

Global Energy Management System Implementation: Case Study

India

Arvind

First Textile industry in India who has been recognized "Top Rank Award" by Ministry of Power, Government of India.



Arvind Limited, Santej – 250 acres of plant area declared as Green belt Zone

Business Case for Energy Management

Arvind Limited - Santej recognizes that the uncontrolled consumption of energy can have a negative impact on the environment and on business performance. A company commitment to follow this policy is at the core of Arvind Limited - Gandhinagar's energy management system (EnMS). We successfully implemented an energy management system (EnMS) that meets all requirements of ISO 50001. Led by a cross-functional

Arvind Limited – Santej plant has received **National Energy Conservation Award** from Ministry of Power, Govt. of India for three consecutive years i.e. 2014, 2015 & 2016 and **"Excellent Energy Efficient Unit"** by CII for Year 2016.

"Energy Saving: A profitable Way to reduce Global Warming and to remain Sustainable."

—Mr. Susheel Kaul, CEO

Case Study Snapshot

Industry	Textile
Product/Service	Woven & Knitwear
Location	Gandhinagar, Gujarat
Energy Management System	ISO 50001
Energy Performance Improvement Period	3 Years
Energy Performance Improvement (%) over improvement period	27.8
Total energy cost savings over improvement period	\$8.3 Million USD
Cost to implement EnMS	\$9.5 Million USD
Payback period on EnMS implementation (years)	1.15
Total Energy Savings over improvement period	9,30,285 GJ
Total CO ₂ -e emission reduction over improvement period	142,544 Ton of CO ₂

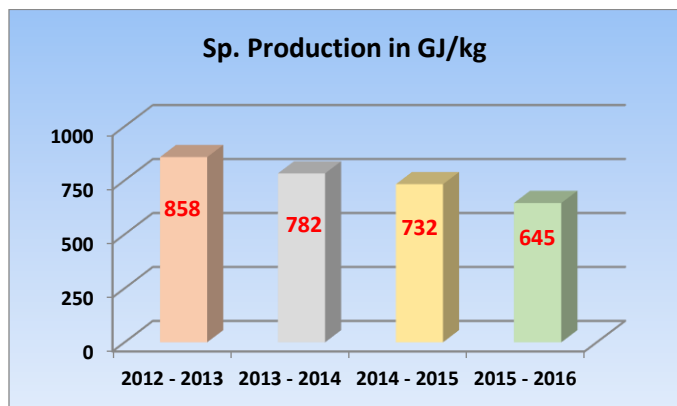
Arvind Limited - Santej facility has implemented ISO 50001 & shown an energy performance improvement of 27% in last three years. This has resulted in 746,000 GJ of energy savings and a reduction of 142,544 metric tons of CO₂e. The energy cost savings was greater than \$8.3 million USD.

Business Benefits Achieved

Arvind Limited – Santej is also identified a Designated Consumer (DC) as per the norms laid down by the Ministry of Power under the Perform Achieve Trade (PAT) scheme and hence compliance to this scheme was made a mandatory requirement under this scheme the

plant was given the target to reduced its consumption by 5.6% by employing energy saving / conservation measures in its 1st cycle i.e. during April 2012-March 2015. Our unit has undertaken many initiatives to save energy in 1st cycle of PAT. The methodological PDCA approach of EnMS has shown us the way to plan, carry out energy review, make action plan and put the efforts on list of opportunities to maximize the gain with less investment. Use of techniques like auditing, benchmarking & analyzing have given us a lot of opportunities for improvement. In the year 2015-16, around 45 numbers of energy saving projects implemented.

Years	GTG TCO2/ MT
2012 – 2013	14.4
2013 – 2014	13.9
2014 – 2015	13.6
2015 – 2016	13.0



Few Energy Saving Project Implemented in last three Years

S.No.	Title of Project	Total Annual Savings, \$ USD
1	Installed MVRE(Mechanical vapor recompression Evaporation) in place of MEE	456,757
2	Installation of Economizer in 30 TPH steam boiler	318,612

3	Installed of two PHE in 4.3 MWM & 4 MWM Gas Engine	254,776
4	Installation of O2 sensor & Insulation improvement in steam boilers	240,042
5	Installed of Energy efficient Centrifugal Air Compressors	232,216
6	Heat Recovery from process effluent water @ 85 C Effluent	230,299
7	Installed of VFD with Pressure Transducer for 28 nos. Re-winding Machines	150,299
8	Installed Loomspahare concentrated Humidification plant in place of conventional	110,179
9	Installed of PNLD in Air compressors drain water	85,065
10	Installed of VFD on the following Blowers in Pressure Dryer of Dyeing Machine	64,373
11	Improvement in Power Factor to 0.99	43,881

Business Case for Energy Management

Textile plant is power sensitive and power intensive process as well. The energy cost is 32% of total cost of production. So energy usage, consumption and efficiency play a vital role in sustainable business performance of the plant. ISO 50001 implementation has helped us to reduce our cost of production, reduce our carbon foot print and in addition has enabled us to meet Energy Consumption reduction target set by Govt. of India under PAT scheme.

The Legal and other requirements include:

- Achieving of Specific Energy consumption target notified to by Govt. of India in PAT (Perform Achieve & Trade) scheme.
- Meeting requirement of Energy conservation Act 2010, Govt. of India.
- Fulfilling of Corporate sustainability requirements as per Arvind's technical standard.
- Creating a brand image in Indian textile Industry and corporate sector.

EnMS has facilitated to meet above requirement in a structured manner.

Key to Success:

- Formation of Energy cell consisting of people at different levels.
- Appointment of energy manager.
- Training and developing of internal auditors.
- Periodical review by top management.
- Availability of advanced tools like IT enablement, EMS SCADA, online reporting etc.
- Implementation of business excellence drivers which include Six Sigma energy saving projects, Asset Optimization frame work of Arvind Limited
- Inter department cross-functional energy audits.
- Active participation in national level energy management programs, workshops.
- Technical support & involvement of reputed associate partners like Siemens, Hencon for integrated plant maintenance (IPM).
- Young enthusiastic work force always quick to learn and eager to innovate & implement new out of the box ideas.

'Implementing ISO 50001 has provided measurable results and raised the visibility of the energy program at Arvind Limited.'

-Harvinder Rathee, Head – Engineering

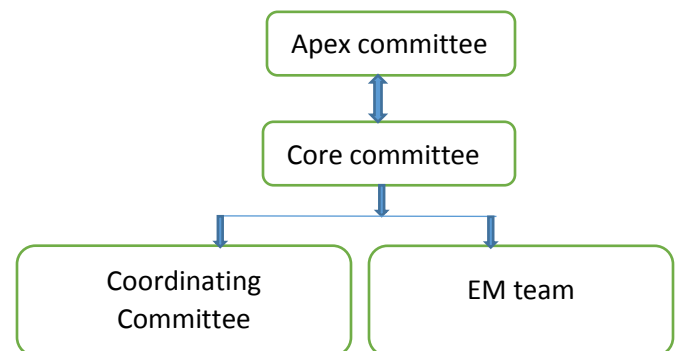
EnMS Development and Implementation

Organizational

At Arvind Limited, we believe that teams are always better than individuals and systematic tools are more fruitful than solitary ideas. Cross functional team involvement in Focused Improvement Projects to improve energy performance by optimizing processes, adopting innovation to implement new ideas and latest technology has helped achieve significant energy reduction.

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

- Formation of Energy cell (Refer Fig-1.31) which comprises of three layer structure consisting Apex committee, core committee, Coordinating committee and EM team.
- Defining an energy policy by taking care all the organizational and legal requirements.
- Appointed a management representative (MR) and Energy manager to drive the system successfully.
- Defining the roles and responsibility of MR and Energy manager.
- Establishment of energy objectives and targets according to energy policy and providing all necessary resources to achieve the same.
- The necessary resources include CAPEX (capital expenditure) and OPEX (operational expenditure) proposal approval for energy saving project implementation, IT enablement of all energy reports, energy efficient procurement, design etc. and human resources.
- Providing necessary training to all plant personnel on energy conservation awareness.
- Reviewing periodically the energy performance of the plant.



Formation of Energy Cell Fig. 1.31

Our team is actively involved in spreading energy conservation awareness drive in the community and in industry. We conduct workshops at national level as well. Arvind has organized first aluminum sector KEP (knowledge exchange platform) involving all players of textile industry, research institutes and Bureau of

Energy Efficiency, Govt. of India.



National level KEP Workshop hosted by Arvind Limited

“We are what we repeatedly do. Excellence, then, is not an act, but a habit. We won “Top Rank Award” award from GOI for three consecutive years i.e. 2013, 2014 & 2015.”

-Mr. Yogesh Gohil, Head Utility

Energy Review & planning

Energy review is the heart of this management system. All the aspects of EnMS depends on Energy Review, so a proper energy planning and review is must for successful implementation of EnMS. We conduct the energy review exercise every year. Energy planning process includes;

- Identification of different type of energy streams used in our plant.
- Analysis of energy use and consumption.
- Finding out of significant energy use and consumption (by Pareto method).
- Analysis of past and present energy consumption, thereby finding the baseline for each area.
- Analysis of relevant variables impacting significant energy use.
- Identifying opportunities for improvement.
- Accordingly setting objective and targets.

Moreover during energy review the total team of energy cell is getting involved in the whole exercise where in energy consumption in each load like motors, lights, process, furnaces etc. are measured in power analyzer and recorded for analysis purpose and this method is followed for all types of energy streams.

To monitor the energy performance, energy performance indicators (EnPI) have been defined for each area and on the basis of past and present energy consumption, baseline is set for each EnPI by considering year average energy consumption.

List of opportunities are found out through different methods like audit, brainstorming, best practice sharing etc. and then prioritized based on conditions like payback, feasibility, process impact etc.

“Composite Textile industry is too complex to arrive at a benchmark due to product variation. EnMS can help us by educating us for better performance.” - Mr. Kishore Dhage, Head (Processing)

Cost-benefit analysis

Implementation of ISO 50001 has given Arvind Limited, Santej various benefits year by year. Cost benefits for the FY 15-16 are as follows

- Annual energy cost savings \$ 8.3 Million USD
- Cost to implement \$ 9.5 Million USD
- Payback period 1.15

Approach used to determine whether energy performance improved & to validate results

Approach used to establish and maintain a system of internal audits to determine the effectiveness of the Arvind Management System adopted by the Organization All the departments/ functions covered under Management Systems shall be audited once in a year, however Social Accountability Management Systems shall be audited twice in a year. Audit planning Group (APG) – APG under leadership of Management Representatives are responsible for ensuring the implementation of this procedure. Also responsible for the overall coordination and administration of matters relating to internal system audits. All HODs will assist in implementing this procedure. Departmental Head are Responsible for providing necessary Co-operation for

conduct of audits and ensuring implementation of Corrective/Preventive actions arising out of such audits

Steps taken to maintain operational control and sustain energy performance improvement

- IMS/04/01/OCP/01 Operational Control Procedures for General Electrical Maintenance
- IMS/04/01/OCP/02 Operational Control Procedures for Conservation of Energy by optimizing the use of office lights & Air Conditioner
- IMS/04/01/OCP/03 Operational Control Procedures for Safe Operation of Lifts
- IMS/04/01/OCP/04 Operational Control Procedures for Energy Conservation
- IMS/04/01/WIN/01 Work instruction for Shift In charge
- IMS/04/01/WIN/02 Work instruction for Section In charge
- IMS/04/01/WIN/04 Work instruction for Predictive Maintenance of Power plant
- IMS/04/01/WIN/05 Work Instruction for Preventive Maintenance work instruction of Motor, LRS, GRR
- IMS/04/01/WIN/06 Work Instruction for safe & Efficient Operation of Lifts.
- IMS/05/01/OCP/10 Conservation of Energy Associated with Office Lighting & Air Conditioner
- IMS/05/01/OCP/11 Conservation of Energy associated with Control Panel
- IMS/06/01/WIN/01 Work Instruction for operators during changeover of shift
- IMS/06/01/WIN/02 Work Instruction for operators for control from Utility
- IMS/06/01/OCP/01 To control dust during operation of ESP
- IMS/06/01/OCP/03 To minimize dust generation during cleaning activity in shutdown.
- IMS/06/01/OCP/04 To minimize dust generation while cleaning cyclone jam material.
- IMS/06/01/OCP/05 To control dust generation during pressurization of steam boiler

- IMS/06/01/OCP/06 To control for TG set
- IMS/06/01/OCP/07 To minimize Power consumption of various drives during operation
- IMS/06/01/OCP/08 To control heat losses during Air compressor operation
- IMS/03/01/OCP/02 Optimum utilization of resources during over hauling of hydraulic system.
- IMS/03/01/OCP/10 Optimum use of power & ensuring safety during operation.
- IMS/03/01/OCP/12 To Reduce Consumption of energy associated with office / site lighting & AC
- IMS/03/01/OCP/13 To Conserve Energy during operation of compressor

Development and use of professional expertise, training, and communications

We regularly train our people with respect to three types of training programs –organizational needs, functional needs and individual needs. In FY2014-15, 166 internal and external training programs were conducted across all Arvind units accomplishing a total of 6533 training man hours –a key highlight of our People Development Agenda. We are attempting to customize the training programs based on the individual learning style of employees in the coming year. In addition to classroom training, Some of the training external training programs are illustrated photograph below.



EnMS Training conducted in-house in year 2014-15

Tools & Resources

Arvind Limited, Santej plant has a value driven culture where we have very strong business drivers like six sigma, quality circle, Kaizen, asset optimization, sustainability, IMS, 5S are in place. Further to add, as mentioned earlier also, we have been equipped with advanced IT based tools like MES online report generation, SAP based Energy efficient product procurement, E-based document management system.

Lessons Learned

We at Arvind Limited, Santej have been greatly benefited by implementation of the ISO 50001 and have already been certified for Woven & Knitwear Unit as well Denim Manufacturing plant.

Keys to Success

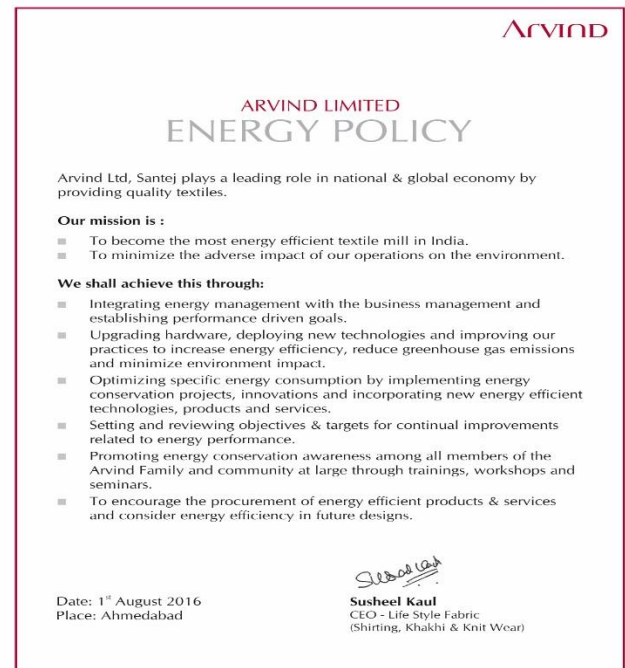
- Each and every department power should monitor and recorded in proper way.
- Production data of each process should be up to date.
- Every data should be accurate and up to date.
- Top management commitment
- If you don't measure, can't control.

Sustainability Milestones at Arvind:

- Winner of "Special Commendation" for "Golden Peacock Award For Sustainability – 2016"
- On Board member of SAC (Sustainable Apparel Coalition)
- Value Chain Affiliates for ZDHC program as contributor from mill side
- Our Own formulated & Undated Chemical

Management System

- Self & third Party assessment on HIGG Index 2.0
- Textile sector is too complex to arrive at a benchmark due to product variation. BEE can help us by educating us for better performance compare to national and international units making similar products.



"Where victims see adversity, extreme achievers see opportunity. We snatched the opportunity and created national benchmark"

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.

