

# Solar Power Top Trumps

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**Elliot Hayes**

04/01/2021

With the cost of solar power reaching historic lows paired with relative ease of construction and production stability, solar power is one of the safest bets for renewables investment. The International Energy Agency takes it one step further, stating that solar power is “the cheapest electricity in history”.

IEA chief Dr Fatih Birol anoints solar as the clear leader of future energy markets saying: “I see solar becoming the new king of the world’s electricity markets.”

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However, the technology behind solar power runs a poor second to wind energy when it comes to PR. The likes of Vestas and Siemens Gamesa have become household names when the same cannot be said of solar power players, unless you buy into Tesla’s (genius) solar roofing solution... which has yet to come to market properly.

This general perception is beginning to change with record low prices being achieved and a shift in direction for panel manufacturers heralding a sexier future on the horizon for solar energy.

In the past, most improvements to panel performance came from efficiency gains due to advances in solar cell technology. While that is partly a driver behind the massive jump in panel wattage, the main factor is new larger cell sizes being developed together with a greater number of cells per panel.

Solar efficiency has been at the forefront of developers’ minds in the lead-up to 2020. This year we have seen a shift in focus from increasing the efficiency of the panel to boosting net power. Since early summer many industry leaders have been announcing panels of 500W and more, but in July Trina Solar was the first to break into the next bracket launching its 600MW model called Vertex. It also claims to be close to having a fully-developed 660W panel to bring to market.

Zhang Yingbin, head of product strategy for Trina Solar, says: "The Vertex ultra-high power module is based on the brand new 210/M12 cell technology, combining Trina's more than 20 years of technological experience and innovation, excellent R&D team and first-class domestic intelligent manufacturing base.

“This combination makes the Vertex series modules quickly become the new benchmark in the industry. At the same time as technological innovation, Trina Solar has been cooperating with third-party organisations to jointly explore the testing methods and evaluation standards for the long-term reliability of modules.”

However, its lead on power output did not last for long and the following month (August) Jinko Solar announced its 610MW Tiger Pro 78TR panel at the SNEC PV Power Expo in China.

Dr Jin Hao, CTO of JinkoSolar, comments: "Reducing costs and increasing efficiency is the goal that the industry has always been striving for. JinkoSolar has always been committed to providing global customers with high-efficiency, top quality, and extremely reliable solar modules.

"We will increase our investment in R&D to ensure constant innovation in our technology, improve our products' performance, and ensure the highest system compatibility. This will allow us to fulfill our commitment to offer the best service to our global customers and to allow the application of our solar modules in a variety of scenarios, further empowering the solar PV industry and achieving grid parity."

Also in August, Canadian Solar started talking about its HiKu 7 650W model. It is not yet clear when the module will be on the market, but it appears to be the most powerful that will come to market soonest.

Dr Shawn Qu, chair and chief executive of Canadian Solar, remarks: "Following the launch of our 500 W+ modules, I am excited to introduce our 600+ W modules, which marks another milestone for Canadian Solar as the leader in solar PV cell and module technologies."

He adds: "As always, the design of our new Series 7 modules puts our customer needs at heart. Our focus is not only to increase power wattage but – more importantly – to reduce LCOE, improve product reliability and increase energy yield. These product and technological innovations will continue to boost solar project returns, further improve solar energy's competitiveness and accelerate the global clean energy transition."

The panel will come in both bifacial (BiHiKu 7) and monofacial (HiKu) models, giving clients the option to choose between the two technologies.

## **Bifacial versus Monofacial**

The technology behind bifacial solar panels has been around for quite some time – since the 1960s – but it has taken time to gather momentum due to its higher cost in comparison to monofacial units.

However, as prices started to drop and further advancement on technology and knowledge on how to measure accurately the cost of bifacial plant – as well as how to accurately predict the power production with all of the variables accounted for – bifacial looks set to become the industry standard.

If adopted, bifacial modules can produce additional power of 10-20% over monofacial panels. If conditions are optimised and single-axis trackers used, that additional power can be as much as 30-40%.

"Bifacial modules are the future of the industry," said Hongbin Fang, technical director of LONGi Solar. "It inherited all the advantages of mono PERC modules: high power density resulting in significant BOS savings, high energy yield with better low-light performance and lower temperature coefficient.

"In addition, bifacial PERC modules also harvest energy from the rear side, demonstrating higher energy yield. We think bifacial PERC modules are the best approach to realize lower LCOE."

Talking about predicting how much energy the module would produce, a solar source says: "The challenge with bifacial is predicting the power output from the bottom panel as it is dependent on whatever is underneath the panel and how good that is at reflecting onto the panel."

The industry source adds: "Until this can be properly forecasted, lenders will continue to feel uncertain about using this type of module."

Wood Mackenzie anticipates that bifacial solar will by 2024 account for more than 17% of global installations. By 2030, Bloomberg New Energy Finance believes bifacial will account for 35% of the market share among all silicon PV modules.

But there's a lot more to panels and their performance and one of the key elements is how they are fixed to the ground, with significant technological advancements logged in the last couple of years.

## **Solar Tracking**

Fixed-tilt solar panels on utility-scale projects are a thing of the past. It is understood that around 80% of solar farms in

the world now use some form of solar tracking. Not only is this more efficient, but it also increases net power by around 30%.

However, it also comes at a price. Trackers only really make financial sense when the yield gain over fixed-tilt is more than the capital expenditure of the system itself.

Single-axis solar trackers follow the course of the sun east to west, rotating on a single point, moving either in unison, by panel row or by section. Dual-axis trackers rotate on both the X and Y axes, making panels track the sun directly.

Solar trackers have quickly become the go-to technology to mount panels to the foundations. Much like with the panels themselves, cost and space have been a huge benefit for single axis trackers, costing less and taking up less space.

“Trackers will be instrumental to the continued wide scale adoption of solar energy products around the world,” said Jeff Krantz, Chief Commercial Officer of Array Technologies.

“The combination of weather data and machine learning algorithms allow us to identify the optimal position for a solar array in real time, generating up to 25% more energy than “fixed tilt” or non-rotating panels.

“This increased energy output makes solar a more attractive and cost competitive energy solution and represents a significant value to the customer. We are confident that the increasing use of trackers will continue to accelerate the adoption of utility scale solar projects well into the future.”

Furthermore maintenance and its related costs on the dual axis are a big deterrent for the technology but, developer confidence is growing in these mechanisms and – more importantly – bankers are increasingly comfortable lending against this technology.

## What's next?

Some are pointing towards floating solar energy as the future for the industry. Virtually untapped, the first solar farm to be floated was in 2007 at a Californian vineyard. Since then only another 350 have been built, equating to some 2.6GW, with significant advancements expected in this space across Asia in coming years.

“Floating solar technology has huge advantages for countries where land is at a premium or where electricity grids are weak,” says Riccardo Puliti, senior director for energy and extractives at the World Bank.

“Governments and investors are waking up to these advantages, and we are starting to see interest from a wide range of countries in Africa, Asia and Latin America.”

Obviously, developers are looking at more powerful panels. This, however, does often mean larger panels as was seen with the JA Solar announcement for an 800W solar panel... appropriately called Jumbo. The panel stand 2.2 meter high by 1.75 meter long, making it less practical for utility-scale use.

But the fact remains that the price of solar energy continues to drop and the technology continues to improve, so whatever shape and size panels come in, the outlook of solar is... sunny.

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