Petroleum and Petrochemicals Economics Program: Petrochemical Market Dynamics

Olefins 2012

Olefins 2012 is one in a series of reports published annually as part of the Petroleum and Petrochemical Economics program.

This report provides an in-depth analysis and forecast of key olefins including ethylene, propylene and butadiene.

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Abstract

Olefins and aromatics are the basic building blocks for most of the petrochemical industry. The most commercially important olefins are ethylene, propylene and butadiene. Olefins are mainly produced by steam cracking hydrocarbon feedstocks, with additional production from oil refinery upgrading processes and by catalytic dehydrogenation of paraffins. Higher prices for conventional petrochemical feedstocks have driven technology development to exploit alternative feedstocks such as coal and methane. The first two plants producing propylene from coal via methanol have recently started in China.

The proportion of ethylene, propylene and butadiene produced by a steam cracker depends on the feedstock used and the operating conditions. All feedstocks for steam cracking produce ethylene. Heavier feedstocks produce a greater proportion of propylene and butadiene, the heavier olefins, per unit of ethylene output while steam crackers using light feedstocks such as ethane produce almost exclusively ethylene. Recent feedstock price volatility has led to increased flexibility in feedstock selection by steam cracker operators. Numerous steam cracker operators in Europe and Asia have invested in modifications to permit increased cracking of LPG because of its lower cost relative to naphtha. In North America, ethane is displacing heavier feedstocks, which is improving competitiveness of ethylene production, but reducing the production of propylene and butadiene.

New projects are centred on exploiting low cost feedstock sources in areas such as the Middle East and now the US Gulf, or improving integration with refineries in other regions. The preferred model in China involves integrating steam crackers with hydrocracking refineries, with the steam cracker consuming the heavy hydrocracker by-products. In other regions refiners generally prefer to run full conversion at hydrocrackers in order to maximise production of products, such as diesel, thus limiting the volumes of hydrowax available for steam cracking. While some producers are building in some capability to crack hydrowax in their steam crackers, there, is limited interest in new cracker projects with a feedstock dominated by hydrowax. As gas feedstocks become more difficult to obtain in the Middle East, there is a renewed focus on export oriented refinery and petrochemicals complexes. Steam crackers in the Middle East are however, more likely to process naphtha, which is currently exported in large quantities.

The production of olefins from coal is now underway in China, with three large scale plants now operational. The successful development of these plants has highlighted a massive opportunity to exploit inland coal reserves, and numerous sponsors are now promoting coal-based developments. The scale of the volumes under discussion is impressive, and coal-based olefins development in China is likely to be one of the principal defining factors in global olefins market dynamics in this decade.

Despite the demand side issues in China and the Eurozone, olefins markets continued to grow over 2011, albeit at a lower rate than 2010 growth which benefitted from restocking after the downturn. Some areas saw a crisis of business confidence, leading to steep declines in operations in quarter four 2011, although 2012 has shown ongoing slow recovery.

Global Ethylene Consumption, 2011





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Note:

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