

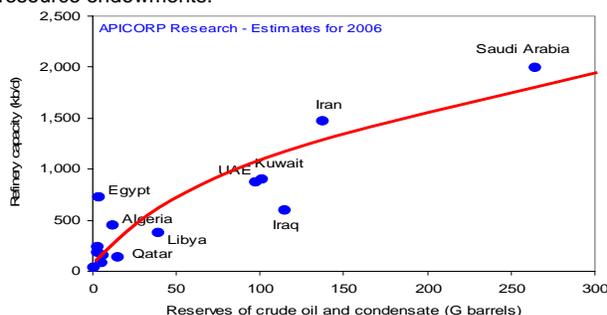
MENA INVESTMENTS IN PETROLEUM REFINING: DETERMINANTS, DRIVERS AND RISKS TO GROWTH ¹

1. MENA refining industry, which has until recently been relatively stagnant, faces three major challenges.¹ Firstly, the industry needs to expand to cope with tight supply in the domestic markets and take advantage of tremendous growth opportunities in the export markets. Secondly, the industry has to satisfy a demand pattern increasingly dominated by declining heavy fuel oil and growing light transportation fuels. Thirdly, the industry must comply with stricter environmental regulations and standards.

2. The policy responses to these challenges typically involve boosting investment in order to modernize and upgrade existing capacity and embarking on major grassroots projects to add significant crude oil distillation and conversion facilities. This commentary aims to provide insights into the determinants of these investments. It further highlights key drivers of growth and the associated uncertainties and risks. The investment outlook covers the refining and integrated refining-petrochemical sectors. It excludes investments outside the region.

Investment outlook

3. MENA refining capacity, as measured by crude oil distillation capacity, stands currently at 8.75 million barrels per day representing a little more than 10% of world's refining capacity. As shown in the 2006 cross-section below, the distribution of this capacity basically reflects MENA countries' petroleum resource endowments.



4. The main reason for MENA's low share in world's refining is that shipping crude oil is traditionally considered less costly than handling and transporting refined products, making more sense to build refineries close to major consumer markets. However, the relatively high cost and long lead time of building new refineries in the OECD area has prompted a shift in investment strategy of the key producers: siting new export refineries at home and pushing for forward integration in the fast-growing markets of China and India. Furthermore, in the GCC area, which has witnessed a gradual decline in the quality of crude oils, the trend is for more complex refineries with deeper conversion and integration to petrochemical processes.

5. In keeping to crude oil distillation capacity as the main indicator of growth in the sector, Table below shows that the currently planned capacity in key countries for the period 2007-2011 totals 5.8 million barrels per day. This represents more than 60% of world's incremental refining capacity during the next 5-year period. Not unexpectedly, the largest expansion will occur in Saudi Arabia in both capacity and complexity. The first and biggest ongoing project, which is due to start in 2008, is the JV partnership between Saudi Aramco and Sumitomo Chemical.

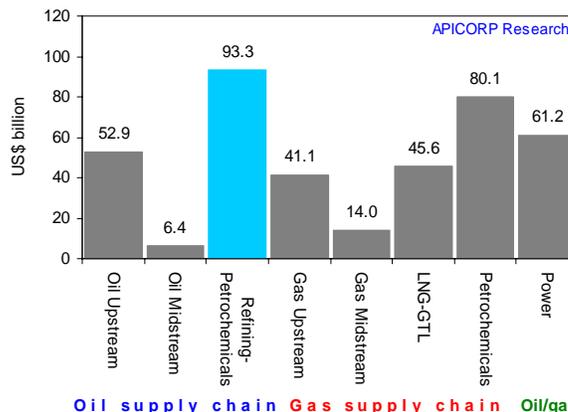
¹ As usual in this commentary the Middle East & North Africa (MENA) is defined to include the Arab world and Iran.

The project expands an existing platform of the Rabigh topping refinery into a world-scale 400 kb/d integrated refining and petrochemical comprising a high-olefins-yield fluid catalytic cracker and ethane-based cracker units. As a result, the existing complexity index, a measure of secondary conversion capability, will triple.

	2007-2011 Planned Refineries		
	Nb	Cap (kb/d)	% of total
Saudi Arabia	4	1,650	28.6
Kuwait	2	615	10.7
UAE	2	605	10.5
Iran	3	445	7.7
Algeria	3	415	7.2
Iraq	3	370	6.4
Qatar	2	345	6.0
Libya	3	340	5.9
Egypt	3	330	5.7
Sudan	2	250	4.3
Oman	2	200	3.5
Syria	1	140	2.4
Tunisia	1	60	1.0
Total	31	5,765	100.0

APICORP Research

6. The above planned refineries are taken from APICORP's review of capital expansion in the MENA energy sector for the period 2007-2011 (see *Economic Commentary* Vol. 1 No. 10). The review has established that investments in the refining sector, which includes the modernization and upgrading of existing capacity, total US\$93 billion (Figure below). For reasons developed more fully below, the resulting average cost per barrel of daily capacity of some US\$16,200 has inflated by more than 60% compared to the cost reference five years ago.



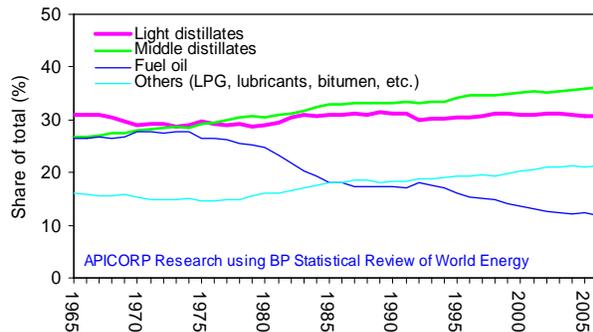
Drivers and risks to growth

7. A number of economic and policy drivers underpin this medium-term investment outlook. They include market opportunities, 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

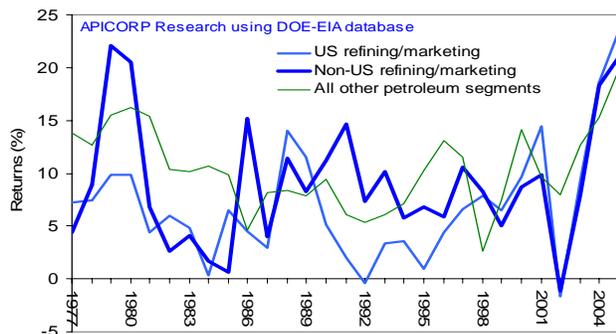
8. Market developments have been driven by economic growth and significant changes in energy balances. During the last five years, up to 2006, oil demand rose by a remarkable 6.9 Mb/d to 84.5 Mb/d. Thanks to a faster and more sustained economic growth, most of the increment has come from China, the Middle East and, to a lesser extent, India. The bulk of this increment has been for use in the transportation sector, which remains quasi entirely dependent on petroleum. In fixed facilities, competitive alternative sources of energy, chief of which natural gas, are among the key factors that have affected the demand pattern for oil products.

9. As a result, and as shown in the Figure below, the share of fuel oil consumption has continued its sharp decline from 18% to 12% of total demand during the last two decades. In contrast, the share of middle distillates has increased from 33% to 36% and that of light distillates has maintained a share of 31%. Looking forward, oil products meeting more stringent quality specifications are expected to account for an increasing share of total demand. While this will offer new market opportunities, it may compromise the economic viability of refining.



ii) Economic viability

10. Refining is basically a margin-based manufacturing business, which has traditionally been considered less profitable than other segments of the petroleum industry. Gross refining margins - the difference between the cost of crude oil and the price of refined products - have, until recently, been comparably low. Furthermore, additional investments to meet stricter environmental standards and tighter product specifications, particularly with regard to sulphur content, have contributed to reducing net profit margins even lower. Although having improved in most recent years as a result of tighter markets (Figure below) returns are expected to come under renewed pressure as the required capital investments have soared.²

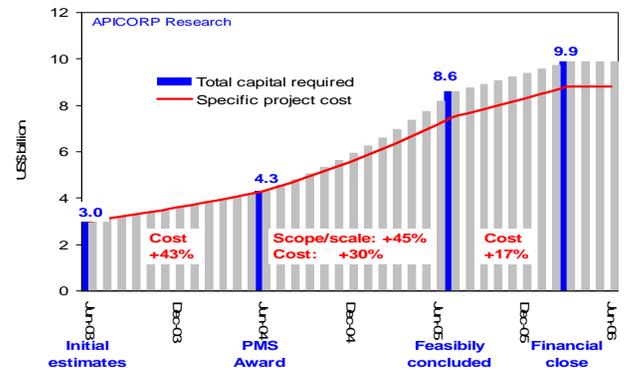


11. Indeed, as indicated in paragraph 6, APICORP's review of MENA energy investments has shown that the surge in capital investment stems from soaring project costs. The factors most responsible for the escalation of these costs are those underpinning EPC prices. They include rising prices of factor inputs, higher contractors' margins and the systematic pricing of project risks (see *Economic Commentary* Vol. 1 No. 9).

12. This has induced project sponsors to seek larger scale as a means of reducing per-unit costs and greater scope in order to add more value to their business processes. Obviously, this has added to total capital requirements. This is well illustrated in the case of the Petro-Rabigh refinery-petrochemical project. As shown in the figure below, a first cost update (+43%) occurred a

² Return on investment (ROI) is the most commonly used measure of economic performance in the refining industry. The EIA-DOE from which data are taken defines ROI as net income earned by the refining/marketing line of business as a percentage of net fixed assets.

year after Saudi Aramco embarked on the project. Then, a combination of changes in scope/scale (+45%) and cost (+30%) were announced at the conclusion of the feasibility study and the establishment of the JV. Finally, a further rise in cost (+17%) was observed at financial close.



iii) Financing accessibility

13. It has been demonstrated in previous commentaries (see *Economic Commentary* Vol. 1 No. 10) that the capital structure of petroleum 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\$13billion per year for the refining sector (including integrated refinery and petrochemical projects). This amount, which represents 31 % of the total debt needed for the entire energy sector, is double the level of debt financing of US\$6.5 billion concluded in 2006.

14. To finance the impending gap, NOCs and their partners need to look at other debt instruments such as bonds and sukuk. The cost of capital in these markets depends on credit ratings, which are almost always capped by sovereign ceilings. 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 petroleum countries, only those in the GCC area have attained investment grade status. Rating is, however, just one element in a complex set of factors that determine the suitability of each country's energy investment climate.

iv) Investment climate suitability

15. APICORP's "perceptual mapping" of the energy investment climate of key MENA petroleum producing countries, which is based on investment potential, country risk, and enabling environment, offers a comprehensive framework for assessing the investment climate (see *Economic Commentary* Vol. 1 No. 6). It has shown that Saudi Arabia on the one hand and the cluster formed of Qatar, the United Arab Emirates and Kuwait on the other hand offer the region's most suitable energy investment climate. In contrast, Iran is currently perceived as less attractive despite its huge investment potential. Also, Algeria has to catch up with Oman and Egypt, which have taken great stride to enable investments in the downstream sector.

Conclusions

16. The slow response to oil market signals in the major consuming areas has prompted a shift in MENA petroleum investment strategy. As a result investment plans in refining have been given strong support. However, MENA oil companies embarking on high-cost export-oriented refineries may face financial challenges if the economic viability of these projects deteriorates with a downturn in refining margins. Such an uncertainty constitutes an important risk factor that could curb exposure to this critical link of the petroleum supply chain.