

NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness

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Outline

- Background
- Mission and Vision
- Readiness
- Strategic Goal, Objectives, and Strategies
- Implementation Action Plans
- Regulatory Review Options
- Staged Licensing Process
- Timelines
- Conclusion

Background

- The NRC has reviewed and licensed non-LWRs
 - Fermi 1 (sodium-cooled reactor) licensed by AEC
 - CP in 1956, OL in 1963, shutdown in 1972
 - Fort St. Vrain (HTGR) licensed by AEC
 - CP in 1968, OL in 1973, shutdown in 1989
- The NRC could review and license a non-LWR today, if needed
- More recently, the NRC issued a CP for SHINE
 - Moly-99 medical isotope production facility
- The NRC needs to be efficient and effective as it conducts its safety, security, and environmental protection mission

Non-LWR Activities Align with Overarching NRC Direction and Policies

Strategic Plan for
FY 2014-2018

Principles
of Good
Regulation

NRC Mission

**Non-LWR
Activities**

NRC Vision

Advanced
Reactor
Policy
Statement

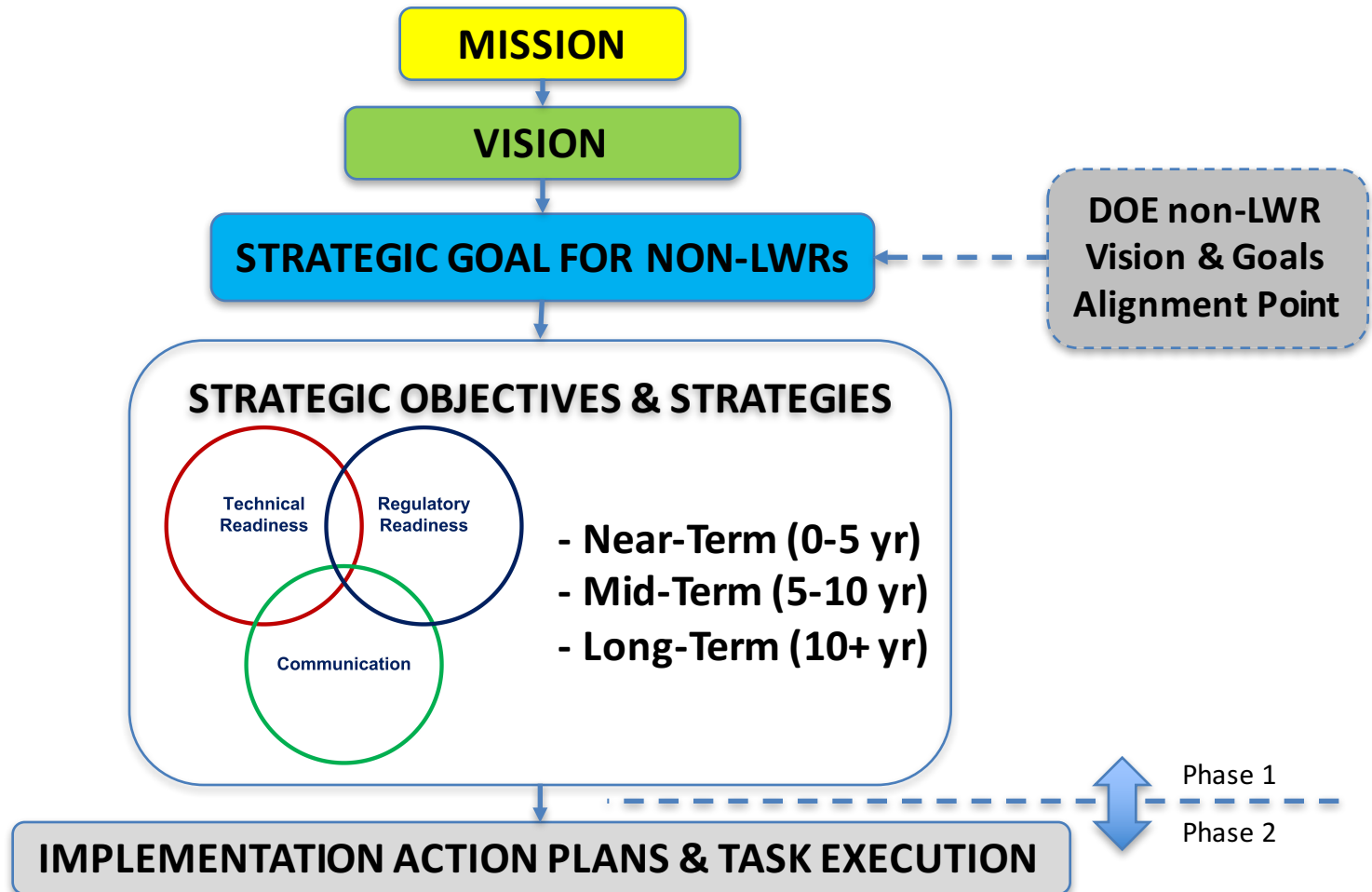
The NRC's Mission

- **NRC Mission** - “The NRC licenses and regulates the Nation’s civilian use of radioactive materials to protect public health and safety, promote the common defense and security, and protect the environment.”
- **DOE Mission** - “The mission of the Energy Department is to ensure America’s security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions.”

The NRC's Vision

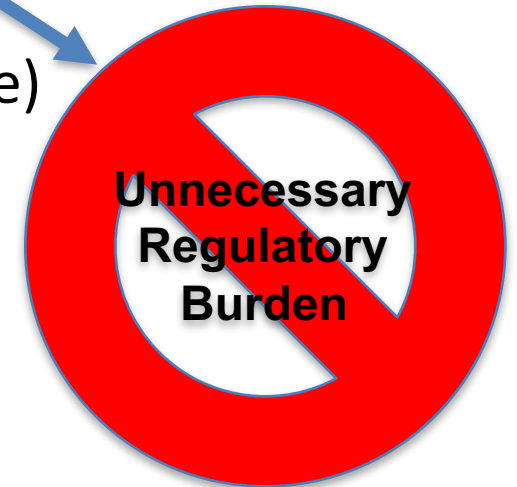
- **Vision** - “A trusted, independent, transparent, and effective nuclear regulator.”
 - The NRC must “excel in carrying out its mission ... in a manner that engenders the trust of the public and stakeholders ... consistent with the Principles of Good Regulation”
 - Independence
 - Clarity
 - Openness
 - Reliability
 - Efficiency

Non-LWR Mission Readiness Roadmap



What Does “Readiness” Mean?

- “Readiness” means that the elements needed to conduct the NRC’s regulatory operations to support its mission are in place and **optimized**
 - People (e.g., staff training)
 - Processes (e.g., procedures and guidance)
 - Organization and Infrastructure (e.g., project-based matrix organizations)
 - Tools (e.g., computer models)
 - Policies (e.g., EP requirements)
 - Decision Criteria (e.g., DSRS)
 - Transparency and Clarity of Requirements (e.g., guidance)
 - Communication (e.g., workshops)



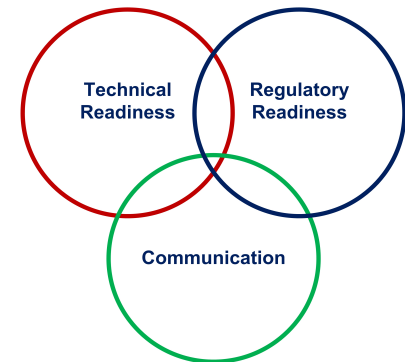
Strategic Goal for non-LWRs

Assure NRC readiness to efficiently and effectively review and regulate non-light water reactors

- Strategic objectives and contributing activities support this goal
- Aligns with DOE's vision and strategy
 - Goal: By the early 2030s, at least two non-light water advanced reactor concepts have reached technical maturity, demonstrated safety and economic benefits, and completed licensing reviews by the NRC sufficient to allow construction to go forward.

Three Strategic Objectives & Implementation Strategies

- Enhance technical readiness
- Optimize regulatory readiness
- Optimize communication



- Strategies and contributing activities have defined time components
 - Near-term (0-5 years)
 - Mid-term (5-10 years)
 - Long-term (10+ years)

Near-term Strategies (0-5 years)

- Acquire/develop sufficient knowledge, technical skills, and capacity
- Acquire/develop sufficient computer codes and tools
- Establish more flexible, risk-informed and performance-based review process
- Facilitate industry codes and standards needed to support the non-LWR life cycle
- Identify and resolve technology-neutral policy issues
- Develop and implement a structured, integrated communication strategy

Mid-Term Strategies (5-10 years)

- Identify and resolve technology-specific policy issues that impact regulatory reviews
- Acquire/develop sufficient technical skills and capacity to perform regulatory reviews/oversight
- Initiate and develop new non-LWR regulatory framework (if needed)

Long-Term Strategies (10+ years)

- Finalize a new non-LWR regulatory framework (if needed) that is risk-informed, performance-based, and that features staff review efforts commensurate with the demonstrated safety performance of the non-LWR NPP design being considered
 - A new regulatory framework could be helpful
 - The current framework was developed to support licensing LWRs
 - Non-LWR designs use different fuel types, coolants, passive safety features, and other design features
 - Non-LWRS exhibit different behavior during plant transients or accidents
 - It would better integrate risk-insights, address technological differences, and align with various industry and international standards

Implementation Action Plans

- Development of IAPs will include:
 - Identification of detailed tasks to be performed
 - Preparation of order-of-magnitude cost estimates
 - Estimated work durations
 - Expected participants by organization
- Execution of IAPs depends on:
 - Resource availability
 - Maturity/readiness of non-LWR technologies/vendors
 - Specific non-LWR stakeholder needs

Non-LWR Regulatory Review Options

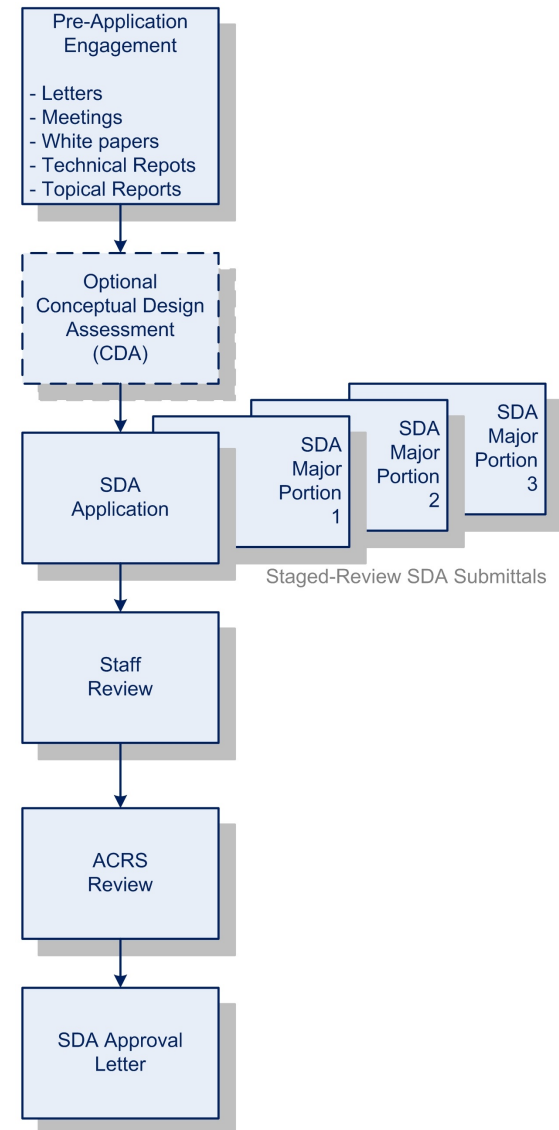
- Two near-term options
 - Conceptual Design Assessment
 - NRC staff did pre-application safety evaluation reports in the 1990s for liquid-metal and gas-cooled reactors
 - No approvals of designs, but results expected to help inform future licensing submittals
 - Scope of review depends on design maturity and design completeness
 - High degree of design completeness could result in statement of no obvious licensing impediments
 - Lesser degree of design completeness could result in more uncertainty in our conclusions

Non-LWR Regulatory Review Options

- Two near-term options (cont.)
 - Staged review process
 - Part 52 Subpart E (Standard Design Approval) describes options for submitting a final design for major portions of a facility for approval
 - Could lessen financial risk by allowing a staged submission of major portions of the design for approval
 - Possible additional review risk during integration of partial SDAs into a final approval

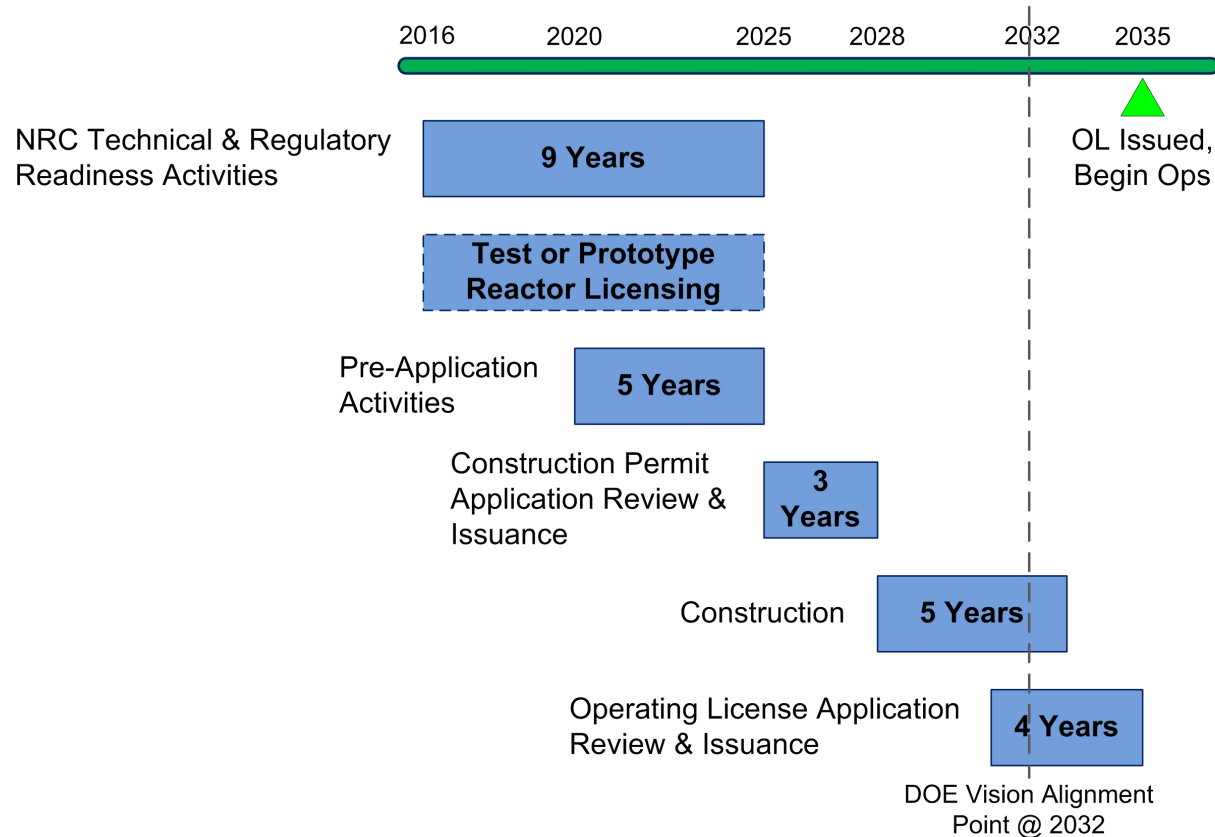
Staged Review Process

- Hypothetical staged SDA submittal and review process
- Major portions of the complete design could be submitted for review and approval
- Final comprehensive SDA could be issued once entire design has been submitted and approved



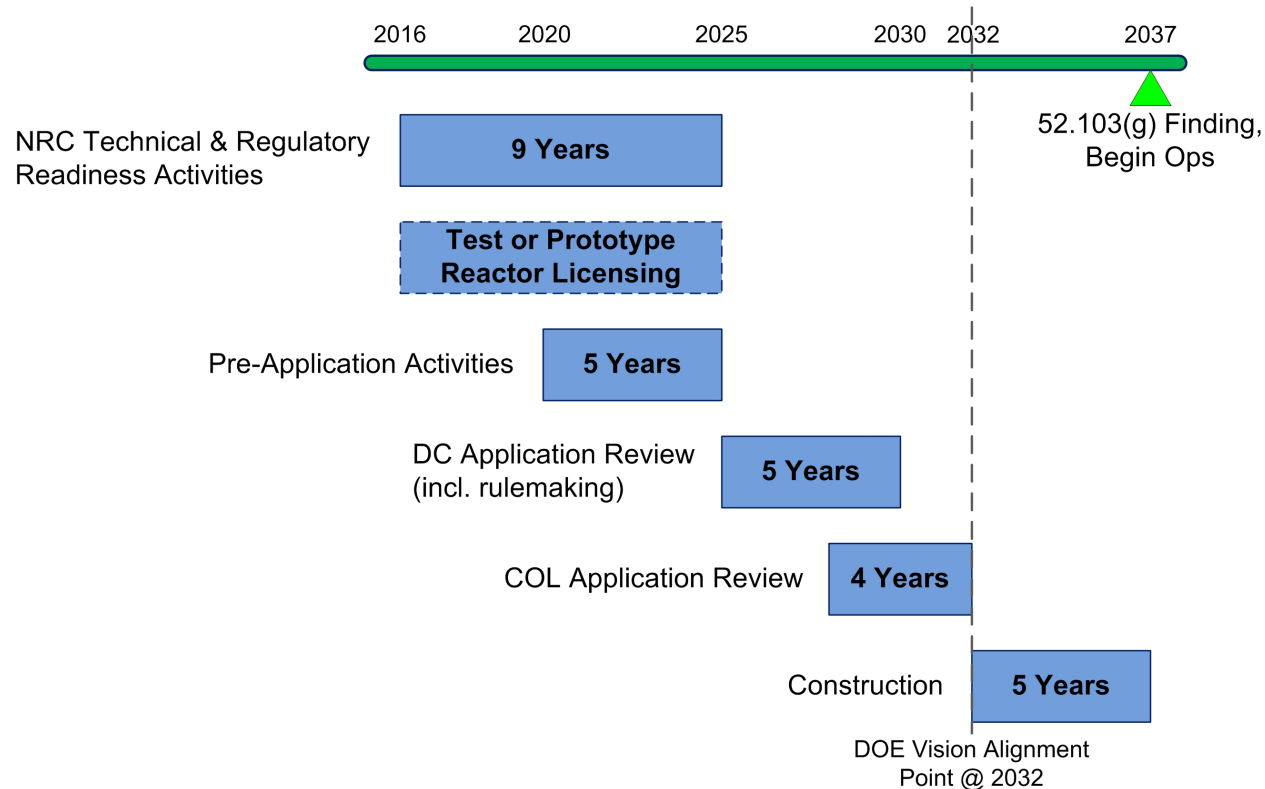
Notional Timelines

Non-LWR Deployment Timeline with Part 50 Construction Permit and Operating License



Notional Timelines (cont)

Non-LWR Deployment Timeline with Part 52 Design Certification/Combined License



Conclusion

- The NRC could review and license a non-LWR today
- The NRC has a vision and strategy for non-LWR mission readiness
- Our strategic goal to assure NRC readiness to efficiently and effectively review and regulate non-light water reactors aligns with DOE's vision and strategy
- We have a number of near, mid, and long term strategies and associated contributing activities to support our goals and are developing implementation action plans