Center for American Progress

Wind Power Helps to Lower Electricity Prices

Richard W. Caperton October 10, 2012

Introduction

Here's something that shouldn't surprise anyone: A company that benefits from high power prices is lobbying for policies that would raise power prices for consumers. What should surprise everyone, however, is the sheer audacity of their effort: using a deeply flawed study to argue that tax incentives for wind power are "distortionary" while arguing for the exact same incentives for their preferred technologies.

Earlier this summer Exelon Corporation, a large U.S. power generator and utility operator, began quietly lobbying against extending the production tax credit for wind energy. Its effort gradually became more public, and has now erupted into a full-scale war on the wind industry.[1] In fact, the American Wind Energy Association terminated Exelon's membership in the association.[2] And Exelon is now touting a study by the NorthBridge Group, an economic and strategic consulting firm, that purports to show that the production tax credit is deeply harming consumers by—get this—saving them too much money.[3]

Exelon's argument is strange but has gained some traction among wind energy opponents on Capitol Hill. Sen. Lamar Alexander (R-TN) and Rep. Mike Pompeo (R-KS), for example, just penned an editorial in The Wall Street Journal parroting NorthBridge's claims.[4] Fortunately, though, the facts are on the side of wind power.

This issue brief will show how the wind production tax credit benefits our economy, while also shedding light on Exelon's efforts against the wind industry by:

- Explaining the anticonsumer motives behind Exelon's antiwind arguments
- Showing some of the serious flaws in the study that Exelon claims justifies their arguments
- Describing how nuclear power—Exelon's primary power source—could be substituted for wind in Exelon's arguments, which shows that their concern is really wind power and not market distortions

Let's begin with the benefits for consumers.

Consumers benefit from cheap power but Exelon doesn't

It's critical that we keep Exelon's fundamental motivations in mind. Exelon is in the business of selling power, and would prefer that power to be expensive.

Studies show that wind energy lowers power prices in wholesale markets,[5] so it's perfectly rational for Exelon to oppose wind power. But Exelon's argument about the production tax credit hurting consumers is deeply misleading. Before digging into their argument, however, we need to review how wind power drives down prices.

Much of Exelon's power is sold in competitive wholesale power markets, which allow power generators (like Exelon) to sell power to local distribution utilities, which in turn sell that power to businesses and homeowners. Competitive markets all operate on a "single clearing price" basis, which means that all generators get paid the same amount for their power, no matter how much it costs to produce. This auction method ensures that every generator bids in the lowest price they're willing to accept for their power.

While the details are extremely complicated—the rules for the market that operates in the mid-Atlantic area are more than 2,000 pages long, for example[6]—the basics are fairly straightforward. Every generator in the market tells the market operator how much power they're willing to provide and at what cost. At the same time, every distribution utility tells the market operator how much power they need to buy. The market operator then stacks up the generators from lowest to highest bid.

Then, starting at the lowest bid, the market operator adds up all of the bids until they have enough power to meet the distribution utilities' demands. The last bid accepted becomes the "clearing price"—the price the distribution utilities pay for all of their power, and the price that every generator receives.

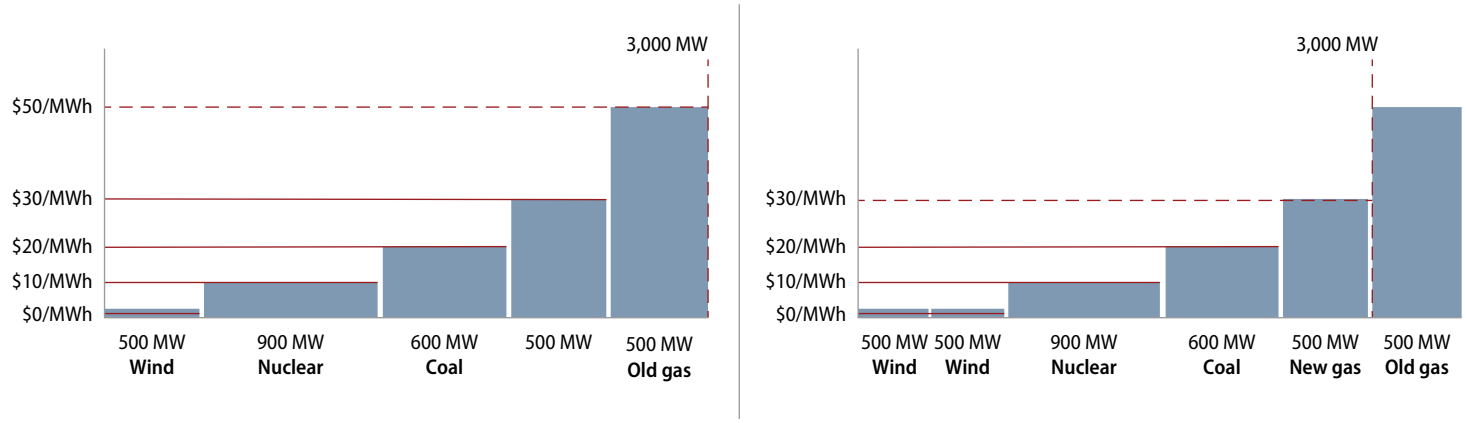
To see how wind impacts power markets, consider the hypothetical examples displayed in Figure 1. Say a market has five different generators: a wind farm, a nuclear reactor, a coal-fired power plant, an efficient and modern natural gas power plant, and an older and less efficient natural gas plant. Each of these plants will offer to sell power at the price that covers their operating cost. On the other side of the market, distribution utilities need to buy 3,000 megawatts of power. This means the market operator will then stack up the bids from lowest to highest and then add up the bids until enough power can meet the 3,000 megawatts of demand.

In the first example the market will clear at $50 per megawatt-hour of electricity. Now, consider what happens to this market if someone builds a new 500-megawatt wind farm, as shown in the second example. The need for power hasn't changed at all, so the cheapest 3,000 megawatts will still determine the clearing price. In this case, the market now clears at $30 per megawatt-hour of electricity.

FIGURE 1

Adding more wind power reduces prices in electricity markets

In the first example (on the left), the market clearing price is $50. In the second example (on the right), more wind pushes the most expensive plants out of the mix, and the clearing price is reduced to $30.



Note: This is a hypothetical example for illustrative purposes and is not intended to represent any particular power system.

This effect of wind power driving down wholesale prices is known as "price suppression" or the "merit order effect," and its benefits are well known. gA recent study of the Midwest Independent System Operator, for example, found that large amounts of wind could save consumers $200 per year.[7]

While the benefits for consumers are clear, existing generators lose some profits. In the original scenario, the nuclear reactor—let's say it's owned by Exelon—was making $40 per megawatt-hour more than their operating cost. (This isn't technically "profit," since some of this $40 goes toward covering fixed costs.) In the latter scenario, the reactor is only making $20 more than their operating costs.

Of course, while Exelon makes $20 less, consumers save $20 on their power bill.

The production tax credit is not "distortionary"

Exelon knows that saying wind power is bad because it saves money for consumers is hardly a winning argument, so they've made a slightly different argument to avoid the real issue. They are now touting a September report by the NorthBridge Group, which concludes that "[production tax credit]-driven negative prices directly conflict with the performance and operational needs of the electric system and with federal energy policies supporting well-functioning competitive wholesale markets."[8] What they mean by this: Wind farms are paying grid operators to take their power, which is reportedly distorting electricity prices in wholesale markets.

NorthBridge has identified the rare occurrence of negative power prices—when power generators pay someone to take their power—and have used that as the basis for a full-scale attack on tax incentives for wind energy.

There are two questions here. First, is the production tax credit the main cause of negative power prices? And second, are negative power prices a bad thing?

Negative prices are a reasonable response to these market conditions. Market operators could avoid negative prices by implementing an arbitrary price floor of $0, but this would be economically inefficient and could lead to challenges with figuring out which power sources to use. If there are more generators willing to give away power than there is demand for power (at a time of low usage during off-peak hours), a market without negative prices would have no way to determine which power source to use, and would probably select generators at random. Negative pricing fixes this problem.

To answer the second question, negative power prices are not necessarily bad. There are a few reasons why a generator would pay a customer to take their power. If a nuclear power plant shuts down, for example, it can take days to restart, so the operator would rather pay someone to take the plant's power for a short period of time rather than turn off. A hydroelectric facility may face penalties if they don't allow water to go through the dam for fish, and will avoid those penalties by paying people to take the facility's power.

Wind power is different. Not only does wind power have zero operating costs, but wind turbines earn a $22 tax credit for each megawatt-hour of electricity they produce.[9] Thus, the rational response for a wind turbine owner would be to pay someone just under $22 per megawatt-hour to take the turbine's power.

Negative prices aren't a very big issue

Let's be clear: negative power prices are a very rare occurrence. NorthBridge would have you believe that wholesale power prices are negative as much as 10 percent of the time in some parts of the country. Indeed, the implications of this would be large, although still not necessarily bad for consumers.

But other data sources differ with NorthBridge's conclusions. According to the Energy Information Administration, no competitive market sees negative prices as much as 0.1 percent of the time,[10] which means Northbridge overstates the problem by about a hundredfold.

The difference is probably methodological, and it appears that the Energy Information Administration's methodology is much more comprehensive. Their data are based on looking at the price over every single location on every single market operator's system. (For ref-

erence, the California Independent System Operator has about 3,000 locations with unique prices.[11]) Because of transmission constraints and other physical realities of the grid, prices can be different at each node, and there is no single, systemwide price for power.

Each node has a price for every hour of the year, or 8,760 unique prices. This means that the Energy Information Administration looked at roughly 25 million data points for the California system alone. Of all of those data points, fewer than 0.07 percent had a negative price—and this is by far the highest rate of negative prices of any system in the country.

NorthBridge's methodology isn't clear, but it appears to be talking about any hour in which at least one node has a negative price. NorthBridge also tries to directly link negative prices to wind power, but that's not necessarily the case, either. As the Energy Information Administration states:

> *The [system] with the highest number of instances of negative prices in 2011 was the California ISO (CAISO). The resource mix in CAISO is highly dependent on nuclear, hydro, and wind generation. Also, typically in the late spring, California imports significant quantities of excess hydroelectric generation from the Pacific Northwest.*[12]

To summarize, Exelon, with the help of the NorthBridge Group, is arguing that negative prices are a serious problem, and that they're caused by wind power. But that fact is that more than 99.9 percent of power prices are positive, and that even the less than 0.1 percent that are negative are caused by a multitude of factors, not solely wind power.

Exelon still faces challenges

Exelon's attacks on the production tax credit are misguided, but the company still faces challenges. Consider the 99.9 percent of prices that aren't negative. Those prices are largely set by energy sources other than wind power, and in much of the country, the majority of prices are determined by natural gas (as in the rough example in Figure 1).

With natural gas at historically low prices, electricity from natural gas power plants has gotten much less expensive. As a result, clearing prices in competitive power markets are lower than they have been for the last decade.

Cheap natural gas, combined with wind power, is helping to drive down power prices. And low power prices were the primary reason that the financial services company UBS downgraded Exelon's shares in September.[13]

Nuclear power also has a production tax credit

It's worth noting the irony of Exelon, a large nuclear plant operator, complaining about a production tax credit. Since 2005 new nuclear plants have been eligible for a production tax credit of $18 per megawatt-hour.[14] This, of course, is on top of at least $185 billion in federal subsidies the nuclear industry has received since 1947.[15]

And it's also worth noting that nuclear power, especially when combined with a production tax credit, could also lead to negative power prices. Given the significant costs incurred by shutting down and restarting a nuclear reactor, these plants may already offer to sell their power at negative prices. Adding the production tax credit—which is only available to new plants and not those that are currently in operation—would simply reduce the price they're willing to accept by another $18 per megawatt-hour.

Conclusion

The long-term implications of renewables need to be considered now

Today, less than 0.1 percent of power prices are negative,[16] and we get less than 3 percent of our power from wind and solar.[17] But avoiding the most catastrophic consequences of climate change requires that in the future we get most of our power from wind, solar, nuclear, and other zero-carbon resources. This will be good for consumers and for our economy. (It is also important to remember that Exelon "praised" the U.S. House of Representatives for its passage of climate legislation sponsored by Reps. Henry Waxman (D-CA) and Ed Markey (D-MA),[18] and then left the U.S. Chamber of Commerce over the business group's opposition to the climate change bill.[19])

Getting to that point, however, will likely involve rethinking how competitive power markets work. Large parts of the country rely on competitive markets to send the right price signals for companies to build new power plants. This has worked well in the past, as prices were generally set by relatively expensive natural gas. But when most of our power comes from renewables, power prices will be extremely low. It's likely that prices will be zero or even negative for long periods of time. If this happens, no one will be financially rewarded for building new power plants—renewable, nuclear, or otherwise.

Policymakers need to start thinking about this scenario today and coming up with ways to address it. The Exelon argument about negative prices being bad for consumers is wrong today, but it won't necessarily be wrong in the future. We need to make sure that our power system encourages investment in the power plants that make our economy work.

The production tax credit is a government investment success story. Since the creation of the credit, wind energy deployment has boomed while costs have come down an astonishing 90 percent.[20] With a stable investment environment enabled by a long-term extension in 2009, the amount of wind energy used in this country has doubled in the last four years.[21] This has helped the wind manufacturing sector take off, with more than 60 percent of the value of a turbine now added domestically.[22]

But the production tax credit is under attack by companies that are harmed by wind power, which has serious implications for our economy. Wind is helping to drive down

power prices, which benefits consumers. Wind is also helping put people back to work, and these jobs are at risk if the credit is allowed to expire. According to Navigant Consulting, expiration would put 37,000 people out of work, and we're already seeing the beginnings of these layoffs.[23]

Unfortunately, some companies—like Exelon—that benefit from higher power prices have decided to argue against the production tax credit. Their arguments are flawed, however, and should not convince policymakers to do the wrong thing and let the credit expire.

Richard W. Caperton is the Director of Clean Energy Investment at the Center for American Progress.

Endnotes

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