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**As Written**

## **Choices in Akron, Trenton and Riyadh**

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Each day we hear news about nuclear energy, from Akron to Trenton to Riyadh. The prominence of these events—what makes them newsworthy—is a reflection of how nuclear energy is central to so many of the issues we care about. Jobs, health, national security, the climate. Nuclear energy matters because we care about the big ideas that define our way of life, and enable human health, safety, comfort and prosperity around the world.

The future of nuclear energy will be shaped by the choices being made by the White House and Congress, by individual companies, by state legislatures and governors and by federal agencies. And to be clear—there are choices to be made. They will also come from entrepreneurs, students and concerned citizens who become grassroots advocates. Let's also be clear about one more thing—if we fail to act, we have still, in fact, made a choice.

The market is forcing us to make fundamental choices. Do we want to preserve a diverse electric system? Do we want to be prepared when fossil fuel prices change again? When weather extremes create competing demands for natural gas, or freeze the coal piles? Do we want to hold on to clean air? Do we want to sustain the industrial base and talent base that is linked to our national security? We didn't have to stress these virtues ten years ago, but in today's market, we do.

Nuclear energy produces no air emissions. It does that in a lot of places where zero-emission energy is essential, because the downwind air quality is already bad. We operate with months or years of fuel already on site, so we are invulnerable to problems with pipelines, barges or railroads. We run well in cold weather and hot weather, and we either ride through hurricanes, or we're ready as soon as the grid gets restarted.

So, we are here to talk about why we are important. Vital, in fact, to maintaining the resiliency of our electric system. Electricity is at the heart of our economy, our health and our comfort. We are passionate about preserving our industry, which produces almost 20 percent of our electricity and more than 56 percent of our carbon-free power. I want to tell you what we are doing to meet these challenges. Part of our response is to help inform the choices that are being made.

We have sought to step back from the hourly news cycle and try to provide a framework for understanding these decisions. We call it the National Nuclear Energy Strategy.

The strategy has four priorities. First, to preserve the operating nuclear fleet that we have today. We do that by working to ensure that the attributes of nuclear power are properly valued, so that no well-run plant is driven into early retirement. Second, we must sustain the efficient operation of the nuclear facilities. This means ensuring that we are running our plants as efficiently as we can, while applying

regulations that are appropriate for the risks we face. Third, we must innovate by developing and deploying advanced technologies that expand the ways that we use nuclear energy. And fourth, the U.S. nuclear industry needs a level playing field to thrive internationally.

Let me use these strategic priorities to frame the choices that will matter.

As we think about preserving the nuclear fleet, now 99 reactors, the choice before us is how we should value the benefits that nuclear energy provides. Nuclear plants that operate in competitive wholesale markets are obviously under significant economic stress. Six reactors closed in the last five years, and we lose 38 million megawatt-hours of emissions-free electricity every year. Plant owners have announced their intention to close twelve more in the coming years.

If nothing is done to save these plants, the impacts will be devastating. Thousands of jobs will be lost across the country. Our electricity grid will lose the diversity that has allowed it to withstand hurricanes, floods, extreme temperatures and other challenges. And we will lose a lot of non-emitting electricity. If all of these twelve plants close, we will lose over 120 million megawatt-hours of carbon-free generation. That's equal to half of all the megawatt-hours of wind electricity generated last year in the United States.

Ohio and Pennsylvania face a choice right now; FirstEnergy has announced that without policy changes, it will retire two reactors in Ohio and two more in Pennsylvania, in 2020 and 2021. We can stick with a myopic focus on short-term prices. Or we can strive to preserve a resilient, robust electricity system, jobs, tax revenues, clean air and healthy communities.

A report by the Brattle Group is being released on Monday. It will sum up the threatened closures starkly. Keeping the four Ohio and Pennsylvania nuclear plants running would avoid more than 21 million metric tons of carbon emissions annually, compared to making the electricity with gas and coal. That's the equivalent of 4.5 million cars. Losing these plants would more than reverse the emissions benefits of all the renewable generation in PJM installed over the past 25 years. Those installations cost billions of dollars.

Policymakers have begun to take these risks seriously. Secretary Perry has sparked a much-needed conversation about the importance of having a resilient grid. FERC has embarked on a deeper investigation of resilience.

Here's the issue: If our markets force nuclear plants to close, we will create risks we have not thought about enough. ISO New England has looked at what its future might be like without the nuclear plants and it sees reasons for alarm. New England's electricity mix is now at 48 percent natural gas, up from 15 percent in 2000. As the grid looks out to the mid-2020s it sees less coal and nuclear and still more reliance on natural gas. The challenge the planners face is that the region uses natural gas for heating. While they have the generation capacity to meet that need, the region hasn't added enough pipelines to also support electricity production. In a cold winter, they forecast that they will be unable to produce enough power except under the most optimistic scenarios.

And winters are going to be tougher in places served by those 12 reactors marked for premature retirement. In the cold weather last winter, even with these plants helping to provide power, electricity prices soared above \$200 per megawatt hour in some areas as fossil fuel prices spiked. Managing severe

cold weather events without these nuclear plants will be costlier as the system will depend on less resilient sources of energy.

Weather is a major challenge to the electric system. Hurricanes caused widespread devastation in 2017, and we expect intense storms in years to come. Already this year we've had the "bomb cyclone." Keeping the bulk power supply system intact and ready is crucial; you can't recover from a hurricane without electricity. You can't ride through a polar vortex or other extreme cold or heat without electricity.

Irma and Harvey were unwelcome visitors. But even as roads in the Houston area became impassable, the South Texas Nuclear Project continued to churn out electricity. Other services faltered, but not electricity.

Nuclear plants keep a stock of generators, pumps and other emergency equipment on-site. They can keep themselves safe but also they can continue churning out their product, electricity, for the safety of others.

This is the type of asset that is now threatened. Are we making wise choices with our electric grid? Or are we allowing incremental changes that together introduce a level of risk nobody would knowingly accept? These are the questions that we need to be asking.

We are seeing state governments taking a lead to ask and answer those questions. And, increasingly making choices about how they will value nuclear energy.

We have nuclear power plants in 30 states. Three years ago we saw only about a dozen nuclear-related bills in the state houses; last year we saw more than 100 of them. This year is on track for a similar number. States recognize more and more that nuclear plants are vital to meeting environmental goals, driving local economies and providing the energy security they need.

A handful of states are considering steps to preserve nuclear plants. Connecticut passed a law last fall that could allow the Millstone plant to participate in its clean energy procurement process. New Jersey has held hearings on legislation that would create zero-emission credits for electricity from nuclear plants. I testified in Trenton, and Columbus, about the need to preserve these nuclear plants. I was not alone. I was joined by environmentalists and labor leaders.

It's clear to legislators in Trenton that if the goal is to avoid emissions, then preserving existing reactors is a very cost-effective way to do it. And doing so will also preserve valuable capacity and reliability. The legislature there could vote later today.

Pennsylvania lawmakers have established the first-ever bicameral, bipartisan nuclear energy caucus. Members of Maryland's House of Delegates just formed such a group. Ohio has considered a zero-emission nuclear credit bill. The Minnesota legislature has advanced a bill out of committee that would create a stable environment for capital investments at its nuclear facilities.

These states are following the leads provided by New York and Illinois, which acted to save plants. These policies were challenged in U.S. district court, although in each instance the case was dismissed. In reviewing the New York policy, the judge could not see how state programs to support renewable deployments were meaningfully different than the program to preserve nuclear plants for their non-emitting attribute. Each case is now being heard by the U.S. Court of Appeals.

The pursuit of clean energy can threaten our nuclear plants if we don't do it thoughtfully. If the goal is to reduce emissions, then all zero-emission technologies must be part of the solution. We must recognize what we already have in place, and build on that. Replacing zero-emitting technology with other zero-emitting technology won't help.

Arizona is facing a clear choice about how a state should use nuclear energy in meeting its environmental goals. One of the proposals under consideration would include nuclear; the other sets a less ambitious goal while excluding nuclear. The first one will get more done and get there faster, because of the Palo Verde Nuclear Generation Station. It is America's largest single source of non-emitting electricity. It provides 30 percent of the state's total electricity. It should be allowed to contribute to this clean energy future.

A policy that advances renewables while closing nuclear plants won't solve any problems. This approach is like running in place. In fact, where the goal is to cut carbon dioxide emissions, we should be thinking in terms of zero-emissions standards, not sun and wind standards.

Finally, we are seeing widespread attention on broader policies to address carbon emissions. New Jersey and Virginia are considering joining the Regional Greenhouse Gas Initiative. New York is assessing whether its state programs to support non-emitting generation could be met through market pricing. Others such as Washington and Maryland are exploring the possibility of carbon taxes. Policies targeted at reducing carbon will create incentives to use nuclear energy as part of a suite of technologies to reach those goals.

This is a varied landscape. The decisions that will shape the future of nuclear energy are being made in the state capitals today.

Our efforts to sustain the fleet are driving us toward smooth, efficient operations. Again for the last 12 months, our operations have been exemplary; we have a 92 percent capacity factor for the U.S fleet, and consistent production of more than 800 million megawatt-hours a year. That means we're producing more electricity with 99 reactors than we ever have before. In fact, it would have taken 140 reactors in the 1980s to produce as much electricity as our 99 reactors do today.

Our generating costs have fallen for the last five years in a row. In 2017 our total generating cost was \$33.61 per megawatt-hour. This includes fuel, operations and capital costs but it does not account for returns or risk management. The industry costs are down nearly 19 percent since their peak in 2012.

Part of the drop is because of our continued search for efficiencies. We call it Delivering the Nuclear Promise. This is an industrywide effort to spread best practices among the operators. We have so far identified 68 steps, which create the potential for cutting costs by \$1.3 billion across the industry.

Part of our expense structure is the Nuclear Regulatory Commission. Our industry pays about 90 percent of the NRC's budget. As the industry faces changes, so does the NRC. And we remain interested in an efficient regulatory framework that governs the current plants as well as future reactors.

The NRC leadership is actively looking for input on how to improve its operations. We have suggested stricter adherence to a principle that we all agree to in theory, risk-informed regulation, which means focusing on what matters, and what is important to safety. We have also repeatedly called for

embracing the best available new technology, including digital technology, where appropriate. Digital technology can improve safety and trim unnecessary costs.

And our reactors are durable. By the end of the year we expect that owners of six of them will have applied for permission to extend their lives to 80 years.

We see a very substantial bipartisan coalition that supports follow-through on the Nuclear Waste Policy Act. That means two things: relatively small appropriations that will allow the NRC to resume its hearings on whether to grant a license for the Yucca Mountain Repository, and support for an interim storage site. The Trump administration asked for \$150 million to support the NRC and the DOE. Eighty members of the House signed a letter requesting that this be made a top priority in the 2019 budget. Last year the House Energy and Commerce committee approved a bill to advance the Yucca Mountain repository. The bill also would authorize consolidated interim storage of used fuel, and locations in both New Mexico and Texas have expressed interest in hosting an interim storage site. Given the legislation's current momentum and strong vote of 49-4 within the committee, we anticipate the bill will be brought to the House floor in the coming weeks and will pass with overwhelming bipartisan support.

In the Senate we could see bipartisan used fuel legislation introduced in the near future as well. We look forward to working with both bodies of Congress to once and for all address the issue of nuclear waste in a comprehensive manner. The hurdles to solving used fuel are political, not technical, and we hope to move the ball forward later this year.

And we continue to innovate. In March, Southern Company's Plant Hatch started up with test quantities of two kinds of accident tolerant fuel. There are four companies developing such fuel, each with its own approach. The new fuels are designed to withstand hotter temperatures without damage. Some of the designs would also allow greater heat production, meaning that existing reactors could produce more electricity.

I also want to tell you about the new reactors that are coming. They are being helped along by what Congress did in February; it removed the deadline for qualifying for a production tax credit and widened the scope of who can use it.

Extension of the production tax credit was an important component of the decision by Georgia Power and the Public Service Commission to proceed with the Vogtle project, near Augusta.

After those two reactors, there will be production tax credits available for another 3,800 megawatts of new reactors. One obvious candidate is the small modular reactor project being developed by UAMPS. UAMPS wants a NuScale plant and already has a site, at the Idaho National Laboratory. NuScale's design certification is progressing well through the NRC now.

We also see a variety of players aiming for a new product category that might best be called microreactors, that would compete with the dirtiest and most expensive form of fossil generation, diesel fuel. There is strong interest in these reactors for remote, off-grid locations, including military bases.

There continues to be a great deal of interest in new reactor designs that take advantage of different fuels or coolants. They are meant to mesh well with intermittent renewables, and to provide higher quality heat.

Developing advanced reactors is about more than just the price of electricity; we'll also need markets that value all that nuclear delivers, and we'll need good management and planning by the regulators. And we hear encouraging things from the NRC. At its annual public conference in March, the commission chair, Kristine Svinicki, said her agency would develop new processes to review and approve reactors other than the familiar light water models.

And a thriving American nuclear industry is about more than just reactors in the United States. We are encouraged by the vigor with which the Kingdom of Saudi Arabia is pursuing nuclear power.

The Kingdom has a growing demand for electricity, and it will continue to grow. The Saudis don't want to burn oil for electricity or to make potable water, because they want to continue to export it. Given the continued electrification of Saudi society, the clear solution is nuclear power, a route already embraced by the Saudis' neighbors in the United Arab Emirates. The Saudis plan to procure both new large nuclear reactors as well as smaller advanced designs. There is an international competition to supply technology and expertise to Saudi Arabia. We thank the administration for helping keep the U.S. in the running. It opens up the opportunity for the United States to form a century-long relationship, rather than with Russia or China.

Another growing segment of the international market is the United Kingdom, which has limited supplies of natural gas and a national commitment to reduce emissions of carbon. The UK is looking at multiple designs from U.S. vendors for both large and smaller applications. These include GE, NuScale and Westinghouse. The Westinghouse AP1000 reactor is one of four designs under consideration for large reactors. The Chinese and the French also are competing in this market.

The export market is growing and our success there will strengthen the U.S. supply chain and its support of the existing U.S. fleet.

Where does all of this leave us? We need a healthy domestic nuclear industry, to keep the lights on, to keep air pollution in check, to keep thousands of people in good-paying, year-round jobs, to keep municipal budgets funded, to keep our expertise base that helps us with exports in a global market. And in places that have carbon emission goals, nuclear is essential to meeting them.

But most of all we need to recognize what we've got and not let it slip away through incremental decisions, or careless decisions, that take us in directions we'll regret later on. We need to make choices that will sustain the fleet, help us innovate, and thrive.

We are an essential component of a clean, diverse, resilient grid. Our challenge is to spread that message in the state capitols, among the grid operators, to the lawmakers here in Washington and to the country as a whole. We can make the right choices that will benefit all of us, here and around the world.

Thank you.