GCC Power Market Overview - 2016

Written by Ventures Onsite for Middle East Electricity
Overview of the GCC Power Market

The GCC power sector will require about US$ 50 billion of investment in new power generating capacity. The GCC alone will add 76.8 gigawatts (GW) of capacity for power generation between 2016 and 2020 (pan-Arab energy investment bank Apicorp estimates). According to the International Renewable Energy Agency (IRENA), GCC electricity consumption is expected to reach 856 terawatt-hours by 2020, requiring 100 GW of additional power over the next 10 years to meet the demand. Strong economic and demographic growth, driven in part by the GCC economies’ highly energy-intensive industrialization programmes, has led to a dramatic surge in power consumption. As the demand increases, the GCC countries are also experiencing significant requirements for power sector infrastructure development. The GCC countries have collaborated in developing a joint Gulf power grid, to develop the region’s electricity network and also help unify the six countries. The grid has already led to savings of US$ 3 billion in investments, in addition to a savings of US$ 330 million of operating costs and fuel, according to the Gulf Cooperation Council Interconnection Authority.

The total value of GCC power projects is estimated to be worth US$ 247 billion (as of 7th February 2016). Saudi Arabia (KSA) registered the highest project value among the GCC countries worth US$ 118 billion followed by the UAE and Kuwait (refer Figure 1).

Figure 1 represents the total value of power projects and share in the GCC as of 7th February 2016.

Snapshot of GCC Renewable Energy Market

Interest in renewable energy in the GCC has been on the rise in recent years. The GCC countries are as richly endowed with renewable resources, and benefit from strong regular sunshine and the space to develop large solar power plants.

The countries could save up to three billion barrels of oil, if they reach their 2030 renewable-energy targets, which would save them about US$ 200 billion. Renewables have formed an important part in the GCC governments’ strategies to diversify the domestic energy mix with the region’s consumption anticipated to continue growing at a fast pace over the next two decades.
The UAE is the leading country among the GCC countries for launching several solar-power projects. The country is likely to be more successful in diversifying its energy sources within the next decade, with the development of a nuclear power plant and increasing focus on renewable energy. However, natural gas will play a crucial role in fuelling the country's power sector.

Figure 2 represents the renewable energy projects in the GCC.

Figure 2 - note: Construction start and end dates are not mentioned for projects in early planning stage or on hold.

Source: www.venturesonsite.com
Analysis of the Power Market for each GCC Country
**UAE**

According to *IRENA*, renewable energy has become economically attractive in the UAE. Increasing renewables to 10% of the country’s total energy mix, and 25% of total power generation, could generate annual savings of US$ 1.9 billion by 2030 by reducing fossil-fuel consumption and could lower energy costs.

The UAE has been embarking upon a nuclear power program in close consultation with the International Atomic Energy Agency. It accepted a US$ 20 billion bid from a South Korean consortium to build four commercial nuclear power reactors, total 5.6 GWe (Gigawatt of electrical output), by 2020 at Barakah. All four units are now under construction. The first is more than 75% complete and is expected to be completed in 2017.

The Federal Electricity and Water Authority (Fewa) of the UAE is set to spend about US$ 354 million on the development of new power distribution stations and expansion of key facilities in the Northern Emirates. The major projects include construction of 25 new power distribution stations, expansion of 17 existing stations and replacement of overhead electric cables with underground ones in the emirates of Ajman, Fujairah, Ras Al Khaimah and Umm Al Quwain (UAQ). The UAQ will have five power stations including the main power station at the Umm Al Thaub area, stated Mohammed Saleh, the director-general of Fewa. Four other stations worth over US$ 7.62 million will be built at Al Hamra-2 area in April 2016, Al Suwaihat area in June 2016, the Intersection-2 area in August 2016, and the Old City in December 2016. Unveiling the plans for Ras Al Khaimah, ten new stations will be built in different areas of the emirate. The major station, to be built at a cost of US$ 19.05 million, is expected to be ready in February 2016. The other nine substations will be built spending US$ 7.62 million each at Shaml in March 2016, Shaikh Khalifa in April 2016, Al Rams-2 and Ghalila in May 2016, Al Jazeera Industrial area in July 2016, Al Dheit and Al Hamraniya in August 2016, Al Rifa-3 in September 2016, and Al Daqdaqa in December 2016. Under this scheme, Fujairah will get five new substations.

Dubai Electricity and Water Authority (Dewa) has approved strategic projects worth over US$ 7.34 billion based on the independent power producer (IPP) model in its new budget. The utility firm’s move is aimed at leveraging public private partnerships (PPP), building new capacity in renewable energy, and diversifying the emirate’s energy mix in the long term. Dewa has announced a total budget of US$ 6.43 billion for 2016, a slight increase from US$ 6.2 billion in 2015. Dewa will
launch a tender to build the third phase of the Sheikh Mohammed bin Rashid al-Maktoum Solar Park in six weeks. The project will include construction of an 800MW solar photovoltaic independent power plant at Seih al-Dahal along the Dubai - Al Ain Road. The facility, to be developed as an independent power producer (IPP) model, is the largest single-site solar project in the world. It will produce 1,000MW by 2020 and 5,000MW by 2030, at a total investment of US$ 13.6 billion.

This supports Dubai Government’s Clean Energy Strategy 2050, which is aimed at reducing carbon emissions. Under this plan, initially 25% of Dubai's energy will come from clean sources by 2030, which will be increased to 100% by 2030.

On the project’s progress, the work is progressing well on the 200MW second phase of the Solar Park, which will be operational by 2017, and the 800MW third phase by 2020.

Dubai doubled the capacity of the Phase 2 of the solar park from 100 MW to 200 MW after receiving the lowest-ever recorded cost for solar power in a tender won by Saudi Arabia’s ACWA Power and Spain's TSK. Dewa supports Dubai’s Plan 2021 to establish the emirate as a smart and sustainable city, whose environmental elements are clean, healthy, and sustainable.

The UAE has the right regulatory environment to foster solar energy investments, which will help achieve net zero energy buildings to support the nation’s sustainable development goals. Both emirates have ambitious initial targets: Abu Dhabi wants solar to account for 7% of its output by 2020, while Dubai is aiming for 5% by 2030.

The Emirates Nuclear Energy Corporation (Enec) has signed a connection and interface agreement (C&IA) with the Abu Dhabi Transmission & Despatch Company (Transco). The agreement establishes a contractual operating framework between the two entities that will allow for the electricity generated from Enec’s four nuclear energy units located in Barakah to be transmitted over Transco’s power lines to the UAE grid. The signing of this agreement allows ENEC to prepare for the energisation of the switchyard, which is an important milestone for the UAE peaceful nuclear energy programme and the delivery of the four nuclear energy reactors. The energisation of an electrical infrastructure is a safety test performed under the supervision of qualified experts to examine new electric equipment and verify its conformity to the regulatory requirements. This important phase allows the equipment to be energised and for testing to be performed. Once the
equipment is deemed satisfactory for normal service, the equipment is turned over to the system operator for normal service.

Enec continues to progress safely and to the highest standards of quality in the delivery of the four nuclear energy units in Barakah. Unit 1 is now over 84% complete, Unit 2 is 64%, Unit 3 is 41% and Unit 4 is 25%. Enec’s first unit is scheduled for completion in 2017. All four units and the associated subsidiary buildings are now over 58% complete and, pending regulatory approval, the four nuclear energy units are scheduled to be operative in 2020. Each unit’s progression remains scheduled at approximately 12 months apart. Nuclear energy will play a critical role in the provision of sustainable energy to power the future of the UAE.

**Saudi Arabia (KSA)**

KSA will need investments worth US$ 133.3 billion in electricity projects over the next 10 years to cope with the rising power demand and wherein the private sector is expected to take part. The country expects peak electricity to hit 90,000 megawatts (MW) in 2022. Installed capacity is around 70,000 MW now. Contracts to build an electricity grid to connect KSA and Egypt would be signed before mid-2016, and the project would operate at full capacity before mid-2019. KSA’s energy consumption was expected to grow by 4-5% annually in the next few years, reaching double its current level by 2030 if no efficiency measures are taken. KSA will spend US$ 100 billion on renewable energy over the next 20 years.

KSA is the world’s largest oil producer and exporter, but its future in solar energy is not very sunny. The Kingdom’s domestic consumption of fossil fuels is expected to nearly triple by 2030, according to International Energy Agency, which estimated that the demand for energy may grow to 8.4 million barrels of oil equivalent in 2028 from 3.4 million barrels. KSA’s target of renewable energy is between 16% and 22% in 2032, according to IRENA. It plans to build solar projects with a total capacity of 40 GW. King Abdullah City for Atomic and Renewable
Energy (KACARE), established in 2010 by late king Abdullah Bin Abdul Aziz, seeks to make the oil-rich state self-sufficient in sustainable energy.

Hydrocarbons will remain a primary element in the probable energy mix in 2032, but they would be supported by nuclear, solar, wind, waste-to-energy, and geothermal: hydrocarbons, 60 GW; nuclear, 17.6 GW; solar, 41 GW (of which 16 GW will be generated through the use of photovoltaic cells and the balance by concentrated solar power); wind, 9 GW; waste-to-energy, 3 GW; and geothermal, 1 GW. In this scenario, nuclear, geothermal, and waste-to-energy will meet the base load of night-time demand during winter; photovoltaic energy will meet total daytime demand year round; concentrated solar power, with storage, will meet the maximum demand difference between photovoltaic and base-load technologies; and hydrocarbons will meet the remaining demand.

Saudi Electricity Company (SEC) has signed a US$ 980 million deal to build a combined cycle power plant in Waad Al Shamal in December 2015. The plant will have a total capacity 1,390 MW, of which 50 MW will come from a solar component. The solar energy will save the equivalent of 4 million barrels of oil equivalent over the duration of the project. Including the cost of connecting the plant to the electricity grid, the project's total costs are expected to reach US$ 1.24 billion. The power plant is due to be completed in 2018.

KSA plans to construct 16 nuclear power reactors over the next 20 years at a cost of more than US$ 80 billion, with the first reactor on line in 2022. However, there have been differences over KSA’s solar ambitions, as there are concerns about the scale of the project, its ownership, and the technology. Regulations governing the development of the sector, long awaited by foreign investors who set up offices in KSA in anticipation of huge, lucrative solar projects, have still not been approved. According to BMI research, a sustained period of lower oil prices and the resultant fiscal pressures will curb KSA's ambitious plans to build nuclear and solar capacity and lead to a bigger focus on a smaller number of strategically important power projects.

**Qatar**

Qatar is geographically well positioned to tap its tremendous solar energy potential and has set a target of 2% renewable energy contribution in the national energy mix by 2022. Qatar’s solar energy future is steadily developing. The state of Qatar has set a benchmark with its implementation of massive innovative programmes in deploying large solar power plants. The GCC has seen rapid growth in renewable energy generation and consumption, with Qatar leading the region, supported by innovative research and infrastructure development plans.

Deployment of new renewable energy initiatives has ensured that the small Gulf country has become a primary producer of solar energy, enhancing its sustainability drive. Being the most abundant and viable energy source, solar energy effectively addresses the increasing power requirements in the region, as the ongoing construction
projects ramp up in the shadow of the FIFA World Cup 2022. Qatar General Electricity & Water Corporation (Kahramaa) has targeted a generation capacity of 200 MW through solar power by 2020. Qatar’s first solar power station is set to be operational by 2016.

Kahramaa has recently launched a mega project to monitor its electricity distribution network in a bid to prevent outages. The monitoring for asset management of 11kV Electricity Distribution Network, which serves households, would have the capability to sense the conditions that could cause large-scale power supply disruptions. The scale of the above project is being considered as first of its kind in the GCC region as a whole covering the entire Electricity Distribution Network, according to Kahramaa.

The Solar-Smart Grid project – an initiative of the Qatar Foundation (QF) – is also the first commercial photovoltaic (PV) project to be granted approval for grid connection from Kahramaa. According to industry approximations, QF’s solar energy smart-grid-enabled systems generate up to 85% of Qatar’s total solar energy output. Qatar Environment and Energy Research Institute (QEERI) announced its plans to set up a solar map by 2016, which will assist in identifying areas across the country that receive high-intensity solar radiation, with the aim to install solar cells for power generation. Five solar stadiums for the 2022 World Cup will use ground-breaking solar-powered cooling technology to enhance the use of renewable energy.

Renewable energy is still in nascent stages in Qatar. While the country has excellent solar energy potential and limited prospects for wind, biomass and tidal energy, it has negligible renewable energy capacity and no renewable energy legislation in place. Qatar experiences moderate wind speeds, which are suitable for small wind turbine generators for water pumping or to produce electricity at remote locations, such as isolated farms.

Biomass energy potential in Qatar is largely contributed by municipal wastes and a 34 MW waste-to-energy plant is already in operation at Domestic Solid Waste Management Center at Messiaeed. Moreover, solar PV and concentrated solar power are well suited to local climatic conditions and serious efforts are already underway to tap Qatar’s vast solar power potential.
However, while Qatar has exceptional solar energy potential, price competitiveness and lack of a renewable energy policy framework poses a challenge to the growth of the solar power in the region.

**Oman**

As far as the country’s power sector is concerned, market reforms stretching back almost two decades ensure that it is among the most competitive in the GCC, well capable of ramping up production in line with the country’s growth.

Current priorities for the sector include completing an ambitious waste management investment program, encouraging the growth of renewable energy and further honing the regulatory environment. According to IRENA, renewable energy currently plays no role in Oman’s energy supply, despite important wind and solar resources, and a policy for developing renewable energy resources is needed. If implemented, this could give renewable energy an important role in reducing Oman’s dependence on oil and natural gas. Demand for electric power in Oman is increasing rapidly because of the economic growth driven by the oil and gas sector. Increasing consumption of natural gas for new power projects has led the government to embrace renewable energy projects, in line with the sultanate’s Vision 2020 economic diversification plan.

Economic growth, urbanisation, and industrialisation have all contributed to continued rising domestic energy use. Increasing personal income, housing starts, and continuing government investment in infrastructure projects are major contributors to continued high growth in electricity demand. The country possesses important untapped renewable-energy resources. The level of solar radiation in all regions of Oman is reckoned to be among the highest in the world. Wind is also a promising renewable energy resource, especially in the coastal and southern parts of Oman. Oman is developing an energy strategy that entails the production of 10% of its electricity needs from renewable energy resources.

Mitsui & Company and its consortium have won a major contract from Oman Power and Water Procurement Company (OPWP) to develop a US$ 2.3 billion power plant project in the sultanate. As per the deal, the consortium – which includes KSA’s Acwa and Dhofar International Development and Investment Holding Company of Oman –
will build a total 3.15 GW gas-fired combined cycle power generation units for Ibri and Sohar-3 power generation projects in the northern region. On completion, these power plants will be supplying 30% of the electricity that will be consumed in the Muscat area.

**Kuwait**

According to the Ministry of Electricity and Water of Kuwait, the country, which has one of the highest per capita energy-consumption rates in the world, plans to reach its target of generating 15% of its energy from solar power by 2030. The government has earmarked US$ 9.9 billion for infrastructure projects including power and progress is being made on greenfield thermal and renewable projects. Kuwaiti authorities are eyeing 9,000 MW in additional new capacity by 2020 to meet demand. The ministry said it is seeking to generate a total of 2,000 MW of renewable energy by 2030 by launching three projects. The first phase will be a 70 MW energy park scheduled to be completed by 2016. This facility will be built on 100 square kilometres of desert. The second and third phases are projected to produce 930 MW and 1,000 MW, respectively.

Construction is underway at Kuwait’s Shagaya renewable-energy park – starting with a photovoltaic plant. The solar facility, being constructed by Spain’s TSK Electronica y Electricidad and local construction company Kharafi National, will form part of the park being built around 100 kms west of Kuwait City. The Shagaya facility is being developed by the country’s Ministry of Electricity and Water and the Kuwait Institute for Scientific Research. The photovoltaic plant will boast a 10 MW capacity and should be connected to the grid in the first half of 2016, according to TSK. The park’s first phase will also include a 50 MW solar thermal plant.

**Bahrain**

Bahrain has embarked on a new era of modernisation and development of the existing power infrastructure to meet the increasing demand due to population growth and industrial expansion. The government has allocated US$ 4 billion in 2015 to be invested in the power and water sector by 2020. In this, the private sector role remains crucial in implementing the strategy especially at a time when the public sector spending is being squeezed due
to the record and persistent low oil prices. Bahrain, the smallest of the six GCC countries, aims to produce 5% of its energy from renewables by 2030. The country’s energy resources are limited, and its domestic oil production is estimated at only 30,000 barrels per day. According to IRENA, Bahrain plans to build a 500 MW concentrated-solar-power plant, in addition to small-scale hybrid power plants using solar and wind.

Bahrain is also developing renewable energy sources to reduce its carbon emissions and fuel input costs, with hopes that the cost of solar infrastructure will eventually lower, making it more cost-effective in comparison to subsidised conventional utilities. Under the Kingdom’s blueprint for social and economic development, named Vision 2030, up to 7% of its energy needs are to be met by renewable sources within 15 years. The construction of the pilot projects is expected to lay the groundwork for the renewable strategy. An extended period of low hydrocarbon prices may, however, put pressure on renewable energy investments as cheap input costs for conventional generation plants potentially reduces the appeal of new solar projects for private investors.
Major GCC Power Projects
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Country</th>
<th>Client</th>
<th>Contractor</th>
<th>Start Date</th>
<th>End Date</th>
<th>Est. Value (US$ Million)</th>
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<tbody>
<tr>
<td>Al Zour North IWPP</td>
<td>Kuwait</td>
<td>Kuwait Authority for Partnership Projects (KAPP)</td>
<td>Hyundai Heavy Industries, Sidem, France</td>
<td>Q2 2013</td>
<td>Q4 2022</td>
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<td>Fadhili Power Plant</td>
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<td>Saudi Aramco</td>
<td>Not Appointed</td>
<td>Q1 2016</td>
<td>Q1 2020</td>
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<td>Facility D - IWPP</td>
<td>Qatar</td>
<td>Qatar General Electricity &amp; Water Corporation (Kahramaa),Tokyo Electric Power Company, Incorporated (TEPCO),Mitsubishi Corporation, Qatar</td>
<td>Tokyo Electric Power Company, Incorporated (TEPCO),Mitsubishi Corporation, Samsung C &amp; T Corporation, Hitachi Zosen Corporation, Japan</td>
<td>Q3 2015</td>
<td>Q3 2018</td>
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<td>Yanbu Power and Desalination Plant - Phase 3</td>
<td>KSA</td>
<td>The Power &amp; Water Utilities Company for Jubail &amp; Yanbu (Marafiq), Saline Water Conversion Corporation (SWCC)</td>
<td>Al Jaber Engineering, Samsung Engineering, Al Toukhi Company for Industry, Trading &amp; Contracting, Doosan Heavy Industries &amp; Construction Co.</td>
<td>Q4 2012</td>
<td>Q2 2017</td>
<td>3,000</td>
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<td>Al Zour North IWPP - Phase 1</td>
<td>Kuwait</td>
<td>Ministry of Electricity &amp; Water (MEW), Kuwait, Shamal Az Zour Al Oula KSC</td>
<td>Kuwait Authority for Partnership Projects (KAPP),Ministry of Electricity &amp; Water (MEW), Kuwait, Shamal Az Zour Al Oula KSC</td>
<td>Q2 2014</td>
<td>Q2 2016</td>
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<td>Nuwaiseeb IPP</td>
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<td>Project Name</td>
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<td>Est. Value (US$ Million)</td>
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<td>--------------------------------------------------</td>
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<td>Qatar Power Transmission System Expansion - Phase 13</td>
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<td>Q3 2016</td>
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<td>Jizan Refinery - IGCC Power Plant</td>
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<td>Coal Fired Power Plant at Hassyan - Phase 1</td>
<td>UAE</td>
<td>Dubai Electricity and Water Authority (DEWA)</td>
<td>Alstom Power Service, Dubai (Alstom Middle East)</td>
<td>Q1 2016</td>
<td>Q3 2020</td>
<td>1,500</td>
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Source: [www.venturesonsite.com](http://www.venturesonsite.com)
Future Outlook
Blackouts in parts of the GCC suggest that even the some of the richest countries in the world are not immune to a power crisis. The GCC countries will have to move on various fronts to address their rising electricity needs. The region will also have to develop a sound framework to slowly reduce energy subsidies. This is apart from raising awareness of energy efficiencies and developing legislation that encourages the use of energy-friendly products. In addition, population growth, industrialisation, and urban migration are all stimulating demand for power. Therefore, it puts forth huge investment and growth opportunity. The GCC will require as much as US$ 316 billion by 2020 to meet its growing power needs (The Arab Petroleum Investment Corporation estimates). The GCC's power sector has leveraged its strength as a fossil fuel producer to source cheap and plentiful power for the domestic economy. Crude oil is seen as an inefficient energy source for power generation and most economies have moved away from oil and focused on natural gas, hydro, nuclear or renewables to generate electricity. However, countries like KSA still depend on crude oil for power, a trend that is to continue in the absence of alternatives. The key is for the GCC to monetise its natural gas reserves to displace crude oil for domestic power consumption. While nuclear power and renewable energy is set to become a part of the GCC's energy mix, they will continue to play an important role at least over the next twenty years.

With the GCC’s vast desert and the highest solar radiation in the world, the potential is very high for solar plant implementation. Solar power can drive the future of GCC countries, as the region’s 60% surface area has excellent suitability for solar-photovoltaic deployment. The lack of a clear policy framework is one of the main reasons for limited solar activity in the GCC. Additionally, it is imperative for solar energy to emerge as a key focus area in government’s agenda. Therefore, re-energising the renewable energy programs will give a boost to the solar power sector in the GCC.

In conclusion, government investment in the GCC power markets is expected to be robust over the next two to three years.
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