

SUMMARY

Paradoxically, a shortage of electricity has emerged in a region endowed with one-quarter of the world's natural gas. This shortage has been caused by overheated demand stemming from deep underpricing of both gas and electricity. Gas is sold at rates far below those of the global market, allowing for electricity tariffs that can be a tenth of those in the United States. Pricing distortions have allowed buildings – and entire cities – to be built without regard for energy efficiency. Unrestrained consumption has, in turn, handed the Gulf states the embarrassing position of leading the world in per capita emissions of greenhouse gases. It has also created the impetus for action.

This policy brief outlines three policy options that Gulf Arab governments can consider to address the shortage. First, raise prices. Second, retrofit buildings for energy efficiency. Third, ban inefficient air conditioners and other appliances. The brief discusses the political obstacles involved in raising prices and eliminating a key subsidy used by governments to maintain domestic support. It concludes by recommending a policy of gradual price hikes and government-backed retrofitting of buildings.



Energy Conservation Options for GCC Governments

By Jim Krane

Introduction

The six states of the Gulf Cooperation Council (GCC) comprise the world's energy storehouse and chief supplier, holding 40 percent of the world's proven crude oil reserves and 23 percent of its natural gas.¹ Incredibly, however, they are unable to meet their own fast-rising demand for domestic energy, mainly natural gas feedstock for electricity generation. Only one of the six countries, Qatar, is able to supply itself with enough gas for electricity generation for the foreseeable future. The others—Saudi Arabia, the United Arab Emirates, Oman, Kuwait and Bahrain—either face current shortages in the availability of gas and electric power or appear likely to endure them soon.

Conservation of domestic fossil fuels is therefore a legitimate priority for the Gulf countries, given domestic needs as well as the global market for these products. This brief argues that governments can reduce domestic energy demand. To that end, it outlines three policy alternatives that GCC governments may consider. Key assumptions include the need to reduce energy consumption while maximizing economic returns from exports of fossil fuels, as well as the desire to minimize the opportunity cost of

consuming fuels at home. It also assumes governments understand the need to rein in some of the world's highest per capita emissions of greenhouse gases, although the issue is not yet a priority for rulers or their populations.² (The GCC holds just 0.6 percent of the world's population but produces around 2.4 percent of global emissions.³) This paper only briefly addresses efforts to increase energy supply by adding capacity in renewable or nuclear energies, since schemes providing the scale required would require much larger investments and would not affect overall energy consumption.

Background on the Shortage

The GCC energy shortage stems from a number of factors. The Gulf region is just emerging from a six-year economic boom that brought some of the world's fastest growth in population, GDP, energy consumption, and carbon emissions. Natural gas was the fuel that powered the sprawl of Riyadh, Abu Dhabi, Doha and especially Dubai. It made possible the simultaneous industrial expansion into petrochemicals and aluminum, for example, as well as the growth in production of electricity and desalinated water. Political

structures exacerbated demand: the rentier state* nature of these six countries and the distributive practices of their governments saw domestic consumers provided with natural gas and electricity at prices far below those in the global market; in some cases it was even given away for free.⁴

As a consequence, gas consumption in Saudi Arabia, Qatar, Kuwait and the UAE rose by nearly 50 percent from 2002 to 2008 (or 6.8 percent per annum), while electricity generation grew at nearly the same rate.⁵ GCC generation capacity reached 75,000 megawatts (MW) by 2007, nearly equivalent to that held by the United Kingdom, even as blackouts took down key infrastructure in Saudi Arabia, Kuwait and the United Arab Emirates. By 2015, GCC countries could need 60,000 MW in new generation, nearly 80 percent of the current installed capacity.⁶ Given that the majority of that capacity is expected to be powered by gas, the chief fuel burned by Gulf power generation plants, the supply deficit could reach 7 billion cubic feet per day by 2015.⁷

Other Perspectives on GCC Energy Consumption

Governments in the region have grown concerned about their energy use and have displayed interest in policies aimed at achieving sustainable consumption, even as the GCC's domestic consumption of energy has gained academic attention. Hertog and Luciani (2009) believe government efforts to deal with the crisis will focus on energy diversification projects that do not address current consumption. These include forays into nuclear power, as well as renewables such as the zero-carbon Masdar City initiative and Saudi Arabia's moves to increase capacity in solar-generated electricity. The authors believe these initiatives are more likely to be successful than politically dangerous attempts to regulate the behavior of residential consumers.⁸

Dargin (2008) believes that the problem is not a shortage of natural gas, in the sense that underground reserves are running low, but rather an underpricing scheme that has encouraged inefficient consumption while undercutting investment incentives for developing new sources of gas for the domestic market.⁹ For instance, the gas price in Saudi Arabia is set by the government at 75 US cents per million BTUs,¹⁰ about eight times lower than the current US benchmark Henry Hub price of \$6.00. Domestic gas prices of at least \$5.00 per m/BTU are needed to spur exploration and production, believes Jonathan Stern of the Oxford Institute for Energy Studies.¹¹

Raouf (2009) notes that conservation strategies can be better legitimized by citing *hurma*, the notion that Muslims should respect and protect nature.¹² Raouf (2008) also points out that the GCC countries are signatories to the UN's Kyoto Climate Change Protocols and the Framework Convention on Climate Change, but, as developing states with no binding emissions targets, they have only belatedly begun to look for opportunities to cut emissions and generate carbon credits. Renewable energy currently produces just 0.3 percent of GCC electricity, Raouf notes.¹³

Meanwhile, the Climate Group (2008) offers technology solutions for energy use in buildings that could offer deep reductions in electricity consumption.

Policy Alternatives

Option 1: Raise the Price of Electricity

Energy subsidies are the chief barrier to conservation in the Gulf. Residential electricity prices can be a tenth of US rates. An obvious solution would be to raise the prices of gas feedstock provided to domestic utilities, which could then pass along the increased costs to consumers. Electricity prices range from zero in Qatar (for nationals; expatriates pay 2 US cents

*The term "rentier state" connotes a country that derives most of its national income from the external sale of natural resources.

per kilowatt-hour) to initial rates of 1.5 US cents per kWh in Saudi Arabia, 2.5 cents in Oman and 5.5 cents in Dubai.¹⁴ (The average US price is about 12 cents per kWh, with the UK price around 16 cents.) If the price of electricity and water reflected global norms, residents would change their consumption behavior. Electricity use would ease, and new preferences would emerge for energy-efficient homes and appliances.

Increased tariff revenues from sales of gas, electricity and water would encourage investment in natural gas exploration and production, as well as generation capacity, helping to alleviate future shortages. Also, the competitiveness of renewable energies would rise relative to fossil fuels, increasing the potential for powering the grid with a mix of energies.

However, governments are discouraged from raising prices or restricting supply by the nature of the social contract between state and citizen. In rentier states, citizens are more like “distributional clients,” rather than full participants in their national project. GCC governments have made a few moves toward boosting “slab” energy tariffs, which raise rates on customers with higher-than-normal consumption, but most of these are part of a dual price structure aimed at non-citizens. Moves to radically raise prices for citizens would be considered a violation of the rights of citizenship, and might generate significant political opposition. [Instead of raising prices, Woertz (2009) suggests an unlikely rationing scheme that would see utilities allotting customers a maximum monthly supply of electricity that will only last the entire month with conservation measures in place, such as a minimum interior temperature of 25 degrees.¹⁵] Indeed, the patronage system in some GCC states is already strained by population growth, and governments there may be anxious to minimize the potential for political opposition arising from further reduction of distributional benefits for citizens.

Thus, in the interest of maintaining the existing social contract between GCC governments and citizens, Hertog and Luciani believe any efforts at demand-side management will probably be restricted to industrial users. Dargin writes that raising gas (and electricity) prices to even half of international levels would result in severe political repercussions.¹⁶

However, it appears that two GCC states – the UAE and Qatar – have sufficient governmental autonomy and national wealth, as well as unique population structures that, taken together, should allow them to raise electricity prices on commercial, industrial and even residential customers. Inhabitants of both countries are overwhelmingly foreign; national citizens form less than 20 percent of the population. (There were about 1 million UAE citizens among some 6 million total residents in 2008¹⁷, and just 220,000 Qatari citizens among 1.5 million total residents in 2009.¹⁸) Hence, these governments could squeeze efficiencies by restricting subsidies to citizens and raising prices for non-citizens. Such blatant favoritism is already practiced in various guises and is unpopular among expatriates; but non-citizen utility rates remain subsidized. A sharp increase in energy prices for expatriates could be a pretext for rate increases for citizens, albeit at a lower tariff that preserves their favored status.¹⁹ Or, energy prices could be raised across the board, with citizens compensated by a replacement subsidy of similar value in a non-energy area.

Option 2: Make Buildings More Energy Efficient

Buildings in the GCC have been poorly designed and constructed, largely under a cheap energy model that has left them without contemporary controls technology or even proper insulation and efficient appliances. Households are responsible for 53 percent of energy use in Saudi Arabia²⁰ and 57 percent of the UAE’s ecological footprint.²¹

Solutions to improve efficiency range from simple to technically complex. Dilip Rahulan, who heads the Dubai-based instruments firm Pacific Controls, believes that energy use in Dubai's buildings can be cut by a collective 20 percent under a combination of retrofitting with insulation, efficient windows and appliances, shading, reflective roofing, and a host of automated controls that adjust energy use.²²

Governments have a menu of options²³ to consider, including the following:

- **Enacting mandatory standards on new construction** that promote best practices in efficiency. These include America's Leadership in Energy and Environmental Design (LEED), Canada's EnerGuide for Houses; and the BRE Environmental Assessment Method in the United Kingdom.²⁴ Since enacting a green buildings directive in 2008, Dubai has registered more than 500 buildings for LEED certification.²⁵ Abu Dhabi's Estidama initiative, which has a greater focus on water conservation, is another example.
- **Offering incentives to builders, owners and tenants to adopt efficiency technology** to cut their energy use. In the developed world, tax credits are often used. But GCC countries lack most taxes, so incentives must be creative. Possibilities include mortgage discounts for "green" construction and renovation plans.
- **Encouraging retrofitting of existing buildings** through government-guaranteed loans that are repaid through energy savings, such as the Energy Star program under consideration in Dubai.²⁶ These would fund the addition of thermal insulation, window shading, reflective roofing, and efficient appliances.
- **Encouraging (or subsidizing) adoption of automated building management**

systems that govern cooling and ventilation systems, and switch off unused lights and computers. Remote monitoring tools could cut energy use further.

- **Mandating cuts in energy use and carbon emissions** across the government, while budgeting for upgrades to government buildings. The policy could also be shifted to private businesses regulated by government.
- **Encouraging denser housing in low-rise buildings using traditional Arab designs** that maximize effects of shade and breezes, while de-emphasizing lifts, air conditioners and automobiles. Communities should be designed with pedestrianized commercial areas.²⁷

These policy suggestions face a significant hurdle: the lack of a sufficient energy price in most markets, which undercuts the incentive for conservation. Developers also lack incentives to build-in energy efficiencies, since the techniques add to costs and cut into profits. And since many energy bills are paid by tenants, landlords have no incentive to make their homes or offices more efficient.

Further, new building standards have no effect on the existing stock of inefficient structures. Retrofitting existing buildings would be expensive and governments would need to guarantee loans and provide incentives to make it work. Finally, there is a preference in the Gulf for large homes that consume huge amounts of cooling and desalinated water, which is also produced by burning gas. Changing these preferences, which connote status, will be difficult.

Water consumption, while not addressed directly in this paper, is another facet of the gas shortage that offers wide room for conservation. Per-capita water use, notably in the UAE, is among the world's highest at

550 litres per day (compared with US usage at 425 liters/day).²⁸ Overuse of water is also exacerbated by subsidies.

Option 3: Enact Green Appliance Standards

GCC governments could set minimum energy efficiency and water use standards on the import of appliances that are sold inside their countries, effectively banning the sale of inefficient air conditioners, dishwashers and washing machines. This could cut energy and water use in the medium- and long-term, as inefficient appliances wear out and are replaced. New laws would cost governments virtually nothing, and would be a simple matter to enact (by decree in most states). Administration of the laws would largely be a function of national customs services. Governments could go further, offering incentives – or mandates – that air conditioners of a certain age be replaced.

However, these measures would require years to produce an effect on electricity and water consumption. Import restrictions would likely be opposed by powerful merchant families with exclusive licenses to import and sell branded goods. To that end, governments may have to compensate families whose import businesses would be damaged by the phasing out of a given brand of appliance.

Recommendation

In terms of effectiveness and political feasibility, this paper recommends that GCC governments adopt aspects of each policy, but focus primarily on option 2: policies that make buildings more energy efficient, including retrofitting. This requires an incremental increase in the energy price in some states, which could be offset by corresponding subsidies elsewhere.

Conclusion

The shortage of electricity and natural gas is a fundamental development challenge for the Gulf states, as it hinges directly on the distributive nature of the region's political systems. Managing domestic energy demand will probably entail one or more of the options above, but in the long term it will require structural political changes. These could be as simple as a recalibration of subsidies granted to citizens, or they could go far deeper. One could envisage governments developing fee and taxation systems, with corresponding mechanisms for greater citizen participation in decision making. The notion of conservation will also have to be mainstreamed into popular discourse and school curricula in ways that are largely absent today.

Alongside conservation, GCC states will also have to reduce their total reliance on fossil fuels, moving to a mix of renewable energy sources and nuclear power. Such a strategy would provide greater energy security, as well as reduce the opportunity cost of burning fossil fuels at home. Solar-generated electricity is especially viable in a region that receives so much of the sun's energy, with ample open land for solar collection.

Hertog, Luciani and others believe that the GCC countries should seek to retain their advantage in low-cost energy production to become exporters of renewable energy and energy-intensive products to a world under tighter emissions restrictions. This scenario would play to the region's geo-economic advantages, and also makes a good case for the use of carbon capture and storage in underground oil reservoirs.²⁹

For its part, Saudi Arabia has already announced that it will prioritize sustainable energy. National oil company Saudi Aramco, viewed as the most impressive such institution in any OPEC state,³⁰ is managing the new King Abdullah

University of Science and Technology (KAUST), which will focus on clean energy research and development. In 2009, Saudi oil minister Ali al-Naimi said that the Kingdom “aspires to export as much solar energy in the future as it exports oil now,” and that KAUST would spearhead that effort.³¹

Abu Dhabi has been chosen to host the just-formed UN International Renewable Energy Agency (IRENA). The body will be headquartered inside Masdar City, a community under construction which is intended to become a carbon-neutral home to 90,000 residents and a research hub for green energy technology. Masdar, which has received \$22 billion in government funding, represents the largest regional push into renewables.

It must be noted that the region’s foray into renewable energy is not a priority among most residents, and is being done partly to improve the environmental credentials of a region seen as the chief supplier (and among

the biggest per-capita consumers) of fossil fuels in the world. Household consumption of energy will be the most difficult issue to address, given the political constraints in all six states. A combination of one or more factors—including significant political opposition, limited political autonomy, or lack of resources—limits the scope for most GCC governments to remove or reduce energy subsidies for their citizens. Likewise, a high proportion of citizens to expatriates in several GCC countries makes two-tier electricity pricing ineffective.

Only in the United Arab Emirates and Qatar do national governments have the autonomy and wealth to pursue renewable energy programs while also reining in consumption. In Oman, a government-sponsored study recommends investment in solar and wind power,³² but it remains to be seen whether those findings will be heeded. In the other Gulf countries, energy conservation will probably be addressed by a long process of mainstreaming and public education.

ENDNOTES

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- 19 Dubai increased its slab rate on electricity tariffs for non-citizens by 33 percent in 2008.
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- 21 Laura Ledwith (Sustainability and Policy Advisor, Emirates Wildlife Society), e-mail interview with author, December 30, 2009.
- 22 Dilip Rahulan (CEO, Pacific Controls, Dubai), e-mail interview with the author, November 18, 2009. See also: Pacific Controls, *24x7 Global Command and Control for Energy Services*, October 2009, and Pacific Controls, *Remote Energy Management Services for Data Centers*, October 2009.
- 23 Many of these options stem from The Climate Group, *Smart 2020: Enabling the Low Carbon Economy in the Information Age*, 2008, http://www.theclimategroup.org/_assets/files/Smart2020Report.pdf.
- 24 Ibid.
- 25 Dilip Rahulan, e-mail interview with author, November 18, 2009. Note that 500 buildings is a tiny percentage of the tens of thousands of buildings in Dubai.
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Jim Krane is a journalist and the author of *City of Gold: Dubai and the Dream of Capitalism*. Currently researching Gulf energy issues at the University of Cambridge's Judge Business School, Mr. Krane was a Visiting Fellow at the Dubai School of Government during 2008-09.

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Editor: Stephen Brannon

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Dubai School of Government
Convention Tower, Level 13
P.O. Box 72229
Dubai, United Arab Emirates
Tel: 971-4-329-3290
Fax: 971-4-329-3291