



The Villages at Crest Mountain, a solar community in Asheville. Phelps Clarke photo

The economics of solar

Demystifying the hype

□ BY PHELPS CLARKE
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There are a lot of misconceptions about solar energy systems – they need expensive batteries, have high maintenance costs, produce insignificant amounts of power, decrease the value of real estate – and the list goes on.

Like any industry, solar's development has been a messy process, which has helped foster these negative perceptions. We often feel like we're living in the Wild West stage of the industry, but the reality is solar has moved into the mainstream and is getting close to the tipping point of exponential growth.

Background

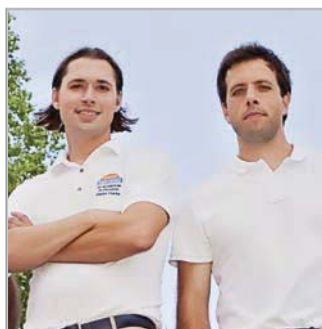
Solar electric systems convert sunlight to electricity using photovoltaic panels. Early on, photovoltaics were very expensive and didn't produce much power per panel. They also required batteries

for storage, which further increased the price of the systems. The technology has undergone significant changes since that time – not only in the panels themselves but also in how they integrate with the grid. Important factors in the recent proliferation of solar installations have been net-metering policies which eliminate the need for expensive batteries and a steep drop in the price of components due to technological advances and scaled production.

Politics

The market for solar has traditionally been heavily reliant on political incentives at both the federal and state levels, although this is becoming less and less of a factor as the pricing becomes more competitive with fossil fuels and nuclear. The current 35 percent North Carolina tax credits are set to expire at the end of 2015 and the 30 percent federal tax credits are set to expire at the end of 2016.

Another important political factor is the issue of third-party sales. Currently, in North Carolina, only the public utility can sell power to the end user (the customer). However, in many states (like California) com-



Phelps Clarke and Douglas Ager.
Bren Photography

panies other than public utilities can sell power. This enables businesses to rent your roof, install a solar system, and then sell that power back to you. This model has accelerated the number of rooftop

solar installations because it removes the significant up-front costs for the consumer. At the time of printing, a bill is currently being debated in the N.C. Legislature about making third-party sales legal in this state.

Grid interconnection policies also play a critical role in the solar market. Currently, only the large utilities are required by law to net meter. In Western North Carolina, you can net meter on Duke Energy Progress's grid but not on French Broad EMC, Haywood EMC, or Rutherford EMC.

Big Picture

Is there really a viable alternative to fossil fuels? Can we generate enough power through renewable sources to supply the growing appetite for energy around the world?

The short is answer is yes. But the long answer gets more complicated. The real challenge with energy created through photovoltaics is storage. The large majority

of systems use the grid as a battery by pushing power onto the grid when it produces more than is consumed and taking power back from the grid when it produces less than it consumes.

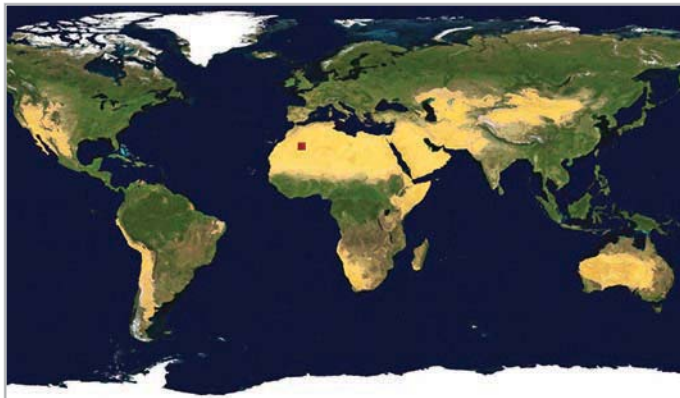
The underlying challenge with this model is that it relies on power plants to maintain grid parity during times when the sun isn't shining. If it's cloudy for a few days, the power company is going to have to have the same number of power plants so that it can supply all the energy needs. One big advantage of natural gas fired power plants (in contrast to coal) is that they are better able to increase or decrease capacity quickly depending on the conditions.

Tesla's recent introduction of a home and business battery pack raises the possibility of storing solar energy at its source (in the home or business where the panels are located) or at a remote location that can help moderate the natural cycles of solar energy production.

Net Zero Homes

As solar systems become less expensive and need less space, the "dream" of a home that can produce as much power as it consumes becomes not only possible but also affordable. Recent advances in inverter technology means partial shading of the array (often a problem in the mountains) does not as significantly decrease the efficiency, and as the price of panels continues to drop, putting panels on east and west-facing roofs begins to make financial sense. And why stop there, why not start building homes that can also produce enough power to charge an electric car or two!

Phelps Clarke and Douglas Ager are cousins and co-owners of a renewable energy company based out of Fairview, NC. Founded in 2010, Sugar Hollow Solar designs and installs solar electric, solar hot water, and radiant floor heating systems for homes and businesses around Asheville. sugarhollowsolar.com.



One percent of the surface area of the world's deserts would be enough to meet our current electricity needs. theecologist.org

Solar Q&A

What is the return on investment for a grid-tied solar electric system?

We tell people it's approximately 10 to 14 years for residences and 4 to 8 years for businesses. The reason it is so much shorter for businesses is that they can take advantage of an accelerated depreciation schedule available for solar which basically means they can write off the entire amount of the cost in the first five years. The majority of photovoltaic panels are warranted to last for 25 years although the inverters may have to be replaced sooner. Even so, when it is time replace the components; the infrastructure is already in place so the labor will be less.

What about replacing shingle roofs under a solar array?

All the systems we install use flashed feet, which increases shingle life and decreases the cost of temporarily removing the panels if the roof needs to get replaced. Additionally, you can now buy shingles with a lifetime warranty and modern metal roofs have extended life spans.

Does it increase the value of real estate?

This has always been a difficult question to answer because there are so many factors. Location clearly plays an important role as well as what type of buyer might be interested in the property. A recent study done through the U.S. Department of

Energy found that in California, solar powered homes on average garner \$17,000 more than comparable homes without solar (<http://emp.lbl.gov/sites/all/files/lbnl-4476e.pdf>), so you could argue that Asheville's real estate market has some similarities to California.

How much do these systems cost?

We generally tell people that we can install a roof-mounted system on their house that will take approximately \$50 a month off their power bill for a net cost of \$7200 (after the 30% federal and 35% state tax credit). For a similar system that will take \$100 a month off their power bill, the after tax credit cost would be \$12,000.

How do the tax credits work?

Unlike tax exemptions, tax credits directly remove tax liability from what you owe, and you have five years after the installation to use them. For example, the federal tax liability for a married couple in NC making \$60,000 a year filing jointly would be close to \$10,800, and their state tax liability would be say \$9,000. So, for a system that will eliminate roughly \$100 from their power bill, they will only owe \$1,793.75 in federal tax and \$4,500 in state tax in the first year (in North Carolina, you can only take half of your tax liability each year), and they can take an additional \$4,500 off their state tax in the second year and then \$1,800 in the third year.

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