

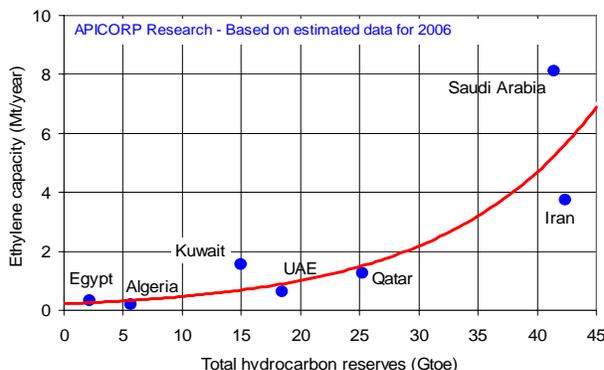
PETROCHEMICAL INVESTMENTS IN THE MENA REGION DETERMINANTS, DRIVERS AND RISKS TO GROWTH ¹

1. Contrary to what some economists would argue, the petrochemical industry has remained a critical link of the hydrocarbon supply chain. This is particularly the case in the MENA region, for not only the industry depends directly on upstream feedstock for its operations but it is also starting to integrate with the refinery link or be part of cluster developments involving adjacent hydrocarbon processes. This hydrocarbon link and proximity are important to consider when analyzing changing investment conditions in the industry and evaluating the driving and restraining forces in its business environment.

2. With such a perspective in mind, this commentary aims to provide insight into the determinants of investment in the industry and the resulting medium-term investment outlook.¹ It focuses on the key drivers of growth and the associated uncertainties and risks. The investment outlook covers the dominant primary industry portion that manufactures base chemicals (olefins and aromatics) and nitrogen fertilizers (ammonia and urea). However, for the sake of clarity and illustration, emphasis is put on ethylene - the industry's key building block in the region - as the main indicator of growth.

Determinants of investment

3. MENA hydrocarbon producers have consistently identified value-adding as an important determinant of investment in the petrochemical industry as it diversifies and stimulates economic growth, promotes direct and indirect job creation and enhances current account balances through import substitution or export. However, while the availability of feedstock at low prices has given the region a major competitive advantage over other producing areas, empirical evidence both through over-time and in cross-section analyses (Figure below for the latter) has shown that the pace of development (measured through ethylene capacity) has been uneven. Government's vision and commitment and the strategies and business models adopted by their champions - the national companies in charge of developing the industry - have dictated today's achievements.



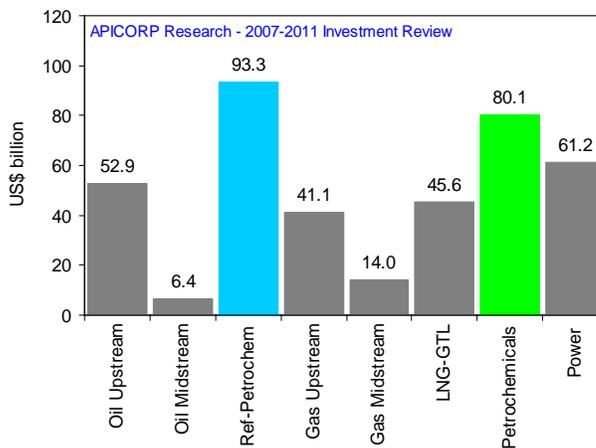
4. Nonetheless, the region, which in 2006 contributed some 12% of the world's ethylene capacity, has embarked afresh on ambitious plans to fully develop its potential. In keeping to ethylene as the main barometer of growth in the sector, the Table below shows that the planned/announced capacity of key countries for the period 2007-2011 totals 26 million tons. This higher than all previous five-year rolling outlook, which continues

to be dominated by Saudi Arabia, represents more than 70% of the world's incremental ethylene capacity.

Country	2007-2011 Capacity (kt/yr)
Saudi Arabia	9,930
Iran	5,120
Qatar	4,100
Algeria	2,800
UAE	1,400
Egypt	1,000
Kuwait	850
Oman	800
MENA region	26,000

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5. Obviously, investments are more considerable when looking at the petrochemical and fertilizer sectors as a whole. APICORP's review of capital expansion (see *Economic Commentary* Vol. 1 No. 10), has established that this sector total some US\$80 billion. This is just below the dominant oil-based refinery link, which includes integrated refinery-petrochemical projects (Figure below).



6. A number of economic and policy drivers underpin this medium-term investment outlook. They include market opportunities, feedstock availability, economic viability, financing accessibility and investment climate suitability. These drivers, which also carry intrinsic uncertainties and risks for projects growth over the outlook period, are briefly reviewed in the following sections.

i) Market opportunities

7. It is well established that both global demand and supply for petrochemical products have grown more rapidly than world GDP. Yet, different rates of growth between regions and product groups have caused changes in trade flow patterns, which favoured low-cost suppliers. Although Europe has remained a net importer of ethylene derivatives, much higher growth rates of import have been achieved for olefins, aromatics and ammonia/urea in the Asian region as China's and India's strong economic growths have created a huge demand for these products. However, with international chemical companies moving into Asia to save on costs and secure markets, MENA leading producers have to reassess the impact of this trend on their own asset redeployment and trade strategies particularly for ethylene derivatives, which remain the dominant export products from the region.

¹ This commentary is an abridged version of a communication by Ali Aissaoui, Head of Research at APICORP, to the forthcoming Fleming Gulf's Middle East Petrochemicals Forum (Dubai, 26-27 February 2007).

ii) Feedstock availability

8. The bulk of the additional 26 million tons of ethylene capacity highlighted previously is ethane-based. The required feedstock, from both associated and non-associated gas, may prove problematic to supply entirely. Anecdotal evidence suggests that some countries within the MENA region are likely to be facing dwindling high quality and low-cost gas supplies. This seems to be the case of the UAE, Kuwait and, to a lesser extent, Saudi Arabia. While the UAE will be very soon procuring competitively-priced gas from Qatar through Dolphin Energy (an option denied to Kuwait for transit path unfeasibility), Saudi future gas potential hinges on the prospects of discoveries by the International Joint-Ventures currently involved in the Rub' Al-Khali basin.

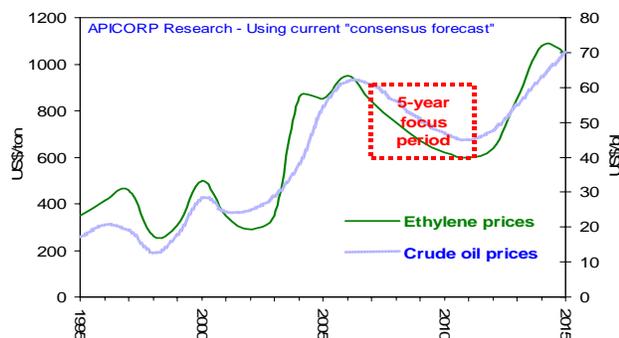
9. In any case, significant investments in far afield and deeper gas reservoirs will be required. In this context, the pricing of more costly methane and ethane has to be addressed. While it is beyond the scope of this commentary to dwell on the pricing of indigenous hydrocarbon resources, prices should be expected, in the absence of a proper market, to increase to reflect either the opportunity cost or at least the long-run marginal cost of production plus a depletion premium.

iii) Economic viability

10. Higher prices of feedstock (either traditional or alternative) will still be competitive and, in any case, unlikely to deter project sponsors in the region. However, other factors such as project costs and product output prices will significantly affect the economic viability of petrochemical projects.

11. As far as costs are concerned, APICORP's investment review for the period 2007-2011 has shown that the upsurge in project costs stems from notable changes in scope and/or scale of key projects and above all soaring project costs across the board. Furthermore, the factors most responsible for the escalation of project costs are those underpinning EPC prices. These include rising prices of factor inputs, higher contractors' margins and the systematic pricing of project risks (see *Economic Commentary* Vol. 1 No. 9).

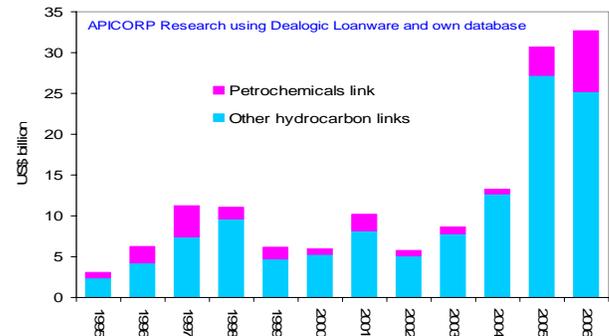
12. With regard to product output prices, those of ethylene, which constitute a key benchmark for the global petrochemical industry, are likely to continue to evolve in parallel with oil prices. Industry experts anticipate that prices may fall by some 30% to 40% at the bottom of the cycle at the end of the 5-year focus period (2007-2011) before moving upward again along a new cycle (Figure below).



iv) Financing accessibility

13. It has been demonstrated in previous commentaries that the capital structure of hydrocarbon downstream projects for the period 2007-2011 was likely to be 70% debt and 30% equity, resulting in an average annual amount of debt close to US\$11 billion per year for the petrochemical link (excluding integrated

refinery and petrochemical projects). This amount, which represents some 25% of the total debt needed for the entire hydrocarbon and energy sector, is far higher than the record level of debt financing of US\$7.5 billion concluded in 2006 out of the US\$33 billion for the whole hydrocarbon and energy sector during the same year (Figure below).



14. To finance the impending gap, entrepreneurial petrochemical project sponsors, which have in recent years been relatively active in the IPO market for external equity, have started to borrow through other debt instruments such as bonds and sukuk. Those keen to follow suit are certainly aware that the cost of access to the capital market depends on projects' and companies' investment grade credit ratings, which are almost always capped by sovereign ceilings.

15. The key to such ratings involves improving governance and transparency and overcoming inhibition to external scrutiny through enhanced public reporting. Currently, out of the eight or so significant MENA petrochemical producing countries, only those in the GCC area have attained investment grade status. Rating is, however, merely one element among a set of complex factors that determine the suitability of each country's hydrocarbon investment climate.

v) Investment climate suitability

16. APICORP's perceptual mapping of the hydrocarbon investment climate of key MENA oil and gas producing countries, which is based on investment potential, country risk, and the enabling environment, offers a comprehensive framework for assessing the investment climate (see *Economic Commentary* Vol. 1 No. 6). It has revealed that, Saudi Arabia on the one hand, and the cluster formed of Qatar, the United Arab Emirates and Kuwait on the other hand, occupy the most desirable quadrant [Vast Investment Potential-Lower Country Risk-Strong Enabling Environment]. In contrast, Iran is perceived as less attractive despite its huge investment potential. Also, Algeria has to make further progress to catch up with Oman and Egypt, which have taken great stride to enable investments in the downstream sector.

Conclusions

17. Never before has the outlook for investment in the MENA petrochemical sector been so bullish and yet so uncertain. While higher-value adding projects should be expected to find active support, the industry's drivers and the uncertainties and risks associated with them will be key to investment decisions. In a context of constrained availability of traditional feedstock and soaring project costs, the industry, which is more prone to cycles than any other link of the hydrocarbon supply chain, may face a price downturn in the medium term. Depending on the depth and length of the down cycle, project sponsors may well review the timing and magnitude of their investment and consider delaying some of their less strategic capital projects until the business cycle swings high again.