General Atomics Electromagnetic Systems

General Atomics-EMS Reactor Development Overview

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Presented To: **Nuclear Regulatory Commission**

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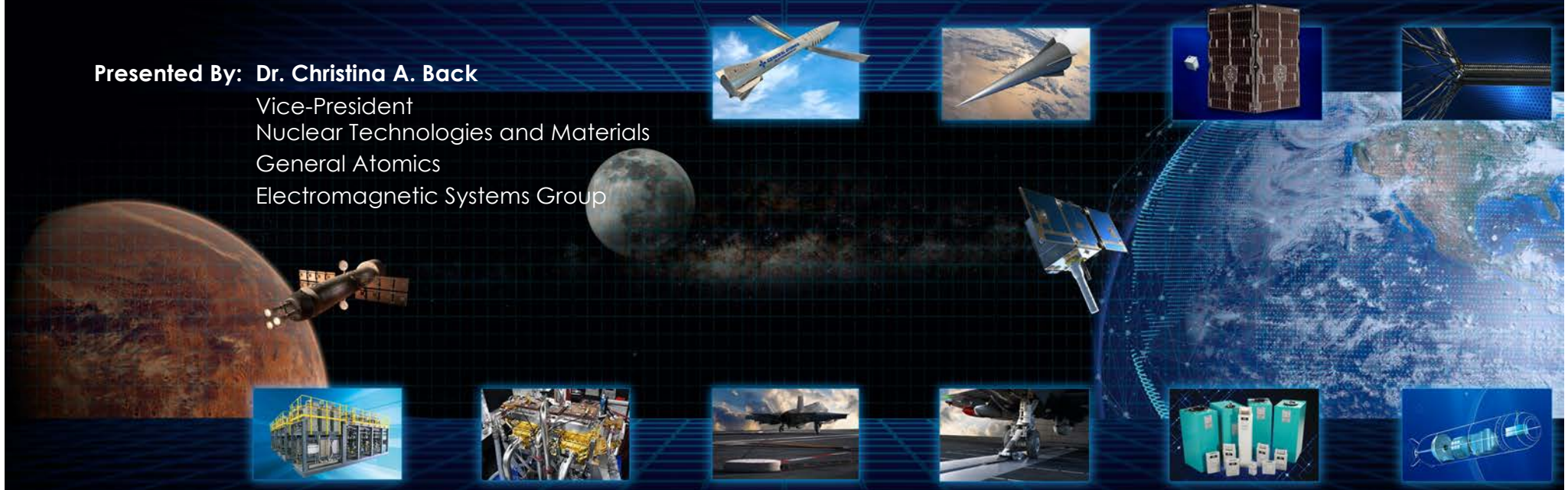

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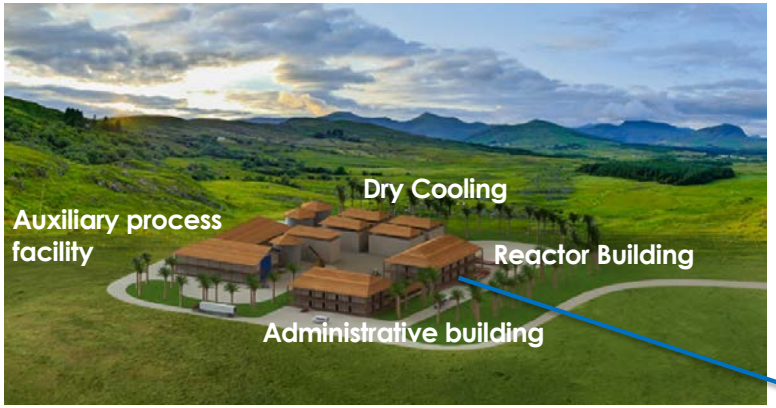
Fast Modular Reactor (FMR) Concept



Thermal power	100 MW
Electric output	44 MW
Coolant	Helium
System pressure	7 MPa
System temperature	509 - 800 °C

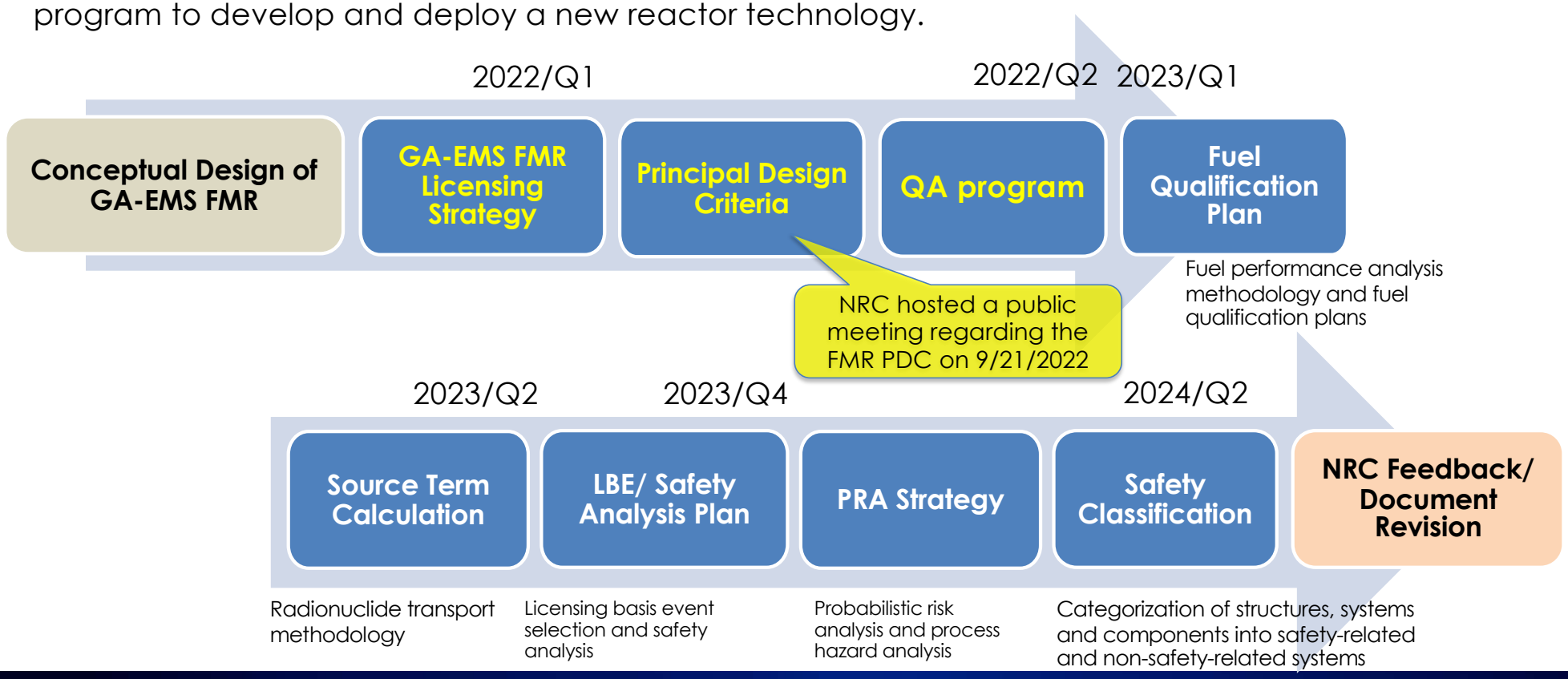
Reactor Type

- ***Gas-cooled Fast Reactor (GFR)***
- ***High-Temperature Reactor (HTR)***
- ***Small Modular Reactor (SMR)***

The community-friendly, safe, and distributed resource for the 2035 US Market

FMR Pre-application Regulatory Engagement Plan

A Regulatory Engagement Plan (REP) is encouraged by the NRC as an early step in the overall program to develop and deploy a new reactor technology.

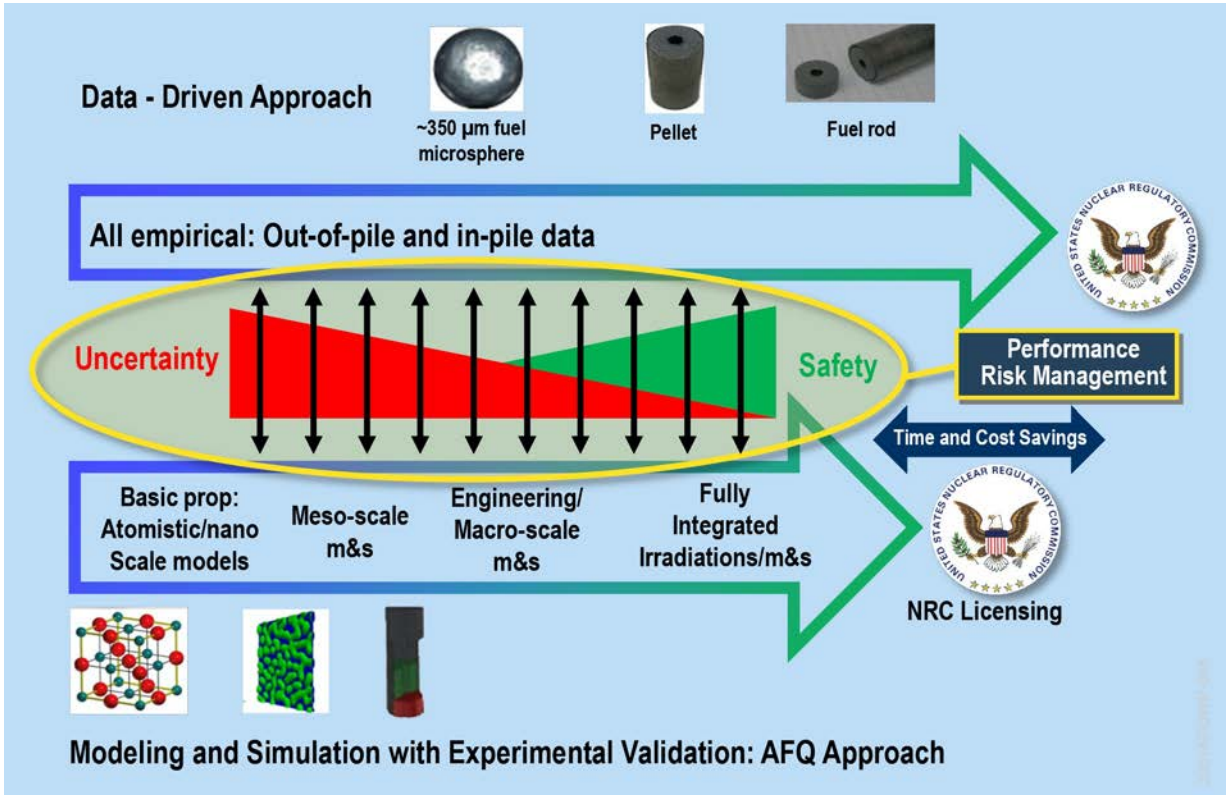


Accelerated Fuel Qualification (AFQ): Methodology to Reduce Time and Cost to Qualify New Fuels

- **Brings together modeling and simulation with targeted experiments**
- **Emphasis on physics-based modeling and simulation versus use of empirical fits**
- **Use of integral as well as separate effects and accelerated experiments**

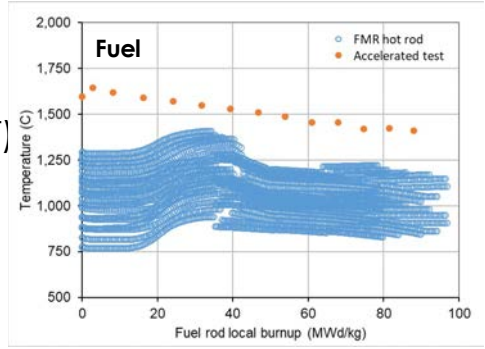
K. A. Terrani, N. A. Capps, M. J. Kerr, C. A. Back, A. T. Nelson, B. D. Wirth, S. L. Hayes, C. R. Stanek,
JNM 539, 152267, 2020

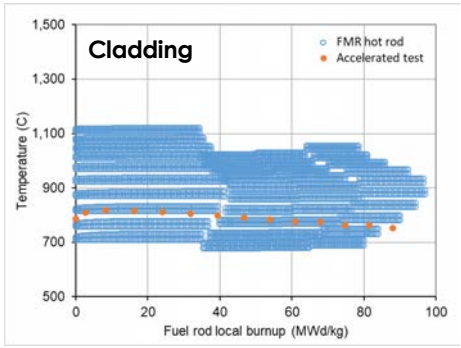
C. Drzewiecki, J. Schmidt, C. VanWert, P. Clifford, ***NUREG 2246, 2022***
Fuel Qualification for Advanced Reactors

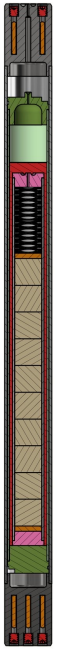


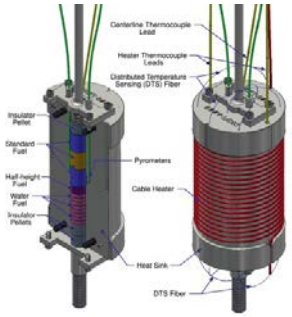
Fast Modular Reactor (FMR) Fuel Test Plan

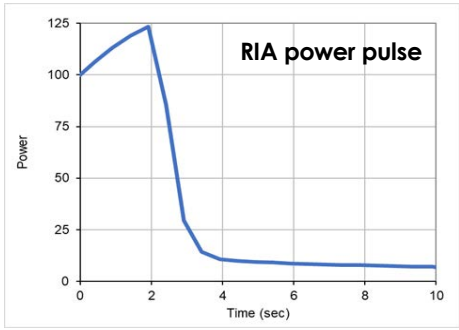
- **Accelerated testing** for long lifetime fuels: Advanced Test Reactor (ATR) high-burnup irradiation tests
  - Fission accelerated steady-state testing (FAST) approach with irradiation system for high-throughput acquisition (ISHA) capsule to accelerate the irradiation in compact-size rodlets
- **Separate effects test:** Transient Reactor Test (TREAT) facility transient tests
  - Reactivity-initiated accident (RIA) power pulse test in a modified version of the dry in-pile fracture test (DRIFT) capsule
- **Sub-integral test** to bound fuel failure criteria: In-pile tests to component properties
  - Confirm the hermeticity, pellet-cladding mechanical interaction to inform FMR design











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