

MARKET WATCH:

Here comes the Sun

The rooftop solar industry in the United States is experiencing rapid growth. [Anna Petherick](#) reports on its progress.

Speak to any venture capitalist in Silicon Valley and they will tell you that 'cleantech' has been set to become the next big thing for about a decade. It distracted top firms that could have muscled in on social networking much earlier¹. Meanwhile, the headlines around energy generation in the United States have been about the rise of natural gas. Somehow, perhaps because the investment hype seems dog-tired, or because all talk of climate change has gone through periods of political aversion by Washington's elite, the rapid growth of solar power has slipped under the radar. Going on numbers alone, the rise of natural gas is indeed the top story in the country, but solar has recently been the second biggest source of new electricity generation capacity, and its rate of growth has been stunning (Fig. 1).

In 2013, solar accounted for nearly 30% of all new electricity generation capacity in the United States². The trend has been primarily driven by sliding costs. The Solar Energy Industries Association (SEIA), based in Washington DC, says that the average price of a photovoltaic panel has dropped by 60% since 2011. And although the majority

of the additional capacity has been added by utility companies, much has also come from residential installations, known colloquially as 'rooftop solar'. "Here, the primary business model to date has come from a number of solar companies that offer lease [photovoltaic] systems, and they come in and install them for you," says Corrie Hitt, SEIA's senior vice-president of state affairs. These allow homeowners to pass on responsibility for monitoring and maintenance and avoid the upfront costs of buying solar panels to place on their roofs. By comparison, rooftop solar was prohibitively expensive for middle-class Americans about seven years ago, with a typical system setting them back at least \$30,000, explains Alison Mickey of Clean Power Finance, a San Francisco-based company that runs an online solar marketplace.

The United States has also benefitted from the global reduction in photovoltaic panel prices, which have dropped by 20% with each doubling of shipped volume. Various federal programmes, such as the Department of Energy's SunShot Initiative, have had a significant effect, points out Keya Chatterjee, the World Wildlife Fund's director of

renewable energy outreach. This initiative explicitly set out to lower all of the costs that come on top of those of the actual panels — the 'soft costs' in the industry vernacular — by, for example, funding the City of Chicago's push to cut the waiting time for small solar installation permits from a month to a day, as well as reducing the permit fee³. But although these soft costs have declined dramatically in recent years, they remain stubbornly high in general, says Mickey, by some estimates accounting for 60% of the total installation costs.

The Chicago example hints at just how closely tied the growth of rooftop solar has been to municipal and state policies. The US's impressive national growth figures really result from a mere handful of states, in particular California, which has by far the highest take up, Massachusetts, Arizona, New York and Hawaii. Only in California and Massachusetts has the state government's promotion of solar energy been explicitly linked to a wider goal of lowering greenhouse gas emissions, says Hitt.

Where soft costs are sufficiently low, the upfront costs and maintenance can be passed off and the Sun is sufficiently bright, what possible drawbacks could there be? Indeed, one recent study⁴ by researchers at the Lawrence Berkeley National Laboratory examined the marginal cost of house prices in California between 2000 and 2009, with and without photovoltaic installations. It reports a home sale price premium of approximately \$17,000 for a typical house with a relatively new and typical photovoltaic system.

But there have been considerable tensions that have, in at least some places, cut into the business model that has made solar so successful. Utility companies, which are held responsible when the electricity grid fails, insist that their chief complaint about rooftop solar is not that it lowers demand for their product, but that new solar installations route spikes in electricity supply to a grid that is ill-equipped to cope. Homeowner horror stories have reached national news outlets, recounting cases where utilities have thrown back the cost of upgrading the neighbourhood grid at unsuspecting

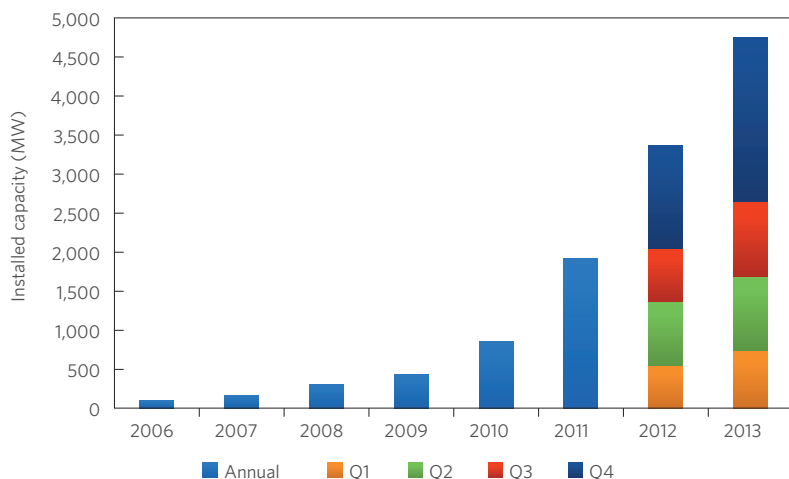


Figure 1 | Growth in new photovoltaic capacity in the United States in recent years. The pattern has been one of sequential record years with particularly rapid recent expansion: the capacity installed in 2013 represented a 41% increase over that installed in 2012, bringing the overall total to an amount sufficient to power more than 2.2 million average US homes. Q1 is the first quarter, Q2, the second quarter, and so on. Figure reproduced with permission from ref. 2, © 2014 SEIA.

average Joes, who simply signed up to one of the commonplace rooftop solar leasing agreements. In Hawaii, a new rule requiring the residents of Oahu, the most populous island, to seek the local utility's permission before adding panels to their property, has caused a 50% slump in the photovoltaic market, according to Reuters⁵. "The [grid] system is really based on a central station power, and its construction really hasn't changed since it was created in the early part of the last century," says Hitt. "It's not stopping solar *per se*, but as you get more penetration, it's becoming more of an issue."

Although technical solutions to this problem exist, there is little consensus about who should pay for them. Lawsuits have sprung up as quickly as the Sun has popped out from behind the clouds. The most forward-thinking outcome so far, says Chatterjee, is an agreement that was reached

in March by utility regulators in Minnesota⁶, although its adoption is still voluntary. Following two years of negotiations, the Minnesota Public Utilities Commission settled on a formula for calculating all of the various costs involved, including the social cost of carbon emissions. But elsewhere, solutions have tended to be more quotidian. Arizona settled on a much-reduced monthly fee of \$5 per solar-owning homeowner, after 1,000 protesters took to the streets of Phoenix⁷, objecting to the Arizona Public Service utility's imposition of a \$50 charge.

"I think all the markets are sorting through this," says Hitt. Such growing pains are certainly not eating into the industry's projections for its own future. By all accounts, 2014 is on track to be the best year yet. SEIA, for one, is betting on a 26% increase on 2013's record number of installations. □

Anna Petherick is a freelance news writer based in Oxford, UK.

*e-mail: annajpetherick@gmail.com

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