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Overview of Nuclear Regulation for State Legislatures

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Nuclear Regulatory Overview for State Legislatures

The regulation of the civil nuclear energy industry in the U.S. is distinct from how much of the rest of the energy sector is regulated due to the unique nature of nuclear power. The commercial nuclear industry is relatively small—there are currently fewer than 100 commercial nuclear reactors operating in the U.S. to generate electricity. The nature of nuclear power also requires specialized knowledge and expertise to effectively oversee the safe operation and disposition of these facilities and their waste. For these reasons, the nuclear industry is heavily regulated under a more centralized, federal approach through the U.S. Nuclear Regulatory Commission (NRC).

However, nuclear plants must navigate more than just NRC regulations. State governments can and have imposed regulations that affect nuclear power plants—from imposing fees on the storage of spent nuclear fuel to outright prohibitions on the construction of new nuclear facilities.

Put simply: The NRC has sole authority to regulate the nuclear, radiological, operational and site-specific aspects of nuclear facilities; meanwhile states can implement policies to regulate the electric companies that develop and operate nuclear power facilities. In a similar capacity, local governments can enforce certain tax and zoning requirements on nuclear facilities.

Federal Oversight

The NRC is responsible for licensing and regulating the civilian use of nuclear energy and radioactive materials to protect public health, safety and the environment. It carries out its mission through rules and regulations that establish licensing requirements, operational oversight and incident response for commercial nuclear reactors. This authority includes the design, construction and operation of nuclear power facilities, including the handling, storage and disposition of nuclear fuel and nuclear waste.

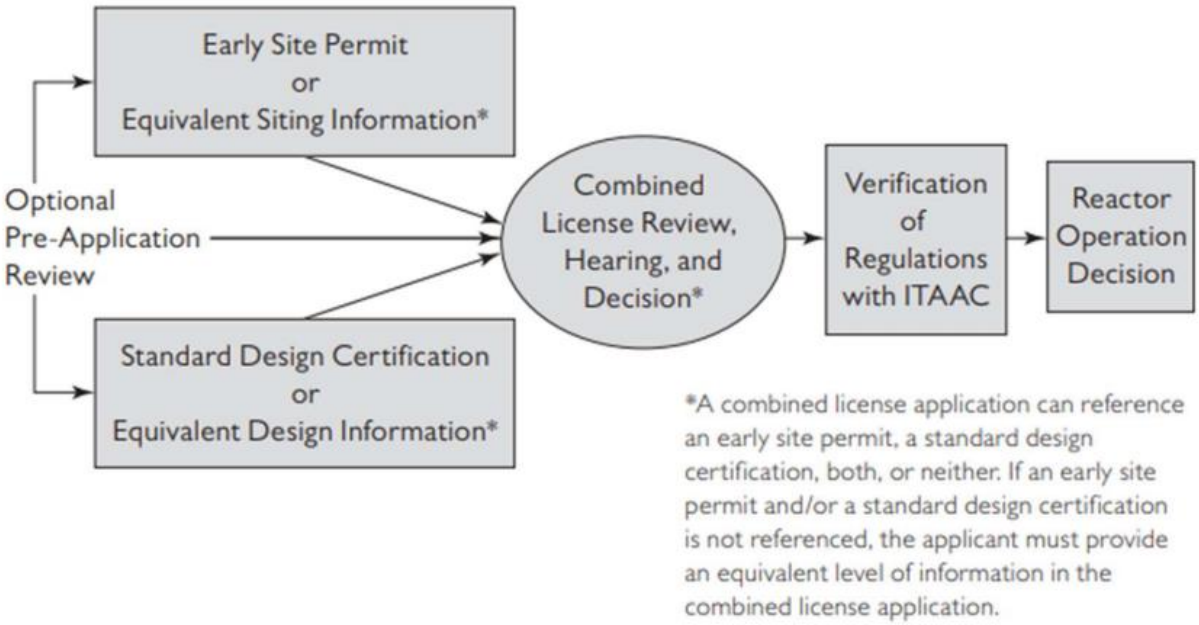
New Reactor Development

The NRC is responsible for licensing, certification and decommissioning of nuclear facilities. The licensing process is intentionally burdensome for applicant companies; they are required to supply substantial information to justify that their proposed facilities can be developed, operated and decommissioned safely. NRC review and approval is required every step of the way: from certifying a new reactor design to site evaluation and permitting, construction oversight and final approval to operate.

The NRC is currently active in reviewing designs in three categories of reactors:

- ***Large Light Water Reactors (LWR):*** These are the traditional, 1,000-megawatt (MW) rated nuclear reactors that have been in operation across the globe since the 1950s, including the more than 90 commercial reactors currently in operation in the U.S.
- ***Small Modular Light Water Reactors (SMRs):*** This is a new, modernized class of LWR that has been scaled down—typically with rated capacities between 100 and 300 MW. As such, they benefit from a smaller footprint than traditional LWR reactors. These designs still rely on the traditional LWR design concepts, but include enhanced safety and operational components. SMRs are often designed to capitalize on factory fabrication of modular components which would be assembled on-site to streamline project development and reduce delays. (Example: NuScale Power.)
- ***Advanced Reactors:*** These designs are often small and modular—designed to be factory fabricated like SMRs—but use alternatives to the traditional LWR design, which relies on water as a coolant. Advanced reactor technologies rely on new coolants and fuels, including liquid metal, fluoride salt or gas. (Examples: TerraPower, X-energy, Oklo.)

The diagram below offers an overview of the NRC's permitting and licensing requirements.



Source: NRC

Operating Reactor Oversight

If a developer makes it through the NRC's licensing process and receives an operating license, that license is valid for an initial 40 years, with the option to extend the license in 20-year increments. Many reactors in the U.S. are already operating on the 20-year license extension and several have already applied for and received approval for a second 20-year extension.

The NRC regularly inspects the performance of the nation's commercial reactors through its Reactor Oversight Process, which has been designed to inspect, measure and assess the safety and security

performance of operating nuclear power plants in the U.S. The process includes regular inspections, reporting and public assessments, and can result in enforcement decisions in response to violations.

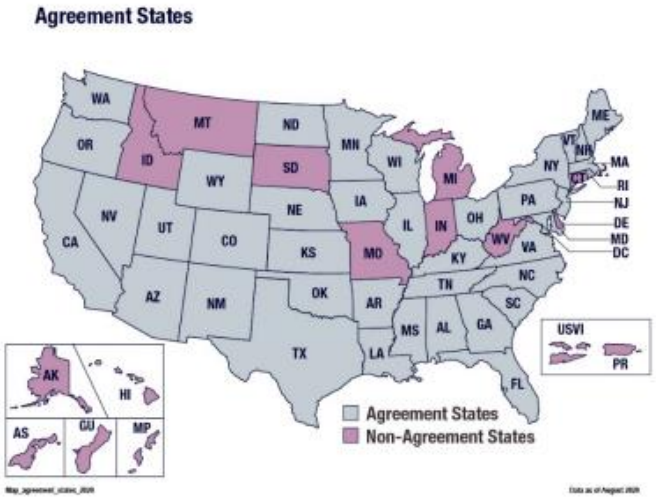
Every quarter, NRC inspectors review the performance of all nuclear power plants based on a variety of performance indicators and inspection findings, with more substantial reviews conducted at the six-month and annual quarterly reviews. Annual reports are publicly published on the NRC website, and NRC staff hold public meetings to discuss each facility's performance.

Decommissioning

The NRC is also responsible for regulating the safe decommissioning of nuclear facilities following their closure. This involves the safe and secure removal of a facility and associated structures from service and the reduction of residual radioactivity to a level that allows for the release of the property for unrestricted use or use under restricted conditions. The NRC works with its Agreements States to regulate the decontamination and decommissioning of these facilities.

Federal-State Collaboration: The NRC Agreement State Program

Under the Atomic Energy Act, state governments able to sign agreements with the NRC to take over authority to license, conduct inspections and enforce safety regulations for certain radioactive materials. However, these agreements apply to a very limited scope of materials related to industrial, medical and academic uses of radioactive materials. Examples, include byproduct materials like radioisotopes, source materials like uranium and thorium, and certain quantities of special nuclear materials.



Source: NRC

However, the NRC maintains full regulatory authority over all commercial power reactors, research reactors and facilities involved in the production of nuclear fuel for commercial reactors.

There are currently 39 states that have entered into agreements with the NRC.

State Oversight

The form of state oversight of commercial nuclear facilities can vary substantially among the states. However, it's important to note the federal preemption over state regulation of radiological and safety aspects of commercial nuclear facilities. This Congressional Research Service report details the legal foundations and challenges to federal preemption in relation to nuclear facility regulation. The report notes that the U.S. Supreme Court has held that, while states retain authority over "questions of need, reliability, cost, and other related state concerns," federal preemption prevents states from regulating radiological safety aspects of nuclear power production.

Even with this federal preemption, a number of states have found various ways to establish regulations that affect nuclear power facilities, primarily through authorities granted over utility companies.

Regulatory Structure

One of the primary factors determining the degree and type of regulation of power plants comes down to whether a state has restructured its electric industry or continued to use traditional regulatory structures.

All nuclear plants in operation today—along with those currently under development—were built under traditional regulatory structures, where state public utility commissions play a larger role in determining the mix of resources developed by electric utilities within their jurisdiction. In states that restructured their electric sector, state public utility commissions (PUCs) have a much more limited role in shaping the resource mix, as merchant generators make investment decisions based on market signals.

However, in states that continue to use the traditional cost-of-service regulatory approach, PUCs have a much greater role in determining a state's resource mix based on various statutory authorities that states have granted PUCs over electric companies.

Integrated Resource Planning

Many traditionally regulated states require electric companies to submit integrated resource plans (IRPs) to state regulators on a regular basis. The IRP outlines how the utility plans to meet demand projections over the course of one or two decades with either demand management (such as energy efficiency) or resource development (such as new generation sources).

PUCs establish the rules and guidelines that utilities use to develop their IRPs. These rules can influence which resources a utility considers—or doesn't—during that process. In addition, PUCs review and approve IRPs, essentially signing off on the resources that utilities plan to pursue. In doing so, PUCs in traditionally regulated states provide financial assurance to utilities as they develop new generation resources, because ultimately the utility's customers will pay for these projects through their rates.

In certain states, including Florida and Georgia, PUCs were directed to provide construction work in progress (CWIP) financing to utilities developing nuclear power facilities—a mechanism that allows the utility to charge customers throughout the construction of a new facility. In most states, utilities don't recover costs until the resource is online and providing service to customers. However, a number of states that enabled CWIP for nuclear have recently repealed those laws due to cost overruns at projects.

Certificate of Public Convenience and Necessity

PUCs also play a more direct role in approving new generation resources in traditionally regulated states, many of which require utilities to apply for and receive a Certificate of Public Convenience and Necessity (CPCN) from the PUC. Utilities often apply for these following the approval of an IRP. The purpose of a CPCN is to justify the necessity of the investment—and the added cost to customers.

Environmental Permitting

States maintain authority over certain indirect aspects of nuclear power plant operations relevant to the environment. While nuclear power plants operate within the ambient air quality requirements imposed by states and the federal government, states do have authority over water permitting that can affect nuclear power facilities.

Several states in the northeast have used these permits to pressure nuclear plant operators in recent years. For example, the Massachusetts attorney general recently pressured the owner of the recently closed Pilgrim nuclear plant, which is being decommissioned, over potential violations of the plant's water discharge permit, which was issued by the Massachusetts Department of Environmental Protection and the U.S. Environmental Protection Agency (EPA).

Similarly, New York threatened to prevent the Indian Point nuclear plant from receiving a new water use certificate from the state in its attempt to shutter the facility. While a court ruled that Indian Point was grandfathered into the certificate based on its historical usage, the issue was moot after the owner of Indian Point decided to shutter the facility.

Imposing Taxes and Fees

States also have authority over how nuclear facilities are taxed and have the authority to impose additional fees on those facilities. (I have attached a separate document detailing state taxation of nuclear facilities.)

For example, Pennsylvania (35 P.S. § 7110.402) applies fees on all operators of nuclear power plants and radioactive waste storage sites through its Radioactive Protection Act, which was passed in the aftermath of the Three Mile Island accident. The law gave the state Department of Environmental Protection a mandate and broad authority to maintain a radiation protection program and emergency response capabilities. Fees were assigned based on the number of reactors, not the amount of spent nuclear fuel. While a factor, the focus of this legislation is not on the spent fuel, so federal preemption rules were not called into question.

Many other states regulate, tax and otherwise assess fees on low-level radioactive wastes, such as clothing, tools, and equipment that have been contaminated by radioactive material, but these do not apply to spent nuclear fuel.

Another unique example comes from Minnesota. The statute in Minnesota (Minn. Rev. Stat. 116C.779) dates back to 1994 and appears to be fairly unique—both in assessing substantial fees/penalties on the storage of spent nuclear fuel and in how that money is managed. The state doesn't call it a tax or anything specific, other than to say that every year its nuclear plants shall transfer a certain amount of money into a Renewable Development Account for each cask of spent fuel stored in dry cask storage on-site.

The state's two nuclear plants (Prairie Island and Montecello) are both owned by Xcel Energy, the state's largest investor-owned utility. Therefore, each year Xcel pays the required fees into the Renewable Development Account. However, Xcel Energy also manages the Renewable Development Account into which the funds are paid. I would assume there was some negotiation with Xcel over the legislation to arrive at this arrangement.

Here is a bit of background on the Renewable Development Account program.

In addition, Xcel issues a report to the legislature every year detailing its work in managing the program. The 2019 report can be viewed here. This is how the utility describes the law in its report:

"As a condition of storing spent nuclear fuel in dry casks at Prairie Island, the RDF statute required Xcel Energy to transfer $500,000 per year for each dry cask containing spent fuel to a renewable energy fund,

which amounted to $9 million annually. In 2003, this statute was amended to extend the life of the nuclear-waste storage at the Prairie Island plant; at that time the amount to be transferred into the RDF was increased to a fixed sum of $16 million annually. In 2007, the statute was further amended to add an additional assessment for dry casks stored at our Monticello nuclear generating plant in Monticello, Minnesota. The annual amount set aside for RDF funding has increased throughout the years as the Company has placed in service more dry cask storage at its Prairie Island and Monticello nuclear generating plants. A cumulative total of $307,548,394 million has been set-aside in the RDF since inception."

Over the years, the types of projects eligible to receive funding from the Renewable Development Account has expanded to include resiliency, physical and cyber security, energy storage and more.

Restrictions on New Nuclear Development

At the far end of the spectrum, 12 states have established restrictions on the construction of new nuclear facilities. These range from an outright ban in Minnesota to establishing certain conditions that must be met in order to receive approval for a new nuclear facility. These conditions include:

- the identification/approval of a demonstrable technology or a means for high-level waste disposal or reprocessing (California, Connecticut, Illinois, Maine, New Jersey and Oregon);
- approval by the state legislature (Hawaii, Illinois, Massachusetts, Rhode Island and Vermont);
- voter approval (Maine, Massachusetts and Oregon)

However, a handful of states have repealed these types of restrictions in recent years, including Kentucky, Montana, West Virginia and Wisconsin.

Further Reading

Below is a list of resources that offer additional information on these topics.

- *NRC Webpage on New Reactor Regulation*
- *NRC Backgrounder on Nuclear Power Plant Licensing*
- *NRC Slides on Nuclear Power Plant Licensing Pathways*
- *NRC Webpage on the Agreement State Program*
- *CRS Report: "State Authority to Regulate Nuclear Power: Federal Preemption Under the Atomic Energy Act (AEA)"*