Global Energy Management System Implementation: Case Study

USA

Curtiss-Wright Electro-Mechanical Corporation

Providing leading edge technologies that are relied upon to enhance our customers' safety, reliability and performance in the most demanding environments while improving our energy efficiency

EMD facility aerial view

Business Benefits Achieved

EMD, a business unit of the EMS Division of Curtiss-Wright has a history of implementing energy conservation into our business objectives. EMD saw implementation of an energy management system in accordance with ISO 50001, as a key element in continuing with energy conservation. ISO 50001 provided a structured process to ensure sustainability. From a baseline established in 2010, EMD has reduced energy consumption by approximately 70,000 MMBTU over 5 years. They could account for 7.6% to achieve Silver Level Superior Energy Performance (SEP) from 2010 baseline to 2011-2013 performance period. EMD's energy conservation initiatives have saved the company approximately $300,000 and 100 Metric tons CO_2.

"Within Curtiss-Wright, we work hard all year to conduct business in an environmentally responsible manner, […] sustainability initiatives are truly becoming "a way of life" for us."

—David Adams, Chairman and CEO

CURTISS-WRIGHT

Case Study Snapshot	
Industry	Commercial and Defense Nuclear Manufacturing
Location	Cheswick, PA
Energy Management System	ISO 50001, SEP
Product/Service	Electro-mechanical products
Energy Performance Improvement (%)	13.08% over five years
Annual energy cost savings	$60,000
Cost to implement	$100,000
Payback period	1 year, 8 months

Company and Facility Profile

Curtiss-Wright is a global company with a continued path of innovation and advanced engineering, and has applied expertise to a number of critical applications in various markets, including defense and power generation. We are a provider of highly engineered, technologically advanced products and services. Curtiss-Wright has locations across North America, Asia, and Europe, employing over 8,000 employees.

The EMD Cheswick facility supports the defense and commercial nuclear industries. The largest energy intensive product we currently manufacture and test is the AP1000® Reactor Coolant Pump. The facility covers over 650,000 square feet and employs over 650 people.

Business Case for Energy Management

The energy management system development at EMD started as a grassroots initiative which quickly gained management sponsorship. EMD has become more energy conscious since the energy management system has been implemented. It is now becoming more of a part of our culture to conserve energy.

EMD has a history of striving for energy efficiency but lacked a formal, uniform way of reporting. With the rising cost of energy, it was decided an ISO 50001 based energy management system would help to ensure sustainability and verify energy efficiency improvements.

Keys to Success

- Contracting a third party consultant (PennTAP) helped EMD to understand exactly what was required to establish an energy management system
- Having a dedicated cross-functional Energy Management Steering Committee was key in instilling an energy aware culture
- Familiarity with other ISO standards was instrumental in developing the energy management system

EnMS Development and Implementation

EMD started the ISO 50001/SEP energy management system development in 2012 by attending a Department of Energy sponsored workshop. The workshop provided guidance on how to develop an energy management system. Cross-functional steering and implementation committees were established in 2012.

Business Benefits

- Savings of $300,000 from 2010 to 2016
- 70,000 MMBTU Savings
- 100 Metric Tons in CO_2 reduction
- Improved lighting quality (CRI) with upgraded energy efficient fixtures throughout the facility
- Improved comfort levels throughout office areas and shop conditioned space through upgrades to HVAC systems.

Energy Teams

EMD utilizes an Energy Steering Committee and an Energy Implementation Team to run the EnMS. The Steering Committee meets bi-weekly and does the majority of the ground work creating and implementing necessary procedures, processes, documents, etc as required by ISO 50001 and the SEP program. The Implementation Team supports the Steering Committee in the respective departments. The management team consists of the general manager and operations director.

Steering Committee	
Department	**# of Members**
Facilities	2
Quality Assurance	1
Supplier Quality Excellence	1

Implementation Team	
Department	**# of Members**
Facilities	3
Quality Assurance	1
Supplier Quality Excellence	1
Supply Chain Management	2
Human Resources	1
Regulatory Compliance	1
Test	1

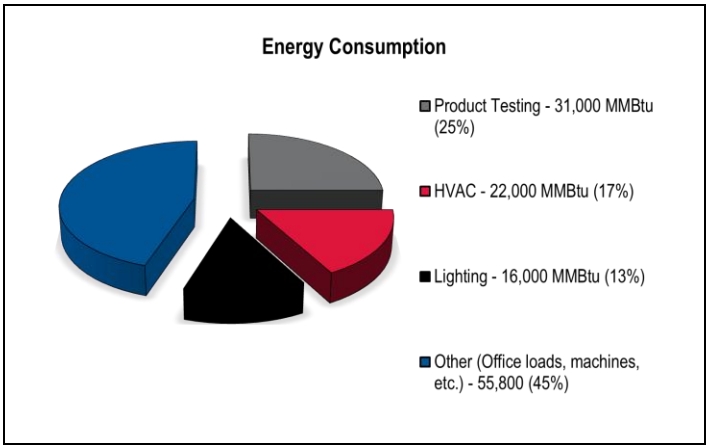
Energy Review and Planning

EMD reviewed all of the energy crossing their site boundaries for incorporation into the Energy Management System. EMD's sources of energy come from electricity, natural gas, propane, and diesel. Electricity makes up 76%, natural gas 23.5% and propane and diesel only make up approximately 0.5% of the energy consumption.

The baseline year 2010 was chosen in order to achieve ISO 50001 and SEP certification by end of 2014. Since EMD started the process of developing the EnMS in 2012, the first few years were spent evaluating historical data.

EMD looked at a multitude of variables such as production hours, weather data, product testing, and HVAC. Due to their energy intensive product testing, they chose it to be their production variable. Normal plant operation (without product testing) is approximately 2.5 MW. During product testing, site energy demand increases to over 10.5 MW, when running at full load.

The significant energy users are product testing, HVAC, and facility lighting. These were chosen based on percent usage being over 10%. HVAC includes EMD's chiller plant, boilers, air handling units, and roof top units, etc.



EMD Baseline Energy Consumption Profile

Project evaluation is based upon investment payback time, implementation time and anticipated annual energy cost savings. A score is developed based on the criteria, and then highest scoring projects are selected to be implemented first. To date, major projects have been a new chiller plant, multiple lighting upgrades, drive installations on HVAC systems and boiler replacements.

EMD received a grant from the Department of Energy "Save Energy Now LEADER" initiative, which covered about half of the program costs. EMD took the opportunity to get involved in this program to ensure sustainability and verify energy efficiency improvements.

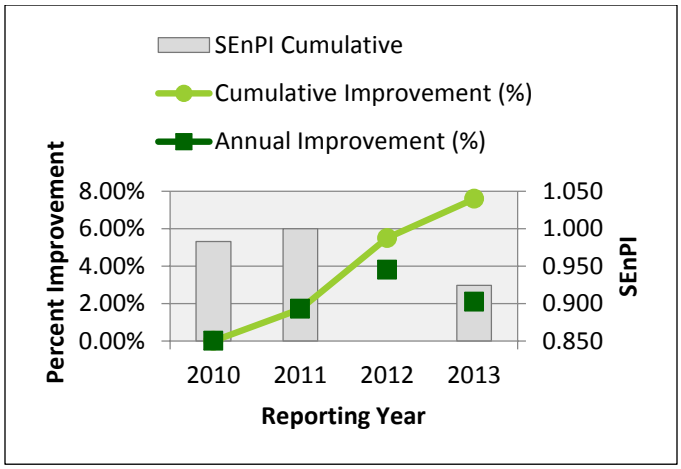
Training and Communications

EMD sent two facility engineering representatives to three 2.5 day workshops at Penn State University to learn about implementation of an ISO 50001 EnMS and DOE SEP system. The consultants (PennTAP) were also utilized to assist with internal audits and measurement and verification training.

The Steering Committee developed an online awareness training to engage and familiarize site employees with the EnMS, its operation, and goals. Multiple articles were written for the internal newsletter to broadcast improvements and update the site employees on progress. Input was also given to the General Manager Staff for use in all-employee meetings.

Tools and Resources

EMD is able to monitor fifteen-minute electric consumption through their utility's online application. This, along with their billed gas consumption, allows for detailed tracking of their usage. The usage data is then evaluated though the DOE provided EnPI tool which tracks the normalized energy performance improvements across multiple years.



Operational Control

Procedures were created in the EnMS specifically to govern the handling of Significant Energy Uses. They issue guidance for the training necessary to perform work that affects the efficiency of the SEUs. An automated building management system is also in use and has been set to give alarms if the EnMS established parameters are violated.

Approach

Hand calculations were performed to assess the potential value that would be added from the completion of a given project. Sub-metering and the DOE EnPI tool were used to validate achievements. The implementation of the ISO 50001 EnMS, including the usage of the DOE EnPI tool are routinely audited both internal measurement and verification protocol auditors and by DEKRA, a third-party auditor.

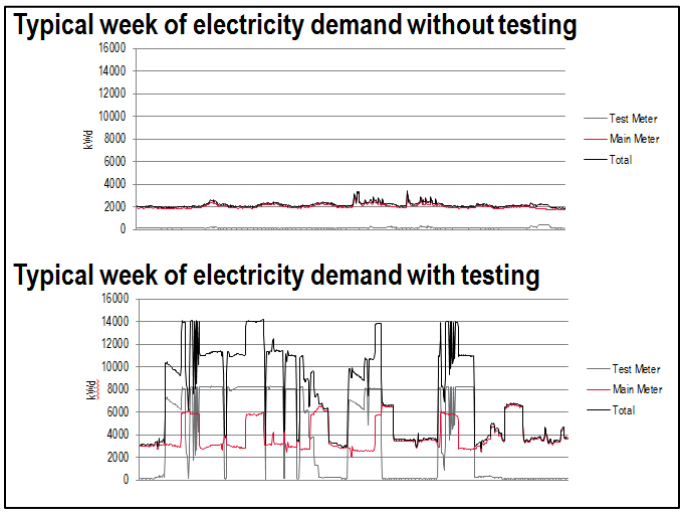
Cost-Benefit Analysis

The initial startup cost included the cost of the workshop EMD attended, the Certification Audit, and internal efforts, approximately 500 hours of engineering time and the additional time of a Co-Op student to assist with data gathering. The overall implementation costs including EMD's own internal cost were $100,000. EMD is achieving a $60,000 a year return and the recurring cost for certification and sustainability are estimated at approximately $22,000 a year. The initial simple payback is 1 year 8 months; the recurring payback is approximately 4 months.

"Energy savings prior to this effort were always kind of hit or miss. When people "had time" to pay attention to energy conservation, we did an O.K. job. ISO 50001 really gave us the systematic approach we needed to ensure sustainability."

—Darren Keller, Facilities Manager

Visuals



Electricity Demand

EnMS Steering Committee

AP1000 RCP in Test Loop

Lessons Learned

Attending the workshop presented by PennTAP proved invaluable when first developing an EnMS. The DOE EnPI tool was very helpful in modeling and providing the regression analysis for EMD's energy usage. EMD chose to normalize their production variables which enables them to incorporate various test loops they operate that are dormant for periods of time. The type of model presented EMD's certification auditors with a problem and EMD received assistance from the DOE in order to achieve a working model that was acceptable to the 3rd party auditors. It was difficult looking backwards since EMD did not have as regimented a system for documenting the energy initiatives; the plan do check act system set up by ISO50001 will enable EMD to sustain the energy program.

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.

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