

CHEMSYSTEMS PPE PROGRAM

Report Abstract

Petrochemical Market Dynamics Aromatics

Aromatics, Markets, Supply/Demand, Plant Developments, Global trade patterns.

August 2011

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Nexant, Inc. (www.nexant.com) is a leading management consultancy to the global energy, chemical, and related industries. For over 38 years, ChemSystems has helped clients increase business value through assistance in all aspects of business strategy, including business intelligence, project feasibility and implementation, operational improvement, portfolio planning, and growth through M&A activities. Nexant has its main offices in San Francisco (California), White Plains (New York), and London (UK), and satellite offices worldwide.

Nexant's Petrochemical Market Dynamic, Vinyls report investigates the market and growth profile of EDC, VCM and PVC, and details the expected plant developments and changes in global trade patterns. The reports are published as part of ChemSystems / Petroleum and Petrochemical Economics Programme (PPE). Subscriptions to the programme are available from www.chemsystems.com. For further details or to request a sample copy, please email chemsystems@nexant.com.

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The Future of Benzene and *Para*-Xylene after Unprecedented Growth In 2010

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The aromatics industry has witnessed unprecedented volatility in both margins and demand over the past few years. While the global para-xylene market recovered rapidly since 2009, the recovery in benzene demand has been slower due to its dependence on construction activity and the maturity of some key derivative application areas. Polystyrene accounts for 20 percent of global benzene demand, and despite recovery from the low point in 2009, the market remains smaller than it was ten years ago. Nevertheless, global consumption of both benzene and paraxylene exhibited an unprecedented increase by volume in 2010. Cotton prices skyrocketed due to reduced supply as well as rebounding demand. The acreage of cotton planted in China – the biggest producer – dropped by five percent in 2010, and the effect was compounded by late season rains and flooding in India and Pakistan respectively. Monthly average U.S. spot cotton prices soared to more than US\$5000 per ton in March 2011, compared to an average of less than US\$1400 per ton over 2005-9. This caused a surge in demand for all synthetic fibres such as polyester, nylon and acrylic fibres. In addition, the shortage of para-xylene supply was exacerbated by recent production issues in the United States, Western Europe as well as in Urumqi, China where a one million tons per year para-xylene unit was started up in December 2010. As a result, margins for *para*-xylene producers surged in the fourth quarter of 2010, with Southeast Asian spot prices exceeding \$1600 per ton, reaching a historical high in the first quarter of 2011.

Benzene prices also increased ahead of rising crude oil prices, with margins over naphtha feedstock staying substantially higher than in 2009. Nevertheless, margins weakened through the first half of 2011, with availability increasing from both steam crackers and aromatics complexes, for which operations are driven by ethylene and *para*-xylene, respectively. Increasing length in benzene supply seems unavoidable as growth in both ethylene and *para*-xylene will continue to outpace that of benzene, depressing benzene operating rates at high-cost on-purpose production units.

Aromatics Demand

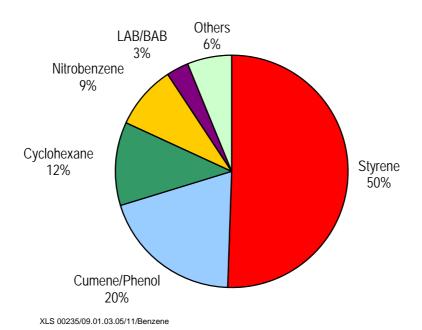
Global consumption of benzene, estimated at more than 40 million tons in 2010, showed an unprecedented growth in volume at more than three million tons from the level seen in 2009. Growth was particularly strong for cumene/phenol, cyclohexane and nitrobenzene, driven by strong automotive and electronics industries. Global vehicle production grew by around 27 percent in 2010, after losing around 20 percent during the economic crisis. Severe weather also supported the synthetic fibre and rubber markets, as cotton and natural rubber prices skyrocketed. This has boosted demand for polyester, nylon as well as SBR. 2010 growth was distributed across the world, improving benzene margins significantly. The majority of growth



in the future will be concentrated in Asia Pacific, particularly in China, where most of the new derivatives will be built.

Global *para*-xylene demand growth stalled in 2008 from the combined impacts of the global financial crisis, soaring recycling of post consumer of PET bottles, and destocking along the value chains. The *para*-xylene industry however showed unprecedented volume growth in 2010, growing by 2.8 million tons, a full ten percent growth from 2009. The pace of growth has decreased over the first half of 2011, although there is no sign of a collapse. Prices and buying activity will be highly sensitive to indicators on the 2011 cotton harvest. There remains significant long term growth potential for *para*-xylene, but rates will be substantially lower than those prior to 2008, due to the effects of recycling and the maturation of the PET bottle grade market.

Global Benzene Demand, 2010



Aromatics Supply

The complexity in upstream factors provided a challenging business environment for aromatics. Benzene supply from pygas is highly dependent on the economics and feedstock of ethylene production. U.S. pygas supply has recently been further reduced by the abundance of cheap gas feedstocks, in turn resulting from shale gas exploitation, while LPG also gained in popularity as cracker feedstock in Western Europe. On the other hand, Asian crackers have been running at higher rates following a recovery in polyolefins demand, but were setback by the increasingly large benzene surplus in the region. On the reformer side, severe winter weather limited reforming operations, and underlying demand for transportation fuels continues to be affected by high crude oil and refined products prices. The effect of reduced pygas availability in the United States is offset by the recently implemented MSAT II gasoline regulations. Some producers will increase benzene extraction, while others will reduce the benzene content of their reformate by



removing precursors from the feed. Coal-based benzene production in China has grown at an astonishing rate, and now accounts for around five percent of global benzene production, even with operating rates at very low levels. The coalfield benzene is a by-product from coking plants which supply the steel industry. As a result, the projected benzene trade flow will depend not only on benzene demand, but also the performance of ethylene, *para*-xylene and steel industries.

Geographically, Asia Pacific will continue to drive the development of new aromatics capacity from all major sources, although capacity growth in other emerging regions (i.e. South America, Central and Eastern Europe) is forecast to accelerate following one or two world-scale developments each in the next ten years. New capacity additions in the Middle East are slowing down before a new investment wave within the next three to four years, while there is unlikely to be any major investment in North America or Western Europe.

TDP/Transalkylation 12% Pygas Extraction 34% Reformate Extraction 36%

Global Benzene Capacity by Process, 2010

Nexant's "Petrochemical Market Dynamics: Aromatics" report provides analysis on the dynamics behind the various supply sources of aromatics; steam cracking, reforming, coal and on-purpose units. The impact of petrochemical feedstock development in different parts of the world has driven changes in the supply structure for aromatics, particularly benzene. Nexant's analysis of the major derivatives (e.g. polyester, styrene, cumene/phenol, cyclohexane and LAB/BAB) is combined with the supply side analysis to provide a complete understanding of the benzene and *para*-xylene markets.

Nexant's "Petrochemical Market Dynamics: Aromatics" report, part of the ChemSystems Petroleum and Petrochemical Economics (PPE) program of reports available for subscription on www.chemsystems.com.





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