New Nuclear is Real

Conversation with Pillsbury's Jeff Merrifield
(former Commissioner, Nuclear Regulatory Commission)

PUF had been in San Diego for a third day. Or was it day four? Or five? Many of the regulatory and utility leaders and the like had by then lost count after many meetings and a networking bonanza at the NARUC Summer Policy Summit.

The last general session drew everyone back to the large conference hall. On a topic all wanted to know more about, "are we ready for a nuclear reactor renaissance?" With NARUC President Judy Jagdmann at the helm, filing onstage for the panel discussion were the CEOs of new nuclear companies Oklo and TerraPower, Jacob DeWitte and Chris Levesque respectively, the CEO of the Nuclear Energy Institute, Maria Korsnick, and a former Commissioner at the Nuclear Regulatory Commission, Pillsbury lawyer Jeff Merrifield.

Those in the room indeed learned so much about the promise and pace of this next generation of nuclear technologies. So, the PUF team put the grab on one of the experts, former NRC Commissioner Merrifield. As you can see in the Q&A below, there is a lot to know.

PUF's Steve Mitnick: You were a Commissioner on the Nuclear Regulatory Commission. Now you are a lawyer with a major firm, and work in nuclear quite a bit. How did your career lead to this role and what do you do on a typical day?

Jeff Merrifield: My career had an interesting and different trajectory. I came to D.C. in 1986 and went to work on the personal staff of Senator Gordon Humphrey who was a Republican for New Hampshire.

The first major issue I worked on for him was licensing activities associated with Seabrook Station nuclear power plant. That was a major issue in the State of New Hampshire at that time.

I worked for his successor, Senator Bob Smith, and went to Georgetown law school at night. After I graduated law school in 1992, I spent a couple of years working for a D.C.-based law firm doing environmental law.

In '94 when the Republicans took over the U.S. Senate, Senator Smith took over as the chairman of the Superfund subcommittee. I spent four years working on staff of the Senate environmental works committee.

Along the way, I managed to see a few nuclear power plants and my name was floated in 1998 to be a Commissioner. I was Senate confirmed in October of 1998 and was sworn in as a Commissioner on October 23.

I served a partial term under President Clinton and then was renominated and reconfirmed under President George W. Bush for a full term running from 2002 to 2007. I spent almost nine years at the NRC.

During that time, I found my way to half of the then four hundred forty nuclear power plants around the world and visited thirty of the thirty-one countries in which they operated. I was probably the most traveled NRC Commissioner and got an in-depth understanding in the industry.

In 2007, I moved to Charlotte, North Carolina, and took a business development role with The Shaw Group, which was a major constructor of power plants. I was in charge of their nuclear business development and as Shaw Group owned ten percent of Westinghouse, I spent a lot of time focused on the AP1000, which is a design that is currently being built at Vogtle for Georgia Power.

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At the tail end of that job, I was working on coal units, scrubber units, combined-cycle gas units and maintenance. For a variety of reasons, I decided to leave what was then Chicago Bridge & Iron after they purchased The Shaw Group.

In 2015, I took a position as a partner of the Pillsbury law firm, leading our energy practice. I was made head of the Energy Section in 2016. Our group is the oldest and largest nuclear law practice in the world.

We work for utilities, technology companies, suppliers, countries, and nongovernmental organizations among others. We also work for the vast majority of developers of advanced nuclear technologies. I'm also the external regulatory council for the Fusion Industry Association.

I'm doing both fission and fusion and increasingly we are doing a lot of work with hydrogen, particularly as it relates to the use of existing and future nuclear power plants for producing hydrogen.

My day is diverse. Today, I had a conversation about helping airline folks figure out some of their carbon issues. I was talking to several folks and meeting with the NRC about fusion.

I do a lot of work with NGOs, and with advanced reactor developers. My role isn't the typical corporate lawyer practice. I'm focusing on helping these technologies move forward.

Many of the NGOs I support are concerned about eliminating carbon production and global warming. I also do a lot of public speaking and appearances.

PUF: What is the future of small modular nuclear reactors?

Jeff Merrifield: I'm the chair of the Advanced Nuclear Working Group for the U.S. Nuclear Industry Council, which is an association of suppliers and technology developers. We had the ninth annual Advanced Reactors Conference in Idaho in April.

I have been as encouraged on these issues as I have in a long time for several reasons. Number one, the technologies are moving forward and utilities and the public utility commissioners who will oversee them are going to have a lot of choices available in the coming decade and beyond.

But the second one is, unlike the situation when I first came to Washington D.C. in 1986, there's broad and bipartisan support for enabling these technologies, and it's not just the folks in the Congress.

Going from the Obama administration, then the Trump administration, and now to the Biden administration, there is consistently growing support for deployment of these technologies. In Congress, it's not just a bunch of Republicans anymore.

Leading advocates for advanced nuclear are folks like Senator Sheldon Whitehouse of Rhode Island, and Senator Cory Booker of New Jersey. On the House side are others who don't come from traditional constituencies supporting this. On the fusion side, Congressman Don Beyer, Virginia, is one of the leading advocates for the move to nuclear fusion, so both Democrats and Republicans have become leading advocates for these technologies.

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The third element is that times have changed. People ask me, "we've seen this before. We thought when you were a Commissioner, we were going to have a range of nuclear power plants. Those didn't come to fruition."

We're dealing with a different set of circumstances. At that time, it was all about producing power. How do utilities find power they can produce in large volumes at a reasonable cost?

The challenge at that time was fracking. Originally, fracking was the harvesting of massive amounts of natural gas and the price of natural gas went from ten dollars to eight dollars to two dollars to sub-two dollars. You saw this huge deployment and we were part of it in my former job of building combined cycle units that could take advantage of it.

No utility could have gone in front of a PUC and been able to sustain moving forward with nuclear in the face of that huge drop in the price of gas. Southern did and there were good reasons for that circumstance and a lot of government support in Georgia. But a lot of other utilities couldn't get that support and turned to natural gas.

What's different today? The price of natural gas is up, but the most important element that aligns for a hopeful future for nuclear is a recognition of the noncarbon-generation benefits it provides that we don't receive from other forms of generation. Half of the power in the United States that is carbon-free is produced by nuclear power. Twenty percent of our total generation in the U.S. is nuclear and it has roughly been that number for years.

People realize it's reliable. These aren't the 1980s. Ninety-four percent of the time those reactors are operating, which is far above any other form of generation out there, and particularly when you look in comparison to other carbon-free generation, it's more than double the next nearest component.

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Utility executives are seeing two issues. One, they're seeing governments, including their public utilities, looking at them and saying, we need to decarbonize our generation. Number two, they are looking at how to produce power going forward.

What I hear over again from utility executives is, I can get eighty percent of my needs for noncarbon-based generation with traditional wind, solar, and storage, even though battery storage is not where it needs to be. But I can't get the remaining twenty percent of noncarbon generation from those technologies. That is where nuclear plays a part and has a great opportunity.

PUF: How do you feel about NRC's ability to move with agility on these new applications?

Jeff Merrifield: There're a lot of technologies and designs out there. Not all of them are going to make it to the end point.

You have to look at this in tranches, in groupings of reactors that will be deployed. Early on, we're going to see some of the small modular light water reactors. NuScale, which has gotten approval from the NRC, and GE's BWRX-300 which relies on traditional technologies but is an underground reactor.

Holtec has a reactor design that uses light-water technology. Currently it uses existing fuel. Potentially Rolls Royce in the UK is relying on typical small modular reactor technologies, and the

UK government is supportive of that design. That's one grouping we'll see.

The next are the recipients of the Advanced Reactor Demonstration Program Awards. That is TerraPower's Natrium design, which will be deployed in Wyoming, and the X-energy design, which will be deployed in Washington State with Energy Northwest.

They're going to be receiving significant monies from the U.S. government, and those are intended to be deployed in the late 2020s. There is an issue with those, as well as some subsequent ones, as they need to have access to higher enrichments of fuel. That is a challenge Congress is focused on.

Some folks who have received NRC Risk Reduction Awards or other early movers I would put in that category include Oklo, which is deploying a reactor in Idaho. You've got Terrestrial Energy, which is pursuing efforts both in the U.S. and Canada with a molten salt design. Kairos Power in Tennessee, ARC, and Moltex which could be deployed in New Brunswick, Canada.

What we're going to see is a series of deployments beginning in the 2020s and starting to ramp up and deploy more and more reactors as we get into the early and mid-2030s.

The NRC knows light-water reactor technologies very well. They don't have the same level of expertise currently with molten salt reactors, high temperature gas reactors, fast reactors, and other technologies of this nature but they're working.

There is a traditional licensing program at the NRC and it's one of two forms. Almost all current reactors are licensed under Part 50. This is a two-step licensing process where first the applicant comes in for a construction license.

That's reviewed. Then there's potential for a hearing. Then they build the plant. They seek an operating license from the NRC. That also could potentially involve a hearing.

The second process was designed to try to reduce the hearings to only one. Part 52, which we first deployed in the late '90s when I was a Commissioner, was intended to use a certified design, have that pre-approved, and have a site with an early site permit that has been pre-approved. Once you have those two elements, you can go ahead and apply for a one-step construction and operating license.

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You would go in, present that to the NRC, which would review it and would give you an approval. After you build the plant, if you meet a series of inspection reports called ITAACs, then you can go ahead and operate the plant. Southern Company has proved that principle. Southern submitted all the ITAACs and is in the process of being reviewed and approved by the NRC.

Where does that leave the new Advanced Reactor licensing program under Part 53? Part 53 was required under the NEMA Act, which said Congress wanted the NRC to create a specialized

At NARUC's Summer Policy Summit, Jeff Merrifield is second from the left of this general session panel, moderator and NARUC President Judy Jagdmann of Virginia is left of him, and to his right is Nuclear Energy Institute's Maria Korsnick, Oklo's Jacob DeWitte, and TerraPower's Chris Levesque.

Applicants in front of the NRC will be using regulatory processes, Part 50 and Part 52 to license reactors. Those were designed for light-water reactors, but you can seek exemptions from certain elements if not applicable to your technology. That's what developers of advanced technologies are intending.

licensing framework for advanced reactive technologies and the timeline Congress set to implement that was a final rule by 2027.

Subsequently, there were conversations between Congress and the NRC, and they collectively moved the timeline up to 2024. About a year ago, the NRC realized it wasn't going to make that date. The NRC is targeting to have a final rule in place by 2025.

One of the things the NRC is trying to do is engage with the industry, namely the advanced reactor developers and utilities, to see if they can come to some commonality on what Part 53 ought to look like.

There's a way to go. We've got a lot of discussions and work ahead if we're going to get a rule that is acceptable to the agency, and individual advocates will want to use. We're not there yet.

I want to make this clear. Applicants coming in front of the NRC will be using the existing regulatory processes, Part 50 and Part 52 to license reactors. Those processes were designed for light-water reactors, but you can seek exemptions from certain elements if they're not applicable to your technology.

That's what the developers of advanced technologies are intending to do. I had a conversation with one of my clients who has already engaged with the NRC and reached agreement on those portions of the regulation they would not be expected to meet.

Additional work needs to be done to streamline the agency's licensing process, including the reviews undertaken by the Advisory Committee on Reactor Safeguards, which is the independent body that reports to the NRC.

There are things that can be done to make the licensing process more efficient. I'm hopeful this will put us in a good place to license and deploy advanced reactors.

PUF: The new generation of nuclear plants are different. They're smaller, in some cases mobile. They have different safety technologies. So, you get exceptions and that'll slim down the process, so it doesn't take fifteen years?

Jeff Merrifield: That is part of it. Ultimately, when you're evaluating a nuclear reactor, one of the key attributes that the agency and others will look at is a term called, source term.

The source term is a function of the radiological risk associated with volume and material you're dealing with and the ability to control it. The mere fact that these reactors are smaller and don't have a large source term, does allow a lot more flexibility for their deployment.

Recently, the agency embraced the concept that source term

could be used as the means to determine how large your emergency evacuation zone would be and how closely you could locate these plants near higher residential areas.

Under current processes, it was viewed that the size of prior large-scale reactors would necessitate a ten-mile emergency evacuation zone and that they'd be located in areas of lower population density.

With newer, smaller reactors, the Commission agrees it would consider emergency evacuation zones as little as the fence line of the site, but also said it would be willing to consider having them located in areas closer to population zones.

From a public utility standpoint, it means there are hundreds of sites around the U.S, where we used to have coal plants, which are located much closer to city centers. They had existing distribution and transmission networks and infrastructure, access to water and rail lines, which had been or will be shut down, which could be repowered with these advanced reactors.

The flexibility these technologies represent for the public utility commissions and utilities is extraordinary. That's another reason I'm excited about the dialogue we had at the recent NARUC Summer Policy Summit. There's been real leadership within the NARUC membership on trying to better understand these technologies.

PUF: What can the industry do to help this along, and accelerate it?

Jeff Merrifield: There are more utilities actively considering the opportunity to move forward. One example is Duke Energy in North Carolina. There's been a lot of dialogue between the North Carolina Utilities Commission and Duke, and I believe Lynn Good, the CEO of Duke, feels more comfortable talking about these issues in public.

TVA led by their CEO Jeff Lyash, is actively working to deploy reactors at Clinch River, and Ontario Power Generation has made a commitment to go this direction, as well at the Darlington site outside of Toronto. New Brunswick Power is evaluating two technologies for deployment at Point Lepreau where it has one nuclear plant currently.

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It's important for public utility commissioners to express to utilities they regulate to evaluate these designs as part of their forward plans. They will want to understand, is this something that could be an option for our state to consider as we're trying to address the need for clean energy in the state? Ultimately, utilities and public utility commissions are going to have to make those decisions for ratepayers.

One of the slides I recently presented at the NARUC Summer Policy Summit suggested you've got to think about these as long-term assets. They could potentially operate for a hundred years.

If you've got a wind turbine or solar panels, they have a limited lifetime. You're going to have to replace them, typically within about twenty years.

You're going to have to repower them. Public utility commissions don't look at a two-year horizon. They've got to look long-term. That's why having nuclear as part of the consideration is important for what the future energy mix should be. PUF