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Solar and Wind Just Passed Another Big Turning Point

It has never made less sense to build fossil fuel power plants.

Photographer: Luke Sharett/Bloomberg

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Wind power is now the cheapest electricity to produce in both Germany and the U.K., even without government subsidies, according to a new analysis by Bloomberg New Energy Finance (BNEF). It's the first time that threshold has been crossed by a G7 economy.¹

But that's less interesting than what just happened in the U.S.

To appreciate what's going on there, you need to understand the *capacity factor*. That's the percentage of a power plant's maximum potential that's actually achieved over time.

Consider a solar project. The sun doesn't shine at night and, even during the day, varies in brightness with the weather and the seasons. So a project that can crank out 100 megawatt hours of electricity during the sunniest part of the day might produce just 20 percent of that when averaged out over a year. That gives it a 20 percent capacity factor.

One of the major strengths of fossil fuel power plants is that they can command very high and predictable capacity factors. The average U.S. natural gas plant, for example, might produce about 70 percent of its potential (falling short of 100 percent because of seasonal demand and maintenance). But that's what's changing, and it's a big deal.

For the first time, widespread adoption of renewables is effectively lowering the capacity factor for fossil fuels. That's because once a solar or wind project is built, the marginal cost of the electricity it produces is pretty much zero—free electricity—while coal and gas plants require

more fuel for every new watt produced. If you're a power company with a choice, you choose the free stuff every time.

It's a self-reinforcing cycle. As more renewables are installed, coal and natural gas plants are used less. As coal and gas are used less, the cost of using them to generate electricity goes up. As the cost of coal and gas power rises, more renewables will be installed.

The virtuous cycle has begun.



Source: Bloomberg

Wind and solar have long made up a small fraction of U.S. electricity—about 5 percent in 2014. But production has been rising at an exponential rate, and those two energy sources are now big enough to influence when coal and natural gas plants are kept running, according to BNEF.²

There are two reasons this shift in capacity factors is important. First, it's yet another sign of the rising disruptive force of renewable energy in power markets. It's impossible to brush aside renewables in the U.S. in the same way it might have been just a few years ago. "Renewables are really becoming cost-competitive, and they're competing more directly with fossil fuels," said BNEF analyst Luke Mills. "We're seeing the utilization rate of fossil fuels wear away."

Second, the shift illustrates a serious new risk for power companies planning to invest in coal or natural-gas plants. Historically, a high capacity factor has been a fixed input in the cost calculation. But now anyone contemplating a billion-dollar power plant with an anticipated lifespan of decades must consider the possibility that as time goes on, the plant will be used less than when its doors first open.

Capacity Factors Take a Sharp Turn³

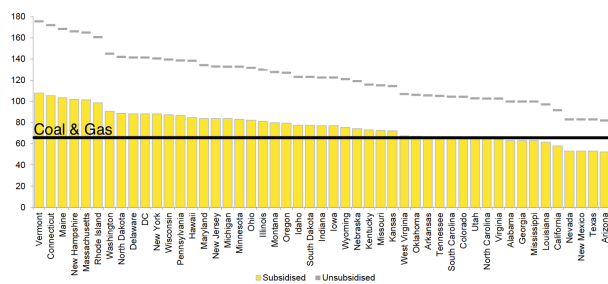
	H2 2014	H1 2015	H2 2015
Coal	86%	85%	85%
Natural Gas	70%	70%	62%
Wind	32%	35%	37%
Solar	16%	17%	20%

Source: Bloomberg, Data: BNEF

Most of the decline in capacity factors is due to expensive "base-load plants that are being turned on less because of renewables," according to BNEF analyst Jacqueline Lilinshtein. Plants designed to come online only during the highest demand of the year, known as peaker plants, play a smaller role. In either case, the end result is that coal-fired and gas-fired electricity is becoming more expensive and the profits less predictable.

The opposite is true of wind and solar, as well as new battery systems that can be paired with renewables to replace some peaker plants. Wind power, including U.S. subsidies, became the cheapest electricity in the U.S. for the first time last year⁴, according to BNEF. Solar power is a bit further behind, but the costs are dropping rapidly, especially those associated with financing a new project.

Latest Solar Costs by State



Source: BNEF, Annotated by Bloomberg


The economic advantages of wind and solar over fossil fuels go beyond price.⁵ Still, it's remarkable that in every major region of the world, the lifetime cost of new coal and gas projects⁶ are rising considerably in the second half of 2015, according to BNEF. And in every major region the

cost of renewables continues to fall.

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1.

1 Denmark, not part of the G7, said last year that it had passed the same milestone.

2.

2 The BNEF report analyzes thousands of data points culled from individual deals and projects around the world to estimate the actual costs associated with each type of energy, excluding subsidies.

3.

3 The capacity factor for wind is increasing due to taller turbines that can reach gusts even when it's quiet on the ground. The solar factor is increasing because a greater share of panels is being installed in the Southwest, where long sunny days are more frequent.

4.

4 Without the subsidies, which effectively end by the end of 2017, wind is still expected to be cheaper than coal and gas within a decade.

5.

5 They also provide predictable electricity prices and a stable return on investment, and they avoid the negative externalities of burning fossil fuels, including climate change, asthma, and heart disease.

6.

6 Referring to BNEF's Levelized Cost of Energy (LCOE) calculations, which include costs like financing and maintenance but exclude subsidies.