




# Kairos Power

## Company Overview

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2022



Kairos Power's mission is to enable the world's transition to clean energy, with the ultimate goal of dramatically improving people's quality of life while protecting the environment.

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In order to achieve this mission, we must prioritize our efforts to focus on a clean energy technology that is *affordable* and *safe*.

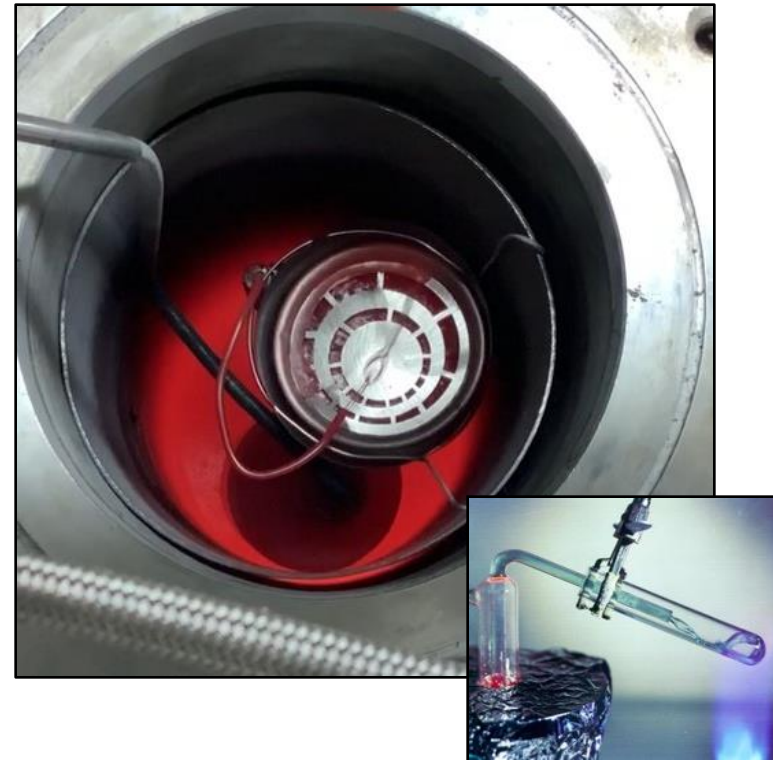
# Fluoride Salt-Cooled High-Temperature Reactor Technology Basis

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Coated Particle Fuel  
**TRISO**



Liquid Fluoride Salt Coolant  
**Flibe (2LiF-BeF<sub>2</sub>)**





# Overview of Kairos Power

- Nuclear energy engineering, design, and manufacturing company *singularly focused* on the commercialization of the fluoride salt-cooled high-temperature reactor (FHR)
  - Founded in 2016
  - Current Staffing
    - 280 Employees
    - ~90% Engineering Staff
- Private funding commitment to engineering design and licensing program and physical demonstration through nuclear and non-nuclear technology development program
- Schedule driven by US demonstration by 2030 (*or earlier*) and rapid deployment ramp in 2030s
- Cost targets set to be competitive with natural gas in the US electricity market

Kairos Power Headquarters



Kairos Power Team



# Kairos Power Locations



**HQ / R-Lab / S-Lab**  
Alameda, CA



**T-Facility / Engineering Test Unit**  
**Production Development Facility**  
Albuquerque, NM




**Molten Salt Pilot Plant**  
Elmore, OH

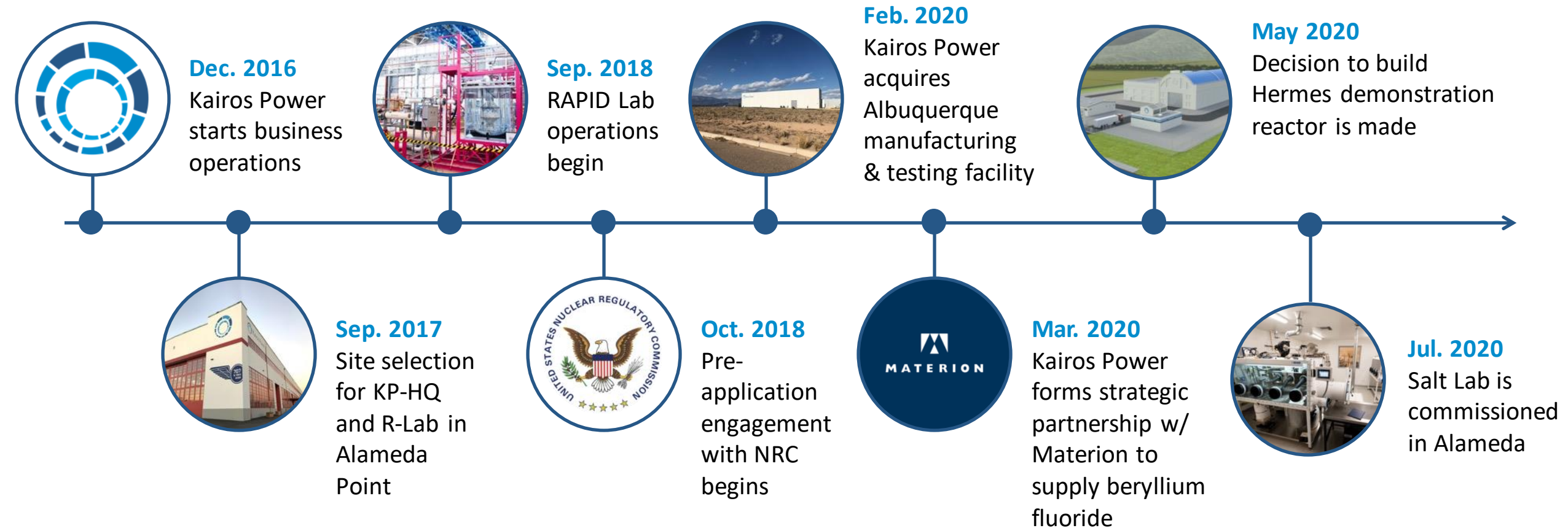
**Hermes Reactor**  
Oak Ridge, TN



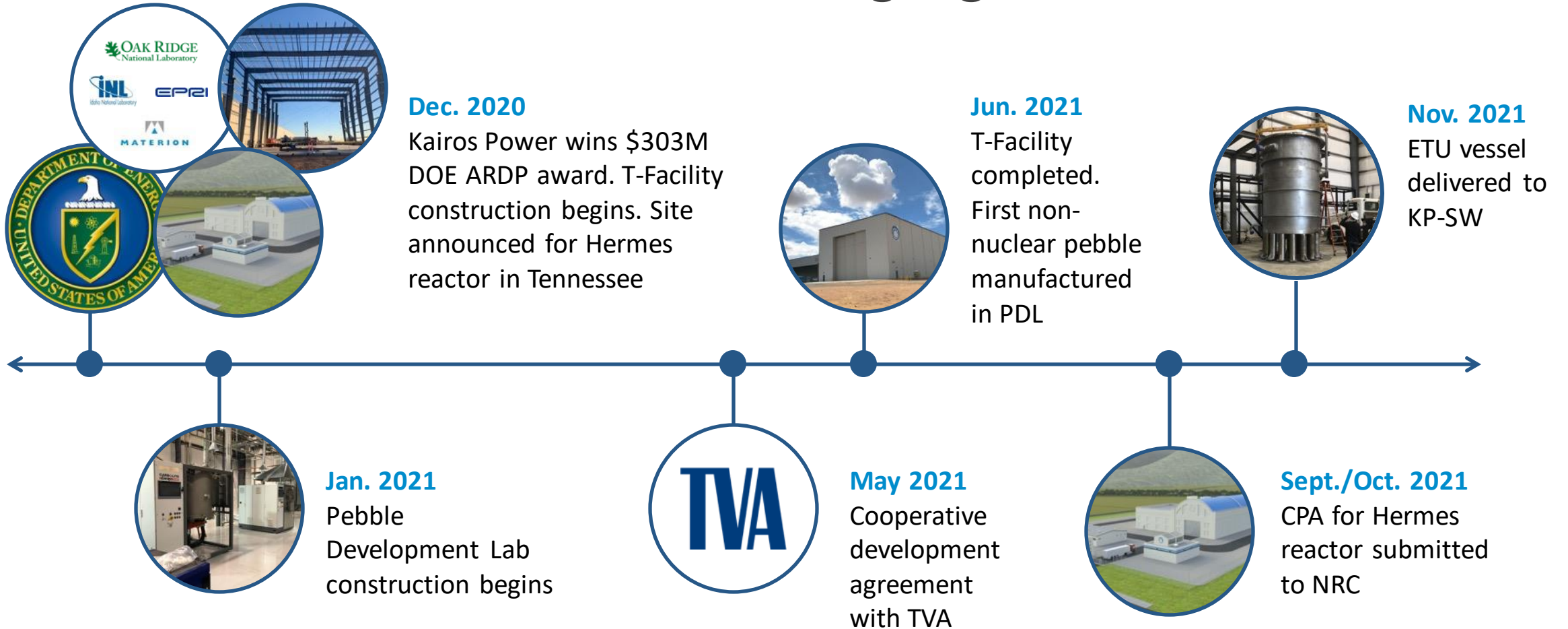
**Licensing Office**  
Charlotte, NC

-  Kairos Power Facilities
  - **RAPID Lab**
  - **Salt Lab**
  - **Testing Facility**

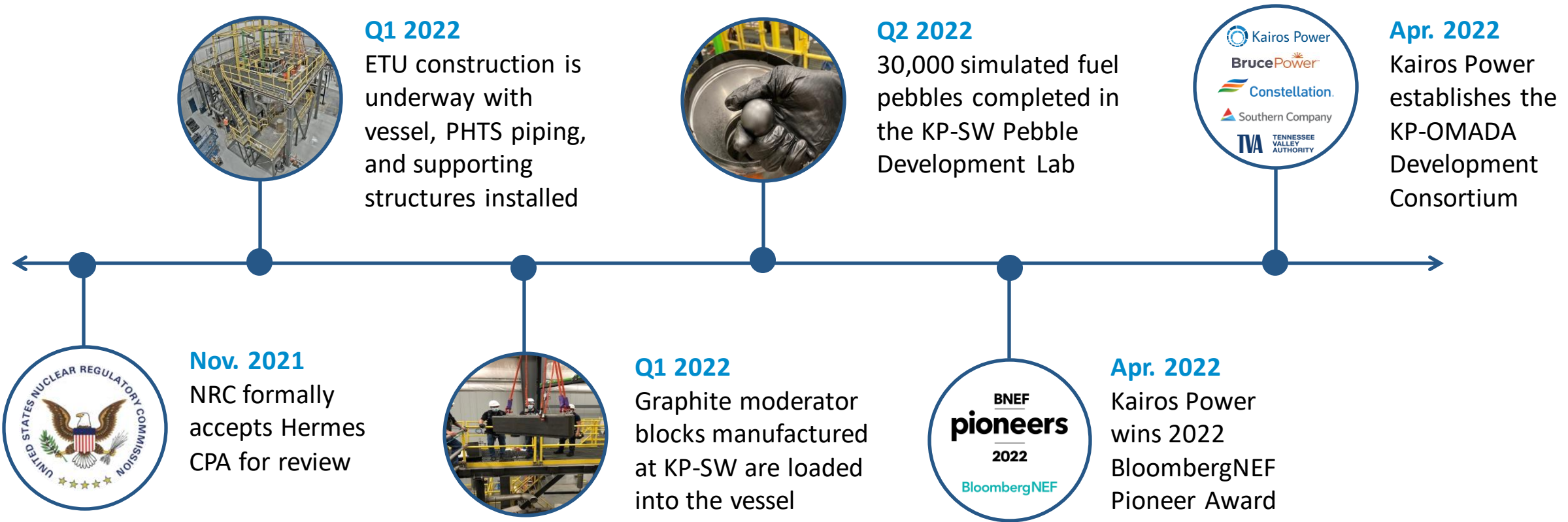
# Kairos Power Highlights



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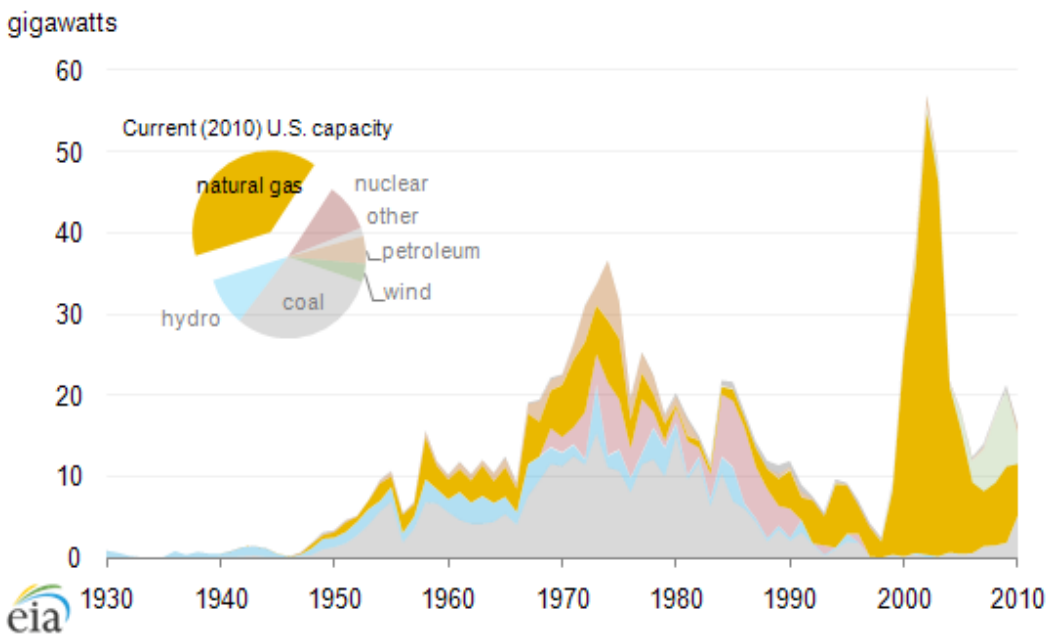
# Kairos Power Highlights



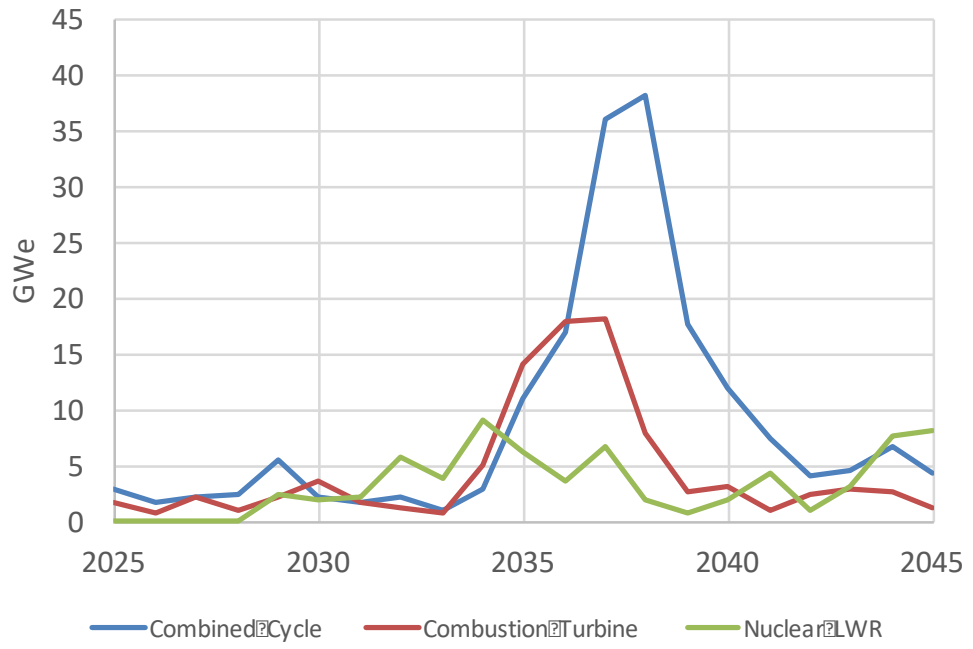


# kai·ros (def.): the right or opportune moment

U.S. Electricity Generation by Initial Year of Operation and Fuel Type



Annual U.S. Generation Retirements



# Kairos Power is Uniquely Suited to Supply the **Nuclear Technology** to Replace U.S. Natural Gas Capacity

- **Robust Inherent Safety**

- Uniquely large *fuel temperature margins*
- Absorption of fission products in primary coolant
- Low-pressure system
- Effective passive decay heat removal

- **Lower Capital Costs**

- Reduce requirements for high-cost, nuclear-grade components and *structures* through FHR intrinsic safety and plant architecture
- Leverage conventional materials, existing industrial equipment, and conventional fabrication and construction methods

## Technology Basis

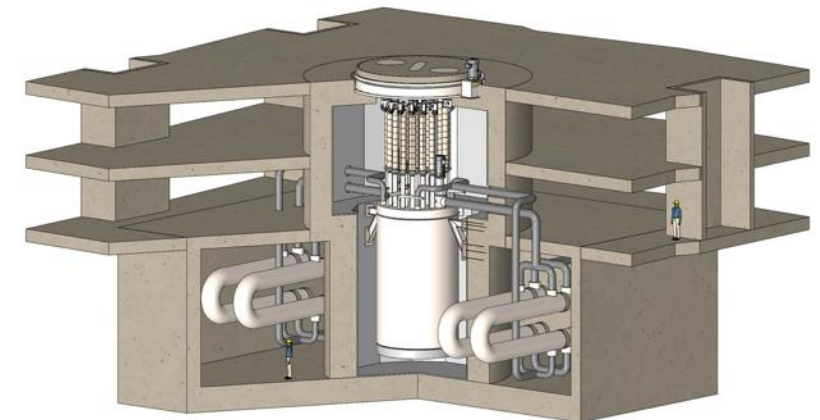
Coated Particle Fuel  
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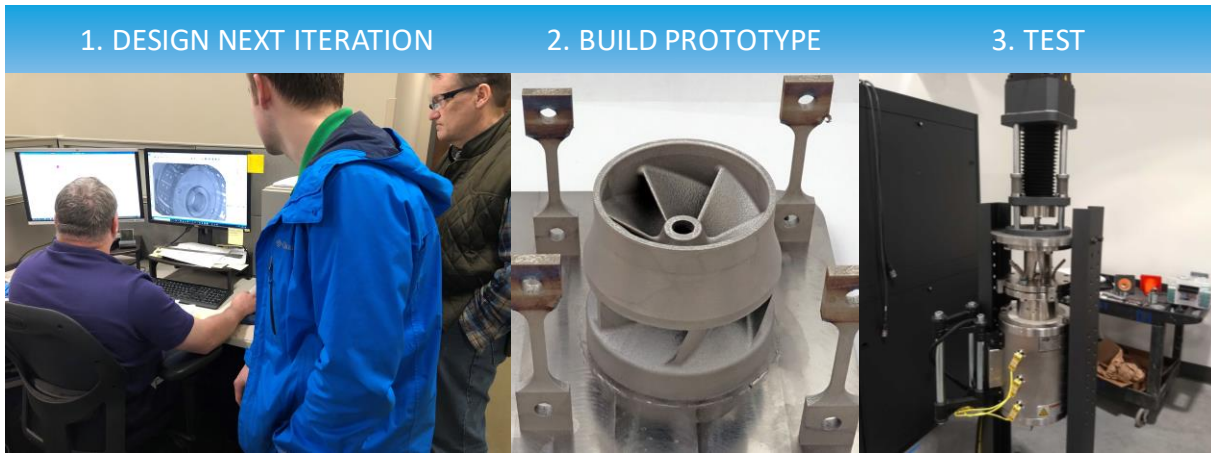
Liquid Fluoride Salt Coolant  
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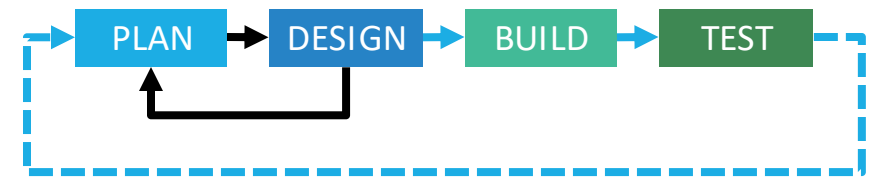
## Kairos Power Reactor Nuclear Island



# Kairos Power Nuclear **Development** Paradigm Shift

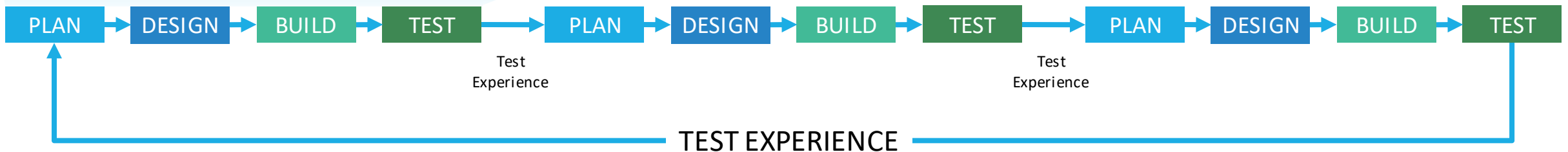


## Conventional Nuclear Development Cycle

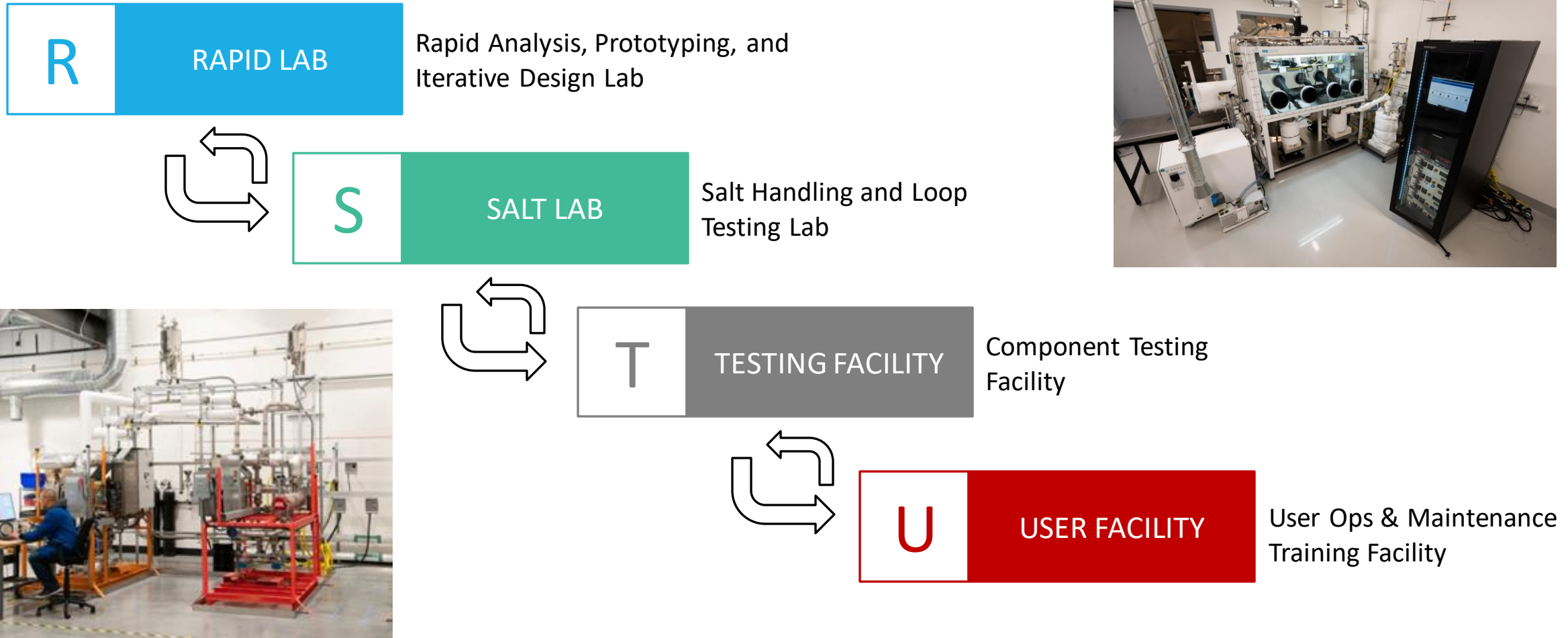


TEST EXPERIENCE

## Kairos Power Accelerated Test Cycles for Innovation and Optimization



# Kairos Power Testing Program - Rapid Technology Demonstration Requires **Non-Nuclear** Development and Qualification Facilities





# What is Kairos Power's Falcon 1?

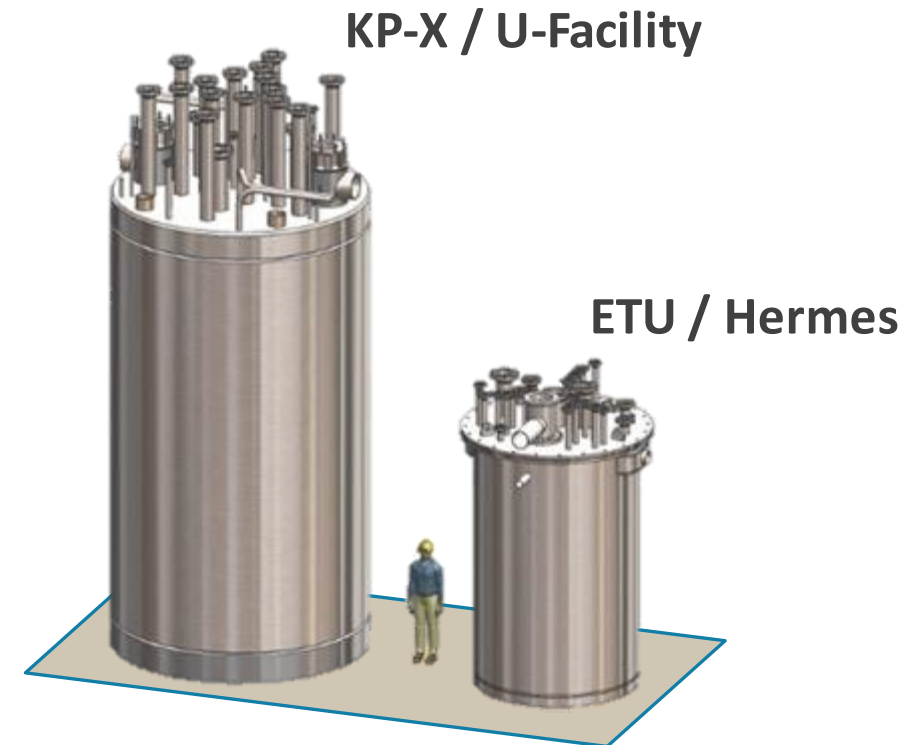
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SpaceX's Falcon 1 Flight 4 on the launch pad at Omelek Island in the Kwajalein Atoll of the Marshall Islands (19 Sep 2008)

# Kairos Power Engineering Test Unit (ETU) Overview

- What?
  - A **non-nuclear, unenriched Flibe-wetted, and isothermal** integrated test for principal SSCs (e.g., vessel, pump, pebble handling, CRDMs, etc.)
  - Full-scale version of Hermes and proportional to KP-X Commercial Reactor
- Why?
  - **Cost:** Establish competitive cost through vertical integration
  - **Supply Chain:** Initiate and exercise supply chain for KP-FHR specialized components and materials
  - **Design / Test:** Demonstrate design and integration of principal KP-FHR technologies
  - **Operations:** Accelerate experience base of large-scale Flibe facility and initial plant operations



*ETU should provide confidence in Kairos Power's ability to design, build, and operate high-temperature Flibe systems*

# What is Flibe?

- **A molten salt made from a mixture of lithium fluoride (LiF) and beryllium fluoride (BeF<sub>2</sub>)**
- Desirable properties:
  - High heat capacity
  - Strong affinity for radionuclides
  - Maintains single phase at operating temperatures
  - Optically transparent



**Unpacking Beryllium Fluoride**



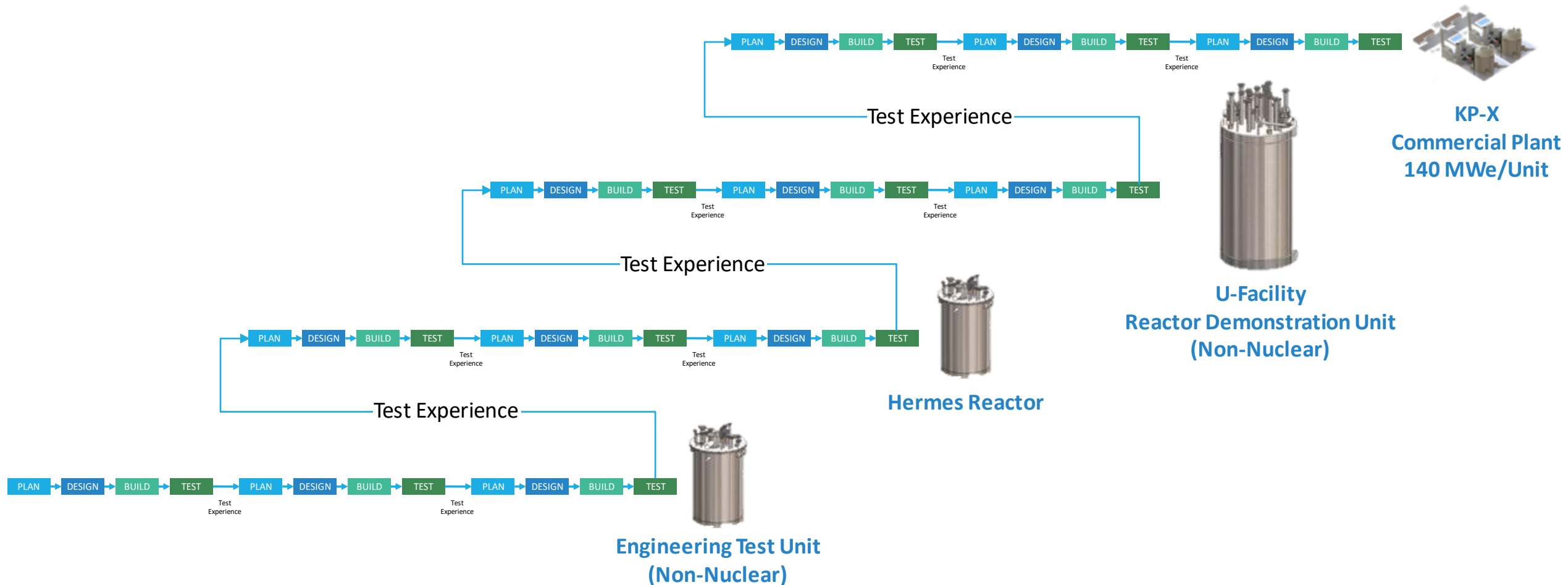
**S-Lab**



**Flibe Produced in S-Lab**

- **Kairos Power is an industry leader in working with Flibe**
  - Kairos Power has established the capacity to safely work with beryllium products in S-Lab to test, develop, and operate Flibe systems
  - Partnering with Materion has enhanced our beryllium EH&S program and S-Lab design
  - Integral to our development pathway of rapid iteration with non-nuclear systems to de-risk nuclear technology

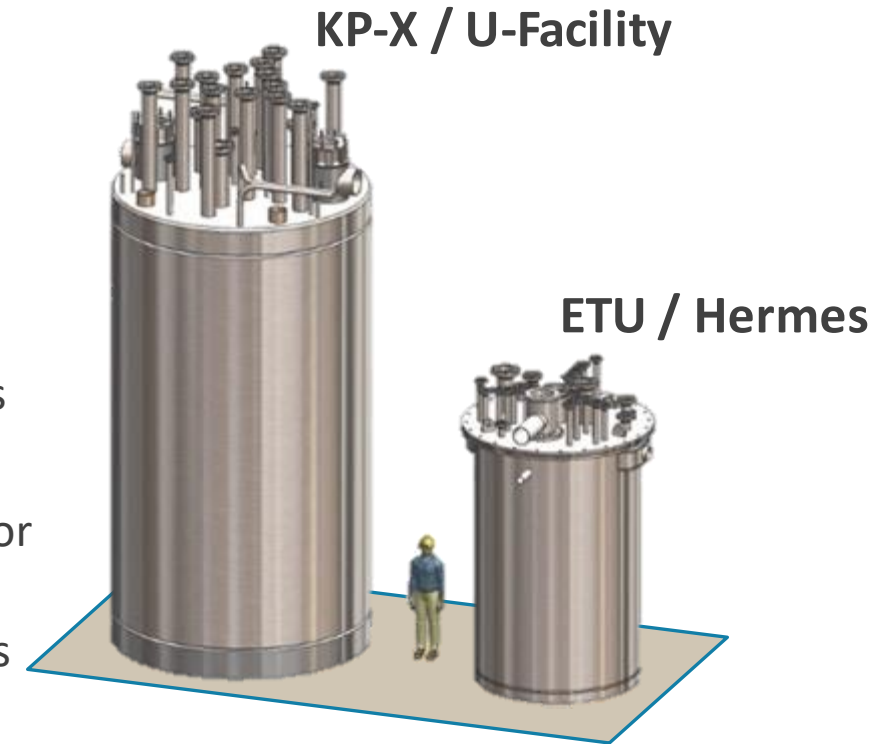
# Kairos Power Path to Commercialization: Successive Large-Scale Integrated Demonstrations





# Kairos Power Hermes Reactor Overview

- What?
  - A **low power demonstration reactor** that will prove Kairos Power's capability to deliver low-cost nuclear heat
- Why?
  - **Cost:** Establish competitive cost through iterative learning cycles
  - **Supply Chain:** Advance the supply chain for KP-FHR specialized components and materials while vertical integrating critical systems
  - **Design / Test:** Deliberate and incremental risk reduction
  - **Licensing Approach:** NRC will license Hermes as a non-power reactor and facilitate licensing certainty for KP-FHR
  - **Operations:** Provide a complete demonstration of nuclear functions including reactor physics, fuel and structural materials irradiation, and radiological controls



*Hermes will ultimately demonstrate the U.S. aptitude to license an advanced reactor in a timely manner*

# Kairos Power Receives U.S. DOE ARDP Award

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- Kairos Power is a recipient of an **Advanced Reactor Demonstration Program (ARDP)** award for Risk Reduction funding to support development of the Hermes reactor
- This is a cost-shared partnership between the DOE and industry to demonstrate advanced nuclear technology in the United States
- The total award value over the next seven years is **\$629 million** (DOE share is \$303 million)
- Kairos Power is partnering with Materion Corporation, Oak Ridge National Laboratory, Idaho National Laboratory, and Electric Power Research Institute on this project

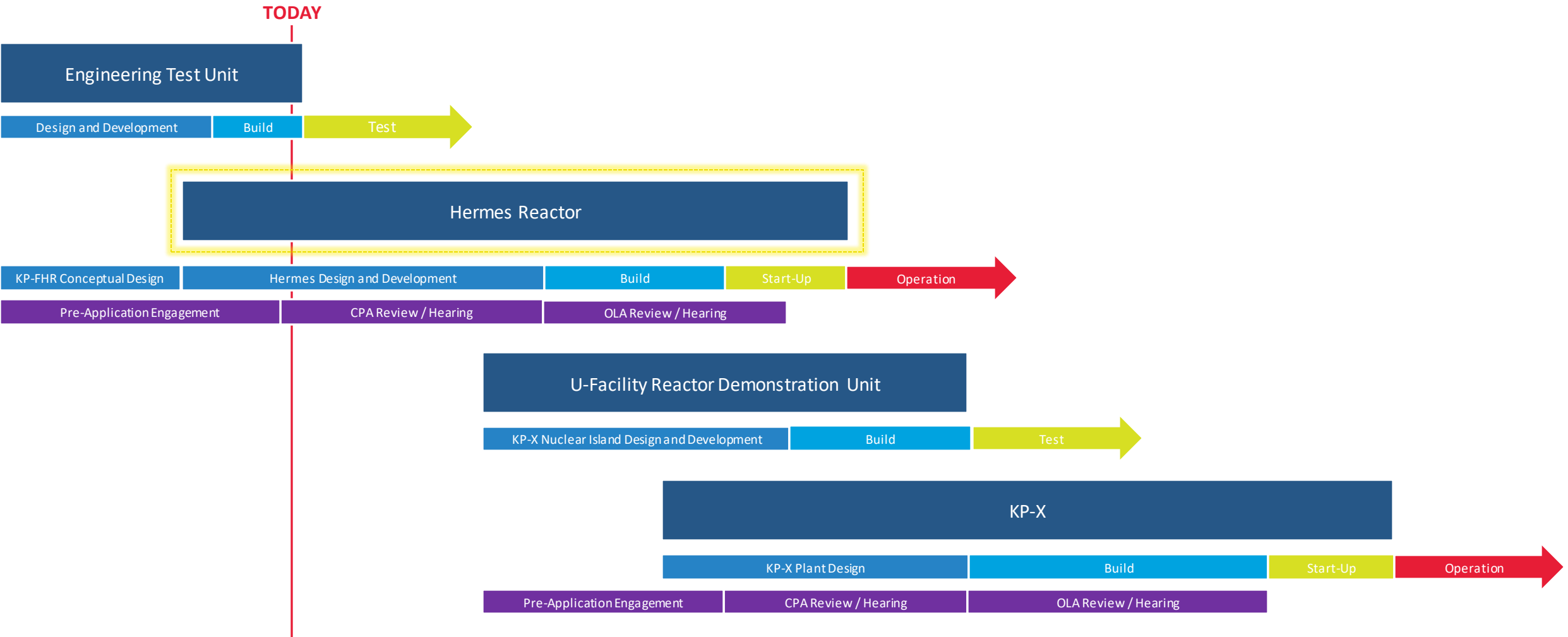


# Kairos Power Selects Oak Ridge Site to Deploy Hermes

- Kairos Power has acquired the former K-33 gaseous diffusion plant site at the East Tennessee Technology Park
- Hermes will achieve criticality in **2026**
- Hermes leverages proven technologies that originated in Oak Ridge with the Molten-Salt Reactor Experiment (MSRE) in the 1960s
- Kairos Power is investing **\$100 million** and creating **55+ full-time jobs** to support construction and operation of Hermes
- Hermes is a collaborative effort by Kairos Power and our partners

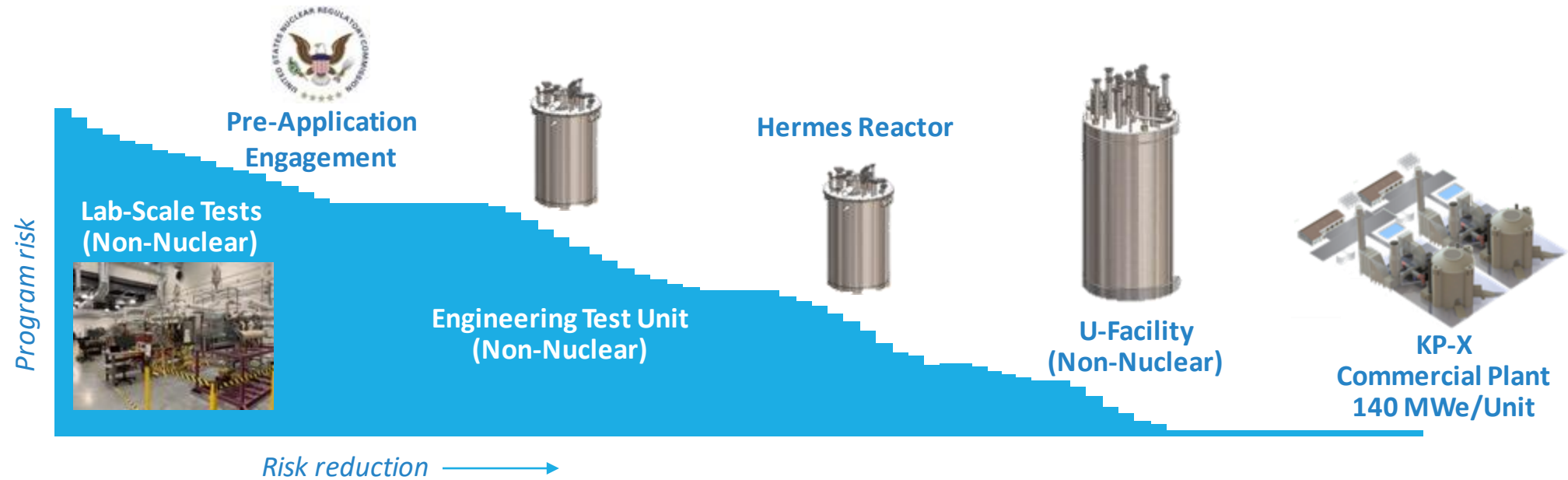


# Kairos Power Development Schedule





# Risk Reduction



Kairos Power is significantly retiring risk to commercial deployment:

- Technical and Cost risk via iterative development and Hermes reactor
- Regulatory risk via comprehensive pre-application engagement
- Commercial risk via full-scale U-Facility



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