

LNG SUPPLY AND DEMAND: THE GREATER MIDDLE EAST PARADOX

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ABSTRACT

The Middle-East and North Africa region has around 50% of the world's proven conventional natural gas reserves. Yet this region, known to be the richest in hydrocarbons will face a strange paradox: that of having a critical gas shortage albeit momentarily! The countries of the region, particularly the wealthy Arab Gulf states, have one of the fastest growing rates of energy demand. This is mainly characterized by the increasing consumption of power in the region and its seasonal volatility as well as rapid industrial growth. In fact analysts refer MENA as having 'one of the world's fastest growing rates of power demand on a percentage basis of any region'. On the other hand, with the exception of Qatar and Iran, every other country in the region is facing challenges around supply growth. Consequently, the Gap between the local demand and the local supply will increase rapidly over the next few years. Kuwait, Bahrain, Oman, and to another scale Saudi Arabia have all given signs that they need to find ways of bridging that gap! One of the ways of bridging that gap is to import Gas either via pipeline or LNG as a last resort for some and a smart alternative for others. One may think that Qatar or Iran would logically be providers of gas via pipeline for the region. Yet we are mistaken, why would they do so some argue? LNG represents probably the lowest technical and non-technical transaction costs in the energy mix.

BACKGROUND

The world is full of paradoxes, and few regions are quite as paradoxical as the Greater Middle East, a region which spans from Morocco to Cape Kanyakumari. The three sub regions – the Middle East, South Asia and North Africa (also called MENASA hereafter) - have a great deal in common ranging from history, geography, and religions to colonization. Some have plenty of oil and others plenty of gas and some have plenty of both yet still need to import pipeline gas and/or liquefied natural gas (LNG). The Greater Middle East energy paradox consists of resource abundance and export opportunities on the one hand, and rising domestic demand and LNG imports on the other. After all, why would the world's seventh largest oil producer (the United Arab Emirates)¹ ever consider importing pipeline gas, let alone LNG?

The energy policies in the Greater Middle East region have surprised the rest of the world, being in some cases in complete contrast to what would have been expected from a region awash in natural resources. Some, like the State of Qatar, elected to impose a moratorium on gas production once it reached its goal of producing 77 million tonnes per annum (mtpa) of LNG, despite sitting on the third largest conventional gas reserves in the world.² Others, like the Islamic Republic of Iran, the United Arab Emirates and Oman – all oil exporters - decided to diversify their energy supply mix through nuclear and solar power generation, by importing gas or LNG, and in some countries a mixture of all of these energy alternatives.

This region is finding its own way by many alternate routes. Sometimes the creative and innovative response to conventional socioeconomic challenges and macroeconomics will be misunderstood, but the resourcefulness and ability to intrigue and surprise the rest of the world will continue.

AIMS

This paper will discuss the global outlook for both natural gas and LNG and describe the Greater Middle East's current and anticipated supply and demand situation. It will show that LNG is an important and

¹ BP (2012), "BP Statistical Review of World Energy 2012", viewed 22 January 2013, http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2012.pdf.

² Ibid.

growing aspect of the Greater Middle East's energy mix, bringing both security and flexibility. Ultimately, we will see that the so-called paradox is no paradox at all when it comes to LNG.

SETTING THE STAGE

Looking back at the developments of the world's hydrocarbon resources, one is struck by the many commonalities: the commonality of difficult predictions, of the potential for hydrocarbons to change lives and even civilizations and the commonality of the business acumen required to turn a resource into a wealth creating trade.

When Spindletop was first drilled in the Texas panhandle in 1901, "black gold" was indeed valuable but no one could know how it would come to dominate the world's energy needs, up to then satisfied by wood and dung and later by coal. When the giant Groningen gas field was discovered in the early 1960s there was skepticism about the scale of the resources. Later in that same decade there was incredulity when wells with chances of success of less than 1 in 50 opened up a whole new province in the North Sea. Most recently, the advent of commercially viable shale gas - something that geologists have known about for decades, but nobody saw as commercially viable until well into the noughties - demonstrated how discoveries and technologies in one part of the world can change lives and livelihoods in another.

In short, not much has changed:

- 1- Predicting the future remains notoriously tricky. Our ability to anticipate supply and demand and, as a consequence, the timing and pace of the required investments remains a very challenging task, best left to a select few who accept both its associated risk and potential economic benefit.
- 2- Energy powers civilizations and is a major contributor to the stability and the continued prospects for economic and social development. The resource challenge does not carry any flag and remains timeless as its form ranges from electricity to water, to salt and to food.
- 3- Merchants have the privilege and the responsibility to ensure that supply keeps pace with demand and competition ensures that prices remain within a range that buyers and sellers, consumers and producers can tolerate.

Before we focus on the Greater Middle East and discuss the trends introduced earlier, let's review the global context for a moment. What are the global natural gas trends that will also influence the Greater Middle East?

GLOBAL NATURAL GAS AND LNG OUTLOOK

First of all, global gas demand is likely to grow by around 2% per year, probably for several decades.³ By 2030, we expect demand to reach as much as 5 trillion cubic metres (tcm) of gas per year, a growth of greater than 60% compared to 2010.⁴ The power sector will drive most of this demand growth as natural gas offers an affordable, fast and cleaner route to meet demand for lighting, refrigeration and the other blessings available to those moving upwards out of poverty.

A modern gas plant emits only half the CO₂ of a modern coal plant and 70% less than decades-old steam turbine coal plants, of which there are still hundreds in operation in North America, Europe and China⁵. Many of these older plants are expected to be decommissioned in the next 5-15 years. In deciding what replaces all that old coal capacity, governments and utilities are beginning to recognise that natural gas capacity is both faster and cheaper to install than other new-build sources of electricity and much better able to complement intermittent wind or solar electricity than either coal or nuclear.

³ Shell analysis.

⁴ Ibid.

⁵ Shell (2011), "Sustainability Report: Royal Dutch Shell PLC Sustainability Report 2010", viewed 22 January 2013, http://reports.shell.com/sustainability-report/2011/servicepages/previous/files/all_shell_sr10.pdf.

What about supply? In principle there is a lot of gas around. The International Energy Agency (IEA) estimates that total technically recoverable gas resources total about 250 years of current global production.⁶ However, getting this gas out of the ground will require significant investment. According to the IEA, to grow supplies by 40% over the next twenty years, cumulative global investment of some \$8 trillion in gas supply infrastructure will be needed⁷ - more than a quarter of a trillion dollars per year.

Along with investment, the industry will have to use an array of innovative production methods to get the gas out of the ground. Over the next decade, technological advances will further accelerate the expansion in unconventional gas production, unconvensionals having already proved to be a game-changer in North America. These technological innovations will not be limited to North America. By 2020, our industry will be producing from shale gas, coal bed methane, tight gas and sour gas in a variety of new locations.

LNG is but a subset of the overall gas outlook, but several features set it apart. Despite the short-term tightness in the LNG market many are predicting, world-wide LNG demand is likely to continue to grow rapidly. In fact, demand for LNG is increasing at a faster pace than overall natural gas demand and it should double in this decade.⁸

This growth will be driven by a host of countries and regions that see domestic supply sources diminishing and find the flexibility and speed with which they can create LNG infrastructure especially appealing. Between 2000 and 2010, the number of countries electing to import LNG more than doubled and the number of LNG exporters increased by 50%.⁹

Why LNG, which represents less than 5% of the global energy mix?¹⁰ Because LNG is to the energy industry what salt is to the food industry: relatively small but absolutely necessary.

LNG offers unique supply security advantages because of its flexibility. Unlike pipelines, LNG ships can follow demand as it shifts and fluctuates around the world. The value of this flexibility was evident after Fukushima when Japan ramped up its LNG imports to make up for the shutdown of its nuclear plants. Between 2010 and 2015 we expect LNG supply to grow at an average of 4.3% per annum, about three times the rate of natural gas overall.¹¹ The number of LNG exporters is likely to increase by nearly one third by 2015, providing buyers with the comfort of a diversified supply portfolio.¹²

The LNG sector must continue to pursue rapid expansion and innovation to meet demand. Shell, for example, is meeting this challenge through its involvement in coal bed methane, shale and tight gas along with floating LNG (FLNG). The latter will enable gas liquefaction at sea, opening up gas resources once considered too remote or expensive to develop. An added advantage is that once production from one gas field has been completed, the FLNG facility could be re-deployed to another site. Shell's first FLNG project at Prelude in Australian waters is currently under construction and we see opportunities to use FLNG in the wider Asia-Pacific region as well as other parts of the world.

So between now and 2030, the global LNG story is one of surging demand, massive investment, tremendous innovation, and rapid globalization.

⁶ International Energy Agency (2011), "World Energy Outlook 2011 - Special Report: Are We Entering a Golden Age of Gas?", viewed 22 January 2013, http://www.worldenergyoutlook.org/media/weowebiste/2011/WEO2011_GoldenAgeofGasReport.pdf.

⁷ Ibid.

⁸ Shell estimate.

⁹ Wood Mackenzie LNG (April 2010).

¹⁰ Ibid.

¹¹ Brinded, Malcolm, Executive Director Shell Upstream International. "Natural gas: a vital part of Europe's energy future." International Oil Summit, Paris, France, 22 April 2010.

¹² Wood Mackenzie LNG (April 2010).

We reported recently that “we could see about half of the permitted LNG supply actually on stream by 2020 – 60 to 70 mtpa – and that might be optimistic. That figure would be about 10% of all expected gas production in 2020, and some 15% of global LNG.”

On the other hand, some, like FACTS Global Energy, expect around 40 mtpa of LNG production from the US to target the premium East of Suez market by 2020.¹³

This target is becoming increasingly realistic but will perhaps play out over a different timeframe as US LNG exporters move closer to final investment decisions.

Is export from the US a game changer? Possibly; unlike conventional LNG projects, feed gas for US LNG exports is priced on a commodity basis traded on the NYMEX, competing with domestic demand from a wide variety of sources. With the US contributing perhaps 10% of overall LNG demand in 2025, the LNG spot market will remain a function of supply and demand, and not that of domestic US supply/demand although Henry Hub (HH) will continue to have some influence.

It is worth noting that (a) US LNG is lean compared to Asian-sourced LNG and correcting for quality will add to the price of LNG sourced from the US; (b) the politics of US energy security as well as other regulatory challenges will play a key role in determining the extent to which US LNG exports will be permitted - the most recent developments here include publication of the NERA report¹⁴ and the subsequent launch of a group of industrial companies lobbying against LNG export; (c) current HH prices are probably lower than the marginal cost of supply hence not sustainable; and (d) the dynamics of shipping capacity from the US Gulf of Mexico to Asia are complex given the distances involved and the widening of the Panama Canal and potential for LNG carriers to transit will influence these dynamics. All of these factors interplay to affect the price of US-sourced LNG to Tokyo Bay, China or the Middle East.

US exports will be an interesting addition, helping to respond to the need for additional LNG volumes but adding yet another ingredient to LNG pricing.

GREATER MIDDLE EAST AS A GAS AND LNG SUPPLIER

The Greater Middle East region is a big player in natural gas with three of the world’s top five conventional gas reserve holders: Qatar, Iran and Saudi Arabia. Its total gas production exceeded 750 billion cubic metres (bcm) in 2011 giving it almost 24% share of the world’s gas production, up from around 15% in 2001. In comparison, the US, presently the world’s top gas producer, produced about 650 bcm in 2011.¹⁵

The region currently supplies about half of the world’s LNG supply and cross-border trade¹⁶ and is expected to deliver over half of the incremental LNG supplies by 2015,¹⁷ driven by Qatar.

The Greater Middle East is not new to LNG. In 1964, the world’s first commercial natural gas liquefaction plant came on stream in Algeria, using Shell technology. That same year, Shell undertook the management of the first two LNG ships ever built and nowadays, Shell operates 44 of the world’s LNG carriers. Continuing our history of involvement in the region, Shell is a partner in Oman LNG (OLNG) since 2000, a partner in Qalhat LNG through OLNG, and holds a 30% stake in Qatargas 4, a joint venture with Qatargas.

Along with the countries mentioned above, Abu Dhabi, Egypt, Libya and Yemen complete the region’s LNG export picture.

¹³ Fesharaki, Fereidun. “The Middle East Gas Revolution: A New Paradigm or a Temporary Shift?” GASTECH, Abu Dhabi, 2009.

¹⁴ NERA Economic Consulting (2012), “Macroeconomic Impacts of LNG Exports from the United States”, viewed 22 January 2013, http://www.fossil.energy.gov/programs/gasregulation/reports/nera_lng_report.pdf.

¹⁵ BP (2012), “BP Statistical Review of World Energy 2012”, viewed 22 January 2013, http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2012.pdf.

¹⁶ Ibid.

¹⁷ Shell analysis.

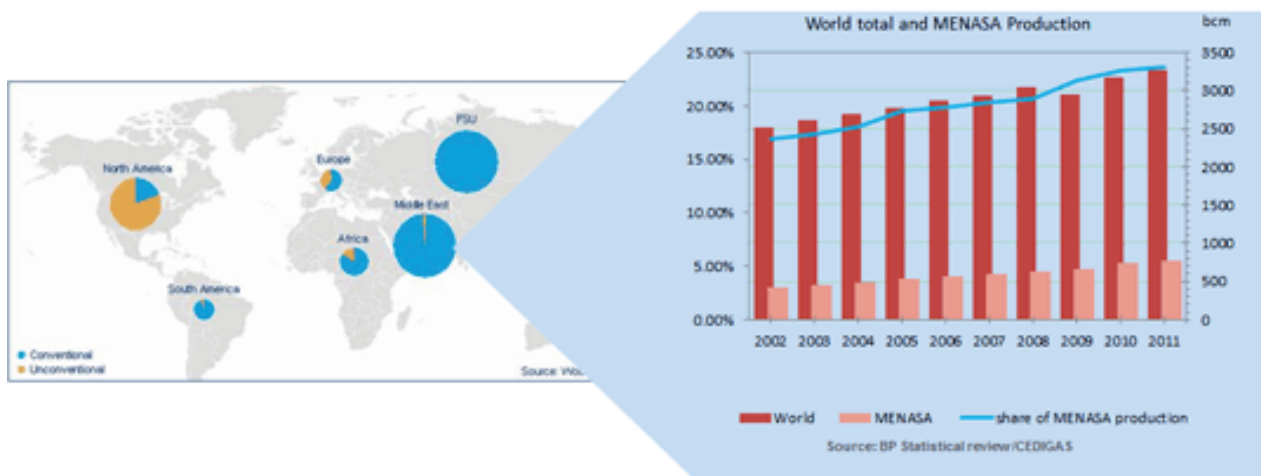


Figure 1: World Total and MENASA Production¹⁸

GREATER MIDDLE EAST AS A GAS AND LNG CONSUMER

Now that we have covered the Greater Middle East’s role as a major source of LNG, let’s turn to demand. The region’s strong economic performance is driving the growth in domestic gas demand. Three factors are contributing to this increase: the switch from oil to gas in the power sector, the growth of the industrial sector, and injection into oil reservoirs to enhance oil recovery (EOR). Consequently, the region’s gas consumption is predicted to grow by about 5% per annum, twice as fast as that of the major European economies.¹⁹

In 2001, Greater Middle East gas consumption barely hit 250 bcm and represented around 13% of the world’s share of gas consumption. A decade later, consumption doubled to above 625 bcm and its share of the world gas consumption reached 19.4%.²⁰

Two examples stand out in the region: Kuwait and Dubai. Kuwait has the world’s sixth largest oil reserves²¹ and significant associated gas. However, the gas is often needed to maintain and enhance oil recovery with the surplus being used in electricity generation. That surplus is no longer sufficient and burning fuel oil or diesel to generate power is inefficient and less environmentally friendly than gas. LNG imports, being cheaper than the liquid fuel equivalent, fill the void beautifully and, if contracted for flexibly, can be tuned to the needs of the nation.

In Dubai, less well endowed in hydrocarbons than many of its neighbours, LNG similarly provides flexibility, monetary savings and environmental benefits compared to alternatives. Other countries in the region are joining this trend towards import of LNG including Bahrain, Morocco, Tunisia, Jordan, Abu Dhabi, and even Egypt.

India, for instance, has become one of the major gas consumers in the Greater Middle East region. Over the last two decades, it has witnessed a tremendous economic growth which needs to be fueled. Natural gas constitutes almost 10% of its energy mix²² and its gas demand has been growing at a rate of 8% per year

¹⁸ BP (2012), “BP Statistical Review of World Energy 2012”, viewed 22 January 2013, http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2012.pdf.

¹⁹ Shell analysis.

²⁰ BP (2012), “BP Statistical Review of World Energy 2012”, viewed 22 January 2013, http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2012.pdf.

²¹ Ibid.

²² BP (2012), “BP Statistical Review of World Energy 2012”, viewed 22 January 2013, http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2012.pdf.

and is expected to keep growing at a rate of 5% per year over the period 2010 to 2020²³. At the same time, domestic production such as KG-D6 has declined from 22.5 mtpa in 2010 to 6.5 mtpa in 2012, 66% more than initial estimates. Consequently, many anticipate that India LNG imports will reach around 20 bcm by 2020 with an estimated 30 mtpa of regasification capacity and only 9 mtpa supply committed on a long term basis.²⁴

Pakistan, on the other hand, has been attempting to import up to 10 mtpa of LNG for the second time and is likely to succeed sooner or later.

Meanwhile, the annual consumption growth rate of the region remained above 5% from 2001 to 2010 with years 2008 and 2009 staying substantially above the world average as illustrated in the graphs that follow.²⁵

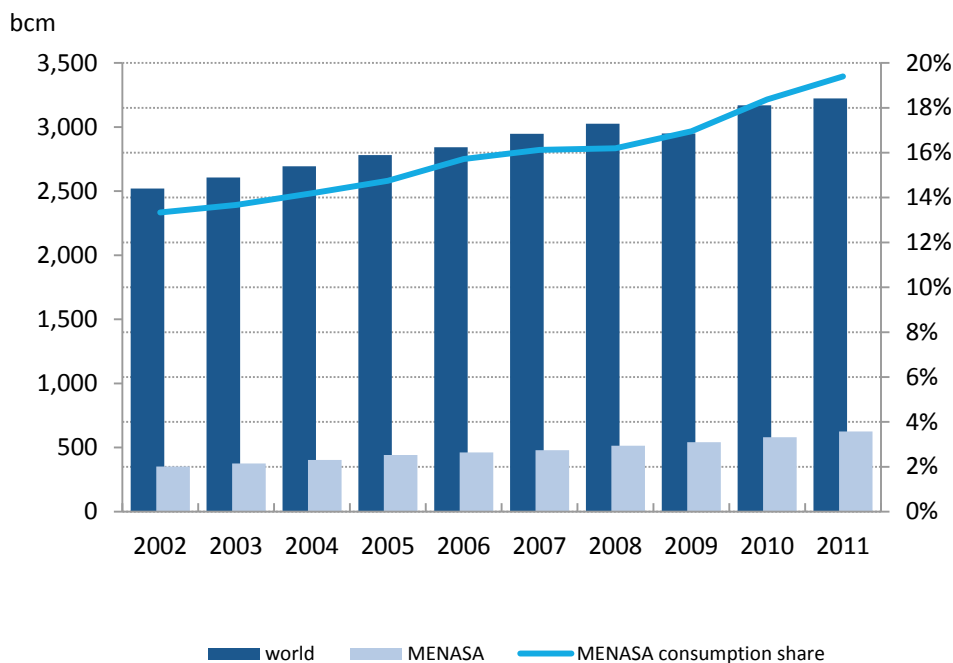


Figure 2: Increasing Share in World Consumption²⁶

²³ Shell analysis.

²⁴ Wood Mackenzie LNG.

²⁵ Ibid.

²⁶ Ibid.

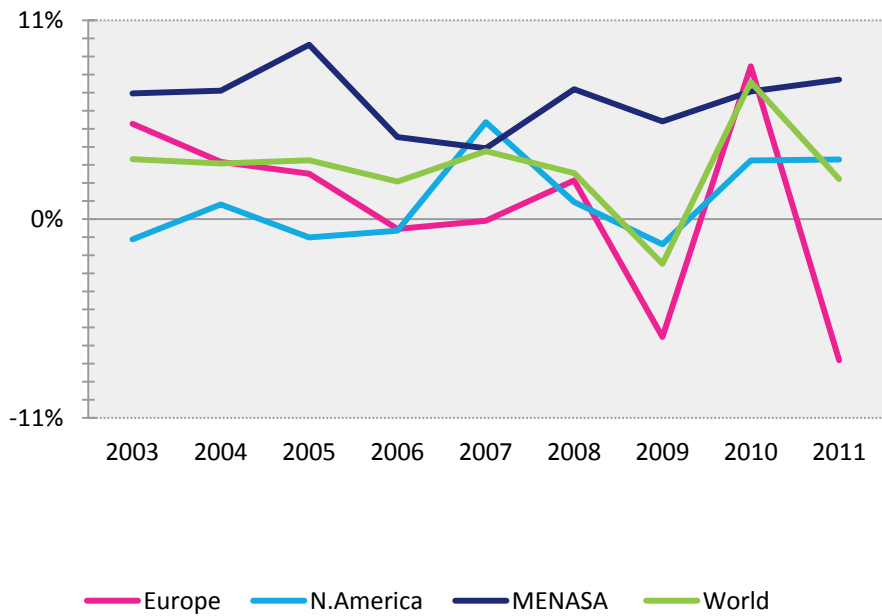


Figure 3: Annual Consumption Growth Rate²⁸

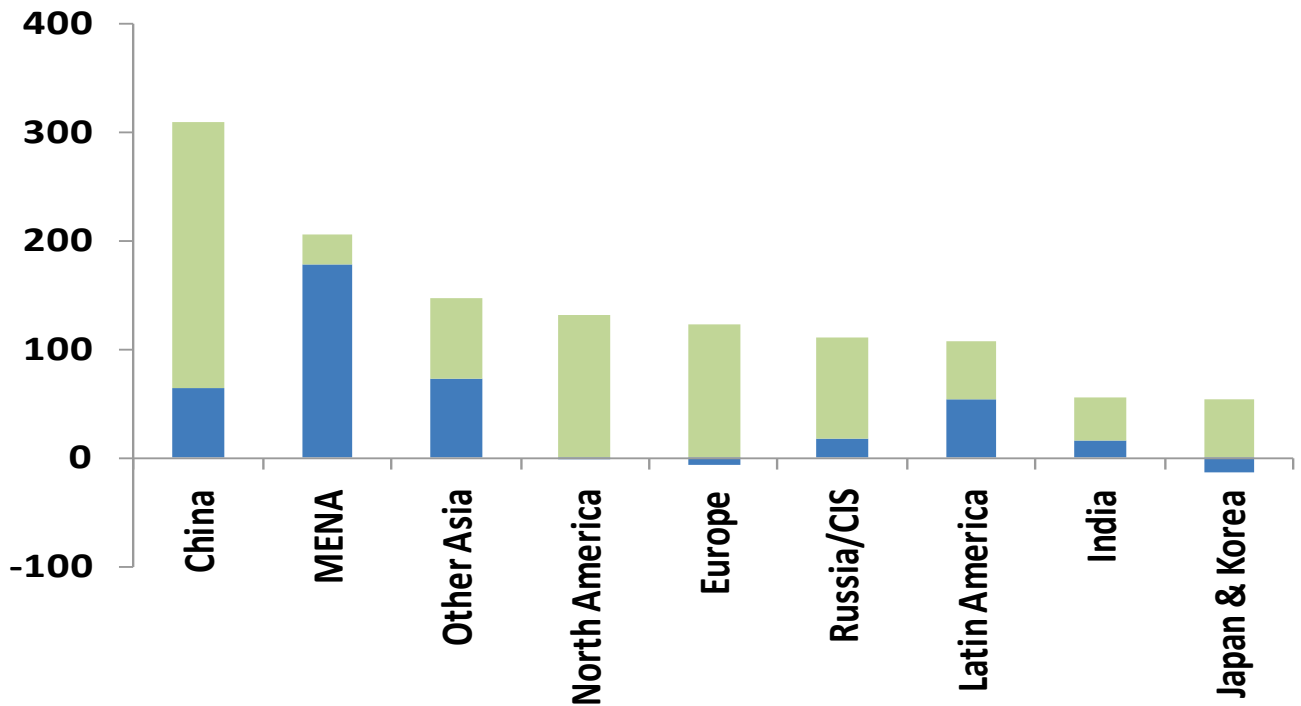


Figure 4: Gas Demand Growth 2020 vs. 2010 (bcm); Lowest and Highest Cases²⁹
(Banks, IEA, DoE, various consultants, Shell internal)

As shown in the preceding figures, Greater Middle East demand growth has exceeded global demand growth and is expected to continue increasing at a considerable pace. The supply/demand fundamentals in the region could lead to an interesting scenario where LNG carriers never sail past the Arabian Sea.

²⁸ Ibid.

²⁹ Shell analysis.

When we compare the world's gas demand with for instance the Middle East and North Africa (MENA) alone (Figure 4), the consensus forecast on the top three is striking. However, there is an outlier: the demand generated by gas reinjection to enable enhanced oil recovery is often ignored in this region. Fesharaki estimates reinjection demand in the Gulf countries increased from 0.17 bcm/d in 2000 to about 0.23 bcm/d in 2008, and will grow to about 0.36 bcm/d by 2020.³⁰

Assuming half of the Greater Middle East gas consumption will be for oil production and/or oil substitution, at current oil and gas/LNG price spreads, gas and LNG will at worst compete at oil parity and at best be a multiple of oil if, for instance, we can economically extract ten molecules of oil for one molecule of gas. Furthermore, between 60 and 80% of reinjected gas can be recovered³¹ so gas reinjection could be seen as a long term storage play.

Nick Wilson of MEES reported that Iran alone will need 0.56 bcm/d - a considerable increase from the current 0.08 bcm/d - if it is ever to deliver its oil production plans.³² New entrants and incumbents will compete with Iran for the same supply of LNG. In this scenario the Greater Middle East could potentially consume the equivalent of all of its LNG production by 2015, meaning the paradox has taken another interesting twist.

Unique to this region is the size of its people opportunity and the consequence on energy demand. The population growth rates are among the highest in the world and the size of the youth population is of a different scale altogether. In the coming decade, around 60 million people will reach employable age in the Arab world alone and if the rest of the Greater Middle East is considered, the challenge becomes daunting as the region will need as many new jobs as the population size of the United States.³³

THE GREATER MIDDLE EAST PARADOX

This brings me to the question of how to solve the Greater Middle East's gas paradox- reconciling resource abundance and export opportunities with increasing local demand. I believe the solution has three crucial elements:

1. Conservation and diversification of energy;
2. Increasing natural gas supplies through exploration and development; and
3. Expanding the region's natural gas and LNG infrastructure (both import and export).

Let us focus on LNG and the role it will play in addressing the supply and demand gap.

LNG provides the world with the lowest technical and non technical transaction costs when compared to other hydrocarbon conventional energy resources³⁴. It offers flexibility equal to none, providing customers with price driven supply security. It also remains very efficient to operate compared to coal and is not prone to the high social and environmental costs associated with nuclear failure.

The Greater Middle East region has certainly caught on to the benefits of LNG. As late as the end of 2003, the region had no LNG regasification capacity available. However, by the end of 2011 it reached 23 mtpa of operating or near completion capacity and it could grow to 30 mtpa by 2014 and as much as 70 mtpa by 2020.³⁵

³⁰ Facts Global Energy (2012). Middle East and North Africa Gas Annual Reports.

³¹ Fesharaki, Fereidun. "The Middle East Gas Revolution: A New Paradigm or a Temporary Shift?" GASTECH, Abu Dhabi, 2009.

³² Wilson, Nick (2010). Middle East Economic Survey (MEES).

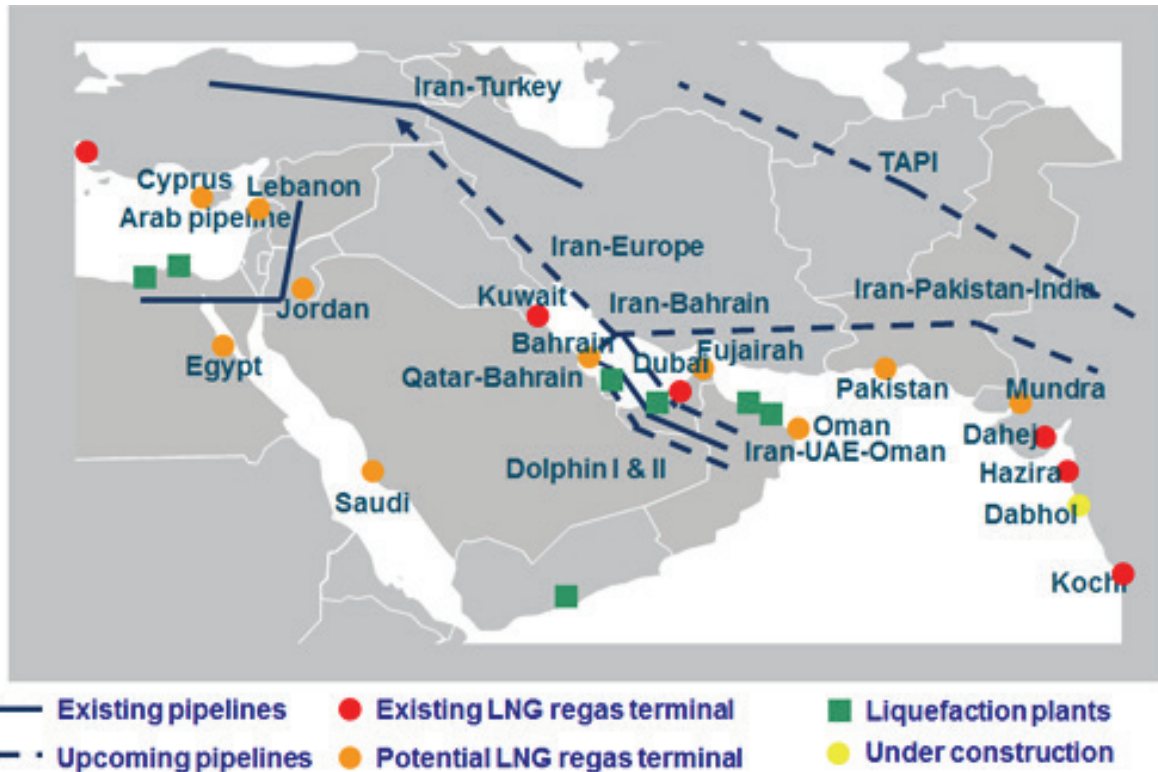
³³ Population Reference Bureau, 2011, "Youth Population & Unemployment in the Middle East & North Africa", viewed 22 January 2013, <http://www.un.org/esa/population/meetings/egm-adolescents/roudi.pdf>.

³⁴ Shell estimate.

³⁵ Ibid.

The growth in regasification capacity is as impressive as it is perplexing. In a region with abundant gas reserves, why are countries importing LNG instead of building pipelines?

Figure 5 below shows the current and future gas infrastructure in the region. A quick glance at the pipeline projects gives you an idea of the political complexity involved in getting these projects off the ground. It can take up to 20 years to develop the simplest cross border pipeline. In contrast, it took Kuwait 20 months to construct a terminal and secure a 5 year 2 mtpa summer supply deal.³⁶ As you can see, LNG poses an attractive alternative to pipeline gas and other energy sources due to political, cost and time advantages.



** Source: FACTS global

Figure 5: Existing and Potential Gas Infrastructure ³⁷

CONCLUSIONS

The “law of gravity of economics” can be summarized in two points:

- 1- Transaction costs are the cost of (a) searching and discovering what could meet anyone’s needs, (b) agreeing with those offering to meet our needs, and (c) monitoring that those agreements met those needs.
- 2- The self modulating forces of supply and demand are collectively represented by (a) short term price volatility, (b) medium term momentum, and (c) long term reversion to the mean.

The trends described by the law of gravity of economics can be witnessed in the Greater Middle East’s relationship with LNG. The amazing increase in LNG growth worldwide and the agility with which players and governments switched from import to export (a few times over!) remains fascinating. This is true for the US, for Europe and - as demonstrated in this paper- for the Greater Middle East. LNG could represent the lowest transaction costs when compared with the alternatives available today.

³⁶ Excelerate Energy, Mina Al-Ahmadi GasPort®, viewed 24 January 2013, <http://excelerateenergy.com/project/mina-al-ahmadi-gasport>.

³⁷ FACTS Global Energy

Where are we with the paradox? There is no paradox: exporting and importing LNG from the same region and for that matter from the same country can provide major resource holders with impressive flexibility depending on prevailing oil and LNG price spreads. It also provides buyers with security of supply at a relatively competitive price.

The decisions made in the Greater Middle East today are as rational as the decisions of leaders in Europe, Asia and the US 50 years or 3 days ago - simply sound economic decisions. It is all about how to plan for the future with what we have and what we need, now and going forward.

So, as suggested in 1963, let's focus on innovation and on those refrigerated ships the British were contemplating using to import gas from Holland before the North Sea discovery two years later. That might just be the lesson of history.

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