

ISO 50001 Energy Management System Case Study

2020

INDIA

JSW Steel Coated Products Limited, Vasind & Tarapur

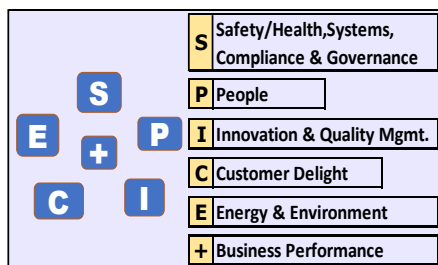


Better Every Day

Organization Profile & Business Case

“Better Every Day” is a Tagline of JSW for us to do better every day, is a driving force.

JSW Steel Ltd. is India’s leading steel producer and among the world’s most illustrious steel companies. **JSW Steel Coated Products Limited (JSWSCPL)** is a 100 % subsidiary of JSW Steel Ltd., having state of the art manufacturing facilities at Vasind (VSD), Tarapur (TPR) & Kalmeshwar (KLM) in Maharashtra. JSWSCPL is India’s largest manufacturer and exporter of Coated Steel with a total capacity of 1.8 MTPA. The manufacturing facilities at Vasind & Tarapur plants are located near major ports and cater mainly to export markets.



Driver: Energy is one of the most key component of JSWSCPL’s Business as the same is being reviewed monitored through **SPICE+** framework, where

“E” denotes – Energy” is considered to decide on Business Strategic Goal.

“The world is changed by your example not by your opinion. Whenever you have a problem, face it, fight it and finish it”

Sajjan Jindal – MD

JSWSCPL has a very systematic approach towards Energy Conservation. Leadership at JSWSCPL is committed towards the Energy Policy. JSWSCPL adopts & maintain global best practices on energy & **minimize GHG emission** throughout its operations. Our organization is constantly improving upon environmental footprint and contributing towards more inclusive growth of the society in which we operate, besides delivering on the economic front.

JSWSCPL focus is to take initiatives which will help us to reduce environmental de-gradation and improve climatic condition in long run. Moreover, we are also taking steps to optimize resources and improve efficiencies as a part of Energy Management efforts. For Energy conservation we have done lot of system improvement and modified processes necessary to improve energy performance with commitment for continual improvement and provides a **framework for setting energy objectives & targets**. With this aim, we established our Energy Policy in November,2015. Energy management programme has led our organisation to operate plant in highly efficient manner.

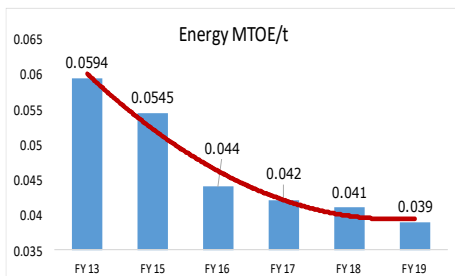
The Energy Management Programme implemented for reduction in SEC and to further meet the PAT norms, reduction in Co2 emission and ultimately motivates the employees under initiatives of cost reduction. JSWSCPL is targeting reduction in SEC by 25 % and reduction in GhG by 33 to 35 % by 2030 which is in line with Nationality Determined Contributions (NDCs) .

Case Study Snapshot

Industry	Steel Industry
Product/Service	GI, GL, PPGI, PPGL,TIN
Location	Vasind (V), Tarapur(T)
Energy management system	ISO 50001
Energy performance improvement period, in years	Three Years (2017 to 2019)
Energy Performance Improvement (%) over improvement period	12.82 Vasind, 9.11 Tarapur
Total energy cost savings \$USD over improvement period	1808571, Vasind (V), 1816271, Tarapur (T)
Cost to implement EnMS \$USD	137871(V), 137871 (T)
Total Energy Savings over improvement period (GJ)	142205 (V) 42225 (T)
Total CO ₂ -e emission reduction over improvement period (MT)	7978 Vasind (V) 15440 (Tarapur) (T)

Business Benefits

JSWSCPL is a designated Consumer as per the norms laid down by the Ministry of Power under the Perform Achieve Trade (PAT) Scheme which is inline with Global concern on Climate Change. Under this scheme, the organization has been allotted the target to reduce its specific energy consumption by 6% in the 2nd PAT Cycle i.e. April-2017 to March-2019 through implementation of energy conservation initiatives. Round the clock our energy team is effectively working for taking energy efficiency initiatives, ensuring healthiness of the equipment resulting reduction in SEC. The estimated cost involved in implementing EnMS is approx. US \$ 275743 per annum for both the locations except project Cost. Top Management commitment, systematic approach, effective planning & execution of energy saving initiatives has resulted in achievement of 12.82% reduction in SEC at Vasind & 9.11 % at Tarapur resulting in reduction in Co2 emission by 7978 metric ton at Vasind and 15440 ton at Tarapur. The saving achieved is US\$ 4805714 per annum for Vasind & Tarapur. Energy MTOE/t consistently reducing year on year for Vasind can be



seen in below graph.

The major initiatives taken to reduce the energy consumption in last three years are captured in **Table 1**

& the plan to reduce energy consumption in FY 19-20 is given in **Table 2**.

Non-energy / Other benefits:

With the implementation of ISO 50001, JSWSCPL is not only benefitted in terms of energy & cost but has ripped the other/intangible benefits like

1. Increased more participation in **Energy Awards**
2. Improved **Team Work**
3. Increased **Awareness** among all employees
4. Employees participation in **Kaizen** w.r.t. Energy saving
5. Participation of employees in **Quality Circle** competition at national and international level
6. Participation of employees in **Energy skit /roadshow /energy exhibition /quiz competition/ Suggestion etc.**
7. **Availability of documentation & data**

8. **Strong management focus** on energy saving.
1. **Domain expertise.**
2. Real time **monitoring** of energy data.
3. **Won many Energy Awards.**
4. **Procurement of Energy Efficient Equipment's**
5. Improved **confidence** of employees for small initiatives
6. Improved **monitoring and measurement** system
7. Customer appreciation

Table 1

Major ENCON Measures (Vasind & Tarapur) (FY 17 to FY19)	Annual Saving	
	Total Gcal	Rs Lacs
Installation of VFD and speed control of drive through close loop of controll parameters.	3471	240
Modification in process control and parameters	15005	974
Installation of LED Lights	541	44
Engineering control During idle HRS Auxiliaries of Lines and Mills made off.	200085	402
Modification and optimization of Air Compressor	705	49
Modification in pumping system and Efficiency enhancement	388	27
Installation of Economizer at 5 Ton Boiler.	41805	9
Modification and efficiency enhancement of Blowers	2769	193
CGL#1 and CGL #2 Line Fix Power Optimization by increasing Line Speed from 150 to 200 MPM .	3096	222
Provision of local burner at CCL-1 and CCL-2 oven to reduce fuel consumption	32739	1186

Table 2 - Vasind and Tarapur

ENCON Measures for FY 19-20	Saving			Target Date
	(kWh)	Thermal (GCal)	Rs Million	
Replacement of inefficient ventilation blowers of mill motor with high efficiency blowers.	617760		4.08	March'20
Replacement of old motors with Energy efficient motors.(IE 3)	130326		0.86	Dec'19
Installation of VFD in Fan, Blower and Crane LT and CT to reduce power consumption.	111542		0.56	Dec'19
Oxygen analyser to be installed at CGL Stack.		460	1.5	Dec'19
Installation of 2.1 million ton PLTCM with advance energy efficient technology.	44000000	6300	286	May'20
Fixed power optimisation by speed increased.	2000000		13.2	Jan'20
Total	46859628	6760	306.16	

PLAN

Implementation of ISO 50001 Standard: At JSWSCPL, the ISO 50001 is implemented in 2016 with the keen interest of top management to reduce specific energy consumption. The target to established and implement the ISO 50001 was only of seven months. Top Management has appointed Energy Management Team to execute ISO 50001. The first step to receive the training on EnMS which is successfully received by all EMT members. JSWSCPL was already having the BEE Certified Energy Manager & Energy Auditor. The EMT structure and the strength of qualified people in Energy is shown in Table 3. After receipt of training EMT has

Particulars	Numbers	Head Coated Products
BEE Certified Energy Manager	03 No	Plant Head
BEE Certified Energy Auditor	01 No	
Trained Internal Auditor for Energy Management System	40 Nos	Management Representative / DH Tech. Services
Qualified Lead Auditor for Energy Management System	06 Nos	
Energy Management Team (Two Teams each 22 Nos)	44 Nos	EMT

formulated the structure of EnMS and established adequate documentation, procedures, spread awareness, initiated suggestion scheme to involve employee’s participation, in order to achieve the EnMS Certification. Finally, in April, 2016 with successfully implementation of ISO 50001 System JSWSCPL received the ISO 50001 certification. Journey is not ended here but it is started with new Objectives to reduce the energy consumption. Investment and Involvement of top management can be vigilance from the data given in Table 4.

Fiscal Year	Investment	Energy Saving	
	Rs Lac	GCal	Rs Lac
FY 16	307	5948	232
FY 17	724	31783	1006
FY 18	882	6868	320
FY19	791	45195	2004

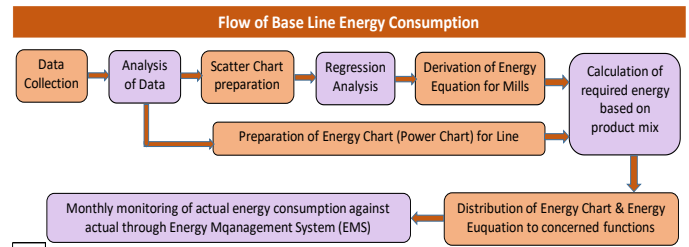
Approach: Base line Energy Consumption: At JSWSCPL, we have established a procedure JJ-EnMS-PR-01 – Energy Review to arrive at base line and identify the

Energy type	Process / equipment	Unit of consumption	Energy performance Indicator
Electricity	GI, GL, CCL, Mills, Pickling, Slitter	Kwh	KWh/t of production
Electricity	Lighting	Kwh	KWh / day
RLNG	GI, GL, CCL, Pickling Boiler, ARP, HPH	MMBtu, t	MMBtu/t
FO	DG set	t	Gram/Kwh
HSD	DG set	t	lit/Kwh
Steam	Pickling, Mills, ETP	kg	Kg/t

Significant Energy Use (SEU’s). The consumption of all types of energy & performance indicator identified by JSWSCPL are shown in Table-5, The same are measured and analyzed for improvement in energy performance of the organization. In order to improve the Energy Performance, the following key elements are monitored regularly. For any deviation, root-cause analysis is done and action plan is being implemented. On a monthly basis cross location data are compared / situation is analyzed and accordingly actions are initiated.

Monitoring of Key elements area:- 1. Fuel consumption 2. Power consumption 3. Equipment utilization, 4. Healthy condition of equipment by doing routine & preventive maintenance 5. Production, 6. Over Injection of power, 7. Quality of Power and fuel, 8. Reduction of wastage.

Strategy & Targets of Energy consumption: To achieve any target, setting of base line is key factor and with implementation of EnMS we have established a well-defined procedure to derive a base line for different type of processes for energy consumption target setting. The flow of defining the base line for energy consumption is detailed in Fig 4. To arrive at base line, the data is analysed and normalized by removing the abnormal data (out liers).



The scatter plot is prepared to check the relationship between the power consumption and the most affected variables. The regression analysis of the data those shows strong relationship with power consumption i.e. Power Consumption Vs Reduction % and Power Consumption Vs Rolling Rate (TPH). In addition to above analysis, equipment wise fix power shall be measured and calculate power consumption during break down hrs and shut down hrs. On the basis of analysis, a table is derived to calculate base line. The table indicates the relationship between power consumption in Kwh/t and the most affecting variable/s. The derived table will give theoretical power consumption for the processed material (coil wise/month wise/year wise).

This theoretical power consumption will be considered as BASE LINE. Eg. POWER (Kwh/t) = A + B x Variable 1 + C x Variable 2 (A, B & C are constant).

At JSWSCPL, the data pertaining to energy saving & its financial impact is provided for sustainability Annual report duly audited by certified audit team. In addition, monthly data of unit wise Specific energy consumption along with analysis on energy conservation measures, initiatives and specific consumption of energy is being provided to all concerned process in charge for review and to top management for review & strategic decision.

Review & Analyzing Energy Use: We at JSWSCPL, do the regular review and analysis of identified SEUs at different levels for its energy performance on regular intervals at macro & micro level as defined in EnMS procedure. The analysis results are reviewed to check the energy performance of SEU’s. An appropriate action is planned and implemented for the deviation observed against the base line. The same has been recorded in the prescribed format of EnMS ISO 50001 procedure. Also on a monthly basis Energy performance is reviewed by different levels of management i.e. Operating Committee (OPCOM) → Corporate Operating Committee (COC) → Executive Committee (EC) to take strategic decision & to provide any resources.

Since our Vasind & Tarapur unit of JSW Steel Coated Products Limited, has similar process, the EMT has exchanged the ideas and shared the practices and established the system

EnMS_ISO 50001 Implementation Activities	Aug, 2015	Sept, 2015	Oct, 2015	Nov, 2015	Nov to Jan & onwards	Feb, 2016	Mar 2016
Release of Energy Policy as per ISO 50001							
Formation of EMT							
Training on EnMS ISO 50001							
Awareness							
Deciding the methodology for Base line calculation							
identification of legal requirements							
Identification of EnPI							
Monitoring and Metering of process parameters							
Energy Review							
Identificaion of SEU							
Preparation of EnMS Manual							
Preparation EnMS procedure							
Setting of Objectives & Targets							
Implementation of ISO 50001							
Internal Audit							
Management Review							
Stage-1							
Stage-2							

similarly at both the locations, by doing the cross location audit, visiting frequency to each other plant. EMT of JSWSCPL, Vasind & Tarapur Unit were always in contact with

each other through Video Conferencing for discussing and taking decisions on various EnMS implementation. For both the sites we have drawn a road map activity wise as shown in Fig 5 for implementation of EnMS- ISO 50001.

DO, CHECK, ACT:

As a systematic approach, JSWSCPL carry out the energy review based on past year energy consumption. Based on energy review, identified SEU’s, Legal requirements, Findings of energy audit and guideline from top management **Energy Objectives** are set for current financial year. In order to achieve these objective and targets, participation from all employees is ensured for suggestion and brain storming to identify the energy efficiency measures. The activities are priorities as per defined procedure and will be arrived at score considering the Investment required, saving potential and required down time. Teams are formed to implement and identify the resource requirement. The approval is solicited from top management for the resources. In addition to the Energy Specific Objectives and Target, other targets like legal compliance, training, system improvement are also set and achieved. EMT is actively involved in taking and implementing various energy initiatives and monitoring of energy performance. The various key activities identified and implemented by EMT is listed below:

List Key activities:

1. Adoption of advance technology which has resulted in huge saving in Energy by 30 %
2. Installation of high efficiency blowers
3. Installation of high efficiency pumps
4. Increased productivity by increasing the process speed and reduced fix energy.
 1. Change heating system
 2. Process automation
 3. Installation of Variable Frequency Drive
 4. Replacement of old inefficient motors with IE3 & IE4 motors
5. Optimisaiton of compressed air system
6. Replace conventional lights with LED

Achievement of Targets: Each identified activities are closely reviewed and monitored by EMT for its performance and finally audited by competent energy Manager. Achievement of these target is then

communicated to top management.

Determination & Validation of Performance: JSWSCPL, has systematic approach for verifying and validating the results achieved. A strong monitoring and measurement system with ERP is in place at JSWSCPL which enables to produce real time data of production, process parameters, power consumption and RLNG consumption, auto report generation and communication is done. **EMS – Energy Management System** is a Web View Monitoring System. It is integrated with SAP. Based on available data the Specific Energy consumption is calculated and measure the performance improvement as per the below formula

$$\left[\frac{\text{baseline period energy intensity} - \text{reporting period energy intensity}}{\text{baseline period energy intensity}} \right] \times 100$$

Before modification & after modification data are compared to determine the performance. Further the data/ results are validated by Internal Audit department.

Energy Audit is one of the tool to discover new opportunities. In JSWSCPL we have conducted Mandatory audit followed by Verification audit in every three years (in each PAT Cycle) by accredited energy auditor of BEE as per PAT requirement is carried out. **Internal Energy Audit** by certified energy manager and energy auditor is carried out at regular interval. Last mandatory audit was conducted by Schneider in Dec-18 and last verification audit was conducted in Dec-19. At JSWSCPL, the external audit findings are taken very religiously. Timely actions are initiated for Energy Audit Report. During last Energy Audit 13 Energy Efficiency Measures were highlighted. Out of 13 points 7 points are completed. 1 point is dropped and Five is under progress.

Top Management Motivation for Employee Engagement in Energy Management: JSW Group values its employees as its most important asset. At JSWSCPL people are cared from sourcing to separation. In order to motivate them and to keep them excited to unleash their potential for creativity and innovation and to achieve personal as well as organizational success, there are several initiatives, forums as well as welfare schemes and facilities in place.

We strongly believe in appreciating the contribution of its employees through their good work. To encourage and support high performance JSWSCPL leadership has

instituted a structured Rewards and Recognition program to its employees. Leaders also participate in assessment process and awarding the high performers.

The Various employee engagement initiatives at both group level and company level are listed in in **Table 5.**

Group level	Plant level
Photography competitions	Energy Week Celebration
Art Competition	Safety Day Celebration
Standard Chartered Marathon	Environment Day Celebration
Challengers Trophy (Lawn Tennis, Cricket, Football, VollyBall etc.,)	Road Safety Week Celebration
Squash Academy	Celebration of major festivals
Womens Day Celebration	Founders day Celebration
JSW Scholarship	

JSWSCPL management inspires employees to participate in various activities. Employees are encouraged to do higher studies to pursue their personal goals. This year a scheme has been initiated that fees will be reimbursed for those who will successfully complete the **Energy Manager & Energy Auditor course**. We have a 40 Nos of people trained as an Internal Auditor for ISO 50001. We also have Certified Energy Auditor & certified Energy Manager as detailed in **Table 3**. Apart from this, regular various internal trainings are being provide to all level of employees depend on the needs identification. The Energy Week is celebrated with aim to increase awareness upto the bottom line. Some of the key initiatives in Energy Week Celebration

1. On the spot quiz competition at shop floor. Winner are awarded.
2. Energy Poster Competition in School for 5th to 8th Standard and 9th & 10th Standard students
3. Energy Slogan competition
4. Energy Skit
5. Mega Energy Quiz competition for middle management and higher management



“EnMS ISO 50001 sharpened our focus on energy saving, thus yielding noteworthy results”

Ajay Khandelwal

“EnMS ISO 50001 made energy saving A Culture at JSWSCPL”

-Sunil Jain

List of Awards:

Energy Awards received in FY 19-20	Received / scheduled
JWSWSPCL, Vasind Unit Won First Prize in 14th State level Energy Conservation Award in Metal Category by MEDA.	March_2020 Scheduled
JWSWSPCL- Kalmeshwar Won Second Prize in 14th State level Energy Conservation Award by MEDA.	March_2020 Scheduled
Gold Medal for India Green Manufacturing Challenge -2019 BY IRIM - Tarapur.	March, 2020 Scheduled
20th National Award for Excellence In Energy Management 2018 - "Excellence Energy Efficient Unit" Vasind	Sep-19
20th National Award for Excellence In Energy Management 2018 - "Energy Efficient Unit" Tarapur.	Sep-19
SEEM National Energy Management Awards (SNEMA) 2019.For Tarapur Location. Won Gold Award	Sep-19
SEEM National Energy Management Awards (SNEMA) 2019.For Vasind Location. Won Silver Award	Sep-19
Other Awards in FY 19-20	Received / scheduled
Received "Best Supplier" award for 2019 from M/s Haier Appliances, Pune	Jan_2020
Samsung has awarded JSWSPCL for Excellence in recognition of "Best Support" for Quantity Supplied during 2019	Dec'19
JWSWSPCL, Kalmeshwar unit has Participated in 33rd National Convention on Quality Concepts (NCQC-2019) in December 2019 held at (IIT BHU) Varanasi (Total 8 Teams participated)	Dec-19
JWSWSPCL, Vasind unit has Participated in 33rd National Convention on Quality Concepts (NCQC-2019) in December 2019 held at (IIT BHU) Varanasi (Total Two Teams participated)	Dec-19
JWSWSPCL, Kalmeshwar unit has participated in Chapter Convention on Quality Concept (CCQC) -2019 Cojmpetition at Nagpur. Won Two Teams Super Gold, Four Team Gold & Two Silver Medal & 3rd Prize in Propagation award	Oct'19
JWSWSPCL, Vasind unit has participated in Chapter Convention on Quality Concept (CCQC) -2019 Cojmpetition at Mumbai. Won two gold Trophy's	Sep-19

Transparency

We publish our energy performance through sustainability report & in Business Annual report. Also we have a system of communicating the Energy Policy & Energy requirements to our supplier through Purchase Order and during the Suppliers' meet & Customer's meet. Various Customer carry out the System audit frequently including energy performance. We regularly conduct the awareness session for the society and taken energy efficiency initiatives like

Energy Efficient Chullha distribution, LED light distribution & installation for the society.

Lesson Learned & Keys to Success: After the implementation of ISO 50001, the key to success and lesson learned by JSWSPCL are tremendous which cannot be explained in words..!! but to quote few of them are.....

1. Improved understanding within the team
1. Achievement of PAT targets
2. Involvement of all employees at all levels
3. Management Commitment towards EnMS
4. Energy management system – Online energy recording and report generation
5. Horizontal deployment of best practices among the JSWSPCL Units
6. Participation in National and State level energy awards
7. Reduction of specific energy consumption through latest technology.
8. Clear defined Role & responsibility
9. Establishment of energy management culture among the whole organization
10. Reward and recognition of energy related achievements
11. Improved documentation & systematic approach to calculate energy
12. Formation of dedicated Team for Energy – “EMT “
13. Systematic approach for setting objectives



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.



