

Reducing the energy footprint

Significant energy savings have been achieved in the Moerdijk Lower Olefins (MLO) plant in The Netherlands, thanks to the application of energy saving technology and best practices. The success of a year-long Energise project could see the programme adopted by other Shell chemicals plants as part of the drive for efficiency and reducing the environmental footprint of energy consumption.

It was the first time that a project team from Energise, a consultancy group in Shell Global Solutions*, had applied expertise gained from similar work at oil refineries, to a chemicals plant. The three-strong Energise team worked with Shell Chemicals people from the MLO and the Lower Olefins technology group in Amsterdam, to apply 23 energy-saving ideas.

The savings could potentially cut the total energy bill for the Moerdijk ethylene plant by up to four percent, and also reduce levels of greenhouse gas emissions.

Peter Mooi, who headed the Energise team, says: "Although the plant staff are constantly searching for new ways of saving energy, they often have limited time and need to concentrate on ensuring production continuity and product quality are maintained."

"The Energise approach brings full commitment to realise energy saving projects, from idea generation up to and including the implementation, without diverting plant people."

The Energise programme is based on two main features – an exclusive software-based tool for mapping and assessing energy use, and implementation based on sharing risks and rewards. "The software produces a computer model based on

operational data and estimates a reference level for energy consumption at the same time as calculating the savings," he says.

Significant opportunities

Gerard Koot, senior technologist Lower Olefins, who worked on the project, says: "The aim was to reduce energy levels with minimal capital investment in equipment. In the initial assessment phase we studied all aspects that influence energy use and identified a significant number of opportunities for reducing consumption. Most of the implemented options were small-scale projects, which when combined, produced significant savings.

"Much of the energy savings have come from a better understanding of steam and fuel balances, fine-tuning of equipment and investing in instrumentation to monitor equipment performance. In Lower Olefins we were rather sceptical at first that savings of any size could be made but were impressed by what was achieved."

Most of the savings were realised in the steam turbines, compressors and the pyrolysis furnaces. "By adjusting the pressure levels around the compressor systems we were able to make important savings," says Koot.

"In the furnaces we improved the tuning by making a better match of the



Above: Peter Mooi from Shell Global Solutions and Gerard Koot, senior technologist with the lower olefins business.

air and fuel levels so that we could get the optimum performance from the burners. It may sound simple on paper but it requires expertise and focus."

"New instruments were installed to enable the compressors to run at optimal performance, with minimal energy consumption," adds Mooi.

All the work was carried out while the plant was operational so there was no need for any shutdown. The 23 energy-saving projects did not compromise either production levels or safety. In fact they have led to a potential increase in

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production, by utilising the main equipment of the plant in a more effective way.

"The alterations we've made have generated some spare capacity for the plant," says Mooi. "And at the end of the project, the site has many energy management systems in place, so that the savings can be sustained."

A Dutch government grant was awarded to the project, due to its innovative methods to reduce energy consumption.

"Because we have cut, in particular, the levels of steam needed for the ethylene cracker, there is a significant drop in the amount of natural gas consumed for production of this steam," says Mooi. "This means that there is a corresponding reduction in CO₂ and other emissions."

The successes at the lower olefins plant at Moerdijk have paved the way for similar schemes to reduce energy levels at the site's SM/PO plant as well as other chemicals plants in Europe and the US.

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* The term Shell Global Solutions refers to the companies of the Royal Dutch/Shell Group engaged in the provision of research and technical services.