

Global Energy Management System Implementation: Case Study

Ireland

GSK Cork

Through the implementation of a structured EnMS and a culture of continuous improvement, GSK Cork has achieved significant energy, CO₂ and cost savings



GSK Cork

Figure 1: Aerial Photograph of GSK Cork

“Implementation of ISO 50001 has ensured that GSK Cork has a sustainable process to drive energy reduction in the years ahead”

—Edmund Collins, Energy, Utilities and Engineering Quality Improvement Lead

Business Case for Energy Management

GSK is a global healthcare company with a mission to help people do more, feel better, live longer. We have a long standing commitment to responsible business which is central to our strategy. The Company has an ambitious target of 25% reduction in overall carbon footprint by 2020 versus 2010 baseline. The Cork site, which manufactures APIs, is one of GSK's largest energy users. Since 2009, GSK Cork has delivered significant energy savings as part of the overall corporate 2020

Case Study Snapshot

Industry	Pharmaceutical
Product/Service	APIs
Location	Cork, Ireland
Energy Management System	EN 160001 ISO 50001
Energy Performance Improvement Period	6 Years
Energy Performance Improvement (%) over improvement period	8.1%
Total energy cost savings over improvement period	\$4,642,769
Cost to implement EnMS	\$50,000
Payback period on EnMS implementation (years)	0.02
Total Energy Savings over improvement period	232,578 GJ
Total CO ₂ -e emission reduction over improvement period	20,309 Metric Tons

targeted reduction in overall carbon footprint. Since 2009, significant energy cost savings have contributed to a reduction in the site's overall operating costs. GSK Cork is a member of the Sustainable Energy Authority of Ireland (SEAI) Large Industry Energy Network (LIEN) which involves a commitment to a sustained energy reduction program. Prior to achieving EN 16001 certification in 2011 and ISO 50001 certification in 2012, energy reduction was mainly achieved through individual projects. As a result of ISO 50001 the site has adopted a more systematic and sustainable approach to energy reduction which has reduced its dependence on capital projects.

Business Benefits Achieved

Since EN 16001 certification was achieved in 2011, GSK Cork has achieved an 8.1 % reduction in annual energy consumption and a cumulative reduction in CO₂ emissions of 20,309 Metric Tons and cost savings of \$4.6 million. This success was built on earlier energy savings achieved from 2009 through the sites Operational Excellence program. ISO 50001 certification was achieved in 2012. The energy and CO₂ performance for the site can be seen in the chart below. In 2014 a new Consumer Healthcare production facility resulted in a significant increase in the site's energy consumption. An Energy Efficient Design methodology was used during the design phase of the new Consumer Healthcare facility. Regular meetings were also held with the project team during the construction and commissioning phases of the project. This ensured that energy efficiency was incorporated in the new facility prior to the start of operations.

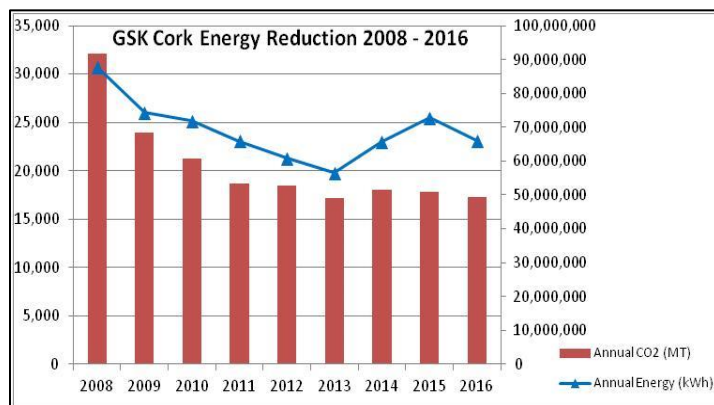


Figure 2: GSK Cork Energy and CO₂ reduction 2008-2016

Energy savings over this period have been delivered by a wide range of projects and opportunities including:

- HVAC air change reduction and temperature optimization
- Optimization of waste incineration and heat recovery systems including use of surplus steam to pre heat combustion air
- New high efficiency air compressor with heat recovery to pre-heat boiler feed water
- Optimization of nitrogen use from PSA plant
- Steam trap surveys and remediation, upgraded insulation of steam distribution system
- Compressed air and nitrogen leak detection and remediation
- Energy efficiency design reviews for new production facilities
- Load optimization of process chillers to improve COP
- Installation of 3MW wind turbine to supply 30% of site electricity needs and offset CO₂ impact of new Consumer Healthcare production facility

EnMS Development and Implementation

The site's EnMs was originally developed from GSK's Operational Excellence program in 2009, then through certification to EN16001 and certification to ISO 50001 in 2012.

Organization

In 2009 the site management team had committed its support for the energy reduction program through the allocation of additional resources and prioritization of program activities. This support was sustained through 2012 to achieve ISO 50001 certification and continues to the present day in the effective operation of the EnMS. Since 2009 there has been a dedicated energy manager on the site and that role now includes the responsibilities of the EnMS team leader. The EnMS team which includes the team leader, Energy Engineer, Project Engineer, part time Energy Consultant and work placement students is also supported by key members of the Engineering and EHS teams.

Energy Review and Planning

Comprehensive energy usage analysis and mapping as part of ISO 50001 and GSK's energy kaizen process was fundamental to identifying SEUs. This enabled an action plan of capital projects and operational improvements to be prioritized and implemented. A comprehensive metering infrastructure has enabled energy usage data for gas and electricity to be obtained. This data has been used to generate dashboards to track the actual performance of the SEUs against predictions.

The GSK Kaizen approach entails the participation of a wide range of engineering and operational personnel supported by external experts. These Kaizen events normally take place over the course of a week and include a review of all aspects of the sites energy use. A range of energy saving opportunities are identified and evaluated. The events have the support of senior site management and the action plans are presented by the Kaizen team at the end of the event. The action plans range from “just-do-it” initiatives to capital and strategic projects.

Energy usage data are continuously recorded using the site’s electricity and gas metering infrastructure. All significant electricity and gas users are metered as well as the generated electricity from the on site Wind Turbine. Overall electricity and gas usage metered data is checked against the billed data monthly.

SEU energy usage maps are updated annually and usage data is compared to previous years.

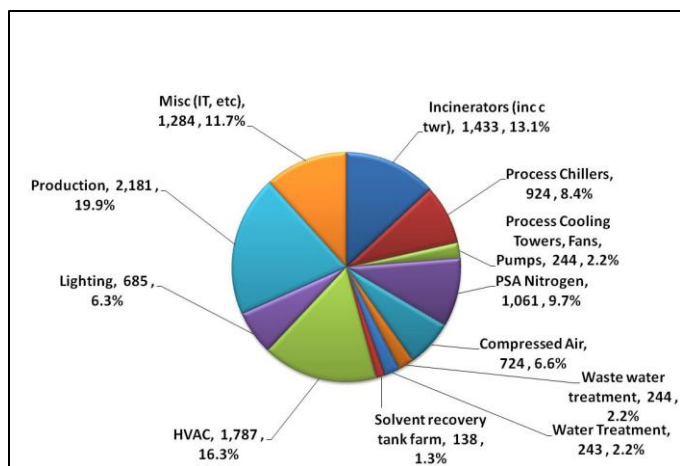


Figure 3: GSK Cork Energy Mapping

An annual energy and CO₂ reduction plan is developed from the site opportunities register and the overall target is agreed with GSK’s corporate energy management team. The annual plan is presented as a waterfall chart which includes actual usage for the current year and predicted usage for the year ahead. The waterfall charts include planned production changes and energy reduction projects and initiatives.

At the end of the year actual performance is reported against the target.

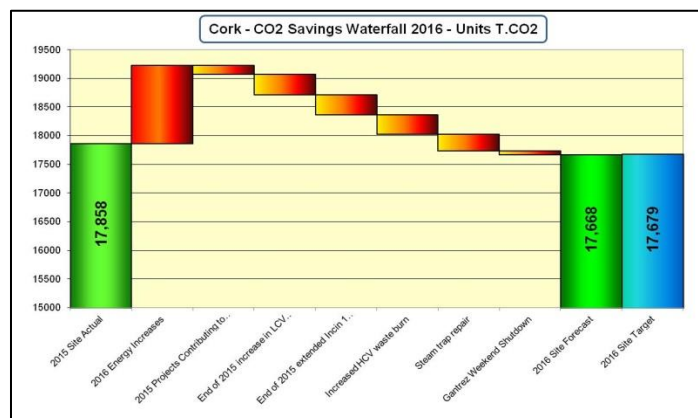


Figure 4: 2016 Energy CO₂ Reduction Waterfall

In addition, detailed models based on predicted production plans, weather and production waste are used to forecast and monitor gas and electricity usage.

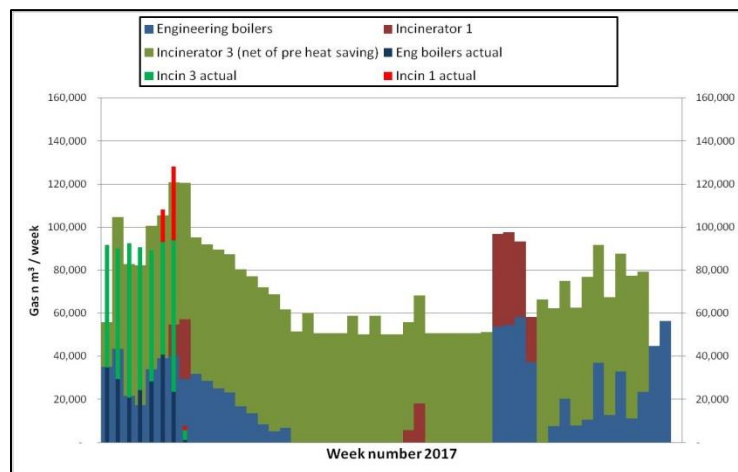


Figure 5: GSK Cork Gas Usage Prediction Model

Actual electricity and gas usage is continuously recorded and reviewed against predicted usage on a weekly basis. These reviews are carried out as part of the sites performance management process. The causes of any significant variances are investigated as part of this review processes and corrective action taken if appropriate. Monthly internal audits of SEUs are completed and opportunities and actions are recorded on EnMS registers.

The site’s energy manual is reviewed and updated annually prior to external ISO 50001 compliance audits. Periodic gap analyses against the ISO 50001 standard

are completed and the output from these is used to drive continuous improvement in the EnMS.

Financing

Major energy reduction projects are included in the sites facilities master plan. The capital budget is aligned with the facilities master plan. Each proposed capital energy project must be submitted to the sites project approval panel.

Cost of implementing ISO 50001

The main costs in implementing the EnMS program were for a dedicated Engineer supported by an energy consultant to prepare all the necessary documents and prepare for certification audits. This Engineer also developed a number of energy dashboard tools which generated SEU reports used for tiered metrics reviews. These dashboard tools were developed using existing site systems. The site already had a comprehensive electricity and gas metering infrastructure prior to implementation of ISO 50001.

Sustaining Energy Performance Improvements

Key personnel responsible for operation of SEUs are engaged in energy monitoring and management through the sites performance management process. Training packs have been developed for critical utility systems and engineering crafts personnel responsible for operating and maintaining the systems have completed the training. In addition to the above the site's ISO 50001 auditing process involves SEU owners.

Supporting the Program

The energy reduction program has been supported by a number of professional energy consultants and organizations. The sites communication process is used to inform employees of energy initiatives. An energy awareness day has been held which was supported by the SEAI. Under the SEAI LIEN agreement, the site has also received additional professional expertise to complete surveys of SEUs.

The site's program has had ongoing support from the corporate Environmental Engineering Centre of Excellence. This support has taken the form of funding for external expertise, project feasibility studies and Kaizen events.

The site has been successful in obtaining grant aid from SEAI through the Better Energy Workplaces scheme for the installation of a new energy efficient air compressor and combustion air pre-heater for the incinerator.



Figure 6: Site Air Compressor with Heat Recovery



Figure 7: Combustion Air Pre-heater on Incinerator

The site's program has been acknowledged both internally in GSK and externally by receiving the following awards:

- 2011 SEAI Integrated Energy Management Award, Major User – Winner
- 2013 SEAI Leadership Award- Finalist
- 2013 Green Awards overall winner
- 2014 SEAI Sustainable Collaboration Award as part of the Cork Lower Harbour Energy Group

Lessons Learned

A successful programme needs to be adequately resourced and supported by senior management and will adopt a variety of different strategies.

It's important that new facilities and equipment being installed are as energy efficient as possible.

Energy Efficient Design methodology should be used for all projects.

The adoption of international standards, such as the ISO 50001 Energy Management Standard is key to the development of sustainable programmes which will introduce a culture of continuous improvement.

The on-going involvement of all key stakeholders such as employees, contractors and suppliers should be a key objective.

Finally, adoption of expensive renewable technologies and the replacement of utilities generation equipment should only be done when wastage of energy has been minimised.

Keys to Success

- Support of Site Leadership Team
- Dedicated resources working on programme
- Joined up thinking and good inter-team communication and cooperation
- Use of Operational Excellence Tools within the GSK Production System
- Energy Mapping data used to prioritise projects
- Good Use of Monitoring & Targeting Systems
- Innovative and challenging approach
- Top Down-Bottom Up approach
- Performance Management and Tiered Metrics
- Devolving responsibility and accountability to key users
- Development of networks within and without GSK

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.

