MIDDLE EAST GAS: ADAPTING TO NEW MARKET REALITIES

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1 Introduction

Until recently, the gas industry was preoccupied by the tightening of gas supply availability. But, the global financial crisis and its negative impact on the real economy have resulted in a shift of attention from the supply to the demand-side of gas markets. Potential declines in gas demand growth rates in the main OECD energy markets have become a source of concern for producing countries that have invested heavily in the development of capital-intensive gas export infrastructures. It should be noted, however, that the expected reduction in gas demand is due not only to the economic contractions in several major economies, but to other factors such as energy efficiency measures and the move away from fossil fuels to "cleaner" sources of energy.

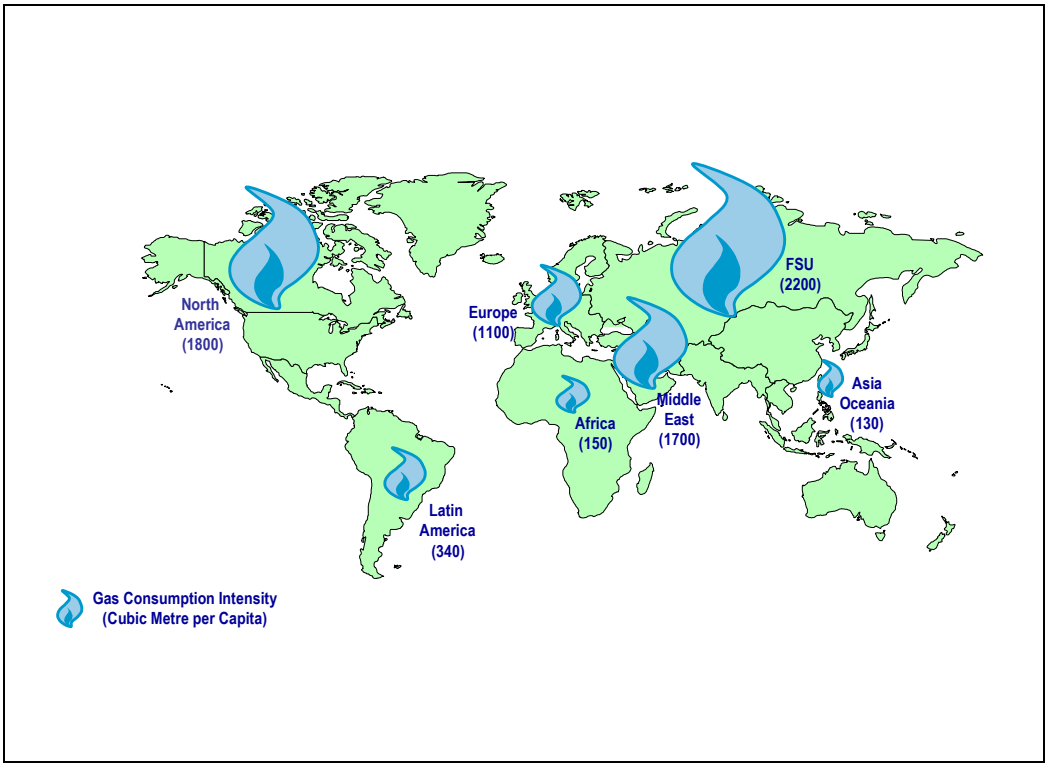
In the Middle East, one of the regions best endowed with natural gas resources, policy decision makers are still focusing on the widening gas supply deficit, especially in the region's largest economies. Over the next few years, the current economic crisis will undoubtedly have a mitigating impact on the magnitude of this supply gap. But given the structure of the Middle Eastern economies, domestic markets will continue to be characterized by relatively rapid growth rates of energy demand putting increasing pressure on local gas supplies. This challenging situation cannot continue and requires realistic and sustainable adjustments.

This paper starts with a review of the main demand\supply drivers and constraints of the increasingly tight gas balance in several Middle Eastern countries and follows with an analysis of the adjustments needed, and in fact being implemented or planned by some countries, to address and adapt to the new energy market realities. It concludes with an assessment of whether this situation reflects another cyclical episode of tight gas supply or a fundamental change in gas and energy markets with far reaching implications for the region's future energy landscape.

2 Demand-side Drivers – The Usual Suspects

In recent years the Middle East accounted for about 10% of total global gas consumption and was the world's fifth largest gas consuming region. However, on a per capita basis, the Middle East region has the third highest gas intensity after the Former Soviet Union (dominated by Russia) and North America (Figure 1). Apart from the obvious rich endowment in natural gas resources, this high gas intensity is the result of a combination of factors affecting the gas consumption patterns of Middle Eastern countries. These factors include young and rapidly growing urban populations; rapid economic growth fuelling significant industrial development; and subsidized low gas prices. Gas demand in the Middle East is driven by three major consuming sectors: power and water desalination; industry; and, largely in Iran, residential and commercial users.

Figure 1- Gas-intensity by Region (2008)
(Source: BP)



The main driver of Middle Eastern domestic gas demand remains by far the power and water desalination sector[1]. It accounts for over 50% of the region's gas use (Figure 2) and is expected to retain the largest share of total gas consumption over the medium to long-term. About 70% of the region's demand for electricity is concentrated in three countries: Iran, Saudi Arabia and the United Arab Emirates (UAE). Despite the current economic slow down and the resulting delay and cancellation of several projects, the region's electricity demand is expected to continue to grow at a relatively rapid rate of over 5% per year on average. Furthermore, water desalination requirements are projected to increase significantly in the coming decades and exert more pressure on the combined demand for power and desalinated water plants.

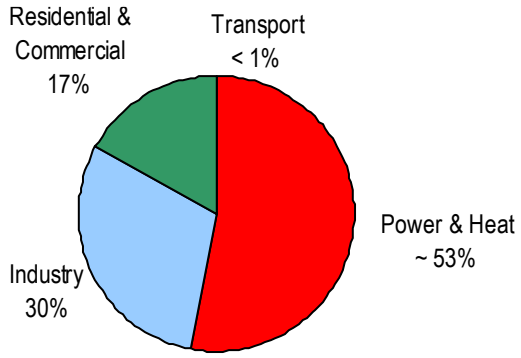
Well over 50% of the electricity presently generated in the Middle East depends on gas supplies produced locally and/or imported through cross-border gas pipelines (Jordan and the UAE/Oman). The second largest category of generating fuels, accounting for close to 40% of the total, is liquids (petroleum products and crude oil). The rest includes coal-fired electricity production in Israel and a smaller electricity output generated by Iran's hydroelectric capacity.

With the bulk of the region's electricity production relying on gas, there is continuous pressure on the allocation of increasing volumes of gas to the power and water desalination sector. Liquid fuels substitute for gas, especially during peak periods, but cannot plug the mounting gas supply deficit. The recent tightening of gas supplies in some of the key Middle Eastern countries and the very limited gas trade within the region poses some critical issues that need to be addressed and alternatives implemented as soon as possible.

The second largest driver of gas demand in the Middle East is the industrial sector. This segment includes all the industries (including the oil and gas industry) that use natural gas as a fuel or as a feedstock or both. It accounts for 30% of the region's total natural gas use. The significant development of a petrochemical industry and energy-intensive projects in the different Arab Gulf Cooperation Council (GCC) member countries have resulted in a substantial increase in the consumption of natural gas in this area of the Middle East.

[1] This includes heat and power and energy to water desalination plants.

Figure 2 – Middle East: Domestic Gas Use Share by Sector
(Source: IEA)



In the GCC's largest economy, Saudi Arabia, associated gas volumes produced with oil were initially flared. In the 1970s, the government, through Saudi Aramco, started developing an impressive national gas infrastructure, the Master Gas System, to collect, treat and transport the recovered associated gas that was flared. The gas was recovered not only to fuel power and water desalination plants, but to develop a local hydrocarbon-based industry to monetize the country's gas resources. This led to the creation of Saudi Arabia's biggest industrial centre, the Jubail Industrial City, on the eastern coast.[2]

Elsewhere in the GCC, the development of smaller industrial poles or clusters was launched using the countries' indigenous hydrocarbon resources. In the 1990s, Qatar started developing what is now one of the world's largest gas export complexes, the Ras Laffan Industrial City, to exploit the large non-associated gas resources of Qatar's North Field. On the other side of the Gulf, Iran established in the 1990s a Petrochemical Special Economic Zone at Bandar Imam as the country's first specialized industrial park.[3] An ambitious expansion has been planned for this park. A new industrial city has also been developed in Iran, the Bandar Assaluyeh Industrial City, strategically located on the coast of the Arabian Gulf to utilise gas supplies from the nearby South Pars gas field.

The development of these industrial cities and parks is the main driver of the region's gas demand for the industrial sector. Over the last three decades, the use of natural gas reflected evolving objectives. Initially, governments were keen to reduce the wasteful flaring of associated gas resources. Due to the lack of gas infrastructure and markets, gas was very much undervalued and policymakers made available gas at very low prices to encourage the development of gas-based industries. Today with the tightening of local gas supply availability in every Middle Eastern country, except Qatar, there is a focus on the prioritization of supplies to industries that can provide higher gas monetization values. This objective could be commercially challenging for some industries to meet. Overall, industries will have to adapt to the new gas balance situation in each country and adjustments will need to be made in a comprehensive manner necessitating long-term strategic choices.

The residential and commercial sector is the region's third largest gas consuming sector accounting for over 15% of total gas consumption in the Middle East. But this aggregated figure represents

[2] Another industrial city was developed in the western part of the country, the Yanbu Industrial City, but with fewer gas-based industries due to its long distance from the sources of gas supplies.
[3] It should be noted that in the early 1970s Iran initiated work on a major petrochemical plant in the Bandar Imam area, but the Iran/Iraq war inflicted heavy damages on what was already built.

largely Iran's gas use by this sector. At present, the national gas distribution network in Iran covers over 80% of the urban population.

In other parts of the Middle East, natural gas distribution networks have been developed and/or are at an advanced stage of development - in the UAE and Israel. Few other countries in the region have announced plans to develop gas distribution networks to supply residential and commercial customers. But these plans have not progressed, mainly due to a lack of gas supplies. Climatic conditions and population sizes in the affluent and gas-rich areas of the Middle East limit the potential for a significant increase in the number of gas distribution network projects.

The use of gas in the residential and commercial sector will continue to be dominated by Iran, but the current domestic pricing of gas supplies will severely limit any growth prospects. In fact, continuing to supply existing customers under the same pricing terms is a challenge, especially for the urban centres located in the northern part of the country.

Gas demand in the Middle East will continue to be driven by the power and water desalination sector and the industrial sector, which together account for over 80% of total gas use in the region. Therefore, all the demand-side adjustments needed to address current and expected gas market imbalances are focused on these two major gas consuming segments.

3 Supply Side – Where are the Constraints?

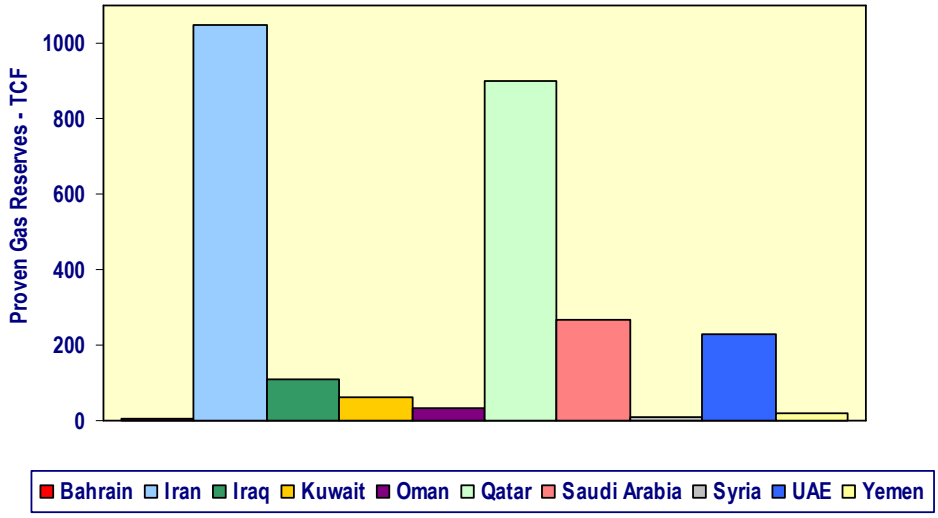
There is rarely a presentation[4] on Middle East gas that does not include a graph highlighting the region's largest share of the world's proven gas reserves. Middle Eastern countries like Saudi Arabia and the United Arab Emirates, which are currently experiencing gas supply deficits, have respectively the fourth and sixth largest proven gas reserves in the world. These figures compel us to ask the obvious and simple question: where are the supply constraints?

Being endowed with large proven reserves of natural gas does not necessarily mean that plentiful supplies of gas could be made available when and where needed, with adequate quality and at the "right" price. As shown in Figure 3, there is an uneven distribution of reserves in the Middle East, with two countries (Iran and Qatar) holding over 70% of the region's gas reserves. There is also very limited gas infrastructure interconnectivity between the countries. Intra-regional gas exchanges are presently limited to supplies of Qatari gas, through the Dolphin Energy gas pipeline, to the UAE and Oman. There have been several attempts to develop gas pipeline exports from the region's two largest gas reserve holders to neighbouring Middle Eastern countries. But for political and commercial reasons, none of these projects has materialized yet.

Qatar has so far concentrated on expanding its exports beyond the Middle East, including North America, Asia and Europe. Iran has developed its gas reserves mainly for domestic use so far and the small volume it exports to Turkey is roughly matched by imports from Turkmenistan. Ambitious plans to expand exports by both pipeline (to South Asia and Europe) and by LNG are mired in both political and commercial problems.

[4] Including this author's past presentations.

Figure 3 – Middle East: Proven Gas Reserves (2008)
(Source: BP)



At present, some Gulf countries with a pressing demand for additional gas supplies have switched their focus to imports of gas in the form of liquefied natural gas (LNG) and are taking advantage of the emerging new floating LNG (FLNG) technology to speed up the gas import process. Both Kuwait and the Emirate of Dubai have developed projects to import LNG through new FLNG import terminals. Bahrain is reported to be considering the same approach to meet its gas needs. This would give these gas-short countries the flexibility to procure gas supplies from within and outside the region.

The Middle East's proven gas reserves include both non-associated and associated gas. Whilst Qatar's huge reserves consist mainly of non-associated gas, two of the region's largest energy consuming countries, Saudi Arabia and the UAE, have over 50% of their gas reserves associated with oil. This constrains the potential availability of additional gas supplies, especially in today's reduced crude oil production environment.

The issue of gas quality in some countries like the UAE is another constraint to the full exploitation of the region's large proven gas reserves. The Emirate of Abu Dhabi, which for a while delayed the development of its sour gas reserves, has recently signed a reported $10 billion agreement to develop its Shah sour gas field. Under a sustained low gas price environment, such high cost projects would challenge the economic viability of developing sour gas reserves.

In Saudi Arabia, there is a continuous effort to develop non-associated gas reserves in the Eastern province. Supplies from these new non-associated gas fields are expected to reach markets before the middle of next decade. In neighbouring Kuwait, non-associated gas discoveries were announced in 2006. But it is not clear yet how these new discoveries would contribute to future domestic gas supplies. It is likely that Kuwait will have to rely on gas imports to meet its future needs. Recently, Iraq has been considered as a future potential source of gas supplies for countries such as Syria, Jordan and possibly Kuwait. However, it is still too early to assess the likelihood of such exports due to a combination of factors, including contractual issues; infrastructure availability; Iraq's own domestic gas requirements; and the security situation in the area.

It is clear that any significant incremental gas production within the Middle East could only come from the region's two largest gas reserve holders, Iran and Qatar. It is also known that major new gas supply developments are unlikely to take place in these two countries before the middle of next decade. In Qatar, the current moratorium on new gas projects is not expected to be lifted until 2014. Whilst in Iran, political and commercial issues keep constraining any significant incremental gas output prospects. Iran is presently a net importer of gas with significant domestic gas requirements. It is also expected to have substantial gas injection needs that will further restrain the near term availability of gas supplies for export markets. The UAE is also constrained by significant gas injection requirements, although at lower levels than Iran's but with an expected significant impact on gas supplies availability for domestic and export markets.

Gas-short countries in the Middle East are presently facing increasing gas supply deficits and cannot afford to wait for long-term improvements in the regional gas supply situation and some countries seem to be concerned about dependence on one or two sources of gas supply raising the issue of security of supply. Therefore, adjustments are needed to address the new challenging gas market situation the region has started facing over the last few years. As a matter of fact, several measures to adapt to these new market realities are being developed or planned.

4 Adjustments – Need for Realistic Measures

Any adjustment measures will need to be implementable within the Middle East context. Adjustments that gas-short countries are presently considering are both supply-side and demand-side measures. On the supply-side, some of the region's gas-rich economies are actively working on the development of their non-associated gas resources and others are looking at alternative sources and ways of importing gas.

On the demand-side, as indicated above, gas use is dominated by the ever expanding consumption of the power and water desalination sector and the various industries. Despite the current economic slow down, the projected longer-term rapid gas use growth by these sectors remains challenging. Several Gulf countries are seriously assessing the possibility of using alternative sources of energy, like coal, nuclear and renewables. There is also an interest in promoting energy efficiency.

However, both supply and demand-side adjustments are facing a common constraint in their implementation: the higher costs and long gestation period of implementing these measures. Although the escalation of project costs have somehow abated in recent months, upstream development costs for non-associated gas resources in more difficult formations and sour gas reserves will result in much higher delivered gas costs than the currently subsidised prices of gas. The introduction of new technologies to exploit alternative energies for the generation of electricity and production of desalinated water will confront users with a much higher energy cost structure and will take time to implement.

Therefore, it is critically important that these adjustment measures are properly sequenced and preceded by the necessary adjustment or reform stages. The first fundamental step to take to adapt the Middle Eastern energy markets to the new changes is a reform of the domestic energy pricing system. Apart from some recent gas transactions, domestic gas prices in the region are heavily subsidised even by today's much lower international gas price standards. As long as gas prices (and energy prices in general) are kept at artificially low levels, demand for gas will continue to be almost "unlimited"[5]. There are no or limited incentives to develop new gas reserves, at least for private sector entities, under these gas pricing conditions.

At present, prices for some new gas supply transactions to consuming areas like Dubai are reported to be around $5/MMBtu, a level that is much higher than the existing subsidised gas prices that range from about $0.50/MMBtu to $1.50/MMBtu. This significant price jump by Middle Eastern standards has been forced upon gas users because of the current market conditions. What is required is a holistic and structured approach to domestic energy pricing that is not limited to natural gas. Electricity tariffs will need to be adjusted to sustain higher gas fuel prices and the opportunity and environmental costs of using liquid fuels have to be carefully considered. Once a more integrated and sustainable approach to domestic energy pricing is adopted, the adjustment measures to address the current tight gas supply in the several Middle East countries would be easier to implement

Initially, gas-short countries like Kuwait, the Emirate of Dubai and Bahrain looked at sources of gas supplies beyond their borders, but still within the Gulf or Middle East region and through the establishment of intra-regional gas pipeline exchanges. There was also a project to develop a Gulf gas pipeline grid. But for commercial and other reasons, such alternatives remain limited to the existing Dolphin Energy gas pipeline scheme. However, as indicated in the previous section, gas-deficit countries are no longer limiting themselves to potential gas suppliers within the region. The establishment of new floating LNG receiving facilities in some of the gas-short countries will offer them the possibility to procure gas from various locations. This is a radical change for a region that has always been considered as a net exporter of gas. But this flexibility comes at a price. Gas consumers will have to overcome the gas price "barrier" and be ready to accept more realistic gas prices.

[5] The gas infrastructure constraint is also a major constraint to the expansion of local gas markets.

Alternative sources of energy are also looked at seriously by a number of countries in the Middle East as a means of addressing the mounting shortage of gas supplies to fuel the power sector. At the moment, the UAE is leading the group of Middle Eastern countries planning alternatives such as nuclear power and the use of renewable energy to generate electricity. Coal-fired electricity generation has also been considered. It is, however, the nuclear energy option that is the present focus of energy policy makers.

A series of agreements on nuclear power have been signed with European, American and Russian organizations. But this alternative option cannot help alleviate the short to medium term shortage of energy due to tight gas supplies. Developing the region's first nuclear power plants could take well over ten years. In addition, notwithstanding the issue of decommissioning, the high capital costs of nuclear power plants are likely to limit the potential capacity that can be developed within the region.

Countries[6] of the Arab Gulf Cooperation Council (GCC) have very recently linked their national electricity grids to allow for intra-GCC power exchanges, especially during peaking periods. But the very limited surplus of power capacity currently available and the coincidence of peaks in member countries will make it difficult to fully exploit the benefits of a GCC power grid at least in the short term. Furthermore, cross-border exchanges of subsidised electricity supplies will be limited, unless exchanges are based on commercial rather than subsidised terms.

There are also a couple of initiatives to produce electricity based on renewable energy. The Emirate of Abu Dhabi is leading these initiatives with a multi-billion dollar commitment to develop the use of renewable energy. In fact, the UAE have recently been selected to host the headquarters of the newly created International Renewable Energy Agency. In other parts of the Middle East, in Jordan, there are plans to use wind energy to generate electricity.

During the next decade, the introduction of renewables would only provide a modest contribution to the region's energy balance. The costs of developing these new technologies will undoubtedly need strong government financial support, especially in a period of competing low fossil fuel prices. Nevertheless, it is important to note that for a major hydrocarbon producing region like the Middle East, considering nuclear energy and renewable forms of energy to address their widening energy supply gap marks a fundamental shift in the way energy policy makers are looking at how to meet their future energy needs.

There is also a huge potential for energy efficiency measures in the Middle East, one of the world's most energy-intensive regions. Some Middle Eastern countries are looking at how they can introduce energy efficiency programmes that will reduce energy consumption and plans are being designed for more energy efficient construction projects. However, this demand-side management measure would be difficult to implement if the issue of domestic energy price subsidies is not tackled first. There would be limited incentives to change to a more energy efficient consumption pattern if domestic energy prices continue to be heavily subsidised. That is why the reform of domestic pricing is pre-requisite to all the above-mentioned adjustments being contemplated to address the region's present tight gas (and consequently power) supply situation.

5 Conclusions – A Determination for Change

Taking a narrow view of the current gas supply / demand situation in the Middle East, one is tempted to conclude that it is another cyclical occurrence of tight gas markets and that the current softened demand for gas by OECD countries undergoing a severe economic downturn may allow for some reallocation of the available export supplies to the local Middle Eastern markets. Unfortunately, this scenario is unlikely to take place soon. The gap between the expected market value of gas supplies in international markets[7] and the mainly subsidised gas prices in local Middle Eastern markets and the severe lack of intra-regional gas infrastructure will prevent any significant expansion of intra-regional gas trade in the coming years.

There is on the part of gas-short countries a new determination to implement fundamental changes in the way they consume and procure energy supplies, especially natural gas. The search for alternative sources of energy to generate electricity is not a rushed, political move to respond to the current gas

[6] As of July 2009, four countries are linked (Saudi Arabia, Kuwait, Qatar and Bahrain). The UAE and Oman will join later.
[7] It should be noted that gas exporters would be reluctant to commit to new gas supplies if the current (July 2009) levels of Henry Hub and NBP prices were to continue for any length of time.

supply deficit. Policymakers in those countries have done their homework and are well aware of the constraints and long gestation periods these new alternatives would require. However, they seem to be serious about embracing new alternatives, even if it means that these would account for only a small share of their total energy balance.

The shift from potential pipeline imports to LNG imports through new FLNG import terminals (or the consideration of imports in both forms) is also another sign that new priorities, like concerns about security of supply, are emerging or are being expressed openly. These new decisions do not preclude the prospect of increased intra-regional gas trade. It means that new foundations are being laid for new trading rules. This brings us back to the critical and sensitive issue of domestic energy pricing. Despite the past stubborn refusal of regional gas buyers to pay realistic prices rather than the prevailing low subsidised ones, it is now accepted that they will have to adapt to the new market realities and pay the market-related prices for new gas supplies. The decision to import LNG is a confirmation of this change, and as indicated above, some new supply transactions have indeed been concluded under a different gas price structure with much higher price levels.

Detailed studies on the restructuring of the domestic gas pricing system and its possible impact on gas consuming sectors have been carried out by producing countries in the region. The question is no longer whether domestic energy price subsidies should be phased out or not, but rather when and how without inflicting major shocks to the economy. Therefore, the current system of subsidised domestic energy prices is poised to be overhauled with a lifting or a gradual phasing out of price subsidies to allow for needed investment in upstream and gas infrastructure developments and wherever applicable to make imports of gas supplies commercially viable.

On the other hand, it is unlikely that adjusted domestic gas prices will quickly reach international market prices, if at all, in countries where prices are presently set at very low levels and where there are potentially large undeveloped proven gas reserves. The more likely path is a gradual approach of upward adjustments that can reconcile cost recovery objectives with an acceptable margin and are politically sustainable. In other parts of the Middle East where the bulk of the energy needs is imported, there is less flexibility for gradual price adjustments and more aggressive price adjustments would take place for some consuming segments.

Plans for the introduction of alternative sources of energy to generate electricity in the region should not be dismissed because of the implementation challenges they pose. Some countries will definitely adopt new energy technologies. However, the contribution of these alternative energy sources to the overall energy balance will remain limited. Economies in the Middle East will continue to rely on fossil fuels and gas demand within the region will continue to be met largely by local supplies. But the unavoidable adjustments that the region will have to undergo will gradually result in a more sustainable gas consumption gas pattern. In the long-term, new and commercially sounder gas supply procurement terms would enable exporting countries to allocate more supplies that were initially destined for exports (or possibly could not be placed) outside the region to local Middle Eastern markets.

Finally, the current and planned energy developments in the region, especially in the gas industry and the power sector, show a determination for change on the part of Middle Eastern policymakers to adapt to new energy market realities. Adjustment measures taken and/or being planned indicate that governments are focussing on the implementation of long-term structural changes rather than responding to cyclical movements in the supply and demand for natural gas.