Dark times for big solar

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Are the clouds gathering over solar? *EcoGeneration* asked a panel of experts for their views on the outlook for this much beleaguered but highly trusted source of clean energy.

THE PANEL

Monique Miller, executive director, CEFC

Ku Jun Heong, director of sales and marketing Asia-Pacific and Middle East, Trina Solar

David Dixon, senior analyst renewables Asia-Pacific, Rystad Energy

James Larratt, co-founder and CEO, Solpod

A modular solution may tempt renters to invest in solar.

As more sources of renewable energy are connected to the grid it seems large-scale and commercial and industrial solar are battling to keep up the forward momentum they enjoyed only a few years ago. Investors in utility-scale solar are seeing the impact of marginal loss factors and curtailment on revenues, with the uncertainty of low daytime prices also casting a shadow over business plans.

EcoGeneration asked a financier, manufacturer, analyst and C&I installer about the outlook for this trusted source of clean energy. Are the clouds gathering over PV or will it just keep on growing?

Australia has been hit by bushfires, a falling dollar and now the global impact of covid-19. What is your outlook for investment in large-scale solar in Australia?

Monique Miller, CEFC: Large-scale solar will continue to play a meaningful role in Australia's energy transition, particularly as the grid evolves to accommodate lower-cost renewables, replacing the ageing coal-fired power fleet. We expect the trend in new committed projects to migrate from high numbers of medium-size projects to a smaller number of extremely large projects. Notably, this larger size can enable scale efficiency and offset higher connection costs.

Some very small projects are likely to soak up the remaining capacity at more crowded areas of the grid, taking advantage of the simpler connection arrangements.

Ku Jun Heong, Trina Solar: The bushfires in Australia late last year and early this year had no major negative impact on demand for solar. In fact, it raised a red flag among many in the community about the real need to switch to renewable energy to address the issue of climate change.

As for covid-19, it has been widely reported that the economic impact of the coronavirus is pushing Australia into recession. In the short-term there has been minimal impact because projects that were already well-progressed are continuing. But utility-scale projects tend to move in line with GDP. We will have to wait and see what the longer-term impact of covid-19 is on the economy and demand for large-scale solar projects.

I would not like to make predictions but it is true that – generally speaking – demand for large-scale solar projects is cyclical and in line with broader economic activity. The issue, however, is not just covid-19 and the economy; there have been delays in utility-scale projects in Australia because of grid connection approval.

David Dixon, Rystad Energy: At the beginning of 2020 Rystad Energy expected that 2-3GW worth of renewable projects would achieve financial close and begin construction this year, including 1-2GW of PV. At present, 530MW of PV capacity has taken financial close and has either already begun construction or will do so in 2020. The impact of covid-19 on project economics will likely delay or cancel the financial close of the remaining projects.

As expected, PPA pricing has followed capex down the cost curve. However, as capex has increased with rising hardware costs, developers will be challenged to profitably meet PPA pricing. Securing debt will be an obstacle in the short term, given that cash is now a scarce commodity; financiers are unlikely to lend cheaply.

Do you have any comments on the timetable for upgrades to transmission in weak parts of the NEM and the effect on the pipeline for large-scale solar?

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>
> – David Dixon, Rystad Energy

Ku, Trina Solar: There is a big pipeline of utility-scale projects in Australia but there have been delays because some sections of the grid are unable to take any additional power. The authorities are aware of the issue and are working to strengthen the grid. It will take time to achieve this nationwide. The trick will be to make improvements to the grid in those locations where the new utility-scale projects plan to come online.

There needs to be more investment made in the national grid to help fulfil the demand among industry and those in the community for more solar energy. Now is the time to make such an investment.

How viable is storage installed at generation at current costs?

Miller, CEFC: While the storage market is rapidly evolving, we see year-on-year cost reductions and technology improvements in utility scale battery technology and warranty terms. With smaller batteries being integrated with projects to minimise curtailment, we expect most larger scale batteries will increasingly derive their revenues from FCAS markets, where they can raise or lower frequency to balance the grid.

In areas with a higher penetration of renewables and more price volatility batteries are also increasingly likely to deliver load shifting, with the business case for this improving as renewables become a more significant component of the overall grid.

We are also seeing new applications for batteries in grid services which have traditionally been provided by the synchronous generation fleet. If markets for those services are developed, or transmission authorities attribute value to those services, this could support significant-scale batteries which are not necessarily co-located with generation.

Grid constraints have led to project delays.

> "Storage can increase the return on investment for a solar farm because the owner can capitalise on higher spot prices."
>
> – Ku Jun Heong, Trina Solar

Current modelling indicates that choosing a longer duration battery – for example, two hours versus one hour – may lead to a lower base case return if a revenue case relies on FCAS markets, where short duration batteries are still competitive. However, more sponsors are choosing a longer duration battery because of the increased optionality to use it for other purposes, such as load shifting, particularly if FCAS markets become saturated or we see more sustained price volatility.

Ku, Trina Solar: Some utility-scale projects in the pipeline are looking to have power storage. It gives flexibility to the solar farm developer and to the grid operator. They can pump in power to the grid when it is required and when the price being offered by the grid operator is high. If grid price is low and demand is low, the developer can always store the power in the battery. It is viable cost-wise.

They can increase their return on investment for the solar farm, because now they can capitalise on higher spot prices. Also, the cost

Business owners with available land may decide to invest in PV directly.

Demand for PPAs may soften if wholesale spot prices are forecast to drop.

of battery storage is falling thanks to economies of scale. It is important to note that when investors develop a solar farm they are thinking long-term, 15-20 years.

Dixon, Rystad Energy: Our understanding is it is currently too expensive, hence the majority of projects will require subsidies to get their projects over the line.

What risks do developers take in cutting costs in technology, such as panels, inverters, racking, etc?

Ku, Trina Solar: When an EPC or developer chooses any kind of technology, they need to look into whether it is a quality product and if the manufacturer has a good track record when it comes to delivery of quality product. You also need to be confident that if you buy a module, that the manufacturer will still be in business in more than 20 years from now. If something goes wrong, the manufacturer needs to be there to deal with product quality issues.

We are investing in high-efficiency, high-power modules that make use of larger cell sizes – namely 166mm-diameter cells and 210mm-diameter cells. These new modules deliver lower levelized cost of energy and lower balance of system cost. These new modules are compatible with mainstream inverters, trackers, etc.

Dixon, Rystad: Developers [who compromise by cutting costs on technology used in a solar project] risk poorer than expected performance, resulting in reduced revenues and economics.

What new developments in large-scale solar system design or technology do you see as having potential in Australia?

Miller, CEFC: We are interested to see more analysis on yield uplifts from bifacial solar panels and have installed a section of these at one of our investments to test how they perform versus "traditional" one-sided solar panels. As the high-irradiance areas of the grid become full and new projects may not achieve the same irradiance levels, incremental yield improvements will become important.

Other areas of potential are self-forecasting technology, bidding

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software and cleaning technologies as measures to optimise operation of existing assets.

Dixon, Rystad: Higher module power output, such as 500Wp modules, will have a big effect on project economics. A rough rule is for every 100Wp increase in module power capex reduces by 5%.

Ku, Trina Solar: Australia is usually at the forefront of technology in the solar market, so it is not surprising that Australian solar farm developers are shaping up to be early adopters of the new higher efficiency modules. The launch of Trina Solar's new 500W-plus modules, known as the Vertex series, is a significant new technological development in the market. There are two types of Vertex module: mono-facial backsheet modules and bifacial double-glass modules. If one is using a tracking system, the additional energy gain can be as high as 30% from the back of the module.

These new modules, particularly the bifacial version, are pitched primarily to large-scale solar developments. The 500W-plus Vertex modules are also being incorporated into TrinaPro, which is our integrated solution for solar farms that includes the modules, inverter, trackers, mounting system and monitoring system.

What do developers sometimes underestimate about the environmental and weather conditions when designing systems for Australia?

Ku, Trina Solar: Parts of Australia are very hot and very humid. In coastal areas, for example, you can have high salt mist, high humidity and temperature. Double-glass modules are highly recommended for installation in these harsh and challenging environments.

Do you see falling wholesale electricity prices impacting the uptake of power purchase agreements?

James Larratt, Solpod: Not necessarily. A key driver for companies to enter power purchase agreements is to meet their sustainability goals. As the world considers the recovery from covid-19, there is a push for higher aspirations on a Green New Deal, which may result in a greater take up of renewable PPAs.

Ku, Trina Solar: Hopefully the drop in wholesale prices will be short-term. Lower energy prices do impact on the LCOE calculations. The issue of lower wholesale prices is a result of the current situation, which is the lockdown in Australia caused by covid-19. Many industries are not currently working. This is a short-term scenario. Once the lockdown is over, industries such as manufacturing will restart and demand for electricity will increase. There has been disruption in the market caused by covid-19. Hopefully, it is short-term.

Dixon, Rystad: Potentially [falling wholesale prices will impact the uptake of PPAs], although it depends on the counterparty, their time horizon and their view on prices.

What is your outlook for the commercial and industrial solar PV sector?

Larratt, Solpod: The C&I solar market entered the covid-19 pandemic in a strong position as businesses were choosing in record numbers to take up the benefits of rooftop solar. The sales cycle is long, so we do not expect to see the impact of covid-19 pandemic on install volumes for six months.

Ku, Trina Solar: The C&I segment of the solar market has been growing for several years now. For the commercial and industrial companies, solar energy is really a no-brainer because it means you spend less money on electricity from the grid as you have your own source of electricity. All major retailers in Australia, for example, have been installing solar on their rooftops.

How can solar be best utilized in dense industrial zones?

Ku, Trina Solar: If you are an industrial business with no vacant land or very little available roof space, then one option is you can purchase the solar energy via a virtual power plant [VPP]. It means someone puts up a solar plant, usually 5MW to 20MW, and then different industrial businesses tap into that. We are seeing VPPs, for example, being established in South Australia.

Cancellations will affect the pipeline for utility-scale solar projects.

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Larratt, Solpod: Currently, solar on an industrial property probably tells you more about the ownership structure of the property than the underlying economics. Owner-occupiers are buying solar. Tier-1 property funds are also buying solar to meet their investors' expectations for sustainability.

This leaves many businesses who are renting without access to solar. These businesses may have only a few more years committed to the site, which has been a period too short for solar to deliver savings.

Solpod has a rental offer where businesses can rent our prefabricated, 10-panel pods on a short-term basis, say one year. The pods are redeployable and deliver electricity at a similar rate to standard rooftop PPAs of eight or more years.

What are some interesting PV ownership models for businesses you've seen working in other markets?

Miller, CEFC: We expect to increasingly see the development of large residential and C&I solar-plus-storage portfolios under a lease or PPA model, as has occurred in other markets.

In recent years, businesses have tended to invest in solar using cash and their normal funding lines. However, with businesses increasingly combining storage with solar investments, to lock in longer term lower costs and emissions we may see off-balance-sheet finance models become more attractive, particularly in an era of cash constraints and cost mitigation.

This has the added advantage of allowing large energy users to outsource the management and maintenance of their energy system investments.

Ku, Trina Solar: In some overseas markets one interesting approach is a group cap deal, where you have multiple end customers – in the C&I segment – which develop a powerplant or ask a developer to develop a powerplant.

You might have, for example, four customers that put up a 100MW power plant and each gets 25MW. This way you achieve economies of scale by reducing, for example, the cost of land acquisition and cost of developing the powerplant.

In the utility segment, a novel approach we have seen in the US market is tax equity financing, where you have investors who help to finance the project. They receive the tax benefits that result from the project, while the benefits that come with selling the solar energy go to the developer.

Larratt, Solpod: The Solpod rental offer is unique and delivers businesses the benefits of rooftop solar without the long commitment or complexity of a rooftop PPA. While purchasing a solar array or entering a standard rooftop PPA commits the business to today's technology for decades to come, Solpod's rental offer can efficiently enable businesses to upgrade panels in the future or opt out of solar if circumstances change. eco