



# THE JOURNAL OF ENERGY

# AND DEVELOPMENT

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*"Alternative Power-Sector Financing to Meet  
Saudi Arabia's Economic Development,"*

Volume 37, Number 2

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# ALTERNATIVE POWER-SECTOR FINANCING TO MEET SAUDI ARABIA'S ECONOMIC DEVELOPMENT

*Said A. Al-Shaikh and Lama S. Kiyasseh\**

## *Introduction*

The power and utility sectors in the member nations of the Gulf Cooperation Council (GCC) will require substantial investments over the coming years to sustain the region's rapid population growth and developmental needs in terms of both social and physical infrastructure. For countries in the region, the imple-

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*The Journal of Energy and Development*, Vol. 37, Nos. 1 and 2

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mentation of cost-reflective utility prices and the development of renewable energy sources are critical as the demand for power has accelerated the consumption for fuel, decreasing otherwise high-value crude oil monetization. As investments from the private sector assume a growing role in supporting the power market, funding institutions will emerge as key players since large projects are increasingly financed through project finance schemes.

The power sector's role within the Kingdom of Saudi Arabia's socio-economic development is significant as the country diversifies its economy away from its dependency on oil. The sector aims to strengthen the economy's industrial base and expand its infrastructure in order to accommodate the demands of its growing population. The state-controlled power utility company, Saudi Electricity Company (SEC), has been active since its consolidation in 2000 by extending electrification to all parts of the Kingdom. Through off-take agreements with the Saline Water Conversion Company (SWCC) desalination plants and purchased power from large contributors like Saudi Aramco, both the power and water infrastructure largely has developed over the past decade (2000–2010).

Nonetheless, greater generation capacity will be required over the upcoming years to sustain the Kingdom's level of economic development, in turn, accentuating the extent of the challenges the sector faces. Artificially low tariffs in a highly regulated sector have led to wasteful use of electricity causing power shortages and blackouts. Accordingly, sizeable funding needs have emerged as a central issue. To overcome this challenge, the Kingdom is encouraging more private sector participation investments vis-à-vis independent power/water/steam producers (IPPs/IWPPs/IWSPPs) and financiers.

### ***Market Determinants***

Saudi Arabia's rapidly rising population, expansionary fiscal policies, and large investments in social and physical infrastructure have exerted pressure on the existing electrical network. Total population has grown at a compound average growth rate (CAGR) of 3 percent over the past decade and is expected to continue rising at a nearly similar pace over the next five years. This steady growth of consumers has resulted in a 6-percent increase in power consumption over the same period. The accelerated pace of power consumption relative to that of population is attributed to low tariff rates, which is below production cost for the same unit, as the power sector continues to be heavily subsidized by the government. While the Saudi population is estimated to reach 31.69 million in 2015, additional pressure will be placed on energy-intensive desalination plants for potable water as well as on electricity for air conditioning during the summer months.

The abundance of oil and gas reserves provides the Kingdom with both a comparative advantage in energy costs and in funding sources. This acts as a key

driver in the project market. In 2010, total contract awards in the construction sector alone amounted to Saudi Arabian riyals (SAR)107 billion, led by the power sector at SAR38 billion, followed by residential real estate. The pace of the project market has assumed an even a faster rate in 2011. Total contract awards amounted to SAR179.5 billion up to the third quarter, with the power sector accounting for a 14-percent share.

The government's 2011 budget aims to continue enhancing economic capacity through raising the level of capital expenditure. Total capital outlay is forecast to amount to 44 percent of the SAR580 billion planned budget, reaching an estimated SAR255 billion. Moreover, the Kingdom's *Ninth Development Plan* (2010–2014) also has earmarked an estimated SAR1,445 billion in financial requirements for the development of social and physical infrastructure. Collectively, these factors are going to shape the power sector in the upcoming years.

### ***Regulatory Developments***

**Institutional:** The consolidation in 2000 of the fragmented power sector to create the SEC, a Saudi joint stock company, was pivotal in strengthening the sector. In 2001, the Electricity and Co-generation Regulatory Authority (ECRA) was formed to open up the power market to private investment. Major functions of ECRA include the issuance of licenses, periodical reviews of the controversial electricity tariffs, as well as the implementation of regulations that encourage competition within the sector.

In 2002, the Supreme Economic Council passed a resolution permitting private-sector participation in IWPPs on a build-own-operate (BOO) basis. Initially, a project company was set to be 60 percent owned by the developer, with the remainder share being split between the SEC and the Saudi government's Public Investment Fund (PIF). The SWCC was responsible for the construction of the water delivery systems and the SEC was responsible for establishing power transmission. Both entities received state credit as a means of funding for these projects. The government allocated land sites with a nominal rental charge over the power and water purchase agreement terms. The Water and Electricity Company (WEC), formed pursuant to this resolution, was the single off-taker for these IWPPs selling 100 percent of both the water and electricity produced to SWCC and SEC, respectively. Two such plants that currently operate under the WEC umbrella are Shuaibah and Shuqaiq with a combined electricity output of 1,750 megawatts (MW).

SEC currently enjoys a vertically integrated natural monopoly. It benefits from a quasi-monopoly in generation and a monopoly in transmission and distribution. It also has a 31.6-percent share in the Gulf Cooperation Council for Interconnection Authority (GCCIA). This was established by GCC member countries in 2001 to enhance generation capacity and transmission. The power grid will reduce

high long-term investment costs in the construction of generation plants by reducing the level of reserves needed in each country, as well as providing wheeling services and enabling energy trading. Upon completion of the project, Saudi Arabia will be able to receive 1,200 MW of additional power capacity.

In 2010, the ECRA suggested an unbundling of the current vertically integrated structure to enhance the role of private contributors. The plan includes arrangements that eventually will feature multiple generators, multiple distributors, an independent transmission company, and electricity traded in liquid spot and bilateral markets. The Saudi Electricity Company intends to restructure its power generation business by dividing it into four separate portfolios consisting of these generation units. The composition of each generation portfolio will be determined by taking into consideration factors such as technology, availability of fuels, generation capacity, and the number of generation units. The SEC's distribution business and transmission will remain a monopoly until the government decides to introduce competition to the electricity distribution sector in the Kingdom.

**Electricity Pricing:** The electricity tariffs, initially set in 1975 and revised in late 2000, vary by customer type: residential, governmental, commercial, industrial, and agricultural. In 2010, in an attempt to boost the sector's revenues and profitability, the government approved a new tariff structure—up to a ceiling of 26 Halalas per kilowatt-hour (kWh)—for only the governmental, commercial, and industrial sectors, taking effect in July of that year. Previously, governmental tariffs were based on consumption slabs while the industrial tariff was fixed at 12 Halalas/kWh (note: there are 100 Halalas in 1 Saudi Arabian Riyal).

The electricity tariffs in the Kingdom are based on a sliding scale for all end-users: ascending from the lowest consumption slab of less than 1,000 kWh, charged at 5 Halalas/kWh, to the maximum level of above 10,000 kWh, at a price of 26 Halalas/kWh (table 1). SEC also charges for meter reading, maintenance, bill preparation, and tariffs for service connections. The new tariff structure emphasizes cross-subsidization, that is, where governmental and commercial customer categories face higher tariffs than average supply cost, while tariffs for agriculture and residential customer categories are below the average supply cost.

### *The Power Sector*

**Market Size:** In volume terms, the size of the Saudi electricity sector in the Kingdom can be estimated by accumulating the actual generation capacity of (1) SEC power plants, (2) desalination plants, and (3) large producers. SEC purchases power from the latter two sources to supplement the electrical grid, specifically during peak loads. The total actual generation capacity was 49,138 MW by the end of 2010. In value terms, the market size amounted to SAR27.9 billion for the same

Table 1  
ELECTRICITY TARIFFS BY CONSUMER GROUPS, EFFECTIVE JULY 2010<sup>a</sup>  
(in Halalas per kilowatt-hour–kWh)

Consumption Range (kilowatt-hour)	Residential	Commercial	Governmental	Agricultural
1 – 2,000	5	12	26	5
2,001 – 4,000	10	12	26	10
4,001 – 5,000	12	20	26	10
5,001 – 6,000	12	20	26	12
6,001 – 7,000	15	20	26	12
7,001 – 8,000	20	20	26	12
8,001 – 9,000	22	26	26	12
9,001 – 10,000	24	26	26	12

<sup>a</sup> The average tariff rate for industrial consumers varies based on (1) if the load is less than or greater than 1,000 kWh, (2) two consumption periods of October–April and May–September, (3) if consumption falls within peak hours (1,200 – 1,700 hours) of Saturday–Thursday, and (4) if electromechanical or digital readers are used to record power loads. The range of tariffs extends from 12 to 26 Halalas/kWh. One Saudi Arabian Riyal is subdivided into 100 Halalas.

Source: Electricity and Co-generation Regulatory Authority (ECRA), Board of Directors Decision (1/22/31) dated 01/06/1431 AH, *Electricity Tariff* (Riyadh, Saudi Arabia: ECRA, January 2011), available at <http://www.ecra.gov.sa/pdf/electricity%20tariff-new.pdf>.

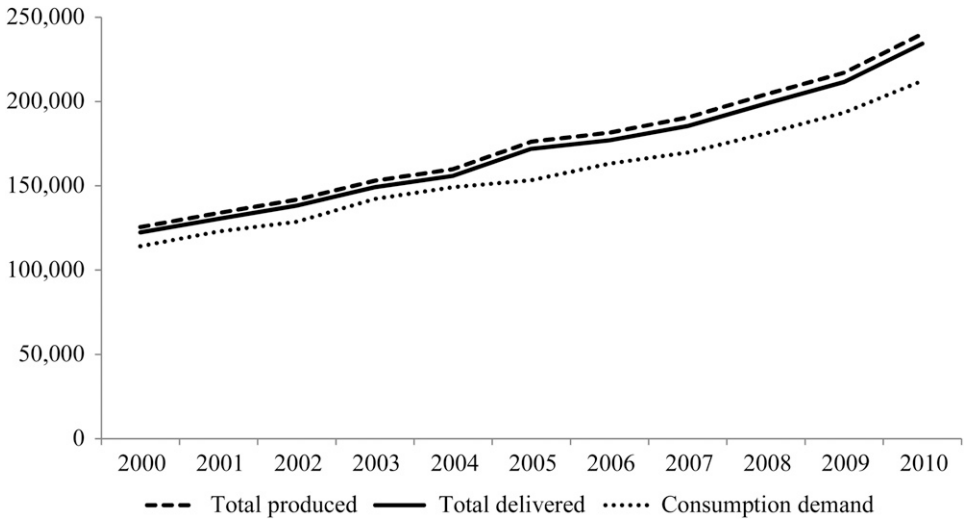
period based on SEC's total operating revenues. The Kingdom's *Ninth Development Plan* (2010–2014) aims to raise the generation capacity by 20,400 MW over the next 5-year period.

Over the past decade, SEC's contribution to the Kingdom's total generation capacity has averaged at 87 percent, with purchased power from desalination plants, large producers, and rental diesel units supplying the rest. At the end of 2010, total electricity delivered through the electrical grid was 234,371 gigawatt hours (GW) (see figure 1).

*Market Size—Saudi Electricity Company:* SEC is partly privatized with both Saudi Aramco and the government owning a 6.9-percent and 74.3-percent stake, respectively. The remaining 18.8-percent share is traded on the Saudi stock exchange. The generation capacity of the company comes from its gas, steam, combined-cycle, and diesel generators. The company also rents diesel generation units, which add to its generation capacity. By the end of 2010, SEC was operating 729 generation units within 71 power plants, generating an actual capacity of 40,697 MW. Over the past 10 years, gas-fired turbines have continued to command the largest share of SEC capacity, growing at a 10-year CAGR of 6.4 percent. In 2010, gas turbines accounted for 61.3 percent of total generated SEC's capacity, equivalent to 24,503 MW (figure 2).

*Market Size—Desalination Plants:* The SWCC is a government-owned entity that not only operates water desalination plants but also produces the second

Figure 1  
TOTAL ELECTRICITY PRODUCED AND DELIVERED, AND TOTAL  
ELECTRICITY CONSUMPTION, 2000–2010  
(in gigawatts)



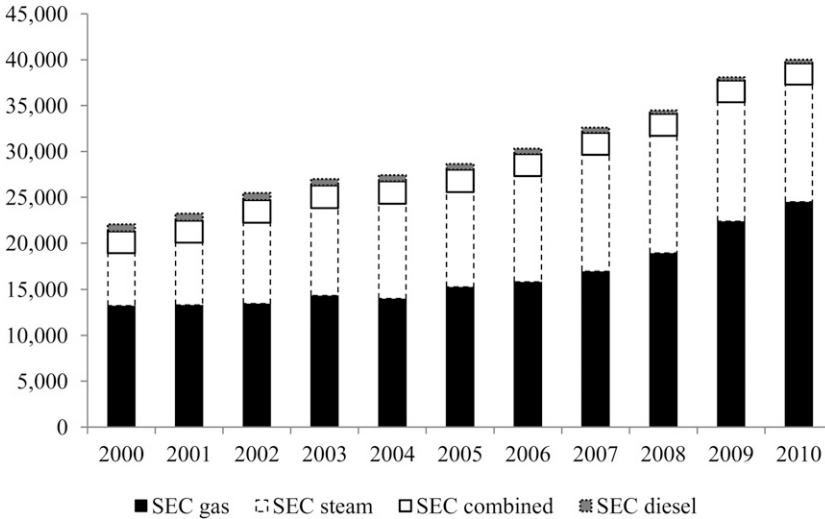
Source: Saudi Electricity Company (SEC), *Annual Reports* (Riyadh, Saudi Arabia: SEC, 2001–2010).

largest volume of electric power in the Kingdom. By the end of 2010, SWCC plants had an installed capacity equivalent to 3,426 MW, of which 2,059 MW were purchased by SEC, corresponding to 60 percent. SEC purchases most of the additional electricity it requires by accessing SWCC's generation capacity through SEC's networks in the Eastern and Western regions, with tariffs set by a Council of Ministers resolution.

The cost of purchased SWCC energy was derived through examining the relationship between the Kingdom's total actual generation capacity of 49,138 MW (measure of power) and that of sold electricity of 212,263 GWh (measure of energy) by the end of 2010. Consequently, it can be assumed that the 2,059 MW purchased energy from SWCC amounts to an estimated 8,895 GWh. At the end of 2010, SEC had accrued payables to SWCC for purchased energy in the amount of SAR552 million. Thus, it is estimated that SEC pays SWCC roughly 6.21 Halalas/kWh.

*Market Size—Large Producers:* Large producers constitute independent water/steam/power producers and other local companies that generate power. Utilized generated capacities from large producers reached 6,382 MW in 2010. The contribution of large customers to SEC's purchased power has increased its share from 19 percent in 2005 to account for 70 percent of purchased power in 2010.

Figure 2  
 SAUDI ELECTRICITY COMPANY (SEC) ACTUAL ELECTRICITY  
 POWER GENERATION BY TYPE, 2000–2010  
 (in megawatts)



Source: Saudi Electricity Company (SEC), *Annual Reports* (Riyadh, Saudi Arabia: SEC, 2001–2010).

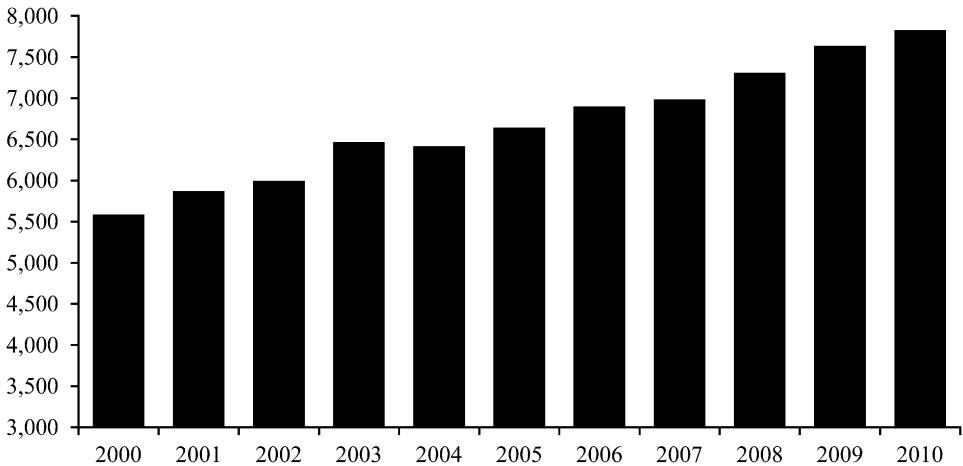
**Electricity Consumption:** By the end of 2010, total electricity sold reached 212,263 GW, a 9.7-percent year-over-year increase, reaching 5,997,553 customers. The consumption level in 2010 represented an 86-percent increase from that in 2000, having grown at a CAGR of 6.4 percent over the last decade.

*Per-Capita Electricity Consumption:* By the end of 2010, per-capita electricity consumption was 7,822 kWh. It had grown by over 40 percent since 2000, thus increasing by a CAGR of 3.4 percent over the 10-year period (figure 3). Therefore, electricity consumption, which has increased by a CAGR of 6.4 percent, not only had to accommodate for the population growth of 3.0 percent, but also for the higher per-capita consumption.

For purposes of comparison, given the size of the Kingdom’s economy and its gross domestic product (GDP) per capita by year end 2008 of U.S. \$18,471, Saudi Arabia’s per-capita electricity consumption remains lower than its peers in the GCC or similar economies. As per the 2011 *World Development Indicators*, Norway continued to dominate the per-capita electricity consumption with 24,867 kWh, followed by Canada—largely attributed to very cold weather—then the United Arab Emirates and Kuwait, which is attributed to the hot climate. In addition to climate, variation in per-capita consumption across countries is due to the impact of different income and price elasticities. In the case of Saudi Arabia, accounting for income and



Figure 3  
SAUDI PER-CAPITA ELECTRICITY CONSUMPTION, 2000–2010  
(in kilowatt-hours)



Source: Saudi Electricity Company (SEC), *Annual Reports* (Riyadh, Saudi Arabia: SEC, 2001–2010).

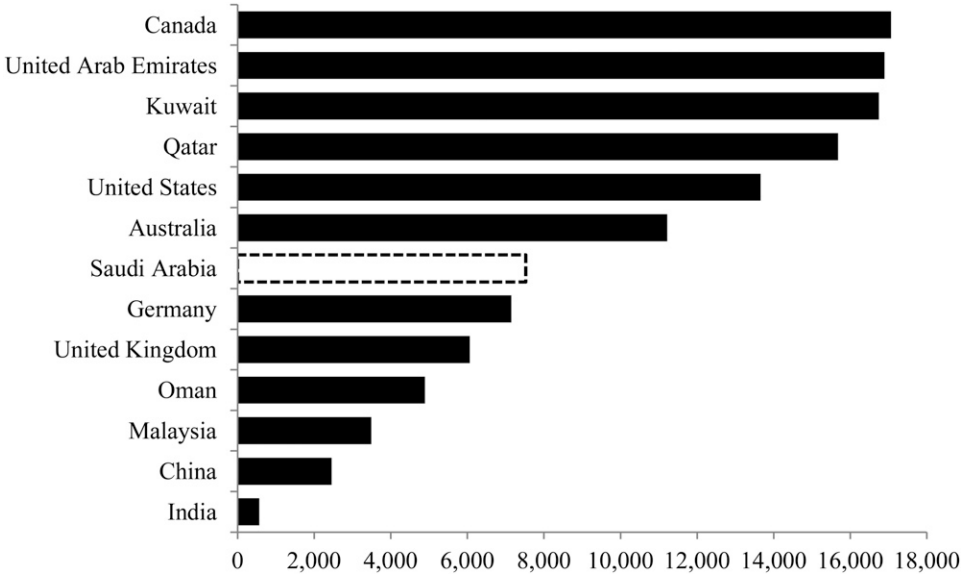
price elasticity implications, the Kingdom's different climate zones (with milder climates in both the north and south), along with lesser urbanized parts in the country, explain the rather lower per-capita consumption in comparison to other GCC members (figure 4).

*Consumption by Customer Categories:* SEC divides its customers into five main categories: residential, commercial, industrial (which includes state-owned industries), agricultural, and governmental.

*Residential Consumption:* Approximately 4.9 million residential subscribers continued to command the most electrical consumption, accounting for 51 percent of the total in 2010 or 108,627 GW (figure 5). This translates into an annual average demand of 22,204 kWh per household consumer or a monthly equivalent of 1,850 kWh. This average monthly consumption is categorized in the primary tariff bracket of 5 Halalas/kWh. Therefore, the majority of revenues generated are from the lowest tariff bracket, restricting the profit margin of an industry already facing financing challenges.

*Industrial Consumption:* Power consumption by the industrial sector grew at a CAGR of 3 percent since 2000 to reach 38,569 GW in 2010, an equivalent of 18 percent of total consumption. Some 20 years ago, the share of industrial consumption was 28.3 percent at 16,666 GW; by 2000 it had fallen to 24.2 percent. As more industrial plants began to rely on their independent power generation, the share of the industrial category consumption on the grid has declined. One such example is that of Rabigh Arabian Water & Electricity Company (RAWEC), which

Figure 4  
 PER-CAPITA ELECTRICITY CONSUMPTION OF SELECTED COUNTRIES, 2008  
 (in kilowatt-hours)



Source: The World Bank, *World Development Indicators* (Washington, D.C.: The World Bank, 2011).

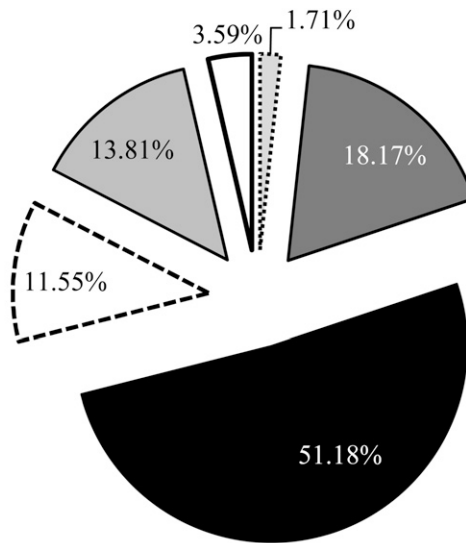
is primarily responsible for power generation for the Rabigh complex. RAWEC has an installed capacity of 600 MW and a generation capacity of 480 MW. This trend is likely to continue over the forecast period as more IPP, IWPP, and IWSPP schemes undertaken by the industrial entities opt for independent power generation.

*Consumption Kingdom-Wide:* By the end of 2010, the Eastern region accounted for the highest consumption share at 31 percent, closely followed by the Western region at 30.67 percent. The Central region captured 30.03 percent, with the Southern region receiving a smaller share of only 8.29 percent. In terms of the share of industrial consumption to total consumption on a regional basis, the Eastern region accounted for the highest, at 45.10 percent. This is due to the higher concentration of industrial projects in the Eastern Province (figure 6).

*Peak-Load Demand:* The Kingdom’s peak-load demand normally occurs during the summer months. Saudi Arabian peak load in 2010 was 45,661 MW, having more than doubled since 2000. Over the past decade, it has grown at a CAGR of 7.7 percent, while the Kingdom’s actual generation capacity has risen at a slower CAGR of 6.7 percent. This has narrowed the country’s reserve margin and tightened the demand-supply balance (figure 7).

In 2002, the Saudi reserve margin widened to 19.7 percent. By the end of 2010, this cushion had dwindled to a mere 7.6 percent, somewhat lower than the industry

Figure 5  
SAUDI SECTOR BREAKDOWN OF ELECTRICITY CONSUMPTION, 2010<sup>a</sup>  
(in percent share)



⊞ Agriculture   ■ Industrial   ■ Residential   ⊞ Government   ■ Commercial   ■ Other

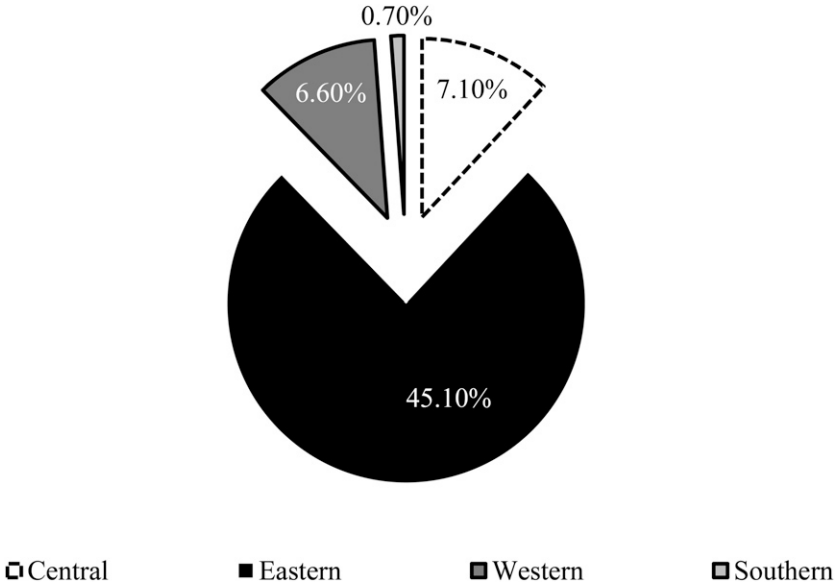
<sup>a</sup>“Other” includes mosques, hospitals, charities, and streets.

norm of at least 10 to 20 percent. A reserve margin is needed as insurance against breakdowns in parts of the system and to ensure that electrical networks can cope with unexpected increases in demand. The Kingdom’s *Ninth Development Plan (2010–2014)* aims to raise the reserve margin to 19.8 percent by 2014.

*Unit Cost of Electricity and Effective Average Tariff Rate:* The average unit cost of electricity in Saudi Arabia in 2010 was estimated at 14.1 Halalas/kWh (3.8 U.S. cents/kWh) by ECRA. Its thorough analysis accounts for the cost of generation, transmission, and distribution. It also accounts for operational and capital expenses, fuel, purchased electricity, and depreciation. ECRA’s average unit cost of electricity has been nearly 18 percent above SEC’s effective average tariff rate (sale price) over the past few years (figure 8). However, following the latest changes in the tariff structure, the difference fell to 7 percent. In contrast, SEC’s unit cost for 2010 was estimated at 12.3 Halalas/kWh (3.3 U.S. cents/kWh), which is approximately 7 percent below SEC’s effective average tariff rate for the year.

Since the monthly power consumption pattern fluctuates across consumer groups, the effective average tariff rate (sale price) is the actual bill paid for each kWh of electricity consumed. In 2010, SEC sold 212.3 billion kWh of electricity for

Figure 6  
 SAUDI INDUSTRIAL ELECTRICITY CONSUMPTION BY REGION, 2010  
 (in percent share)



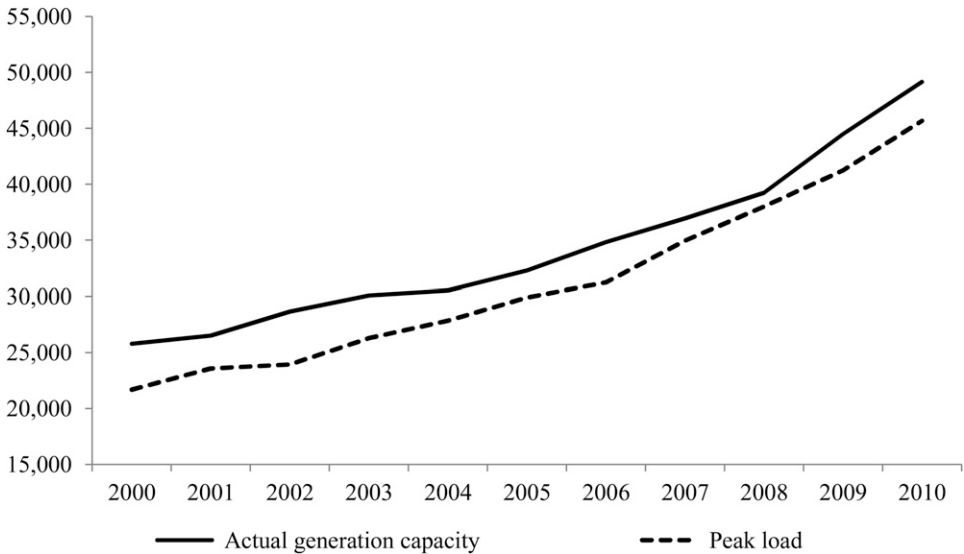
Source: Saudi Electricity Company (SEC), *Annual Reports* (Riyadh, Saudi Arabia: SEC, 2001–2010).

operating revenues worth SAR27.9 billion, giving a national effective average tariff rate of 13.13 Halalas/kWh (3.5 U.S. cents/kWh). This value has grown by approximately 6 percent since 2002, when the effective average tariff rate was 12.38 Halalas/kWh. For comparison purposes, electricity prices in the United States average 12 U.S. cents/kWh, with that in the United Kingdom at 16 U.S. cents/kWh.

In 2010, the most expensive tariff of 26 Halalas/kWh commanded only a minimal percentage of the total: approximately 2 percent accounted for by the government (table 2). As the bulk of consumption remains concentrated in the residential segment, the existing tariff structure does not reflect the real cost and, in turn, is a direct incentive not to ration power. While the government sought to justify this subsidy on social grounds, the higher-income groups appropriate most of the benefits since the subsidized tariff is applied indifferently to the household level of income.

**Transmission and Distribution:** All electricity produced by SEC is transmitted in the Kingdom through SEC’s high-tension, high-voltage transmission grid. By the end of 2010, the transmission network grew by 7.3 percent to reach 46,183 circular kilometers (ckm) (table 3). To enable the transmission network to cope with higher peak loads, it was reinforced during 2010 by adding 3,072 ckm of extra-high voltage transmission lines and 404 ckm of high voltage lines. Extra-

Figure 7  
SAUDI ACTUAL GENERATION CAPACITY AND PEAK LOAD, 2000–2010  
(in megawatts)



Source: Saudi Electricity Company (SEC), *Annual Reports* (Riyadh, Saudi Arabia: SEC, 2001–2010), and Ministry of Water and Electricity (MOWE), *Electricity Growth and Development in the Kingdom of Saudi Arabia* (Riyadh, Saudi Arabia: MOWE, 2009), available at [http://www.mowe.gov.sa/NewMowe/Arabic/files/Book\\_MMM%20NEW.pdf](http://www.mowe.gov.sa/NewMowe/Arabic/files/Book_MMM%20NEW.pdf).

high voltage ranges from 230 kilovolts (KV) to 380 KV and high voltage ranges from 110 KV to 132 KV.

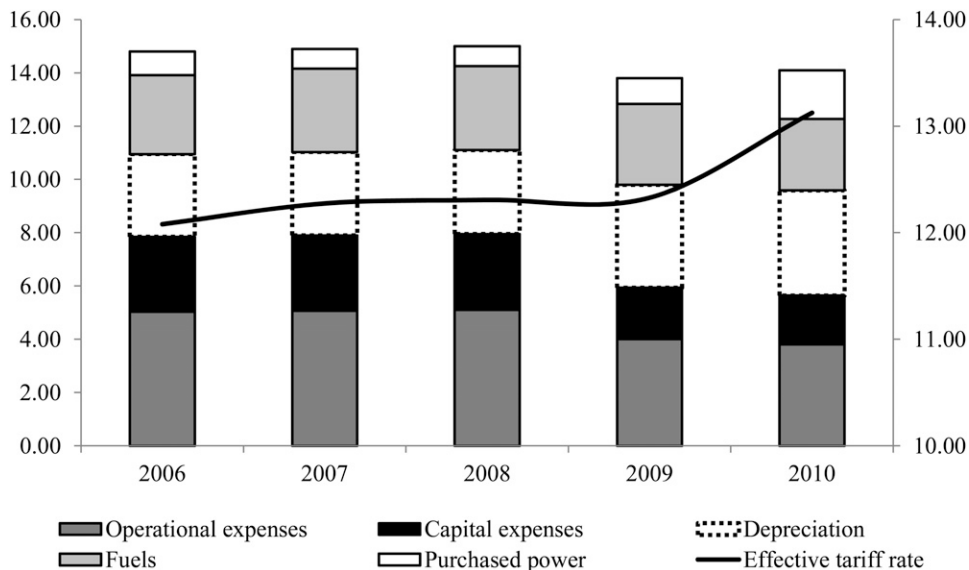
The length of the distribution grid reached 383,304 ckm in 2010, growing by 75 percent since 2000. SEC has spent an average of SAR6,255 million annually during the past five years to expand and maintain a reliable distribution network and to deliver power supply to an average of 258,000 new customers annually.

### ***Power-Sector Challenges***

The Kingdom's electricity sector is facing three major challenges: (1) the rapid rise of fuel consumption and consequently the decline of oil/gas export earnings; (2) the rising financial burden on SEC owing to the double effect of under-pricing electricity (due to the existing tariff structure), resulting in growing waste; and (3) the sizable financing requirements for SEC.

**SEC Fuel Consumption:** All fuel for SEC's power generation is supplied under long-term arrangements by Saudi Aramco with prices set by the government

**Figure 8**  
 DISTRIBUTION OF ELECTRICITY AND CO-GENERATION REGULATORY AUTHORITY'S  
 UNIT COST OF ELECTRICITY AND SAUDI ELECTRICITY COMPANY'S EFFECTIVE  
 AVERAGE TARIFF RATE (axis on the right), 2006–2010  
 (in Saudi Arabian Halalas)



Source: Saudi Electricity Company (SEC), *Annual Reports* (Riyadh, Saudi Arabia: SEC, 2001-2010), and Electricity and Co-generation Regulatory Authority (ECRA), *Activities and Achievements of the Authority* (Riyadh, Saudi Arabia: ECRA, 2010).

(table 4). Under Royal Decree No. M/169, increases in fuel costs from Saudi Aramco will be passed through in a corresponding tariff increase.

Fuel consumption for power generation grew by 75 percent since 2000 to reach 53 million ton of oil equivalent (toe) in 2009. This was equivalent to an estimated daily consumption of 1,069,037 barrels of oil to meet the Kingdom’s power needs. For the same period, the consumption of heavy fuel oil, crude oil, and diesel grew by 73 percent, 75 percent, and 44 percent, respectively. In 2010, crude oil continued to command the largest share, at 40 percent of fuel consumption (figure 9).

The supply of crude oil, however, has come under constraint following a government decision to free up oil stocks for export and higher-end uses rather than direct burn for power generation. As a result, more gas has been allocated for power generation instead. Since 2000, gas consumption for power generation grew by 94 percent to reach 22,095 million cubic meters in 2009.

To further curb its dependence on crude, the Kingdom has commenced with initiatives that promote a more sustainable portfolio of energy sources. It is tapping into energy alternatives such as nuclear power and solar energy. The King Abdullah

Table 2  
SAUDI CONSUMPTION (in kilowatt-hours per month) AND CUSTOMERS WITH  
RESPECTIVE TARIFFS (in Halalas per kilowatt-hour), 2010

Sector	Consumption (in percent)	Customers (in percent)	Consumption (kWh/month)	Tariff (Halalas/kWh)
Residential	51.18	81.57	1,850	5
Industrial	18.17	0.12	429,174	10, 12, 14, 15, 26
Government	11.55	1.98	17,175	26
Commercial	13.81	13.84	2,942	12
Agriculture	1.71	1.02	4,918	10

Sources: Saudi Electricity Company (SEC), *Annual Report* (Riyadh, Saudi Arabia: SEC, 2010), and Electricity and Co-generation Regulatory Authority (ECRA), Board of Directors Decision (1/22/31) dated 01/06/1431 AH, *Electricity Tariff* (Riyadh, Saudi Arabia: ECRA, January 2011), available at <http://www.ecra.gov.sa/pdf/electricity%20tariff-new.pdf>.

City for Atomic and Renewable Energy (K.A.CARE) is set up to develop nuclear technology as part of a SAR300 billion drive to boost power generation over the next decade, thus allowing the Kingdom to maintain significant oil exports.

Moreover, solar energy has received interest and the Kingdom currently has a 2-MW rooftop solar plant at King Abdullah University of Science and Technology (KAUST) in Jeddah. Another 3.5-MW project is being developed near Riyadh for Saudi Aramco. Additionally, the largest solar power plant is to be developed in Dhahran, on Saudi Aramco's premises, generating 10 MW. Most recently, the country's first solar-powered plant opened on Farasan Island, generating 0.5 MW. This was financed by the Japanese company, Showa Shell Sekiyu. The company also built the plant's structures and installed the machinery and photoelectric panels. It will own the plant for 15 years before the transfer to SEC.

Renewable energy applications, through private investment, can contribute to the national grid during peak-load demand times. They also can be developed in sparsely populated regions of the Kingdom where remoteness necessitates the need for independent sources of electrical energy.

Table 3  
SAUDI ELECTRICITY COMPANY'S TRANSMISSION NETWORK, 2006–2010  
(in circular kilometers–ckm)

	2006	2007	2008	2009	2010
Transmission network (ckm)	37,981	38,681	39,793	42,703	46,183

Source: Saudi Electricity Company (SEC), *Annual Reports* (Riyadh, Saudi Arabia: SEC, 2006–2010).

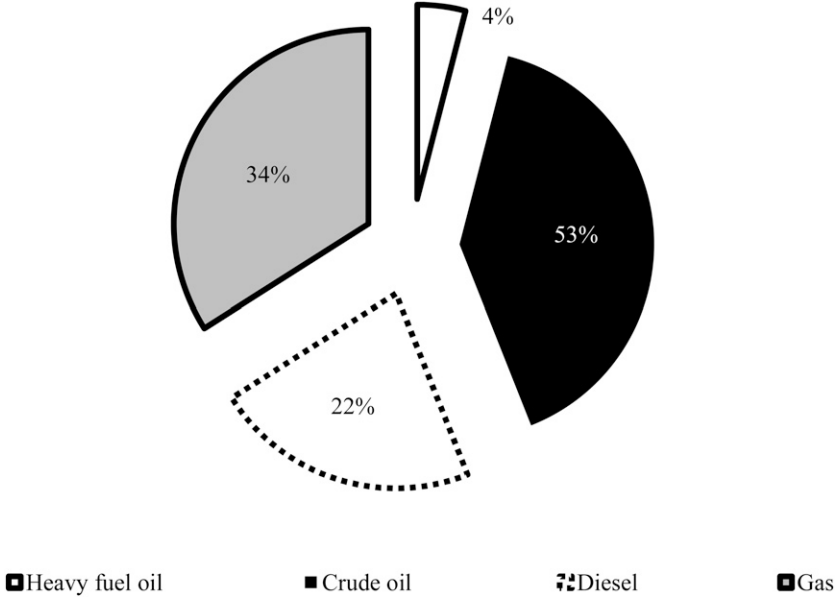
Table 4  
SAUDI ARAMCO FUEL PRICING

Type of Fuel	Price (in U.S. dollars/million British thermal units)
Natural gas	0.75
Diesel	0.63
Light crude oil	0.74
Heavy fuel oil	0.32

Source: Saudi Electricity Company (SEC), *Electricity Sukuk Company Sukuk Offering Circular* (Riyadh, Saudi Arabia: SEC, April 2010).

**Saudi Electricity Company Financial Obligations:** SEC continues to face difficulties in meeting its financial obligations. In 2010, total operating revenues were SAR27.9 billion, increasing by approximately 17 percent since 2009. Over the same year, net income almost doubled, growing to SAR2.3 billion (figure 10). However, while the recent revised hike in tariff structure improved SEC’s profitability in 2010, it remains insufficient to assist the company in covering its funding requirements.

Figure 9  
SAUDI FUEL CONSUMPTION, 2010  
(in percent share)



Source: Electricity and Co-generation Regulatory Authority (ECRA), *Activities and Achievements of the Authority* (Riyadh, Saudi Arabia: ECRA, 2010).

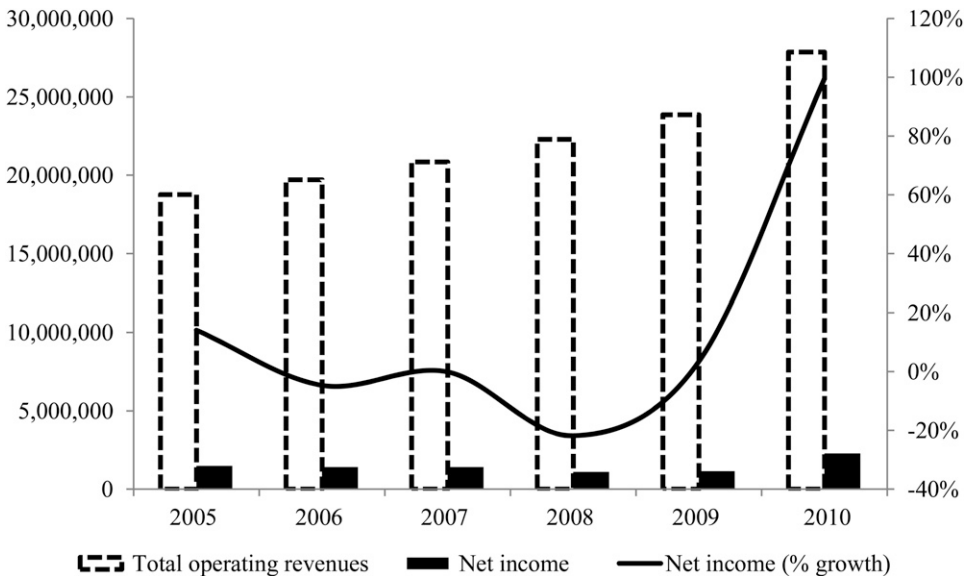


Other sizeable obligations include SEC's payables. Net electricity consumers' receivables were SAR8.7 billion by the end of 2010, while its payables for the same period were equivalent to SAR49.5 billion, consisting mainly of fuel costs and purchased energy. Since its inception, SEC has not paid Saudi Aramco's fuel cost. As the build-up of accrued payables far exceeds the receivables, this highlights SEC's ongoing financial challenges.

**Electricity-Sector Financing:** There are four main direct external sources of funding for SEC: (1) government loans, (2) bank loans, (3) export credit agencies (ECAs), and (4) *Sukuk*. Indirectly, SEC in partnership with private developers is funding power generation projects through several project finance schemes, such as BOO. At the end of 2010, SEC had outstanding commercial debt equivalent to SAR30.8 billion (table 5).

The reconciliation of net dues (company claims and government loans) has been treated like a long-term soft loan for SEC, with a grace period of 25 years starting from the date of incorporation of SEC. At the end of 2010, this balance stood at SAR14.9 billion. In addition, the government extended a SAR15 billion soft loan in April of 2011, to be paid over two years to the company, with a repayment

Figure 10  
SAUDI ELECTRICITY COMPANY TOTAL OPERATING REVENUES, NET INCOME, AND  
NET INCOME GROWTH (axis on the right), 2005–2010  
(in thousand Saudi Arabian riyals)



Source: Saudi Electricity Company (SEC), *Annual Reports* (Riyadh, Saudi Arabia: SEC, 2005–2010).

Table 5  
 SELECT SAUDI ELECTRICITY COMPANY NON-CURRENT LIABILITIES,  
 AS OF DECEMBER 31, 2010

Non-Current Liabilities	Thousand Saudi Arabian Riyals
Long-term loans	10,632,390
<i>Sukuk</i>	19,000,000
Government loans	18,688,060
Total	48,320,450

Source: Saudi Electricity Company (SEC), *Annual Report* (Riyadh, Saudi Arabia: SEC, 2010).

schedule over 25 years. By the end of 2010, SEC only has used SAR3.7 billion of that loan. Therefore, total government loans for the same period stood at SAR18.7 billion. However, in June 2011, SEC was able to secure an interest-free SAR51 billion facility from the government.

Bank loans to the company represent long-term debt obtained from commercial banks to finance construction work. One recent example includes a Shariah-compliant loan awarded by a group of Saudi banks in the amount of SAR5 billion. Some of these loans are secured by promissory notes issued by SEC and proceeds of revenues collected by the banks.

However, there are a number of challenges facing banks when extending credit to SEC. The nature of long-term loans results in an asset-liability maturity mismatch. This is attributed to the fact that banks lend on a long-term basis with short-term funding resources, thereby increasing their liquidity risk. Additionally, given the sizable sum of the loans needed by SEC, this may lead to a higher credit concentration risk for any one particular bank to undertake. Moreover, banks are constrained by the legal lending limit of not exceeding 25 percent of their capital to a single borrower. As such, commercial loans to SEC often are syndicated, in which a group of banks work together to provide funding for the company.

Other forms of credit facilities are secured from export credit agencies (ECAs). This tranche comes in one of two types: either covered or direct (uncovered). If covered, the ECA provides a guarantee while a foreign bank will provide the funding. The latter type involves direct lending to companies. In June 2009, SEC signed a financing agreement with the Export-Import Bank of the United States and Export Development Canada to receive a direct loan in the amount of SAR4.1 billion to be made available by the end of 2010. The loan was set up with the facilitation of General Electric Energy to finance the supply and installation of GE equipment, such as gas-turbine generators.

In addition, SEC has issued three rounds of *Sukuk*, diversifying its funding sources. These were valued at SAR19 billion at the end of 2010. Proceeds of the *Sukuk* are used mainly to finance capital investment requirements and refinance

existing financial obligations (table 6). The issuance of *Sukuk* will enhance SEC's international profile, further facilitating its access to possibly global sources of funding. Currently, SEC has a corporate credit rating of AA- from Standard & Poor's, AA- from Fitch, and A1 from Moody's.

### *Project Finance by Private Developers*

The Kingdom initially had planned three core venture IWPPs at Shuaibah, Jubail, and Ras Al-Khair (formerly known as Ras Al-Zour). However, on the back of financing challenges that emerged following the global financial crisis in 2008, the implementation of some projects stalled, with bidding time frames extended like that for the Ras Al-Khair IWPP. In April 2009, SWCC became responsible for tendering and financing the Ras Al-Khair power plant, which was procured on an engineering, procurement, and construction (EPC) basis. Recently, the Saudi government merged the Ras Al-Khair power plant with the Saudi Arabian Mining Company (Maaden), in order to overcome difficulties in sourcing long-term project finance.

A noticeable trend for local developers in these large-scale power projects has been to partner up with foreign firms in order to gain a competitive edge in their bidding process. Additionally, the structuring of bankable schemes and contracts that are acceptable to both the Saudi partners and to foreign investors has propelled sponsor interest. The execution of the initial three IPPs was facilitated through government guarantees, eliminating both the market and fuel risk for the IPP developers. As the developers became more comfortable with the process, these government guarantees were no longer applicable.

The commercial bank cost of debt has spanned a 120 to 340 basis point range above the Saudi Arabia Interbank Offer Rate (SAIBOR) since 2004, contingent on the health of the world economy and subsequent liquidity within local banks. When banks are flushed with liquidity, as has been the case recently, the basis points above SAIBOR for loans occur on the lower end of the aforementioned range. There also are upfront fees

Table 6  
SAUDI ELECTRICITY COMPANY *SUKUK*, AS OF DECEMBER 31, 2010<sup>a</sup>

<i>Sukuk</i>	Coupon (Annual Return)	Issue Date	Maturity Date	Par Value (Saudi Riyals)	Issue Size (million Saudi Riyals)
Saudi Electricity	SAIBOR + 0.45%	7/1/2007	15/07/2027	500,000	5,000
Saudi Electricity 2	SAIBOR + 1.6%	7/6/2009	6/7/2029	100,000	7,000
Saudi Electricity 3	SAIBOR + 0.95%	5/10/2010	10/5/2030	10,000	7,000

<sup>a</sup> SAIBOR is the Saudi Arabia Interbank Offer Rate.

Source: Saudi Electricity Company (SEC), *Annual Report* (Riyadh, Saudi Arabia: SEC, 2010).

the levels of which are determined by the market. If credit is tight, these fees tend to be higher. Local banks prefer funding in Saudi Arabia riyals given its greater availability, with a differential of around 30 to 40 basis points above SAR debt facilities for U.S. dollar debt facilities. Interest rate risks normally are hedged on a rolling 5-year period. The tenure on loans in the Saudi power sector historically has been in the range of 18 to 22 years. Investments on a BOO or build-operate-transfer (BOT) basis allow for greater flexibility, making it more appealing for foreign investors to be part of such projects. BOO arrangements lend themselves to greater certainty that a power purchasing agreement (PPA) will be signed once the initial agreement expires. The model assumes that PPAs will be extended to cover the economic lives of the generating assets. The internal rate of return (IRR) for IW/S/PPs tends to fall between 9 to 14 percent.

### *The Sector Outlook*

**Key Power Indicators:** Projecting domestic consumption to grow at its current rate of 6.4 percent per year, by 2015 total electricity consumption will reach 289,437 GW. This will correspond to a per-capita electricity consumption of 9,134 kWh. The increase in per-capita electricity consumption can be attributed to the rising pace of urbanization and industrialization witnessed in the country. In addition, changes in the behavior of households, on the back of attaching more importance to functional features of end-use equipment and affluence, will shift consumers into higher electricity consumption slabs. Assuming the 8-year CAGR at 1 percent of effective tariff rates, in turn, market size is forecasted to reach SAR39.4 billion in nominal terms by 2015 (table 7).

To validate the micro bottom-up market size forecast, a macro top-down analysis—forecasting on the basis of the utility-sector share and nominal electricity sales share of nominal nonoil GDP—suggest comparable projections. Yet, market-size micro estimates indicate a minimal decline in its share to nominal nonoil GDP from 3.53 percent in 2010 to 3.32 percent in 2015. Given the highly regulated nature of the sector (which controls pricing while everything else is likely to be subjected to inflationary pressures), such minimal decline in nominal terms, despite rapid expansion, seems to be normal.

Table 7  
SAUDI FORECASTED POWER MARKET SIZE, 2011–2015

Name	2011F	2012F	2013F	2014F	2015F
Effective tariff rate (in Saudi Halalas)	13.22	13.32	13.41	13.51	13.61
Consumption demand (in gigawatts)	225,845	240,296	255,671	272,030	289,437
Market size (in billion Saudi Riyals)	29.9	32.0	34.3	36.8	39.4

The total actual generation capacity available is forecasted to reach 67,827 MW by 2015 using a 10-year CAGR of 6.7 percent. Additional generation units have been added at an average annual rate of 2,300 MW over the past decade. Under the baseline scenario, an additional 18,689 MW will need to be added over the next five years. This assumes holding both the 10-year total actual generation capacity CAGR of 6.7 percent and the 10-year peak-load demand CAGR of 7.7 percent constant, thus resulting in a very minimal 2.3 percent reserve generation capacity (Scenario A).

The Ministry of Economy and Planning (MEP) aims for a reserve generation capacity equivalent to 19.8 percent by the end of the *Ninth Development Plan* (2010–2014). To examine this target, we tracked the power projects in the pipeline with a completion date up to 2015. Based on market insights regarding ageing power plant infrastructure and the remaining asset life of SEC's plants, we also accounted for decommissioning 5,000 MW through the end of our forecasted period. According to Middle East Economic Digest Projects, by the end of October 2011, power projects completed by third quarter of that year amounted to 3,980 MW (Appendix, table A.1). Those in the execution phase (table 8) and EPC (bid) phase amounted to 23,439 MW and 4,930 MW, respectively, for a total of 28,369 MW (Appendix, table A.2). And those in the study or planned phase amounted to 3,780 MW (Appendix, table A.3).

Accounting for the completed projects by third quarter 2011 and the projects in the execution and EPC (bid) phase, total actual generation capacity will reach 76,487 MW by 2015, ensuring a feasible reserve generation capacity of 15.4 percent (Scenario B) (figure 11).

Moreover, if approximately 77 percent of the projects in the study or planned phase materialize, total generation capacity will reach 79,399 MW, achieving the MEP's intended reserve generation capacity target of 19.8 percent, (Scenario C) (table 9). Though it was intended for the end of the Ninth Development Plan in 2014, we assume the same reserve margin target to still hold for 2015.

Over the next three years, SEC plans to add a further 7,250 ckm of lines to its transmission network. It also intends to continue expanding the network coverage by adding 87 new substations with an additional capacity of approximately 26,000 million volt-amperes (MVA). The total expenditure for upgrading the transmission network is estimated at SAR12.95 billion annually over the next five years. As for expanding, maintaining, and improving its distribution network, SEC is estimated to spend SAR7 billion annually over the same period. The company's capital expenditures (capex) are forecasted to peak in 2012 at SAR35.5 billion and then moderate to reach SAR22.3 billion by 2014 (table 10). As the independent power sector develops, SEC is anticipated to scale back its expenditures, specifically on power generation projects.

**Saudi Electricity Company IPP Program:** In 2007 SEC initiated its IPP program to attract private (foreign and local) investment in pioneering three IPPs on a BOO basis (Rabigh IPP, Riyadh PPII, and Qurayyah IPP 1), with total capital investments exceeding SAR25 billion. This would contribute toward re-directing

**Table 8**  
**SELECTED SAUDI INDEPENDENT POWER PRODUCERS (IPPs)**  
**IN THE EXECUTION PHASE<sup>a</sup>**

Project	Shareholders	Type	Output (megawatts)	Budget (million)		Completion Date
				U.S. dollars	EPC Award	
Ras Al-Khair Power Plant	SWCC/ Maaden	EPC	2,800	3,000	2010 Q3	2014 Q2
Hajr for Electricity Production Co. - Qurayyah IPP	ACWA Power (17.5%)/ MENA Infrastructure Fund (GP) Limited (15%)/ Samsung Construction & Trading (17.5%)/ SEC (50%)	BOO	1,800	2,200	2011 Q3	2014 Q2
Total			4,600	5,200		

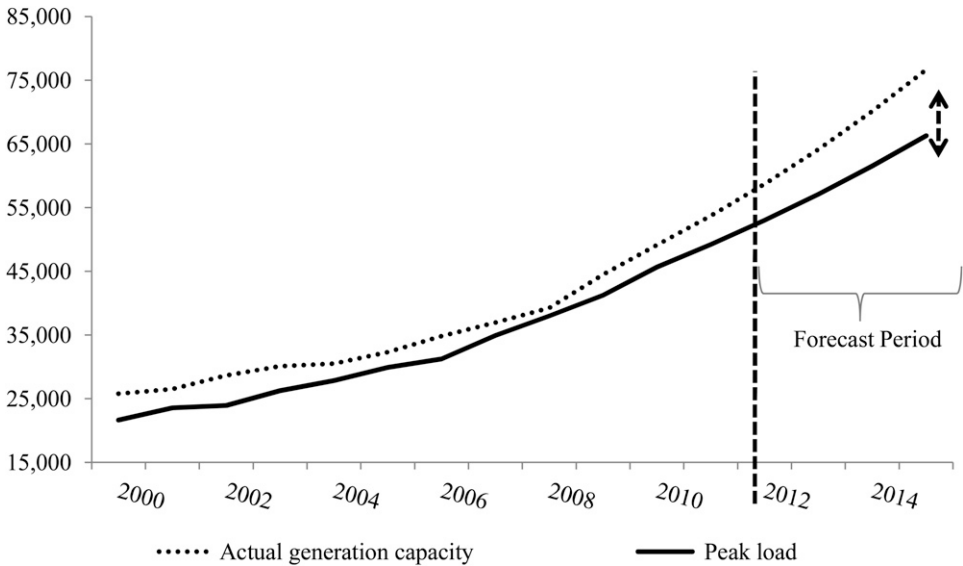
<sup>a</sup> EPC = engineering, procurement, and construction; BOO = build-own-operate; IPP = independent power producer; SEC = Saudi Electricity Company; SWCC = Saline Water Conversion Company.

Source: Middle East Economic Digest Projects (MEED Projects), *Analyse It Flexi Report Research Criteria Include: "Project Area: Saudi Arabia, Sector: Power with a Completion Date Range from Q1 2011 – Q4 2015"* (Dubai, United Arab Emirates: MEED Projects, October 31, 2011).

available company funds for transmission and distribution projects. The agreement stipulates SEC as the single off-taker of the entire output generated, under long-term power purchase agreements (PPAs) using the energy conversion model for fuel. Subject to meeting certain efficiency parameters, fuel costs are a pass through, secured through a fuel supply agreement (FSA), with SEC bearing this risk. The FSA is a guarantee to the developer that the off-taker will purchase the fuel and deliver it to the developer. Additionally, the price at which power will be bought by SEC is agreed upon in these PPAs. The price of electricity has been approximately 8 Halalas/kWh. This does not account for the cost of fuel or transmission and distribution. Competitive tariffs are ascertained through three main factors: (1) capex structure as well as a quality EPC (bid) contract, (2) cost of financing and the nature of the equity injection, and (3) equity internal rate of return (IRR).

Provisions have been made in the agreement for future initial public offerings, should SEC and the developer opt for that path. Investor appetite in this program grew from two consortium bids in the first IPP to six bids in the third IPP in March 2011. According to industry sources, the program is set to expand into several more projects, which will further enhance SEC generation capacity (table 11). SEC's equity stake in the IPP projects ranges between 20 to 50 percent, with SEC targeting

Figure 11  
FORECAST SAUDI ACTUAL GENERATION CAPACITY  
AND PEAK LOAD, 2000–2015  
(in megawatts)



Sources: Saudi Electricity Company (SEC), *Annual Reports* (Riyadh, Saudi Arabia: SEC, 2001-2010), and Ministry of Water & Electricity (MOWE), *Electricity Growth and Development in the Kingdom of Saudi Arabia* (Riyadh, Saudi Arabia: MOWE, 2009), available at [http://www.mowe.gov.sa/NewMowe/Arabic/files/Book\\_MMM%20NEW.pdf](http://www.mowe.gov.sa/NewMowe/Arabic/files/Book_MMM%20NEW.pdf)

a minimum equity IRR of 7.5 percent. It also strives towards a minimum debt share of 70 to 80 percent, with local banks contributing a sizable 30 to 40 percent of the project cost, and international banks and/or ECAs accounting for the remainder.

### Conclusion

Saudi Arabia needs to expand its power capacity and networks to support the Kingdom's ambitious industrialization plan as well as to meet its growing population demand. Total actual generation capacity reached 49,138 MW by the end of 2010, having risen at a 10-year compound average growth rate of 6.7 percent. However, overall consumption and peak-load demand grew at 10-year CAGRs of 6.4 percent and 7.7 percent, respectively, amounting to 212,263 GW and 45,661 MW. The hastened pace of consumption has decreased the Kingdom's reserve generation capacity to a mere 7.6 percent, somewhat below the industry norm of 10 to 20 percent.

Table 9  
 FORECASTED SAUDI TOTAL ACTUAL GENERATION CAPACITY/PEAK LOAD  
 (in megawatts) AND RESERVE MARGIN (in percent), 2015<sup>a</sup>

Indicator	2010	Scenario A		Scenario B		Scenario C	
		CAGR	2015F	CAGR	2015F	CAGR	2015F
Total actual generation capacity (megawatts)	49,138	6.7%	67,827	9.3%	76,487	10.1%	79,399
Peak load (megawatts)	45,661	7.7%	66,276	7.7%	66,276	7.7%	66,276
Reserve generation capacity	7.6%	-	2.3%	-	15.4%	-	19.8%

<sup>a</sup> Scenario A assumes holding both the 10-year total actual generation capacity CAGR of 6.7 percent and the 10-year peak-load demand CAGR of 7.7 percent constant. Scenario B accounts for all completed projects by third quarter 2011 and projects in both the execution and EPC (bid) phase that will materialize by 2015. Scenario C targets the Ministry of Economy and Planning's reserve margin of 19.8 percent, with approximately 77 percent of the projects in the study or planned phase having to materialize. Both Scenario B and Scenario C hold the 10-year peak-load demand CAGR of 7.7 percent constant. CAGR = compound average growth rate.

Source: Saudi Electricity Company (SEC), *Annual Report* (Riyadh, Saudi Arabia: SEC, 2010).

Our base-line scenario assumed that actual generation capacity and peak-load demand growth will maintain the same pace over the next five years, narrowing the reserve margin to 2.3 percent. However, projects in the execution and EPC (bid) phase between 2011–2015 will amount to a total of 28,369 MW. Assuming these projects materialize, this will bring total actual generation capacity to 76,487 MW and would result in a feasible reserve generation capacity of 15.4 percent by 2015.

Nonetheless, there are a number of challenges facing the industry. First, artificially low tariffs in a highly regulated sector have resulted in squeezed profit margins and an inefficient use of electricity. Tariffs for non-residential consumers were revised in July of 2010 in an attempt to reduce subsidies and improve profitability. Industrial and governmental consumer groups were subjected to

Table 10  
 FORECASTED SAUDI ELECTRICITY COMPANY CAPITAL EXPENDITURES, 2011–2014  
 (in million Saudi Arabian riyals)

	2011	2012	2013	2014
Capital expenditures (CAPEX)	33,035	35,534	23,323	22,345

Source: Saudi Electricity Company (SEC), *Electricity Sukuk Company Sukuk Offering Circular* (Riyadh, Saudi Arabia: SEC, April 2010).



Table 11  
CURRENT AND UPCOMING SAUDI ELECTRICITY COMPANY (SEC) INDEPENDENT  
POWER PRODUCER (IPP) PROJECTS

Name	Status	Output (megawatts)	Private Sector (percent capital)	Completion Date
SEC - Rabigh IPP	Execution	1,200	80%	2013
SEC - Riyadh PPII	Execution	1,729	50%	2013
SEC - Qurayyah IPP	Execution	3,927	50%	2015
SEC - Deba IPP	Planned	1,600	60%	2018
Total		8,456		

Source: Saudi Electricity Company (SEC), *Investment/IPP* (Riyadh, Saudi Arabia: SEC, 2011), available at <http://se.com.sa/SEC/English/Menu/Partners/IPP+Program/Projects.htm>.

higher rates, thereby cross-subsidizing residential subscribers who account for the largest share of demand. The second challenge in the power sector is the rising fuel consumption, since the government wishes to reserve crude oil for export purposes. The Kingdom is tapping into alternative sources of energy, such as nuclear and solar power, as a means of providing a more sustainable portfolio of energy sources.

The third challenge is the large amount of funding required for SEC's projects and IPPs. The private sector's finance, operation, and management of the Kingdom's power sector are considered essential if Saudi Arabia is to meet its demand requirements over the forecast period. Banks face concentration risks, which may be overcome through syndication, as well as the risk of an asset-liability mismatch. Nonetheless, from a bankability perspective, the appetite in project finance is strong for the Saudi power sector, given the nature of the PPAs that are strengthened by the creditworthiness of SEC as the off-taker. Pass-through fuel conversion models are an added incentive for private developers, as they bear no risk. The competitive tariff proposals are also a result of quality EPC contracts and the type of equity injection. Private investors generally target an IRR of 9 to 14 percent, while the cost of long-term loans for the sector have been in the range of 120 to 340 basis points above SAIBOR, moving in parallel with the changes in the world economy.

The Saudi power sector is poised to meet growing demand over the forecasted period. The healthy appetite from local banks, as well as ECAs, toward the sector signals increased confidence, especially for private developers. Together with accessing capital market funding, SEC continues to have state support from the Saudi government, which provides it with ongoing and important debt cushions for its funding needs over the medium term. This adds credence to its strategic role as the Kingdom's main power utility player.

## Appendix

Table A.1  
 SAUDI POWER SECTOR GENERATION PROJECTS TO BE COMPLETED BY THIRD  
 QUARTER OF 2015 AS OF OCTOBER 31, 2011<sup>a</sup>

Project	Shareholders	Type	Output (megawatts)	Budget (million U.S. dollars)	EPC Award	Completion Date
SEC - Riyadh PP10 Power Plant	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	LSTK	2,000	2,000	2008 Q2	2011 Q3
SEC - Jizan Power Plant Expansion II	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	LSTK	300	195	2007 Q1	2011 Q2
SEC - Hail Power Plant Extension	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	LSTK	160	120	2010 Q2	2011 Q2
Shuqaiq Water & Electricity Company - Shuqaiq-II IWPP	PIF (32%)/ SEC (8%)/ Shuqaiq Water & Electricity Company (60%)	BOO	1,020	1,870	2007 Q1	2011 Q1
SEC - Faras Power Plant Expansion	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	LSTK	500	500	2007 Q3	2011 Q1
Total			3,980	4,685		

<sup>a</sup> LSTK = lump sum turnkey, BOO = build-own-operate basis, IWPP = integrated water and power plant, and SEC = Saudi Electricity Company.  
 Source: Middle East Economic Digest Projects (MEED Projects), *Analyse It Flexi Report Research Criteria Include: "Project Area: Saudi Arabia,  
 Sector: Power with a Completion Date Range from Q1 2011 - Q4 2015"* (Dubai, United Arab Emirates: MEED Projects, October 31, 2011).

Table A.2  
SAUDI POWER SECTOR GENERATION PROJECTS IN THE EXECUTION  
AND EPC (BID) PHASES TO BE COMPLETED BY FOURTH  
QUARTER OF 2015 AS OF OCTOBER 31, 2011<sup>a</sup>

#	Project	Shareholders	Status	Type	Output (megawatts)	Budget (million U.S. dollars)	EPC Award	Completion Date
1	SEC - Shuaiba Power Plant Stage III	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	1,200	3,000	2008 Q2	2011 Q4
2	SEC - Tabuk Power Plant Expansion VI	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	200	180	2008 Q3	2011 Q4
3	SEC - Reinforcement of Qurayyah Power Plant	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	120	163	2010 Q2	2012 Q1
4	Saudi Aramco - Karan Gas Development - Cogeneration & Utilities	Saudi Aramco (100%)	Execution	LSTK	150	400	2009 Q1	2012 Q1
5	SEC - Extension of PP10 Power Plant	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	700	500	2010 Q4	2012 Q2

(continued)

Table A.2 (continued)  
 SAUDI POWER SECTOR GENERATION PROJECTS IN THE EXECUTION  
 AND EPC (BID) PHASES TO BE COMPLETED BY FOURTH  
 QUARTER OF 2015 AS OF OCTOBER 31, 2011<sup>a</sup>

#	Project	Shareholders	Status	Type	Output (megawatts)	Budget (million U.S. dollars)	EPC Award	Completion Date
6	Marafiq - Yanbu Industrial City Power Plant: Phase V & VI	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	550	750	2009 Q3	2012 Q3
7	SEC - Tabuk Power Plant Expansion (Phase VII)	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	110	120	2010 Q4	2012 Q4
8	SEC - Reinforcement of Hail 2 Power Plant Extension III	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	280	260	2011 Q2	2012 Q4
9	SEC - Qassim Power Plant Expansion: Phase III	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	560	381	2010 Q4	2012 Q4
10	SEC - Conversion of Qurayyah Power Plant to Combined Cycle	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	1,330	1,010	2010 Q1	2013 Q1

(continued)

Table A.2 (continued)  
 SAUDI POWER SECTOR GENERATION PROJECTS IN THE EXECUTION  
 AND EPC (BID) PHASES TO BE COMPLETED BY FOURTH  
 QUARTER OF 2015 AS OF OCTOBER 31, 2011<sup>a</sup>

#	Project	Shareholders	Status	Type	Output (megawatts)	Budget (million U.S. dollars)	EPC Award	Completion Date
11	Dhuruma Electricity Company - Riyadh IPP (PP11)	Al Jomaih Group (15%)/ GDF SUJEZ Energy International (20%)/ SEC (50%)/ Sojitz Corporation (15%)	Execution	BOO/ LSTK	1,729	2,500	2010 Q2	2013 Q2
12	SEC - Extension of Qurayyah Power Plant	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	800	500	2010 Q4	2013 Q2
13	Rabigh Electricity Company - Rabigh IPP	ACWA Power (40%)/ Korea Electric Power Corporation (40%)/ SEC (20%)	Execution	BOO	1,320	2,500	2009 Q2	2013 Q2
14	SEC - PP12 Combined Cycle Power Plant	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	EPC Bid	LSTK	1,800	2,000	2012 Q1	2014 Q1

(continued)

Table A.2 (continued)  
 SAUDI POWER SECTOR GENERATION PROJECTS IN THE EXECUTION  
 AND EPC (BID) PHASES TO BE COMPLETED BY FOURTH  
 QUARTER OF 2015 AS OF OCTOBER 31, 2011<sup>a</sup>

#	Project	Shareholders	Status	Type	Output (megawatts)	Budget (million U.S. dollars)	EPC Award	Completion Date
15	Marafiq - Yanbu Interim Power & Desalination Plant	Private Shareholders (0.76%)/ PIF (24.81%)/ Royal Commission for Jubail & Yanbu (24.81%)/ Saudi Aramco (24.81%)/ SABIC (24.81%)	Execution	LSTK	850	900	2011 Q2	2014 Q1
16	Hajr For Electricity Production Company - Qurayyah IPP 2	ACWA Power (17.5%)/ MENA Infrastructure Fund (GP) Limited (15%)/ Samsung Construction & Trading (17.5%)/SEC (50%)	Execution	BOO	1,800	1,800	2011 Q3	2014 Q2
17	Saudi Aramco - Shaybah NGL Recovery Program - Package III: Cogeneration Power Plant	Saudi Aramco (100%)	Execution	LSTK	1,000	500	2011 Q1	2014 Q2

(continued)

Table A.2 (continued)  
 SAUDI POWER SECTOR GENERATION PROJECTS IN THE EXECUTION  
 AND EPC (BID) PHASES TO BE COMPLETED BY FOURTH  
 QUARTER OF 2015 AS OF OCTOBER 31, 2011<sup>a</sup>

#	Project	Shareholders	Status	Type	Output (megawatts)	Budget (million U.S. dollars)	EPC Award	Completion Date
18	Hajr For Electricity Production Company - Qurayyah IPP	ACWA Power (17.5%)/ MENA Infrastructure Fund (GP) Limited (15%)/ Samsung Construction & Trading (17.5%), SEC (50%)	Execution	BOO	1,800	2,200	2011 Q3	2014 Q2
19	SWCC / Maaden - Ras Al-Khair Power Plant	SWCC/ Maaden	Execution	EPC	2,800	3,000	2010 Q3	2014 Q2
20	SEC - Shuaiba II Combined Cycle Power Plant	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	1,440	1,400	2011 Q4	2014 Q4
21	SWCC / Marafiq - Yanbu Power Plant: Phase 3	SWCC/ Marafiq	EPC Bid	LSTK	2,500	2,000	2011 Q4	2014 Q4
22	Saudi Aramco - Arabiyah-Hasbah Development Programme: Cogeneration Power Plant	Saudi Aramco (100%)	Execution	LSTK	600	500	2011 Q1	2014 Q4

(continued)

Table A.2 (continued)  
 SAUDI POWER SECTOR GENERATION PROJECTS IN THE EXECUTION  
 AND EPC (BID) PHASES TO BE COMPLETED BY FOURTH  
 QUARTER OF 2015 AS OF OCTOBER 31, 2011<sup>a</sup>

#	Project	Shareholders	Status	Type	Output (megawatts)	Budget (million U.S. dollars)	EPC Award	Completion Date
23	SEC - Rabigh Power Plant Extension - Phase VI	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	2,800	4,000	2010 Q3	2014 Q4
24	SEC - Jeddah South Power Plant (Phase I)	SEC (100%)	EPC Bid	LSTK	630	650	2012 Q1	2015 Q1
25	SEC - PP10 Steam Turbines Power Plant	Saudi Government (74%)/ Private Investors (19%)/ Saudi Aramco (7%)	Execution	LSTK	1,300	1,721	2011 Q4	2015 Q3
Total					28,369	32,935		

<sup>a</sup>SEC = Saudi Electricity Company; LSTK = lump sum turnkey; BOO = build-own-operate basis; IPP = independent power producer; and EPC = engineering, procurement, and construction.

Source: Middle East Economic Digest Projects (MEED Projects), *Analyse It Flexi Report Research Criteria Include: "Project Area: Saudi Arabia, Sector: Power with a Completion Date Range from Q1 2011 - Q4 2015"* (Dubai, United Arab Emirates: MEED Projects, October 31, 2011).



**Table A.3**  
**SAUDI POWER SECTOR GENERATION PROJECTS IN THE STUDY OR PLANNED**  
**PHASES TO BE COMPLETED BY FOURTH QUARTER OF 2015**  
**AS OF OCTOBER 31, 2011<sup>a</sup>**

<b>Project</b>	<b>Shareholders</b>	<b>Status</b>	<b>Output (megawatts)</b>	<b>Budget (million U.S. dollars)</b>	<b>EPC Award</b>	<b>Completion Date</b>
SEC - Al-Muzahimiyah Power Plant	Saudi Government (74%) / Private Investors (19%) / Saudi Aramco (7%)	Study	1,325	750	2012 Q3	2014 Q3
SEC - Rabigh Steam Power Plant Extension (Phase II)	Saudi Government (74%) / Private Investors (19%) / Saudi Aramco (7%)	Planned	630	650	2012 Q4	2014 Q4
SEC - Salbukh Power Plant	Saudi Government (74%) / Private Investors (19%) / Saudi Aramco (7%)	Planned	1,325	746	2012 Q4	2015 Q4
Saudi Aramco - Expansion of IPP (3 nos.)	Saudi Aramco (100%)	Planned	500	800	2012 Q4	2015 Q4
<b>Total</b>			<b>3,780</b>	<b>2,946</b>		

<sup>a</sup> SEC = Saudi Electricity Company and IPP = independent power producer.

Source: Middle East Economic Digest Projects (MEED Projects), *Analyse It Flexi Report Research Criteria Include: "Project Area: Saudi Arabia, Sector: Power with a Completion Date Range from Q1 2011 – Q4 2015"* (Dubai, United Arab Emirates: MEED Projects, October 31, 2011).