

# 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

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# 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

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# 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

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# The NRC's Mission

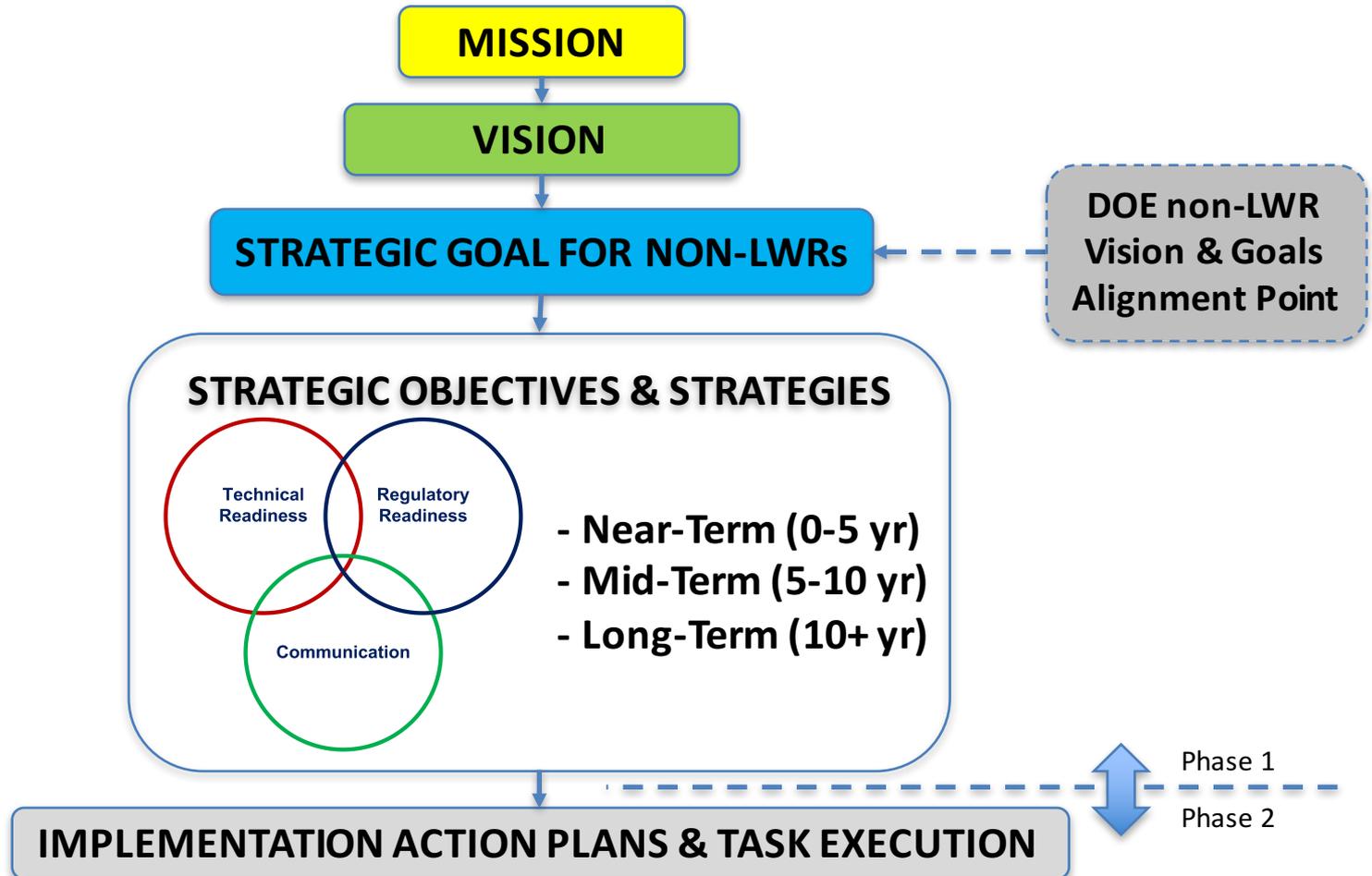
- **NRC Mission** - “The NRC licenses and regulates the Nation’s civilian use of radioactive materials to protect public health and safety, promote the common defense and security, and protect the environment.”
- **DOE Mission** - “The mission of the Energy Department is to ensure America’s security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

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# The NRC's Vision

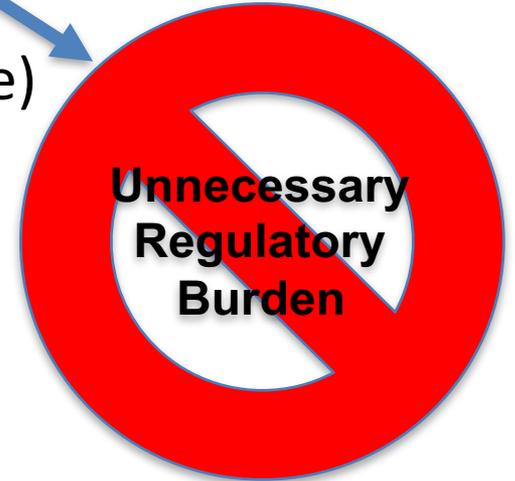
- **Vision** - “A trusted, independent, transparent, and effective nuclear regulator.”
  - The NRC must “excel in carrying out its mission ... in a manner that engenders the trust of the public and stakeholders ... consistent with the Principles of Good Regulation”
    - Independence
    - Clarity
 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



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# Strategic Goal for non-LWRs

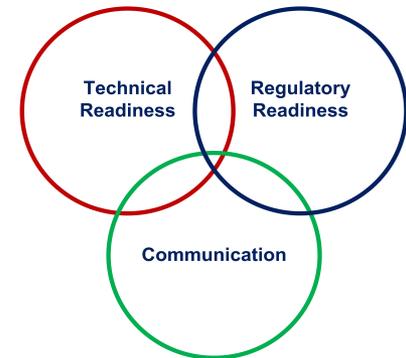
Assure NRC readiness to efficiently and effectively review and regulate non-light water reactors

- 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.

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# Three Strategic Objectives & Implementation Strategies

- Enhance technical readiness
  - Optimize regulatory readiness
  - Optimize communication
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- Strategies and contributing activities have defined time components
    - Near-term (0-5 years)
    - Mid-term (5-10 years)
    - Long-term (10+ years)



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# 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

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# 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)

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# 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

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# 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

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# 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

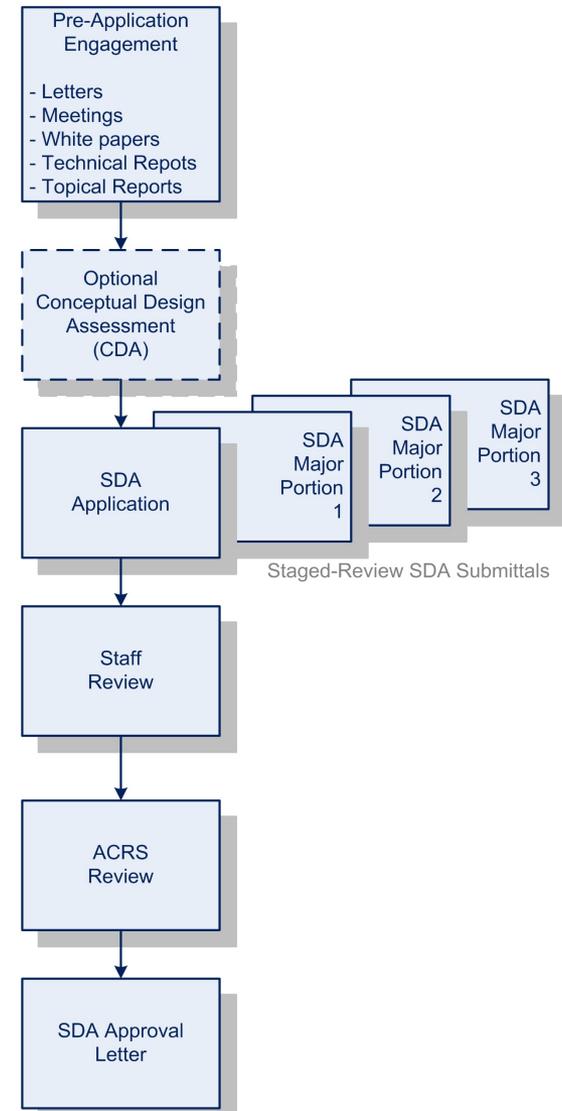
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# Non-LWR Regulatory Review Options

- 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

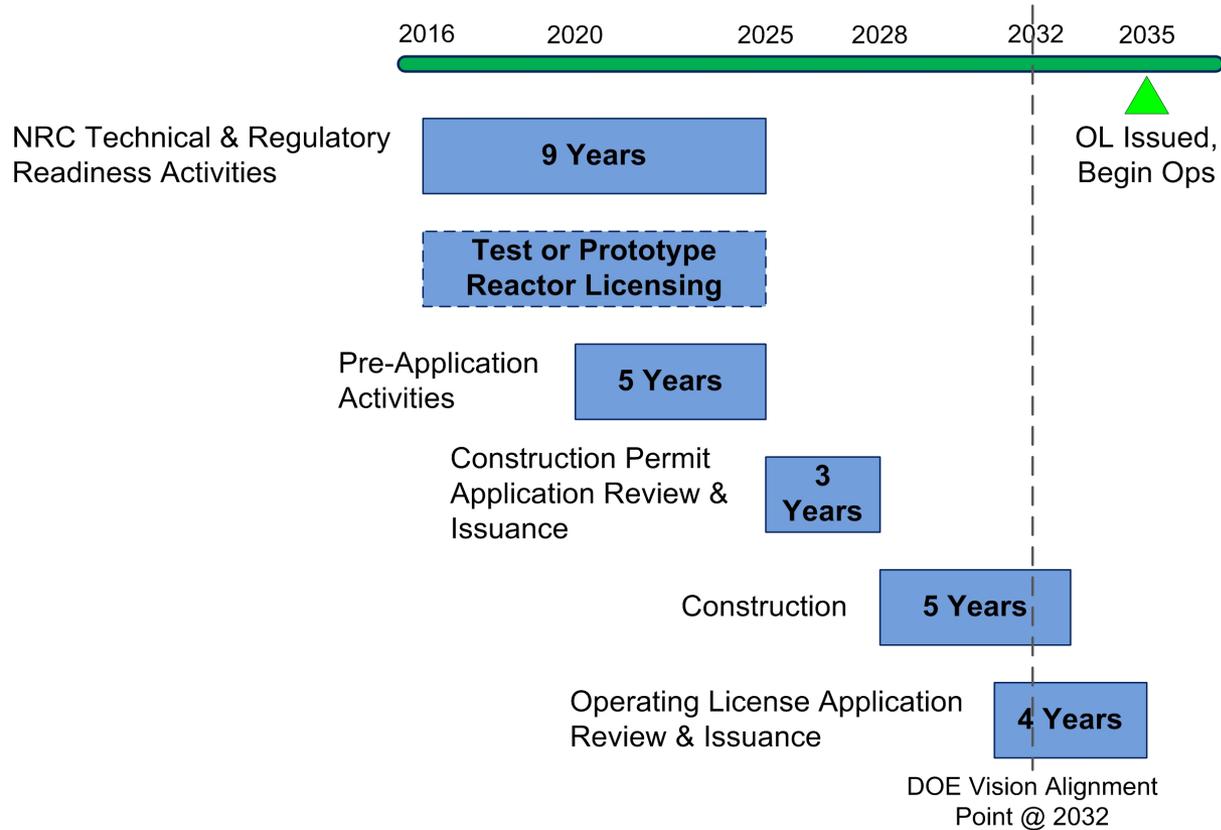
# Staged Review Process

- 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



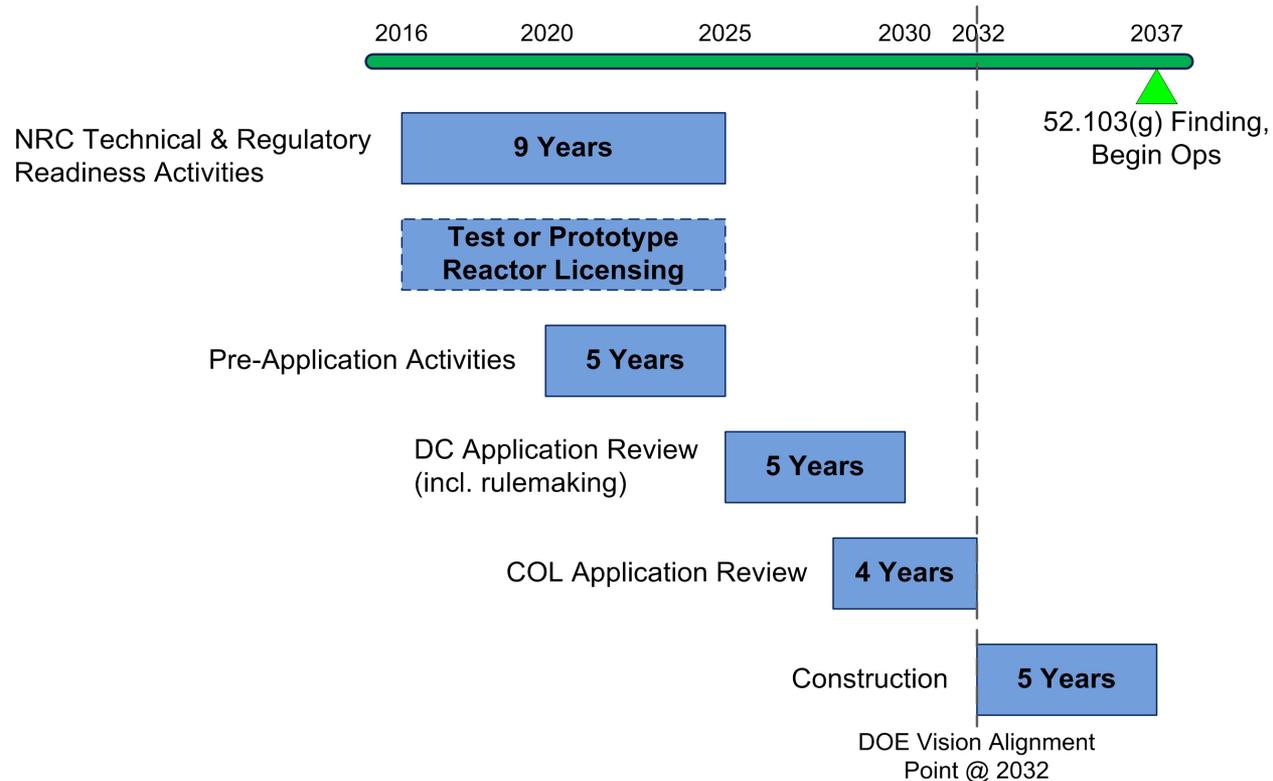
# Notional Timelines

## 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



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# 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