

**U.S. Nuclear Regulatory Commission
Commissioner Bradley R. Crowell
Remarks for the 2022 ANS Winter Meeting and Technology Expo, Phoenix, AZ
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(Remarks as prepared)

Good morning. Thank you, John, for that kind introduction. I'm happy to be here in Phoenix at the 2022 American Nuclear Society Winter Meeting and Technology Expo. I am especially honored to have been asked to address the opening plenary session. As I begin, let me be clear that my comments today are mine and do not necessarily represent the positions of the Nuclear Regulatory Commission or the NRC as a whole.

As part of this morning's panel, I've been asked to address the challenges facing the U.S. and global nuclear sector in a rapidly evolving environment. This is a forward-looking topic. However, as I discuss future challenges and opportunities, I recognize that the past informs the present. That said, for the civilian nuclear sector to be successful on the road ahead, we must not let the shortcomings of the past be prologue for the future.

So, this morning I'd like to speak a bit about how we have collectively arrived at this moment and the path ahead in my view for the future of civil nuclear energy and related technologies. I'll cover three main topics.

First, since I'm the newest member of the NRC, I thought I'd share a little bit about myself and my perspectives on our nation's relationship with nuclear energy and science. Second, I'll provide a high-level overview of my perspectives on the future of nuclear energy – including the challenges and opportunities that lie ahead as we embark on a resurgence in nuclear technology. Finally, I'll talk about my preliminary view of the NRC's posture and readiness to embrace the opportunities and overcome the challenges.

Who am I?

I was born and raised in Carson City, NV. My father Robert Crowell, served in Vietnam as part of a 23-year career in the U.S. Navy. He later served as Mayor Carson City for 12 years until he passed in 2020. He devoted his life to public service, and he is the inspiration for my commitment to public service.

After graduating from Santa Clara University, I moved to Washington, D.C. where I began my career working for former Nevada Governor and U.S. Senator Richard Bryan, and later for Senator Sheldon Whitehouse of Rhode Island. From 2010 to 2016, I served in the Obama-Biden Administration at the Department of Energy, including as Assistant Secretary for Congressional and Intergovernmental Affairs. Most recently, from 2016 until August of this year, I was Director of the Nevada Department of Conservation and Natural Resources for two Nevada governors - one republican and one democrat.

And earlier this year, I was honored to be nominated by President Biden and confirmed by the Senate to return to Washington and serve on the U.S. Nuclear Regulatory Commission, where I am serving the remainder of a five-year term ending in June 2027. My experiences in Washington and Nevada have given me unique opportunities to address civilian and defense related nuclear issues at both the Federal and State levels of government.

At DOE, I gained insights on many topics, including advanced nuclear reactor technologies, consent-based siting for spent nuclear fuel disposal, nuclear weapons modernization, and cleaning up America's Cold War-era environmental legacy. My tenure at DOE coincided with both the 2011 Fukushima nuclear accident and the 2014 radioactive waste incident at the Waste Isolation Pilot Plant in New Mexico.

During my time in Nevada, I led a state level cabinet agency of 1,000 employees responsible for a broad range of issues including hard-rock and critical minerals mining, hazardous and low-level radiological waste disposal, water rights, and land management, among other issues.

Perhaps most importantly, in all of my previous roles I have been consistently reminded of what I see as the most critical component of addressing any and all nuclear related issues – public trust and engagement. Without the active and informed participation of the public, the road ahead for nuclear will be cut short and fail to realize its full potential.

My experience with these issues is why I prioritize the fundamental principles of balance, transparency, efficiency, and fact-based decision making as hallmarks for how a public agency should operate. At the NRC, I will strive to uphold these principles.

In preparation for joining the NRC, I was pleased to learn that the agency had adopted what they call the “five principles of good regulation”: Independence, Openness, Efficiency, Clarity, and Reliability. Within which, public health and safety and protection of the environment are foremost. And whatever new technologies, or new approaches to old problems, may come to fore, the NRC must not compromise these core values.

We must always remember that nuclear regulation is the public's business. The public must be fully informed and must have the opportunity to participate equally in the regulatory and licensing process. Doing so will form the foundation for a truly successful and lasting nuclear renaissance.

As the frontline safety regulatory, the NRC must maintain open channels of communication with Congress, other Federal and State agencies, licensees, and the public in equal measure. At the same time, we must also strive to maintain open communications and active engagement with the international nuclear community.

Efficiency means that all Americans -- public citizens and the regulated nuclear industry - are entitled to a fully transparent and accessible nuclear regulatory framework.

Whether fair or not, many Americans are increasingly losing faith in government. Thus, it is incumbent upon all public officials to help reverse this trend by maintaining the highest standards of accountability and active engagement with the public, for whom we serve. This means the NRC must continue to update and improve its regulatory capabilities without undue delay and in a manner that engenders public trust.

This does not equate directly to more or less regulation, but to smart, forward-looking regulation that is transparent, efficient, and fairly applied, and with a direct nexus to the degree of risk reduction achieved.

I hope my comments thus far have given you some insights on who I am, and how I make decisions. So now, let me turn to the road ahead:

Three Pillars: Climate Change, Energy Security, and Environmental Justice

President Biden and his administration have made it clear that nuclear must be part of our energy portfolio if we are going to make meaningful progress on reaching our climate goals. These goals include the most ambitious agenda for climate action in history, including goals to cut emissions in half by 2030, reach 100% clean electricity by 2035, and achieve net zero by 2050. In support of this effort, 23 states have announced or enacted similar GHG reduction goals. Collectively, these states represent over 58% of the U.S. economy, 54% of the U.S. population, and 41% of net U.S. greenhouse gas emissions.

And while world leaders are meeting in Egypt for COP27, it's equally important to note that over 70 countries, accounting for nearly 70 percent of the world's population have also announced net zero plans.

Be it at the local, nation, or international level, these goals cannot be achieved without expanding the contributions of nuclear energy. Nuclear energy provides about 20% of our electricity and 50% of the nation's annual carbon-free electricity production, making it the largest and most reliable source of carbon-free electricity. And the stage is set to increase those percentages.

As the Administration moves forward with its carbon reduction goals, including implementing the Civil Nuclear Credit Program and tax credits to preserve the existing fleet, the NRC will likewise need to keep apace.

Consistent with the requirements of the Nuclear Energy Innovation and Modernization Act, or NEIMA, the NRC is modernizing and moving on several fronts to ensure it will be ready to review license applications for new reactors. In a moment, I'll talk more about the NRC's ongoing efforts to develop Part 53, a technology-inclusive, risk-informed, and performance-based regulatory framework for licensing advanced reactors. Notably, NEIMA also reformed NRC's fee collection process to ensure the operating fleet is not unjustly impacted as reactors continue to go offline.

Relatedly, nuclear energy is becoming an essential part of our energy security and national security. The Russian invasion of Ukraine has dramatically changed the geopolitics of civilian nuclear energy and technology – and this deserves our utmost attention. Russian aggression has also magnified the challenges within the nuclear fuel supply chain. To achieve true energy security, the U.S. must make rapid progress to bolster our domestic mining, milling, conversion and enrichment capabilities. And we must do so on a timeline commensurate with establishment of new and advanced reactors in the U.S.

Lastly, a true nuclear renaissance must incorporate the key principles of environmental justice. At present, I am most concerned about environmental justice in the context of responsible management of used nuclear fuel and nuclear waste storage and disposal. Progress on nuclear waste management must keep pace with our renewed efforts to bring more carbon-free nuclear power to market. This includes both addressing the existing backlog of nuclear waste in need of permanent disposal, as well as not exacerbating the nuclear waste conundrum further. The potential for advanced reactors with smaller waste profiles and/or the ability to responsibly reuse existing spent fuel may play a role in addressing this issue.

To put a finer point on this topic, it is my firm belief that it would be irresponsible to utilize nuclear energy to lower emissions and help address climate change if in doing so we knowingly

allow for nuclear energy to become the harbinger of new multi-generational threats to our public health, safety, and economy – namely in the form of unmanaged spent fuel and nuclear waste or exacerbating the challenges of nuclear proliferation. In other words, let's not allow nuclear energy to solve one problem while creating new, equally vexing, problems for a children and grandchildren.

NRC Transformation

Looking ahead, the NRC has its work cut out for it on all fronts.

Concurrent with the agency's implementation of NEIMA, the NRC is also transforming to become a more modern, risk-informed regulator, open to new technologies and ways of implementing its safety and security mission.

The NRC continues to make progress in four focus areas: (1) recruiting, developing, and retaining a strong workforce; (2) improving decision-making through the acceptance of an appropriate level of risk without compromising the NRC's mission; (3) establishing a culture that embraces innovation; and (4) adopting new and existing information technology resources. Each of these four areas require the active support and engagement of stakeholders like ANS, and many others.

Looking Ahead: New Nuclear Technologies

As I mentioned a moment ago, Part 53 is an important rulemaking effort underway for licensing and regulation of advanced reactors. But before I get there, I want to acknowledge some of the agency's preparations for addressing the front end of the fuel cycle.

For instance, the agency is enhancing its focus on uranium mining. The Commission has before it a limited-scope proposed rule on groundwater protection at uranium *in situ* recovery facilities. This rule would amend the NRC regulations that govern the licensing of in situ recovery facilities and risk-inform the requirements for groundwater protection. This undertaking is consistent with a July 2020 memorandum of understanding (MOU) with the EPA.

In addition, the agency has received several applications for high-assay low-enriched uranium processing (HALEU); and applications for accident tolerant fuel. Notably, in a 2021 report to Congress, the NRC reported that the current regulatory framework has sufficient flexibility to accommodate NRC licensing reviews and decisions related to HALEU. And just last week, the DOE announced \$150 in funding for the American Centrifuge Project. These are essential undertakings necessary for establishing the needed HALEU infrastructure for advanced reactors and building an enduring domestic, commercial-scale production capacity for HALEU and other advanced fuels.

Now, as I promised, let's talk about Part 53. As many of you know, the NRC is working to create a regulatory framework for advanced reactors that is a risk-informed, performance-based, and technology-inclusive approach. The NRC staff has taken a novel approach with this rulemaking by releasing iterative versions of preliminary proposed rule language and conducting public meetings to receive comments and feedback. Recently, on September 29, 2022, the staff released the draft proposed rule package to support a meeting with the NRC's Advisory Committee on Reactor Safeguards.

As I'm sure many of you know, as currently structured, the draft rule responds to stakeholder feedback by providing two Frameworks: Framework A is a PRA-led approach; and Framework B is a technology-inclusive traditional framework where risk insights are used in a supporting role.

In a Commission meeting this past July (a few months before I joined the Commission), the NRC staff explained that this "two framework" strategy is intended to provide regulatory predictability and clarity; enable effective and efficient licensing reviews; and incorporate diverse views and technical inputs received during public engagement to inform the draft rule.

Last but not Least: The Back End of the Nuclear Fuel Cycle

As the NRC moves forward with research, rulemaking, and licensing of new nuclear energy generation technologies, we must not lose focus on the responsible management and/or reuse of spent fuel inventories as well as timely advances in nuclear waste storage and disposal strategies.

As part of addressing this longstanding issue, the NRC is currently engaged in the licensing process for two privately operated consolidated interim storage facilities. Meanwhile, the DOE has hastened its efforts to advance a consent-based siting framework to establish one or more consolidated interim storage facilities.

These undertakings are widely seen as essential precursors to identifying a workable pathway for permanent disposal of civilian nuclear waste inventories – which will ultimately necessitate Congressional action.

We must also think about these issues in the context of new nuclear energy technologies such as advanced non-light water reactors and fusion energy systems which will likely have different fuel needs and waste profiles.

But the challenges of spent fuel and nuclear waste disposal must not be lost in the urgency to bring new carbon-free nuclear energy online as quickly and safely as possible and on a trajectory that will have a meaningful impact on reducing carbon emissions and mitigating the escalating impacts of climate change.

So How Do We Achieve All of This? The Future of Nuclear Needs You!

None of what I have discussed will be possible without a robust nuclear workforce. As we prepare for this potentially exciting nuclear future – we will need a new generation of nuclear workers – engineers, scientists, operators, and everything in between.

For its part, the NRC is actively preparing for an emerging nuclear energy landscape that will directly affect its work. The NRC recognizes that its ability to monitor and proactively address needs within the nuclear workforce are essential for turning today's challenges into new opportunities and future successes.

To help inform its needs, the NRC commissioned a futures assessment that provides a range of possible workforce scenarios 30 years into the future. This is an ongoing effort. But it is the people in this room and organizations like ANS that will make tomorrow's nuclear workforce a reality.

Conclusion

In conclusion, I believe nuclear energy is indispensable to the United States meeting its GHG reduction goals. We can rebuild U.S. leadership globally by prioritizing the safety of the existing fleet; by safely deploying advanced reactor technologies and ensuring a safe and secure nuclear fuel supply; and by expanding international nuclear energy cooperation. But we must remember the lessons of the past to inform our path forward and hasten a true and lasting nuclear renaissance.

Thank you, John, for the opportunity to speak today. I look forward to answering any questions that the panel and members of the audience have for me.