July 1–July 7, 2016

A report to members of the Nuclear Energy Institute

NUCLEAR ENERGY Overview

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NEI's Fertel Says Nuclear Energy's Future Is Bright

- ***Nuclear a necessity as electrification increases, carbon regulation spreads***
- ***Closure of nuclear plants "systemic" problem warranting urgent solutions***
- ***California policies drove decision not to extend Diablo Canyon operations***

July 7, 2016—Nuclear energy has a strong future in the U.S., even if its present is challenging in some regions, NEI President and Chief Executive Officer Marvin Fertel believes.

"We see a really bright future. When we look beyond the near-term challenges, what we see is a very significant future," Fertel told reporters during a recent press conference on the heels of the North American Leaders' Summit in Ottawa, Canada.

"We certainly appreciated the statements by our president, the prime minister of Canada and the president of Mexico yesterday with their commitment looking to get to a 50 percent clean energy goal for all of North America. They recognize the importance of nuclear energy," Fertel said.

The increasing use of electricity throughout modern society, coupled with global efforts to reduce greenhouse gases and criteria pollutants, makes nuclear power a necessity, he said.

"When we look out, we see the electrification of America being the frontier we're moving into, whether it is in transportation or it's in industrial processes with robots, or it's what's been done to the Savannah port, where you've made everything electric driven," Fertel said.

An electric car being charged. The increasing use of electricity throughout modern society makes nuclear energy a necessity, NEI President and CEO Marvin Fertel said.

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"We're going to use more electricity down the road. We're going to have very stringent carbon requirements as time goes by, and we see nuclear energy as absolutely critical to helping our country, our economy and our people. Losing current plants that are really good performers is just absurd."

His reference was to the premature retirement of several nuclear energy facilities in recent years, as well as the June announcement that California's Diablo Canyon Power Plant will close when the operating licenses of its two reactors expire in 2024 and 2025.

The basis for the joint proposal to close Diablo Canyon was "policy decisions made in the state," Fertel said.

"You have a combination of a very high renewable portfolio standard…very high standards for efficiency, and either very low growth or Pacific Gas & Electric losing customers to aggregators. You have a relatively unique set of circumstances around the plant itself," he explained.

Fertel reiterated calls for state and federal officials to move decisively and expeditiously to prevent the closure of nuclear energy facilities that are generating electricity reliably and affordably—less than $30 per megawatt-hour in many cases.

"I would have thought that the impact of shutting down Kewaunee [in Wisconsin] a couple years ago and then the shutdown of Vermont Yankee would have been a wakeup call to state governors and others that you don't want to let this happen," Fertel said. "For whatever reason, they are being thought about as separate, independent actions…We have a systemic problem that requires urgent attention by those in the states and federal government."

Click here for more information on the Diablo Canyon decision and electricity market issues in other states. **<<** Steven Kerekes, *sck@nei.org*

The Nuclear Energy Agenda for DOE's Quadrennial Energy Review

- ***NEI catalogs options to correctly value, preserve existing nuclear plants***
- ***Closing reactors means higher electricity costs, more emissions, less diversity***
- ***Conditions for new nuclear development a 'strategic imperative'***

July 7, 2016—NEI calls for reforms to electricity markets and a systematic effort to create the conditions necessary to deploy advanced reactor technologies in its input to the U.S. Department of Energy's Quadrennial Energy Review (QER), a major report on challenges facing the U.S. energy sector.

"NEI believes that preserving existing nuclear generating capacity, and preparing to build relatively large amounts of new nuclear capacity in the next decade, are strategic imperatives," NEI said in comments submitted July 1. "A continuing, growing contribution from nuclear energy is essential to produce needed baseload electricity at stable prices and to sustain reductions in emissions of carbon and other pollutants."

Risk Informed Engineering Programs (10CFR50.69) Workshop
The Westin Charlotte
Charlotte, NC
July 19-20, 2016

In the theme of Delivering the Nuclear Promise, the Risk Informed Engineering Program (RIEP) is an opportunity for nuclear plant operators to save millions of dollars in operational and capital costs.

RIEP has the potential to improve the efficiency of plant-wide processes and therefore requires the coordination of multiple departments including operations, engineering, licensing and supply chain. The workshop will go through key aspects of implementing RIEP over several sessions.

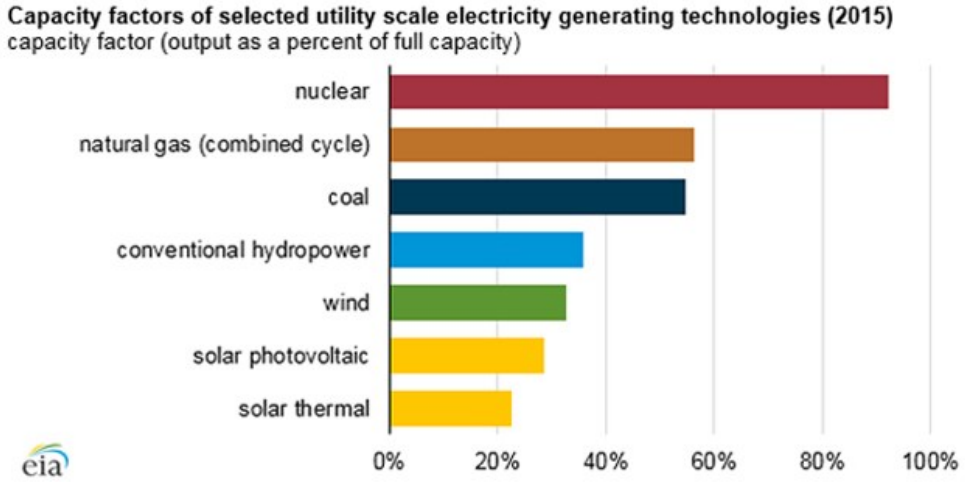
For more information and to register, go to: www.nei.org/Conferences/Operational-Efficiency.

The first QER, published in April 2015, examined the energy transmission, storage and distribution infrastructure. The QER now being developed will focus on an integrated assessment of the U.S. electricity system; it is slated for release later this year.

In its comments, NEI makes clear the cost of shutting existing nuclear power plants. Fourteen reactors have been shut down, or announced their closure, in recent years. NEI says those closures are already beginning to have negative effects in three major areas: loss of fuel and technology diversity, higher electricity costs, and higher carbon emissions.

"In total, these reactors represent between 47 million tons and 64 million tons of increased CO_2 emissions, depending on what sources of fossil-fueled electricity replace them. As a point of comparison, the Environmental Protection Agency's analysis includes an estimate that the Clean Power Plan will lead to CO_2 emissions being reduced 82 million tons by 2020, so the loss of the avoided emissions from the nuclear plants that have closed or are scheduled to close negates more than one-half of this expected reduction," NEI notes.

NEI's comments discuss nuclear energy's unique set of attributes and value to the grid, which support the conclusion that nuclear-generated electricity is a premium product. The comments also highlight another disturbing trend—the progressive loss of fuel and technology diversity, and the ever-increasing dependence on natural gas for electricity generation.



Source: U.S. Energy Information Administration.

"The United States has had repeated warnings over the last five years of the dangers associated with excessive dependence on natural gas," NEI states. "In 2011, it was Texas; in the winter of 2013, New England; in the winter of 2014, the PJM region and the midcontinent. This year, the warning came in southern California, the result of major problems with the Aliso Canyon natural gas storage reservoir."

For those who hope that renewables can quickly fill the gap left by closed nuclear energy facilities, NEI points out that wind and solar lack the scale and reliability of nuclear power plants that usually run 24/7 except when they are in refueling outages.

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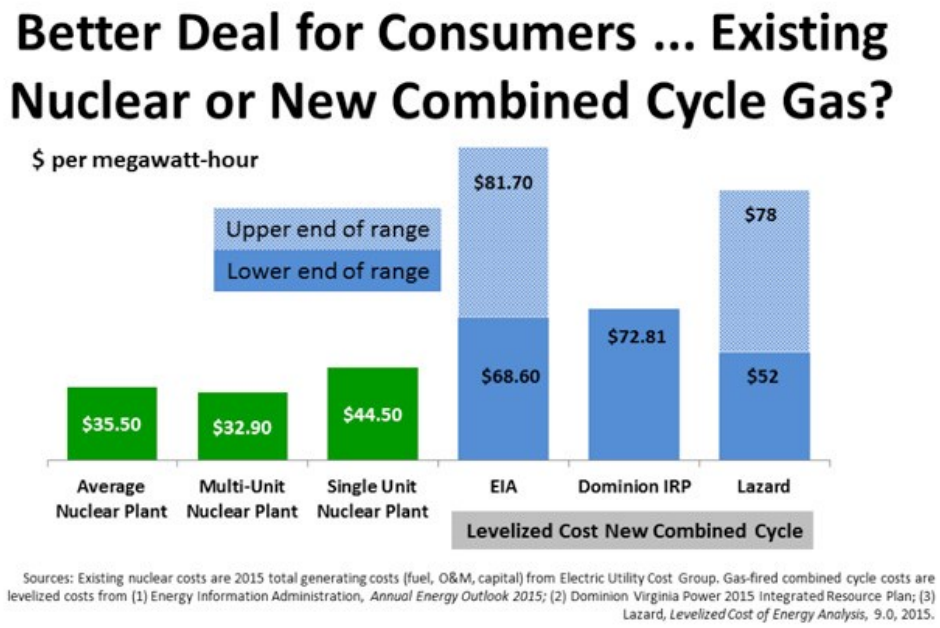
"Renewable sources are intermittent and do not have the same value to the grid as dispatchable baseload resources like nuclear plants. And renewables do not have the scale necessary to replace existing nuclear plants," NEI says.

NEI's comments also point to analysis by the independent market monitor for the New England and New York independent system operators (ISO) demonstrating that preserving existing nuclear power plants has a lower carbon-abatement cost than renewables sources like wind and solar. "Looking to the future, the Energy Information Administration's Annual Energy Outlook expects nuclear energy to produce 789 billion kWh in 2040. By then, EIA forecasts wind and solar will produce 818 billion kWh. So it will take the next 25 years for wind and solar to catch up to where nuclear energy is today," NEI says.



Sources: Existing nuclear costs are 2015 total generating costs (fuel, O&M, capital) from Electric Utility Cost Group. Gas-fired combined cycle costs are levelized costs from (1) Energy Information Administration, *Annual Energy Outlook 2015;* (2) Dominion Virginia Power 2015 Integrated Resource Plan; (3) Lazard, *Levelized Cost of Energy Analysis,* 9.0, 2015.

Recent closures of nuclear power plants hit the bottom line of those who can afford it least: households and businesses. After the shutdown of the San Onofre Nuclear Generating Station in 2013, California consumers paid $350 million more for electricity the following year.

"Sooner or later, that nuclear capacity must be replaced and, when it is replaced with new gas-fired combined cycle capacity, consumers will pay more on a levelized [lifecycle] cost basis," NEI warns.

Shutting down nuclear power plants also results in higher emissions. This is because (zero-emissions) nuclear power plants are usually replaced with natural gas plants which produce significant amounts of carbon emissions. In California, carbon emissions rose 9 million tons per year after the closure of San Onofre. In New England, emissions rose five percent after the closure of the Vermont Yankee Nuclear Power Plant in 2014.

NEI emphasizes that the reasons for many of these recent premature closures are short-term price signals that are unsustainable, not long-term market fundamentals.

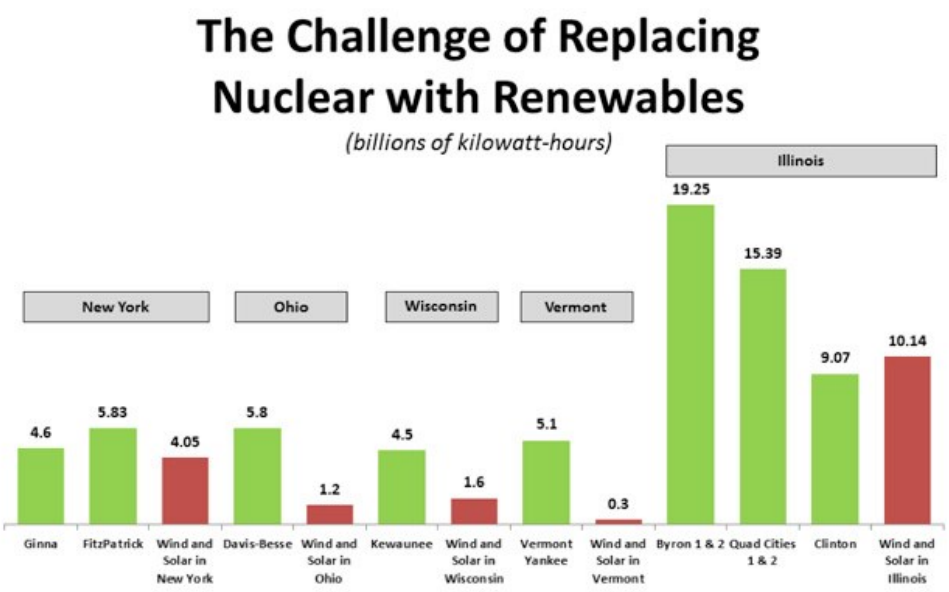
NUCLEAR FUEL SUPPLY FORUM

The Mayflower Hotel
Washington, DC
July 19, 2016

This one-day forum will provide information on policy issues related to the nuclear fuel industry. Speakers from key government agencies and organizations that shape policy will present the latest insights on what lies ahead.

Utility nuclear fuel managers; uranium exploration and mining companies; uranium converters and enrichers; nuclear fuel fabricators; nuclear fuel brokers, traders and consultants; transporters of nuclear fuel; energy economists, investors and financial institutions; legal experts in uranium and fuel contracting issues; government officials, policy makers and regulators; and international energy organizations will benefit.

For more information and to register, go to: www.nei.org/Conferences/Nuclear-Fuel-Supply-Forum.



Note: In reality, a nuclear plant would never be replaced with renewables because solar and wind are intermittent and non-dispatchable. Nuclear plants are dispatchable and operate 24-by-7. Nuclear would be replaced largely by emitting generation.
Source: Energy Information Administration. 2014 data except for Kewaunee (Wisconsin), which is 2012 generation, its last full year of operation

"Market conditions are forcing companies to make decisions that our nation will regret for the next 20 or 30 years, or longer, on the basis of short-term, unsustainable price signals," NEI states.

A prime example is certain subsidies that unnaturally depress electricity prices. The U.S. Energy Information Administration has reported that subsidies are creating very low or even negative electricity prices in some markets.

NEI suggests a number of ways that federal and state policymakers can preserve existing nuclear generating assets, including:

- Providing incentives for electric-generating capacity, as is done in PJM Interconnection LLC's Capacity Performance program or ISO New England's Pay-for-Performance program.
- Minimizing the effects of subsidies in markets by providing tax credits that would place carbon-free nuclear energy on a level field with carbon-free renewables.
- Addressing out-of-market subsidies that suppress electricity prices.
- Authorizing long-term power purchase agreements to lock in electric output from nuclear power plants at rates that properly value their uniquely valuable set of attributes.
- Considering the adoption of state-level zero-carbon clean energy standards (including nuclear power) instead of zero-carbon renewable standards, which do not include nuclear. Alternatively, states could adopt zero-emission credits which explicitly credit nuclear energy as a carbon-free source.

Westin Charlotte
Charlotte, NC
July 27-29, 2016

The Mitigating System Performance Index (MSPI) Workshop dives into the concepts behind MSPI and features subject matter experts who can answer your questions.

The workshop will help you to report MSPI accurately, better predict the impact of additional equipment failures and unavailability, and develop strategies to address those challenges. Operating experience and lessons learned will be discussed, especially as they relate to managing margin. Also covered will be changes in MSPI and NEI 99-02 since the last workshop.

For more information and to register, go to: www.nei.org/Conferences/Mitigating-System-Performance-Index-Workshop.

- Encouraging states to adopt mass-based compliance, including new and existing sources, under the EPA's Clean Power Plan.

NEI adds that existing plants wanting to pursue second license renewal could be supported by providing a "predictable regulatory framework," financial incentives and a more efficient regulatory regime.

NEI also says that government can help support new nuclear technologies in various ways. DOE's Licensing Technical Support Program, which plans to take a single small modular reactor design through U.S. Nuclear Regulatory Commission design certification, is not enough. NEI urges funding to take at least two reactor designs through the process, including "design finalization" work. The government could also commit to using small reactors at federal installations like the national labs, NEI says.

NEI believes nonlight water advanced reactors could be deployed commercially by 2030 if government and industry work together to solve several major challenges. Foremost among these challenges is the need for financing for development and demonstration that could cost $9 billion to $10 billion spread over several years. In light of this, NEI says that "industry and government must start immediately to create a new, durable platform to finance advanced technology development." << Thaddeus Swanek, *tjs@nei.org*

Paul Genoa, Former NEI Senior Director, Passes Away

- ***Highly effective ambassador for nuclear energy***
- ***Advocated domestically and at myriad international forums***
- ***Combined technical knowledge with ability to connect with others***

July 6, 2016—Paul H. Genoa, the Nuclear Energy Institute's long-time senior director of policy development, died July 4 in Michigan, where he lived with his wife, Denise.

With three decades of technical, regulatory and policy experience, Genoa was an international authority on energy and environmental issues. He counseled ministers and delegates at the United Nations Commission on Sustainable Development and its Framework Convention on Climate Change, the International Atomic Energy Agency, the Council of Europe, the OECD Nuclear Energy Agency, the World Energy Congress, the World Energy Forum, and the World Forum on Energy Regulation.

Genoa began his career working on safety and environmental issues at several nuclear energy facilities, including Consumers Power's Big Rock Point Atomic Plant, Arizona Public Service Co.'s Palo Verde Nuclear Generating Station and Florida Power Corp.'s Crystal River Nuclear Power Plant.

Genoa joined NEI in 1995 and held several positions before becoming director of policy development in 2006. In that position, he demonstrated strong leadership in helping shape policy that addressed the nexus of climate concerns and international energy development. Genoa represented the industry for many years at Conferences of the Parties meetings, the annual United Nations climate change conferences. He played a key role in developing and managing NEI's outreach to, and advocacy with, the National Association of Regulatory Utility Commissioners. Over the years, he

Nuclear Advocacy Network (NAN) is the industry's grassroots advocacy program, aimed at educating and mobilizing its members on nuclear energy-related issues and legislation.

Members of NAN receive email alerts, information and important news about nuclear issues at the state and federal levels.

NAN gives its members communication and advocacy tools to educate members of Congress and other elected officials on nuclear-related issues and to help keep those issues front and center.

Sign up today at: nuclearadvocacynetwork.org. If you are already a member, check out our new website and see how you can engage in 2015.

Paul H. Genoa, Nuclear Energy Institute's former senior director of policy development. [Photo: NEI]

worked on NEI programs in low-level waste, decommissioning, small modular reactors and others.

An educator by nature and an avid outdoorsman, Genoa lectured on energy and environmental policy at programs for the Harvard School of Public Health, the University of Florida Public Utility Research Center, the New Mexico State Center for Public Utilities, the University of Idaho's Utility Executive Training Course and Duke University's Environmental Leadership Program.

"Paul had a unique ability to explain complex issues in simple terms, and make them accessible to a general audience," NEI Vice President and Senior Advisor Richard Myers said. "He was one of NEI's most capable ambassadors, and he had an enviable ability to build relationships with people of all persuasions. He will be greatly missed."

He is survived by his wife Denise Genoa, his son Matthew Genoa, his grandson Evan Genoa, his sister Leslie Temples, his mother Gloria Genoa and countless friends.
<< Mark Flanagan, *mpf@nei.org*

Milestones

Two Chinese Reactors Move Closer to Full Operations

Two new nuclear power reactors in China have recently reached significant milestones toward their operation. First criticality has been achieved at Fuqing 3, a CPR-1000 in Fujian province, while cold hydrostatic tests have been completed at the Haiyang 1 Westinghouse AP1000 in Shandong province.

Fuqing 3 achieved a sustained chain reaction for the first time July 3.China National Nuclear Corp.'s Fuqing Nuclear Power Plant will eventually house six Chinese-designed pressurized water reactors, the first four being 1087-megawatt CPR-1000 pressurized water reactors. Fuqing 1 and 2 entered commercial operation last year. Fuqing 3 is expected to begin operating later this year following the completion of a series of commissioning tests, while Fuqing 4 is scheduled to start up in 2017.

For Haiyang 1, Cold hydrostatic tests of the primary circuit were successfully completed July 2.The tests aim to confirm the integrity and sealing of the circuit's components. Haiyang 1 is expected to begin operating by the end of the year. << Robbie Hayunga, *rah@nei.org*

German Commission Submits Repository Report

Following more than two years of work, a commission looking into the storage of Germany's high-level radioactive waste submitted its final report to the country's government July 5. The report provides a recommended method for the disposal of the waste in a geologic repository.

According to the 32-member commission's final report, the site with "the best safety" will be determined in a three-phase process, which will include extensive public participation, and will be defined by federal law.

The repository could be located in salt, clay or crystalline. The commission said the “controversial” Gorleben rock salt formation in Lower Saxony has not been excluded in its report. << Robbie Hayunga, *rah@nei.org*

Contracts

Areva TN Signs Contract to Provide Advanced Storage Canisters

Areva TN, Areva Inc.’s nuclear logistics division, held a ceremonial contract signing with Dominion Virginia Power at the World Nuclear Exhibition in Paris. Under this contract, Areva TN will provide 75 NUHOMS EOS dry shielded canisters, which are designed to securely store used nuclear fuel, to two of Dominion’s operating facilities through 2038.

The EOS canisters will be manufactured at Areva TN’s Columbiana Hi Tech facility in Kernersville, North Carolina. Areva TN will begin delivering the canisters in 2019. << NEI Staff, *overview@nei.org*

AREVA Signs International Fuel Cycle Contracts

During the World Nuclear Exhibition in France, Areva Inc. signed several contracts with its international nuclear customers.

The Belgian Nuclear Research Centre and Areva signed an agreement to extend the contract for the used fuel management from the BR2 research reactor, located in Mol, Belgium, through 2030. BR2 produces medical radioisotopes and assists in safety evaluation of structural materials and fuels for power reactors.

The Romanian agency for nuclear energy and radioactive waste and AREVA signed a contract to carry out a prefeasibility study for the construction of a fiber concrete container manufacturing installation at the Saligny site in Romania. The containers will safely condition low and intermediate level waste at the repository currently under implementation at the same location. Such fiber concrete containers are already used by nuclear waste management facility operators in France and the U.S., among other countries. << NEI Staff, *overview@nei.org*

China and Argentina Reaffirm Nuclear Cooperation

China and Argentina have signed a memorandum of understanding reaffirming their plans to construct two new nuclear power reactors in the South American country with financing from Chinese banks. Construction of Argentina's fourth reactor is to start early next year.

Last November, Argentina signed deals with China for the construction of its fourth and fifth nuclear power plants: a third Candu pressurized heavy water reactor at the Atucha site and a pressurized water reactor at an unspecified site. The projects are worth around $15 billion and China will contribute 85 percent of the required financing.

A memorandum affirming the November agreement—made under the previous government of former president, Cristina Fernandez—was signed in Beijing June 30 by Argentina's Minister of Energy and Mining Juan José Aranguren and Nur Bekri, director of China's National Energy Administration. << NEI Staff, *overview@nei.org*

Transitions

The Institute of Nuclear Power Operations has announced several senior leadership changes:

- ***Dave Igyarto***, senior vice president, workforce training, education and proficiency, and executive director of the National Academy for Nuclear Training, will be promoted to executive vice president, industry strategy, effective July 1.
- ***Bill Webster***, executive vice president, industry strategy, retired from INPO effective June 30.
- ***Kim Maza***, currently on reverse loan at Duke Energy, will return to INPO and be promoted to replace Igyarto, effective July 1.
- ***Rob Gambone***, vice president, industry trends and organizational learning, will begin an executive reverse loan assignment to Tennessee Valley Authority's corporate office in Chattanooga as vice president, operations support, effective July 18.
- ***Bob Gambrill***, director, WANO-AC operations, was elected by the INPO Board of Directors to the replace Gambone upon commencement of his reverse loan assignment.
- ***Dave Crabtree*** will return from his reverse loan assignment as the peer review program director, WANO-London office, and will be promoted to director, WANO-AC operations, effective July 15.

Michael Wautlet, director for nuclear energy policy at the National Security Council, is leaving his current position. Despite the urging of NEI and other groups, the position—which helped to coordinate U.S. civilian nuclear trade, security and climate policy—has been eliminated. << NEI Staff, *overview@nei.org*