

Advancing Regulatory Efficiency: Lessons and Opportunities in NRC Licensing Practice

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Executive Summary

The U.S. Nuclear Regulatory Commission (NRC) plays a critical role in ensuring that the nation's nuclear energy is deployed safely, securely, and efficiently. As interest in advanced and small modular reactors grows, the NRC faces a surge of new licensing applications that will test the capacity and efficiency of its regulatory framework. This paper outlines how the NRC can build on its recent progress to substantially improve licensing timeliness and predictability—within its current statutory authority—without compromising safety, rigor, or due process.

Recent experience demonstrates that the NRC can accelerate reactor licensing timelines through administrative process improvements. Parallel reviews, optimized management, and Advisory Committee on Reactor Safeguards (ACRS) engagement have already reduced schedules for construction permit application review by up to eight months. These gains, achieved through procedural innovation rather than regulatory change, highlight the potential for further optimization.

The paper identifies several opportunities for streamlining:

- **Parallel and risk-informed reviews:** Conduct management, ACRS, and legal reviews concurrently, focusing resources on novel or risk-significant issues.
- **AI and digital tool integration:** Use digital engineering and artificial intelligence to flag issues early, improve coordination, and reduce rework.
- **Targeted ACRS and legal engagement:** Embed legal counsel on project teams from the outset, align ACRS scope with technical novelty, and apply a graded, risk-informed approach for nth-of-a-kind (NOAK) designs.
- **Hearing reform:** Continue to modernize the mandatory hearing process and adopt more efficient formats for contested hearings—such as paper-based or legislative-style proceedings under 10 CFR Part 2 Subpart O.
- **Environmental review efficiency:** Leverage tiering, adoption, and generic determinations under the National Environmental Policy Act (NEPA) to avoid redundant analyses and focus on new or site-specific issues.
- **Commission scheduling and transparency:** Include Commission review time in published schedules and set default decision timelines to improve predictability.

Together, these measures can significantly shorten review durations, enhance clarity for applicants and stakeholders, and position the NRC to handle a higher volume of advanced reactor applications effectively.

By institutionalizing recent innovations, expanding risk-informed and AI-enabled processes, and reinforcing disciplined legal and hearing practices, the NRC can modernize its administrative operations to support the nation's clean energy and

climate objectives while maintaining its hallmark commitment to safety and public confidence.

Introduction

The U.S. Nuclear Regulatory Commission (NRC) plays an important role in enabling the large-scale commercialization of new nuclear energy. Its roles include licensing new reactors and overseeing existing ones to ensure the public can safely benefit from nuclear energy. The NRC boasts a dedicated, highly technical staff and a legacy of overseeing a remarkably safe nuclear industry. But it can continue to improve its efficiency to support acceleration of new nuclear energy commercialization, address growing energy demands, and control costs.

The NRC is already experimenting and making some improvements, reducing review times without changing the diligence or substance of its evaluations, and the results are promising. If the projected volume of applications materializes, the NRC will need to continue to apply the new approaches it has begun using, as well as seek out additional efficiencies. The focus of this paper is what NRC can do now—under existing statutory authority—to compress schedules while preserving safety, due process, and analytical quality. The paper provides actionable recommendations to help the NRC realize the gains suggested by its recent schedule improvements, achieve greater efficiencies, and provide more transparency on timelines.

Enhancing Efficiencies and Timelines in New Reactor Licensing

Several related factors influence the length of an NRC licensing proceeding, whether it's for a construction permit (CP), design certification (DC), combined license (COL), early site permit (ESP), or license amendment. The timeline is shaped by a mix of regulatory requirements, applicant readiness, and external influences, including contested hearings. Importantly, many of the longest-path items stem from procedural choices within the Commission's control—such as hearing format, contention admissibility standards, the scope of Advisory Committee on Reactor Safeguards (ACRS) review, and the sequencing of management and legal reviews.

Lessons from Recent Experience

Recent large reactor licensing experiences have included:

- The Westinghouse AP1000 DC, which initially took about four years (March 2002 to January 2006), but later extended to nearly 9 years (December 2011) with design amendments to address new requirements for aircraft impact.
- The Vogtle 3 & 4 COL which took about 3.5 years (August 2008 to February 2012), longer than the estimate of 2-2.5 years, due in large part to delays in the AP1000 DC, including new post-Fukushima requirements.

- The V.C. Summer 2 & 3 COL which took about 4 years (March 2008 to March 2012), also delayed mainly by the AP1000 DC timeline.

Between 2010 and 2020, there were a handful of other COLs that took between 6 and 9 years, but they were slowed significantly by applicant business decisions to reduce investments and respond to market fluctuations, so they don't accurately reflect what schedule was possible at the time. Nonetheless, the Vogtle and Summer AP1000 experiences demonstrated a licensing timeline for first-of-a-kind (FOAK) technology that took a decade. This was influenced by many factors—within the NRC, at the applicant companies, and the result of external events and interventions—and it has driven significant concern among investors, utilities, vendors, and policymakers that nuclear energy cannot be licensed quickly enough to serve as a timely solution for energy requirements.

Over the past 10-15 years, extensive efforts have been made by the industry, policymakers, the NRC, and other stakeholders to improve licensing timelines and outcomes, and the results are positive. Many efforts centered around using a less prescriptive, more risk-informed, performance-based, and technology-neutral approach to regulation.

These adjustments, along with many lessons learned by industry, and a move towards using the construction permit application (10 CFR Part 50) instead of the design certification approach (10 CFR Part 52) for FOAK projects have resulted in projected improvements in schedule. Recently, accelerated and parallel review approaches are shortening projected schedules further. See, for example, Figure 1, which shows significantly shorter schedules in several construction permit applications. The schedules include three phases that reflect completion of three documents:

1. the draft safety evaluation (SE) contains the NRC staff's preliminary technical findings, and may contain significant open and unresolved items;
2. the advanced safety evaluation is nearly final, with only minor confirmatory items left to be resolved; and
3. the final safety evaluation, which reflects the NRC staff's complete conclusions and forms the basis for Commission consideration and a licensing decision.

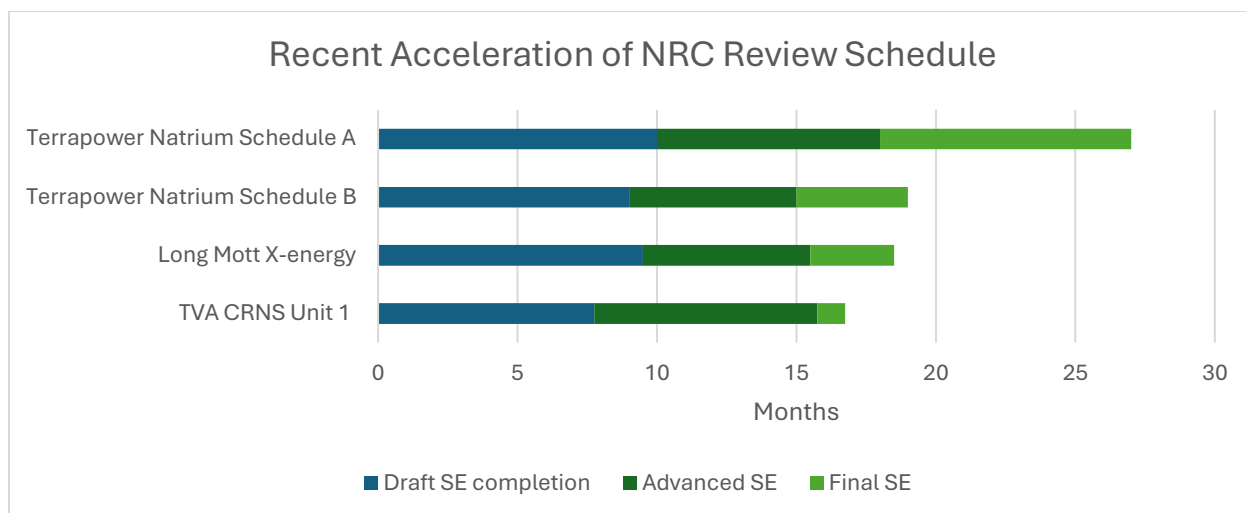


Figure 1: Recent acceleration of NRC safety evaluation (SE) reviews

The first review length estimated by NRC for TerraPower subsidiary US SFR Owner LLC¹ for Kemmerer Unit 1 (in Wyoming) in May of 2024 was 27 months – already an improvement over past experience with the AP1000 (46 months for the initial design certification review).² Over the subsequent 13 months, the projected schedule was shortened by 8 months to a new target of 19 months.³ The schedule change was driven by the President’s executive order, but also made possible through efficient interactions between the NRC and the applicant. This included streamlined management reviews, optimized environmental impact assessment, and a streamlined review by the ACRS. These reviews will be performed in parallel with each other and with finalization of the safety evaluation (SE) report, rather than sequentially. This shortens the scheduled “Final SE” period to 4 months instead of 9 months.

In June of 2025, the NRC provided a schedule for review of the Long Mott Generating Station Construction Permit Application – a project to build the X-energy Xe-100 plant at a Dow Chemical Company site.⁴ This project also takes advantage of streamlined and parallel reviews, and has a total timeline of about 18.5 months.

The Clinch River Nuclear Site (CRNS) Unit 1 construction permit application by Tennessee Valley Authority (TVA) has a target review schedule of just under 17

¹ “US SFR Owner LLC” is the name of the TerraPower, LLC subsidiary that is the applicant for the project to build a TerraPower Natrium reactor in Kemmerer, Wyoming.

² The US SFR Owner LLC application for Kemmerer Unit 1 in Kemmerer, WY, is for a construction permit, rather than a design certification; this is a substantial difference, but we don’t have other recent experience with construction permits to consider.

³ “US SFR OWNER, LLC – KEMMERER POWER STATION UNIT 1 CONSTRUCTION PERMIT APPLICATION REVIEW STATUS” February 26, 2025. <https://www.nrc.gov/docs/ML2505/ML25055A019.pdf> and July 1, 2025. <https://www.nrc.gov/docs/ML2518/ML25181A764.pdf>

⁴ “LONG MOTT GENERATING STATION CONSTRUCTION PERMIT APPLICATION REVIEW SCHEDULE AND RESOURCE ESTIMATE.” June 10, 2025. <https://www.nrc.gov/docs/ML2515/ML25155B841.pdf>

months,⁵ with significant acceleration taking place through leveraging an already approved early site permit coupled with the parallel review process that reduces the timeline without changing review effectiveness. In this case, the ACRS review appears to be planned for a shorter window with even greater overlap with internal approval and with finalization, and there is only a one-month gap planned between completion of the “Advanced Safety Evaluation Report” and the “Final Safety Evaluation Report.” By comparison, the initial schedule provided to US SFR Owner LLC (TerraPower) allotted 9 months between these two events, and the revised schedule provides for four months. From the first US SFR Owner LLC schedule to the TVA CRNS Unit 1 schedule, the NRC shows an acceleration of 8 months based on parallel reviews and demonstrates that significant optimization is available through largely administrative changes to the review process. This is a noteworthy accomplishment by the NRC, and this parallel review approach should become the standard moving forward. In the case of TVA CRNS Unit 1, the project is also benefitting from collaboration between the NRC and the Canadian Nuclear Safety Commission (CNSC), through which the NRC’s review is informed by the CNSC’s prior analysis and findings. It is possible that this collaboration contributes to the faster draft SE completion schedule for TVA CRNS Unit 1.

NRC has not yet approved these construction permit applications, so the schedule is aspirational at this point, but the NRC’s website reports that these processes are currently running on schedule. The schedule provided by the NRC currently does not include the Commission’s final review, and the Commission does not provide a timeline for that; the issuance of a permit occurs only after Commission approval.

Legal Authority & Tools for Streamlining

The Atomic Energy Act (AEA) provides a contested hearing opportunity as well as a statutory hearing requirement, but the NRC has discretion in how it implements these. The AEA §189a requires the Commission to “hold a hearing” on major reactor authorizations after notice, but it does not prescribe the format. The Commission has long interpreted this to permit paper-based, time-bounded proceedings that satisfy due process.⁶

Under the NRC’s Rules of Practice (10 CFR Part 2) there are multiple pathways:

- Subpart L (simplified) and Subpart O (legislative) for paper-centric, tightly managed hearings;
- Subpart G (formal) reserved for when cross-examination is indispensable.

Notably, 10 CFR 2.309 is the regulation that establishes the standards for admitting a party to a contested hearing. It requires standing plus at least one admissible

⁵ “CLINCH RIVER NUCLEAR SITE, UNIT 1, CONSTRUCTION PERMIT APPLICATION REVIEW SCHEDULE AND RESOURCE ESTIMATE” July 25, 2025. <https://www.nrc.gov/docs/ML2520/ML25205A005.pdf>

⁶ AEA §189a(1)(A)–(B); SRM-SECY-24-0032 (mandatory hearing reform).

contention that is within scope, material, supported by facts and/or expert opinion, and shows a genuine dispute with the application, safety evaluation report (SER), or environmental impact statement (EIS). Robust application of 2.309 is lawful and essential to schedule discipline.

Other relevant provisions include the following:

- **ACRS scope and management.** AEA §§29 and 182b establish the ACRS, but what it reviews is a policy choice. The Commission can focus ACRS on novel and risk-significant topics for FOAK and use delta-only letters for NOAK.^{7,8}
- **Emergency preparedness (EP) modernization.** 10 CFR 50.160 (SMR/advanced reactor EP rule) enables performance-based EP and scalable emergency planning zones, supporting co-location and reducing late-stage redesign churn.⁹
- **National Environmental Policy Act (NEPA) efficiency tools.** 10 CFR Part 51 authorizes tiering and adoption to reduce duplication;¹⁰ NUREG-2157 (the Continued Storage generic environmental impact statement (GEIS)) generically resolves spent-fuel storage impacts, limiting hearing scope absent the Commission granting a 10 CFR 2.335 waiver to allow a challenge to a Commission regulation in a hearing.¹¹
- **Risk-informed foundation.** The Commission's 1995 PRA Policy Statement directs increased probabilistic risk assessment (PRA) use "in all regulatory matters," underpinning a risk-informed, performance-based approach across technical and legal reviews.¹²

Insights From Legal, Management, and ACRS Reviews

Legal, management, and ACRS reviews have at times taken about one-third of the review schedule for reactor safety evaluation reports (SERs). Moving these into a parallel review process has proven immensely helpful, but as volume of applications increases—and as projects shift from FOAK designs to NOAK designs—the nature of the review should also evolve, focusing less on broad, baseline evaluations and more on verifying changes or risk-significant departures from previously reviewed material.

To strengthen this approach, the Commission should direct staff and the ACRS to prepare a concise scoping memo for each application review that (i) identifies novel or risk-significant topics requiring full review and (ii) lists matters appropriate for

⁷ AEA §§29, 182b; Commission policy direction.

⁸ A "delta-only" review is a type of focused licensing or safety review that looks only at the changes ("deltas") between an existing, previously approved design or licensing basis and a new or modified version. A "delta-only" letter would focus ACRS only on topics relating to changes between an existing licensing basis and the one before them.

⁹ 10 CFR 50.160 (effective Dec. 18, 2023).

¹⁰ Tiering refers to using a prior broader EIS as a foundation for a narrower, later one. Adoption typically refers to the fact that the NRC can formally adopt another agency's environmental document for an action – for example, the Department of Energy's (DOE's) or Department of Defense's (DoD's) – if it meets NRC's NEPA standards.

¹¹ 10 CFR Part 51; NUREG-2157; 10 CFR 2.335.

¹² 60 Fed. Reg. 42622 (Aug. 16, 1995).

“delta-only” treatment by referencing prior ACRS letters for NOAK applications. The ACRS review scope should focus on that which is both risk significant and novel, consistent with the intended purpose of the ACRS to advise the Commission on new technologies and challenging technical questions. For NOAK applications, the ACRS review should encompass only new material, and if there are no changes, the ACRS should be able to reference its prior review in a letter. The Nuclear Innovation Alliance has offered several recommendations to improve the efficiency of the ACRS in its 2023 report, *Improving the Effectiveness and Efficiency of the Advisory Committee on Reactor Safeguards*.¹³ The Commission should align internal ACRS guidance with those recommendations through a short policy statement.

The NRC’s Office of General Counsel (OGC) can also look for opportunities to adopt a more agile, risk-informed approach to its reviews, focusing on what matters most and avoiding editorial refinements that may delay projects without adding value. Like the ACRS, OGC should prioritize efficiency and impact by concentrating on new, novel, or non-routine issues with safety significance, rather than revisiting matters that have been reviewed and decided previously. The OGC can also enhance its communication with the technical NRC staff. Embedding the OGC on the project team from day one can help identify legal inflection points (procedural choices, hearing posture, EP assumptions) in parallel with SER/environmental assessment (EA) drafting. Addressing legal considerations in parallel with technical work can reduce the need for extensive rework at the end of the process.

In reviewing low-consequence technologies such as microreactors, OGC should seek innovative, flexible interpretations within existing statutory authority, avoiding unnecessary constraints based on precedents set for large light-water reactors, and applying a risk-informed mindset consistent with the NRC’s mission and goals. For example, for microreactors or other low-consequence designs, the NRC should apply 10 CFR 50.160, which established performance-based emergency preparedness requirements for advanced reactors, presumptively and document the graded basis early.

To optimize for review efficiency and support consistency, the NRC should develop AI-tools trained to provide an early review with a particular legal, technical, or management lens, to identify and flag issues for staff and applicant resolution at the most useful point in time. These can supplement and accelerate human reviews.

An overall approach, consistent with Commission policy, is to make legal, management, and ACRS reviews more risk-informed, to ensure internal communication and collaboration, and to use AI and digital tools to enhance efficiency.

¹³ Emche, D., Greenwald, J. Ibarra, V.J. “Improving the Effectiveness and Efficiency of the Advisory Committee on Reactor Safeguards.” March 2, 2023. <https://nuclearinnovationalliance.org/improving-effectiveness-and-efficiency-advisory-committee-reactor-safeguards>

Streamlining the Mandatory Hearing Process

Historically, the NRC's mandatory uncontested hearing (required by Section 189a of the Atomic Energy Act) for combined license (COL) applications and other major reactor approvals has been a substantial, in-person proceeding with extensive testimony and cross-examination. This format has been resource-intensive and lengthy. A recent analysis by Idaho National Laboratory, detailed in the April 2023 report *Recommendations to Improve the Nuclear Regulatory Commission Reactor Licensing and Approval Process*,¹⁴ found that mandatory hearings have typically delayed license issuance by about six months, while offering little benefit.

Recently, the NRC streamlined its approach to the mandatory uncontested hearing requirement by shifting from a more trial-like proceeding to a primarily paper-based review supplemented by focused oral questioning. Most recently, the Commission issued a decision in a staff requirement memorandum (SRM) on July 18, 2024 (SRM-SECY-24-0032) that adopted an OGC recommendation to have the mandatory hearing (except for uranium enrichment facilities) largely leverage written materials, shortening the process to about 8 weeks.¹⁵ The Kairos Hermes 1 and Hermes 2 projects are small non-power reactors with approved construction permits. The Hermes 1 project mandatory hearing took about 4 months, in 2023. The Hermes 2 mandatory hearing was conducted under the new Commission guidance based on written documents and was complete in 10 weeks. Although the new process accelerates the schedule modestly, it is still lengthy and resource-intensive when considering large-scale licensing of fleets of new reactors. In implementing this new approach, the Commission could track and publish median days spent in the mandatory hearing process in order to demonstrate and measure improvements.

This evolution reflects a desire to meet statutory requirements while reducing burden on staff, applicants, and the Commission, and to accelerate decision timelines without compromising safety or public participation. Several studies have questioned the value added by the statutory mandatory hearing, with NIA and others advocating for its removal by Congress.¹⁶ Unless or until that change is made, the NRC should continue to seek efficiencies that can reduce the burden of this hearing. Consistent with SRM-SECY-24-0032, "OGC should conduct a lessons learned review after the completion of two mandatory hearings held under this new process to determine further efficiencies."

¹⁴ Burdick, S.J., Wagner, J.C., Gehin, J.C. "Recommendations to Improve the Nuclear Regulatory Commission Reactor Licensing and Approval Process." April 2023. https://inldigitallibrary.inl.gov/sites/sti/sti/Sort_65730.pdf

¹⁵ Fishman, S., Roma, A., Hughes, C.T. "NRC streamlines mandatory hearing process. July 29, 2024. <https://www.jdsupra.com/legalnews/nrc-streamlines-mandatory-hearing-5993894/>

¹⁶ White, P. and Ponangi, R. "Enabling High Volume Licensing of Advanced Nuclear Energy. January 31, 2024. <https://nuclearinnovationalliance.org/enabling-high-volume-licensing-advanced-nuclear-energy>

Addressing Challenges in Contested Hearings

Contested hearings provide a formal avenue for stakeholders—such as state and local governments, advocacy groups, or individual members of the public—to raise concerns, present evidence, and challenge the applicant or NRC staff’s position. In general, early outreach to stakeholders by the NRC and the applicant can be useful in addressing concerns or questions prior to initiation of hearings. The requirement for these hearings is set in Section 189 of the AEA. The process is governed by the NRC’s Rules of Practice, found in Title 10 of the Code of Federal Regulations, Part 2 (10 CFR Part 2). The AEA empowers the NRC to “determine appropriate hearing procedures.”

The process begins when the NRC publishes a notice of opportunity for hearing in the Federal Register, typically following the receipt and docketing of a license application. This notice identifies the nature of the application and the facility or activity to be licensed, and provides a window of time for interested persons to file a petition for intervention.

- **Petition for Intervention:** Parties seeking to participate in a contested hearing must file a petition for intervention. This petition must demonstrate standing (i.e., a direct interest that may be affected by the proceeding) and set forth at least one admissible contention—a specific challenge to the application or NRC staff’s analysis, supported by facts or expert opinion.
- **Contention Admissibility:** The NRC’s regulations impose strict requirements for the admissibility of contentions. A contention must be material to the NRC’s decision, supported by alleged facts or expert testimony, and reasonably specific.

Once petitions for intervention are received, the Commission establishes an Atomic Safety and Licensing Board Panel (ASLBP). The ASLBP—comprised of administrative judges with expertise in nuclear safety, law, and related technical fields—reviews the petitions, determines standing, and evaluates the admissibility of contentions.

The ASLBP traditionally conducts a trial-like hearing, during which parties present written and oral testimony, may cross-examine witnesses¹⁷, and submit documentary evidence. Proceedings may be conducted in person, by videoconference, or by written submissions.

After the evidentiary hearing concludes, the ASLBP prepares an initial decision, which resolves the contention in dispute and may uphold, reject, or modify the license. The decision is subject to internal NRC review and, in some cases, judicial appeal.

¹⁷ Generally, the ASLB questions witnesses based on suggested questions from the parties. Only in rare circumstances does the ASLB authorize cross examination.

Parties may appeal the ASLBP's decision to the Commission (NRC's governing body), which may affirm, reverse, or remand the case for further proceedings. Judicial review in federal appellate court is possible after exhaustion of administrative remedies.

Contested hearings create an opportunity for the public to participate in the process of siting nuclear energy projects, and are required by the AEA. They can, however, introduce lengthy delays, sometimes taking a year or more to resolve, take up significant NRC staff time, and impose significant costs on applicants.

Given the cost and delay associated with these hearings, the NRC should make them as efficient as possible to ensure that only petitions meeting admissibility and standing standards proceed. The Commission can provide greater clarity and feedback to the ASLBP through guidance on contention admissibility and standing, so that the ASLBP's approach is aligned with expectations. Contested hearings should be structured to maximize efficiency and focus on issues that are genuinely material and capable of adding value to the decision-making process, while avoiding broad or duplicative debates.

While currently the procedures are governed by 10 CFR Part 2, the Commission has discretion to "determine appropriate hearing procedures" and can evaluate options to make them more efficient. The Commission should determine whether a graded approach—tailoring the scope and depth of hearings to the significance and novelty of the issues—would meet legal requirements and whether it would improve outcomes, or whether an approach aligned with the NRC's new approach for the mandatory hearing would be appropriate and permissible, for example. In the April 2025 INL report "Recommendations to Improve Nuclear Licensing",¹⁸ the authors recommend that NRC consider the use of legislative style hearings under NRC's rules in 10 CFR Part 2 Subpart O, and estimate that this process could be completed in just a few months, rather than the year or more required in the traditional process.

To provide greater clarity, OGC should publish a one-page "Hearing Path Selector," mapping issue profiles to Subparts G, L, and O, with default timelines. Subparts G, L, and O define different types of hearing procedures to suit different situations. Subpart G describes the most formal, trial-like proceeding, Subpart L provides a simplified hearing, and Subpart O describes an informal hearing approach.

In addition to broader reforms, several immediate steps could help the ASLB manage hearings more efficiently. The Nuclear Energy Institute has provided several general and specific recommendations to improve the efficiency of NRC hearings in the July 2025 report, *Accelerating NRC Reform: Industry Recommendations* (see pages 43-47).

¹⁸ Burdick, S.J., Wagner, J.C., Gehin, J.C. "Recommendations to Improve Nuclear Licensing." April 2025. https://inl.digitallibrary.inl.gov/sites/STI/STI/Sort_167741.pdf

Some practical gatekeeping steps under 2.309 include the following:

- **Pre-hearing conference.** At the prehearing conference, ASLBP should:
 - Dismiss contentions outside scope or not material to the decision;
 - Require specific citations to the application/SER/EIS showing a genuine dispute;
 - Enforce page limits and expert declaration requirements; and
 - Decide hearing requests within the regulatory clock.
- **Route selection—use Subpart O by default for paper-resolvable issues.** The Commission should instruct ASLBP that Subpart O is presumptively appropriate where issues are legal or policy-related or can be resolved on the written record, reserving Subpart G for discrete fact disputes requiring cross-examination.¹⁹
- **NRC rules cannot be challenged in hearings.** The Commission should reinforce to the ASLBP that 10 CFR 2.335, “Consideration of Commission rules and regulations in adjudicatory proceedings,” establishes that hearings may not be used to re-litigate generic NRC regulations or determinations. For example, the applicability of 10 C.F.R. 51.23 and the Continued Storage (GEIS (NUREG-2157) in advanced reactor proceedings should not be challenged in a hearing unless a waiver is granted.
- **Standing improvements for advanced reactors:** Currently, the NRC applies “proximity standing” for reactor hearings which presumes that anyone living within the ingestion emergency planning zone has standing to challenge a reactor license. The Commission should consider revising standing rules (either in the regulations or Commission case law) for petitions involving advanced reactors to move away from “proximity standing” toward a traditional judicial standing concept (e.g., injury-in-fact, causation, redressability). This would better reflect the lower potential offsite impacts of some new designs while preserving due-process rights for those with a concrete stake.²⁰
- **Time-boxing & case management.** The Commission should issue standing case-management orders with firm discovery windows and decision deadlines that are substantially shorter than existing Appendix B milestones,²¹ ensuring

¹⁹ 10 CFR Part 2 Subparts G, L, and O define different types of hearing procedures to suit different situations. Subpart G describes the most formal, trial-like proceeding, Subpart L provides a simplified hearing, and Subpart O describes an informal hearing approach.

²⁰ For additional background and discussion of proximity standing versus traditional judicial standing, see: Repka, D. A., & Smith, T. R. (2010). PROXIMITY, PRESUMPTIONS, AND PUBLIC PARTICIPATION: REFORMING STANDING AT THE NUCLEAR REGULATORY COMMISSION. *Administrative Law Review*, 62(2), 583–601. <http://www.administrativelawreview.org/wp-content/uploads/2014/04/PROXIMITY-PRESUMPTIONS-and-Public-Participation-.pdf>

²¹ 10 CFR Part 2 Appendix B provides “Model Milestones To Be Used By a Presiding Officer as a Guideline in Developing a Hearing Schedule for the Conduct of an Adjudicatory Proceeding in Accordance With 10 CFR 2.332.” <https://www.nrc.gov/reading-rm/doc-collections/cfr/part002/part002-appb>

hearings stay focused on issues that genuinely affect the Commission's key safety and licensing findings.

NEPA / Part 51 Efficiencies (Tiering, Adoption, and Generic Findings)

The environmental review process under the National Environmental Policy Act (NEPA) and 10 CFR Part 51 is an essential component of NRC licensing, but it can be streamlined without compromising analytical rigor or public participation.

The NRC staff should make greater use of the full suite of tools available under Part 51, including tiering to the Environmental Standard Review Plan (NUREG-1555), clear adoption of existing programmatic analyses such as the Continued Storage GEIS (NUREG-2157), and reliance on generic determinations to avoid duplicating site-specific work where issues have already been resolved generically. For additional ideas and analysis, please see past NIA work:

- *Improving Environmental Reviews through a Categorical Exclusion for Microreactors* by John Martin Weed & Brittany Lutz, April 1, 2025.²²
- *Enabling High Volume Licensing of Advanced Nuclear Energy* by Patrick White and Rama T. Ponangi, January 31, 2024.²³
- *Streamlining NRC NEPA Reviews for Advanced Reactor Demonstration Projects* by Amy Roma, Sachin Desai, Brittainy A. Cavender, & Ashley Finan, September 23, 2019.²⁴

Experience with recent environmental reviews for projects such as the Kairos Hermes test reactors, the Clinch River Nuclear Site, and several advanced reactor early site permits show that early planning and judicious use of generic findings can shorten schedules while maintaining quality. See, for example, Figure 2, which shows projected or actual NEPA review times for recently submitted applications. The Kairos projects are test reactors, and after the Hermes 1 project EIS found a small impact, the NRC determined that it was appropriate to review an EA in the case of Hermes 2, which was 8.5 months faster than the Hermes 1 EIS. The Long Mott X-energy project is also pursuing an EA to begin with, and the TVA CRNS Unit 1 project is pursuing a supplemental EIS, leveraging the existing EIS for the Clinch River Site.

²² <https://nuclearinnovationalliance.org/index.php/improving-environmental-reviews-through-categorical-exclusion-microreactors>

²³ <https://nuclearinnovationalliance.org/enabling-high-volume-licensing-advanced-nuclear-energy>

²⁴ <https://nuclearinnovationalliance.org/index.php/streamlining-nrc-nepa-reviews-advanced-reactor-demonstration-projects>

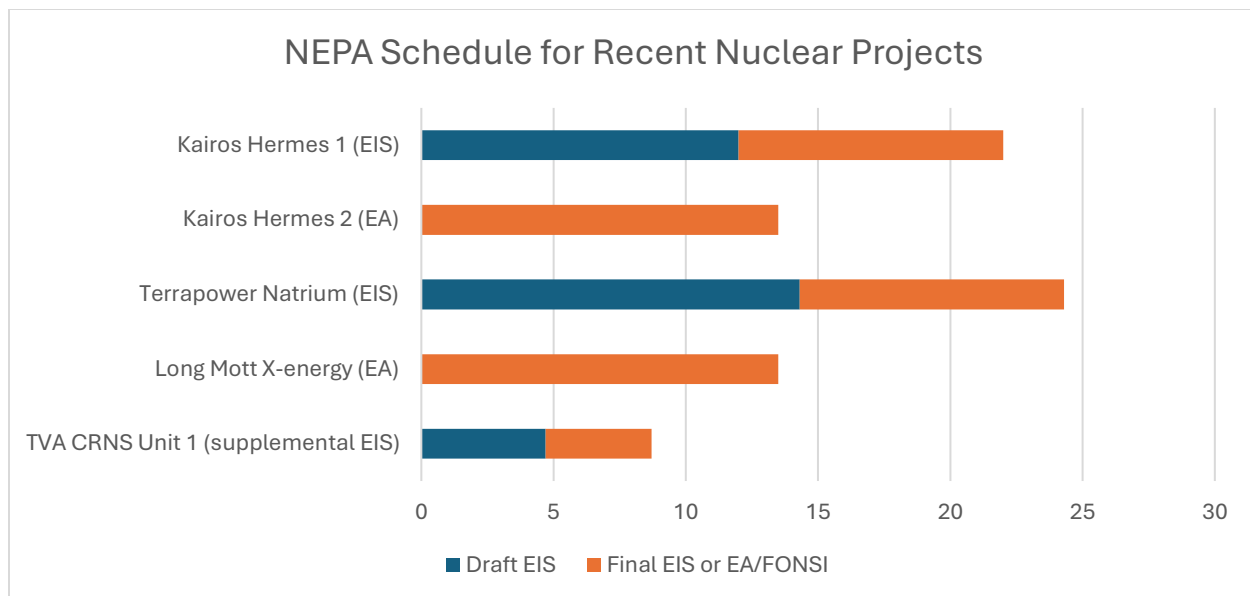


Figure 2: NEPA review schedules for recent and ongoing projects

For repeat sites or “nth-of-a-kind” (NOAK) applications, staff and applicants should provide a concise “delta table” highlighting only new or changed environmental impacts, rather than re-evaluating matters previously addressed in an EIS or EA.

Additional efficiencies are available through early scoping with cooperating agencies (e.g., EPA, USFWS, state environmental offices), which can reduce late-stage surprises, and through expanded use of categorical exclusions for routine or low-impact activities. The Commission should also reinforce the limits of adjudicatory challenges to environmental findings: generic determinations adopted by rule—such as those in the Continued Storage GEIS—may only be litigated through a waiver under 10 CFR 2.335, keeping hearings aligned with the streamlined scope of the environmental review.

Taken together, these steps would improve predictability, allow staff resources to focus on genuinely new environmental questions, and integrate NEPA work more tightly with overall licensing schedules.

Actionable Recommendations

The following recommendations can help the NRC realize the gains suggested by its recent schedule improvements, achieve greater efficiencies, and provide more transparency on timelines:

1. **Parallel and AI-enhanced reviews:** Continue implementing parallel reviews for management and ACRS, and expand opportunities for such coordination. Evaluate how digital engineering and AI tools can support parallel reviews—for example, by automatically flagging subsequent changes that need re-review.

Properly designed AI agents could provide an early screen from legal, technical, or management perspectives, helping staff and applicants resolve issues sooner.

2. **Risk-informed prioritization of ACRS reviews:** Focus the ACRS review on topics that are both risk-significant and novel, consistent with its mandate to advise on new technologies and challenging issues. For NOAK applications, the ACRS should address only new or changed material and may reference prior reviews when appropriate.
3. **More risk-informed and integrated legal reviews:** Encourage OGC to adopt a more agile, risk-informed approach—focusing on material issues rather than editorial refinements. Like the ACRS, OGC should prioritize novel or non-routine questions and avoid revisiting settled matters. Embedding legal staff on project teams early allows legal concerns to be addressed alongside technical work, reducing late-stage rework. For low-consequence technologies, OGC should seek flexible interpretations within existing authority, avoiding unnecessary reliance on precedents for large light-water reactors. and applying a risk-informed mindset consistent with the NRC’s mission and goals.
4. **Environmental (NEPA) review efficiencies:** Direct staff to apply all tools available under Part 51 to shorten schedules without reducing analytical rigor. This includes tiering to the Environmental Standard Review Plan (NUREG-1555), adopting generic analyses such as the Continued Storage GEIS, preparing concise “delta tables” for NOAK designs, coordinating early with cooperating agencies (EPA, USFWS, state offices), and expanding categorical exclusions where appropriate. The Commission should also reinforce that generic NEPA findings adopted by rule may only be challenged through a waiver under 10 CFR 2.335.
5. **Commission review schedule:** Include the Commission’s review time in published schedules. Establish a default target—e.g., 30 days or less—for action on each application type, giving applicants and stakeholders greater predictability.
6. **Continue to seek efficiency in mandatory hearings:** Maintain efforts to streamline mandatory hearings. Consistent with SRM-SECY-24-0032, OGC should perform a lessons-learned review after two hearings under the new process and recommend further efficiencies.
7. **Commission guidance on contested hearings:** Issue clear Commission guidance to the ASLB emphasizing consistent and strict application of standing and admissibility standards to exclude matters that are immaterial or would not significantly improve the license review, and further encourage summary disposition for narrow or record-based issues, so hearings are reserved for matters that genuinely and significantly affect licensing outcomes. Replace outdated Appendix B model milestones with more aggressive, enforceable timelines that reflect current NRC performance and best practices for parallel, risk-informed reviews.

8. **More efficient process for contested hearings:** The Commission and OGC should assess options for streamlining contested hearings, including approaches used for mandatory hearings, legislative-style hearings under 10 CFR Part 2 Subpart O, and other available tools.

Conclusion and Path Forward

The NRC can achieve significant improvements in efficiency, transparency, and effectiveness by adopting the recommendations above. Leveraging parallel and AI-enabled reviews can streamline processes and allow earlier identification of critical issues. A risk-informed approach across technical and legal reviews will help focus attention on matters of genuine significance, reducing unnecessary delay or rework. Establishing clear and ambitious timelines for Commission actions and hearings will increase predictability and accountability for applicants, stakeholders, and NRC staff. Early legal engagement, disciplined hearing procedures, and modern tools—such as digital engineering—can further strengthen the regulatory framework. With sustained commitment, the NRC can continue to meet its safety and security mission while supporting the timely deployment of advanced nuclear technologies.

Glossary of Acronyms

- ACRS: Advisory Committee on Reactor Safeguards – Independent group advising NRC on reactor safety.
- AEA: Atomic Energy Act – Federal law governing nuclear energy regulation.
- ASLB/ASLBP: Atomic Safety and Licensing Board (Panel) – NRC administrative judges for hearings.
- COL: Combined License – NRC license for construction and operation of a nuclear facility.
- CP: Construction Permit – NRC permit for building a nuclear facility.
- DC: Design Certification – NRC approval of a reactor design.
- EA: Environmental Assessment – Document analyzing environmental effects of a project.
- EIS: Environmental Impact Statement – Document analyzing environmental effects of a project.
- FOAK: First-of-a-kind – First deployment of a new reactor design.
- GEIS: Generic Environmental Impact Statement – NRC document resolving generic environmental issues.
- NOAK: Nth-of-a-kind – Subsequent deployments of an already-approved technology.
- NEPA: National Environmental Policy Act – Law requiring environmental review of major federal actions.
- NRC: Nuclear Regulatory Commission – Federal agency responsible for nuclear safety and licensing.
- OGC: Office of General Counsel – NRC’s legal advisors.
- SMR: Small Modular Reactor – A type of advanced nuclear reactor.
- SRM: Staff Requirement Memorandum – NRC decision document.