

## What are the important trends affecting the downstream processing industry this year? Executives and experts forecast challenges and prospects that could affect profitability

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**T**he story of refining is one of two divergent trends. Huge and modern capacity increases are being built in key emerging markets, and particularly in Asia. But in developed OECD markets, refiners are seeing their already low operating rates and profitability squeezed further by the newer additions. What will be the end game? The simple answer is that we expect significant excess refining capacity for at least another several years, pushing many European and other OECD refineries to close up shop.



Following the economic recession of 2008-2009, and maturing OECD oil demand relative to the rapid growth seen in the non-OECD, the OECD oil refining sector has come under intense economic and operational pressure. The new refining capacity in emerging countries is often developed with high complexity, and is sometimes built more for strategic than purely economic reasons. This new capacity will place further pressure on OECD refiners not only because it is more efficient and of a larger scale, but also because the differentiation between environmental standards places OECD operators at a further cost disadvantage.

As highlighted in the IEA's Medium Term Oil and Gas Markets 2011, the world will add an additional 9.7 million b/d of crude distillation capacity post-2010, to reach a total of 103 million b/d in 2016. This compares to forecast demand growth of some 7 million b/d in the period, of which an increasing share will be met by non-refined supplies, such as biofuels, gas and coal to liquids, NGLs and condensates, which bypass the refining system.

Some 95% of additions are planned in the non-OECD, and most notably in Asia. China alone is expected to account for a third of global capacity growth, or 3.3 million b/d. That is largely in line with demand growth estimates. While project uncertainty here is ever present, the government's strategy seems to balance concerns over surplus capacity and increased product import requirements. Projects scheduled for the tail end of the forecast are therefore likely to be managed in line with evolving demand prospects. The rest of Asia will see a further 1.3 million b/d added in the period, or 13% of

global growth, while significant investments are also taking place in the Middle East and Latin America.

In contrast with China's caution, India is expanding its refining industry strategically, to establish itself as a key product exporter in the Asia Pacific region. India is already exporting high-quality products to the US, Latin America and Europe since the opening of Reliance's huge new Jamnagar export plant in 2009. The country is likely to further increase product surpluses as refinery capacity is expanded by more than 1 million b/d by 2016. In the Middle East, Saudi Aramco has revived its ambitious refinery expansion plan, which was temporarily put on hold during the recession. It seems that three of the four proposed mega-projects will now come to fruition, with two 400 000 b/d projects likely before 2016. Elsewhere in the region, the UAE's 400 000 b/d Ruwais project is expected in 2014. Latin American expansions are dominated by Brazil, which is likely to add 1 million b/d of capacity by 2016 through several greenfields projects.

Emerging market plans seem to be driven by various objectives. Some major consumers wish for greater product self-sufficiency, while others are positioning themselves as regional hubs. At the same time, some erstwhile crude exporters are trying to shift to the export of higher value-added products. Most are driven by a mix of these goals.

OECD refining offers a stark contrast to this booming picture. Since the economic downturn, a total of 1.8 million b/d of crude distillation capacity has been shut (or is firmly committed to shut) in the coming years. That is the result of two things: structurally declining demand and increased competition from the non-OECD.

The picture looks particularly bleak in Europe, where seven refineries have already closed. Furthermore, several plants have lately been sold to cash-rich upstream non-OECD interests (Rosneft, CNPC and Essar, among others). The US sector is interesting, as the country is transforming into a significant product exporter - a major turnaround from its position as a net importer of more than 2 million b/d only a few years ago. Diverging markets also exist within the country, with those enjoying access to now very cheap crude from the US Midwest at a great advantage, especially compared to those in the difficult East Coast refinery market. With lower US gasoline import needs, European refiners face further pressure, as they are structurally inclined towards gasoline production (and less towards distillates). In the OECD Pacific, industry rationalisation also continues apace, with Japan accounting for the

brunt. By 2014, Japanese refiners face tough choices of closing capacity or investing heavily in upgrading units. As in the rest of the OECD, further capacity rationalisation, over and above that already announced, is likely before the market finds a new equilibrium.

The global refining market is seeing a contrast between developed and emerging economies, which is familiar in so many areas of global economic activity. The story is one of booming growth versus stagnation or contraction compounded by technologically superior and larger-scale competition. Given the short- to medium-term economic picture and resulting demand uncertainties, refiners would be wise to maximise the flexibility of their capacity plans, and to see what 2012 will bring. Some will not have that luxury.

### **Umberto della Sala** President & Chief Operating Officer Foster Wheeler

**W**e are certainly seeing robust activity in all of the hydrocarbon-related business sectors in which Foster Wheeler's Global Engineering and Construction Group operates: onshore and offshore upstream oil and gas, midstream/LNG, refining, chemicals, pharmaceuticals, metals and mining and power.



Certainly, we have a good prospects pipeline, although it is true that clients are in some cases taking longer to reach final investment decision or are releasing projects in phases. We have a number of projects that are going through the final investment decision-making process and for which we believe we are well positioned. And we are seeing new opportunities continuing to emerge, particularly in Asia, the Middle East and South America.

Looking forward into 2012, we see three key themes, which are in many ways the same three that we saw at the start of 2011, but these are now coming into even sharper focus. First is local service delivery. This has always been important to us and is becoming an even stronger area of focus for us and for our clients. We have made further strides forward this year, for example in Saudi Arabia and in Azerbaijan, by developing our own resources and by building relationships with local or regional client and/or contractors to enable us to deliver the Foster Wheeler product locally and competitively to our clients, for the long-term, in line with local content requirements and our clients' preferences.

Second, the emphasis is on upstream. We are seeing clients splitting their organisations into separate upstream and downstream companies, and many of international oil companies are focusing more of their planned capital spend on the upstream sector (many include LNG in this category). The offshore and onshore upstream sector remains a strategically important market for us and one in which we are further developing our skills, service portfolio and geographic presence.

The third theme relates to the size and complexity of projects. Large projects are getting even larger and more complex; for example, the scope and scale of some of the planned investments in the Middle East, South America and Asia. In a number of these regions, new approaches are required, including bringing sources of external financing, leveraging local partnerships and developing innovative execution strategies, such as "smart cloning" for fast-track delivery, or employing a modular design and build approach in areas where resources are constrained. Size and complexity play to our strength, and we are now leveraging our skills and experience in delivering these complex hydrocarbons projects into the metals and mining sector.

As we have said before, competition remains strong everywhere. We are focusing on those opportunities where we believe we have differentiators, such as our technologies, our know-how, our client relationships, our global presence and our ability to work with clients from the earliest phases of projects to help them shape their investment, and our proven track record of safely delivering technically complex and very large projects.

### **Leon de Bruyn** Managing Director Chevron Lummus Global

**F**ear of change is a natural human emotion and especially felt in today's tough economic market. As daily crises are announced, the energy industry is reeling from the challenges that could cause our industry to fall farther and farther behind in meeting the world's increasing energy demands.



Actually, the energy industry is currently in a period of technical innovation that is quietly, yet surely, improving the future of energy for generations to come. We now expect to produce a more diverse supply of cleaner energy products available globally with extended lifecycles. Here are a few examples that were considered major world crisis problems only a few years ago, while now they are viewed as challenges that lead us to innovations that help make positive changes:

- The anxiety over the inevitable onslaught of peak oil that had been discussed and argued for years
- The competition for scarce energy causing future wars, famine, destruction of wildlife habitat and global warming as carbon heavy fuels were consumed more and more rapidly
- The future of energy expected to be particularly tough for the developing world that needs it to decrease poverty and develop their countries' potential in a brutal market
- The environmental goals that were always viewed to be in conflict with world economic growth.

And in the US, the Energy Policy will force consumers to pay higher and higher prices for transportation fuels

as carbon gets taxed, coal mines are shut, petroleum supplies shrink and where bio-derived fuels, wind and solar power are mandated and subsidised. In each and every one of these areas, investments in R&D are steadily changing in direction from negative to positive in coal, shale, petroleum, biofuels, wind and solar. It is with such advanced, innovative technologies that we are able to discover new unconventional resources to produce products for our future.

The continuous search for energy efficiency at all levels in our industry, whether driven by emissions and carbon footprint reduction, energy utilisation or economic optimisation, continues to propel research and development breakthroughs. We continue to see new materials in catalysis and higher performance catalysts, manufacturing improvements, process innovations and equipment design advancements, and we are even rethinking our basic assumptions and conventional wisdoms, among others. This relentless search at Chevron Lummus Global has resulted in new-generation Isocracking applications, such as integrating hydrocracking for fuels and lubes, integrating hydrocracking and hydrotreating functions, and optimised partial conversion. The first of these new-generation Isocracking units that we designed were started successfully in the last couple of years.

Heavy oil development continues to be economic and highly attractive in North and South America. Horizontal drilling and multistage fracking will eventually unlock trillions of dollars of new oil and gas shale reserves in the Americas, Europe and Asia. These technologies will continue to improve the useful life of these reserves, which are estimated to last multiple decades.

Our latest heavy oil catalyst technologies allow the production of light clean transport fuels while still reducing the overall carbon intensity of the combined process. Catalyst innovation continues as a platform for greater R&D investment for Chevron Lummus Global. We have a great history and continue to develop and commercialise lower cost, higher performance hydrotreating and hydrocracking catalysts that are fit for purpose to convert heavy oil fractions to high-value, salable products.

Heavy oil recovery and upgrading will move well above 2 Million b/d as improved thermal technologies make their application economic at crude oil prices as low as \$50/bbl. We also anticipate a technology push into the subsurface areas of heavy oil production, where in-situ upgrading may prove feasible and economic in the next few years. Subsurface upgrading technology is an area that could prove as revolutionary as the recent shale technologies have been in unlocking previously unrecoverable oil assets.

Recovered heavy oils such as bitumen are being converted in LC-Fining complexes in Canada and elsewhere to synthetic crude or finished products. We have furthered the LC-Fining technology and integrated it in upgrading schemes with other proven processes such as solvent deasphalting and delayed coking. As a result, recovery of heavy oil and conversion to transport

fuels has become more economically attractive, unlocking resources.

Bio-derived fuels are not doomed to causing inflation by driving up food prices. Non-food crops will prove to be cost-effective sources of biofuel feedstocks in the near future as our latest R&D investments come on line. Chevron Lummus Global is now working in partnership with ARA to bring our first dedicated demonstration biorefinery on line by 2014.

Maybe we will always continue to fear change in our energy industry, but here we must recognise that a new generation of engineers, scientists and investors are coming behind us to meet the energy and environmental goals of a growing population.

## Charles Drevna

### President

### National Petrochemical & Refiners Association

(American Fuel & Petrochemical Manufacturers as of 25 January 2012)

Political and regulatory uncertainty abounds for petroleum refiners and petrochemical manufacturers in the US in 2012, making it impossible to predict with certainty what changes lie ahead. 2012 also brings one change I can predict for the 110-year-old trade association I represent: NPRA, the National Petrochemical & Refiners Association. On 25 January, we will change our name to AFPM, the American Fuel & Petrochemical Manufacturers. We are adopting this new name because it better describes who we are and what we do.

Regarding the outlook for our industries in 2012, much depends on actions by Congress, President Obama, the US Environmental Protection Agency and the courts. President Obama, his EPA and the Senate majority remain focused on increasing over-regulation and increasing taxes on companies that produce oil and natural gas and that manufacture fuels and petrochemicals. The policies they advocate are part of an anti-fossil fuels agenda that would raise the cost of petroleum fuels and petrochemicals in an effort to make so-called "alternatives" that receive billions of dollars in taxpayer subsidies more competitive.

The majority in the House of Representatives is seeking to rein in over-regulation by EPA. The environmental agency wants to require fuel and petrochemical manufacturers to spend billions of dollars to reduce emissions, even though these reductions would bring little or no environmental benefit and would increase energy costs, trigger job losses, and harm US economic and national security.

At the same time, the outcome of lawsuits will determine how far EPA can go in some of its regulation of fuel and petrochemical manufacturers. One major case before the US Court of Appeals for the District of Columbia Circuit challenges EPA's "endangerment

