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forum

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Oil has defined the modern-day development of the Gulf region in a way seen in no other place in the world; together, the six members of the Gulf Cooperation Council (GCC), Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE), are home to around a third of known global reserves of oil, and nearly a quarter of its natural gas. Saudi Arabia remains the world's most important producer of conventional oil, and continues to hold the majority of the world's spare capacity, while Qatar has become the world's largest producer of liquefied natural gas (LNG). This reflects the GCC states' continuing pivotal role on global energy markets as a key centre of world energy supply.

The fast-track economic growth and development experienced by the GCC economies since the mid-20th century in particular, however, has also left its toll on the region's energy profile. No longer just global suppliers of energy, the GCC states have become a key centre of energy demand growth in their own right, accounting to a large extent for projections such as those by the IEA that see the Middle East alongside Asia as the world's future energy demand growth centres well into the 2030s. This collection of articles reflects on the variety of options and challenges faced by the GCC states more than a decade into the new millennium, and offers perspectives on future policy choices inside one of the world's most important group of energy producers.

GCC energy challenges in the 21st century

The issue heads off with a perspective from Saudi Arabia. In his article, *Prince Abdulaziz Bin Salman Al-Saud* describes Saudi Arabia's efforts at raising the efficiency of its domestic economy. Prince Abdulaziz Bin Salman Al-Saud argues that energy efficiency has become 'a strategic imperative' in light of the Kingdom's rapidly rising levels of energy intensity and overall energy consumption. As Saudi Arabia focuses on addressing the dual challenge of economic growth and development and the parallel need to manage demand, the Kingdom aims to engage all stakeholders – at state level and in the private sector alike – in contributing towards a more sustainable energy future.

Justin Dargin provides an overview over the challenges faced by the GCC states, as the region continues on its path towards becoming an increasingly important centre of energy demand growth throughout the coming years. While oil and natural gas have played a crucial role in the region's development, Dargin argues that the Gulf states will increasingly need to open themselves

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to fuel alternatives to power their domestic economies. He argues that while 'a healthy and vibrant economy will continue to consume more energy … 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.'

Frontier technologies, 'green energy', and the low-carbon economy

Marianne Haug and *Laura El-Katiri* discuss the 'next energy frontier' in the GCC, renewable energy. Haug starts off, asking whether renewable energy sources could form an increasingly important part of the region's supply-side response to growing electricity demand at home. In principle, she welcomes the GCC states' growing interest 'to join the USA, Europe, Japan, and China in financing and supporting the R&D, learning, and scaling-up process for renewable electricity'. However, the author cautions, successfully diversifying the GCC economies' domestic energy mix will require continuous commitment and a dedicated policy framework that takes renewable energy plans beyond 'hypes' and 'green-washing'.

Laura El-Katiri considers the economic value of renewable energy in the GCC, in light of its fundamental benefits for the Gulf economies, but also its cost vis-à-vis conventional energy sources. Investment in more renewable energy, particularly solar power, could be an important means for the GCC states to save their more valuable crude oil resources for export. However, El-Katiri argues, a more obvious starting point to address the GCC states' surging domestic demand for energy would be the removal of those structural market distortions that have incentivized the creation of highly energy-intensive economies in the first place: domestic energy prices. If fiscal policies to promote renewable energy deployment in the GCC could be used to this end, the author suggests, the value of renewables in the region could be great indeed.

Samar Khan argues that rather than supply-sided solutions only, the efforts of GCC states should focus on the management of demand, including through improvements in energy efficiency. Looking at the case of Saudi Arabia, Khan points towards some frequently overlooked domestic hurdles in the way of achieving such targets, including the lack of environmental and technological awareness amongst the public, a customary reliance on private, rather than public transport in the Kingdom, and the overall lag in delivering messages on sustainable energy use through the education system.

Steve Griffiths looks at what is perhaps the region's largest experiment in sustainable energy provision so far, at Masdar City. Conceived by policymakers in Abu Dhabi initially as the world's first carbon-neutral, zero-waste city, the 'City of Possibilities' has the opportunity to become a paradigm for sustainable cities in the region and globally, the author argues. This seems more possible since Masdar has survived the first obstacles caused by the financial crisis in 2008 and is beginning to offer a clearly replicable model for beyond the region.

The nuclear option

Two of our articles debate the pros and cons of nuclear energy in the GCC contact. *Adnan Shihab-Eldin* and *Holger Rogner* trace some of the historical debate surrounding the nuclear option in the Middle East, arguing the use of nuclear power is seen as an important step that could extend the lifetime of reserves and release additional domestic oil and natural gas production to earn revenues for exporters, while supporting net-importers of energy in the MENA region by reducing the cost of expensive fossil fuel imports. Geopolitical considerations may also play a role, according to the authors, who suggest developments on the side of Iran are closely watched in the wider Gulf and nuclear power may eventually result in a race for 'capacity parity'.

Giacomo Luciani looks more closely at nuclear power in Saudi Arabia. He maintains that nuclear power is a strategic choice for Saudi Arabia, which needs to diversify its domestic energy mix and requires large additions of power generation capacity over the next two decades. Geopolitically, Luciani contends that nuclear energy may involve a very welcome by-product: 'a regime considering the acquiring of a nuclear energy component, possibly including some eventual enrichment and reprocessing capability', he argues, 'knows very well that if it goes ahead, its own stability becomes much more important to the rest of the world', and, not only in the context of the current debate surrounding the fading US interest in the Middle East, 'will see this as a welcome by-product'.

Energy pricing and regulatory responses

Several articles deal with the issue of how to respond to surging domestic energy demand in the GCC via changes to domestic energy market regulation, in particular energy pricing. *Robert Bacon* provides an overview over the region's overall price environment, which he sees as being largely obsolete and in need of comprehensive reform at national and regional level. While the GCC states' long-established practice of charging among the lowest energy prices in the world to domestic customers reflects important economic and social goals, Bacon argues, they also impose large costs on the economies, including large fiscal losses, and underfunded utilities, and hence recurring power shortages. 'Incomes have risen throughout the GCC', he says, 'to a level where it is unnecessary to provide energy subsidies in order to induce the poorest to switch to modern forms of energy.'

Bassam Fattouh and *Lavan Mahadeva* provide insights from a recent OIES study, which uses a model-based approach to simulate the effects of pricing reform on Kuwait's utility sector. With the GCC's lowest electricity tariff band – unchanged since its first introduction during the 1960s – Kuwait faces surging domestic demand for electricity, driven by decades of low pricing incentives. Consumers, ranging from residential users to industries, now need to conserve and rationalize their use of electricity, and this confronts the country with the enormous task of providing enough generation capacity over the long run, while effectively running a constant deficit inside power generation. Fattouh and Mahadeva reveal that different scenarios regarding consumer welfare changes are possible, depending on the type and size of accompanying mitigation measures.

Ayele Gelan offers additional insights from his forthcoming study on the reform of Kuwait's electricity pricing system based on a newly developed computerized general equilibrium model. He confirms that substantial potential economic benefits could be generated from a domestic pricing reform, and shows that when households are compensated for the welfare loss associated with utility price increases, aggregate GDP and household welfare effects will also be positive, in addition to savings made through reduced electricity consumption.

Faisal Ali Rashid and *Katarina Uherova Hasbani* offer a glimpse into future energy planning in Dubai. With among the GCC states' most advanced long-term energy strategies in the making, Dubai has begun to systematically re-regulate and provide incentive schemes aimed at encouraging a more efficient use of energy and water across all sectors, including residential, commercial, and industrial users. More than any supply-sided policies, the authors argue, it will be the rationalization of demand that will promise the greatest economic rewards, as is evident in Dubai's ambitious target of cutting energy consumption by 30 per cent by 2030.

The GCC and climate change

Robin Mills makes the case for the greater use of carbon capture and storage (CCS), for whose development the GCC could be a major market. Despite various plans for more CCS usage, most importantly in Abu Dhabi, Mills notes that progress in CCS deployment across the GCC has been lagging as a result of the industry's and the region's various disincentives. These include the continued absence of strict global emissions limits or carbon pricing, as well as domestic market pricing incentives and the general risk-averseness of national oil companies. In the future, he maintains, CCS could make an important contribution in the GCC towards a more sustainable use of fossil fuels in the presence of rising domestic energy demand and climate change.

The issue closes with a perspective on the GCC and climate change. In her article, *Mari Luomi* calls for a fundamental rethinking of the region's traditional policy stance, as the GCC economies now count towards the most carbon-intensive economies in the world. While some Gulf states, most importantly the UAE, have already embarked on a number of policy, project, and sector-wide efforts at climate mitigation in line with broader development priorities, such as economic diversification and efficient resource use, many of them 'still mostly exist only on paper, and consist of fragmented actions with low transformative impact'. Luomi advocates a more strategic approach to low-emission development that integrates emission reduction goals to broader resource efficiency, economic sustainability, and resource security goals.