The Upside

After the 'sunrush': what comes next for solar power?

The fall in costs that has driven solar's rapid growth is slowing - but scientists are exploring the next generation of materials that can harness more energy from the sun

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Wed 28 Feb 2018 06.00 GMT
Last modified on Wed 28 Feb 2018 08.21 GMT

A robot handles a solar panel on the module production line in Singapore. Photograph: Nicky Loh/Bloomberg/Getty Images

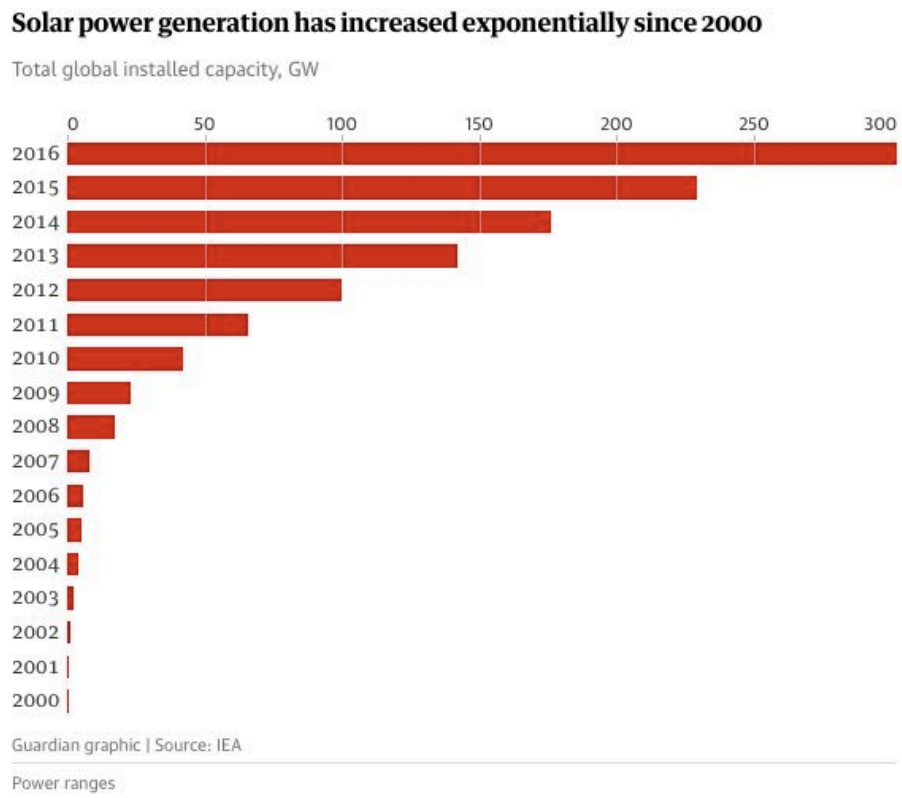
Some people call it the "sunrush": a 25-year period in which solar power has grown exponentially, transforming the technology from rarefied oddity to the world's fastest-growing energy source.

This surge, which saw 100MW of capacity in 1992 rocket to more than 300GW in 2016, has been largely driven by falling costs, which plunged 86% between 2009 and 2017.

China, the world leader in building and installing solar panels, added a record-breaking amount of capacity last year. The technology is even setting records in the grey UK: at one point last summer even providing more power than the nation's nuclear power stations.

But with some experts asking whether the cost reduction curve of solar is drawing to an end, there are questions over whether stratospheric growth can be maintained.

And while more energy from the sun hits the Earth's surface in an hour than humanity uses each year, can today's silicon-based solar meet our long-term power needs?



To meet these challenges, researchers around the world are racing to explore new materials which can eke out more energy from the sun's photons and be used more flexibly than today's panels.

The most abundant mineral on Earth has become the frontrunner, promising more efficient and lighter solar panels, which could even be made semi-transparent for use as windows.

"Perovskite currently has taken the lead among emerging photovoltaic (PV) technologies," says Varun Sivaram, fellow for science and technology at the Council on Foreign Relations.

His upcoming book on solar says the crystal has made a meteoric ascent in academic circles, describing it as: "a material that could enable manufacture of cheap, highly efficient solar coatings that could be unspooled from a printer much as newspaper is printed."

One firm born in Oxford, England, is at the vanguard of the race to develop and scale up perovskite for commercial use. Founded in 2010, Oxford PV initially spent years exploring an alternative, dye-sensitive cells.

But Henry Snaith, the firm's co-founder, changed tack in 2012. "I discovered perovskite could be extremely efficient in PV cells. We realised this was where the real opportunity lay."

Glass windows with integrated solar panels are seen during the opening day of the International Trade Fair in Munich. Photograph: Michaela Rehle/Reuters

The British- and German-based company's big idea is to piggyback on the success of silicon, which Chinese manufacturing scale and efficiency has made so cheap.

Perovskite captures energy from a different part of sunlight's wavelength than silicon, so Oxford PV's plan is to layer it atop silicon, to maximise electricity generation.

"We find ourselves in a position that we are not fighting a $35bn industry [silicon], we are enhancing it. The idea is use the existing assets. If you do something completely different it will fail. This can complement the existing cell," said Frank Averdung, the company's CEO.