

Despite Signs Of A Nuclear Power Revival, Outlook Still Mixed

By **Marc Campopiano, Lucas Quass and Shawna Strecker** (June 28, 2023, 3:43 PM EDT)

As part of long-range plans to address climate change, many states have adopted policies to spur the transition to a low-carbon future. Renewable sources like solar, wind and geothermal energy have garnered considerable attention, but nuclear power is the largest domestic source of carbon-free power.

Nuclear power plants have supplied about 20% of total annual U.S. electricity since 1990.[1] Yet, even as the U.S. and many states seek to decarbonize their energy sectors, nuclear reactors in the U.S. are being decommissioned because of age, and new nuclear facilities often face public opposition.

The rise of small-scale nuclear technologies and legislative incentives may signal a shift in the use of nuclear power in the U.S. Small modular nuclear reactors are nuclear fission reactors with a power generation capacity of up to 300 megawatts of electricity per unit, which is about one-third of the capacity of traditional nuclear power reactors.

The U.S. Department of Energy reports that small modular nuclear reactors may offer several advantages over traditional large-scale nuclear reactors, including lower capital costs, greater flexibility and improved safety features. Several private companies have made significant strides in developing small modular nuclear reactor designs.

Notably, the U.S. Nuclear Regulatory Commission certified the first small modular nuclear reactor design in a rulemaking on Feb. 21, which may lead to licensing and deployment of small modular nuclear reactors in the U.S. Recent federal action and state legislative proposals may also help facilitate the development of nuclear power in the U.S., including the development of small modular reactors.

However, as previous nuclear legislation has failed to capture widespread support, the future of nuclear power in the U.S. remains uncertain.

Nuclear Regulatory Commission Rulemaking

The Biden administration has advocated for stronger climate policies — and has supported the development of nuclear energy to meet carbon reduction goals.

For instance, on Dec. 8, 2021, President Joe Biden signed Executive Order No. 14057. The executive



Marc Campopiano



Lucas Quass



Shawna Strecker

order requires federal agencies to procure 100% carbon-free energy by 2030, and it includes nuclear power under its definition of "carbon pollution-free electricity." [2]

Subsequently, in August 2022, Congress enacted the Inflation Reduction Act, which establishes a comprehensive set of clean energy incentives, and includes credits for zero-emission nuclear power production. [3] And on Jan. 19, the NRC issued a final rule certifying a private company's small modular nuclear reactor design, making it the first small modular nuclear reactor design certified by the NRC and the seventh nuclear reactor design cleared for use in the U.S. [4]

The certified design consists of a modular reactor building designed to hold up to 12 power modules. Each power module has an electrical output of 50 MW, with a total potential capacity of 600 MW for the 12 modules.

The design also uses passive safety features that do not rely on external power sources or operator intervention to prevent accidents. For example, while some traditional reactors rely on externally powered pumps to inject water if the core overheats, the certified small modular nuclear reactor design uses natural circulation to cool the reactor core.

The Department of Energy is now collaborating with a local utility to demonstrate a small modular nuclear reactor plant in Idaho. [5] The plant is scheduled to be partially operational by 2029, and fully operational by 2030.

In addition, on May 20, the Biden administration announced a commitment to support the development of a small nuclear reactor project in Romania that will use the same NRC-certified design. [6] The U.S. and other international partners committed to providing up to \$275 million for Romania's small modular reactor project.

Proposed Nuclear Energy Bill Faces Uncertain Pathway

In April 2023, several U.S. senators introduced the Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act. The bill aims to promote both the new and continued use of nuclear energy.

The legislation includes proposals to reform the licensing fee process, clarify regulations, expand the nuclear workforce, manage spent fuel and provide rewards for certain licensing activities. While it is not specific to small modular reactors, it aims to encourage the deployment of advanced nuclear reactors and new technologies, which may include small modular reactors.

The bill's future remains unclear. A prior bill that mirrored many of its provisions did not make it through committee. States may also resist new nuclear facilities.

For example, since the 1970s, California has imposed a moratorium on new nuclear power plants. [7] Despite multiple efforts to establish new nuclear power in the state, legislative initiatives to permit the development of new nuclear facilities have failed repeatedly in the California Legislature.

A.B. 719, which would have repealed the moratorium, was voted down in April 2007. A.B. 1776, which would have lifted limits on new nuclear power plants and imposed some reasonable provisions designed to avoid the costs of trying to build on a seismically active site, failed to pass in 2008.

A.B. 65, which was introduced in December 2022, would have exempted small modular nuclear reactors from the state's ban on the construction of new nuclear power plants, but also failed to advance.

Conclusion

The NRC's certification represents a step forward for the small modular nuclear reactor industry. But whether the technology will proliferate in the U.S. remains to be seen.

Despite attempts by lawmakers to encourage the development of new nuclear power facilities on a federal level and in some states, such legislation has often failed to advance.

As small modular nuclear reactors and other advanced nuclear technology develop, nuclear power may facilitate the energy transition and support low carbon domestic power options. But the future of nuclear in the U.S. is still uncertain.

Marc Campopiano is a partner, Lucas Quass is counsel and Shawna Strecker is an associate at Latham & Watkins LLP.

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[1] U.S. Energy Information Administration, "Nuclear Explained: Nuclear Power Plants" (last updated July 12, 2022), <https://www.eia.gov/energyexplained/nuclear/nuclear-power-plants.php>.

[2] Exec. Order No. 14057, 86 Fed. Reg. 70935 (2021). See Sec. 603(d): "Carbon pollution-free electricity" means electrical energy produced from resources that generate no carbon emissions, including marine energy, solar, wind, hydrokinetic (including tidal, wave, current and thermal), geothermal, hydroelectric, nuclear, renewably sourced hydrogen and electrical energy generation from fossil resources to the extent there is active capture and storage of carbon dioxide emissions that meets U.S. Environmental Protection Agency requirements.

[3] H.R. 537/1-/217th Congress (2021-2022): Inflation Reduction Act of 2022, Sec. 13105.

[4] U.S. Nuclear Regulatory Commission Final Rule, 88 Fed. Reg. 3287 (2023).

[5] U.S. Office of Nuclear Energy, "NRC Certifies First U.S. Small Modular Reactor Design" (Jan. 20, 2023), <https://www.energy.gov/ne/articles/nrc-certifies-first-us-small-modular-reactor-design>.

[6] U.S. Department of State, "The United States and Multinational Public-Private Partners Look to Provide Up To \$275 Million to Advance the Romania Small Modular Reactor Project; United States Issues Letters of Interest for Up To \$4 Billion in Project Financing" (May 20, 2023), <https://www.state.gov/the-united-states-and-multinational-public-private-partners-look-to-provide-up-to-275-million-to-advance-the-romania-small-modular-reactor-project-united-states-issues-letters-of-interest-for-up-to>.

[7] Warren-Alquist State Energy Resources Conservation and Development Act, Cal. Pub. Res. Code Sec. 25500 et. seq., §§ 25524.1-25524.2. A 1976 amendment to the Warren-Alquist Act banned nuclear power certification until the state approves a demonstrated high-level waste disposal system.