TRISO-X Overview
RadWaste Summit 2025

Gary L. Bell, Ph.D.
Vice President

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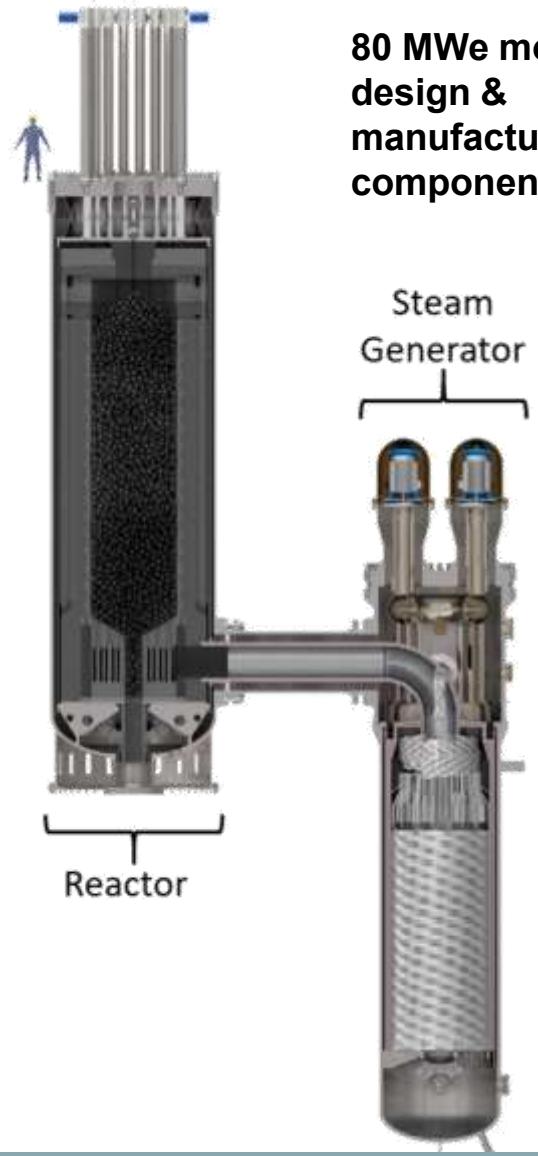
energy

Intrinsic Safety: Simple Design



80 MWe modular design & manufactured components

Xe-100 does not require active systems or operator actions to ensure safety. All safety functions are intrinsic to the design.

Current-generation LWR reactors require many active safety systems—operator action, water pumps, back-up electric power, etc.—to prevent the reactor from melting down.

The Xe-100 Advantage

- Uncomplicated layout utilizing natural features to ensure safety. No need for complex safety systems.
- More automated operations and fewer personnel.
- Turbine generator can be air- or water-cooled—affording geographic siting flexibility.
- The low reactor power density and self-regulating core design (i.e., if cooling stops, the core shuts down), ensures the reactor is always ‘walk-away safe.’
- Much smaller site footprint and operational impact to surrounding area.
- Allows us to revolutionize the way turnkey nuclear reactor solutions are delivered.
- Reduced cost of upfront engineering and licensing effort.
- Higher certainty on construction cost and timelines equates to lower risk.
- 4 modules optimized for the ‘sweet-spot’ size—320 MWe with load-following capabilities similar to a natural-gas plant.

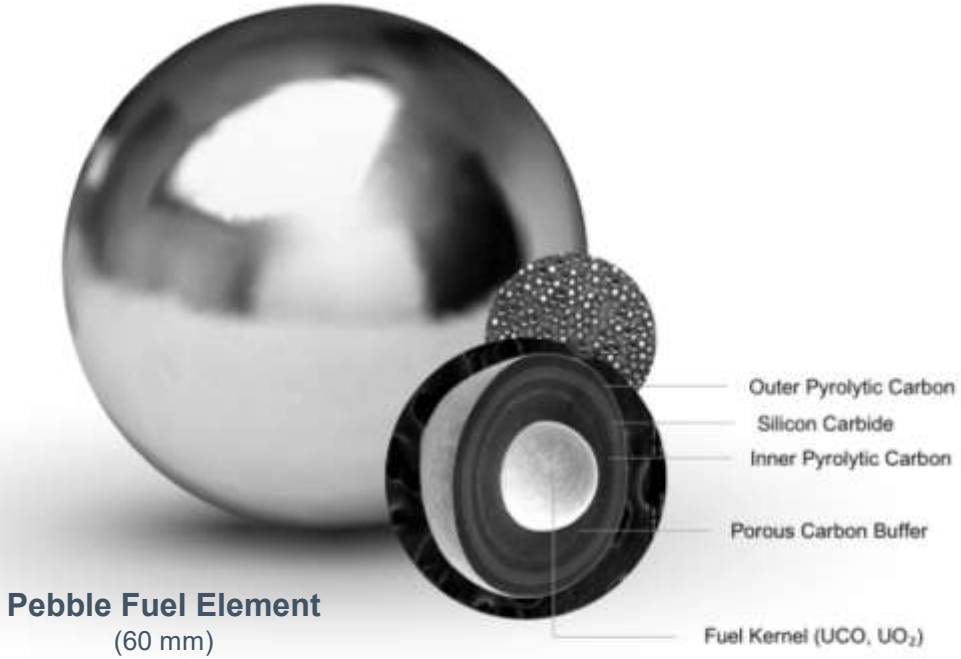
→ Allows Xe-100 to be co-located with Industrial user

Digital rendering of a Xe-100 4-pack (320MWe)

North America's First Nuclear-Powered Industrial Site

The Dow Chemical Company, UCC Seadrift Operations, Seadrift, Texas

Intrinsic Safety: Tri-structural Isotropic (TRISO) Fuel



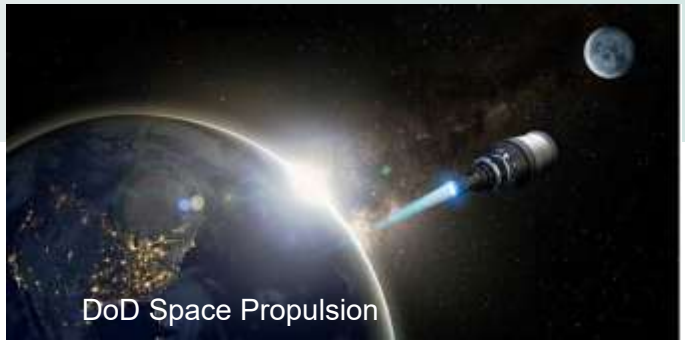
Pebble Fuel Element
(60 mm)

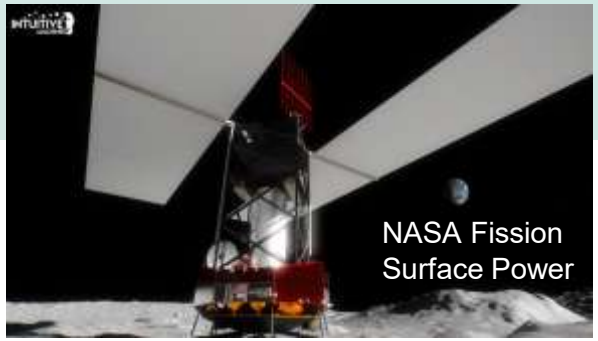
TRISO Fuel particle
(≈1 mm)

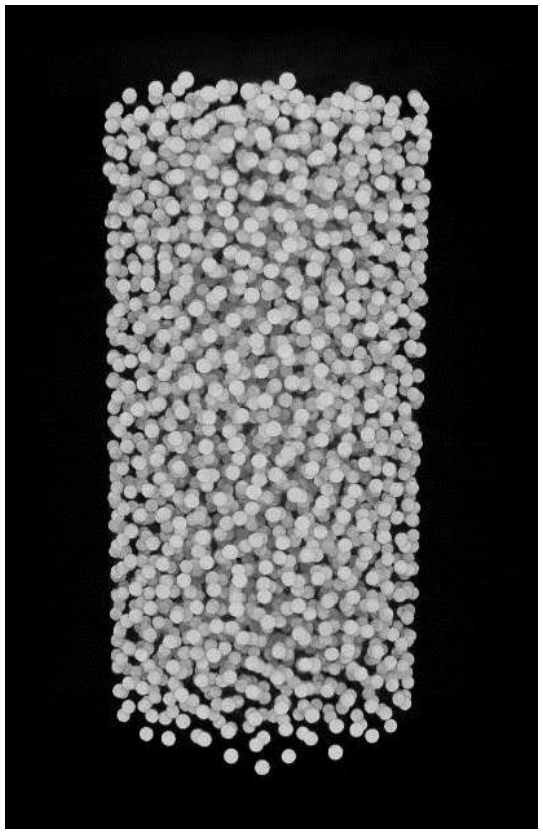
- **TRISO-X manufactures TRISO encapsulated fuel** to ensure supply of high-quality advanced reactor fuel. TRISO fuel has a 60+ year demonstrated track record through prototype and full-scale reactors
- HALEU-based fuel like TRISO increases burnup and efficiency, which decreases costs
- Because **TRISO Fuel IS a containment vessel and is designed not to melt**, the Xe-100 does not require large, expensive concrete & steel containment structures
- The low reactor power density and self-regulating core design means that if cooling stops, the core naturally shuts down. This **prevents the reactor from melting under foreseeable adverse conditions and requires no operator actions under such adverse conditions**
- **Physics, not mechanical systems, ensures safety**

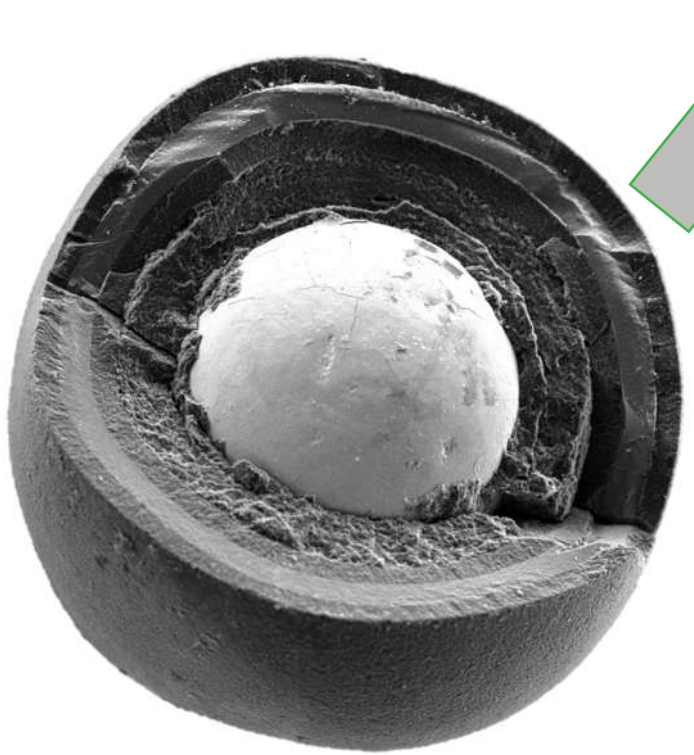
The Department of Energy describes TRISO fuel as "the most robust nuclear fuel on Earth"
It retains waste and fission products within the fuel during all foreseeable adverse conditions, even worst-case accidents, and it is designed not to melt

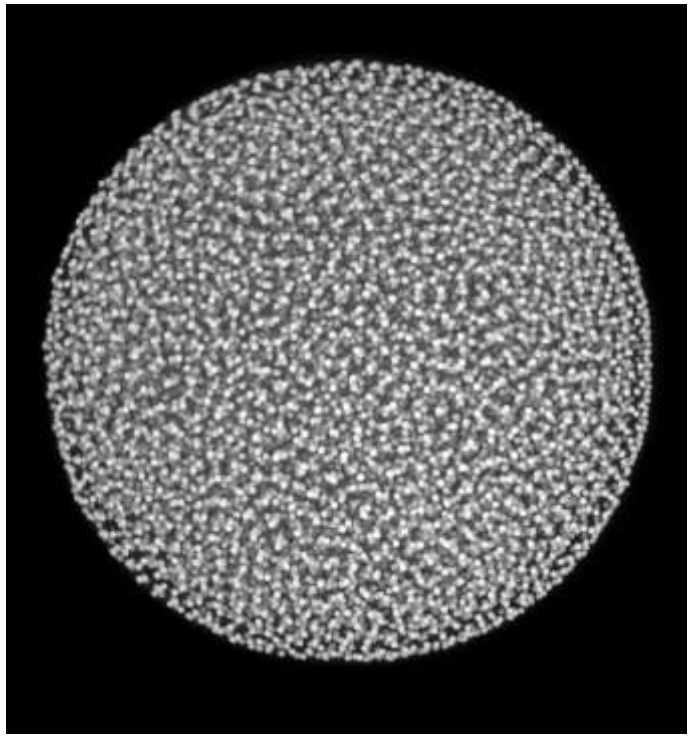
Cross-cutting Nature of Encapsulated Fuel





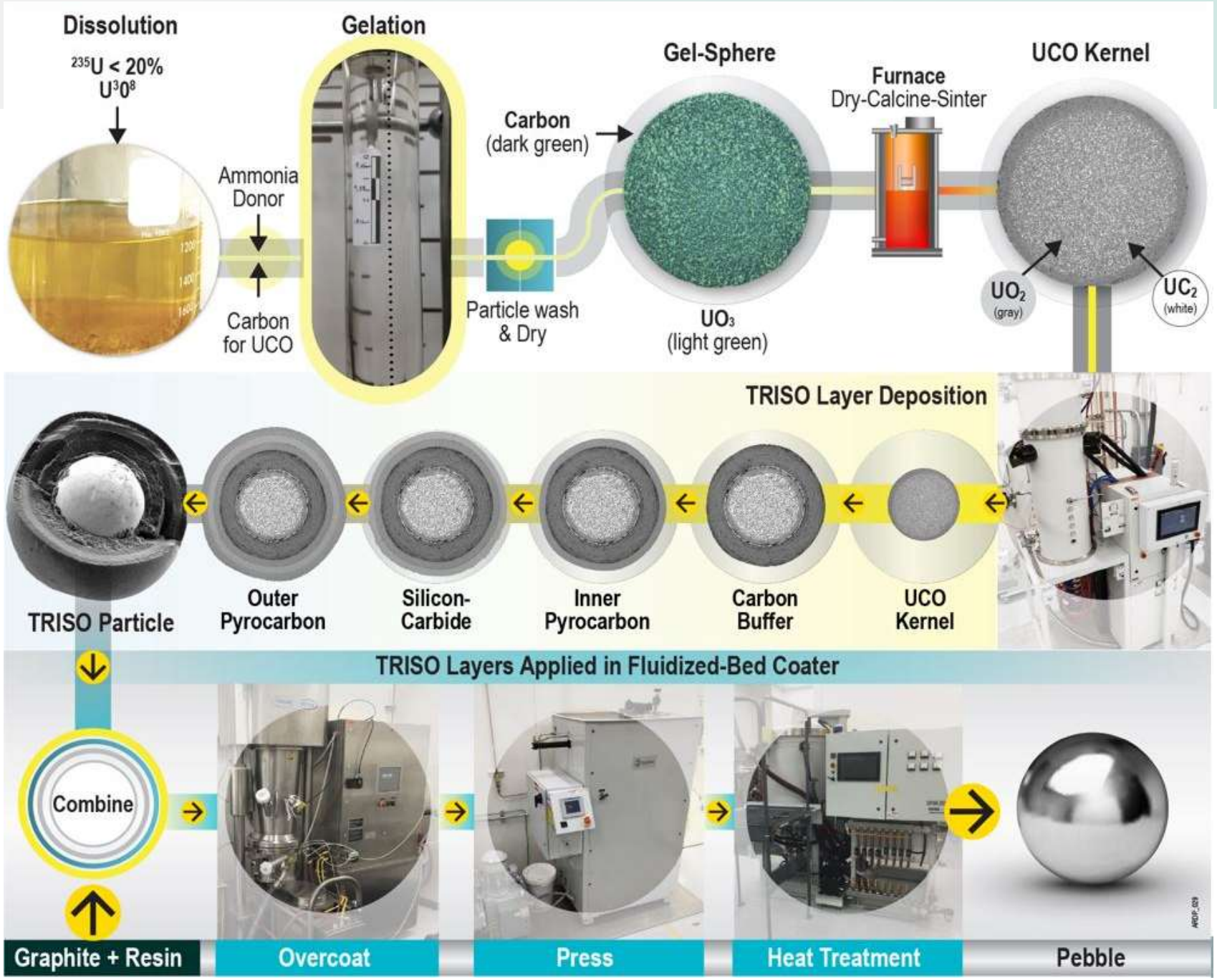






TRISO Coated Particles Support Multiple Reactor or Propulsion Designs

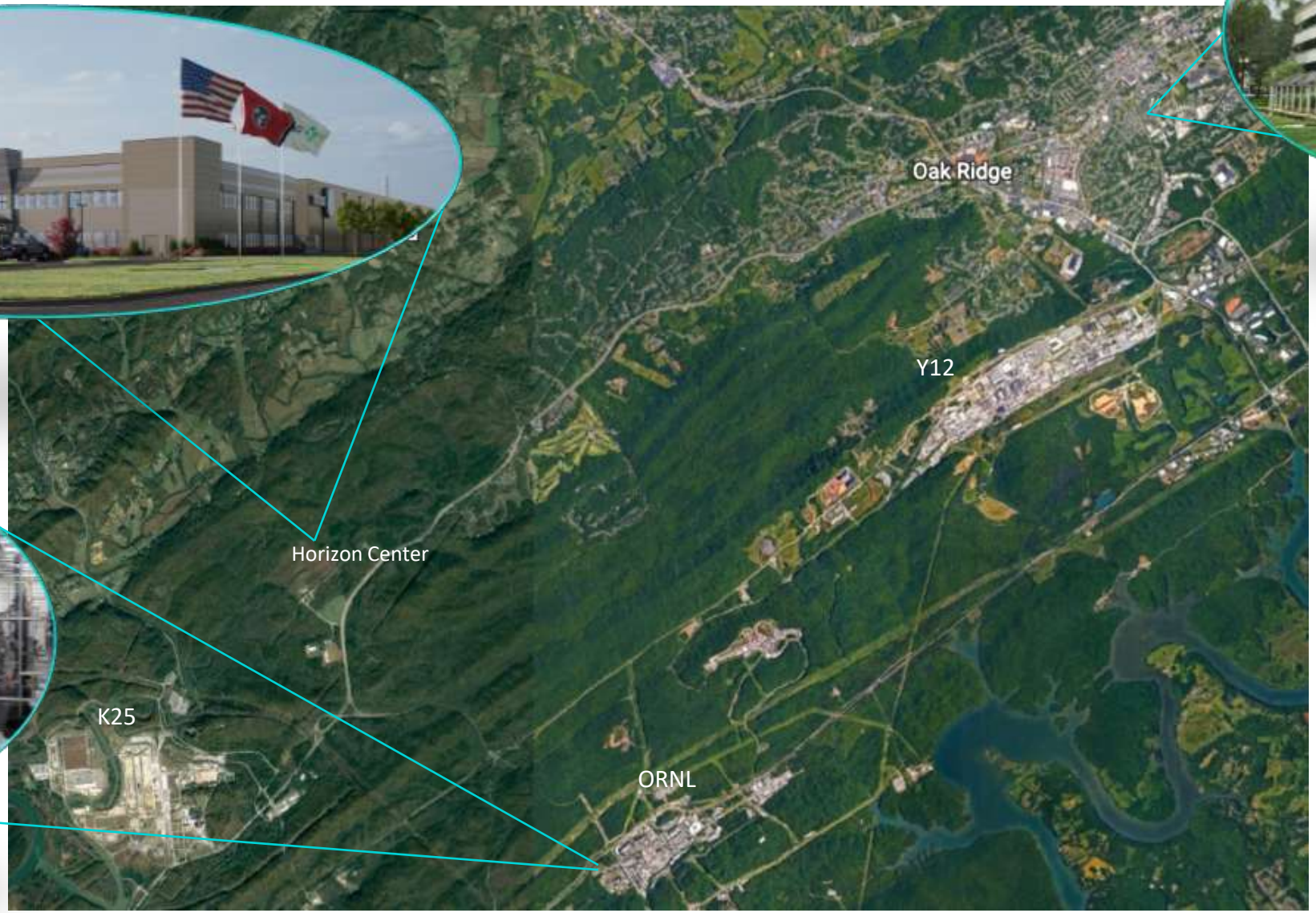
TRISO Fuel Fabrication



TRISO-X, Oak Ridge, Tennessee

TRISO-X Fuel Fabrication Campus
Horizon Center

TRISO-X Pilot Facility at Oak Ridge National Laboratory



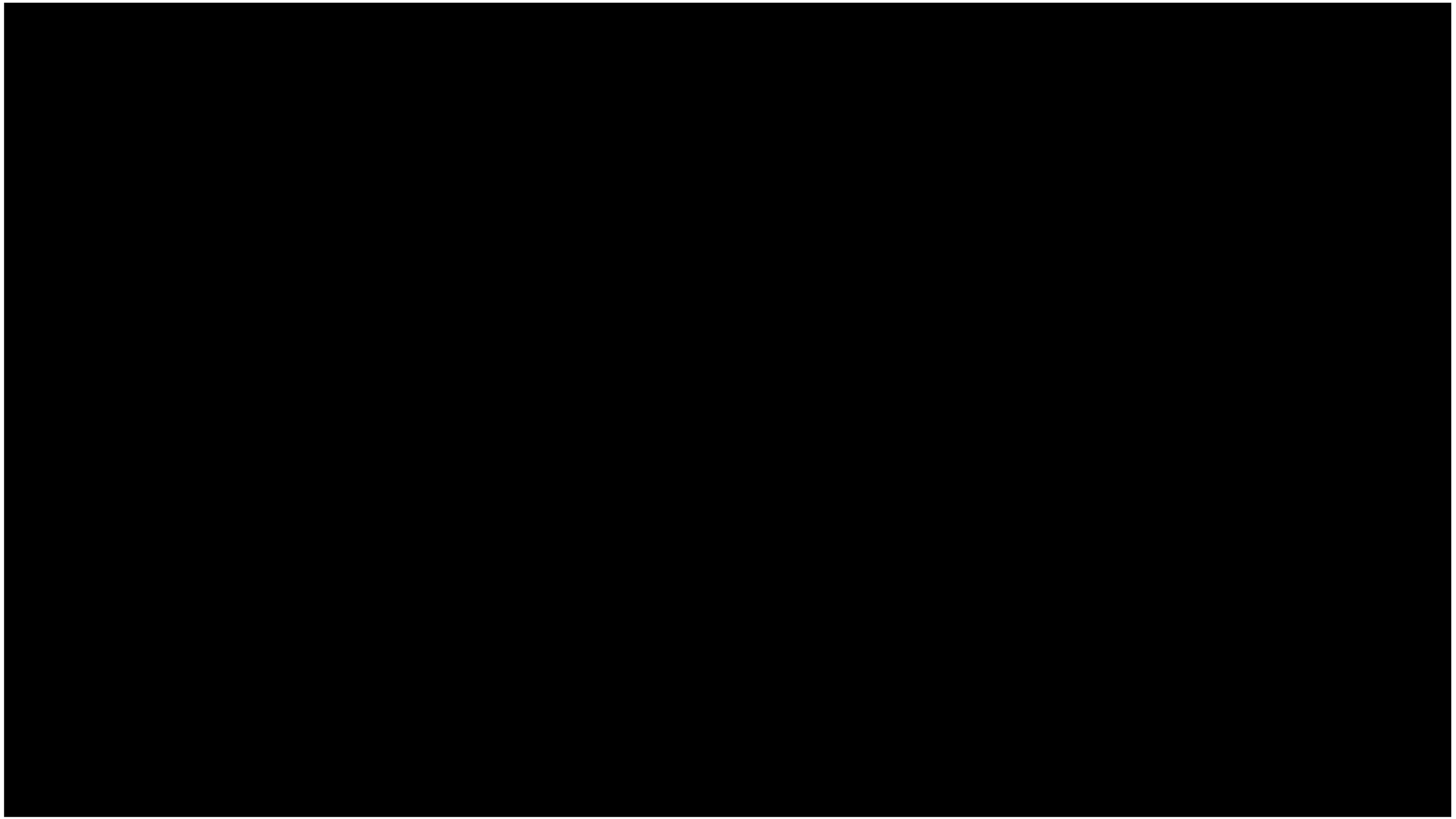
TRISO-X Corporate Office
151 Lafayette Dr

TX-1 Facility Overview

- 5 MTU/yr, 715,000 pebbles/yr (~1957 pebbles/day)
- 80% equipment utilization
- Footprint: 350 ft x 560 ft
- 214,812 sq. ft. total
- 110 Acres at the Horizon Center Industrial Park in Oak Ridge, Tennessee
- 1.6M pebble storage capacity
- Supports ~11 Xe-100s operating at steady state
- Projected staff count: 463
- Power In: 12.5 MW
- Baseline 1st pebble: 12/6/27

TX-1 is being developed in partnership with the DOE Office of Nuclear Energy under it's Advanced Reactor Demonstration Program

TRISO-X, Oak Ridge, Tennessee



TRISO-X License Application Review

NRC Review Project Status Summary

19 Technical Focus Areas

Meetings (Jan 2023 – May 2025)	Documents Submitted to NRC	Requests for Additional Information (RAIs)	Pages of RAI responses
107	7 (1640 pages)	145	450+

https://www.nrc.gov/info-finder/fc/triso-x/project-status.html

TRISO Waste Handling

- We aim to Reduce and Recycle to the maximum extent economically feasible.
- All waste generated in the Radiologically Controlled Area will be disposed of as either mixed waste or low-level radioactive waste.
- We will not perform waste processing activities. We will:
  - Employ waste compaction of dry active waste.
  - Solidify liquid waste with an absorbent material.
  - Use a waste broker to coordinate waste shipments to off-site disposal facilities.
- TX-1 is to be a Zero Liquid Discharge facility.
  - Liquid waste will be solidified with absorbent material for off-site burial.
  - The one exception is for mixed waste generated in the Quality Control Lab (e.g., mercury porosimeter, density columns, and materialographic mounts) that will require off-site processing.
- The expectation is that our waste will leave the facility in either 55-gallon drums or B-25 boxes.
- When we have sufficient operational data, we plan to get our waste classified under the Tennessee Bulk Survey for Release (BSFR) Program. We expect to secure operational data for 6 – 24 months to provide objective evidence to enable disposal under the BSFR Program.

TRISO

TX-1 & Future TX-2

Additional information

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X-energy: at a glance

Background

- Advanced modular reactor and fuel designer/ manufacturer
- Founded in 2009 by space + energy industrialist Kam Ghaffarian
- 15 years of investment and development in pebble-bed, high temperature gas reactor technology
- >400 Employees Including 40+ PhDs and 40+ Masters in Engineering / Science. Up to 1000 people working on first project

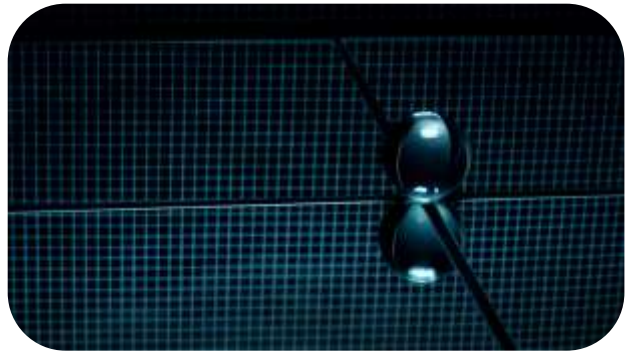
Locations

- HQ in Rockville, Maryland, USA
- Offices in Birchwood Park, Warrington, UK and Toronto, Canada
- Commercial fuel fabrication plant under construction in Oak Ridge, Tennessee
- Xe-100 projects in Texas and Washington State

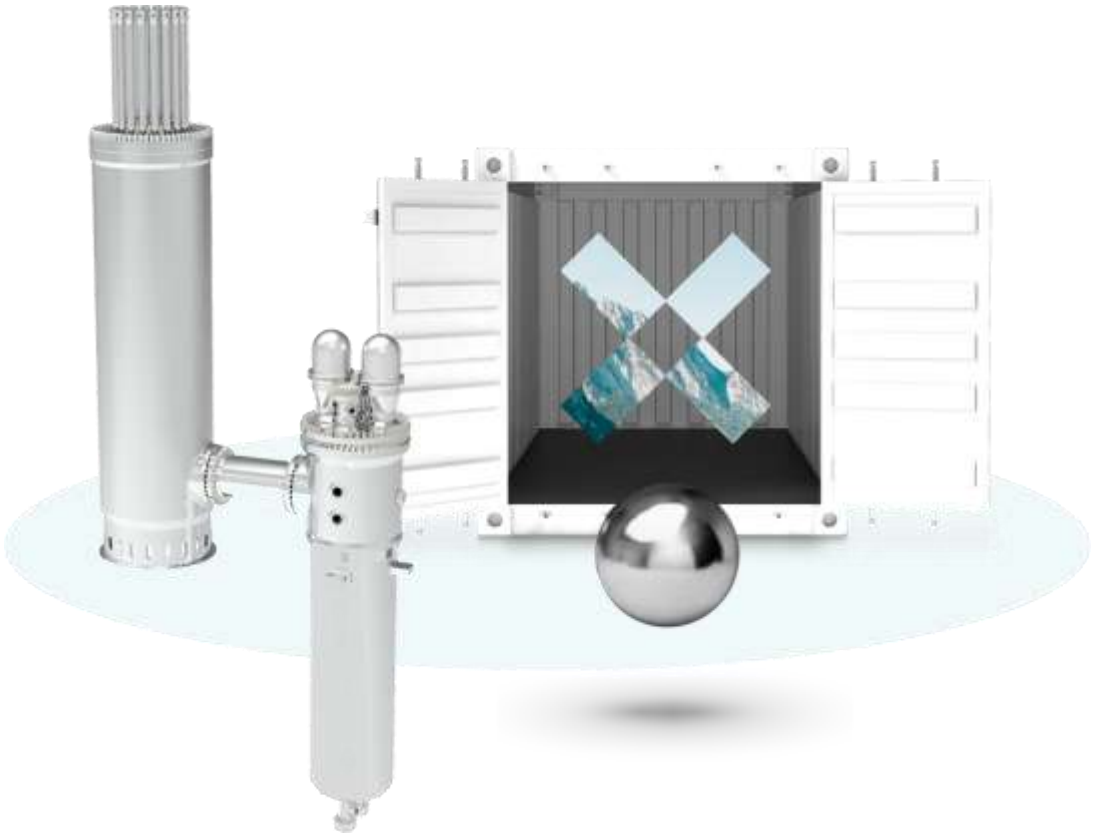
Funding

- $1.2bn Federal Funding (Advanced Reactor Development Program, including fuel)
- $1.1bn private investment to date
- Plus $150m additional tax credit funding for fuel manufacture






We Design & Build Reactors and the Fuel That Powers Them



Reactor: Xe-100

We're focused on Gen-IV High-Temperature Gas-cooled Reactors (HTGR) as the technology of choice, with advantages in sustainability, economics, reliability and safety.

Reactor: Xe-Mobile

To address the need for ground, sea and air transportable small power production. We've developed reactor concepts with potential civilian government, remote community and critical infrastructure applications.

Fuel: TRISO-X

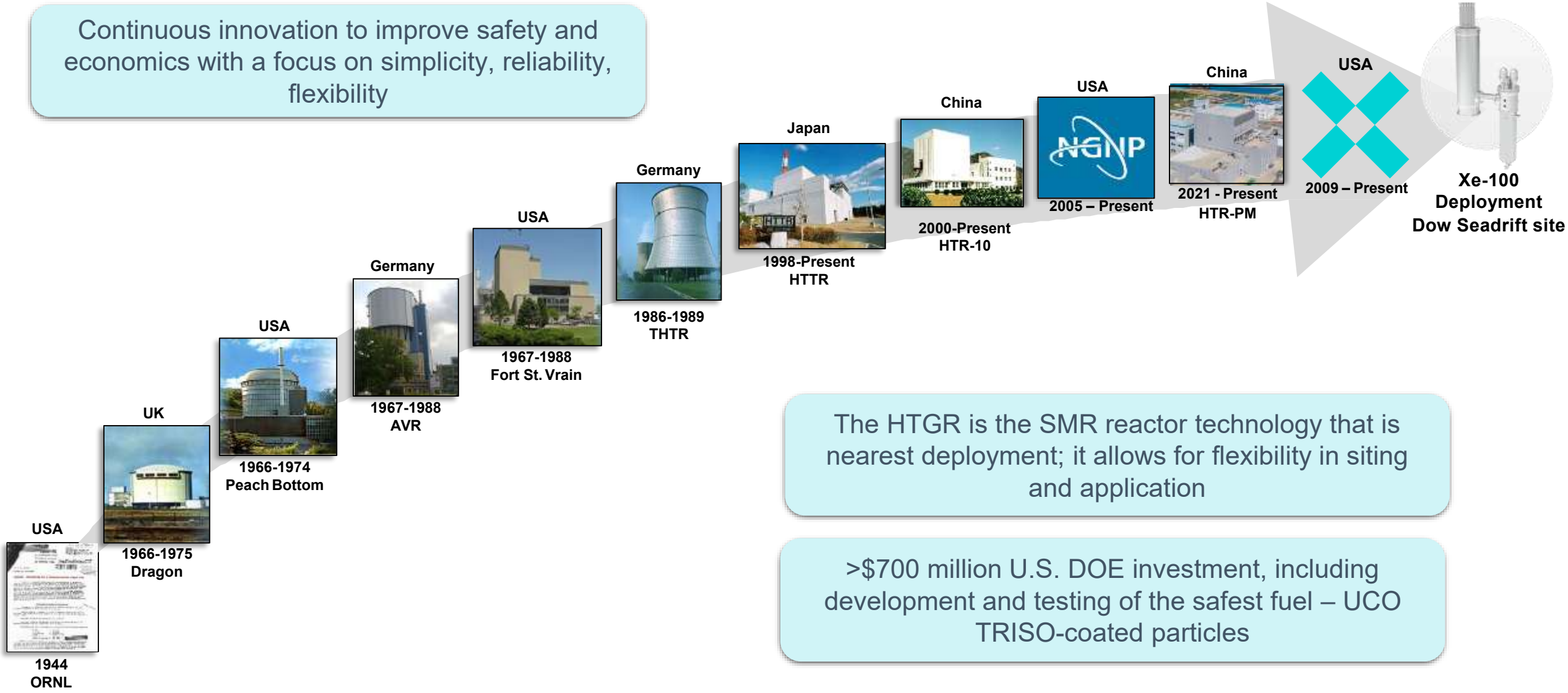
Our reactors use tri-structural isotropic (TRISO) particle fuel, developed and improved over 60 years. TRISO-X is a wholly owned subsidiary of X-energy. The mission of TRISO-X is to ensure supply of high-quality fuel to meet advanced reactor needs.

Space Applications

NASA, DOE, and DOD are exploring our technology and fuel for nuclear thermal propulsion and fission power for the lunar surface.

HTGRs Leverage Proven Technology with Novel Flexibility

Continuous innovation to improve safety and economics with a focus on simplicity, reliability, flexibility



The HTGR is the SMR reactor technology that is nearest deployment; it allows for flexibility in siting and application

>$700 million U.S. DOE investment, including development and testing of the safest fuel – UCO TRISO-coated particles

Construction Progress

Construction Progress

November 11, 2025

May 6, 2025

ARDP First Application of Advanced Reactor to Industrial Sector

DOE's Advanced Reactor Development Program ("ARDP") is a critical advantage for U.S. Nuclear Leadership

ARDP Overview

1. **Construct and Operate the First of a Kind commercial scale 4-unit nuclear power plant at a Dow Chemical site at Seadrift, Texas**

2. **Construct a commercial scale, NRC Cat egory 2 TRISO Fuel Fabrication Facility to support the newly constructed NPP and to validate a First-of-a-Kind market-ready supply chain**

The program provides 50% cost share on all costs to deliver the first plant

Our ARDP Project With Dow

Dow Seadrift Operations Project

4-reactor Xe-100 Plant (320MWe)

What ARDP Selection Means to X-energy

✓ **DOE recognition as an advanced reactor technology of choice**

- Selected out of ~50 applicants

✓ **Secures first customer deployment**

- Partnered with Dow Chemical to deploy the first advanced small modular nuclear reactor at an industrial site
  - Will use steam and electricity
- Customer also benefits from 50% cost-share on their development and construction costs

✓ **Provides $1.2 billion in funding from the DOE**

- Fully funds all remaining design, licensing, and commercialization milestones of the reactor, including overnight CAPEX
- Funds the completion of the first TRISO-X fuel fabrication facility

✓ **Strengthens DOE's support of the advancement of TRISO fuel**

- ARDP funds the first TRISO fuel commercial manufacturing facility
- Exemplifies the DOE's commitment to scaling TRISO fuel production in the U.S.