



ARDP AWARDS

Guest Speakers
Chris Levesque and Clay Sell

WHAT *Inspires* US

NRIC WEBINAR SERIES

January 7, 2021



NRIC National Reactor
Innovation Center

Ashley Finan, Ph.D.
Director National Reactor Innovation Center



Mike Simpson
U.S. Congressman for Idaho 2nd District



Chris Levesque

President and Chief Executive Officer
TerraPower



NATRIUM

Advancing Nuclear Solutions with Integrated Energy Systems

Chris Levesque
TerraPower President and CEO

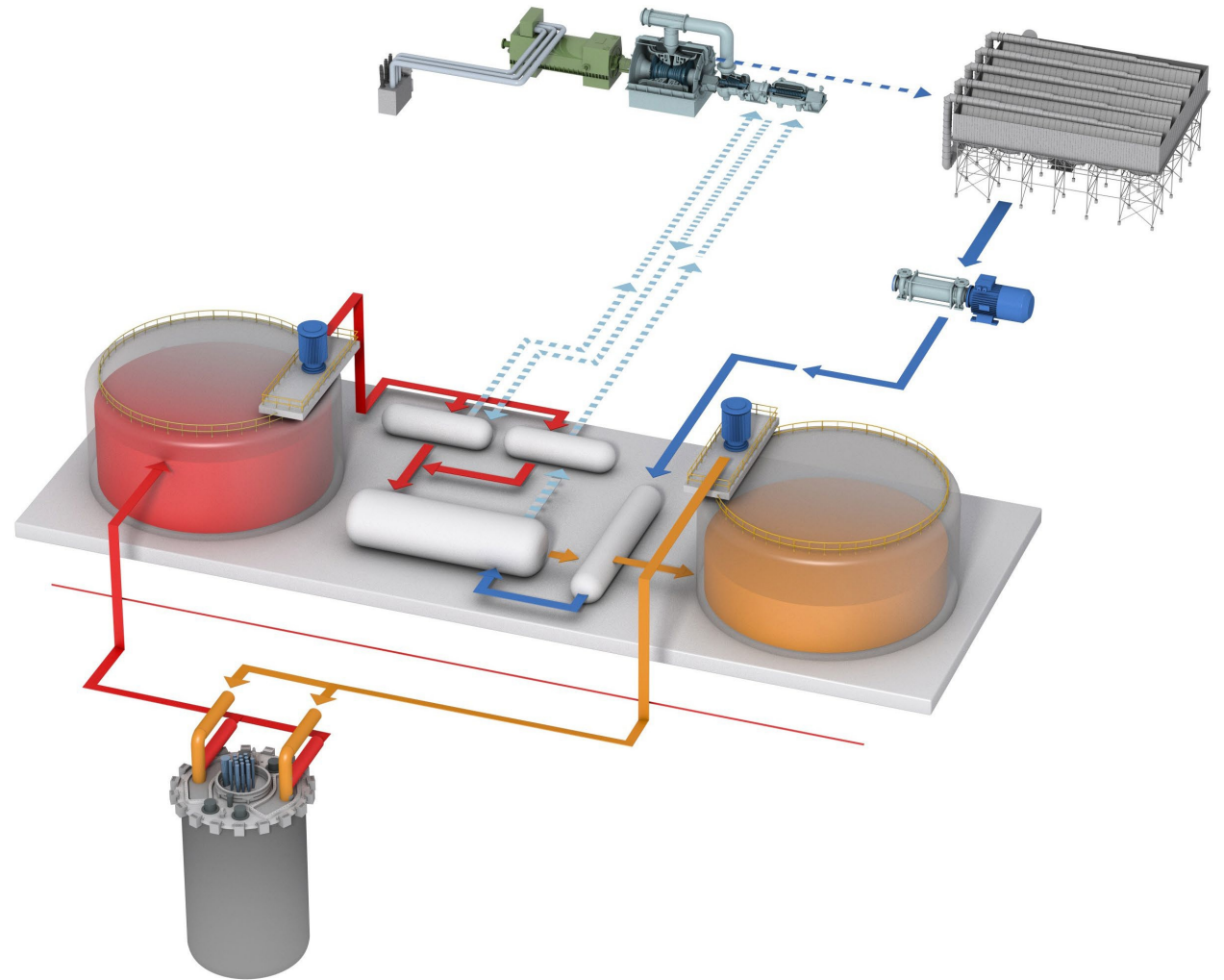


HITACHI



Introducing the Natrium™ Technology

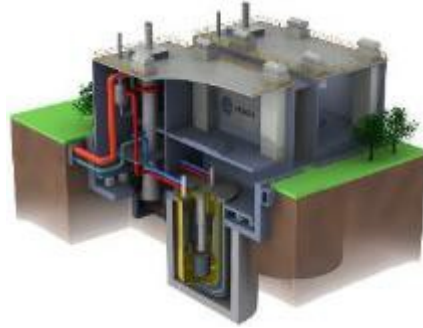
- Builds on PRISM, TWR and concentrated solar-power technologies with a focus on cost competitiveness
- Integrates on and fortifies grids with high-renewables penetrations
- 345MWe reactor that can flex to 500MWe for 5.5 hours when needed



Strong Team with Complementary Expertise

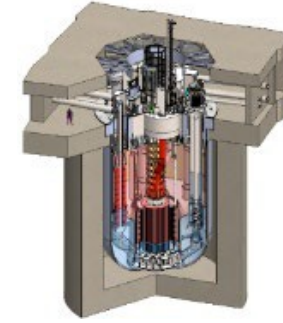


HITACHI



- Nuclear design experience
- Involved in delivering more than 80 nuclear power plants globally
- Fuel fabricator and nuclear services provider for those plants
- Original equipment manufacturer supplier and supply chain
- Established presence in international markets
- GE corporate experience

TerraPower



- Nuclear design experience
- Technology development, component and system testing
- SFR fuel development and qualification
- Advanced computational tools for integrated design of nuclear reactors
- Strong mission-driven and innovation culture
- Access to partners and private capital



HITACHI



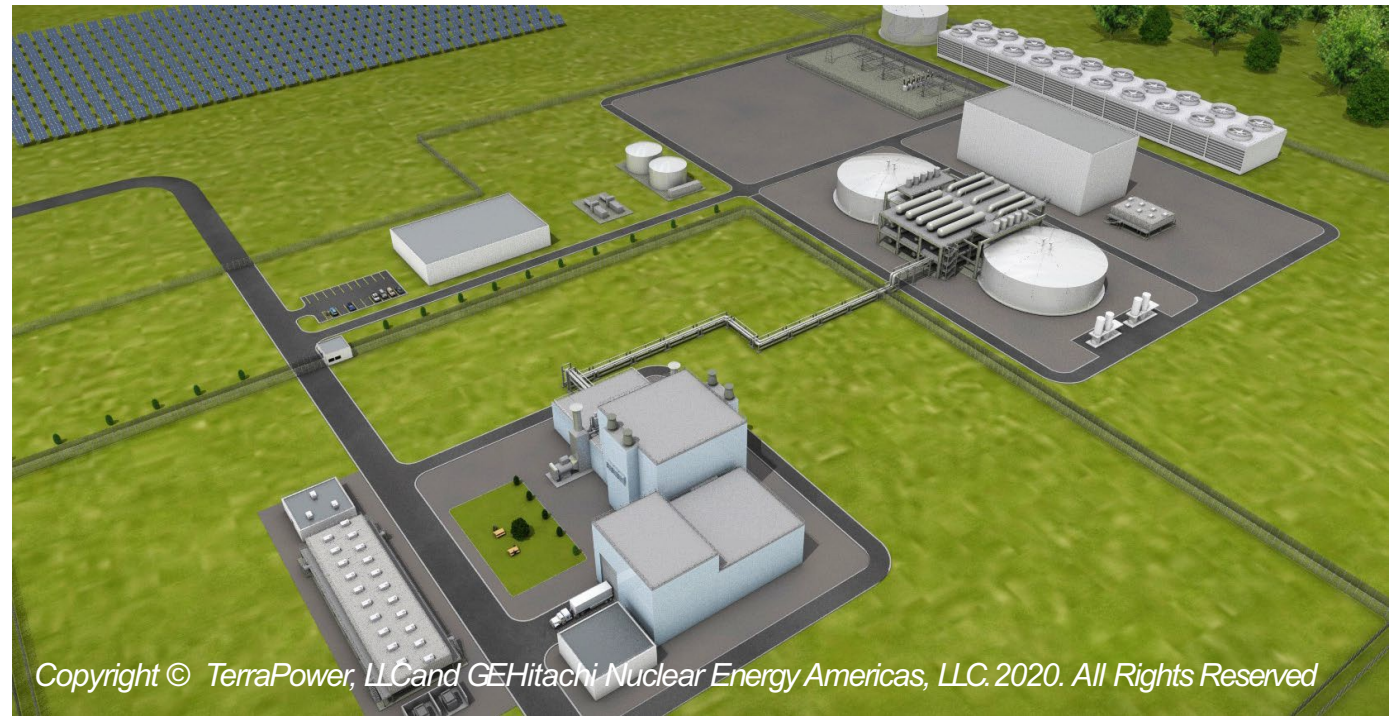
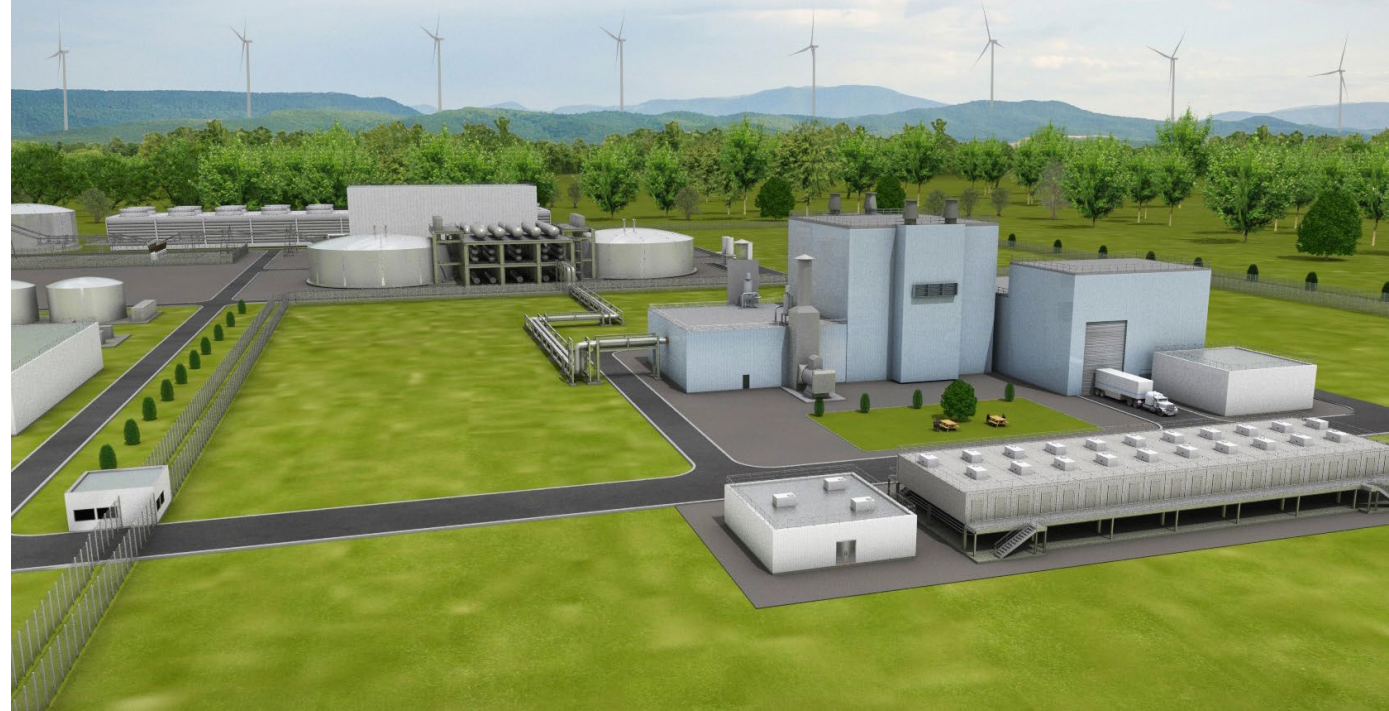
Rethinking What Nuclear Can Be

Nuclear redefined

- Eliminates nuclear “sprawl”
 - Design to cost
 - Simplicity
 - Rapid construction
 - Design-specific staffing
- ~41% net thermal efficiency

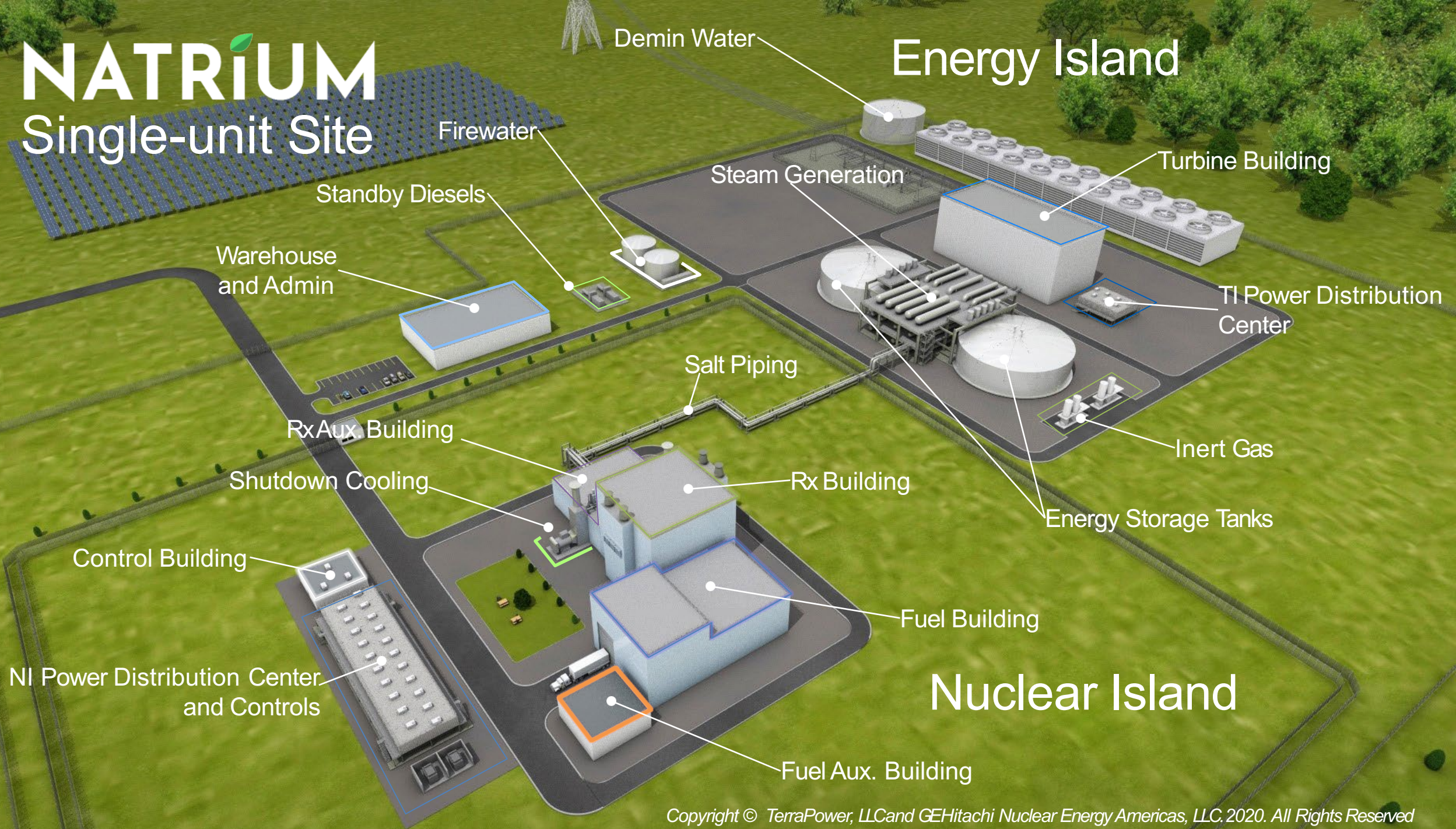
Integrating with renewables

- Zero-emission, dispatchable resource
- Price follower with reactor at 100% power 24/7
- 345 MWe nominal
- Flex to 500 MWe for 5.5 hours with energy storage

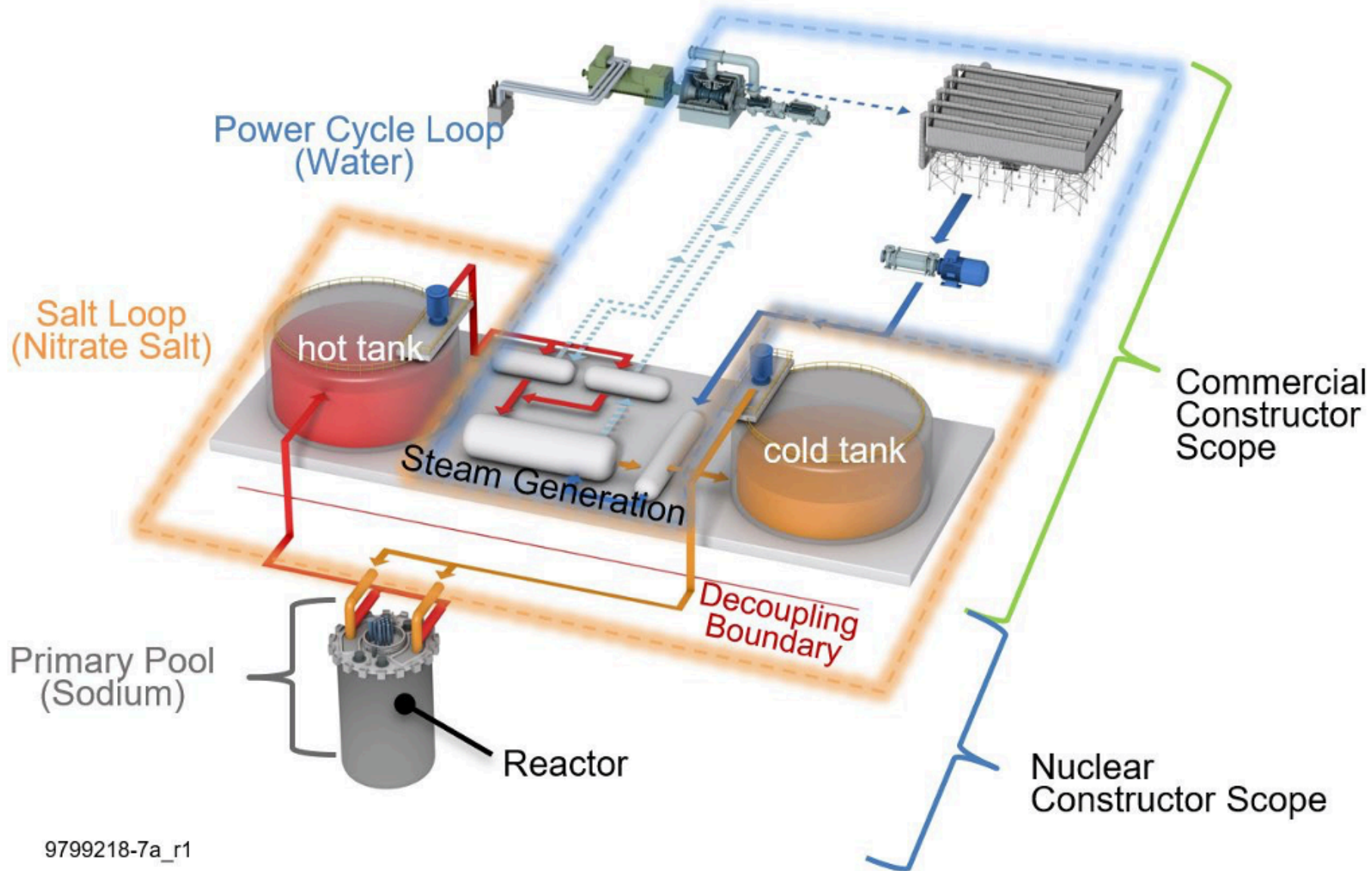


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Single-unit Site



Integrated Energy System (IES)



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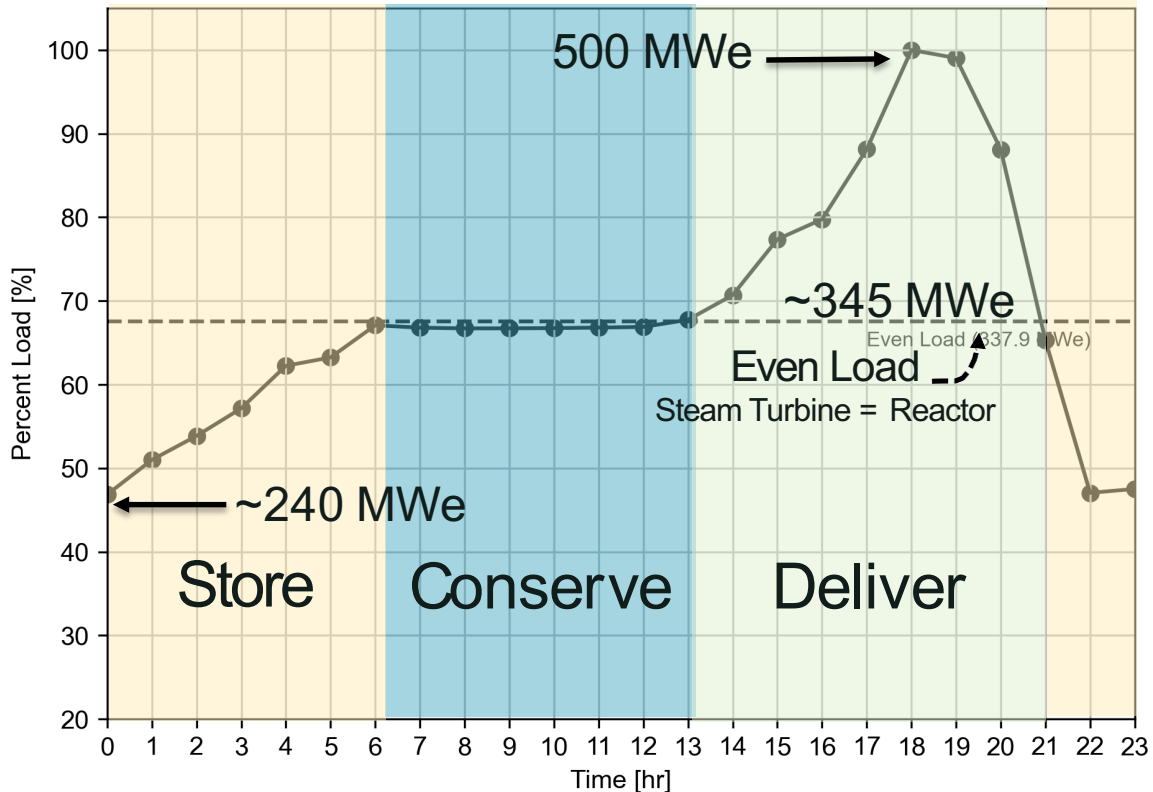


HITACHI



California Rolling Blackouts: Aug. 12-25, 2020

Average Daily Turbine Load Profile



NATRIUM

Midnight – 6 a.m.

Ramp in early morning. Charging tanks.

6 a.m. – 1 p.m.

Hold even load.

1 p.m. – 6 p.m.

Ramp to peak load. Discharging tanks.

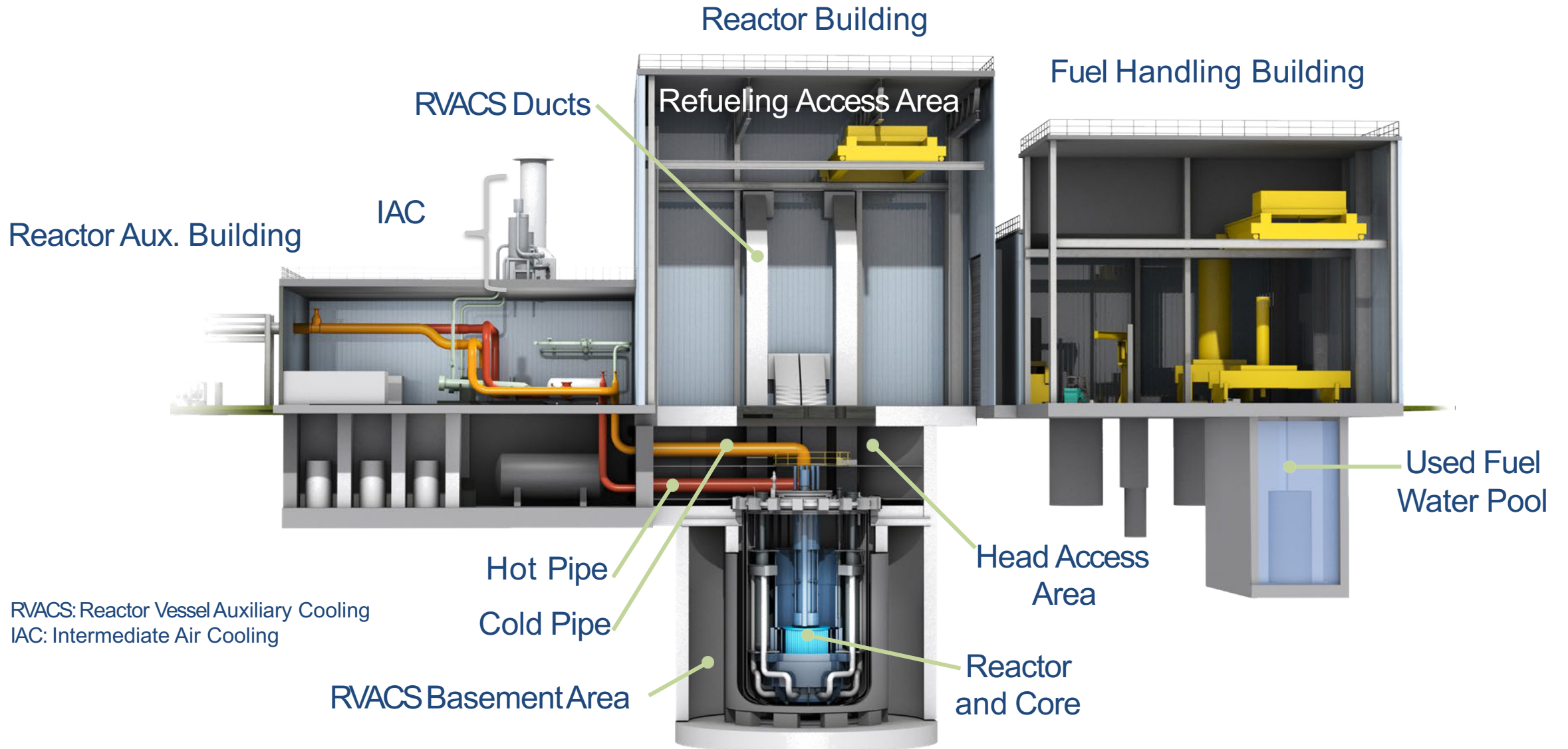
7 p.m. – 9 p.m.

Ramp down. Discharging tanks.

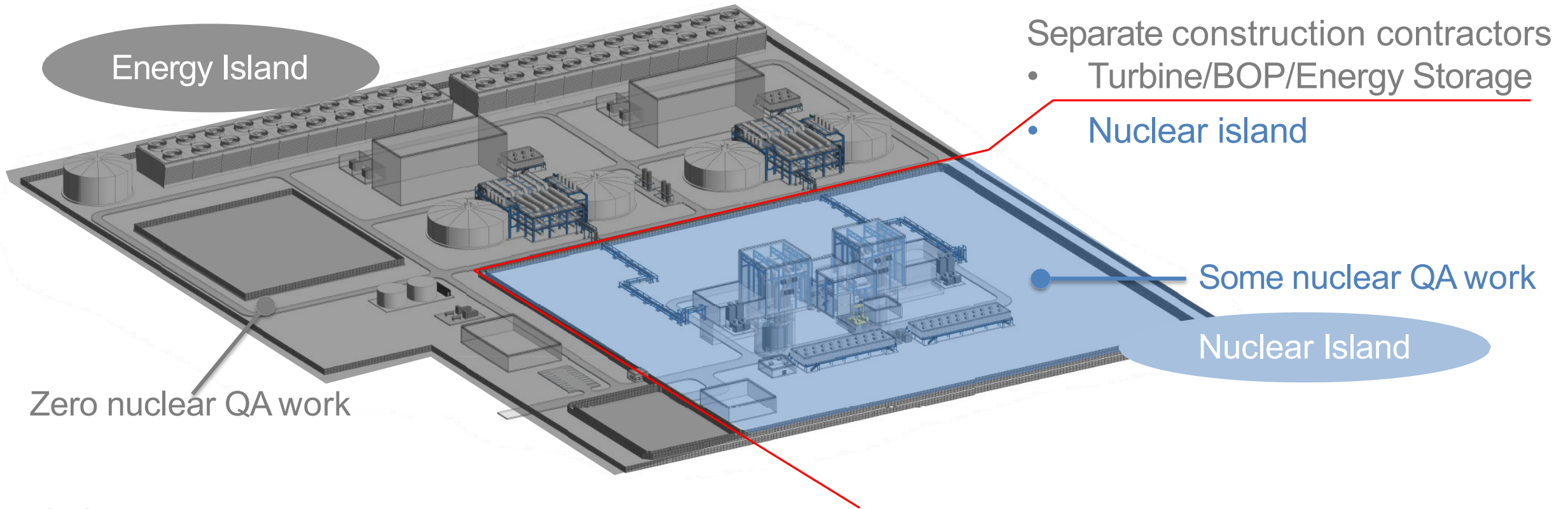
9 p.m. – Midnight

Ramp down. Charging tanks.

Reactor Building



A Decoupled Approach



Competitive Clean Energy

Simple Nuclear System

- Exceptional heat transfer
- Passive air cooling
- Low pressure
- Optimized layout

Flexible Power Generation

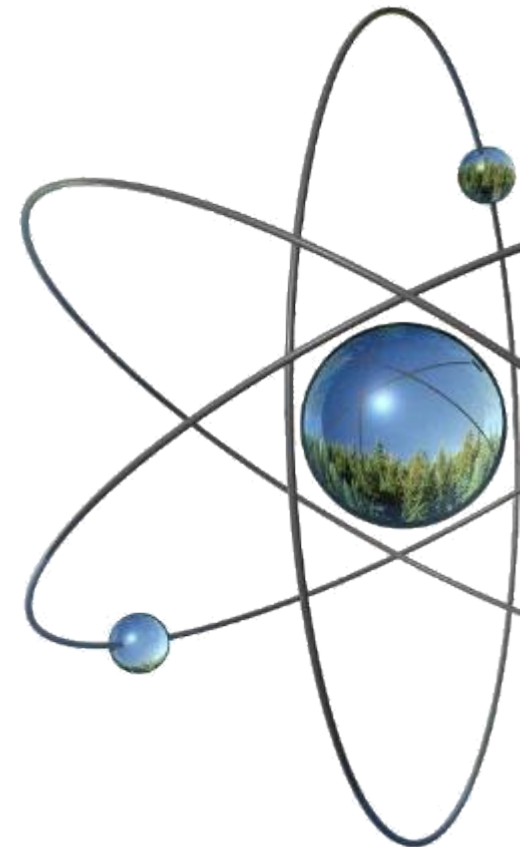
- Dispatchable power
- Energy storage and price following
- Integrate with renewables
- Process heat

Adjacent Innovations

- Concentrated solar power industry
- Tunneling industry (vertical cut)
- Combined cycle gas turbine industry



Learn more at
[NatriumPower.com](https://www.NatriumPower.com)



J. Clay Sell

Chief Executive Officer
X-energy





energy

Clean • Safe • Secure • Affordable

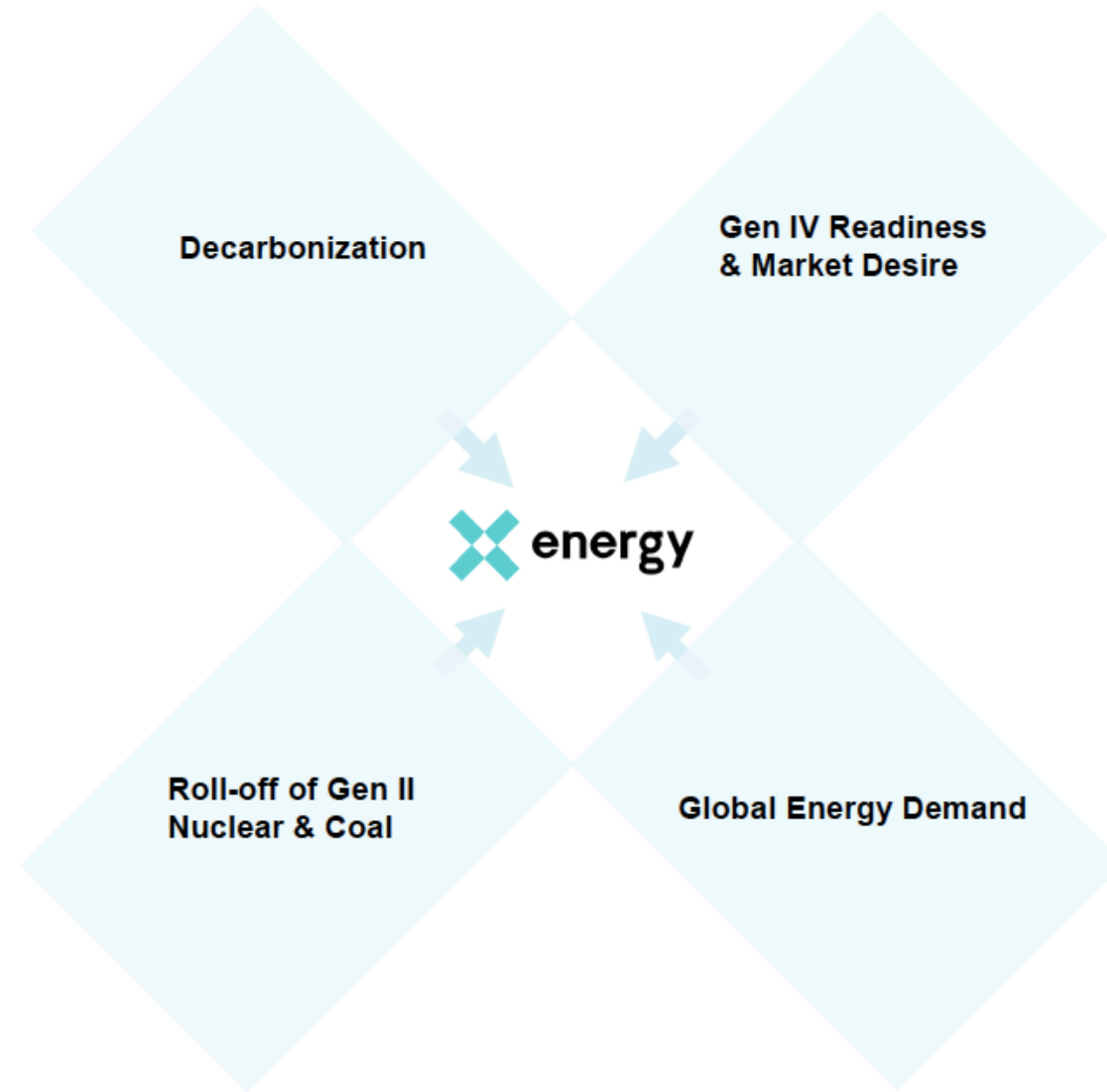
NRIC Webinar: “What Inspires Us”

J. Clay Sell, Chief Executive Officer

January 7, 2021

X-energy's timing is meeting the larger moment

Never before has there been such a crossroads of need, opportunity & ability.



The X-energy value proposition



Zero carbon emissions	← Clean →	Unlike coal and natural gas plants
Always on	← 24/7 →	Unlike intermittent renewables
Cost down to ~\$50.00 per MWh	← Affordable →	At or below natural gas
Low project risk	← Simple →	Simplified permitting & licensing
Power plants that can't melt down	← Safe →	Never a danger to the public
3-4 years to deploy vs. 10 years	← Efficient →	'Plug-and-play' scalable growth into new markets
Greatest geographic flexibility	← Anywhere →	No need to be by water, 400m vs 10mile safety zone
Modernized licensing case	← Global →	Easier new market entry
Proliferation resistance	← Secure →	Ideal for foreign markets

Our traction, accomplishments & risk reduction to date



Founded by Kam Ghaffarian



Xe gets into the fuel business. Hires Dr. Pete Pappano, builds fuel team.

Begins regulatory engagement with NRC.
Produces first pebble in pilot fuel facility

Canada passes a carbon tax

Selected by U.S. DOE for Advanced Reactor Demonstration Program

Selected by U.S. DOD for preliminary design of a mobile nuclear power plant

OPG advances engineering and design work with X-energy

Completes conceptual design; 50% of basic design complete

2009

2010

2014

2015

2016

2018

2019

2020



Reactor science team in place,
led by Dr. Eben Mulder &
Dr. Martin Van Staden

Forms Customer Advisory Council

Achieves 50% conceptual design on Xe-100

Established pebble fuel manufacturing capability



Formally initiates commercialization track in Canada

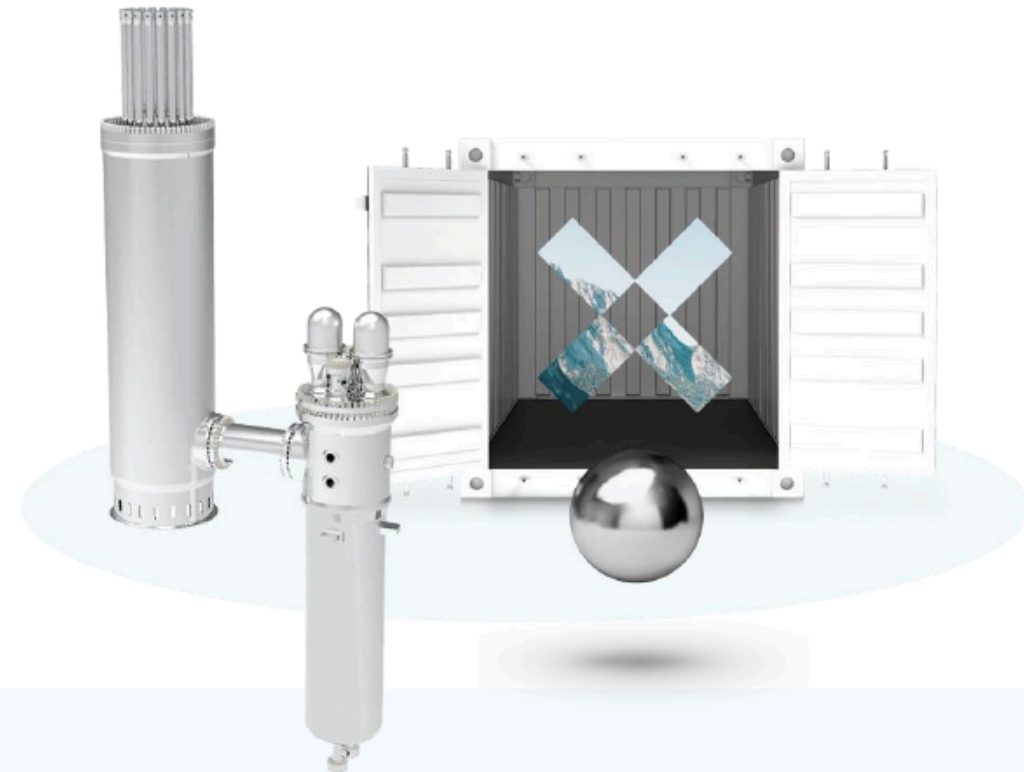
Executed LOI with Jordan to deploy SMR

EIA reports 95 Gigawatts of coal capacity closed or switched to another fuel over the previous decade, with another 25 GW slated to shut down by 2025

We are capitalizing on decades of learning & best practices in High Temperature Gas-cooled Reactor design.

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

Our optimized, meltdown-proof Xe-100 is the only Gen IV reactor deployable within 5 years.

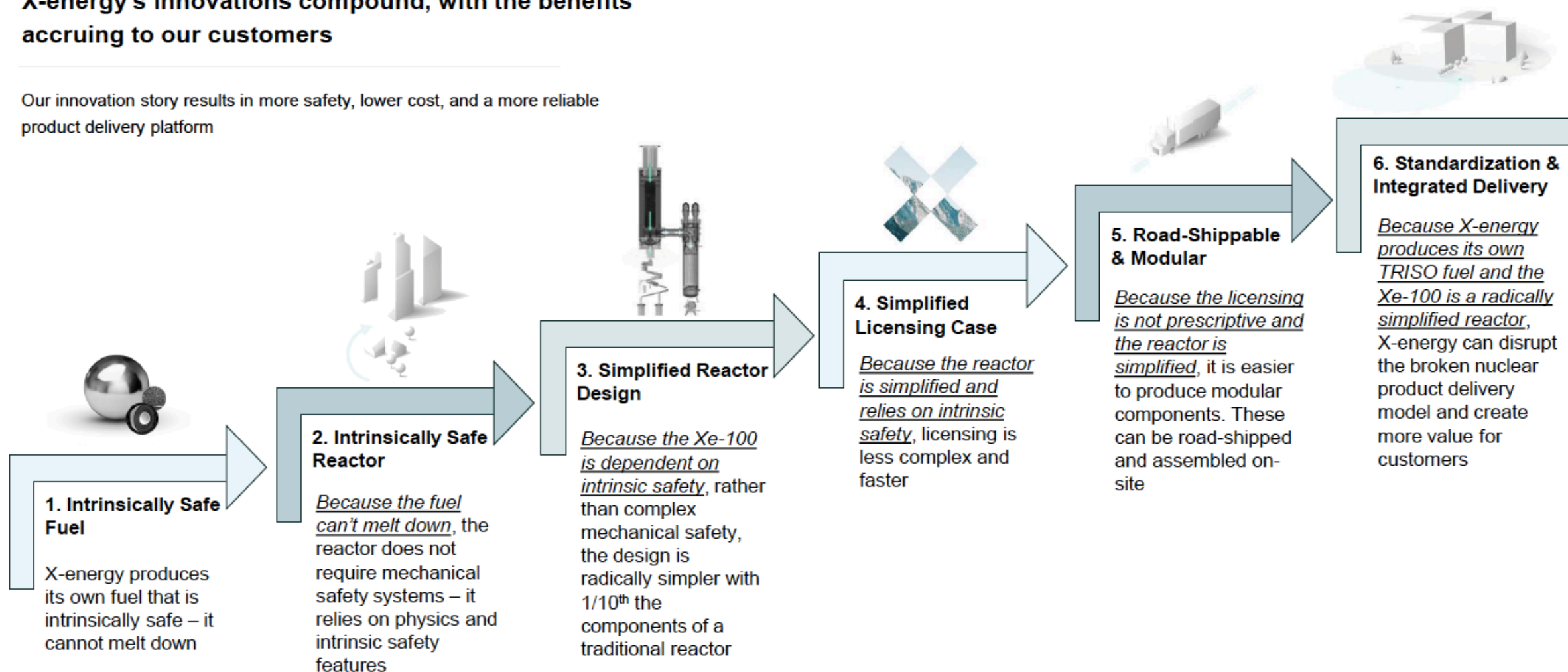


We are leveraging proven technology & billions of dollars of prior investment

									
USA	UK	USA	Germany	USA	Germany	Japan	China	USA	
1944 ORNL	1966-1975 Dragon	1966-1974 Peach Bottom	1967-1988 AVR	1967-1988 Fort St. Vrain	1986-1989 THTR	1998-Present HTR	2000-Present HTR-10	2005 – Present	

X-energy's innovations compound, with the benefits accruing to our customers

Our innovation story results in more safety, lower cost, and a more reliable product delivery platform



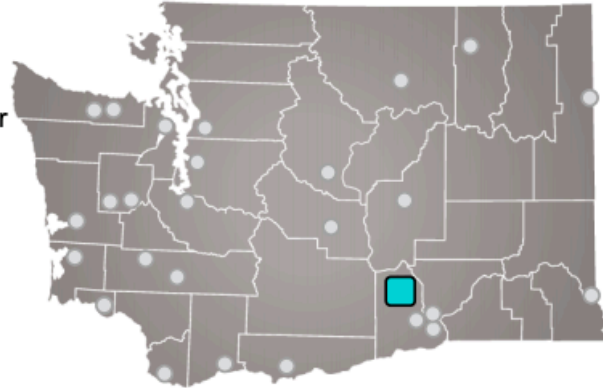
ARDP Details

- In May 2020, the Department of Energy announced the Advanced Reactor Demonstration Program (ARDP)
- X-energy and TerraPower were selected as program winners in October 2020
- Program designed as a public-private partnership:
 - Government provides winning bids with 50% cost share for first-of-a-kind advanced nuclear plant
 - Plant must be commercial (not demonstration)
 - Plant must be ready for deployment by 2027
 - Private sector partner applies with 1) utility customer and 2) qualified site
 - ✓ Government motive? Kick-start advanced nuclear industry
- X-energy partnered with Energy Northwest, a top-tier customer

Energy Northwest



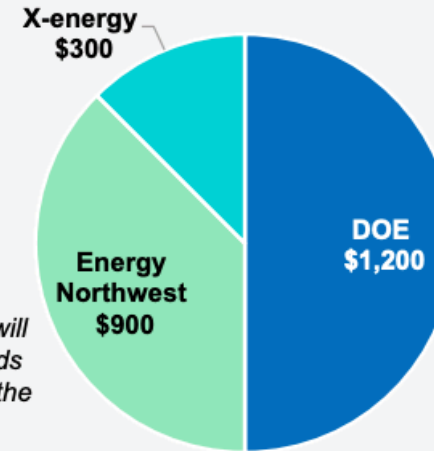
- Membership includes 27 public power utilities, including 23 of Washington state's 29 public utility districts
- Challenged by state law that mandates zero carbon grid by 2045, with limited additional upside in Washington state for wind, solar, or hydro
- Public agency with tax-advantaged capital access



● Member utility
 ■ X-energy site

Cost Share (\$mm)

X-energy capital raise covers non-recurring engineering/regulatory costs

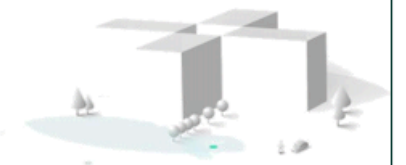


Department of Energy cost share does not include equity, royalties, or any intellectual property rights

Energy Northwest will issue municipal bonds and pass the cost to the rate-payer

What ARDP Means to X-energy...

- 1 Final design, engineering, and licensing
- 2 Commercial fuel facility
- 3 First advanced nuclear plant in the market





energy

empowering earth

Clean • Safe • Secure • Affordable

Q & A



All proceedings will be uploaded
to nric.inl.gov



NRIC National Reactor
Innovation Center