How Retiring Nuclear Power Plants May Undercut U.S. Climate Goals

By Brad Plumer

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Over the last decade, a glut of cheap natural gas from hydraulic fracturing has driven hundreds of dirtier coal plants in the United States out of business, a big reason carbon dioxide emissions fell 14 percent from 2005 to 2016.

But more recently, that same gas boom has started pushing many of America’s nuclear reactors into early retirement — a trend with adverse consequences for climate change.

The United States’ fleet of 99 nuclear reactors still supplies one-fifth of the country’s electricity without generating any planet-warming greenhouse gases. When those reactors retire, wind and solar usually cannot expand fast enough to replace the lost power. Instead, coal and natural gas fill the void, causing emissions to rise.

U.S. Electric Power Generation

Megawatt-hours

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<td>Natural gas</td>
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<td>Geothermal</td>
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Wind power generation estimates over 12 months, April 2016 to March 2017. Source: Energy Information Administration
Some environmental groups that have long been hostile to nuclear power are now having second thoughts. “We don’t support unlimited subsidies to keep these nuclear plants open,” said John Finnigan, lead counsel with the Environmental Defense Fund. “But we are concerned that if you close these plants today, they’d be replaced by natural gas and emissions would go up.”

Faced with looming nuclear plant shutdowns, several states are considering a difficult and sometimes unpopular option: subsidizing their existing nuclear reactors to keep them running for years to come.

In Pennsylvania, for instance, Exelon recently announced that it would close the last remaining reactor at the Three Mile Island nuclear plant by 2019 unless policy makers stepped in to support it. Cheap natural gas had cut regional electricity prices in half, pushing Pennsylvania’s nine reactors, which produce one-third of the state’s power, toward unprofitability.

State legislators have formed a “nuclear caucus” to explore policies to keep the plants open, studying recent moves by New York and Illinois to compensate nuclear operators for the carbon-free power they produce. Those in favor are motivated partly by climate concerns.

“If Three Mile Island closes, we’d lose more zero-carbon power than all of the state’s renewable resources put together,” said John Raymond Hanger, a former Pennsylvania environmental secretary and an outside adviser to Exelon.
Yet such policies still face staunch opposition from gas producers and even other environmentalists reluctant to subsidize a multibillion-dollar industry — making this one of the more contentious climate debates around.

**Five shutdowns since 2013, and six more planned**

Since 2013, five nuclear power plants have been retired in Florida, Wisconsin, California, Vermont and Nebraska, the result of a mix of political opposition and competition from gas. Six more plants, including Three Mile Island and California’s Diablo Canyon, have announced that they will close between now and 2025, even though they could technically operate for decades.

Those shutdowns would take enormous amounts of clean energy off the grid. The six retiring nuclear plants generated nearly 60 million megawatt-hours of electricity last year, more than all of America’s solar panels combined, according to an analysis by Environmental Progress, a green group pushing to save nuclear power.

Several more plants in Ohio, New Jersey, Pennsylvania and Connecticut are also at high risk of closing. A study by Geoffrey Haratyk of the Massachusetts Institute of Technology found that if all of the United States’ at-risk reactors shut down and were replaced by modern gas plants, domestic carbon dioxide emissions in the power industry would increase 4.9 percent — erasing a large portion of the recent climate gains from the decline of coal.

“For a long time, we could have our cake and eat it, too, with cheap natural gas — it was driving down power prices and also lowering emissions,” said John Parsons, executive director of the Center for Energy and Environmental Policy Research at M.I.T. “But now that low gas prices are endangering nuclear plants, we’re facing a real trade-off between the economic benefits of cheap gas and hurting the planet.”

And even if states eventually added enough renewable energy to offset lost nuclear, Mr. Parsons said, they would basically just be “running to stay in place,” rather than lowering emissions.

Few companies are contemplating new nuclear plants to replace those lost, deterred by high costs and challenges in construction. And once an existing nuclear reactor is retired, it cannot be reopened later, as workers immediately begin removing fuel and decommissioning the plant.

“If we close, we’re closed for good,” said Joseph Dominguez, an executive vice president at Exelon.

**The contested push to keep plants going**

The push to save nuclear power began in August when regulators in New York moved to subsidize three upstate nuclear plants in danger of closing by, in effect, compensating them for the zero-carbon power they produced. Officials concluded that New York could not meet its
ambitious climate goals if those plants shut down. (Indian Point, a plant closer to New York City, will still close by 2021.)

In December, Illinois’s legislature passed a bill that both expanded support for renewable energy and created “zero emissions credits” to help two of Exelon’s financially troubled nuclear plants stay open. Several green groups supported the compromise, while coal and gas companies opposed it, noting that propping up nuclear would cut their market share. Those firms are challenging both states’ programs in court.

Three Mile Island days after a partial meltdown in one of the reactors in March 1979.
Barry Thumma/Associated Press
Meanwhile, federal regulators are exploring changes to rules for wholesale electricity markets that could compensate nuclear plants for the benefits they provide, like zero-carbon electricity and fuel diversity. But, Mr. Dominguez said, federal changes alone would not suffice to save plants like Three Mile Island.

Lawmakers in Ohio, Pennsylvania, New Jersey and Connecticut are now mulling fresh policies to keep their endangered reactors operating. While some legislators are focused on air pollution concerns, others point to the jobs lost if those plants vanished. Still others worry about becoming overly dependent on a single fuel, natural gas, with a history of price volatility.

Proponents of those subsidies argue that energy markets don’t properly value the low-carbon benefits that nuclear reactors provide — in contrast to wind and solar, which have been shielded from low electricity prices by state renewable mandates and federal tax credits.

But opposition abounds. In Ohio, the American Petroleum Institute is waging a fierce campaign against a bill to subsidize the state’s two nuclear reactors. In Pennsylvania, a coalition of natural gas producers and manufacturers has railed against state subsidies.

“Competitive markets are working well on behalf of consumers,” said Steve Kratz, a spokesman for Citizens Against Nuclear Bailouts. “Any effort to favor one industry over another would just cause electricity prices to increase and hurt everyone from ratepayers to large-scale manufacturers.”

**Is saving nuclear worth the cost?**

From a climate perspective, paying to keep existing nuclear plants open can be a relative bargain, analysts say, since the reactors have already been built and their capital costs are sunk.

A paper by Michael Buchdahl Roth and Paulina Jaramillo of Carnegie Mellon University estimated that the country’s at-risk nuclear plants would require additional support of $8 to $44 per megawatt-hour of electricity produced to stay open, depending on the type of plant.

For comparison, an analysis by Third Way, a centrist think tank, calculated that federal subsidies for wind power could be worth $20 to $29 per megawatt-hour, and support for solar worth $26 to $85 per megawatt-hour. While the prices of wind and solar keep falling, nuclear plants have the added benefit of running around the clock.

Ultimately, experts say, the best solution would be for Congress to enact a nationwide price on carbon that put all zero-carbon energy on an equal footing. But until that happens, state efforts to prevent existing nuclear power from dying will be one of the biggest things policy makers can do to keep emissions down in the next decade.
“All these fights trace back to the fact that current energy markets don't value climate change properly,” said Alex Gilbert, an energy analyst who has studied nuclear retirements. “So states are essentially trying to find a backward way into carbon pricing,” first by subsidizing renewables, and now by trying to save nuclear. But, he added, “it’s a really messy way of getting there.”

**Correction: June 15, 2017**

An article on Wednesday about the effects on climate change of the retirement of several nuclear power plants omitted an affiliation of John Hanger, who commented on the possible closure of a reactor at Three Mile Island. While Mr. Hanger is a former Pennsylvania environmental secretary, he is also an outside adviser to Exelon, the utility that operates Three Mile Island.

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