THE ABDULLAH BIN HAMAD AL-ATTIYAH
FOUNDATION FOR ENERGY & SUSTAINABLE DEVELOPMENT

INAUGURATION

Industry Report

Reversing the trend in domestic energy consumption in the GCC: *Consequences of success & failure?*

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Energy consumption in the Gulf States has grown by eight percent annually since 1972, compared to two percent for the world. Together, four of the six GCC countries (Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates) have less than one percent of the world's population, but account for more than five percent of global oil consumption. Saudi Arabia, which consumes roughly a quarter of its own production, is now the world's number-six oil consumer, consuming nearly as much as Russia and more than either Brazil or Germany, countries with far larger economies and populations.

The Special Report will explore: What lies behind the transformation and make recommendations on how to tackle the challenge of soaring domestic energy consumption in the Gulf States and start to reverse the trend?

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INTRODUCTION

Saudi Arabia's King Faisal once said, "In one generation we went from riding camels to riding Cadillacs. The way we are wasting money, I fear the next generation will be riding camels again."

Substitute the word "oil" for "money" in this gloomy prophecy and you have a succinct summary of the gathering quandary affecting much of the Gulf.

Surprising as it may seem, the Gulf States are facing an energy crunch that stems not from "peak oil" as was feared a decade ago, but from their own internal consumption.

When King Faisal reigned in the 1960s and 1970s, the Gulf States were underdeveloped and under populated. Their oil demand was a mere rounding error on global consumption. It was only natural that, given the lack of demand at home, these countries became ideal suppliers for the importing world. At the time, it also seemed natural to share the oil wealth with country men emerging from countless generations of poverty. Why shouldn't ordinary Gulf citizens share in the riches? Cheap gasoline, cheap electricity and cheap desalinated water became part of the plan for national development in these embryonic states. Since populations were so small relative to the prodigious resource base, there was no inkling that domestic demand might someday interfere with the exports that provided the economic lifeline for these newly independent states.

Those days are gone. Compounding annual growth rates of 6% to 9%, fueled by increasing population and wealth, have raised Gulf energy consumption to some of the highest levels in the world, measured on per capita basis or – more importantly – in terms of oil consumed per unit of GDP.

As the rest of the world grows more energy efficient in economic terms, most of the GCC is going the other way, using ever more energy to produce a unit of economic growth and becoming less competitive in the process. Research from a Saudi investment bank found that the kingdom uses 10 times the oil to produce a unit of GDP than the global average[1]. The situation in neighboring states is no less stark.

If these long-term consumption trends continue, the Gulf States are forecast to be just a few decades away from relinquishing their long-held roles as global energy suppliers. At the same time, the prodigious burning of fossil fuels in the Gulf and neighboring exporting states of the Middle East has also caught the world's attention as a major and fast-growing source of greenhouse gases. Since 1990, GCC carbon dioxide emissions have grown by an average of 5% per year, versus 2% for the world as a whole. In 2015, the International Energy Agency joined the chorus of prominent multilateral organizations calling for reductions in Middle East oil consumption and associated emissions from its production. Global climate goals cannot be met without a major change in behavior in the Gulf.

What is driving this inefficient growth and waste of resources? After all, many of the world's countries have experienced similar growth in population and income, but do not exhibit the same energy inefficiency as that of the Gulf States. What makes the Gulf countries different?

Part of the answer, it appears, is price.

Energy is sold more cheaply in the Gulf than almost anywhere else on the planet. Prices that appeared munificent in the 1970s have remained constant – or even been reduced, in a few cases – despite the eroding effects of income and inflation. Energy prices have thus fallen dramatically in real terms, growing so cheap relative to income that consumption decisions in the Gulf have become an afterthought.

In the OECD countries, where energy prices more closely reflect market values, consumers have strong incentives to reduce their use of air conditioning, heating or lighting when their homes or offices are unoccupied. As a matter of course, buildings are designed with insulation and other features that minimize energy consumption. Fuel efficiency is a key variable in car and appliance purchase decisions. In some countries, electricity prices are high enough to encourage building owners to generate their own electricity by investing in rooftop solar panels. Consumers in the Gulf are simply not subject to the same incentives.

These assertions form the central argument of this paper, which examines the energy demand growth in the GCC countries, the factors contributing to that growth, and the implications of continuing these trends – and of successfully reversing them.

The rest of this paper flows as follows. Section 1 examines current growth trends and the implications of continued increases in energy demand. Section 2 looks at the driving factors behind these trends. Section 3 shifts to the initial policy prescriptions that have been proposed as a result. Section 4 examines prior subsidy reforms that have taken place in the Gulf and other energy exporters, ahead of the concluding remarks.

Section 1

TRENDS IN HYDROCARBON CONSUMPTION IN THE GULF

The ultimate drivers of high rates of energy consumption in the Gulf are government policies. In the early days of oil, policy focus was on national development. Energy resources were seen foremost as generators of export revenues, which were then invested to advance improvements in infrastructure and economies.

Oil and gas were also the main sources of primary energy for these growing economies, a fact that tends to be overlooked in most of the scholarship on the region. The availability of inexpensive energy during this crucial development period shaped the preferences and habits of these societies. Cheap energy influenced building and neighborhood design; underpinned systems of governance and relations with other states; and integrated exporting countries into the global economy.

However, the very low prices of oil and other forms of energy that helped kindle development when these countries were impoverished have remained in place as the Gulf has grown wealthy and developed. Energy subsidies have far outlived their useful lives.

Costs of providing electricity are rising, as are the costs of feedstocks used to generate it. Government policy still insulates consumers from these rising costs. Consumption levels continue to grow, unaffected by price signals. Meanwhile the Gulf's greenhouse gas emissions are becoming a global concern, and a growing source of international pressure on governments.

ENERGY POLICY IN THE INDEPENDENCE ERA

In the early days of oil, concession agreements, typically with British and American firms, kept global prices low and steady, which bolstered global demand and economic growth but minimized the flow of revenues to the states which owned the resources. Host governments steadily improved the terms of these agreements over the years until the trend culminated in a wave of nationalizations in the 1950s through the 1970s in which governments in the Middle East, North Africa, Latin America and elsewhere seized full ownership of resources and export revenues. These changes came amid post-colonial independence movements, a time when oil concessions were viewed as unwelcome constraints upon national sovereignty.

The 1973 Arab OPEC members' embargo led to the quadrupling of oil prices to $12 per barrel, which, coupled with the nationalization of foreign concessions, brought unprecedented transfers of wealth from importing to exporting countries, and drastic changes on these still underdeveloped economies.

This was the era in which development choices and energy policy decisions were made that still shape the way energy is valued and consumed within the Gulf States. First, government policy encouraged underpricing of energy – via direct or indirect subsidies – which were aimed at stimulating foreign investment and eradicating poverty. Among consumers, low prices, which may have been initially viewed as government benevolence, soon became understood as entitlements[2]. Second, Gulf policymakers reacted to labor shortages among their own countrymen by encouraging large-scale immigration to the region. The new arrivals increased the size of the population in all six states, and expatriates eventually came to outnumber citizens in the UAE, Qatar, Bahrain and Kuwait. As the expanding population grew wealthier, its ability to consume energy increased, compounding the other factors already exacerbating energy demand.

ENERGY BALANCES AND GROWTH TRENDS

In 1973, oil consumption in Arabia was less than one percent of global demand. Forty years later, the Gulf States, with just 0.5% of the world's population, consumed 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.

Saudi Arabia, the largest of the Gulf States by population, economy and energy reserves, has shot up the ranks of global oil consumers. By 2009, the kingdom had surpassed Brazil and Germany to become the world No. 6 oil consumer, despite its comparatively small population, economy, and industrial base. (Table 1) By 2014, Saudi Arabia and Russia – another major oil producing and exporting country – were consuming oil in nearly equal amounts: 3.185m b/d in Saudi Arabia and 3.196m b/d in Russia. While Russia's plentiful natural gas supply allows it to substitute for oil in the domestic economy, oil-based energy prices in Russia are also much higher. For example, a liter of gasoline sold for 86 US cents in Russia in 2014, but 12 cents in Saudi Arabia.

Table 1: Saudi oil consumption in perspective

	Oil consumed 2014 (m bbl/d)	GDP 2014	Population 2014	Oil consumption per capita (bbl/yr)
Brazil	3.23	US$2,353bn	203 million	5.8
Germany	2.37	US$3,860bn	81 million	10.7
SaudiArabia	3.20	US$752bn	31 million	37.8
Russia	1.50	US$1,857bn	144 million	8.1

Source: IMF World Economic Outlook 2015, BP Statistical Review 2015

ELECTRICITY MARKET

Power generation growth in the GCC countries has been nothing short of dramatic, given that most of the region was un-electrified as recently as 1960. In Oman, large-scale electrification did not even unfold until well into the 1970s. Many residents can remember the difficult days before refrigeration and air conditioning. Residents of the richer states of Kuwait, Qatar and the UAE now consume more electricity, on average, than do those in the United States.

Power generation growth averaged 10% per year since 1973, slipping to 7% per year between 2000 and 2010, which was slightly faster than average GDP growth that decade of 6.5%. About 60% of power generated in the GCC countries flows from natural gas-fired plants, versus 40% for liquid fuels such as crude oil, diesel and heavy fuel oil[3]. Overall, about a third of all natural gas produced in the Gulf States is consumed in regional power generation. Gas demand is exacerbated by its use in producing desalinated water, often in co-generation plants that use waste heat to produce electricity.

In recent years, growth in electricity demand has outstripped domestic supply of natural gas in five of the six GCC states. Only Qatar commands sufficient supply for the foreseeable future. This shortage leaves Gulf States facing higher marginal costs for new power generation and production of desalinated water. In the past, governments had to cope with the cost of building plants, while surplus feedstock was made available as a byproduct of oil production. Now, policymakers must contend with market-priced imported fuels, expensive production of unconventional gas[4] or the opportunity cost of burning crude oil and other costly liquid fuels.

OIL AND LIQUID FUELS

Oil demand has risen across the GCC by an average of 9% per year since 1973, growing faster than GDP, on average. Aggregate oil consumption in the six GCC States was less than 500,000 b/d in 1973 and more than 4m b/d in 2014.

Although power demand has been problematic in all GCC States outside Qatar, Saudi Arabia and Kuwait face highest demand pressure because of their reliance on liquid fuels – crude oil, heavy fuel oil and diesel fuel – for most of their power generation feedstock. Hence, while oil consumption in the remaining GCC states is weighted more heavily toward the transport sector – where oil is considered most valuable – burning of liquid fuels for power generation is still dominant in Saudi Arabia and Kuwait. (See charts).

Saudi Arabia consumed more than a quarter its overall production in 2013. Direct burn of crude oil for power generation reached an average of 0.7 m b/d from 2009 to 2013 during the months of June to September[5], with peak month power sector consumption rising as high as 900,000 b/d[6]. While Kuwait is gradually shifting toward natural gas via imported LNG, Saudi crude burning looks set to top 1m b/d by 2020[7]. Low domestic prices for crude oil – roughly $5/bbl in Saudi Arabia – are a major factor encouraging crude oil demand. Intensifying domestic crude burning coupled with a 1.4m b/d increase in crude shipments to Aramco refineries inside and outside the kingdom signal that Saudi Arabia is moving beyond its long-held role as the world's market-balancing supplier of crude oil. Recent data show slipping Saudi crude exports, alongside flat or rising production. Assuming that Saudi crude production remains constant at around 10m b/d, the amount of crude available for export could fall below 5m b/d by 2020[8].

OIL CONSUMED IN TRANSPORT SECTOR AS SHARE OF TOTAL DEMAND IN 2012

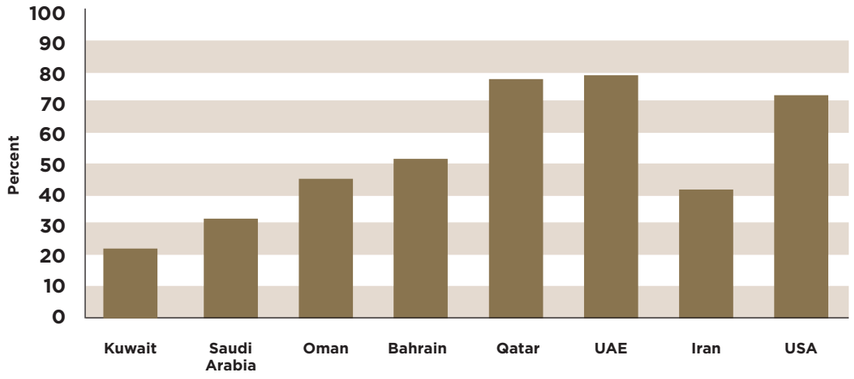


Figure 1: Among the six GCC states, oil is chiefly used as transport fuel in Qatar and UAE, as is the case in most of the developed world (Source: IEA 2015)

GCC POWER GENERATION BY FEEDSTOCK SINCE 1971

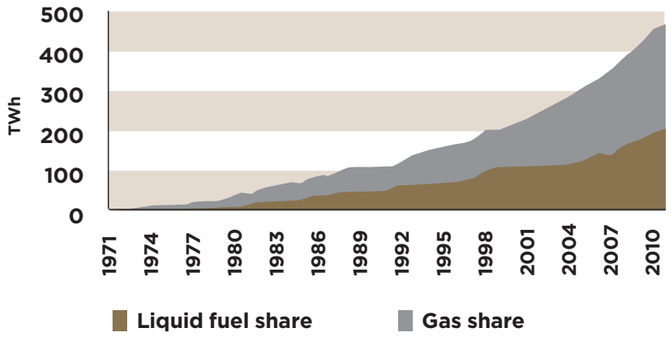


Figure 2: Aggregated total GCC electricity generation in terawatt-hours since 1971, highlighting the share of power generated with natural gas and that generated by liquid fuels (crude oil, heavy fuel oil and diesel by feedstock, 1971-2011 (Source: IEA 2013)

SAUDI POWER GENERATION BY FUEL, 2013

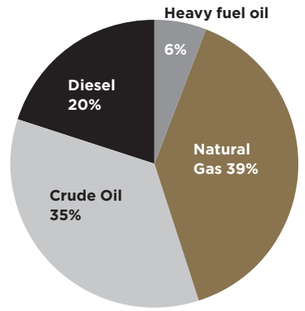
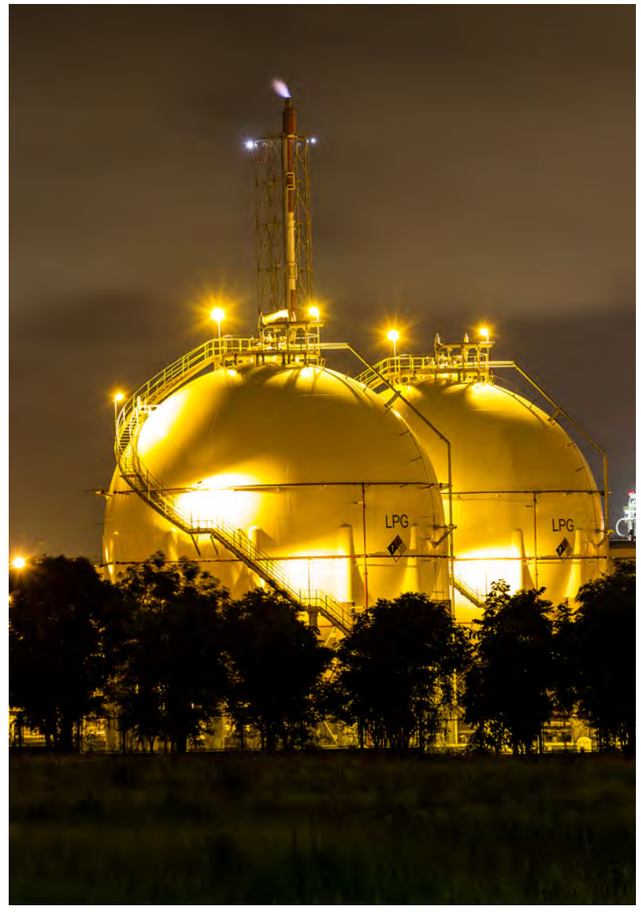


Figure 3: Saudi power generation by feedstock, with shares given for liquid fuels, 2013 (Source: MEES 2014)

NATURAL GAS

The GCC also holds major reserves of natural gas, but, in contrast with oil, most production is consumed domestically. Only Qatar is a major exporter. The UAE and Kuwait have been net gas importers since 2008. The region has no gas market pricing mechanism, such as an index based on trade at a hub. In similar fashion to the electricity sector, low prices (of around $1 to $2 per MMBtu) are driving demand. But underpricing is also stifling production from known reserves – some of which are comprised of high-cost non-associated gas – which has encouraged imports. 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[9].

In Oman, rising domestic demand and depleting conventional gas reserves have forced reductions in LNG exports. Unconventional reserves are under development, but lifting costs are expected to run beyond the state-fixed selling price for bulk gas. 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,[10] but, like Oman, most of its non-associated reserves consist of difficult formations.



"Aggregate GCC emissions are nearly as large as those of Japan, despite a population less than a third as large."

CARBON EMISSIONS IN CONTEXT

One of the byproducts of energy intensity in the GCC is carbon intensity. As is the case with energy, per capita emissions output from the Gulf leads the world. But, unlike energy demand, carbon pollution is a global problem. The implications of wasteful use of energy thus extend beyond the region's borders, exposing the Gulf States to rising international pressure to reduce greenhouse gas emissions.

Aggregate GCC emissions are nearly as large as those of Japan, despite a population less than a third as large[11]. The IEA and IMF have made recent high-profile calls highlighting the role of fossil fuel subsidies in climate change. A 2015 IEA report spotlights the rise in Middle East emissions and calls for major reductions in energy subsidies, oil's use in power generation, and the flaring of natural gas in oil production.[12]

IMPLICATIONS OF CONTINUED GROWTH

A number of authors have forecast that, if policies are not adjusted, spare crude oil production capacity will be lost and oil exports may decline.[13] Over the past decade, oil consumption in the six GCC states has grown by a yearly average of 6.5%. In Saudi Arabia the percentage of oil production consumed domestically has risen from 5% in the 1970s to 28% in 2014. Table 2 offers an insight into the future implications of these trends. The final two columns provide estimates of the number of years, at recent rates of growth, to reach 50% and 100% domestic consumption of oil production, with production, demand and other factors held constant. For instance, at recent rates of consumption growth, Saudi Arabia, Qatar and the UAE consume 50% of 2014 oil production by the middle of next decade, and 100% before 2040.

CO2 EMISSIONS: GCC VS. JAPAN, 1970-2014

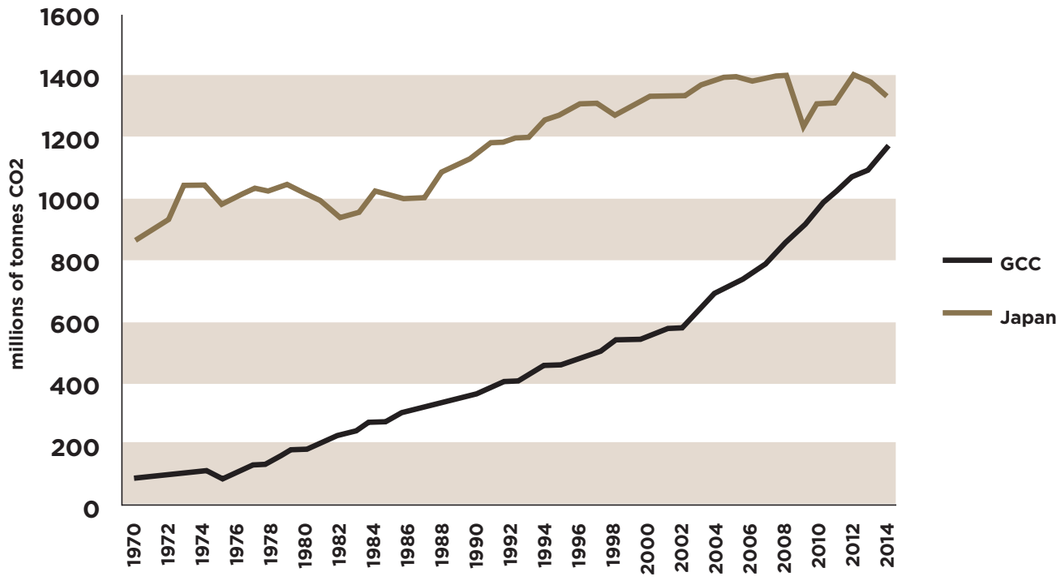


Figure 4: Carbon dioxide emissions from energy consumption since 1970 for Japan and the GCC (excluding Oman and Bahrain). Source: BP 2015

Table 2: Oil consumption in the Gulf States

	2014 oil produced (m b/d)	2014 oil consumed (m b/d)	% of oil production consumed in 2014	Average % growth / year 2005-14	Years to reach 50% of 2014 production, at current rates (year)	Years to reach 100% of 2014 production, at current rates (year)
Kuwait	3.1	0.5	16%	3.2%	34 (2048)	58(2072)
Qatar	2.0	0.3	16%	11.4%	11 (2025)	13 (2032)
KSA	11.5	3.2	28%	5.3%	11 (2025)	25 (2039)
UAE	3.7	0.9	24%	6.2%	12 (2026)	23 (2037)

Source: BP Statistical Review 2015; author's calculations

These "projections" are simple ones, and do not capture complexities of energy demand in these countries. They are most useful in showing that, by reducing rates of demand growth – as has happened in Kuwait – these countries can extend the dates at which their domestic consumption claims 50% and 100% of their production. The lower the rate of growth, the greater the longevity of exports, all else constant. ●

DISCUSSION: DOMESTIC CONSUMPTION AND EXPORT LONGEVITY

Hydrocarbon resources are finite and non-renewable. Producer countries face an inevitable end to exports – and, at some point, an end to overall production – 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. For example, when domestic consumption outstripped production in China and the United States, these former oil exporters became net importers. More recently, the United Kingdom has seen its North Sea production tail off. By 2005 it was a net importer of both oil and natural gas and in 2013 it became a net importer of petroleum products.[14] Oil and gas exporters Malaysia, Indonesia and Egypt are now reaching this stage. The experience of these onetime net exporters shows that domestic consumption is a key determinant of the longevity of exports. If countries are to maximize their benefits from a resource blessing, domestic consumption must be carefully calibrated so that resources are not wasted.

Section 2

EXAMINE FACTORS CONTRIBUTING TO DEMAND

POPULATION AND GDP GROWTH; CLIMATE, INDUSTRIAL STRUCTURE

A country's energy demand is a compilation of numerous influences. Major factors include population, income, prevailing technology (or capital stock), climate, and price. Each of these factors plays a role in influencing the particular shape of energy demand in the Gulf States. For example, the GCC population has more than quintupled in the past four decades as a result of high birthrates and large-scale immigration. (Table 3) The combined population grew from just over 8m in 1971 to reach 45m in 2011, expanding at an annual rate of 4.3% – nearly triple the global average.

Rising individual incomes have also encouraged demand, with per capita GDP growing by an average of 2.2% per year since 1981, and 4.3% since 2000.[15] (Table 4) The hot and humid climate in the Gulf plays a big role on demand for air conditioning, which has been exacerbated by intensified individual preferences for cooler indoor temperatures. The GCC industrial structure also contributes, given the profusion of energy-intense industrial sectors such as aluminum, glass, fertilizer and petrochemical production.

PRICE

How do energy prices figure into this debate?

Price affects demand in two ways: directly, by influencing choices in consumption of fuel and electricity; and indirectly, through choices of energy-consuming equipment and its efficiency, as well as how often it is used. In the Gulf, low fuel and electricity prices relative to typical incomes offer little incentive for conservation, compared with pricing and incomes in unsubsidized markets.

Several authors have reached similar conclusions. Alyousef and Stevens describe low and subsidized prices in Saudi Arabia as "the single most obvious explanation for the extremely high levels of energy use in the Kingdom."[16] In their report on the kingdom's demand growth, Bourland and Gamble argue that the "key reason for the rise in consumption is very low energy prices." [17] Mehrara finds that subsidies in oil exporting countries explain their otherwise "implausibly high energy intensity" that has caused energy consumption to grow much faster than their overall economies. [18]

A recent Deutsche Bank report examining rising domestic consumption in OPEC member-states finds that oil demand increased more than four times faster than the world average during the last decade, 56% versus 13%. Adjusting for population growth, the authors find that OPEC oil demand still grew at a much stronger rate, 1.4 barrels per capita per year for an increase over the decade of 24%, versus 0.03 barrels per capita globally, an 0.7% increase. The authors conclude that "there is a very strong prima facie case for saying that the subsidies on domestic oil consumption in OPEC countries are the main reason why per-capita consumption within OPEC has increased so much more quickly than per-capita consumption for the world as a whole over the last decade." [19]

In summary, these authors argue that subsidies have encumbered GCC and OPEC states with long-term structural encouragement of demand for key energy commodities. One must inquire about the wisdom of such policies. Why would policymakers seek to encourage domestic demand for the same export commodities that form the basis of their economies? After all, oil and gas exports typically provide 40% of collective GDP and 80% of government revenues. This one-sided dependence suggests that hydrocarbons have a high value that is not reflected in prices. Domestic sales of potential oil and gas exports are usually done near the cost of production, rather than at global market prices. In this way, local sales are a drag on government budgets, rather than a source of funds.

Over time, low pricing has contributed to path dependence on high consumption, encouraging development of energy intensive infrastructure and habits, while locking-in traditional energy sources and blocking transitions to low-carbon power generation. Subsidies promote energy intensive behavior in other ways, including by encouraging long-term investments by firms into technology that is less energy efficient than would otherwise be warranted. [20]

Table 3: GCC population growth since 1971

	1971 population	2011 population	Growth multiple 1971-2011	Yearly growth rate
Bahrain	220,000	1.3m	5.9	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	6.0m	28.1m	4.7	3.9%
UAE	273,000	7.9m	28.9	8.8%
GCC	8.2m	44.8m	5.5	4.3%
World	3.8bn	7.0bn	1.9	1.5%

Source: World Development Indicators, World Bank 2013

Table 4: Growth in GDP per capita and oil demand since 1971

	GDP per cap 1971 (current US$)	GDP per cap 2011 (current US$)	Yearly growth rate
Bahrain	$8,584 (in 1980)	$18,184	2.5%
Kuwait	$4,784	$62,664	6.6%
Oman	$397	$25,221	10.9%
Qatar	$3,280	$92,501	8.7%
Saudi Arabia	$1,127	$20,540	7.5%
UAE	$27,590 (in 1975)	$45,653	1.4%

Source: World Development Indicators, World Bank 2013; IEA 2013

HISTORY OF LOW ELECTRICITY AND TRANSPORT FUEL PRICES

Why are energy prices so low in the GCC?

Various rationales have been put forward. Retail energy prices tend to be lower in exporting countries than in importing countries, but this is not always the case. For instance, prices of electricity and fuel are unsubsidized and heavily taxed in exporting countries like Norway, Canada and Australia. Some of the lowest energy prices are found in countries with non-democratic systems where-in-which public participation in decision-making is informal and does not typically involve elections. But this too is not always the case. Venezuela simultaneously provides its citizens some of the world's lowest prices on transportation fuel as well as high levels of formal political participation.

In the Gulf, low prices appear to be based upon a number of factors. First, they are holdover policies from an earlier era of energy surplus and impoverished populations, a time when ruling families sought ways to distribute new resource wealth among the public. Low electricity prices also 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 captured and put to productive use.[21] Low prices also reflect state desires to fulfill terms of a social contract with society, meeting citizen expectations for rising living standards in return for public support for the government.

Despite the soundness of these motivations, the system of energy pricing in the GCC lacked foresight. 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 electricity tariffs in Saudi Arabia have been reduced six times since 1950. (Fig. 5)Saudi Arabia reduced gasoline prices in 1992 and 2006. In none of the Gulf States were prices even indexed to inflation.

ELECTRICITY PRICES IN KUWAIT AND JEDDAH SINCE 1950

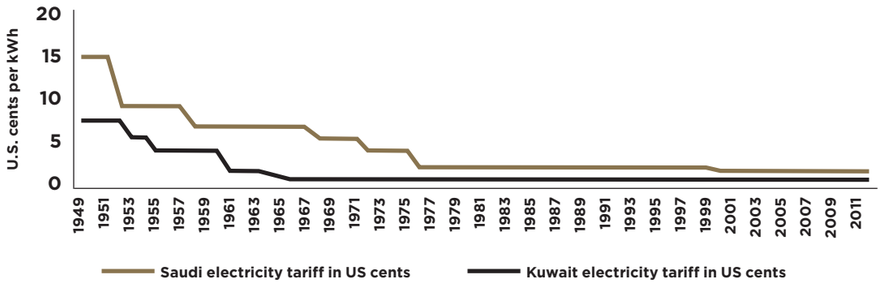


Figure 5: Electricity prices in Kuwait and Jeddah, in current dollars at 2012 exchange rates (Kuwait source: al-Qudsi and al-Shatti (1989) and Kuwait Ministry of Electricity and Water; Saudi source: Electricity Cogeneration and Regulatory Authority of Saudi Arabia (2012)

ELECTRICITY PRICES IN GCC AND USA

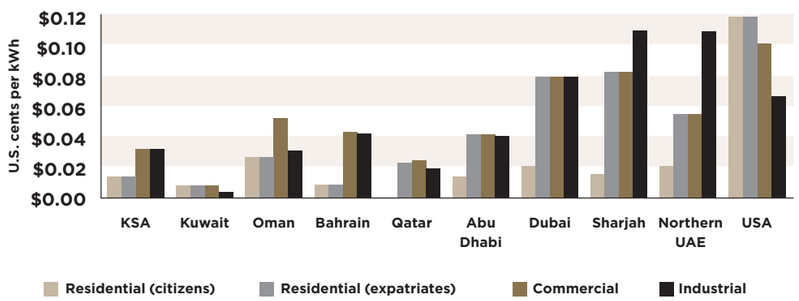


Figure 6: 2012 retail prices across sectors for an initial 2,000 kWh of electric power, in the six GCC countries and the United States(Note that four utilities operate in the UAE. Source: Author's compilation from national utilities, interviews and media sources; All GCC prices are fixed by the state. 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.)

GCC CONSUMER REACTION TO RATIONALIZED ENERGY PRICES

Given the growth in average personal incomes in the GCC states, one can make a strong argument that the interests of Gulf citizens would be better served by preserving the longevity of oil and gas exports, rather than maintaining subsidized energy prices that threaten to undermine these exports. The question of subsidy reform becomes difficult to avoid.

Before making the decision to remove subsidies, policymakers would want to know how energy consumption would change if prices were rationalized. Economic theory dictates that, in the short run, energy demand is inelastic. This means demand is unlikely to decrease by the same magnitude as an increase in price. In the longer run, energy demand is more elastic. Over time, consumers will change their behavior and make necessary investments to upgrade their consuming technology, thereby reducing their exposure to higher prices.

Some scholars argue that, even over the long term, energy demand in the wealthy Gulf is probably not very sensitive to price. A $1 increase in price would have a smaller corresponding effect on demand. This argument is probably correct, but it overlooks the magnitude of the differences in energy prices between the Gulf and those in unsubsidized markets. Even when using a relatively low estimate of price elasticity, the price increases required to cover the full cost of energy products in the Gulf are so large that the resulting reductions in demand become significant.[22]

In a previous 2012 paper by the IMF, it found that Kuwait would have to raise its gasoline price by 183% (from 23 to 65 US cents per liter) to eliminate the implied subsidy. Faced with such an increase in gasoline prices, Kuwaiti consumers would reduce consumption by about 27%.[23]

However, electricity in Kuwaitis subject to a much larger subsidy. Government figures show that the electric power subsidy covers about 95% of the total cost. An increase of some 1800% would be required to fully recoup the government's cost of providing electricity. Such a massive price increase implies that long-run demand would decrease (even under a modest estimate of price elasticity) by about 59%, when using the same IMF formula.

Table 5 below displays the results of extrapolating this methodology across other energy products. Significant decreases in long-run demand would result from price rationalizations, across the board. The savings range from a 20% reduction in gasoline consumption in Oman and a similar drop in electricity consumption by expatriates in Abu Dhabi (who pay three times the electricity price of citizens); as well as reductions of about a third in demand for gasoline in Saudi Arabia and residential electricity in Oman; to a drop of 43% in citizen power consumption in Abu Dhabi and, as mentioned, a 59% reduction in power demand in Kuwait. Of course, short-run effects would be smaller.

Table 5: Energy price increases required to remove subsidies and subsequent demand response

	Price (US$)	Unsubsidized price (US$)	% price increase to displace subsidy	% decrease in long-run demand
Kuwait: electricity	0.007	0.135	1829	-59
Kuwait: gasoline	0.23	0.65	183	-27
Saudi Arabia: gasoline	0.16	0.65	306	-34
Abu Dhabi: electricity (expatriates)	0.041	0.089	117	-20
Abu Dhabi: electricity (citizens)	0.014	0.089	536	-43
Oman: electricity	0.026	0.1	285	-33
Oman: gasoline	0.31	0.65	110	-20

Note: Electricity prices are in kWh and gasoline is priced per liter. Current prices and estimates of unsubsidized prices compiled by author. Price elasticity estimate used is -0.3, which is based on the lower figure used in Rodriguez et al. (2012). Demand effect calculations are based on energy demand formula in Rodriguez et al. (2012), which uses a non-linear function that reflects effects of large price increases. Expatriates receive smaller energy subsidies in some countries.

Summing up these findings, it appears that subsidized prices in the Gulf account for a significant share of demand for electricity and transportation fuel. That share can be plausibly estimated at between one fifth and one half of total demand. Regardless of whether such price increases represent a political possibility, these results imply that a full reform of subsidies, all else constant, would palpably reduce demand.

EXAMPLES OF PRICE REFORM TO DATE

If such dramatic results in energy savings are possible, why have governments been so reluctant to seize them? Given widespread understanding of the threat to exports and national economies, why do policymakers continue to maintain policies that encourage domestic demand for all-important export commodities?

One reason for reluctance to raise energy prices relates to inflation. Since energy is an input for nearly all forms of commerce, a rise in energy prices tends to impact broader consumer prices. For instance, if electricity prices rise, the cost of renting or occupying an apartment may also rise. If gasoline subsidies are abolished, taxi drivers may try to pass along the cost increase to their customers. Subsidy reform typically has a one-off impact on prices. Furthermore, the effects are well-known. In countries where energy prices are set by market forces, inflationary pressure has long accompanied price swings. While these swings can be harmful to some consumers and sectors, they are manageable. Unlike changes in market prices, the timing of subsidy reform makes price increases predictable, which allows for preparations to be made.

Perhaps a more important hurdle in confronting subsidies has to do with the difficulties experienced by other states which have attempted similar reforms. Put simply, retraction of welfare benefits is a well-documented driver for political violence. Regional governments seem to be calculating that the short-term risks of political unrest outweigh the longer term risks of overconsumption.

How rational are these fears? To answer this question, we need to examine the historical record on subsidy reform, focusing on mineral-exporting states. Here, the record is mixed. On the negative side are cautionary examples like increased prices on subsidized energy and food in Venezuela and Indonesia in the 1990s – both OPEC member-states at the time – in which governments were overthrown after long periods of violent unrest. Recent strife in Nigeria, Ecuador, Bolivia and Jordan stemmed in part from energy price increases. The Arab Spring revolts in Tunisia and elsewhere originated in popular responses to economic austerity, a detail which has not been lost on Gulf policymakers.

However, most subsidy reforms have met with more benign public responses. All but five of 28 substantial energy subsidy reform efforts documented by the IMF in the past two decades managed at least partial success.[24] Among energy exporters, Indonesia, after failed attempts in 1997 and 2003 successfully raised fuel prices in 2005 and 2008, amid declining exports. Indonesia reduced its subsidy load from 3.5% of GDP in 2005 to 0.8% by 2009. Yemen has also managed small reductions in fuel subsidies, which, however, still accounted for 7.4% of 2009 GDP. Mexico reduced gasoline subsidies in 2005 and 2006[25] after failing to reform electricity prices between 1999 and 2002. Malaysia underwent a series of attempts to reduce fuel subsidies (which stood at more than 1% of GDP in 2012) but most were reversed following public outcries.[26] Nigeria's fuel price reforms of 2011-12 triggered anti-government unrest but still managed to reduce costs from 4.7% to 3.6% of GDP.[27] However, the most relevant example of subsidy reform has arisen in a neighboring OPEC member state in the Gulf.

IRAN'S SUBSIDY REFORMS

In December 2010, Iran became the first major energy-exporting country to drastically cut subsidies on energy products[28] when it halved the world's largest energy subsidy burden, valued at around $100 billion or a quarter of 2010 GDP. Iran was also the first country in the world to replace energy handouts with a universal cash transfer program for households.[29] In effect, the Iranian government converted subsidy benefits into cash payments. The exchange was not done in one-for-one fashion, with payments calculated upon energy consumption – a method which would have continued to benefit wealthy consumers which typically receive the largest share of government energy subsidies. Instead, the government distributed payments in an equitable manner, basing stipends on household size and a few other variables. The reform was welcomed by the IMF and, initially, by much of the Iranian public.[30] Studies have credited the reform with a temporary reduction of domestic energy demand that allowed oil exports to begin to increase before Iran's oil trade was blocked by international sanctions[31] and the subsidy reforms were eroded by inflation. More recently, the Iranian government has sought to revive parts of the reform by increasing gasoline prices from about US 16 cents to 28 cents per liter.[32]

Table 6: Detail of price changes in 2015 UAE fuel subsidy reform

Fuel type	Aug. 2015 price	Change in price after subsidy removal
Octane 95 gasoline	AED 2.14/liter	+24%
Octane 98 gasoline	AED 2.25/liter	+23%
Diesel fuel	AED 2.05/liter	(-30%)

Source: UAE Ministry of Energy, 2015

SUBSIDY REFORM IN THE UAE

Iran's technique of cash compensation for higher prices offers one avenue for consideration in the Gulf States. However, large payments to citizens may not be necessary. Initial reforms were imposed in Dubai in 2011, where electricity prices were raised by 15% (described in detail below). Modest increases were also enacted in Abu Dhabi in 2014. In neither case did policymakers offer a replacement benefit. In 2015, the UAE announced the lifting of all transport fuel subsidies, again without a replacement benefit. The UAE's fuel subsidies were already the lowest in the region, and the fixed price of diesel was actually higher than prevailing market prices. Thus lifting the subsidy actually resulted in a lower price for diesel fuel. (Table 6).

UAE policymakers made a similar calculation to counterparts in Indonesia, Egypt, Ghana and elsewhere, that removing fuel subsidies is easier when oil prices are low. With international oil prices in mid-2015 at less than half of year-ago values, subsidy reform places less of a burden on the public. Exporting countries like the UAE can point to lower oil revenues to justify the need to tighten public spending, and ask that consumers pay more for energy. However, if oil prices return to recent highsa public outcry could nevertheless ensue and maintaining unsubsidized prices may prove politically difficult. ●

DISCUSSION: PATH-DEPENDENCE AND INSTITUTIONAL OBSTRUCTIONS TO SUBSIDY REFORM

Thus far, we have seen that Gulf energy consumption levels and growth rates are high, by global standards. We have learned that subsidies account for a significant amount of demand, and that reforming them would reduce and perhaps reverse growth in consumption. And we have seen that enacting meaningful subsidy reform is difficult but not impossible.

Before looking at the types of policy actions that could comprise part of a comprehensive energy sector reform in the GCC, it is worth mentioning the structural issues that inhibit reform. This concept was covered implicitly in the section on price elasticity calculations, but the issue is important enough to warrant further caution about expectations of subsidy reform.

Today's energy consumption is based on prices and development decisions made in a previous era. This means that demand is path-dependent upon structural factors that cannot be changed as easily as prices. Path-dependence is a process through which initial decisions influence further steps in the same direction. Deviating from the path becomes more difficult because of the institutional or structural factors that are created by the initial path. In the case of subsidy reform, structural factors might reduce some of the potential for savings. Such factors include the patterns and density of human settlement, the prevailing characteristics of the built environment, and the available transportation alternatives.

In the Gulf, initial pricing and supply patterns shaped cities and infrastructure, allowing developers to reduce costs by ignoring energy efficient techniques and "locking in" an energy intensive lifestyle that may be difficult to change. For instance, if electricity prices are rationalized, a homeowner in, say, Kuwait City, may find it worthwhile to install a more efficient air-conditioning system and reduce the intensity of its use. He may also invest in efficiency improvements such as building insulation and thermal-pane windows. However, the homeowner could do little about the size of his home or its physical location in a neighborhood without public transportation or pedestrian options. Hence, these sorts of structural factors may reduce the overall effectiveness of subsidy reforms.

Section 3

SECTOR-BY-SECTOR APPROACH TO REFORM OF HYDROCARBON DEMAND IN THE GULF

To date, governments in the region have approached the consumption dilemma by concentrating on increases in supply of fuels and electricity. There have been few attempts to address demand for energy, despite numerous signs that demand is irrationally high. Supply-side reform has focused on investment into alternatives to oil – given the high value of oil on international markets – mainly through increased domestic production of natural gas, or in some cases imports of natural gas. In electricity markets, Qatar and the UAE have invested in diversification beyond fossil energy, into nuclear and renewable power generation. Other GCC states have made similar plans. Transportation markets remain dominated by oil-derived fuels.

Demand-side reforms were more modest at the time of writing. These consisted mainly of new regulatory standards and voluntary efficiency campaigns. As mentioned, modest subsidy reforms have been launched in a few markets.

ELECTRICITY MARKET

Electricity markets have been booming since the 1970s in the Gulf, growing at rates of 7% to 9% a year, which is comparable to postwar boom periods in OECD Europe and Asia, or in emerging South Korea and China. At the time of writing, more than 99% of the electricity generated in each of the six Gulf States was based on oil and gas. As mentioned, high growth in electricity demand has exerted pressure on governments across the region, with Kuwait and Saudi Arabia still burning significant amounts of crude oil in power plants. In fact, Saudi Arabia is still building oil-fired power plants: 14 gigawatts of oil-fired generating capacity are due for completion by 2018.[33] Outside the Middle East, oil-based power generation has been largely replaced by much cheaper coal, natural gas and nuclear power.

It is therefore unsurprising that GCC governments have looked to diversify their power generation feedstocks and technologies.

In Saudi Arabia and Kuwait, emphasis has been on shifting away from oil toward an increase in natural gas-fired generation. Both states have increased gas exploration and production, however supply remains insufficient to push liquid fuels from the feedstock mix. Elsewhere, gas dominates. The percentage of power produced from natural gas ranges from a high near 100% in Qatar, Bahrain and the UAE, to around 43% in Saudi Arabia and 38% in Kuwait. Beyond this, diversification of the electricity sector involves nuclear power, renewables and coal.

Table 7: Electricity production from natural gas sources (% of total)

Bahrain	100
Kuwait	38
Oman	82
Qatar	100
Saudi Arabia	43
UAE	98
Arab World	61
World average	22

Source: World Bank 2015 (2011 data)

SUPPLY-SIDE REFORMS: NUCLEAR

Abu Dhabi is the obvious front-runner in nuclear power in the GCC. In 2008 it launched a ground-up drive to nuclearize, which, if reaching initial startup as planned in 2017, represents one of the world's quickest-ever creations of an atomic power sector. With power demand growing by 9% per year, Abu Dhabi in 2009 accepted the $20.4 billion bid of a South Korean consortium to build four 1.4 GW nuclear power stations, the last of which is to be completed sometime after 2020.[34] Saudi Arabia has also announced an $80 billion foray into nuclear power, with plans to construct 16 nuclear power reactors producing 17 GW of electricity over the coming decades, with the first reactor powering up as soon as 2022.[35]

Elsewhere, Kuwait firmly rejected nuclear power in the wake of the 2011 Fukushima disaster in Japan. Qatar took a similar stance in 2008. Only Oman remains a further viable GCC location for nuclear power. Although it signed a nuclear power agreement with Russia in 2009, Oman has not announced plans to move further.[36]

Across the Gulf, Iran in 2013 began operating a single 1GW nuclear power station at Bushehr. The Bushehr plant is the first and only plant yet brought to fruition in an expensive and laborious Iranian civilian nuclear program that was hampered by serial interruptions and delays. That program, which dates to 1957, has been the subject of numerous agreements with foreign governments – including the United States, Russia and France – and suffered from revolution, sanctions, earthquakes and even aerial bombardment.[37]

"To date, electricity production from renewable sources has met only a negligible portion of total demand"

RENEWABLE ENERGY

The GCC countries have also announced dramatic plans to build renewable power generation capacity, mainly using solar technology. The announcements typically reference the region's abundant sunshine and available unused land, as well as growth in power demand and shortages of natural gas feedstock.

The attributes are undeniable, however the on-ground progress of solar power projects in the Gulf lags far behind the aspirational statements. For instance, Saudi Arabia has declared it will produce 50 GW of renewable power by 2032, half of which is supposed to be up and running in under five years from the time of writing.[38] The kingdom appears unlikely to meet its deadline. Likewise, Abu Dhabi is unlikely to reach its announced goal of producing 7% of its installed capacity of power generation – about 1.5 GW – by 2020.

To date, electricity production from renewable sources has met only a negligible portion of total demand. Across the Middle East and North Africa, Egypt was the only Arab country that met more than 1% of 2014 electricity demand with non-hydro renewables such as solar and wind power. According to BP, the top 2014 producer in the GCC was Qatar, which generated 34,000 megawatt-hours of solar power, a tiny fraction of its power demand. (Table 8)

Table 8: Non-hydro renewable electricity consumption in 2014

	2014 consumption in TWh	% of total 2014 electricity consumption
Iran	0.355	0.13%
Kuwait	0.018	0.03%
Qatar	0.034	0.09%
Saudi Arabia	0.001	0.0003%
UAE	0.019	0.02%
Algeria	0.250	0.4%
Egypt	1.867	1.2%
USA	287.3	6.7%
Germany	140.1	22.8%
China	234.6	4.2%

Based on gross generation from renewable sources including wind, geothermal, solar, biomass and waste, and not accounting for cross-border electricity supply. Source: BP Statistical Review of World Energy 2015

Enthusiasm for renewables in the Gulf appears to have been dampened by high expense and disappointing performance. For instance, the cost of Abu Dhabi's Shams I project, a 100 MW concentrating solar power (CSP) plant, was reported at $700 million – about the same cost as is typical for constructing a gas-fired powered power plant with ten times the capacity.[39] The Shams I plant uses a square-mile array of mirrored parabolic troughs to concentrate solar energy and drive a conventional turbine.

Gulf renewables plans have also been deterred by a mismatch between solar generation and peak daily power demand. The typical summer electricity demand curve for a city in the lower Gulf reveals two daily peaks. The first comes at midday, when the sun is overhead. The second peak comes after dark, when humidity effects are at their most intense. Solar radiance is well matched to the first peak, but not the second.[40] Therefore, most Gulf utilities would not be able to deploy solar power capacity in lieu of conventional generation, making them unable to forgo the cost of building and operating conventional power plants. In most cases, intermittent renewables only allow utilities to reduce fuel consumption. Despite this, most of the GCC States have announced plans to move ahead with renewable initiatives.

COAL

Coal is the only hydrocarbon not found on the Arabian Peninsula, and hence coal-fired power generation has never emerged as a practical option for the largely self-sufficient Gulf States. However, the UAE and Kuwait became net gas importers in 2008. The limited availability of gas via pipeline from Qatar and Iran has led the UAE and Kuwait to import comparatively expensive liquefied natural gas (LNG). In this context, coal is being viewed as an inexpensive possible addition to a more diverse generation fleet. Coal comes with numerous drawbacks, including high levels of local pollution and carbon dioxide emissions (about twice as high as those of natural gas), as well as the expense of building new infrastructure for importing and storing coal. In hot climates, the problem of spontaneous combustion of coal heaps also becomes a factor, requiring periodic spraying with water. For these reasons – as well as a strong public outcry against coal – Oman considered and rejected coal power in 2011.[41] However, Dubai has recently accepted bids for a 1.2 GW coal-fired power plant. If built, it would be the first project of its kind in the Gulf. [42]

DEMAND-SIDE REFORMS

Efforts to address the demand side of the domestic energy equation have languished until recently. Gulf policymakers have been loath to challenge their citizens' access to inexpensive electricity, water and transportation fuels. To the extent that demand has been targeted, efforts tended toward public campaigns asking for voluntary reductions in use. In recent years, demand-side management has gained currency, and governments have launched tentative reforms. These involve regulatory schemes on capital equipment and building standards, and, most recently, incremental reforms of energy price subsidies (covered in the following section).

In the transportation market, reforms of gasoline and diesel fuel subsidies have been enacted in the UAE, as mentioned, with price increases also in Qatar, Kuwait and Abu Dhabi. Dubai's price reforms have been accompanied by road use tolls and a successful light rail network that, as of 2015, remained the only viable alternative to personal vehicle use in the Gulf. Elsewhere, fuel demand is being addressed by investments into public transportation in Doha and Riyadh, and in bus networks in other Gulf cities. Further fuel economy improvements are inevitable, given that the Gulf region imports vehicles from outside its borders and which (despite regional preferences for large, high-consumption vehicles) are subject to increasing efficiency standards imposed elsewhere.

BUILDING STANDARDS

New "green" building codes and appliance standards, along with industrial efficiency guidelines have been launched in some of the Gulf States, with a few exceptions. These typically require building cavity insulation, thermal windows and programmable thermostats. Some, like Abu Dhabi's Estidama initiative, go further, requiring waste minimization, recycled or local materials, and solar hot water heaters.

The Saudi Energy Efficiency Program (SEEP) is emblematic of the efforts around the Gulf, seeking energy efficiency across the industrial, buildings and transport sectors with the ultimate goal of reducing energy intensity in 2030 by 30% over 2005 levels. SEEP initiatives include:

- Reducing energy intensity in industry, especially in water desalination and cement manufacturing
- Upgrading building codes to US standards[43] in energy efficiency, requiring thermal insulation, double-paned windows and programmable thermostats
- Improving efficiency standards for air conditioners to US standards[44] and mandating regular maintenance
- Improving lighting efficiency
- Establishing minimum efficiency guidelines for washing machines, dishwashers and refrigerators
- Ensuring compliance through inspections and enforcement

Abu Dhabi's Estidama initiative sets standards not just for buildings but for planned community developments that provide guidelines for subdivision size, housing density and road network design. These are the sorts of structural attributes that must be addressed to temper the region's path-dependence on high energy intensity. ●

DISCUSSION: WHAT ABOUT HUMAN BEHAVIOR?

Concentrating on energy consumption by altering prevailing technology or capital stock is one aspect of improving efficiency. The other involves human behavior. Energy consumption is determined not just by the type of equipment or its level of efficiency, but by decisions about the rate of use of that equipment. In other words, a home might be extremely energy-efficient on paper, but if the occupants leave doors and windows open while cooling equipment is running, the building envelope's efficiency is meaningless. Economists have long argued that the most effective way of changing human decisions on energy is through price. As Dasgupta argues, "When environmental resources are free, there is absolutely no incentive to economize in their use."[45]

Section 4
ENERGY SUBSIDY REFORM IN THE GULF

This paper is structured to proceed in similar fashion to the flow of GCC government policymaking on energy demand. When political elites first learned of adverse energy trends, they sought to address these by increasing and diversifying energy supply. As understanding of demand growth deepened, policymakers targeted consumption by imposing efficiency measures. As those measures have played out, it has become apparent that their effectiveness is being constrained by subsidized prices that continue to encourage demand. Price reforms, as mentioned, are the most politically challenging of the three reform categories. This section attempts to clarify those difficulties within the GCC's unique political context. A short case-study of price reform in Dubai informs the final sections on public perceptions of subsidies and potential government strategies for reform.

DIFFICULTIES OF SUBSIDY REFORM IN GENERAL POLITICAL SETTINGS

When governments endow citizens with welfare benefits, they unwittingly sow the seeds of future state-society conflict. Subsidies are described by academics as asymmetric: easy to impose and difficult to retract. This goes for all types of government, from the most to least democratic. When governments provide price subsidies, they create vested interests among beneficiaries who later coalesce to preserve their interests. When their benefits come under threat, these groups can rise up and threaten political leadership. Pierson argues that any society which relies on state-provided welfare benefits maintains a constant potential for public mobilization that raises the stakes of benefit reform. As examples, he shows how the Thatcher and Reagan governments, elected with mandates to dismantle welfare states in the UK and the USA, failed to implement the sweeping reforms they promised because their actions mobilized pensioners' lobbies and other interest groups created by the expanded benefits.[46]

Benefit reforms are even more difficult when a government is highly centralized. Centralized systems like those in the Gulf also concentrate accountability. Reform-minded rulers are thus exposed to the full force of public reaction and can only pursue these policies during periods when they feel they can absorb the political consequences, or when they are sheltered from blame. This is best done under conditions of budgetary crisis or during reforms mandated by an external body such as the IMF or WTO.[47]

These peculiarities wind up constraining a government's ability to launch effective policy on subsidy reform. As understanding of the "stickiness" of damaging subsidy policies has increased, multilateral financial institutions have begun warning governments about the perils of adopting them in the first place.

ASPECTS OF PREVIOUS SUBSIDY REFORMS THAT PERTAIN TO THE GULF CONTEXT

Despite the difficulties, subsidy reforms – including on energy prices – have taken place. As detailed above, governments of all stripes have raised prices on various energy products. These include governments with centralized leadership structures. The case of Dubai's partial subsidy reform of 2011 offers useful lessons on the hazards and benefits of raising energy prices.

ELECTRICITY AND WATER PRICE REFORMS IN DUBAI

Dubai, a nearly depleted oil producer, began confronting rising energy demand during a period of financial crisis. The global financial meltdown that started in 2008 affected all parts of the GCC, but none as deeply as the UAE emirate of Dubai. Amid a recession and crashing real estate market, the city's government decided to address the rising cost of electricity and water. In prior years, the Dubai government – like those elsewhere in the UAE – restricted price increases to expatriate residents and commercial customers. But in 2011, policymakers decided to extend increased prices to the heretofore untouched citizen-residential sector.[48]

At the time, UAE citizens in Dubai paid 1/3 the electricity price of expatriates.[49]

At least two-thirds of the cost of citizen consumption was paid by direct subsidy from the Dubai government. Subsidies were thus encouraging higher consumption and increasing the government's costs, all the while insulating citizen consumers of electricity and water from the austerity measures that, in the wake of the financial crisis and real estate crash, were otherwise being imposed across the board.

Further, the Dubai government faced rising utility expenses that had been intensified since 2008 by Dubai's importing of LNG at market prices. The exponential increase in marginal cost of natural gas feedstock exacerbated Dubai's financial predicament, providing the impetus to raise prices.

Dubai's ruler agreed with policymaking officials that citizens needed signals to restrain their consumption behavior, and that these signals were most convincingly conveyed by raising prices. The Dubai Electricity and Water Authority (DEWA) received permission for a 30% increase in electricity prices. Half of that increase would be imposed through a 15% increase in electricity consumption tariffs on all customer classes, including citizens. The other half would take the form of a surcharge added to bills that would cover imports of LNG when costs rose beyond 2010 levels. The ruler also agreed to impose the first-ever limits on citizens' receipt of free municipal water, which had to be desalinated at high cost in the same gas-fired co-generation plants that produce electricity.[50]

The aim was to increase efficiency in a city in which infrastructure and habits had been shaped by the prior availability of plentiful cheap energy.

> "Officials warned that efficiency programs would not function unless subsidies were cut."

Now that Dubai was a net importer of energy, the city's Supreme Council of Energy declared its intention to reduce projected electricity demand in 2030 by 30%. This reduction would reduce needs for 4GW of future generation capacity, allowing Dubai to forgo building at least four power plants.[51] Raising tariffs would be the most challenging aspect of a program that also included efficiency standards on buildings and appliances. Officials warned that efficiency programs would not function unless subsidies were cut.

Dubai's tariff increase went into effect on January 1, 2011. Newspapers ran cursory announcements of the price increases, but these attracted little public debate. In an untimely coincidence, the increase was imposed as the Arab Spring uprisings unfolded in Tunisia and Egypt. These uprisings increased government sensitivity to citizen opinion on the subsidy reform.[52]

When opposition emerged to the increases that appeared on DEWA bills, the Dubai leadership made three separate retractions of parts of the reform, all of which affected only the citizen residential sector. The retractions included new provisions for low-income citizens, a doubled quota for free municipal water, and exemption of citizens to the LNG surcharge. Expatriate complaints elicited little official sympathy, with DEWA executives advising non-citizen customers simply to "stop wastage of precious resources."[53]

Overall, the reform was a success. Dubai's 15% increase in electricity tariffs stayed in place for expatriates and the majority of citizens. Significantly, citizens were in principle expected to pay something for excessive water consumption.[54] DEWA reported that, by the end of 2011, the reform reduced power consumption by an average of 3% per account and water consumption by an average of 7%. The hike saved Dubai the equivalent of around six shipments of LNG that year, worth some $300 million at then-prevailing prices.[55]

Dubai's success appears to have encouraged modest reforms in neighboring monarchies. Kuwait recently raised diesel prices from US 18 cents per liter to 56 cents, but then reduced prices back to US 36 cents after an outcry in the Kuwaiti parliament.[56] Bahrain is said to be planning an Iran-style increase in electricity prices, with compensation payments for citizens.[57] In 2014, the UAE emirate of Abu Dhabi enacted a measure similar to that in neighboring Dubai, imposing small price increases on citizen residential customers and a larger increase on expatriates. As in Dubai, citizen households were charged for water use for the first time.[58]An Abu Dhabi newspaper editorial summarized the thinking behind the increase:

"The important thing here is the recognition that electricity and water are valuable commodities that have, until now, been greatly subsidized. Placing a retail price on them – albeit one that is still lower than the actual cost – is a step towards making consumers aware that scarce resources need to be conserved... As customers, we now have the incentive to minimize our bills by taking simple steps such as limiting the length of showers, turning off running taps, fixing leaks, switching off power-hungry air-conditioners and 'instant-on' devices when they are not needed, installing lower-wattage light bulbs, double-glazing or tinting windows, and using energy-efficient household appliances." [59]

ALTERNATE PERCEPTIONS OF SUBSIDY 'ENTITLEMENT:' GULF CITIZENS VS. ELITES

Much of the academic literature on the Gulf States declares that citizens conceive of subsidized energy and other benefits as "entitlements" due to them by dint of their citizenship. While these perceptions may be accurate among a segment of the population, the experience in Dubai and Abu Dhabi suggests that a substantial portion of the citizenry does not consider itself entitled to free or cheap energy and is willing to pay more.

A previous study reveals that elites and regional experts exhibit a more conservative view of subsidy entitlements than do Gulf citizens themselves. The experts surveyed – whether in government or industry, expatriate or national – assumed high levels of citizen "entitlement" to cheap energy and deep citizen opposition to increased prices. Among citizens, a reduced expression of "entitlement" was found. Only a minority of citizens remained strongly opposed to higher prices on electricity once given an explanation that reforms aimed at reducing consumption were in the national interest.[60]

STRATEGIES AND CONSIDERATIONS FOR GULF POLICYMAKERS PURSUING SUBSIDY REFORM

What do these findings mean for policymaking? Gulf policymakers may be exhibiting more caution than necessary in reforming energy subsidies, especially when global oil and gas prices are at multi-year lows. Governments in need of reducing energy consumption may have more scope for reform than they or regional elites believe. Although more work must be done to investigate public opinion, results suggest that reforms could be made more palatable through a media campaign that highlights the extent of wasted resource, such as that which that preceded Iran's subsidy reforms of 2010.[61] As noted above, Dubai's reform did not include such a public information campaign, and still attracted only moderate opposition from citizens. Had the government explained its intentions and rationale before launching the increased prices, opposition may have been reduced.

Finally, Gulf governments which do ignite significant opposition to subsidy reforms – especially those with much more ambitious price increases in mind – would do well to prepare an appropriate response to assuage public anger, rather than simply reversing a portion of the increase. Readying to provide an alternate benefit is one strategy. Iran was successful in recasting energy subsidies as a cash benefit and Bahrain appears to be considering a similar action. While Gulf governments may wish to avoid the expense of providing an alternate subsidy, economic analysis demonstrates that cash handouts are more efficient than distributing benefits on an in-kind basis.[62]

Policymakers might also consider exchanging subsidies on energy for reduced prices for a service that is less economically or environmentally damaging. For example, if energy prices were increased, the government might consider launching replacement subsidies on communications bandwidth, such as broadband Internet or mobile telephone charges. A communications subsidy would still distort demand, but in a less polluting and economically damaging way. Designing a flexible reform that can be adjusted depending on public reaction would thus seem to be a prudent course of action. ●

CONCLUSION

The Gulf States have changed dramatically in the four decades since 1973. They have grown from impoverished remote provinces where life was short and difficult, to some of the most prosperous states on Earth, with modern lifestyles and economic opportunities that have become the envy of much of the world. Education and health care, infrastructure and life expectancy have improved remarkably. Low prices of domestic energy played a role in some of these advances. But the benefits of underpriced energy are now overshadowed by the distortions of overheated demand, and the ensuing waste of valuable resources. The preponderance of evidence indicates that energy subsidies have remained in place far longer than their useful lives.

The title of this paper refers to the consequences of success and of failure to reduce energy consumption growth in the Gulf. The consequences of failure are obvious: Lost export revenues, damaged fiscal health, increased emissions of pollution and carbon dioxide, premature end to exports, and reduced geopolitical stature.

What are the consequences of success? The portions of national budgets that underwrite subsidies represent a diversion of public funds and national resources that could be used to generate greater social benefit. In this sense reformed prices that make energy products more expensive would raise additional revenues for the state, while inducing consumers to adopt habits and technologies that increase conservation and benefit the environment – both locally and globally. This, in turn, would reduce state spending and preserve resources for export.

Even the prodigious natural resource endowments of the GCC States have their limits. While reserve sizes remain large in the big producers, levels of production have not increased at the same pace as domestic consumption. The GCC's role as reliable supplier of crucial commodities to world markets is coming under challenge. Maintaining this status depends on GCC citizens, and the flexibility in their sense of entitlement to cheap energy and willingness to submit to reform. It also depends on measures the state is willing to take to ensure the continuity of exports. Governments and their national utilities need to move toward a more balanced energy policy, with diversification of supply and simultaneous efforts to address demand, including through price reforms. As demonstrated above, abolishing the subsidies that encourage overuse of oil and gas resources represents an effective and underutilized step toward reaching these goals.

I strongly believe in empowering our citizens.

Educating our citizens is vital for the future of the Gulf region, which faces many challenges, including that of heavy energy consumption. The region has witnessed major developments and now faces big power shortages. It needs more gas and more oil. The local market has huge consumption, which mostly comes at the expense of exporting crude oil.

The Gulf countries have to rethink the generous subsidies they have, they cannot afford them anymore and will have to look at alternatives. They have to reduce subsidies and prepare people to accept that change. The people will protest because they are used to cheap or free electricity and power. I believe this will eventually change culturally because people will realize that they cannot keep depending forever on a depleting product. Young, educated people will be instrumental to that change.

HE Abdullah Bin Hamad Al-Attiyah
Chairman
The Abdullah Bin Hamad Al-Attiyah Foundation for Energy and Sustainable Development

Footnotes:

1 / Brad Bourland and Paul Gamble, "Saudi Arabia's Coming Oil and Fiscal Challenge" (Research report, Riyadh: Jadwa Investment, 2011); p. 20.

2 / Several authors describe energy subsidies as entitlements or rights of citizenship in the Gulf States. See, for example: Jill Crystal, Oil and Politics in the Gulf: Rulers and Merchants in Kuwait and Qatar (Cambridge: Cambridge University Press, 1990); F. Gregory Gause III, Oil Monarchies: Domestic and Security Challenges in the Arab Gulf States (New York: Council on Foreign Relations, 1994); Michael Herb, "No Representation without Taxation? Rents, Development, and Democracy," Comparative Politics 37, no. 3 (2005): 297–315; HazemBeblawi and Giacomo Luciani, "Introduction," in The Rentier State, ed. HazemBeblawi and Giacomo Luciani (London: Croon Helm, 1987), 1–21; Gwenn Okruhlik, "Rentier Wealth, Unruly Law, and the Rise of Opposition: The Political Economy of Oil States," Comparative Politics 31, no. 3 (April 1999): 295–315.

3/ 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: International Energy Agency, "Electricity Information and Natural Gas Information," statistics database (Paris: IEA, 2012).

4/ Unconventional gas developments such as the Shah project in Abu Dhabi, Block 61 in Oman, and others under consideration in Kuwait and Saudi Arabia entail much higher lifting costs.

5/ US Energy Information Administration. "Saudi Arabia Country Brief." Sept. 10, 2014; http://www.eia.gov/beta/international/analysis.cfm?iso=SAU

6/ US Energy Information Administration. "Saudi Arabia uses largest amount of crude oil for power generation since 2010." Sept. 24, 2014; http://www.eia.gov/todayinenergy/detail.cfm?id=18111

7/ MEES, 2014. "Saudi Direct Crude Burn Plan Can Only Work Short-Term, Says FGE." Middle East Economic Survey, Apr. 25, 2014.

8/ Not including NGLs. See: "New Gulf Refineries to Make Middle East Major Products Exporter." MEES Vol. 57 No. 31, Aug. 1, 2014.

9/ 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.

10/ Michael Lamotte, "Saudi Arabia's Pressing Gas Initiative" (Dallas: Guggenheim Securities, 2012).

11/ BP, "Statistical Review of World Energy 2015," statistical report (London: BP, 2015). Note that emissions from Oman and Bahrain are not included in the GCC total.

12/ International Energy Agency, "World Energy Outlook 2015 Special Report on Energy and Climate Change." June 15, 2015; http://www.worldenergyoutlook.org/energyclimate/#d.en.143801

13/ Jim Krane, "Guzzling in the Gulf: The Monarchies Face a Threat From Within," Foreign Affairs, December 19, 2014; Jim Krane, "Stability versus Sustainability: Energy Policy in the Gulf Monarchies," The Energy Journal 36, no. 4 (2015);Bourland and Gamble, "Saudi Arabia's Coming Oil and Fiscal Challenge"; GladaLahn and Paul Stevens, "Burning Oil to Keep Cool: The Hidden Energy Crisis in Saudi Arabia" (London: Chatham House, 2011); Mark C. Lewis and Michael Hsueh, "Crude Oil: Iceberg Glimpsed off West Africa" (Energy market research report, Paris: Deutsche Bank, 2012); Dermot Gately, Nourah Al-Yousef, and Hamad M. H. Al-Sheikh, "The Rapid Growth of Domestic Oil Consumption in Saudi Arabia and the Opportunity Cost of Oil Exports Foregone," Energy Policy 47 (2012): 57–68; Heidy Rehman, "Saudi Petrochemicals: End of the Magic Porridge Pot?" (Citibank research report, Dubai: Citi Equities Research, 2012).

14/ U.S. Energy Information Administration, "UK became a net importer of petroleum products in 2013." July 3, 2014; http://www.eia.gov/todayinenergy/detail.cfm?id=16971

15/ Per capita GDP growth is PPP and averages all six GCC growth rates since 1981 on an unweighted basis; source: International Monetary Fund, "World Economic Outlook" (Washington: IMF, October 2012).

16/ Yousef Alyousef and Paul Stevens, "The Cost of Domestic Energy Prices to Saudi Arabia," Energy Policy 39 (2011): 6900–6905., emphasis added

17/Bourland and Gamble, "Saudi Arabia's Coming Oil and Fiscal Challenge.", emphasis added

18/ Mohsen Mehrara, "Energy Consumption and Economic Growth: The Case of Oil-Exporting Countries," Energy Policy 35 (2007): 2939–45.

19/ Lewis and Hsueh, "Crude Oil: Iceberg Glimpsed off West Africa," 13–14., emphasis added

20/ A Diaz Arias and C van Beers, "Environmentally Damaging Government Policies in the Energy Sector," in Energy and Innovation: Structural Change and Policy Implications, Purdue University Press, United States, ed. M.S. van Geenhuizen (Purdue: Purdue University Press, 2010).

21/ Valerie Marcel, Oil Titans: National Oil Companies in the Middle East (Washington: Brookings, 2006).

22/ Some of the material in this section appears in the forthcoming article:Jim Krane, "Rationalizing Energy Demand through End-User Prices in the GCC," Oxford Energy Forum, no. 101 (November 2015).

23/ Pedro Rodriguez, Joshua Charap, and Arthur Ribeiro da Silva, "Fuel Subsidies and Energy Consumption: A Cross-Country Analysis," Kuwait Selected Issues and Statistical Appendix, IMF Country Report (Washington: International Monetary Fund, June 2012).

24/ International Monetary Fund, "Energy Subsidy Reform: Lessons and Implications" (Washington: IMF, 2013).

25/ Noel D. Uri and Roy Boyd, "An Evaluation of the Economic Effects of Higher Energy Prices in Mexico," Energy Policy 25 (1997): 205–15.

26/ Malaysia was not included in the IMF's case study report. See instead Lee Chyi, "Kicking the Subsidy Habit," Penang Monthly, 2012, http://penangmonthly.com/kicking – the – subsidy – habit and International Monetary Fund, "Case Studies on Energy Subsidy Reform: Lessons and Implications" (Washington: IMF, 2013).

27/ International Monetary Fund, "Energy Subsidy Reform: Lessons and Implications."

28/ International Monetary Fund, "Energy Subsidy Reform: Lessons and Implications"; Dominique Guillaume, Roman Zytek, and Mohammed Reza Farzin, "Iran: The Chronicles of Subsidy Reform" (Washington: International Monetary Fund, 2011).

29/ Hamid Tabatabai, "The Basic Income Road to Reforming Iran's Price Subsidies," Basic Income Studies 6, no. 1 (2011): 1–24.

30/ Initial public support is documented in Guillaume, Zytek, and Farzin, "Iran: The Chronicles of Subsidy Reform."

31/ 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."

32/ "Iran: Cut those subsidies," The Economist, April 30, 2014.

Footnotes:

33/ MEES, 2014. “Saudi Direct Crude Burn Plan Can Only Work Short-Term, Says FGE.” Middle East Economic Survey, Apr. 25, 2014.

34/ World Nuclear Association, “Nuclear Power in the United Arab Emirates.” March 2014; http://www.world-nuclear.org/info/Country-Profiles/Countries-T-Z/United-Arab-Emirates/

35/ World Nuclear Association, “Nuclear Power in Saudi Arabia.” June 2015; http://www.world-nuclear.org/info/Country-Profiles/Countries-O-S/Saudi-Arabia/

36/ World Nuclear Association, “Emerging Nuclear Countries.” June 2015; http://www.world-nuclear.org/info/Country-Profiles/Others/Emerging-Nuclear-Energy-Countries/

37/ World Nuclear Association, “Nuclear Power in Iran.” May 2015; http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Iran/

38/ Muhammad Garwan, “Sustainable Energy Mix for Saudi Arabia.” K.A.CARE, Nov 2013,

39/ April Yee, “Sunshine that follows the storm at Shams 1.” The National, Abu Dhabi. Feb. 6, 2012.

40/ CSP typically allows for some thermal storage that could be effective in covering the evening peak. See: JimCSP typically allows for some thermal storage that could be effective in covering the evening peak.

41/ After scrapping plans for a coal generator at Duqm in 2011, Oman appeared to be reconsidering the technology in 2015. See: Conrad Prabhu, “Oman sees coal as potential fuel resource.” Oman Observer, April 21, 2015.

42/ Dania Saadi, “Dewa to award Hassyan clean coal power plant contracts by June.” The National, Abu Dhabi. Jan. 14, 2015.

43/ Based on those of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

44/ Based on those of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

45/ Partha S. Dasgupta, “The Environment as a Commodity,” Oxford Review of Economic Policy 6, no. 1 (1990): 51–67.

46/ Paul Pierson, “The New Politics of the Welfare State,” World Politics 48 (1996): 143–79.

47/ Ibid.; Douglas R. Arnold, The Logic of Congressional Action (New Haven: Yale University Press, 1992); Eric Patashnik, “After the Public Interest Prevails: The Political Sustainability of Policy Reform,” Governance 16, no. 2 (2003): 203–34.

48/ This material and much of this section is based on multiple interviews with Dubai government officials in the energy sector and municipal government who spoke on condition of anonymity, 2011-13.

49/ Pricing structures in Dubai were similar to those across the UAE, with expatriates cross-subsidizing citizens by paying triple the price per unit of electricity. After the 2011 reform, when citizens were exempted from the LNG surcharge, the difference between citizens and expatriates widened. Although citizens endured a price increase, during some months expatriates paid prices that were four times as high.

50/ Author interviews with Dubai government officials in the energy sector and municipal government who spoke on condition of anonymity, 2011-13.

51/ NejibZaafrani, CEO, Dubai Supreme Council of Energy, speech at the Dubai Global Energy Forum, April 18, 2011, Dubai.

52/ Author results from expert elicitation with UAE policymakers, March 2012. Fifteen of 25 respondents said the Arab Spring events made the government “less willing” to raise utility rates; 21 of 26 respondents said the government was either “very sensitive” or “extremely sensitive” to citizen opinion on subsidies.

53/ ZaherBitar, “Dubai Residents Complain of Hikes in Water, Electricity Tariffs,” Gulf News, October 19, 2011, http://gulfnews.com/news/gulf/uae/government/dubai-residents-complain-of-hikes-in-water-electricity-tariffs-1.903101.

54/ A 2013 financial risk prospectus accompanying the issue of a Dubai sukuk noted that “UAE nationals are required to pay their own electricity bills.” But that, when it comes to water, “While the government encourages UAE nationals to pay their own invoices, the Government issues credit notes to cover any unpaid residential water invoices of UAE nationals.” See: Dubai Electricity and Water Authority, “DEWA Sukuk 2013 Limited,” financial disclosure for investors (Dubai: DEWA, February 28, 2013).

55/ Author interviews with energy policy officials in Dubai government, 2012 and 2013.

56/ “Kuwait cuts diesel fuel prices after political pressure,” Reuters, Jan. 28, 2015.

57/ “Bahrain government plans more subsidy cuts,” Trade Arabia, May 26, 2015.

58/ Binsal Abdul Kader, “Abu Dhabi revises water and electricity tariff.” Gulf News, Dubai, Nov. 13, 2014.

59/ “Rise in utility prices is good for the UAE,” The National, Abu Dhabi. Nov. 13, 2014.

60/ Jim Krane, “The Political Economy of Subsidy Reform in the Persian Gulf Monarchies,” in The Economics and Political Economy of Energy Subsidies, ed. Jon Strand (Cambridge, Mass.: MIT Press, 2016).

61/ Guillaume, Zytek, and Farzin, “Iran: The Chronicles of Subsidy Reform.”

62/ Paul Segal, “How to Spend It: Resource Wealth and the Distribution of Resource Rents,” Energy Policy 51 (2012): 340–48; Steffen Hertog, “Redesigning the Distributional Bargain in the GCC” (BRISMES Annual Conference, World Scientific, 2012).

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35/ World Nuclear Association, “Nuclear Power in Saudi Arabia.” June 2015; http://www.world-nuclear.org/info/Country-Profiles/Countries-O-S/Saudi-Arabia/

36/ World Nuclear Association, “Emerging Nuclear Countries.” June 2015; http://www.world-nuclear.org/info/Country-Profiles/Others/Emerging-Nuclear-Energy-Countries/

37/ World Nuclear Association, “Nuclear Power in Iran.” May 2015; http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Iran/

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58/ Binsal Abdul Kader, “Abu Dhabi revises water and electricity tariff.” Gulf News, Dubai, Nov. 13, 2014.

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60/ Jim Krane, “The Political Economy of Subsidy Reform in the Persian Gulf Monarchies,” in The Economics and Political Economy of Energy Subsidies, ed. Jon Strand (Cambridge, Mass.: MIT Press, 2016).

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62/ Paul Segal, “How to Spend It: Resource Wealth and the Distribution of Resource Rents,” Energy Policy 51 (2012): 340–48; Steffen Hertog, “Redesigning the Distributional Bargain in the GCC” (BRISMES Annual Conference, World Scientific, 2012).