

Master Plan For Responsible Advanced Nuclear Development in New York:

Regulatory Issues and Safety Study

NEW YORK STATE

NYSERDA Report 26-21d

November 2026

Notice

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Summary

Ensuring that advanced nuclear technologies are developed, constructed, and operated safely and responsibly is critical to the future of nuclear energy. New York State (NYS) is committed to public health and safety and a regulatory framework that ensures protection of public health, safety, and the environment is central to assessing future advanced nuclear development. New nuclear facilities will be subject to an extensive system of federal licensing and oversight, state environmental and energy regulation, and local emergency-management responsibilities. To inform New York State's roadmap for advanced nuclear development, this study provides a comprehensive analysis of the federal, state, and local regulatory roles, statutory authority, and responsibilities governing nuclear fission reactors in New York State to help policymakers, communities, project developers and other stakeholders make informed decisions about ensuring economical, safe operation of new advanced nuclear development.

New York State is approaching safe and responsible new advanced nuclear development from a position of strength. The study's central finding is that New York has the core legal and institutional framework needed to evaluate new grid-connected nuclear development. This study offers conclusions that would enable New York State to better facilitate new advanced nuclear development by improving coordination, scaling requirements appropriately, and supporting local preparedness while maintaining strong protections for public health, safety, security, and the environment.

The sections that follow describe the regulatory landscape and how it is changing, the safety characteristics that distinguish advanced reactors from the existing fleet, the reactor types and end uses New York may encounter, and the study's findings and conclusions. A short glossary of recurring terms immediately follows.

Key Terms at a Glance

Advanced reactor: a new reactor technology that differs from the conventional large light-water reactors that make up today's fleet, often featuring passive safety, smaller size, or non-water coolant.

Agreement State: a state that has agreed with the U.S. Nuclear Regulatory Commission (NRC) to self-regulate certain radioactive materials; New York is one.

Article 10: New York's unified state siting process for major electric generating facilities of 25 MW or more other than solar and wind.

Emergency Planning Zone (EPZ): the area around a plant for which offsite emergency plans are prepared. Large light-water reactors (LWRs) use a 10-mile zone; qualifying advanced reactors may use smaller zones based on site-specific analysis, potentially the site boundary.

Light-water reactor (LWR): the established commercial technology cooled and moderated by water; this includes New York's existing fleet, which consists of large LWRs (LLWRs).

Passive safety: safety functions that rely on natural forces such as gravity, natural circulation, and convection rather than powered systems or operator action, often with the intent to improve safety posture.

Microreactor: a very small reactor designed for transportability, remote or autonomous operation, and minimal on-site staffing.

NRC licensing pathways (Parts 50, 52, 53, and 57): the federal routes to authorize construction and operation of a commercial nuclear reactor.

Small modular reactor (SMR): a smaller reactor intended for factory fabrication and phased, modular deployment.

Regulatory Landscape and Modernization

Regulation, oversight, and safety of nuclear power plants go hand in hand. The regulatory framework is the means through which safety, security, and environmental protections are established, verified, and maintained throughout a nuclear facility's lifecycle. Licensing defines the facility's approved safety basis before construction or operation begins. Inspections, monitoring, reporting, and enforcement then verify compliance during operation and require identified problems to be corrected. Emergency preparedness and security are important components of this framework, and they provide for safe operation along with reactor design requirements, radiation protection, operational oversight, and decommissioning obligations.

Responsibility and statutory authority for this system is divided across levels of government. The federal government has exclusive authority over reactor licensing and the radiological safety and security of commercial nuclear facilities. New York State and local governments retain authority over non-radiological matters, including environmental protection, utility regulation, land use, infrastructure, and off-site emergency response. Effective coordination is therefore necessary to ensure that the full system of protections functions coherently.

The Federal Government Exercises Exclusive Jurisdiction Over Radiological Safety, Licensing, and Security

The Nuclear Regulatory Commission (NRC) is the primary federal regulator for commercial nuclear reactors. It regulates all aspects of nuclear reactor design, construction, operation, maintenance, and adherence to strict safety and environmental standards. Other federal agencies are involved in research and development, defense-related nuclear applications, and regulation and oversight related to public health and safety, waste management, wholesale electricity sales and interstate transmission, and emergency preparedness and response.

Licensing New Reactors

Commercial nuclear reactors must obtain an NRC license before construction and operation. Applicants may pursue different licensing pathways depending on the reactor technology, design maturity, and development strategy:

- Part 50 provides a two-step process consisting of a construction permit followed by an operating license;[1]
- Part 52 allows for combined licenses that authorize both construction and operation subject to specified conditions and provisions for Early Site Permits (ESPs), Standard Design Approvals (SDAs), and Design certifications (DCs);[2]
- Part 53 is a new technology-inclusive, risk-informed, and performance-based framework;[3] and
- Part 57 is a new, streamlined pathway for qualifying microreactors and other reactors with comparable risk profiles proposed in May 2026.[4]

Across each pathway, applicants must submit information supporting the NRC's safety, environmental, security, emergency-preparedness, and financial reviews. The licensing process also includes opportunities for public participation and coordination with other federal, state, local, and Indigenous Nation/Tribal authorities.

A Landmark Project for New York

In August 2026, Fort Drum became the first site in New York selected for an advanced nuclear reactor. The U.S. Department of the Army selected Fort Drum, home of the 10th Mountain Division, as one of five installations to host a microreactor under the Army's Janus Program and awarded the contract to Westinghouse Government Services for its eVinci microreactor. The Janus Program aims to have at least one Army-regulated reactor operating at a domestic installation by September 30, 2028. Because this reactor will be constructed and operated for military purposes under the Army's own nuclear authorities, it is not expected to require an NRC license but may be subject to non-radiological environmental permitting requirements. Even so, the project is a significant milestone for advanced nuclear in New York and it creates concrete opportunities for State coordination, where applicable. It also positions New York as an early proving ground for technology that could later be employed commercially in the State.

Ongoing Oversight and Emergency Preparedness

Once a reactor is licensed and operating, the NRC maintains continuous oversight through its reactor oversight and inspection programs that protect public health, safety, security, and the environment. Emergency preparedness is implemented through a coordinated federal, state, local, and licensee framework. Reactor operators develop and maintain on-site emergency plans subject to NRC review, the Federal Emergency Management Agency (FEMA) evaluates off-site plans, the state leads off-site emergency planning and response, and local governments implement emergency plans. Existing LLWRs generally have two EPZs based on the radial distance from the reactor site: a 10-mile plume exposure pathway zone and a 50-mile ingestion exposure pathway zone. NRC regulations permit qualifying small modular reactors (SMRs) and other advanced reactor designs to use EPZs based on site-specific consequence analyses, potentially reducing the zone to the facility's site boundary.[5]

What Is an Emergency Planning Zone?

Emergency planning zones (EPZs) define the geographic area for which offsite protective measures, such as public alerting and evacuation planning, are prepared in advance. For the large light-water reactors operating today, the plume-exposure zone extends about 10 miles, and the ingestion-pathway zone extends about 50 miles. Under a 2023 NRC rule, the EPZ is sized by the dose that could reach the public rather than by reactor size: a licensee must plan for the area within which a projected dose would exceed 10 millisieverts (1 rem) over 96 hours following a potential release. Under this rule, a reactor whose analysis shows that any significant dose would remain close to the plant may qualify for a smaller zone, in some cases no larger than the site boundary. Smaller EPZs can reduce the offsite planning burden on

host communities and may allow siting closer to where power is needed, but a smaller EPZ must be justified by the facility's demonstrated safety case during the federal licensing process.

New York State Exercises Authority Over Non-Radiological Environmental Protection, Siting, Utility Regulation, and Emergency Preparedness

New York State agencies and authorities are responsible for carrying out their own requirements for environmental review and permitting, utility regulation and siting of major electric generating facilities, and emergency preparedness coordination (Table S-1). The New York State Energy Research and Development Authority (NYSERDA) has a legislated umbrella responsibility for coordination of atomic energy activities within New York State, with other states, and with the federal government.[6] This includes serving as the Governor's designated state liaison officer (SLO) between New York State and the NRC.

Table S-1. New York State Agency and Authority Regulatory Roles

Agency	Role
New York State Energy Research and Development Authority (NYSERDA)	• Overall state nuclear coordination through its Nuclear Coordination Office • State Liaison Officer between NYS and NRC • Radioactive waste policy • Monitor the generation and management of Low-Level Radioactive Waste
Department of Public Service (DPS)	• Utility regulation and emergency response • Siting of major electric generating facilities (≥25 MW)
Department of Environmental Conservation (DEC)	• Environmental review and permits (facilities <25 MW) • Issue State Environmental Quality Review Act (SEQRA) regulations
Department of Health (DOH)	• Radiation protection • Lead agency for radiological emergency response
Division of Homeland Security and Emergency Services (DHSES)	• Lead agency for emergency planning • Emergency response coordination
Department of State (DOS)	• Coastal Zone Management Act compliance with the New York State Coastal Management Program

New York is an Agreement State, meaning it has entered into an agreement with NRC to assume regulatory authority over certain radioactive materials and environmental releases.[7] NRC retains authority over commercial nuclear reactors and quantities of special nuclear material sufficient to form a critical mass. Some defense-related nuclear facilities supporting the U.S. Navy in New York are regulated by Naval Reactors, an agency independent of NRC. Together, these responsibilities allow the State to protect environmental and public interests.

New York also plays a central role in the siting of nuclear facilities and their electric grid integration through a combination of statutory siting authority, energy planning, and grid oversight functions (Table S-2). The siting of certain major electric generating facilities (≥25 MW) other than solar and wind, such as nuclear plants, is conducted under Article 10 of the New York Public Service Law (PSL).[8] PSL Article 10 establishes a unified, state-level review process administered by the Board on Electric Generation Siting and the Environment (Siting Board) within the Department of Public Service (DPS).

Under the Article 10 siting process for nuclear facilities ≥25 MW, a Certificate of Environmental Compatibility and Public Need (Certificate) from the Siting Board is required to construct, operate, and maintain the facility. Article 10 preempts all other state and local procedural requirements for nuclear facilities, including state environmental permits, and the Siting Board may elect not to apply substantive local laws such as zoning or other land use laws. Instead, the Article 10 process is a "one stop shop" for siting where State and local agencies that otherwise would have had permitting authority participate alongside the applicant and affected parties. The localities in which a nuclear facility is sited participate as parties in the siting process and are represented by two members of the Siting Board. Nuclear facilities outside Article 10 jurisdiction would be subject to the full set of State and local requirements.

Table S-2. New York State Review at a Glance

Review track	Lead entity	What it covers	Relationship to NRC licensing
Siting of major facilities (≥25 MW)	Siting Board / DPS (Article 10)	State-level siting review; pre-empts all non-federally-delegated environmental permitting; may waive substantive local land-use requirements	Runs in parallel with NRC licensing;[a] applicant submits its NRC license application as an exhibit
Environmental review and permits	DEC	Issues SEQRA regulations; air, water, and natural-resource permits for facilities not subject to Article 10	Coordinates with federal National Environmental Policy Act (NEPA) review
Radiation protection	DOH	Radiation protection; radioactive-materials licensing for certain uses	Complements NRC radiological oversight
Emergency preparedness	DHSES (with DOH)	Offsite emergency planning and response coordination	Aligns with NRC and FEMA framework
Coastal consistency	DOS	Coastal Zone Management Act consistency where applicable	Federal consistency review tied to NRC federal licensing
Statewide coordination / Regulatory Concierge	NYSERDA	Umbrella coordination of atomic-energy activities; State Liaison Officer	State Liaison Officer between NYS and NRC

[a.] NRC maintains statutory authority over radiological safety.

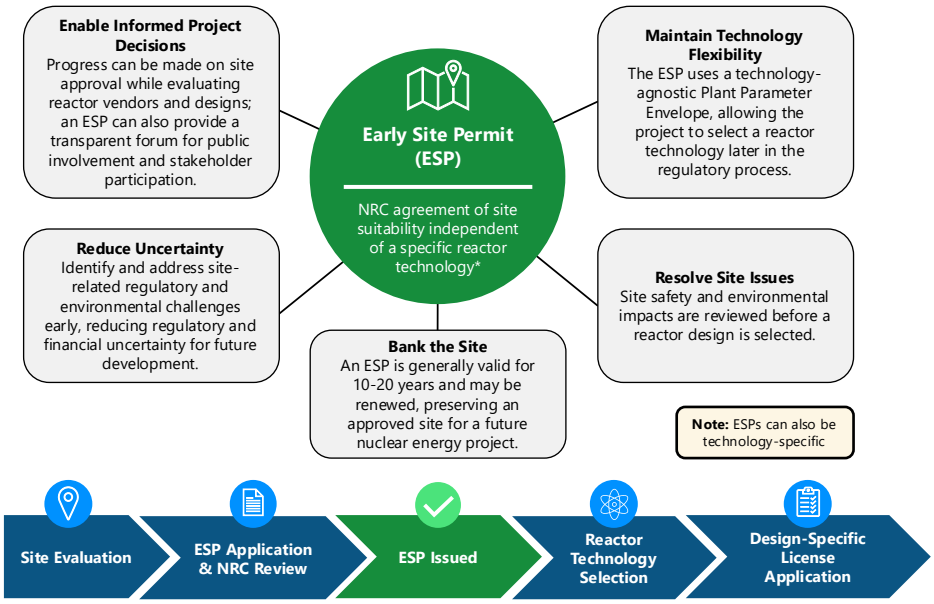
Environmental Review and Permitting

New reactors would undergo environmental review at both the federal and state level. At the federal level, the NRC conducts review under the National Environmental Policy Act (NEPA) as part of the licensing process. For nuclear facilities of 25 MW or more, State environmental review occurs through the Article 10 process, which preempts all non-federally-delegated environmental permitting and approval. For facilities not subject to Article 10 jurisdiction (<25 MW), the DEC issues air, water, and natural-resource permits. In addition, the DOS conducts federal consistency review under the Coastal Zone Management Act if a facility is located within the NYS coastal zone or if located outside the zone would affect coastal resources and uses within the NYS coastal zone. Because state and federal environmental reviews examine overlapping questions, coordination between NRC and state review is an opportunity to reduce duplication while preserving each jurisdiction's distinct role.

The Case for Early Site Permits

An ESP is a federal approval that settles whether a location is suitable for a nuclear plant, covering its geology, water, weather, surrounding population, and emergency planning, before a developer chooses a reactor or begins construction. Once granted, those site questions are generally not reopened when the developer later applies to build a reactor. An ESP lasts 10 to 20 years and can be renewed. A site can even be approved for a class of reactors and matched to a specific design later.

ESPs can be a powerful way to reduce project completion risk for developers and communities. A state, public authority, or community can qualify a promising site in advance, so a developer inherits a location that is ready to build on rather than starting the siting question from scratch. The approach is proven; six sites nationwide hold ESPs, including the Clinch River site in Tennessee, the first aimed at small modular reactors. Recently, DOE and NYSERDA provided co-funding to support Constellation Energy's application for an ESP for advanced reactors at Nine Mile Point Clean Energy Center (Nine Mile Point), illustrating the opportunity for cooperative federal and state support to lower hurdles for potential projects to access the ESP process.



Local Governments Exercise Authority Over Land Use and Local Zoning Alongside State and Federal Licensing Processes for Reactors of Less than 25 MW

For projects that are not subject to Article 10, local governments have authority over non-radiological facilities, including through land-use planning, zoning, site-plan review, special-use permits, building and energy code enforcement, local infrastructure, and emergency response,

while NRC maintains exclusive jurisdiction over radiological safety of nuclear facilities. New York State agencies and authorities can support and facilitate local zoning and land use review by providing technical assistance, supporting coordination between local and state reviews, and clarifying local authorities.

The applicable siting process will depend on the project's size, application, and site.

Local governments also play a central role in off-site emergency preparedness. Responsibilities include developing, maintaining, and implementing radiological emergency response plans that provide protective actions for the public, developed in coordination with state entities and consistent with federal standards. The scope of these responsibilities may differ for advanced reactors that qualify for reduced or site-boundary EPZs.

Public Participation

At the federal level, the NRC runs an open, on-the-record process. Application materials, staff correspondence, and review documents are posted to a free public library (ADAMS),[9] and hearing and comment opportunities are announced in the Federal Register. The public can comment in writing at multiple junctions throughout the permitting process, speak at scoping meetings, observe the NRC's independent technical advisers, and, where a license would affect their interests, petition to intervene in a formal hearing.

For grid-scale reactors (≥25 MW), the Article 10 siting process opens with the applicant's Public Involvement Plan, grants party status for the host community and its residents, funds local participation through intervenor fees, and seats two voting members from the host community on the Siting Board that decides whether to certify the project. As dictated by each government's jurisdiction, the public can engage in radiological safety matters via NRC's review processes and engage on non-radiological issues including siting, environmental, and land-use issues via State and local processes.

The State can encourage early, well-publicized engagement by making full use of the participation avenues its own law provides.

The Reactor Lifecycle: Decommissioning and Waste

A full picture of nuclear regulation extends beyond licensing and operation to the end of a facility's life (typically 60–80 years or more). When a reactor permanently shuts down, federal

rules require the licensee to remove the fuel, submit a post-shutdown decommissioning plan, and dismantle the facility to standards that permit release of the site, a process that must be completed within 60 years of permanent cessation of operations unless the NRC approves an extension.[10] Licensees must set aside funds for this work in advance through NRC-approved financial assurance. Newer rules allow the required assurance to be based on a site-specific cost estimate, so that the amount set aside for a smaller reactor can reflect its lower expected decommissioning cost.

New York plays a defined role at this stage as well. The Public Service Commission (PSC) maintains supervisory authority over retired reactors and requires financial assurance and site-restoration commitments, as reflected by the ongoing decommissioning of Indian Point.[11] Federal law makes disposal of low-level radioactive waste a state responsibility, and NYSERDA serves as the State's lead entity for radioactive-waste policy, monitoring how such waste is generated and managed.[12]

Federal Policy Has Shifted Toward Accelerating Advanced Nuclear Development and Deployment

The 2019 Nuclear Energy Innovation and Modernization Act (NEIMA) and 2024 Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act reoriented federal regulation toward efficient, risk-informed, and technology-inclusive review and an 18-month target for new reactor authorizations, which was reinforced by four federal executive orders signed May 23, 2025.[13] Recent changes to NRC licensing regulations include the finalization of the Part 53 technology-inclusive licensing framework (March 2026) and the proposed Part 57 pathway for high-volume licensing of microreactors and comparable-risk reactors (proposed May 2026). Implementation of these federal policies continues with the NRC issuing roughly two dozen proposed rule changes in 2026 touching numerous aspects of federal licensing and oversight processes. New York State reviews and comments on federal rulemakings to advocate for the State's interests, including rapid development of advanced reactors, efficient and effective partnership between the NRC and New York State, and public health and safety. NYSERDA coordinates State entity review of NRC rulemakings; State comments submitted in regard to proposed rulemaking are publicly available.[14]

A Decade of Federal Action

2019: NEIMA directs the NRC toward a technology-inclusive, risk-informed framework.

2024: The ADVANCE Act adds hiring flexibilities, fee relief for certain first movers, and an 18-month target for new reactor authorizations.

May 2025: Four executive orders direct further acceleration of licensing and deployment.

March 2026: The NRC finalizes the Part 53 technology-inclusive licensing framework.

May 2026: The NRC proposes Part 57, a streamlined pathway for microreactors and comparable-risk reactors.

Through 2026: The NRC advances roughly two dozen rulemakings implementing these directives in order to rapidly expand development of advanced nuclear reactors.

Regulatory and Safety Considerations for Advanced Reactors

Advanced reactor technologies have the potential to offer significant design benefits including enhanced passive safety features, modular construction, and flexible deployment operations, but also present novel considerations based on how they differ from the operating experience of the existing large LWR fleet. Advanced reactor safety characteristics include passive safety systems that rely on gravity, natural circulation, convection, or stored energy rather than external power or operator action; inherent design characteristics that limit reactor power or heat generation as temperatures rise; lower-pressure operation; smaller radioactive inventories; and accident-tolerant fuel forms. Where demonstrated through the licensing process, these characteristics may reduce risk and thus support requirements that are better aligned with the risk profile of the facility, including smaller EPZs or modified security and staffing requirements. Comprehensive safety review of new reactors occurs during the NRC licensing process.

Assessing the regulatory complexity of advanced reactor technologies is challenging because there is limited commercial operating experience and development and design is ongoing for many of the technologies. Advanced reactor regulation does not scale solely based on reactor size. Reactor size is relevant to footprint, emergency planning needs, environmental impacts, and state law thresholds. As federal regulations move toward risk-informed, performance-based,

and technology-inclusive criteria, regulatory treatment depends on the reactor's risk profile, licensing pathway, safety case, design maturity, degree of standardization, emergency planning consequences, security needs, operational model, and intended application.

There are also distinct regulatory considerations depending on the end use or application, for example, smaller reactors suited to industrial sites, remote locations, and specialized uses.

Regulatory Considerations by End-Use Type

There are distinct regulatory considerations depending on the advanced reactor's end-use or application, for example, smaller reactors suited to industrial sites, remote locations, and specialized uses. Table S-3 provides a high-level description of regulatory processes by end use or application.

Table S-3. Regulatory Considerations by End Use or Application.

End Use or Application	What it involves	Regulatory profile
Grid-connected electricity and behind-the-meter >200 MW	Power sold to the bulk electric system or power used for onsite purposes	The most comprehensive requirements: full NRC licensing plus federal grid, reliability, and market interfaces and Article 10 siting
Industrial Behind-the-meter ≤200 MW	On-site power for an industrial host	Full NRC licensing and DEC permits still apply
Backup power	Standby power for critical or remote facilities	NRC licensing required regardless of duty cycle; reduced EPZ or security treatment may be available where the risk supports it; no tailored state pathway yet exists
Process heat and industrial	High-temperature heat for manufacturing	NRC licensing plus coordination between nuclear and industrial safety systems; state review must address the co-located industrial process
Hydrogen production	Reactor heat or electricity used to produce hydrogen	NRC licensing plus state permits for hydrogen storage, handling, and transport, and integrated safety analysis of the combined facility
Thermal storage integration	Storing reactor heat for flexible, dispatchable output	Review depends on whether the storage system is safety-related or functionally integrated with the reactor
Medical isotope production	Producing isotopes such as molybdenum-99	Often a narrower NRC review than a power reactor, plus DOH licensing for possession and distribution

Findings

Based on the study's analysis of the federal, state, and local regulatory landscape, this study identifies the following findings related to the development of new advanced nuclear reactors in New York State.

Federal, state and local roles. Federally, the NRC maintains exclusive authority over reactor safety, security, and licensing of the radiological safety aspects of building and operating a commercial nuclear power plant. States retain authority over non-radiological environmental protection, siting, utility regulation, and offsite emergency preparedness. Local governments exercise authority over land use and local zoning for smaller reactors alongside state and federal licensing processes.

Safety requirements for advanced reactors: Many advanced reactors may use passive safety features and hold less radioactive material on site, so enacted and proposed federal rules scale emergency planning and security requirements to their risk. Every design remains subject to the NRC's independent safety review and oversight. New York State, through its State Liaison Officer, should monitor these federal changes, assess what they mean for New York's communities, and coordinate with State and local agencies to keep public health and safety protected.

New York State's core regulatory framework. New York has the core legal and institutional framework needed to evaluate new grid-connected and large behind-the-meter nuclear development, whether LLWRs or more advanced and smaller reactor designs. DPS and the Siting Board, pursuant to Article 10 of the Public Service Law, have the primary role in siting nuclear generation facilities greater than 25 MW through the exercise of jurisdiction over most non-radiological aspects of siting, constructing, and operation of nuclear reactors. Article 10 serves as the central process to coordinate the siting and permitting of nuclear facilities (≥25 MW), which occurs in parallel with the federal NRC process and aims for efficiency and minimal duplication of work, with NRC licensing materials filed for reference in the Article 10 proceeding.

The State's framework must adapt to differentiate by scale. As the deployment of smaller and non-grid connected nuclear plants becomes increasingly feasible, the State's regulatory and safety framework must adapt in order to appropriately evaluate, site, and oversee the full lifecycle of such facilities. New technologies and deployments necessitate differentiation by scale or application in the State framework.

Complexity and agency coordination. Multiple State agencies and authorities (DPS, DEC, DOH, DHSES, DOS, and NYSERDA) have important and established roles with respect to nuclear deployment on issues of health and safety, environmental impacts, emergency preparedness, and intergovernmental coordination. These intersecting entity roles and requirements can make it challenging for stakeholders to navigate the regulatory process, highlighting opportunities to streamline procedures and provide a clear, single source of information.

Early Site Permits can increase regulatory certainty. The federal ESP process settles key regulatory aspects for a particular location before a reactor design is chosen or construction begins. It is a practical way to prepare project-ready sites for advanced nuclear development. However, navigating the regulatory process can be challenging and costly for communities who may need additional support to make the best use of ESPs. The recent DOE and New York co-funding to support Constellation Energy's application for an ESP for advanced reactors at Nine Mile Point is an example of cooperative federal and state support to lower hurdles for potential projects to access the ESP process.

Ongoing federal regulatory modernization. As federal agencies implement regulatory updates to accelerate deployment of advanced reactors, New York supports best practices for federal processes to improve efficiencies and ensure public safety. New York State comments on the many federal rulemakings have emphasized preserving NRC independence; ensuring adequate NRC staffing levels; coordinating between NRC and DOE efficiently; achieving licensing predictability; providing appropriate safety requirements and oversight; maintaining review quality as new licensing pathways and accelerated timelines take effect; and funding advanced-reactor safety research.

Local governments are important stakeholders: Local governments review aspects of nuclear facilities through zoning, site plan review, special use permits, and building permits for nuclear reactors below 25 MW. For nuclear facilities subject to Article 10, local governments are represented on the Siting Board and have statutorily guaranteed party status. Additional resources, technical information and assistance, and planning support may be useful for municipalities, particularly as advanced nuclear technologies mature, and to address ancillary development such as roads, highways, water and sewer infrastructure, housing, and financial planning.

Regulatory readiness for nuclear fusion: NRC's upcoming fusion rulemaking reflects that fusion is expected to produce very limited long-lived high-level radioactive waste. New York State, mainly through DOH, will have primary responsibility for licensing and oversight of future

fusion facilities and already does so at the University of Rochester's Laboratory for Laser Energetics. Additionally, any fusion generator would fall under Article 10 as a major electric generating facility where nameplate generation exceeds 25 MW for siting of electric infrastructure. While New York State's statutory authority has no fundamental gap, administrative and technical opportunities remain to enhance preparedness and consider streamlined procedures for commercial-scale facilities.

Conclusions

- **Continue to conduct proactive public engagement, including clear and timely information on nuclear development, and nuclear energy education, so that host communities and the broader public can meaningfully engage in public participation opportunities and have confidence in the rigor of State and federal oversight.**

- **Conduct a review of State regulations including for smaller and for non–grid-connected nuclear facilities to identify opportunities to increase efficiencies, streamline review, and address potential emerging areas – building on the findings in this Master Plan and to further the Governor's EXPRESS NY initiative.**

- **Consider additional support for local governments in local planning and regulatory needs to prepare for potential new nuclear development through updates or development of new model zoning laws and planning tools.**

- **Provide information on regulations, licensing, safety, and waste management for stakeholders, local governments, and host communities, and assist with referrals to appropriate permitting, environmental, and public safety agencies.**

- **Continue working with the federal government to develop cooperative federal and State support on the Early Site Permit process to communities and developers in the form of federal co-funding and regulatory assistance.**

- **Include fusion in the State's efforts to provide information on nuclear regulatory issues as well as State assessment and review of regulations for nuclear facilities; and strengthen agency preparedness to ensure the State is ready as and when the first pilot or commercial project application emerges.**

1. Introduction

The Regulatory Issues and Safety Study is one of a collection of studies prepared by the New York State Energy Research and Development Authority (NYSERDA) and the Department of Public Service (DPS) as part of the "Master Plan for Responsible Advanced Nuclear Development in New York" (Master Plan). Collectively, these studies examine the technical, economic, workforce, supply chain, regulatory, environmental, community, and infrastructure considerations associated with deploying advanced nuclear technologies in New York State. Each study addresses a distinct topic area and offers analysis, findings and conclusions to contribute to a comprehensive roadmap for advanced nuclear development in New York.

NYSERDA and DPS acknowledge the contributions of Solestiss and The Nuclear Innovation Alliance (NIA), working as subcontractors to The Brattle Group, in preparing this study.

The Regulatory Issues and Safety Study includes the following sections:

- **Section 2, Allocation of Regulatory Authority,** introduces the allocation of regulatory authority for commercial nuclear energy across federal, state, and local governments.
- **Section 3, Federal Licensing and Oversight Framework,** describes the federal licensing processes for new advanced nuclear reactors and Subsequent License Renewal (SLR).
- **Section 4, Reactor Safety and Public Health Protections,** describes the federal, state, and local government roles in protecting public health and safety through reactor safety oversight, radiation protection, environmental surveillance, security, and emergency preparedness, including considerations for advanced reactor technologies.
- **Section 5, Site Selection and Land Use,** describes State and local authority over zoning and land use relevant to siting new advanced reactors.
- **Section 6, Environmental Review and Permits,** outlines federal and State environmental review and permitting requirements for new reactor licensing.
- **Section 7, Decommissioning,** considers federal and State decommissioning obligations and procedures.

- **Section 8, Scale and Application Considerations for Advanced Reactors,** analyzes how specific federal, state, and local regulatory requirements could apply by advanced reactor type and by end use or application.

- **Section 9, Fees and Fiscal Considerations,** summarizes fees associated with federal licensing, State permits and other State requirements, and local permits and approvals that new advanced nuclear facilities may be subject to.

- **Section 10, Fusion Regulatory Framework,** describes the distinct regulatory framework that would apply to fusion machines in the State.

The Regulatory Issues and Safety Study finds that New York has the core legal and institutional framework to evaluate new grid-connected nuclear development and identifies opportunities for the State to consider process efficiencies and proportionate flexibility by project scale, risk, and application to support and facilitate new advanced nuclear development and deployment. This study offers conclusions that could enable New York State to better facilitate new advanced nuclear development by improving coordination, scaling requirements appropriately, and supporting local preparedness while maintaining strong protections for public health, safety, security, and the environment. The scope of this study encompasses commercial power reactors, non-power production facilities, and research and test reactors operating under U.S. Nuclear Regulatory Commission (NRC) jurisdiction. It examines advanced reactor technologies that are Generation III+ (Gen III+) large light-water reactors (LLWRs), Generation IV (Gen IV) large reactors, SMRs, and microreactors that use a coolant other than water. The focus of this study is on regulatory and safety considerations for new advanced reactors rather than on the currently operating reactors in New York State. Recent federal legislative changes and ongoing federal rulemaking activities as of October 2026 are reflected in the analysis.

2. Allocation of Regulatory Authority

The regulatory framework through which safety, security, and environmental protections are established, verified, and maintained throughout a nuclear facility's lifecycle is divided across levels of government. This section introduces the allocation of regulatory authority for commercial nuclear energy across federal, state, and local governments. This section is intended to provide an informational overview of the different and at times overlapping roles of federal, state, and local governments. Appendices A and B describe federal and State regulatory requirements by entity, respectively.

The federal government has exclusive authority over reactor licensing and the radiological safety and security of commercial nuclear facilities. New York State, with the participation of local governments, retains authority over non-radiological matters, including environmental protection, utility regulation, land use, infrastructure, and off-site emergency response. Recent federal policy toward accelerating advanced nuclear development and deployment has significant implications for the regulatory framework for commercial nuclear reactors and is discussed in Section 2.5.

2.1 Federal Statutory Foundation

This section describes the statutory foundation for the federal government's authority to regulate nuclear energy.

2.1.1 Constitutional and Statutory Foundation

The federal government's authority to regulate aspects of nuclear energy has evolved over time with the maturity of the technology. The federal regulatory authority was originally established by the Atomic Energy Act (AEA),[15] which defined a comprehensive framework for the development and regulation of nuclear materials and facilities for defense and civilian purposes. Subsequently, the Energy Reorganization Act of 1974 created the NRC as an independent agency responsible for civilian or commercial nuclear safety regulations.[16] Nuclear safety for defense applications became a responsibility of several agencies but is not the primary focus of this study.

2.1.2 Federal and State Authority

The NRC's regulatory authority generally encompasses matters with a reasonable nexus to radiological health and safety or national defense and security. However, states retain their general authority to enact laws that promote environmental protection and the public interest.

This framework means that state and local governments may impose requirements on nuclear facilities within State and local authority. For example, under its authority to license commercial nuclear power plants, the NRC requires an applicant to obtain a construction permit (CP) before it can start construction. A state may also require the applicant to obtain a Certificate of Public Convenience and Necessity (CPCN) from a state regulatory authority to permit construction. An applicant can comply with both federal and state requirements by not starting construction until both a state CPCN and a federal CP are obtained. Because the federal CP is permissive in that it allows an applicant to start construction but does not require it, both the federal and state requirements can be read harmoniously together.

2.2 Federal Agency Roles

This section outlines the roles of different agencies in the federal regulatory framework for nuclear energy.

2.2.1 Nuclear Regulatory Commission

The NRC serves as the primary federal regulatory authority for commercial nuclear power in the United States. The Atomic Energy Commission (AEC), created in 1946, was responsible for both promoting and regulating nuclear technology for defense and commercial purposes until the Energy Reorganization Act of 1974. This act abolished the AEC and established the NRC to assume most of its regulatory functions, moving the AEC’s defense-related and research and development functions to what became the U.S. Department of Energy (DOE).

NRC’s regulatory authority derives primarily from the AEA as amended,[17] which provides the fundamental legal framework for the NRC’s authority over civilian nuclear activities. Key provisions include Section 103 authorizing commercial licenses, Section 104 addressing research and development activities, and Section 161 granting NRC broad authority to establish rules and regulations necessary to protect health and minimize danger to life or property. The NRC's mission statement, as updated in January 2025 pursuant to Section 501 of the Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act, now explicitly includes language addressing efficiency in regulation and the deployment of civilian nuclear

energy technologies for the benefit of society.[a] This represents a significant evolution of NRC's historical focus solely on safety and security to acknowledge the broader societal interests in successful nuclear deployment while maintaining safety and security.

NRC licensing requirements are described in Section 3 and additional regulations pertaining to safety requirements are described in Section 4.

2.2.2 Department of Energy

DOE maintains significant jurisdiction over nuclear facilities operated for or on behalf of the DOE for research and testing activities, and the nuclear fuel cycle. DOE's regulatory authority derives from the AEA and the Department of Energy Organization Act of 1977.[18]

DOE exercises self-regulatory authority over its own nuclear facilities through 10 CFR Part 830, Nuclear Safety Management. This regulation establishes quality assurance (QA) requirements and safety basis requirements for DOE nuclear facilities, including contractor-operated reactors at national laboratories. The regulation requires documented safety analyses, technical safety requirements, and a graded approach to safety commensurate with hazard levels.[19] Activities conducted under the authority of the Director of Naval Nuclear Propulsion, which are described in more detail in the following sections, are excluded from DOE regulation per 10 CFR Part 830.2.

Historically, DOE has authorized testing and demonstration reactors on DOE-owned land. Recent changes to this practice rely on DOE authorization under 10 CFR Part 830, which enabled testing and demonstration at U.S. Army installations. These changes enabled Fort Drum in NY to be selected as a demonstration site for a Westinghouse microreactor. Regulatory oversight for this program is provided by the Army Reactor Regulatory Office through a Memorandum of Understanding with the DOE.[20] These changes did not revise the AEA requirement that an NRC license is required, even at DOE facilities, for demonstration of commercial operation, which may follow successful demonstration through the Janus Program.

In May 2025, President Trump signed Executive Order 14301, which directs streamlining of national laboratory processes for reactor testing and directs DOE to start a new pilot program to expedite testing of advanced reactor designs. Further details on Executive Order 14301 are

[a] As required by the ADVANCE Act, the NRC updated its mission statement to "The NRC protects public health and safety and advances the nation's common defense and security by enabling the safe and secure use and deployment of civilian nuclear energy technologies and radioactive materials through efficient and reliable licensing, oversight, and regulation for the benefit of society and the environment." https://www.nrc.gov/about-nrc/governing-laws/advance-act/about-advance-act.

provided in section 2.5. The DOE program facilitates but does not fund the construction and operation of non-national laboratory commercial prototype reactors. This Reactor Pilot Program is ongoing, and four reactors achieved the goal of reaching criticality by July 2026. The program aims to unlock private investment, provide support with DOE expertise and infrastructure, and expedite future commercial licensing. DOE has initiated a Launch Pad program as a follow-on to the Reactor Pilot Program.

To facilitate consideration of a DOE authorization under the Reactor Pilot Program within the NRC licensing process, DOE and NRC have executed memoranda of understanding (MOU) to coordinate their respective activities, particularly regarding advanced reactor development. A 2025 addendum to the NRC-DOE MOU specifically addresses coordination for the Reactor Pilot Program, information sharing on advanced reactor technologies, and leveraging DOE facilities and operating experience for future NRC licensing activities.[21] On October 22, 2026, NRC published a final rule, "NRC Reviews of Reactor Designs Previously Authorized by U.S. Department of Energy or Department of War", which enables use of data collected through DOE demonstrations for NRC licensing.

DOE's Idaho National Laboratory, Oak Ridge National Laboratory, Savannah River National Laboratory, and Argonne National Laboratory serve as primary research facilities for advanced reactor technology development.

DOE also administers the civilian nuclear waste management program and maintains statutory authority and associated responsibility for disposition of government-owned spent nuclear fuel and high-level radioactive waste under the Nuclear Waste Policy Act. The Master Plan Waste Study provides more detail on these topics.

2.2.2.1 U.S. Department of Defense

Separate from DOE authority, the U.S. Department of Defense (DoD) may regulate reactors for military purposes when so directed by the President. DoD, DOE, and NRC are working together on several programs for military applications including the Army's Janus Program that is aimed at deploying microreactors to military installations. The Janus Program is the Army's next-generation nuclear power program, funded at up to $2.2 billion across five selected vendors and carried out in partnership with the Defense Innovation Unit (DIU) with the goal of operating at least one Army-regulated reactor at a domestic installation by September 30, 2028, consistent with Executive Order 14299. Under Section 91 of the AEA, the Army intends to regulate these reactors under its own nuclear authorities rather than through NRC commercial licensing. The

NRC does not regulate nuclear reactors constructed and operated by the military for military purposes when authorized by Executive Order.

On August 26, 2026, the Department of the Army announced that Fort Drum, home of the 10th Mountain Division, was one of five installations selected to host a microreactor under the Janus Program and awarded the contract for that site to Westinghouse Government Services for its eVinci microreactor. The other four selected installations are Fort Bragg, North Carolina (Antares Nuclear); Fort Campbell, Kentucky (BWXT Advanced Technologies); Fort Hood, Texas (General Atomics Electromagnetic Systems); and Fort Benning, Georgia (Radiant Industries).

2.2.2.2 Naval Reactors

Naval Reactors (NR) has authority for the Naval Nuclear Propulsion Program (NNPP). NR headquarters is located at the Washington, DC Navy Yard, and there are Naval Reactors Laboratory Field Offices providing on-site oversight in several locations, including at facilities in New York State. The Director of Naval Reactors has authority within both DOE and the Department of the Navy. This authority includes cradle-to-grave responsibility for all naval nuclear propulsion matters and was established through Executive Order 12344 and subsequent legislation. Naval Reactors also has responsibility for civilian and military personnel who design, build, operate, maintain, and manage the nuclear-powered ships and other facilities supporting nuclear-powered vessels for the U.S. Navy. The Naval Nuclear Laboratory (NNL), which supports the NNPP, is operated by Fluor Marine Propulsion, LLC and is regulated by NR. New York State has two NNL facilities that support NNPP: the Knolls Site, a research, development, and remote fleet support facility in Niskayuna, NY and the Kesselring Site, which has an operating nuclear reactor for technology development and training Navy sailors in West Milton, NY.

2.2.3 Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission (FERC) exercises jurisdiction over wholesale electricity sales and interstate transmission (as well as other authorities), which significantly affects nuclear power plant economics and grid integration. FERC's authority derives from the Federal Power Act, as amended, which grants FERC exclusive jurisdiction over "the transmission of electric energy in interstate commerce" and "the sale of such energy at wholesale in interstate commerce."[22]

Power plants, including nuclear power plants, selling electricity into wholesale markets operated by Regional Transmission Organizations (RTOs) or independent system operators (ISOs) are subject to FERC-regulated market rules, tariffs, and interconnection requirements. Six FERC-

regulated RTOs/ISOs operate in the United States: PJM Interconnection, which has jurisdiction spanning 13 states and Washington, DC; Midcontinent Independent System Operator (MISO); Southwest Power Pool (SPP); ISO New England (ISO-NE); New York Independent System Operator (NYISO); and California Independent System Operator (CAISO).[23] The Electric Reliability Council of Texas (ERCOT) is not subject to FERC jurisdiction, but instead is overseen by the Public Utility Commission of Texas and the Texas Legislature.

Importantly, FERC does not regulate the construction or siting of nuclear generating facilities. The authority for nuclear licensing matters rests with the NRC, and state public utility commissions have authority over traditional utility regulation (see section 2.3.4). However, FERC's market rules and transmission policies significantly influence nuclear project economics and commercial viability. Through FERC, the federal government occupies the field of regulation of wholesale rates, and states are precluded from policies related to generation that impact this occupied field.[24]

2.2.4 Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA), within the Department of Homeland Security, shares responsibility with the NRC for nuclear power plant emergency preparedness and response. While the NRC regulates on-site emergency preparedness, FEMA is responsible for assessing the adequacy of off-site emergency plans prepared with state and local governments in cooperation with the facility owner.[25]

The regulatory framework for emergency preparedness requires that adequate protective measures are ready and will be taken in the event of a radiological emergency. The NRC reviews on-site plans while FEMA takes the lead for off-site community planning. FEMA evaluates off-site emergency response plans and conducts periodic exercises to verify emergency response capabilities. FEMA’s findings and determinations regarding the adequacy and capability of implementing off-site plans are communicated to the NRC. The NRC then makes determinations about whether specific commercial nuclear power plants meet emergency preparedness requirements.

The joint NRC-FEMA guidance document provides criteria for preparation and evaluation of radiological emergency response plans. [26] This document establishes 16 planning standards and associated evaluation criteria that both licensees on-site and state and local off-site plans must address.

2.2.5 Other Federal Agencies

Several additional federal agencies exercise regulatory jurisdiction over other aspects of nuclear reactor development and operation:

Environmental Protection Agency (EPA): Sets generally applicable environmental standards for radiation protection under the Clean Air Act and establishes Protective Action Guidelines used in emergency response planning. The EPA standards set in 40 CFR Part 190 set overarching radiation standards for air and water releases from a nuclear power plant, while Part 20 NRC regulations focus on operational and occupational dose limits for workers and the public. EPA regulates radiation from civilian nuclear power plant operations and other operating uranium fuel cycle facilities.[27] EPA also regulates hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act and wastewater discharges under the Clean Water Act (which has been delegated to states with certain authorized programs, including New York [see section 6.2]); these regulations are implicated in nuclear facility operation and decommissioning.

U. S. Department of Transportation (DOT): Regulates the transportation of radioactive materials, including new and spent nuclear fuel, in conjunction with NRC transportation packaging standards in 10 CFR Part 71.[28] The DOT occupies the field of hazard material transportation route planning and states are generally precluded from regulating such shipping, although states may designate preferred highway routes under DOT rules.[29]

U.S. Army Corps of Engineers (USACE): Issues permits under the Clean Water Act for activities affecting Waters of the United States, relevant primarily to nuclear facility construction involving wetlands or waterways.[30, 31]

Occupational Safety and Health Administration (OSHA): Maintains jurisdiction over occupational safety at nuclear facilities for non-radiological hazards.[32]

Additional federal actions intended to support growth in advanced nuclear are listed in the table below.

Other Related Federal Programs, Laws and Regulations Supporting Nuclear Energy

- Inflation Reduction Act of 2022 (IRA) – clean energy tax incentives for nuclear power including production tax credits:
    - Section 45U Nuclear Power Production Tax Credit – production tax credit for electricity produced at a qualified nuclear power facility in tax years beginning after December 31, 2023, and before January 1, 2033
    - Section 45Y Clean Electricity Production Credit – technology-neutral tax credit for the production of clean electricity from facilities generating zero-emissions electricity placed in service after January 1, 2025
    - Section 48E Investment Tax Credit – technology-neutral clean energy investment tax credit that provides up to 30% of the cost for zero-emission generation and energy storage facilities
    - Section 6417 Direct Pay – allows tax-exempt entities and municipalities to receive direct cash payments from the IRS equal to the full value of clean energy tax credits for nuclear investments
- 2025 Tax Law Changes (One Big Beautiful Bill Act) – preserved nuclear production tax credits
- DOE Office of Energy Dominance Financing Loan Program – provides multibillion dollar loan guarantees and commitments to scale up domestic nuclear capacity
- Federally Supported Long-lead Procurement – funds pre-construction purchase of challenging to manufacture components requiring multiple years to complete like reactor pressure vessels and steam generators to accelerate construction schedules
- May 2025 Nuclear Executive Orders (Including 400 GW by 2050 Goal) – series of executive orders that collectively target quadrupling U.S. capacity to 400 GW by 2050, directing streamlining of NRC licensing, and more

2.3 State Roles

New York State carries out many functions related to coordination with federal and local agencies; protection of public health and the environment; siting of new energy facilities; and regulation of electricity production and other applications. Table 1 summarizes NYS agency and authority regulatory roles. The state's primary responsibilities related to coordination, radiological oversight, and energy siting and grid integration are outlined in the following sections. Additional state responsibilities related to safety and public health protections, siting,

environmental review and permitting, emergency preparedness, and decommissioning are covered in subsequent sections.

Table 1. New York State Agency and Authority Regulatory Roles

Agency/Authority	Role
New York State Energy Research and Development Authority (NYSERDA)	• Overall state nuclear coordination through its Nuclear Coordination Office • State Liaison Officer between NYS and NRC Radioactive waste policy • Monitor the generation and management of Low-Level Radioactive Waste
Department of Public Service (DPS)	• Utility regulation and emergency response • Siting of major electric generating facilities (≥25 MW)
Department of Environmental Conservation (DEC)	• Environmental review and permits (facilities <25 MW) • Issue State Environmental Quality Review Act (SEQRA) regulations
Department of Health (DOH)	• Radiation protection • Lead agency for radiological emergency response
Division of Homeland Security and Emergency Services (DHSES)	• Lead agency for emergency planning • Emergency response coordination
Department of State (DOS)	• Coastal Zone Management Act compliance with the New York State Coastal Management Program

2.3.1 Agreement State Status

New York is an Agreement State under Section 274 of the AEA, meaning in 1962 it entered into an agreement with the AEC, the predecessor to the NRC, to assume regulatory authority over certain uses of radioactive materials.[33] As an Agreement State, New York—through the DOH, New York City Department of Health and Mental Hygiene (NYCDOHMH), DEC, and NYSERDA—regulates all sources of radiation except: (1) nuclear reactors, (2) federal facilities, and (3) quantities of special nuclear material sufficient to form critical mass. NNPP-related reactors and support operations in New York are regulated by Naval Reactors. This means the NRC retains exclusive jurisdiction over commercial power reactors, while the state regulates other radioactive materials uses.[34]

2.3.2 NYSERDA Statutory Coordination Role

The development of nuclear energy laws in New York has evolved from early support and infrastructure development in the 1960s to a comprehensive, coordinating framework focused on safety, waste management, and zero-emission grid reliability, with NYSERDA playing a coordinating role. A brief review of the legislative history leading to this role for NYSERDA starts

with the establishment of the Office of Atomic Development in 1959 to promote the development and peaceful use of atomic energy. In the early 1960s, the Atomic and Space Development Authority (ASDA) was formed to focus on nuclear power development, land acquisition, and space related research. In 1968, the New York Power Authority (NYPA) was authorized to build nuclear power plants, and in 1974, the State directed NYPA to buy, complete, and operate the nuclear power plants it built.

Following the 1970s oil crisis, NYSERDA was created under Article 8 of the State Public Authorities Law through the reconstitution of ASDA.[35] Section 7-101 of the New York Energy Law solidified the State's atomic energy oversight structure, and when the State Energy Office was closed in 1995, NYSERDA, through legislative direction, took on those responsibilities. Energy Law Section 7-101 requires NYSERDA to coordinate state programs affecting atomic energy activities, advise the Governor and Legislature on such programs, and make recommendations to ensure that atomic energy programs encourage peaceful uses while protecting public health and safety.[36] Further, NYSERDA is required to coordinate NYS atomic energy programs with those of the federal government and other states. NYSERDA carries out these required coordination responsibilities through its Nuclear Coordination Office.

NYSERDA's President serves as the Governor's designated state liaison officer (SLO) to the NRC, representing the primary communication channel between New York and the federal nuclear regulator. NRC has an organizational structure and processes in place that governs information exchange and other interactions with states including observation of NRC inspections.[37] NYSERDA also regularly liaises with DOE and DoD.

Within New York State, NYSERDA frequently coordinates with DPS, DEC, DOS, DOH, Division of DHSES, NYCDOHMH, and the Office of the Attorney General.

Engagement with other states occurs primarily through the NRC SLO role, the National Association of State Energy Officials (NASEO), and other national and regional groups. NYSERDA co-chairs two NASEO advanced nuclear initiatives, the Advanced Nuclear State Collaborative and the Advanced Nuclear First Mover Initiative.[38]

NYSERDA leads coordinated State entity review and comment on federal rulemakings related to atomic energy activities including nuclear power. Submitted NYS comments on federal rulemakings are publicly available and posted on NYSERDA's website.[39]

2.3.3 Radiological Oversight

New York State exercises radiological oversight through a coordinated regulatory framework involving multiple state entities, operating under its status as an Agreement State. DOH, through its Bureau of Environmental Radiation Protection, and NYCDOHMH for medical and academic facilities in NYC, serve as the primary authority for licensing, inspection, and enforcement related to the possession and use of radioactive materials for medical, academic, industrial, and research purposes, excluding, however, reactors, federal facilities, and quantities of special nuclear material sufficient to form critical mass that remain under NRC jurisdiction. The state's role in safety and public health is detailed in Section 4.

In parallel, DEC regulates environmental releases, waste disposal, and environmental radiation impacts under 6 NYCRR Part 380, including permitting, dose limits to members of the public, monitoring, and incident reporting requirements, as detailed in section 4.4.2. DEC also permits and regulates low-level radioactive waste transportation and disposal facilities under 6 NYCRR Parts 381, 382, and 383 (described in section 6.2.8), although there are currently no low-level waste disposal facilities in New York State. NYSERDA plays a coordinating and policy role as the State's liaison with the NRC and as the entity responsible for statewide nuclear coordination and low-level waste policy. Waste issues are detailed in the Master Plan Waste Study.

2.3.4 Energy Siting and Grid Integration

New York plays a central role in the siting of nuclear facilities and their integration into the electric grid through a combination of statutory siting authority, energy planning, and grid oversight functions. The siting of major electric generating facilities (≥25 MW), other than wind and solar, such as nuclear power plants, is conducted under Article 10 of the New York Public Service Law, which establishes a unified, state-level review process administered by the Board on Electric Generation Siting and the Environment (Siting Board) within DPS.[40] The Chair of the Siting Board is statutorily empowered to coordinate directly with the NRC concerning nuclear siting.[41] DPS is also responsible for grid planning, including distribution buildout and generation mix. Additionally, DPS oversees funding for renewable and nuclear generators.

2.3.4.1 The Public Service Commission, the Department of Public Service, and the New York State Board on Electric Generation Siting and the Environment

The PSC is the State's primary decision-making body for utility regulation, vested with statutory authority under the Public Service Law to regulate the rates, services, and operations of electric,

gas, steam, telecommunications, and water utilities. The PSC is statutorily tasked with long-term energy planning and overseeing the development of the State's generation mix and transmission grid. The PSC is organizationally located within DPS, with DPS serving as the PSC's staff arm responsible for technical analysis, investigations, case management, and enforcement support. While the PSC issues binding orders, certificates, and policy determinations through formal proceedings, DPS staff develop the evidentiary record, evaluate utility proposals, conduct stakeholder engagement, and provide recommendations to inform PSC decisions. The Chair of the PSC also serves as the chief executive officer of DPS, ensuring institutional alignment between the PSC's quasi legislative and adjudicatory functions and DPS's administrative and analytical role.

DPS serves as the State's central regulatory agency for energy infrastructure siting and grid integration, administering both the siting review of major electric generating facilities and the coordination of transmission and system planning. DPS houses the Siting Board, the decisional body that conducts unified siting proceedings for major electric generating facilities other than wind and solar under Article 10 of the Public Service Law. DPS also includes the Office of Renewable Energy Siting and Electric Transmission (ORES), which implements the State's permitting framework for major renewable generation and electric transmission facilities under Article VIII. In its grid integration role, DPS supports the PSC's oversight of transmission planning, interconnection policy, and utility coordination with the NYISO, ensuring that new generation and transmission projects are aligned with bulk system reliability, deliverability, and statewide energy policy objectives.

In addition, the Public Service Law prohibits an electric corporation from constructing an electric plant, or from exercising any right or privilege under any franchise, until it receives the PSC's approval in a CPCN.[42] In considering its approval of a CPCN, the PSC shall "consider the economic feasibility of the corporation, the corporation's ability to finance improvements of a gas plant or electric plant, render safe, adequate and reliable service, and provide just and reasonable rates, and whether issuance of a certificate is in the public interest." An electric plant, including any new nuclear generating facility, must obtain a CPCN prior to construction.

Operating generators, including nuclear generators, may be subject to the PSC's lightened regulation framework. Under this framework, the PSC considers which Public Service Law provisions apply to generators operating in competitive wholesale markets and implements those that are necessary to protect the public interest. This framework may include regulation of securities issuances, reorganizations, and property transfers to prevent generators from

exercising undue influence over the New York generation marketplace. In the nuclear context, lightened regulation may also include reporting and monitoring requirements to ensure that the public is adequately informed of events at nuclear facilities and that the impact of these generators on the availability of supply in New York is adequately tracked. The PSC may also require nuclear generators to provide it with advance notice of any planned permanent shutdown of a nuclear generating unit for economic reasons.

2.3.4.2 Article 10 Process for Siting Nuclear Generation Facilities

In New York, nuclear facilities of 25 MW or more are subject to the Public Service Law Article 10 siting process. Constructing, operating, or maintaining a nuclear facility requires a Certificate of Environmental Compatibility and Public Need (Certificate) from the Siting Board pursuant to Article 10. The Certificate is a permit with conditions for the construction, operation, and maintenance of an electric generator. The Siting Board decides whether, and under what conditions, to issue a Certificate as part of the Article 10 siting process. Following issuance of a Certificate, the PSC or DPS staff ensure compliance with the terms of the Certificate and approve compliance filings.

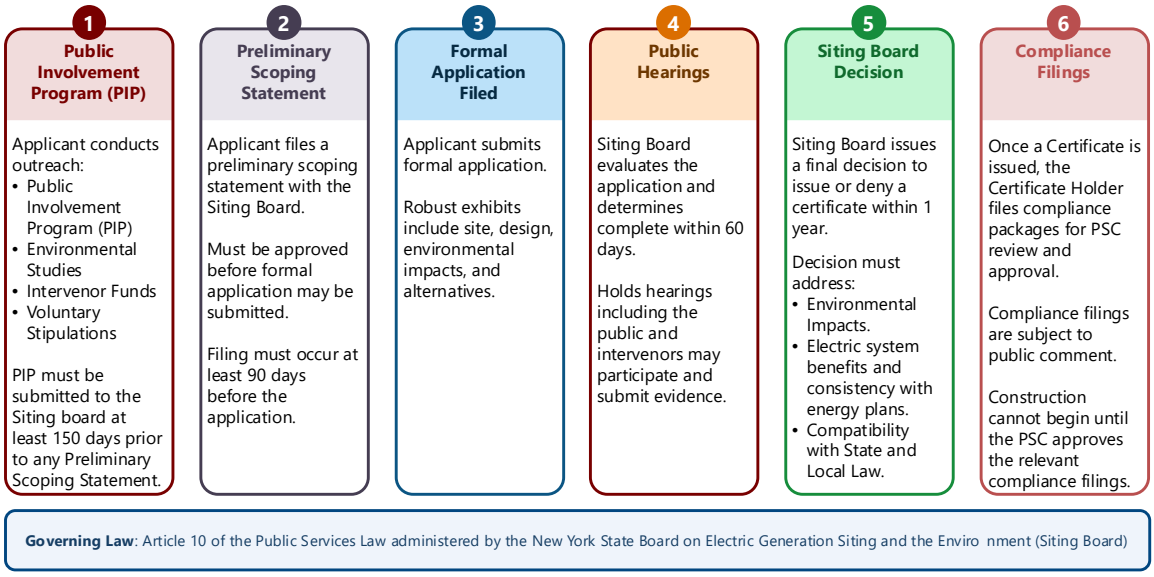
Article 10 preempts all other state and local procedural requirements for nuclear facilities. For example, host municipalities cannot issue a permit to site a nuclear facility in that municipality, and other State entities cannot issue permits related to matters within the Siting Board's jurisdiction. Moreover, the Siting Board may elect not to apply substantive local laws, such as zoning or other land use laws. Instead, the Article 10 process is a "one stop shop" for siting where State and local agencies that otherwise would have had permitting authority participate alongside the applicant and affected parties.

The Siting Board is Chaired by the Chair of the PSC and includes the Commissioner of Environmental Conservation, the Commissioner of Health, the Chair of NYSERDA, the Commissioner of Economic Development, and two Ad Hoc members. The Ad Hoc members are residents of the host municipality or community district for the nuclear facility.[43] The host community, nearby communities, and residents of the host and nearby communities can be parties to the Article 10 proceeding. Others may file public comments, make a limited appearance, or seek full party status. Intervenor funds are available to facilitate participation.

Figure 1 describes the Article 10 proceeding, which begins with an applicant filing a Public Involvement Plan (PIP). The PIP describes the applicant's plan to inform, engage, and solicit input from the host community, the public, and stakeholders. Next, the applicant files a

preliminary scoping statement, which functions as a preview of the pending application and is designed to solicit input. The applicant then formally files the application at which point the Siting Board evaluates the application and holds hearings during which parties may identify issues, file expert testimony, and submit briefs on the application. Finally, the Siting Board decides whether, and under what conditions, to issue a Certificate.

Figure 1. New York Public Service Law Article 10 Certification Process for Nuclear Power Plants ≥25 MW



The application is a comprehensive package of approximately 40 exhibits, testimony, a narrative, and other supporting documentation. The application details the site, potential environmental impacts, electric system planning and interconnection consistency reviews, alternatives, and visual impacts, among other topics. A proposed nuclear facility must submit its NRC license application as an exhibit, provide updates on the status of its NRC application, and provide information on public health, public safety, and environmental impacts related to radiological matters. Unlike the other exhibits, which inform whether and under what conditions to issue a Certificate, the purpose of the NRC license application exhibit is to ensure that all information is accessible to all interested persons. Radiological matters are solely within the jurisdiction of the NRC, and these matters are not subject to litigation before the Siting Board.

The Siting Board's role ends with issuing (or denying) a Certificate. However, the Article 10 process continues under the PSC's purview if a Certificate is issued. Certificates obligate developers to make comprehensive compliance filings that detail the methods and plans for constructing a nuclear facility consistent with the Certificate. Each compliance filing is subject to

both public and party comment, and the developer works with the relevant State entities and stakeholders to address feedback and recommendations. The PSC approves most compliance filings, but some minor filings receive DPS staff approval. After meeting all conditions precedent in the Certificate, the developer may begin construction with the PSC's approval. DPS staff and the PSC oversee construction.

Finally, the PSC oversees compliance with the Certificate for the life of the facility. This entails continued coordination and communication between DPS, State agencies and authorities, the developer, municipalities, and stakeholders.

2.4 Local Roles

While the NRC maintains exclusive jurisdiction over the radiological safety aspects of nuclear facilities, in New York State, local governments retain authority over land use, building and energy codes, road access, and local emergency response for nuclear reactors of less than 25 MW. This could include, for instance, projects using microreactor technologies as discussed in the Master Plan Nuclear Microreactor Technologies Study. For nuclear facilities 25 MW or greater, local governments participate in the Article 10 process as statutory parties. There are two Ad Hoc members of the Siting Board from the host municipality or community district for the nuclear facility. The Ad Hoc members are voting members of the Siting Board that decides whether, and under what conditions, to issue the developer a Certificate for a nuclear facility. Local governments can also participate in federal licensing and permit processes as stakeholders. Section 5 details local authority over land use and zoning and section 4.7.3 describes the local role in emergency preparedness.

2.5 Recent Federal Policy Developments

The 2019 NEIMA and 2024 ADVANCE Act reoriented federal regulation toward efficient, risk-informed, and technology-inclusive review and an 18-month target for new reactor authorizations, which was reinforced by four executive orders signed May 23, 2025. This section describes the 2025 Executive Orders as well as recent federal rulemaking implementing these policy developments.

2.5.1 2025 Executive Orders

Culminating a push to facilitate new nuclear development over the last ten years through legislation and executive actions, on May 23, 2025, President Trump signed four interrelated executive orders that have significant implications for nuclear energy policy. Each order

addresses different aspects of nuclear policy across commercial, defense, and research sectors, including regulatory modernization, reactor testing procedures, national security applications, and the nuclear industrial base. As discussed elsewhere in this Master Plan, federal agencies have been implementing bipartisan direction to foster the option of new nuclear development to promote economic and energy security. For context, the four executive orders signed on May 23, 2025, are:

- Executive Order 14299: Deploying Advanced Nuclear Reactor Technologies for National Security;[44]
- Executive Order 14300: Ordering the Reform of the Nuclear Regulatory Commission;[45]
- Executive Order 14301: Reforming Nuclear Reactor Testing at the Department of Energy;[46] and
- Executive Order 14302: Reinvigorating the Nuclear Industrial Base.[47]

Table 2 summarizes these recent executive orders.

Table 2. Summary of Executive Orders Signed on May 23, 2025

Executive Order (EO)	Primary Focus	Key Federal Actions	Timing Signals
EO 14299 Deploying Advanced Nuclear for National Security	National security, artificial intelligence (AI), defense power	Deploy reactors at military and DOE sites; designate AI data centers as defense critical; release high-assay low-enriched uranium (HALEU); expand nuclear exports	Near-term deployment (2027–2029)
EO 14300 Reforming the NRC	Licensing speed and regulatory reform	Fixed licensing deadlines; NRC restructuring; expedited pathways; high-volume licensing	Rulemaking by 2026
EO 14301 Reforming DOE Reactor Testing	Demonstration and testing	Expedited test reactor approvals; pilot reactors outside national labs; NEPA reform	Criticality by July 4, 2026
EO 14302 Reinvigorating the Nuclear Industrial Base	Fuel, workforce, financing	Expand enrichment and HALEU; spent fuel policy; Defense Production Act authority; deployment targets	2025–2030

The four executive orders collectively impact a broad range of federal departments and agencies, requiring significant coordination across the executive branch. Major impacts to federal agencies are outlined in Table 3.

Table 3. Summary of 2025 Executive Order Impacts on Federal Agencies

Agency or Office	Description of Executive Order Impacts
Nuclear Regulatory Commission (NRC)	The NRC faces the most extensive mandates, including organizational restructuring, workforce reductions, comprehensive regulatory revision, reconsideration of appropriate drivers for the safety framework, and establishment of expedited licensing pathways. The orders directed NRC coordination with DOGE,[48] Office of Management and Budget (OMB), DOE, DoD, and EPA.
Department of Energy (DOE)	DOE assumes expanded responsibilities for advanced reactor testing, fuel supply chain development, site designation, HALEU distribution, NEPA reform, and workforce training. DOE National Laboratories, particularly Idaho National Laboratory, face significant operational changes.
Department of Defense (DoD)	DoD, through the Department of the Army, must establish nuclear energy programs for both installations and operations, with the Secretary of the Army designated as executive agent for nuclear energy across DoD. The orders direct reactor deployment at military installations.
State Department	The State Department must lead diplomatic engagement for Section 123 Agreements,[49] which establish legally binding frameworks for significant peaceful nuclear cooperation, pursuing at least 20 new agreements to enable American nuclear exports to partner countries.
Environmental Protection Agency (EPA)	EPA must participate in the reconsideration of radiation exposure models and standards, consulting with NRC, DOE, and DoD on potential adoption of determinate radiation limits.
Office of Management and Budget (OMB)	OMB coordinates budgetary processes and provides oversight of regulatory actions across agencies, including review of NRC restructuring and fee cap implementation.
Council on Environmental Quality (CEQ)	CEQ must consult on NEPA categorical exclusions for advanced reactor construction at federal sites and provide guidance on streamlined environmental review procedures.

2.5.2 Recent Federal Rulemakings

To implement the federal legislation and Executive Orders described in the previous sections, the NRC is in the process of issuing roughly two dozen proposed rule changes in 2026 touching numerous aspects of federal licensing and oversight processes. A selection of recent proposed and final rulemakings are briefly summarized in Table 4 and discussed in more detail in the relevant sections of the study. New York State reviews and comments on federal rulemakings to advocate for the State's interests and public health and safety. NYSERDA coordinates State agency review of federal rulemakings and submitted comments are publicly available.[39]

Table 4. Selection of Recent Nuclear Regulatory Commission Proposed and Final Rulemakings

Rule (Proposed or Final)	Description
Implementation of the National Environmental Policy Act (Proposed)[a]	Would expand categorical exclusions, narrow the scope of NRC environmental reviews, eliminate Environmental Impact Statement (EIS) scoping and issuance of draft EISs for public comment (see section 6.1.2)
Reforming and Modernizing the NRC's Radiation Protection Framework (Proposed)[b]	Would remove ALARA principle from NRC regulations and relax certain occupational and public radiation dose limits (see section 4.4.3)
Modernizing Reactor Licensing, Safety Oversight, and Siting Practices (Proposed)[c]	Would provide a general license authorizing construction of major portions of a new nuclear power plant prior to a license being issued if certain conditions are met; extend scalable EPZs to all new reactors and allow operating reactors to submit license amendment requests to shrink their EPZs; allow siting in areas of greater population density, including near population centers of more than 25,000 residents, when justified by an assessment comparing societal risks and benefits; extend reactor license renewal terms to 40 years
Streamlining Contested Adjudications in Licensing Proceedings (Final)[d]	Shortens the adjudicatory process with strict, truncated deadlines for 3 tiers of complexity (Expedited, Focused, and Standard) ranging from 6 to 18 months.

[a.] U.S. Nuclear Regulatory Commission, "Implementation of the National Environmental Policy Act," proposed rule, 91 Fed. Reg. 42086, July 7, 2026, https://www.federalregister.gov/documents/2026/07/07/2026-13687/implementation-of-the-national-environmental-policy-act.

[b.] U.S. Nuclear Regulatory Commission, "Reforming and Modernizing the NRC's Radiation Protection Framework."

[c.] U.S. Nuclear Regulatory Commission, "Modernizing Reactor Licensing, Safety Oversight, and Siting Practices," proposed rule and guidance; request for comment, 91 Fed. Reg. 44560, July 16, 2026, https://www.federalregister.gov/documents/2026/07/16/2026-14341/modernizing-reactor-licensing-safety-oversight-and-siting-practices.

[d.] U.S. Nuclear Regulatory Commission, "Streamlining Contested Adjudications in Licensing Proceedings," Final rule, 91 Fed. Reg. 69446, November 3, 2026, https://www.federalregister.gov/documents/2026/11/03/2026-22443/streamlining-contested-adjudications-in-licensing-proceedings.

2.6 Findings

Federal, State and Local Roles: Federally, the NRC maintains exclusive authority over reactor safety, security, and licensing of the radiological safety aspects of building and operating a commercial nuclear power plant. States retain authority over non-radiological environmental protection, siting, utility regulation, and offsite emergency preparedness. Local governments regulate land use and local zoning for smaller reactors alongside state and federal licensing processes.

New York's core regulatory framework: New York has the core legal and institutional framework needed to evaluate new grid-connected and large behind-the-meter nuclear development, whether LLWRs or more advanced and smaller reactor designs. DPS and the Siting Board, pursuant to Article 10 of the Public Service Law, have the primary role in siting nuclear generation facilities greater than 25 MW through the exercise of jurisdiction over most non-radiological aspects of siting, constructing, and operation of nuclear reactors. Article 10 serves as the central process to coordinate the siting and permitting of nuclear facilities, which occurs in parallel with the federal NRC process and aims for efficiency and minimal duplication of work, with NRC licensing materials filed for reference in the Article 10 proceeding.

Complexity and State Agency Coordination: Multiple State agencies and authorities (DPS, DEC, DOH, DHSES, DOS, and NYSERDA) have important and established roles with respect to nuclear deployment on issues of health and safety, environmental impacts, emergency preparedness, and intergovernmental coordination. These intersecting entity roles and requirements can make it challenging for stakeholders to navigate the regulatory process, highlighting opportunities to streamline procedures and provide a clear, single source of information.

Governmental Coordination: Federal, state, and local agencies should continue to engage proactively to engage stakeholders, reduce unnecessary overlap in review processes, and support effective emergency preparedness planning. This includes coordination on scalable emergency preparedness and security requirements, as well as outreach and technical assistance to promote understanding of evolving federal, state, and local policies.

Multi-Agency Federal Coordination is Essential: Successful nuclear deployment requires coordination among NRC, DOE, FERC, FEMA, DoD and other federal agencies. Recent MOU addenda, such as the one signed by DOE and NRC in 2025, and interagency initiatives, such as the Reactor Pilot program, demonstrate recognition of this need, but continued attention to efficient coordination is warranted.

Coordinate DOE-NRC Transition for Demonstration Projects: For advanced reactor designs proceeding through DOE's Reactor Pilot Program and Launch Pad toward subsequent NRC commercial licensing, DOE and NRC should cooperate with applicants' efforts to ensure effective coordination and information transfer. Safety data, operational experience, and lessons learned from DOE-authorized testing should be documented and made available to support NRC licensing reviews. Applicants should engage in pre-application discussions with the NRC while

they are under the authorization process at the DOE. NRC should continue to conduct independent safety and environmental reviews for license applications.

NRC Tribal Liaison Program: The NRC Tribal Liaison Program supports communication, coordination, and government-to-government engagement between the NRC and Indigenous Nations on matters within NRC jurisdiction, while the Nuclear Energy Tribal Working Group provides a forum for information sharing, dialogue, and collaboration between Indigenous Nations and the U.S. DOE on nuclear energy-related issues.

3. Federal Licensing and Oversight Framework

The NRC, as the primary federal regulator of commercial nuclear reactors, regulates all aspects of nuclear reactor design, construction, operation, maintenance, and adherence to strict safety and environmental standards. Commercial nuclear reactors must obtain an NRC license before construction and operation. As part of the licensing process, applicants must submit information supporting the NRC's safety, environmental, security, emergency-preparedness, and financial reviews. The licensing process also includes opportunities for public participation and coordination with other federal, state, local, and Indigenous Nation/Tribal authorities.

This section describes the NRC licensing pathways, including considerations for advanced reactor licensing, as well as the operating reactor license renewal process.

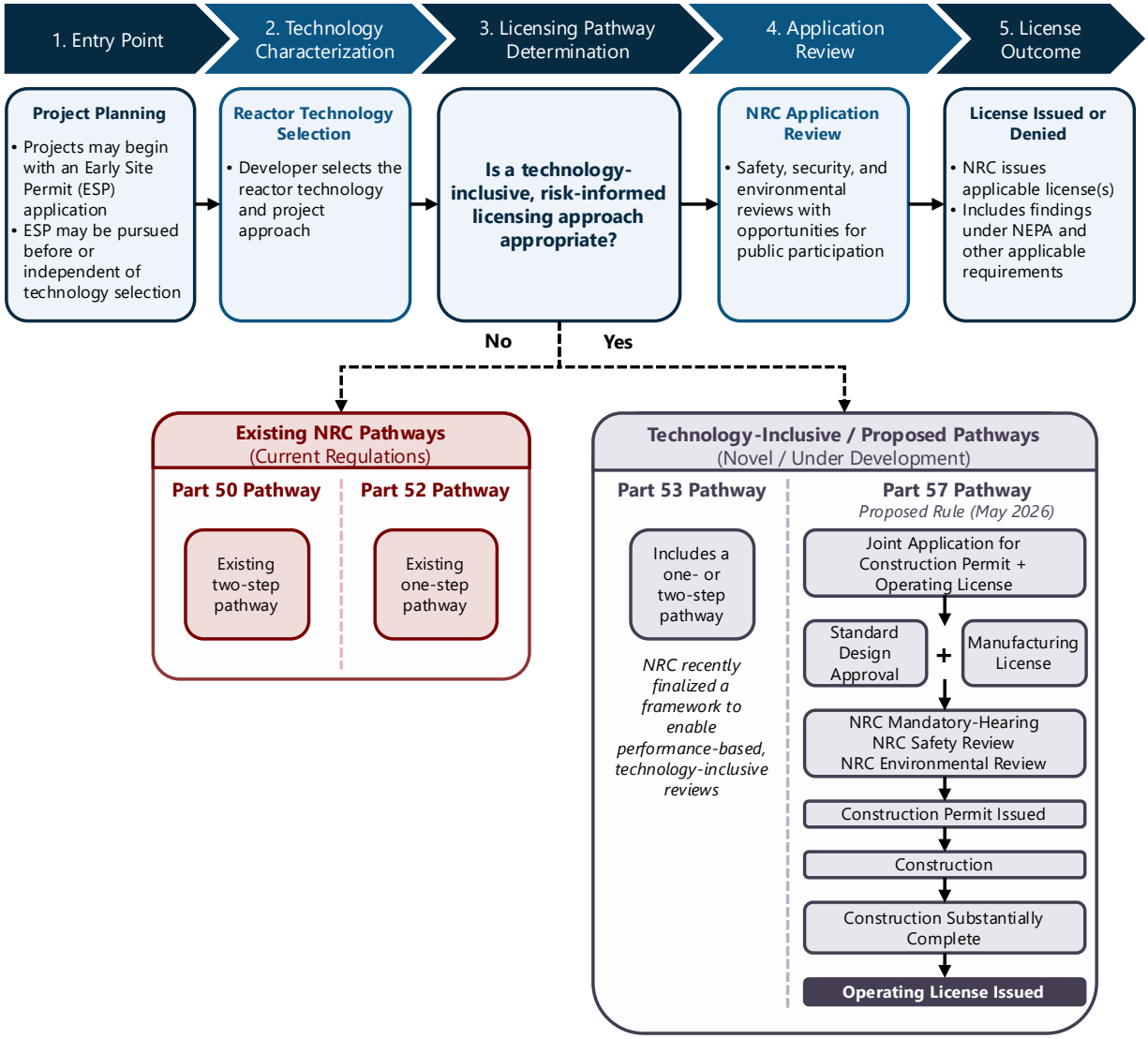
3.1 NRC Licensing Pathways

NRC has statutory authority for licensing and regulating commercial nuclear reactors while ensuring adequate protection of public health, safety, the environment, and national security. Any commercial nuclear facility must obtain authorization from the NRC prior to construction, operation, and eventual decommissioning. The NRC's licensing framework is increasingly risk-informed and performance-based. Licensees are subject to continuous regulatory oversight by NRC.

The NRC provides several licensing pathways for nuclear power reactors to accommodate differences in facility type, technological maturity, and deployment strategy (Figure 2). Once an applicant chooses a licensing pathway for a given facility, that pathway is generally used throughout the facility's life (there are no ready provisions to shift between pathways).

Figure 2. Nuclear Regulatory Commission Licensing Pathways for New Nuclear Reactors

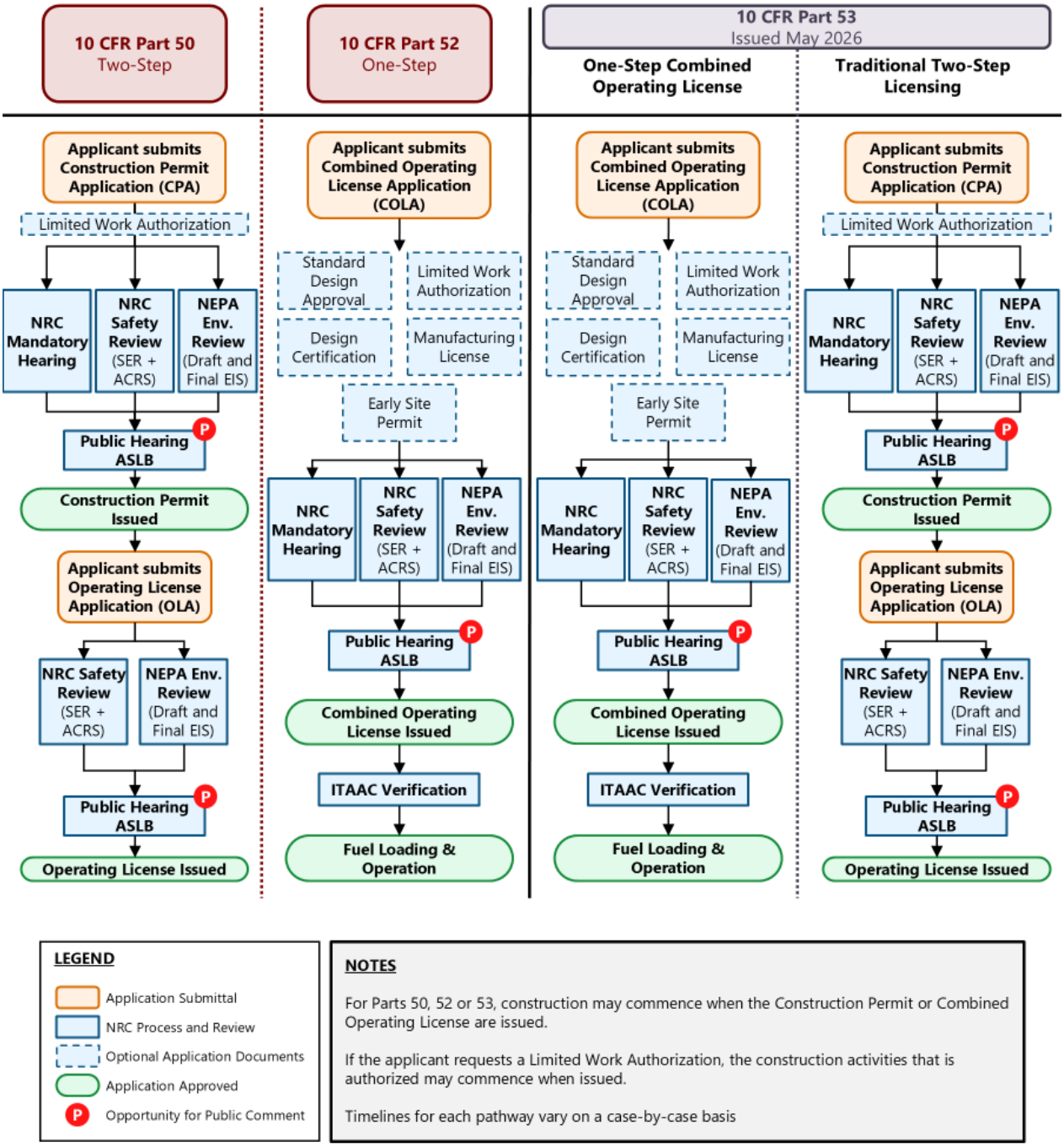
Note: Existing and proposed pathways will vary based on reactor technology and project approach



Across all licensing pathways, the NRC requires a comprehensive demonstration of safety through documented analyses and supporting programs. Core submittals typically include a safety analysis report describing the facility design and safety basis, an environmental report (ER) to support the NRC's environmental review under NEPA and proposed operational and management programs. The NRC's review process involves detailed technical evaluations, opportunities for public participation, and coordination with other federal, state, local, and Indigenous Naiton/Tribal authorities, as appropriate.

Figure 3 details the Part 50, 52, and 53 licensing pathways. More information on each licensing pathway, including the proposed Part 57 pathway, and associated NRC requirements is discussed in the following sections.

Figure 3. Nuclear Regulatory Commission Part 50, 52, and 53 Licensing Pathways



3.1.1 Part 50 Two-Step Licensing Process

The traditional licensing pathway under Part 50 employs a sequential two-step process consisting of a construction permit followed by an OL (Figure 3). This Part 50 licensing framework was used for all commercial nuclear power plants operating currently in New York State and is available for new advanced reactor applications.

3.1.1.1 Construction Permit Phase

An applicant seeking a Part 50 CP must submit a Preliminary Safety Analysis Report (PSAR) demonstrating that the proposed facility can be constructed and operated at the proposed location without undue risk to public health and safety. The PSAR provides the technical basis for a CP, detailing site characteristics such as meteorology, geology, and hydrology, preliminary plant design including the core, the reactor coolant system and safety features. If not already approved, the applicant's QA program must be included in the PSAR. The QA program establishes the organizational structure, procedures, and measures taken during the design phases to identify and correct potential problems. The PSAR must be detailed enough to allow the NRC to determine whether the proposed design and site are safe.

As part of this phase, the NRC conducts a safety review documented in a Safety Evaluation Report (SER) that may include Requests for Additional Information if the PSAR is lacking data, and the Advisory Committee on Reactor Safeguards (ACRS) reports on the NRC review. The NRC conducts a mandatory public hearing after the application is docketed.[50]

Under the NRC's current environmental review process, the applicant must also submit a comprehensive ER evaluating potential environmental impacts of constructing and operating a nuclear power plant, covering aspects such as land use, water resources, air quality, ecological impacts, and alternatives to the proposed action. The ER is used as the foundation for preparing the environmental assessment (EA) or EIS, as applicable. Under current NRC regulations, generally a new nuclear power plant CP, ESP, or COL requires an EIS. If an EIS is required, the NRC independently evaluates, analyzes, and supplements the information in the ER to create an EIS for a new license under NEPA. [51] The independent NRC evaluation includes conducting site audits to verify the data provided in the ER and may include Requests for Additional Information if needed. The draft EIS is then issued for public comment before the final EIS is issued.

Under its July 7, 2026 proposed rule, "Implementation of the National Environmental Policy Act," the NRC would determine whether to prepare an EA or EIS based on the likely significance of the proposed action's reasonably foreseeable environmental effects.[52] The NRC also proposes

discontinuing the publication of a draft EIS, including the routine solicitation of public comments. Under the proposal, the NRC would continue to request public comments on the Notice of Intent to prepare an EIS and could request additional comments at its discretion during preparation of the EIS. Based on the final environmental document and the record, the NRC would make the findings required by Part 51 and consider the environmental review in deciding whether to issue the license.

If the NRC finds reasonable assurance that the facility can be safely constructed and operated without undue risk and makes the required environmental findings, then the NRC can issue a CP authorizing construction activities.

An applicant for a CP under Part 50 may reference an optional ESP (described in Section 3.1.2.1).

3.1.1.2 Operating License Phase

Upon completion of plant construction, the applicant submits a Final Safety Analysis Report (FSAR) with as-built design details, operating procedures, and technical specifications. The NRC verifies construction completion through inspections and conducts a final safety review. An opportunity for public hearing is provided, and upon favorable findings, an OL is issued authorizing fuel loading and reactor operation.[53]

3.1.2 Part 52 Combined License Process

Part 52, promulgated in 1989 and significantly revised in 2007, established alternative licensing processes intended to provide greater regulatory predictability and efficiency. Part 52 allows the applicant to go through a one-step COL process and also allows for an ESP and Standard Design Certification (DC) (Figure 3).[54]

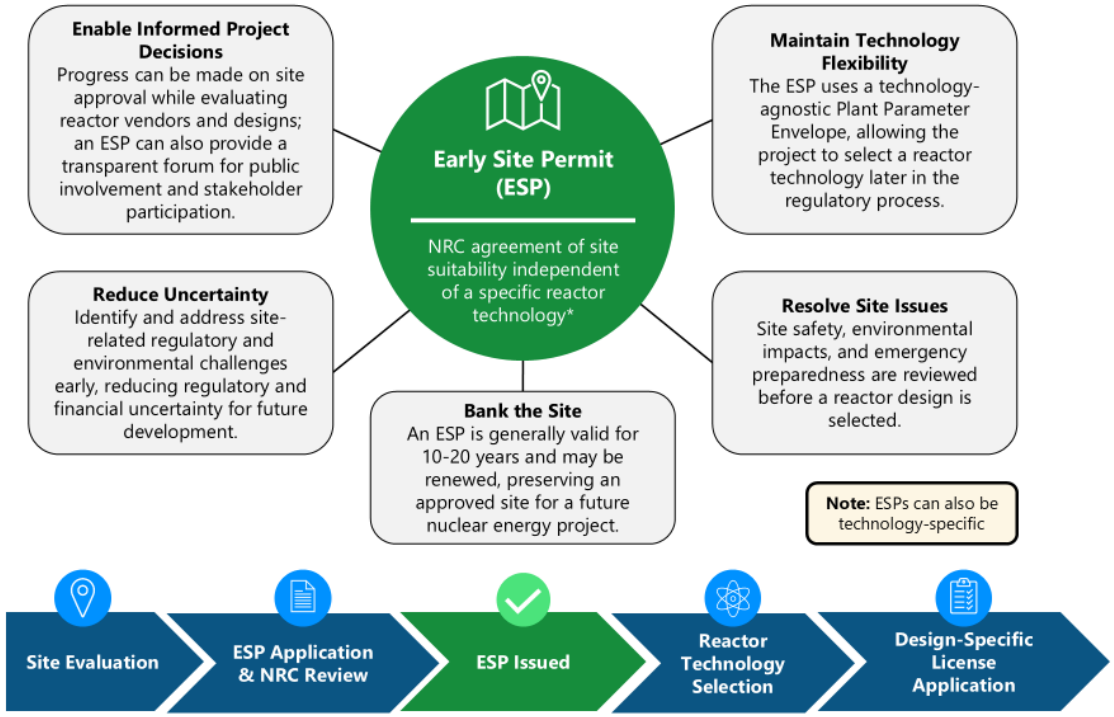
3.1.2.1 Early Site Permit

An ESP is an optional part of the NRC licensing process that allows resolution of site suitability issues before major investments in plant design. The permit addresses the site's seismic and geological characteristics, hydrology, meteorology, population considerations, and must identify any significant impediments to developing an emergency plan. The NRC may also consider emergency planning feasibility if the application so requests. An ESP is currently valid for 10 to20 years, with provisions for renewal, and may be referenced in a subsequent Part 52 COL application, Part 50 CP application, or Part 53 CP or COL application.[55] The proposed Part 57 rule does not include an ESP process.

The NRC has granted multiple ESPs based on a plant parameter envelope (PPE) that specifies a range of parameters, like thermal power ratings and cooling water requirements. [56, 57] Such parameters are usually design specific, but a PPE can encompass several candidate reactor designs (e.g., large light water reactor, small modular reactor, or microreactor) and still provide adequate information required by the NRC to be submitted as part of the site safety report for an ESP application.

The ESP process offers significant advantages for project planning and risk management (Figure 4). By resolving site safety issues, environmental protection issues, and emergency preparedness considerations prior to submitting an application for a CP or COL and for only a portion of the cost of pursuing a CP or COL, applicants can reduce licensing uncertainty and financial risk. In addition, if the ESP application is based on a PPE instead of a specific reactor design, licensing and financial risks can be mitigated before committing to a specific reactor design. Pursuing an ESP allows applicants to advance licensing progress while continuing to work with state regulators, stakeholders, and community leaders and retaining the ability to finalize development of the site if needed to meet quickly-growing energy needs and energy policy goals.

Figure 4. Early Site Permit Process and Key Advantages



Recently, DOE and NYSERDA provided co-funding to support Constellation Energy's application for an ESP for advanced reactors at Nine Mile Point, illustrating the opportunity for cooperative federal and state support to lower hurdles for potential projects to access the ESP process.

3.1.2.2 Design Certification and Standard Design Approval

The NRC can approve a standardized nuclear power plant design by issuing a design certification (DC) rule, as described in the following section. The DC may then be referenced without re-litigation of resolved safety issues. Alternatively, an applicant can request an SDA. If the applicant requests, the NRC can codify the SDA by issuing by a DC rule.

The reactor design certification process, established under Part 52, Subpart B, enables the NRC to approve standardized nuclear power plant designs independent of a specific site.[58] This process allows reactor vendors to obtain NRC approval of a reasonably complete reactor design through formal rulemaking, with the certified design codified in the regulation. Design certification resolves all safety questions associated with a design before construction authorization, providing regulatory finality that benefits subsequent applicants who reference the certified design in combined license applications (COLAs).

Applications for design certification must contain sufficient design information to enable the NRC to reach final conclusions on all safety questions. The Part 52 regulations require applicants to demonstrate compliance with the general design criteria (GDC) in Part 50, Appendix A, and to submit a design-specific probabilistic risk assessment (PRA). For LWR designs, applicants must also describe and analyze design features for the prevention and mitigation of severe accidents, addressing challenges such as core-concrete interaction, hydrogen combustion, and containment bypass.

A distinctive feature of design certification is the organization of design information into two tiers. Tier 1 information, which is approved and certified by the NRC, contains design descriptions; inspections, tests, analyses, and acceptance criteria (ITAAC); interface requirements; and site parameters. Tier 2 information is approved but not certified, providing detailed design information that supports Tier 1 compliance. The ITAAC constitute verification requirements that must be satisfied before fuel loading, ensuring that as-built facilities conform to the certified design.

NRC staff reviews design certification applications against the acceptance criteria in NUREG-0800, the Standard Review Plan (SRP), and documents its findings in a Safety Evaluation Report.

The ACRS independently reviews each application and provides recommendations to the NRC. Upon determining that a design meets applicable requirements, the NRC issues the certification through rulemaking, providing opportunity for public comment before the final rule takes effect.

The NRC has certified several reactor designs under the Part 52 licensing framework, including the Advanced Boiling Water Reactor, Advanced Passive (AP) 1000, Economic Simplified Boiling Water Reactor, APR1400, and the NuScale small modular reactor (SMR). DCs are valid for 40 years and may be renewed.

3.1.2.3 Combined Operating License

Unlike the Part 50 two-step process, under Part 52, a COL authorizes both construction and operation in a single licensing action.

Similar to the process under Part 50, the applicant submits the ER, the NRC holds scoping meetings and validates the information in the ER and prepares an environmental document, such as an EIS, EA or categorical exclusion, as appropriate. The NRC is piloting an alternative environmental review approach for the Fermi project in Texas, in which the applicant will prepare the draft EIS.[59] This new approach is enabled by recent statutory amendments to NEPA.

If a COL application references an ESP and DC, issues resolved in those proceedings are not subject to re-litigation. However, before loading fuel, the licensee must demonstrate that acceptance criteria from the COL have been met. Confirmation that inspections are completed and the criteria are met ensures the facility has been constructed in accordance with the approved design which then allows the NRC to make an affirmative finding under 10 CFR 52.103(g).[60] After this finding is made, the fuel can be loaded into the reactor.

3.1.3 Part 53 Advanced Reactor Licensing Framework

The 2019 NEIMA directed the NRC to complete rulemaking for a technology-inclusive, risk-informed, and performance-based (TI-RIPB) regulatory framework for advanced nuclear reactors by the end of 2027. The Part 53 regulation represents the NRC's response to this mandate, offering an alternative licensing pathway for new reactor technologies.[61] While the Part 50 and 52 frameworks were developed primarily to regulate the large LWR technologies that dominated commercial nuclear deployment in the United States for several decades, the Part 53 rule is technology inclusive and designed to accommodate any reactor technology, size, or commercial use including both traditional LWRs and advanced non-LWR designs. The final rule was published on March 30, 2026, with an effective date of April 29, 2026.[62]

Part 53 retains the core objective of providing reasonable assurance of adequate safety. Rather than relying primarily on prescriptive, technology-specific requirements derived from historical LWR experience, Part 53 incorporates greater flexibility and is designed to allow applicants to demonstrate safety by meeting defined performance objectives informed by probabilistic risk assessment (PRA) and other modern analytical tools (see Section 4 for further discussion). The TI-RIPB regime streamlines licensing for non-light-water designs (e.g., molten salt, gas-cooled) by emphasizing safety outcomes, using PRA or other systematic risk evaluations, and accommodating smaller, modular designs with passive safety features.

3.1.3.1 Key features of Part 53

Systematic Risk Assessment Approach: Part 53 requires applicants to perform facility-specific risk assessments, such as PRAs, to identify potential failures, event sequences, and consequences. Systematic risk evaluation, like a PRA, results inform selection of licensing basis events (LBEs); safety significance classification of structures, systems, and components; and overall facility design. Design Basis Events include operational occurrences, design-basis accidents, external events, and natural phenomena for which the plant must be designed to ensure safety functions.[63] This approach aligns with the Licensing Modernization Project methodology endorsed in NRC Regulatory Guide 1.233.[64] Systematic risk assessment is summarized further in Section 4.

Technology-Inclusive Design: Unlike Parts 50 and 52, which contain requirements specific to LWR technology, Part 53 uses functional requirements applicable across reactor types including sodium-cooled fast reactors, high-temperature gas reactors, molten salt reactors, and novel small modular designs.[65] This mitigates the need for exemptions and special license conditions under Parts 50 and 52 to account for non-LWR technologies.

Multiple License Application Types: Part 53 accommodates eight different license application types: CPs, OLs, COLs, ESPs, SDAs, Standard Design Certifications, Manufacturing Licenses, and LWAs.[66] This allows for greater flexibility including the use of PRAs to scale requirements to the specific risk of the facility. An applicant does not need to take advantage of each of the license types, but this flexibility allows for selection based on different business models and allows for acceleration of commercialization while ensuring a high level of safety.

3.1.4 Limited Work Authorization

An LWA allows applicants for Part 50 CPs, Part 52 COLs, or Part 53 CPs to perform certain preliminary construction activities at a proposed nuclear power plant site before the NRC issues

the underlying license. An LWA can be requested under Parts 50, 52, or 53 either in conjunction with an ESP or as part of a phased construction permit application. Specifically, an LWA authorizes the driving of piles, subsurface preparation, placement of backfill, concrete, or permanent retaining walls within an excavation, and installation of foundations for structures, systems, and components that have a reasonable nexus to radiological health and safety or common defense and security. To obtain an LWA, applicants must submit a safety analysis report demonstrating compliance with technically relevant NRC requirements, an ER in accordance with 10 CFR 51.49, and a redress plan describing how the site would be restored if the underlying license application is denied or withdrawn. As proposed, Part 57 does not provide for LWA.

3.1.5 Part 57 Microreactor Licensing Framework

The ADVANCE Act and Executive Order 14300 directed NRC to establish processes for high-volume licensing of microreactors and modular reactors. In May 2026, NRC proposed Part 57, a risk-informed and performance-based regulatory framework for rapid licensing of new microreactors and other reactors with comparable risk profiles for high-volume licensing of these reactors (Figure 2).[4] Key features of the proposed rule include requesting approval of fleets of identical reactors, allowing appropriate use of alternative design standards and programs for novel reactor operation, streamlining environmental reviews for projects with demonstrated minimal impacts, and providing a pathway for limited construction prior to receiving an NRC permit. Reactors would have to meet the entry criteria in the proposed rule to be eligible for this pathway to ensure that only simple and low consequence reactors can use it. The NRC intends to accelerate licensing and deployment timelines by targeting 6-12 months to complete the entire process for CPs and OLs. The proposed rule is expected to be finalized by the end of 2026 with an effective implementation date of early 2027.

Proposed Part 57 retains the core objective of providing reasonable assurance of adequate safety. Like Part 53, the proposed Part 57 does not rely primarily on prescriptive, technology-specific requirements and instead incorporates greater flexibility through the TI-RIPB regime, described in the previous section.

The proposed Part 57 does not change the basic NRC licensing structures (e.g., the system of CPs and OLs) from Part 50 (Figure 2). Part 57 also incorporates SDA and Manufacturing Licenses from Part 52. For reactor designs that can meet the proposed Part 57 entry criteria and design characteristic requirements, this pathway could streamline licensing to reflect that these reactor designs often incorporate inherent and passive safety design features that distinguish them from other reactors. The major features of the rule would allow streamlined review of safety

requirements and EA for simpler license applications. Once the NRC has approved the initial project or projects, follow-on projects could expect rapid licensing reviews of reactors with less complex designs, simplified safety characteristics, and low potential radiological consequences.

Under the proposed Part 57 rule, an applicant for a CP could commence construction under a general license provided certain conditions are met.[67] The proposed general license would be contingent on (1) the NRC docketing a joint application for a construction permit and OL, (2) the joint application references a manufacturing license, (3) the joint application references a previous joint application approved with finality by the NRC, (4) the application meets the criteria for a categorical exclusion from NEPA review, (5) the joint application contains a redress plan, and (6) other required permits and agency consultations have been completed. As proposed, construction under a general license pursuant to Part 57 could not include bringing special nuclear or other radioactive material on-site.

3.1.6 General Design Criteria

The GDC are found in Part 50, Appendix A but are not exclusively applicable to a Part 50 license. The GDC are considered generally applicable to various types of water-cooled reactors. In practice, for Parts 50 and 52, the NRC uses the GDC to define the required safety standards for a plant's design.

For conventional LWRs, compliance with all 64 GDC is generally required. Advanced reactor applicants may propose alternative or modified criteria through a certified design application or in the Part 52 application, with appropriate justification, and the NRC evaluates these proposals. This flexibility acknowledges that different reactor technologies achieve safety functions through different design features.

The NRC has developed Advanced Reactor Design Criteria (ARDC) in Regulatory Guide 1.232. The Regulatory Guide provides guidance on principal design criteria for non-LWRs, including sodium-cooled fast reactors, molten salt reactors, and high-temperature gas-cooled reactors.[68] These ARDC provide flexibility for applicants to propose alternative or modified criteria with appropriate justification.

As discussed in Section 4, the NRC recognizes the licensing efficiencies of moving to a technology-inclusive, risk-informed and performance-based (TI-RIPB) regime, especially for reactor technologies other than light water cooled. Part 53 regulations provide for developing

and approving such TI-RIPB design criteria. Part 57 would expand the TI-RIPB regime to address microreactors and other low-consequence reactors.

3.1.7 Reactor Site Criteria

The cornerstone of NRC siting regulation is 10 CFR Part 100, which establishes the fundamental criteria for evaluating proposed reactor sites.[69] The regulation applies to applications for site approval for constructing and operating stationary power and testing reactors under both 10 CFR Parts 50 and 52. For Part 53, instead of Part 100, the reactor siting criteria are adapted for TI-RIPB regulation in Subpart D of Part 53. Part 57 would allow a graded approach to siting microreactors and other similar low-consequence reactors as an alternate to Part 100.[70]

Section 100.20 identifies the factors to be considered in site evaluation, including characteristics of reactor design and proposed operation; population density and use characteristics of the site environs; physical characteristics of the site including seismology, meteorology, geology, and hydrology; and the location and characteristics of nearby industrial, transportation, and military facilities.[71,72] Part 53 Subpart D also requires consideration of these siting factors. For Part 57, the NRC proposes that these siting characteristics be disclosed in the CP and OL joint application and compared to the site parameters postulated for that design, such as the parameters specified in an SDA.

Section 100.21 establishes the non-seismic siting criteria,[73] which require that every site must have an exclusion area[74] and a low population zone (LPZ)[75] of dimensions determined by appropriate calculations.[76] The population center distance must be at least one and one-third times the distance from the reactor to the outer boundary of the LPZ. Sites must be located away from very densely populated centers. Accordingly, areas with low population density are generally preferred. The number and density of residents is relevant in emergency planning so that certain protective measures (such as notification and instructions to residents) can be accomplished in a timely manner. The site atmospheric dispersion characteristics must be evaluated and shown to meet regulatory requirements for routine and accidental releases.

For Part 53, the NRC requires similar consideration of exclusion zone, EPZ, and distance to population centers.[77] Part 57 does not propose explicitly including similar off-site emergency planning considerations. Instead, for Part 57, the NRC proposes that for emergency planning, "Each applicant and licensee under this part must coordinate response needs with local emergency planning and offsite response organizations. The applicant must provide the offsite response organizations that are expected to respond in an emergency with the opportunity to

provide input on the emergency plan before submitting it to the NRC. The application must contain any input on the emergency plan received from offsite organizations."[78]

Section 100.23 addresses geologic and seismic siting criteria, requiring comprehensive investigation of the geological, seismological, and engineering characteristics of the site and its environs.[79] Parts 53 and 57 applicants similarly consider external hazards against TI-RIPB design considerations. For Part 50 and 52, applicants must determine the Safe Shutdown Earthquake Ground Motion, which represents the maximum vibratory ground motion for which safety-related structures, systems, and components must be designed to remain functional.[80]

3.1.8 Licensing Pathway Considerations for Advanced Reactors

New advanced reactors cannot begin construction until the NRC licensing process, including comprehensive safety review, is complete. Most advanced nuclear reactor developers have elected to pursue the Part 50 pathway, finding it offers flexibility for first-of-a-kind (FOAK) designs. On the other hand, the Vogtle Electric Generating Plant pursued licensing under Part 52 based on many factors, not the least of which was an expectation that over a dozen AP1000 reactors at multiple sites would be constructed using a standardized design codified by the NRC as a design certification rule for the AP1000 reactors. There was an informal AP1000 owner's group that coordinated construction of multiple AP1000 plants. The lead owner was the Tennessee Valley Authority, pursuing Bellefonte Units 3 and 4 whose COL Applications (COLA) became known as the reference plant COLA (RCOLA). The subsequent COLA (SCOLAs) worked with the NRC to follow the reviews of the RCOLA and revise their SCOLAs to reflect the NRC conclusions on the RCOLA review. Despite expectations of standardization, the reference AP1000 plants, Bellefonte Units 3 and 4, were cancelled prior to construction, shifting the reference plant to Vogtle Units 3 and 4. Other subsequent plants were cancelled or put on hold, including VC Summer Units 2 and 3 after completing some partial construction. The project cancellations and delays eliminated the expected efficiencies of multiple orders for AP1000 plants and saddled Vogtle Unit 3 with the additional costs of being FOAK. There are lessons learned from the Vogtle licensing experience, which have influenced subsequent business decisions on licensing pathways.[81] For example, X-Energy and TerraPower each recently pursued CP applications under Part 50, which are expected to be followed by separate OL applications with follow-on plant orders awaiting successful FOAK construction progress.[82]

Although Parts 50 and 52 can be, and have been, used to license advanced reactors, they are widely viewed as less efficient and less well matched to any advanced reactor technology that

does not meet the prescriptive regulations. For example, the DC for NuScale's advanced light-water SMR contained two exemptions (related to control room staffing and reactor containment leak testing) needed to reflect innovative features of the NuScale SMR design that provided reasonable assurance of adequate safety but did not meet the prescriptive regulations.[83] Both Part 50 and 52 frameworks embed assumptions about reactor design, operating modes, and accident scenarios that reflect large LWR technology, including requirements related to emergency core cooling systems, design basis accidents, and deterministic safety analyses. For advanced reactors that rely on fundamentally different cooling mechanisms, fuel forms, or passive safety features, these assumptions may not be directly applicable.

As a result, developers of advanced reactors with innovative features pursuing licensing under Parts 50 or 52 often must request numerous exemptions, alternative evaluation methods, or tailored license conditions to demonstrate compliance. Part 53 is intended to reduce inefficiencies and reliance on exemptions. Importantly, the NRC has emphasized that Part 53 is intended to be a voluntary, additional licensing pathway option, not a replacement for Parts 50 or 52, which developers may choose to use instead. Applicants may continue to choose the licensing pathway that best aligns with their technology, project maturity, and risk tolerance. Given the recent issuance of the final rule, applicants for Gen IV technologies are in the process of evaluating using Part 53.

3.1.9 Public Participation in Federal Licensing Pathways

Public participation is built into every NRC licensing pathway. Under Parts 50, 52, 53, and the proposed Part 57, members of the public and other stakeholders can review application materials, submit written and oral comments, ask questions of the NRC, and, where they have a stake in the outcome, petition to take part in a formal hearing.

Across all pathways, an individual or organization that believes a license would affect its interests may petition to intervene and request a hearing. To do so, a petitioner must show standing and raise at least one admissible contention: a specific, supported challenge to the application. This is the most formal avenue for participation, and it is also the most demanding.

Under Parts 50, 52, and 53, the NRC also holds a mandatory hearing even when no one has filed a contention. Historically these uncontested hearings served to confirm on the record that the required safety and environmental findings could be made. Based on a 2026 Policy Statement on Mandatory Hearings for Reactor Licensing, the hearing is now held soon after an application

is docketed and is intended to function as "a forum for information exchange and public input," a shift that moves the public's opportunity earlier in the process.[84]

The NRC issued a final rule on November 3, 2026, to implement section 5(j) of Executive Order 14300, which directs the NRC to streamline its public hearing process.[85] Contested hearings today can run for years; the final rule compresses them to a final decision between 6 and 18 months based on complexity of the decision. Faster resolution has clear benefits for applicants and communities awaiting certainty.

Table 5 summarizes the public participation opportunities by licensing pathway. All four pathways share a public docket, an opportunity to comment on the environmental record, and the right to petition for a hearing. Meetings between the NRC and applicants or licensees are generally open to the public, closed only when proprietary or security information must be discussed, and the public normally has the chance to ask clarifying questions.[86]

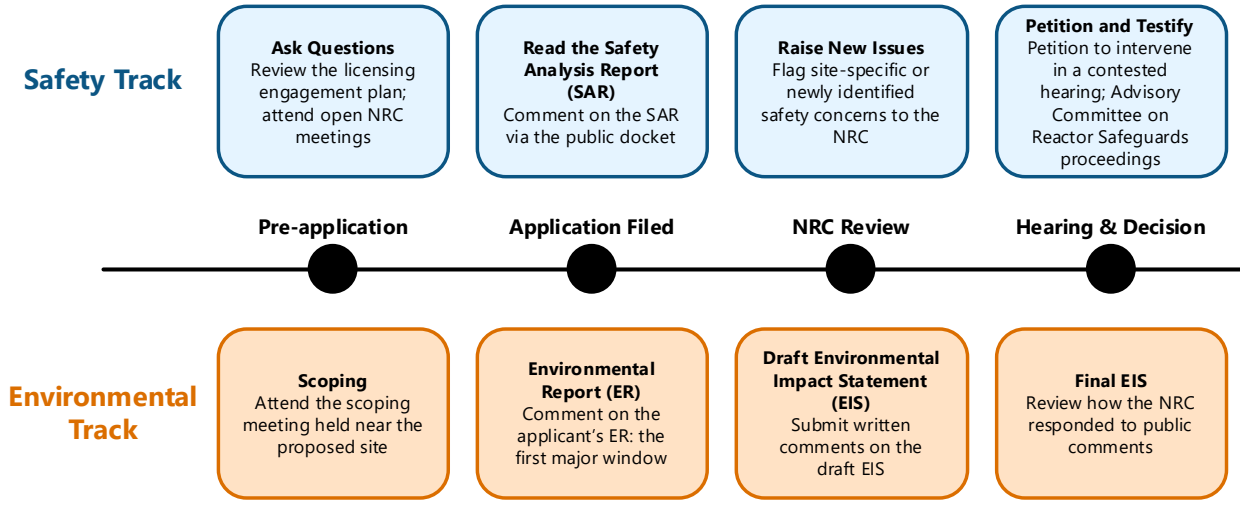
Table 5. Public Participation Opportunities by Federal Licensing Pathway

Pathway	Written comment opportunities	Hearing structure	Notable features for the public
Part 50 (two-step)	ER; draft EIS; safety analysis report	Petition to intervene for a contested hearing; separate mandatory hearing	Two decision points (construction permit, then operating license) create two windows
Part 52 (combined license)	ER; draft EIS; ESP comments; design-certification rulemaking	Petition to intervene; mandatory hearing on the combined license	ESP may settle siting questions early and keep them open to public view
Part 53 (risk-informed)	ER; draft EIS; safety case; design-certification rulemaking	Petition to intervene; mandatory hearing	Technology-inclusive record; participation mirrors Parts 50 and 52
Part 57 (proposed, microreactors)	Environmental submittal; application materials	Single consolidated hearing on a joint construction-and-operating application	Fewer, faster entry points by design; comment opportunity preserved

The practical gateway to information on the NRC licensing review process is the public docket. The NRC makes application materials, staff correspondence, meeting notices, and review documents available through its Agencywide Documents Access and Management System (ADAMS),[87] a free online library, and publishes hearing and comment opportunities in the Federal Register and on Regulations.gov. Knowing where the record lives is the first step to engaging with it.

Figure 5 summarizes the public's central opportunity to participate during the safety and environmental review tracks of the NRC licensing process.

Figure 5. Public Participation Touchpoints along the Nuclear Regulatory Commission Safety and Environmental Review Tracks of the Licensing Process



On the safety track, the public can comment on the applicant's safety analysis report (SAR). Where a safety issue is common to a class of reactors, the NRC may already have resolved it for example, through a DC rule[b] under Part 52 or 53 or a generic licensing action. In that case, the meaningful moment for public input was the earlier, generic proceeding, and for the project at hand, the public would ordinarily be limited to raising concerns of sufficient safety significance or concerns resting on information that was not available when the issue was first resolved.

The public can also participate fully in the review of site-specific safety issues unique to the application. Beyond commenting on the applicant's own analysis, members of the public may raise concerns about the NRC's safety evaluations where those evaluations surface new issues during staff review. Because the NRC also requires applicants to demonstrate their financial and technical qualifications, and because those administrative findings are treated as site-specific, the public may participate in the qualification review as part of the safety track as well.

On the environmental track, participation begins with the applicant's ER. Under the NRC's proposals to expedite environmental review, that report can be both the first and the most

[b] A DC is approved through a rulemaking rather than an adjudicatory hearing. Anyone may submit written or oral comments on the proposed design and the NRC must respond to significant comments before the design is codified.

consequential opportunity for the public to weigh in on environmental questions, which places a premium on engaging early.

The NRC is piloting an approach in which the applicant prepares the draft ER and the NRC adopts it, with modifications as needed, as the basis for its EIS. This consolidation can shorten schedules, but it also concentrates the environmental record in a document the applicant authors, which makes timely public comment on that report all the more important. In the pilot project, the applicant's environmental submittal was filed in July 2026, published by the NRC in August 2026, and is expected to be issued as a final report by December 2026.[59]

3.2 Operating Reactor License Renewal and Subsequent License Renewal

Federal law allows the NRC to grant initial OLs for commercial nuclear power plants with terms up to four decades.[88] Licenses may be renewed for additional terms of up to 20 years, and no plant has yet been licensed to operate beyond 80 years. NRC recently proposed extending license renewal terms to 40 years. The license renewal process for plants licensed under Part 50 or 52 is governed by Part 54. Licensing under Part 53 and proposed Part 57 contain their own requirements for subsequent license renewal and do not rely on Part 54. Operation beyond the original license term is referred to as extended operation. The license renewal process provides continued assurance that the current licensing basis will maintain an acceptable level of safety during extended operation.[89]

The safety requirements for license renewal under Part 54 are designed to be efficient, stable, and predictable, ensuring that important systems, structures, and components (SSCs) will continue to perform their intended function during the period of extended operation. [90] NRC review under the license renewal framework proceeds along two parallel tracks: one for safety issues under Part 54 and another for environmental issues under Part 51.[91] Applicants must address the technical aspects of plant component aging (referred to as aging here) and describe how aging effects will be managed, while also evaluating potential environmental impacts of continued operation. A license renewal application must contain an Integrated Plant Assessment (IPA) that identifies and lists SSCs subject to an aging management review (AMR) to assess system-level issues associated with management of aging plant components,[92]

The application must also include a list of time-limited aging analyses with demonstration that: the analyses remain valid for the period of extended operation; the analyses have been projected to the end of the period of extended operation; or the effects of aging on the

intended functions will be adequately managed. Additionally, applicants must submit a supplement to the ER that complies with the requirements of Part 51, Subpart A. The NRC's Generic Aging Lessons Learned (GALL) Report, NUREG-1801, documents the agency's generic basis for determining the adequacy of aging management programs (AMPs).[93] Key aging management areas addressed in the GALL Report include: reactor vessel material surveillance programs; water chemistry and one-time inspection programs for various systems; buried piping and tank inspection programs; containment in-service inspection programs; and cable aging management programs. The NRC can use License Renewal Interim Staff Guidance (LR-ISG) to provide lessons learned and identified efficiencies prior to formal revisions of the GALL Report or the Standard Review Plan for License Renewal (SRP).[94]

SLR refers to the renewal of an initial renewed operating license, extending operation from 60 years to 80 years.[95] The NRC issued the first SLR in December 2019 for Turkey Point Units 3 and 4 in Florida. As of early 2026, the NRC has issued SLRs for multiple LLWRs, with additional applications under review.[96] For example, the Dresden Nuclear Power Station Units 2 and 3 in Illinois received their final safety evaluation for SLR in September 2025.[97] The Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report, NUREG-2191, establishes the technical basis for the adequacy of applicant aging management programs consistent with its guidance.[98] The Standard Review Plan for Review of Subsequent License Renewal Applications (SRP-SLR), NUREG-2192, provides guidance to NRC staff reviewers for evaluating SLR applications.[99] Similar to initial license renewal, the staff can issue Subsequent License Renewal – Interim Staff Guidance (SLR-ISG) to identify lessons learned and efficiencies prior to formal revisions for the GALL-SLR and SRP-SLR. The NRC issued Revision 1 to both documents in July 2025, incorporating lessons learned from completed SLR reviews and updated technical information.[100]

Drawing on experience from numerous completed renewal reviews, the NRC established an 18-month target for processing applications that do not involve contested hearings, reduced from a previous 22-month benchmark.[101] The NRC conducts pre-application meetings with potential applicants to discuss technical or plant-specific issues and engages federal and state entities earlier in the environmental review process. Executive Order 14300 directed the NRC to establish fixed deadlines of no more than 12 months for existing reactor license renewals.[102]

The NRC's environmental review for license renewal is conducted in accordance with NEPA and Part 51. The Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437) addresses environmental issues that are common to all nuclear power plants and

those applicable to only a subset of plants to ensure broad applicability.[103] NRC approved an update to NUREG-1437 (Revision 2) in 2024, which was published in final form in August 2024.[104] This update incorporates lessons learned from previous license renewal environmental reviews and addresses evolving environmental considerations, including climate change impacts on facility operations and the environment. For each license renewal application, the NRC prepares a plant-specific supplement to the GEIS addressing site-specific environmental issues. The NRC can prepare these supplements as a supplemental EA with a Finding of No Significant Impact, rather than a supplemental EIS, as was recently done for Edwin I. Hatch Nuclear Plant Units 1 and 2 SLR.[105] However, the NRC's July 2026 proposed rule on NEPA implementation would establish categorical exclusions for most reactor license renewals.

Each license renewal application is traditionally referred to ACRS for review and a recommendation to NRC. The ACRS independently reviews the licensee's application, the NRC staff's Safety Evaluation Report, and relevant inspections and audits. The goal of this review is to ensure that the established programs and commitments made by applicants provide confidence that reactors can be operated safely through the renewal period. If requested by the NRC, the ACRS issues a recommendation to the NRC regarding issuance of the renewed license, which becomes part of the public record. However, since Executive Order 14300, ACRS has only reviewed license renewals that are determined to contain unique, novel, and noteworthy safety-significant aspects.[106] This ensures that ACRS effort is focused on decisions that are most impactful rather than routine review of similar license renewal applications. [107]

The NRC's inspection program for license renewal verifies the information in the application and the agency's evaluation. Inspection Manual Chapter 2516 provides policy and guidance for license renewal inspection programs,[108] while Inspection Procedure 71003 addresses post-approval site inspections.[109] These inspections ensure that scoping of plant SSCs has been completed properly, operating experience review was performed, and the aging management programs committed to in the application are in place to be implemented before entering the period of extended operation.

3.3 Findings and Conclusions

The federal regulatory framework for nuclear fission reactors reflects decades of experience while evolving to accommodate technological advances and changing policy priorities. Several findings, best practices, and conclusions emerging from the assessment presented in this section are described below.

Regulatory Modernization is Underway: The combination of NEIMA mandates, ADVANCE Act provisions, and other federal initiatives is focused on regulatory reform for advanced nuclear reactors. The Part 53 and proposed Part 57 licensing frameworks, alternative emergency preparedness and security requirements, and streamlined environmental review processes should provide a more flexible federal regulatory framework for the full range of advanced reactor technologies.

Licensing Efficiency: Clear interfaces and information sharing mechanisms can reduce duplicative review and support more efficient licensing outcomes. Federal efforts to improve licensing efficiency, such as predictable review timelines, reduced fees for qualifying advanced reactors, and standardized application approaches should be sustained and refined as experience with new technologies increases. With the flexibility for structure and content of new reactor applications under Parts 53 and 57, NRC should issue timely and specific guidance to support predictable licensing reviews.

Early Site Permits Can Increase Regulatory Certainty. The federal ESP process settles key regulatory aspects for a particular location before a reactor design is chosen or construction begins. It is a practical way to prepare project-ready sites for advanced nuclear development. However, navigating the regulatory process can be challenging and costly for communities who may need additional support to make the best use of ESPs. The recent DOE and New York co-funding to support Constellation Energy's application for an ESP for advanced reactors at Nine Mile Point is an example of cooperative federal and state support to lower hurdles for potential projects to access the ESP process.

Conclusion:

- **Continue working with the federal government to develop cooperative federal and state support on the Early Site Permit process to communities and developers in the form of federal co-funding and regulatory assistance.**

4. Reactor Safety and Public Health Protections

Public confidence in nuclear energy rests on two foundations: the safety characteristics of modern reactor technologies and a robust, independent regulatory framework that ensures projects meet the highest standards for protecting public health, safety, and the environment. New York and the nation have a comprehensive federal, state, and local regulatory framework aimed at ensuring reactor safety and public health, described in this section. It is this robust framework that underpins public trust. The continued evolution of advanced nuclear and responsible deployment must be centered on maintaining strong safety principles while ensuring regulatory approaches address new designs and novel deployments.

The NRC maintains statutory authority to ensure that commercial nuclear power plants in the United States operate safely and do not pose undue risks to public health and safety. To fulfill this authority, once a reactor is licensed and operating, the NRC maintains continuous oversight through its reactor oversight and inspection programs that protect public health, safety, security, and the environment. Emergency preparedness is implemented through a coordinated federal, state, local, and licensee framework. This section describes the federal, state, and local government roles in protecting public health and safety through reactor safety oversight, radiation protection, environmental surveillance, security, and emergency preparedness. This section also considers safety characteristics of advanced reactor technologies. It outlines both current requirements for currently operating LWRs as well as recently enacted and proposed updates and implications for advanced reactors.

4.1 Federal, State, and Local Safety and Public Health Roles

Protection of public health and safety in the nuclear context is carried out through a coordinated federal, state, and local framework. At the federal level, NRC authority establishes and enforces nuclear safety, radiation protection, and emergency preparedness requirements and FEMA evaluates off-site emergency plans. States lead off-site radiological emergency planning and response, including radiation monitoring, coordination of protective actions, and oversight of training and exercises while operating within the bounds of federal authority. Local governments, particularly counties, implement emergency plans on the ground by managing public warnings, evacuation or sheltering actions, first responder support, and public communication during any incidents.

4.1.1 Federal Role

The NRC exercises continuous oversight over operating reactor safety through the Reactor Oversight Process (ROP), a comprehensive program designed to monitor, inspect, and assess nuclear power plant performance, described further in Section 4.3.

The NRC also plays a central role in radiation protection and emergency preparedness. NRC regulations establish limits on radiation exposure to workers and the public, requirements for monitoring and controlling radioactive releases, and standards for emergency planning around nuclear reactor sites.

4.1.2 State Role

The State oversees public health and safety through comprehensive emergency planning, radiological monitoring, and protective action coordination. The State develops and maintains comprehensive plans for prompt response to potential emergencies and conducts regular drills, training, and exercises with local counties and nuclear power plant operators. The DOH Bureau of Environmental Radiation Protection acts as the lead technical responder to emergencies, and additional information on emergency preparedness is provided in Section 4.7.

Lastly, DOH conducts its own environmental surveillance through its Environmental Radiation Surveillance Program, described in Section 4.5.2.

4.1.3 Local Role

Local governments, particularly counties, play a role in radiological protection mainly by implementing county-level emergency plans, managing emergency warning systems, organizing evacuation or sheltering protocols, and training local first responders. Local emergency preparedness work is done in partnership with DHSES.

Key local roles for emergency planning include developing procedures to protect the public from radiation accidents, including evacuation routes, reception centers, and sheltering instructions. Local governments participate in DOH and DHSES programs to maintain radiation detection equipment and conduct exercises. Local officials are responsible for making protective action decisions, issuing alerts, communicating necessary safety measures, such as potassium iodide medication distribution for radiological emergencies, and keeping the public informed during any incidents. Additional information is provided in Section 4.7.

4.2 NRC Safety Philosophy and Goals

Safety philosophy for nuclear power plants is the foundation for applying NRC statutory authority and is founded on the concept of providing reasonable assurance of adequate protection. One key aspect of providing such assurance is the concept of defense in depth. Where there is a measurable risk of an active system failing, defense in depth is an approach that prevents and mitigates accidents through multiple safeguards so that no single action is exclusively relied upon.[110]

Defense in depth ensures that if one defense layer fails, other layers of defense prevent failures, mitigate risks, and protect systems from breaches. Key defense in depth requirements include multiple physical barriers (e.g., fuel cladding and reactor containment), redundant and diverse safety systems, and operational and administrative controls, such as maintenance policies and staff training and procedures.

4.3 NRC Reactor Oversight Process

The NRC maintains the statutory authority to ensure that commercial nuclear power plants in the United States operate safely and do not pose undue risks to public health and safety.[111] To fulfill this authority, the agency implements the ROP. The ROP is a comprehensive framework designed to monitor, inspect, and assess nuclear power plant performance using risk-informed and performance-based methodologies.[112] The ROP framework is consistent with NRC's high-level performance goals including maintaining a low frequency of events that could lead to a nuclear reactor accident, achieving zero significant radiation exposures resulting from commercial nuclear reactors, ensuring no increase in offsite releases of radioactive material exceeding regulatory limits, and preventing any substantiated breakdown of physical protection.[113] The ROP is specifically designed to verify that licensees maintain adequate defense in depth at their facilities. One way to think about the ROP is that it is similar to the restaurant health inspection system where there is an oversight framework involving key principles, and inspection requirements, and responses to violations are aligned with risk.

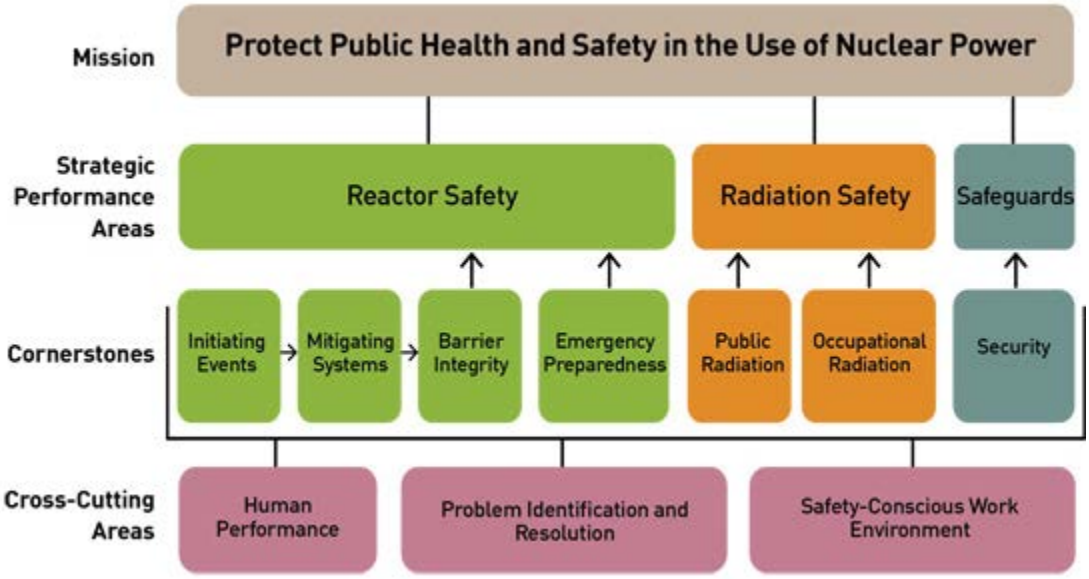
In 2025, the NRC staff issued a policy paper and subsequent update describing the development of the Advanced Reactor Construction Oversight Program (ARCOP), which will apply to future construction and manufacturing activities for advanced reactor technologies (see Section 4.3.9).[114] The ARCOP framework builds on the construction-specific ROP (cROP) the NRC adopted during construction of Vogtle Units 3 and 4 and subsequent lessons learned.[115] The NRC intends

for the program to be risk-informed, technology neutral, and scalable with its own regime for performance monitoring, inspection, and significance determination.[116]

As illustrated in Figure 6, the ROP is structured around three strategic performance areas, which guide NRC regulatory activities. The performance areas are supported by seven safety cornerstones, and three cross-cutting areas influence performance across each area and cornerstone. By structuring oversight in this manner, the ROP enables the NRC to focus authority on the most safety-significant areas, detect declining performance early, and maintain transparency and accountability in nuclear safety regulation. Each component of the framework is briefly discussed in the sections below.

Figure 6. NRC Reactor Oversight Process (ROP) Framework

Source: NRC, https://www.nrc.gov/reactors/operating/oversight/rop-description.



4.3.1 Reactor Safety Performance Area

The reactor safety performance area focuses on preventing accidents and ensuring that plant systems can respond effectively to abnormal operating conditions. Its objective is to maintain stable reactor operation and ensure that safety-related systems are available, reliable, and capable of preventing core damage if issues occur.

This performance area incorporates multiple layers of defense in depth and is supported by cornerstones that address initiating events, mitigating systems, barrier integrity, and emergency preparedness.

4.3.2 Radiation Safety Performance Area

The radiation safety performance area addresses the protection of both workers and the public from unnecessary radiation exposure during normal plant operations. This area ensures that occupational radiation doses remain within regulatory limits. Regulatory radiation exposure limits are established based on knowledge of how radiation impacts health. This area also ensures that exposure pathways for the public, including direct radiation exposure and radioactive effluent releases to the environment, are properly controlled.

Radiation safety is a distinct strategic area supported by cornerstones of occupational radiation safety and public radiation safety, reinforcing NRC oversight of radiological controls and exposure management.

In addition to this performance area of the ROP, federal and State radiation protection requirements are described in Section 4.4.

4.3.3 Safeguards and Security Performance Area

The safeguards and security performance area focuses on protecting nuclear facilities and materials against radiological sabotage, theft, or diversion. This area ensures the physical protection of nuclear plants and special nuclear material, supporting the prevention of intentional acts that could compromise public safety or national security.

Safeguards and security form a separate strategic performance area, reflecting the importance of physical protection and security programs within the overall ROP framework.

4.3.4 Safety Cornerstones

The three strategic performance areas are supported by seven safety cornerstones that represent essential aspects of nuclear plant safety and support the defense in depth philosophy. Together, satisfactory performance across all cornerstones provides reasonable assurance that a plant is operating safely and in compliance with regulatory requirements. The seven safety cornerstones are:

- **Initiating Events:** Limits the frequency of events that challenge plant stability.
- **Mitigating Systems:** Ensures the availability and reliability of systems that prevent core damage.
- **Barrier Integrity:** Maintains the physical barriers that prevent radioactive release.

- **Emergency Preparedness:** Evaluates the capability to protect the public during an emergency.
- **Occupational Radiation Safety:** Protects workers from unnecessary radiation exposure.
- **Public Radiation Safety:** Controls radioactive releases to the environment.
- **Security:** Protects facilities and materials from sabotage or theft.

4.3.5 Cross-Cutting Areas

NRC's ROP has three cross-cutting areas that influence performance across all strategic performance areas and cornerstones:

- **Human Performance:** Decision-making, work practices, and resource management;
- **Problem Identification and Resolution:** Effectiveness of corrective action programs; and
- **Safety-Conscious Work Environment:** Ability of personnel to raise safety concerns without any fear of retaliation, intimidation, or punishment.

The cross-cutting areas are prioritized based on lessons learned from past events involving nuclear safety. These areas are evaluated during inspections and periodic assessments to provide insight into organizational and cultural contributors to safety performance. These cross-cutting areas span the entire ROP framework, reinforcing their role in sustaining safe and compliant plant operations.

4.3.6 Baseline Inspection Program

The baseline inspection program is the minimum inspection effort the NRC conducts at all operating nuclear power plants to provide reasonable assurance that plants are meeting safety cornerstone objectives. This program focuses on activities and systems that are risk-significant, meaning those that have the potential to trigger an accident, can mitigate the effects of an accident, or can increase the consequences of a possible accident.

Resident inspectors stationed at each nuclear power plant conduct a significant portion of the baseline inspection program. Each operating plant has at least two resident inspectors who are highly trained professionals tasked with observing plant activities and verifying compliance with federal safety requirements on a daily basis. These inspectors visit control rooms, review operator logbook entries, observe tests and repairs of important systems, interact with plant

employees, and check corrective action documents to ensure problems are identified and resolved.

The resident inspectors are supported by NRC headquarters and region-based specialists who cover areas including plant security, emergency planning, radiation protection, environmental monitoring, fire protection, and specialized engineering disciplines. Each year, these specialists conduct numerous routine inspections at each nuclear power plant. The baseline inspection program includes inspectable areas organized by cornerstone, with inspection procedure attachments specifying the scope, objectives, and level of effort for each inspection activity.

The baseline inspection procedures address reactor safety, including the initiating events, mitigating systems, and barrier integrity cornerstones. Inspection procedures cover the reactor safety strategic performance area, addressing topics such as operator training, maintenance effectiveness, equipment alignment, surveillance testing, and design basis verification. Additional procedures address radiation safety, emergency preparedness, and security cornerstones.

For advanced reactors with less complex operations, the NRC is evaluating policy options that rely on visiting inspectors with specialized expertise rather than on-site generalists supplemented by regional or headquarters-based experts.

4.3.7 Integration with Enforcement

The ROP integrates with the NRC's enforcement program to address violations of regulatory requirements.[117] Violations associated with inspection findings evaluated through the Significance Determination Process (SDP) are assigned colors corresponding to their risk significance. Green findings with associated violations are typically documented as non-cited violations, while white, yellow, and red findings result in increased NRC inspections to assess licensee performance. Separate from the SDP, the NRC considers other factors in deciding enforcement actions, such as timeliness of corrective action and willfulness. The NRC may escalate enforcement actions including notices of violation and civil penalties.[118]

4.3.8 Updates to the Reactor Oversight Process

The ADVANCE Act and EO 14300[119] directed NRC to focus inspection activities on areas believed to be most impactful for safety and to maintain responsiveness to credible risks. Accordingly, on March 25, 2026, the NRC Commissioners approved changes to the Baseline Inspection Program of the ROP. Refocusing ROP and the associated reduction in inspection hours affect the reactor

safety, emergency preparedness, radiation protection, and problem identification and resolution portions of the Baseline Inspection Program. The changes are expected to result in a 38 percent reduction in direct inspection hours compared to current levels. NRC's decision notes that resident inspectors will continue to be NRC's essential eyes and ears overseeing safety at reactor sites. The resident inspectors at each operating nuclear power plant will be performing more targeted baseline inspections, contributing to reductions in the size and frequency of multi-disciplinary regional inspections. The changes to the ROP were based in part on NRC's finding that the operating fleet's performance has improved since the ROP was first implemented in 2000, noting that licensees have implemented strong operational practices in programs such as emergency preparedness, radiation protection, and security.

4.3.9 Advanced Reactor Construction Oversight Program

Based on lessons learned from oversight of the Vogtle construction project, NRC is developing the ARCOP. This will be a performance-based, technology-inclusive, risk-informed, and scalable program. The program will include advanced reactor construction inspections, an inspection finding significance determination process, enforcement, and project quality assessment. ARCOP will cover all new reactor construction projects, including large reactors, SMRs, and microreactors, regardless of whether they are LWR or non-water-cooled technologies.[120]

4.4 Radiation Protection and Monitoring

4.4.1 Federal Regulations

Federal dose limits in Part 20 are set to ensure safety, limiting workers to 5,000 mrem/year total effective dose equivalent, while the public is limited to 100 mrem/year. ALARA principles are currently mandated to reduce doses below these limits by taking practical, reasonable, and cost-effective actions based on knowledge of radiation health principles. Effluent controls ensure emissions meet strict constraints and continuous monitoring of effluent release points is generally required. If public doses from airborne emissions exceed limits, operators must report to the NRC and take corrective action.

Potential federal changes to the ALARA principle are described in Section 4.4.3.

4.4.2 State Regulations

DEC's Bureau of Hazardous Waste and Radiation Management administers permits for the discharge or disposal of radioactive materials to the environment under 6 NYCRR Part 380 and

in agreement with the NRC. The regulation sets radiation dose limits and emission levels above which a party must obtain a Radiation Control Permit. Permitted facilities also require a radioactive materials license from DOH or NYCDOHMH. These requirements may apply to parts of the process to use nuclear technologies for medical radioisotope production outside of NRC licensing.

Part 380 requires parties who discharge radioactive material to keep records and maintain discharges to be ALARA. Recent amendments adopted in May 2018 updated compatibility with NRC regulations and expanded requirements for incident reporting and permit application content. The regulations include an air emissions limit of 10 millirem per year dose to any member of the public, which is the same as the current federal National Emission Standard for Hazardous Air Pollutants for radionuclides limit.

4.4.3 Potential Changes to the ALARA Principle and Safety Implications

Executive Order 14300 (see Section 2.5.1) directed the NRC to reconsider reliance on two foundational elements of radiation protection: the linear no-threshold (LNT) model and the ALARA principle. In July 2026, NRC issued a proposed rule, Reforming and Modernizing the NRC's Radiation Protection Framework, to replace ALARA with a graded approach. [121] NRC expects to finalize this rule in early 2027.

"The LNT model assumes that radiation risk is directly proportional to radiation dose, and that any dose no matter how small, could result in detrimental health effects such as cancer or heritable genetic damage. Based on this model, the ALARA principle, implemented in 10 CFR 20.1003, requires that licensees make every reasonable effort to maintain exposures to radiation as far below dose limits as practical. ALARA has been described as the cornerstone of occupational radiation protection, reflecting the conservative assumption that any increased radiation exposure carries some risk and accordingly, there is benefit to reducing occupational and public dose using reasonable means, including for portions of the population who may be disproportionally impacted by radiation. Most regulations for occupational and public dose are based on exposure in excess of natural background, which is about 300mrem/year in the United States. The Executive Order directed the NRC to consider adopting "determinate radiation limits" in place of the current approach, consulting with DoD, DOE, and EPA in developing new specific standards.

In parallel with the development of the NRC proposed rule, DOE initiated the process to remove ALARA from all DOE directives and regulations.[122] The NRC's proposed graded approach would establish specific exposure thresholds below which no protective action would be required. This contrasts with the current approach of applying ALARA principles to use practical and reasonable steps to minimize radiation dose below the limits.

The proposed rule, if adopted, could have wide-ranging implications for nuclear safety practices. Key areas of potential impact include:

Occupational Exposure Limits: Current NRC limits of 5 rem (50 mSv) per year for workers have remained unchanged since the 1960s.[123] The NRC's proposed rule allows of up to twice the current 5 rem per year limit if the worker received less than 5 rem per year over the previous 5 years.

Public Exposure Standards: The current public exposure limit is 0.1 rem per year. The proposed rule may also allow higher exposure to the public from radiation or from release of radioactive materials to the environment. The proposed rule would also increase air emission limits, for an individual member of the public on a total effective dose equivalent basis from 10 to 25 mrem per year. None of the New York Radiation Control Permit (Part 380) facilities are approaching the 10 mrem/yr limit under the current regulatory regime. Instead, most facilities are well below that at 1 mrem/yr.

Environmental Remediation: ALARA principles currently drive cleanup standards at contaminated sites. NRC's license termination rule requires residual radioactivity to be reduced to levels that are ALARA and sets a public dose limit of 25 mrem per year, consistent with DEC's Criteria for Decommissioning of Radioactive Material Licensed Sites. Removal of ALARA could affect remediation requirements at decommissioned reactor sites, other previously licensed sites, and Superfund sites with radiological contamination.[124]

Reactor Design Requirements: ALARA has historically driven reactor design features aimed at minimizing occupational and public exposures during normal operations. Modified standards could reduce design complexity and associated costs.

Emergency Planning: Higher permissible exposure thresholds in the proposed rulemaking could affect emergency planning zones and protective action guidelines for reactor accidents.

4.5 Environmental Surveillance and Public Reporting

4.5.1 Federal Monitoring and Reporting Requirements

The NRC requires nuclear power plants to conduct radiological environmental monitoring programs to measure radioactivity in the local environment, beginning at least 2 years before operation to establish a baseline. Licensees must submit annual radiological environmental operating reports to the NRC, which are publicly available through the NRCs Agencywide Documents Access and Management System (ADAMS). Licensees must report all effluent discharges (gaseous and liquid) annually to the NRC. If monitoring indicates that regulatory reporting levels are exceeded, the licensee must submit a special report documenting the event and defining corrective actions.

The NRC conducts periodic inspections of licensee effluent and environmental monitoring programs every 2 years. All NRC inspection reports are available to the public through ADAMS and document NRC's assessment of licensee compliance with requirements.

4.5.2 State Monitoring Programs

DOH's Environmental Radiation Surveillance Program determines radionuclide levels in environmental media (soil, sediment, air, or water) near commercial nuclear power plants, other nuclear facilities, and background locations. While DOH does not perform environmental surveillance at the perimeter of decommissioned nuclear sites, DOH does maintain baseline environmental data and sampling results over time. Knowing both the baseline and tracking levels over time allows assessment of the influence of human activities. The Surveillance Program is not a mandated requirement and DOH bears full responsibility for the program. Program data is available to the public.

Separately, Executive Law Article 2-B Section 29C authorizes the monitoring of off-site radioactive material in the vicinity of nuclear electric generating facilities in the State and the collection of fees to support state and local government radiological emergency preparedness plans. The annual fee of $1 million per reactor is payable to the Disaster Preparedness Commission and expended as outlined in Section 29C. State fees are discussed further in Section 9.2.

4.6 Reactor and Facility Security Requirements

4.6.1 Federal

Current requirements under 10 CFR 73.55 mandate protection against the Design Basis Threat of radiological sabotage through prevention of significant core damage. NRC requires reactors licensed under Part 50 or 52 to prepare a Physical Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, and Cyber Security Plan.[125]

The plans must identify, describe, and account for site-specific conditions that affect the licensee's capability to satisfy the requirements of the section. The licensee is responsible for maintaining the on-site physical protection program in accordance with NRC regulations through the implementation of security plans and written security implementation procedures. Applicants for an OL under Part 50 or holders of a COL under Part 52 must implement the requirements before fuel is allowed onsite (in the protected area).

The NRC currently conducts one force-on-force exercise at each nuclear power plant on a 3-year cycle. Beginning in 2029, the NRC staff will instead observe licensee-conducted exercises. In addition, the NRC conducts physical and cyber security inspections.

In addition to physical security requirements, commercial nuclear power plant operators must also establish, implement, and maintain a cyber security program in accordance with 10 CFR 73.54, “Protection of Digital Computer and Communication Systems and Networks”. These standards include cyber security measures to protect cyber systems from unauthorized access, theft, misuse, or damage of nuclear materials and facilities.

Part 53 and the proposed Part 57 rule provide alternative physical security requirements for advanced reactors, discussed in Section 4.8.6.

4.6.2 State

Under the Article 10 siting process and related requirements, applicants for a Certificate must file electric generating facility security plans as Exhibit 18 to an application. DPS, DHSES, and local emergency first responders review the Exhibit 18 plans.[126] While security requirements for nuclear facilities are primarily established by the NRC under 10 CFR Part 73, DHSES plays a coordinating role in emergency response planning and threat assessment.

4.7 Emergency Preparedness

4.7.1 Federal Emergency Planning Framework

The federal emergency planning framework for commercial nuclear fission reactors is established primarily under the NRC's Part 50[127] and in Appendix E to Part 50 and is implemented through a coordinated federal, state, and local system. Under this framework, reactor licensees are responsible for developing and maintaining on-site emergency plans, while off-site radiological emergency preparedness is the responsibility of state and local governments with federal oversight and support. The NRC evaluates the adequacy of on-site emergency plans and relies on findings by FEMA regarding the adequacy and feasibility of off-site plans. FEMA administers the Federal Radiological Emergency Preparedness (REP) Program, which provides planning standards, guidance, training, and exercises to ensure that state and local authorities can protect public health and safety in the event of a radiological emergency. Together, this framework is intended to provide reasonable assurance that effective protective measures can and will be taken to mitigate the consequences of an accident at a nuclear power plant.

Emergency planning for nuclear power plants involves a collaborative framework among federal, state, and local agencies, described in more detail in the following sections. The NRC establishes requirements for on-site emergency preparedness, reviews and approves emergency plans developed by licensees in coordination with state and local authorities, and periodically evaluates emergency preparedness through drills, exercises, and inspections. FEMA evaluates off-site emergency response plans and communication capabilities developed by NRC licensees in cooperation with state and local governments.

EPZs define the geographic area for which offsite protective measures, such as public alerting and evacuation planning, are prepared in advance. For the LLWRs operating today, the plume-exposure zone extends about 10 miles, and the ingestion-pathway zone extends about 50 miles. Under a 2023 NRC rule, the EPZ is sized by the dose that could reach the public rather than by reactor size.[128] Under this rule, a reactor whose analysis shows that any significant dose would remain close to the plant may qualify for a smaller EPZ, in some cases no larger than the site boundary. Smaller EPZs can reduce the offsite planning burden on host communities and may allow siting closer to where power is needed, but a smaller EPZ must be justified by the facility's demonstrated safety case during the federal licensing process. Even if the EPZ does not extend beyond the site boundary, the NRC still requires some off-site planning focused on communication and coordination.[129] Recently, NRC proposed extending scalable EPZs to all new

reactors and allow operating reactors to submit license amendment requests to shrink their EPZs.

4.7.1.1 FEMA Off-Site Emergency Planning Responsibilities

FEMA plays a central role in ensuring that effective off-site emergency planning and preparedness measures are in place to protect the public in the event of a radiological emergency at a commercial nuclear reactor. Under its REP Program, FEMA has statutory authority for reviewing, evaluating, and approving emergency response plans and capabilities developed by state, local, Indigenous Nation/Tribal, and territorial governments within EPZs surrounding nuclear power plants.

EPZs for the existing LWRs have historically been established at approximately 10 miles for the plume exposure pathway and 50 miles for the ingestion exposure pathway. 10 CFR 50.47 generally requires the EPZ to be 10 miles, but the exact size and configuration can be determined based on local emergency response needs and other factors. NRC's rule establishing alternative emergency preparedness requirements for SMRs and microreactors is described in Section 4.8.5.

FEMA's findings regarding the adequacy of these off-site plans are provided to the NRC and are a required input to NRC licensing decisions related to reactor construction and operation. In coordination with the NRC, FEMA establishes planning standards, evaluates exercises and drills, provides technical assistance and training, and verifies that off-site authorities can implement timely protective actions, such as public notification, evacuation, and sheltering to mitigate potential radiological impacts on public health and safety.

4.7.2 State Role in Emergency Preparedness

DHSES coordinates radiological emergency preparedness for the State's nuclear power plants under Executive Law Article 2-B.[130] Activities include state plan development, county coordination, exercise participation, and public notification protocols.

The Radiological Emergency Preparedness (REP) Program, administered by DHSES's Office of Emergency Management, coordinates with state entities, counties hosting nuclear facilities, and nuclear power plants to ensure emergency response capabilities. The program maintains the Radiological Hazards Annex for Fixed Nuclear Facilities to the New York State Comprehensive Emergency Management Plan[131] and conducts planning, training, and exercises with other state agencies and counties in compliance with Executive Law Article 2-B and federal requirements.

New York currently has three operating nuclear plants, with four total reactors, covering three counties within the 10-mile EPZ, plus one county within 10 miles of a Connecticut plant. The REP Program purchases, maintains, and calibrates radiological detection equipment and coordinates Joint Information Centers for emergency communications. Any new nuclear facility with an EPZ that extends beyond the site boundary would require development of comprehensive off-site emergency plans reviewed by DHSES and approved by FEMA. DHSES does not grant final approval of off-site emergency plans but carries out the critical functions noted above.

Safety requirements were agreed upon in the December 2021 Constellation transfer proceeding for New York's four operating nuclear reactors. The Joint Proposal adopted by the PSC and the Transfer approved by the PSC involved a corporate transfer of four upstate nuclear power reactors to an independent, publicly traded holding company.[132] As a part of the Joint Proposal, the Joint Petitioners agreed to continue to maintain and staff emergency operation facilities (EOFs) within New York State.

4.7.3 Local Role in Emergency Preparedness Program

Local governments play a central role in off-site emergency preparedness for nuclear facilities in New York State under the framework established by Executive Law Article 2-B. Counties within the EPZ of a nuclear facility are responsible for developing, maintaining, and implementing radiological emergency response plans that address protective actions for the public, including evacuation, sheltering, and public communications. These plans are developed in coordination with state agencies and must be consistent with federal planning standards established by NRC and evaluated by FEMA.

At the local level, emergency preparedness responsibilities typically include broad coordination among county emergency management offices, public health departments, law enforcement, fire services, emergency medical services, and school districts. Redundancies and backup staffing and systems are key components of local preparedness and planning. Counties must maintain alert and notification systems, conduct public education activities, and ensure that trained personnel and equipment are available to support emergency response actions. Local governments also play a key role in integrating nuclear emergency planning with broader all hazards emergency management frameworks, ensuring that radiological response capabilities are incorporated into county comprehensive emergency management plans.

The scope and intensity of local emergency preparedness obligations are closely tied to the size and configuration of the EPZ, population density, and site-specific characteristics. For advanced

reactors that qualify for reduced or site boundary EPZs under NRC regulations, local responsibilities may be substantially different from those associated with conventional LLWRs. These differences have implications for staffing, training, equipment procurement, and long-term program costs. As new reactor technologies are considered, local governments may require additional guidance, technical assistance, and standardized planning templates to ensure preparedness requirements are appropriately scaled while maintaining public protection. Local emergency planning and coordination is resource- and time-intensive and requires significant lead times before a new facility would become operational.

4.7.4 Drills, Notification Systems, and Interagency Coordination

Emergency preparedness for nuclear power plants relies on regular drills, exercises, and robust interagency coordination to ensure that emergency plans can be effectively implemented. Federal regulations require nuclear facility operators and state and local governments to participate in periodically evaluated exercises that test both on-site and off-site response capabilities. These exercises are jointly evaluated by the NRC and FEMA and are designed to assess decision making, communications, protective action implementation, and coordination across multiple levels of government.

DHSES plays a central coordinating role in organizing and supporting these exercises, working closely with counties, other state entities, and federal partners. Exercises provide an opportunity to identify strengths and areas for improvement in emergency plans, clarify roles and responsibilities, and incorporate lessons learned into updated procedures and training programs. Beyond formal evaluated exercises, drills and tabletop exercises are used to maintain readiness, particularly for agencies with infrequent real world emergency response experience.

Public notification systems are a critical component of emergency preparedness, enabling timely communication of protective action decisions to affected populations. These systems must be reliable, redundant, and capable of reaching diverse communities, including vulnerable populations. Effective operation of notification systems depends on coordination among facility operators, county emergency management offices, state entities, and local media. For advanced reactors with reduced EPZs, notification and exercise requirements may be more limited in geographic scope, which could reduce administrative burden while still ensuring effective public communication.

Interagency coordination is essential to the successful implementation of emergency preparedness programs. NRC, FEMA, DHSES, DOH, nuclear facilities and county emergency management agencies must maintain clear communication channels and shared expectations regarding roles, authorities, and decision-making processes. As regulatory frameworks evolve to accommodate advanced reactor technologies, maintaining alignment across entities will be important to ensure that emergency preparedness requirements remain effective, proportionate, and clearly understood by all participating entities.

4.8 Advanced Reactor Safety Characteristics and Technical Uncertainties

While there are some technical uncertainties because advanced reactor technologies are still under development, comprehensive safety review is required as part of the NRC licensing process (Section 3.1). As New York State evaluates the deployment of new advanced nuclear reactor technologies, their safety strengths, challenges, unknowns, and risks must be considered. While these technologies could offer significant potential benefits including enhanced passive safety features, they also present novel considerations different from the safety considerations associated with the existing LWR fleet. An overview of these issues is provided in the sections below.

4.8.1 Technology-Inclusive, Risk-Informed, Performance-Based Approach to Advanced Reactor Safety Evaluations

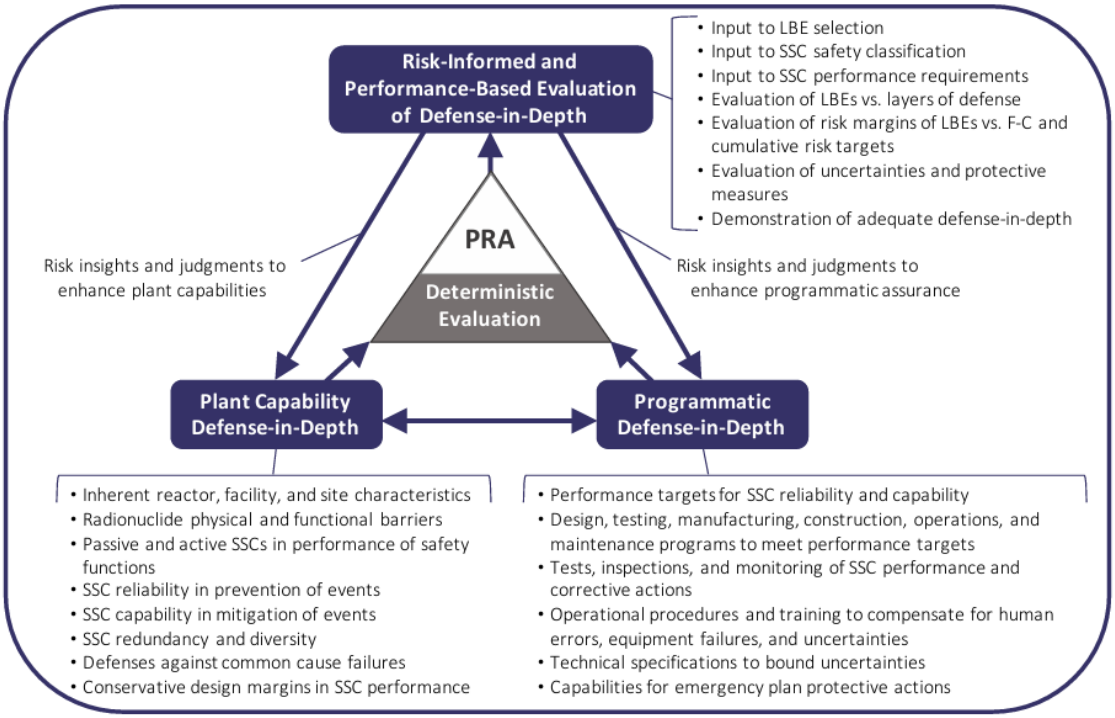
As described in Section 4.2, defense in depth, or the use of multiple independent but complementary methods for protecting the workers and the public from potential harm from nuclear reactor operation, is an important part of the design, licensing, and operation of nuclear power plants. Traditional defense in depth for LWRs addresses five fundamental safety functions:

1. Proper operation and maintenance to prevent abnormal conditions;
2. Detection and control of abnormal conditions if they occur;
3. Systems to prevent reactor accidents in the case of unusual conditions outside of the design basis;
4. Mitigation of consequences if an accident occurs; and

5. Mitigation of radiation exposure to the public in the event of an accident.[133]

A defense in depth strategy includes "An appropriate combination of inherent and engineered safety features."[134] Historically, the NRC relied on deterministic regulations to provide reasonable assurance of adequate protection. In May 2020, the Commission approved the use of technology-inclusive, risk-informed, and performance-based (TI-RIPB) methodology as a reasonable approach for establishing key parts of the licensing basis and content of applications for licenses, certifications, and approvals for non-light-water reactors.[135] For a TI-RIPB evaluation, the designer considers defense in depth to verify that the design prevents and mitigates accidents that release radiation or hazardous materials. The key is creating multiple independent and redundant layers of defense to compensate for potential human and mechanical failures so that no single layer, no matter how robust, is exclusively relied upon to protect the public. Defense in depth includes the use of access controls, physical barriers, redundant and diverse key safety functions, and emergency response measures. Figure 7 illustrates evaluating defense in depth for a TI-RIPB evaluation.

Figure 7. Framework for evaluating defense in depth for technology-inclusive, risk-informed, and performance-based methodology



Advanced reactor designs incorporate multiple layers of safety features designed to prevent accidents and mitigate consequences if they occur. Advanced designs may perform these

functions through combinations of passive and inherent safety features that rely on fundamental physical principles rather than actively engineered systems requiring operator action or electrical power. These features aim to enhance safety by eliminating or reducing dependence on systems that can fail during accidents. Advanced reactors include both LWRs (i.e., Gen III+) and reactors that use something other than liquid water as a coolant like gas, supercritical water, sodium, lead, or molten salt (i.e., Gen IV). Advanced reactors are often referred to by their generation or "Gen." Gen III+ like the AP1000 use liquid water as a coolant.

To evaluate an advanced reactor design in a holistic manner, the designer determines the Licensing Basis Events (LBEs).[136] These are the events the designer expects to challenge design safety. The designer then determines which SSCs address each LBE. The SSCs are evaluated to determine if they have passive or inherent safety features. Where mechanical or human failure challenges the design function, these passive or inherent safety features provide defense in depth to provide reasonable assurance of adequate protection.

4.8.2 Safety Characteristics of Advanced Reactor Technologies

Active safety systems, the primary safety systems in conventional LWRs, rely on an external action (e.g., operator intervention) to change from the normal to the safety state.

In contrast, passive systems utilize natural phenomena such as gravity, natural circulation, convection, and stored energy to perform safety functions without external power or operator intervention. Examples of passive systems include gravity-driven cooling systems, passive containment cooling using natural convection, and passively actuated shutdown systems. The AP1000 design prominently features passive safety, with emergency core cooling driven by gravity injection of water from elevated tanks.[137] Passive systems must be carefully analyzed to ensure reliable performance under all LBEs, including accident conditions.

Inherent safety refers to fundamental physical properties of the reactor design that naturally limit accident progression without requiring any system actuation. Examples of inherent safety characteristics and systems include negative temperature coefficients of reactivity wherein the nuclear reaction rate decreases as temperature increases thus providing automatic reactivity reduction during overheating (power naturally decreases as temperature increases); low power density wherein smaller reactors have lower absolute decay heat levels allowing heat removal through passive cooling by conduction and radiation; the low-pressure operation of sodium-cooled and molten salt reactors that allows operation near atmospheric pressure thus

eliminating high-pressure accident scenarios; and advanced fuel forms, such as Tri-structural ISOtropic (TRISO) fuel, that retain fission products at elevated temperatures.[138] As another example, a plant in which no readily combustible materials are employed would be inherently safe against fire, regardless of whatever else may happen during an accident.

4.8.3 Non-Light Water Reactor Technologies

Several non-light water reactor technologies are being developed and incorporate passive and inherent safety systems. These technologies and their safety characteristics are briefly introduced below.

4.8.3.1 Liquid Metal-Cooled Fast Reactors

Liquid metal-cooled fast reactors use liquid sodium or lead as the coolant. Sodium-cooled fast reactors (SFRs) utilize liquid sodium as a coolant to transfer heat from the reactor core to power generating systems. Unlike conventional LWRs that rely on water as a coolant and moderator, SFRs use liquid sodium due to its excellent heat transfer properties and its ability to remain in a liquid phase at high temperatures without boiling. The sodium metal coolant provides heat transfer with low-pressure operation, which eliminates loss-of-coolant accident concerns associated with high-pressure systems. Although unlikely to be released due to low pressure operation, sodium metal is highly reactive with water or even humidity in air, so it must remain contained. SFRs operate using fast neutrons, meaning they operate with a fast neutron spectrum and do not have a neutron moderator in the core, enabling higher burnup. The large thermal margin to boiling (from 500-550°C normal operation to approximately 900°C boiling point) allows extensive use of passive safety. Demonstration of passive safety systems was validated in the EBR-II loss-of-flow and loss-of-heat-sink tests, where the reactor safely shut down without operator intervention or active system actuation.[139] Some SFR designs use other liquid metals, like lead, as coolants. All liquid metal coolants under consideration provide increased thermal margin and low-pressure operation. Examples of SFRs currently under development include TerraPower's Natrium reactor and ARC Clean Technology's ARC-100 reactor.

4.8.3.2 Gas-Cooled Reactors

Gas-cooled reactors use gas (typically helium) as the coolant and include high-temperature gas reactors (HTGRs), which use graphite as a moderator, and gas-cooled fast reactors (GFRs), which do not use a moderator. Helium is used as both the coolant and heat-transfer medium because it is an inert gas and therefore does not react with other materials or degrade components within the reactor. Because of the low heat capacity of gas at atmospheric conditions, HTGRs

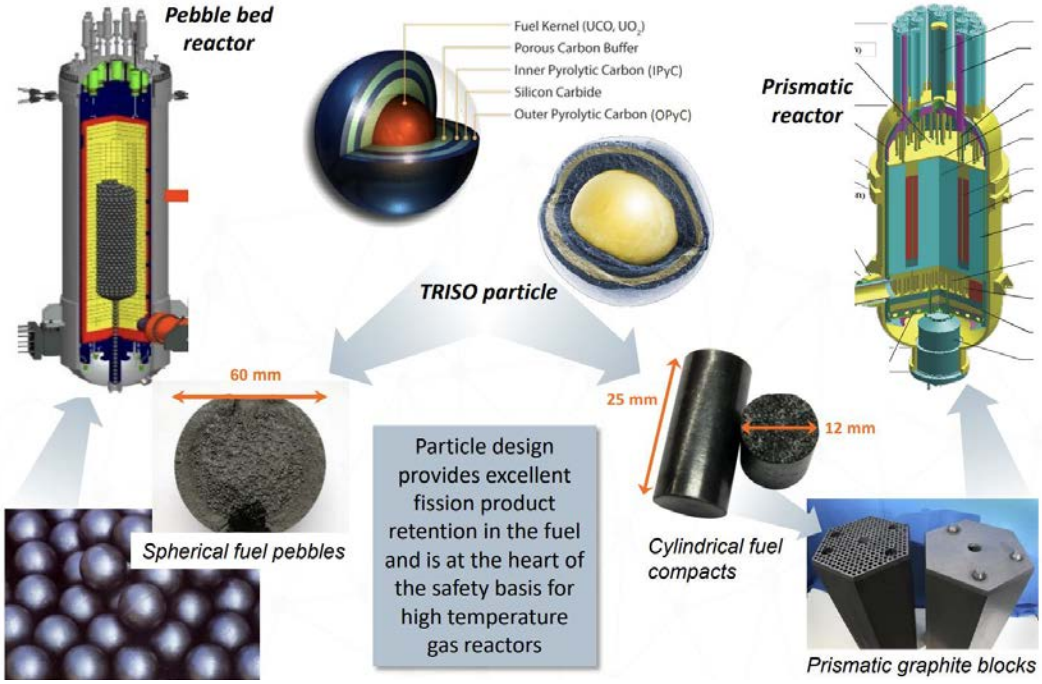
typically operate at high pressures. HTGRs rely on a solid moderator, usually graphite. With low power density and large thermal inertia, even with complete loss of cooling, these reactors are designed to transfer decay heat through passive conduction and radiation without core damage.[140] The fuel for HTGRs can be either fixed in place or intended to move, such as in a pebble bed.

HTGRs use TRISO fuel particles as their fuel. These TRISO fuel particles, which are less than one millimeter in diameter, contain a uranium fuel "kernel" in their center and are surrounded by several layers of protective coatings (Figure 8). These layers include a porous carbon buffer, an inner pyrolytic carbon layer, a silicon carbide barrier, and an outer pyrolytic carbon layer. Together, these layers have been demonstrated to provide exceptional structural integrity and containment, allowing the TRISO particles to retain fission products and remain stable under simulated typical and accident conditions for a HTGR (high temperature and radiation).

Two types of HTGRs that use TRISO fuel are pebble bed reactors and prismatic block reactors (Figure 8). In pebble bed reactors, the TRISO fuel particles are dispersed within graphite fuel pebbles, each roughly the size of a tennis ball. These pebbles are circulated through the reactor core, and the reactor operates continuously by adding fresh fuel pebbles and removing spent ones as they pass through the core. In prismatic block reactors, the TRISO fuel particles are embedded in a carbon matrix, forming composite cylindrical units known as fuel compacts. These fuel compacts (sometimes referred to as fuel sticks because of their shape) are then placed within hexagonal graphite blocks, known as prismatic block fuel elements. These graphite blocks are designed with fuel holes to house the fuel sticks and coolant channels, which are drilled into the graphite to allow the flow of coolant. Examples of HTGR designs that use TRISO fuel pebbles and prismatic blocks include X-energy's Xe-100 reactor and BWXT's Advanced Nuclear Reactor (BANR), respectively.

Figure 8. TRISO Fuel in Pebble Bed and Prismatic HTGRs

Source: Erik Cothron and Zach Koshgarian, From Reactors to Repositories: Disposal Pathways for Advanced Nuclear Reactor Waste (Washington, DC: Nuclear Innovation Alliance, December 2024), https://nuclearinnovationalliance.org/sites/default/files/2026-01/From%20Reactors%20to%20Repositories%20-%20Disposal%20Pathways%20for%20Advanced%20Nuclear%20Reactor%20Waste%20v1.1.pdf



4.8.3.3 Molten Salt Reactors

Molten Salt Reactors (MSRs) use molten salt either as the primary coolant or as both the coolant and the medium that carries dissolved nuclear fuel. Broadly, MSRs fall into two categories: liquid-fueled and solid-fueled. In liquid-fueled MSRs, the fissile material is dissolved directly into the circulating salt, allowing the fuel to flow through the core. Solid-fueled MSRs, by contrast, use molten salt solely as a coolant while relying on a separate solid fuel form. MSRs operate at atmospheric pressure with high thermal capacity coolants that inherently limit rapid temperature and pressure increases. The negative temperature coefficient provides strong self-regulation.

Both liquid and solid-fueled MSRs can use either fluoride- or chloride-based salts. The salts are ionic compounds that are chemically stable, do not undergo decomposition by radiolysis, and are compatible with typical structural materials. Several advanced designs use fluoride salts, particularly the lithium-beryllium fluoride mixture known as FLiBe. FLiBe is a solid at room temperature but melts well below MSR operating temperatures, allowing it to circulate as a

liquid during reactor operation. The salts do not react violently with moisture or humid air like some liquid metals.

Historically, the Molten Salt Reactor Experiment demonstrated passive safety through freeze valve drain systems that automatically evacuate fuel from the core during overheating scenarios.[141] The fuel salt in the drain tank can be passively cooled by conduction, natural convection, and thermal radiation with surrounding structures having sufficient thermal mass to absorb the decay heat indefinitely without exceeding thermal limits.[142]

MSRs can use TRISO fuel pebbles fixed in place instead of fuel dissolved in the molten salt. The high temperature TRISO particle fuel can utilize a carbon matrix-coated particle fuel, similar to that developed for HTGRs, in a pebble-based fuel element. The design of the TRISO fuel layers and the reactor coolant provide functional containment as barriers that control the spread of radionuclides.[143]

An example of a solid-fueled MSR includes the Kairos Power KP-FHR reactor design that uses TRISO fuel pebbles, and an example of a liquid-fueled MSR includes TerraPower's Molten Chloride Fast Reactor.

These advanced designs offer the potential for reduced emergency planning requirements, simplified security provisions, and overall risk profiles substantially lower than the operating fleet. Quantitative risk assessments for some advanced designs suggest core damage frequencies orders of magnitude below current LLWRs, and elimination of scenarios resulting in large early releases of radioactive material.[144]

4.8.4 Technical Uncertainties in Advanced Reactor Safety

Advanced reactor designs present technical uncertainties that differ from those addressed in the existing regulatory framework developed primarily for LLWRs. While many advanced designs incorporate passive and inherent safety features that may offer advantages not observed with active safety systems, these features introduce new considerations requiring careful evaluation.[145] Compared to the existing LWR fleet, there is less operating experience with advanced reactor designs, and therefore greater uncertainties about real-world performance, described briefly below. With additional advanced reactor operational experience in the future, uncertainties will be reduced as was observed with conventional LWRs.

4.8.4.1 Passive Safety System Performance

Passive safety systems operate without external power sources or active mechanical components, instead harnessing physical principles, including gravitational flow, thermal-driven circulation, and heat dissipation through convection, to maintain reactor cooling during abnormal conditions. While this approach can enhance reliability by eliminating dependence on external power, the performance of passive systems under expected operating and design basis conditions must be thoroughly validated.

4.8.4.2 Novel Materials and Fuels

Non-water-cooled advanced reactors employ materials and fuel forms with limited irradiation and operational history at commercial scale. HTGRs use different materials and fuel forms and higher temperatures and pressures compared to typical LWR operations. SFRs utilize metallic fuel or mixed oxide fuel in liquid sodium environments. MSRs either dissolve fuel directly in the coolant salt or use TRISO fuel. Each configuration presents unique material behavior, degradation mechanisms, and fuel cycle considerations that require ongoing research and operational validation.

4.8.4.3 Probabilistic Risk Assessment Limitations

The NRC regulations use a TI-RIPB framework that relies on quantitative risk assessments, like probabilistic risk assessment (PRA)—a quantitative methodology that estimates the likelihood of accident sequences and their potential consequences as a cornerstone of its regulatory decision-making for reactor safety.[146] For advanced reactors, PRA development faces challenges including limited failure rate data for novel components, new accident sequences not fully characterized by existing methodologies, and the need for validated computer codes to model thermal-hydraulic behavior of non-water coolants.

4.8.4.4 Multi-Module Operations

SMR designs often propose multi-module configurations at a single site, with shared control rooms, operators, and support systems. This operational model introduces considerations for interactions between modules, common-cause failures, and appropriate staffing levels that differ from single-unit operations. Review of such configurations will require careful attention to potential dependencies and failure modes.

4.8.5 Implications for Emergency Planning

The enhanced safety characteristics of advanced reactors have significant implications for emergency planning requirements. For the existing fleet of LLWRs, NRC regulations currently require 10-mile EPZs around nuclear power plants. In November 2023, the NRC issued a final rule establishing alternative emergency preparedness requirements for SMRs and microreactors based on site-specific analysis of potential accident consequences.[147] This rule allows a performance-based, consequence-oriented approach to emergency planning as an alternative to the prescriptive requirements originally designed for LLWRs.[148] Under this rule, reactor licensees must establish an EPZ sizing based on actual dose consequence analysis, with the EPZ boundary determined by the area within which the public dose would exceed 10 millisieverts (1 rem) over 96 hours following a potential release. For facilities with highly effective retention of the source term (the type and amount of radioactive or hazardous materials released to the environment following an accident), retention and small radiological inventories, the EPZ may be limited to the site boundary with no dedicated offsite radiological emergency planning.[149]

Reduced EPZ requirements would significantly impact state and local emergency planning responsibilities and costs. If new advanced reactors qualify for reduced or site boundary EPZs, the scope of state off-site emergency planning activities could be substantially less than for conventional LWR plants, while retaining a high level of preparedness.

4.8.6 Security Requirements for Advanced Reactors

While some advanced reactor designs introduce security considerations that differ from conventional LLWRs, particularly for designs proposed for distributed deployment or utilizing enriched fuel materials, all reactor designs must comply with security requirements as part of the NRC licensing process. LWR security considerations generally focus on preventing radiological sabotage. Any advanced reactor design would need to be evaluated to ensure any material risk of diversion is considered in the security plan.

4.8.6.1 Alternative Security Requirements

The NRC recently promulgated alternative physical security requirements for advanced reactors in Part 53, recognizing that traditional security frameworks may impose costs disproportionate to actual risk for some designs. NRC staff in its draft regulatory filings stated that for some advanced reactor designs, particularly those with inherent safety features and low radioactive material inventories, the traditional security framework may impose costs disproportionate to actual risk.[150] Under Part 53, qualifying facilities can use performance-based security measures

commensurate with radiological consequences. Where possible, advanced reactors can incorporate security by design, reducing the size or ability to access vital systems a hostile force might target. In addition, the time frames needed to cause radiological sabotage can be significantly longer for an advanced reactor compared to the current LWR fleet. Therefore, it is possible to rely on local law enforcement response rather than dedicated armed security forces for interdiction and neutralizing the threat (i.e., placing the threat in a condition from which the threat no longer has the potential for, or capability of, doing harm to the protected target).

The proposed Part 57 rule incorporates Security-By-Design (SBD), where possible, so that the microreactor design itself addresses security risks by using built-in engineering and physical protection features instead of relying primarily on operational programs.[151] Because the proposed Part 57 relies on SBD, it uses a graded approach to the security plan. At the lowest threshold, if the SBD features are adequate to prevent off-site doses without intervention by security officers, the security plan would only need to defend against theft of material, not radiological sabotage. In addition, the NRC concluded that reactors with low-risk profiles licensed under Part 57 would not require periodic force-on-force exercises.[152]

4.8.6.2 HALEU Security

Higher enrichment of U-235 in high-assay low-enriched uranium (5 to 20% U-235 by mass) presents different security considerations, primarily with respect to potential for diversion compared to conventional low-enriched uranium fuel (3 to 5% U-235 by mass). HALEU requires enhanced material control and accounting measures. Transportation, storage, and handling of HALEU throughout the fuel cycle must address these requirements. The threat of diversion once the fuel is installed in the reactor is unlikely to differ from the existing LWR fleet.

4.8.6.3 Distributed and Remote Deployments

Due to their smaller sizes and security by design features, microreactors proposed for remote or distributed applications may not require the same security infrastructure of the existing LWR fleet. Integration of security measures with existing site security arrangements, coordination with local law enforcement, and remote monitoring capabilities require tailored approaches. Near-term microreactor deployments include military applications; applications in which security infrastructure is baked into development, construction, and operation. For example, military applications under the Janus Program, including the selected deployment of a Westinghouse eVinci microreactor at Fort Drum in New York, security is coordinated through DoD frameworks rather than NRC commercial security requirements. This project will be housed on-base.

4.8.6.4 Cyber Security

Part 53 establishes a new consequence-based approach for cyber security under 10 CFR 73.110.[153] It requires license applicants to demonstrate protection against potential cyberattacks corresponding to the risk level for their reactor technology and detail the potential consequences of an attack for their technology. The proposed Part 57 rule provides a similar regulatory approach to cybersecurity.[154]

4.9 Findings and Conclusion

Federal, State, and Local Roles in Protection of Public Health and Safety: Protection of public health and safety is carried out through a coordinated federal, state, and local framework. At the federal level, the NRC establishes and enforces nuclear safety, radiation protection, and emergency preparedness requirements and FEMA evaluates off-site emergency plans. States lead off-site radiological emergency planning and response and local governments, particularly counties, implement emergency plans on the ground by managing public warnings, evacuation or sheltering actions, first responder support, and public communication during incidents. This robust federal, state, and local framework underpins public trust in nuclear safety.

NRC Reactor Safety Oversight: The NRC has statutory authority to ensure that commercial nuclear power plants in the United States operate safely and do not pose undue risks to public health and safety. To fulfill this authority, NRC oversees the Reactor Oversight Process, a comprehensive program designed to monitor, inspect, and assess nuclear power plant performance using risk-informed and performance-based methodologies.

Safety is Designed in and Independently Verified: Many advanced reactors are engineered to stay safe by relying on natural forces such as gravity and natural circulation rather than operator action or outside power, and they hold less radioactive material on site. Enacted and proposed federal rules recognize these differences by scaling requirements for emergency planning and security to each design's level of risk. The NRC decides whether each reactor is safe to build and operate. Because these technologies are still emerging, New York State should closely track federal developments, assess how they apply to New York's communities, and coordinate with State and local agencies so that public health and safety remain protected. Explaining these safeguards clearly and openly is essential for communities to weigh new projects with confidence.

Advanced Reactor Emergency Planning: The enhanced safety characteristics of advanced reactors have significant implications for emergency planning requirements. A recent NRC rule

established alternative emergency preparedness requirements for SMRs and microreactors based on a performance-based, consequence-oriented approach to emergency planning as an alternative to the prescriptive requirements originally designed for LLWRs. These requirements may enable smaller EPZs, potentially to the site boundary, with implications for off-site State and local emergency planning responsibilities and cost.

Local Emergency Planning: County emergency planning is already highly developed around existing nuclear facilities, but the level of planning depends heavily on the project footprint, size and configuration of the EPZ, population density, and site-specific characteristics. Emergency planning responsibilities impose additional costs on affected counties. For advanced reactors that qualify for reduced or site boundary EPZs, local responsibilities may be substantially different from those associated with conventional LLWRs, with implications for staffing, training, equipment procurement, and cost. Local governments may require additional guidance, technical assistance, and standardized planning templates to ensure preparedness requirements are appropriately scaled for new advanced reactors while maintaining public protection.

Technical Uncertainties in Advanced Reactor Safety: While advanced reactor designs incorporate passive and inherent safety features that may offer advantages, these features introduce new considerations and uncertainties given limited operating experience. Key uncertainties requiring careful evaluation include passive safety system performance, novel materials and fuels in non-water-cooled designs, probabilistic risk assessment limitations, and multi-module operations.

Prioritize Advanced Reactor Safety Research: DOE and NRC should continue to prioritize research programs addressing safety uncertainties in advanced reactor designs. Reducing operating uncertainties allows for efficiencies such as increased power levels that reduce operating costs and the resulting cost of electricity over time. Priority research areas include development and validation of safety analysis codes for non-light-water reactor technologies, collection of operational data from demonstration projects to inform commercial licensing, material behavior research under advanced reactor operating conditions, and fuel qualification for novel fuel forms. Research findings should be systematically incorporated into regulatory guidance as necessary to support efficient and thorough licensing reviews and as appropriate to improve reliability, cost effectiveness, and total power output during operations of advanced reactors.

Conclusion:

- **Continue to conduct proactive public engagement, including clear and timely information on nuclear development, and nuclear energy education, so that host communities and the broader public can meaningfully engage in public participation opportunities and have confidence in the rigor of State and federal oversight.**

In support of this conclusion, the State should continue to support public education efforts regarding advanced nuclear technologies, addressing both potential benefits and risks. Public engagement should begin early in the planning process for any potential deployment and should provide communities with accessible information about reactor safety characteristics, emergency planning requirements, and environmental considerations.

To further support public trust in advanced reactor safety, the State should prepare for deployment of new reactors by:

- Coordinating with applicants before the NRC and the Siting Board to implement emergency planning requirements in a flexible manner that maximizes the efficiency and effectiveness of achieving NRC-approved emergency planning objectives for advanced reactors.

- Assessing New York's emergency planning and response capacity for potential advanced reactor deployments. This assessment should address coordination approaches for facilities with reduced or site-boundary EPZs, emergency planning for non-traditional sites, training needs for counties that may host new nuclear facilities, training needs for state and local emergency response, integration with existing all-hazards emergency management frameworks, and lead times needed for local coordination before reactor operation.

5. Site Selection and Land Use

As described in the sections above, the NRC exercises authority over radiological safety through its licensing and oversight processes, including through its reactor site criteria described in Section 3.1.7, environmental review described in Section 6.1, and emergency planning requirements described in Section 4.7.1. New York State exercises authority over land use for nuclear reactors subject to Article 10 and local governments exercise review authority where not preempted or waived by Article 10 jurisdiction (Table 6).

In New York State, the Article 10 siting process for major electric generating facilities other than wind and solar (≥ 25 MW), such as nuclear power plants, is the unified State siting process. Article 10 preempts all other state and local procedural requirements for nuclear facilities subject to Article 10 jurisdiction. For example, host municipalities cannot issue a permit to site a nuclear facility in that municipality, and other State entities cannot issue permits related to matters within the Siting Board's jurisdiction. Participation of host communities and the public in the Article 10 process is described below and in Section 2.3.4.2.

Nuclear facilities in New York State that are not subject to Article 10 (<25 MW) are subject to all applicable local land use requirements and environmental review under SEQRA. Local governments, acting pursuant to their land use authority, conduct zoning and land use reviews through locally established procedures and apply adopted plans and regulations to proposed facilities not under Article 10 jurisdiction. In this coordinating role, municipalities evaluate site-specific land use considerations and provide the primary forum for public engagement, while advancing their local planning and development objectives.

State agencies and authorities support and facilitate local zoning and land use review by assisting municipalities in understanding how local authority operates in the context of state and federal oversight. This includes providing technical assistance, supporting coordination between local land use review and state environmental review, and clarifying the limits of local authority where federal or state preemption applies. State involvement is particularly important for advanced or non-traditional nuclear facilities that raise novel land use issues or fall outside common zoning classifications.

Local authority and review processes for facilities not preempted by Article 10 are the focus of this section. Additional discussion of federal, state, and local requirements by advanced reactor type and end use or application is in Section 8.

Table 6. Summary of Government Role in Site Selection and Land Use

Level of Government	Agency or Entity	Primary Role in Site Selection & Land Use	Authority and Application
Federal	NRC	Regulates radiological safety and licensing of nuclear facilities; generally preempts state and local regulation of radiological safety	Federal preemption applies to radiological safety; otherwise, Federal authority does not displace local land use authority unless there is a direct conflict
State	New York State Siting Board (Article 10)	Reviews and approves major electric generation facilities ≥ 25 MW; may waive local land use requirements	Applies only to Article 10 covered facilities; municipalities participate in Article 10 and serve on Siting Board; facilities below 25 MW remain fully subject to local zoning
	DOS	Provides technical assistance to municipalities; supports state and local coordination; clarifies preemption boundaries; implements the NYS Coastal Management Program under the Coastal Zone Management Act	Non-coastal: Advisory and coordination role; no direct authority Coastal: Implements the Coastal Zone Management Act, which may include applying state or local land use regulations if located within or affecting a federally approved local waterfront revitalization program
	Other State Agencies	Coordinate environmental review and licensing with local land use processes	Parties to Article 10 for facilities ≥ 25 MW; supportive role, especially for advanced or non-traditional nuclear facilities
County	County Planning Agencies	Advisory review of certain local land use actions within referral thresholds where not preempted or waived by Article 10 jurisdiction	Review required under General Municipal Law §§ 239-l, 239-m, 239-n; supermajority of the local planning board needed to override county recommendations
Local (Town, City, Village)	Governing Boards, Councils and Commissions	Adopt zoning regulations; amend zoning; adopt comprehensive plans where not preempted or waived by Article 10 jurisdiction	Authority derived from Town Law Article 16, Village Law Article 7, General City Law (subdivisions 24 & 25 of section 20, and Article 3)
	Planning & Zoning Boards	Conduct site plan review; evaluate layout, access, infrastructure, and design not preempted or waived by Article 10 jurisdiction	Town Law § 274-a; review focuses on non-radiological land use impacts

5.1 Local Zoning and Land Use Authority

5.1.1 Local Government Authority

New York State General City Law, Town Law, and Village Law authorize cities, towns, and villages to regulate land use through zoning, long-range comprehensive planning, site plan review, and special use permits.[155] Together, they form the core legal framework through which such local governments evaluate and approve (or deny) the siting and development of major infrastructure projects, including nuclear-related facilities, subject to federal and state preemption.

Analysis of local government authorities here focuses on upstate regions and excludes the downstate region. Governor Hochul's 2025 directive to NYPA is to develop and construct at least 1 GW of advanced nuclear capacity in upstate New York where eight communities have already expressed interest.[156]

While federal preemption prevents local regulation of radiological safety, it is important to note that localities retain authority over land use (subject to Public Service Law Article 10 preemption), the enforcement of building and energy codes, road access, and local emergency response.

In New York State, land use regulations are primarily a function of municipal governments. Cities, towns, and villages derive their zoning and land use authority from the New York State Constitution, Section 10 of the Statute of Local Governments, and enabling statutes in the General City Law (Subdivisions 24 & 25 of Section 20, and Article 3), Town Law (Article 16) and Village Law (Article 7), respectively. Absent a transfer of functions under an alternative form of county government, counties in New York do not have direct zoning authority but play an important coordinating and review role through the county planning agency, discussed below in Section 5.2.

As described above, for nuclear facilities (≥25 MW) subject to Article 10, local review and permitting is preempted, and the Siting Board may waive substantive land use and other local requirements. Municipalities instead participate in the Article 10 siting process. Two members of the Siting Board are selected from the municipalities in which a nuclear facility is proposed to be sited, and these members participate in the process and vote on whether, and under what conditions, to issue an Article 10 Certificate. Municipalities are parties and can intervene as defined in Article 10.

For facilities below the 25 MW threshold that are not subject to Article 10, all applicable local land use requirements will be considered, subject only to federal preemption of radiological safety matters.

Local governments can also participate in federal licensing and permit processes as stakeholders, submitting comments and seeking intervenor status in any available hearing processes, as well as advising and participating in the federal consistency review of federal licenses and permits under the Coastal Zone Management Act (CZMA), described in Section 6.2.7.

5.1.2 Zoning and Land Use

Most municipalities in upstate New York do not have specific zoning provisions addressing nuclear facilities; such projects would be treated as unclassified uses or would need to be evaluated as industrial uses within applicable zoning districts. In many municipalities, power generation facilities, including nuclear facilities, would be permitted only in heavy industrial or manufacturing districts. Where not listed as permitted uses, developers may pursue variances or zoning amendments.

Zoning regulations typically impose dimensional requirements, including minimum lot size, setbacks from property lines, maximum building height, and maximum lot coverage. A typical industrial district in an upstate New York community might require, for example, minimum lot size of 2–5 acres, front setback of 50–100 feet, side and rear setbacks of 25–50 feet, maximum building height of 35–60 feet, and maximum lot coverage of 40–60 percent.

DOS provides technical assistance to municipalities, supports local capacity-building for complex energy infrastructure review, facilitates state-local coordination for federally licensed projects, and supports the development of model zoning laws and best practices for complex or non-traditional energy projects. DOS also provides technical assistance and guidance to municipalities on proper exercise of zoning and land use authority (e.g., guidance on statutory provisions for complex or novel projects, understanding preemption boundaries between NRC authority versus local land use authority).

5.1.3 Site Plan Review

Town Law Section 274-a, Village Law Section 7-725-a and General City Law Section 27-a authorize municipalities to require site plan approval for new development of a single parcel of land. Site plan review allows a local planning board to examine the arrangement, layout, and

design of a proposed use to ensure compatibility with the surrounding area and compliance with local standards.

Typical site plan review criteria applicable to a nuclear facility would include adequacy of traffic access and parking, stormwater management and drainage, landscaping and screening, lighting, signage, building design and materials, utility connections, and environmental protection measures. Site plan review must be completed within 62 days of receipt of a complete application, unless extended by mutual consent.

Site plan review fees range from $500 to $5,000 with escrows of $5,000 to $50,000+.

5.1.4 Special Use Permits

Town Law Section 274-b, Village Law Section 7-725-b and General City Law Section 27-b authorize municipalities to require special use permits for uses that are permitted in a zoning district subject to certain conditions. A special use permit is an administrative authorization requiring the applicant to demonstrate that the proposed use meets specified criteria and will not adversely affect the neighborhood.

Special use permit conditions must be reasonable and directly related to the proposed use. Conditions motivated by radiological safety concerns may be preempted under federal law and thus could not be used to require special use permits. However, conditions addressing non-radiological impacts, such as traffic, noise, visual impact, and economic effects are permissible. DOS provides guidance on proper administration of special use permits and assists municipalities in understanding discretionary authority and limits under federal preemption.

Municipalities determine which uses are subject to special use permits. If a municipality does subject nuclear-related facilities to special use permits, project developers would be required to apply for and obtain special use permits where nuclear-related facilities are conditionally permitted, demonstrate compliance with permit criteria and conditions, and participate in public hearings. As discussed in Section 8.5, all end uses and applications of advanced nuclear technologies could require special use permits. Advanced nuclear technologies may require special use permits due to novel siting or non-traditional land uses. Ancillary facilities also may trigger special use permit requirements. Municipalities may choose to utilize site plan reviews, described above, instead of special use permits.

Under Town Law § 274-b, municipalities may deny permits, impose conditions, or revoke approvals for noncompliance, subject to federal preemption.[157] However, once a special use

permit is issued, it is typically difficult to revoke. Fees for a local permit application, hearing, and review vary by municipality and range from $500 to $2,500.

5.2 County Planning Review

General Municipal Law Sections 239-l, 239-m, and 239-n require that certain local land use actions be referred to the county planning agency for review and comment before final local action is taken. Referral is required when a proposed action is within 500 feet of:

- a municipal boundary;
- the boundary of an existing or proposed state or county park;
- the right-of-way of a state or county road;
- the existing or proposed right-of-way of any stream or drainage channel owned by the county or for which the county has established channel lines;
- the existing or proposed boundary of any county or state-owned land on which a public building or institution is situated;
- or a farm operation in a state agricultural district (except for the granting of area variances).

DOS provides technical assistance to municipalities regarding referral thresholds and procedures, supports coordination between municipalities and county planning agencies, and assists local governments in understanding procedural requirements for large or complex infrastructure projects. Applications to site advanced nuclear technologies could be subject to county planning review. Advanced reactors proposed at non-traditional or distributed sites may be more likely to trigger county referral due to proximity to infrastructure, municipal boundaries, or designated resources. SMRs or microreactors may be sited in areas closer to municipal boundaries or infrastructure, increasing the likelihood of referral even where overall footprint is limited.

Municipal land use review boards are required to ensure applications subject to site plan review, special use permits, or variances are referred to the county planning agency when statutory criteria are met, provide sufficient project information to support county review, and address county advisory comments prior to final local action. Generally, there are no fees associated with this review. The county planning agency has 30 days to review the referral. The county review is

advisory, but if the county recommends disapproval or modification, the local planning board may only act contrary to the recommendation by a supermajority vote. Failure to make a required county referral may expose the local decision to legal challenge.

5.3 Building Codes and Standards

The DOS Division of Building Standards and Codes (DBSC) focuses on building safety, fire protection, and energy efficiency where those matters fall outside federal preemption. The DBSC complements and does not replace NRC authority over nuclear safety, licensing, and radiological protection. DOS coordinates with NRC on the boundary between nuclear and building safety and FEMA on fire and emergency standards.

The Uniform Fire Prevention and Building Code (Uniform Code) establishes minimum standards for building construction, fire safety, and structural integrity statewide.[158] The State Energy Conservation Construction Code (Energy Code) establishes energy conservation and greenhouse gas reduction standards for public and private buildings in the State.[159] DOS, through the New York State Fire Prevention and Building Code Council (Code Council), maintains and updates the Uniform Code and Energy Code to ensure codes reflect current standards and materials for structural safety, fire protection, means of egress, accessibility, resilience to hazards (e.g., flooding, wind, seismic considerations), and energy efficiency. DOS through the Secretary of State provides formal code interpretations to clarify how code provisions apply and coordinates with national model codes. DOS provides guidance to local code enforcement officials and project developers and helps resolve novel or non-standard construction questions, including those associated with modular construction, factory-built structures, and specialized industrial facilities.

While local governments generally enforce the codes, the DBSC oversees the statewide systems of code administration, establishes minimum training and certification requirements for code enforcement personnel, provides technical assistance to municipalities, and conducts compliance and administrative reviews when needed. DOS coordinates with DEC and DHSES Office of Fire Prevention and Control.

With limited exceptions, project developers and operators are required to comply with applicable Energy Code and Uniform Code provisions, such as building and fire safety for non-reactor structures and coordinate with local code enforcement officials. There are fees associated with local building permits and inspections. Local code officials enforce compliance through plan review, inspections, and issuing certificates of occupancy.

All end uses and applications of nuclear technologies would be subject to the Uniform Code and Energy Code. Advanced nuclear reactors may rely on factory-built or modular structures, which would require coordination of separate sets of applicable provisions, including those for factory manufactured buildings.[160]

5.4 Siting and Deployment Considerations for Advanced Reactors

All end uses and applications of nuclear technologies would be subject to local zoning and land use requirements not preempted or waived by Article 10 jurisdiction. Non-electric applications (e.g., heat, hydrogen, medical radioisotope production) may be treated as industrial or special uses under local zoning and ancillary facilities (e.g., storage, processing) may trigger additional site plan or special use permit requirements. Advanced nuclear reactors may raise novel zoning and special use permit questions, as well as questions from the public, especially for non-traditional sites (e.g., industrial parks, campuses, ports). Local governments may have limited experience reviewing advanced nuclear technologies, increasing the importance of State technical assistance and early coordination between developers, local governments, and State agencies and authorities. Advanced LLWRs and SMRs may more commonly require special use permits, zoning amendments, or variances, whereas microreactors may fit within existing industrial or institutional zoning districts. However, smaller reactor size does not eliminate local procedural requirements. Additional considerations are briefly described below and in Section 8.

SMRs and microreactors are proposed for industrial facilities, remote communities, and military use. In contrast to dedicated nuclear power plant facilities, these settings may lack the established infrastructure, security arrangements, and community familiarity associated with existing nuclear sites. Site-specific assessments must address unique characteristics including proximity to populations, available emergency response capabilities, and integration with existing industrial operations.

5.4.1 Scalable Emergency Planning Zones

As described in Section 4.8.5, recent NRC regulations allow scalable EPZs for SMRs and microreactors based on dose consequence analysis, potentially reducing EPZs to the site boundary for qualifying designs.[161] While reduced EPZs may enable deployment closer to population centers and reduce emergency planning burden on state and local governments, the transition from prescriptive 10-mile EPZs to performance-based approaches requires careful

coordination between licensees, the NRC, FEMA, DHSES, and local emergency management agencies.

5.5 Finding and Conclusion

Local governments are important stakeholders: Local governments review aspects of nuclear facilities through zoning, site plan review, special use permits, and building permits for nuclear reactors below 25 MW. For nuclear facilities subject to Article 10, local governments are represented on the Siting Board and have statutorily guaranteed party status. Additional resources, technical information and assistance, and planning support may be useful for municipalities particularly as advanced nuclear technologies mature and to address ancillary development such as roads, highways, water/sewer infrastructure, housing, and financial planning.

Conclusion:

- **Consider additional support for local governments in local planning and regulatory needs to prepare for potential new nuclear development, through updates or development of new model zoning laws and planning tools.**

In support of implementing this approach, specific opportunities for New York State to support local governments include:

- Support Comprehensive Plan updates to address potential nuclear facility siting. New York State should support collaborative updates to county, municipal, or multi-municipal collaboration on Comprehensive Plans to address potential nuclear facility siting by developing and disseminating resources for local governments for clean energy development, identifying suitable siting criteria for advanced nuclear development, as well as recommending strategies to avoid adverse impacts to surrounding lands and mitigate community impacts.

- Develop tools to support advanced nuclear siting attuned to local conditions. The State should evaluate updating or developing new planning tools that could be specifically tailored to advanced nuclear facilities. Local municipalities interested in nuclear development are encouraged to consider establishing clean energy overlay districts with streamlined approval processes. This can include enacting reasonable review timelines and establishing clear fee schedules tied to administrative costs to balance cost recovery with timely project development.

- New York State can help county and municipal planning boards to be better equipped as host communities for advanced nuclear development. This could include developing host community agreement templates and providing training materials for local officials on nuclear facility characteristics so that municipalities can better anticipate development and operational needs. Emergency planning responsibilities can require significant staff expertise and resource investments, often before nuclear infrastructure is built, and involve long-term responsibilities throughout the facility's lifecycle. New York State should evaluate how best to increase local capacity and address this knowledge gap for host communities, perhaps by developing a host community toolkit, encouraging cross-border municipal collaboration, or assisting in the formation of a community of practice with other host communities and local practitioners in the State.

6. Environmental Review and Permits

The NRC has statutory authority for conducting environmental reviews under NEPA as part of the licensing process for nuclear reactors. For nuclear facilities of 25 MW or more, State environmental review occurs through the Article 10 process, which preempts all non-federally-delegated environmental permitting and approval. For facilities not subject to Article 10 jurisdiction (<25 MW), DEC issues air, water, and natural-resource permits in accordance with potential impacts of the nuclear plant facility on natural resources and the environment. In addition, DOS conducts federal consistency review of NRC licensing under the Coastal Zone Management Act if a facility is within or affects the NYS coastal zone. The applicable State permits will depend on the nuclear facility design and operation details. Table 7 provides an overview of federal and state roles in environmental review and permitting and the sections below describe these roles in detail.

Table 7. Federal and State Environmental Review and Permitting Roles

Jurisdiction	Review or Permit Type	Issuing or Review Agency	Scope
Federal	NEPA Environmental Review	NRC	ER, scoping, draft Environmental Impact Statement (EIS), final EIS
Federal	Categorical Exclusion	NRC	Actions with no significant impacts
Federal requirement; State is certifying authority	Clean Water Act Section 401 Water Quality Certification	DEC (for facilities not subject to Article 10) or PSC[e]	State water quality certification
Federal consistency review by the State	Coastal Zone Management Act Federal Consistency Review	DOS	Siting, construction, and operation of nuclear facilities
State	Environmental review under Article 10	Siting Board	For facilities ≥25 MW, State environmental review occurs under the Article 10 process
State	Natural Resource Permits	DEC (for facilities not subject to Article 10)	Protection of Waters; Tidal Wetlands; Freshwater Wetlands; Threatened and Endangered Species; Wild, Scenic and Recreational Rivers; Coastal Erosion Management; Dams and Impound Structures; Long Island Wells

Table 7. (Continued)

Jurisdiction	Review or Permit Type	Issuing or Review Agency	Scope
State	State Pollutant Discharge Elimination System Permits	DEC	Thermal, chemical, stormwater discharges
State	Title V Air Permit	DEC	Major source air pollutant emissions
State	State Facility Permit	DEC	Large facilities not in major source category
State	Air Facility Registration	DEC	Smaller, non-major facilities
State	Radioactive Material Transport	DEC	Low-level radioactive waste transport and disposal
State / Local	State Environmental Quality Review Act (SEQRA) Review	State & Local Agencies (for facilities not subject to Article 10)	Discretionary approvals; environmental impacts

[e.] For facilities subject to Article 10 jurisdiction, the PSC, following the end of the Siting Board's jurisdiction, will issue the water quality certification.

6.1 Federal Environmental Review

NEPA requires federal agencies to undertake an assessment of the environmental effects of major federal actions, such as an approval of a license for a new nuclear plant. As discussed in Section 3.1, in accordance with NEPA, the NRC requires an applicant to submit a comprehensive ER for any license to construct or operate a nuclear power plant. Part 51 contains the requirements for environmental review under NEPA. Section 6.1.2 discussed the proposed changes to NRC NEPA review that would affect the process described in this section.

The process starts with the applicant's submission of an ER detailing the potential impacts on the environment, which the NRC independently verifies to produce the EIS. The key requirements of the ER include:

- Description of the proposed action;
- Environmental impact analysis;
- Radiological and non-radiological effluents;

- Alternatives analysis;
- Adverse impacts; and
- A list of all necessary federal, state and local permits.

Once the ER is evaluated for sufficiency, it is docketed. The NRC then defines the scope of the review and holds a public meeting near the proposed site. The NRC conducts independent analysis and prepares a draft EIS, assessing the environmental impacts, including alternatives. The draft EIS is released for public comment, and the final EIS is released, addressing public comments. The NRC works with federal and state entities during the environmental review such as U.S. EPA, U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration (NOAA).

As described in Section 3.1.2, the NRC is piloting an alternative environmental review approach for the Fermi project in Texas, in which the applicant will prepare the draft EIS.[162]

In addition, in April 2026, the NRC issued a rulemaking, "Generic Environmental Impact Statement for Licensing of New Nuclear Reactors (NR GEIS)," which codifies the findings of NUREG-2249 and is intended to improve efficiency of NRC's environmental reviews under NEPA.[163,164] Specifically, the GEIS "uses a technology-neutral framework and a set of plant and site parameters to determine which potential environmental impacts would be common to the construction, operation, and decommissioning of many new nuclear reactors, and thus appropriate for a generic analysis, and which potential environmental impacts would be unique, and thus require a project-specific analysis." Further, to improve efficiency, "NRC may rely on the NR GEIS' generic findings when conducting a subsequent, project-specific environmental review for a new nuclear reactor if specific conditions are met."[163]

6.1.1 Categorical Exclusions

Under NRC regulations, some types of actions are subject to a Categorical Exclusion (CX) under NEPA.[165] As defined by NEPA, a CX is a category of actions that a federal agency has determined normally does not significantly affect the quality of the human environment. Once the agency has established a categorical exclusion, it is not required to prepare an environmental assessment or EIS for any action that falls within the scope of the categorical exclusion.

NRC recently amended its CX list, "Categorical Exclusions From Environmental Review" in March 2026.[166] The amended rule added new categories of actions and expanded several categories of actions that NRC determined will not have a significant effect on the human environment. Under

its current rules, the NRC CX does not apply to new reactor applications; however, the NRC subsequently published a proposed rule, described below, that included additional categories of actions being eligible for CX.[167] Separately, in February 2026, DOE proposed a CX for authorization, siting, construction, operation, reauthorization, and decommissioning of advanced nuclear reactors, which applies specifically to DOE's noncommercial projects, and would not apply to the commercial reactor types that are the focus of this study and the Master Plan.[168]

6.1.2 Proposed Revisions to NRC NEPA Review

On July 7, 2026, the NRC proposed major revisions to its regulations implementing NEPA in response to recent legislation, regulations, executive orders, and case law with the goal of further streamlining the NEPA environmental review process. The proposed rule would no longer require an EIS for all new reactor licenses and would create new CXs that exempt some licensing actions from NEPA review separate from the newly promulgated CXs described above that became effective on April 29, 2026.

The proposed rule includes the following major changes:

- Eliminates two steps in the NRC staff's development of an EIS: the requirement to hold a scoping process and the requirement to prepare and publish a draft EIS for public comment;
- Establishes procedures for applicant, rather than NRC, preparation of draft EAs and EISs;
- Narrows the scope of environmental reviews to those environmental effects with a direct connection to radiological impacts;
- Authorizes the use of EAs and "mitigated Findings of No Significant Impact (FONSI's)" for reactor licensing actions;[c]
- Categorically excludes new reactor construction permits, operating licenses, combined licenses, and early site permits as long as the facility and site meet the parameters of the Appendix C tables, which are based on the Generic Environmental Impact Statement (GEIS) for Licensing of New Reactors;
- Allows for NRC adoption of categorical exclusions established by other federal agencies; and

[c] NRC can issue a FONSI if it determines an action will not have significant environmental impacts. A FONSI presents the reasons why the agency has concluded that there are no significant environmental impacts projected to occur upon implementation of the action.

- Allows new NRC categorical exclusions to be established without rulemaking by listing them on the NRC's website.

The proposed changes would have significant impacts on the NRC's environmental reviews for nuclear reactor licenses. New York's comment letter on the proposed rule can be found on NYSERDA's webpage.[39]

6.2 State Environmental Review and Permitting

Nuclear facilities require various non-radiological environmental permits, including natural resource permits, State Pollutant Discharge Elimination System (SPDES) permits for thermal and chemical discharges to water bodies, air pollution control permits for non-radiological emissions, and wetlands permits if the facility affects protected jurisdictional wetlands. DEC also issues regulations for the State Environmental Quality Review process and regulates the transportation of low-level radioactive waste. DOS conducts federal consistency review of the NRC licensing pursuant to the Coastal Zone Management Act and the enforceable coastal policies of the NYS Coastal Management Program if a facility is within or affects the NYS coastal zone.

For facilities subject to Article 10, environmental review occurs through the Article 10 process, described below. The sections below also describe the full suite of State regulations and permits that may apply to facilities of less than 25 MW.

6.2.1 State Environmental Review Under Article 10

Article 10 preempts all other state procedural requirements for constructing, operating, maintaining, or increasing the capacity of generators with a capacity of 25 MW or more other than wind and solar facilities.[169] Instead, state entities such as DEC are statutory parties to the Article 10 proceeding, and are voting members of the Siting Board.[170] While Article 10 preempts procedural requirements (e.g., permits and review processes), it does not preempt the substantive state non-radiological environmental standards. Applications are reviewed for compliance with state environmental standards, and the conditions to a Certificate ensure compliance with such standards.

To issue a Certificate for a nuclear facility, the Siting Board must identify the nature of the probable environmental impacts resulting from the construction and operation of a nuclear facility.[171] Environmental impacts are broadly defined and include impacts to: wildlife and its habitats; ground and surface water; cultural and historic resources; air emissions; public health;

and environmental justice. The Certificate must minimize, avoid, mitigate for, or offset the identified environmental impacts. These conditions to the Certificate must be consistent with substantive State law but can go beyond what substantive State law requires; the Siting Board may include conditions that address any environmental consideration "deemed pertinent by the [Siting] board." The environmental review begins with the preliminary scoping statement, which must identify environmental impacts and measures to minimize such impacts, and continues throughout the proceeding.[172] DPS and other State entities review applications for environmental impacts and measures to avoid, minimize, or mitigate for such impacts.[173] Insofar as agreement is not reached on any environmental issue, parties may submit briefs and sponsor expert testimony in support of avoidance, minimization, and mitigation measures. Finally, the Siting Board reviews the record to ensure that the record identifies all probable environmental impacts and considers issuance of a Certificate with conditions to avoid, minimize, offset, or mitigate for the identified impacts.

While Article 10 preempts procedural State law, it does not preempt federal law. Federally delegated permitting programs remain in effect. Thus, programs such as SPDES and State water quality review, described below, remain applicable to nuclear facilities.

6.2.2 State Environmental Quality Review (SEQR) Act

Nuclear facilities subject to Article 10 are not subject to SEQR review; the Article 10 environmental review process is described above. For facilities that are under 25 MW or federally preempted (i.e., outside Article 10 jurisdiction), review under SEQR may be required by State or local permitting agencies.

Article 8 of the New York State Environmental Conservation Law (ECL) and its implementing regulations provide the statutory and regulatory framework for SEQR review in New York State.[174] SEQR requires state and local agencies to consider environmental impacts of a project or action during discretionary decision-making. An action is subject to review under SEQR if any state or local agency has authority to issue a discretionary permit, license, or other type of approval for that action. SEQR also applies if an agency funds or directly undertakes a project or adopts a resource management plan, rule, or policy that affects the environment. DEC issues statewide regulations for the SEQR process but does not review or enforce SEQR processes by other agencies.

SEQR was modeled after NEPA and therefore has a similar review process in that actions must be evaluated to see if SEQR applies. If SEQR applies to the action, the lead agency then classifies

the action and makes a determination of significance (either a positive or negative declaration). If a negative declaration is issued, the lead agency has determined there are no potential significant adverse environmental impacts associated with the action and the SEQR process concludes. If a positive declaration is issued, the lead agency has determined there may be potential significant adverse environmental impacts associated with the action and further review is required via the preparation of a Draft Environmental Impact Statement (DEIS) and public comment periods. Each step of the SEQR process has prescribed time frames set by either statute or regulation, except the preparation of a DEIS, if potentially significant impacts have been identified and the lead agency issues a positive declaration.

Some categories of actions, the "Type II" list, do not require further environmental review because DEC has determined these actions do not have a significant adverse environmental impact.[175] Unless an action is already categorized as "Type II," the requirements of SEQR to determine if there is potential for significant adverse environmental impacts do not change based on the type of action. As such, in any case where New York State has jurisdiction or discretionary approvals over a new advanced nuclear facility, the action must be reviewed under SEQR.

In addition, DEC and other state entities can act as cooperating agencies through the NRC NEPA environmental review process for projects within New York State.

6.2.3 Natural Resource Permits

Nuclear facilities subject to Article 10 do not need natural resource permits; the Article 10 environmental review process is described above. For facilities that are under 25 MW or federally preempted (i.e., outside Article 10 jurisdiction), natural resource permits may be required by State permitting agencies.

Natural resource permits (e.g., Freshwater Wetlands, Incidental Take, Tidal Wetlands, Protection of Waters, Water Withdrawal) are required from DEC if the construction of a facility would impact state-regulated resources. The size and type of impacts determine the conditioning for the permit as well as mitigation requirements, if necessary. Permit requirements are based on construction and operation impacts, regardless of the technology and application type. Natural resource permit applications not only have to undergo SEQR but also must comply with the relevant program's regulations and the Uniform Procedures Act (UPA). The UPA and its implementing regulations set minimum application requirements, timelines for review and public notice, permit terms, and other application procedures.[176] Applications for natural

resource permits cannot be noticed for public comment until they are deemed complete under UPA. The UPA also states that an application cannot be complete until the SEQR requirements are met.[177] The time for review, public comment,[d] permit decision(s), and permit term(s) can vary depending on the natural resource permit(s) required.

Most natural resource permits do not have any application or permit fees, except freshwater and tidal wetlands permits, which do have associated application fees.[178]

Should natural resource permit(s) be issued for a given project, they are subject to the conditions therein and are only authorized for the permitted activities for the effective term of the permit. Failure to meet any of the permit conditions or conducting activities outside of the effective term of the permit can lead to a Notice of Violation and result in additional enforcement action.

6.2.4 State Pollutant Discharge Elimination System Permits

SPDES permits from DEC are required for thermal and chemical discharge to water bodies[179] ; this includes nuclear facilities where applicable. New York's SPDES program has been approved by the EPA for the control of surface wastewater and stormwater discharges in accordance with the Clean Water Act (CWA); however, the SPDES program is broader in scope than that required by the CWA as it controls point source discharges to groundwaters as well as surface waters.[180] Under the SPDES program, facilities are required to use the best available technology to minimize adverse environmental impacts from cooling water intake structures.

Draft SPDES permits are required to be available for EPA review and comment, and the draft permit must also be made available for DOH and public review.

While there are no application fees for permit review, annual fees are assessed based on the type of facility, type of authorization, and discharge volume.[181] Fees range from $1,500 to over $50,000. Failure to meet any of the permit conditions can lead to informal or formal enforcement, depending on the severity of the non-compliance. A Notice of Violation may be issued, and additional enforcement action may be taken. If a violation is severe enough, DEC may proceed straight to an Order on Consent and skip the Notice of Violation.

[d] Only UPA "major" applications go out for public notice (6 NYCRR 621.7).

6.2.5 Air Pollution Control Permits

Air pollution control permits may be needed for site operations equipment at nuclear power plants including emergency diesel generators, auxiliary boilers, standby fire water pumps, or backup oil heaters. DEC issues three types of Air Pollution Control authorizations under ECL Article 19. [182] These include Title V Facility Permits, State Facility Permits and Air Facility Registrations. Title V Facility permits are required for non-radiological emissions from facilities to be considered major sources and that meet or exceed the following specific emission thresholds: [183]

- Hazardous air pollutants: 10 tons/year for a single pollutant or 25 tons/year for a combination of pollutants;
- Carbon monoxide, sulfur dioxide, and particulate matter (PM_{10} and $PM_{2.5}$): 100 tons/year;
- Volatile organic compounds: 25 tons/year in the New York metropolitan area and Long Island and 50 tons/year in the rest of the state; and
- Nitrogen oxides: 25 tons/year in the New York metropolitan area and Long Island and 100 tons/year in the rest of the state.

Applicants for a Title V Facility Permit must submit detailed information on emissions, processes, and control equipment to the DEC. DEC is required to offer a public comment period. Once the public comment period is concluded, Title V permits undergo a 45-day EPA review period. Title V Facility Permits are issued for a period not to exceed 5 years and holders must pay annual fees based on actual emissions from the facility and including a base fee. [184]

State Facility Permits are issued for a period not to exceed ten years. These permits are required for facilities that meet certain criteria as defined in subpart 6 NYCRR 201-5. These facilities are often those that have potential emissions that would identify them as a major source, but their potential to emit[e] has been restricted by enforceable permit conditions to limit emissions below major source thresholds. Such permits are also subject to public review and comment. Similarly, Air Facility Registrations are required for non-major facilities that meet criteria defined in subpart 6 NYCRR 201-4. These are issued for a period of ten years and tend to be smaller facilities that do not meet thresholds to require a State Facility or Title V Facility Permit. Both State Facility Permits and Air Facility Registrations have annual fees. [185]

[e] Potential to emit is defined at the maximum capacity of an air contamination source to emit any regulated air pollutant under its physical and operational design under 6 NYCRR 22.

6.2.6 Water Quality Certification (CWA Section 401)

Under Section 401 of the federal CWA, a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the U.S. unless a Section 401 Water Quality Certification (WQC) is issued, verifying compliance with state water quality requirements.[186] For facilities subject to Article 10 jurisdiction, the PSC, following the end of the Siting Board's jurisdiction, is the certifying authority for Section 401 WQCs. For facilities not subject to Article 10 jurisdiction, DEC is the certifying authority. DEC or the PSC, as applicable, may waive, deny, deny without prejudice, or issue certification to an applicant. Certification requirements are based on non-radiological construction, and operation impacts regardless of the nuclear technology or application.

There are no fees associated with the WQC. Failure to meet any of the permit conditions can lead to a Notice of Violation and additional enforcement action may be taken.

6.2.7 Coastal Zone Management Act and New York State Coastal Management Program Federal Consistency Review

Under the federal CZMA and New York's Coastal Management Program (CMP), the DOS Office of Planning, Development and Community Infrastructure (OPDCI) ensures that federal actions, federally licensed or permitted activities, and federal financial assistance projects affecting New York's coastal area are consistent with New York State coastal policies or federally approved Local Waterfront Revitalization Program (LWRP) policies, as applicable.[187] Nuclear reactor licensing by the NRC triggers federal consistency review in which DOS evaluates a project's consistency with the enforceable policies in New York's CMP or federally approved LWRP, including but not limited to public safety and hazard avoidance, siting of energy facilities, coastal erosion and flooding, water-dependent uses, public access, habitat protection, water quality, and infrastructure resilience and adaptation.[188] DOS issues a concurrence, a concurrence with conditions, or an objection to an applicant's federal consistency certification for the proposed activity. If a DOS objection is issued, federal permits may not proceed unless the U.S. Secretary of Commerce overrides the DOS objection. Any conditions included in a DOS concurrence may be enforced by the federal permitting agency (i.e., NRC for nuclear reactor licensing), and all conditions must be accepted by the applicant, or the decision defaults to an objection.

DOS coordinates with NRC during the consistency review. DOS may also participate as a cooperating agency with NRC on licensing and environmental reviews under NEPA, DOE for funding and R&D, USACE for CWA Section 404 permits and Section 408 authorizations, as well as Rivers and Harbors Act Section 9 and 10 permits, and NOAA for CZMA oversight. The federally enforceable coastal policies were created as a networked program with referenced regulations under jurisdiction of multiple NYS entities including but not limited to DEC, NYS Office of General Services, and NYS Historic Preservation Office. DOS coordinates with neighboring coastal states on interstate coastal issues (e.g., shared waters, transmission corridors, emergency planning). DOS also coordinates regionally through the Mid-Atlantic & Northeast Regional Ocean Partnerships and Great Lakes Commission and with international partners in Canada through its seat on the International Joint Commission and with the Great Lakes Governors and Premiers. Additionally, coastal program managers coordinate nationwide on regulatory, resource, and use considerations.

Federal consistency review has been significant for nuclear facilities in New York. Three of the state's existing reactors are proximate to the Lake Ontario National Marine Sanctuary, which was designated by NOAA in 2024 to protect a collection of nationally significant shipwrecks and is co-managed by NOAA and New York State.

Any new advanced nuclear facility proposed in New York's coastal area, including the Great Lakes shoreline where existing facilities are located, would require DOS federal consistency review. Federal consistency review is based on an effects test of whether an activity may have a reasonably foreseeable effect on a coastal use or resource. Facility size has no bearing on whether federal consistency is required. All actions must be fully consistent with all applicable policies, and it is important to note that no policy applies to the exclusion of the others.[189] A project developer subject to federal consistency review is required to submit a Federal Consistency Assessment Form along with a copy of the relevant federal permit applications or financial assistance applications and demonstrate consistency with all applicable CMP policies. Fees are not associated with this review. Early coordination with DOS would be important for projects located in the NYS coastal area or outside the coastal area but with reasonably foreseeable coastal effects (e.g., cooling water discharges, transmission, ports).

Novel siting concepts, such as those related to microreactors, coastal infrastructure, or hybrid energy uses, may raise new coastal use conflicts or resource impacts that warrant careful review. All end uses or applications of advanced nuclear technologies could be subject to federal coastal consistency review.

6.2.8 Transportation and Disposal of Low-Level Radioactive Waste

The federal Low-Level Waste Policy Act of 1980 and its 1985 Amendments made disposal of low-level waste a state responsibility. Low-level waste is generated through use of radioactive materials in nuclear power, medical, academic, government, and industrial sectors.

DEC also regulates transportation of low-level waste under Part 381 and low-level waste disposal facilities under Parts 382 and 383.[190] Part 381 establishes permitting, operational, and recordkeeping requirements for transporters of low-level waste. Any person or entity transporting low-level waste into, within, or through New York must obtain a DEC transport permit, unless a specific exemption applies, and shipments must be accompanied by a completed New York State low-level waste manifest for tracking and enforcement purposes.

Part 381 incorporates by reference applicable U.S. DOT and NRC requirements governing packaging, labeling, and radiation safety.[191] New York further requires transporters to maintain specified levels of financial assurance, comply with incident reporting and recordkeeping obligations, and ensure that waste is delivered only to authorized treatment, storage, or disposal facilities. In addition, highway transport of low-level waste through New York State requires a Part 381 permit regardless of whether the shipment originates or terminates within the State.

Under the State Low-Level Radioactive Waste Management Act of 1986, DEC was charged with permitting and regulating low-level waste disposal facilities. Part 382 regulates the siting of low-level waste disposal facilities and Part 383 applies to low-level waste facility design, construction, operation, closure, post-closure, and institutional control. After Part 382 was promulgated, a Siting Commission was set up but was disbanded without siting a low-level waste disposal facility in the State and there are currently no low-level waste disposal facilities operating in New York State. Low-level waste is transported to out-of-state low-level waste disposal facilities. Management of low-level waste is detailed in the Master Plan Waste Study.

Under the New York State Low-Level Radioactive Waste Management Act, NYSERDA monitors the generation and management of low-level waste in New York.[192] NYSERDA collects annual reports from facilities that produce, store, or dispose of low-level waste and prepares annual status reports for the Governor and Legislature, the most recent of which was published in 2026.[193] This function will continue and become increasingly important with new advanced reactor development because advanced reactors may generate different types and volumes of waste than conventional LWRs, as detailed in the Master Plan Waste Study.

6.2.9 Indigenous Perspectives on Stewardship

Indigenous perspectives on stewardship encompass a broad range of environmental, economic, public health, spiritual, and cultural considerations extending beyond radioactive waste management. Indigenous Nations' feedback highlighted the importance of considering advanced nuclear energy's potential impacts on water resources, air quality, sacred geographies, culturally significant landscapes, hunting, fishing, gathering practices, protected species, and other natural resources that support cultural continuity across generations.

6.3 Finding

Environmental Review for Nuclear Facilities: NRC conducts environmental reviews under NEPA as part of the licensing process. For nuclear facilities of 25 MW or more, State environmental review occurs through the Article 10 process, which preempts all non-federally-delegated environmental permitting and approval. For facilities not subject to Article 10 jurisdiction (<25 MW), DEC issues air, water, and natural-resource permits in accordance with potential impacts of the nuclear plant facility on natural resources and the environment. In addition, DOS conducts federal consistency review under the Coastal Zone Management Act if a facility is within or affects the NYS coastal zone.

7. Decommissioning

7.1 Federal Decommissioning Process

NRC's decommissioning requirements ensure that, following cessation of operations, nuclear facilities are safely dismantled, and sites are restored to conditions permitting license termination. The NRC's decommissioning regulations address financial assurance, technical procedures, and radiological release criteria and have evolved through experience with numerous facility shutdowns.[194]

Upon permanent shutdown, a licensee must submit certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel.[194] These certifications terminate the authority to operate the reactor and trigger a transition to decommissioning status.[195]

Within two years of permanent cessation of operations, the licensee must submit a Post-Shutdown Decommissioning Activities Report (PSDAR) describing the planned decommissioning activities, schedule, cost estimate, and environmental impacts. The NRC holds a public meeting to discuss the PSDAR, and major decommissioning activities may begin 90 days after NRC receipt of the PSDAR.[196]

Three general decommissioning strategies are recognized by NRC: DECON (immediate dismantlement), SAFSTOR (safe storage with deferred dismantlement), and combinations thereof. Regardless of strategy, decommissioning must be completed within 60 years of permanent cessation of operations unless NRC approves an extension.[197] NRC recently issued a proposed rule that would retain the 60-year deadline to complete decommissioning but would make it easier for a licensee to obtain an exemption from this timeliness requirement.[198]

7.2 State Responsibilities

The PSC possesses general supervisory authority over all electric generating plants in New York State, including "retired nuclear power reactors and their associated systems," and must be informed prior to any shutdown.[199] In the case of Indian Point, DPS established the Indian Point Decommissioning Oversight Board. The 25-member board, which includes representatives from state agencies and authorities, local and State representatives, and other stakeholders and experts, is charged with creating a forum for information sharing between involved entities,

identifying issues for relevant oversight entities to address, and facilitating public participation and information sharing.[200]

7.3 License Termination

At least two years before anticipated license termination, the licensee must submit a License Termination Plan (LTP) to NRC describing final decommissioning activities, radiation survey protocols, and demonstration of compliance with radiological criteria. The radiological criteria for unrestricted release require that residual radioactivity be reduced such that radiation doses to any individual person do not exceed 25 mrem per year.[201]

Upon completion of decommissioning and NRC approval of the Final Status Survey Report demonstrating compliance with release criteria, the NRC license is terminated. If an Independent Spent Fuel Storage Installation (ISFSI) remains on site, the NRC license may be reduced to the Independent Spent Fuel Storage Installation (ISFSI) footprint pending ultimate disposition of spent fuel.

7.4 Financial Assurance for Decommissioning

Licensees are required to indicate to the NRC how they will provide reasonable assurance that funds will be available for the radiological decommissioning process.[202] For nuclear power reactors, minimum decommissioning costs are established by formula based on reactor type and power level.

Part 50 and 52 licensees are required to submit a decommissioning report that must contain a certification that financial assurance for decommissioning will be (for a license applicant), or has been (for a license holder), provided in an amount which may be more, but not less, than the amount established by the NRC.[203] For Part 53,"[t]he amount of financial assurance for decommissioning ... must be based on a site-specific cost estimate."[204] Acceptable financial assurance mechanisms include prepayment, external sinking funds, surety bonds, letters of credit, insurance, parent company guarantees, and self-guarantee for certain qualifying licensees.[202] Licensees must report to NRC on the status of decommissioning funding annually or biennially, depending on the time remaining before projected shutdown. These reports must address the amount of funds accumulated, projected costs, and any funding shortfalls requiring corrective action. Part 57, as proposed, includes similar decommissioning financial assurance requirements but allows Part 57 applicants to request NRC approval of a decommissioning plan

as part of a joint application for a construction permit and operating licenses.

Decommissioning trust funds for LLWRs typically must accumulate hundreds of millions to over a billion dollars to cover the cost of decommissioning. The amount of financial assurance required for decommissioning is determined by a site-specific cost estimate. Site-specific decommissioning cost estimates must account for the engineering, labor, equipment, transportation, disposal, and related charges needed to support termination of the license.[205] This includes costs for decontaminating and removing SSCs and materials. It also must include plans for adjusting levels of funds assured for decommissioning to demonstrate a reasonable level of assurance that funds are available. This allows required decommissioning trust fund levels for smaller reactors to better reflect their lower decommissioning costs.

In addition, the PSC has imposed significant decommissioning financial assurance and financial reporting requirements on the owner of New York's four operating reactors. The owner has also committed to achieving the State's cleanup standards for residual radiation following decommissioning.[206] While the plants remain operational, these commitments include regularly updating the State as to whether each facility's nuclear decommissioning trust is adequately capitalized to fund all projected decommissioning, site restoration, and spent fuel management expenses. After a facility has shut down, these commitments include maintaining certain minimum nuclear decommissioning trust balances until all spent fuel has been removed from the site and providing the State with regular status updates. These requirements, adopted by the Commission Order Asserting Jurisdiction, Approving and Adopting Joint Proposal, and Continuing Lightened Regulation (Joint Proposal), provide for the prompt and comprehensive decommissioning and restoration of the New York sites. In addition, as part of the Joint Proposal, the plants' owner agreed to "providing an 18-month advance notice of power reactor deactivations."[207] Finally, the PSC has also secured commitments from the owner to achieve partial site release well in advance of the NRC's permissible 60-year deadline.[208]

For facilities subject to Article 10, certificate applications must include a plan for the decommissioning and restoration of the facility site, including how the site's decommissioning and restoration will be funded. Nuclear facilities must also provide under Article 10 a plan to establish a trust fund to ensure that sufficient funding will be available to decommission the non-radiological portions of the facility and restore the site.[209]

DOH also requires financial assurance from certain radioactive materials licensees under its jurisdiction and certain circumstances.[210] The amount required depends on the type and quantity of radioactive materials involved and the potential decontamination costs.

7.5 Waste Management

The Master Plan Waste Study details waste management of HLW and low-level waste relevant to decommissioning issues and considers management of waste from advanced reactors. State responsibilities for low-level waste are also briefly described in Section 6.2.8.

7.6 Findings

Federal Decommissioning Statutory and Regulatory Authority: NRC requires that nuclear facilities are safely dismantled and sites are restored to conditions permitting license termination following cessation of operations. Decommissioning must be completed within 60 years of permanent cessation of operations unless NRC approves an extension. Licensees are required to provide reasonable assurance that funds will be available for decommissioning.

State Decommissioning Responsibilities and Experience: Indian Point is currently undergoing decommissioning in New York State and is being overseen by the Indian Point Decommissioning Oversight Board. The PSC has imposed additional decommissioning requirements on the owner of New York's four operating reactors including decommissioning financial assurance, financial reporting requirements, and achievement of State cleanup standards.

8. Scale and Application Considerations for Advanced Reactors

The sections above consider advanced reactor technologies generally under the current and developing federal, State, and local regulatory framework. This section builds on the regulatory framework detailed above to discuss how specific federal, state, and local regulatory requirements could apply by advanced reactor type and by end use or application. As context, the section begins with a description of advanced reactor designs and operating experience.

Regulatory complexity for advanced reactor regulation does not scale solely by reactor size. Reactor size remains relevant because it can affect footprint, emergency planning needs, environmental impacts, and state law thresholds, such as Article 10's 25 MW or greater applicability threshold. However, federal regulation is increasingly moving toward risk-informed, performance-based, and technology-inclusive criteria. Under this approach, regulatory treatment depends on the reactor's risk profile, licensing pathway, safety case, design maturity, degree of standardization, emergency planning consequences, security needs, operational model, and intended application. Accordingly, this section considers reactor size as one practical indicator but does not generally treat size as a standalone proxy for regulatory complexity.

8.1 Advanced Reactor Designs and Operating Experience

A fundamental challenge for new advanced reactor technologies is the limited commercial operating experience compared to the conventional LWR fleet. While some advanced reactor designs build upon decades of research and prototype operation, commercial-scale deployment remains in early stages for most advanced concepts.[211] The section below outlines operating experience of the broad advanced nuclear reactor categories. Additional information on Gen III+ LWRs and light-water SMRs is in Appendix E of the Advanced Nuclear Policy Options Paper and additional information on microreactors is in the Master Plan Nuclear Microreactor Technologies Study.

8.1.1 Generation III+ Light Water Reactors

The AP1000, first deployed in the US at Vogtle Units 3 and 4 in Georgia, represents the most recent large LWR construction experience in the United States. While the design incorporates passive safety systems validated through extensive testing, the construction process revealed

challenges including first-of-a-kind engineering issues, supply chain constraints, and limited workforce availability that contributed to significant schedule delays and cost overruns.[212] Lessons learned from Vogtle (see Section 3.1.8) provide a roadmap for improving future large LWR construction cost and timing, though each site presents unique considerations.

8.1.2 Light-Water Small Modular Reactors

In January 2023, the NuScale Power Module became the first SMR to complete NRC design certification, a regulatory milestone no other SMR developer has yet achieved.[213] NuScale received NRC Standard Design Approval for a larger (77 MW) version in 2025.[214] In 2025, Holtec submitted a LWA application to start construction on a dual-unit SMR-300 plant at the Palisades Energy Center in Michigan, which is currently under review by the NRC.[215]

To date, no commercial SMR has yet operated in the United States, meaning operational data to validate performance projections and refine safety analyses remains limited. The Tennessee Valley Authority has submitted a construction permit application for a BWRX-300 SMR at Clinch River, with a construction permit decision expected in fall 2026.[216] A BWRX-300 at the Darlington New Nuclear Power Project site in Ontario is expected to be completed sooner than the Clinch River site would be and will provide operational data to validate performance projections.[217]

8.1.3 Microreactors

Microreactor designs are in various stages of development and licensing, with several pursuing NRC approval or authorization under the Reactor Pilot Program and follow-on Launch Pad program, which are both run by DOE.[218] These designs propose novel operational concepts including factory fabrication, transportability, remote or autonomous operation, and minimal on-site staffing. While potentially transformative for distributed energy applications, commercial operating experience is needed to validate performance of safety and reliability features.

The Army's Janus Program, aimed at deploying microreactors to military installations, has selected five vendors and installations with the goal of operating its first reactor by September 2028.[219]

8.1.4 Generation IV Non-Water-Cooled Reactors

Sodium-cooled fast reactors, molten salt reactors, and high-temperature gas-cooled reactors utilize fundamentally different coolants, fuel forms, and operating parameters than conventional LWRs (see Section 4.8). Several non-water- cooled designs are advancing through NRC's

licensing processes. For example, TerraPower's Natrium sodium-cooled fast reactor received its construction permit in March 2026, representing a significant milestone.[220] In addition, the NRC completed its environmental review of the construction permit application for X-Energy's Long Mott high-temperature gas-cooled pebble bed reactor in May 2026.[221] However, the U.S. commercial operating experience with these technologies is limited to experimental and demonstration facilities from decades ago. FOAK commercial deployments will generate essential data but also carry inherent uncertainties.

8.2 Federal Regulatory Requirements by Advanced Reactor Type

Section 3 summarized the current and proposed licensing processes that would apply to advanced reactors and Section 4 described safety requirements and oversight, including considerations for advanced reactors. This section explores how advanced reactor type impacts the federal regulatory process. The following sections examine state and local regulatory requirements by reactor type.

As NRC moves toward a more risk-informed and performance-based approach to licensing, reactor size is one of several important considerations. The sections below describe the three general reactor types, LLWRs, SMRs, and microreactors–and the likely associated federal licensing requirements. The reactor type categories below are useful for organizing the discussion, but they should not be read as fixed regulatory classes.

8.2.1 Large Light Water Reactors

LLWRs, often exceeding 1,000 MWe per unit, represent the established commercial nuclear technology and anchor the existing regulatory framework. The fleet of 94 operating reactors in the United States consists entirely of LLWRs (pressurized water reactors and boiling water reactors) most of which were licensed under Part 50.[222]

These facilities are subject to the complete prescriptive requirements developed over decades of operating experience, including the General Design Criteria, reactor oversight process, and full emergency preparedness requirements with 10-mile plume exposure pathway EPZs. However, the NRC is implementing risk-informed regulation of LLWRs where appropriate.[223]

Historically, reactor size increased to achieve economies of scale, but with increased size came increased complexities in design and operation. In response, the industry invested in efforts to simplify designs and rely more on passive safety features. New advanced LLWRs reflect these

design changes, like the designs of the two AP1000 reactors built at Vogtle Units 3 and 4 in Georgia. These two units in Georgia are the only new large reactor units completed in the United States since the 1990s and were licensed under Part 52 with combined licenses referencing NRC's design certification.[224]

Based on this experience, future plans for new units of 1,000 MW or more in the US will likely benefit from standardization, such as using a certified design with demonstrated construction experience like the AP1000 or APR1400 design. As more of these projects are completed, more comprehensive lessons learned can be applied to future construction.

8.2.2 Small Modular Reactors

NRC regulations define SMRs as power reactors producing heat energy up to 1,000 MWth per module. [225] As the NRC evolves toward more risk-informed, performance-based approaches, SMRs as well as other types of reactors may receive risk-aligned regulatory treatment recognizing that SMRs may present lower accident consequences due to reduced source terms, simplified designs, and enhanced passive safety features.

As described above, the NRC issued the NuScale Power Module design certification in 2023.[213] The 50 MWe module employs integral pressurized water reactor technology with passive safety systems. The design certification process required approximately seven years and addressed novel issues including multi-module operation and control room staffing.[226] Subsequently, NRC issued NuScale a standard design approval for a 77 MWe module and NuScale has not pursued a DC rule for this larger modular design. Although early in the process, NuScale has plans to work with ENTRA1 Energy to deploy up to 6 GW of SMR capacity across the Tennessee Valley Authority's seven-state service region.[227]

Evolving regulatory accommodations relevant to SMRs include: (1) scalable EPZ sizing based on dose consequence analysis; (2) alternative physical security requirements under proposed Part 73 amendments; (3) potential reductions in operator staffing requirements based on automation and passive safety; and (4) fee reductions under the ADVANCE Act for advanced reactor licensing activities.[228] Any reactor design or project that meets the entry criteria (not only SMRs) can use these accommodations. For example, the ESP for SMRs at the Clinch River site benefited from scalable EPZs.[229]

8.2.3 Microreactors

Microreactors, generally characterized by power output below 20 MW and designed for factory fabrication and transportability, present the greatest departure from traditional regulatory assumptions. The NRC has undertaken dedicated initiatives to address microreactor licensing considerations.[230] For example, the NRC issued staff guidance in 2020 to scale environmental reviews appropriately for microreactors, acknowledging they may have minimal environmental footprints and may not involve credible severe accident scenarios.[231]

Recently, the NRC proposed Part 57 for licensing microreactors and other reactors with comparable risk profiles, described in Section 3.1.5. One of the entry criteria proposed by the NRC for using Part 57 was a 10 metric ton fuel limit, corresponding to about a maximum power of 100 MW. Depending on the final regulatory criteria and other aspects of the design, some SMRs might qualify for licensing under Part 57.

Key regulatory considerations unique to microreactors include: (1) factory fabrication and transportation of complete reactor modules; (2) potentially autonomous or remote operation without continuous on-site operators; (3) site boundary EPZs or elimination of formal EPZs based on consequence analysis; (4) transportation and installation as pre-licensed units referencing manufacturing licenses; and (5) simplified decommissioning involving whole-module removal rather than on-site dismantlement.[232]

The Fort Drum microreactor project under the Army's Janus Program will be constructed and operated for military purposes under the Army's own nuclear authorities, including licensing, and falls outside the State's siting jurisdiction.

Table 8 summarizes the federal regulatory scaling complexity by reactor category and deployment posture. The table retains the familiar categories of LLWRs, SMRs, and microreactors, but distinguishes between FOAK or non-standard deployments and more standardized repeat deployments where appropriate. This framing reflects that reactor category is useful for organizing the discussion, but as NRC regulations evolve toward a risk-informed and performance-based approach, regulatory complexity may depend more on the distinction between early movers versus standardized designs.

Table 8. Indicative Federal Regulatory Scaling and Complexity by Reactor Category

Notes: The indicative federal regulatory complexity column represents qualitative indicators of likely federal regulatory complexity, not safety rankings. They reflect the expected relative burden of NRC licensing review, emergency planning, security, environmental review, staffing, and operational-review issues. Actual complexity will depend on the applicant's safety case, design maturity, licensing pathway, degree of standardization, source term, offsite consequence analysis, and operating model.

Reactor Category	Likely NRC Licensing Pathway	Emergency Planning Treatment	Key Complexity Drivers	Indicative Federal Regulatory Complexity
Large LWR—FOAK or non-standard	Part 50/52; potentially Part 53	Fixed 10-mile Emergency Planning Zone (EPZ) or scalable EPZ under 10 CFR 50.160 or 53.855	Large source term, complex construction, extensive safety review, major environmental review	**High**
Large LWR—standardized repeat deployment	Part 52 referencing certified design; Part 50/53 possible	Fixed 10-mile EPZ or scalable EPZ	Larger facility but more mature design and prior review experience than FOAK	**Moderate**
SMR—FOAK deployment	Part 50 / 52 / 53; Part 57 if eligible	Fixed 10-mile EPZ or scalable EPZ; No EPZ if qualified for Part 57	FOAK design issues, multi-module operations, staffing, control-room, passive safety validation	**Moderate-High**
SMR—standardized repeat deployment	Part 50 / 52 / 53; Part 57 if eligible	Fixed 10-mile EPZ or scalable EPZ; No EPZ if qualified for Part 57	Smaller source term, standardized design, more bounded review issues	**Moderate**
Microreactor / comparable low-risk reactor	Part 57 if eligible; otherwise Part 50 / 52 / 53	Site-boundary or no formal offsite EPZ may be possible	Limited source term, factory fabrication, transportability, remote/autonomous operation	**Lower-Moderate**

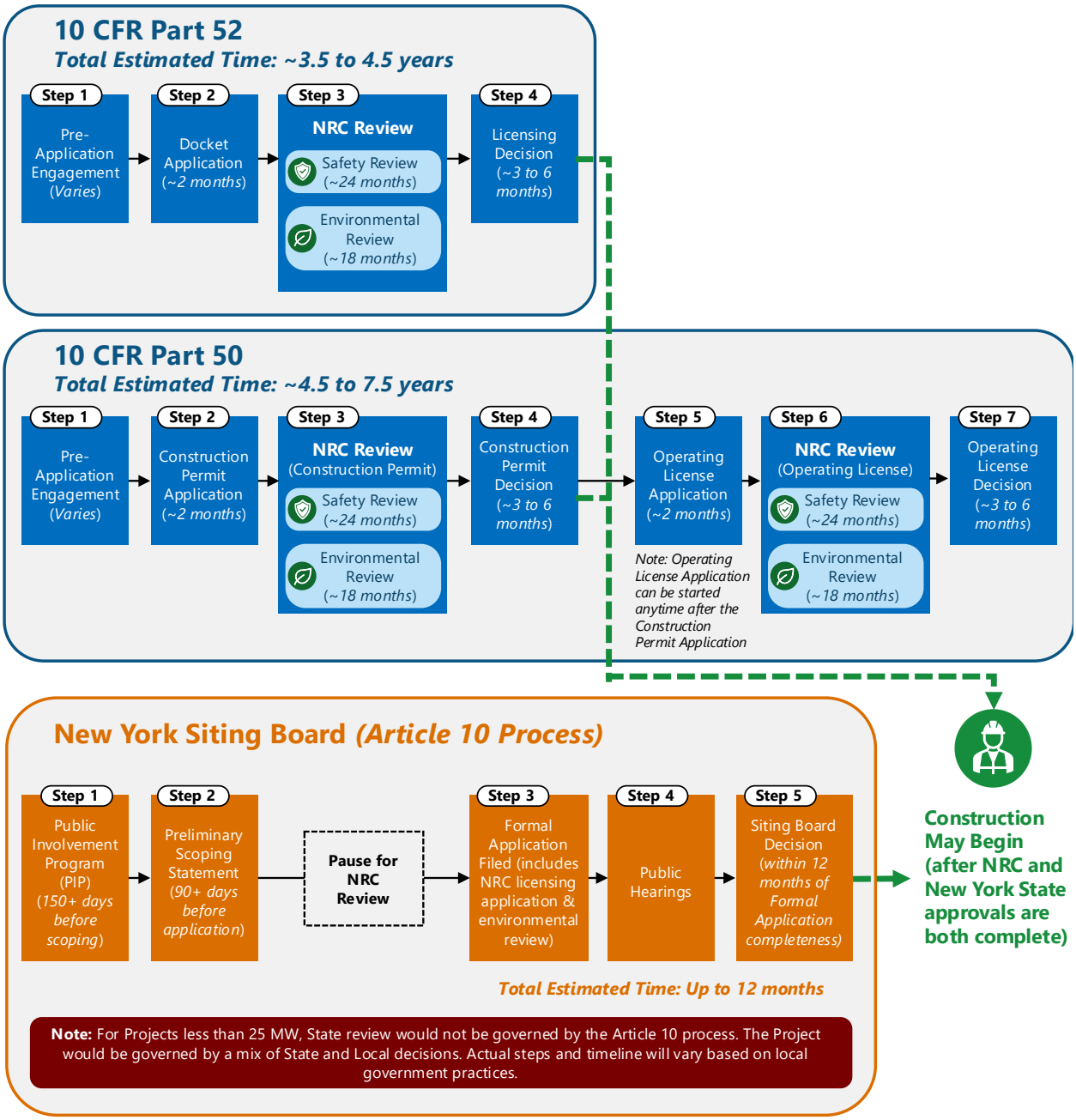
8.3 State Regulatory Requirements by Reactor Type

In New York, LLWRs ≥25 MW fall under Article 10 jurisdiction and would require DOS federal consistency review if in the coastal zone and DHSES emergency planning coordination. The Article 10 environmental review process for LLWRs would require comprehensive consideration of environmental impacts due to their significant footprint, cooling water requirements, and other potential impacts. The Article 10 process is described in Section 2.3.4.2 and the Article 10 environmental review process is described in Section 6.2.1.

In practice, State siting review under Article 10 could occur in parallel with the NRC licensing process as illustrated in Figure 9. Construction on a site could proceed only after both NRC and New York State approvals are complete.

Figure 9. Parallel NRC Part 50/52 Licensing Process and State Article 10 Review Process and Associated Timelines for Nuclear Facilities ≥25 MW.

Notes: The Part 52 and Part 50 timelines here are approximate based on historical experience and do not reflect NRC's current milestones to complete Part 52 and 50 review within 18 months. As depicted here, the Part 52 process includes the assumption that a Design Certification is in place.



SMRs and microreactors ≥ 25 MW would be subject to Article 10 siting requirements with the same procedural requirements as larger facilities. Microreactors < 25 MW are not subject to Article 10 review and would require applicable DEC permits (described in Section 6.2) and local review (described in Section 5) as part of the siting process.

Table 9 summarizes indicative state regulatory complexity by reactor category for FOAK reactors. Reactor size affects the State review process because it determines Article 10 jurisdiction, but size is not a perfect surrogate for all aspects of site and regulatory complexity, for example, emergency planning complexity. While federal requirements require licensees to provide more complex emergency plans where the potential off-site dose from a maximum hypothetical radioactive source exceeds protective action guidelines,[233] State and local emergency planning coordination is uniform for all facilities, reflecting that the current nuclear power facilities in New York are roughly equivalent in size and potential source term. The complexity ratings in Table 9 assume that the State and local planning activities under current practices, and do not reflect potential adaptations of State and local requirements for scaled emergency planning for reactors that meet NRC criteria.

The indicative state regulatory complexity presented in Table 9 will likely decrease for these reactor types after FOAK designs become repeated, standardized designs.

Table 9. Indicative State Regulatory Scaling and Complexity for FOAK by Reactor Category

Notes: The indicative State regulatory complexity column represents qualitative indicators of likely State regulatory complexity, not safety rankings. They reflect the reactor size, State siting framework, environmental review process, and emergency coordination.

Reactor Category	State Siting Framework	State Environmental Review & Permitting	State Emergency Coordination	Key State Complexity Drivers	Indicative State Regulatory Complexity
Large LWR	Article 10 applies	Environmental review under Article 10; DOS review if coastal; significant land, water, discharge, and construction impacts possible.	Likely extensive if traditional 10-mile EPZ applies.	Large footprint; cooling water needs; transmission impacts; Article 10/NRC interface; public engagement.	**High**

Reactor Category	State Siting Framework	State Environmental Review & Permitting	State Emergency Coordination	Key State Complexity Drivers	Indicative State Regulatory Complexity
SMR	Article 10 applies if ≥25 MW	Environmental review under Article 10 if ≥25 MW; impacts depend on cooling, footprint, water use, and site.	May be lower if NRC-approved scalable EPZ applies.	Multi-module issues; reduced footprint; need to align with NRC risk-informed review.	**Moderate-High**
Microreactor ≥ 25 MW	Article 10	Environmental review under Article 10 if ≥25 MW; smaller footprint may reduce impacts.	Likely lower if NRC supports site-boundary or limited offsite planning.	Article 10 threshold may drive process more than actual risk, footprint, or source term.	**Moderate**
Microreactor < 25 MW	Article 10 does not apply; local review becomes more important.	State permits may be narrower but remain site-specific.	Likely lower if comparable to NPUF or radioactive-materials planning.	No Article 10 but local zoning, site plan, special use, and SEQR review.	**Lower-Moderate**

8.4 Local Requirements by Reactor Type

For facilities ≥25 MW subject to Article 10, local procedural requirements are preempted, and the Siting Board may elect not to apply substantive local laws such as zoning or other land use laws. The full scope of local requirements would apply to facilities <25 MW not subject to Article 10.

Local regulatory requirements in New York State do not currently differentiate based on reactor size. However, some size-related considerations are relevant to compliance with local regulations:

- LLWRs: Large physical footprint, present the greatest challenges for compliance with local dimensional standards; significant visual impact, extensive security perimeters. May require zoning amendments.
- SMRs: Smaller physical footprint that may fit existing industrial zones and facilitate compatibility with existing land uses.

- Microreactors: Very small footprint potentially compatible with commercial or light industrial zones and may qualify as an accessory use. Most microreactors (< 25 MW) would fall outside Article 10 jurisdiction and be subject to the full range of local requirements.

Table 10 describes general local requirements and indicative level of regulatory complexity for FOAK reactors by reactor type. Similar to Table 9, the indicative regulatory complexity in Table 10 will likely decrease for these reactor types after FOAK designs become repeated, standardized designs.

Table 10. Indicative Local Regulatory Complexity for FOAK by Reactor Category

Notes: The indicative local regulatory complexity column represents qualitative indicators of likely local regulatory complexity, not safety rankings. They reflect reactor footprint, security perimeter, and zoning.

Reactor Category	Applicability of Local Requirements	Key Local Complexity Drivers	Indicative Local Regulatory Complexity
Large LWR ≥ 25 MW	Preempted by Article 10.	Large footprint; visual and land-use impacts; extensive security perimeter; zoning amendments may be required.	**High**
SMR ≥ 25 MW	Preempted by Article 10.	Smaller footprint; greater compatibility with industrial zones; fewer dimensional conflicts than LLWRs.	**Moderate-High**
Microreactor ≥ 25 MW	Preempted by Article 10	Very small footprint; potential compatibility with industrial, institutional, or utility uses.	**Moderate**
Microreactor < 25 MW	Full local zoning, site plan, permits, and SEQR apply because Article 10 does not.	Very small footprint; potential compatibility with commercial/light industrial zones or as accessory use; no Article 10 preemption	**Moderate**

8.5 Requirements by End Use and Application

There are distinct federal, state, and local regulatory considerations depending on the end use or application of nuclear generation, summarized in Figure 10 and described in detail in the following sections.

Figure 10. Federal, State, and Local Regulatory Interfaces by Advanced Reactor End Use or Application

End Use & Application	Federal	State	Local
Grid-Connected Electricity Production	• NRC licensing • Federal grid, reliability and market interfaces	• **Article 10 siting process for facilities ≥25 MW** • DEC environmental review and permits for facilities <25 MW • PSC oversight • DOS review if coastal • DHSES coordination	• Transmission and interconnection • Access and infrastructure • Land use and zoning • Public engagement • Emergency planning
Behind-the-Meter (Industrial or Onsite Use)	• NRC licensing • Federal grid role depends on degree of grid interaction	• **Article 10 siting process would apply unless the reactor is for industrial purposes, located on-site, and is ≤200 MW** • DEC permitting • DHSES coordination	• Industrial-site compatibility • Onsite infrastructure • Land use and zoning
Backup Power Applications	• NRC licensing • May qualify for reduced EPZ or security requirements if risk supports it	• **Article 10 siting process would apply unless the reactor is for industrial purposes, located on-site, and is ≤200 MW** • No tailored State pathway • DEC permitting • DHSES coordination	• Local responders • Critical-facility coordination • Emergency planning
Process Heat & Industrial Applications	• NRC licensing • Interfaces with industrial safety requirements	• Article 10 siting process may apply in certain circumstances • State review of co-located industrial processes • Relevant State permits • DHSES coordination	• Industrial zoning fit • Infrastructure and utilities • Site integration
Hydrogen Production	• NRC licensing • Interfaces with hydrogen production and storage systems	• Article 10 siting process may apply in certain circumstances • State permitting for hydrogen storage, handling and transport • Water use approvals • DHSES coordination	• Industrial footprint • Storage and transportation considerations • Emergency access and response
Integration with Thermal Storage	• NRC review depends on whether storage systems are safety-related or functionally integrated	• Article 10 siting process may apply in certain circumstances • Review based on storage medium • DEC permitting • Fire and building code interfaces	• Footprint and siting • Fire protection requirements • Industrial-site integration
Medical Isotope Production	• NRC licensing • Review may be narrower than power reactors; FDA interface may apply	• Article 10 siting process may apply in certain circumstances • DOH radioactive materials licensing • DEC permitting, if necessary	• Generally smaller footprint • Specialized material-handling considerations

8.5.1 Grid-Connected Electricity Production

Grid-connected nuclear power generation, the traditional application for commercial nuclear power, triggers the most comprehensive set of federal and state regulatory requirements. These facilities operate as NRC-licensed production or utilization facilities under Part 50, Part 52, Part 53, or proposed Part 57 with full application of safety, security, and emergency preparedness requirements described in Sections 3 and 4, scaled to facility size and design characteristics.[234]

Such facilities must interconnect with the bulk electric system under NYISO procedures, comply with reliability standards administered by the North American Electric Reliability Corporation (NERC), and potentially participate in NYISO capacity and energy markets. PSC oversight of rates, cost recovery, and power purchase arrangements applies to the extent the facility serves retail customers or sells to regulated utilities. Grid-connected facilities must comply with FERC requirements for interconnection and wholesale electricity sales, which preempt State policies that are inconsistent with exclusive FERC jurisdiction. Black start capability (the ability of the generator to recover from a blackout), frequency response including controls that provide rapid response to frequency changes, and reactive power requirements ensuring there is no difference in the power factor at the point of interconnection to ensure grid voltage stability, may be specified in interconnection agreements.

8.5.2 Behind-the-Meter Applications

Behind-the-meter nuclear power generation, serving on-site load without exporting to the grid, represents a growing area of interest, particularly for industrial facilities, advanced manufacturing, and other large energy users. Behind-the-meter facilities would still require NRC licensing, applicable DEC permits, and coordination with DHSES on emergency planning. Article 10 applies to behind-the-meter applications unless the reactor is for industrial purposes, located on-site, and is 200 MW or less. However, they might avoid some utility regulatory requirements and potentially benefit from simplified interconnection if limited grid interaction is proposed.

Co-location arrangements where nuclear facilities serve industrial facilities have also generated significant regulatory attention. As part of FERC's examination of whether and how to assert jurisdiction over large load interconnections, FERC issued an Advance Notice of Proposed Rulemaking in October 2025 to consider establishing standardized procedures for interconnection of loads greater than 20 MW to the interstate transmission system.[235] In June 2026, FERC opted to issue show cause orders to each of the six FERC-jurisdictional regional grid

operators seeking information on why their tariffs should not be found unjust and unreasonable with respect to large load interconnection.

8.5.3 Backup Power Applications

Some proposals incorporate the use of microreactors or SMRs in backup power applications, where they might provide resilience for critical facilities or remote locations. In such applications, the reactor would need to have capabilities for startup and operation without external power from the grid and the design would need to be approved by the NRC. While this capability is atypical of historic LLWRs, it has been incorporated and licensed in the NuScale Power Module design and is envisioned by other reactor designers as well.

Because this is a more novel application, a project using a reactor as a backup generator may face a regulatory framework not designed for this use case. Traditional backup generators are typically exempt from many permitting requirements due to their intermittent operation and small size. Nuclear facilities, regardless of their intended duty cycle, would require full NRC licensing and associated State permits.

Microreactors deployed for remote or backup power applications may qualify for alternative emergency preparedness under 10 CFR 50.160 and reduced security requirements under Part 53 or proposed Part 73 amendments. These applications typically involve smaller source terms and limited radiological consequences that may support streamlined regulatory treatment, such as under the proposed Part 57.

The operational profile of backup applications raises questions about applicability of requirements designed for baseload generation. Emergency planning requirements, staffing levels, and security provisions may warrant modification for facilities that operate by remote control rooms, intermittently, or primarily in standby mode. Current State regulations do not differentiate based on the intended operational profile.

8.5.4 Process Heat and Industrial Applications

Advanced nuclear reactors, especially HTGRs operating at 700°C or higher, can provide process heat for industrial applications including chemical manufacturing, steel production, and other energy-intensive processes. These applications typically require co-location with industrial facilities, introducing siting considerations and the potential for dual-purpose (i.e., heat and electricity) operations. The NRC's regulatory framework does not fundamentally distinguish

between electricity generation and heat production; a licensed nuclear reactor may produce heat for any purpose within the scope of its design bases.[236]

In addition to NRC nuclear safety licensing considerations, worker safety at co-located industrial facilities would involve both NRC radiation protection requirements and OSHA industrial safety requirements. The interface between nuclear and industrial operations would require careful coordination among multiple state and federal regulatory agencies.

Current State regulations do not specifically address nuclear process heat applications. Environmental review would need to consider the industrial processes served as well as the reactor itself.

X-energy's Xe-100 HTGR, under development for deployment at a Dow Chemical facility in Texas, exemplifies the industrial heat application of advanced reactors. The reactor would provide process steam for chemical manufacturing while also generating electricity. NRC licensing addresses the integrated facility while ensuring the nuclear safety case is independent of the rest of the chemical plant.[237]

Section 202 of the ADVANCE Act provides for reimbursement of NRC licensing fees for the first licensed reactor that can produce process heat for industrial applications, recognizing the federal policy interest in demonstrating this application pathway.

8.5.5 Hydrogen Production

Nuclear hydrogen production, using reactor heat with a catalyst and/or electricity for water electrolysis, represents a promising application for decarbonizing hydrogen-dependent industries. HTGRs can enable more efficient hydrogen production through high-temperature steam electrolysis. Multiple advanced reactor designs are being evaluated for hydrogen production capabilities using electrolysis. Some commercial nuclear plants are piloting hydrogen production through on-site electrolysis to meet on-site hydrogen demand. Nuclear power plants typically use hydrogen both as an additive to the primary coolant for corrosion mitigation and to cool the main electric generator.

Very high temperature process heat can enable the use of chemical processing methods for hydrogen production, such as the sulfur-iodine (S-I) process. Nuclear licensing considerations discussed above for process heat would also apply to production of hydrogen either through heated electrolysis or high-temperature chemical processing.

Hydrogen production facilities would introduce additional State permitting requirements beyond the reactor itself, including permits for hydrogen storage, handling, and transportation. The combination of nuclear and hydrogen facilities at a single site would require integrated safety analysis addressing potential interactions between the two systems. Current regulations do not specifically address this combined use case.

8.5.6 Integration with Thermal Storage

Some advanced reactor designs incorporate thermal energy storage, using molten salt or other media to store heat for later electricity generation or industrial use. This capability enables reactors to provide flexible, dispatchable power even while operating at steady thermal output. The TerraPower Natrium design, for example, includes an integrated molten salt energy storage system.

Thermal storage integration adds complexity to regulatory review, as the storage system may be physically separate from the reactor but functionally integrated. The boundary between NRC-regulated nuclear components and state-regulated thermal storage components would need to be defined. Current federal regulations allow for determining the boundary between SSCs, non-safety related but safety significant SSCs, and other SSCs. Part 53 and proposed Part 57 allow for making these determinations in a technology-inclusive, performance-based, risk-informed process.

8.5.7 Medical Radioisotope Production

Medical radioisotope production, particularly molybdenum-99 (Mo-99), which decays to technetium-99m (Tc-99m), used for diagnostic imaging, can utilize research reactors, dedicated isotope production facilities, or potentially advanced nuclear reactors. The American Medical Isotopes Production Act of 2012 established policy supporting domestic production of Mo-99 and other medical isotopes using non-highly-enriched uranium (non-HEU) technologies.[238] Several facilities are under development nationally to establish domestic Mo-99 supply.

The NRC has developed specific guidance for medical radioisotope production facilities.[239] The NRC augmented the guidance to address unique considerations for medical radioisotope facilities for both reactor-based and subcritical accelerator-driven production technologies.[240]

Medical radioisotope production facilities are licensed under Part 50 as production facilities or utilization facilities, depending on the technology employed. The regulations reflect licensing simplifications for less complex non-power reactor applications.

In New York, medical isotope production would involve both NRC regulation of the production facility and DOH licensing for possession, processing, and distribution of isotopes for medical use. DOH's Bureau of Environmental Radiation Protection licenses nuclear pharmacies and medical isotope users under 10 NYCRR Part 16. Coordination between federal production facility licensing and state medical use licensing would be required.

As one example, SHINE Technologies has received a construction permit for a medical isotope production facility in Wisconsin employing subcritical operating assemblies driven by accelerator neutron sources.[241] The NRC review of the SHINE licensing application demonstrated licensing of non-power production facilities, with the construction permit issued in February 2016, approximately 24 months after application acceptance. This timeline represents a potential model for expedited licensing of lower-risk nuclear facilities. Other potential applicants for Mo-99 production facilities include Eden Technologies, Atomic Alchemy (subsidiary of Oklo), Oregon State University, and Niowave, Inc. All these facilities will potentially benefit from recent NRC reforms to expedite reactor licensing, including non-power reactors.

8.6 Findings and Conclusions

The findings and conclusions in this section build off those in previous sections.

New York's core regulatory framework: New York has the core legal and institutional framework needed to evaluate new grid-connected and large behind-the-meter nuclear development, whether large light-water reactors or more advanced and smaller reactor designs. DPS) and the Siting Board, pursuant to Article 10 of the Public Service Law, have the primary role in siting nuclear generation facilities greater than 25 MW through the exercise of jurisdiction over most non-radiological aspects of siting, constructing, and operation of nuclear reactors. Article 10 serves as the central process to coordinate the siting and permitting of nuclear facilities (≥25 MW), which occurs in parallel with the federal NRC process and aims for efficiency and minimal duplication of work, with NRC licensing materials filed for reference in the Article 10 proceeding.

Complexity and State Agency Coordination: Multiple State agencies and authorities (DPS, DEC, DOH, DHSES, DOS, and NYSERDA) have important and established roles with respect to nuclear deployment on issues of health and safety, environmental impacts, emergency preparedness, and intergovernmental coordination. These intersecting agency roles and requirements can make it challenging for stakeholders to navigate the regulatory process,

highlighting opportunities to streamline procedures and provide a clear, single source of information.

Federal Application Flexibility Exists: The NRC's licensing framework accommodates diverse nuclear applications including electricity generation, industrial heat, hydrogen production, and medical isotope production. While the fundamental safety framework applies regardless of application, specific licensing requirements scale with actual facility risks.

The State's framework must adapt to differentiate by scale. As the deployment of smaller and non-grid connected nuclear plants becomes increasingly feasible, the State's regulatory and safety framework must adapt in order to appropriately evaluate, site, and oversee the full lifecycle of such facilities. New technologies and deployments necessitate differentiation by scale or application in the State framework.

Conclusions:

- **Conduct a review of State regulations including for smaller and for non–grid-connected nuclear facilities to identify opportunities to increase efficiencies, streamline review, and address potential emerging areas – building on the findings in this Master Plan and to further the Governor's EXPRESS NY initiative.**
- **Provide information on regulations, licensing, safety, and waste management for stakeholders, local governments, and host communities, and to assist with referrals to appropriate permitting, environmental, and public safety agencies.**

As part of this recommended function, the State could develop a project development guide and roadmap in coordination with State regulatory agencies outlining the necessary state approvals for developing nuclear reactors. Consider having the guide broken down by type/size of reactor and use case.

9. Fees and Fiscal Considerations

The sections below summarize fees associated with federal licensing, State permits and other State requirements, and local permits and approvals that new advanced nuclear facilities may be subject to.

9.1 Federal Fees

The NRC charges hourly fees for staff review time of licensing applications and annual fees for operating reactor oversight. A front-end engineering and design (FEED) study for a nuclear project is usually about 20 percent of the overall costs but can be a higher percentage (up to a third) for a FOAK project. The NRC review fees can be a substantial portion (about 15 percent) of nuclear facility FEED costs.[242] To the extent that these fees and NRC staff review time were consistent across all reactor sizes and technologies, they would represent a larger proportion of development costs for smaller reactor designs and, thus, a competitive disadvantage.

The ADVANCE Act reduced hourly licensing fees (by about half the standard rate) for qualifying advanced reactor applicants[243] and directed the NRC to develop more cost-effective review processes. To qualify for a reduced hourly rate, the application must be pursuant to a regulatory engagement plan. When an applicant submits a regulatory engagement plan, the NRC creates a budget for review of the application. Such budgets are typically smaller for reactors of smaller licensed thermal power rating but vary depending on the complexity of the safety and other licensing issues in the plan.

In June 2026, the NRC issued a final rule updating its licensing and service fee structure.[244] The rule created fixed caps on service fees for licensing and other NRC activities requested by applicants aimed at providing greater financial certainty.

9.2 State Fees

9.2.1 Article 10 Intervenor Fees

There are several categories of intervenor fees associated with Article 10 applications for nuclear facilities ≥25 MW.[245] Applicants are required to contribute to an Intervenor Fund to enable local parties and municipalities to participate effectively in siting proceedings. For both pre-application and application-phase intervenor funding, at least 50% of the funds for potential awards are required to be reserved for municipalities.[246] Applicants are assessed an intervenor fee equal to $1,000 per 1 MW of generating capacity of the subject facility, but no more than

$400,000 total. For example, for a 100 MW facility, the application phase intervenor fee would be $100,000. For facilities that will require storage or disposal of fuel waste byproduct, an additional intervenor fee is required of $500 per 1 MW of capacity, but no more than an additional $50,000. If an amendment to an application is filed constituting a "revision," an additional intervenor fee of $1,000 per 1 MW of capacity, but not to exceed $75,000 is required.[247]

In addition, the Article 10 pre-application provisions require each pre-application preliminary scoping statement to be accompanied by an intervenor fee of $350 per 1 MW of generating capacity of the subject facility, but no more than $200,000. If the preliminary scoping statement is substantially modified, an additional intervenor fee of up to $25,000 may be required.[248]

For a 300 MW SMR, total intervenor fees could reach approximately $455,000 to–$505,000 depending on waste disposal requirements. For a 1,000+ MW large reactor, fees would reach the maximum caps. These fees are scaled to reflect the resources required to permit municipalities, impacted residents, and other stakeholders to meaningfully participate in the Article 10 siting process. The fee structure for intervenor fees is independent of technology type under Article 10.

DPS does not retain intervenor fees. Following Certification, any undispersed fees are returned to the applicant.

9.2.2 DOH Radioactive Materials License Fees for Medical Isotope Production

DOH assesses annual fees for radioactive materials licenses which would apply to medical isotope production at nuclear facilities.[249] Fee amounts are based on the type of license issued and in cases where more than one fee category applies, only the highest applicable category and fee amount will be assessed.

9.2.3 DEC Permit Fees

DEC permit fees vary by permit type. SPDES permits have no application fees but do have annual fees based on the type of facility, type of authorization, and discharge volume.[250] Air permit fees depend on the permit type and facility emissions and each permit type has its own fee schedule.[251] Some natural resource permits have small application costs, but their applicability to a nuclear facility would depend on whether DEC has jurisdiction (see Section 6.2). The primary operating permit fee for a major facility like a nuclear power plant would be SPDES permit fees, which could reach tens of thousands of dollars annually.[250]

There are no fees associated with obtaining a Part 380 Radiation Control Permit (described in Section 4.4.2).

9.2.4 Emergency Preparedness Fees

Executive Law § 29-c stipulates that nuclear electric generating facilities in New York State must pay a fee of $1 million per reactor, per year for emergency preparedness. The fee is paid to the Disaster Preparedness Commission led by DHSES. Fifty percent of the total fees collected go to New York State, and the remaining fifty percent is split between specified counties at certain percentages. The specified counties either directly host operating nuclear plants or are included in the EPZs for those plants. These fees support accepted radiological emergency preparedness plans including monitoring of radioactive materials, purchase and storage of equipment, emergency services personnel training, and more.

The law currently does not differentiate based on reactor size in assessing the set fee of $1 million per year. New advanced nuclear facilities may have smaller or no EPZs (described in Section 4.8.5) and lesser potential emergency preparedness impact due to distinct factors including but not limited to the size of the projects, site locations, and generating capacity. Such considerations may be particularly relevant for SMRs and microreactors. Maintaining a one-size-fits-all approach to emergency planning fees could be viewed as an unnecessary barrier for those interested in developing projects that will be held to higher fee impacts and standards, despite their smaller potential impact footprint. In addition, a flat fee is a reasonable surrogate for actual costs only when all facilities are roughly the same size, as is the case for New York's currently operating fleet, but may not be appropriate for a mix of new advanced reactor facility types.

9.2.5 Low Level Waste Annual Assessments

NYSERDA collects annual monetary assessments from the operating nuclear power plant licensees to recover expenditures from implementation of the Low-Level Radioactive Waste Management Act by DEC and DOH.[252] The assessments are calculated based on anticipated costs for the coming fiscal year and adjusted to reflect actual costs incurred the previous year. NYSERDA acts as a pass-through, distributing the funds to the NYS Commissioner of Tax and Finance.

The total assessment amount varies each year based on anticipated and actual expenditures by DEC and DOH. Notably, the assessments are divided equally between all eligible nuclear plants because the law does not differentiate based on reactor size. Historically, the amount charged to

each plant has ranged from approximately $600,000 to $1 million annually. For the State fiscal year 2025-2026, each of the four currently operating nuclear power plants was assessed at $621,767.

9.3 Local Fees

9.3.1 Building Permits and Property Taxes

Administration and enforcement of building codes, described in Section 5.3, is typically the responsibility of local governments. Building permits are required for construction of new buildings and structures and for the renovation of existing buildings. While for nuclear facilities, certain construction activities are subject to NRC inspection and approval, local building permit requirements apply to ancillary structures and non-radiological-safety-related construction. It is uncertain how ancillary structures and construction types may be treated for novel advanced nuclear facilities and whether any special considerations may be needed at the local government level. Building permit fees are typically $10–15 per $1,000 of construction value.

Nuclear facilities are also subject to local property taxation. Payment in Lieu of Taxes (PILOT) agreements may be negotiated through Industrial Development Agencies to provide tax certainty while reducing overall tax burden.

9.3.2 Local Fee Structure

Local governments in New York have authority to charge fees for various land use approvals and permits described in Section 5, as shown in Table 11. These fees must be reasonably related to the cost of providing the service.

Table 11. Local Fee Summary Table

Fee Category	Estimated Range
Building Permit (specific types, not fee for entire facility)	$10,000–$100,000+ (varies by municipality)
Site Plan Review	$1,000–$25,000 (plus escrow)
Special Use Permit (if applicable)	$200–$1,000
Zoning Variance Application	$100–$1,000
Planning Subdivision Review	$500–$5,000
Environmental Review (EIS preparation)	$50,000–$1,000,000+

9.4 Finding and Conclusion

Fee Structures: New York State fees and procedural requirements do not all scale based on reactor size, type, or risk. Local fees and emergency planning responsibilities can impose additional costs on counties. Maintaining a one-size-fits-all approach on fees could be a barrier for those interested in developing advanced nuclear projects that would be held to higher fee impacts and standards, despite their potentially smaller impact footprint. At the same time, fees fund critical state and local responsibilities. In the case of Article 10, fees permit meaningful public participation.

The Master Plan recognizes that currently certain fees are allotted uniformly on a per reactor basis. Such allocation is reasonable where each of the nuclear sites in New York is about the same reactor size and the need for services are approximately equal over time. In contrast, new reactor projects are expected to vary substantially from each other in terms of needs for State and local services.

Conclusion:

- **Consider reviewing fees as part of the assessment and review of State regulations described in the Section 8 conclusions.**

The recommended assessments should include review of the current emergency planning and low-level waste fee structures. The fees for new advanced reactor projects should be based on the direct services needed for each reactor project. In the alternative, the fees should be allocated based on a surrogate that reasonably approximates the services needed. Specifically:

- Emergency Planning Fees: DHSES should re-examine the emergency planning fee currently assessed to each operating nuclear plant annually to determine if it is structured to accommodate increased development associated with the nuclear backbone, emerging or novel advanced nuclear technologies, and is appropriately scaled to project size and community capacity. For example, emergency planning fees could be allocated based on the ratio of citizens in the EPZ around a facility to the total number of citizens in EPZs.
- Low-level Waste Assessments: NYSERDA should re-examine the annual low-level waste assessments that are currently assessed to each operating nuclear plant. Maintaining the existing paradigm of dividing the total annual assessment equally among each operating facility regardless of the plant's relative generating capacity may have a negative effect on establishing new facilities and advanced nuclear project development.

10. Fusion Regulatory Framework

Fusion energy has long been viewed as a potential source of abundant, low-carbon electricity, but for seven decades it remained primarily a scientific endeavor rather than a near-term energy option. In recent years, several developments have shifted the field from incremental and theoretical research toward early-stage commercial development for electricity production. At a high level, fusion combines light atoms to form a heavier atom, releasing energy in the process. This reaction occurs under different physical conditions and produces different byproducts than fission.

Fusion remains pre-commercial: no fusion system has yet operated as a complete electricity-generating facility. However, there are more than 50 private developers pursuing commercial fusion worldwide with many of them concentrated in the United States. Multiple technology developers are targeting technology demonstrations and pilot plants within the next five years with signed site agreements in the U.S. and targeting grid-connected power in the late 2030s. The Master Plan Fusion Energy Study provides additional background information on fusion energy, including the challenges to commercialization.

This section outlines the technical distinctions between fusion and fission as well as the safety and environmental considerations of fusion that directly affect requirements outlined in fusion regulatory frameworks. The regulatory framework for fission is detailed in the sections above; here, the federal and State regulatory framework specific to fusion is described. Overall, a regulatory pathway for fusion is not being created from scratch. It is being built within an existing framework that has been adapted to reflect the technology's distinct characteristics. The assessment concludes that New York State possesses sufficient statutory authority to regulate fusion facilities under existing law; the remaining considerations relate primarily to administrative coordination, technical expertise, and rulemaking finalization. As fusion progresses toward commercial deployment, continued coordination between federal and state regulators will be essential to ensure oversight remains protective, predictable, and proportionate.

10.1 Fusion v. Fission: Fundamental Technical Differences

As described in the Master Plan Fusion Energy Study, fusion systems differ from fission in several key technical respects which directly affect regulatory treatment. The following focuses on how these differences translate into regulatory and safety implications:

- **No Self-Sustaining Chain Reaction:** Because fusion reactions require continuous external heating and confinement, they do not present the possibility of a sustained or runaway chain reaction. If power is interrupted or confinement is lost, the plasma cools rapidly and the reaction stops. This significantly reduces the severity and range of credible accident scenarios of fusion relative to fission systems, allowing emergency planning and safety requirements to be scaled to a lower hazard profile.
- **Limited Fuel Inventory:** Fusion systems operate with relatively small, continuously supplied fuel inventories rather than the large, long-lived fuel assemblies required for fission reactors. A single gram of fusion fuel contains many more atoms than a gram of fission fuel, allowing many more fusion reactions with the same mass of fuel. Only a small quantity of fuel is required in the fusion reaction chamber at any given time. This limited fuel inventory reduces the potential consequences of accidental releases and thus informs licensing approaches, containment design, and emergency preparedness requirements with a focus on the smaller scale of the fuel amounts.
- **No Special Nuclear Material and Distinct Waste Profile:** Unlike fission reactors, fusion systems do not rely on enriched fissile material and do not produce high-level spent fuel. Instead, radioactive byproducts primarily arise from neutron activation of structural materials and are generally classified as low-level radioactive waste. This difference in waste profile allows fusion systems to be regulated within existing low-level waste frameworks, rather than requiring disposal pathways associated with high-level waste.

While fusion and fission differ significantly in their technical characteristics and hazard profiles, they share a number of important industrial and regulatory considerations. Both fusion and fission facilities involve significant industrial systems, including high voltages, strong magnetic fields, cryogenic systems, and complex mechanical components that require careful regulatory oversight.

10.2 Environmental Health and Safety Considerations

Fusion systems have two primary sources of radioactive material: activation of structural materials due to neutron exposure and tritium associated with the fuel cycle. These materials

and related waste streams are the underlying source driving the environmental and safety management requirements outlined in fusion regulatory frameworks.

10.2.1 Neutron Activation

Neutron activation occurs when neutrons are absorbed by a material, which makes it radioactive. Most fusion reactions produce high-energy neutrons. High-energy neutron radiation in a fusion reactor induces embrittlement and swelling of structural materials and neutron activation. Engineering designs for fusion reactors account for this material degradation to maintain containment and minimize the need for replacement. Neutron activation also impacts materials in the first wall, blanket, shielding, and other in-vessel components. Following shutdown, these activated materials continue to emit gamma radiation, driving the need to carefully plan inspection, maintenance, repair, and component replacement to minimize radiation dose. These components require periodic replacement, interim storage, and eventual disposal or recycling.

Structural integrity, shielding design, and maintenance procedures are central elements of the safety reviews conducted by regulators to ensure the public and the environment are protected.

10.2.2 Tritium Fuel Cycle

Tritium is a radioactive isotope of hydrogen with a half-life of approximately 12.3 years and is a fuel in deuterium-tritium fusion systems and can also be bred in blanket systems. Well established procedures are in place to protect operators from radiation dose from tritium. Ongoing work is expected to further improve plasma-facing components, inertial-fusion target debris, and breeding blankets. Tritium retention, permeation, chemical behavior, and material compatibility in fusion reactors has been studied extensively but will continue to be an important design consideration.

There is substantial operating experience with tritium handling, storage, purification, and recovery. Many of the common technologies needed to store, transfer, monitor, and recover tritium require careful design, operation, and monitoring. Processing and material-interaction challenges associated with sustaining a fusion fuel cycle, including tritium retention and permeation in reactor materials, recovery from fusion-specific process streams and components, and breeding and extraction from blanket systems are important areas of for future development to support a commercially viable and game changing technology.

Because some tritium is ubiquitous in fusion reactors, it will need to be tracked similar to activated corrosion products in fission reactors. In contrast to activated corrosion products, tritium does not emit significant radiation such that exposure from being near it is a concern, although inhalation or ingestion may be exposure pathways. Licensing decisions will involve an evaluation of monitoring system adequacy, robustness of containment structures, and operating procedures for minimizing and mitigating releases. The regulatory objective is to ensure proper disposition of all radioactive materials associated with life cycle operation. Regulators and radiation-protection personnel will also require specialized training on tritium behaviors that differ from those encountered with more conventional radioactive materials.

10.2.3 Waste Profile

These sources of radioactivity give rise to several distinct waste streams, each with different handling and disposal requirements:

- **Solid waste:** Activated structural components and shielding materials, generally expected to be managed as low-level waste and disposed of in licensed facilities, consistent with existing regulatory frameworks such as Part 61. However, some materials may not align neatly with existing low-level waste classifications, potentially requiring updated disposal pathways or classification approaches.
- **Liquid waste:** Some activation of cooling water can occur in systems that use water as a coolant, as neutron interactions may produce short-lived activation products in water and allow small quantities of tritium to permeate into the coolant, forming tritiated water.[253] These effects are generally transient and managed through shielding, water treatment, and tritium control systems, and they do not typically represent a significant source of long-lived waste compared to activated structural materials. Contaminated coolants and process fluids containing tritium or activation products, requiring treatment, storage, and controlled discharge or conversion to solid waste forms depending on radionuclide content.
- **Gaseous waste:** Tritium gas and tritiated vapor associated with fuel-cycle systems, managed through containment, monitoring, and controlled release systems designed to meet radiation protection standards.

International Atomic Energy Agency assessments indicate that many fusion waste streams are short- to intermediate-lived with majority of the radionuclides having half-lives of less than 30 years, enabling management approaches such as interim storage followed by recycling, clearance, or disposal in existing facilities.[254] Advances in low-activation materials may further reduce the volume and longevity of these waste streams. This is a significant advantage for

fusion reactors when compared to fission reactors which produce significant long-lived radioactive waste products.

Early-stage fusion plants may generate larger volumes of low-level waste per plant than more mature technologies, due to the relatively short and intense neutron bombardment that causes components like the blanket to degrade and require frequent replacement.[255] Regulatory oversight focuses on how these materials are characterized, handled, stored, and disposed of in accordance with applicable waste classification standards. Fusion waste streams are expected to be managed within existing low-level waste frameworks with the option to complete a site-specific intrusion assessment to demonstrate deep geologic disposal is not necessary.

10.2.4 Industrial Hazards

Fusion facilities incorporate complex industrial systems that can introduce significant non-radiological safety and environmental considerations, including cryogenic systems for superconducting magnets, strong magnetic fields, lithium or other reactive materials, high-voltage equipment, and heavy maintenance operations. Like fission reactors and other large thermal power plants, cooling requirements could also affect the siting and permitting of commercial fusion facilities. Depending on the fusion technology and power-conversion system, developers could use water-based, air-based, or hybrid cooling systems, with trade-offs among water use, thermal efficiency, facility footprint, cost, and environmental impacts.

10.3 Fusion Federal Regulatory Framework

The regulatory framework for fission reactors is described in Section 2. Fission has a distinct regulatory framework that reflects the technology's distinct characteristics. The following sections describe the federal regulatory framework and federal agency responsibilities specific to fission.

10.3.1 Nuclear Regulatory Commission

The NRC regulates the use of radioactive material in the U.S.. As fusion transitions from experimental research to potential commercial infrastructure, the NRC is responsible for determining how existing statutory authority applies to this emerging technology and establishing a framework that is both protective and proportionate to its risk profile.

NEIMA directed NRC to develop a regulatory framework for fusion reactors and the ADVANCE Act further clarified that radioactive material produced by fusion machines is to be treated as byproduct material under Section 11e.(3)(B) of the AEA.

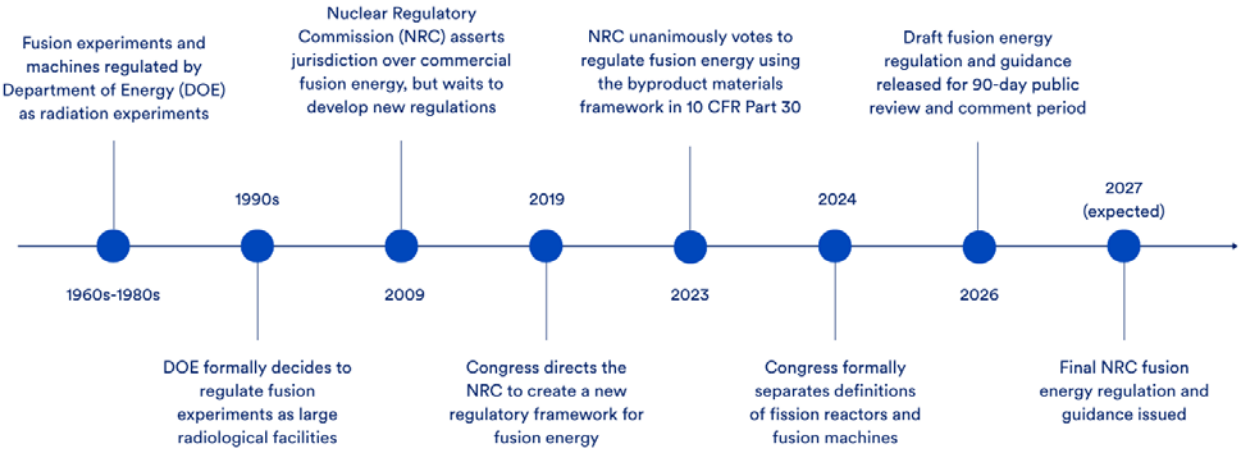
This statutory clarification formally distinguished fusion from fission in regulatory terms. By treating fusion generated radioactive material as byproduct material, similar to materials produced by particle accelerators, Congress acknowledged that fusion produced radioactive activation products (like tritium) rather than the long-lived high level radioactive fission products (such as uranium or plutonium) associated with fission reactors. The legislation also recognized that unlike fission reactors which require complex cooling and active control to prevent meltdowns, fusion reactors can be turned off on demand without risk of runaway reactions. The byproduct designation reflects that fusion reactions do not produce significant amounts of fissile material.

10.3.1.1 Regulatory Framework Development

Amendments to Parts 20, 30, and 51 are under development to address radiation protection, license content, environmental review, and waste management specific to "fusion machines"[256] as part of the NRC's "Regulatory Framework for Fusion Systems" rulemaking proposed in February 2026.[257] The NRC expects to issue the final rule by the NEIMA mandated deadline of the end of 2027. The development timeline of the fusion regulatory framework is illustrated in Figure 11.

Figure 11. Timeline of Development of the Fusion Regulatory Framework

Source: Clean Air Task Force, Fusion Energy Regulation Primer, June 2026.



The regulatory development reflects NRC's conclusion that fusion does not require the same licensing framework as fission reactors (described in Section 3). Instead, fusion facilities will be regulated using a materials-based approach tailored to radioactive material control and radiation protection. This regulatory framework for fusion machines has important distinctions from the framework for fission reactors. The framework focuses on radioactive materials produced or used in fusion systems rather than on the fusion machine itself. The regulatory emphasis is on protecting workers and the public from radiation exposure, controlling and monitoring radioactive materials, managing waste streams and effluents, and addressing environmental impacts associated with licensed activities. By anchoring fusion in the byproduct material framework, a performance-based structure allows companies to define their own safety cases.

Under Part 30, fusion facilities will be required to demonstrate effective radiation protection programs, tritium containment and monitoring systems, environmental reporting, material accountability, and decommissioning financial assurance. Emergency preparedness requirements will be scaled to the facility's hazard profile. Security provisions will focus on radioactive material control rather than on safeguards associated with special nuclear material.

10.3.1.2 Environmental Review

Under the NRC's February 2026 proposed fusion-machine rule, applicants for certain NRC fusion-machine licenses would be subject to applicable ER requirements under Part 51. The NRC would then determine the appropriate level of review under NEPA, including whether an EA or EIS is required based on the potential significance of environmental impacts.

10.3.1.3 Agreement State Program

As described in Section 2.3.1, New York State is an Agreement State with primary responsibility for licensing, inspection, and enforcement related to byproduct material within its borders. Because fusion is regulated under the byproduct material framework, licensing authority for fusion facilities in New York State is expected to reside with DOH, subject to NRC oversight. New York State already maintains a regulatory framework for licensing radioactive materials and DOH currently licenses fusion-relevant research at the University of Rochester's Laboratory for Laser Energetics.

NRC and Agreement States including New York State carry out their respective regulatory programs for radioactive material under a collective framework called the National Materials Program (NMP), a national system for the regulation of agreement material with the goal of

protecting public health and safety, security and the environment through compatible regulatory programs.

10.3.1.4 Nuclear Regulatory Commission Strategy for Fusion Regulation

The NRC released its Vision and Strategy: Regulating Fusion Machines Across the NMP in March 2025 and a revision in January 2026 (January 2026 Vision).[258] The report identifies regulatory optimization, technical readiness, and partnership as strategic priorities for regulating the emerging fusion industry. These focus areas emphasize the need for regulatory expertise, stakeholder engagement, and coordination with Agreement States and lay out a vision for ways the federal regulatory framework may benefit from further attention and enhancement:

- **Regulatory optimization:** Fusion regulation under the byproduct materials framework is intended to balance flexibility and consistency. As new regulatory guidance is developed, it will be structured to reflect the known characteristics of near-term fusion technologies. If new designs are developed that introduce new hazards, materials, or other safety and security concerns, the NRC has the authority under 30.32(b) to require additional information during licensing or impose licensing conditions to ensure adequate protection of public health and safety. If new designs are created that contain hazards that go sufficiently beyond the current assumptions, then appropriate regulatory action may be recommended to the NRC. In the January 2026 Vision, NRC notes that they will work with Agreement States to ensure they have licensing and inspection programs for fusion machines that are compatible and provide consistency, under the NMP.
- **Technical Readiness:** Given there are a wide variety of designs being considered by commercial developers, it is difficult for regulators to have the deep expertise and understanding of all designs. Partnerships between DOE, industry, academia and international regulatory agencies could assist regulators with strengthening their expertise and growth up the learning curve. In the January 2026 Vision, NRC notes they will deliver training to NRC and state regulators on fusion confinement methods and design specific safety considerations. Additionally, identifying further research needs, especially those related to materials effects, waste disposal and recycling, and offsite dose evaluations will strengthen fusion expertise as technology develops.
- **Partnership and Coordination:** Continued close cooperation between NRC and Agreement States on the development of regulations, licensing and inspection guidance and training will benefit the development of new designs. There is a standing committee on fusion oversight made up of NRC and Agreement State staff that will allow for sharing

lessons learned and best practices. Continued coordination between NRC and other federal agencies such as the DOE, the National Nuclear Security Administration (NNSA) and the Department of Commerce (DOC), which provides the framework for export controls on tritium and other fusion associated isotopes, will allow for consistency and increased regulatory certainty as the commercialization of fusion technology advances.

10.3.2 Department of Energy

The DOE plays a foundational role in advancing fusion research and technology development. While the NRC governs licensing and safety oversight, DOE has historically supported fusion through the Fusion Energy Sciences program and national laboratory infrastructure. NRC can leverage these research activities to inform the regulatory approach. In November 2025, the DOE elevated its focus on fusion by creating a standalone Office of Fusion, separate from the Office of Science, under the Under Secretary for Science. It is still in its formative stages and will develop further as definitive funds are established in the federal budget for the office. The President's proposed FY 2027 budget creates this coordinating office for all fusion activities, funded at $10 million.

The DOE has a regulatory role in managing fusion R&D activities at its national labs including Princeton Plasma Physics Laboratory and Lawrence Livermore National Laboratory. DOE has a responsibility to maintain safety standards for technologies developed in its labs. The DOE manages partnerships with private firms, ensuring technologies developed in labs can safely transition to commercial use. DOE does not have a regulatory role for commercial, private sector fusion machines.

10.3.3 Other Federal Agencies

In addition to NRC and DOE, several other federal agencies play important roles in fusion regulatory and R&D.

- **NNSA** manages the inertial confinement fusion (ICF) program. This relates to their core mission of recreating extreme environments like those in exploding nuclear weapons, in a laboratory. NNSA relies on the ICF program as the extreme temperatures and pressures achieved during fusion allow researchers to study material properties and radiation effects. The NNSA collaborates with DOE to help push the limits of fusion technology.
- **DOC** plays a critical role in regulating, securing, and standardizing technologies for the production of isotopes. The DOC manages the export control of commercial fusion

equipment and sets the national scientific measurement benchmarks for radioactive isotopes through the National Institute of Standards and Technology.

- **FERC's** jurisdiction over interconnection and market participation will become relevant as fusion facilities transition from demonstration to commercial power production.
- **FEMA** involvement in off-site emergency planning for fusion systems will depend on the hazard profile established through NRC rulemaking and state licensing conditions.
- **EPA** sets generally applicable environmental standards for radiation that might apply to a project, but EPA has no distinct role in the licensing of fusion machines.

10.4 Regulatory Distinctions: Fusion Versus Fission

The regulatory framework for fusion machines differs substantially from the framework applied to commercial fission reactors. Table 12 summarizes the key distinctions in licensing, environmental review, waste management, decommissioning, and financial assurance.

Table 12. Fusion vs. Fission Regulatory Framework Comparison

Regulatory Area	Fission Reactors	Fusion Machines
Primary NRC licensing framework	Licensed under Parts 50, 52, 53, or 57 (proposed).	Proposed to be licensed under the byproduct material framework in Part 30. The framework focuses primarily on possession and control of radioactive material and radiological safety rather than regulation of the fusion machine as a fission reactor.
Licensing process	Licensing processes under Parts 50, 52, 53, and 57 are described in Section 3.	Applicants would submit information describing the facility, radioactive materials to be possessed and used, radiation safety programs, operating procedures, emergency protocols, and methods for tracking radioactive materials. Applicants must demonstrate that equipment, facilities, personnel qualifications, and operating procedures are adequate to protect workers and the public and satisfy applicable requirements under Parts 20, 30-36, 37, and 51.
Safety focus	Reactor safety requirements address prevention and mitigation of accidents involving the reactor core, cooling systems, containment, and other safety-related structures, systems, and components (see Section 4).	The regulatory emphasis is on radioactive material control, worker and public radiation protection, tritium containment and monitoring, radioactive effluents, emergency preparedness appropriate to the hazard, and decommissioning.

Regulatory Area	Fission Reactors	Fusion Machines
Environmental review	Environmental review as part of the NRC licensing process.	Environmental review would be conducted under Part 51. Under the proposed fusion-machine rule, applicants for certain NRC licenses would submit an ER, and NRC would determine the appropriate level of NEPA review, including whether an EA or EIS is required.
Radiation and release standards	Subject to NRC radiation protection requirements and reactor-specific environmental and effluent controls.	Subject to the radiation protection requirements of Part 20, including the 100 mrem/year total effective dose equivalent limit for individual members of the public from licensed operations. Tritium releases may also be subject to separate NRC effluent limits and applicable environmental standards.
Waste management	NRC regulates spent nuclear fuel storage and DOE is responsible for permanent HLW disposal in a deep geologic repository. Interim storage casks are subject to detailed structural, confinement, and passive heat-removal requirements. See Master Plan Waste Study.	Fusion radioactive waste would generally be managed as low-level radioactive waste under Part 61. Because fusion may generate activation products not specifically addressed by existing Part 61 classification tables, some waste may require facility- or waste-specific assessment. Waste that exceeds Class C limits is evaluated on a case-by-case basis, and novel waste streams may require analysis of potential doses to inadvertent intruders.
Nature of radioactive waste	Includes spent nuclear fuel and long-lived fission products requiring long-term isolation and, for spent fuel and HLW, geologic disposal. See Master Plan Waste Study.	Expected to consist primarily of activated structural materials, tritium-contaminated components, and other low-level radioactive waste. Some highly activated components could potentially be classified as Greater-than-Class-C waste. Radioactive decay may allow some materials to be reclassified, recycled, cleared, or managed through less restrictive disposal pathways over time.
Decommissioning	Decommissioning involves removal of reactor systems, management of activated materials and contamination, and disposition of spent fuel and radioactive waste under reactor-specific NRC requirements (see Section 7).	Planning begins during licensing and includes anticipated contamination pathways, dismantlement methods, tritium management, activated components, and waste disposal. Remote handling may be required for neutron-activated components. Research reactor experience provides relevant experience with tritium-contaminated components, dismantlement, and tritium accountancy.
Financial assurance for decommissioning	NRC establishes reactor-specific decommissioning funding requirements, with standardized	Existing financial assurance requirements under Part 30.35 apply. The proposed fusion-machine rule does not establish a separate

Regulatory Area	Fission Reactors	Fusion Machines
	formulas and periodic funding reporting applicable to commercial fission reactors (see Section 7.4).	fusion-specific financial assurance framework. Required amounts are facility-specific and depend on radioactive-material inventories, contamination, and anticipated decommissioning conditions. Where required, the licensee prepares a site-specific cost estimate and decommissioning funding plan and updates the plan at least every three years.
State role	Commercial fission reactor safety licensing remains under NRC jurisdiction.	Because fusion radioactive material is treated as byproduct material, Agreement States may assume licensing and oversight authority where applicable. State environmental, waste-disposal, and decommissioning requirements may therefore supplement the federal framework.

10.5 New York State Regulatory Responsibilities for Fusion

The State regulatory framework and NYS agency and authority roles for fission reactors are described in Section 2.3. This section describes New York State regulatory roles specific to fusion.

10.5.1 Agreement State Authority

As an Agreement State, New York State has direct regulatory authority for certain categories of radioactive material through a cooperative framework with the NRC. This framework, in which licensing authority is expected to reside primarily with the State rather than NRC, reflects a federal determination that fusion's hazard profile differs from that of fission reactors and is appropriately regulated through the materials licensing pathway. New York State has long operated under this framework and maintains an established regulatory infrastructure for licensing, inspection, and enforcement related to byproduct materials, source material and small quantities of special nuclear material.

The Agreement State framework therefore places New York State in a central oversight role as fusion transitions from research to potential commercial deployment. New York State is one of forty Agreement States in the country, and continued coordination and involvement with the Organization of Agreement States will be advantageous for New York State as fusion technology

is developed and deployed across the country. For example, Massachusetts, Wisconsin, Tennessee, and Washington currently have advanced private fusion technology projects, and New York State can learn from their experience.

The Conference of Radiation Control Program Directors (CRCPD) also plays an important role as the bridge between state agencies and authorities and the federal government. CRCPD focuses on harmonizing state, federal, and international standards to ensure that regulations addressing tritium handling and cyber security at fusion facilities are consistent across state lines.

While the federal government establishes compatibility requirements and overarching policy direction, implementation at the project level will occur largely through state agencies and authorities. As an Agreement State, New York is responsible for reviewing and issuing licenses for the possession and use of radioactive materials, siting a fusion facility including environmental review under SEQRA, and providing oversight once a facility is operational. The following sections describe the relevant authorities and responsibilities.

10.5.2 State Licensing Authorities for Fusion

DOH is the primary licensing authority for radioactive materials under New York State's Agreement State program and will serve as the lead agency for materials licensing as fusion facilities advance toward pilot-scale and commercial operations. For fusion facilities located outside New York City, DOH would be responsible for reviewing license applications, evaluating radiation protection programs, assessing tritium management systems, and conducting inspections to ensure compliance with state and federal standards.

In practice, DOH would evaluate how fusion facilities propose to control radioactive material, monitor worker exposure, implement contamination controls, and maintain appropriate safety documentation. Safety reviews done by DOH under Part 16 and 38 confirm that neutron shielding is adequate to ensure the public and the environment are protected. DOH maintains a statewide surveillance program measuring background radiation levels in air, water and soil at various locations in the State, but it is not designed or intended to monitor releases from specific facilities. DOH would also oversee decommissioning financial assurance requirements and enforce ongoing compliance.

Workplace safety for fusion machines is primarily regulated and enforced by OSHA for the private sector and DOL for the public sector. For radiation safety, DOH's Bureau of

Environmental Radiation Protection oversees the licensing and safety with rules that complement OSHA standards to ensure comprehensive protection.

Within New York City, authority over radioactive materials resides with NYCDOHMH. Facilities located within the city's jurisdiction would therefore be subject to licensing and oversight at the city level, consistent with state and federal compatibility requirements.

This dual structure reflects New York State's long-standing approach to radioactive materials regulation and would apply to fusion facilities in the same manner as other licensed material users. Coordination between city and State authorities would ensure consistency in regulatory standards and enforcement.

10.5.3 Environmental Permitting Authority for Fusion

DEC exercises authority over environmental permitting within the state, including air emissions, water discharge, disposal of radioactive materials, and waste transportation within the state. Fusion facilities will require environmental review and permitting in addition to radioactive materials licensing from DOH. Coordination between DOH and DEC will be necessary to ensure that radiological and environmental reviews proceed efficiently and comprehensively.

For example, cooling systems, water use, or potential air emissions associated with facility operations would require DEC permits. Any facility that releases regulated radioactive materials through airborne materials or as effluent would need a Radiation Control Permit under Part 380, which sets the limits on the disposal and release of radioactive material, requires safety reviews demonstrating operational shielding and ventilation keep offsite releases below those limits, and requires permit holders to maintain records and comply with applicable dose limits. DEC also regulates transportation and disposal of low-level waste (see Section 6.2.8). Although fusion does not produce HLW, neutron-activated materials and other industrial byproducts must be managed in accordance with State environmental standards.

Any NYS agency issuing a permit for a fusion machine must comply with the SEQRA. Most commercial fusion facilities would likely qualify as Type I actions, which require a lead agency to be established to coordinate the review among all NYS agencies. The applicant for a Type I facility license must complete an Environmental Assessment Form to identify the potential impacts. The lead agency issues a formal determination of impacts, which will dictate whether the SEQRA process ends or whether a full EIS would be required. DEC is generally identified as the lead agency.

10.5.4 Other NYS Agency and Authority Roles

Additional State regulatory roles related to fission are described in Section 2.3. Other NYS agency roles related to fusion include:

- **NYSERDA**: As fusion technology advances, NYSERDA's statutory coordination role could be leveraged to include interagency coordination of fusion regulatory processes and coordinating discussions among developers, regulators, and other stakeholders. In a policy context, NYSERDA may support policy analysis and evaluate how fusion fits into state energy goals. In this sense, NYSERDA contributes to the broader strategic context within which regulatory decisions are made.
- **PSC and DPS** would play an important role in the siting and grid integration of commercial fusion facilities that generate electricity. Depending on facility size and configuration, fusion projects may fall under the Article 10 siting process.
- **DOS** administers coastal zone management consistency reviews for projects affecting New York's coastal area (see Section 6.2.7).
- **DHSES** coordinates statewide emergency preparedness and response planning in cooperation with local governments. The scope of required emergency preparedness measures will be informed by NRC rulemaking and State licensing conditions. Under the proposed Part 30 rule, applicants for a fusion license must submit a summary of their radiological emergency procedures. Local governments and emergency planning officials would be involved in reviewing these procedures. Local officials would maintain the authority and responsibility to decide on and implement public protective actions such as evacuation or sheltering. The proposed framework requires licensees to maintain the capability to notify local, state, and federal officials within 15 minutes of declaring an emergency.

10.6 Assessment of State Regulatory Responsibilities and Potential Gaps for Fusion

From a statutory perspective, no fundamental gap in State authority has been identified. Existing New York State law provides mechanisms for radioactive materials licensing, environmental review, waste oversight, and energy facility siting. Fusion does not require the creation of an entirely new regulatory structure. Instead, there is an opportunity to review current regulatory pathways and consider ways to prepare for potential implementation, described below.

10.6.1 Technical Capacity Gap

Fusion technologies introduce regulatory questions related to tritium breeding systems, neutron activation of structural materials, and plasma-facing component replacement cycles. While these topics fall within the scope of radioactive materials regulation, they will raise technical issues that differ from traditional medical, industrial, or research material licenses. Two aspects should be considered:

- **Tritium Monitoring and Inspection Expertise:** Because tritium management represents the primary radiological consideration in fusion facilities, DOH would need sufficient in-house technical expertise to evaluate tritium containment systems, material accountability programs, monitoring technologies, and leak detection protocols. For FOAK or pilot systems, tritium supply, breeding, containment, recovery, and material retention represent additional commercialization and safety challenges. Tritium throughput and inventory requirements will depend on design-specific factors such as burn fraction, target repetition rate, recovery efficiency, material retention, and breeding performance. A New York State pilot plant could therefore require the State to evaluate tritium handling, accounting, containment, monitoring, breeding, and release-prevention systems at a scale and level of operational complexity beyond most existing tritium-related activities overseen under conventional radioactive-materials licensing. Inspection staff must be capable of assessing compliance with license conditions specific to fusion operations.
- **Staff Training in Fusion-Specific Hazards:** As fusion technologies evolve, State regulators would benefit from targeted and, where feasible, hands-on training on neutron activation, tritium breeding systems, plasma confinement technologies, and related inspection considerations so they can independently assess facility designs, radiation-protection programs, monitoring systems, operating procedures, and proposed safety controls. Targeted technical training for DOH staff and coordination with the NRC and other Agreement States will help ensure consistent interpretation and inspection practices. The NRC is in the early phases of developing and implementing its own fusion training program for its staff.

10.6.2 Fusion-Specific Guidance Gap

At present, most State regulatory guidance documents were developed for conventional byproduct material applications. As NRC rulemaking progresses, New York State may need to adopt or develop its own supplemental guidance tailored to fusion facility characteristics, including inspection protocols and tritium accountability expectations.

10.6.3 Interagency Coordination Gap

Fusion facilities will intersect radiological licensing, environmental permitting, energy siting, and emergency planning processes. While each entity's authority is established and New York State has formal coordination pathways for fission, formalized pathways specific to fusion have not yet been defined. For example, clear coordination mechanisms between DOH and DEC will be essential because fusion facilities will require both radioactive materials licensing and environmental permitting. Defined roles, information-sharing processes, and synchronized review timelines can reduce duplication while maintaining comprehensive oversight.

Establishing interagency integrated review of fusion regulatory processes in the state may identify mechanisms that could reduce duplication and improve predictability for applicants. The processes for each type of license have similarities and could be managed in an integrated fashion. NYSERDA, with its established State-legislated nuclear coordination authority, is well placed to facilitate such coordination through its Nuclear Coordination Office.

10.6.4 Preparation for NRC Rule Finalization

The NRC expects to issue the final rule by the end of 2027. DOH could prepare for NRC rule finalization by reviewing State regulations for compatibility with amended federal requirements and developing fusion-specific interpretive guidance. Draft NRC guidance (NUREG-1556, Vol. 22) provides a useful reference for application content, including expectations regarding tritium management, radiation protection programs, and decommissioning financial assurance.

10.6.5 Evaluation of Existing State Siting and Environmental Review Pathways

The siting and environmental review pathway is a potentially significant source of project uncertainty for developers. DPS, DEC, and other relevant agencies could evaluate and determine how a fusion facility would be treated under existing siting and environmental-review statutes and regulations, including whether PSL Article VIII, as implemented under the Renewable Action Project Interconnection and Deployment Act, could apply to fusion facilities or whether legislative or regulatory clarification would be required. Providing a formal determination, whether through statutory interpretation or targeted clarification, before a developer selects a New York State site would reduce project uncertainty and may offer opportunities for administrative efficiency.

10.6.6 Emergency Planning Proportionality

Because fusion hazard profiles differ from those of fission reactors, emergency planning requirements should be appropriately scaled. Clarifying proportional emergency preparedness expectations at the State level would help avoid either under-preparation or unnecessary regulatory burden. The State could establish clear thresholds for when emergency planning measures are required and ensure alignment among DOH, DHSES, and facility operators.

10.6.7 Waste Disposal Pathway Confirmation

Activated structural materials and other radioactive byproducts must have an identified disposal pathway consistent with Part 61 requirements. Early confirmation of classification, transportation protocols, and access to licensed low-level waste disposal facilities would support regulatory certainty.

10.6.8 Decommissioning Financial Assurance Review

Fusion licensees will be required to demonstrate adequate financial assurance for decommissioning. The State should maintain review procedures to assess cost estimates, acceptable financial instruments, and long-term funding adequacy to ensure that decommissioning obligations do not shift to the public. The proposed Part 30 regulations do not clarify if a demonstration plant would need to demonstrate financial assurance.

Overall, New York State's regulatory framework is structurally capable of accommodating fusion technologies within existing authority. The primary gaps are not legislative but administrative and technical in nature. Addressing these early, through coordination, training, and procedural clarity, will position the State to evaluate fusion demonstration projects confidently and consistently as federal rulemaking is finalized.

10.7 Finding and Conclusion

Regulatory readiness for nuclear fusion: NRC's upcoming fusion rulemaking reflects that fusion is expected to produce very limited long-lived high-level radioactive waste. New York State, mainly through DOH, will have primary responsibility for licensing and oversight of future fusion facilities and already does so at the University of Rochester's Laboratory for Laser Energetics. Additionally, any fusion generator would fall under Article 10 as a major electric generating facility where nameplate generation exceeds 25 MW for siting of electric infrastructure. While New York State's statutory authority has no fundamental gap,

administrative and technical opportunities remain to enhance preparedness and consider streamlined procedures for commercial-scale facilities.

Conclusion:

- **Include fusion in the State's efforts to provide information on nuclear regulatory issues as well as State assessment and review of regulations for nuclear facilities; and strengthen agency preparedness to ensure the State is ready as and when the first pilot or commercial project application emerges.**

New York State should incorporate fusion into this study's conclusion to provide coordinated information to stakeholders in Section 8. This would help the State strengthen preparedness by aligning early on NYS agency and authority roles, establishing coordinated State review pathways, and avoiding duplicative processes as projects emerge.

Consistent with the assessment and review of State regulations for fission in Section 8, a parallel, related effort should be pursued for fusion. Specific areas of focus could include:

- Prepare for NRC rule finalization: DOH should prepare for NRC rule finalization by reviewing State regulations for compatibility with amended federal requirements and developing fusion-specific interpretive guidance.
- Evaluate the applicability of existing State siting and environmental review pathways: DPS, DEC, and other relevant agencies should determine how a fusion facility would be treated under existing siting and environmental-review statutes and regulations. Clarify treatment of fusion energy: Explicitly defining fusion energy within State statutes could reduce ambiguity regarding the applicability of existing energy, environmental, and siting policies.

Acronyms and Abbreviations

ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agencywide Documents Access and Management System
ADVANCE	Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy
AEA	Atomic Energy Act
AEC	U.S. Atomic Energy Commission
AI	artificial intelligence
ALARA	as low as reasonably achievable
AMR	aging management review
ANS	American Nuclear Society
ANSI	American National Standard Institute
AP	advanced passive
AR	Advanced Reactor
ARCOP	Advanced Reactor Construction Oversight Program
ARDC	Advanced Reactor Design Criteria
ASDA	New York State Atomic and Space Development Authority
CAISO	California Independent System Operator
CEQ	U.S. Council on Environmental Quality
CFR	Code of Federal Regulations
COL	combined operating license
COLA	Combined License Applications
CP	construction permit
CPCN	Certificate of Public Convenience and Necessity
CRCPD	Conference of Radiation Control Program Directors
CRM	comprehensive risk metrics
cROP	construction-specific ROP
DC	Design Certifications
DEC	New York State Department of Environmental Conservation
DHSES	New York State Division of Homeland Security and Emergency Services
DOC	U.S. Department of Commerce

DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOGE	U.S. Department of Government Efficiency (Dismantled)
DOH	New York State Department of Health
DOS	New York State Department of State
DOT	U.S. Department of Transportation
DPA	Defense Production Act
DPS	New York State Department of Public Service
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EOF	emergency operation facility
EPA	U.S. Environmental Protection Agency
EPZ	Emergency Planning Zone
ER	Environmental Report
ERA	Energy Reorganization Act
ERCOT	Electric Reliability Council of Texas
ESP	Early Site Permit
FEED	front-end engineering and design
FEIS	Final Environmental Impact Statement
FEMA	U.S. Federal Emergency Management Agency
FERC	U.S. Federal Energy Regulatory Commission
FOAK	First-of-a-kind
FSAR	Final Safety Analysis Report
GALL	Generic Aging Lessons Learned
GDC	General Design Criteria
HALEU	High-Assay Low-Enriched Uranium
HEU	highly-enriched uranium
ICF	inertial confinement fusion
IDA	Industrial Development Agency
IPA	Integrated Plant Assessment

ISFSI	Independent spent fuel storage installation
ISO	Independent System Operator
ISO-NE	Independent System Operator of New England
ITAAC	inspections, tests, analyses, and acceptance criteria
LBE	Licensing Basis Event
LNT	Linear No-Threshold
LPZ	low population zone
LWA	Limited Work Authorization
LLWA	Large Light-Water Reactor
LWR	Light-Water Reactor
MISO	Midcontinent Independent System Operator
Mo-99	Molybdenum-99
MOU	memorandum or memoranda of understanding
mrem	millirem
mSv	millisieverts
MW	megawatt
MWe	megawatt electric
MWth	megawatt thermal
NASEO	National Association of State Energy Officials
NEI	Nuclear Energy Institute
NEIMA	Nuclear Energy Innovation and Modernization Act
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NIA	Nuclear Innovation Alliance
NMP	National Materials Program
NNPP	Naval Nuclear Propulsion Program
NNSA	National Nuclear Security Administration
NRC	U.S. Nuclear Regulatory Commission
NUREG	Prefix for numbered U.S. Nuclear Regulatory Commission reports or brochures on regulatory decisions, results of research, results of incident investigations, and other technical and administrative information.
NYCDOHMH	New York City Department of Health and Mental Hygiene

NYISO	New York Independent System Operator
NYPA	New York Power Authority
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
OL	operating license
OMB	U.S. Office of Management and Budget
ORES	New York State Office of Renewable Energy Siting and Electric Transmission
OSHA	U.S. Occupational Safety and Health Administration
PILOT	Payment in Lieu of Taxes
PJM	PJM Interconnection
PPE	plant parameter envelope
PRA	probabilistic risk assessment
PSAR	Preliminary Safety Analysis Report
PSC	New York State Public Service Commission
QA	quality assurance
RCOLA	Reference Combined License Application
rem	roentgen equivalent man
REP	Radiological Emergency Preparedness
ROP	Reactor Oversight Process
RTO	Regional Transmission Organization
S-I	sulfur-iodine
SBD	Security-By-Design
SCOLA	Subsequent Combined License Application
SDA	standard design approval
SDP	Significance Determination Process
SEQRA	New York State Environmental Quality Review Act
SLO	State Liaison Officer
SLR	Subsequent License Renewal
SLR-ISG	Subsequent License Renewal – Interim Staff Guidance
SMR	Small modular reactor
SPDES	State Pollutant Discharge Elimination System

SPP	Southwest Power Pool
SRP	Standard Review Plan
SRP-SLR	Standard Review Plan for Review of Subsequent License Renewal Applications
SSC	Systems, Structures and Components
Tc-99m	Technetium-99m
TI-RIPB	technology-inclusive, risk-informed and performance-based
USACE	U.S. Army Corps of Engineers
VC	Virgil C. Summer (VC) Nuclear Station

Appendix A. Federal Regulatory Requirements Summary Table

Table A-1 summarizes key federal regulatory requirements applicable to nuclear fission reactors across the complete facility lifecycle.

Table A-1. Summary of Key Federal Regulatory Requirements

Note: This table provides a summary of statutory authority. Complete regulatory text should be consulted for definitive compliance determination. Links to full regulatory text available at: NRC (www.nrc.gov), eCFR (www.ecfr.gov), DOE (www.energy.gov), FEMA (www.fema.gov).

Regulation/Citation	Agency	Description
10 CFR Part 20	NRC	Radiation protection standards; occupational dose limits (5 rem/yr TEDE); public dose limits (100 mrem/yr); ALARA requirements
10 CFR Part 50	NRC	Two-step licensing (CP/OL); General Design Criteria (Appendix A); QA requirements (Appendix B); Emergency planning (§50.47); Decommissioning (§50.82)
10 CFR Part 51	NRC	Environmental protection; NEPA implementation; EIS requirements for licensing actions
10 CFR Part 52	NRC	Combined licenses; early site permits; standard design certifications; manufacturing licenses
10 CFR Part 53	NRC	Technology-inclusive, risk-informed, performance-based framework for new reactors; PRA-led approach
10 CFR Part 54	NRC	Issuance of renewed operating licenses and renewed combined licenses for nuclear power plants licensed pursuant to Sections 103 or 104b of the Atomic Energy Act of 1954, as amended
10 CFR Part 73	NRC	Physical security; design basis threat protection; access authorization; cyber security (§73.54)
10 CFR 50.160	NRC	Alternative emergency preparedness for SMRs and advanced reactors; scalable EPZ sizing
10 CFR Part 830	DOE	Nuclear safety management for DOE facilities; QA requirements; safety basis requirements; documented safety analyses
44 CFR Part 350	FEMA	Review and approval of state/local radiological emergency plans; offsite emergency preparedness evaluation
NUREG-0654/FEMA-REP-1	NRC/FEMA	Criteria for preparation and evaluation of radiological emergency response plans; 16 planning standards
40 CFR Part 190	EPA	Environmental radiation standards for uranium fuel cycle facilities; dose limits to public
18 CFR Parts 35, 37	FERC	Wholesale electricity rates and tariffs; open access transmission; generator interconnection
49 CFR Parts 171-180	DOT	Transportation of radioactive materials; hazardous materials shipping requirements

Table A-1. (continued)

Regulation/Citation	Agency	Description
10 CFR Part 71	NRC	Packaging and transportation of radioactive material; certification of transport packages
10 CFR Part 72	NRC	Independent spent fuel storage; ISFSI licensing requirements
ADVANCE Act (2024)	Congress	Reduced licensing fees for advanced reactors; NRC mission update; microreactor guidance; DC extension to 40 years
NEIMA (2019)	Congress	Mandates technology-inclusive framework (Part 53); fee reform; milestone schedules

Appendix B. State Regulatory Requirements Table

Table B-1 summarizes the key state regulatory requirements applicable to nuclear reactor development in New York State.

Table B-1. Summary of Key State Regulatory Requirements

Note: This table provides a summary of key requirements. Additional permits and approvals may be required depending on specific site conditions and facility characteristics. Federal NRC jurisdiction preempts state regulation of radiological safety aspects of nuclear reactor construction and operation.

Agency/Authority	Regulation/Citation	Requirement Type	Description
NYSDPS/Siting Board	PSL Article 10; 16 NYCRR Part 1000	Siting Certificate	Certificate of Environmental Compatibility and Public Need for facilities ≥25 MW
NYSDPS/PSC	PSL § 68	Certificate of Public Convenience	Required for electric corporations to construct generating facilities
NYSERDA	Energy Law § 7-101	Coordination/State Liaison Officer	Coordinates state atomic energy programs; serves as Governor's SLO to NRC
NYSERDA	L. 1986, c. 673	Low-level Waste Monitoring	Monitors low-level radioactive waste generation and management
NYSDEC	6 NYCRR Part 381	Transportation Requirements	Transportation of low-level radioactive waste regulations
NYSDEC	6 NYCRR Part 617	SEQRA Review	State Environmental Quality Review for discretionary actions
NYSDEC	ECL Article 17	SPDES Permit	Water discharge permit for thermal and chemical effluents
NYSDEC	ECL Article 19	Air Pollution Control Permits	Non-radiological air emissions
NYSDOH	10 NYCRR Part 16	Radioactive Materials License	License for radioactive material byproduct distribution (Agreement State)
NYCDOHMH	NYC Health Code Article 175	Radioactive Materials License	Licenses for academic or medical facilities located in NYC
NYSDOS	15 CFR 930	Coastal Consistency Review	Federal consistency certification for facilities within the coastal area or with reasonably foreseeable effects on coastal uses or resources
NYSDOS	19 NYCRR Parts 600-602	Coastal Consistency Review	Interstate Coastal Consistency and Local Waterfront Revitalization Plans
NYSDHSES	Executive Law Art. 2-B	Emergency Planning	Radiological emergency preparedness coordination
NYSDHSES	16 NYCRR § 1001.18	Security Plan Review	Review of facility security plans under Article 10

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