



Promoting economic, environmental and social gains in the petrochemical industry

By identifying advanced thermo-chemical technologies that crack mixed waste plastics back to basic refinery and petrochemical products, a consortium led by the olefins, derivatives and refining company Innovene Ltd hopes to reduce the cost of manufacturing new plastics and other petrochemicals. The same work also aims to reduce the environmental impact of these petrochemicals, and at the same time, create a new competitive opportunity for the European petrochemicals industry.

Target benefits

- create new economic opportunities through an efficient polymer cracking process for more cost-effective plastics and petrochemicals manufacturing
- reduce the carbon footprint of plastics manufacture, limit the use of landfill and conserve valuable fossil resources
- challenge a substantial competitive advantage currently enjoyed by Middle-Eastern polymer manufacturers over their Western counterparts

Isolating and purifying valuable monomer molecules from waste plastics cracking processes is currently energy-intensive and uneconomic at small scale. There are also significant supply chain difficulties in recycling waste plastics that are slowing down the adoption of new technologies.

To develop the new technologies required to create a more efficient polymer cracking process with effective separations and purifications, and to solve the supply chain challenge, Innovene has

brought together a team of scientists and supply chain partners to run a 28-month, £1.3 million project called SPORT ('Sustainable Plastics to Olefins Recycling Technology'). Half-funded by the Technology Programme, the project launched in August 2005. Innovene is leading the project, in partnership with the University of Surrey, Imperial



College London, SIMS Group UK Ltd and Rural Services Scotland.

Objectives

The main raw materials used in the manufacture of versatile thermoplastics such as polyethylene, polypropylene and polystyrene are ethylene, propylene and benzene. The conventional petrochemical processes used to extract these valuable molecules have changed little over recent decades and are extremely costly.

The main objective of the SPORT project is to discover, adapt and apply the best emerging hydrocarbon purification and separation technologies to the cracking of waste plastics. Initially, it will concentrate on the production of liquid petrochemicals including benzene.

The second objective will be to create a model for an effective supply chain of waste plastics to the recovery centres. The traditional supply chain for virgin plastics manufacture includes oil extraction, refining and processing in the petrochemical plant. Collecting waste products as a feedstock, however, represents a very different challenge, involving principally commercial waste but potentially also household waste dispersed over a large area. Finding an effective solution will remove an important barrier to investment in recycling in the petrochemical industry. The project is also designed to deliver important environmental benefits, primarily by reducing reliance on landfill and other forms of disposal. Naturally, the re-use of materials also reduces

the consumption of fossil resources and hence reduces the carbon footprint of plastic. If successful, social benefits are likely too, with the creation of new jobs in the waste collection, preparation and recycling industries. Life cycle assessments and social impact assessment tools will be used by the University of Surrey in support of the project.

There is also a macro-economic case for the project. By providing a 'new', low cost raw material, it is hoped the petrochemicals industry could start to reduce the cost gap with Middle Eastern producers, who have easy access to low-cost hydrocarbon resources.

Solutions

By bringing expertise in the technological, logistical and environmental areas into the same project team, Innovene will evaluate the case for the adoption of waste plastics cracking within the European petrochemical industry.

The consortium hopes to find the solution that meets the economic and corporate social responsibility (CSR) agendas of industry management, by combining significant cost benefits in the production process with a practical, dispersed supply chain and clear social and environmental gains.

Results

A few months into the project, a shortlist of possible waste plastics cracking processes and purification and separation technologies have been identified.

Project manager Graham Rice of Innovene is realistic about the enormity of the challenge but still believes that all SPORT's objectives are achievable. "We are trying to do something that no-one else has yet managed to do," he says.

"Bringing together sound commercial and environmental benefits is of great interest to the global petrochemicals industry, and we believe a successful resolution to the project could result in wide adoption, potentially placing the UK at the forefront of an important new technology."



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