

Global Energy Management System Implementation: Case Study

Ireland

Astellas AICL (Kerry Plant)

Changing Tomorrow – Our Innovative Journey Towards Sustainability.



AICL (KP) Killorglin Co.Kerry

Business Case for Energy Management

Situated on the idyllic ring of Kerry, AICL (KP) recognized at an early stage the need to develop sustainably within its community. Due to the remoteness of the location this has lead AICL (KP) to look at how it uses resources, in the most efficient and environmentally beneficial way.

Our proactive commitment to sustainability and energy management is also part of Astellas global CSR. In 2011 the company signed up to the United Nations Global Compact. The global compact establishes ten principles for corporate social responsibility based on the four key areas of Human Rights, Labour, Environment and Anti-Corruption.

Astellas headquarters have set a CSR initiative to reduce CO₂ emissions by 45% from 2005 levels by the end of 2020. Through innovative projects and a strong committed workforce AICL (KP) surpassed the target in 2012.

ISO5001 accreditation was achieved in 2011 with the support of senior management. Through the Energy Management System AICL (KP) focus on the continual goal of improving energy efficiency, reducing energy consumption and reducing carbon emissions to ultimately reduce our impact on the environment.

“The positive impacts of ISO50001 are clear, it has facilitated the development of a concise and effective energy management programme, enabling AICL (KP) to achieve the highest standards in energy management”

—Louis Collins, Director of Engineering

Case Study Snapshot

Industry	Pharma
Product/Service	Pharmaceuticals
Location	Kerry, Ireland
Energy Management System	ISO 50001
Energy Performance Improvement Period	5 Years
Energy Performance Improvement (%) over improvement period	17.8%
Total energy cost savings over improvement period	\$ 197,000
Cost to implement EnMS over improvement period	\$500,000
Payback period on EnMS implementation (years)	2.5 Years
Total Energy Savings over improvement period	7820 (GJ)
Total CO ₂ -e emission reduction over improvement period	5040

Business Benefits Achieved

The application of ISO50001 has driven the efficient use of energy, led to significant improvements in competitiveness and reduced greenhouse gas emissions onsite. The systematic approach in achieving continual improvement has led AICL (KP) to half its' kwh/up consumption and reduce CO2 emissions by over 90%.

In 2011 AICL (KP) installed an 850 kW Enercon wind turbine on site, and followed that investment in 2012 with the installation of a 1.6 MW Weiss woodchip boiler. In 2014 AICL (KP) added Solar to the renewable energy portfolio with 65m² of solar panels. As a result 64% of the sites energy comes from renewables simultaneously lowering both the environmental impact and the cost base.

EnMS Development and Implementation

Organizational

AICL (KP) journey began in 2003 when it was certified to the International Management System Standard ISO 14001 and through commitment to continuous improvement this has led to certification to the Energy Management System Standard ISO 50001 in 2011.

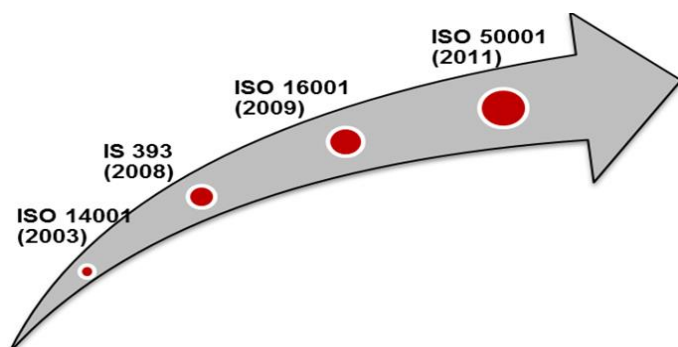


Figure 1 Our Journey to ISO50001 Certification

In organising an effective Energy Management System, one of the key principles is that AICL (KP) employees have individual roles and responsibilities for applying the Management System and the Energy Policy in the performance of their tasks. AICL (KP) management provide resources essential to the implementation and control of the Management System including human

resources, specialised skills, technology and financial resources.

The energy management structure led by the Facilities Engineering Manager consists of the energy management committee whose members include; Building Services Engineer, Site Electrician, Site Energy Lead and Production Representative. Each department has its own energy representative which conducts quarterly audits of their area and liaises through the energy leader with the energy management committee.

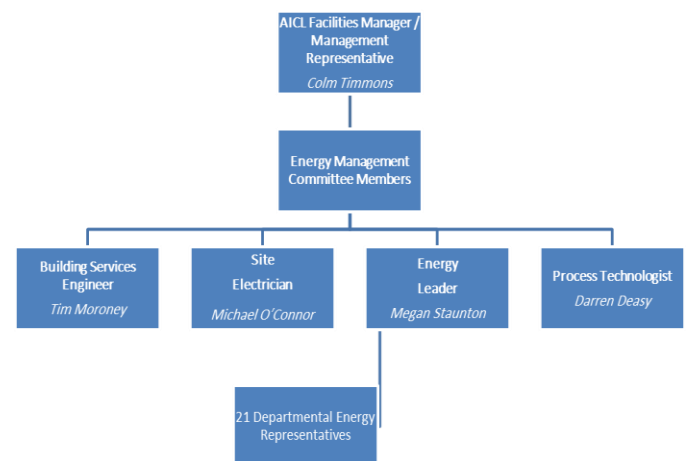


Figure 2 Our Energy Team

Energy Review and Planning

An initial formal review of AICL (KP)'s energy users identified;

- 1) Past and present energy usage,
- 2) Equipment having significant energy usage
- 3) Opportunities for improvement in the future;
- 4) Persons whose work may affect significant energy usage.

AICL (KP) has compiled three Energy Registers, the Electrical Energy Register, the Thermal Energy Register and the Compressed Air Energy Register. All plant items that consume electrical energy, thermal energy or compressed air are included in these registers. These registers are used to generate a site load breakdown

and identify Significant Energy Users (SEU's). The addition and removal of equipment to site are reported and the registers are regularly updated.

AICL (KP) monitor and measure the key characteristics of its operations and activities that can have a significant impact on energy use. Energy Performance Indicators (EPI's) provide a means to evaluate the energy performance of the significant energy users on site and constitute a fundamental element of the EnMS. Monthly reviews of the site EPI's are carried out by the Energy Leader. If there are any deviations from the norm these are flagged and reviewed with the Energy Committee. The EPI's inform the energy key performance indicator which is reported monthly to senior management as part of the sites key performance indicators

Energy Management Action Plan is prepared for a rolling three year period and reviewed on an annual basis. The action plan is populated with projects from the Energy Saving Opportunities Log and the Energy Management Opportunities Log. The Energy Management Committee prioritise projects based on feasibility, potential savings, budget, available resources and current site activities and schedules. The programme details the proposed actions, responsibilities and target dates for objectives and targets

“Implementing ISO50001 has required energy impact to be a forefront consideration at project concept phase at AICL (KP), facilitating energy efficient design across all engineering projects”

—Colm Timmons, Facilities Engineering Manager

Cost-benefit analysis

Since achieving ISO50001 standard accreditation AICL (KP) in 2011 has achieved \$197,000 savings from investment of \$500,000 over 5 years. This excludes the larger capital investment in the onsite wind turbine and the wood chip boiler and their associated savings which have paybacks of 6 and 7 years respectively.

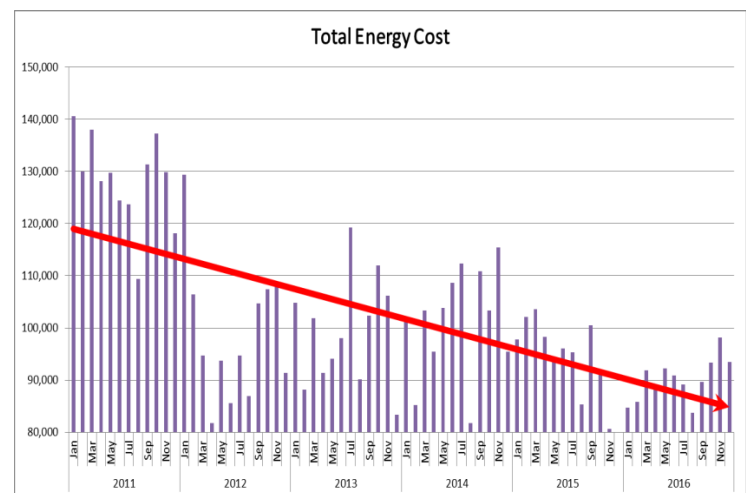


Figure 3 Annualised Total Energy Cost

Approach used to determine whether energy performance improved

AICL (KP) monitor and measure the key characteristics of its operations and activities that can have a significant impact on energy use. Energy Performance Indicators (EPI's) provide a means to evaluate the energy performance of the significant energy users on site and constitute a fundamental element of the EnMS. Monthly reviews of the site EPI's are carried out by the Energy Leader. If there are any deviations from the norm these are flagged and reviewed with the Energy Committee. Factors which impact energy consumption such as monthly heating degree and cooling degree, yearly weather data, equipment COP and production levels are also reviewed and monitored to ascertain their impact. The electrical, thermal and total energy usage are also reviewed against energy baselines to provide a basis for comparison of energy performance.

The overall energy performance for the site is reviewed on an annual basis as part of the Annual Management Review. The EPI's inform the energy key performance indicator which is reported monthly to senior management as part of the sites key performance indicators which are reported to management in Japan

Approach used to validate results

Internal audits are the means used by AICL (KP) to check compliance with the requirements of the Energy Management System and other obligations. Audits are used to check compliance with the Energy Policy, energy objectives, legislative requirements, the organisations own commitments and procedures and those of the Energy Management System Standard.

Energy Management System audits provide for the assessment of both technical and system aspects of the Energy Management System. A schedule for the audits of the technical and system aspects of the Energy Management System is documented and updated annually.

The Energy Leader ensures that all auditors are trained to a competent level. Annual Energy Rep training occurs to ensure that those conducting the audits are equipped with the necessary skills to complete the audit to a high level objectivity and the impartiality of the audit process are fundamental criteria to be considered in the selection of auditors and the auditing process. An Energy Audit Schedule is developed annually taking into consideration the status and importance of the process and areas to be audited as well as the results of previous audits.

Audit findings are recorded in the Energy Audit Observation Database and are only closed once the effectiveness of a change introduced to close that finding has been assessed.

Steps taken to maintain operational control and sustain energy performance improvement

AICL (KP) has identified significant energy users and has established documented procedures to control these users.

Procedures are in existence, which cover situations where their absence could lead to deviations from the company policies, legal requirements and objectives and targets. Procedures relevant to operational control under the Energy Management System are detailed in the Energy Training Matrix (ENG217).

Energy Efficient Design & Procurement Procedure and Energy Efficient Design Management Manual are used to control company purchases, which impact directly or indirectly on the energy consumption of the plant and to manage capital cost spending in relation to energy efficiency of new equipment.

Use of these procedures demonstrate that practical alternatives have been explored in relation to procurement and design choices of both new and replacement equipment and that the option selected is most likely to deliver the most sustainable and energy efficient solution.

All new projects and equipment are reviewed under the following criteria;

- **Over 30 kW** must undertake a full energy efficient design review in conjunction with the energy leader.
- **Over 10 kW** must complete an energy efficient design evaluation checklist.
- **Under 10 kW** must be appraised as part of the energy management equipment reporting sheet .

AICL (KP) ensures that non-conformances and potential non-conformances with the requirements of the Energy Management System are identified and that corrective and preventative actions will be taken. Any non-conformances are logged in the Non Conformance Database which is reviewed on a regular basis thus

ensuring that issues identified are closed out in a given timeframe and that preventative action is taken to avoid repetition of the non-conformance. Non-conformances identified during the internal and external auditing programme or during the Energy Management Committee meetings following review of the EPIs, will also necessitate the logging of a non-conformance in the Non Conformance Database.

The aim of the Energy Management Review is to ensure continual improvement in energy performance and that the Energy Management System operates in-line with the Energy Policy.

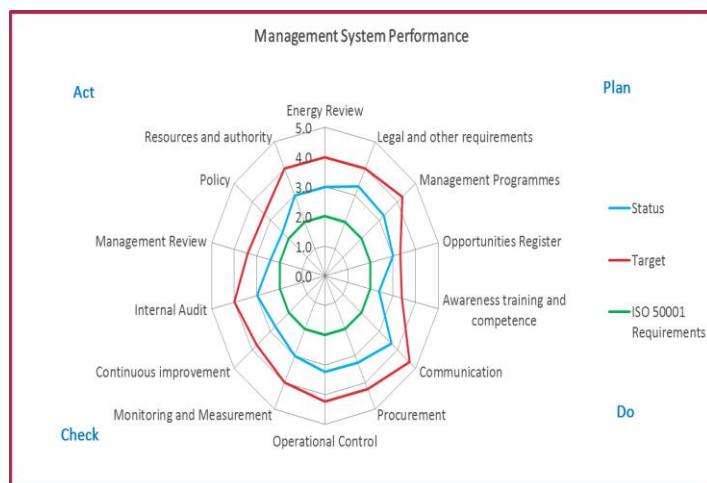


Figure 4 Energy Management System Maturity Model

The purpose of the management review is to provide feedback on determining the following key aspects:

- The status and effectiveness of the energy management system in meeting AICL (KP)'s objectives and targets;
- Whether the policies are effective, up to date, complying with statutory requirements, corporate requirements, corporate guidelines and best practices within the chemical and pharmaceutical industry;
- A review of energy performance and any recommendations for improvement.

Development and use of professional expertise, training, and communications

General Energy Awareness Training, including an overview of the Energy Management System standard, is provided as part of induction training for all employees.

Employees are made aware of:

- Activities to control energy usage and improving energy efficiency;
- Their roles and responsibilities as part of the Energy Management System;
- Impact of work activities on energy use and benefits of improved performance.

Education of employees to become energy aware in all aspects of their life is a key part of AICL (KP) energy awareness development plan. AICL (KP) believes this holistic approach drives energy consideration across all aspects of the site.

A number of energy awareness events take place on site highlighting both work and home energy awareness.

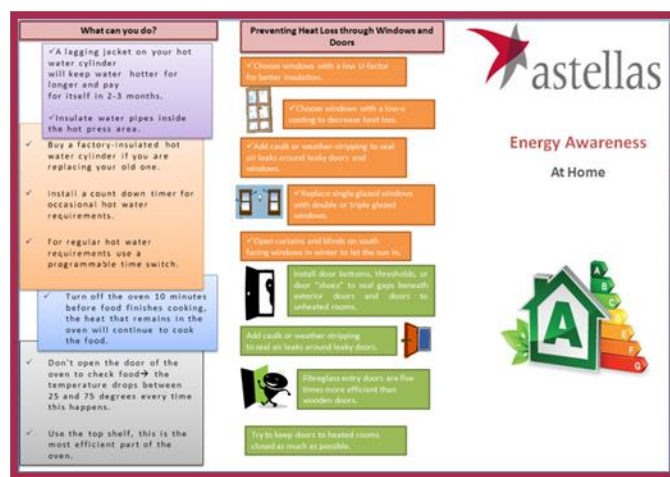


Figure 5 Astellas promotion of energy saving at home

Through ongoing training and development of employees AICL (KP) ensures that personnel which may have an influence on energy efficiency have the appropriate education, training and experience.

Site energy performance is communicated to employees through monthly emails, noticeboards, business information sharing meetings and awareness drives including annual energy awareness week and the annual energy quiz.

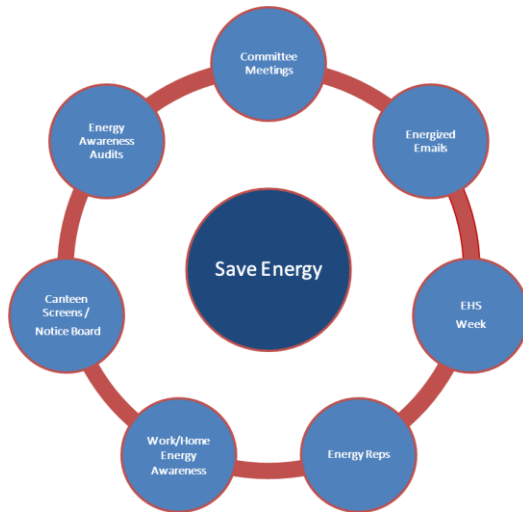


Figure 6 Communication chain to promote energy on site

AICL (KP) use accredited ISO50001 auditors to validate the EnMS annually. These audits also allow us to benchmark our performance not just against our own internal standards but against industry standards.

Tools & Resources

Lean Six sigma is applied across the site to improve efficiency, problem solving and communication processes.

AICL (KP) liaises with Sustainable Energy Authority of Ireland (SEAI) and is a member of their LIEN programme (Large Industry Energy Network) sharing information and best practice.

EUTD- European Technical Division is an idea sharing platform between three Astellas sister manufacturing plants in Europe. It promotes sharing expertise and ideas to enhance engineering performance across all sites.

Lessons Learned

The key lessons learned;

- Establishment of baseline is critical.
- Senior management engagement crucial.
- Setting of annual targets a key driver of performance. AICL (KP) set an annual target of 2% reduction in total energy consumption.
- The application of ISO50001 and the monitoring and measuring of significant users allows us to illustrate to senior management where savings can be achieved.
- ISO50001 consideration when planning and implementing future projects aids the application of energy efficient design.

Keys to Success

- Senior Management Commitment
- Dynamic Energy Team
- Employee Engagement
- Financial consideration for Energy projects

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.