

## Small Nuclear Reactors Essential to the US Energy & Climate Change Future

*Editor-in-Chief's Interview with Nuclear Energy Institute President Maria Korsnick*



Maria Korsnick is president and chief executive officer at the Nuclear Energy Institute (NEI). The Institute's mission is to promote the use and growth of nuclear energy through efficient operations and effective policy. It accomplishes this by providing a unified industry voice before Congress, the executive branch, state and local legislatures, and federal regulators, as well as international organizations and venues, on key policy issues. Drawing on her engineering background, hands-on experience in reactor operations, and deep knowledge of

energy policy and regulatory issues, Korsnick aims to increase understanding of nuclear energy's economic and environmental benefits among policymakers and the public. Before joining NEI, she was senior vice president of northeast operations for Exelon Corp., responsible for overseeing operation of the Calvert Cliffs 1 and 2, R.E. Ginna, and Nine Mile Point 1 and 2 nuclear power plants. Exelon operates the largest fleet of nuclear plants in the US with 21 reactors at 12 facilities spanning Illinois, Maryland, New York and Pennsylvania. Prior to Exelon, Korsnick served as chief nuclear officer (CNO) and acting chief executive officer at Constellation Energy Nuclear Group. She began her career at Constellation in 1986 and held positions of increasing responsibility including engineer, operator, manager, site vice president, corporate vice president, and CNO. She holds a bachelor's degree in nuclear engineering from the University of Maryland and has held a senior reactor operator license.

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**Krieg** How has your engineering background and experience in nuclear reactor operations influenced your work as NEI President & CEO?

**Korsnick** It all really comes down to my passion for nuclear energy, technology, and what it means for our clean energy future. Before joining NEI, I

spent more than 30 years hands on at nuclear plants, from engineer, operator, manager, site vice president to corporate vice president and CNO. Each step of the way has really led me here to this critical moment for climate and energy.

At a certain point in my career, I realized that nuclear is not widely understood or valued for the reliable, resilient, carbon-free power it provides, which thankfully led me to the Nuclear Energy Institute (NEI). It has always been NEI's mission to help get that message to policy makers, regulators, and the public. My passion and deep knowledge of energy policy and regulatory issues made it an easy choice to help lead NEI's efforts to increase understanding of nuclear energy's economic and environmental benefits among policymakers and the public.

**Krieg** The logic for a robust and dynamic nuclear sector is becoming abundantly clear. As DOE Secretary Jennifer Granholm and others have argued, expanding the domestic nuclear sector will be essential to meet national energy system decarbonization goals. Could you elaborate on that?

**Korsnick** We already know that nuclear energy is the most reliable, scalable, carbon-free option we have. So, if we really take a look at what it takes to achieve the true, deep decarbonization that the world desperately needs, it is clear that nuclear must be the backbone of the power sector, alongside growing shares of wind and solar.

Nuclear energy is the source that can make it all work—not just electricity production, but job creation, economic revitalization, and decarbonization. Nuclear plants produce the most carbon-free electricity in the country, which is why urban and rural communities count on them for clean, reliable power around the clock.

**Krieg** We are at a seminal moment—some would say an inflection point—in the development of advanced reactor technologies, including small modular reactors (SMRs) and microreactors. Key SMR benefits are linked to their small footprint and the fact that prefabricated reactor components can be manufactured and shipped to deployment sites. What are the full range of SMR benefits?

**Korsnick** When we talk about the next generation of reactors we are not talking about your grandfather's nuclear plants. Developers are creating simpler designs, incorporating factory construction, and working to lower overall construction and operating costs to be more competitive with other

forms of energy generation.

These new designs will come in a wide range of sizes, from a few megawatts to more than 1,000 (like traditional reactors). This will allow owners to tailor their electricity generation to their energy demands. This is particularly important for smaller companies, rural electric cooperatives, or municipal agencies and for isolated and distributed applications.

But the possibilities go well beyond electricity generation. The nuclear reactors of tomorrow—some less than a decade away—will offer a variety of benefits such as water desalination, process heat and alternative fuels generation, and access to power beyond the grid. They will help remote areas have reliable and clean electricity options and provide immediate power after a disaster. Some designs will even allow us to recover and recycle elements in used nuclear fuel that can still produce energy.

**Krieg** How does the existing nuclear fleet and advanced large design reactors fit into the nuclear industry in the future?

**Korsnick** The clean energy system of the future is anchored by the strength and resilience of our current reactors, which produce nearly a fifth of U.S. electricity and half of our carbon-free generation, but we will need even more nuclear energy to meet increasing demand. In this clean-energy future I talk about, hundreds of reactors, from large, existing models to newer, advanced reactors, dot the landscape.

The momentum we're seeing at the federal and state level is a testament to the value of our existing fleet and our progress on next-generation technology. On the federal level the passage of the bipartisan infrastructure act and the Inflation Reduction Act sends a clear signal that nuclear is essential in the transition to a carbon-free economy and provides confidence to invest in not only nuclear's present but its future as well, opening a bright path toward the next generation of reactors.

In states like California and Illinois, we have seen policymakers pass legislation, keeping critical nuclear plants open when faced with closure, while in states like West Virginia, Montana and Wisconsin policy makers have lifted legacy bans on new nuclear projects. When looking at advanced reactors, we are seeing states like Indiana pass laws paving the way for SMR deployment and similarly with support from the state of Tennessee, TVA announced a \$200 million program to explore advanced light-water designs.

What's exciting is I don't think we are going to see a one-size-fits-all future with nuclear. Especially when you look beyond the United States. People will have options—various makes and models that make nuclear a versatile solution to decarbonize the economy.

**Krieg** In September, the Department of Energy released a report indicating that fully 80% of US coal power plant sites could be converted to small reactor sites, with numerous benefits to local mining communities, substantial cost savings, and positive environmental implications. Do you agree?

**Korsnick** As next-generation nuclear reactors come to the market, customers recognize that these technologies can meet their electricity and economic needs at the same time. The new reactors, which are simpler, smaller, and more flexible, can use much of the existing infrastructure surrounding a coal plant. This will allow host communities to maintain existing jobs while also creating high-paying new ones.

A recent report looked specifically at communities transitioning from coal to nuclear. The report estimated that each small modular reactor sited to replace a retiring coal plant would provide hundreds of on-site jobs. At coal sites, we estimate that up to 75 percent of the current workforce could transition to work at a nuclear plant. These jobs would exist throughout the entire life of the plant, 60 plus years, and pay substantially higher wages.

Hundreds of coal plants are scheduled to close in the next several years but that shouldn't leave local economies behind. When we invest in next-generation reactors, they can utilize existing coal infrastructure, which avoids the need for new transmission to connect these plants to the grid.

Advanced nuclear reactors will be local economic engines. They'll provide quality, secure jobs. They'll bring tax revenue to support schools, libraries and first responders. And they do it all without emitting air pollutants that harm people's health.

Building these reactors can make the transition to clean energy a just economic transition. Investments in nuclear energy are investments in working people.

**Krieg** Over 70 commercial SMR designs are in various stages of development here and overseas. Two SMRs began operation at Russia's floating Akademik Lomonosov facility during 2020. China is building the world's first land based commercial SMR in Hainan. Given the tempo of foreign-

led SMR activity, is the pace of domestic SMR development, nuclear R&D, and actual facility construction on the right trajectory?

**Korsnick** We are confident we will see new technologies built this decade. This is our time to prove ourselves. It's on the industry to demonstrate that we can build these technologies on time and economically. That's why these demonstration projects are critical--to take learnings that will create a system that is efficient. We need to get into the rhythm of new builds. As we build confidence, I anticipate we will see even more customer commitments for all the reasons that make nuclear a valuable part of our climate solution.

**Krieg** How can the pace of U.S. SMR development and deployment be quickened? Beyond national security and climate change concerns, it's been estimated that global demand for nuclear power could eventually produce a multi-trillion-dollar export market for the U.S. nuclear industry. In broad strokes, what is the critical path to meet this opportunity?

**Korsnick** The industry must demonstrate we can get these deployed on time—and that's what we will see this decade. Companies are waiting to see these demonstration projects take off—and from there I anticipate, based on what we are hearing from our members, we will see a wave of new builds.

At this point, our challenge isn't a lack of demand, it's being able to build fast enough to meet the demand before us. First, the Nuclear Regulatory Commission is going to face a rapidly growing volume of applications for new reactors and siting & construction permits. If we're going to build them, we need a more efficient process. Regulators must have the capacity to efficiently review and approve licenses and permits so these reactors can come online.

We are not talking about demand for 10 or even 20 reactors. NEI recently polled Chief Nuclear Officers at our member utilities. Together, they are expecting to add 90 gigawatts of nuclear power to the grid in the U.S. with the bulk of that coming online by 2050.

That translates to about 300 new small modular reactors in the next 25 years. That type of production would double U.S. nuclear output today.

We are working with our members to help prepare the NRC to meet this moment. We are exploring solutions to improve the licensing process to be more efficient and develop a framework that recognizes the unique characteristics of these new designs. This is all critical to ensuring these

reactors can be online in time to meet our climate goals.

Financing plays a key role in bringing these technologies to reality, and we are going to need investments in our technology to reach the reliable, carbon-free grid of the future. We need investors to see what global leaders see in the next generation of reactors. These designs are more cost-efficient than ever. They're smaller and simpler. Some designs can even be factory-made and shipped to their destination.

One of the most important things we can do as an industry is engage and educate the ESG and larger financial community about both existing nuclear power and new reactor technologies. That is something we are taking on at NEI. We are making a case that nuclear is a critical part of a just and clean energy transition. Over the next five to six years, investors will see for themselves that the newer designs are not your grandfather's nuclear plants. The newer designs being developed are being built with economic and consumer needs of the future in mind.

**Krieg** Assuming that the US can marshal itself to deploy the current nuclear fleet and advanced reactor designs of all types to 40 percent of overall electricity production by mid-century, what would that year 2050 energy sector look like?

**Korsnick** The numbers are clear—renewables alone can't meet our climate goals. The United Nation's Climate Panel has been clear that nuclear energy is a necessary part of our energy transition. We must look at the whole picture, and that starts with looking at what the customer needs.

What they need is a complement of sources that will get us both carbon-free energy, but abundant amounts of reliable and affordable energy that can flow 24/7, and that means a partnership between wind, solar and nuclear.

Study after study has shown the surest way to affordably achieve carbon reductions is by including nuclear energy. Doing so will allow us to decarbonize while avoiding the need to over-build renewables and to massively expand our long-distance transmission system. A study commissioned by Energy Northwest found that under a complete decarbonization scenario, the Pacific Northwest could save more than \$8 billion PER YEAR by keeping nuclear plants online and adding multiple SMRs instead of trying to decarbonize the grid using just renewables and storage.

If we rely on wind and solar to do the heavy lifting, the system costs would be truly prohibitive according to research from Stanford Univer-

sity, the Clean Air Task Force, Environmental Defense Fund, and other groups. Nuclear energy forms the backbone of a stable electric grid that includes large shares of other carbon-free sources like wind, hydro-power and solar, alongside the latest in battery storage technology. The upshot is clear: Nuclear is the critical component that actually makes complete decarbonization affordable while keeping our grid reliable.

**Krieg** How would you characterize both federal and state policy support for nuclear industry revitalization and leadership? From a public policy perspective, is sufficient attention being paid to the need for efficient processing of advanced reactor licensing, government funding streams, and other policy-level changes capable of advancing the timetable for advanced reactor deployment.

**Korsnick** The level of bipartisan support for nuclear is remarkable. No matter where you sit on the political spectrum, nuclear has something for everyone. Support for nuclear starts at the White House. In 2021, the Biden Administration declared the next few years a “can’t miss opportunity” for nuclear. U.S. Energy Secretary Jennifer Granholm has also called nuclear an “absolutely critical part of our decarbonization equation.”

At the other end of Pennsylvania Avenue, a bipartisan majority in Congress recognizes that the path to an affordable, carbon-free future runs through nuclear energy and that means maintaining our current fleet as well as deployment of new technologies. And they’re backing it up with unprecedented levels of funding. We have seen support in the Inflation Reduction Act proposal for nuclear tax credits, which will preserve the current plants, while also incentivizing new nuclear builds.

States have harnessed this support as well in their transition away from coal. Ten years ago, we would have been lucky to see even a dozen pro-nuclear bills moving through state legislatures. In recent years we’ve seen ten times more action in the states and more than 100 bills supporting nuclear. It’s becoming “not so much, not in my back yard—but please in my back yard.”