

EPRI R&D Activities

Accident Tolerant Fuel

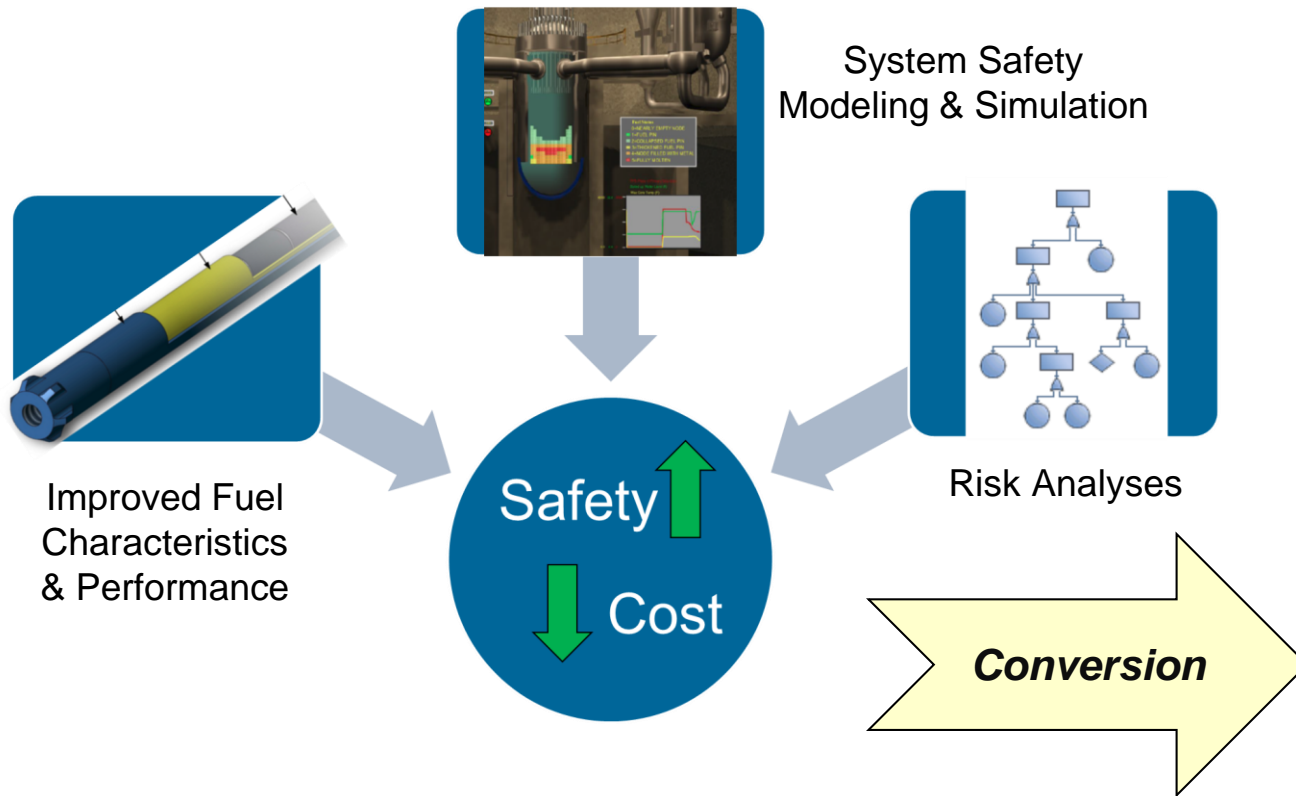
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NRC Commission Brief
April 12, 2018

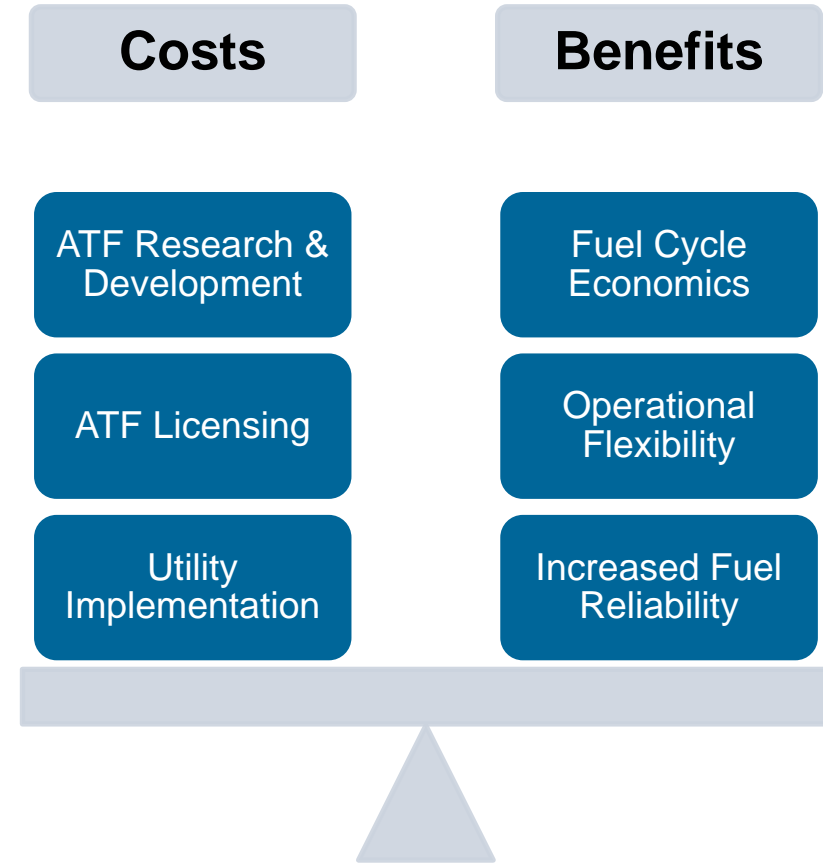


ATF Valuation 1.0: Benefit Analyses

EPRI ATF Safety Benefits Scoping Study



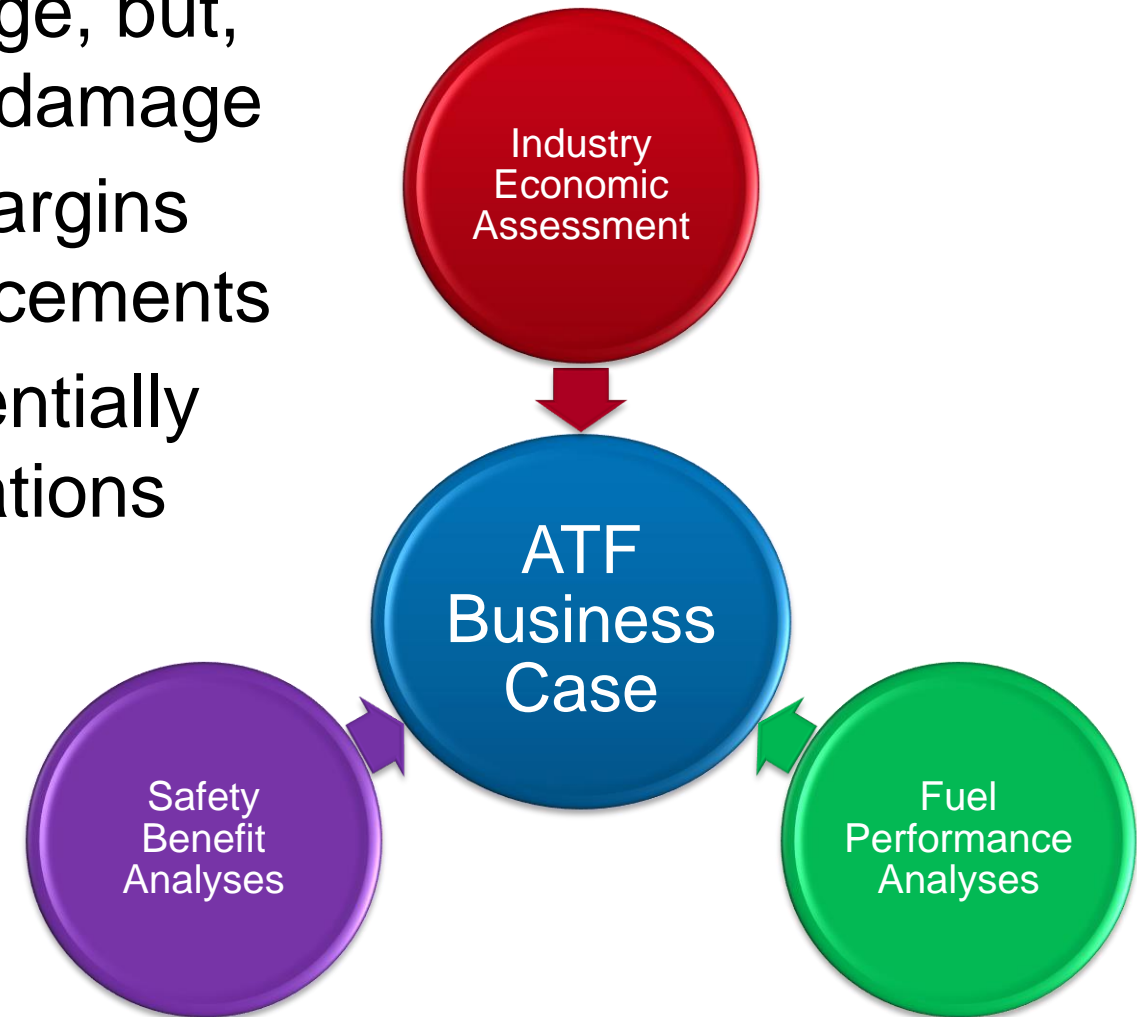
Industry ATF Business Case



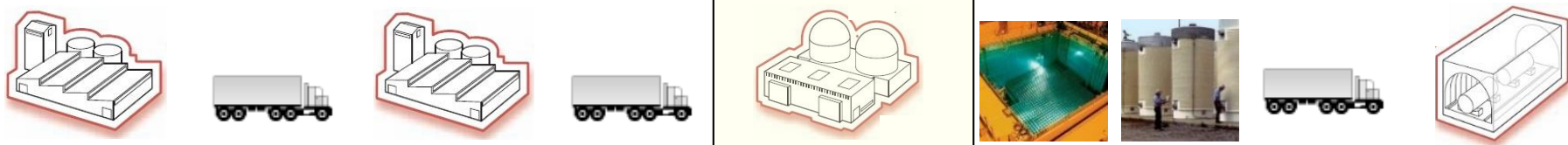
Potential Concomitant Safety and Economic Benefits of ATF

ATF Valuation 1.0: Enabling Capability & Path Forward

- BDBA cases, ATF delays core damage, but, core cooling needed to prevent core damage
- DBA/AOO cases, improved safety margins support additional operational enhancements
- ATF as an enabling capability to potentially offer greater benefits in normal operations and design basis scenarios
- ATF Valuation 2.0 opportunities for expanding benefits underway:
 - ATF combined with mitigation
 - Improved fuel reliability
 - Additional DBA/AOO cases



Holistic Technical & Regulatory Challenges

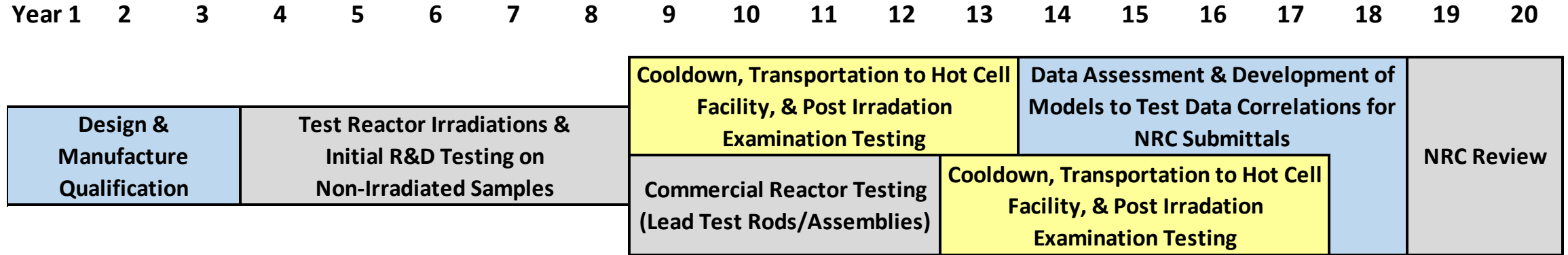


ATF Concepts	U235 Levels	Enrichment Facility	Transport	Fuel Fab Facility	Transport	Rx Performance		Spent Fuel Pool	Dry Storage	Transport	CISF/ Repository	Safety & Economic Benefits
		Part 70/73/74/76	Part 71	Part 70/73/74	Part 71	Fuel Part 50	Cladding Part 50	Part 50	Part 72	Part 71	Part 72/60/63	
Coated Zr / UO ₂	≤ 5%	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Yellow
	> 5%	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Green
Non-Zr Clad / UO ₂	≤ 5%	Green	Green	Green	Green	Green	Yellow	Green	Yellow	Green	Green	Yellow
	> 5%	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green
Non Zr / New Fuels	≤ 5%	Red	Red	Red	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Green
	> 5%	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Green

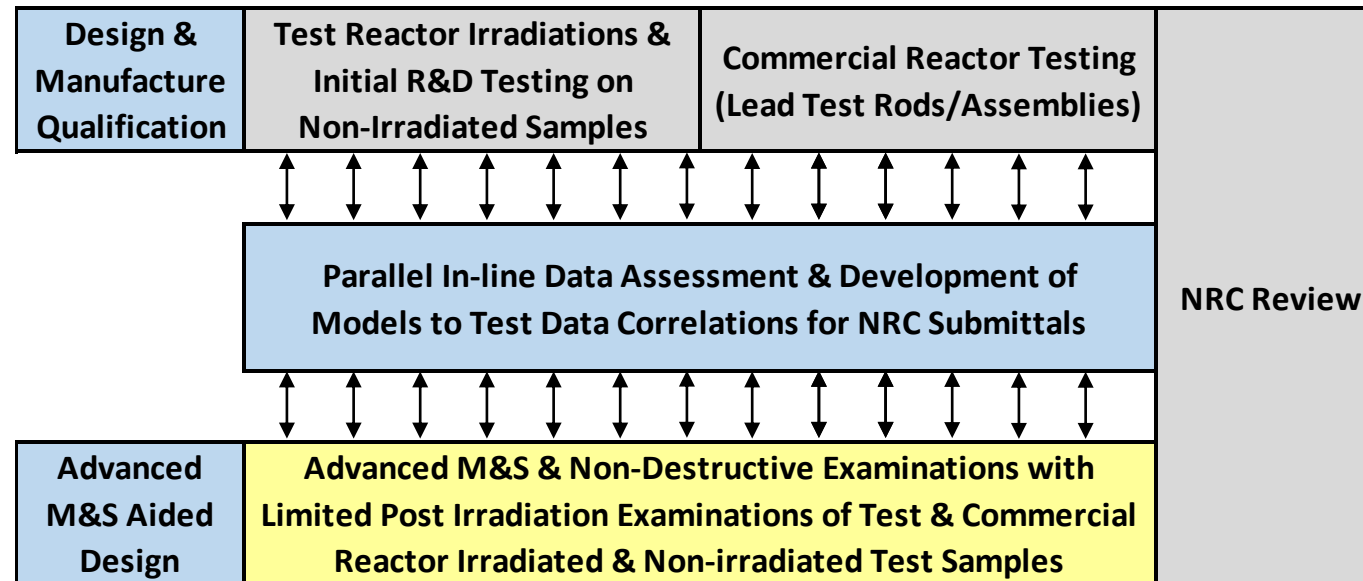
- Technical and regulatory challenges exist across entire fuel cycle
- Coatings provide safety and economic benefits sooner for full cores
- Transformative benefits with new clad/fuels longer path to full cores

Longer-Term ATF Implementation Challenge

Traditional



Parallel Approach



- Serial to parallel process
- Potential opportunities to accelerate data collection and model development with Advanced M&S & NDE

Gap Analyses: Identify & Prioritize Key ATF R&D

- Gap analyses using the Phenomena Identification & Ranking Table (PIRT):
 - Facilitate R&D decisions by leveraging global resources to identify, prioritize, and target R&D gaps to accelerate ATF implementation
 - Cooperative gap analyses with key ATF stakeholders to reduce duplication of effort
- Issue resolution report:
 - Prioritized plan to address gaps from PIRTs
 - Identify innovative data collection and/or advanced M&S approaches to accelerate ATF implementation timeframes



Summary

- ATF Valuation 1.0 completed:
 - “...the work completed by the task force does illustrate the potential for economic benefits to utilities resulting from the deployment of ATF.”
- ATF Valuation 2.0 underway:
 - Examining additional opportunities for safety and economic benefits
- PIRT Gap Analyses:
 - Identify technical/regulatory gaps, areas of synergy, and common opportunities for research collaboration to reduce duplication
- Advanced M&S and NDE could be leveraged for longer-term ATF concepts as tools for both regulators and industry



Together...Shaping the Future of Electricity