



MSR Workshop 2020

MARK PÉRÈS – VICE PRESIDENT ENGINEERING

OCTOBER 2020



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.

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

Overview of Kairos Power

- Nuclear energy engineering and design company *singularly focused* on the commercialization of the fluoride salt-cooled high temperature reactor (FHR)
 - Founded in 2016
 - Current Staffing
 - 158 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

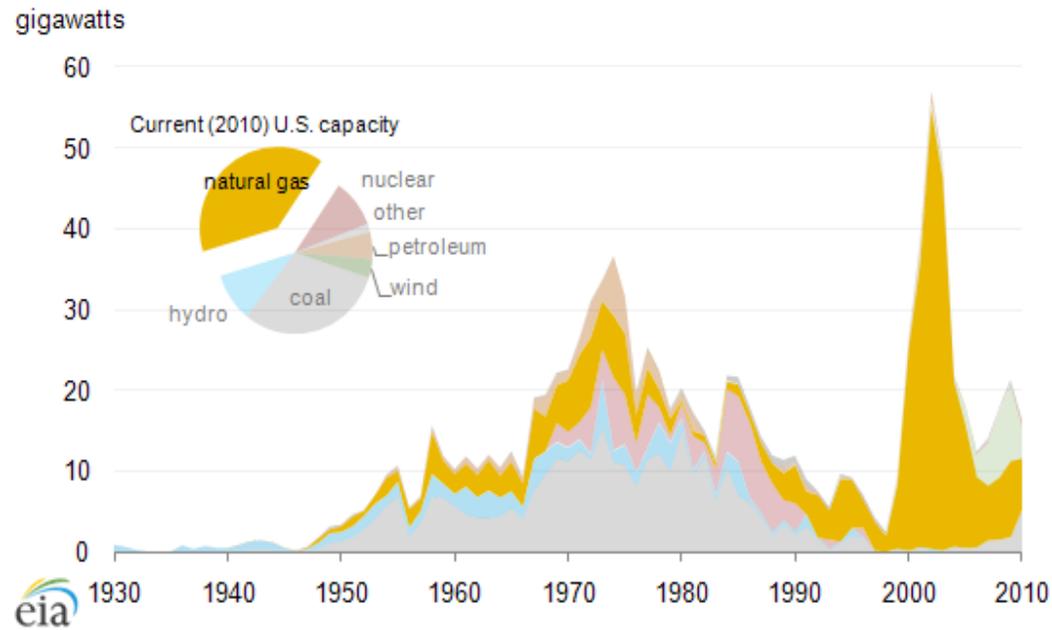


Kairos Power Team

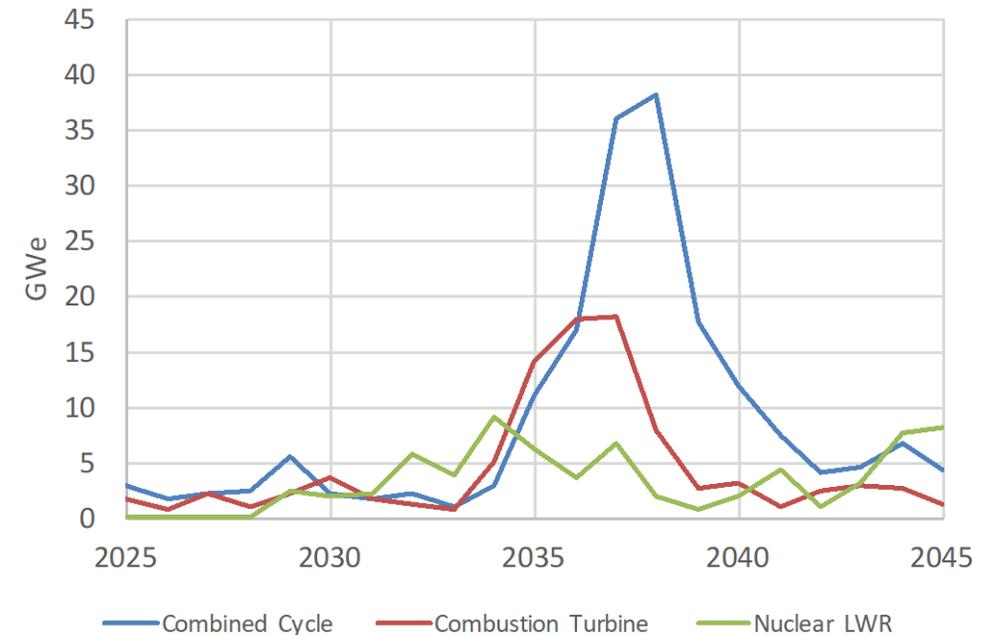


kairos (def.): the right or opportune moment

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

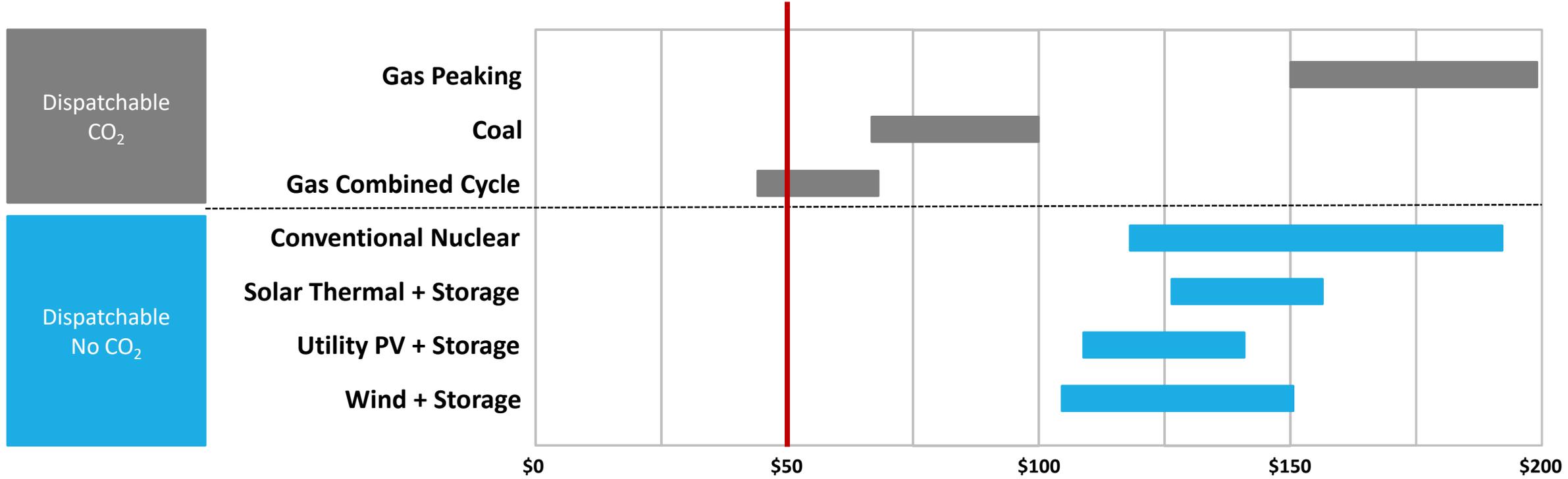


Annual U.S. Generation Retirements



Kairos Power's LCOE objective is to aggressively compete with natural gas combined cycle plants, even in today's tough market conditions

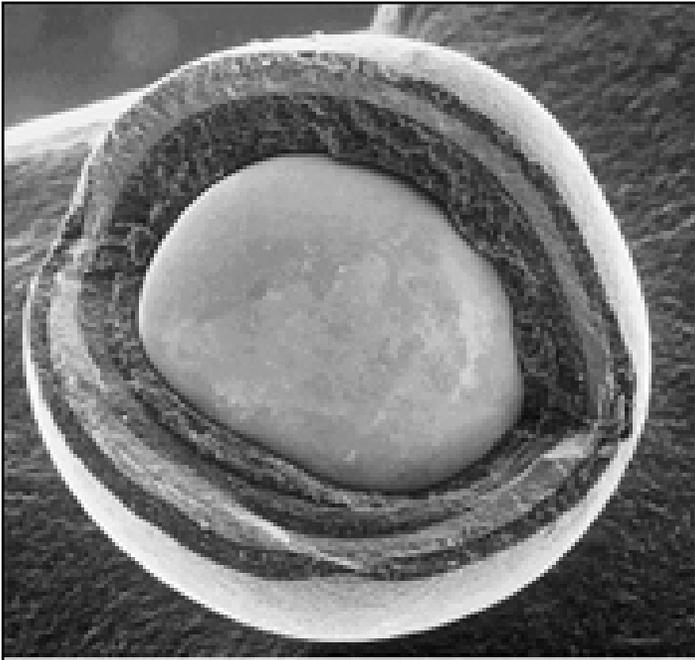
Competitive Dispatchable Target = \$50/MWh



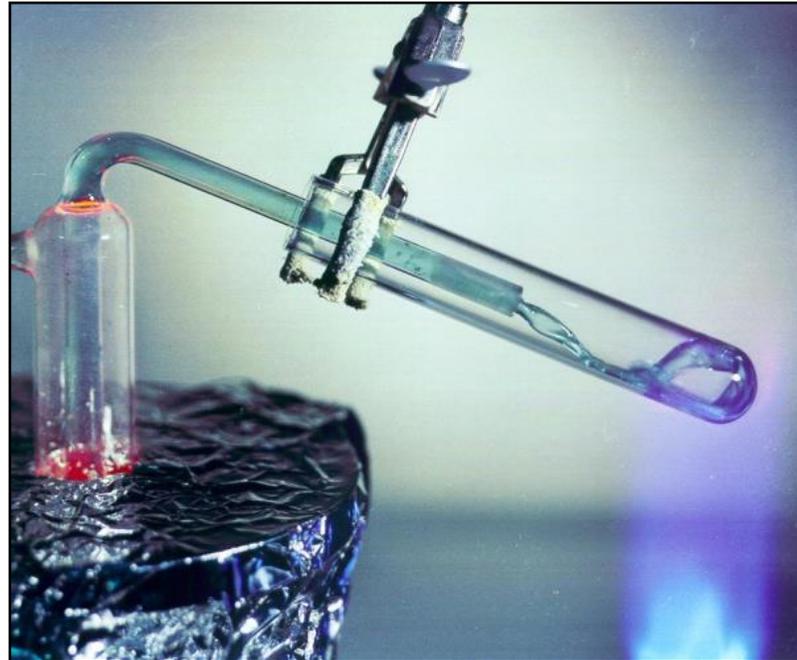
Natural gas price @ \$3.45/MMBTU.
 Source: Lazard Levelized Cost of Energy Analysis - Version 13.0, November 2019

Fluoride Salt-Cooled High-Temperature Reactor (FHR) Technology Basis

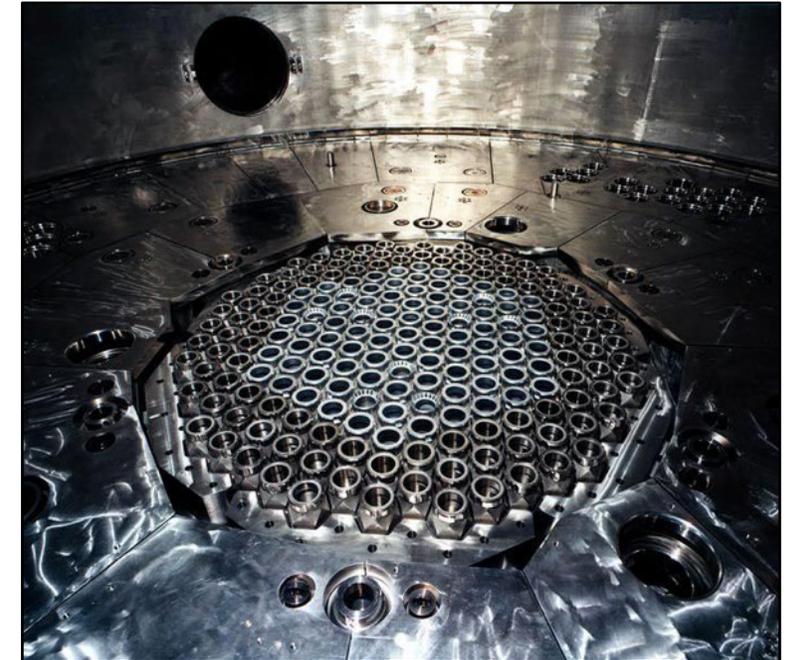
Coated Particle Fuel
TRISO



Liquid Fluoride Salt Coolant
Flibe (2LiF-BeF₂)

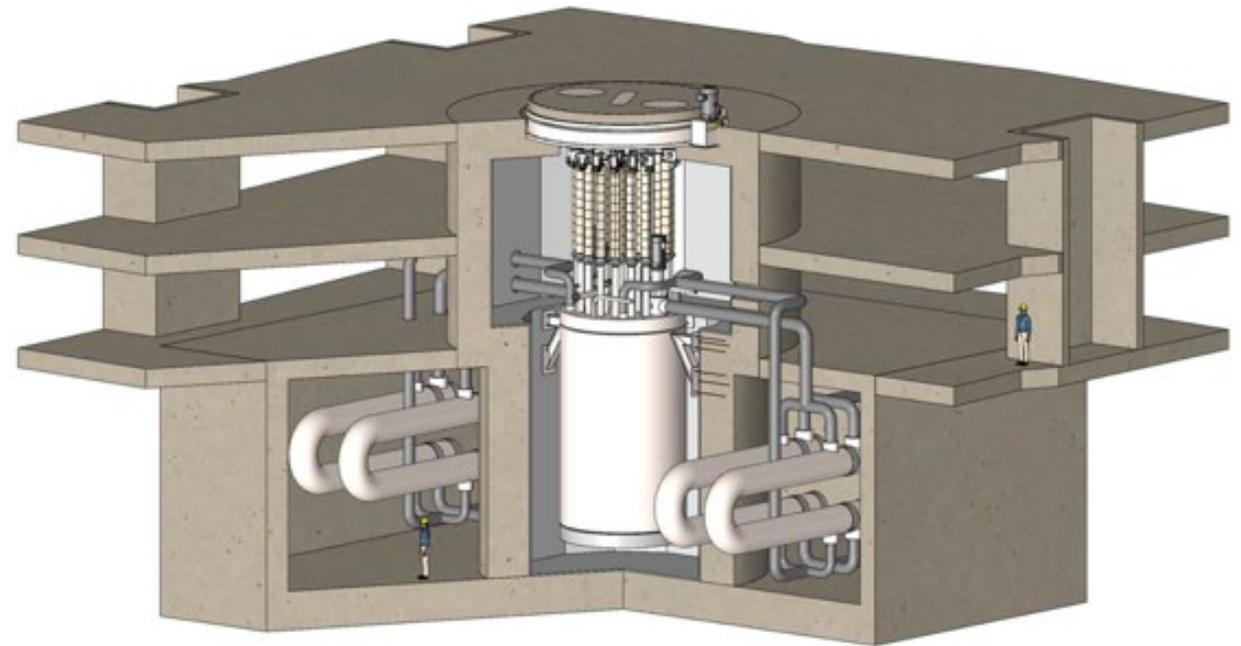


Low-Pressure Reactor Vessel
(FFTF core shown)



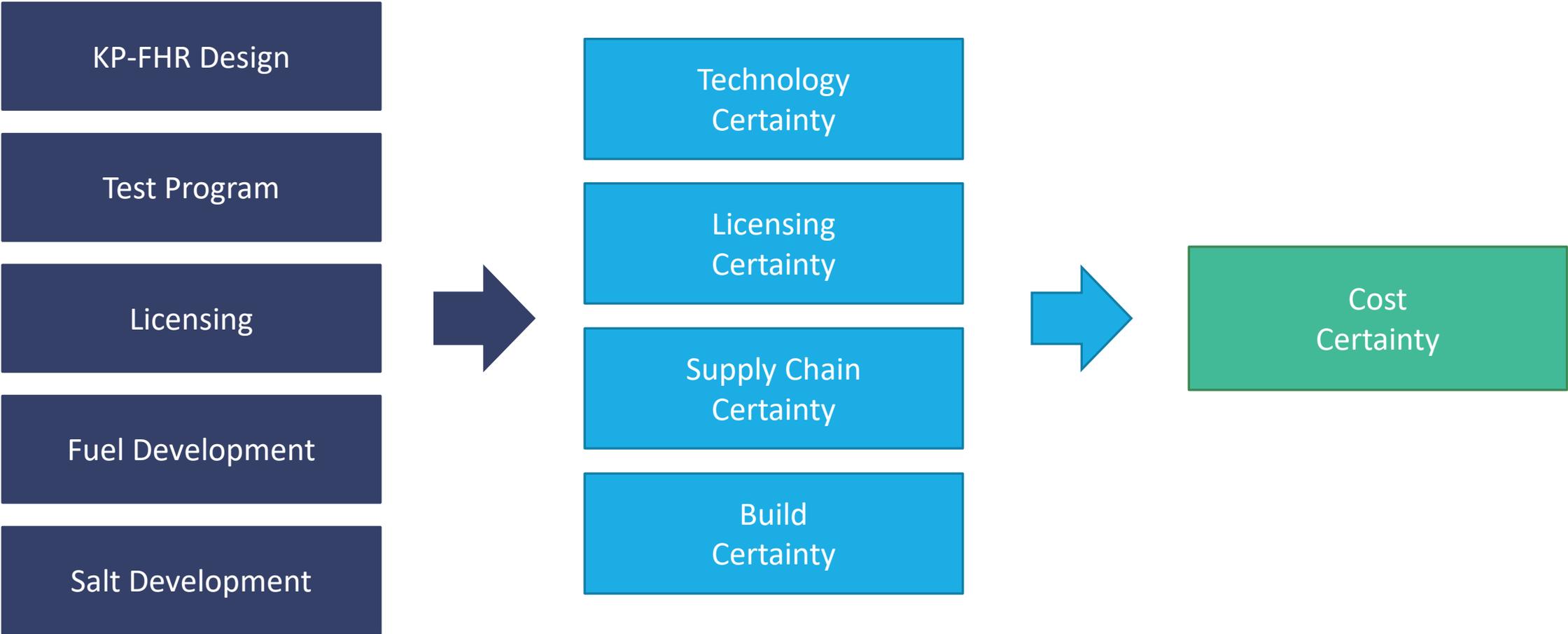
KP-FHR Design

Parameter	KP-FHR
Thermal Power	320 MWt
Electric Power	140 MWe
T-hot	650 C
T-cold	550 C
Operating Pressure	Near Atmospheric
Enrichment	19.55 wt%

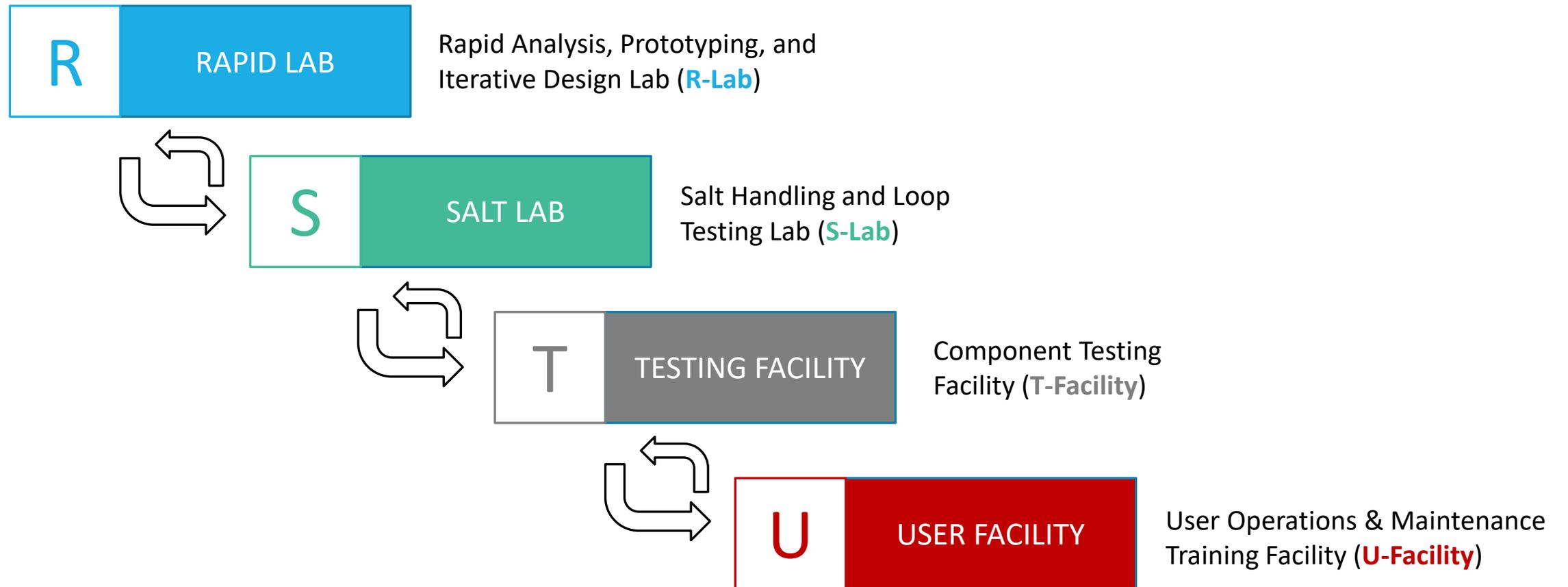


KP-FHR Nuclear Island

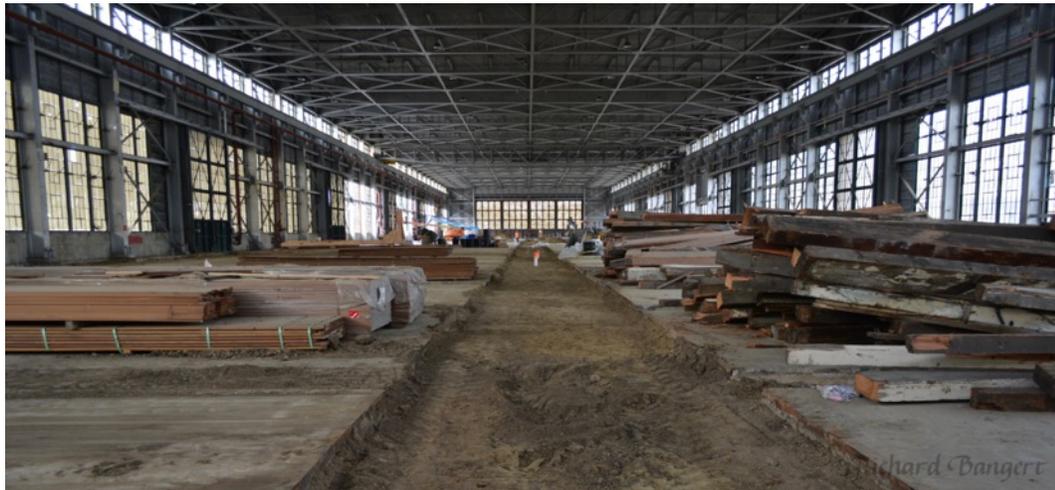
Kairos Power Workstreams Reduce Risk and Build Cost Certainty



Rapid Technology Demonstration Requires Unique **Non-Nuclear** Development and Qualification Facilities



Alameda CA HQ Move In September 2018



R-Lab Commissioned Fall 2018



R-Lab

Engineering Test Unit Demonstration Experiment (ETUDE)

**Scaled Water Mock Up of Engineering Test Unit
Includes pump, pebble circulation and control rod insertion.
Commissioned Nov 2019**



Kairos Power Recent Progress

S-Lab

Flibe Chemistry and Materials Testing Lab
Operational Sep 2020



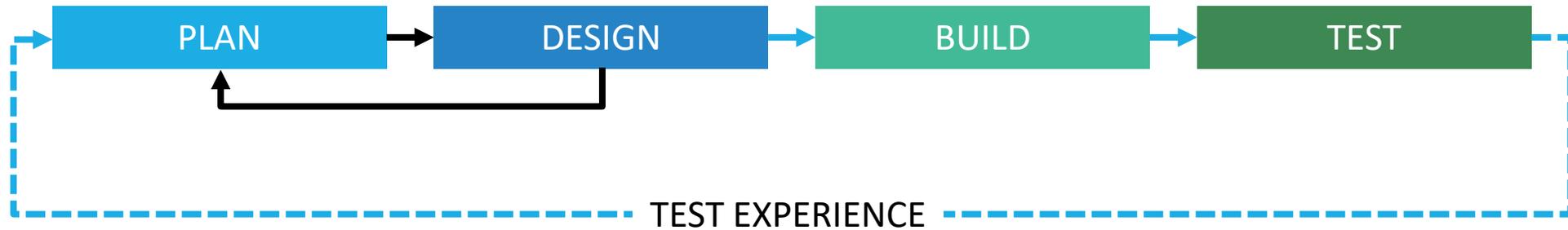
New Mexico Expansion

T-Facility and Manufacturing Development Facility
Purchased Jan 2020

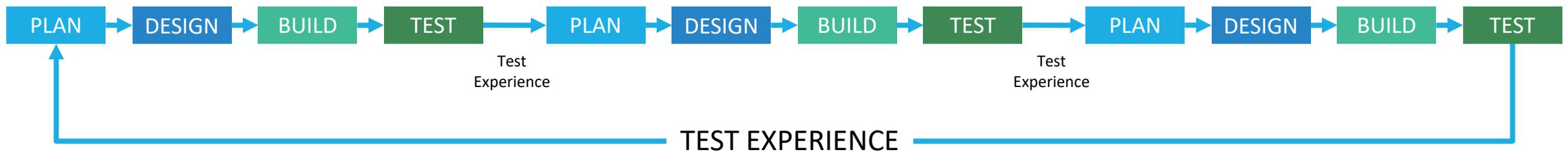


Kairos Power Nuclear **Development** Paradigm Shift

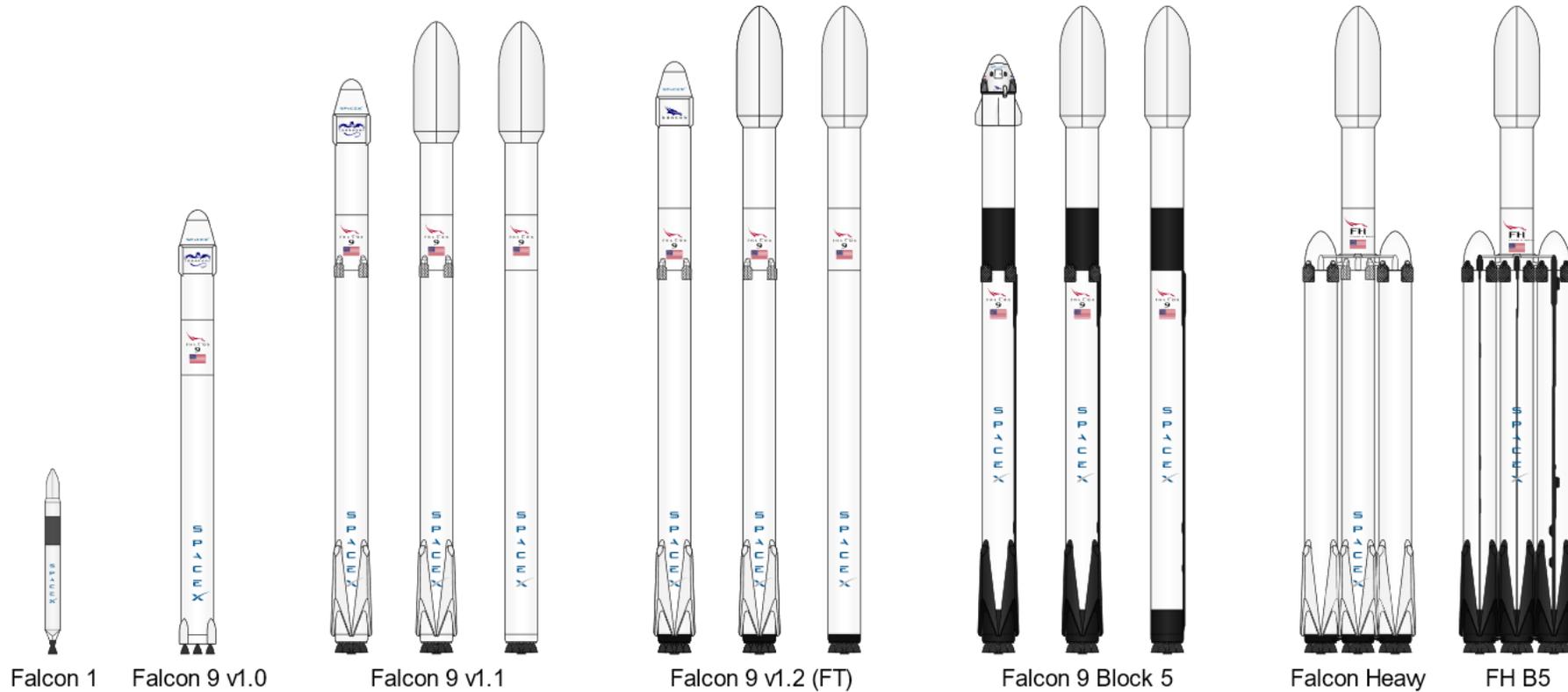
Conventional Nuclear Development Cycle



Kairos Power Accelerated Test Cycles for Innovation and Optimization



SpaceX Development Sequence

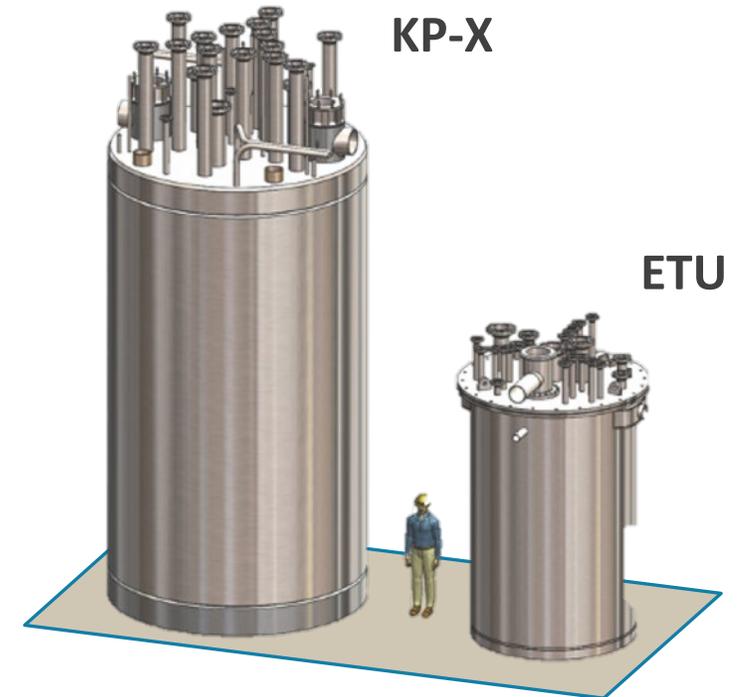


Wikipedia contributors. "SpaceX reusable launch system development program." Wikipedia, The Free Encyclopedia, 8 Oct. 2020



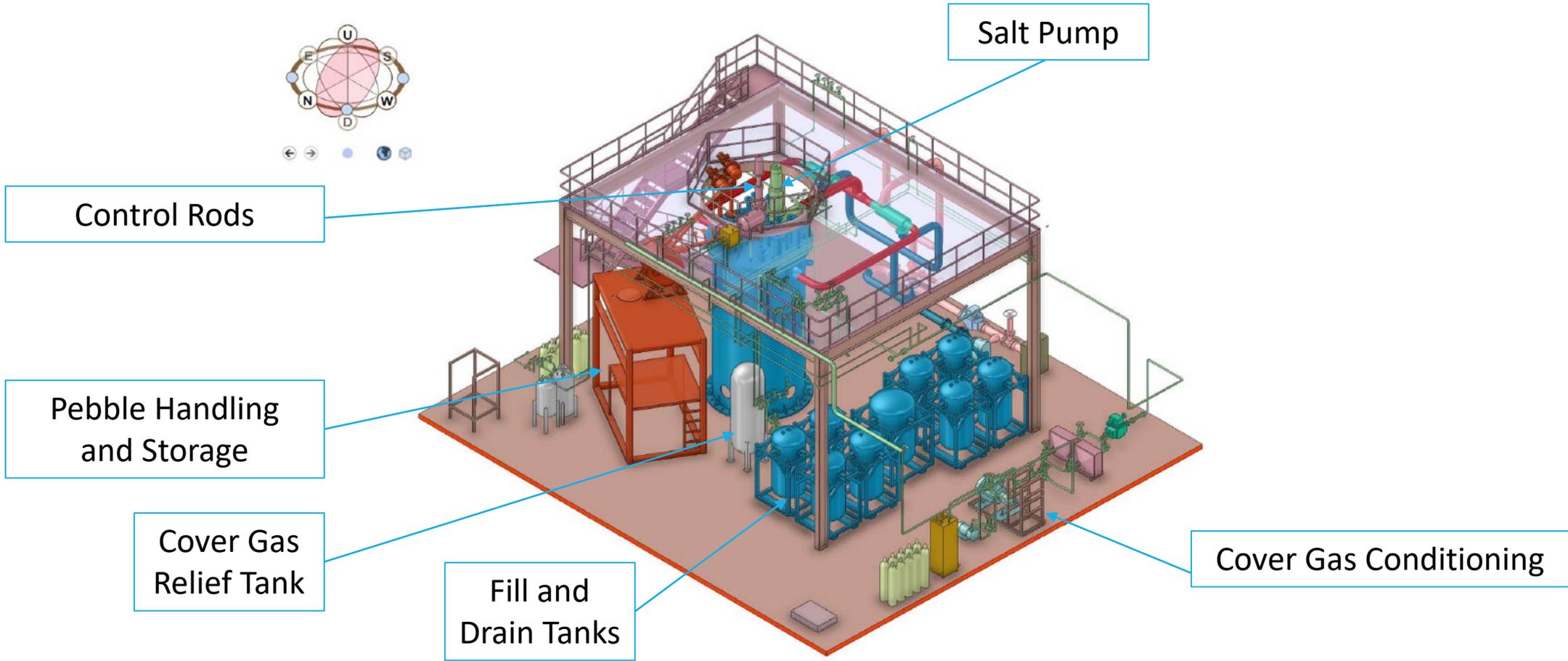
Kairos Power Engineering Test Unit (ETU)

- What?
 - A **non-nuclear, unenriched flibe-wetted, and isothermal** integrated test for principal SSCs (e.g., vessel, pump, pebble handling, control elements, etc.)
 - Scale relevant to Hermes and KP-X Commercial Reactor
- Why?
 - **Supply Chain:** Assess and exercise supply chain for KP-FHR specialized components and materials
 - **Design / Test:** Demonstrate rapid iteration design and integration of principal KP-FHR technologies
 - **Operations:** Accelerate experience base of large-scale flibe facility and initial plant operations

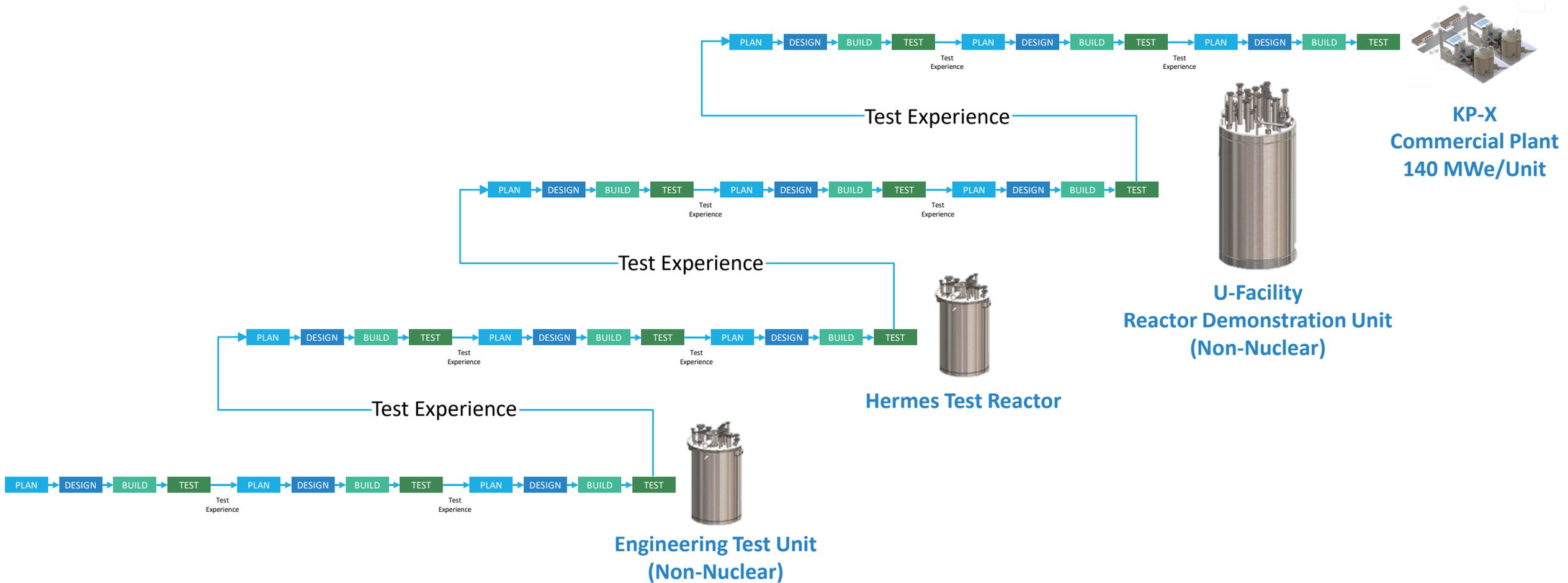


ETU should provide confidence in Kairos Power's ability to design, build, and operate high-temperature flibe systems

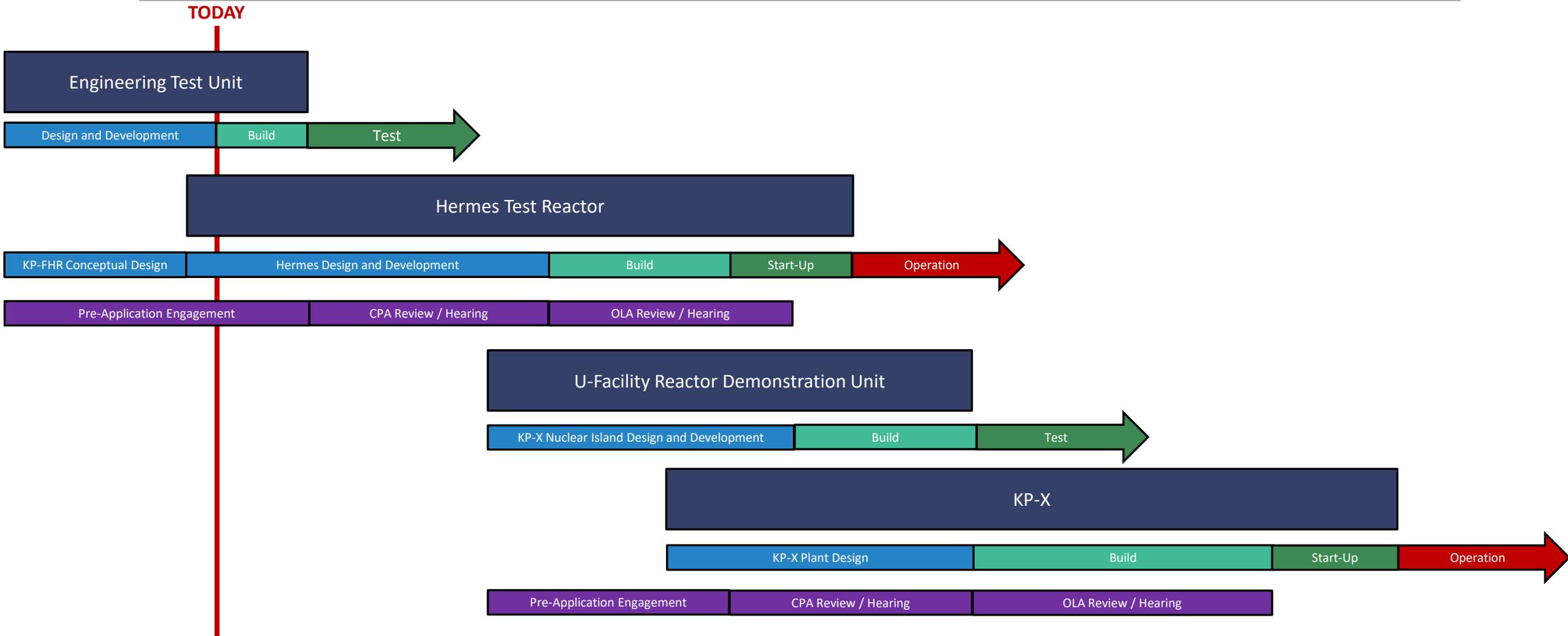
ETU Progress Update



Kairos Power Development Program



Kairos Power Development Schedule





Thanks
Q&A

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