

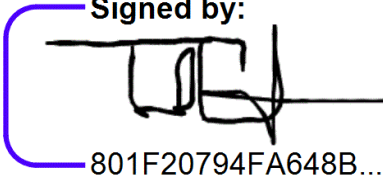
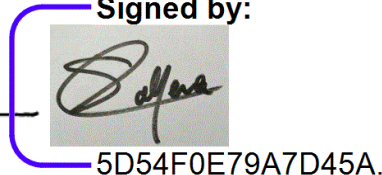


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U.S. LFR-AS-200 Reactor Technology Regulatory Engagement Plan

ABSTRACT:

This plan provides information about newcleo Group and its U.S. subsidiary, newcleo Americas, efforts to establish a licensing project plan and associated preapplication engagements for its LFR-AS-200 advanced nuclear reactor technology. This regulatory engagement plan is part of its strategy to prepare the necessary qualifying applications for a prospective U.S. LFR-AS-200 deployment and associated licensing activity.

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ACRONYS AND ABBREVIATIONS

LFR	Lead-cooled Fast Reactor
CFR	Code of Federal Regulation
NRC	U.S. Nuclear Regulatory Commission
ENEA	Italian National Agency for New Technologies, Energy and Sustainable Economic Development
MOX	Mixed-Oxide Fuel
FOAK	First-of-a-kind
REP	Regulatory Engagement Plan
CPA	Construction Permit Application
OL	Operating License

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1 INTRODUCTION

This Regulatory Engagement Plan (REP) sets out newcleo's structured pre-application engagement strategy with the U.S. Nuclear Regulatory Commission (NRC) for the LFR-AS-200 advanced nuclear reactor, a 480 MWth (200 MWe) lead-cooled fast reactor (LFR) technology designed for both electrical generation and industrial co-generation applications. The newcleo Group (collectively newcleo in this plan) is comprised of several business units with its newest subsidiary, newcleo Americas, established in late 2025 for the purpose of commercializing a mixed oxide (MOX) fuel facility and reactor (LFR) technology in the North American market.

newcleo initiated its U.S. regulatory engagement for the LFR technology with a pre-application meeting with NRC staff on March 24, 2026, at which the company presented its technology, preliminary licensing basis, and deployment ambitions. This REP is the direct follow-on to that meeting, translating the initial dialogue into a structured plan for pre-application engagement. This plan lays out the necessary licensing actions for an initial U.S. deployment project and subsequent projects to follow.

In accordance with the Nuclear Energy Innovation and Modernization Act (NEIMA) and NRC fee rules, this REP is provided as newcleo's licensing project plan as an advanced nuclear reactor pre-applicant. We request the activities associated with this REP and review of all submitted materials be considered subject to the reduced hourly rate in §170.20.

The REP describes: newcleo as a company and technology developer (Section 2); the LFR-AS-200 and its planned U.S. deployment path (Section 3); newcleo's planned licensing approach (Section 4); and the specific regulatory engagements — topical reports and key submissions — planned between now and a future licensing action application filing (Section 5 and Appendix A).

Newcleo brings to this engagement a substantial foundation of prior regulatory work: more than 20 meeting-days of pre-licensing engagement with the French nuclear safety authority (ASNR) between 2023 and 2025, over 600 pages of submitted safety documentation, and a substantial and active research and development infrastructure with more than 12 qualification and testing facilities. The U.S. engagement builds directly on this body of work.

The goal of this REP is to give NRC staff early, transparent visibility into newcleo's regulatory approach — enabling efficient resource planning on both sides and building the technical record necessary to support future reviews.



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2 COMPANY INFORMATION

Since launching in 2021, newcleo has quickly established itself as innovator in the field of nuclear energy. Newcleo is working to design, build, and operate Gen-IV Advanced Modular Reactors (AMRs) for multiple market applications. Our technologies are centered around liquid lead as the reactor coolant, fast spectrum neutrons, and mixed oxide fuel that can help nations address surplus defense-application plutonium and ultimately close the fuel cycle through safely reprocessing used nuclear fuels.

With over \$780M in private funding and many partnerships and collaborations across the nuclear industry, the growth of the newcleo Group is supported through the targeted acquisition of key companies with strong capabilities in nuclear engineering, manufacturing, and waste management. Through its workforce of over 900 highly qualified employees across France, the U.S., the UK, Italy, Switzerland and Slovakia, newcleo is not only developing and delivering the skills and services required for the group's own ambitious project timelines but also supporting the development of Small Modular Reactor supply chains in Europe and beyond.

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3 NEWCLEO'S REACTOR TECHNOLOGY AND DEPLOYMENT PLAN

Key aspects of newcleo's technology development program, research program, and reactor characteristics for the LFR-AS-200 are available in introductory meeting material available in ADAMS:

- <https://www.nrc.gov/docs/ML2608/ML26082A018.pdf> Company overview & technology development
- <https://www.nrc.gov/docs/ML2608/ML26082A020.pdf> LFR technology overview

Lead-cooled fast reactors have been the subject of sustained international research and development since the 1990s, with programs conducted across Europe — including Belgium, France, Italy, the Netherlands, Sweden, and the United Kingdom — as well as in Japan and the United States. This work built a deep scientific foundation: characterization of lead's thermophysical and chemical properties, thermal-hydraulic modelling, code validation, and the development and qualification of MOX fuel and core materials in European fast reactor programs such as Phénix, Superphénix, and the Prototype Fast Reactor (PFR).

Much of this research was conducted in Italy, where the national agency Energia Nucleare ed Energie Alternative (ENEA) has been a central actor in LFR development for over two decades. Newcleo was founded by researchers and engineers who came directly out of this environment. The company maintains a deep and ongoing collaboration with ENEA, including co-development and joint operation of the qualification and testing infrastructure at the Brasimone Research Centre. Newcleo does not simply reference this body of work — it inherits it, having acquired key intellectual property and embedded the institutional knowledge of these programs into its design team.

3.1 LFR-AS-200 REACTOR TECHNOLOGY

The LFR-AS-200 is newcleo's commercial-scale lead-cooled fast reactor design. It is a 480 MWth pool-type liquid metal fast reactor capable of producing approximately 200 MWe in a steam Rankine power cycle. The reactor vessel is amphora-shaped (AS) and uses lead as the primary coolant and working fluid managed at atmospheric pressure. Several benefits arise from the use of lead coolant in the reactor system: it is chemically inert, has an extremely high boiling point, naturally provides some fission fragment retention capacity and radiation shielding, and its density and heat capacity provide economically favorable cycle efficiencies. Unlike other liquid metal reactors, there is no intermediate loop due to the compatibility of working fluids. The design life of the facility is 60 years.

The LFR-AS-200 is designed to use MOX fuel tested in various international campaigns. For the U.S. market, it is anticipated that the initial fuel will be produced from surplus plutonium processed into a usable reactor fuel form. This approach is being pursued by the Department of Energy (DOE) as a means of rendering excess Pu stock (both weapon and reactor grade material) into fuel for advanced nuclear reactors. The LFR-AS-200 is also capable of using MOX fuel derived from reprocessed used nuclear fuel through the processes currently in use in France. A regulatory engagement plan for newcleo's fuel cycle-related activities will be provided in separate correspondence.



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3.2 U.S. DEPLOYMENT PLANS

Newcleo is actively developing projects in the European market that build upon an extensive non-nuclear research and development program and the scaled nuclear demonstration reactor in France, the LFR-AS-30. Newcleo's U.S. deployment strategy will proceed in two stages:

The first stage is the construction and operation of a First-of-a-Kind (FOAK) LFR-AS-200 as our commercial-scale demonstration facility. The objective is to deploy this project on a DOE-managed site, to benefit from the proximity of the proposed site of our initial plutonium processing and fuel fabrication facility. First operation is targeted for the early 2030's. The FOAK is intended as a commercial electricity-producing facility and will be licensed under the NRC regulatory framework. The project is planned in partnership with a commercial partner requiring firm, low-carbon electricity at this scale. The FOAK will serve a dual purpose in newcleo's commercialization strategy: 1) demonstrating commercial performance and 2) developing what will become the standard design and licensing bases for future deployments. It will also provide a platform to further mature the fuel and material qualification bases, further validate our evaluation models and code suites and potentially become a platform to advance portions of the technology (e.g., use of lead test fuel assemblies over time).

The second stage is broader commercial deployment of the LFR-AS-200 through the remainder of the 2030's and beyond. After the Operating License for the FOAK LFR-AS-200 is issued, newcleo intends to use the range of safety findings and NRC staff review conclusions from that licensing effort and our suite of topical reports to establish the licensing bases for the standard design. This will allow a streamlined path for follow-on units.

Additional project details will be provided in responses to NRC staff regulatory information summaries (RIS 2026-02) and related calls for planning information that contain business-sensitive information.



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4 LICENSING APPROACH

This section provides context for the regulatory engagements described in Section 5, particularly with respect to the expected regulatory path for the FOAK LFR-AS-200 project. Key aspects of newcleo's safety design and licensing approach for the LFR-AS-200 are available in introductory meeting material available in ADAMS:

- <https://www.nrc.gov/docs/ML2608/ML26082A021.pdf> Licensing basis and safety strategy

4.1 REGULATORY FRAMEWORK

Newcleo intends to pursue licensing of the LFR-AS-200 as a Class 103 commercial utilization facility under Title 10 of the Code of Federal Regulations (10 CFR) Part 53, the risk-informed, performance-based regulatory framework that went into effect on April 29, 2026. Part 53's technology-inclusive approach is well suited to the LFR-AS-200's non-LWR safety characteristics and eliminates the need for design-specific exemptions from LWR-derived prescriptive requirements.

The safety design approach implemented in the LFR technology is aimed to be aligned with Part 53 and the Licensing Modernization Project (LMP) methodologies captured in NEI 18-04. Newcleo is evaluating the standards for reactor design and probabilistic risk assessment for the U.S. market in order to describe differences in approach from European standards. These differences are a focus area of the preapplication engagement described in this REP.

Since Part 53 is a new regulation, a near-term engagement is planned to provide newcleo's analysis of the regulatory requirements, identified implementing guidance, and other advanced reactor regulatory resources we will use to develop the licensing basis for the technology. See Appendix A.

4.2 PRE-APPLICATION ENGAGEMENT

Following the guidance of NEI 18-06 and DANU-ISG-2022-01, newcleo intends the pre-application engagement period to 1) resolve technical, policy, and programmatic matters as early as possible, 2) familiarize the NRC with LFR technology, and 3) introduce progressively the safety design approach for the LFR-AS-200 design. Newcleo is also engaging with the DOE and university resources to strengthen the technical bases of the design and will keep the NRC informed of these activities, particularly when they intersect with regulatory matters.

4.3 FOAK LFR-AS-200 PROJECT LICENSING APPROACH

The details of the project delivery model and business arrangements are under development between participants in the FOAK LFR-AS-200 project, with newcleo considering different roles that impact the licensing approach. Either as owner or on behalf of an entity, newcleo intends to use a two-step licensing



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approach for this FOAK project aligned with recent precedent for advanced reactor commercialization. The development of the aspects of a Part 53 Construction Permit Application (CPA) will occur in parallel with design and analysis maturation, siting, and program development to meet U.S. requirements. Also in a parallel path, we anticipate the development or adaptation of implementing guidance for this regulation by the NRC and industry. The specific timing of application submission will be provided in response to RIS 2026-02 and a project-specific REP. Where possible, previously submitted and reviewed topical reports will be incorporated by reference to address technical approaches and methods.

After the CP is issued, newcleo will apply for the Operating License (OL) for the facility. The project is aware of the NRC's development of construction oversight approaches for advanced reactors and transition into an active reactor oversight program. Newcleo will also request the necessary material licenses to support readiness to receive and store fuel and other nuclear material ahead of the authorization to load fuel with OL issuance.

Newcleo is evaluating the use of the NRC's Generic Environmental Impact Statement for Licensing of New Reactor (NR GEIS) in NUREG-2249 for use in accelerating the environmental review of this FOAK project.

4.4 NOAK LFR-AS-200 LICENSING APPROACH

Newcleo envisions using the provisions of 10 CFR 53.1124 to reference the issued FOAK project OL as a means of expediting the review of one of the available standard design licensing actions that will better enable future project licensing.



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5 PLANNED REGULATORY ENGAGEMENTS

Appendix A describes the pre-application submissions newcleo plans to provide to NRC in the form of white papers and select topical reports. This approach anticipates three distinct batches of submissions through the end of 2027 to aid in resource planning for both the NRC and newcleo. All dates are provided as target submission periods for further coordination with the NRC Project Manager(s) as needed. If additional topics are identified for inclusion in this plan, or if a topic is determined to no longer be necessary, a revision to Appendix A will be provided. These engagements are planned to be conducted under newcleo’s project docket 99902162 initially used for general LFR technology engagements that will support future site-specific projects.



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APPENDIX A: LFR-AS-200 PREAPPLICATION ENGAGEMENT PLAN

Engagement Topic and Type	Submission Period (Week of)	Objective
Topical Report: Principal Design Criteria Development Approach	[[]] ^P	Approval of the approach to develop the principal design criteria (PDC) based on U.S. and European guidance and the initial PDC for the LFR-AS-200.
Topical Report: U.S. Quality Assurance Program Description	[[]] ^P	Approval of the approach to implement U.S. quality assurance standards to meet 10 CFR 50 Appendix B requirements for both LFR-AS-200 and MOX Fuel-related activities. This topic is also addressed in newcleo's MOX Fuel Facility REP.
White Paper: Residual Heat Removal Architecture	[[]] ^P	Review of newcleo's approach to develop the design criteria for the heat removal functions in the reactor technology and initial architecture approach to address adequate defense-in-depth for the function.
White Paper: Regulatory Analysis of 10 CFR 53 and Implementing Guidance	[[]] ^P	Review of newcleo's decomposition of regulatory requirements from the newly issued Part 53 and the assessment of necessary implementing guidance to be used in developing the licensing bases.
Topical Report: Fuel Qualification Program	[[]] ^P	Approval of the NUREG-2246-based fuel qualification program plans for LFR-AS-200 MOX fuel.
Topical Report: Materials Qualification Program	[[]] ^P	Approval of the approach to establish the necessary material qualification programs, including testing activities, that form the basis for material selection and compatibility for the technology.
White Paper: Steam Generator System Design Approach	[[]] ^P	Technical review of the safety design approach for the steam generator system.
White Paper: Control Rod and Shutdown Device Design Approach	[[]] ^P	Technical review of the safety design approach for the control rod and shutdown device system.
White Paper: Safety Analysis Approach – SGTR Evaluation	[[]] ^P	Technical review of the safety design approach and initial analytical methods for the SGTR event sequence family.
White Paper: Functional Containment and Source Term Strategy	[[]] ^P	Review of newcleo's approach to implement functional containment concepts from SECY-18-0096 and RG 1.233 in the reactor design and how mechanistic source terms are developed for safety analyses.
Topical Report: Safety Analysis Approach: Licensing Event Selection Method	[[]] ^P	Technical review of the approach to implement RG 1.233 and RG 1.254 methods of establishing the scope of licensing events for the technology.
White Paper: Decay Heat Removal System Design Approach	[[]] ^P	Technical review of the safety design approach for the decay heat removal systems.
White Paper: Fuel Handling System Design Approach	[[]] ^P	Technical review of the safety design approach for the fuel handling system.



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Engagement Topic and Type	Submission Period (Week of)	Objective
White Paper: Core Structural/Mechanical Design Approach	[[]] ^P	Technical review of the safety design approach and initial analytical methods for core design and structural/mechanical analyses.