



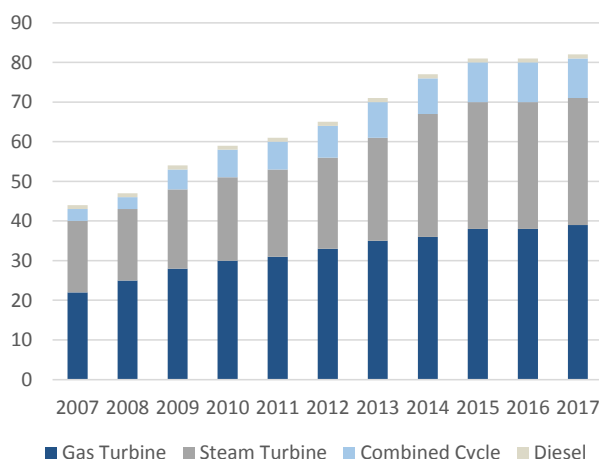
Saudi power sector: reforms underway

Saudi Arabia's power sector has long been the target of reforms. Electricity demand has surged over the past decade, with our estimates suggesting that the power sector needs \$20bn of investment in the next five years to meet rising demand. The government has been able to add significant capacity in the last decade but has more recently relied on Independent Power Producers (IPPs) to share the burden. However, the budgetary shortfalls since the oil price decline in 2014 created the need for further reforms to the power sector, with two main objectives: the first is to tackle runaway demand by improving efficiency and increasing electricity prices and eventually liberalising them; the second is to adopt a more market-oriented structure, allowing for the private sector to share a greater responsibility for the reliable supply of competitively priced power.

Electricity consumption in Saudi Arabia has risen at an average annual rate of 6.6% between 2006 and 2016. This growth has been driven by a number of factors: an increase in income levels, population, urbanisation, strong economic growth, and subsidised electricity prices. To meet this growth in demand, the Saudi government has invested heavily in new power-generating capacity. Current installed capacity in the Kingdom is estimated at 82GW, up from around 60GW in 2010.

But the old model is not sustainable and the need to curb demand has become a priority. Historically electricity prices have been too low, leading to overconsumption, whilst the provision of subsidised feedstock to power plants encouraged inefficient generation. To meet rising demand, the government had to invest in new generating capacity at a high cost, putting additional pressure on the government's energy budget.

Saudi installed capacity (GW)



Source: MEES; APICORP Research

Current market structure and the role of IPPs

The Kingdom relies on a bundled single-buyer market structure. Saudi Electricity Company (SEC) is the Kingdom's vertically-integrated electricity company that owns most power-generating assets and almost all transmission and distribution networks. While the power-generating business is open to the private

sector, SEC is the only wholesale purchaser from private companies and is responsible for selling the electricity to final consumers. Estimated capacity stood at 82GW in 2017, with SEC's generating capacity around 57GW while the remaining is operated by the private sector. The Kingdom will meet rising demand with around **17GW** of additional capacity already in the pipeline. Of this, **7.5GW** are SEC projects while the rest are IPPs, Saudi Aramco, and Saline Water Conversion Company (SWCC) projects.

Major power projects 2018-20 (MW)

Project	Capacity	Fuel	Start-up
PP13 (SEC)	1,800	Gas	2018
Shuqaiq (SEC)	2,650	Oil	2018
Waad Al-Shamal (SEC)	1,390	Gas/Solar	2018
Jizan IGCC (Aramco)	4,000	Vacuum res.	2018
Duba-1 (SEC IPP)	550	Gas/Solar	2019
Fadhili IPP (SEC/Aramco)	1,500	Gas	2019
Sakaka 1 (REPDO IPP)	300	Solar	2019
PP14 (SEC)	1,640	Gas	2020
Yanbu 3 (SWCC)	3100	Oil	2020
Total	16,930		

Source: MEED Projects, APICORP Research

While the government has historically been responsible for all the investment required in the power sector, significant stress on the state finances has forced the government to turn to the private sector. IPPs have been playing an increasing role in the Kingdom's power-generating sector over the past decade and non-SEC capacity represents around 30% of the country's total. IPPs in the Kingdom provided a quick solution to the problem of rising demand, along with several other benefits to the government.

First, IPPs reduce fiscal pressure on SEC by providing upfront capital in the power sector. Although SEC usually holds a majority stake in all IPP projects, it was able to add capacity without the need to pay the entire upfront cost. This has been especially beneficial as the state utility has had to tap the local and external debt market to finance some of their projects.

Second, IPP projects are usually more cost competitive than government plants, given that bidders with the lowest levelised cost of electricity are usually awarded the contract. Third, IPPs are usually quicker to execute than government power plants - which normally issue EPC tenders. IPP projects allow for governments to identify project or capacity needs, and allow private developers to bid. On average, IPPs take 3-4 years to develop, whereas government power plants often take longer due to conflicting roles of government entities, and technical specification changes that are usually associated with government projects.

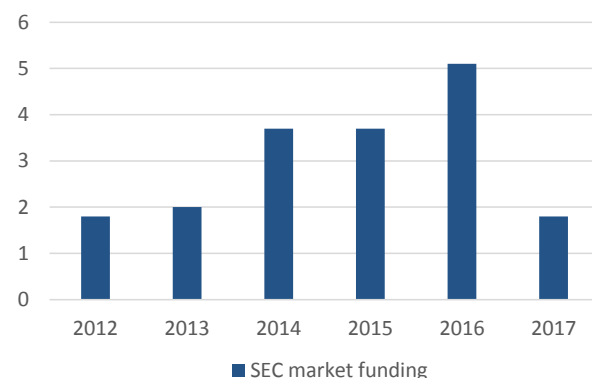
The current market structure in the Kingdom has been beneficial to IPPs as SEC assumes most of the risks through a guaranteed power purchase agreement (PPA) underwritten by the state. PPAs offered to IPPs are usually 20 to 25 years on a 'take or pay' basis at an agreed strike price for the duration of the contract, to mitigate demand-side risk. In the Kingdom, IPPs are usually baseload plants. Most IPPs also sign fuel supply agreements with the government to mitigate feedstock price fluctuations. These favourable terms came at a time when the government wanted to bring IPPs and quickly increase capacities. But it is unclear if these terms will continue after liberalisation of the market. If the government does not underwrite IPPs with private off-takers, following market liberalisation, IPP terms may become less attractive to private investors.

Strong desire for reform

The government has begun plans to reform the sector with several reasons behind the urgency. First, having seen a third consecutive year of budget deficits, the government is keen on having a more sustainable resource allocation plan. This also comes at a time when the Kingdom is pursuing an ambitious plan to diversify its economy and allow for greater participation from private sector. The power sector is perhaps one of the most suitable industries for privatisation.

Second, inefficiency and high liquid fuel consumption in power generation is a cause for concern. Historically, the government has relied on inefficient and cheap-to-build plants to meet rising demand. These included open-cycle power plants - the quickest solution at a time when rising domestic consumption of valuable liquid fuels was not a major concern. Although the country is steadily reducing its crude consumption in power plants with demand in 2017 at 436k b/d - an eight-year low - fuel oil consumption has increased from 384kb/d in 2015 to average 516kb/d in 2017.

SEC market funding (\$bn)



Source: MEES,

Third, financing is a growing challenge for the state utility. SEC's growing reliance on external finance has helped reduce the burden on the government but the state utility is borrowing at all-time highs. SEC borrowed a record \$5.1bn in 2016, surpassing previous records of \$3.7bn in 2014 and 2015. However this fell to \$1.8bn in 2017. SEC, which has always preferred to have a complete monopoly on power generation, realises the need to rely on non-government funds for its expansion programmes, and is increasingly relying on domestic and international financing, as well as IPPs to fill in the gap. Since 2007 to date, SEC has borrowed \$26bn from local and international capital markets.

IPP limitations

The current trajectory of IPP growth in the Kingdom can prove distorting and inefficient in the longer term if not properly managed. Allowing a greater share for IPPs relieves SEC from a large financial and operational burden. But at the same time, IPPs usually sign long PPAs that can last between 20-25 years, meaning that SEC is obliged to buy all the electricity generated over the duration of the contract. In theory, this is fine as long as demand continues to rise. However, after years of unprecedented growth in electricity demand in the Kingdom, demand growth is now actually slowing. If this continues, the government could find itself with overcapacity and costly obligations in the long run, although in the medium term, this is less of an issue.

IPPs are also given feedstock price and availability guarantees, making their investments profitable and less risky, thus sending incorrect signals to the market. With plans in place to privatise the power sector and implement reforms, which will result in a more liberalised market, the current trend in IPP involvement can complicate such efforts. As more IPPs are introduced, their respective generating assets will be tied to long-term PPAs - which could impede the desired progression towards market liberalisation. To overcome what is perhaps a structural issue in the market; the government could introduce competition to a segment of the market as a means of absorbing residual demand. This would mean the market would have both a regulated segment and a competitive segment. The challenge is whether the two can co-exist together.

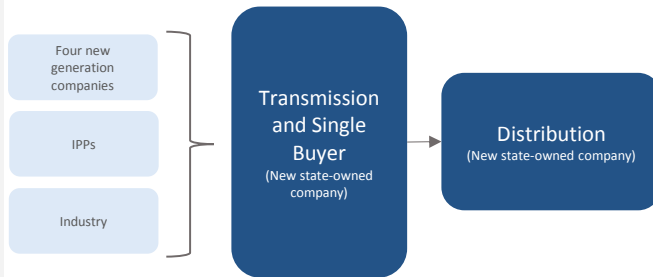
A new market structure is needed

Accepting the urgent need to reform, the government has announced that it will break SEC up into four power-generating companies, one transmission and one distribution company. This is a first step towards market liberalisation, which has long been overdue. Much uncertainty remains on the timing of these reforms, which were first announced to take place by the end of 2016. The plan will centre on allocating SEC's power-generating assets to four companies, with the likelihood that these companies will be offered to local and international investors. These companies will also likely be offered on the Saudi Stock Exchange. The government hasn't made clear if it will remain a shareholder.

The new market structure implies that the government will keep the single-buyer model and maintain its monopoly in the transmission and distribution networks. The new market structure will follow an unbundled single-buyer model.

This will make the power-generating element of the sector more competitive and could eliminate some of the inefficiencies prevailing in the current bundled single-buyer model where the state owns most power-generating capacities.

Future power sector structure



While this market structure is likely to be the one put in place in the near future, reform could also come in the form of a multiple buyer approach – where wholesale buyers compete amongst themselves to purchase power from generators. This structure allows for competition at the wholesale level and reduces the off-taker risk since there will be more than one buyer in the sector. This also improves efficiency although long-term contracts are usually in place. In this structure, wholesale buyers sell their electricity to one or more transmission/distribution companies who then sell to consumers. Multiple buyers will enable price signals to work and government involvement will be reduced as the market becomes more liquid. The regulator can also regulate the electricity companies in order to protect consumers and ensure fair prices. More importantly, the government will not have to guarantee the off-taker, which is a key requirement for the private sector in the current market structure. A key requirement will be transparency on market rules and an overall regulatory framework.

One of the main challenges that will arise when breaking up SEC's generating assets will be the impact on existing IPPs, which usually include SEC as the majority shareholder. SEC will either sell its shares to the project partner or allocate the share to the newly formed generation companies. Another issue will be on the price these companies will pay for feedstock fuels in the future. It is unclear if generators with long-term contracts will be subjected to international feedstock prices or if they will continue to pay subsidised prices.

Integrating renewable energy in the new market structure will also be important. The Kingdom announced plans to seek \$30-50bn in investments by 2023 to help meet the 9.5GW target for solar and wind energy, and the first utility-scale solar project was recently awarded to ACWA Power. The 300MW Sakaka PV project – to be located in the AL-Jawf region - achieved a world-record price of \$0.02342/kWh and will operate under a long term PPA.

The private sector will require PPAs to participate, although this should not be a problem as the government will be willing to provide guarantees given the significant upfront cost associated with renewable projects. While the main obstacle behind renewable deployment in most countries is financial, the Kingdom's original renewable plan never kicked off for several other reasons. The first was that, until recently, SEC believed that it is cheaper to build conventional power plants. The second reason was related to the absence of institutional capacity and support policy frameworks for renewable programmes to

succeed, which the government is addressing. Last, renewable energy deployment in the region has only recently gained momentum, and as more countries accelerate with their renewable energy targets, the feasibility and cost effectiveness of these projects is reinforced further.

Recent price reforms will help form a new market structure

The government also introduced a series of price reforms to help reduce demand growth. It first raised electricity prices at the end of 2015 by up to 100% for some consumption brackets, although the final price was still very low. Households with consumption levels below 4,000kWh per month were unaffected, while the price for consumption of between 4,000kWh and 6,000kWh increased from SAR0.12/kWh to SAR0.20/kWh. For consumption levels above 6,000/kWh, the price was set at SAR0.30/kWh.

Saudi Electricity Tariffs (SR/kWh)

Sector	Consumption kwh/month	2016	2018	Change %
Residential	< 6,000	0.05	0.18	260
Residential	> 6,000	0.30	0.30	0
Industry		0.18	0.18	0
Government		0.32	0.32	0

Source: MEES

In late 2017, the government introduced the second round of price hikes. Electricity tariffs went from SAR0.05/kWh to SAR0.18/kWh for residential consumption levels below 6,000kWh/month. Residential consumption levels above 6,000kWh/month remained at SAR0.30/kWh.

This inevitably has had an impact on electricity demand growth. The first phase of reform in late 2015 saw energy demand growth decrease from 3.5% in the first half 2015 to 1.7% in the first half of 2016. However, it is difficult to attribute this decline solely to the hike in prices, given that GDP growth - one of the main demand drivers - fell to 1.4% in 2016 compared with 4.1% to 2015. Looking forward, the government expects annual electricity demand growth to be 1.5%.

But the energy price reforms were not exclusive to electricity. The first wave of reforms at the end of 2015, in addition to a hike in gasoline and transport diesel prices, also increased the price for fuels used in the power sector, although these were not uniform. Natural gas prices increased by 67%. Diesel for power generation was also increased by 55% in the first wave of reforms, and a further 15% at the start of 2018. Whilst prices for crude oil to industry were also increased by at least 50%. These reforms would ultimately compound financial pressures on SEC, as the company was making losses even before the price increases. Whilst retail price increases were needed in order to address this problem, they did not solve it. But the Kingdom is also keen on increasing the role of gas in the power mix, raising its share from 50% to 70% by 2030. This is in line with Aramco's target to double natural gas processing capacity to 23 billion cubic feet per day (bcfd) by 2021.

Saudi energy prices

Product	Unit	2015	2016	increase	2018	increase
Natural Gas	(\$/mmbtu)	0.75	1.25	67%	Unchanged	0%
Ethane	(\$/mmbtu)	0.75	1.75	133%	Unchanged	0%
Diesel Industry	(\$/barrel)	9.11	14.1	55%	16.15	15%
Arab Light Crude	(\$/barrel)	4.24	6.35	50%	Unchanged	0%
Arab Heavy Crude	(\$/barrel)	2.67	4.4	65%	Unchanged	0%

Source: Apicorp research

Conclusion

The government has begun a process of overhauling the power sector. On the supply side, a market structure reform with the breakup of SEC is imminent while on the demand side, the government will try to tackle rising demand by liberalising electricity prices and introducing efficiency measures. While these announced market and price reforms are long overdue, they are certainly a step in the right direction.

But the lack of clarity on how consumers will respond to price hikes, as well as the unclear future structure of the power sector

and uncertainty surrounding the renewable-energy integration form the key challenges.

The government is aware that reforming its power sector will be difficult. Numerous international examples are available for the Kingdom to learn from but it will need to ensure that best practices can be applied in the Saudi context.

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