



GLOBAL ENERGY DEMAND UNDERGOING RAPID CHANGE

Shale revolution and population and consumption growth changing nature of investment and presenting challenges to the Middle East

\$2 trillion investment needed in regional energy sector in next two decades

Doha - 3rd April 2013

The world's energy demand is growing with increasing population and rapid development in emerging markets. Today, about 1.1 billion people in the 'developed' world, consume 110 million barrels of oil equivalent per day (boe/d) in primary energy. The developing world's 5.8 billion people consume 140 million boe/d. What this means is that if the developing world were to consume primary energy even at the level of the EU (the most efficient energy users in the developed world), the planet would need a further 270 million boe/d to meet demand. This is more than double the current primary energy consumption.

What's more, with the global population expected to increase from its current 7.1 billion to peak at 9-10 billion mid-century, growth in energy demand may even be underestimated in various agencies' forecasts. Whatever the demand decades from now, oil, gas and coal will continue to be the main sources of energy, still supplying 80% of primary energy. Given its environmental, availability and cost advantages, gas should be the fuel for 21st century.

Majid Jafar, CEO of Crescent Petroleum and Vice-Chairman of the Crescent Group, in remarks made at the Doha Energy Forum, says that there are more than 250 years of gas reserves at current consumption levels and levels of reserves increase every year. "In 2012 the world oil and gas industry added approximately 100 trillion cubic feet of new gas resources through exploration discoveries", he said.

Gas differs from oil in several ways. Gas resources are well distributed globally and the creation of a Gas "OPEC" is almost impossible, so as a result the gas industry better obeys the rules of Supply & Demand, which ensures gas prices remain more competitive compared to oil prices. Mr. Jafar believes these trends will have "huge implications for the global energy industry as well as for the Middle East region in particular".

"There are various examples of observable trends that will affect the global energy industry. Only a few years ago, major investment decisions were made in the Middle

East to supply LNG to the USA - the world's largest gas consumer and expected at the time to become the largest LNG importer", Mr. Jafar says. However, "technological progress led by the US independent sector has delivered massive quantities of shale gas, filling the supply-demand gap that was emerging. The drivers of the shale gas revolution included the sustained high US gas price, creating the environment for entrepreneurialism to flourish".

Yet Mr. Jafar believes it is unlikely that the US shale gas revolution is a local phenomenon: "Today, from Argentina to China, each country is trying to explore for shale gas and this includes MENA region countries such as Algeria and Saudi Arabia. For example, China is estimated to hold, at 1200 trillion cubic feet, even more shale gas resources than the US, according to an EIA study. In this context, matching resource to markets in the most cost effective way is a critical question facing the industry", he argues.

For its part, the Middle East region both exports and imports gas. In 2011, the region (excluding Turkey), produced roughly 51 billion cubic feet per day (bcf/d) of gas, of which 13 bcf/d was exported and 39 bcf/d. consumed within the region. Projections suggest that by 2020, consumption could increase to ca. 54 bcf/d – a staggering 40% increase in the next 7 years. Meanwhile the region's proved reserves life (reserves to production ratio) is currently close to 200 years, without including probable or yet to find conventional and unconventional resources. The conclusion from this, Mr. Jafar argues, is that in the next seven years the Middle East region's energy companies need to invest in production capacity and interconnecting infrastructure if this gas demand growth is to be met.

A second significant trend is the threat that gas poses to oil, especially in sectors such as shipping, rail and heavy-duty road transport. In North America, there is already a huge drive to gassify road and rail transport – given the current gas price is at roughly \$24/barrels oil equivalent (boe) versus a diesel price of about \$160/boe at the pump. The incentive to use compressed natural gas in road transport is huge. Today, half of global oil demand is in petrochemicals, power production, industry, road freight, shipping and rail sectors. "An attack by cheap gas into these sectors of oil consumption would fundamentally change both the oil industry and the gas industry. The Middle East, with its dependence on oil revenues, should also prepare for a structural change in the oil industry as a consequence of the gas revolution", Mr. Jafar says.

A common misperception, he believes, is that the shale revolution is only in gas. However, North America is also leading the world in shale oil production. US unconventional oil production is expected to grow from almost nothing in 2010 to 4.5 million boe/d by 2020, pushing US total liquids production towards 12 million barrels/day. As a result, the US could soon become the third >10 million b/d oil producer alongside Russia and Saudi Arabia. Coupled with an oil-to-gas switch in the heavy-duty transport sector, this could massively reduce the demand for Middle East oil, following low demand from the US for Middle Eastern gas. From a strategic perspective, building regional, resource-based industries could reduce the Middle East's dependence on export markets, while accelerating the economic development of the region.

Finally, Mr. Jafar argues that meeting energy demand growth in the Middle East will require massive investment. The IEA estimates that between 2012 and 2035, the Middle East will require \$2 trillion in investments into its energy sector. Of this, about half is into oil industry investments and the rest is split 50/50 between gas and power production. In other words, the gas-power chain in the region will need \$1 trillion in the next 23 years, or \$43 billion per annum. In this context, the region's energy companies will need significant capital and project management resources. This is happening while international oil companies have significant investment opportunities in their own home regions or other emerging oil and gas regions of the world – the OECD alone is expected to need \$22 trillion of energy investments in the same period. So, Mr. Jafar argues: “the Middle East may need to rely on its own resources, in both the NOCs and the region's private sector, to meet its own energy challenge. But it is a challenge that is imperative to meet”.

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