

PHOTOVOLTAICS

Israel's solar expansion



Israel is realising the benefits of having a distributed grid powered by plentiful renewables. But the country must also contend with a lack of available land as it decarbonises. Joe Charlaff, in Jerusalem, and Keith Nuthall report.

The government of Israel is pushing ahead with an ambitious plan to expand the country's solar power output, awarding two sets of tenders involving 840 MW of generating power in the past 12 months, as well as requesting bids for a huge single solar power plant in the Negev Desert for 300 MW.

This plant – which may also offer energy storage – would be located at Dimona, 35 km west of the Dead Sea. The government has set aside a 2.7mn m² site for the project and tender may be awarded this year. The new plants would follow the award last year of two major sets of contracts to develop solar power in the country.

First, in July 2020, a 168 MW tender award was announced by the Israel Electricity Authority, with three Israel-based energy companies – Doral Renewable Energy Resources Group, Enlight Renewable Energy and Ellomay Capital – scoring contracts. These were to develop 100 MW, 48 MW and 20 MW of capacity respectively, which the companies must bring online by 2022, feeding

the national grid. A second, and larger, award was announced in December 2020 and involved contracts to supply a total of 609 MW in solar energy, as well as 2.4 GWh of energy storage

Energy independence

The series of projects reflect a change in Israel's government policy and attitudes toward energy independence. The country has previously been dependent on energy imports and is now adding renewables to its domestic production roster, as well as exploiting the extensive gas fields off its Mediterranean coast.

In October, the government approved targets proposed by energy minister Dr Yuval Steinitz to produce 30% of the country's electricity from renewables by 2030, growing its solar energy output by 15 GW. These 2030 targets will be reviewed and updated by December 2024. The government has also fixed an intermediate target of 20% of electricity being produced from renewable sources by December 2025. The plan foresees \$24bn

being invested to achieve these goals.

The Dimona plant tender encompasses requirements for integrating energy storage in the form of batteries. Some 27 consortia from several countries submitted applications in the pre-screening process, signalling significant interest in the project.

Dr Gideon Friedmann, Chief Scientist at the Ministry of Energy, told *Energy World* that the solar energy expansion was firstly designed to reduce pollution in general, including greenhouse gas emissions. 'The second most important reason is energy diversity and security,' he said – ensuring Israel does not rely on one energy source, such as its growing gas sector, especially as the country phases out coal usage.

'Solar is a distributed source, and its generation can emanate from many sites, and is not as sensitive as generation from a central source,' Friedmann explained. 'If Israel was in a military conflict and a power plant took a hit, 400 to 600 MW could be lost.' As the energy unit costs of solar continue to fall, cost is another factor, he stressed. Moreover, Israel's government has encouraged private enterprise to invest in solar, which will also improve the diversity of energy sources.

Solar power plant at Tze'elim, the Negev desert, Israel

Photo: Albatross

Siting issues

Policy makers are intent on removing bureaucratic and infrastructure obstacles to bringing private money into the sector. One way this can be achieved is by enabling land to be allocated to solar farms, which require large tracts of this small country. As well as persuading farms to install solar panels where they can, the government is supporting the installation of roof-top panels.

'With local municipalities we issued a guaranteed loan plan with the help of a national lottery company which provides funding schemes for installation of PV on the rooftops,' Friedmann added. 'There has been a lot of activity on the municipal level.'

The Chief Scientist said changes would have to be made to the electricity grid to take better advantage of solar power. This includes ensuring power can be transmitted from more remote areas, such as the Negev, to the main population areas in the centre of the country. 'Upgrading [the grid] is a challenge because there is no more room for building new power lines,' said Friedmann. Instead, the existing grid will be upgraded to increase capacity, through high-voltage lines. Underground transmission will also increase, given above-ground constraints.

In addition, improved storage capacity is required 'and this will reduce the grid load,' according to Friedmann. Smart grids, managed automatically, will also make distribution more efficient. As for who will deliver these projects: 'The market is competitive - the bids are open to everyone with low requirements for participating in these bids. We are trying to create a market for as many players as possible and where the prices are fair,' he said.

Tamir Cohen, CEO of Israel real estate company Shikun & Binui, which has a keen interest in solar power, thinks solar energy is Israel's key renewable: 'Wind energy in Israel is limited due to the geographical situation - it's a small country with a lack of wind,' he noted, with an obvious lack of freshwater courses delivering hydro.

Dr Amit Mor, CEO and Co-Founder of Eco Energy, a financial and strategic consulting service, based in Herzliya, northern Tel Aviv, stressed that with the 90% decrease in the cost of solar panels and lithium-ion batteries in the past decade, solar power is green and cheap. This is especially true in sunny Israel: 'In our region, solar

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radiation is very high. There are more than 300 sunny days in the year, thus shifting to renewables makes sense in terms of environmental considerations and cost.'

Room for growth

There is plenty of room for growth. Currently, approximately 8% of Israel's electricity is from solar, 65% is from natural gas and 27% is from coal (and falling). The government concluded that, by 2025, Israel Electric Corporation will phase out coal for electricity generation. According to its forecast, by 2026 85% of electricity is going to be produced by gas, and 15% will be produced by renewable energy - chiefly solar.

Mor does not believe that the government target of 30% by 2030 will be achieved 'but it will be close'. By 2040, he thinks more than 40% of electricity will be produced by solar, increasing to 60% by 2050. Achieving this will not be easy, especially given the relative scarcity of land in Israel. Moreover, on the Negev, which is lightly populated, much of the land is 'hilly and not suitable for the producing solar energy', said Mor. Significant portions are also controlled by the Ministry of Defence for military training.

To achieve 30% of electricity generation (as projected by 2030), around 1.5% of Israel's land might have to be covered by solar panels, according to Mor. This shows why it's key to persuade food farmers to become 'solar farmers' and focus on future technologies which might include covering outside walls of buildings with panels,

along with increasing electrical efficiency.

Gal Shofrony, Head of the renewable energy section of the country's Electricity Authority, said the government had thought hard about its pro-solar strategy, stressing that wind turbines would be unpopular in highly urbanised Israel. The country needs a secure and diverse power generating system, he stressed.

One reason is that the population is growing. Israel is an anomaly demographically - its population is expected to double in 25 years, with women having an average of 3.1 children, compared to the average of 1.7 children across the other developed countries. The economy is also growing steadily (expanding 3.5% before COVID-19 hit last year), thereby increasing electricity demand. Another problem is that Israel is not connected to neighbouring countries' grids for diplomatic reasons.

Storage is a key factor

Shofrony stressed that significant effort is being expended so that storage releases power on cloudy days and during the evening, with a recent tender delivering 609 MW in stored power. The government wants to ensure Israel has standalone storage systems not dedicated to any particular power source by the end of 2021, he said. The government is also looking at sophisticated cost and revenue systems, where power producers help fund grid costs considering the location of solar plants - so that more remote plants may pay more for access to the grid.

'Storage is a key factor as it maximises the existing grid. It is also important for the grid operator having storage sites immediately accessible,' emphasised Shofrony. The government has tried hard to shift demand for power to hours when usage is comparatively light. Ultimately, Israel - a country that is 11 times smaller than the UK has to assign land to solar power, offering permits and dealing with complex planning issues associated with buffer zones for urban areas and growing demand for housing.

The country is known for its innovation, however. One might be installing panels above (rather than on) farmland so that farmers can generate power without harming their power yields. If anywhere can develop such energy technology, it is probably hi-tech Israel - and the rest of the world will be watching. ●

Solar power panels on roofs in Tel Aviv, Israel

Photo: Beko

