

Advanced Nuclear Power and West Virginia

April 2024

Small modular reactors (SMRs) are new lower-power, smaller-footprint reactor designs that seek to avoid the high costs and delays [associated with](#) nuclear power. This Science and Technology Policy Note considers opportunities and challenges associated with advanced nuclear power deployment in West Virginia, with a particular focus on SMRs at former coal sites.

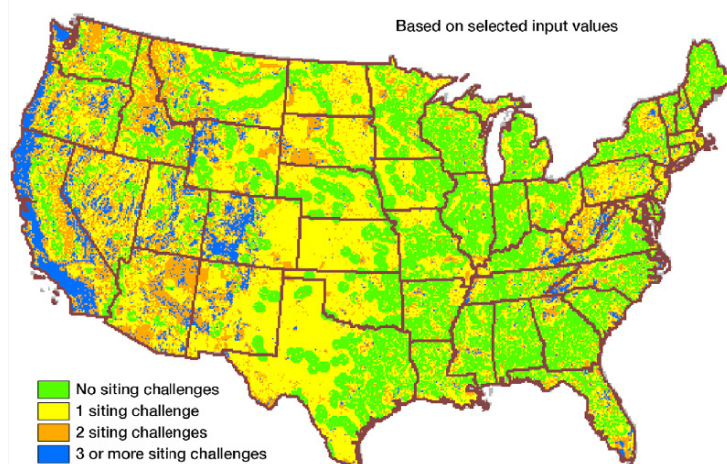
What are Small Modular Reactors?

A small modular reactor (SMR) is a compact nuclear power plant that generates electricity on a smaller scale than traditional nuclear reactors. SMRs offer several potential advantages over traditional nuclear power plants, including off-site “modular” construction and staged plant opening, which improve development costs and timelines. Additional SMR advantages include smaller geographic footprints, reduced staffing requirements, and potential enhanced safety features.

Opportunities and Challenges for SMR Development in West Virginia

A 2022 Department of Energy (DOE) [report](#) found that over 80% of existing and former coal plant sites may be suitable sites for new nuclear power plants; there are six of these sites in West Virginia.

Siting Challenges for Nuclear Development



Source: adapted from [Oak Ridge National Laboratory](#)

Research Highlights

- New advanced, small modular nuclear reactors (SMRs) have been proposed as a potential replacement for coal power plants. [DOE reports](#) have suggested that SMRs could add economic value and higher-paying jobs to local economies.
- The immature nature of SMR technology and siting challenges in West Virginia make pursuing SMR development a risk.
- Possible policy actions include forming a nuclear energy working group, establishing an innovation fund, and providing industry subsidies.

Reusing coal plant infrastructure like transmission lines could reduce project costs: DOE [estimates](#) a savings of 15-35%.

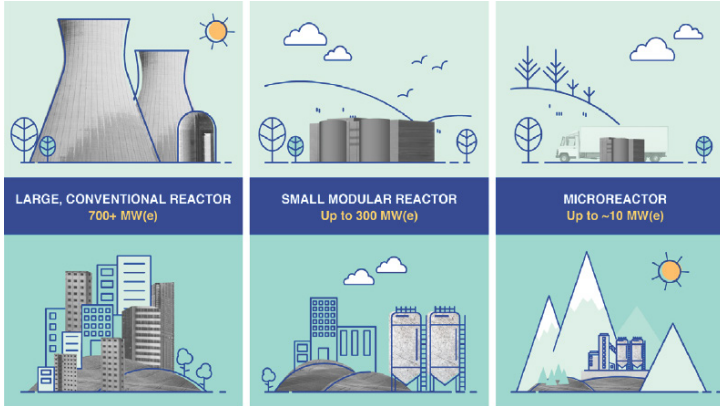
However, West Virginia’s mountain topography presents siting challenges for new nuclear development (factors such as land slope and proximity to fault lines and population centers); most of the state has at least one siting challenge.

Additional challenges include the [immature nature](#) of SMR reactor technology, dependence on [federal subsidies](#) for economic competitiveness, [long project time-horizons](#) (Wyoming’s Natrium reactor has been [delayed 2 years](#) and is expected to open in 2030), radioactive waste storage and management, and [community acceptance](#). Nuclear waste remains a hazard for [tens of thousands of years](#) or more and may [be stored onsite](#) at the SMR facility. Awareness of [historical accidents](#) could impede community acceptance of nuclear power in West Virginia.

Benefits and Risks of SMR Development in West Virginia

A [2022 DOE Report](#) estimated that replacing a coal plant with a nuclear plant would result in a net increase in jobs and local economic activity. SMR projects could thus benefit communities that have been disadvantaged by the coal transition, providing a source of [clean firm energy](#).

What Are Small Modular Reactors?



Source: [A. Vargas, International Atomic Energy Association](#)

However, SMRs' advantages are currently only theoretical. As of April 2024, only three non-military SMRs are known to be operating worldwide, all in Russia and China. [A few](#) SMR projects are [being planned](#) in the United States, including the [world's only coal-to-nuclear project](#), which is being developed by TerraPower in Wyoming. TerraPower [has considered](#) West Virginia for a future SMR site. A Utah SMR project was [canceled by NuScale in 2023](#) after delays and cost overruns. [In March 2024, Virginia Governor Youngkin said](#) the state's first SMR would probably not be at a former coal site. [None of the SMR projects underway](#) in the United States have yet had their reactor design approved by the Nuclear Regulatory Commission (NRC).

Risks associated with SMR development include radioactive waste production and the potential safety incidents relating to radiation. [Studies](#) have found that despite their smaller size, SMRs produce [the same or greater amounts \(2-30 times in one study\)](#) of radioactive waste compared to conventional large-scale nuclear reactors, and that this waste can be [more complex](#), contributing to management and disposal challenges. [Further, some SMR designs use a more highly enriched uranium fuel](#), potentially increasing [security and nuclear proliferation risks](#). Radiation incidents, [while rare](#), have the potential to significantly [affect employees and surrounding communities](#).

Despite [unique workplace hazards](#), employment in nuclear power [is safer \(based on deaths and air pollution\) than in fossil fuel industries](#).

Nuclear Policies in West Virginia and Neighboring States

The possible [energy and economic benefits](#) of a coal-to-nuclear (C2N) transition have attracted West Virginia [lawmakers' attention](#). In 2022, the West Virginia Legislature [lifted](#) a [1996 ban](#) on nuclear power. In 2023, Governor Justice [applied](#) to the NRC to become an [NRC Agreement State](#), to transfer [partial authority](#) for regulation of nuclear materials to the state government. In 2023 and 2024, [HB 3434](#) and [HB 5150](#)—introduced in the House of Delegates—stalled in committee. These bills would have encouraged the development of SMRs at former coal sites.

Virginia has taken a [raft of legislative actions](#) to support energy development, including SMRs, at former coal sites. In 2023, they created a [Nuclear Education Grant Fund](#) and a [Virginia Power Innovation Fund](#) aimed at developing “innovative energy technologies” including nuclear. In 2024, they [passed a bill](#) that will allow utilities to [recoup costs associated with SMR development at the expense of ratepayers](#), regardless of whether or not the project is completed.

In 2023, the Kentucky legislature established the [Nuclear Energy Working Group](#), which includes representatives from government, utilities, industrial utility customers, universities, and a conservation nonprofit.

The governor of Tennessee created the [Tennessee Nuclear Energy Advisory Council](#), composed of policymakers, administration officials, and key nuclear industry representatives.

Policy Options for Nuclear Development in West Virginia

Should policymakers wish to encourage SMR or other advanced nuclear development in West Virginia, one policy option is to establish a nuclear energy working group composed of experts from academia, industry, and government. This group could help guide the state's nuclear development. A program like Virginia's Power Innovation Fund, which supports advanced energy technology research and nuclear workforce development and assists with site selection for SMR projects could be pursued. Industry subsidies may incentivize SMR development in West Virginia but could risk taxpayer and ratepayer money for projects that could prove economically uncompetitive or [fail entirely](#).

This Science & Technology Note was written by Ryan Nesselrodt, PhD, West Virginia Science and Technology Policy Fellow on behalf of West Virginia University's Bridge Initiative for Science and Technology Policy, Leadership, and Communications. Please see <https://scitechpolicy.wvu.edu/> or contact scitechpolicy@mail.wvu.edu for more information.

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