WH – WEISS

GREEN REVOLUTION

Oxford researchers recently [predicted](http://www.sciencedirect.com/science/article/pii/S0048733315001699) precipitous growth in green energy over the next 10 to 15 years, decreasing global need for fossil fuels. Yet, the largest renewable energy company in the world, SunEdison, just [filed for bankruptcy](http://www.nytimes.com/2016/04/22/business/energy-environment/sunedison-files-for-bankruptcy-protection.html) on the heels of [the fall of](http://www.wsj.com/articles/spains-abengoa-wins-u-s-bankruptcy-court-protection-1461783532) another clean energy giant, Abengoa.

Is the renewable energy sector in trouble? What is holding back more immediate success in the industry?

**OPINION 1**

**Solar Energy Will Thrive**

[*David Sandalow*](https://sipa.columbia.edu/faculty/david-sandalow)*, the inaugural fellow at Columbia University's Center on Global Energy Policy, is a former under secretary of energy and assistant secretary for policy and international affairs at the U.S. Department of Energy.*

Solar power is booming. [Globally](http://www.solarserver.com/solar-magazine/solar-news/current/2016/kw14/iea-pvps-snapshot-of-global-pv-markets-2015-at-least-227-gw-of-pv-now-installed-world-wide.html) and in the [United States](http://www.seia.org/research-resources/solar-market-insight-2015-q4), installations grew at least 28 percent last year.The U.S. solar industry now employs more than[200,000 workers](http://money.cnn.com/2016/01/12/news/economy/solar-energy-job-growth-us-economy/) – roughly[three times as many as the coal mining industry](http://www.thesolarfoundation.org/wp-content/uploads/2016/01/Factsheet-Census-2015-FINAL.pdf).   
  
Does the bankruptcy of SunEdison signal trouble for the solar industry? In almost all respects, the answer is no. SunEdison’s troubles were mainly the result of rapid growth and excessive debt. Many solar companies with better managed growth and modest leverage will prosper in the years ahead.

The growth of solar energy will be driven by three factors. First and most important, costs are falling sharply. Solar module costs have fallen [roughly 80 percent](http://www.ibtimes.co.uk/solar-energy-be-cheapest-power-source-10-years-says-report-1489228) since 2007 and are projected to keep falling. Already, solar power is cheaper than the competition in many sunny places. Solar power’s competitive strength will continue to grow in the years ahead.   
  
Second, governments around the world strongly support solar power due its many social benefits. Solar power produces neither local air pollutants nor heat-trapping gases. In many places it is ideally suited for extending electricity to those who now lack it. The Chinese and Indian governments, along with many others, have [ambitious targets](http://www.nytimes.com/interactive/projects/cp/climate/2015-paris-climate-talks/china-raises-its-targets-for-renewable-energy) for solar deployment. The U.S. government just extended an important [tax credit for solar power](https://www.technologyreview.com/s/544981/tax-credit-extension-gives-solar-industry-a-new-boom/) for five years.   
  
Third, integrating solar and wind power into electric grids is proving easier than many thought. Variable renewable power presents real challenges for grid operators, but those are being managed even as solar and wind power exceeds [50 percent of the energy](http://www.utilitydive.com/news/texas-colorado-set-model-for-increased-renewables-integration-under-clean/400855/) fed into electric grids in Texas, Colorado and elsewhere. The solutions include technologies that help grid operators forecast solar and wind input, reduce electricity demand when needed and store excess energy.   
  
In one respect, however, the SunEdison bankruptcy is a harbinger of challenges ahead. The solar industry, still young, is struggling to access low-cost capital in large volume. That was one reason for SunEdison’s relentless growth.   
  
Because the solar industry has high capital expenses and low operating expenses, low-cost capital will be especially important to its long-term success. Progress has been made in recent years, thanks to the Department of Energy's Loan Guarantee Program (which helped pave the way for low cost debt capital for utility-scale solar projects in the United States), the early use of securitization and other tools.   
  
But the SunEdison bankruptcy in part reflects the challenges the solar industry is facing as it grows to the scale of other, older energy industries and seeks access to the low cost capital essential to its success. Fortunes will be made (and lost) working on that problem in the years ahead.

**OPINION 2**

**Subsidies in the Wrong Places Skew Renewable Energy’s Power**

[*Joseph Aldy*](https://www.hks.harvard.edu/about/faculty-staff-directory/joseph-aldy)*is an associate professor of public policy at Harvard University's John F. Kennedy School of Government. From 2009 to 2010, he was the special assistant to the president for energy and environment at the White House.*

Renewable power has experienced tremendous growth: Wind and solar’s share of total U.S. power generation [increased](http://www.eia.gov/beta/MER/index.cfm?tbl=T07.02A#/?f=M&start=197301&end=201601&charted=1-2-3-5-8-14) to 5 percent in 2015 from less than 0.5 percent in 2005. This growth reflects both innovation driving down costs and an array of subsidies, including tax credits and grants (about [30 percent of investment costs](http://reep.oxfordjournals.org/content/7/1/136.full)), accelerated depreciation ([15 percent](http://ei.haas.berkeley.edu/research/papers/WP259.pdf) of investment costs), loan guarantees ([7 percent](https://www.gpo.gov/fdsys/pkg/BUDGET-2010-PER/pdf/BUDGET-2010-PER.pdf) of investment costs), and state renewable power mandates, which create valuable credits – worth as much as 50 cents per kilowatt hour for solar in Massachusetts and New Jersey – that complement the revenue stream from power sales. Continued investment in renewable power, however, must confront investment challenges in the power sector.

Innovation has driven lower costs for wind, solar and their competitors. The fracking revolution has drastically lowered the cost of U.S. natural gas, with the price of natural gas delivered to the power sector in 2015 equal to [one-third the price](http://www.eia.gov/dnav/ng/hist/n3045us3a.htm) in 2008.

As the costs of producing power have fallen, so has the demand for electricity. Since 2010, the U.S. economy has grown [11 percent](https://research.stlouisfed.org/fred2/series/GDPC1), but electricity consumption has fallen by [1 percent](http://www.eia.gov/beta/MER/index.cfm?tbl=T07.02A#/?f=M&start=197301&end=201601&charted=1-2-3-5-8-14) in part because of subsidies and standards targeting energy efficiency. The absence of a growing power market reduces the need for utilities to invest in new power generation. In some parts of the country, the costs of new wind and solar may appear competitive with new coal or natural gas facilities, but new renewable investment effectively competes with existing, lower-cost power plants.

The incumbent coal-fired power plants also enjoy a large, [implicit subsidy](http://www.imf.org/external/pubs/ft/survey/so/2015/NEW070215A.htm). In today’s dollars, the average U.S. coal-fired power plant imposes costs through premature mortality and respiratory illnesses of about [3.5 cents per kilowatt hour](http://www.nap.edu/read/12794/chapter/1). Accounting for the climate change damages associated with burning coal would likely [double this cost](https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf). Eliminating these subsidies would significantly improve the economics of lower-polluting sources of power.

Even with full pricing of pollution for coal-fired power plants, renewable power typically cannot be ramped up and down in response to short-term swings in power demand: Sometimes the wind blows or the sun shines when people don’t need the power. As a result, utilities may [value](http://www.jstor.org/stable/29783746) natural gas capacity more than renewable capacity, since they can dispatch natural gas to meet changes in demand. The value of renewable power is also lower because the investment does not always target the highest-quality resource. Solar goes where the subsidies are, not where the sun shines. Thus, Massachusetts and New Jersey may have relatively low-quality solar, but rank among the top six states in installed solar capacity. And Germany, which has rarely been described as sun-drenched, hosts the most solar capacity in the world.

Given the existing low-cost competition in a no-growth market, renewable developers face tough investment challenges absent new policies. A carbon tax could substantially increase market demand for renewable power and encourage the retirement of pollution-intensive coal-fired power plants.

**OPINION 3**

**Utilities Must Stop Blocking Solar Growth**

[*Katie Ottenweller*](https://www.southernenvironment.org/staff/katie-chiles-ottenweller)*is a staff attorney and the leader of the Solar Initiative at the Southern Environmental Law Center.*

As solar power becomes rapidly more affordable, all Americans should have access to this abundant resource, which will help us create stronger, cleaner and healthier communities. Unfortunately, the right to go solar is coming under attack across much of the country, hindering families and businesses from choosing cheaper, cleaner solar power.

Despite the incredible potential for homegrown solar power in the sunny Southeast, some utilities are working to [erect barriers and create restrictive rules](http://www.postandcourier.com/20160430/160509988/santee-cooper-policies-cast-cloud-over-solar)that protect their monopoly instead of allowing Americans to choose their energy source on an open market.

These utilities take advantage of [outdated monopoly protection laws](http://www.bizjournals.com/charlotte/news/2016/04/15/regulators-fine-nc-warn-60-000-for-selling-solar.html) to prevent independent solar companies from offering customers financing options to lower or eliminate upfront costs of installing solar panels – options that would make solar available to lower income families that are most in need of stable power bills.

Many solar customers also face [punitive fees and fines from utilities](http://www.utilitydive.com/news/iowa-co-op-proposes-one-of-the-highest-fixed-solar-charges-in-nation/402881/) who claim they are entitled to charge customers for not using their product or for using less of it – to the tune of as much as $85 each month.

Other utilities are trying to block fair compensation for excess electricity that solar customers provide to the grid, which often is generated on hot, sunny days when demand and stress on the grid is highest. Solar customers have little recourse when their utilities undervalue this solar electricity, telling homeowners it’s only[worth 3 or 4 cents](http://www.eenews.net/stories/1060030715) and then turning around and selling that same electricity to another customer (often their next door neighbor) for three times that amount.

These unfair practices deserve closer scrutiny by public utility commissions and state legislators, who should not put entrenched interests of powerful utility companies above the interests of their customers.

We can harness the value of local solar power for the good of all Americans by ending energy companies’ punitive solar taxes on customers, opening the market to solar financing companies, and establishing fair compensation for solar electricity.

But the regulators will need to keep the fox from guarding the henhouse.

**OPINION 4**

**To Increase Use of Renewables, Owners Need to Understand Energy Use in Their Buildings**

[*Andrew Chen*](http://blog.wegowise.com/andrew-chen)*is a managing director at Boston Community Venture Fund and the chief executive of [WegoWise](https://www.wegowise.com/home).*

Renewable energy is undoubtedly our future, but getting there isn’t as easy as flicking a light switch. One big impediment is that building owners often don’t know just how much energy and water is consumed in their buildings, how much should be consumed, and how much is wasted.

Most building owners and managers pay their utility bills as a matter of routine, with little understanding of how much energy is being used and why. Absent such an understanding, they fail to see how making different energy choices will be relevant to them. But these building owners are a critical population to persuade in the shift toward renewables. About 40 percent of total U.S. energy consumption last year came from residential and commercial buildings,[according](http://www.eia.gov/tools/faqs/faq.cfm?id=86&t=1) to the U.S. Department of Energy.

Shifting to renewable energies like solar and wind requires a willingness to do business differently. And the first step to embrace these new energy sources is to have a clear understanding of how energy is currently used and identify those buildings where efficiency upgrades and investments in renewables can generate the highest returns. For example, owners may waste money if they unknowingly over-size a solar panel installation in order to compensate for a building with a poorly performing heating and air conditioning, or lighting system.

Industries as disparate as personal fitness, finance, and online advertising have made shifts to incorporate Big Data into the way they conduct business to find new opportunities and maximize returns. The real estate industry likewise can unlock data about their buildings to increase the returns on these assets.

Better-informed people make better-informed decisions. Tracking and analyzing energy use is essential in identifying opportunities and understanding how renewables fit within the toolset to improve building performance. Equally important is to continue engaging with the data to measure and verify the returns on those investments, identify future opportunities, and make sure the equipment is working properly.

My company has helped hundreds of property owners track their energy use so they could make changes that saved millions of dollars and conserved precious natural resources.

Building owners can continue to push the use of renewable energy from something deemed inaccessible, harnessed by few and relegated to the realm of obscure technology, into a part of day-to-day operations wherever people live and work. Understanding and making use of energy data is the key to unlocking a future in which renewable energy is the rule, not the exception.