As seen in the May 2021 issue of **Nuclear**News

A STATE OF UNCERTAINTY:

Two of the state's six nuclear plants nearly closed in 2016, but legislative action saved them. Now two more are at risk.

If there is one U.S. state you might think would be on top of the nuclear-plant-retirement problem, it's Illinois: With 11 power reactors, more than any other state, it is number one in nuclear generating capacity. In 2019, 54 percent of its in-state generation came from nuclear power. So why, at this writing in mid-April, does Illinois still face the possibility of losing two of its nuclear plants later this year?

First, a little background (mostly dark): On August 27 of last year, Exelon, owner of the nation's largest power reactor fleet, announced its intention to prematurely retire its Byron and Dresden plants, citing long-standing economic pressures. Without some form of compensation from the state for the plants' environmental and reliability attributes, the company declared, Byron would depart the grid for good in September 2021, and Dresden two months later, resulting in the loss of almost 4,200 MWe of clean power for more than four million Illinois homes and businesses, some $63 million in annual taxes, and 1,500 well-paying, full-time jobs. Exelon also warned of a bleak future for the state's Braidwood and LaSalle facilities, saying that they, too, were in jeopardy of early closure.

NUCLEAR POWER IN ILLINOIS

By Michael McQueen

It was not the first time Exelon had felt compelled to issue such a heads-up. In June 2016, the company announced that it would be moving forward with plans to shutter the Clinton and Quad Cities plants in 2017 and 2018, respectively. According to the notice conveying the news, Clinton and Quad Cities had lost a combined $800 million between 2009 and 2016, despite being two of Exelon's top performers.

Illinois lawmakers ultimately responded to that alert in December 2016 by passing the Future Energy Jobs Act (FEJA), a wide-ranging piece of legislation that was quickly signed into law by then governor Bruce Rauner. Among its many clean-energy provisions, FEJA established a zero-emission credit (ZEC) program to compensate Clinton and Quad Cities for their carbon-free power generation. The program resulted in a $235 million annual investment in nuclear power. According to Exelon, the program also avoided $364 million per year in higher electricity costs and $766 million per year in social costs from greenhouse gas emissions.

The four other plants in the state's nuclear fleet, however—Braidwood, Byron, Dresden, and LaSalle (with a collective net capacity of nearly 8,900 MWe, close to 10 percent of the nation's total nuclear power capacity)—were left unaided. At the time, Exelon expected to be able to recover the costs and risks of their operation through the regional power markets, notwithstanding what the company viewed as market flaws.

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THE PROBLEM

In its August 2020 announcement on the Byron and Dresden closures, Exelon said the plants faced "revenue shortfalls in the hundreds of millions of dollars" from declining energy prices (largely from cheap fracked natural gas) and market rules that allow fossil fuel generators to underbid nuclear and other clean resources in the PJM wholesale capacity auction. (Capacity represents a commitment of resources to provide electricity at a future date, usually about three years out. Currently, capacity for northern Illinois is purchased through a regional market run by grid operator PJM.) In 2016, energy price projections for a forward-looking three-year period were in the $29/MWh range. By March 2020, those projections were in the $22/MWh range, meaning that expected revenues for the plants had fallen by roughly 25 percent.

The announcement also pointed to the December 2019 decision by the Federal Energy Regulatory Commission to expand PJM's minimum order price rule (see sidebar on page 71), stating that FERC's decision "undermines long-standing state clean-energy programs and gives an additional competitive advantage to polluting energy sources in the auction."

These financial challenges remain today, more than half a year after Exelon's announcement, according to Mason Emnett, the company's senior vice president of regulatory policy and analysis. The Illinois plants, he notes, are operated in energy and capacity markets where electricity is fungible and where the environmental attributes of nuclear power are not taken into account. "We are forced to compete against generators that can pollute for free," says Emnett, "allowing those generators to underbid us, because they're not charged for their pollution."

Possible playing field levelers for the market, Emnett says, include a carbon fee, which would incorporate fossil fuel generation's "negative external consequences," i.e., greenhouse gas emissions, into the energy price, or the fixed resource requirement option, which would allow power generators to exit PJM's capacity market and instead bid their capacity through a state-run system that prioritizes zero-emission sources. But while a carbon fee and fixed resource requirement procurement would be viable alternatives in the long term, neither could be implemented in time to prevent the retirement of Byron and Dresden this fall, according to Emnett. Instead, he suggests a third option, one that could be implemented more quickly: a credit program similar to those now benefitting Clinton and Quad Cities and wind and solar resources.

"That's what renewables get," says Emnett. "They get renewable energy credits, solar credits, offshore wind credits—a compensation mechanism for the clean aspects of those projects. Nuclear doesn't, except for the handful of programs where the states have acted. With the extension of the zero-emission credit program to Quad Cities and Clinton in 2016, Illinois acknowledged that those clean resources were challenged. They were in the same situation that we are now in with Byron and Dresden."

Byron Nuclear Power Plant. Photo: Exelon

Dresden Nuclear Power Plant. Photo: Exelon

But in 2021, Illinois state officials and lawmakers are particularly wary of appearing too agreeable where Exelon is concerned, given the much-publicized bribery scandal last year involving the company's Commonwealth Edison subsidiary. In July 2020, Jordan Abudayyeh, a spokesperson for Illinois's current governor, J. B. Pritzker, said, "It is imperative that any clean-energy legislation in the future has the full confidence of the public. . . . The governor has made clear that any future legislation must protect the environment and consumers, and that it will not be written by utility companies."

And so, in early January, the Illinois Environmental Protection Agency finalized a $215,000 contract with a Cambridge, Mass.–based research and consulting firm, Synapse Energy Economics, to scrutinize the financial fitness of Byron and Dresden.

According to the agency's January 4 emergency purchase statement, "The announced closures of a large percentage of Illinois's electric generation would have a substantial impact on the state budget and electric reliability for Illinois residents. Thus, auditing Exelon's books will help determine how rapidly to deploy renewable energy without compromising affordable or reliable electricity."

News of the results of Synapse's report hit April 15 (just before this issue of *NN* went to press). According to a redacted copy of the audit received by the *Chicago Tribune*, Synapse agrees with Exelon that the Byron and Dresden plants require financial help to stay profitable. That's good news for Exelon and the nuclear community in general, of course, but whether it will prove to be sufficient motivation for Exelon to reverse its decision to retire the plants is not clear at this writing. Unlike the 2016 solution for Clinton and Quad Cities, which provided $235 million per year over 10 years, Synapse says Illinois can limit Byron and Dresden payments to $150 million per year at most, and over a five-year period.

And not all analyses of the financial status of Exelon's plants conclude that they are unprofitable. For instance, the January–June 2020 *State of the Market Report* for PJM, authored by not-easily-dismissed Monitoring Analytics, the grid operator's independent market monitor, found the plants to be economically viable in the long run.

In Emnett's view, that very different conclusion is in part due to a disagreement over what qualifies as a cost. "The market monitor believes we are overstating our costs," he says. "And the way it does that is essentially to look through our cost analysis and scratch things off, saying, 'I don't think that's relevant.' This includes property taxes and our cost of capital—costs that any rational business would associate with its operations. The market monitor also ignores the risks we face when agreeing to operate years into the future. We're promising to be there, to show up, and if prices change between now and then, that's on us. If the unit goes out during the delivery year because of transmission line trips or something happens within the unit, we lose the revenue, and that's on us."

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IMPACTFUL NUMBERS

In the event legislation to assist Illinois nuclear plants is not passed in time, and Exelon is forced to retire part or all of its uncompensated Illinois reactor fleet, Emnett expects the price of energy to rise—and not insignificantly. "The Brattle Group did an analysis of this," he says, "finding that electricity prices would go up by about $480 million a year should all four of the plants close."

That report, *The Impacts of Illinois Nuclear Power Plants on the Economy and the Environment*, was prepared for the Illinois International Brotherhood of Electrical Workers State Council and the Illinois AFL-CIO in 2019. The authors, Brattle principals Dean Murphy and Mark Berkman, looked at the electricity-price, economic, and environmental ramifications over a 10-year period (2020–2029) of closing Braidwood, Byron, Dresden, and LaSalle. The report was reissued last December, following Exelon's August 2020 announcement, with additional information on the cost and emissions impacts of losing only Byron and Dresden.

As shown in the table below (reproduced from the Brattle report), Murphy and Berkman project substantial increases in electricity costs and emissions in both the two-plant and four-plant closure scenarios. The four-plant closure scenario also shows large economic losses for the state.

SUMMARY OF CLOSURE IMPACTS, ANNUAL AVERAGE, 2020–2029[a]

	Without Byron and Dresden	Without Byron, Dresden, Braidwood, and LaSalle
Increased electricity costs in Illinois, per MWh	$2.11/MWh	$3.27/MWh
Increased electricity costs in Illinois, annual	$313 million	$483 million
Illinois state GDP loss	n/a[b]	$3.464 billion
Illinois in-state job loss	n/a[b]	28,030 jobs
Illinois state tax revenue loss	n/a[b]	$149 million
Total CO_2 emissions increase	20,094,860 tons	45,208,804 tons

[a] All dollar amounts are in 2020 dollars.

[b] Economic impact modeling was not performed for the case considering just Byron and Dresden, so the GDP, job, and state tax revenue impacts are not available for that case.

WITHOUT THE NUCLEAR PLANTS, ELECTRICITY PRICES GO UP. THAT HAS AN IMPACT ON THE ECONOMY, TOO, BECAUSE WHEN YOU OR I SPEND MORE ON OUR ELECTRICITY BILL, WE HAVE LESS MONEY LEFT TO SPEND AT, SAY, A RESTAURANT.

"Without the nuclear plants, you lose the direct jobs associated with the plants, which has a knock-on effect in the economy on some indirect jobs," says Murphy. "And you also have this other important effect, the electricity price effect. Without the nuclear plants, electricity prices go up. That has an impact on the economy, too, because when you or I spend more on our electricity bill, we have less money left to spend at, say, a restaurant."

One caveat to keep in mind, Murphy stresses, is that the economic impact calculated by the Brattle report is the gross impact, not the net impact. The report doesn't consider the cost of financial support for plants that might be provided through a ZEC program or some other mechanism. "We've got the nuclear plants operating in one case and the nuclear plants not operating and electricity prices going up in the other case," Murphy says. "What we don't have is the additional cost of keeping the nuclear plants in the first case. So the gross number can't be used as the value of keeping the nuclear plants around. You have to offset it by the costs of doing that." (An April 2021 study by professors at Carnegie Mellon confirmed that the costs of the 2016 Illinois ZEC program, as well as a similar New Jersey ZEC program, were more than offset by lower energy prices, resulting in a net decrease in power prices paid by retail customers, according to Exelon.)

The value of maintaining the nuclear plants can also be clearly seen in the report's significant emission numbers. "The lost nuclear generation will be replaced by fossil-fired generation," Murphy says. "It will be mostly gas, some coal, based on what is available in the region."

According to the report, this is true even after accounting for recent commitments to increasing renewable generation in Illinois. "Losing nuclear generation means less emission-free power than there would otherwise be, and correspondingly more fossil generation and emissions," the report states. "Since renewable generation is unlikely to increase more or faster if these nuclear plants are lost, any new Illinois renewables that will be developed in any case would not actually replace lost nuclear generation."

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FERC Failure?

A December 2019 FERC order instructed PJM to expand its minimum order price rule to cover new and existing energy resources, including renewables and nuclear, that receive "out-of-market" state subsidies, effectively raising the bidding price for state-aided resources. Proponents of the FERC order see it as a correction to wholesale capacity market price distortions caused by those subsidies.

The nuclear industry sides with Exelon on the minimum order price rule issue. Shortly after FERC rendered its decision, Maria Korsnick, president and chief executive officer of the Nuclear Energy Institute, said that FERC's order "intrudes on states' authority to protect the environment by undermining policies that support carbon-free, reliable electric generation for their residents while keeping prices low. We are disappointed that FERC's effort to ensure a competitive capacity market does not also value the important contributions that nuclear energy provides to PJM and the entire nation."

"IN ORDER TO ACHIEVE THE GOAL OF REDUCING CARBON IN THE STATE OF ILLINOIS, AND ACROSS THE COUNTRY, NUCLEAR IS A VITAL COMPONENT OF OUR ENERGY POLICY AND NEEDS TO CONTINUE TO BE SO."

SEN. SUE REZIN, MINORITY SPOKESPERSON ON THE ILLINOIS SENATE ENERGY AND PUBLIC UTILITIES COMMITTEE

SOLUTIONS ON THE HORIZON?

Three high-profile energy bills are currently under consideration in Springfield: the Clean Energy Jobs Act (CEJA), promoted by a coalition of environmental, consumer, and community groups; the Path to 100 Act, supported by the renewables industry; and the Climate Union Jobs Act (CUJA), a union-backed measure. While all three are designed to move Illinois toward a clean-energy future, CEJA and CUJA include specific provisions that could potentially offer a lifeline to Exelon's economically troubled assets.

Revised from an earlier iteration, CEJA was reintroduced by Rep. Ann Williams (D., 11th Dist.) in February and advanced out of the House Energy and Environment Committee on March 15 (along with the Path to 100 Act). The bill aims to achieve carbon-free energy in Illinois by 2030 and 100 percent renewable energy by 2050, in part through implementation of the fixed resource requirement option. If CEJA were to be enacted in its current form, the Illinois Power Agency would take over capacity procurement from PJM—a move that would likely benefit Exelon's nuclear plants, as well as renewables.

The Pritzker administration, however, is opposed to CEJA's fixed resource requirement, arguing in a 2020 report, *Putting Consumers and Climate First: Governor Pritzker's Eight Principles for a Clean & Renewable Illinois Economy*, that "the alleged cost reductions for consumers that might result from current fixed resource requirement proposals may actually result in cost increases for consumers. The cost structure is based on the 2018/19 delivery year, when prices were very high. A 5 percent cost reduction from that year, as proposed, would technically result in a cost increase today, because energy prices have fallen over the last two years." Instead, the governor's office recommends establishing a market-based program that would incorporate the social cost of carbon.

CUJA, the newest legislative entry, was unveiled on March 29 by strongly pronuclear Sens. Sue Rezin (R., 38th Dist.) and Michael Hastings (D., 19th Dist.) and Reps. Marcus C. Evans Jr. (D., 33rd Dist.), Jay Hoffman (D., 113th Dist.), and Lawrence Walsh Jr. (D., 86th Dist.). CUJA calls for the creation of 74 million MWh of carbon mitigation credits for Exelon's Braidwood, Byron, Dresden, and LaSalle facilities. (Since the Clinton and Quad Cities plants participate in Illinois's ZEC program, they would not be eligible.)

It is an expansive piece of legislation that, among other things, would also create 35 million MWh Renewable Portfolio Standard credits, with 25 percent of the solar allocation being dedicated to public schools; set union labor standards when ratepayer dollars are used, i.e., require union labor on projects receiving state subsidies; end formula rates and return to traditional ratemaking that includes pay-for-performance metrics; and require utilities to participate in annual standards and compliance audits and to disclose revenues and expenses related to renewable, zero-emission, and carbon-mitigation credits.

"In order to achieve the goal of reducing carbon in the state of Illinois, and across the country, nuclear is a vital component of our energy policy and needs to continue to be so," says Rezin, minority spokesperson on the Illinois Senate Energy and Public Utilities Committee. (Rezin's district holds three of the four at-risk Exelon plants—Braidwood, Dresden, and LaSalle.) "If Byron and Dresden were to prematurely close, it would take more than 35 years to replace the loss of the carbon-free energy with wind and solar," she adds.

Exelon is not currently endorsing any of the bills and, according to Emnett, would support any policy mechanism that addresses the financial challenges faced by the nuclear fleet. "As long as it meets the underlying problem and provides sufficient revenue to cover our costs and risks when paired with the revenue available from the market—that's what we're focused on," he says.

THE CLOCK IS TICKING

Whether legislators will respond to Exelon's 2020 warning in time to save Byron and Dresden from premature retirement is still up in the yet-to-be-adequately-decarbonized air. And while a reference to nuclear in Gov. Pritzker's February State of the State address was encouraging—"passing an energy bill that protects our nuclear fleet," he said, was among his "key priorities" for 2021—time is running out. The Illinois General Assembly's current legislative session adjourns at the end of May. If there's no good news out of the state capital by then, there will be precious little time left for a turnabout.

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Quad Cities Nuclear Power Plant. Photo: Exelon