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## Can Solar Challenge Natural Gas?

A new report from Citigroup argues that solar panel installations will surpass expectations as its cost falls below that of the most expensive gas-fired power plants

By Special to E&E and ClimateWire | Thursday, February 28, 2013 | 6 comments

Large consumer electronic brands are likely to enter the solar energy market and fuel a worldwide boom in panel installations that will surpass most expectations as the rooftop technology becomes cheaper than gas, a report by Citigroup says.

Although worldwide solar installations grew by an average of 59 percent per year from 2007 to 2012, much of that advance was due to subsidies and legislation mandating solar spending. That's about to change, according to the report.

Solar has reached residential parity in many regions, and utility-scale parity will follow over the next few years. Some U.S. utilities are already choosing to build solar farms instead of gas plants to deliver peak loads based on pure economics.

"In Germany, Spain, Portugal, Australia and the South-West of the U.S., residential-scale solar has already reached grid-parity with average residential electricity prices," Citigroup analysts Shar Pourreza, Jason Channell and Timothy Lam wrote in their report. "In other countries grid parity is not far away. We forecast that grid parity will be attained by Japan in 2014-2016, South Korea in 2016-2020 and by the U.K. in 2018-2021."

On the other hand, China, India, Russia and Saudi Arabia will not attain grid parity until after 2020, despite good solar conditions in some regions, due to their low residential electricity prices, which are subsidized by the state, the report says.

As far as utilities are concerned, giant solar farms must be able to compete against wholesale power prices from combined-cycle gas turbine plants. That's currently impossible with U.S. shale gas selling at \$3 per million British thermal units. But Citigroup says \$3 per MMBtu doesn't reflect the true cost of production of shale gas. In addition, gas costs more in Europe and Asia (in some cases much more: \$16 per MMBtu in Japan), so solar can be highly competitive there even at utility scale.

One issue will be that solar growth will lead to lower utilization rates at conventional generation plants, which will nevertheless need to remain online to cover power demand on less sunny days, at night and during the winter.

"Ultimately we believe that the system will move to a capacity payment mechanism to remunerate utilities for low utilization rates on plants that must remain open as backup generation," the analysts said. "Ultimately, while solar can reduce costs directly, the consumer



**SOLAR POWERED:** A cyclist on a cross-country camping jaunt pauses in a California state park to charge his laptop from a folding solar array.

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will end up paying for these capacity payments."

### **Consumer electronic brands likely to move in**

"We are likely to see large consumer electronic brands dominate the space, potentially alongside large industrial manufacturers," Citigroup said. "These companies would bring their existing brand strength, customer relationships, route to market, balance sheets, access to cheap capital and purchasing power to the party. If they were to build 5 [gigawatts] of capacity using the latest equipment, they would achieve economies of scale and lower costs by a technology advantage of two to three years."

Solar panel manufacturing is a relatively easy activity to gain entry to, with most companies using the same machines manufactured by the same few equipment providers, and with little to differentiate themselves apart from size of facility and location.

While new entrants could try to buy distressed assets from existing solar market players -- as has happened with German producer Q-Cells, taken over by South Korea's Hanwha -- such deals would come with older and higher-cost equipment or with production based in higher-cost locations like Europe or the United States.

"While consolidation of existing capacity is likely to happen to an extent, we suspect it is more likely that it will be new production facilities using the latest equipment, and with larger unit facilities to gain extra economies of scale," the report says.

In the end, seven or eight panel manufacturers with a capacity of 4 to 5 GW each will dominate the market, the report predicts, compared with the current situation where the bulk of the companies have a capacity of a few hundred megawatts each.

### **Subsidies fade, but demand rises**

The International Energy Agency forecasts cumulative solar installations of 662 GW from 2012 to 2035, or an average of 29 GW per year. According to the Citigroup report, that's too conservative -- the analysts forecast growth of 34 GW per year. But even under the IEA scenario, solar would represent 11.2 percent of all new installed generation capacity and 13 percent of the investment in generation capacity.

Although the main solar markets are in Europe today, the continent's importance to the technology will diminish as subsidies are reduced in several countries. New solar installations will drop from 4 GW last year in Italy to 1.5 GW this year, and from 7.6 GW in Germany to 3 GW, the report forecasts.

Meanwhile, China will double its installations to 10 GW, Japan will go from 2.7 GW last year to 5 GW this year and the United States will go from 3.2 GW to 4 GW. The most important emerging markets will be in the Middle East, which will install 3.5 GW by 2016 from next to nothing now, and India, which will install 1.3 GW per year by 2016, according to the report.

"While historically core markets will provide support, this growth will come from new regions and markets, some already established, others yet to materialize," the analysis says. "China will become a larger part of the global market as the government supports demand by setting a sharply higher annual installation target of 10 GW."

Europe accounted for nearly 50 percent of 2012 demand, with most of it fueled by unsustainable subsidies. In a separate report, Deutsche Bank analyst Vish Shah said that this year Europe will account for only 20 percent of the overall demand. But these European installations will be much less dependent on subsidies.

"We expect 33 percent of demand within Europe to come from sustainable markets as we expect developers in Italy and other Southern European regions to develop projects without subsidies," Shah said. "More importantly, we expect demand from sustainable markets to account for 66 percent of overall demand in 2013 compared to 30 percent in 2012."

Solar is now cheaper than diesel-based electricity generation in many markets such as India and Africa, where a stable and sustainable

energy supply at fixed costs such as solar is becoming a more attractive option for policymakers concerned about rising energy demand.

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