

Navigating Saudi Arabia's Multi-Gigawatt Renewable Energy Program

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Navigating Saudi Arabia's Multi-Gigawatt Renewable Energy Program

Saudi Arabia is finally showing its muscles in the Middle East and globally with plans to deploy nearly 10 GW of renewable energy capacity over the next six years. The world's biggest oil exporter launched its first utility-scale solar and wind tenders in 2017 as part of a broader strategy that aims to diversify the economy beyond oil and encourage foreign investment.

Managed by the Renewable Energy Project Development Office (REPDO) of Saudi Arabia's Ministry of Energy, Industry and Mineral Resources, the National Renewable Energy Program (NREP) seeks to substantially increase the share of renewables in the country's energy mix. The plan is to generate 3.45 GW by 2020 under the National Transformation Program, and 9.5GW by 2023, towards Vision 2030.



Figure 1: Sakaka City, Saudi Arabia. Source: World Atlas

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 Laurent Becerra, Vice President Middle East & Africa, **EDF**

 Mohammed Ayoub, Executive Projects Director, **GE Power - Saudi Arabian Projects**

 Michelle T Davies, Partner, **Eversheds Sutherland**

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Bids have already been invited for the first-round projects totalling 700 MW, comprising Dumat Al Jandal 400 MW wind power project and Sakaka 300 MW solar PV project, both to be built in Al Jawf Province, north-western Saudi Arabia. While bidders for Dumat Al Jandal have until January 2018 to submit their proposals, the Sakaka tender is moving faster. The \$300-million solar project attracted record-low bids as revealed in October 2017, with the lowest levelized cost of electricity at 1.78 US cents/kWh, bid by Masdar-EDF, followed by 2.3 US cents/kWh, bid by ACWA Power.

Table 1: REPDO's first two utility-scale projects

	Sakaka Solar PV Project	Dumat Al Jandal Wind Power Project
Capacity	300 MW	400 MW
Shortlisted companies	128	24
Bids invited	8	TBA
PPA duration	25 years	20 years
Commissioning	2019	TBA

The six other consortia were led by Spanish infrastructure developer Cobra; French energy utility ENGIE; subsidiary of French oil giant Total Solar International, as well as three companies from Japan: engineering group JGC Corp; business conglomerate Marubeni Corp, and general trading giant Mitsui and Co. Bidding companies are expected to be shortlisted by November 28, 2017, and the contract should be awarded to the winning consortium on January 27, 2018.

"The prequalification conditions for the round-one solar project were very selective, which restricted the qualified pool to solar industry giants and large quasi-state actors," Browning Rockwell, executive director of the Solar GCC Alliance and founder of Saudi Arabia Solar Industries Association (SASIA) said.



Figure 2: Browning Rockwell, Founder of Saudi Arabia Solar Industry Association addressing the REPDO-sponsored Saudi Arabia Renewable Energy Investment Forum in April 2017

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Considerations to take

As the country's first public-private partnership tender, the Saudi government is very keen to make it as easy as possible for international companies to invest in the kingdom.

"What is great is that REPDO is taking a lot of responsibility. They will provide the land and support any licenses required. In fact, if a foreign company is coming in and does not have a license from SAGIA [Saudi Arabian General Investment Authority], as soon as they sign the PPA, they will receive an immediate license for 25 years, the life of the contract," Hisham Alhegelan, director at Abengoa Saudi Arabia said.

Abengoa is involved on the EPC side of REPDO's solar and wind tenders. The Spanish group is already active in Saudi Arabia, where it is constructing a massive desalination plant with a capacity of 250,000 m³/day for ACWA Power in consortium with Fisla Italmimpianti, and the 1,390 MW Waad Al Shamal ISCC for Saudi Electricity Company (SEC) with General Electric.

Unlike other tenders in the region, the Saudi Power Procurement Company, a subsidiary of SEC and the offtaker for renewable projects, will hold no stake in the asset that's being built. And while the financial obligations of the offtaker will be guaranteed by SEC, no sovereign guarantees will be provided from the government.

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Moreover, the Sakaka project features significantly long lock-in periods placed for the sponsors (commercial operation date + 10 years), which seems unusual for a solar PV project, according to Rockwell. Across regions, lock-in periods are usually 1-2 years after commencing operations.

"Normally, in a conventional IPP/IWPP comprising of complex O&M requirements, extended sponsor's involvement is essential for ensuring smooth project operations. However, in a solar project, the O&M requirements are not as complicated," Rockwell said.

He added that a solar plant is considerably de-risked once the plant is connected to the grid and commences operation. "The flexibility to recycle investments shortly after the project starts operating would also allow sponsors to reinvest their limited capital on competitive terms in subsequent rounds of projects."

Sourcing local content

One of the toughest technical criteria set for round-one projects is a 30% local content requirement, a ratio which REPDO said will increase in future rounds. The percentage includes goods manufactured in Saudi Arabia, and not just assembled, as well as Saudization – how many citizens are recruited and how much they get paid.

According to ACWA Power, the NREP Saudization Compliance Metric formula is created to measure the levels of Saudization and local spending in the kingdom of the total expected CAPEX of the project, and to establish and develop a network of local suppliers. During the operation phase, the project company is required to employ qualified Saudi Arabian nationals, so that the total number is at least 25% within five years from the commercial operation date, 50% within 10 years, and 75% within 15 years.

However, the kingdom has a limited manufacturing capacity for PV components, mostly for the first stage of the value chain. According to Sabri Asfour, general manager of Fas Energy, a power plant's levelized cost of electricity, the main factor in competitiveness, is largely dependent on the technology as PV components account for 36% to 50% of project costs.

"It's going to be a gradual process, starting with parts in the value chain that are lower in complexity and have less requirements in capital intensity and scale. Tracker structures, moving on to inverter assembly, module assembly and the last step, which will probably take a while, will be silicon-wafer based PV cells," Moritz Borgmann, partner at cleantech advisory Apricum, which is active in the Saudi solar and wind tenders for some of the bidders said.

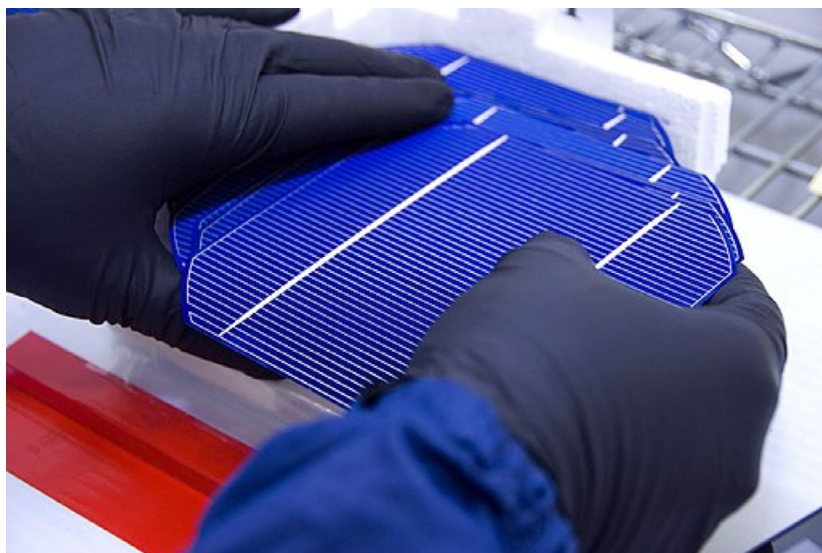


Figure 3: A finished solar wafer. Source: Wikimedia Commons

Alhegellan expects to see the more specialized components, especially in PV, all coming from China, simply because of pricing. "There's no way right now to manufacture PV panels locally and compete with the outside market, unless the government decides to strongly subsidize the industry. I'm sure as the program grows, we will see local manufacturing."

Borgmann similarly remarked that the international market for renewable energy components is highly competitive and that apart from logistics, there were few areas where developers could cut costs. "On the bright side, Saudi players have the chance to be almost on par with international cost levels, but that will require hard work," he said.

Saudi Arabia is known to have a large industrial base for the oil and construction sector as well as cement, steel and cable manufacturing. Basic support and electrical equipment for the solar plants can also be covered locally. However, with just one polysilicon manufacturer, based in Jubail, PV developers will likely have to import components for the initial projects.



Figure 4: Jubail is home to Saudi Arabia's only polysilicon manufacturer. Source: Wikimedia Commons

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"Civil works and installation services can easily be sourced locally. These subcontracted services fit the traditional construction model in Saudi Arabia. One of the challenges of the REPDO utility scale tenders will be how to encourage local supply chain development in a 'winner take all' tender process," Rockwell explained.

Wind turbines have over 3,000 parts, some of which could be sourced locally, he noted. Moreover, China's Goldwind, one of the 24 qualified companies in the 400 MW Dumat Al Jandal, signed an MoU with Saudi industrial property authority MODON in August 2017 to fabricate wind turbines in Saudi Arabia.

In the future, the kingdom could capitalise on its assets and become a manufacturing hub for solar and wind power plant components, given that land and electricity prices are not expensive compared to other markets and manpower is affordable. Moreover, there are highly credible EPC companies in the kingdom and some manufacturing facilities, with others looking to establish there, including from within the region.

"Saudi Arabia has a well-established IPP record and this project is not of a size which should encounter too many challenges. The challenge will be for the sponsor consortium to deliver this super cost effectively. I think wind will be more of a challenge particularly for the first gigawatts. We have seen in other markets just how difficult it is for wind technology to be provided in non-traditional ways and still be bankable," Michelle Davies, head of clean energy and sustainability at international law firm Eversheds Sutherland said.

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For a smooth entry into the market, Davies advises newcomers to “identify a good local partner, form relationships with the key government stakeholders, understand the regulatory regime and the changes that are likely to happen, and consider opportunities outside the tenders, particularly for private offtake and net metering.”

Table 2: Local Manufacturing Activity in Saudi Arabia

COMPANIES	DETAILS
Advanced Electronics Company – KACO New Energy	In September 2015, Saudi Arabia's Advanced Electronics Company (AEC) and Germany's KACO New Energy launched the country's first PV inverter line. The facility has a production capacity of 2,000 units, or 1 GW per year, and can produce inverters ranging from 20 kW to 2 MW.
Advanced Electronics Company – Power System	In January 2016, AEC signed a partnership agreement with Italy's Power System to set up solar energy IP65 container manufacturing and a maintenance services center at AEC's facility in Riyadh.
Afandi Group	Saudi conglomerate Afandi Group plans to open a SAR338m solar panel factory in the Red Sea port of Yanbu through its subsidiary Afandi Solar. Covering 55,000sqm, the factory will feature a production line utilising American, French and Swiss technologies to build solar panels from scratch. The facility will have an initial production capacity of 120 MW per year, or 450,000 panels, before being expanded to 1 GW.
Desert Technologies	Saudi solar developer Desert Technologies, which is involved in projects in Jordan and Egypt, acquired a 75 MW crystalline silicon assembly line and a 20MW amorphous-silicon manufacturing facility in 2014 to secure a competitive advantage in the market.
Green Gulf	Al-Khobar-based Green Gulf is in the process of constructing a solar PV manufacturing facility in Yanbu, western Saudi Arabia. The company plans to manufacture solar wafers and modules, with initial capacities of 750 MW and 200 MW respectively.
KACST	King Abdulaziz City for Science and Technology (KACST) in Riyadh built the first PV module assembly line in the kingdom in 2010 with an annual capacity that has now reached 100 MW. Operated by Saudi engineers, the fully automated line can produce multi- and mono-crystalline modules and has supplied Al Khafji water desalination project with about 40 MW of PV modules.
Polysilicon Technology Company	Headquartered in Jubail Industrial City, Polysilicon Technology Company is the only polysilicon manufacturer in Saudi Arabia and the first in the region, producing 3,000 metric tons of solar-grade polysilicon, using Hydrochlorination - Siemens process. In solar cells, polysilicon represents over half the cost of PV panel production.
Solar Frontier – Saudi Aramco – NICDP	In September 2016, Japanese CIS module maker Solar Frontier signed an MoU with Saudi Aramco and the Saudi Arabian National Industrial Cluster Development Programme (NICDP) to undertake a joint study into the feasibility of CIS solar panel production in Saudi Arabia.
Taqnia Energy	Taqnia Energy, a subsidiary of the Saudi Technology Development and Investment Co. is looking to invest in a polycrystalline PV module assembly line in Taif with an annual capacity that will reach 500 MW.

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Upcoming rounds

REPDO has already announced that round two of the NREP will go live during Q4 of 2017 and will have a total capacity of 1,020 MW, including 400 MW wind and 620 MW solar PV. "In the second and third rounds, the total amount will be huge, but it will be broken down to a lot more projects to give a chance to smaller companies, so it won't just be the big players," Alhegelan said.

Davies notes that participants in the upcoming rounds will be running their models to understand exactly what returns they can live with and how they can get their pricing to at least the ACWA Power pricing on Sakaka. "This will be the benchmark to beat. Of course, the larger the project, the greater the economies of scale so we expect pricing to be equally competitive."

When it comes to other forms of renewable energy, REPDO said at the Saudi Arabia Renewable Energy Investment Forum in April 2017 that the tender rounds will feature an increasing percentage of CSP and waste-to-energy (WTE) projects. "REPDO has forecast that by 2023, PV will account for approximately 5.5 GW, wind will account for approximately 2.5 GW, CSP will account for approximately 1 GW, and WTE will account for approximately 500 MW," a research note from Latham & Watkins law firm said.

Other sources suggest that the target of 3.45 GW by 2020 will comprise 1.95 GW of PV, 300 MW of CSP, 1.15 GW of wind, and 50 MW of WTE.

"It's all about pricing and what you need. A lot of the necessity in the kingdom is based on peak demand. The advantage you get out of CSP is the dispatchability and storage. If you don't need storage or dispatchability, then PV is perfect. For a longer-term program and if you're replacing plants that run 24/7, then CSP becomes important. After the results of Dubai's CSP tender and as the CSP market grows, prices will come down and plans may change," Alhegelan said.

Private-sector investment

Earlier this year, Saudi Arabia said that developing 9.5 GW of renewable energy by 2023 will require an investment of \$30–\$50 billion. However, this will not come from the government. "They have set targets which they hope to achieve via public tenders with private sector investment. Between the \$500 billion NEOM City announcements with 100% renewable and the pending IPO of Aramco, there's plenty of opportunity in the region. The \$500 billion mega-city will be floated on financial markets alongside oil giant Saudi Aramco as part of the kingdom's drive to diversify away from oil," Rockwell said.

Saudi Arabia is also forming strategic partnerships with governments and organisations. In October 2017, the country said it was planning to sign an agreement with Russia to set up a \$1 billion fund for energy projects, including renewable energy.



Figure 5: PIF and SoftBank Vision Fund, through SEC, will develop 3 GW of solar capacity in the kingdom in 2018

In the same month, SEC announced that Japanese telecom group SoftBank was looking to take a stake in the utility company as part of an agreement with the kingdom's Public Investment Fund (PIF) to develop solar capacity in NEOM investment zone. This followed the signing of an MoU between SoftBank Vision Fund and PIF, the majority shareholder of SEC, for the utility to develop 3 GW of solar energy in 2018.

While these ambitious partnerships could lead to a greater number of smaller projects, for the time being, large-scale power plants will be the focus. "Saudi Arabia's solar market is currently dominated by REPDO utility-scale projects which have limited the participation to global industry giants. Until the energy policy is changed to encourage distributed generation, there will be little private-sector organized solar activity," Rockwell said.

Overall, the Saudi market presents a great opportunity, especially because it has scale. The challenge now is getting momentum, according to Davies. "Once this is in place, the market will boom and beyond the 2023 target. It's also important not to ignore the non-government procured opportunities, especially in the off-grid space where so much is dependent on subsidized diesel generation."

Alhegelen concluded that the tender represents the start of what will probably become the largest market in the world. "There will be room for everyone, and I think any company that has expertise can bring it to the market."

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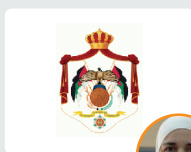
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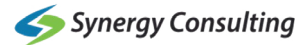
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