

Engineering Social Responsibility and Reliability

By Marty Brown at Pfizer Global Engineering and Michael Becker at Pfizer Global Manufacturing

An innovative Engineering Operations programme implemented at Pfizer demonstrates that environmental stewardship and operational efficiencies are no longer mutually exclusive.

The global pharmaceutical industry is being challenged to minimise its environmental footprint. Pharmaceutical companies are addressing this critical environmental imperative by developing and implementing sustainability programmes and initiatives across multiple operational and organisational levels. The energy conservation initiatives in place at Pfizer Inc, for example, demonstrate that environmental stewardship and operational efficiencies are no longer mutually exclusive.

At Pfizer, an innovative Engineering Operations programme is improving operational performance and uptime, optimising capital investment, and reducing the carbon footprint. Leveraging the vast expertise of thousands of engineering colleagues on a global scale, the fluid structure of the Engineering Operations initiative supports and advances Pfizer's Agile/Lean Manufacturing (and other Continuous Improvement) initiatives. In 2003, Engineering Operations teams began developing programmes aimed at reducing energy consumption and improving equipment reliability and performance.

Pfizer's Engineering Operations umbrella encompasses all aspects of energy supply and use, utility operations, and equipment/asset reliability. Since 2004, Pfizer engineers have undertaken hundreds of Engineering Operations projects. Their success has transformed the company's approach to energy and reliability management, both globally and locally. Empowered by the credo, 'local action – global results', and aligned under a common goal, teams of engineering colleagues from across Pfizer enabled the programme to scale quickly and achieve results.

ENGINEERING GREEN PRINCIPLES INTO WORLDWIDE OPERATIONS

Pfizer advances its purpose – working together for a healthier world – with the quality of the products it manufactures, as well as by mitigating the environmental impact of its operations. Pfizer's Energy and Climate Change programme exemplifies the organisation's proactive



Figure 1: Pfizer's Freiburg, Germany, facility is engaged in a site-wide environmental stewardship programme designed to reduce local CO₂ emissions by 40 per cent by 2012.

Table 1: Cumulative energy and environmental impact	
Category	Reduction
Energy reduction	20,000 MW-h
Water reduction	15,000m ³
CO ₂ reduction	6,000 tonnes

approach to global integration of green principles. Mobilised by the Engineering Operations Center of Excellence, the Energy and Climate Change programme is led by a cross-functional team of Pfizer colleagues, (representing engineering, operations, environmental, legal, and procurement). Leadership team members are subject matter experts (SMEs) in their respective fields and leverage engineering expertise through a network of teams across the organisation in areas including heating, refrigeration, ventilation and water.

Developed in conjunction with its Energy and Climate Change programme, Pfizer's Green Buildings initiative supports the organisation-wide environmental goal of incorporating sustainable business practices into the design, construction and operation of its facilities. Designed to promote alternative energy sources, minimise environmental impact and optimise operational efficiencies, Pfizer's Green Buildings programme applies innovative engineering and sustainability principles to conserve natural resources, reduce energy consumption, support eco-friendly workplace environments, reduce long-term operating costs and minimise environmental impact.

Pfizer's proactive and holistic approach to environmental stewardship has not only achieved recognition on a global scale; its initiatives and programmes are designed to support risk management and efficiency goals across the organisation. Energy and Climate Change Programme initiatives have been instrumental in helping the company surpass its publicly stated goal of reducing greenhouse gas (GHG) emissions by 35 per cent per million dollars of sales by the end of 2007 from the baseline year of 2000. The final GHG reduction figure totalled 43 per cent.

As a result of the team's proactive approach and early voluntary carbon reduction and reporting activity, Pfizer was named on the Carbon Disclosure Leadership Index (CDLI) in 2007 and 2008. The CDLI is compiled by the Carbon Disclosure Project, a collaboration between the US Environmental Protection Agency and industry, that aims to develop long-term, comprehensive climate change strategies, and sets greenhouse gas emissions reduction goals. Pfizer's Energy and Climate Change team is

currently working toward the company's second generation emissions reduction goal: an absolute GHG reduction of 20 per cent from 2007 to 2012.

BUSINESS IMPACT OF THE ENERGY AND CLIMATE CHANGE PROGRAMME

Globally, 85 Pfizer facilities have implemented more than 1,500 energy-related projects that have resulted in cost savings of more than \$110 million. Structured energy assessments continue to identify other energy savings opportunities. The projects range from ensuring that lights and energy-consuming equipment are turned off when not needed to advanced management of heating, ventilating and air conditioning systems, to making significant capital investment in major infrastructure such as boilers, chillers and combined heat and power units. Major renovations and expansions have been designed to engender greener facilities and operational efficiencies.

GREEN LEADERSHIP IN ACTION

Pfizer's Freiburg site in Germany is participating in an aggressive programme designed to reduce local CO₂ emissions by 40 per cent by 2012. Since 2004, they have completed approximately 65 energy- and Green Buildings-related projects as part of the renovation of a 1950s office and manufacturing complex. Encompassing GMP and non-GMP areas, the projects ranged from HVAC improvements – geothermal heating and cooling, adiabatic cooling and adjustments to air

Figure 2: Renovated to achieve energy and other environmental efficiencies, the Pfizer facility in Freiburg, Germany, utilises a geothermal-based heating and cooling system. The short vertical pillars in the foreground mark the locations of some of the 130-metre deep boreholes that are at the heart of the system



change rates – to improvements in overall energy efficiency – improving building exterior windows and insulation in addition to capturing waste heat from condensate and compressed air systems. Table 1 represents cumulative energy and environmental improvements resulting from the projects.

With a CO₂ reduction of 1,200 tonnes per annum, the retrofit to geothermal heating and cooling provides a significant contribution towards reducing the site's carbon footprint. Twenty boreholes circulate water to a depth of 130 meters (420 feet), where a constant year-round temperature level of 15°C (59°F) exists. The temperature reservoir can be used in combination with a heat pump, coupled with heating and cooling ceilings within the laboratory and office spaces. With an estimated performance co-efficient of 4.5 on heating duty and improved summer condenser temperatures, the energy use for heating and ventilation has been reduced by a factor of four. The geothermal plant became operational in June 2008, and its estimated payback is approximately two years. The site is currently installing a wood pellet-fired boiler that is expected to reduce the site's carbon footprint by an additional 3,400 tonnes of CO₂/annum. The wood pellets, which are manufactured to follow sustainable forestry practices, consist of biomass from local forests, agriculture and the wood industry.

ENGINEERING RELIABILITY INTO WORLDWIDE OPERATIONS

Mobilised under the auspices of Engineering Operations, Pfizer's Global Reliability programme is designed to optimise the organisation's global asset use. Working in tandem with the Energy and Climate Change programme, the Global Reliability team implements the necessary practices and tools to enable an enterprise-wide, data-centric approach to reliability. This centralised approach allows greater visibility to critical company assets while proliferating Reliability Based Maintenance (RBM) practices that incorporate energy efficiency.

At Pfizer's site in Kalamazoo (Michigan, USA), asset management data have enabled significant energy reductions related to its HVAC systems. In addition, the facility was able to target a reliability goal of two-year uninterrupted runtime on those systems. The facility is conducting Failure Mode and Effect Analysis (FMEA) on the components of approximately 400 air-handling units. It will then establish countermeasures for each of the potential failure modes as part of a comprehensive reliability plan. As a result of improvements to the maintenance of air handling units, uptime is increasing and energy efficiency improvements – estimated to reach approximately 5,000MW-h – are occurring. Combining asset data with RBM methodology, the facility reduced energy consumption.



Marty Brown leads Pfizer's Energy & Climate Change Programme which has been established to reduce Pfizer's energy footprint, optimise energy spend and reduce its contribution to Greenhouse Gas (GHG) emissions through a comprehensive programme of demand and supply-side initiatives across the energy supply chain.

Having spent nearly five years with Pfizer, he has 25 years' experience in the pharmaceutical industry, including positions with Bristol-Myers Squibb and GlaxoSmithKline. Marty has served in a variety of site and corporate engineering roles including Manager of facilities operations and maintenance; Project Manager on numerous facility construction, renovation and energy conservation projects and Programme Manager on global business change programmes. He received a BSME from the University of Notre Dame (Indiana, USA) and is a member of the ISPE and AEE.



Michael Becker has served as Engineering Director of Pfizer's Freiburg, Germany, facility since 2001. At Freiburg, he has been responsible for the SPRING (Strategic Plant Restructuring) Project, as well as packaging automation and a number of innovative energy and resource conservation projects. Prior to joining Pfizer, Michael held the position of Head of Sales at Krupp Corpoplast in

Essen, as well as Head of Engineering for Faurecia Interior Systems where he was involved in lean maintenance strategies, Just In Time (JIT) production and Total Productive Maintenance (TPM).

THE EFFECT ON THE COMMUNITY

The work of the Engineering Operations team has extended beyond the borders of the Pfizer organisation and into the communities in which the engineering colleagues reside. For example, several engineering colleagues in Sweden and Germany have converted their homes to geothermal heating and cooling. Engineering colleagues in Ireland, Singapore and the United States have also applied a combination of solar thermal, photovoltaic and wind energy to partially, and in some cases, completely, remove themselves from the local power grid.

From operational efficiencies to environmental stewardship, engineering innovation is an important behind-the-scenes driver in keeping pharmaceutical companies lean and competitive. Pfizer empowers engineering colleagues on a global scale to engage one another at the local level, in support of excellence in energy and utilities management and operational efficiencies. A collaborative, fluid approach builds scalability into the programme, thus providing the added flexibility to accommodate the dynamics of the pharmaceutical industry.