

ExxonMobil Chemical Company

Baytown, Texas

ExxonMobil Chemical Company, a division of ExxonMobil Corporation, is the third-largest petrochemical company in the world. ExxonMobil Chemical manufactures and markets various petrochemical products including olefins, aromatics, synthetic rubber, polyethylene, polypropylene, plasticizers, synthetic lubricant basestocks, and many others. The petroleum refinery and petrochemical complex located in Baytown, Texas, is the largest of its kind in the world (Figure 1). The complex consists of a refinery, two chemical plants, and two research centers, collectively employing approximately 4,000 individuals. As one of four major ExxonMobil Chemical facilities in the United States, the Baytown complex serves as a proving ground for many new energy-efficient technologies.

Global Energy Management System

The Global Energy Management System (G-EMS) is a complete management process aimed at increasing energy efficiency at more than 60 ExxonMobil refineries and chemical plants worldwide.

Developed and tested in 1998 and 1999, G-EMS was first deployed at the Baytown complex and several overseas locations in 2000.

ExxonMobil Chemical received the American Chemistry Council's 2000 Energy Efficiency Award for developing and deploying this comprehensive system.

The G-EMS process begins with a facility assessment conducted by company experts highly knowledgeable in processing units, utility systems, compressors, heat exchangers, furnaces, and heat integration. Representatives from the facility work with these

Benefits

- Identification of energy savings opportunities totaling nearly 15% of ExxonMobil's energy consumption.
- Reduction of NO_x and other greenhouse gas emissions.

corporate experts to develop operational and facilities improvement ideas. The facility representatives are then responsible for ensuring that the improvements are implemented.

By the end of 2002, ExxonMobil anticipates that all of its U.S. facilities will have completed the assessments and developed implementation plans. The selected practices

Figure 1: Baytown Complex



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and facility modifications will be performed over the next five to eight years. By employing the G-EMS process at all of ExxonMobil's facilities, the company expects to reduce its total energy use by 15%.

Combustion System Improvements

Motivated by the increasingly stringent emissions regulations governing oxides of nitrogen (NO_x) in the Houston area, ExxonMobil is improving its combustion systems to reduce NO_x and other greenhouse gas emissions. ExxonMobil and other Houston-area industrial companies plan to spend up to \$10 billion on combustion system improvements. As part of this effort, ExxonMobil will develop and implement a retrofit strategy for over 200 pieces of equipment at its Houston-area facilities between 2002 and 2008.

The majority of the improvements will be equipment retrofits requiring application of next-generation technologies. For instance, ExxonMobil will install low-emission burners such as the high-efficiency, ultra-low emission, integrated process heater burner currently under development as part of a DOE-sponsored project between ExxonMobil Research and Engineering Company, TIAX LLC, and Callidus Technologies, L.L.C. These low-emission burners improve performance while reducing NO_x emissions from 30-50 parts per million (ppm) to 18-25 ppm. The low emissions are achieved without the use of selective catalytic reduction, a costly post-combustion technology that introduces the potential for releasing ammonia.

Gas-Fired Cogeneration

Electricity and steam are the primary forms of energy consumed in refineries and chemical plants. Steam is typically generated on-site by burning natural gas, while electricity is purchased from external power companies. Conventional electricity generation involves combusting coal, oil, or natural gas to produce a hot gas that drives a turbine generator. Large energy losses occur as the hot gases or steam escape after driving the turbine, and additional losses occur during distribution. Overall, only a small fraction of the heat contained in the oil or natural gas feedstock is made available as electricity at the end use.

Cogeneration reduces the energy lost in electricity generation by using the hot gases emitted from the turbine to produce hot water and steam with no additional consumption of fuel. This translates into greater energy efficiency, cost savings, and reductions in emissions of NO_x and other greenhouse gases. Since the 1920s, the Baytown refinery has used cogeneration to meet its power and steam needs. During the past 40 years, ExxonMobil has installed natural gas-fired cogeneration facilities at 32 additional locations worldwide. Cogeneration now meets approximately 70% of ExxonMobil's worldwide refining and chemical plant power and steam needs. At the end of 2001, ExxonMobil had a cogeneration capacity equivalent to 2,700 MW (enough to power more than 2.1 million U.S. households).

The Office of Energy Efficiency and Renewable Energy of the U.S. Department of Energy conducts technology showcases to encourage industry adoption of energy efficiency technologies and practices. Replication throughout industry can boost productivity and help achieve National goals for energy, the economy, and the environment.

For more information, please visit our Web site: www.eere.energy.gov

For more information on this project, please contact:

Doug Deason
ExxonMobil Chemical Company
4500 Bayway Drive
Baytown, TX 77522-9728
P.O. Box 4900
Baytown, TX 77520-4900

Phone: 281-834-2849
Fax: 281-834-2802

E-Mail:
Doug.L.Deason@ExxonMobil.com