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GSI REPORT

The Context of Fossil-Fuel Subsidies in the GCC Region and Their Impact on Renewable Energy Development

Chris Charles
Tom Moerenhout
Richard Bridle

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Head Office
161 Portage Avenue East, 6th Floor, Winnipeg, Manitoba, Canada R3B 0Y4
Tel: +1 (204) 958-7700 | Fax: +1 (204) 958-7710 | Website: www.iisd.org

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International Institute for Sustainable Development
Global Subsidies Initiative
International Environment House 2, 9 chemin de Balexert, 1219 Châtelaine, Geneva, Switzerland
Tel: +41 22 917-8373 | Fax: +41 22 917-8054

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Prepared by Chris Charles, Tom Moerenhout and Richard Bridle

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Executive Summary

This discussion paper on fossil-fuel pricing and subsidies in the countries of the Gulf Cooperation Council (GCC) consists of three main parts. Part one introduces the topic and the importance of energy pricing in the political, social and economic context of the GCC countries. Part two explains different methodologies to estimate subsidies, after which it includes an overview of fossil-fuel subsidies in GCC countries based on (1) estimates by the International Energy Agency (IEA) and IMF, and (2) detailed price-gap calculations by GSI for subsidies to gasoline and diesel used as transport fuels and for electricity. Part three analyzes the adverse impact of fossil-fuel subsidies on renewable energy development.

Lowering fossil-fuel prices has long been considered as a measure to redistribute wealth gained by the state from selling domestic resources. It thus serves a political goal as part of the social contract upon which the political model in Gulf countries is built. While oil and gas shares of GDP in GCC countries are among the highest in the world, GCC governments continue to make a substantial effort to diversify their economies. Low energy pricing has indeed been an important measure to achieve economic goals, in particular since energy-intensive industries form an important part of Gulf economies. Social goals have included the guaranteeing of energy access for the poor.

By now it has been recognized that the low pricing of fossil fuels has led to a number of adverse impacts. While GCC countries have among the highest GDPs per capita in the world, the opportunity cost of selling fuels domestically at prices below international market rates and the volatility in world oil prices have started putting fiscal pressure on GCC governments. Low fuel pricing has resulted in domestic over-consumption of hydrocarbons and the absence of incentives to achieve energy efficiency in the economy. At the same time, renewable energy uptake has been impeded by a lack of competitiveness.

Over-consumption has been the most pressing problem. Electricity consumption has been growing at about 7 per cent per year in GCC countries—the residential sector in most countries covers about half of domestic power demand. At the same time, retail prices are fixed and have not increased in line with consumption. This has resulted in GCC states no longer being able to meet demand for natural gas with domestic resources, which has increased electricity production costs. The use of diesel for electricity production has strongly increased in a number of countries over the past decade.

Similarly, the consumption of gasoline and diesel for transport has also increased very strongly in the last decade. From 2007 to 2011, total transport fuel consumption increased by at least 60 per cent in most GCC states. Like retail electricity prices, transport fuel prices for the public have remained low. While the UAE in particular has attempted to gradually increase prices, most GCC countries have kept prices the same, or even reduced them in the last years. The so-called "Arab Spring" and its impact on the GCC region led to an increase in public spending and fuel price rises, while fiscally needed, seem a political challenge in the short term.

Given that domestic consumption has grown, while retail prices have mainly remained the same and international oil prices have been volatile, opportunity costs of subsidies to fossil fuels for electricity and transport have increased significantly in the last decade. According to the IEA, in 2011, subsidies to oil, natural gas and electricity reached around US$105 billion. Building on IEA calculations, the IMF has added some additional data and estimates they are now closer to US$107 billion. A little more than half of these subsidies have been allocated to oil, with the remainder distributed between electricity and natural gas (respectively around 27 and 20 per cent).

Using price-gap calculations, GSI has attempted to sketch a more detailed image of subsidies to gasoline and diesel for transport as well as for electricity generation. It has found that in 2011 about US$51 billion in oil subsidies went to

gasoline and diesel. Around 72 per cent was used as subsidies to oil consumption in the transport sector (39 per cent gasoline and 33 per cent diesel) and the remainder was used by diesel in the electricity sector. Diesel thus received a total subsidy of US$31 billion. In Kuwait and Qatar, diesel subsidies have increased more rapidly than gasoline subsidies in the last decade. Quantitatively, however, Saudi Arabia is one of the main drivers in subsidy growth, with an increase from US$2 billion and US$3 billion in gasoline and diesel subsidies in 2004 to US$14 billion and US$15 billion in 2012. In Kuwait, Oman and Saudi Arabia there has been a significant increase in the use of diesel for electricity generation.

The paper subsequently demonstrates that underpricing of fossil fuels has impeded the pace of development and deployment of renewable energy in the GCC region. While many countries are investing in renewable energy, it will prove difficult to find the financial resources and offer a competitive environment in the absence of partial fossil-fuel subsidy reform. Also fiscal pressure has grown immensely, with fossil-fuel subsidies, estimated based on an opportunity cost approach, reaching almost 11 per cent of GDP in Saudi Arabia. At the same time, Gulf countries have some of the highest energy intensity per unit of GDP. For the most part, it is energy-intensive industries that have benefitted from the subsidy schemes without a push to enhance their own energy efficiency. Other negative impacts in the GCC region have been a heightened incentive for smuggling, a growing hidden inflation given the unsustainability of the underpricing and more local air pollution and emissions.

This paper thus concludes that (partial) fossil-fuel subsidy reform in the GCC region is both desirable and unavoidable on economic, fiscal, social and environmental grounds. However, at the moment, the political environment for reform is difficult. A thorough political economy analysis is needed to understand the political drivers and constraints that could play out in planning or implementing price adjustments.

TABLE 1. FOSSIL-FUEL SUBSIDIES IN THE GCC (2011, US$ MILLION)

	SOURCE	SPECIFIC FUEL	BAHRAIN	KUWAIT	OMAN	QATAR	KSA	UAE	TOTAL GCC
Oil	IEA	Gasoline, diesel, kerosene, LPG	n.a.	4,340	n.a.	2,030	46,120	3,930	56,420
	IMF	Gasoline, diesel, kerosene	1,389	4,968	2,189	2,123	44,545	1,656	56,870
	GSI	Gasoline, diesel	802	4,028	1,778	1,896	40,237	2,430	51,171
	GSI	*Gasoline (transport)*	441	1,769	1,105	721	14,169	1,478	19,683
	GSI	*Diesel (transport)*	361	904	87	1,175	13,413	851	16,791
	GSI	*Diesel (electricity)*	n.a.	1,355	586	n.a.	12,655	101	14,697
Natural Gas	IEA	Total	n.a.	2,080	5,540	1,860	0	11,520	21,000
	IMF	Total	n.a.	2,080	5,348	1,860	n.a.	11,520	20,808
Electricity	IEA	Total	n.a.	4,680	n.a.	2,090	14,820	6,370	27,960
	IMF	Total	665	4,680	550	2,090	14,820	6,370	29,175
Total subsidies	IEA	Total	n.a.	11,100	5,540*	5,980	60,940	21,820	105,380
	IMF	Total	2,054*	11,728	8,087	6,073	59,365*	19,546	106,853

Notes: (1) GSI 2011 subsidy estimates are based on 2010 consumption levels and therefore likely a lower bound estimate of the actual subsidy. (2) Equal IEA and IMF estimates were originally provided by the IEA and used by the IMF. (3) Electricity subsidy estimates are based on electricity consumption. Subsidized fuel used as input for electricity generation is considered under the categories 'oil' (diesel) and 'natural gas'. (*) Estimates are incomplete because of a lack of availability (n.a.) of certain subsidy estimates.

Source: IEA, 2013b; IMF 2013, Author calculations.

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Acronyms

ASCM	Agreement on Subsidies and Countervailing Measures
Dii	Desertec Industrial Initiative
EIA	Energy Information Agency
GCC	Gulf Cooperation Council
GIZ	German International Cooperation Agency
IEA	International Energy Agency
KSA	Kingdom Saudi Arabia
OAPEC	Organization of Arab Petroleum Exporting Countries
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
SEC	Saudi Electricity Company
UNDP	United Nations Development Programme
WTO	World Trade Organization

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1.0 Introduction and Scope

Member states of the Gulf Cooperation Council (GCC) have an energy advantage, being endowed with significant hydrocarbon resources, allowing them to set domestic prices for transport fuel and electricity to meet policy objectives with reference to the cost of production, as opposed to international market prices. These policy objectives include redistributing resource wealth amongst their citizens, the promotion of domestic industries and the achievement of economic development goals. Subsidized energy can, however, result in a range of unintended negative impacts, as it distorts price signals for consumers, with serious consequences for energy efficiency and the optimal allocation of resources (Fattouh & El-Katiri, 2012a).

The magnitude of fossil-fuel subsidies in the GCC region and globally is significant and appears to be growing. In 2011, the IEA calculated an estimated US$523 billion in fossil-fuel subsidies against international reference prices for the consumption of fuels in a selection of key countries, up from US$412 billion in 2010 (IEA, 2011, 2012). Oil products were the most subsidized, at US$285 billion, followed by electricity at US$131 billion. There is now a growing awareness amongst policy-makers and civil society groups that pricing energy below market rates—especially in the case of fossil fuels, but also for biofuels and renewable energy—may be inefficient in achieving the intended policy objectives, and that subsidies in the GCC region have led to wasteful consumption (Moerenhout, 2013).

The overall aim of this discussion paper is to deliver an overview of the use, impact, and fiscal costs of energy pricing policies in the GCC region, and identify options for optimizing energy prices to address environmental, economic, social, and political issues. This paper recognizes that the costs of energy subsidies in the GCC are high—and increasing. There is also a growing recognition amongst GCC regulators and energy companies of the need to rationalize not only energy prices, but also consumption patterns (Al-Naimi, 2012; Moerenhout, 2013). This provides a platform from which GCC countries can advance an agenda for pricing reform. There are options for taking forward the rationalization of energy prices, tailored to the unique sensitivities of the GCC region.

The aims of this discussion paper are to:

(1) Provide an overview of the social, environmental and economic impact of low fossil-fuel prices.

(2) Give a consolidated overview of subsidies to fossil-based electricity consumption and transport fuels in each of the GCC countries through a review of available literature on subsidy estimates.

(3) Offer new estimates for levels of support to gasoline and diesel as fuels used in transport and electricity through an application of the price-gap approach.

(4) Highlight options for the reform of energy prices in support of economic, social and political objectives and assist GCC governments in diversifying their economies and optimizing fossil-fuel energy prices.

This paper recognizes that the reform of energy prices can help GCC countries' economies adapt to the realities of reducing fossil-fuel resource endowments. GCC countries are currently facing an increasing fiscal challenge in maintaining financial support for rising fuel and electricity consumption, making this a favourable time to discuss optimizing fossil-fuel energy prices. Nonetheless, this discussion paper notes that the current political environment in the GCC region makes the reform of domestic energy prices challenging in practice, resulting in any reform likely being a medium- to long-term endeavour.

The energy sources assessed in this paper are mainly electricity from liquid fuels (principally oil) and natural gas, and fossil-based transport fuels (gasoline and diesel). The role of electricity production in driving economic development and the scale of support provided to it makes it a key aspect of the energy system. Liquid fossil fuels, such as gasoline

and diesel, are central to private and commercial transport activities. Both forms of energy receive significant levels of support in the GCC, where their retail price at the point of consumption is controlled, as are (in some cases) upstream aspects of electricity generation and petroleum fuel refining. An initial review revealed limited publicly available information on upstream refining of petroleum transport fuels in GCC countries. Consequently, for fossil-based transport fuels this paper focuses on downstream activities using the price-gap method for measuring subsidies.

2.0 The Importance of Energy Pricing

2.1 Distributing and Accounting for Energy and Financial Resources

The pace of economic development in the GCC countries has accelerated dramatically during the last two decades. Sharp rises in oil prices in the 1970s transformed the ability of these countries to invest in domestic industry and infrastructure. Equipped with massive oil revenues, the Gulf countries embarked on ambitious programs to diversify their economies (Hvidt, 2013) and to improve the standard of living for their citizens. This rapid economic growth was associated with large increases in per capita income, urbanization, industrialization, use of road transportation, and electrification. Consequently, demand for energy in these countries has been growing at a much higher rate than that of developed and developing countries (El-Katiri, 2013; Hertog & Luciani, 2009).

Energy intensity per unit of GDP is among the highest in the world, and even increasing in certain GCC countries—a trend opposite to many developed economies, which are moving to more energy-efficient and diversified service-based models (Fattouh & El-Katiri, 2012a). Rising energy consumption has led to significant improvements in the standard of living for GCC citizens, but it has also led to gas and oil resources being depleted at an accelerated rate. At the same time, it has contributed significantly to the fiscal burden on government budgets, fuel and electricity shortages, increased local and international pollution, and inhibited economic diversification efforts (Fattouh & El-Katiri, 2012a) and the deployment of renewable energy. The extraction of oil and gas reserves continues to form the central element of GCC economies in generating GDP growth and government revenue.

TABLE 2. OIL & GAS CONTRIBUTION TO GDP AND TOTAL GOVERNMENT REVENUE (2010, %)

	OIL & GAS SHARE OF GDP	OIL & GAS SHARE OF TOTAL GOVERNMENT REVENUE
Bahrain	20.6	81.8
Kuwait	46.4	93.8
Oman	26.3	81.7
Qatar	18.3	60.8
Saudi Arabia	39.9	90.4
UAE	21.9	75.9

Source: Arab Monetary Fund, 2011.

The provision of low energy prices forms part of a social contract between GCC leadership groups and their citizens. Under an "allocation state model" the leadership groups of the GCC states are able to regulate the sale of fossil fuels, and use income generated from gas and oil reserves to distribute wealth to their citizens, most often in the form of low-price housing, cash payments, pensions and subsidized fuel, electricity and water prices (Hvidt, 2013). In addition to the social contract, Fattouh & El-Katiri (2012a) have identified three other objectives for maintaining low energy prices in the GCC region: (1) promoting industrial development, in particular power generation and energy intensive industries; (2) circumventing inflationary pressures; (3) protect the poorer segments of society, which already spend a disproportionate amount on energy and food. These three objectives are put forward by most countries in the world that subsidize energy and are therefore not specific to the GCC region.

The financing of low energy prices takes different forms, depending on a wide range of factors such as whether the country is a net exporter or a net importer of petroleum products; the organization of the energy sector; the ownership structure of energy assets; the distribution network of gas and petroleum products; and the health of government finances (Fattouh & El-Katiri, 2012a). Low energy prices are defined as prices that are set below liberalised world market prices (see Sections 3.1 and 3.2 on "Defining" and "Measuring" subsidies). An important distinction in energy policy and pricing is made between net energy importing countries on the one hand, and net energy exporters on the other. While the Gulf countries are considered energy exporters, only very few of them are net exporters across the board. In fact, several of the Gulf states, notably the UAE and Kuwait (and soon Bahrain and potentially Oman), are net importers of natural gas (Fattouh & El-Katiri, 2012a).

As a result of the allocation state model, GCC countries have become of the wealthiest states on a per capita basis in the world, according to standard GDP per capita levels. In particular, Qatar, Kuwait and Saudi Arabia have among the highest GDP per capita levels globally. The average GDP per capita of GCC states is six times as high as other non-oil exporting countries in the Arab region (Fattouh & El-Katiri, 2012b).

2.2 Current Context of Low Energy Pricing in the GCC

The costs associated with the allocation state model need to be weighed against key future drivers: (1) fossil resources becoming scarcer (2) increase in domestic demand for energy (3) the drive by GCC governments to diversify their economies. While building a productive economic base was less imperative in the past, the fiscal burden associated with energy subsidization and fossil fuel price volatility makes oil and natural gas sales insufficient to cover government expenditure. (Hvidt, 2013). Fossil-fuel subsidies represent an important part of government expenditure in all GCC countries For example, in Saudi Arabia and the UAE, underpricing of energy represented around 26 per cent of public expenditure.

Without a diversified economy, GCC states are dependent on high and stable oil prices to fund their public expenditure. Because losses in foregone revenues on government records are implicit (underpricing is relative to international market standards), they are difficult for governments to convey to the public as real losses or costs. It is challenging for governments to initiate energy pricing reform due to the lack of transparency around the size of implicit transfers, their direct and indirect costs (Ragab, 2010), and the identities of the main beneficiaries are reasons

In recent years, the Arab Spring has resulted in an increase in public expenditure to maintain political stability. Periods when there is significant political instability may be negating times when GCC governments had more funding from higher oil prices in order to diversify their economy (Darbouche & Fattouh, 2011). In Kuwait and Qatar, additional spending to maintain social cohesion reached 3 per cent of GDP, while in Saudi Arabia it reached about 19 per cent. Arab Spring protests were most felt in Qatar and Oman, with both states receiving US$10 billion from other GCC members to increase public spending in response to the crises (Hvidt, 2013).

3.0 Low Energy Pricing – Define, measure, evaluate

3.1 Defining Subsidies

This section discusses a number of approaches in defining and measuring support to fossil fuels. A major part of the debate on energy pricing focuses on subsidies, which involve low energy prices providing a transfer of public benefit to private entities. Depending on whether a narrow or broad definition of subsidies is applied, there can be significant variations in the financial size of the subsidy estimate. Organizations such as the Global Subsidies Initiative (GSI) of the International Institute for Sustainable Development (IISD) adopt a broad approach with the purpose of identifying all existing programs for a sector, whether those subsidy policies are subsequently considered "good" or "bad."[1] Subsequent steps, i.e., *measuring and evaluating* the subsidy programs can then follow once a clear inventory of potential support policies has been generated (GSI, 2010).

The GSI uses a definition of "subsidy" based on the World Trade Organisation's (WTO) Agreement on Subsidies and Countervailing Measures (ASCM), which is supported by 153 countries. Under Article 1: Definition of a Subsidy, the ASCM determines that four types of subsidies exist, where government:

1. Provides direct transfer of funds or potential direct transfer of funds or liabilities.
2. Revenue is foregone or not collected.
3. Provides goods or services or purchases goods.
4. Provides income or price support.[2]

The ASCM also requires that a subsidy be specific to an enterprise, industry, or group of enterprises or industries under Article 2. However, even though in some cases government support is offered to more than one sector it can still be considered a subsidy if, for example, it is offered only to oil, gas or coal sectors, or if the oil, gas or coal sectors disproportionately benefit from the support.[3]

The IEA definition of a subsidy aims to capture various types of government interventions that impact prices or costs, either directly or indirectly. The IEA defines energy subsidies "as any government action that concerns primarily the energy sector that lowers the cost of energy production, raises the price received by energy producers or lowers the price paid by energy consumers" (IEA, 2006, p. 1). This definition can include external costs or not, which is a choice, not a function of the definition. Compared to the IEA, the Organisation for Economic Co-operation and Development (OECD) has developed an inventory that captures a broader range of measures used in OECD member countries, together with some that do not reduce consumer prices below world prices (OECD, 2013). The OECD has adopted a broad concept of support that encompasses direct budgetary transfers and tax expenditures or provides a benefit for fossil-fuel production or consumption.

3.2 Measuring Subsidies

Measuring subsidies can be difficult. Jurisdictions employ several approaches to transfer value or subsidize the production and consumption of fossil fuels. While some methods (such as direct transfers and grants) are easy to estimate, others, such as preferential tax measures and liability caps, pose more challenges.

[1] It should not be assumed, that because a subsidy is identified at the beginning of the study that it is necessarily in need of reform.
[2] Although the GSI adopts a broad definition of "subsidy," the definition excludes environmental externalities (such as carbon emissions and pollution), which are better considered in the impact assessments in the third step of the GSI process (i.e., evaluate subsidies).
[3] Based on the ACSM list above, GSI has developed subcategories of subsidies (Annex 1) which forms a comprehensive framework and checklist for identifying and analyzing subsidies in any country. This framework has been used in the GSI's series of country case studies "Fossil Fuels – At What Cost?" to identify and quantify subsidies to upstream oil and gas activities.

A "transfer method" approach is useful in that it systematically investigates different policy measures and financial flows, identifying who benefits and what impacts different programs have. However, this method is time- and resource-intensive, and depends on the availability of data. A lack of transparency or a lack of data related to energy subsidies is not uncommon and make a systematic in-depth country assessment difficult.

As a result, due to its simplicity, a technique often used is the "price-gap approach." This method measures the difference between domestic energy prices and world references prices, and considers this value as a proxy for total support to energy prices within a country. There are methodological challenges, such as the choice of the world reference price and end user price (Koplow, 2009).[4]

The price-gap approach does not cover all subsidy programs, and according to the IEA often represents a lower bound estimate of government support, and complementary estimations may prove useful. This is especially the case for support to fossil-fuel production, which can take many forms—their methods of quantification vary widely. As mentioned, data availability and transparency make quantification of fossil-fuel support difficult, and reliant on assumptions (Koplow, Lin, Jung, Thone & Lontoh, 2010).

Closely related to the definition of subsidies are different views on what constitutes the appropriate reference price. While the IEA uses prices on international markets, the Organisation of the Petroleum Exporting Countries (OPEC) and many fossil resource-rich countries including those in the GCC region, often argue that the reference price should be based on the cost of production (IEA, OPEC, OECD & World Bank, 2010).

BOX 1: THE COST OF PRODUCTION AS THE REFERENCE PRICE

In measuring subsidies via the price-gap approach, the selection of energy reference prices is a key criterion in estimating the scale of subsidy. The notion of using energy reference prices based on the cost of production is based on the argument that resource-rich countries are using their own domestic natural resources, in whose production they hold a comparative advantage, for economic development and welfare creation; and that this offsets the losses incurred in selling fossil fuels at prices below international market rates.

For instance, the national oil company can be mandated to sell petroleum products for the domestic market at below international prices but above production costs. In this case, the national oil company does not incur financial losses, and hence the government does not need to make an explicit transfer to compensate the national oil company for losses (Krane, 2013). Nevertheless, low pricing of fossil fuels involves an *implicit subsidy* or an *implicit transfer*. The implicit subsidy represents the economic rent/revenue foregone by failing to sell oil at higher international market prices; it involves a transfer from the government to the final consumers without such a transfer appearing explicitly on state oil companies' records or in the government budget (Krane, 2013).

If this foregone revenue had been collected, it could have been used by the government in a variety of ways—for instance to reduce the budget deficit; to increase spending in productive areas such as infrastructure, education, and health; to distribute it directly to its people; or to reduce, where applicable, taxation. Put differently, the economic and social benefits from selling their own resources at below world prices are higher than the costs associated with it (IEA, OPEC, OECD & World Bank, 2011). The counterargument, however, is that the large opportunity costs of the production cost approach is not recognized. Using production costs as the reference price for estimating the subsidies a government provides results in the level of subsidy being significantly smaller than if a much-higher world reference price was used. This disagreement on the appropriate reference price has policy implications, for example within the G20 commitment to fossil-fuel subsidy reform (IEA, OPEC, OECD & World Bank, 2011), with, for example, the Kingdom of Saudi Arabia claiming that the G20 proposal for phasing out inefficient fossil-fuel subsidies does not apply in its case (Koplow, 2010).

3.3 Evaluating Subsidies

Subsidies should be evaluated against their objectives to assess their effectiveness and to help governments identify those polices or programs that should be considered for reform (GSI, 2010). Measuring a subsidy program's social, economic and environmental impacts assists governments in evaluating whether a policy should be maintained. However, measuring the impacts of subsidy policies is often complex, such as their effect on GDP or job creation, and should therefore be carefully communicated, including assumptions associated with effectiveness valuation.

[4] While oil is a globally traded product, natural gas prices are not as uniform. Even more, electricity prices often differ heavily, even within jurisdictions, as a result of multiple factors such as access and infrastructure. See Koplow (2009) for an in-depth discussion of these methodological issues.

4.0 Energy Consumption and Pricing in the GCC region

While Gulf countries are expected to remain one of the most important providers of fuel in the next years, the GCC countries are confronted with a domestic "energy crisis" caused by rapid increases in domestic energy demand. There are three main causes of rising consumption: (1) demographic changes, (an influx of expatriate workers), urbanization and improved living standards; (2) industrialization leading to economic diversification, and concentration on energy-intensive, especially electricity-intensive industries such as aluminum production; (3) low consumer prices for liquid fuels (mainly for transport) and electricity discouraging sustainable energy use (Hertog & Luciani, 2009; Lahn & Stevens, 2011). Given the importance of electricity and transport fuels (Ragab, 2010), and the relative size of support provided to their production and consumption, the following section provides an overview of key market data and trends for the two sectors.

4.1 Electricity

The GCC power industry is one of the fastest growing electricity markets in the world. Between 1999 and 2008, power generation in the GCC grew an average 7 per cent annually. The main resource used for electricity production in the region was natural gas. About one third of all natural gas produced in the GCC is used to generate about 60 per cent of electricity production. The remaining 40 per cent was generated using liquid fuels (Krane, 2013). The following table illustrates the scale of electricity consumption in the GCC region and the main feedstocks.

TABLE 3. SOURCE OF ELECTRICITY PRODUCTION IN GCC COUNTRIES (2009, TERAWATT HOURS [TWH])

	OIL	GAS	TOTAL PRODUCTION	ENERGY INDUSTRY OWN USE	LOSSES	TOTAL CONSUMPTION
Bahrain	0.0	12.1	12.1	0.6	1.4	10.2
Kuwait	37.9	15.3	53.2	12.3	6.6	34.3
Oman	3.2	14.6	17.8	2.7	2.3	15.0
Qatar	0.0	24.8	24.8	2.1	1.8	20.9
Saudi Arabia	119.8	97.3	217.1	15.7	18.0	183.5
UAE	1.6	88.9	90.6	5.9	11.0	73.6
Total GCC	162.5	253.0	415.5	39.3	41.1	337.5

Notes: There is a small and growing amount of renewable electricity used in the GCC region; however, 2009 IEA data does not indicate any renewable electricity production or consumption.

Source: IEA, 2013c.

In the Kingdom of Saudi Arabia and the UAE, gas used for electricity generation goes as high as 45 per cent and almost 60 per cent of total domestic gas production, respectively. In all GCC states apart from Qatar, domestic supply of natural gas can no longer meet the countries' demand for electricity. As a consequence, GCC states are facing higher electricity production costs as they need to develop more expensive resources domestically or import natural gas at international prices (Krane, 2013).

The main consumer of electricity in the GCC region is the residential sector, making it politically challenging to reform prices. The second largest consumers are the commercial and public services sectors. The gap between the two sectors can vary between countries.

TABLE 4. SECTORAL SHARE OF ELECTRICITY CONSUMPTION (2009, %)

	RESIDENTIAL	COMMERCIAL AND PUBLIC SERVICES	INDUSTRY	AGRICULTURE AND FORESTRY	OTHER	TOTAL (GWH)
Bahrain	53	34	12	0	0	10180
Kuwait	65	35	0	0	0	34309
Oman	53	33	11	0	3	15032
Qatar	24	18	27	0	31	20897
Saudi Arabia	55	29	13	3	0	183466
UAE	43	37	12	0	9	73605
Total GCC	51	31	12	2	4	337489

Source: Absolute consumption figures were taken from IEA (2013c).

Increasing production costs appear not to be offset by higher electricity retail prices. These prices are regulated in an ad hoc way and have not been updated in line with market trends or inflation. Krane (2013) explains that when prices were first set, electricity tariffs reflected only capital expenditure (capex) and operational expenditure (opex) costs, without accounting for the value of the feedstock (gas), which was considered as freely available. With increasing pressure since the mid-2000s, governments have raised tariffs for commercial and industrial consumers in Saudi Arabia, UAE and Qatar and foreigners in Qatar and UAE (Krane, 2013). The following electricity tariffs are observed in the GCC region:

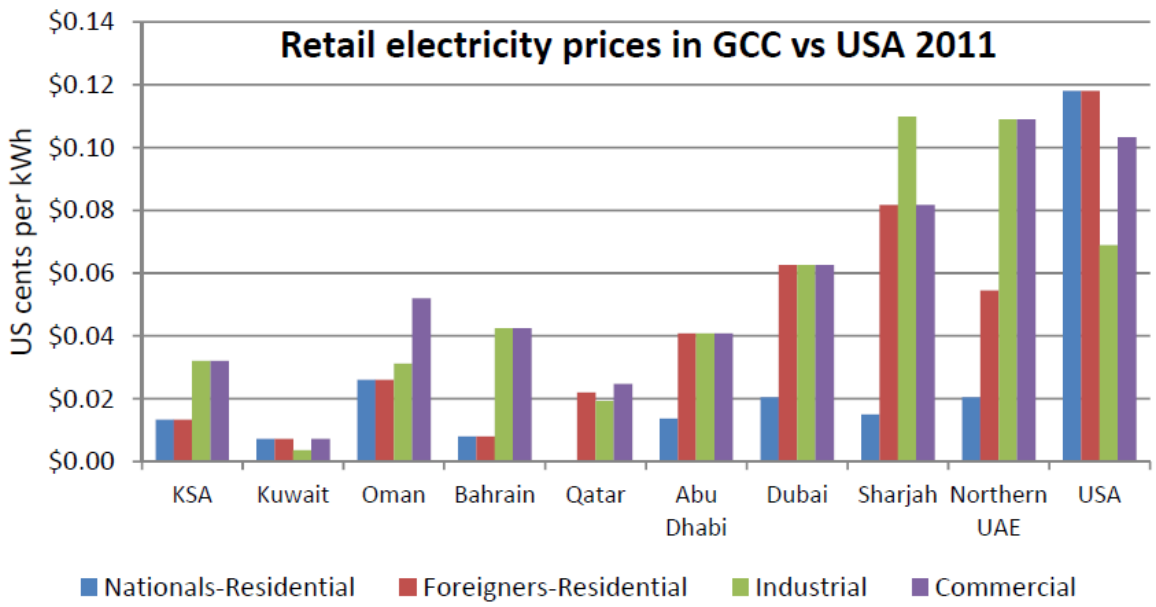


FIGURE 1. RETAIL ELECTRICITY PRICES (2013)

Source: Krane, 2013.

4.2 Transport fuels

Consumption of liquid transport fuels has grown rapidly in all GCC countries. The following table illustrates the general upward trend of gasoline and diesel consumption.

TABLE 5. CONSUMPTION OF GASOLINE AND DIESEL PRODUCTS IN THE GCC, 2007-2012 (THOUSAND BARRELS/DAY EQUIVALENT)

		BAHRAIN	KUWAIT	OMAN	QATAR	KSA	UAE
Gasoline	2007	12	54	25	20	325	84
	2012	16	61	53	30	481	128
Gas Oil/Diesel	2007	8	30	22	25	523	96
	2012	7	58	34	31	711	80
Total	2007	20	84	47	45	848	180
	2012	23	119	87	61	1,192	208

Source: OAPEC, 2012 & 2013.

Transport fuel prices are mostly regulated using ad hoc pricing systems in which governments regulate and determine final prices. Domestic prices of petroleum products in the majority of GCC countries have been maintained at a constant level in nominal terms and at levels well below their counterparts in the international oil market. GIZ (2012) classifies the GCC countries as oil-exporting non-movers, referring to the low level of flexibility built into their pricing system. GIZ also notes a general lack of transparency on data on fuel price breakdowns.

Table 6 shows a comparison of prices between 2002 and 2012, highlighting the static nature of both diesel and gasoline prices. The political logic in maintaining low energy prices is very strong, and the probability that prices might be significantly realigned in the short to medium term is low. In the aftermath of the Arab Spring, many GCC countries decreased fuel prices or put pricing reform plans on hold. There are some notable exceptions, such as the UAE.

TABLE 6. TRANSPORT FUEL PRICES IN THE GCC REGION (US$CENT/LITRE)

	SUPER GASOLINE						DIESEL					
	2002	2004	2006	2008	2010	2012	2002	2004	2006	2008	2010	2012
Bahrain	27	27	21	21	21	27	19	19	13	13	13	17
Kuwait	20	24	22	24	23	23	18	24	21	20	21	20
Oman	31	31	31	31	31	31	26	26	39	38	38	38
Qatar	n.a.	21	19	22	19	27	n.a.	16	19	n.a.	19	27
Saudi Arabia	24	24	16	16	16	16	10	10	7	9	6.7	6.7
UAE	29	28	37	45	47	47	30	28	53	62	71	64

Source: GIZ, 2013a.

5.0 Support to Fossil Transport Fuels and Electricity in the GCC Countries

5.1 Data Sources and Subsidy Measurement

This section provides a consolidated overview of fossil-fuel subsidy estimates for each of the GCC countries based on the following three data sources:

1. Estimates by the IEA of subsidies to petroleum products and electricity, based on a price-gap calculation.[5]
2. Pre-tax estimates by the IMF of subsidies to petroleum products and electricity, based on a price-gap calculation.[6]
3. New estimates by GSI for subsidies to gasoline and diesel used in transport and diesel power generation to the grid and for industry based on a price-gap calculation.

5.2 GSI Subsidy measurement

There was insufficient data on refining activities available to estimate subsidies to gasoline and diesel based on a cost of production approach. Consequently, an analysis of downstream consumption subsidies was undertaken applying a price-gap approach for gasoline and diesel in each of the GCC countries based on the opportunity cost approach (which is consistent with the both IEA and the IMF price-gap approaches using international reference prices). The opportunity cost or price gap is the difference between the higher prices countries could achieve when selling the petroleum product on the world market instead of their domestic market where prices are regulated and maintained below market prices (Koplow, 2009).

The GSI approach did not include excise fuel taxes applied by countries when measuring the gap between wholesale prices in the GCC region and world reference prices. The world reference wholesale prices used were:

1. Petrol: New York Harbor Conventional Gasoline Regular Spot Price FOB (EIA, 2013a).
2. Diesel: Los Angeles CA Ultra Low Sulphur CARB Diesel Spot Price (EIA, 2013a).

The IMF post-tax subsidy estimates (applied in their 2013 study) include final taxation rates on the sale of petroleum products when estimating the price-gap. These are calculated by comparing the actual level of taxation to an economically efficient tax level.[7] For further discussion on taxation and measuring consumption subsidies see IMF (2013). To highlight the role of efficient taxation, as the IMF attempts to do, GSI has included additional benchmark prices in the assessment. These calculations do not specify either a production cost or an opportunity cost approach, but rather refer to the difference with countries that have a certain level of fuel taxation. Used were U.S. and Luxembourg *retail* prices[8] which include significant rates of taxation on the final product (effectively increasing the price gap between gasoline and diesel sold in the GCC region which is not subject to taxation). The retail reference prices were:

[5] An explanation of the IEA's methods for estimating fossil fuel consumption subsidies is available on their website under: http://www.iea.org/subsidy/index.html.

[6] IMF (2013) provides subsidy estimates as percentage of GDP and government revenue, the nominal numbers were obtained in correspondence with IMF representatives.

[7] An economically efficient tax rate is determined by (1) an ad valorem tax on energy products equal to other consumption taxes (equivalent VAT rate or GST rate) in the country (2) corrective taxes which internalize negative externalities arising from energy consumption. Negative externalities include global warming, accidents and health impacts as a result of air pollution (IMF, 2013).

[8] U.S. and Luxembourg retail prices are commonly used as a reference due to the high taxation rates applied to the sale of the final products in order to distinguish different countries according to their level of pricing.

1. U.S. retail price regarded as the minimum reference price for a non-subsidized road transport policies, but without covering external costs (GIZ, 2013b)
2. The Luxembourg retail price is the lowest fuel price in Europe and separates countries with low fuel taxation and those with higher fuel taxation levels, who are generally considered generating revenue and encouraging energy efficiency (GIZ, 2013b).

In line with the IMF price-gap methodology, transportation costs for moving petroleum products from the GCC to international trading hubs were not incorporated into the calculation. International transport costs (which are estimated by the IMF at around US$0.10 per litre) reduce the opportunity cost of selling petroleum products domestically as there is a saving by not having to pay these transport costs. There are, however, domestic distribution and retail costs for petroleum products which GCC countries will have to pay (roughly the same as international transport costs of US$0.10 per litre). Consequently, the cost of transporting petroleum fuels to the international trading hub is offset by domestic distribution and retail costs if the fuels were to be consumed domestically.

Consumption data for diesel used in non-transport uses, such as grid fed power generation and industrial power supply was separated out and the level of support provided for these end uses was estimated.

BOX 2: IEA MEASUREMENT OF ELECTRICITY SUBSIDIES

Electricity is not extensively traded over national borders, so there is no reliable international or regional reference price. The IEA (2013a) estimates electricity reference prices based on annual average-cost pricing for electricity in each country and weighted according to output levels based on each generating technology. The IEA approach in developing a reference price for the cost of production includes transmission and distribution, but no additional costs, such as funding to build new generation capacity. Input costs, such as those for oil and natural gas, are based on reference prices for fossil fuels and annual average fuel efficiencies for different power generation technologies. The IEA applied an allowance of $15/MWh and $40/MWh to cover expenditure associated with transmission and distribution costs for industrial and residential uses, respectively. And, to avoid an overestimation of the electricity reference prices, production costs were capped at the levelized cost for a combined-cycle gas turbine (CCGT) plant (IEA, 2013a).

5.3 Subsidies in GCC Countries

TABLE 7. FOSSIL-FUEL SUBSIDIES IN THE GCC (2011, US$ MILLION)

	SOURCE	SPECIFIC FUEL	BAHRAIN	KUWAIT	OMAN	QATAR	KSA	UAE	TOTAL GCC
Oil	IEA	Gasoline, diesel, kerosene, LPG	n.a.	4,340	n.a.	2,030	46,120	3,930	56,420
	IMF	Gasoline, diesel, kerosene	1,389	4,968	2,189	2,123	44,545	1,656	56,870
	GSI	Gasoline, diesel	802	4,028	1,778	1,896	40,237	2,430	51,171
	GSI	*Gasoline (transport)*	441	1,769	1,105	721	14,169	1,478	19,683
	GSI	*Diesel (transport)*	361	904	87	1,175	13,413	851	16,791
	GSI	*Diesel (electricity)*	n.a.	1,355	586	n.a.	12,655	101	14,697
Natural Gas	IEA	Total	n.a.	2,080	5,540	1,860	0	11,520	21,000
	IMF	Total	n.a.	2,080	5,348	1,860	n.a.	11,520	20,808
Electricity	IEA	Total	n.a.	4,680	n.a.	2,090	14,820	6,370	27,960
	IMF	Total	665	4,680	550	2,090	14,820	6,370	29,175
Total subsidies	IEA	Total	n.a.	11,100	5,540*	5,980	60,940	21,820	105,380
	IMF	Total	2,054*	11,728	8,087	6,073	59,365*	19,546	106,853

Notes: (1) GSI 2011 subsidy estimates are based on 2010 consumption levels and therefore likely a lower bound estimate of the actual subsidy. (2) Equal IEA and IMF estimates were originally provided by the IEA and used by the IMF. (3) Electricity subsidy estimates are based on electricity consumption. Subsidized fuel used as input for electricity generation is considered under the categories 'oil' (diesel) and 'natural gas'. (*) Estimates are incomplete because of a lack of availability (n.a.) of certain subsidy estimates.

Source: IEA, 2013b; IMF 2013, Author calculations.

Bahrain

Electricity

Bahrain oil reserves are becoming scarcer, and increasing electricity prices provides one option for helping to regulate demand and reduce the amount of oil consumed as a feedstock. However, the government of Bahrain has postponed tariff increases on multiple occasions, lastly as a result of social tensions resulting from the Arab Spring. According to IMF estimates, subsidies to electricity consumption have reached US$665 million in 2011 (IMF, 2013). The IEA currently doesn't provide an estimate for electricity subsidies in Bahrain (IEA, 2013b).

Transport Fuels

Since transport fuel prices in Bahrain are among the lowest in the Gulf region, the country is prone to smuggling. As a remedy, Bahrain proposed in 2010 that all GCC countries adopt a common pricing structure (GIZ, 2014). In the last decade, transport fuel prices in Bahrain have decreased (GIZ, 2014). The IMF (2013) estimated subsidies to petroleum products (which besides gasoline and diesel also include kerosene) at US$1.4 billion in 2011 (IMF, 2013). This represented about 5 per cent of GDP and 17.5 per cent of public expenditure.

Over a time frame of 10 years, gasoline and diesel subsidies have increased rapidly. In Bahrain, using wholesale reference prices, GSI estimated support to transport fuels reached US$845 million in 2012 (based on 2010 consumption figures which were the most recently available) when a wholesale spot price is used as a global benchmark price. Given consumption has likely grown, it is likely that the level of subsidy in 2012 is an underestimate.

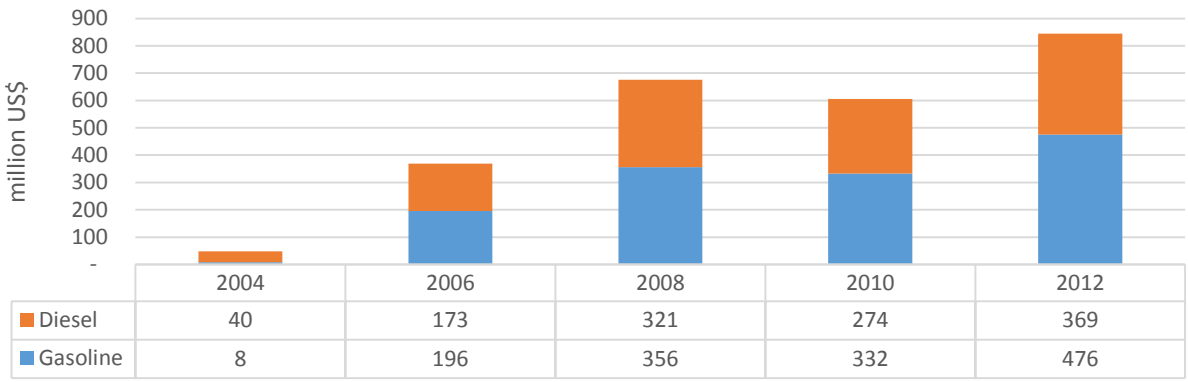


FIGURE 2. TRANSPORT FUEL SUBSIDIES IN BAHRAIN

Source: Author calculations.

Notes: (1) 2012 Subsidy estimates are based on 2010 consumption levels (taken from IEA) and therefore likely a lower bound estimate of the actual subsidy. (2) Wholesale price for gasoline is the average annual New York Harbor Conventional Gasoline Regular Sport Price FOB; wholesale price for diesel is the average annual Los Angeles CA Ultra Low Sulphur CARB Diesel Spot Price.

When prices including taxation are used as global reference price, the level of subsidy is estimated as high as US$2.1 billion for gasoline and diesel combined (for its meaning and method of calculation, please see the methodology section in 3.2).

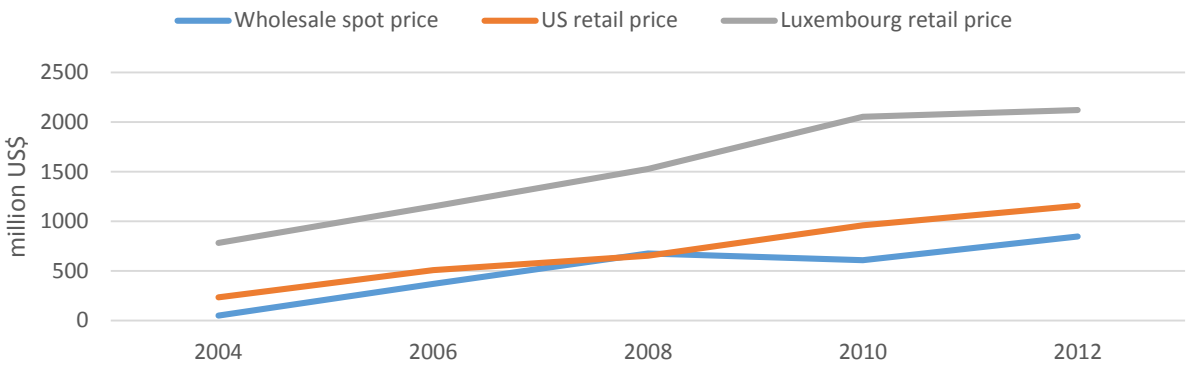


FIGURE 3. TOTAL TRANSPORT FUEL SUBSIDIES IN BAHRAIN ACCORDING TO DIFFERENT BENCHMARK PRICES

Source: Author calculations.

Kuwait

Electricity

lectricity tariffs have remained constant since 1966, when they were reduced to 2 fils (roughly 0.7 US cents per kWh (Krane, 2013). This represents only a fraction of the cost of electricity, which has almost doubled since 2004 to around US$0.14 US in 2011 (Law, 2012). The IEA estimates electricity consumption subsidies in Kuwait in 2011 at US$4.7 billion. IEA time series show subsidies are increasing, up from US$3.3 billion in 2009 and US$3.9 billion in 2010 (IEA, 2013b).

BOX 3: THE USE OF DIESEL FOR ELECTRICITY AND RELATED SUBSIDIES IN KUWAIT

There are many sources of power generation in the Gulf region with natural gas in particular playing a prominent role. Also crude oil and diesel are used in power plants, with the latter also being consumed in individual electricity generators. In Kuwait, the use of diesel for electricity generation in power plants has grown from 85 million litres in 2000 to 1.24 billion litres in 2011. Diesel used in industry has also grown drastically, from 186 million litres in 2000 to approximately 1 billion litres in 2011 (IEA, 2013).

Fuel subsidies to diesel for power generation have also grown in the last decade. By 2012 diesel used in power plants and industry was subsidized to US$1.4 billion using international wholesale reference prices. In 2004, the subsidy to diesel consumption in power plants and industry was near to zero (Author calculations).

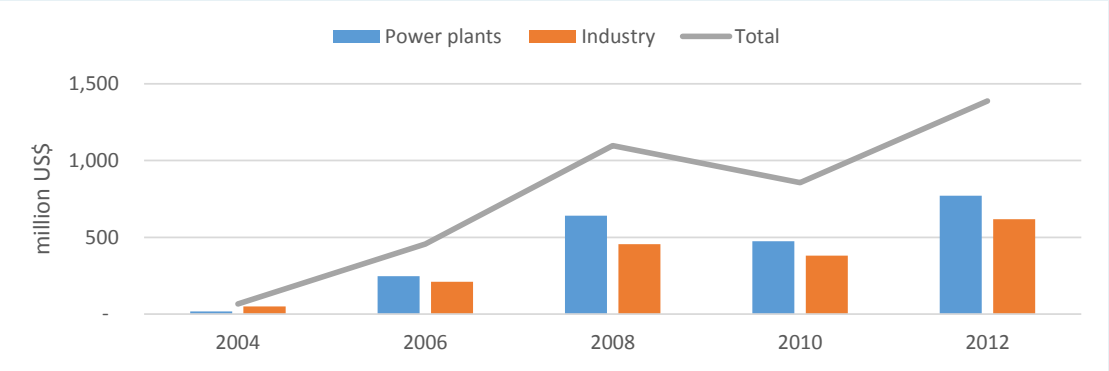


FIGURE 4. SUBSIDIES TO DIESEL FOR ELECTRICITY IN KUWAIT

Source: Author calculations.

Notes: (1) 2012 Subsidy estimates are based on 2010 consumption levels (taken from IEA) and therefore likely a lower bound estimate of the actual subsidy. (2) Wholesale price for gasoline is the average annual New York Harbor Conventional Gasoline Regular Sport Price FOB; wholesale price for diesel is the average annual Los Angeles CA Ultra Low Sulphur CARB Diesel Spot Price.

Transport

The IEA and IMF estimate the subsidy to petroleum products in 2011 respectively at US$4.3 billion and US$5 billion (IEA, 2013b; IMF 2013). The IEA time series indicates that the nominal level of subsidy has grown at a fast pace in recent years; from US$1.9 billion in 2009 to US$2.8 billion in 2010 (IEA, 2013b). In 2011, oil subsidies represented 2.7 per cent of GDP and 7 per cent of public expenditure. GSI estimated subsidies to gasoline and diesel increased from almost zero in 2002 to US$1.9 billion and US$1 billion respectively in 2012 based on wholesale benchmark prices (Author calculations).

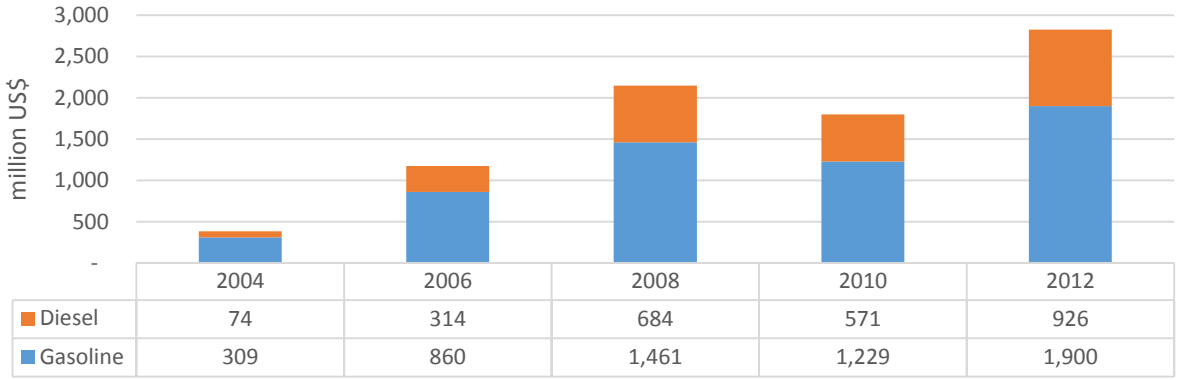


FIGURE 5. TRANSPORT FUEL SUBSIDIES IN KUWAIT

Source: Author calculations.

Notes: (1) 2012 Subsidy estimates are based on 2010 consumption levels (taken from IEA) and therefore likely a lower bound estimate of the actual subsidy. (2) Wholesale price for gasoline is the average annual New York Harbor Conventional Gasoline Regular Sport Price FOB; wholesale price for diesel is the average annual Los Angeles CA Ultra Low Sulphur CARB Diesel Spot Price.

When prices including taxation are used as the global reference price, the level of subsidy is estimated as high as US$7 billion for gasoline and diesel combined (Author calculations).

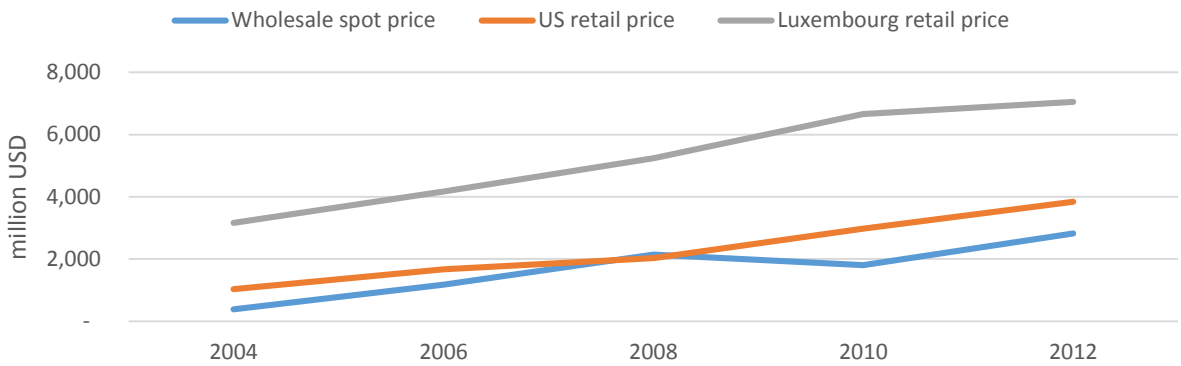


FIGURE 6. TOTAL TRANSPORT FUEL SUBSIDIES IN KUWAIT ACCORDING TO DIFFERENT BENCHMARK PRICES

Source: Author calculations.

Oman

Electricity

In Oman, the cost of generation and supply in 2007 was estimated at 25 *baizas* per kWh[9] or US$0.065/kWh. Residential electricity tariffs, on the other hand, were less at around 15 *baizas* per kWh or US$0.04 kWh (IEA, 2008). When multiplying 2009 residential consumption data by difference between production costs and tariffs levels (10

[9] 25 *baizas* equals (0.03 OMR), approximately US$0.06. Based on currency exchange rates at May, 2013 retrieved from http://www.xe.com/currencyconverter/convert/?Amount=.025&From=OMR&To=USD.

baizas per kWh) the level of subsidy provided to residential electricity consumers is estimated at around 79 million Omani *Rial* (1 *Rial* = 1000 *baizas*) or roughly US$206 million per year (Author calculations). The IMF estimated electricity consumption subsidies for all sectors at US$550 million in 2011 (IMF, 2013).

Transport

There is a large amount of fuel smuggling from Oman into neighbouring UAE which has some of the highest transport fuel prices in the region. In 2011, the IMF estimated that subsidies in Oman to the consumption of petroleum products reached US$2.2 billion (IMF, 2013). This represented 3 per cent of GDP and 5.5 per cent of public expenditure. Oman mainly uses gasoline as a transport fuel with subsidies increasing from US$297 million in 2006 to US$1.2 billion in 2012, a 400 per cent increase (Author calculations).

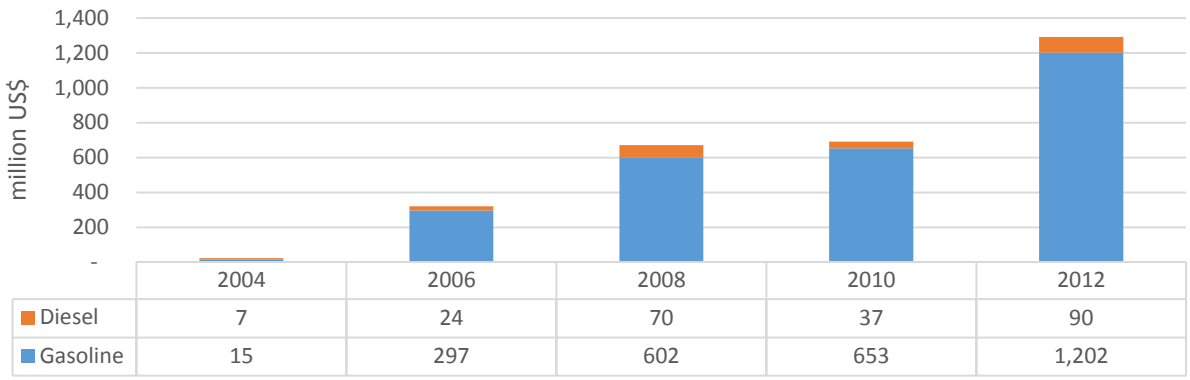


FIGURE 7. TRANSPORT FUEL SUBSIDIES IN OMAN

Notes: (1) 2012 Subsidy estimates are based on 2010 consumption levels (taken from IEA) and therefore likely a lower bound estimate of the actual subsidy. (2) Wholesale price for gasoline is the average annual New York Harbor Conventional Gasoline Regular Sport Price FOB; wholesale price for diesel is the average annual Los Angeles CA Ultra Low Sulphur CARB Diesel Spot Price.

Source: Author calculations.

When prices which include taxation are used as global reference price the level of subsidy is estimated as high as US$3.7 billion for gasoline and diesel combined (Author calculations).

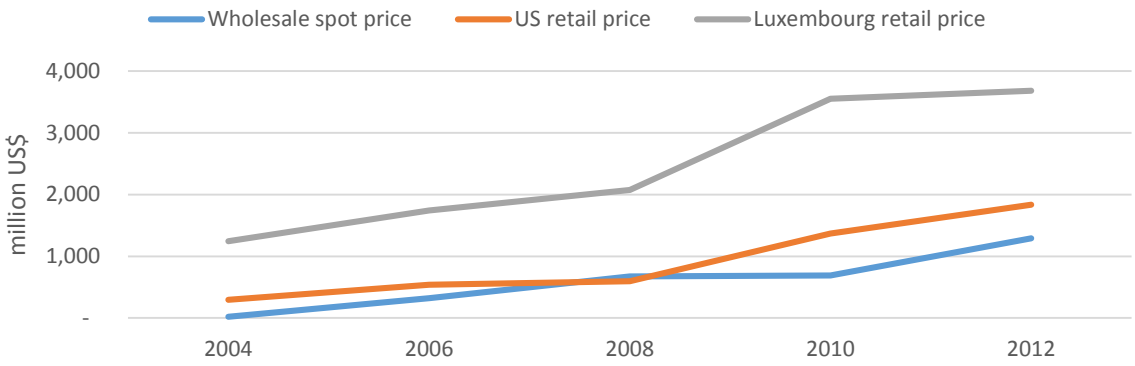


FIGURE 8. TOTAL TRANSPORT FUEL SUBSIDIES IN OMAN ACCORDING TO DIFFERENT BENCHMARK PRICES

Source: Author calculations.

Qatar

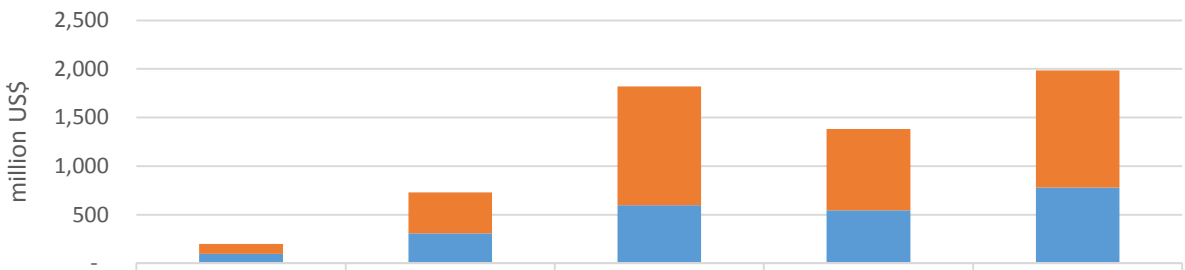
Electricity

The IEA estimated subsidies to electricity consumption at around US$2 billion in 2011 (IEA, 2013b). Based on time series data, subsidy levels have doubled over three years from US$1 billion in 2009.

Transport

Qatar increased prices in 2011 to US$0.27 per litre for gasoline and diesel. This increase was accounted for in GSI price-gap calculations for 2012. The IMF estimated subsidies to petroleum products in Qatar at around US$2.1 billion in 2011 (IMF, 2013). IEA time series data show a significant increase in subsidy levels between 2009 (US$0.7 billion) and 2010 (US$1.2 billion) (IEA, 2013b). In 2011, oil subsidies represented about 1.2 per cent of GDP and around 4.5 per cent of public expenditure.

Unlike Oman, Qatar does substantially use diesel as a transport fuel. Using international wholesale reference prices as a standard of comparison, diesel subsidies increased from US$421 million in 2006 to at least US$1.2 billion in 2012. Gasoline was subsidized at a level of around US$800 million in 2012 (Author calculations).



	2004	2006	2008	2010	2012
Diesel	101	421	1,221	839	1,207
Gasoline	97	308	598	544	779

FIGURE 9. TRANSPORT FUEL SUBSIDIES IN QATAR

Notes: (1) 2012 Subsidy estimates are based on 2010 consumption levels (taken from IEA) and therefore likely a lower bound estimate of the actual subsidy. (2) Wholesale price for gasoline is the average annual New York Harbor Conventional Gasoline Regular Sport Price FOB; wholesale price for diesel is the average annual Los Angeles CA Ultra Low Sulphur CARB Diesel Spot Price.

Source: Author calculations.

When prices including taxation are used as global reference price, the level of subsidy is estimated as high as US$5.1 billion for gasoline and diesel combined (Author calculations).

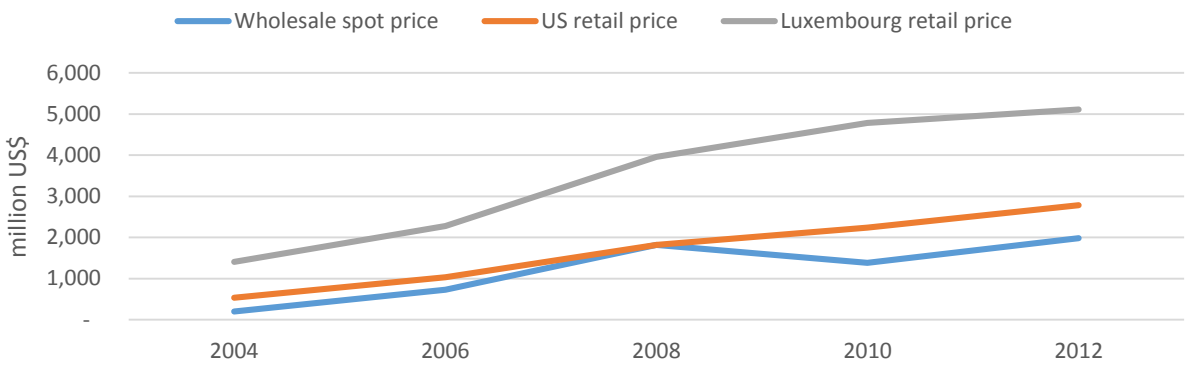


FIGURE 10. TOTAL TRANSPORT FUEL SUBSIDIES IN QATAR ACCORDING TO DIFFERENT BENCHMARK PRICES

Source: Author calculations.

The IEA estimated electricity consumption subsidies at US$15 billion in 2011, up from US$13 billion in 2010 and US$10 billion in 2009 (IEA, 2013b).

BOX 4: THE USE OF DIESEL FOR ELECTRICITY AND RELATED SUBSIDIES IN SAUDI ARABIA

In Saudi Arabia, the use of diesel for electricity generation in power plants has grown from 9 billion litres in 2000 to 13 billion litres in 2011. Diesel used in industry has also grown from 2.3 billion litres in 2000 to approximately 3.9 billion litres in 2011 (IEA, 2013).

While this increase appears less drastic than the one in Kuwait, fuel subsidies to diesel for power generation have also grown in the last decade, in particular as a result of increasing and volatile crude oil prices. By 2012, diesel used in power plants and industry was subsidized to an extent of US$13 billion using international wholesale reference prices. In 2004, the subsidy to diesel consumption in power plants and industry was a little over US$3 billion. This indicates that even when consumption grows at a lower rate, associated subsidies can increase at a much higher rate.

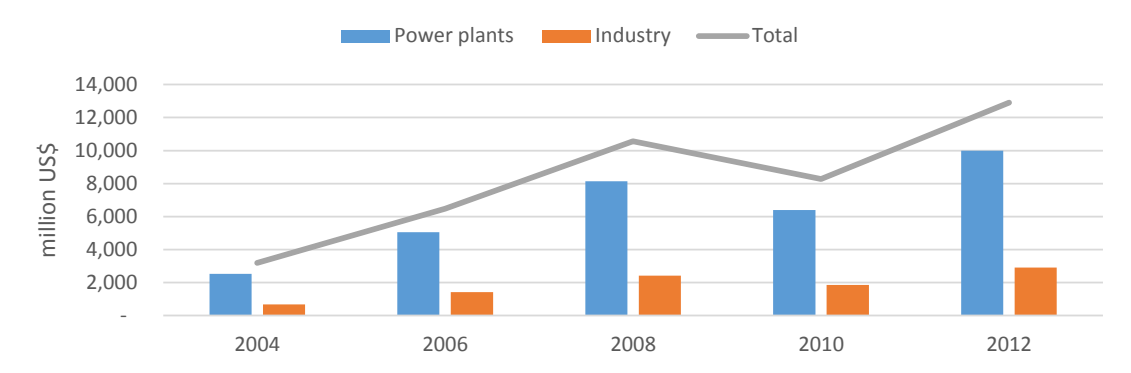


FIGURE 11. DIESEL FUEL SUBSIDIES FOR ELECTRICITY IN SAUDI ARABIA

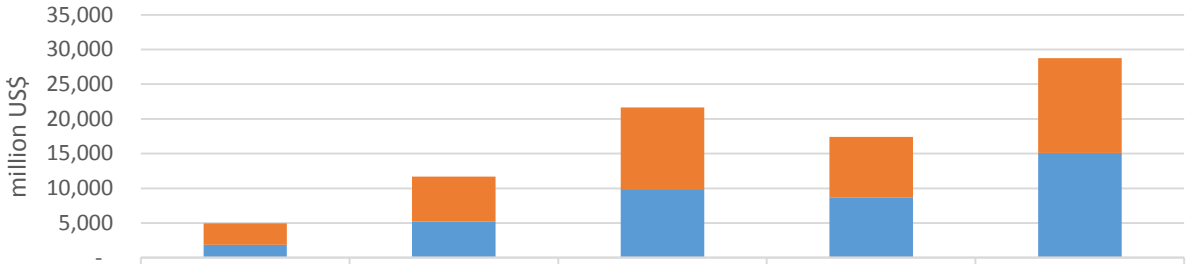
Notes: (1) 2012 Subsidy estimates are based on 2010 consumption levels (taken from IEA) and therefore likely a lower bound estimate of the actual subsidy. (2) Wholesale price for gasoline is the average annual New York Harbor Conventional Gasoline Regular Sport Price FOB; wholesale price for diesel is the average annual Los Angeles CA Ultra Low Sulphur CARB Diesel Spot Price.

Source: Author calculations.

Transport

The IMF estimated subsidies to petroleum products at around US$45 billion in 2011 (IMF, 2013). This number is roughly equal to the IEA price-gap estimate of US$46 billion which is double the level of subsidy in 2009 which was US$22 billion (IEA, 2013b). The 2011 subsidy represented almost 8 per cent of GDP and 20 per cent of public expenditure.

Time series data dating back to 2002 shows subsidies to fossil transport fuels have increased significantly. Based on wholesale reference prices, support to gasoline increased from effectively zero to US$15 billion and to US$12 billion for support to diesel (Author's calculations).



	2004	2006	2008	2010	2012
Diesel	3,072	6,457	11,770	8,767	13,681
Gasoline	1,860	5,251	9,893	8,651	15,087

FIGURE 12. TRANSPORT FUEL SUBSIDIES IN SAUDI ARABIA

Notes: (1) 2012 Subsidy estimates are based on 2010 consumption levels (taken from IEA) and therefore likely a lower bound estimate of the actual subsidy. (2) Wholesale price for gasoline is the average annual New York Harbor Conventional Gasoline Regular Sport Price FOB; wholesale price for diesel is the average annual Los Angeles CA Ultra Low Sulphur CARB Diesel Spot Price.

Source: Author calculations.

When using Luxembourg prices as the benchmark, total subsidies to fuels used in transport reach US$65 billion in 2012, which is likely an underestimate as it is based on 2010 consumption volumes (Author calculations).

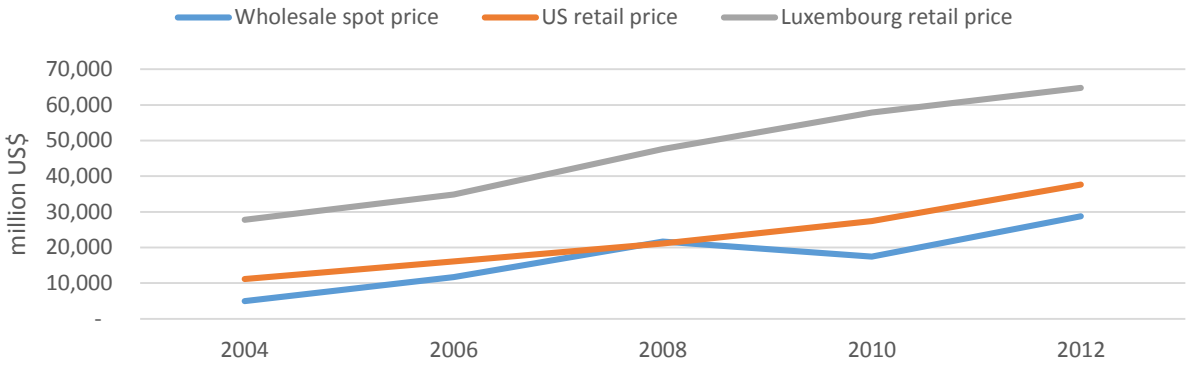


FIGURE 13. TOTAL TRANSPORT FUEL SUBSIDIES IN SAUDI ARABIA ACCORDING TO DIFFERENT BENCHMARK PRICES

Source: Author calculations.

UAE

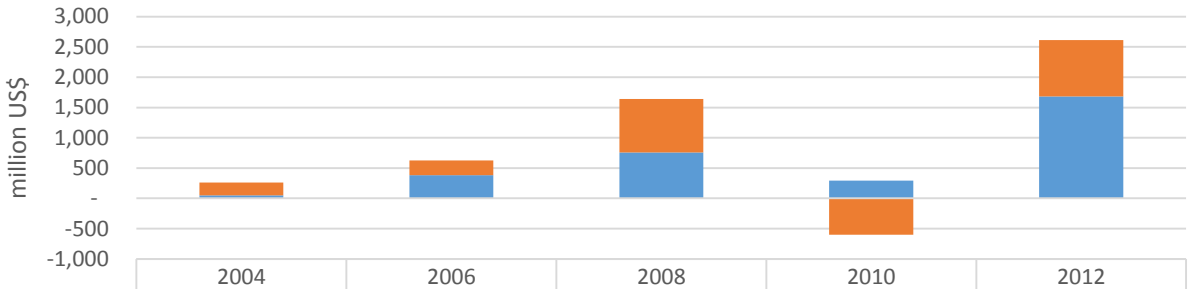
Electricity

The IEA estimated subsidies to electricity consumption at US$$6.3 billion in 2011, almost US$2 billion more than in 2009 (IEA, 2013b). Diesel is generally not used in electricity generation from power plants and support was estimated at US$100 million (Author calculations).

Transport fuel prices

According to OAPEC data, the UAE has the highest gasoline prices in the Gulf, with gasoline prices at the end of 2011 standing at Dh1.52/litre ($0.41)[10] for regular gasoline and Dh1.78 ($0.48) for premium. Analysts explain that UAE gasoline prices are higher than those in the other GCC members because some suppliers in the country import gasoline from other countries that follow market prices. Therefore, suppliers pass some of the higher costs onto consumers. The UAE had relatively low gasoline prices before a series of price hikes carried out over the past three years.

Gasoline is the most used and subsidized transport fuel. For the UAE, IMF and IEA data on petroleum products vary. The IMF estimated support at US$1.7 billion in 2011 (IMF, 2013), while the IEA estimated support at US$3.9 billion, up from US$1 billion in 2009 (IEA, 2013b). The IEA-reported subsidy was around 1 per cent of GDP and 5 per cent of public expenditure. In 2012, taking wholesale prices as a benchmark, motor gasoline subsidies almost reached US$1.7 billion, while diesel subsidies (for transport) were a little over US$900 million. Even though the UAE has higher fuel retail prices than other countries in the GCC region, the level of subsidies has increased recently as a result of higher international prices.



	2004	2006	2008	2010	2012
Diesel	209	246	882	-599	927
Gasoline	51	381	757	294	1,684

FIGURE 14. TRANSPORT FUEL SUBSIDIES IN UAE

Notes: (1) 2012 Subsidy estimates are based on 2010 consumption levels (taken from IEA) and therefore likely a lower bound estimate of the actual subsidy. (2) Wholesale price for gasoline is the average annual New York Harbor Conventional Gasoline Regular Sport Price FOB; wholesale price for diesel is the average annual Los Angeles CA Ultra Low Sulphur CARB Diesel Spot Price.

Source: Author calculations.

[10] 1 Emirati *Dirham* = US$0.27. http://www.xe.com/currencyconverter/convert/?Amount=1&From=AED&To=USD

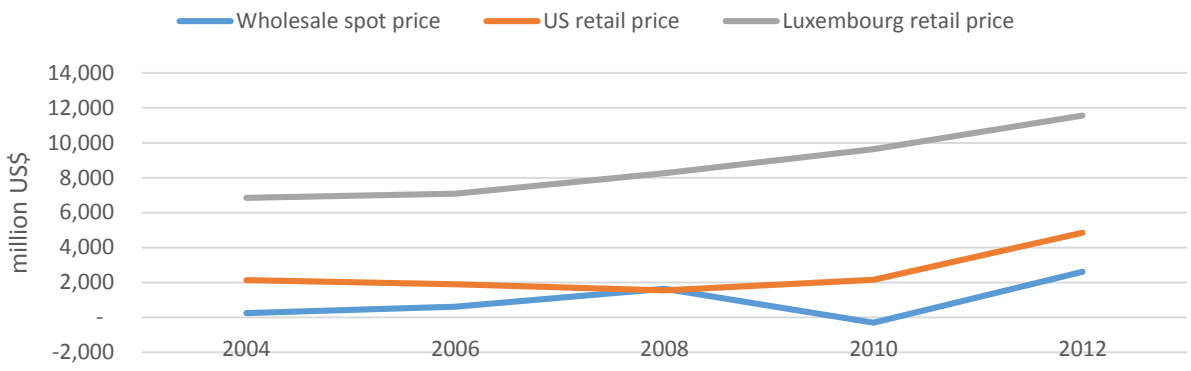


FIGURE 15. TOTAL TRANSPORT FUEL SUBSIDIES IN UAE ACCORDING TO DIFFERENT BENCHMARK PRICES

Source: Author calculations.

6.0 Focusing on Impacts: Financing national electricity utilities and renewable energy deployment

As mentioned earlier, fossil-fuel subsidies have had many adverse impacts in the GCC region, both including and as a result of increasing consumption that relies on low prices. El-Katiri (2013) has set out a number of these impacts, such as a rise in energy intensity of GDP (and thus a lower incentive for energy intensity), underinvestment in the energy sector, rapidly rising fiscal burden and the growth of hidden inflation, and an increase in carbon emissions.

This particular section focuses on the financial health of the electricity utility in Saudi Arabia. It was selected as a country example not because it had a sustainable or unsustainable financial model, but rather the size of its electricity market provided an interesting case, and the availability of financial information allowed the analysis to be undertaken. IISD-GSI understands the financial health of an electricity utility as (1) the ability of the utility to cover operational costs, (2) maintain current infrastructure, (3) invest in new generation capacity, and (4) meet social and environmental norms.

This financial health is often affected by the energy-pricing structure under which it operates. While a large part of the paper is devoted to quantifying and discussing fossil-fuel subsidies, this section fleshes out in detail how feedstock pricing and consumer electricity tariffs influence the operations of electricity utilities. Low market prices for fossil fuels (oil and natural gas) used as inputs to electricity production, or low consumer tariffs, can also work against renewable energy deployment. This section also describes how fossil-fuel subsidies in the GCC region may be holding back the deployment of renewable energy by reducing fossil-based electricity generation costs making renewable energy appear more costly.

6.1 The Context in Saudi Arabia

In addition to the Saudi Electricity Company (SEC), the Saline Water Conversion Corporation (SWCC) and a number of independent generators provide power to the grid. Electricity sector reform is ongoing, aimed at breaking SEC into separate companies for generation, transmission and distribution. SEC's generation business will be broken up and additional generators, including Saudi Aramco, are planning to enter the market. Regulation of the sector is overseen by the Electricity and Cogeneration Regulatory Authority (ECRA) (EIA, 2013b). Over recent years electricity consumption increase by an average of 6 per cent (Bachellerie, 2012) reaching 220 TWh in 2011. The residential sector is reported to make up approximately half of overall consumption (Bachellerie, 2012). To meet rising demand, Saudi Arabia plans to increase capacity from 55 gigawatts (GW) in 2009 to 120 GW by 2020 (Bachellerie, 2012).

Average retail tariffs in Saudi Arabia were estimated at US$0.035 in 2010 and US$0.038 in 2011, a low level by international standards. However, despite the limited tariffs financial information available from the annual reports of the single purchaser of electricity, SEC shows that the revenue generated from electricity sales and other in operating revenues was sufficient to cover operating costs and generate a margin of approximately 7 per cent in 2010. A breakdown of costs and revenue is shown in Figure 16 below.

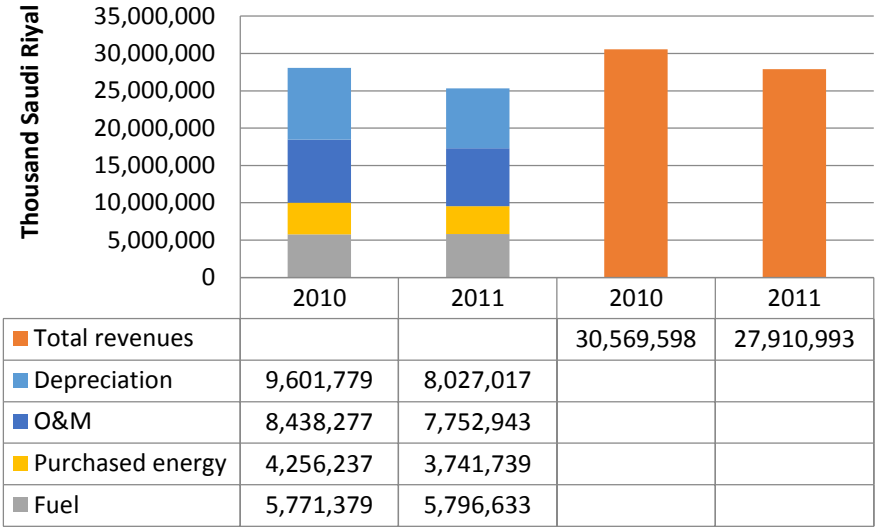


FIGURE 16. BREAKDOWN OF COSTS AND REVENUE FOR SAUDI ELECTRICITY COMPANY 2010-2011

Source: Authors' figure based on SEC annual reports (2010 and 2011).

Fuel costs are relatively low by international standards. The cost of fuel to SEC was calculated based on the SEC annual reports (SEC, 2010; SEC, 2011). The cost of fuel to the Independent Power Producers that make up an increasing proportion of Saudi Arabia's generating capacity was taken from a Royal Decree issued in the spring of 2006 which set the price for crude oil feedstocks for coastal power plants at US$0.46 per million BTU (Bachellerie, 2012). A further decree is reported to establish the fuel price that SEC buys fuel at from Saudi Aramco. This is shown in Table 8 below:

TABLE 8. SAUDI ARAMCO FUEL PRICING

TYPE OF FUEL	PRICE US$/MMBTU
Natural Gas	0.75
Diesel	0.63
Light Crude Oil	0.74
Heavy Fuel Oil	0.32

Source: National Commercial Bank (NCB), 2011.

The cost of fossil fuels to generators observed in Saudi Arabia and the correspondingly low consumer tariffs show the extent to which this effective subsidy influences the electricity sector (see Box 5). The high opportunity cost of maintaining lower cost inputs to the sector should be recognized. Questions remain as to whether this opportunity cost is justified.

BOX 5: INPUT PRICE AND ELECTRICITY TARIFFS

Providing fuel to generators at below international prices represents an opportunity cost as the fuel could otherwise be exported at international prices less transport and marketing costs. As fuel costs are generally one of the largest component sources of expenditure for electricity utilities, when fuel costs are lowered or raised there is a significant impact on overall operating costs. The operating cost of a utility is clearly a key factor in determining the costs charged to consumers in the form of electricity tariffs. In a well-functioning electricity sector utilities tend to be permitted to operate in a way that allows them to recover costs and achieve a margin.

Assuming margins remain constant, the relationship between the effective fuel prices paid by generators and electricity prices paid by consumers is linear. Figure 17 shows the relationship between fuel price and the cost recovery tariff. Where the effective fuel price is lower than the international price it allows the utility to operate with low prices for consumers while maintaining a margin. However, the cost of pricing fuel to generators at below international levels creates a subsidy to the electricity sector.

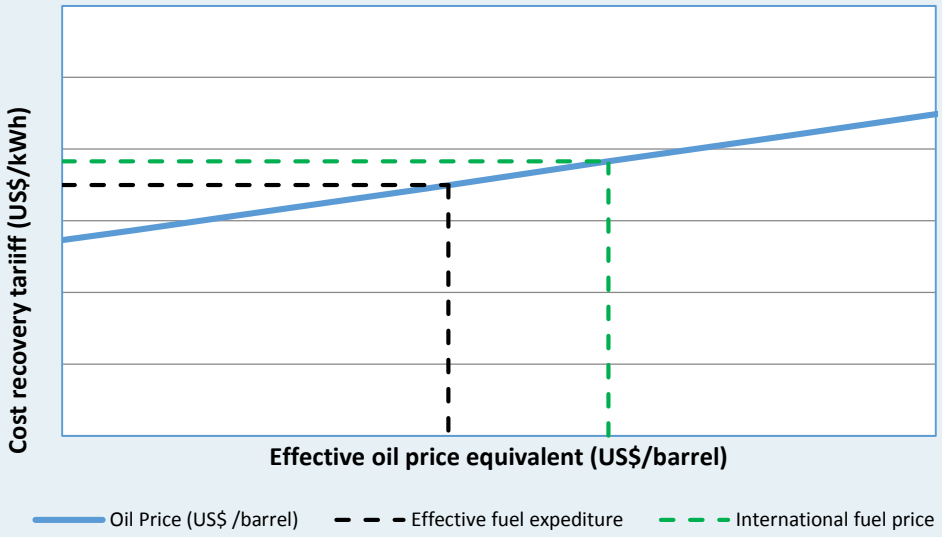


FIGURE 17. EFFECTIVE OIL PRICES AND CORRESPONDING COST RECOVERY TARIFFS

Source: Authors' figure.

6.2 Financial Sustainability in the Electricity Sector

The role of the electricity sector is to provide reliable electricity at a reasonable cost, to act in a financially sustainable manner and to ensure that the electricity system responds to future challenges. In the case of Saudi Arabia, the annual reports show an operating profit in 2010 and 2010 indicating that that cost recovery is achievable. However, the SEC annual reports show that SEC has built up a large account payable to Saudi Aramco from 2000 to 2009, a proportion of this (SR 41 billion) has now been transferred to long-term government payables (SEC, 2011).

Saudi Arabia has different tariffs for the residential, commercial, governmental and agricultural sectors. The structure enables cross subsidisation. Governmental and commercial tariffs are generally higher than the average prices and the residential and agricultural tariffs are generally lower (NCB, 2011). SEC continues to participate in Independent Power Producer projects. SEC approved a plan in 2007 which included a commitment to Rabigh, a 1,200 megawatt (MW) project in the western region, Dharma, a 1,729 MW project in the Riyadh area and Qurayyah, a 3,927 MW

project in the eastern region (SEC, 2011). Overall, it appears that the operational side of the business is potentially sustainable, but the revenues generated are not sufficient to support the level of investment planned to meet future demand. To address this gap, the government has assumed liabilities, thereby conferring a subsidy to the sector.

6.3 Fossil-Fuel Subsidies as the Main Brake on Renewable Energy Development

One of the key reasons blocking renewable energy deployment has been the abundance of relatively cheap hydrocarbons for electricity generators in the form of oil and natural gas (helping to keep the production costs of conventional thermal electricity low) (Elsobki, Wooders, & Sherif, 2009).[11] This has been named by several commentators as the most significant barrier to renewable energy development in the GCC region (Bachellerie, 2012). The subsidizing of fossil fuels has two main impacts. From one side, GCC governments may be unwilling to pay for the deployment of renewable electricity generation assets which appear expensive compared to (subsidized) thermal power generation. From another side, investors are potentially reluctant to enter energy markets that are highly distorted. Increasing the price at which fossil-fuel feedstocks are sold to electricity generators and improving cost recovery models through raising electricity tariffs will help improve the attractiveness of the GCC energy market to investors.

A number of GCC countries have announced significant investment targets for their renewable energy sector. The most notable being the Kingdom of Saudi Arabia, which has announced a fund of over US$109 billion to deliver 41 GW by 2032 through a combination of solar PV and solar thermal technologies (Murray, 2012). Also, Qatar has announced US$20 billion will be spent on a 1,800 megawatt (MW) solar energy plant in 2014 (Reuters, 2012). Given significant plans to invest in renewable energy the United Arab Emirates (UEA) and the Kingdom of Saudi Arabia have been included in the Ernst and Young "Renewable Energy Attractiveness Indices" and ranked 35th and 37th respectively (Ernst and Young, 2012).

The Desertec Industrial Initiative (Dii) noted the switching of fossil-fuel subsidies to support renewable energy in the Middle East and North Africa (MENA) region would promote cost reductions for key renewable technologies, such as concentrated solar PV (CSP), which would in turn begin to displace conventional fossil fuels (Desertec Industrial Initiative [Dii], 2012). However, the absolute scale of fossil-fuel subsidies can prevent governments from finding sufficient resources to encourage the deployment of renewable energy technologies helping them make their cost curves cheaper.

[11] Some forms of renewable energy, such as solar PV, have brought with their own technical challenges, which may have slowed their deployment, such as the fine dust which can settle on the surfaces of solar PV panels surfaces negatively affecting their electrical output.

7.0 Conclusion and Future Work

Based on the available literature there is a general acceptance that fossil-fuel energy subsidies distort price signals and create inefficiencies with serious implications for the allocation of available resources. While low-priced energy inputs have undoubtedly led to significant economic development in the GCC region, the increasing fiscal burden of subsidies is now become a major burden to the region's governments. Subsidized energy also protects consumers from the need to adapt their consumption patterns to the rising cost of energy, and from investing in more energy-efficient technology, leading to overconsumption by industries and households. Energy subsidies also tend to be socially regressive, with high-income households and industries benefiting the most from low energy prices (Del Granado et al, 2010).

This paper provides the background for fossil-fuel subsidies in the GCC region. It also explored the role that fuel subsidization has played in the context of renewable energy. Our analysis suggests that rationalizing fossil-fuel prices may help reduce the cost differential between conventional and renewable electricity. Residential electricity consumption is the main component of overall electricity demand, and no effort at curbing demand growth can be successful without addressing this. This paper recognizes encouraging residential consumers to change consumption patterns is more difficult than pursuing a more rational energy use in industry, and it is especially difficult if the price lever cannot be used. A first step may be to increase the price at which oil and natural gas feedstock are provided to state power utilities. Increasing feedstock prices will push up the generation costs of utilities. However, it can also result in a better understanding of the full cost of power generation and greater transparency relating to the use of subsidies.

Based on world price benchmarks, the scale of subsidies to fossil-transport fuels and electricity generation appears to be significantly increasing in the last few years (though this is also dependent on increases or decreases in world prices for fossil fuels). Low prices for electricity and transport fossil fuels send poor price signals to consumers in the region who have little incentive to conserve energy and cut down on their usage. The GCC region would benefit from the introduction of a pricing mechanism that begins to optimize prices by moving them, even gradually, towards liberalized prices which will encourage greater energy efficiency, better allocation of resources, and reduce the fiscal costs associated with artificially holding prices down.

Compared to other regions of the world the GCC region does have the financial resources and administrative tools at its disposal with which to address energy pricing issues. Financial resources can be used to fund initiatives such as cash transfer schemes, as a way of smoothing out any energy pricing reform programs. Administratively, electricity and transport fuel pricing mechanisms could be introduced quickly and efficiently given the sophistication of the GCCs administrative branches if there was adequate political commitment and preparatory work. For example, electricity tariff schemes that charge consumers more for usage during peak hours can be used in an effort to ease demand. The same applies to road transport fuels, with a significant body of knowledge and experience available with which to support the introduction of market-based price signals. Acting in advance of major energy or fiscal shock to rationalize energy prices is preferable, as governments logically wish to avoid having to take significant policy changes in times of crisis.

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GSI Global Subsidies Initiative

iisd International Institute for Sustainable Development / Institut international du développement durable

For further information contact Damon Vis-Dunbar at:
dvis-dunbar@iisd.org or +41-22-917-8848

International Institute for Sustainable Development
Global Subsidies Initiative
International Environment House 2, 9 chemin de Balexert,
1219 Châtelaine, Geneva, Switzerland
Tel: +41 22 917-8373 | Fax: +41 22 917-8054

