

## THE SOLAR LEAD

# Bifacial Could Be the Default Solar Technology by 2030

What will the solar industry look like a decade from now? A new GTM Squared series takes a look.

# The Solar Lead

From Emma Foehringer Merchant



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Solar is now considered a mature renewable technology. As the energy transition continues, PV is expected to be the resource leading the way in the U.S. and many other global markets.

However, just because it's reached maturity doesn't mean the industry and its interlinking technologies don't have plenty of room for advancement, and maybe even the occasional breakthrough.

In a new GTM Squared series, we'll delve into the technological and structural changes the solar industry is likely to adopt over the next decade. First up, we look at bifacial modules.

## The potential for bifacial

Bifacial solar hasn't had an easy time in the U.S. market, with the Trump administration swinging back and forth on whether it will offer a Section 201 tariff exclusion for imported bifacial modules. That hasn't stopped bifacial modules from becoming the default choice for many large-scale developers.

Just a couple of years ago, bifacial was still considered to be too expensive to achieve widespread commercial application. Now, numerous large-scale developers have proclaimed that their near-term plans will center almost exclusively on that technology.

In 2024, Wood Mackenzie expects bifacial solar to account for over 17 percent of global installations. By 2030, Bloomberg New Energy Finance believes bifacial will account for 35 percent market share among all silicon PV modules.

Neither consultancy has offered specific numbers on the proportion of total large-scale installations bifacial solar will claim in a decade's time, though BloombergNEF acknowledges "bifacial will dominate ground-mounted projects by then."

Ten years from now, if monocrystalline passivated emitter and rear contact — "mono PERC" for short — remains the cell technology of choice and supply matches demand, bifacial is expected to be the go-to for the majority of utility-scale projects across the globe.

## The current state of bifacial solar

After cost declines over the last couple of years, bifacial solar is now cost-competitive with single-sided modules. In 2019, it cost \$0.259 per watt to produce a monofacial mono PERC module, according to WoodMac, while bifacial costs only marginally more at \$0.265 per watt. Bifacial products become even cheaper to produce when manufactured by vertically integrated companies.

For that reason, plus the 5 to 15 percent worth of energy gains bifacial brings to a project, large-scale developers are increasingly relying on the technology. That shift is particularly pronounced in the U.S., where bifacial modules can currently be brought into the country tariff-free.

The great majority of bifacial solar capacity installed today is in China — more than 6 gigawatts of a total 8.8 GW through the first half of 2019, according to WoodMac. The consultancy expects global capacity to increase steadily in the coming years, overtaking 21 GW by 2024. Asia and North America are forecast to account for more than half of that growth.

Looking into the near future, developers and manufacturers are bullish on bifacial. Lightsource BP, a solar developer backed by the European oil major, went all-in on bifacial last year for its installations that use silicon PV. Kevin Smith, Lightsource's CEO of the Americas, told Greentech Media that switch is happening globally, not just in the U.S.

"In the Lightsource BP world, the shift has already happened," said Smith. "We expect that our current views are not unique in this industry."

Indeed, all of the modules Chinese manufacturer Longi shipped to the U.S. for utility-scale projects in 2019 were bifacial. The technology accounts for between 40 and 50 percent of the company's current global orders, Longi told Greentech Media.

"The proportion is only going to go higher, that's for sure," said Hongbin Fang, the company's director of product marketing.

Bifacial makes up about a quarter of the 40 GW worth of projects that solar tracker company NEXTracker has ever supplied, and the great majority of the company's pipeline focused on silicon technology.

"I would bet we're going to be in a world of bifacial being the standard at 2030," said Greg Beardsworth, NEXTracker's senior director of product.

## What's the catch?

The success of bifacial solar will ultimately depend on how much extra power developers can actually squeeze out of the two-sided panels. While there's no doubt bifacial means additional energy, it's still unclear how significant the increase is — thus the 10 percent spread in projected gains mentioned above.

The coronavirus pandemic further complicates bifacial's rise. In September, a WoodMac analysis showed that a global economic downturn — such as the one the world is now experiencing — could depress bifacial uptake by delaying projects and lowering power prices across the board. Other factors dampening bifacial's potential remain the same as those that existed several years ago, even as developers and banks have become more comfortable with bifacial technology.

Overall, the industry lacks data on the long-term output from bifacial projects. That means lenders generally do not consider bifacial energy gains as they finance projects, which ultimately undervalues the two-sided technology.

Financing solar projects depends on achieving an accurate estimate of a project's output, which can be a complex process. And without a large body of data indicating the amount of power bifacial technology produces in the field, banks are financing bifacial projects as if they were monofacial installations — even though it's understood that they'll produce more power.

In the next decade, many analysts and developers expect the industry to surmount those struggles because of the sheer amount of bifacial solar being installed. Wide deployment of the technology is happening at a more rapid clip than independent tests can keep up with.

The National Renewable Energy Laboratory started a three-year bifacial field study in 2019, after years of working on modeling forecasted bifacial output. The lab's initial results show cumulative annual energy gains between 7 and 9 percent, based on comparisons between five different bifacial technologies and their single-sided counterparts installed in Colorado.

Along with examining the possible configurations for the installations — an area that NREL researcher Chris Deline calls a "wide open area for innovation" — NREL is testing different ground coverings, such as light-colored fabric. Albedo, which is the reflectivity of a surface, plays a key role in determining how much energy the panels can produce. The lighter the ground and the higher the albedo, the more sun is reflected back onto the panels.

As more projects come online and help prove the technology's attributes, it should form a feedback loop on financing, said Longi's Fang.

"Once you have projects on the ground, you get more data," he told GTM. "Once you have a few banks and they're comfortable financing the bifacial gain, then more will follow suit."

Developers are plowing ahead regardless. Xiaojing Sun, a senior solar analyst at WoodMac, believes the U.S. market hit 80 percent bifacial by 2024. A decade is a long time in solar years, but by 2030 it's easy to imagine that number creeping close to 100 percent.

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Stephen S. · 4 days ago

Great article! We are learning a ton about BIF as deployment volume increases and performance data is shared. BIF performance bump is valuable in markets with higher ratio of diffuse irradiance and we've got lotsa markets like that in the US. Probably more importantly, is the PVEL data showing that the BIF bump is most prevalent during midday when energy value is low and peters out in afternoon when energy value high. Great recipe for filling up batteries but no so much for maxing production during peak TOD periods.

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