

Most U.S. nuclear plants require life extension past 60 years to operate beyond 2050

December 8, 2014 . When nuclear power plants are built, the Nuclear Regulatory Commission (NRC) has the authority to issue initial operating licenses for a period of 40 years. Beyond that, the reactors need license renewals, and the NRC has granted 20-year license renewals to 74 of the 100 operating reactors in the United States. These reactors may now operate for a total period of 60 years. They represent a cumulative capacity of a little more than 69,000 megawatts (MW). The NRC is currently reviewing license renewal applications for an additional 17 reactors, and expects to receive seven more applications in the next few years.

With the bulk of the existing nuclear fleet licensed before 1990, nearly all existing reactors will be more than 60 years old by 2050. Unless a utility applies for and receives a Subsequent License Renewal (SLR) that could further extend the operating lives of their reactors up to 20 additional years, the reactors will not generate power beyond age 60. Although no applications for an

SLR have been submitted, several utilities are evaluating whether to apply for one, including Dominion Resources for its Surry Power Station Units 1 and 2 in Virginia (current license expiration dates of 2032 and 2033) as well as Exelon for its Peach Bottom Atomic Power Station Units 2 and 3 in Pennsylvania (current license expiration dates of 2033 and 2034).

From a regulatory perspective, the NRC determined in August 2014 that existing license renewal regulations were sufficient to support the SLR process. The NRC's determination was supported by the May (Continued on Page 6)

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China plans for nuclear growth



November 20, 2014. China's nuclear generating capacity is set to triple over the next six years, according to an energy development plan published by the State Council. The State Council published the Energy Development Strategy Action Plan, 2014-2020 on 19 November. The plan aims to cut China's reliance on coal and promote the use of clean energy. China currently has 19.1

GWe of installed nuclear generating capacity. According to the plan, this will reach 58 GWe of capacity by 2020, giving China the third largest nuclear generating capacity after the USA and France. In addition, by 2020, China should also have a further 30 GWe or more of new nuclear generating capacity under construction. The plan calls for the "timely launch" of

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China plans for nuclear growth

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new nuclear power projects on China's eastern coast and for feasibility studies for the construction of inland plants. It says that efforts should be focused on promoting the use of large pressurized water reactors (including the AP1000 and CAP1400 designs), high temperature gas-cooled reactors (HTRs) and fast reactors. The plan also says that research should be conducted into fuel reprocessing technology. In addition, it calls for the active promotion of basic research into nuclear power and the research and development of nuclear safety technology. It also says that research should be conducted to "improve the nuclear fuel cycle system."

Fast reactors - make maximum use of uranium resources by generating a certain amount more fuel than they consume - are seen as the main technology for China's long-term use of nuclear energy. Under previously announced plans, deployment of PWRs is expected to level off at 200 GWe by around 2040, with the use of fast reactors progressively increasing from 2020 to at least 200 GWe by 2050 and 1400 GWe by 2100.

Cleaner energy—The plan sets a cap on annual energy consumption at 4.8 billion tonnes of the standard coal equivalent by 2020. This would limit the annual growth rate of primary energy consumption to less than 3.5% per year over the next six years. Annual coal consumption will be held below 4.2 billion tonnes until 2020, the plan says. Its share of the energy mix will be reduced from the current 67% to 62% by 2020. The plan places responsibility on areas around Beijing, the Yangtze River Delta and the Pearl River Delta to cut their coal consumption in order to reduce air pollution. The share of natural gas, meanwhile, will be raised to over 10%. Meanwhile, the share of non-fossil fuels in the total primary energy mix will increase from 9.8% in 2013 to 15%, according to the plan. Installed capacity of hydro, wind and solar power is expected to reach 350 GWe, 200 GWe and 100 GWe, respectively, by 2020. Last week, China announced plans to achieve the peaking of CO2 emissions around 2030 and "to make best efforts to peak early." It also intends to increase the share of non-fossil fuels in primary energy consumption to some 20% by 2030.

Researched and written by World Nuclear News



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New math to help Exelon's nukes

December 06, 2014. While Exelon prepares to ask state legislators to rescue its Illinois nuclear plants, new rules set by an obscure power-grid organization back East would send more than a half-billion dollars to those sites by significantly raising electric bills. The changes raise questions about whether state action is even necessary. PJM Interconnection, the Valley Forge, Pa.-based regional power-grid operator for all or parts of 13 states including northern Illinois, on Dec. 3 approved changes to the way electricity generators are compensated for their promise to deliver during peak-demand periods. The changes, which are subject to approval by the Federal Energy Regulatory Commission, will benefit Chicago-based Exelon more than any other power company in the 13-state region, analysts say. When they take effect in 2018, those alterations will funnel more than \$560 million in additional revenue that year to five of Exelon's six Illinois nuclear stations, according to an analysis by former Illinois Power Agency Director Mark Pruitt. (One, the downstate Clinton plant, isn't in the PJM region and wouldn't benefit from the special payments.) Spread across all six of Exelon's plants, that revenue would add roughly 22 percent to the net revenue they collected as a group in 2013. Compared with what Commonwealth Edison customers pay today, the changes would hike the price of electricity 19 percent. Customers' total rates would increase by 11 percent, although that number is expected to rise with increases in the separate cost of delivering the juice. Pruitt's analysis doesn't account for any changes in underlying wholesale power prices. But Exelon has projected that they will rise modestly over that period, which would hike rates further. Exelon complains that market distortions have reduced wholesale power prices fetched by its nukes and has threatened to close as many as three of its six Illinois plants without a boost in revenue. It plans to lobby state lawmakers next year for financial assistance in the form of higher electricity rates, although it has yet to make a formal proposal.

But critics ask why the state should force households and businesses to pay Exelon more when the company appears to be in line for a major increase in revenue—courtesy of PJM—in three years. “Why should the Illinois Legislature create another windfall for Exelon at the expense of Illinois ratepayers?” says Howard Learner, executive director of the Chicago-based Environmental Law and Policy Center, which is often at odds with Exelon. “There's no good reason for that.” The fees for peak-demand power delivery, also known as “capacity” charges, are set three years in advance and are paid to operators on top of what they get for the juice they produce. As wholesale power prices have declined—largely due to the low cost of natural gas—capacity payments have become a more important component of power generators' revenue streams. PJM has grown increasingly concerned about grid reliability during high-demand periods. PJM officials cite last winter's polar vortex in particular when 22 percent of the resources “on call” were unavailable when demand spiked. Parts of the region came uncomfortably close to forced outages. The grid operator's answer is to sharply increase financial penalties for generators that don't deliver when called upon, among other things. It also will raise significantly the fee that generators can request for maintaining enough capacity to meet peak demand. It plans to have the changes in place by May, when capacity prices for the year beginning June 1, 2018, are formally set through highly controlled bidding by power plants. The increases PJM is trying to engineer would benefit Exelon more than any other power company operating in PJM's footprint, according to Hugh Wynne, an analyst at Sanford C. Bernstein. Based on the \$272-per-megawatt-day capacity price that PJM is forecasting (118 percent higher than today's), Exelon stands to enjoy an earnings boost of 55 cents per share, 21 percent higher than analysts' consensus 2016 earnings estimate, Wynne said in a Nov. 21 report. At that price, Exelon's five Illinois nuclear plants on the PJM grid would see a revenue boost of \$568 million, or \$6.47 per megawatt-hour, from today's prices, according to Pruitt. And the energy prices paid by ComEd customers would climb 1.4 cents per kilowatt-hour, or 19 percent, from today's 7.4 cents. PJM predicts that more reliable capacity will lessen price volatility during spikes in demand, thereby reducing peak energy prices during

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Exelon weighs closing Cordova, two other power plants



November 24, 2014. Exelon weighs closing Cordova, two other power plants In this file photo, Exelon communications director Bill Stoermer explains how banks of pressure tanks regulate nuclear reaction at the Exelon Quad Cities Generating Station in Cordova. The facility, which began producing electricity in 1973, is one of three Exelon is considering closing if the company does not receive the help it seeks from state lawmakers. As Exelon Corp. considers shutting down three of its nuclear facilities in Illinois -- including the Quad Cities Generating Station in Cordova --- it's asking lawmakers and the public to recognize the multi-faceted value of the energy it produces. During a

Monday editorial board meeting with the Dispatch/Rock Island Argus, Richard Myers, senior vice president of policy development at the Nuclear Energy Institute, said the three stations at risk for closing are Cordova; Byron Generating Station in Ogle County, and Clinton Power Station in DeWitt County. Mr. Myers said nuclear facilities are several economic challenges, including little to no growth in energy demand since 2008, historically low natural gas prices, a congested power grid and energy policies that benefit renewable wind energy.

At times, the Quad-Cities station is operating at negative pricing, said William Stoermer, senior communications manager for the Quad Cities station. He said the company won't make a final decision on closings until after next June, giving state lawmakers time to study the market and find solutions. He said they want lawmakers to create a model to regulate a fair and equitable marketplace, identify what needs to be done to improve the grid and recognize nuclear power is a carbon-free source of energy.

"We are not looking for a bailout," Mr. Stoermer said.

Exelon Corp. owns and operates 11 reactors at six nuclear energy facilities in Illinois, which provide 48 percent of Illinois' electricity and about 90 percent of the state's carbon-free electricity. The facilities in Illinois spark \$8.9 billion in direct and secondary output, officials said. The station in Cordova has an economic impact of \$1.4 billion in total output, employs roughly 900 people and paid \$7.4 million in property taxes this year -- more than half of which went to the Erie School District.

Mr. Myers said people tend to take the economic impact of nuclear facilities for granted. "When they do go away, if they go away, the impact is pretty large," Mr. Stoermer said. "These facilities are real economic engines for the community and counties in which they operate."

The three plants under review provide electricity to about three million homes. Mr. Myers said if they were shut down, the energy needed for those homes would come from somewhere, but likely would cost more and be generated from a source producing more carbon emissions. Mr. Stoermer said they are asking legislators, grid operators and residents to recognize the economic impact. "We want to be the provider of electricity in Illinois long-term," he said. The Cordova facility is licensed to operate through 2032.

By Dawn Neuses, dneuses@qconline.com, The Dispatch/Rock Island Argus.

Beaver Valley reactor shutdown during polar vortex due to improper cooling of main transformer

SHIPPINGPORT, Penn. -- January's subzero arctic weather led to the shutdown of dozens of power plants from the Midwest to the East Coast just when they were needed the most. But one power plant -- one of FirstEnergy Corp.'s two reactors at the Beaver Valley Power Station -- failed because operators had not been briefed on how to operate the plant's aging main transformer. That transformer, which connected the power plant's electrical generation to the high-voltage grid, shorted out, causing the reactor to shut itself down. Did the cold kill the transformer? Or was it just age? Those were the questions the Nuclear Regulatory Commission and the company were asking about the failure of a number of power plants in early January, leading to the chance of a blackout across many states as temperatures plummeted. After tearing the huge piece of equipment apart and examining the result of the "fault" or short, company engineers concluded that the a build-up of static electricity had caused the transformer to short circuit. Such transformers are cooled by oil, which does not conduct electricity. But the flow of cold oil in the transformer on that day in early January -- which became known as the first polar vortex event -- created friction. And the friction created the static electricity. Company investigators then discovered that the company which supplied the transformer had updated its guidance on cold-weather operation years earlier, warning owners not to run all of the pumps moving the oil when the temperature of the oil was less than about 120 degrees. The NRC noted in its quarterly review of the plant operations that the updated transformer operating instructions were six years old. "FirstEnergy Nuclear Operating Co. did not take action to address the recommendation in the ABB Inc. "Life Assessment Report," dated Sept. 2, 2008, to prevent the running of all the main transformer oil pumps when the oil temperature is below 50° C (120 degrees Fahrenheit)," the agency noted. The company has since incorporated those updated transformer operational instructions into plant operating procedures, said company spokeswoman Jennifer Young. And operators have been made aware of the changes. "Beaver Valley operating instructions at both units have now been updated to reflect a vendor recommendation which indicates all of the main transformer oil pumps should not be operated simultaneously when the temperature is below 50 degrees C (120 degrees F) or static electrification may result," Young confirmed in an email. Although the plant shut itself down in an orderly and safe way, the NRC decided the company's failure to include the update's transformer operating instructions was a "performance deficiency" that was "more than minor" because it initiated a cascade of events that shutdown the reactor. The NRC cited the company, though the citation is the lowest level. A check of NRC records indicates that transformer failures are nothing new at the nations reactors, and that the agency issued an "information" notice in 2009 alerting reactor owner to pay attention to the operation of aging equipment. The Beaver Valley reactor has had two previous transformer failures, in 1994 and in 1978, though the causes were unrelated, NRC records show.

By John Funk, The Plain Dealer

New math to help Exelon's nukes

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those periods. That could help offset the increases in capacity prices. Exelon agrees, and in a statement says, "We believe the capacity market design is flawed and needs to be fixed to prevent a reliability crisis." "The fact remains that several of Exelon's Illinois nuclear facilities have been experiencing major annual losses in the past few years due to a combination of factors, not least of them the market's failure to properly value their carbon-free, always-on energy," the company adds. Illinois could address that, it says, by favoring nuclear energy with ratepayer-financed set-asides in the same way it does with renewable sources. The company doesn't address the "double windfall" argument against a state rescue package. It says only that it would be a "guessing game" to project increases in PJM's capacity prices, given that federal energy regulators haven't yet approved all of PJM's changes.

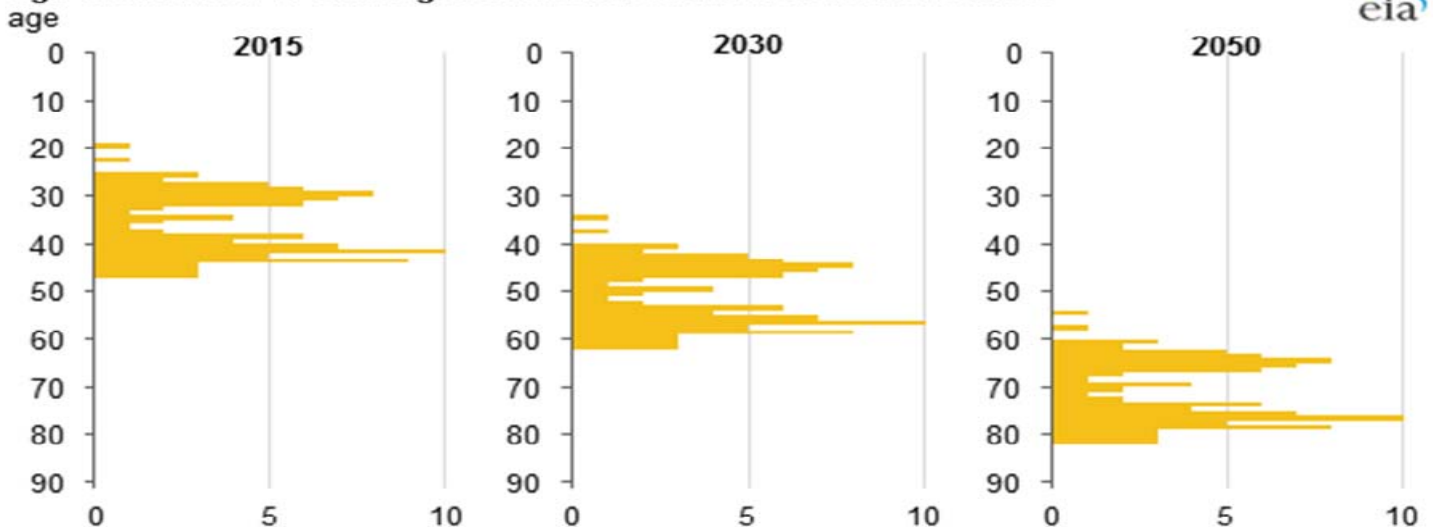
By Steve Daniels

Commercial operation for China's Fuqing 1

20 November 2014. Unit 1 of the Fuqing nuclear power plant in China's Fujian province has entered commercial operation having successfully completed commissioning tests. It becomes China's 22nd operating nuclear power reactor. Plant constructor China Nuclear Engineering Corporation announced on 19 November that the 1080 MWe CPR-1000 reactor had completed a performance test while operating for 100 hours at full capacity. It said that this marked the official transition from commissioning to commercial operation. Construction of the Chinese-developed CPR-1000 began in November 2008. The reactor achieved first criticality on 24 July 2014 and was connected to the grid on 20 August. The Fuqing plant will eventually house six Chinese-designed pressurized water reactors. The first four units of the plant are CPR-1000 reactors. Unit 2, construction of which began in June 2009, is expected to start operating in August 2015. First concrete was poured for units 3 and 4 in 2010 and 2012, respectively. Those reactors should begin operation in February 2016 and March 2017. Researched and written by World Nuclear News.

Almost all U.S. nuclear plants require life extension

Age distribution of existing U.S. nuclear reactors at selected dates



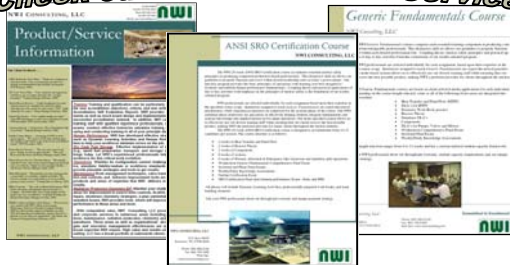
Source: U.S. Energy Information Administration, based on U.S. Nuclear Regulatory Commission. Note: Graph does not include planned nuclear additions but does include scheduled retirements.

2014 findings of the NRC's Advisory Committee on Reactor Safeguards, which stated that the current NRC license renewal framework would support SLR. In making the decision to extend the operating lives of nuclear reactors beyond 60 years, the NRC will consider the long-term safety and security of continued reactor operation. In addition to the NRC, the U.S. Department of Energy, through its Light Water Reactor Sustainability Program, is one of several organizations studying the effects of aging on nuclear power plant systems, structures, and components. Other industry groups involved in studying SLR include the Electric Power Research Institute and the Nuclear Energy Institute. International groups, such as the International Atomic Energy Agency and the Organization for Economic Cooperation and Development's Nuclear Energy Agency, are also involved in addressing life extension issues in support of nuclear power plants around the world. U.S. utilities already make significant investments in maintaining and upgrading the current fleet of U.S. nuclear power plants to ensure safe, secure, and reliable operation throughout their 40- or 60-year lifetimes. The Electric Utility Cost Group estimated that the industry invested \$6.4 billion in capital projects to upgrade and maintain nuclear power plant systems during 2013.

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NWI News Update

The following key activities are being conducted by NWI professionals...

- PPL SSES PM Optimization & Maintenance Rule
- TVA Nuclear Power Group—BFNP QA/Performance Improvement
- Xcel's Monticello EPU Project
- GGNS, IPEC, Pilgrim, RBS, & ANO Entergy—Nuclear Oversight, Performance Improvement/CAP, Maintenance & Training Support
- FENOC Perry Plant's Fukushima FLEX Project
- Duke Energy's Catawba Performance Improvement
- EPRI I&C Study

WE WISH TO EXPRESS SPECIAL THANKS TO THE FOLLOWING CLIENTS FOR MAKING NWI A PREFERRED CONSULTING COMPANY.

- **ENERGY'S ANO, PILGRIM, IPEC, RIVER BEND, AND GRAND GULF STATIONS**
- **PPL SUSQUEHANNA STEAM ELECTRIC STATION**
- **TVA'S BROWNS FERRY NUCLEAR PLANT**
- **XCEL ENERGY'S MONTICELLO**
- **FENOC'S PERRY NUCLEAR PLANT**
- **DUKE ENERGY'S CATAWBA NUCLEAR STATION**
- **EPRI**

Thank You



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