

DRIVE TO DEPLOY ATF WITH INCREASED ENRICHMENT AND HIGHER BURNUP

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Industry Strategic Aspirations



- Develop and deploy fuel technologies that enhance accident tolerance and provide operational resiliency while enabling sustained economic performance through minimizing cost and improving efficiency
- Safely and economically enable 24-month cycle operation for the entire fleet of existing light water reactors (burnups up to ~75 GWd/MTU)
- Achieve fuel licensing infrastructure to support burnup and enrichment extensions (LEU+) beyond legacy limits in the mid-2020s
- Commercialization and economies of scale of these advanced fuel technologies through sustainable volumes to meet the domestic and global demand

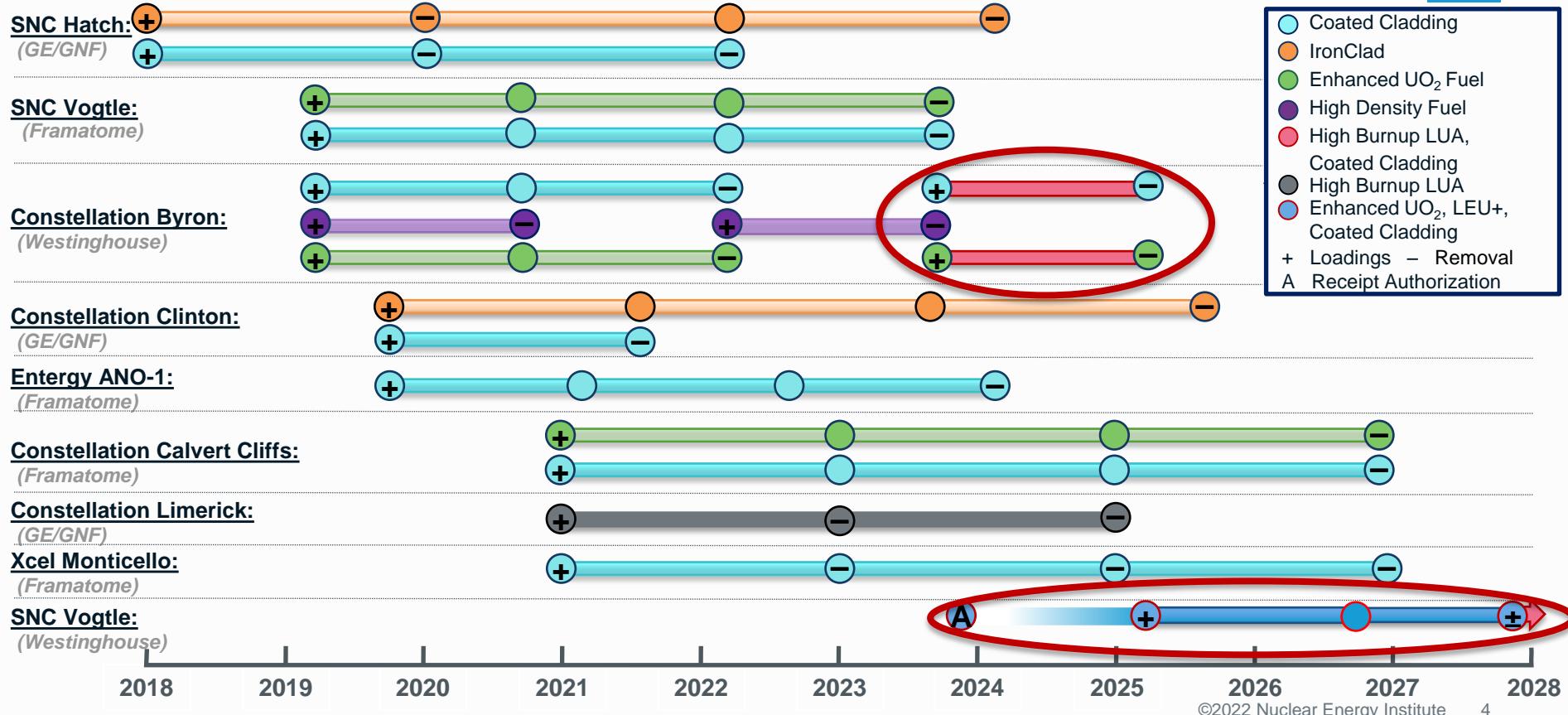
Key Accomplishments

- NRC SECY-21-0109 Increased Enrichment Rulemaking Plan
- Constellation ATF/Traditional Zr HBU LTA LAR approval
- Southern ATF with LEU+ LTA LAR approval
- Framatome Approval for LEU+ Codes and Methods
- Westinghouse ATF ADOPT Topical Approval
- Westinghouse Topical Submittal to 68 GWd/MTU
- Idaho Shipping Moratorium Lifted – Byron Rods
- NRC Commission Meeting: Overview of ATF Activities
- NRC CoC issued for Orano DN30-X (USA/9388/AF-96)
- Publication of NEI-19-01 Rev. 1 and Futures Survey Report
- EPRI HBU & SFP Inventory Management Study and ALS Fee Waiver Request



Key U.S. ATF/LEU+/HBU Commercial Testing

- Coated Cladding
- IronClad
- Enhanced UO₂ Fuel
- High Density Fuel
- High Burnup LUA, Coated Cladding
- High Burnup LUA
- Enhanced UO₂, LEU+, Coated Cladding
- + Loadings – Removal
- Receipt Authorization



Industry ATF Test Sample Shipment

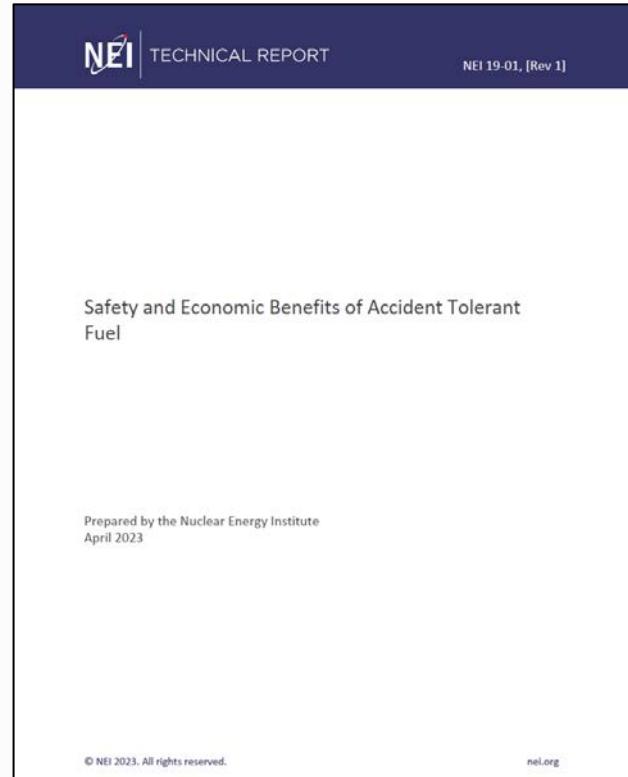


Quarter Shipped	Reactor Site	Vendor	Shipping Container	Lab Destination	ATF Materials
Q4 2020	SNC Hatch	GNF	GE 2000	ORNL	ARMOR / IronClad
Q1 2024	Constellation Clinton	GNF	NAC-LWT	ORNL	IronClad Zircaloy-2
Q2 2021	Constellation Byron	Westinghouse	NAC-LWT	ORNL	ADOPT/Coated Cladding High Burnup AXIOM and Zirlo
Q4 2023	Constellation Byron	Westinghouse	NAC-LWT	ORNL	ADOPT/Coated Cladding High Burnup AXIOM and Zirlo
Q4 2025	Constellation Byron	Westinghouse	NAC-LWT	INL / ORNL	High Burnup ADOPT/Coated Cladding
Q4 2028	SNC Vogtle	Westinghouse	NAC-LWT	INL / ORNL	High Burnup ADOPT/Coated Cladding/LEU+
TBD	Xcel Energy Monticello	Framatome	TBD	PNNL	Coated Cladding
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2026	Constellation Clinton	GNF	NAC-LWT	ORNL	IronClad
2026	Constellation Limerick	GNF	NAC	ORNL	Zircaloy-2 High Burnup
TBD	Constellation Calvert Cliffs	Framatome	NAC-LWT	INL / PNNL	Coated Cladding (EOL) Cr-Enhanced Pellets
TBD	Xcel Energy Monticello	Framatome	TBD	PNNL	Coated Cladding (EOL)

Updated ATF Benefits Report



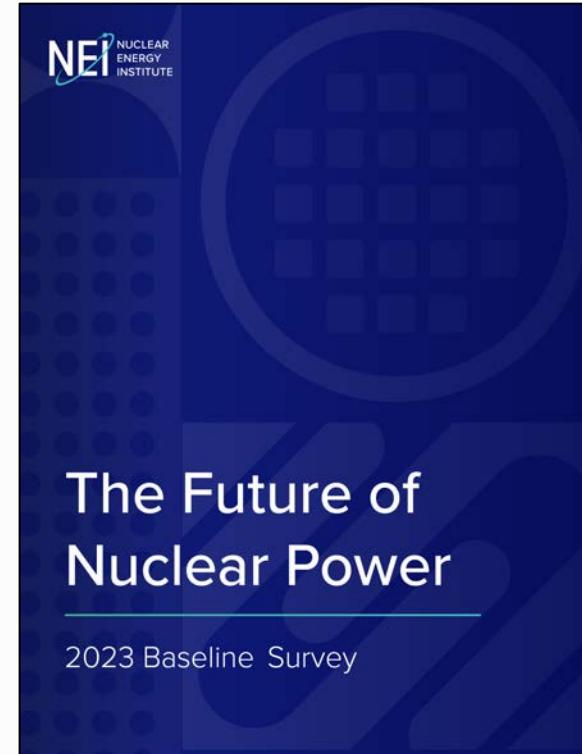
- Updated ATF Safety and Economic Benefits Report (NEI 19-01 Revision 1)
- ATF Commission Meeting: Commissioners asked questions regarding used fuel implications for ATF, LEU+, and HBU
- Added EPRI HBU & SFP study conclusions
- Added potential for expanded power uprates
- Added references found in literature
- Major conclusions from prior reports endure



Enabling Changes & Power Upgrades



- NEI surveys for planning purposes:
 - NEI report published: [Survey Link](#)
- Key takeaways:
 - **~45% of sites** have interest/planning for one or more enabling changes (ATF/LEU+, Extended Fuel Cycles, Risk-Informed LOCA) with deployment generally in 2028-30
 - **>50% of sites** have a level of interest/planning for one or more power uprates with a combined capacity **equivalent to 2 large LWRs**



Front and Back-End Considerations



- LEU+ UF₆ transportation anticipated by early 2025:
 - NRC CoC issued for Orano DN30-X (USA/9388/AF-96) on 3/27/23
 - DN30-X packaging consists of the DN30 protective structural packaging and the 30B-X uranium hexafluoride (UF₆) cylinder
 - 30B-10 cylinder (with a maximum enrichment of 10 wt.% ²³⁵U)
- EPRI HBU & SFP Inventory Management Scoping Study:
 - Increased burnup offset by increased cooling time and enrichments
 - Spent Fuel Pool (SFP) impacts appear small and manageable, occur gradually over multiple cycles
 - Total transfer and dry storage dose rates may decline

Regulatory Stability and Predictability



- Fuel licensing infrastructure updates needed to support burnup and enrichment extensions beyond legacy limits in the mid-2020s:
 - NRC Roadmap to Readiness
- Streamlined regulatory approaches that are timely to capture the safety, environmental, and economic benefits of LEU+ and HBU:
 - EPRI Alternate Licensing Strategy
- Regulatory uncertainty surrounding the radiological source terms in RG 1.183 is a major hurdle for early adoption of ATF features:
 - Revisions 1/2 are critical path to widespread adoption of ATF/LEU+/HBU