ALLERGAN LEAN SIX SIGMA POWERS ENERGY MANAGEMENT SYSTEM

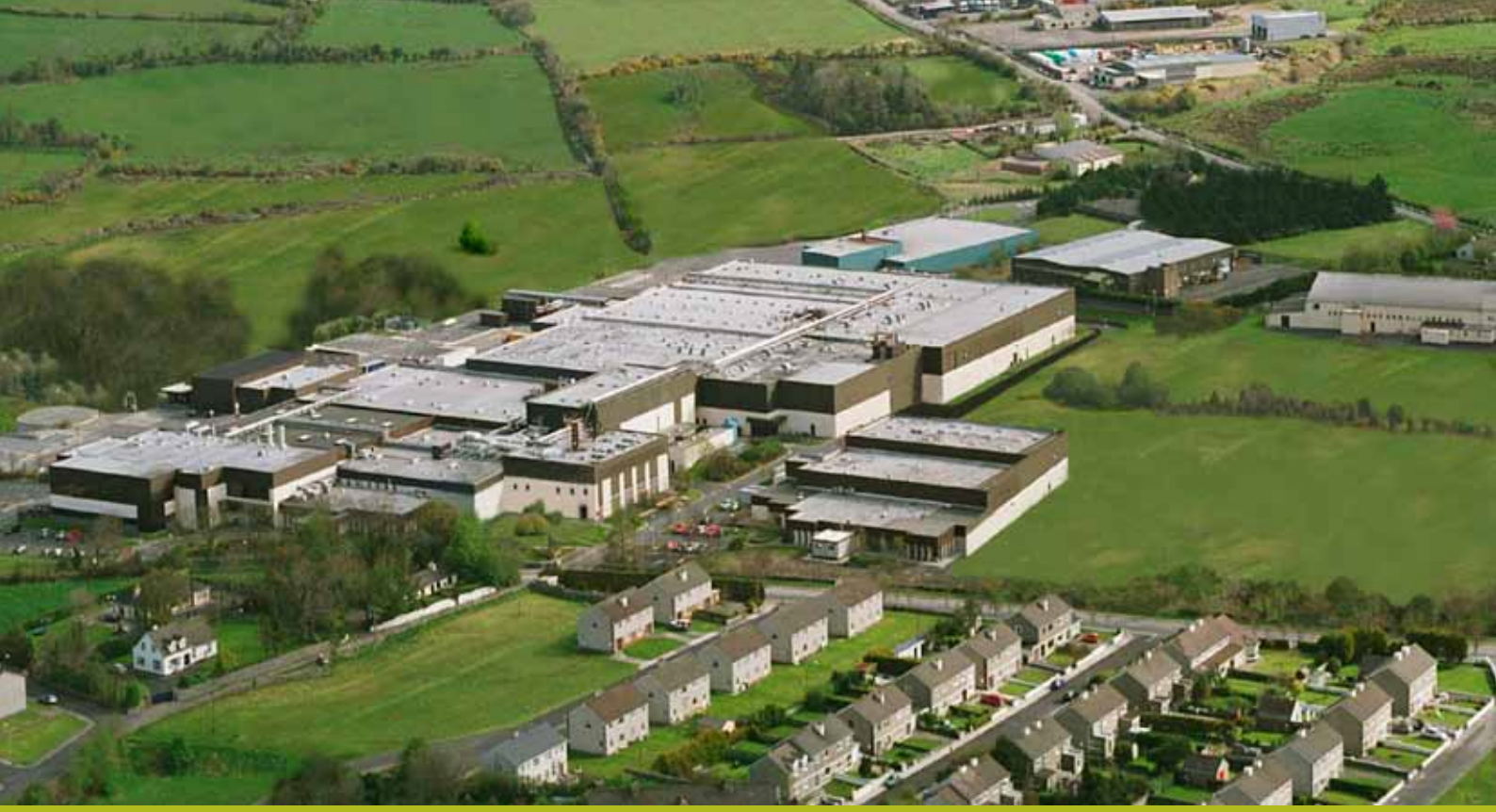
Allergan Inc., headquartered in Irvine, California, is a global specialty pharmaceutical and medical device company that discovers develops and commercialises innovative products for the ophthalmology, neurosciences, medical dermatology, medical aesthetics and other specialty markets.

Allergan Pharmaceuticals Ireland, a subsidiary of Allergan Inc., is based in Westport, Co. Mayo. It's the corporation's largest operations facility with the greatest concentration of employees in one location outside the US headquarters.

Established in 1977, the County Mayo facility has grown to over 600,000 sq ft on a 58-acre campus. It includes state-of-the-art laboratories and is responsible for manufacturing a broad range of the company's products, including Botox, Ozurdex and other ophthalmic products.

In January 2012, Allergan announced a $350 million investment at the Westport site creating an additional 200 jobs and involving the construction of a new state-of-the-art Biologics facility which will happen over the next five years.

The Utility targets at Allergan Pharmaceuticals Ireland include a 50% reduction in energy consumption, water consumption and greenhouse-gas emissions by 2020 from a baseline year of 2000. To realise these goals, the Westport site has adopted an integrated energy management system in implementing aggressive energy reduction initiatives. Energy savings projects implemented at Westport over recent years have won Corporate Excellence Awards.



The Utility targets at Allergan Pharmaceuticals Ireland include a 50% reduction in energy consumption, water consumption and greenhouse-gas emissions by 2020 from a baseline year of 2000.

Role of Energy Team

Natural gas and electricity usage are split approximately 50:50 at the site. Directly measured energy data quantifying energy usage is reviewed on a daily basis by the Site Energy Team at an energy review KPI meeting. This enables energy data for the previous 24 hours to be tracked and monitored, and if necessary, any anomalies or issues are dealt with there and then.

The energy team consists of cross functional members from Utilities, Facilities, Technical Services, Lean Six Sigma, Engineering, Operations and the Environment Health and Safety Departments. The diversity of this group is key to its success as it permeates the organisation's different functions. The site's overall performance against agreed metrics is reviewed at the monthly energy team meeting.

The work of the energy team is evident in the fact that, between 2007 and 2011, as production increased by 25 %, the Westport plant reduced its energy consumption by 52% and its water consumption by 38%.

Systematic Approach

It was recognised early on that a systematic approach to energy efficiency was needed. It was decided to integrate the energy management system with other systems on site – the environmental management system, the quality management system and the Lean Six Sigma programme.

The continuous improvement approach of the energy system offered the ideal model to tackle energy issues, as it engages employees at all levels of the organisation.

Energy Awareness and Communication

It was important that all site employees are actively engaged in the energy management process. A targeted approach was used in training of employees, whereby the level of training depended on the individual's potential impact on energy usage. At a minimum, all Allergan employees are aware of the energy policy and that there is an energy management system in place, while specific technical training was given to management, maintenance technicians, engineers, service contractors, etc.

Plasma screens around the plant display monthly communications about energy performance, while posters with energy conservation messages are posted on noticeboards. Employees are encouraged to suggest 'Good Ideas' for energy reduction through the site's intranet portal.

Energy Aspects and SEUs

The site's Significant Energy Users (SEUs) were defined and include the heating, ventilation and air-conditioning systems, the chiller system and the air compressor system.

The principles of Lean Six Sigma were applied to the register of energy aspects. A project prioritisation matrix and Pareto analysis chart were developed to identify projects that would deliver the greatest benefits. Energy performance indicators were developed so as to assess energy efficiency and identify scope for improvement.

While implementing the energy management system it was decided that data collected should be trended and analysed using the statistical and process management software package Minitab. This allows for better tracking along with data analysis and understanding of energy usage at the site.

Projects Implemented

Since 2008, Allergan Westport has implemented many energy conservation projects, including:

- Conversion of 3 large boilers from operating on fuel oil to natural gas;
- Installation of a boiler flue gas economiser on Boiler 3;
- Installation of over 135 energy-efficient steam traps on the plant steam system;
- Comprehensive leak check of water and air distribution network and system efficiency modifications; and the
- Installation of VSD (Variable Speed Drive) on the chiller system, HVAC and other motors.

Boiler conversion: Allergan decided to convert the three burners on the boilers to dual-fuel (natural gas/fuel oil) to avail of:

- Cheaper fuel (40% more cost-effective), with a return on the capital investment of approximately six months;
- Cleaner burning – a 30% reduction in carbon emissions;
- Potential for installing a CHP plant, with a further energy reduction opportunity; and the
- Opportunity to install a flue gas economiser on the boiler stack from Boiler 3

The fuel cost savings arising from this project amounted to approximately €750,000 annually.

Boiler flue gas economiser: After a technical feasibility assessment, a decision was taken in 2010 to install an economiser on the lead boiler. The heat recovered from the flue gas goes to preheat the boiler feed water. Total annual cost saving amounts to €40,000 per annum, with a payback period of 1.9 years.

Efficient steam traps: A review determined that many of the originally installed steam traps were impaired, resulting in steam loss to the drain. In late 2009, 135 GEM traps were installed. The steam and gas usage was monitored over three months. The results indicated that the plant steam system was up to 20% more efficient as a result. Final savings of €110k per annum, equivalent to 1,000 tonnes of CO2 savings, were realised.

Water reduction: To reduce consumption of water and improve system efficiency, the site's ring main was pressure-tested for leaks and leaks identified were repaired. Gemba walks were undertaken to find waste and improvement opportunities in the water system. Finally,

a CDI (continuous deionization) upgrade led to reduced intake and wastewater emission, while less water was used for process filter flushes on the system.

Other improvements include: cleanroom AHU setback, warehouse temperature control, reverse osmosis water recycling on the purification waste systems, shutdown energy control measures and long-weekend energy management setbacks on AHU's and switch-off's of non-essential equipment, and plant steam generation improvement projects.

Development of Energy Management System

Allergan attributes much of its success in the area of energy optimization to joining SEAI's Energy Agreements Programme and as a result implementing a more effective energy management system at the site. Work evolved from a series of individual improvements to a portfolio of targeted Lean Six Sigma Green Belt improvement projects. With the assistance and encouragement from SEAI, this portfolio developed into a full-blown energy management system and in 2010 Allergan was certified to EN 16001 and in 2011 Allergan was certified to ISO 50001.

Overall, these energy improvements have resulted in a large reduction in energy consumption, reduced energy costs to the business and reduced the plants CO2 emissions.