



CLEAN ENERGY TECHNOLOGY

COVID-19 and Solar PV: How will the solar PV industry weather the storm of a global pandemic?



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Today, the world is in a unique and unprecedented position. The coronavirus disease 2019 (COVID-19) has been the catalyst for seismic changes, and such a storm of social, economic, and health implications has never been felt before in peacetime. The upcoming period will bring great challenges for all industries, economies, and individuals. It may also bring opportunities as the recovery takes place, and a new and different world emerges on the other side of this global crisis.

The PV industry, being linked so closely to the decisions of policy makers, has always been subject to major swings in demand, with sudden—and often unexpected—changes to the outlook for the industry being a commonplace in the last 10 years. Over the years, IHS Markit has made several major unplanned adjustments to its global forecasts as a result of rapid changes in incentive policies and trade tariffs. However, none of them have been as drastic or as surrounded in uncertainty as those which have been made in response to the global pandemic and its subsequent global recession.

Although it is too early to make a precise assessment of the solar capacity (in megawatts: MW) that will not be installed as a result of the crisis, IHS Markit is (for the first time ever) predicting that global PV installations will decline in 2020. This is a result of both the immediate paralysis of global industries and the long-lasting damage to the economy. However, the inherent benefits of PV technology, which make it a low-cost sustainable and reliable source of power, could mean that the solar industry is better placed than many to weather the storm and play a role in the recovery, particularly as the world continues to transition toward a lower-carbon economy.

A global pandemic triggers an economic collapse of unprecedented proportions

There is little to add about the outbreak of COVID-19 that has not already been well reported in every media outlet around the world. Early in 2020, the virus could be relatively easily dismissed as a domestic problem in China. However, that quickly changed as it spread globally with a speed and ferocity that few were able to predict and almost no individual, government, or economy was prepared for. Johns Hopkins University reported on 28 April 2020 that confirmed cases of the virus had exceeded 3 million globally, growing alarmingly from 2 million just 13 days before. Five countries have so far crossed the grim milestone of 20,000 reported deaths caused by the virus, and likely more will follow.

The cost to human life is undoubtedly a tragedy that will never be forgotten. However, the damage to the global economy simply cannot be understated and will also be felt for a very long time to come, along with a transformation to the way society operates. The restrictions that have been placed on daily life in nearly every country have made it impossible for many businesses to operate, either because of a collapse in demand or because they simply cannot practically operate within the social distancing guidelines that are being enforced. There is also the lingering concern that, with many businesses failed and unemployment rate increasing, their customers will not quickly be able to return once the restrictions are lifted. IHS Markit projects that the recession will be steep and will take a long time to recover. The percentage of decline in global GDP in 2020 is forecast to be more than double the figure seen during the global financial crisis in 2009.

The solar industry is facing the same two big questions as most other industries. The first, and most immediate: how to best manage the current unprecedented level of disruption and still be there when the recovery starts. The second, but most important: how to be best placed as a major part of the recovery and to continue being at the forefront of the transition to a low-carbon economy and help tackle climate change.

The immediate impact: A temporary halt to production turns to a collapse in demand

The solar industry, like others, first felt disruption as a result of COVID-19 when manufacturing in China ground to a halt in early 2020. The situation in China had quickly escalated throughout January, eventually leading to an extension of the Chinese New Year holiday and most factories were unable to open for around a month. Even once factories were able to restart, restrictions on movement within and outside China severely constrained the flow of exports out of the country. With over 70% of polysilicon, wafer, cell, and module manufacturing located within China, as well as an estimated 60% of inverter manufacturing, this immediately raised concerns amongst developers and EPCs waiting on the delivery of components to complete projects in 2020. In many cases, installation deadlines were extended to reflect this, and some developers declared "force majeur", which meant they are unable to fulfill a contract because of unforeseeable circumstances.

With careful and strict management of the situation, China has been able to bring the spread of the virus within its borders under control, and manufacturing was fully recovered in most regions before the end of the first quarter. The supply of PV inverters and PV modules has returned to normal, except for some challenges with delivery due to restrictions on logistics and export. However, the nature of the problem flipped overnight from a disruption to supply, to a collapse in demand as restrictions on movement and travel imposed to curb the spread of the virus led to component imports and installations ceasing almost completely in most markets.

The precise impact on demand for solar PV varies by region and segment depending on the severity of the restrictions put in place in each country. In some cases, construction of PV plants falls under the category of 'essential construction' and has been able to continue, but in others installation works have paused completely. Roof-top systems requiring installers to visit homes and businesses have temporarily become all but impossible in the current situation, since door-to-door sales have been prohibited in most regions.

Clearly, the reduction in demand that will be seen in 2020 is largely dependent on how quickly the restrictions can be lifted and installations can resume. IHS Markit's current most likely scenario (as of late April) is based on the industry's ability to return to a 'normal' level of activity in the third quarter with installations reaching a record number in the fourth quarter. In that scenario, it is currently predicted that annual installations in 2020 return to similar levels seen in 2018 at 109 GW, a reduction of over 20% compared with its previous forecasts, and a decline of 12% compared with what was completed in 2019.

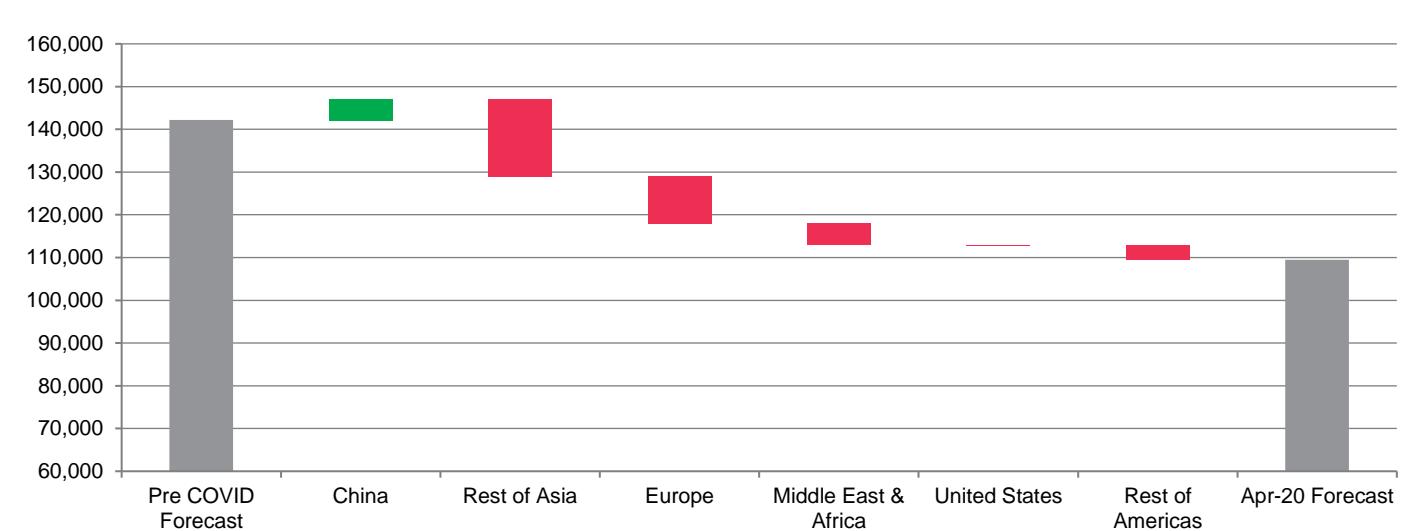
The United States is one country where the cut to the forecast is relatively modest, particularly relative to the size of the market. Here, construction activity has largely continued, and a large pipeline of projects all planned for completion in 2020 have mostly proceeded as planned. Many of these projects are currently making use of modules that had been stockpiled to

Figure 1: COVID-19 and the PV industry: Timeline of events

- 31 December:** China alerts WHO of several cases of 'unusual pneumonia' in Wuhan
- 7 January:** Officials announce they have identified a new virus
- 11 January:** First death in China
- 13 January:** A case is reported in Thailand—first outside China
- 20 January:** First case is reported in the United States
- 23 January:** Some cities in China placed in lockdown
- 24 January:** France confirms 3 cases—first in Europe
- 27 January:** China extends Chinese New Year holiday
- 30 January:** Virus confirmed to have spread to all 31 provinces of China—WHO declares a global emergency
- 2 February:** First death outside China is reported in Philippines
- 14 February:** Europe's first death is reported in France
- 24 February:** India's Ministry of Finance declares solar project developers can invoke force majeure
- 9 March:** Italy imposes a nationwide quarantine
- 17 March:** Confirmed cases reported in all European countries
- 25 March:** California Solar & Storage Association states that installing and maintaining renewable energy resources can be viewed as an "essential service" and can continue throughout lockdown
- 27 March:** Construction stopped for all renewables in South Africa
- 30 March:** Construction of solar farms in Spain banned
- 30 March:** Intersolar Europe cancelled
- 31 March:** Portugal postpones 700 MW solar auction
- 2 April:** Confirmed global cases exceed 1 million
- 2 April:** SNEC PV Exhibition is postponed
- 7 April:** US residential installer, Sunrun, withdraws its 2020 guidance and announces job losses
- 13 April:** Construction ban lifted on Spanish PV systems
- 15 April:** Confirmed global cases exceed 2 million
- 20 April:** Sunpower announces it has stopped production at all of its factories, located in five countries
- 28 April:** Confirmed global cases exceed 3 million

take advantage of Investment Tax Credit safe harboring regulations. However, these projects do face the possible risk of supply shortages in the future should manufacturing in Southeast Asia (where the majority of product is imported to the United States from) become heavily disrupted.

Figure 2: Global PV installations in 2020 – Changes to forecast by region (MW)



Notes: IHS Markit PV installations forecast from April 2020, compared with forecast from December 2019.
Source: IHS Markit

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The one country bucking the trend completely is China, where IHS Markit has cautiously raised its forecast for installations in 2020. Having appeared to have successfully contained the virus and be getting “back to business”, IHS Markit has raised the forecast under the assumption that policy and incentives will be strengthened to stimulate the local market in support of its domestic manufacturers, which will suffer a stalling international demand. As such, IHS Markit now predicts that China will install 45 GW in 2020, which will account for over 40% of global installations this year.

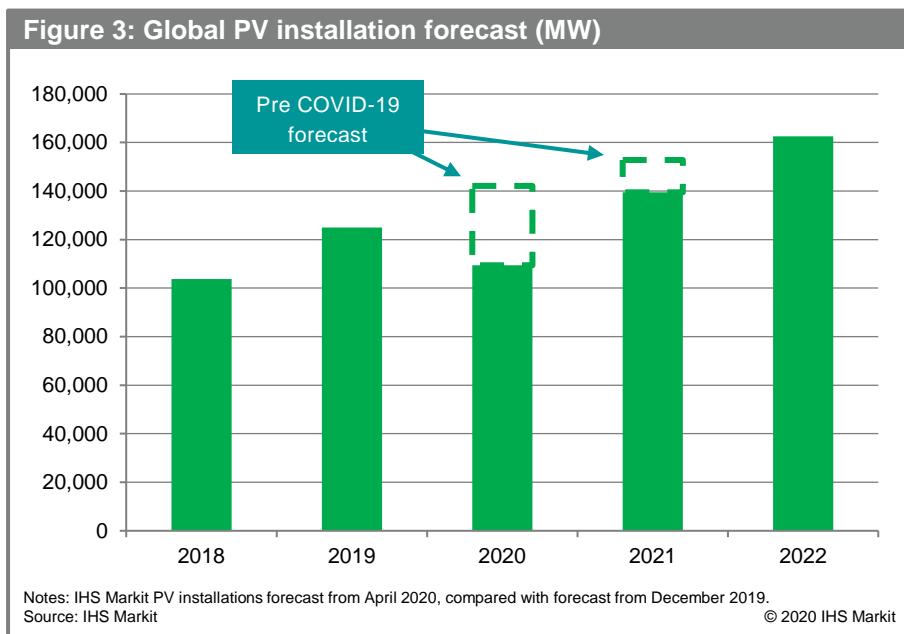
Outside of these two exceptions of the United States and China, the forecast for installations in 2020 has been reduced. IHS Markit has lowered its predictions for this year for nearly all other countries by at least 30% compared with its previous forecasts.

Another immediate consequence of the pandemic on the solar industry today is challenges around carrying out operations and maintenance (O&M) on existing plants. This has led to increased value being placed on digital technologies and the role that they can play in remote O&M. Recent years have seen an increasing amount of digital technologies embedded into PV systems to provide advanced features such as fault diagnostics and reporting, and more granular monitoring. With increasing difficulty in travelling to plants for maintenance or repairs, it has become even more important to monitor and diagnose potential faults and mitigate against them. As a result, digital technologies and low-maintenance reliable products are likely to increase in popularity in the future.

Looking further ahead: When will the recovery come, and what will the solar industry of the future look like?

Once the market has got back on its feet and the worst of the global crisis has passed, the bigger questions will be around the new growth trajectory of the solar industry. Is the rapid growth of renewables immune to a steep global recession? Will action against climate change still be a top priority for society, corporations, and governments? How will a huge decline in demand for power and historically low conventional fuel prices affect the economics of solar? Will the major energy companies that have increasingly looked to take a stake in low-carbon power in recent years still be in a position to take the reins?

In the short term, it is clear that market growth will certainly face a number of immediate headwinds as a result of the economic consequences of the pandemic, and IHS Markit has reduced its forecast for annual installations in 2021. The market is predicted to rebound strongly after stalling in 2020, growing by 27%. However this is still nearly 10% lower than what had been forecast prior to the COVID-19 pandemic, as shown in Figure 3.



In recent years, with the cost of PV systems falling dramatically through both pure cost reduction and technology and efficiency advances, PV has started to become broadly competitive with conventional power generation resources in many areas of the world. This has always been considered the tipping point that would enable growth to accelerate, and no longer be reliant on incentives or subsidies to fuel growth. As a result, a pipeline has built up of unsubsidized projects, which will compete with other forms of power generation by selling power on electricity markets, or by signing Power Purchase Agreements (PPAs) with offtakers without the need for government subsidies.

However, demand for power and conventional fuel has collapsed as commercial and industrial customers have closed and the transport sector has been grounded all around the world, leading to prices declining across the board. Low gas prices—and therefore low power prices—certainly spell trouble for any PV project with a business model that relies upon being competitive with wholesale power prices, with great uncertainty around how prices will react in the future. This is likely to mean a stalling of merchant PV systems, at least temporarily, until power prices can recover. The story may not all be bad news though and does highlight some of solar's biggest benefits. The once unimaginable scenario that has played out demonstrates (again) how volatile the price and supply of conventional fuels can be. Solar is immune to these commodity cycles and has very low ongoing maintenance requirements, making it an exceptionally resilient source of power generation. Finally, solar also benefits from not relying upon a physical supply of fuel, which has always been highly valued in remote parts of the world and islands where disruption to supply is a greater risk, but may become increasingly valued in major economies as well, as security of supply becomes more widely considered.

In the particular case of oil, prices have fallen to historic lows, including turning negative at one point during April. While this could have a direct impact on whether solar is competitive in regions that rely on oil to generate power, it may also have other consequences as well. Major oil and gas companies have been increasingly investing in low-carbon power generation in recent years, and had been expected to play a leading role in solar and other renewables and low-carbon technologies in the future. Royal Dutch Shell, for example, has indicated plans to invest \$2–3 billion

annually in its “New Energies” business over 2021–25, which includes spending tied to its 2018 acquisition of an interest in US solar developer Silicon Ranch. Meanwhile, Total expects to invest \$1.5–2 billion per year on low-carbon electricity, including via its Total Quadran and Total Solar International subsidiaries. BP has taken a 50% stake in leading solar developer Lightsource via two separate transactions in 2017 and 2019. The current low-price environment will certainly force oil and gas companies to curb their capital investments, which may also mean less money invested in renewables from this sector. However, their desire to diversify will be intensified, and so investments in low-carbon activities including solar will either be ringfenced and continue as planned, or are likely to return quickly. In addition, in light of the depression of oil and gas prices weighing on the returns that are available, institutional investors may turn away from the sector and favor more renewable investments.

The poor economic conditions across the globe, which will linger long after social distancing and restrictions on movement and trade are lifted, also pose a threat to the growth of the solar industry. Roof-top solar is likely to suffer the sharpest slowdown, with installations being initially hampered by social distancing regulations, and then by poor economic fundamentals, with both businesses and private individuals preferring to minimize large capital expenditure and maximize liquidity in such times of economic uncertainty. Large ground-mount projects are likely to recover more quickly, once construction activity is able to resume.

Solar may actually have a chance to play an important role in the recovery, and with that potentially rebound faster than some other industries. While the climate crisis had become a permanent fixture in the mainstream media throughout 2019 and was a central topic at Davos 2020, it has fallen from the agenda amid the more immediate and pressing global health and economic crisis. However, governments may seize the opportunity to ‘green’ the recovery by rewarding sustainable industries and green investments within the stimulus packages that will undoubtedly be required to rebuild shaken economies around the world. With solar and other renewables having the benefit of providing local employment to those building and operating systems, and offering a secure, low maintenance, low OPEX, and sustainable local source of power, it could be well positioned to be a central part of the recovery.

Conclusion: Fundamental benefits of solar still position it well for future industry growth.

It is true that the world has changed dramatically within a very short period. The solar industry, like so many others, has been faced with a number of immediate challenges that have caused huge disruption to both supply and demand, and led to an abrupt contraction of the industry. However, many of the fundamental benefits of solar remain. It provides a clean, reliable, and local source of electricity with no reliance on global fuel supply, with stable, predictable, and low maintenance costs in comparison with conventional power generation. These benefits will arguably be even more relevant post COVID-19 than they were before.

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IHS Markit offers Clean Energy Technology, a global service providing comprehensive market intelligence of the important technologies shaping the energy transition. The service includes a continuous flow of data, forecasts, insight and analytics tools to track and understand how technologies develop and their impact on the industry. Robust and detailed demand forecasts are combined with in-depth analysis of the supply chain to provide a comprehensive view of industry developments and key players.