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NUCLEAR ENERGY INSTITUTE

December 1, 2017

Mr. Reece McAlister
Executive Secretary
Georgia Public Service Commission
244 Washington Street, S.W.
Atlanta, Georgia 30334

RE: PROCEEDING TO HEAR EVIDENCE REGARDING GEORGIA POWER COMPANY'S SEVENTEENTH SEMI-ANNUAL VOGTLE CONSTRUCTION MONITORING REPORT, DOCKET NO. 28949

Dear Mr. McAlister:

Enclosed for filing with regard to the above-referenced proceeding are the original and 15 copies of the Direct Testimony of Ms. Mary G. Korsnick, President and Chief Executive Officer of the Nuclear Energy Institute.

Pursuant to the Commission's Procedural and Scheduling Order issued on September 21, 2017, as modified on November 22, 2017, the Commission will hear motions and conduct a hearing on the direct testimony of the Staff and Interveners on December 11–14, 2017. Unfortunately, unavoidable prior business commitments will prevent Ms. Korsnick from appearing before the Commission on December 11 and the morning of December 12, 2017. Thus, we respectfully request that Ms. Korsnick not be called to present her testimony until the afternoon session of Tuesday, December 12, 2017.

We understand that the Commission's practice is to hear testimony from the Staff prior to hearing from Interveners. However, we wanted to make the Commission aware of this limitation in Ms. Korsnick's availability in order to avoid any inconvenience during the hearing. We sincerely appreciate the Commission's consideration of this request and any accommodation that can be provided.

Please do not hesitate to contact me if you have questions regarding this filing.

Sincerely,

Ellen C. Ginsberg

Ellen C. Ginsberg

Enclosures

DIRECT TESTIMONY OF

MARY G. KORSNICK

PROCEEDING TO HEAR EVIDENCE REGARDING GEORGIA POWER COMPANY'S SEVENTEENTH SEMI-ANNUAL VOGTLE CONSTRUCTION MONITORING REPORT

DOCKET NO. 29849

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Mary G. Korsnick. I am the President and Chief Executive Officer of the Nuclear Energy Institute ("NEI"). My business address is 1201 F Street, NW, Suite 1100, Washington, DC 20004-1218.

Q. MS. KORSNICK, PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I graduated from the University of Maryland with a Bachelor of Science degree in nuclear engineering, and have held a Senior Reactor Operator license issued by the United States Nuclear Regulatory Commission. I began my career at Constellation Energy Nuclear Group in 1986 and held positions of increasing responsibility, including engineer, operator, manager, site vice president, corporate vice president, Chief Nuclear Officer, and Acting Chief Executive Officer. Subsequently, I was Senior Vice President of Northeast Operations for Exelon, responsible for overseeing operation of the Calvert Cliffs 1 and 2, R.E. Ginna, and Nine Mile Point 1 and 2 nuclear power plants. I joined

NEI in May of 2015 as Chief Operating Officer, and assumed the role of President and Chief Executive Officer of NEI on January 1, 2017.

Q. PLEASE PROVIDE AN OVERVIEW OF NEI.

A. NEI is the policy organization for the nuclear industry. NEI's mission is to foster the beneficial uses of nuclear technology and to communicate timely and accurate information about the nuclear industry. We develop policy on regulatory, financial, technical, and legislative issues affecting the commercial nuclear energy industry. NEI also provides a forum to resolve legal, technical, and business issues for the industry. NEI has more than 300 members, including all the companies that operate nuclear power plants in the United States, designers, advanced reactor and small modular reactor companies, architecture and engineering firms, fuel processors and suppliers, service companies, consulting services, manufacturing companies, nuclear medicine and radiopharmaceutical companies, companies using nuclear technologies in the agricultural, food, and industrial sectors, universities and research laboratories, law firms, labor unions, and international electric utilities.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. NEI is participating in this proceeding because building new nuclear power plants in the United States is vital for this safe, reliable, clean air electricity source to maintain its important role in our nation's energy mix. Nuclear energy is the only greenhouse gas emission-free source that can safely and reliably generate electricity 24/7. Further, each

nuclear plant built in the United States is part of the supply chain that includes the skilled workers and technicians who design, build, and operate that plant, as well as the other individuals and businesses, small and large, that support that plant and the nuclear industry at large.

Although NEI strongly supports deployment of new nuclear generating capacity in the United States, including the Vogtle project, my testimony will not address specific economic considerations relevant to the Commission's verification of expenditures and decisions regarding the proposed cost forecast and schedule revisions. Rather, my testimony is intended to provide the Commission with information demonstrating the unique benefits of nuclear as a source of electricity generation.

Q. PLEASE SUMMARIZE THE BENEFITS OF NUCLEAR AS A SOURCE OF ELECTRICITY GENERATION.

A. Nuclear energy is the largest and most efficient source of carbon-free electricity in the United States. Currently, 99 reactors in 30 states produce nearly 20 percent of our nation's electricity and nearly 60 percent of our carbon-free electricity. Nuclear energy facilities demonstrate unmatched reliability by operating with an average capacity factor greater than 90 percent—higher than all other electricity sources. Nuclear produces electricity 24/7, is generally available during severe weather events, and has fuel on site for 18 to 24 months. The long horizon for nuclear fuel procurement also means nuclear

generation is not subject to price spikes occasionally experienced by other generation sources in recent years.

Nuclear energy facilities are important contributors to the country's economy and help sustain the local communities in which they operate. The typical operating nuclear plant generates $470 million each year in the sale of goods and services in the local community, and employs 400 to 900 workers. Construction of a new nuclear plant provides in the range of 3500 jobs at peak periods. Collectively, the nuclear industry contributes about $60 billion every year to the U.S. gross domestic product, supports nearly 475,000 primary and secondary jobs, and produces over $12 billion annually in federal and state tax revenues.[1]

II. RELIABILITY

Q. HOW RELIABLE ARE NUCLEAR POWER PLANTS COMPARED TO OTHER SOURCES OF ELECTRICITY?

A. Nuclear power plants are our nation's most reliable source of electricity. First, nuclear power is a "baseload" generator. The U.S. Department of Energy's recent report on electric markets and reliability defines baseload generation as the power plants that are used to meet "base" load—that is, the minimum of electricity that customers demand around the clock. Baseload plants run at high, sustained output levels and high capacity

[1] *See* The Brattle Group, *The Nuclear Industry's Contribution to the U.S. Economy* (July 7, 2015), available at http://www.brattle.com/system/news/pdfs/000/000/895/original/The_Nuclear_Industry's_Contribution_to_the_U.S._Economy.pdf?1436280444.

factors, with limited cycling or ramping. Large nuclear, coal, natural gas steam, and hydroelectric plants have historically been used for baseload generation.[2] According to the North American Electric Reliability Corporation ("NERC"), these traditional steam-driven power plants are attractive from a reliability perspective because they traditionally have low forced and maintenance outage hours and low exposure to fuel supply chain issues.[3] These characteristics help ensure that baseload electricity generation is more resilient to disruptions.

Nuclear energy is also by far the most efficient of all generation resources (baseload or otherwise), achieving capacity factors that far exceed other forms of energy production. The nuclear energy industry continues to make consistent gains in this area. For example, 2016 saw U.S. reactors continue to set a record capacity factor of over 92 percent (*i.e.*, nuclear plants produced over 92 percent of their potential maximum power over the year). In contrast, solar plants operated with capacity factors around 25 percent; wind power plants operated at less than 35 percent.[4] This means that, on average, three to four megawatts' worth of wind and solar capacity must be constructed to generate the

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[2] U.S. Department of Energy, *Staff Report to the Secretary on Electricity Markets and Reliability* (Aug. 2017), available at https://energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability_0.pdf.

[3] *Id.* (*citing* North American Electric Reliability Corporation (NERC), *Synopsis of NERC Reliability Assessments, the Changing Resource Mix, and the Impacts of Conventional Generation Retirements*, unpublished materials submitted to the Department of Energy, May 9, 2017).

[4] U.S. Energy Information Administration, *Electric Power Monthly, with Data on August 2017*, at table 6.7.B (Oct. 2017), available at https://www.eia.gov/electricity/monthly/current_month/epm.pdf. Nuclear power plants also operated at a much higher capacity factor than even coal and natural gas combined cycle plants, which in 2016 operated with capacity factors just above 50 percent. *Id.* at table 6.7.A.

same amount of net electricity as one megawatt of nuclear power capacity. And in periods of low solar and wind potential, carbon-emitting generation sources are used to make up the difference.

Q. HOW DOES FUEL SUPPLY CONTRIBUTE TO THE RELIABILITY OF NUCLEAR POWER PLANTS?

A. Nuclear plants have their fuel on site for 18 to 24 months, which means they can operate for 18–24 months between refueling outages. Refueling and maintenance outages are typically scheduled during the fall or spring months when electricity demand tends to be at its lowest. The new fuel is ordered from the fuel vendor before the reactor goes into its outage and typically arrives four to six weeks before the outage begins, but could arrive as early as three months prior to an outage. During each refueling outage, the oldest one-third of the fuel rods in the reactor are replaced with the new fuel. Even if there were a delay in the arrival of new fuel, the reactor could typically continue to operate for at least an additional three months before reaching 70 percent capacity, and two more months beyond that before decreasing to 50 percent capacity.[5]

Thus, nuclear power plants are not subject to the uncertainties of fuel supply. For example, nuclear electric generating units are not exposed to short-term fuel cost fluctuations (which directly impact market-clearing prices) or fuel supply shortages and interruptions. Nuclear generation units provide valuable price stability and fuel supply

[5] NEI, *Rulemaking Comments of the Nuclear Energy Institute,* Before the Federal Energy Regulatory Commission, Grid Reliability and Resiliency Pricing, Docket No. RM18-1-000 (Oct. 23, 2017).

certainty, which together mitigate the impacts of natural and man-made disasters. For example, while the frigid temperatures produced by the 2013–2014 Polar Vortex created very high demand and impacted the production of electricity from all U.S. generation sources, NERC found that "the polar vortex had the least impact on nuclear plants."[6]

Q. HOW DOES LOW FUEL COST VOLATILITY CONTRIBUTE TO RELIABILITY?

A. In addition to their contributions to reliability, nuclear power plants provide price stability. Unlike other types of power plants, where fuel costs can account for 80 to 90 percent of production costs, in nuclear power plants fuel accounts for just 31 percent of production costs. Further, one uranium fuel pellet—which is about the size of a pencil eraser—produces the same energy as 17,000 cubic feet of natural gas, 1,780 pounds of coal, or 149 gallons of oil.[7]

Q. HOW DOES FUEL DIVERSITY CONTRIBUTE TO RELIABILITY?

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[6] North American Electric Reliability Corporation, *Polar Vortex Review*, App. A, at p. 32 (Sept. 2014), available at http://www.nerc.com/pa/rrm/January%202014%20Polar%20Vortex%20Review/Polar_Vortex_Review_29_Sept_2014_Final.pdf (of the three major fuel types, "the polar vortex had the least impact on nuclear plants."); *see also* Midcontinent Independent System Operator, Inc., *2013-2014 MISO Cold Weather Operations Report*, at p. 24 (Nov. 2014), available at https://www.misoenergy.org/Library/Repository/Report/Seasonal%20Market%20Assessments/2013-2014%20Cold%20Weather%20Operations%20Report.pdf (during the polar vortex, "the outage rate for nuclear units was only 8% and provided the reliability when the system needs them the most").

[7] NEI, *Why Nuclear Energy?*, available at https://www.nei.org/Why-Nuclear-Energy/Reliable-Affordable-Energy/Electricity-Supply.

A. The United States currently enjoys the benefits of having a diverse electricity supply, the result of a combination of factors, including competitive forces and federal and state policy. However, we cannot take that fuel diversity for granted, and it is at risk. For example, the closing of the San Onofre nuclear facility in California dropped nuclear energy as a percentage of California's electric generation from 18.3 percent to approximately 9.0 percent. The substitution of other sources of electricity generation "increase[d] California consumers' exposure to the risks of fossil fuel price movements as well as the risks of low hydroelectric generation due to Western Interconnection drought cycles."[8] In addition, a study by researchers at the University of California Berkeley estimated that the cost of electricity to California consumers increased by approximately $350 million during the first twelve months after the San Onofre closure, and caused carbon emissions to increase by an amount worth almost $320 million.[9]

Maintaining and promoting fuel diversity not only provides important economic benefits, but also protects the electric grid from becoming too dependent on any one fuel source—an issue that NERC has stressed.[10]

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[8] IHS Energy, *The Value of US Power Supply Diversity,* at p. 31 (July 2014), available at https://www.globalenergyinstitute.org/sites/default/files/USPowerSupplyDiversityStudy.pdf.

[9] L. Davis, C. Hausman, *Market Impacts of a Nuclear Power Plant Closure*, Energy Institute at Haas, University of California Berkeley (May 2015), available at https://ei.haas.berkeley.edu/research/papers/WP248.pdf.

[10] *See* NERC, *2016 Long-Term Reliability Assessment*, vii-viii (Dec. 2016), available at http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/2016%20Long-Term%20Reliability%20Assessment.pdf.

A diverse portfolio of fuels and technologies—nuclear, coal, natural gas, hydro, non-hydro renewables, efficiency—serves as a hedge against price volatility and supply disruptions, while providing additional cost savings benefits to customers. For instance, a recent study concluded that maintaining the current, diversified U.S. electric supply portfolio lowers the cost of electricity production by about $114 billion per year. The study also estimated that the premature retirement of existing electric generating resources and replacement with new natural gas and renewable generation would increase retail power prices by about 27 percent.[11]

Reducing fuel diversity has a measurable, well-documented adverse impact on resilience and reliability.[12] Resource diversity is a critical part of any resiliency program. Numerous reports and analyses, as well as common sense, demonstrate that fuel diversity within a region or market is important for the ability of the relevant electric grid to withstand and recover from stresses caused by weather, such as Western droughts, extreme cold or hurricanes, as well as man-made disruptions.

Q. HOW DOES NUCLEAR POWER'S PERFORMANCE DURING SEVERE WEATHER EVENTS DEMONSTRATE ITS VALUE TO THE GRID?

[11] IHS Markit, *Ensuring Resilient and Efficient Electricity Generation* (Sept. 2017), available at https://www.globalenergyinstitute.org/sites/default/files/Value%20of%20the%20Current%20Diverse%20US%20Power%20Supply%20Portfolio_V3-WB.PDF.

[12] IHS Energy, The Value of US Power Supply Diversity (July 2014), available at https://www.globalenergyinstitute.org/sites/default/files/USPowerSupplyDiversityStudy.pdf.

A. Nuclear units perform well during extreme weather events. For example, of the 34 nuclear facilities from South Carolina to Vermont in Superstorm Sandy's path in 2012, 24 continued to operate safely and generate electricity throughout the event. Seven of the nuclear power plants were already shut down for refueling or inspection. The remaining three in New Jersey and New York safely shut down, as designed, because of storm conditions or grid disturbances.[13]

As memorialized in reports regarding the gas price spikes, natural gas supply disruptions, numerous non-responsive combustion turbines, and frozen coal piles, the 2013/2014 Polar Vortex provides another valuable case study on the need for fuel diversity and resilience.[14] During the Polar Vortex the effects of the weather system on the electric grid were significant: 35,000 MW of generation capacity was lost, including 22 percent of generating capacity being placed in forced outage in the PJM Interconnection ("PJM"). Several gas-fired power plants in the Northeast region were unable to run after the natural gas froze in the fuel injectors feeding the turbines. In Texas, freezing temperatures led to shutdowns in pipelines used to transport gas to the Southwest. Because of these supply constraints natural gas prices spiked across much of the country. Separately, some coal plants could not operate due to conveyor belts and coal piles freezing. And as reported

[13] *See* Nuclear Energy Institute, *Nuclear Energy Facilities Prove Resilient During Hurricane Sandy* (October 30, 2012), available at https://www.nei.org/News-Media/Media-Room/News-Releases/Nuclear-Energy-Facilities-Prove-Resilience-During).

[14] *See* Federal Energy Regulatory Commission, *Winter 2013–2014 Operations and Market Performance in RTOs and ISOs*, AD14-8-000, at p. 8 (April 1, 2014), https://www.ferc.gov/legal/staff-reports/2014/04-01-14.pdf.

by PJM, even power plants with generation units with dual-fuel capability encountered issues, including run-time limits related to permit-defined environmental restrictions,

resupply challenges, and increased failure rates for unit startup.[15]

The Polar Vortex illustrates the value that resilient and reliable power plants—including nuclear units—offer to the electric grid, particularly when fuel supply is disrupted during disasters and disturbances. To compensate for these various supply issues, operators relied on older generating plants nearing the end of their useful lives. By comparison, because nuclear facilities have onsite fuel and are hardened facilities, they typically operate continuously in extreme weather conditions, including during the Polar Vortex where nuclear generators performed better than all other forms of generation—operating with an average capacity factor of 95 percent.[16]

While nuclear power facilities perform well during extreme weather events, U.S. Nuclear Regulatory Commission license conditions do require nuclear units to be taken off-line during certain extreme hurricane conditions. However, it is because the nuclear units are sometimes taken off-line *during* an event that they will be reliably available *after* such an

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[15] *See* North American Electric Reliability Corporation, *Polar Vortex Review*, App. A, at p. 32 (Sept. 2014), available at http://www.nerc.com/pa/rrm/January%202014%20Polar%20Vortex%20Review/Polar_Vortex_Review_29_Sept_2014_Final.pdf; PJM Interconnection, *Analysis of Operational Events and Market Impacts During the January 2014 Cold Weather Events* (May 8, 2014), available at http://www.pjm.com/~/media/library/reports-notices/weather-related/20140509-analysis-of-operational-events-and-market-impacts-during-the-jan-2014-cold-weather-events.ashx; Federal Energy Regulatory Commission, *Winter 2013–2014 Operations and Market Performance in RTOs and ISOs*, AD14-8-000, at p. 8 (April 1, 2014), available at https://www.ferc.gov/legal/staff-reports/2014/04-01-14.pdf; The National Coal Council, *Coal = Reliable Energy*, at p. 6 (2015), available at http://www.nationalcoalcouncil.org/Documents/Energy-Education/4-Coal-Reliable-Energy-Final.pdf.

[16] U.S. Department of Energy, *Staff Report to the Secretary on Electricity Markets and Reliability* (Aug. 2017), available at https://energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability_0.pdf.

event to restore power at the earliest possible time once the transmission and distribution system can deliver the energy they produce. This ability to contribute to system resiliency and restoration would be critical if we were ever to experience, for example, a large-scale disruption to the natural gas system.

III. ECONOMIC BENEFITS

Q. HOW DO NUCLEAR POWER PLANTS BENEFIT THE ECONOMY?

A. Every dollar spent by the typical nuclear power plant results in the creation of $1.04 in the local community, $1.18 in the state economy, and $1.87 in the U.S. economy, according to an analysis of 23 nuclear plants representing 41 reactors.[17]

Collectively, the nuclear industry produces nearly $10 billion annually in federal tax revenues and over $2 billion annually in state tax revenues. These tax dollars benefit schools, roads and other state and local infrastructure. In addition, nuclear energy facilities typically employ up to 3,500 people during construction and 400 to 900 people throughout operation, at salaries 36 percent higher than average in the local area. A nuclear plant produces approximately $470 million annually in sales of goods and services in the local community.[18]

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[17] NEI, *Nuclear Energy's Economic Benefits – Current and Future* (April 2014), available at https://www.nei.org/corporatesite/media/filefolder/policy/papers/jobs.pdf.

[18] *See* The Brattle Group, *The Nuclear Industry's Contribution to the U.S. Economy* (July 7, 2015), available at http://www.brattle.com/system/news/pdfs/000/000/895/original/The_Nuclear_Industry's_Contribution_to_the_U.S._Economy.pdf?1436280444; NEI, *Nuclear Energy's Economic Benefits—Current and Future* (April 2014), available at https://www.nei.org/corporatesite/media/filefolder/policy/papers/jobs.pdf.

The construction of new reactors also supports the robust supply chain necessary for various kinds of manufacturing activities. Nuclear plants consist of thousands of components and subcomponents, whose construction requires a deep and diverse supplier base. More than 22,500 companies provide $14.2 billion in components and services to the U.S. nuclear energy industry each year.[19]

Q. HOW DO NUCLEAR POWER FACILITIES CONTRIBUTE TO LOCAL COMMUNITIES?

A. Nuclear power plants often are located in rural communities that benefit considerably from a large industrial complex. Companies that operate nuclear energy facilities are involved in the life of nearby towns and communities, offering college scholarships for related professions, participating in charities and sponsoring other activities. Energy education centers at many facilities teach schoolchildren about nuclear energy as well as about other forms of electricity generation. Because the plants operate over several decades, their presence encourages continuity in their communities by offering employment for more than one generation of families and workers.

Nuclear energy facilities enhance the habitat around the plant, too. Many take an active role in preserving the local flora and fauna, often earning commendations from their communities and from environmental and conservation groups. For example, the St. Lucie facility in Florida has devoted considerable resources to tracking and preserving

[19] NEI, *FAQ About Nuclear Energy—Economic Benefits*, available at https://www.nei.org/Knowledge-Center/FAQ-About-Nuclear-Energy.

the health of sea turtles attracted to breeding areas near the plant. At the Peach Bottom facility in Pennsylvania, a biodiversity team has molded its riverside site into an even more hospitable environment for animals, including bats, white-tailed deer, wild turkeys, foxes, bald eagles, and osprey.

IV. NATIONAL SECURITY

Q. PLEASE EXPLAIN WHY BUILDING NEW REACTORS IN THE UNITED STATES IS A NATIONAL SECURITY IMPERATIVE.

A. The Vogtle reactors are the only ones under construction in the United States. Completion of these reactors will signal that the United States continues to be a significant force in the global nuclear industry.

Russia and China are currently constructing nearly 30 nuclear units. If the United States forgoes its role as a leader in the global nuclear industry, the world will look to China and Russia for leadership, which will put them in a position to develop future standards for nuclear energy technology use around the globe. For example, China recently announced nuclear deals with Sudan, South Africa, Kenya, Egypt, Argentina, and even Great Britain. China is also mining uranium in Namibia and building reactors in Pakistan. Rosatom, which administers the former Soviet weapons complex, says it has received orders for 34 nuclear power reactors in 13 countries. It has customers in India, Bangladesh, Turkey, Vietnam, Iran, Armenia, Hungary, Jordan, and Egypt.

America's nuclear infrastructure supports both its civilian and military needs. Allowing this infrastructure to diminish would adversely affect our defense nuclear complex. In addition, the U.S. civil nuclear industry is a key employer for veterans, especially those from the nuclear Navy.

V. ENVIRONMENTAL BENEFITS

Q. PLEASE DISCUSS THE ENVIRONMENTAL BENEFITS OF NUCLEAR POWER.

A. During normal operations, nuclear energy generation produces no criteria pollutants (*i.e.*, carbon monoxide, lead, ground-level ozone, particulate matter, nitrogen dioxide, and sulfur dioxide), or carbon dioxide. Nuclear energy is America's largest source of carbon-free electricity. In 2016, nuclear energy produced nearly 20 percent of the U.S. electricity supply (805 billion kilowatt-hours) and prevented 554 million metric tons of carbon dioxide emissions. Nuclear energy accounted for nearly 60 percent of America's carbon-free electricity in 2016—three times more than hydropower and three times more than wind energy. The amount of carbon dioxide emissions *avoided* by U.S. nuclear energy facilities is equal to the carbon dioxide emissions produced from 118 million passenger cars—more than all the passenger cars in the United States. Without the carbon emissions avoided by nuclear generation, required reductions in U.S. emissions

would need to increase by more than 50 percent to achieve targets under the Kyoto Protocol.[20]

In addition to nuclear power's carbon-free attributes, no other form of generation—even renewable generation—so fully accounts for its broader environmental impacts. As noted, in addition to its carbon reduction attributes, during normal operations nuclear power does not emit sulfur oxides, nitrogen oxides, mercury, and other dangerous pollutants associated with fossil fuel generation. For example, the nation's nuclear energy facilities prevented the emission of approximately 420,000 short tons of sulfur dioxide and 360,000 short tons of nitrogen oxide in 2016.[21] Nuclear power is also the only power generation source that financially accounts for its environmental impacts up front, unlike all other generation sources. Nuclear facilities also benefit from one of the most stringent regulatory regimes in the world, which regulates every part of the nuclear life cycle, from construction and operation to decommissioning and final disposition of spent fuel.

Q. HOW DO THE LIFE-CYCLE EMISSIONS FOR NUCLEAR POWER COMPARE TO OTHER GENERATION SOURCES?

A. As discussed above, nuclear power facilities do not emit criteria pollutants or carbon dioxide during normal operations, but certain processes used to build and fuel plants do

[20] NEI, *Environment: Emissions Prevented*, available at https://www.nei.org/Knowledge-Center/Nuclear-Statistics/Environment-Emissions-Prevented.

[21] NEI, *Emissions Avoided by the U.S. Nuclear Industry*, available at https://www.nei.org/Knowledge-Center/Nuclear-Statistics/Environment-Emissions-Prevented/Emissions-Avoided-by-the-US-Nuclear-Industry.

produce such emissions. Numerous studies demonstrate, however, that nuclear energy's life cycle greenhouse gas emissions are comparable to renewable energy, such as wind and hydropower, and far less than coal or natural gas-fueled power plants.[22]

Q. HAVE ANY STATES UNDERTAKEN EFFORTS TO VALUE THE ENVIRONMENTAL ATTRIBUTES OF NUCLEAR POWER FACILITIES?

A. Nuclear power facilities have valuable environmental attributes. This is demonstrated by state efforts to appropriately value these attributes. States have taken definitive steps through their legislatures or administrative systems to appropriately value nuclear generation's zero-carbon attributes. For example, the New York Clean Energy Standard ("CES") includes a zero-emission credit that values the non-emitting attribute of nuclear energy. Under New York's CES, the state's load-serving entities must ensure that a certain amount of their electricity comes from non-emitting, clean technologies including nuclear, solar, wind, and hydropower. In Connecticut, legislation recently was passed to make the state's nuclear power plant eligible to be compensated for its zero-carbon emissions. In addition, last year the Illinois Legislature recognized the value of nuclear in meeting Illinois' clean energy goals. Such initiatives represent sound public policy and are logical extensions of renewable energy credit programs that are already in use.

[22] NEI, *Environment: Emissions Prevented*, available at https://www.nei.org/Knowledge-Center/Nuclear-Statistics/Environment-Emissions-Prevented.

VI. REGULATION OF NUCLEAR POWER PLANTS

Q. PLEASE EXPLAIN HOW NUCLEAR POWER PLANTS ARE REGULATED IN THE UNITED STATES.

A. The United States nuclear energy industry is one of the most heavily regulated commercial enterprises. The principal responsibility for government oversight lies with the United States Nuclear Regulatory Commission ("NRC"), which issues the federal licenses to construct and operate nuclear power plants. The licensing process for nuclear power facilities involves in-depth review of plant design, siting, operational safety, environmental impacts, financial assurance, emergency preparedness, and physical security by the NRC staff.

The NRC's process to review and approve applications to construct and operate nuclear power facilities also provides extensive opportunity for public involvement and a robust hearing process, including the adjudication of contested safety and environmental issues before an Atomic Safety and Licensing Board ("ASLB"). The ASLB for a power reactor licensing proceeding is typically comprised of three administrative judges—two with technical expertise, and one with legal expertise (who generally acts as chair for the proceeding). The decisions of the Boards are subject to Commission review.

Once a license is issued, the NRC's mission is to protect public health and safety by ensuring that facilities comply with the terms of their licenses as well as all of the technical and administrative requirements imposed by the agency. The NRC enforces its

regulations with inspections, requirements for corrective action and enforcement—including the authority to shut down a facility. Typically, at least two NRC resident inspectors are assigned to every U.S. nuclear energy facility. These resident inspectors, along with their colleagues from NRC's regional and headquarters offices, conduct thousands of hours of inspections each year. The NRC's inspection program includes both baseline inspections common to all nuclear plants, and additional inspections that may be deemed necessary based on events or plant performance.

Q. HOW DO THE INDUSTRY AND THE NRC ENSURE CONTINOUS IMPROVEMENT AT THE NATION'S NUCLEAR POWER FACILITIES?

A. The industry and NRC routinely analyze operational events worldwide to identify possible lessons for U.S. facilities. For example, after the 2011 accident at the Fukushima Daiichi nuclear energy facility in Japan, the NRC issued new requirements and requested detailed information in several regulatory and technical areas relevant to the accident in Japan. The U.S. nuclear industry took the initiative to develop a diverse, flexible mitigation approach to further enhance its already extensive ability to address extreme scenarios resulting in the loss of power to maintain effective cooling. Building on the strong foundation of existing safety systems, the "FLEX" program involves stationing backup equipment at facility sites and regional depots. About 1,500 pieces of equipment have been purchased or ordered in furtherance of the FLEX program.

Q. DOES THE NRC'S OVERSIGHT CONTINUE AFTER A NUCLEAR POWER FACILITY PERMANENTLY SHUTS DOWN?

A. Yes. The NRC's regulatory oversight continues after a nuclear power facility permanently ceases operation and defuels. Essentially, the facility will continue to be licensed and regulated by the NRC until decommissioning is completed and all spent fuel is removed from the site. The NRC's current decommissioning framework is implemented through regulations and guidance that address virtually all aspects of the decommissioning process and decommissioning funding. The NRC is also currently conducting a rulemaking to improve the regulatory efficiency of the transition from operation to decommissioning.

In addition to regulating the decommissioning process itself, the NRC requires its licensees to provide assurance that sufficient funds will be available to decommission the facility. The NRC's current regulatory structure provides decommissioning funding assurance through multiple requirements and limitations, which apply from the time of initial licensing through the time of license termination.

Q. WHAT ADDITIONAL STEPS, OUTSIDE OF THE REGULATORY PROCESS, HAS INDUSTRY TAKEN TO ENSURE EXCELLENCE AND IMPROVE EFFICIENCY?

A. One foundational aspect of ensuring excellence among the operating nuclear power fleet in the U.S. is the conduct of peer reviews of plant operation through the Institute of

Nuclear Power Operations ("INPO"), which was formed in 1980 to promote excellence in all aspects of nuclear safety. An INPO team and industry peers conduct on-site, two-week inspections at each plant once every two years, followed by a formal post-inspection briefing with the company leadership, including the chief executive officer.

In addition to the long-standing INPO review process, companies that operate America's nuclear energy facilities have been partnering on a multi-year strategy to transform the industry and ensure its viability for consumers, as well as its essential role in protecting the environment. This strategic plan, called Delivering the Nuclear Promise®: Advancing Safety, Reliability and Economic Performance, is a reaffirmation of the industry's commitment to excellence in safety and reliability, and will assure future viability by improving plant efficiency. This industrywide effort is redesigning programs and processes to improve their efficiency and effectiveness. The goal is to provide the operating companies with innovative solutions that enable a significant reduction in operating expenses across the fleet by 2018.

VII. CONCLUSION

Q. DO YOU HAVE ANY CONCLUDING REMARKS?

A. As stated earlier in my testimony, the deployment of new nuclear generating capacity in the United States is vital in order for this safe, reliable, clean air electricity source to maintain its important role in our nation's energy mix. I appreciate the Commission's attention to my testimony, which is intended to facilitate the Commission's consideration

of the overall benefits of nuclear generation, as part of its deliberation on the specific issues before it in this proceeding.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a copy of the within and foregoing DIRECT TESTIMONY OF MS. MARY G. KORSNICK IN DOCKET NO. 29849 upon all parties listed below via electronic service or by hand delivery and addressed as follows:

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This 1st day of December 2017.

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