

Meeting the Gulf energy challenges for the 21st century

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Energy has long been a major factor in the development of countries and their economies. Concerns relating to environmental pollution, economic diversification, and regional competitiveness have recently intensified in the Gulf region, and the area is now attempting to overcome its energy challenges systematically.

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The member states of the Gulf Cooperation Council (GCC) have the most prodigious energy reserves in the world. As of 2012, the region held 486.8 billion barrels of proven oil reserves, approximately 37.5 per cent of global supply, with the Kingdom of Saudi Arabia holding the lion's share, at 20 per cent of the global total. The latest BP figures for 2013 indicate that the area collectively produced 17.3 mb/d (million barrels per day). With the advantage of enormous oil reserves and small, albeit growing, populations, the region exports the majority of its oil production. The region also holds approximately 42 Tcm (trillion cubic metres) of natural gas, about 23 per cent of global natural gas reserves, but it only produces about 8 per cent of total global production. At current production rates it is estimated that the

region's current proven oil reserves will last another 70 years and its natural gas reserves for another 118 years.

Nonetheless, since the early 2000s, the Gulf region (excluding Yemen) has emerged as one of the highest energy consuming regions in the world, trailing only India and China, both of which have significantly larger populations. Over the past three decades Gulf gas demand has nearly doubled every decade and gas deficits began to appear in the region around 2007–8. In 1980, when the region's industrialization programmes were just being initiated and population growth was insignificant, the region consumed less than 3 per cent of global gas demand. Currently, the figure stands at around 12 per cent. Over this 30 year period, significant domestic demand – centred upon petrochemicals, industrial expansion in energy-intensive industries, power generation, and water desalination – has developed in nearly every energy-rich Gulf country.

The unique role of natural gas

Natural gas has a unique role to play as an energy source supporting development in the Gulf region. Its development has traditionally been neglected in energy-rich countries in comparison with that of its hydrocarbon cousin, oil. Nevertheless, due to energy shortages and the potential for massive development of non-associated, shale, tight, and sour gas, the GCC member

states have developed a renewed interest in natural gas as a bridge fuel for continued regional industrialization.

The case for continued and expanded Gulf natural gas production as the primary industrial and power generation fuel is predicated on five main factors: (i) Natural gas is the most economical fuel source in abundance in the region on a per unit basis, when compared to other alternatives (such as nuclear) and hydrocarbon fuel sources. (ii) Because of improved seismic and extraction technology, the potential to produce non-associated natural gas reserves in the Gulf region economically has significantly improved. (iii) The development of deployable energy-efficient gas-fired power plants has the potential to attract large-scale capital investment in the electricity sector and reduce the environmental externalities associated with other hydrocarbon fuels. (iv) The use of natural gas inputs in industrial processes allows Gulf countries to engage in horizontal economic diversification into energy-intensive industries such as: cement, lime, glass, non-ferrous metals, petrochemicals, and steel, and enables it to achieve its job creation goals in linked economic sectors. (v) The global reaction to certain environmental externalities (ecological pollution and greenhouse gas emissions) associated with other fuel sources has focused attention on the potential for natural gas to mitigate and solve those problems for the short and long term.

Three main challenges

Natural gas is the essential cornerstone of economic development and energy security. However, to promote energy security and sustainability in the Gulf, three main challenges need to be overcome: high energy intensity rates, expanding natural gas consumption that outstrips production, and the difficulty of unlocking production of non-associated natural gas reserves (such as tight, shale, sour, and deep gas).

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In meeting these challenges, there are two important and intertwined issues that need to be understood. Firstly, lowering overall energy and natural gas consumption should not be the central focus of Gulf policymakers. An expanding and industrializing economy will, by definition, consume more energy inputs, it is an unbreakable equation. A healthy and vibrant economy will continue to consume more energy, even while energy intensity is lowered, in the aggregate. The question is merely what type of energy will supply it, and in light of structural constraints in the Gulf energy sector, whether there will be sufficient natural gas production to meet regional demand. Gulf policymakers should concentrate simultaneously on both energy intensity reduction and the production of new sources of natural gas (indigenous tight gas and imported natural gas) to supply economic expansion. High energy intensity rates are wasteful and do not contribute to a sustainable energy sector.

Secondly, given the impressive figure for the region's indigenous natural

gas reserves, production of this resource should be expedited. In order to stimulate production, the natural complementary strengths of IOCs and Gulf NOCs must be leveraged. The most effective way in which Gulf governments can facilitate this process is by improving the investment and contractual terms in the upstream sector. IOCs can bring their collective experience and technology to assist in a mutually beneficial collaborative relationship to develop these resources. With a major share of the world's proven oil and gas reserves, the Gulf region is poised to play a significant role in the global energy market for the coming decades with the execution of various megaprojects. As these megaprojects require a significant amount of capital outlay and technology/expertise, strategic alliances between NOCs and IOCs have the potential to expedite regional capacity building for the independent development of indigenous natural gas resources.

The first challenge: energy intensity. Since the 1970s, due to energy-intensive industrial expansion and favourable energy pricing policies, the Gulf region's energy intensity rates have risen much more rapidly than those of any other region in the world. In the Gulf region, nearly every energy-rich country is attempting to achieve economic growth along the energy-intensive industrialization path. While diversification has continued apace, energy intensity in the residential, industrial, and commercial sectors has increased exponentially. The rising energy intensity rates have the potential to harm regional economic competitiveness in strategically important industries, especially in industrial competition with Asian-based firms.

The second challenge: rising Gulf energy consumption. The rise in energy consumption in the Gulf

region has been quite spectacular over the past two decades. Since the early 2000s, the Gulf region has emerged as one of the highest energy consuming regions in the world, trailing only India and China, both with significantly larger populations. Because of high energy consumption rates, many energy-rich Gulf countries have increasingly diverted energy to domestic consumption rather than to export. Significant opportunity costs have been created by oil or natural gas being consumed domestically at administered prices, as opposed to being exported at international market prices, or when precious natural gas has been used in the relatively non-productive residential sector (as electricity), rather than being provided to the productive sectors (petrochemicals, energy intensive industries, fertilizers). This situation has profound implications for the ability of many energy-rich Gulf states to continue their industrial expansion, support foreign revenue generation, and preserve their position as primary global incremental energy suppliers.

The third challenge: unlocking natural gas potential. While the Gulf region has grappled with high energy intensity and natural gas consumption rates, it has attempted to meet consumption needs by exploration and production of non-conventional gas reserves. In both absolute terms and in relation to the number of years in which production can be sustained at current production levels, the productive capabilities of the Gulf region are enormous. Most energy-rich Gulf states have reserve-to-production ratios of approximately a hundred years. Due to high natural gas consumption rates, exacerbated by high energy intensity rates, Gulf states which have formerly been self-sufficient in 'easy' conventional associated natural gas will need to produce from non-associated gas reserves to continue meeting future demand.



Combatting energy intensity

In order to lower energy intensity sufficiently, there must be a process by which performance-based regulations which can provide a 'push' to drive technological change and investment – such as Mandatory Efficiency Performance Standards (MEPS) and Energy Efficient Resources Standards (EERS) – can be implemented. In tandem, market-based incentives (fiscal rewards and tax credits, where applicable) should be used as a 'pull' to encourage investment in energy-efficient technology. This 'push' and 'pull' dynamic will encourage cross-sectoral energy efficiency implementation through a three-pronged strategy of: educational campaigns; government regulations mandating energy efficiency in the industrial, commercial, and residential sectors; and promulgation of fiscal incentives to forge consumer demand for energy-efficiency technology.

If the Gulf states institute moderately aggressive energy efficiency programmes, an overall energy demand reduction of 25 per cent by the year 2030 is possible. If Gulf governments promote energy efficiency implementation aggressively, it would be possible to achieve demand reductions of 50 per cent by the same year. Untapped energy efficiency is the single most effective step, as well as the least expensive, that Gulf policymakers could take to combat increasing energy consumption and environmental externalities.

Mandatory Efficiency Performance Standards (MEPS). MEPS are essential in any energy efficiency policy which aims to reduce energy intensity to a sustainable level. MEPS should be applied in the residential, commercial, and industrial sector to moderate power demand. High Gulf energy intensity rates, compounded by favourable pricing, have hampered

the attempts of Gulf states to supply sufficient natural gas. MEPS will provide the 'push' necessary to drive technological change and lower energy intensity.

Energy Efficiency Resources Standards (EERS). The creation of EERS would foster improvements in efficient electricity generation and transmission on the supply side of the Gulf states' power sector. EERS are conceptually similar to a Renewable Portfolio Standard (RPS) or Alternative Energy Portfolio Standard (AEPS), in the sense that EERS require utilities to reduce energy use by a specified and declining percentage, or an absolute amount on an annual basis. As MEPS drive efficiency gains on the demand side, EERS would be able to reduce energy intensity on the supply side effectively.

Creating a favourable natural gas investment climate

The GCC states should implement a structured programme to encourage IOCs to invest in unconventional gas fields. Collaborative relationships with IOCs will assist in bridging the technology and expertise gap which currently prevents Gulf states from producing their non-associated gas potential. Many majors have developed advanced techniques and technology (specifically: hydraulic fracturing, directional and horizontal drilling, micro-seismic imaging) over the years of exploiting North American tight gas reserves and they would be able to leverage their expertise in the proper enabling environment.

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This process should be fostered by reformation of IOC investment and

contractual terms in the natural gas sector. Moreover, a competitive bidding process that protects intellectual property rights and supports IOC capital investments (by a minimum guaranteed return on investment for a predetermined period for investments made in especially difficult-to-produce fields) would have an advantageous impact on the stimulation of natural gas production. There should also be a reformation of the domestic pricing framework in order to encourage IOCs to supply the domestic market rather than exporting to international customers via LNG.

LNG import as a bridge fuel

As there will be a certain delay between initial field investment and production of non-associated natural gas fields, Gulf states with unfulfilled gas requirements should utilize the global LNG market as a fuel source to bridge any existing supply shortfalls. In those Gulf states with no existing LNG import infrastructure, authorities should implement fast track construction of required facilities to ensure that power generation and industrial gas consumption are not interrupted during the interregnum. The global LNG market would be able to fill any supply gaps until indigenous non-associated natural gas supplies come online. In light of the gas supply constraints, the UAE and Kuwait currently import LNG, with Bahrain being in the process of completing its first LNG terminal projects. These LNG import projects illustrate the fact that the Gulf states do understand that the global LNG market is a crucial part of their strategies to ensure energy security going forward.

Justin Dargin's study 'The Impact of North American Shale Gas Production on the Gulf Petrochemical Sector' for the Oxford Institute for Energy Studies is forthcoming in 2014.

