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CLIMATE PLAN 'MISSES OPPORTUNITY' OF EXISTING REACTORS

NWI Climate Change and Industry Highlights

05 August 2015—The Nuclear Energy Institute (NEI) has welcomed the positive changes on new nuclear power plants contained in the final Clean Power Plan rule issued this week by the US Environmental Protection Agency (EPA), but said it is a "missed opportunity" on existing reactors. US President Barack Obama and EPA administrator Gina McCarthy unveiled the document on 3 August.

The final rule regulates greenhouse gas emissions from existing fossil fuel-fired power plants under section 111(d) of the Clean Air Act. NEI said this rulemaking "significantly changes how the electric power sector operates well into the future" and affects all sources of electricity, including nuclear energy facilities.

According to the final rule, new nuclear reactors and power uprates to existing units will help the USA cut its carbon dioxide (CO2) emissions by 32% from 2005 levels by 2030. Obama said this target makes the plan the "single most important step" the country has ever taken to tackle global climate change.

The White House said the plan will help to achieve Obama's near-term target to reduce emissions in the range of 17% below 2005 levels by 2020, and lays a "strong foundation" to deliver against his long-term target of between 26% and 28% by 2025. The release of the final rule also "continues momentum" towards international climate talks in Paris in December, the White House said, building on announcements to date of post-2020 targets by countries representing 70% of global energy based carbon emissions.

NEI president and CEO Marvin Fertel said he was pleased that the EPA recognizes in the final rule that nuclear plants under construction should not be part of the goal-setting calculation, but should count toward compliance when they are operating. He is also encouraged that power uprates that increase nuclear plants' carbon-free output should count toward compliance. But NEI is disappointed that the "best system of emission reduction" in the final plan does not incorporate the carbon-abatement value of existing nuclear power plants.

"This is surprising since EPA clearly recognized in the proposed rule that some of these plants are at risk of premature shutdown," Fertel said. EPA notes correctly, he added, that existing nuclear generation helps make existing CO2 emissions lower than they would otherwise be, but will not further lower them below current levels. *What the final rule fails to recognize, he said, is that emissions will be significantly higher if existing nuclear power plants shut down prematurely.*

Nuclear power produces 63% of America's carbon-free electricity and should be recognized in policies and in regulations as an essential element of a lower-carbon energy portfolio, Fertel said. In 2014 alone, nuclear energy avoided the emission of 595 million tonnes of CO2.

"Clearly, it must be part of any credible program to reduce carbon emissions," he said. NEI wants new nuclear capacity to include nuclear plants relicensed to operate beyond 60 years, and any nuclear plants that have not received licence extensions to operate beyond their original 40-year term as of the beginning of the 2012 baseline year.

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GNF Launches Next-Generation Fuel

14 May 2015—Global Nuclear Fuel (GNF) has made its next-generation GNF3 boiling water reactor (BWR) fuel assembly available to customers for the first time. GNF3 has evolved from the company's GNF2 fuel, and according to the company, provides improved fuel economics, increased performance and flexibility in operation.It utilizes the same 10 x 10 lattice design used in GNF2, and employs GNF's NSF (1.0% niobium-1.0% tin-0.35% iron) zirconium alloy cladding which GNF says significantly reduces fuel channel distortion due to chemical interaction with compared to zircaloy cladding. The new fuel exhibits superior corrosion resistance, the company said.GNF Americas chief operator officer, Amir Vexler, said the new fuel had been designed to deliver more power while reducing overall fuel cycle costs. "The enhanced GNF3 design will save utilities money by reducing batch fraction, lowering the average enrichment in fuel reloads and extracting more power from the core," he said.

A total of eight GNF3 lead-use assemblies have already been loaded into two nuclear plants - four each at Entergy's River Bend and Exelon's LaSalle - and are operating as designed, according to GNF. The company has now made the fuel available to customers in lead use assembly quantities, for use in a reactor core to confirm performance prior to using it for a full core. GNF3 is scheduled to be available for full reloads in 2018.

The fuel will be manufactured at Wilmington, North Carolina.

GNF, a GE-led joint venture with Hitachi and Toshiba, manufactures and supplies fuel for BWRs and Candu reactors. Earlier this week GE Hitachi Nuclear Energy announced that the company intended to offer refueling services to pressurized water reactors as well as for BWRs.

(Researched and written by World Nuclear News, 14 May 2015)

Climate Plan 'misses opportunity' of Existing Reactors

(Continued From Page 1)

"The final rule appears to give no credit for licence extensions," Fertel said, adding that nuclear power plant operation beyond 40 years, and certainly beyond 60 years, "cannot be treated as a foregone conclusion". License renewal is a major investment decision, he said. Although the cost of renewal varies for each type of reactor design and location, preliminary cost estimates are comparable to the cost of building a new combined cycle natural gas unit - in the range of $500 million to $1.5 billion. NEI noted that Fertel's comments were preliminary and that he will more closely evaluate the final Clean Power Plan rule in the days ahead.

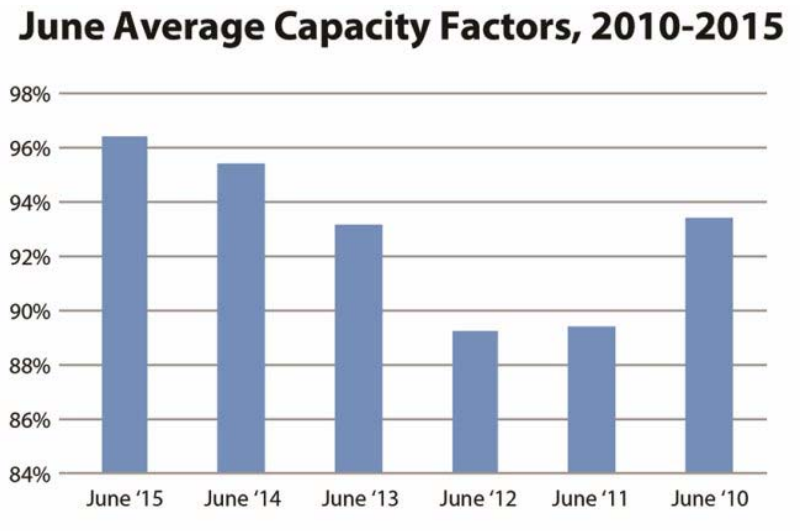
Obama stressed that the final rule sets the first-ever national standards to limit carbon pollution and tailored goals for states to cut emissions. "We already set limits that protect public health by reducing soot and other toxic emissions, but until now, existing power plants, the largest source of carbon emissions in the United States, could release as much carbon pollution as they wanted," he said. "Over the next few years each state will have the chance to put together its own plan for reducing emissions. We are giving states the time and flexibility they need to reduce pollution in a way that suits them." In a statement, the White House said that all low-carbon electricity generation technologies - among which it included renewables, energy efficiency, natural gas, nuclear and carbon capture and storage - can play a role in state plans. These are due in September 2016, but states that need more time can make an initial submission and request extensions of up to two years for final plan submission. The compliance averaging period begins in 2022 instead of 2020, and emission reductions are phased in on a gradual 'glide path' to 2030. These provisions to give states and companies more time to prepare for compliance are paired with a new Clean Energy Incentive Program to drive deployment of renewable energy and low-income energy efficiency before 2022.

(Researched and written by World Nuclear News 05 August 2015)

U.S. Nuclear Plants Show Best Performance Yet

3 August 2015—U.S. nuclear power plants produced electricity with an average estimated capacity factor in June 2015 of 96.4 percent, the highest number in the past six years. The figure compares to 95.4 percent last June, and is 7 percent higher than the 89.2 percent performance achieved in June 2012.

Ninety of the 99 U.S. nuclear reactors ran at a 90 percent capacity or higher in June, while 62 reactors ran at 100 percent or higher.



Source: Calculated from U.S. Energy Information Administration and Nuclear Regulatory Commission data.

Capacity factor compares the amount of electricity a power plant produces over a given period to the maximum it could produce at continuous full power operation during the same period. Reactors running at 100 percent capacity, for example, are operating nonstop and at full power over the period measured.

According to NEI's most recent Nuclear Performance Report, estimated U.S. nuclear generation for the month was 68.5 billion kilowatt-hours, compared to 68.1 billion kWh in June 2014.

Capacity factors are generally higher in the summer and winter peak demand seasons as nuclear plant operators schedule refueling and maintenance outages during the off-peak seasons. U.S. nuclear power plants are some of the best-performing in the world.

According to Platts' Megawatt Daily's June 22 report, Arizona Public Service's 1,405-megawatt Palo Verde 3 was the second highest generator of electricity worldwide in 2014, producing 12.2 billion kWh and posting an annual capacity factor of 97.5 percent. STP Nuclear Operating Co.'s 1,312-MW South Texas 2 was in third place, generating 12.19 billion kWh and obtaining the highest capacity factor, of more than 100 percent.

(NUCLEAR ENERGY INSTITUTE / NEI, 13 August 2015)

World Nuclear Performance Gained in 2014 for First Time Since Fukushima

World nuclear generation tracked by Platts in 2014 rose 1% compared to 2013, the first annual gain since the 2011 accident at Fukushima I in Japan curbed global nuclear output sharply, an analysis shows. The analysis considers generation by the nuclear plants reporting gross generation to Platts. Those plants generated about 2.039 billion MWh in 2014. That was a slight increase from the 2.018 billion MWh in reported generation in 2013. About 350 of the world's 429 nuclear units report gross generating data to Platts. The units in operation in 2014 had a gross capacity of 392.6 GW, up from about 390.9 GW in 2013, when the same number of units operated, according to Platts data. The global nuclear fleet made up for a lack of growth in the number of units in 2014 by increasing output of existing units through uprates. In addition, the units reporting data increased their capacity factor, meaning they were online at full capacity for longer, likely by reducing the length and number of outages. The global nuclear unit capacity factor rose to about 75.8% in 2014, well above the 69.1% in 2013, and higher than the 2012-2014 average capacity factor of 71.9%. That figure was particularly notable as it includes the 48 operable Japanese nuclear reactors, all of which are shut in the wake of the Fukushima I accident in that country. Those units had a capacity factor of 0% in 2014. Global nuclear generation reported to Platts is still far below its peak in 2006 of 2.79 billion MWh, when there were more reactors online and all but a few dozen units were reporting gross output. The number of units reporting to Platts has declined as electricity competition has spread and more companies regard the data as proprietary. All figures are for gross generation. "There's just been an amazing focus on eliminating the causes of things that were detracting from capacity factors historically: equipment problems and human performance," said 22 (Continued on Page 9)

German Winds Make Central Europe Shiver

13 August 2015—Junking nuclear power is creating problems for Germany's neighbors. Germany's shift to renewable energy has been hailed as an historic policy move — but its neighbors don't like it. The country's move away from nuclear power and increase in production of wind or solar energy has pushed it to the point where its existing power grids can't always cope. And it's the Czech Republic, Poland, the Netherlands, Belgium and France that have taken the brunt.

"If there is a strong blow of the wind in the North, we get it, we have the blackout," Martin Povejšil, the Permanent Representative of the Czech Republic to the EU said at a briefing in Brussels recently. Germany's north-south power lines have too limited a capacity to carry all the power that is produced from wind turbines along the North Sea to industrial states like Bavaria or Baden-Württemberg and onto Austria. That means the extra electricity is shunted through the Czech Republic and Poland.

To put an end to the often unexpected power flows from Germany — so-called loop flows — the countries are taking the matter into their own hands. Concerned about the stability of their own grids, additional costs and the ability to export their own power, the Czechs, for example, are installing devices to block the power from 2016 onwards. Poland is also working on the devices, known as phase shifters, and expects to have some operating this year. To the west, the Netherlands, Belgium and France have also installed phase shifters to deal with the flows.

These separate moves come as Brussels pushes for integration of Europe's energy markets. The struggle shows how the drive toward more renewables, combined with outdated infrastructure and inconsistent cooperation within the EU, is having unintended consequences. "In the past, with coal and nuclear power plants, the power system was extremely predictable. Now, with ever more renewable energy coming online, the system isn't as predictable anymore, which can cause challenges also for the single market debate," said Joanna Maćkowiak Pandera, a senior associate with German think tank Agora Energiewende. "We have been telling that to the Germans, 'Increase your transmission system, or we will shut you off'," an EU diplomat said at a briefing in Brussels recently. Power loop flows occur when a country's power grid infrastructure isn't sufficient to handle new production, so the electricity is automatically diverted through neighboring countries on its way to its destination in the producing country. (Continued on Page 5)

German Winds Make Central Europe Shiver

"This also leads to congestion in neighboring systems," said Georg Zachmann of the Brussels-based Bruegel think tank, adding that to deal with the situation countries can also reduce their own electricity exports to South Germany to make space for the German power. That, however, means that Germany's energy transition is affecting the export potential of countries like the Czech Republic and France.

Pressure is building on Germany to expand its north-south connection. But the idea has aroused local opposition in Bavaria, with residents unwilling to see their picturesque countryside spoiled by unsightly transmission towers. "If we want to have a growing share of renewables, we must build the grids," Walter Boltz, vice chair of the regulators board of the EU's Agency for the Cooperation of Energy Regulators (ACER), told POLITICO.

The simplest solution, he said, would be for Germany to build up the necessary links. But that will take time. Alternatively, Germany could simply shut down wind power on highly productive days. But the country's current policy stands in the way. "It's an uncomfortable problem and has to do with Germany's irrational priority dispatch policy under which you cannot shut down renewables," Boltz said. Germany's neighbors aren't immune from criticism on the issue. Poland, for instance, could also consume the power it imports from Germany, something it resists to shield its own industry, Boltz said. Further, Poland's grids needed expansion, he said. Germany, for its part, has stepped up cooperation with its neighbors to remedy the issue. Energy Secretary Rainer Baake recently addressed criticism that Germany's energy transition was an unilateral policy move, German media reported, saying, "People in this country and also outside of Germany who believe this must be some kind of act of re-nationalization of energy policy […] could not be more wrong."

In 2014, German transmission operators agreed with the Czechs to regulate cross-border power flows to protect the Czech grid from overloading and reduce the danger of blackouts. A similar agreement was struck between the Polish and German sides. On a political level in June, Germany signed a pact with 11 "electrical" neighbors, including France, Poland and the Czech Republic, to promote the integration of the respective power markets, counter overcapacity and let the market determine power prices. Still, Poland's regulator last year sent a letter to the ACER, asking it to come forward with an opinion on the loop flows from Germany. The response is expected in September.

In 2013, the agency issued an opinion on unscheduled loop flows, concluding that "in most cases these flows are a threat to a secure and efficient functioning of the Internal Electricity Market." The situation is delicate for the Czech Republic and Poland, which have long insisted that choosing whether power should be generated by solar, wind, coal, nuclear or other ways remains a national issue, not one for Brussels. So Germany is free to make decisions about how to generate electricity, in this case to shut down its nuclear plants. Brussels has stepped up efforts to connect the bloc's energy markets, with the European Commission in a policy paper in February stressing "the interconnection of the electricity markets must be a political priority."

The Commission released an initial plan in mid-July about how to build a borderless power market that can deal with the rise in renewables. Draft legislation is expected in 2016. "We haven't developed the grids," the EU bloc's energy chief Miguel Arias Cañete told POLITICO last month, adding that while there has been a lot of investment in renewables, grids aren't up to standard. That's also why Brussels is keen on increasing cross-border power interconnections. It's making political and financial efforts to finally link up at least 10 percent of the EU's installed electricity production capacity by 2020. But it's a long slog to connect the bloc: EU countries had originally pledged that target in 2002.

(By Kalina Oroschakoff, Politico, 13 August 2015)

China Wants to Build Hybrid Fusion-Fission Reactor by 2030

13 August 2015—Joint Sino-French Taishan Nuclear Power Station being built outside Taishan City in Guandong province © Peter Parks / AFP

China is going to build its first hybrid fusion-fission reactor by 2030, according to local media reports. The reactor is expected to recycle nuclear waste making energy production more environmentally friendly.

The ambitious plan is in the works at the top secret Chinese Academy of Engineering Physics in Sichuan, where China develops its nuclear weapons, China Daily Mail reports. The plans were announced in a study published in the Science and Technology Daily, an official newspaper of the Ministry of Science and Technology.

The experimental research platform will be built by 2020 while the whole system could be launched by 2030, said Huang Hongwen, the deputy project manager, China Daily Mail reported Saturday.

Researchers believe that hybrid reactors will generate twice as much electricity as modern reactors. These reactors are also believed to be safer as they can be immediately stopped by cutting the external power supply.

Today reactors use only fission technology which means dividing atoms in half while future fusion-fission technology will merge two atoms in one. The core of the new hybrid reactor will be a fusion reactor which will be powered by a 60 trillion amperes fission reactor.

The basic principle of the hybrid reactor is recycling uranium-238, which is the main component of nuclear waste, into new fuel. Such a reactor will become a breakthrough in environmentally friendly technologies and in particular a solution of nuclear wastes problem for China, who lacks recycling facilities and has to store the waste inside nuclear energy plants.

Hybrid fusion-fission reactors can also solve another vital problem for China – uranium shortages. According to the study China can meet its uranium demands for only a century, while using fusion-fission technologies will provide it with uranium for several thousand years.

Some scientists have doubts over whether Chinese plans are realistic. “A viable fusion reactor is nowhere in sight, not to mention a hybrid,” an unnamed physicist from Tsinghua University told the SCMP.

“It’s like talking about hybrid cars before the internal combustion engine was even invented. We will be lucky to have the first fusion reactor in 50 years. I don’t think a hybrid can be built way before that”, he added.

China is not the only country which has tried to create a hybrid fusion-fission reactor. Similar projects are being developed in Russia, Japan, the EU and the USA. China, however, is the first country to have planned exact dates.

(RT News, 13 Aug, 2015)

Fast Nuclear Reactor to Start Construction in Fujian in 2017

16 August 2015—Bill Gates attends a press conference in Geneva, Switzerland, May 17, 2011. (File photo/Xinhua) China plans to begin building a pilot fast nuclear reactor in Fujian province in 2017, using one of the six next generation nuclear power technologies developed for cleaner and more sustainable energy, according to Shanghai's China Business News. According to Xu Mi, a researcher at the Chinese Academy of Engineering, construction of a pilot project for a fast neutron reactor in Fujian's Xiapu County is set to begin at the end of 2017.

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Fast Nuclear Reactor to Start Construction in Fujian in 2017

Xu, who is dubbed the "father of fast reactors" in China, said fast reactor technology will increase the amount of energy extracted from uranium from the current level of 1% to 60%, thus minimizing nuclear waste. The newspaper also found information about the planned reactor in Fujian, which is expected to have a capacity of 600 megawatts. Preparations for the construction are also underway.

The World Nuclear Association's website showed that six technologies, including four categorized as "fast reactors," have been selected as the Generation IV nuclear power technologies set to be deployed between 2020 and 2030. The first fast reactor in the world was built by physicist Enrico Fermi and other scientists in the United States in 1946, according to the paper.

Bill Gates, founder of software giant Microsoft, is also involved in the development of a type of fast reactor called a "traveling wave reactor" through TerraPower, a company he founded in 2008 and chairs. Gates has visited China at least three times in recent years for possible cooperation on nuclear power in recent years, the report said.
On his latest trip to Beijing, Gates met with Nur Bekri, a vice chair of China's National Development and Reform Commission, and with China National Nuclear Corp chairman Sun Qin on Feb. 9, the newspaper added. China National Nuclear Corp is the country's largest nuclear power company and a major Chinese partner of TerraPower.
Gates also visited an experimental fast reactor, which was built by the Chinese company's China Institute of Atomic Energy and went online in 2011, during a previous trip, the report went on to say.

According to Xu, the experimental reactor project launched in 1992 cost 2.5 billion yuan (US$390 million) and was very challenging. Xu said it will take China more than 10 years to begin commercial operations of fast reactors, but the new technology should not pose a threat to existing nuclear power plants. This is because fast reactors can use used fuel rods created by existing nuclear power plants to generate electricity.

(Staff Reporter, Want China Times, 16 August 2015)

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Brazilian AP1000 Collaboration for Westinghouse

19 June 2015—The MOU focuses on developing local technical capabilities and flags Westinghouse's commitment to localization as the company looks to opportunities for the AP1000 in the region. "The construction of AP1000 nuclear power plants in Brazil would create thousands of high-paying jobs in the country, expand the industrial capabilities and support the next generation of nuclear professionals who will deploy safe, clean and economical nuclear energy," the company said in a statement. Brazil's two operating pressurized water reactor (PWR) nuclear power plants at Angra supply about 3% of the country's electricity. Angra 1 (626 MWe) was supplied by Westinghouse while Angra 2 (1270 MWe) was supplied by German vendor KWU, which was subsequently integrated into Siemens Power Generation Group, ultimately becoming Areva NP after Siemens' 2009 decision to withdraw from the reactor business. Areva is also completing a third Angra unit which is scheduled to start up next year. Brazilian operator Eletronuclear has proposed building up to four further units at two sites in Brazil, and is considering the Westinghouse AP1000, as well as the Areva-Mitsubishi Atmea-1 and Atomstroyexport's VVER-1000. "Recent statements by the Brazilian government have reinforced its desire to expand nuclear generation in Brazil with several new nuclear projects by 2050," Westinghouse said. Westinghouse's current activities in Brazil include providing technical support to nuclear operator Eletronuclear as well as a partnership with Industrías Nucleares do Brasil on fuel and manufacturing technologies. Nuclep president Jaime Cardoso said the new MOU would support Brazil's established nuclear supplier base. "Our relationship with Westinghouse is strong and this initiative will strengthen and expand our nuclear manufacturing capabilities," he said.

(Researched and written by World Nuclear News, 19 June 2015)

Power Company Says Drones Could Soon Scan Lines for Trouble, Help Identify Storm Damage

14 July 2015 - When tornadoes and hurricanes topple power lines in the future, flying drones might be the first to pinpoint the damage. Power companies across the United States are testing whether small drones can spot trouble on transmission lines or inspect equipment deep inside hard-to-reach power plant boilers. That's just for starters. Researchers and industry executives predict the drones could provide security surveillance to deter vandalism on remote gear and make it safer for utility workers to climb poles and towers. One of the country's largest power companies, Southern Co., says it hopes drones can eventually identify storm damage in the Southeast and allow it to increase its routine inspections. About a dozen utility or service companies have sought permission to use drones for similar purposes. "One of the biggest challenges is going out and assessing the system," said Andrew Phillips, who has directed drone research for the Electric Power Research Institute, an electric industry trade group. "Can we use UAVs to speed that up and do it at a much-faster pace and just getting information? What's the situation? What resources do I need?" Southern Co. is now flying a roughly 7-pound drone at a site east of Atlanta where it normally trains linemen. During a recent demonstration flight, the Aeryon SkyRanger buzzed overhead, flying along an inert transmission line with a camera capable of zooming on tiny imperfections from far away. The drone can fly for about 20 minutes even in choppy wind and bad weather. Right now, the utility inspects its 27,000 miles of transmission lines in the Southeast using planes and helicopters. After a storm, workers in trucks must often scour the countryside looking for damage, a time-consuming task. Southern Co. described the drones in federal filings as "significantly safer" than having workers inspect lines in low-flying aircraft or bucket trucks. Aircraft can crash, and bucket trucks can be cumbersome or impossible to drive through storm-damaged or remote areas. A drone could "point to areas, point to exactly where you need to go, point to what you might need to take with you to do the repair," said Larry Monroe, the senior vice president for research and environmental affairs at Southern Co. Still experimenting with the technology, Southern Co. officials hope to test a drone near an electrified transmission line by early fall. Some have voiced concerns. The Air Line Pilots Association International, a labor union, said drone pilots should be licensed for commercial flights like its members, a higher standard than the government required of Southern Co. The National Agricultural Aviation Association says the drones should be better equipped to avoid collision with low-flying crop dusters and other aircraft. Industry researchers have already learned a few lessons experimenting with drones. The Electric Power Research Institute and about 10 other utilities conducted drone tests in Canada last year, Phillips said. The most-reliable drones with good camera optics generally cost more than $20,000. A drone capable of flying beyond a ground-based controllers' line of sight easily tops $100,000. Drones alone cannot diagnose complicated technical problems. "It's easy to go up and make some cool pictures," Phillips said. "It's pretty hard to do a real inspection and get value out of it." Beyond inspections, utility officials have discussed using drones to place climbing safety gear for utility workers on tall structures and thread the guide lines used to hoist larger transmission cables into place. Workers now use helicopters, bows and arrows or walk. Xcel Energy recently used a drone to inspect the boiler of three power plants in Colorado and Minnesota. The boilers are typically eight to 10 stories tall and have thousands of components that must be inspected. Normally, the company's workers spend a week building scaffolding and using ladders and suspension devices to inspect boiler equipment. Doing the same job by drone took a day and was less risky for workers. "We got the same quality results," said Michael Lamb, Xcel Energy's vice president of operating services. "This has got a lot of potential."

(Associated Press 14 July 2015 By RAY HENRY)

World nuclear performance gained in 2014 for first time since Fukushima

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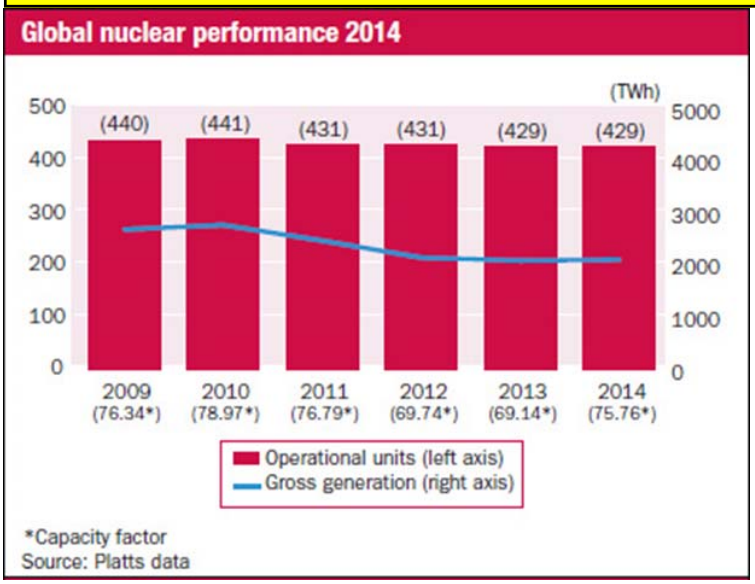

June 2015 - Eugene Grecheck, a former Dominion nuclear executive and current president of the American Nuclear Society.

The US nuclear power industry was achieving capacity factors in the high-50% range in the 1980s until an effort was made in recent decades to upgrade, better maintain and improve the reliability of reactor protection system equipment that was causing performance problems, he said. "Every plant has put a high focus on what was called equipment reliability," he said. In addition, management focus was placed on shortening planned outages by improving the efficiency of workers and improving productivity, he said.

At Dominion, for example, a rule was put in place that said work crews had to report inactivity after 15 minutes, alerting management to a potential increase in unneeded radiation doses to those workers as well as drawing attention to wasted time, he said. The number of operable units globally has declined from 441 in 2010 to 429 in 2014, triggered by retirements in Germany, Japan and the US.

Germany is gradually phasing out nuclear energy in response to the Fukushima accident. Japan is awaiting the phased restart of reactors after regulatory reviews show that they meet stricter nuclear safety standards established since the accident.

The first Japanese reactor could restart in August, nuclear operators have said. In the US, low electricity prices contributed to the retirement of two units in 2013 and 2014, while technical issues related to steam generator replacement resulted in the closure of three additional units in 2013. The 2014 figure still includes five Japanese units for which the operators announced permanent retirements in March. It also includes one US unit, Vermont Yankee, which was retired on the last day of the year. The figures do not include India's Kudankulam-1, which declared commercial operation December 31, 2014, and Argentina's Atucha-2, which was in the commissioning process at year's end. US nuclear generation reported to Platts was little changed compared with 2013. Last year's generation of 649.7 million MWh was higher than the 2013 figure of 648.6 million MWh by about 0.16%. US generation has fallen from the record 843 million MWh in 2007, in part as a result of retirement of four reactors with a total capacity of 3,747 MW, during 2013. Three of the units, Duke Energy's Crystal River-3 and Southern California Edison's two-unit San Onofre, had been in extended outages dating to 2009 and 2012, respectively. US totals in 2014 exclude 24 units that do not provide gross generating data to Platts; 25 units did not report in 2013.

Retirements of units in the US, Japan and Germany have been offset by new units that have come online in China, where the number of units in the analysis grew by five in the past two years. Three units that entered commercial operation in China in 2014 were included in the data. The 1,086-MW Yangjiang-1 began operating commercially in March, 1,089-MW Ningde-2 began operating in April and 1,119-MW Hongyanhe-2 did so in May. Fuqing-1, which entered commercial operation in December, is not included in the data. Additional growth in the number of units is on the horizon. China plans to bring at least seven nuclear units into commercial operation during 2015 and aims to expand its installed nuclear capacity to 58 GW by 2020. The country has over 30 GW of capacity under construction, the country's State Council said in an energy action plan in November. Additional growth in reactors will come from other developing countries in the coming year.

Argentina and India added a single unit each at the end of 2014. South Korea and the US are also expected to add a unit each in 2015, although it remains to be seen if there are further retirements in the US this year in response to challenging economic situations for merchant operators in that country. People in developing countries deserve to have adequate access to electricity, and nuclear energy is a key way to do so without increasing CO2 emissions,

Grechek said. "The fact that the need for great amounts of energy exists elsewhere in the world besides the United States [makes] it inevitable that that is where the great growth of nuclear is going to be," he said.

(By William Freebairn, Washington; Wes Becker, Denver, Platts , 22 June 2015)

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