Stability versus Sustainability: Energy Policy in the Gulf Monarchies

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ABSTRACT

Over the past half-century, production from vast reserves of hydrocarbons has transformed the once destitute Persian Gulf monarchies into developed states with comfortable lifestyles. However, longstanding policies that stimulate energy demand in these states are diverting an ever-larger share of resource production into domestic markets, threatening the region's chief export and biggest contributor to GDP. Five of these six sheikhdoms must soon choose between maintaining energy subsidies and sustaining exports. Rising domestic demand for natural gas, once considered nearly free, has already forced some states to shift to higher-cost resources, including imports. For now, governments have absorbed these costs and insulated consumers from higher prices. This practice only intensifies the pressure on exportable resources. As hydrocarbon production reaches a plateau, domestic consumption will gradually displace exports. Politically difficult reforms that moderate consumption can therefore extend the longevity of exports, and perhaps, the regimes themselves.

Keywords: Energy subsidy reform, Electricity pricing, Natural gas consumption, Hydrocarbon exports, Persian Gulf monarchies

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INTRODUCTION

The hydrocarbon bounty held by the six Gulf Cooperation Council countries, Saudi Arabia, the United Arab Emirates, Kuwait, Qatar, Oman and Bahrain, represents one of the world's vital supplies of energy for the coming decades. Global dependence on these resources stems not just from the size of the reserves or the level of production, but from the small populations in these monarchies and their historically low levels of consumption. It is the GCC's large resource *per capita* that has allowed it to export most of its production and to become a dominant force in international markets.

This story is beginning to change. Rising populations and growing wealth have coupled with low domestic prices to threaten assumptions about the sustainability of GCC exports. At current rates of consumption growth, Saudi Arabia could see oil exports reduced by the end of the decade, much sooner than expected. Peak seasonal consumption in Kuwait is already reducing exports. Oman and Bahrain, the GCC states with the smallest endowments, are in depletion-led decline.[1]

1. Those discussing these trends in Saudi Arabia include Stevens and Mitchell (2008), Bourland and Gamble (2011), Lahn and Stevens (2011), Tottie (2011), and Gately et al., (2012). For Kuwait, see Wood (2011).

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This scenario presents a policy puzzle. Petroleum exports form the bedrock of the GCC political economies. Distribution of oil and gas revenues has cemented near-absolute monarchs in power long after the demise of this form of government elsewhere.[2] Given the vital importance of these revenues, what factors lie behind government policies that encourage domestic consumption of chief exports? How have these policies shaped demand?

With the exception of gas-rich Qatar, these monarchies face an increasingly acute conflict between sustaining exports and maintaining subsidies on electricity, desalinated water and fuels. The era when primary energy was considered nearly free is being eclipsed by one where marginal increases in demand are met by higher-cost resources, either unconventional domestic energy or market-priced imports. For now, governments have absorbed the increased cost and insulated consumers from price signals that might otherwise moderate consumption. This practice only intensifies the call on exportable resources.

The consumption dilemma, coming at a time when opportunity for reform has been constrained by pan-Arab uprisings, presents difficult questions for these regimes. Hydrocarbons help ruling families buy political support, through in-kind domestic distribution; and they provide regimes with economic viability, through export revenues, some of which are also distributed. For the system to continue functioning, resource revenues from the international side of the equation must not be displaced by resource demand from the domestic side.

The choice for regimes is one of short-term political stability versus longer term economic sustainability. As populations rise and energy production reaches a plateau, domestic consumption will gradually displace exports, as has happened in other oil exporting states. Politically difficult reforms that moderate consumption can therefore extend the longevity of exports, and perhaps, the regimes themselves.

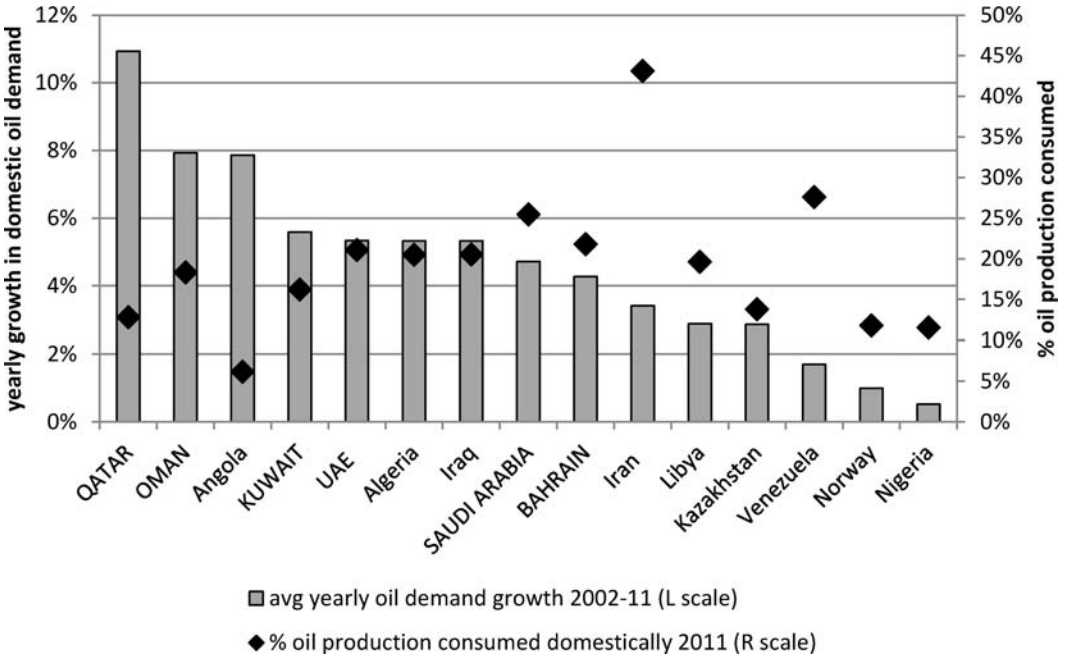
This quandary is illustrated in Section 1 by describing the state of primary energy consumption in the Gulf producer countries and the influence subsidized resource distribution. Section 2 examines subsidies' contribution to demand in electricity markets and the mounting cost of keeping pace. Section 3 looks at the equally beleaguered market for natural gas, where fixed prices have exacerbated demand and undercut incentives to increase supply, as the Gulf has transformed into an importing region. The discussion and conclusion examine the implications of shrinking exports and rising fiscal burdens that are symptomatic of maturing resource exporters.

1. GCC ENERGY CONSUMPTION DYNAMICS

In the past four decades, energy demand in the Gulf Arab countries has undergone a dramatic transformation. At the start of the 1970s, these territories were poor and underdeveloped, with tiny populations emerging from centuries of isolation. Energy consumption in Arabia was less than one percent of global demand. Forty years later, the Gulf monarchies, with just 0.5% of the world's population, consume 5% of its oil. Primary energy consumption in the past decade has grown more than twice as fast as the world average of 2.5% per year. The Gulf's 2001 consumption of 220 million tons of oil equivalent nearly doubled by 2010 and is expected to nearly double again by 2020. Among major oil exporters, only Angola, Algeria and Iraq maintained similar growth (Fig. 1).

2. A large body of political economy literature has made this case, under the rubric of "rentier state theory" and the "resource curse." Works include: Beblawi (1987), Luciani (1987), Anderson (1987), Crystal (1990), Gause (1994 and 2000), Chaudhry (1997), Ross (2001), Smith (2004), Herb (2005), Schlumberger (2006), and Schwarz (2008).

Figure 1: Domestic Consumption of Potential Oil Exports: Avg. Yearly Growth in Oil Consumption, with Production Consumed Domestically in 2011



Source: BP, IEA 2013. Note: Libya figures omit 2011

Table 1: Saudi Oil Consumption in Perspective

	Oil consumed 2011 (m b/d)	GDP 2011 US$bn	Population (2011)	Oil consumption per capita
Saudi Arabia	2.86	$578 bn	28 million	37.2 bbl/yr
Brazil	2.65	$2,493 bn	195 million	5 bbl/yr
Germany	2.36	$3,577 bn	82 million	10.5 bbl/yr

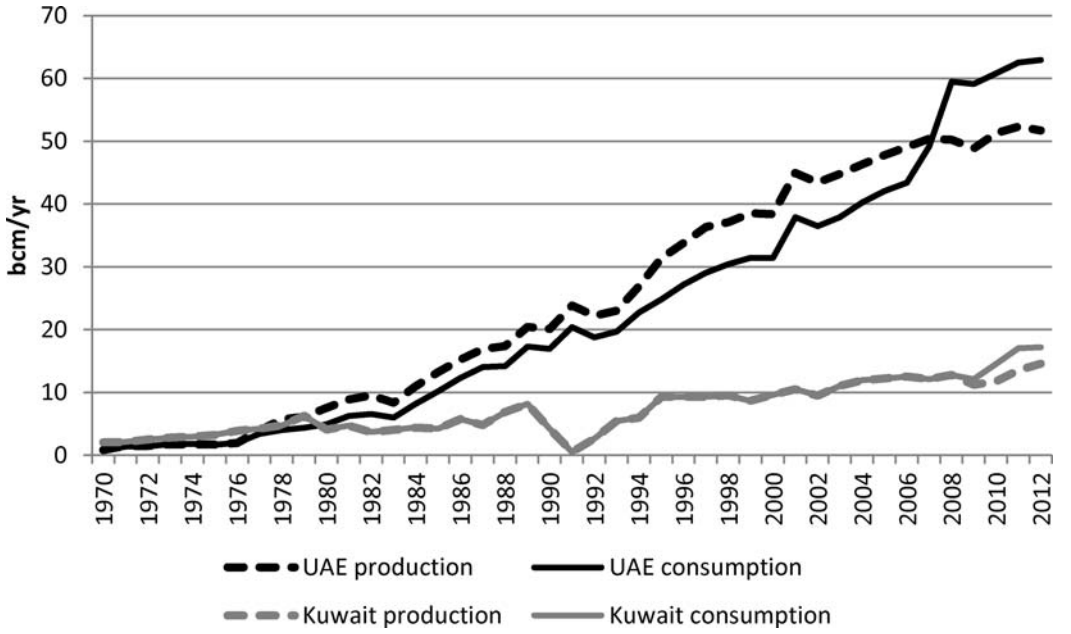
Sources: IMF, BP 2012

Energy demand in the Gulf has escaped notice until recently because of its large reserves, with oil reserves-to-production ratios of 63 years in Saudi Arabia, 79 years in the UAE, 89 years in Kuwait; and, for Qatari gas, more than 100 years (BP 2013). However, with oil production reaching or nearing a plateau, rising domestic consumption will begin to displace exports, regardless of the reserve base, unless production is also increased. Nearly a quarter of GCC oil production is now diverted to domestic use. At the time of the 1973 oil spike, that figure was around 4%.

A remarkable run of rising consumption in Saudi Arabia pushed the kingdom past Brazil and Germany to become the world No. 6 oil consumer in 2009, despite its comparatively small population, economy, and industrial base. (Table 1) In 2011, the kingdom's domestic oil consumption represented lost revenues of more than $80bn, or 13% of GDP, given the average price of Saudi Arabian light crude that year of $108/bbl.[3]

3. This calculation ignores varying prices for grades of crude and market effects of an additional 2.86m b/d of oil.

Figure 2: Gas Consumption Surpasses Production in UAE and Kuwait



Source: BP 2013

The GCC also represents a major repository of natural gas, but, in contrast with oil, most production is consumed domestically. Only Qatar is a major exporter. The remaining five countries produced 206 billion cubic meters (bcm) in 2012 and consumed nearly all of it, 201 bcm. Overall the GCC held more than a fifth of global reserves, but represented only 6% of global gas demand, which foreshadows difficulties in production, trade and pricing (IEA 2013; BP 2013). The UAE and Kuwait have become net gas importers since 2008 (Fig. 2).

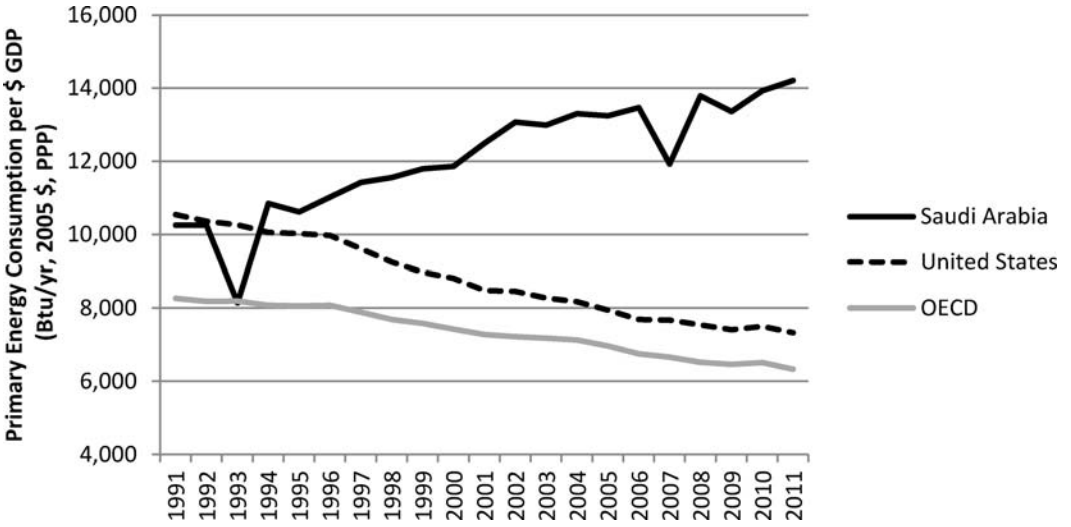
1.1 Consequences of Energy Mispricing

Energy is a key input for industrial development. Most countries increase efficiency as they develop, producing more output from the same input of energy. In so doing, they reduce the overall energy intensity of their national economies, in terms of primary energy consumption per unit of GDP. But in most of the GCC, energy demand is rising *alongside* energy intensity.[4] In effect, these countries are moving in the opposite direction from most of the rest of the world, growing less economically productive in energy terms (Fig. 3).

Oil exporting countries face depletion at varying time horizons, based on the level of production relative to the size of their resources, and the cost of production relative to the commodity's price. As production reaches a plateau, exports typically drop as domestic consumption rises. Unless an increase in the commodity price makes up for exports foregone, the producer experiences a decline in export revenues as resources sent abroad are gradually displaced by do-

4. Energy intensity of GDP is an imperfect measure in the GCC, since GDP figures are influenced by oil prices as well as economic productivity, while intensity figures also reflect feedstocks used in industry. See Lahn and Preston (2013).

Figure 3: Saudi Energy Intensity Measured against U.S. and OECD, 1991–2011.



Source: EIA, 2013

mestic consumption. This trajectory suggests that deriving maximum benefit from natural resources requires careful consideration of domestic use.

Intensity of domestic consumption is a key determinant of the longevity of a country's status as an oil exporter, as Lahn and Stevens (2011) have shown. As domestic consumption outstripped production in China and the United States, for example, these former oil exporters became net importers. Their diversified economies were able to absorb the loss. Oil and gas exporters Malaysia and Indonesia are reaching this stage, and both have significantly diversified their economies for the transition.

How do energy prices figure in this debate? Low pricing encourages consumption at rates above those warranted by the opportunity cost of these fuels on global markets. Low prices also distort energy allocation preferences while undercutting upstream investment and efficiency incentives. Each of these factors has contributed to ongoing shortages of natural gas (Razavi 2009; Darbouche and Fattouh 2011). But the lack of constraints on consumption in the GCC is at odds with its near-total dependence on export revenues. Oil and gas exports typically provide 40% of collective GDP and 80% of government revenues. Such one-sided dependence confers a high value on energy resources that is not reflected in prices.

Converting depletable resource stocks into cash represents a transfer of one type of asset to another. Authors such as Stauffer (1987), Mitchell (2006) and Heal (2007) maintain that these revenues should not be considered income. Sustainable depletion requires conversion of below-ground assets into new forms of above-ground wealth. Heal and Stauffer argue that oil revenues should not even be reflected in GDP figures, since revenues stem from "asset disposal" rather than earnings. Heal contends that a country becomes poorer by spending resource income for any purpose other than capital investment.

By this reckoning, the GCC countries are poorer for not deploying the full investment value of their depleting resource. Much of the Gulf's consumption does not cover cost, let alone create above-ground wealth. Domestic sales of potential oil and gas exports are usually done near the cost of production, rather than at global market prices. Instead of providing income, local

consumption thus serves to *reduce* the state's revenue, either real or potential. Rents are foregone in the failure to sell energy at market prices (an implicit subsidy), and further costs are accrued by below-cost sales of refined fuel and electricity (an explicit subsidy).

Hartley and Medlock (2013) have demonstrated the economic underperformance of state-owned oil companies, finding that national oil companies' social welfare mandates leaves them less revenue-efficient than their shareholder-owned counterparts. In the Gulf region, well-documented distributive political structures lay behind this underperformance. Rent distribution was a tool of political control even before the onset of oil or independent states in the Gulf, as Foley (2010) and Davidson (2005) have shown.[5] The arrival of oil revenues into this framework magnified the political clout of ruling sheikhs, helping them maintain power long after the sweeping aside of counterparts whose resource endowments relative to population did not provide them the same co-optive power.[6] In particular, however, it is the practice of *in-kind distribution* of energy commodities (as distinct from rent distribution) that encumbers these regimes with structural encouragement of resource demand.

2. ELECTRICITY POLICY: GENERATION, FUELS AND PRICES

The arrival of electricity in the Arabian Peninsula is a relatively recent development, coming within the lifetimes of many residents. Much of the region was un-electrified as late as 1960. Electrification in Oman did not begin in earnest until the 1970s. Since then, growth in power generation has been dramatic, especially in the richer states of Kuwait, Qatar and the UAE. These states now consume more electricity per-capita than the United States. Power generation growth averaged 7% per year between 2000 and 2010, slightly faster than average GDP growth of 6.5%. In 2011, power generation consumed about a third of all GCC gas production. Gas, in turn, accounted for 60% of total generation, versus 40% for liquid fuels[7] (Figs. 4 and 5).

In all but Qatar, growth in electricity demand has outstripped domestic supply of natural gas, the region's chief generating feedstock. This shortage heralds an important shift in the Gulf power generation paradigm. In the past, governments had to cope with the cost of building power plants, while feedstock came from cheap and plentiful domestic sources. Now, regimes must cope with an array of new costs: market-priced imports, expensive production of unconventional gas[8] or the opportunity cost of burning crude oil and other liquids. The rising costs of electricity generation are not, for the most part, offset by rising end-user prices.

2.1 Electricity Demand

Energy demand is a function of several factors, among them income, population, technology, climate and price. Each of these factors has contributed to the composition of GCC energy demand. Populations have quintupled over four decades, as a result of high birthrates and large-scale immigration. (Table 2) Combined population in the six states rose from 8.2m in 1971 to 44.8m in 2011, an annual growth rate of 4.3%—nearly triple the global average—albeit slower than growth

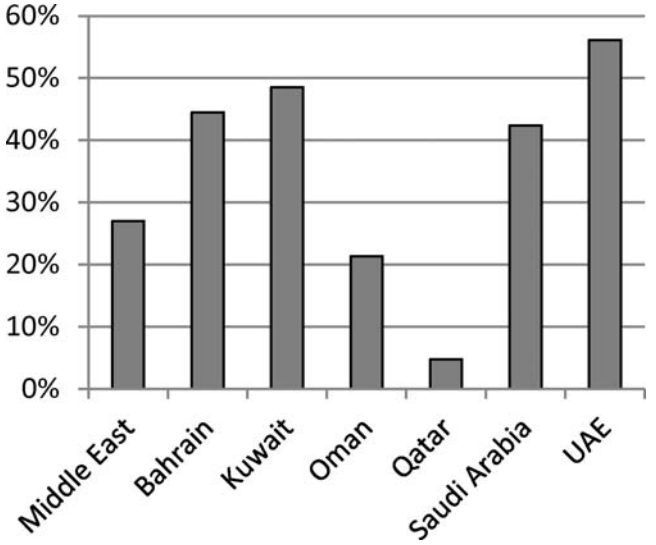
5. Among the examples Foley documents are the al-Saud's distribution of revenues from Hajj fees.

6. Egypt's monarchy was overthrown in 1952, Iraq's in 1958, Yemen's in 1962, Libya's in 1969 and Iran's in 1979.

7. 55% of Saudi power was derived from liquid fuel-based generation, as was 71% in Kuwait and 18% in Oman, where (as in Saudi Arabia) diesel generation provides electricity in areas beyond transmission grids (IEA 2011).

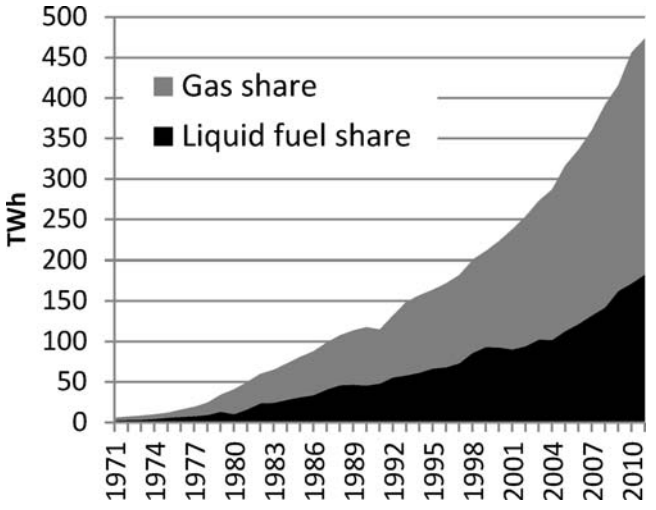
8. Unconventional gas developments such as the Shah project in Abu Dhabi, Khazzan Makarem in Oman, and others under consideration in Kuwait and Saudi Arabia entail much higher lifting costs.

Figure 4: Gas Consumed in Power Sector 2011 as a Proportion of Domestic Gas Production



Source: IEA 2013

Figure 5: Aggregated Total GCC Electricity Generation by Feedstock, 1971–2011



Source: IEA 2013

rates in energy consumption and power generation reported above. At the same time, rising individual wealth has also increased demand for energy, with per capita GDP growing by an average of 2.2% per year since 1981, and 4.3% since 2000.[9] (Table 3) The effects of the hot and humid

9. Per capita GDP growth is PPP and averages all six GCC growth rates since 1981 on an unweighted basis. International Monetary Fund (2012): World Economic Outlook (Edition: October 2012).

Table 2: GCC Population Growth since 1971

	1971 pop.	2011 pop.	Growth multiple 1971–2011	Yearly growth rate
Bahrain	220,000	1.3m	6	4.5%
Kuwait	810,000	2.8m	3.5	3.1%
Oman	758,000	2.8m	3.8	3.3%
Qatar	118,000	1.9m	15.8	7.2%
Saudi Arabia	6m	28.1m	4.7	3.9%
UAE	273,000	7.9m	29	8.8%
GCC	8.2m	44.8m	5	4.3%
World	***3.8bn***	***7bn***	***1.9***	***1.5%***

Source: World Development Indicators, World Bank 2013

Table 3: Growth in GDP Per Capita and Oil Demand since 1971

	GDP per cap 1971 (curr US$)	GDP per cap 2011 (curr US$)	Yearly growth rate	Oil demand 1971 (k b/d)	Oil demand 2010	Yearly growth rate
Bahrain	$8,584*	$18,184	2.5%	15	50	3.1%
Kuwait	$4,784	$62,664	6.6%	70	366	4.3%
Oman	$397	$25,221	10.9%	25	141	4.5%
Qatar	$3,280	$92,501	8.7%	2	192	12.4%
Saudi Arabia	$1,127	$20,540	7.5%	307	2,687	5.7%
UAE	$27,590**	$45,653	1.4%	3	620	14.6%

Source: World Bank, IEA 2013 (*1980, **1975)

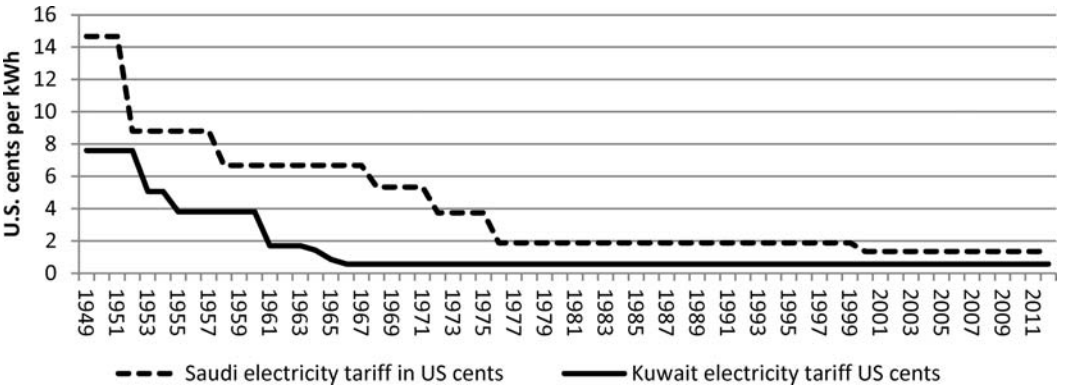
climate in the Gulf play a role, especially in the high rates of utilization of cooling technology. The GCC industrial structure also contributes, given the profusion of energy-intense processes in petrochemicals, fertilizer and aluminum and within the oil and gas sectors.

Since this paper examines the effects of policy on energy demand, the contribution of low fixed prices becomes significant. Price is a key component in demand for energy as well as in the choices of energy-consuming equipment and its operating efficiency, and the rate of utilization of that equipment. Thus, the region's low prevailing prices relative to income offer little incentive for conservation, for investments into more efficient technology, or for reducing rates of utilization. When prices are as low as those in the Gulf, it can be economically rational for people to maintain high rates of consumption using inefficient technology, rather than investing in more efficient replacements. Pricing has thus contributed to path dependence on high consumption, encouraging development of energy intensive infrastructure and habits.

Today's electricity prices have their roots in low valuations of natural gas, which stem from an era when associated gas was considered a nuisance and often flared off, rather than put to productive use. Marcel (2006) describes how Kuwait's 1975 nationalization of the Kuwait Oil Co., then held by BP and Gulf Oil, was driven in part by flaring. Newly nationalized Gulf NOCs soon diverted associated gas to the power sector.[10] Given the near-zero domestic value of the gas, elec-

10. Aramco World Magazine. "Foundations: The Keystone." Vol. 33 No. 6. Nov/Dec 1982. Accessed Aug. 24 2012 at: http://www.saudiaramcoworld.com/issue/198206/foundations-the.keystone.htm

Figure 6: Historical Electricity Prices in Kuwait and Jeddah 1950–2012: Price per kWh in U.S. Cents at 2012 Exchange Rates



Kuwait source: al-Qudsi and al-Shatti, 1989, and Kuwait Ministry of Electricity and Water; Saudi source: Electricity Co-generation and Regulatory Authority of Saudi Arabia, 2012

tricity tariffs needed only cover costs of infrastructure, operation and maintenance (Scott 2010). "Stranded" gas was thus used to develop these lightly populated states, providing improvements in lifestyle while shoring up the political legitimacy of ruling families.[11] Once fixed, electricity tariffs that might have covered costs in the 1970s or '80s have stagnated, or been reduced. Kuwait's price of 2 fils (0.7 U.S. cents) per kilowatt-hour has been fixed since 1966. Residential tariffs in Saudi Arabia have been reduced six times since 1950 (Fig. 6). By the mid-2000s, these (by then) subsidized prices were seen as a convenient way to distribute oil rents.

What share of GCC energy demand, or in this case, electricity demand, is attributable to low prices? While a detailed decomposition of demand lies beyond the scope of this paper, calculations based on a plausible estimate of price elasticity suggest that low prices contribute significantly to demand, and that reforms would provide substantial savings.

In their examination of subsidy effects on GCC energy consumption, Rodriguez, Charap and Ribeiro da Silva (2013) use the region's very low gasoline prices as a proxy for underpriced energy in general. Table 5 shows the percentage by which 2010 energy prices in four GCC countries would need to rise to cover the opportunity cost implied by international market prices. Rodriguez et. al calculate reductions to demand in oil-exporting countries using two long-run price elasticities, -0.3 and -0.5, based on averages of previous estimates. Here, I use the plausible middle range figure of -0.4, while acknowledging the difficulty in estimating consumption behavior in the Gulf, given the lack of empirical evidence from price increases in the region, as well as the large variation in long-run price elasticity estimates in the literature. These estimates range from -0.07 at the low end[12] to -0.86 at the upper end (Dahl and Sterner 1991).

Others examining energy demand in the Gulf have found it to be price inelastic, albeit within a broad range. As shown in Table 4, Eltony and al-Mutairi (1995 and 1996) found long-run gasoline and overall energy demand in Kuwait relatively inelastic, ranging from -0.23 and -0.46.

11. There is debate about whether electricity provision was an explicit quid pro quo for citizen political support, or whether its subsidization owes itself to an unintentional failure to index tariffs to inflation.

12. IMF World Economic Outlook, April 2011, cited in Rodriguez et. al (2013), p. 23.

Table 4: Price Elasticity Estimates for the Gulf Countries

Authors	Sample	Product	Method	Long-term price elasticity
Eltony and Al-Mutairi	Kuwait 1970–89	Gasoline	Co-integration and error correction	−0.46
Al-Mutairi and Eltony	Kuwait 1965–89	Energy	Co-integration and error correction	−0.23 to −0.43
Narayan and Smyth	6 GCC (among 12 Mideast countries)	Oil	panel unit root and co-integration	−0.01 to −0.07
Rodriguez et. al	9 energy-exporting countries	Gasoline	OLS regression	−0.3 to −0.5

Narayan and Smyth (2007) found very little price elasticity in oil demand in the six GCC states, with estimates from −0.01 in Kuwait to −0.07 in Saudi Arabia. In Dubai, a government examination of a 15% increase in electricity prices in 2011 found a small, albeit temporary, decrease in demand.[13] Wade (2003), in the 2003 National Energy Modeling System estimates, obtained long-run price elasticities of −0.49 pertaining to buildings in the U.S. residential sector and −0.45 in the U.S. commercial sector. These were based on a doubling of the electricity price. In general, energy demand is thought to be quite insensitive to price increases in the short run, since energy has few substitutes and rates of consumption are linked to existing infrastructure, which itself is based on past prices. In the longer run, demand is assumed to be more elastic, since consumers and product developers will have had time to respond to higher prices with greater efficiency.

This paper uses a simplification of the demand equation from Rodriguez et. al:

$$q_{i,t} = \alpha \gamma_t A_i y_{i,t}^{\delta} p_{i,t}^{\beta} \tag{1}$$

In this equation, $q_{i,t}$ denotes energy demand of country i at time t, α denotes a constant, y_t denotes technology, A_i denotes country-specific factors such as weather, $y_{i,t}$ denotes the real income of country i at time t, $p_{i,t}$ denotes the real price of energy, δ is the income elasticity of energy demand, and β is the (negative) price elasticity of energy demand.[14]

In the case of Kuwait, where the IMF has determined energy prices would need to rise by 183% to account for the opportunity cost of foregone revenue, the demand adjustment is calculated below. Conforming to the equation above, elasticity is derived by: $\frac{q_1}{q_0} = \left(\frac{p_1}{p_0}\right)^{\beta}$, where β is the price elasticity, in this case −0.4. Given the required 183% increase in gasoline prices, $\frac{P_1}{P_0} = 2.83$, which, raised to power of −0.4 equals 0.66; which means $\frac{q_1}{q_0} = 0.66$. It thus follows that a 183% increase in price leads to a *long-run* drop in demand of 100*(1−0.66), or 34%. Note that the large increases in energy price required to reach international levels requires use of this non-linear function, rather than the simpler linear price elasticity function.

13. Dubai energy sector officials interviewed by the author estimated an average 3% decline per user in 2011, which implies a short-run price elasticity of −0.2. Data and full details were unavailable. Note that price elasticity calculations in Dubai would be hampered by factors including wide price differences between citizens (just 5% of the population) and majority expatriates, who exhibit high levels of transience.

14. Rodriguez, Charap and Ribeiro da Silva (2012) p. 24.

Table 5: Power Demand and Energy Savings in 2025 in Business-as-usual Case (BAU) and after Rationalizing Electricity Prices

	2011 power demand (TWh)	2025 power demand BAU (TWh)	price increase to displace subsidy	Drop in demand at −0.4 price elasticity	2025 Power demand with no subsidy (TWh)	Savings in TWh in 2025	Savings in BOE terms (MMb/year)
Kuwait	43	86	183%	−34%	57	29	17.7
Qatar	28	55	242%	−39%	34	21	12.8
Saudi Arabia	220	436	306%	−43%	249	187	114.2
UAE	80	158	38%	−12%	139	19	11.6

How would the elimination of Kuwait's subsidy affect long-run consumption? Looking ahead, one projection of GCC electricity demand forecasts 5% average growth over each of the 14 years between 2011 and 2025.[15] At that rate Kuwait's power demand would double from 43 to 86 TWh. By increasing prices to opportunity cost levels, Kuwait's projected 2025 demand of 86 TWh would be reduced by a third, to 57 TWh. The portion of 2025 power demand that is attributed to subsidy is therefore 29 TWh. Converted to barrels of oil equivalent using BP's conversion rate of 1 TWh = 610,948 boe, a 29 TWh reduction represents a savings of 17.9m boe, roughly equivalent to three weeks of Kuwaiti crude exports in 2011. For the UAE, where fuel and some electricity prices are closer to international parity, the effects of subsidy removal are less dramatic. The UAE's 2011 consumption of 80 TWh would be expected to reach 140 TWh, even when allowing for a 12% reduction in demand implied by a 38% increase in power prices. See Table 5 for further calculations.

The estimates above depict long-run reductions in demand ranging from 12% in the UAE to 43% in Saudi Arabia that would result from a hypothetical rationalization of electricity prices. These estimates should be considered broadly illustrative since they rely on a proxy composed of oil-based gasoline prices, rather than an unsubsidized price for electricity based on the mix of natural gas and liquids used in power generation.[16] Electricity prices in much of the GCC are proportionally lower than gasoline prices, and, factoring in the opportunity cost of liquid feedstock used in Kuwait and Saudi Arabia, some price increases required to meet opportunity costs would need to be even larger. As mentioned, there is very little data on behavioral responses to energy price increases in the Gulf monarchies, in part because there have been few such increases. Hence the estimates above can be said to provide basic insight into the relative share of GCC electricity demand that can be attributed to subsidy, as distinct from the other factors driving demand, and to a hypothetical response by consumers to rationalized prices.[17]

2.2 Policy Approaches to Electricity Demand

A sudden tripling of electricity prices might offer a useful hypothetical exercise, but it does not by itself provide a viable policy choice to the region's governments. Energy subsidies and

15. Lahn, Stevens and Preston (2013) p. 41.

16. While calculating unsubsidized electricity prices for each of the Gulf monarchies is beyond the scope of this paper, it makes an excellent topic for future research.

17. A more thorough examination of price increases would also examine income elasticity, which tends to decline as income rises.

other welfare benefits take on outsized importance in the tribal-autocratic context of the Gulf monarchies, where they are understood to substitute for citizens' lack of political participation. Taking them away constitutes a reneging on the implied social contract in these countries, with potential consequences for political stability. The perils of energy subsidy reforms can be seen in contributions to recent unrest in Nigeria, Ecuador and Jordan, and the toppling of regimes in OPEC members Indonesia in 1998 and Venezuela in 1993. A more measured policy might opt for targeted subsidies designed to protect low-income and vulnerable groups, while allowing prices to rise for those deemed more able to pay. And, if policymakers believe that citizens are entitled to a given *level* of welfare benefits, they may wish to structure reforms so that overall consumer welfare is not lost when energy subsidies are removed. In such a case, they may seek to replace energy subsidies with a cash transfer or an alternate benefit holding an approximately equal value, minus the deadweight loss that accrues from inefficient allocation.

There is some precedent for such a policy. In 2010, Iran became the first country in the world to replace energy subsidies with a universal cash transfer program that distributed payments averaging $40 per month to nearly all households (Tabatabai 2011). Direct payment subsidy is a more efficient and equitable redistribution mechanism because increased energy prices encourage consumers to reduce consumption, which, as in the Iranian case, allows households to use part of their compensation to buy preferred goods and services. Distributing cash rather than in-kind energy also improves social equity since subsidy accrues disproportionately to wealthy households which have more means to consume. Iran's reform achieved a positive assessment from the IMF for reducing demand while halving the world's largest energy subsidy burden, valued at around $100 billion or a quarter of 2010 GDP. And, perhaps of equal significance, a large segment of the Iranian public supported the reform (Guillaume, Zytek and Farzin 2011). Demand reduction was sufficient to permit a temporary increase in oil exports before international sanctions blocked Iran's oil trade.[18] However, the subsidy reform was halted in 2012 by a lack of parliamentary support and by rising inflation, which reduced energy prices in real terms as well as the value of the cash transfers.[19] The overall outcome of Iran's reform remains inconclusive.

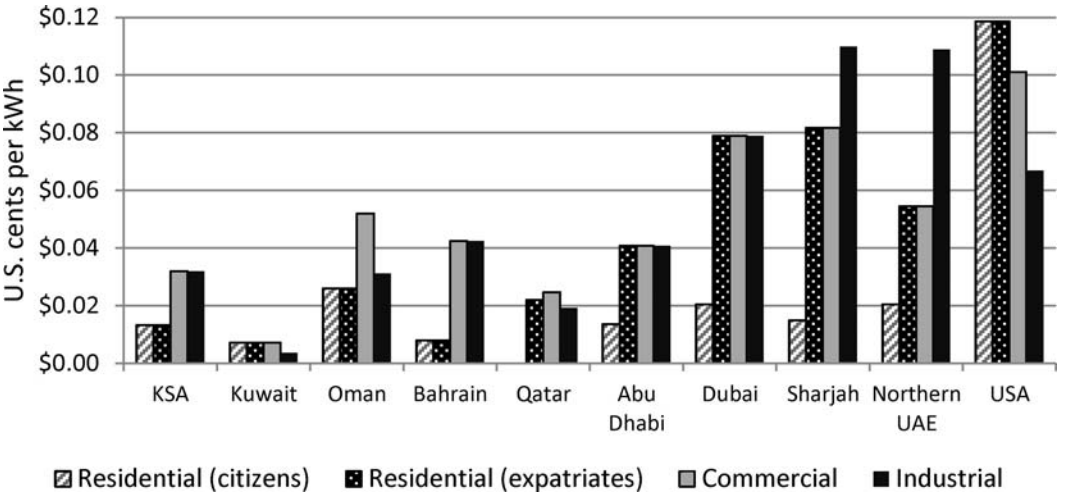
Policymakers in the Gulf have devised various means and proposals to increase energy prices. None (that this author has seen) follow the Iranian path of maintaining consumer welfare through rebating the cash value of the subsidy. A few regimes have managed to target electricity and water subsidies toward the influential citizen residential sector, while tariff increases have been levied on those holding relatively low levels of political influence. Rising prices have been imposed on industrial and commercial customers, and, in Qatar and the UAE, expatriate residents. Low tariffs for citizens are deemed a crucial endowment within the paternalistic social contract between ruling sheikhs and their subjects. Expatriate residents and foreign investors are more likely to see low pricing as a windfall. In the UAE, non-citizen power prices have been raised to at least triple the level of citizens. In Qatar, citizens continued to receive free electricity, while foreign residents are charged 2.5 U.S. cents per kilowatt-hour. Fig. 7 illustrates sector pricing in the Gulf, which runs contrary to that in unsubsidized markets like the United States, where lowest rates tend to be reserved for industrial consumers.

More recently, the Saudi Electricity & Co-Generation Regulatory Authority (ECRA) has initiated efforts to target its electricity and water subsidy toward low-income households. ECRA

18. Middle East Economic Survey (Apr. 30, 2012) "Second Phase Of Subsidy Reform Plan To Await Budget Approval" p. 17–18. See also: Tehran Times. (Dec. 31, 2011) "Petrol rationing saves Iran $38 billion: Official."

19. Bozorgmehr, Najmeh. "Subsidy dispute adds to Iran's woes." *Financial Times*, April 12, 2012; International Monetary Fund (2013).

Figure 7: Retail Electricity Prices for an Initial 2,000 kWh in Comparison across Sectors in the Six GCC Countries and the United States.



Note that four utilities operate in the UAE.
Source: Author's compilation from national utilities, interviews and media sources; All GCC prices are fixed by the state. Those in Dubai include additional fluctuating surcharges for LNG, which have not been included. U.S. figures are 2012 averages from U.S. Energy Information Administration, 2012.

tried and failed to raise residential rates in 1999 when a public outcry forced it to back down. In 2012 ECRA arranged for the Ministry of Social Affairs to pay "reasonable" residential consumption of low-income Saudis, in hopes that the king and his advisers will agree to higher rates on remaining households once ECRA can show that poor and vulnerable customers have been protected (Al-Shehri 2012).

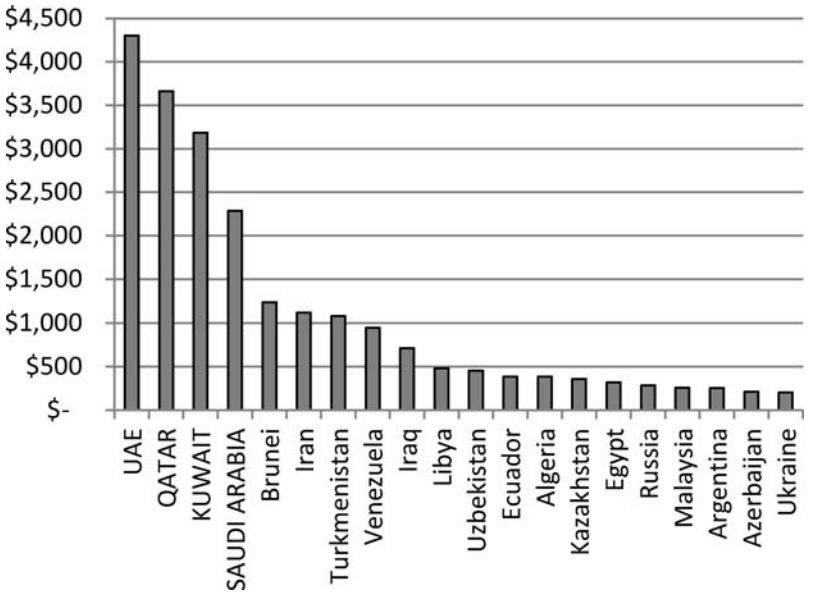
2.3 Electricity Subsidy and the Residential Sector

One of the consequences of policies that reserve the cheapest electricity for residential customers has been that sector's rise to dominance. In all but Qatar the residential sector is the largest consumer of electric power, most of which is used in cooling. In Kuwait, Saudi Arabia, Oman and Bahrain, it represents more than 50% of national power consumption.[20] Residential consumption poses three problems for governments. First, electricity is sold at a loss, so its provision is a drag on the economy. Second, this demand produces an additional opportunity cost by diverting exportable hydrocarbons into the domestic economy, where they are provided at low fixed prices. Third, as mentioned, residential demand is difficult to reform because of the implied risk to political stability.

The difficulty in targeting residential demand is apparent in Oman's 2009 proposal for cost-reflective tariffs, which calls for prices for commercial and industrial customers to rise to cost-reflective levels (Authority for Electricity Regulation 2009). The intent is to reduce Oman's recent 10% yearly increases in electricity demand, which claim an ever-larger share of the sultanate's budget and gas resources. However, the proposal, which would not affect residential consumers,

20. In the UAE, homes were responsible for 43%, the largest sector overall. (IEA 2011).

Figure 8: Per Capita Fossil Fuel Subsidy in 2001 US$, Country Rankings



Source: IEA 2012

remained on hold at the time of writing. The country's electricity regulator said the Arab Spring uprisings, which included virulent demonstrations in Oman, increased government sensitivity to potentially unpopular measures (Cunneen 2011). Among the nine tariff-setting entities in the GCC, only Dubai has raised prices on citizens' residential consumption in the last decade. In 2011, the emirate raised all electricity prices by 15% and imposed a surcharge (which citizens do not pay) that passes along LNG import costs.

In summary, 40 years of rising electricity consumption has been driven by extraordinary growth in population and individual wealth in the Gulf monarchies. These structural demand factors have been exacerbated by subsidies based in distributive patrimonial politics, to which I attribute about a third of GCC electricity demand. Regimes have failed to expose consumers to price signals that might reduce consumption in line with rising government costs. In turn, their subsidies have become the world's largest, on a per capita basis (Fig. 8).

3. NATURAL GAS: PRICE, PRODUCTION AND SHORTFALLS

As mentioned, natural gas feedstock accounts for the largest share of GCC power generation. If the Gulf comprises one of the most gas-rich regions on earth (Table 6) why would five monarchies find themselves in short supply? In similar fashion to the electricity sector, underpricing is driving demand. But in the gas sector, underpricing is also stifling production. Partly as a result, the GCC is being transformed into an importing region.

Most current GCC gas production stems from low-cost associated gas yielded in tandem with oil. By contrast, non-associated reserves in the five gas-short monarchies tend toward the geologically difficult: deep rock-bound "tight" gas, as well as sulfuric "sour" gas. Production costs run between $3 and $9 per million Btu (MMBtu).[21] Such costs render upstream investment com-

21. Gulf-based IOC executive, interview with author on condition of anonymity, Muscat, Nov. 15, 2011.

Table 6: Natural Gas Reserves of the Gulf and Arabian Peninsula

	Size (Tcm)	Share of world total
Bahrain	0.2	0.1%
Iran	33.6	18%
Iraq	3.6	1.9%
Kuwait	1.8	1%
Oman	0.9	0.5%
Qatar	25.1	13.4%
Saudi Arabia	8.2	4.4%
UAE	6.1	3.3%
Yemen	0.5	0.3%
GCC total	**42.3**	**22.6%**
Region total	80	42.7%
World total	187.3	100%

Source: BP 2013

mercially unviable in countries with bulk gas prices capped under $2. And, since most production is sold in-country, the typical incentive for foreign investment—a profitable netback—is eliminated.[22]

3.1 Gas Trading in the Gulf

Unmet demand suggests that pipeline imports from gas-rich neighbors, especially Qatar and Iran, would be attractive. But the region's only cross-border conduit is the Dolphin Pipeline, endowed with a nameplate capacity of 33 bcm/year, but which maintains an operational capacity of just 20 bcm/year. In 2011, it operated at about two-thirds nameplate capacity, carrying 17 bcm from Qatar to Abu Dhabi and Dubai, and a further 2 bcm to Oman. The pipeline could be filled to capacity if equipped with additional compression, but political differences over pricing have undermined Qatari willingness to earmark additional gas for the pipeline.[23]

Dolphin-delivered gas rises in price slightly each year, with UAE prices around $1.50 per MMBtu in 2012. That is considered a significant underpricing, and has pushed Qatar to seek oil-linked prices and markets outside the Gulf. Qatar's neighbors have been unwilling to pay more than what they consider a reasonable markup on production costs below $1/MMBtu. But Qatari officials who value gas by the far higher netbacks from customers in Asia and Europe, view regional requests for "discounted" gas as unrealistic. Other pipeline proposals have failed. (Table 7) Recent sales provide further information on the value of gas in Persian Gulf. A so-called "interruptible supply" of Qatari gas sold to Abu Dhabi via the spare capacity in the Dolphin Pipeline is priced near $5, and resold in the UAE for $7 to $10.[24] Kuwait and the UAE also have resorted to LNG imports, with Kuwait reportedly paying above $15.[25]

22. Mabro and Razavi argue that Mideast gas *exports* are also driven by subsidies, since low domestic prices incentivize firms to reap higher export returns, even when those gains are outweighed by the economic benefits of using gas domestically. See Mabro (2006) and Razavi (2009).

23. A $250m contract to maximize the pipeline's capacity by adding three compressors was awarded in November 2012, but did not include mention of availability of additional gas. See: Watts, Mark. "Dolphin Energy awards Qatar gas contract to Larsen & Toubro." *MEED*, Nov. 13, 2012. See also: World Bank (2013), p. xvi and 44.

24. Gulf-based IOC executive, interview with author on condition of anonymity, Doha, Nov. 29, 2011.

25. Kuwait LNG import price is from *Petroleum Economist* 78, issue 9 (2011), http://www.petroleum-economist.com/Article/2912531/Kuwaits-growing-need-for-LNG-imports.html.

Table 7: GCC Gas Pipeline Proposals that Failed

Project	Year launched	Gas source	Importing countries	Reason for failure	Source
GCC gas grid	1988	Qatar	KSA, Kuwait, Bahrain, UAE	Political/territorial disputes	Dargin, 2008
Crescent Petroleum pipeline	2001	Iran	UAE (Sharjah)	Pricing disagreement. Contract nullified by Iran after pipeline built	Jafar, 2012; Carlisle, 2010; Adibi and Fesheraki, 2011
Dolphin Pipeline extension to Kuwait	2005	Qatar	Kuwait	Saudi refusal to grant access to territorial waters	Dargin, 2008

3.2 Increasing Reliance, Increasing Cost

Despite these difficulties, the U.S. Energy Information Administration (EIA) projects that gas consumption in the Middle East's generating sector will grow by nearly 150% by 2035.[26] Drivers include rising population and energy intensity, industrialization, and gas-for-oil substitution to maximize exports. The marginal cost of additional gas to meet these needs will be far higher than that of domestic associated gas. For example, Abu Dhabi projects a widening deficit in gas feedstock until 2017, when the first of its four nuclear power plants is expected to begin producing power. The Abu Dhabi leadership opted to import LNG to bridge this deficit. The price differential is roughly sevenfold. Current supply costs roughly $1.50/MMBtu. LNG imports will be priced above $10.[27]

In Oman, rising domestic demand and depleting conventional gas reserves have forced reductions in LNG exports. Unconventional reserves are under development, but lifting costs could run beyond $8/MMBtu. In Saudi Arabia, a $9bn gas investment campaign aims to slow the growth of crude oil and diesel in the power sector by substituting with gas. Saudi Aramco hopes to increase gas output by 50% above 2011 production of 280MMcm/day (Lamotte 2012), but, like Oman, most of its non-associated reserves consist of difficult formations.

3.3 The Gulf as an Importing Region

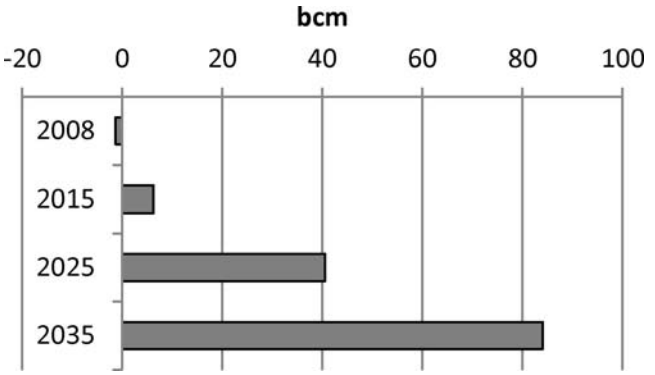
Despite the discomfort of paying market prices for a commodity recently considered "free," the GCC is becoming a gas importing region. The EIA projects that the "Arabian producers" (UAE, Kuwait, Bahrain, Oman and Yemen) will require 40 bcm in yearly imports by 2025 and double that in 2035 (Fig. 9). The EIA expects that Saudi Arabia will remain self-sufficient. However, a senior Saudi energy official told this author that gas imports for the power sector were under consideration.[28]

26. U.S. Energy Information Administration. (September 2011). International Energy Outlook 2011. Chapter 5: Electricity. Figure 83. Middle East net electricity generation by fuel, 2008–2035.

27. Abu Dhabi energy sector official, author interview on condition of anonymity, March 12, 2012.

28. Saudi energy official, Ministry of Petroleum and Minerals, author interview in Riyadh, Oct. 15, 2012, on condition of anonymity.

Figure 9: Projected Gas Imports of Arabian Producer Countries



Source: EIA, International Energy Outlook 2011

From which countries will these imports be sourced? Inexpensive supply from the largest resource holders in the region, Qatar and Iran, appears unlikely. If Qatar's moratorium on further North Field production is lifted after 2015, Qatari policymakers have signaled that the country will market any increased production on a commercial basis.[29] Imports from Iran have been thwarted by price and political disputes, as well as by Iran's prioritizing of reinjection (Adibi and Fesheraki 2011; Wietfield 2011). Iraq also appears a doubtful source. It also requires gas for reinjection, power generation and industry. The most likely destinations for any Iraqi exports are said to be Turkey and Europe (Yacoub and Rutledge 2011). Barring major discoveries, it appears that the limits to the GCC's inexpensive gas supply have taken shape. In all but Qatar, marginal increases in gas demand will be met by higher-cost sources, mainly non-associated and unconventional gas, or market-priced imports. Policymakers have sought other avenues of redress from their gas challenge, as evidenced by investments into nuclear and renewable generation. These technologies are likely to provide only marginal relief.

4. DISCUSSION

Rising domestic consumption is a familiar menace to oil-dominated economies. Venezuela, Iran and Indonesia have experienced similar quandaries. These were addressed in Iran and Indonesia by subsidy reductions and in Venezuela by increasing government debt. Rarely a straightforward process, the subsidy challenge in the Middle East has been magnified by the pan-Arab uprisings. The overthrow of neighboring autocrats has infused caution into Gulf regimes, which responded by increasing social spending and withdrawing subsidy reforms. This author's 2012 survey of UAE policymakers found a deep reluctance to raise electricity and water prices, and a heightened sensitivity to citizen opinion.[30]

29. Author interviews with IOC executives and government consultants in Qatar, Spring 2012.

30. Fifteen of 25 policymakers polled (60%) said "events of the Arab Spring" had made the UAE government "less willing to raise water and electricity prices." Twenty-one of 26 respondents (81%) said the UAE government was either "very sensitive" or "extremely sensitive" to citizen opinion on tariff increases. Anonymous online survey of 36 UAE government policymaking employees conducted by the author between Feb. 22 and March 5, 2012.

Despite the difficulty in reforming energy policy, alternatives appear worse. It is hard to overstate the importance to the Gulf monarchies of preserving hydrocarbon export revenues. Despite modest success with economic diversification, energy exports still comprise the largest share of GDP and government budgets. These earnings provide the hard currency required to maintain imports, to meet social welfare outlays, to develop infrastructure that can drive industrial growth and diversification, and to create jobs for burgeoning workforces.

The Gulf energy conundrum can be read in two ways. On the one hand, it provides an impetus for these historically durable monarchies to renegotiate socio-economic relations between government and citizen, and to begin the inevitable journey toward more efficient and diversified economies. In other hydrocarbon exporters, such as Indonesia, Malaysia and Mexico, political liberalization has been part of this journey. On the other hand, this conundrum could lead to crisis responses that damage state-society relations, if unsustainable welfare schemes are not reframed on agreeable terms (Coates Ulrichsen 2011).

Academic works that examine this issue are split on the likelihood of continued stability. On the pessimistic side are arguments like Davidson's (2012) that shrinking resource rents per capita are undercutting the ruling families' levers of power as globalized media tools undermine their controls on political discourse. More optimistic voices such as Lahn and Stevens (2011) maintain that deficits in the non-hydrocarbon fiscal and current accounts are being addressed through industrial diversification that will supplant depleting hydrocarbon sectors. They argue that energy consumption will be addressed through upgrades in efficiency and largely without antagonizing citizens. Others, including policymakers and experts in Saudi Arabia, the UAE and Oman, believe that energy prices can and will eventually be raised, even on the sensitive residential sector.[31] The optimistic view is bolstered by the historical resilience of the GCC monarchies, which managed to survive both the Arab Spring uprisings and the 1980s-'90s oil bust. It bears recalling that in Saudi Arabia, oil revenues plummeted from $120bn to $17bn over the four years to 1985, while GDP per capita fell from its 1980 peak of $19,000 to reach $6,900 in 1996. Then, too, scholars predicted the fall of the sheikhs[32] but none of the six Gulf ruling families was toppled.

Assessments of the well-being of the Gulf monarchies tend to revolve around global oil prices, and it has been the rising oil price that has enabled recent increases in social welfare, rather than a rise in productivity. However, assuming steady global demand, the crisis covered here is playing out independently of oil prices. That is not to say a falling oil price would be irrelevant, but that a rising price can only temporarily hide the growth of domestic consumption.[33] Ruling sheikhs face a new and distinct challenge. Besides the more widely discussed brushes with globalization, internal opposition, and external market forces, regimes must address domestic consumption of their chief exports, including the subsidies that contribute to demand.

The Gulf monarchies, like exporters before them, have encountered the need to prepare their political economies for the inevitable decline of oil exports. The policies behind their quandary—and the pressures to overcome it—are internal. Regimes have not been galvanized to seek energy efficiency by an economic shock or international outcry. Rather, energy policy has drifted along on formulae set in the 1970s until becoming apparent that exports are at risk. The Arab Spring uprisings add contradictory pressure to increase or prolong subsidies, deepening the medium-term resource predicament in the name of short-term political expediency.

31. For more detail, see Krane (2014).

32. Sick (1998), p. 211. See also: Hunter (1986); Roberts (1987); Al-Ebraheem (1996); Al Rumaihi (1996).

33. For a projection on oil prices required to accommodate future Saudi consumption, see Bourland and Gamble (2011).

Further, it appears that any international outcry will be muted. The Gulf energy crunch coincides with a global boom in unconventional energy. Whether one looks at the shale oil and gas production in the United States; the huge finds off Brazil, East Africa, and the Levant; or the ramping up of LNG exports from Russia and Australia, the world appears less alarmed by the potential for reduced Mideast supply than might have been the case. In fact, cheaper outside gas supply could help these "Arabian producers" transition to "Arabian importers."

5. CONCLUSION

This paper has outlined factors driving Gulf monarchies to encourage local consumption of export commodities, and the resulting changes to energy balances and electricity models. I have presented a picture of regional energy supply and demand to advance the argument that maintaining in-kind resource distribution entails rising *direct costs* in the form of subsidies, rising *opportunity cost* in the form of lost export earnings, premature *displacement* of exports, and premature resource *depletion*, due to uneconomic demand. Reforms can therefore extend the monarchies' status as exporters, bring them higher value from natural resources, and assist with maintenance of prudent fiscal balances. Distributional politics has long been understood as a key element in the Gulf's vaunted political stability, and in-kind resource distribution has been an important component of that model. But this practice, however effective over the past 40 years, now comprises a structural encumbrance that threatens the GCC's economic and political models.

Fast-rising demand for electricity is shifting the region to a higher-cost model of provision that poses an economic drag on the state, since the largest source of demand—the residential sector—is not linked to productive activity. The shortage of natural gas that affects five GCC states is ultimately due to pricing disincentives on production and the distributional imperatives of the social contract that bind the regime to low energy prices.

The political-stability-versus-economic-sustainability puzzle illustrated here suggests a response. Gulf ruling families will be forced to protect their oil revenues, their key stability resource, before preserving energy subsidies, which are a legacy of surplus production. Whether regimes can meet their medium-term imperative without triggering their short-term fear—a popular uprising—remains to be seen. But the future of monarchies that depend so heavily on exports of hydrocarbons cannot be protected unless their leaders find ways to maintain them.

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