



Advanced Reactors: Are Regulations on Pace with Demand?

Aaron Flyer

As the U.S. and Europe suffer through record-breaking heat waves, the case for expanding nuclear power's role in providing carbon-free, climate-friendly baseload energy becomes more and more attractive. To deliver the next generation of reactors, the nuclear industry is looking towards small modular reactors (light-water reactors generating less than 300 megawatts of electricity) and advanced reactors (including fusion reactors) to replace the ~93 large, complex, expensive, and aging commercial nuclear plants currently in operation in the U.S. And while recent private and public investment has shown a clear interest in growing this advanced fleet, before new reactors can start sending electrons to the grid, project sponsors and operators must secure design approval and operating licenses from the Nuclear Regulatory Commission ("NRC") under a regulatory regime that is years, if not decades, from ready.

In 2019, Congress passed the Nuclear Energy Innovation and Modernization Act, directing the NRC to develop performance metrics and milestone schedules for its ongoing licensing work and implement a risk-informed licensing process for advanced reactors.¹ For the latter charge, NRC sought to add a Part 53 to Title 10 of the Code of Federal regulations that would provide a licensing framework for advanced nuclear reactors ("Part 53"). While NRC began engaging with advanced reactor stakeholders in late 2020, the agency does not expect to issue a proposed rule until February 2023, with a final rule by July 2025.² But even after the licensing framework is finalized, the first advanced reactor is still many years away when considered considering the trajectory of small modular reactor development.

On July 29, 2022, NRC announced its plans to issue a final rule certifying NuScale's US460 small modular reactor design.³ With the design approved, future licensees can rely on this certified, standard design when applying for a combined construction and operating license, which will accelerate their ability to break ground and get new plants on-line. However, this process was decades in the making; NuScale's design was first conceived in the early 2000's and the design certification application was submitted to NRC in January 2017. Currently, the public power consortium Utah Associated Municipal Power Systems' aims to deliver the first SMR through its Carbon Free Power Project, with the initial power module coming on-line in 2029.⁴ So all told, NuScale's small modular reactor will be the product of thirty years of work to go from initial concept to completion—and this was all under NRC's licensing framework for

¹ An Act to Modernize the Regulation of Nuclear Energy, [Public Law 115-439](#) (Jan. 14, 2019).

² Note to NRC Commissioners' Assistance, "Proposed Revisions to Schedule Milestones for Risk-Informed, Technology-Inclusive Regulatory Framework For Advanced Reactors (Part 53)," [ML21333A222](#).

³ NRC News, "[NRC to Issue Rule Certifying NuScale Small Modular Reactor](#)," (July 29, 2022) <https://www.nrc.gov/reading-rm/doc-collections/news/2022/22-029.pdf>.

⁴ The Carbon Free Power Project, <https://www.nuscalepower.com/projects/carbon-free-power-project> (last accessed August 9, 2022).



combined construction permits operating and licenses set out in 10 C.F.R. Part 52, which was issued a decade *before* NuScale submitted its application.

The United States' need for widespread adoption of the next generation of nuclear reactors cannot wait thirty years, and Congress continues to appropriate funds for not only research and development, but to encourage private investment. The recently passed Inflation Reduction Act includes advanced reactor investment tax credits providing credits as high as 30% along with \$700 million for the research, development, and use of high-assay low-enriched uranium fuel for advanced reactors.⁵ More public and private investment will undoubtedly come if future project sponsors have a clearer picture of when these advanced reactors can go from concept to reality. Therefore, it is imperative that NRC work to create a regulatory framework that can support the licensing of advanced reactors in a safe and efficient manner.

Aaron Flyer is a Managing Associate at Sidley Austin LLP.

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⁵ See Inflation Reduction Act of 2022, H.R. 5376, available at <https://www.congress.gov/bill/117th-congress/house-bill/5376>.