



SCREENING REVIEW

10CFR50, NUREG-0800, AND REACTOR-RELATED REGULATORY GUIDES

by NEI Licensing Task Force Subcommittee 1

November 2018

ACKNOWLEDGEMENTS

The perspective presented in this report is the result of dedicated effort by many people during 2017 and 2018. The individuals mentioned below contributed to this report, and their efforts are greatly appreciated.



Dominion Energy
Margaret Earle



**GE-Hitachi /
Global Nuclear Fuel**
Alan Beard
Jim Harrison



Duke Energy
Joshua Duc
Bob Harvey
Bob St. Clair



NEI
Kris Cummings



Exelon
Bill Gassmann



Southern Nuclear
Bob Florian
Susan Hoxie-Key



Framatome
Gary Peters

INTRODUCTION AND BACKGROUND

The Nuclear Regulatory Commission’s (NRC) “Draft Project Plan to Prepare the U. S. Nuclear Regulatory Commission to License and Regulate Accident Tolerant Fuel,” issued in early 2018, proposed four preparatory tasks. Task 1 was to address in-reactor regulatory framework and in-reactor fuel performance in support of 1) batch loading of Accident Tolerant Fuel (ATF) into NRC-regulated power plants, and 2) crediting the safety enhancements of ATF in the licensing basis of NRC-regulated power plant.

During 2017, members of the Nuclear Energy Institute (NEI) ATF Licensing Task Force undertook a review of 10CFR50 excluding the appendices, of selected sections of the Standard Review Plan (SRP), and of selected Regulatory Guides (RG). Following the issuance of the NRC’s first draft plan, Subcommittee 1 was formed under the NEI ATF Licensing Task Force to screen for potential ATF impacts in the 10CFR50 Appendices, the unreviewed sections of the Standard Review Plan, and the reactor-related Regulatory Guides. This document presents the results of the screening completed in 2017 by the NEI ATF Licensing Task Force and in 2018 by Subcommittee 1 of the NEI ATF Licensing Task Force.

In September 2018, after the work of Subcommittee 1 was essentially complete, the NRC issued Version 1.0 of the project plan. Section 7, Task 1, of the NRC project plan presents three tables of regulatory and guidance documents identified by the NRC as potentially requiring changes for ATF. For convenience, these three tables have been extracted from the NRC project plan and are included as an Appendix of this report.

The NRC notes in Section 4 of the project plan that delayed recognition of necessary changes to the regulations or regulatory guidance is a “potentially significant risk to the successful implementation of ATF.” The NEI ATF Licensing Task Force Subcommittee 1 hopes that the perspective presented below, when taken together with the regulatory or guidance issues identified by NRC in Version 1 of the project plan, will significantly reduce this risk.

10CFR50 EXCLUDING APPENDICES

During 2017, the NEI ATF Licensing Task Force reviewed all sections of 10CFR50 except the Appendices. Most sections of 10CFR50 were determined not to require changes for ATF implementation or to achieve ATF benefits. However, several sections were identified as potentially requiring changes for ATF implementation, potentially requiring changes for attaining ATF benefits, or as requiring further review by a subject matter expert (SME). These sections are listed in Table 1.

TABLE 1: 10CFR50 (Excluding Appendices)

Review Indicates Change Potentially Required for ATF Batch Loading or Benefit or SME Review Needed

SECTION 50.X	TITLE	EXPLANATION
50.46	Standards for Licenses, Certifications, and Regulatory Approvals: Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors.	As written, 50.46 applies only to reactors fueled with uranium oxide pellets with cylindrical zircaloy or ZIRLO clad. 50.46 and Appendix K may need to be revised to provide acceptance criteria for other alloy clads and other oxide fuels. Status of 50.46c is unknown.
50.47	Standards for Licenses, Certifications, and Regulatory Approvals: Emergency plans.	Revision potentially needed to obtain benefits from ATF in emergency planning.
50.48	Standards for Licenses, Certifications, and Regulatory Approvals: Fire protection.	Revision potentially needed to obtain benefits from ATF in fire PRA contribution to CDF/LERF.
50.65	Issuance, Limitations, and Conditions of Licenses and Construction Permits: Requirements for monitoring the effectiveness of maintenance at nuclear power plants.	Revision potentially needed to obtain benefit from ATF in risk evaluations.
50.67	Issuance, Limitations, and Conditions of Licenses and Construction Permits: Accident source term.	ATF may support a revision to increase the 2-hour period at exclusion area boundary for 25 rem dose. ATF may provide a basis for changing the assumption that all assemblies are affected by a DBA event.
50.68	Issuance, Limitations, and Conditions of Licenses and Construction Permits: Criticality accident requirements.	Revision needed to allow for U 235 enrichments greater than 5% by weight.
50.69	Inspections, Records, Reports, Notifications: Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors.	Revision potentially needed to realize ATF benefit in risk-informed classification.
50.78	US/IAEA Safeguards Agreement: Facility information and verification.	Further review required for US/IAEA safeguards agreement information in 10CFR75.
50.150	Additional Standards for Licenses, Certifications, and Regulatory Approvals: Aircraft impact assessment.	ATF may be a benefit in demonstrating core remains cooled.

10CFR50 APPENDICES

Subcommittee 1 screened all 10CFR50 Appendices. As with the body of 10CFR50, most of the appendices were determined not to require changes for ATF implementation or to achieve ATF benefits. However, several Appendices were identified as potentially requiring changes for ATF implementation, potentially requiring changes for attaining ATF benefits, or as requiring further review by a subject matter expert (SME). These Appendices are listed in Table 2.

TABLE 2: 10CFR50 Appendices

Review Indicates Change Potentially Required for ATF Batch Loading or Benefit or SME Review Needed

APP	TITLE	EXPLANATION
A	Appendix A to Part 50—General Design Criteria for Nuclear Power Plants	No changes required for ATF implementation. Some changes may be needed to Criterion 55 and Criterion 56 to achieve benefits.
E	Appendix E to Part 50—Emergency Planning and Preparedness for Production and Utilization Facilities	Sections VI.2.a.i and ii specify parameters for transfer to Emergency Response Data System that may not be applicable for Uranium Silicide, Uranium metal, or Silicon-Carbide.
F	Appendix F to Part 50—Policy Relating to the Siting of Fuel Reprocessing Plants and Related Waste Management Facilities	Revisit this appendix if an ATF concept includes reprocessing as a key element of economic feasibility.
K	Appendix K to Part 50—ECCS Evaluation Models	Changes needed to address non-UO2 fuel, non Zirc clad, fuel without pellet-clad gap, and experimental requirements for other geometries.

STANDARD REVIEW PLAN (NUREG-0800)

The NEI ATF Licensing Task Force reviewed selected sections of the SRP during 2017. Subcommittee 1 performed a screening review of the remaining sections during 2018. The consolidated results of the two groups' reviews are contained in Table 3. Because of the depth and breadth of the SRP content, Subcommittee 1, in many cases, was only able to make the determination that the section had no bearing on ATF or that further evaluation was required by an SME. For sections for which Subcommittee 1 was able to offer specific comments, those comments are noted.

TABLE 3: Standard Review Plan (NUREG-0800)

Review Indicates Change Potentially Required for ATF Batch Loading or Benefit or SME Review Needed

SECTION	TITLE	EXPLANATION
3.8.4, Appendix D	Design of Structures, Components, Equipment, and Systems: Other Seismic Category I Structures; Appendix D Guidance on Spent Fuel Pool Racks	Guidance on seismic performance of spent fuel racks may need revision to address ATF.
3.9.1	Design of Structures, Components, Equipment, and Systems: Special Topics for Mechanical Components	Guidance on design transients for reactor vessel internal components may need revision to address ATF.
3.9.2	Design of Structures, Components, Equipment, and Systems: Dynamic Testing and Analysis of Systems, Structures, and Components	Criteria which preclude loss of function of reactor core structures and fuel assemblies may need revision to address ATF.
3.9.5	Design of Structures, Components, Equipment, and Systems: Reactor Pressure Vessel Internals	Needs further evaluation to determine if revision needed to address ATF.
4.2	Reactor: Fuel System Design	Further evaluation and extensive revision likely required for non-zirc non-UO2 fuel. Specific criteria for fuel system damage, fuel rod failure, and fuel coolability need revision to address non-zircaloy non-UO2 fuel. Other changes likely needed as well throughout section 4.2.
4.3	Reactor: Nuclear Design	Specific numerical values, such as 2,200 degrees F for peak cladding temperature, which is specific to zircaloy-based clad, need to be replaced with more generalized criteria.
6.2.1.1.A-C	Engineered Safety Features: PWR Dry Containments, Including Subatmospheric Containments; Ice Condenser Containments; Pressure-Suppression Type BWR Containments	Discussions and criteria referencing fuel clad metal-water reaction and hydrogen generation from fuel clad metal-water reaction are not general enough to address a range of potential ATF types.

continued

TABLE 3: Standard Review Plan (NUREG-0800)

Review Indicates Change Potentially Required for ATF Batch Loading or Benefit or SME Review Needed

SECTION	TITLE	EXPLANATION
6.2.1.3	Engineered Safety Features: Mass and Energy Release Analysis for Postulated Loss-of-Coolant Accidents (LOCAs)	Discussion of clad swelling and metal-water reaction are not relevant to all potential ATF types.
6.2.4	Engineered Safety Features: Containment Isolation System	Mention of fuel cladding may require updating to address ATF.
6.2.5	Engineered Safety Features: Combustible Gas Control in Containment	Current acceptance criteria assume hydrogen resulting from 100 percent fuel clad-coolant reaction. A different assumption or assumptions would seem to be appropriate depending on type of ATF.
6.3	Engineered Safety Features: Emergency Core Cooling System	Stated ECCS acceptance criteria would not be relevant for some ATF types.
BTP 6-2	Minimum Containment Pressure Model for PWR ECCS Performance Evaluation	May need to consider fuel criterion other than peak calculated fuel cladding temperature.
BTP 6-5	Currently the Responsibility of Reactor Systems Piping From the RWST (or BWST) and Containment Sump(s) to the Safety Injection Pumps	Consider if modification required for ATF.
9.1.1	Auxiliary Systems: Criticality Safety of Fresh and Spent Fuel Storage and Handling	Consider applicability of benchmark critical experiments to ATF designs.
9.1.2	Auxiliary Systems: New and Spent Fuel Storage	The goal of ensuring safe and subcritical storage of new and spent fuel applies to ATF as well as to current fuel systems. This section contains many references to other regulatory documents and to industry standards. Thorough review of this section and all referenced documents is required to ensure applicability for a range of ATF types.
11.1	Radioactive Waste Management: Coolant Source Terms	ATF materials and potential failure mechanisms may warrant changes. This section needs further review by appropriate SME.
11.2	Radioactive Waste Management: Liquid Waste Management System	ATF materials and potential failure mechanisms may warrant changes. This section needs further review by appropriate SME.
11.3	Radioactive Waste Management: Gaseous Waste Management System	ATF materials and potential failure mechanisms may warrant changes. This section needs further review by appropriate SME.

continued

TABLE 3: Standard Review Plan (NUREG-0800)

Review Indicates Change Potentially Required for ATF Batch Loading or Benefit or SME Review Needed

SECTION	TITLE	EXPLANATION
11.4	Radioactive Waste Management: Solid Waste Management System	ATF materials and potential failure mechanisms may warrant changes. This section needs further review by appropriate SME.
11.5	Radioactive Waste Management: Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems	ATF materials and potential failure mechanisms may warrant changes. This section needs further review by appropriate SME.
Chapter 13	Conduct of Operations	No change needed for ATF implementation. May need evaluation later to reduce Emergency Preparedness requirements as an ATF benefit.
15.0	Accident Analysis: Introduction - Transient and Accident Analyses	Specified values of DNBR and/or MCPR and/or peak clad temperature may not be appropriate as acceptance criteria for all ATF types. DNBR and/or MCPR and/or peak clad temperature may not be appropriate as acceptance criteria for all ATF types.
15.0.1	Accident Analysis: Radiological Consequence Analyses Using Alternative Source Terms	No changes needed for ATF. However, references such as RG 1.183 may need to change.
15.0.3	Accident Analysis: Design Basis Accident Radiological Consequences of Analyses for Advanced Light Water Reactors	Acceptance criteria may need to change to be applicable to ATF.
15.1.1-15.1.4	Accident Analysis: Decrease in Feedwater Temperature, Increase in Feedwater Flow, Increase in Steam Flow, and Inadvertent Opening of a Steam Generator Relief or Safety Valve	Specified values of DNBR and/or MCPR may not be appropriate as acceptance criteria for all ATF types. DNBR and/or MCPR may not be appropriate acceptance criteria for all ATF types.
15.1.5	Accident Analysis: Steam System Piping Failures Inside and Outside of Containment (PWR)	Specified value of DNBR and/or MCPR may not be appropriate as acceptance criterion for all ATF types. DNBR and/or MCPR may not be an appropriate acceptance criterion for all ATF types.
15.1.5A	Accident Analysis: Radiological Consequences of Main Steam Line Failures Outside Containment of a PWR	Iodine limits and spiking values might not apply to all ATF types.
15.2.1-15.2.5	Accident Analysis: Loss of External Load; Turbine Trip; Loss of Condenser Vacuum; Closure of Main Steam Isolation Valve (BWR); and Steam Pressure Regulator Failure (Closed)	Specified value of DNBR and/or MCPR may not be appropriate as acceptance criterion for all ATF types. DNBR and/or MCPR may not be an appropriate acceptance criterion for all ATF types.

continued

TABLE 3: Standard Review Plan (NUREG-0800)

Review Indicates Change Potentially Required for ATF Batch Loading or Benefit or SME Review Needed

SECTION	TITLE	EXPLANATION
15.2.6	Accident Analysis: Loss of Nonemergency AC Power to the Station Auxiliaries	Specified value of DNBR and/or MCPR may not be appropriate as acceptance criterion for all ATF types. DNBR and/or MCPR may not be an appropriate acceptance criterion for all ATF types.
15.2.7	Accident Analysis: Loss of Normal Feedwater Flow	Specified value of DNBR and/or MCPR may not be appropriate as acceptance criterion for all ATF types. DNBR and/or MCPR may not be an appropriate acceptance criterion for all ATF types.
15.2.8	Accident Analysis: Feedwater System Pipe Breaks Inside and Outside Containment (PWR)	Specified value of DNBR and/or MCPR may not be appropriate as acceptance criterion for all ATF types. DNBR and/or MCPR may not be an appropriate acceptance criterion for all ATF types.
15.3.1-15.3.2	Accident Analysis: Loss of Forced Reactor Coolant Flow Including Trip of Pump Motor and Flow Controller Malfunctions	Specified value of DNBR and/or MCPR may not be appropriate as acceptance criterion for all ATF types. DNBR and/or MCPR may not be an appropriate acceptance criterion for all ATF types.
15.3.3-15.3.4	Accident Analysis: Reactor Coolant Pump Rotor Seizure and Reactor Coolant Pump Shaft Break	Specified value of DNBR and/or MCPR may not be appropriate as acceptance criterion for all ATF types. DNBR and/or MCPR may not be an appropriate acceptance criterion for all ATF types.
15.4.1	Accident Analysis: Uncontrolled Control Rod Assembly Withdrawal from a Subcritical or Low Power Startup Condition Control Rod Malfunction	Specified fuel limits such as 1% strain may not apply to all ATF types.
15.4.2	Accident Analysis: Uncontrolled Control Rod Assembly Withdrawal at Power	Specified fuel limits such as 1% strain may not apply to all ATF types.
15.4.3	Accident Analysis: Control Rod Misoperation (System Malfunction or Operator Error)	Specified fuel limits such as 1% strain may not apply to all ATF types.
15.4.4-15.4.5	Accident Analysis: Startup of an Inactive Loop or Recirculation Loop at an Incorrect Temperature, and Flow Controller Malfunction Causing an Increase in BWR Core Flow Rate Flow Malfunction	Specified value of DNBR and/or MCPR may not be appropriate as acceptance criterion for all ATF types. DNBR and/or MCPR may not be an appropriate acceptance criterion for all ATF types.
15.4.8	Accident Analysis: Spectrum of Rod Ejection Accidents (PWR)	Acceptance criteria contained in referenced Regulatory Guides, such as RG 1.77, may not be applicable to all ATF types.

continued

TABLE 3: Standard Review Plan (NUREG-0800)

Review Indicates Change Potentially Required for ATF Batch Loading or Benefit or SME Review Needed

SECTION	TITLE	EXPLANATION
15.4.8.A	Accident Analysis: Radiological Consequences of a Control Rod Ejection Accident (PWR)	Specific fuel limits such as DNB and 280 cal/gm may not apply to all ATF types.
15.4.9	Accident Analysis: Spectrum of Rod Drop Accidents (BWR)	Discussion of specific accident progression, such as the generation or not of finely dispersed UO ₂ , would not apply to all ATF types.
15.4.9.A	Accident Analysis: Radiological Consequences of Control Rod Drop Accident (BWR)	References to Regulatory Guides and specified fuel characteristics such as fuel melt temperature of 2,842 degrees C will not apply to all ATF types.
15.5.1-15.5.2	Accident Analysis: Inadvertent Operation of ECCS and Chemical and Volume Control System Malfunction that Increases Reactor Coolant Inventory	Specified values of DNBR and/or MCPR may not be appropriate as acceptance criteria for all ATF types. DNBR and/or MCPR may not be appropriate acceptance criteria for all ATF types.
15.6.1	Accident Analysis: Inadvertent Opening of a PWR Pressurizer Pressure Relief Valve or a BWR Pressure Relief Valve	DNBR and/or MCPR may not be appropriate acceptance criteria for all ATF types.
15.6.5	Accident Analysis: Loss-of-Coolant Accidents Resulting From Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary	Acceptance criteria on maximum cladding temperature, clad oxidation, and/or hydrogen generation may not be appropriate for all ATF types.
15.7.4	Accident Analysis: Radiological Consequences of Fuel Handling Accidents	ATF may provide a basis for altering the assumptions used in analysis of the fuel handling accident, for example, as a result of stronger cladding or greater fission product retention in the fuel matrix.
15.8	Accident Analysis: Anticipated Transients Without Scram	Peak clad temperature, cladding oxidation, and hydrogen generation may not be appropriate criteria by which to assess maintaining a coolable geometry in an ATF core.
16.1	Technical Specifications: Risk-Informed Decision Making	No change needed for ATF implementation. Limitations that currently affect risk-informed applications with current fuel types may also affect the ability to achieve ATF benefits.

NRC REGULATORY GUIDES – POWER REACTORS (DIVISION 1)

The NEI ATF Licensing Task Force reviewed several Regulatory Guides during 2017. Subcommittee 1 performed a screening review of the remaining Regulatory Guides during 2018. The consolidated results of the two groups’ reviews are contained in Table 4. Because of the depth and breadth of the content of the Regulatory Guides, Subcommittee 1, in many cases, was only able to make the determination that the section had no bearing on ATF or that further evaluation was required by an SME. For those sections for which Subcommittee 1 was able to offer specific comments, those comments are noted.

TABLE 4: NRC Regulatory Guides–Power Reactors (Division 1)

Review Indicates Change Potentially Required for ATF Batch Loading or Benefit or SME Review Needed

REG GUIDE NUMBER	SUBJECT	RESULTS
1.7	Control of Combustible Gas Concentrations in Containment	Needs expert review to determine the potential impact of ATF types. This has been identified as a potential benefit area.
1.13	Spent Fuel Storage Facility Design Basis	Expect that no changes are required for ATF but needs SME review to confirm.
1.20	Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing	Expect no changes are required for near-term ATF but needs SME review for longer-term designs, particularly for Lightbridge design.
1.21	Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste	Needs expert review to determine potential impact of ATF types on radioactive material releases, doses, effluents, and solid radioactive wastes.
1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants	Needs evaluation by an SME to determine if there is ATF impact.
1.77	Assumptions Used for Evaluating a Control Rod Ejection Accident for Pressurized Water Reactors	Contains many references to UO2 fuel and to specific values that apply to UO2 fuel that may not be applicable to some ATF types.
1.97	Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants	Radioactive releases from ATF may be different than from current fuel types. Some requirements for accident monitoring instrumentation may be affected for ATF. Needs further evaluation.
1.98	Assumptions Used for Evaluating the Potential Radiological Consequences of a Radioactive Offgas System Failure in a Boiling Water Reactor (for Comment)	This RG assumes a certain makeup and concentration of off-gasses. The makeup/ concentration of fission gasses may be different if a different fuel material is used.

continued

TABLE 4: NRC Regulatory Guides—Power Reactors (Division 1)

Review Indicates Change Potentially Required for ATF Batch Loading or Benefit or SME Review Needed

REG GUIDE NUMBER	SUBJECT	RESULTS
1.126	An Acceptable Model and Related Statistical Methods for the Analysis of Fuel Densification	This RG appears to assume oxide fuel pellets and that the as-built fuel has a clad-pellet gap. This RG may not be appropriate for all ATF types.
1.136	Design Limits, Loading Combinations, Materials, Construction, and Testing of Concrete Containments	This RG states in multiple places that the design (containment pressure) assumes “hydrogen generated from 100 percent fuel clad-coolant reaction accompanied by hydrogen burning.” This assumption may not be appropriate or needed for certain ATF designs.
1.157	Best-Estimate Calculations of Emergency Core Cooling System Performance	This RG appears to assume oxide fuel pellets and zirconium-based clad. This RG may not be appropriate for all ATF types.
1.183	Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors	Needs evaluation by an SME to ensure that ATF types are appropriately addressed.
1.195	Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors	Needs expert review to determine impact of ATF.
1.219	Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors	Emergency planning has been identified as a potential ATF benefit area. This item needs further review by an SME in Emergency Planning.

APPENDIX:

REGULATORY AND GUIDANCE DOCUMENTS IDENTIFIED IN
NRC PROJECT PLAN VERSION 1 AS POTENTIALLY AFFECTED BY ATF

Table 7.1 Potentially Affected GDC

GDC NO.	TITLE
1	Quality Standards and Records
2	Design Bases for Protection against Natural Phenomena
10	Reactor Design
11	Reactor Inherent Protection
12	Suppression of Reactor Power Oscillations
13	Instrumentation and Control
20	Protection System Functions
25	Protection System Requirements for Reactivity Control Malfunctions
26	Reactivity Control System Redundancy and Capability
27	Combined Reactivity Control Systems Capability
28	Reactivity Limits
34	Residual Heat Removal
35	Emergency Core Cooling
61	Fuel Storage and Handling and Radioactivity Control
62	Prevention of Criticality in Fuel Storage and Handling

Table 7.2 Potentially Affected Regulations

REGULATION (10CFR)	TITLE
20	Standards for Protection against Radiation
50.34	Contents of Applications; Technical Information
50.46	Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors
50.67	Accident Source Term
50.68	Criticality Accident Requirements
Part 50, Appendix B	Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants
Part 50, Appendix K	ECCS Evaluation Models
Part 50, Appendix S	Earthquake Engineering Criteria for Nuclear Power Plants
Part 100	Reactor Site Criteria

Table 7.3 Potentially Affected Guidance

GUIDANCE DOCUMENT	TITLE
NUREG-0630	Cladding Swelling and Rupture Models for LOCA Analysis
NUREG-0800	Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition
RG 1.157	Best-Estimate Calculations of Emergency Core Cooling System Performance
RG 1.183	Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors
RG 1.195	Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors
RG 1.203	Transient and Accident Analysis Methods



NUCLEAR ENERGY INSTITUTE

1201 F Street, NW, Suite 1100
Washington, DC 20004

nei.org

The Nuclear Energy Institute is the nuclear energy industry's policy organization.