TVA Nuclear Overview: New Nuclear Program & Clinch River Nuclear Project

Presented by:
Brian McDermott, Director for Licensing & Planning
TVA New Nuclear Program
Briefing Agenda

• TVA Mission and Generation History
• The Context For Exploring New Nuclear - NetZero Aspirations
• Building Blocks For SMR Deployment
  • Foundations
  • Technology Evaluation
  • Regulatory Pathway
  • Site Development
  • Detailed Planning
Tennessee Valley Authority

- TVA is a federal corporation
- Largest public utility in the US, with the third largest nuclear fleet
- TVA currently receives **NO** funding from the US Government.
- TVA created in 1933 by Congress as part of President Franklin D. Roosevelt’s New Deal

TVA’s Unique Mission: To make life better for the people of the Tennessee Valley through the integrated management of the region’s resources.
TVA’s SMR Journey and Path Forward For Clinch River Site

2014 – 2019
Site Development
- Finished site characterization, engineering and analysis
- NRC Early Site Permit (ESP) approved
- Siting and emergency preparedness risk reduction
- Total cost approximately $55M

2019 – 2020
Technology Evaluation
- Screened and evaluated LWR and non-LWR designs
- LWR designs ready for demonstration
- Non-LWR designs hold promise, need further development
- Partnerships necessary to reduce cost and risk

2021 – 2025
Detailed Planning Phase
- Detailed planning and licensing for an SMR at Clinch River Site
- Identify and characterize additional sites
- Monitor Advanced Reactors Supply chain development
- Workforce development

2026 - 2031
Initial Unit Construction*
- First construction project at Clinch River
- Active lessons learned incorporation
- Plan for optimizing subsequent deployments
- Early licensing for additional sites

2032 - 2039
Optimize For Fleet Deployments*
- Multiple SMR units at multiple sites
- Optimized licensing and construction processes
- Driving to quickly reach Nth-of-a-Kind cost
- Specific number of units driven by Resource Planning

2040 - 2050
Deployments To Reach Net Zero*
- Multiple coordinated deployment projects
- Timing sequenced to maximize efficiency
- Specific number of units driven by Resource Planning

*Subject to future TVA Board Decisions and all Environmental Reviews
Foundations - Direction and Authorization
Board Authorization required to proceed beyond Decision Gate (DG) for each phase. Enterprise evaluation criteria to support recommendation to the CEO and Board.

**Phase 1**
- Planning Begins (~2 years)
  - Design
  - Licensing
  - Estimating

**Phase 2**
- Project Begins (~2 years)
  - Obtain Permit
  - Finalize Design
  - Construction Planning

**Phase 3**
- Construction Begins (~5 years)
  - Obtain License
  - Build
  - Test
  - Transfer to Operations

Potential Off-Ramp or Timing Delay
# Technology Evaluation - Timing and Needs Dependent

<table>
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<tr>
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<th>Light Water SMRs</th>
<th>Non-Light Water Reactors (sodium, gas, salt coolants)</th>
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<tr>
<td><strong>Nuclear Fuel</strong></td>
<td>Same as operating nuclear fleet</td>
<td>Need enrichment, supply chain, testing, and licensing</td>
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<tr>
<td><strong>Supply Chain</strong></td>
<td>Ready; quickly scalable</td>
<td>Need suppliers and component testing</td>
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<tr>
<td><strong>Operational Characteristics</strong></td>
<td>High availability; compatible with renewables</td>
<td>Unproven availability; compatible with renewables; industrial process heat capable</td>
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Technologies and their potential for commercial scale deployment were assessed:

- ✓ The right product (size, electricity production, economics)
- ✓ The right amount of risk (technology, availability, project size)
- ✓ The right team (team strength and vision alignment)
- ✓ The right risk allocation (team roles, contracts, partnerships)
Technical Evaluation - Perspectives on SMR Readiness
Regulatory Pathway

Part 50 Licensing
- Siting Study
- Site Characterization
- Preliminary Reactor Design
- Construction Permit Application
- Environmental Report
- Final Reactor Design
- Operating License Application

Part 52 Licensing
- Siting Study
- Site Characterization
- Certified Reactor Design
- Early Site Permit Application
- Environmental Report
- Combined Operating License Application
Site Development

- Comprehensive Siting Study
  - Available Information
- Site Characterization and Data Collection
  - Physical Investigations and Studies
- Environmental Reviews
- Preliminary Safety Analysis

In the US, site development and work to obtain an NRC Construction Permit for an SMR are estimated to take about half of the deployment timeline (for a first deployment on a greenfield).
Detailed Planning

- Completing Siting Study and Site Characterization in advance can reduce timeline
- Use of retired fossil plant sites can reduce the duration of Site Characterization work
- Timeline for licensing nuclear depends on the status of the design approval
- Construction phase of deployment is the most costly, start at the right time
- Incorporate lessons learned from prior nuclear projects

![Detailed Planning Timeline](image)
Detailed Planning - It’s More Than Just Construction

ISSUES BEYOND PHYSICAL CONSTRUCTION CAN IMPACT PROJECT SUCCESS

- Government Outreach
- Community Engagement and Support
- Emergency Preparedness
- Workforce Planning
- Local Infrastructure
TVA Moving Forward With Clarity On What’s Needed For New Nuclear

✓ TVA’s Pathway to Net Zero requires technology innovation
✓ TVA’s Clinch River Site is approved for SMR demonstrations
✓ TVA’s New Nuclear Program will inform future SMR decisions
✓ TVA’s Decision Gates will ensure the timing is right