NuScale Power™

July 22, 2017

U.S. Women in Nuclear - Region IV

NuScale and the Future of ~~Nuclear~~ Energy

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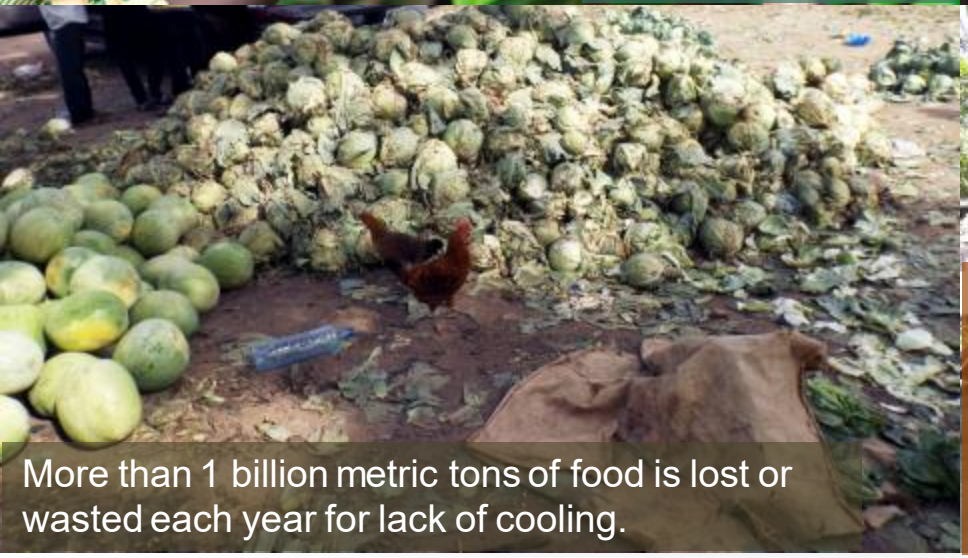
The Global Reality

783 million people do not have access to clean water.

Courtesy R. Temple, NuScale Power

Air pollution in developing economies routinely exceed U.S. standards



More than 1 billion metric tons of food is lost or wasted each year for lack of cooling.

An additional 197 quadrillion BTUs of energy are needed to lift 5.9 billion people out of energy poverty.

Courtesy T. Maloney, NuScale Power

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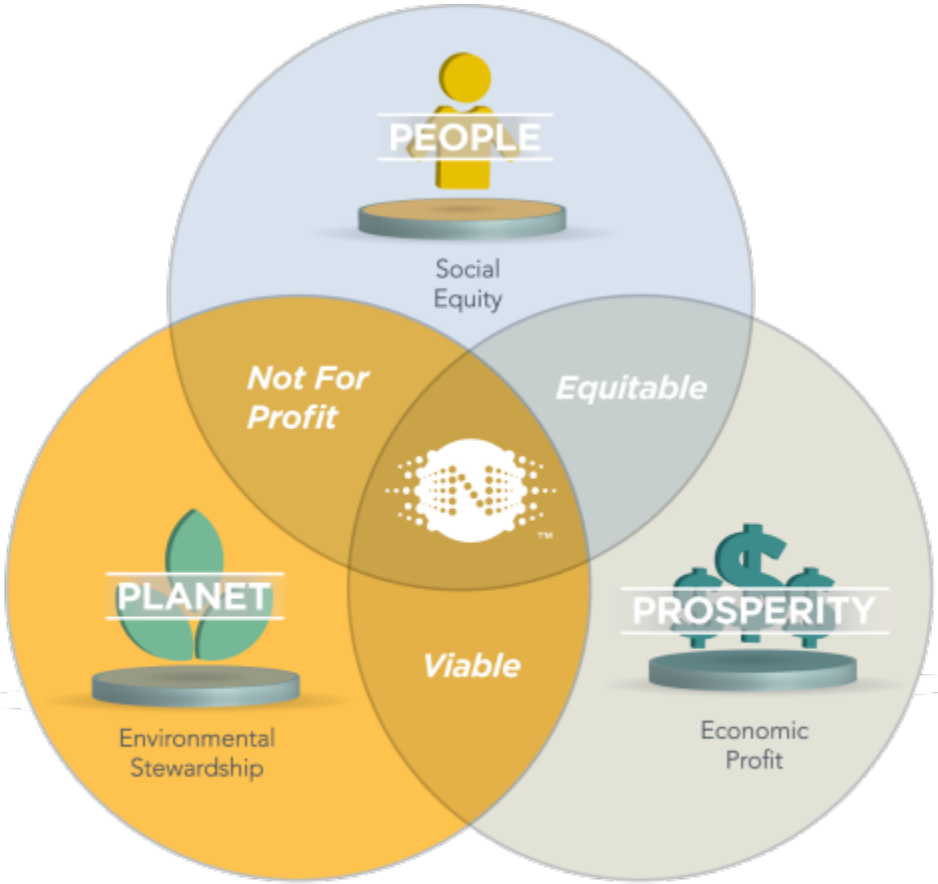
Commitment to People, Planet, Prosperity



NuScale Power provides scalable advanced nuclear technology for the production of electricity, heat, and water to improve the quality of life for people around the world.

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Who is NuScale Power?

- Initial concept started with Department of Energy MASLWR program at Oregon State University.
- NuScale Power was formed in 2007 for the sole purpose of completing the design of and commercializing a small modular reactor – the NuScale Power Module (NPM).
- Fluor, global engineering and construction company, became lead investor in 2011.
- In 2013, NuScale won $217M in matching funds in a competitive DOE funding opportunity.
- >350 patents granted or pending in 20 countries.
- >300 full-time employees in 5 offices in the U.S. and 1 in London
- NuScale design currently undergoing rigorous review by the U.S. Nuclear Regulatory Commission (NRC)

NuScale Engineering Offices Corvallis, OR

One-third scale NIST-1 Test Facility

NuScale Control Room Simulator

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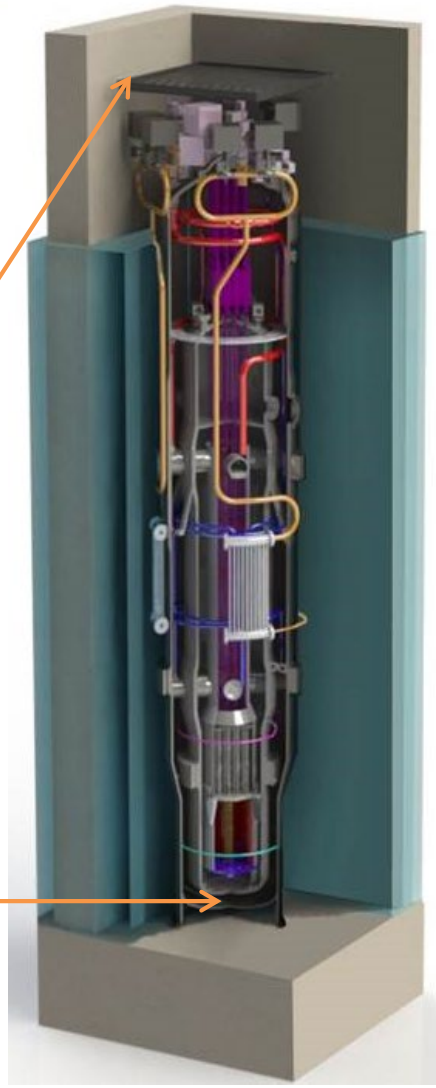
What is a NuScale Power Module?

- A NuScale Power Module (NPM) includes the **reactor vessel, steam generators, pressurizer,** and **containment** in an integral package.
- Each individual NPM is 50 MWe (gross), small enough to be factory built for easy transport and installation.
- The NPM has a simple design that eliminates reactor coolant pumps and large bore piping along with 13 other systems and components needed to protect the core in large conventional reactors.
- Each NPM has a dedicated power conversion system for flexible, independent operation.
- NPMs can be incrementally added to match load growth - up to 12 NPMs for 600 MWe gross (~570 net) total output.



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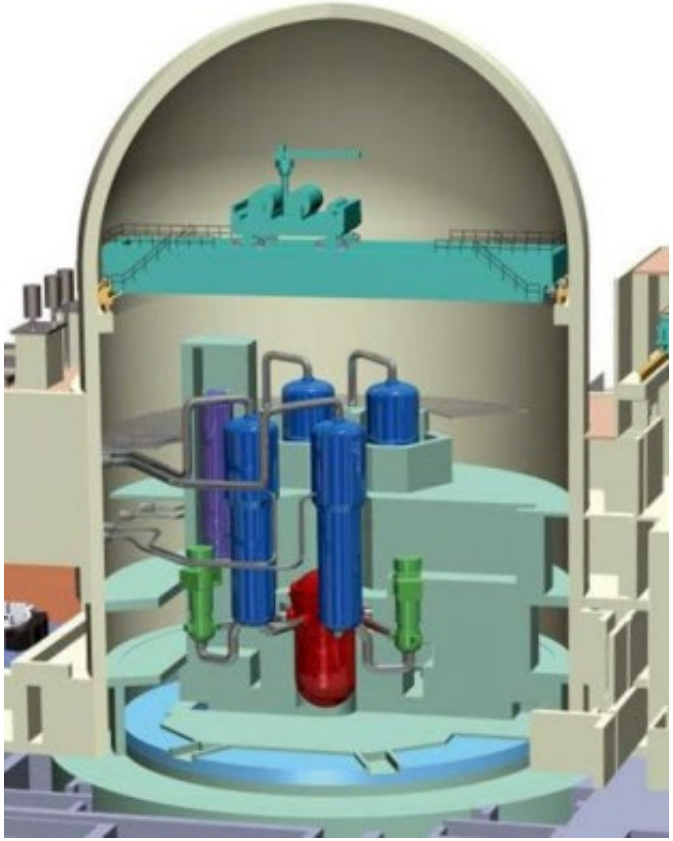
NPM Size Comparison

Typical 1000 MW Pressurized-Water Reactor Containment & Reactor System



*Source: NRC

NuScale Power Module
50 MWe Combined Containment Vessel and Integral Reactor System

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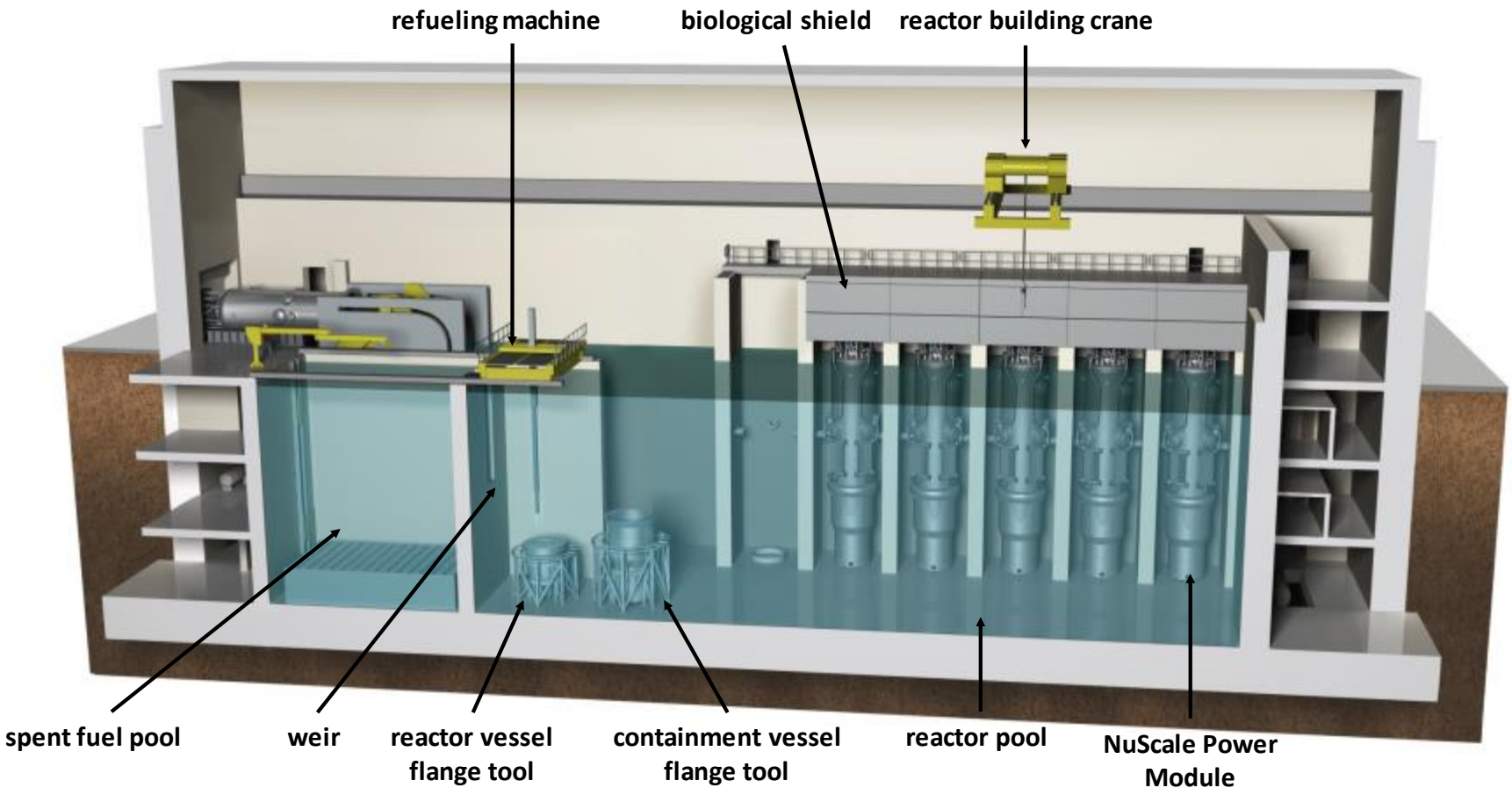
Reactor Building Overview

Reactor building houses NuScale Power Modules, spent fuel pool, and reactor pool



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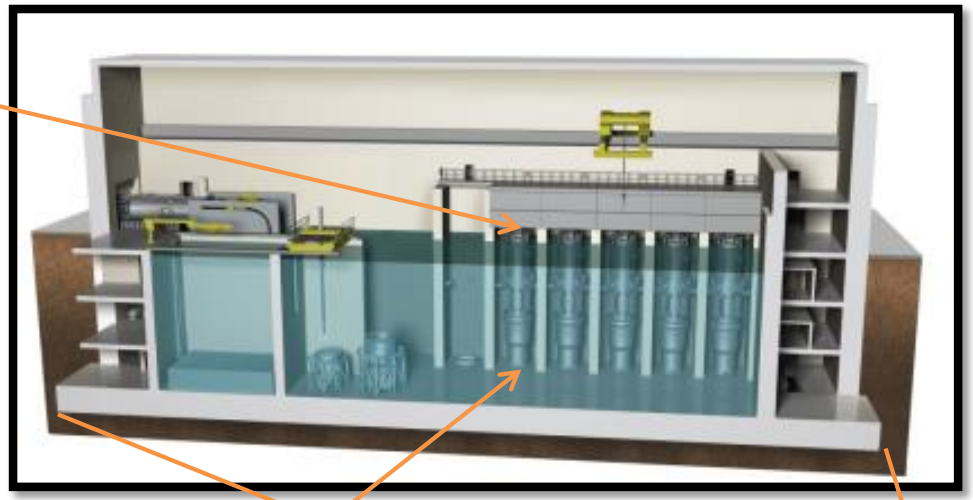
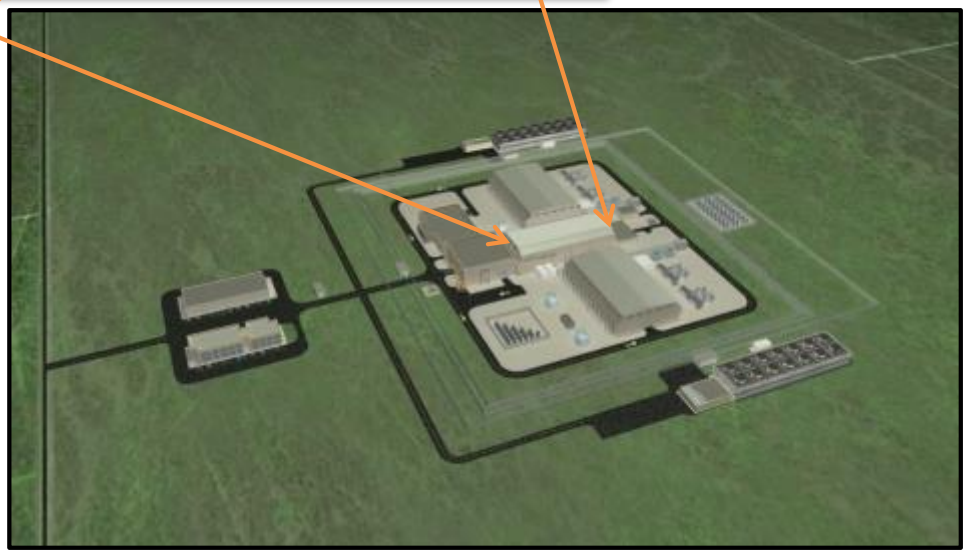
NuScale Power Plant - Overview





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Advantages of Small Modular Approach

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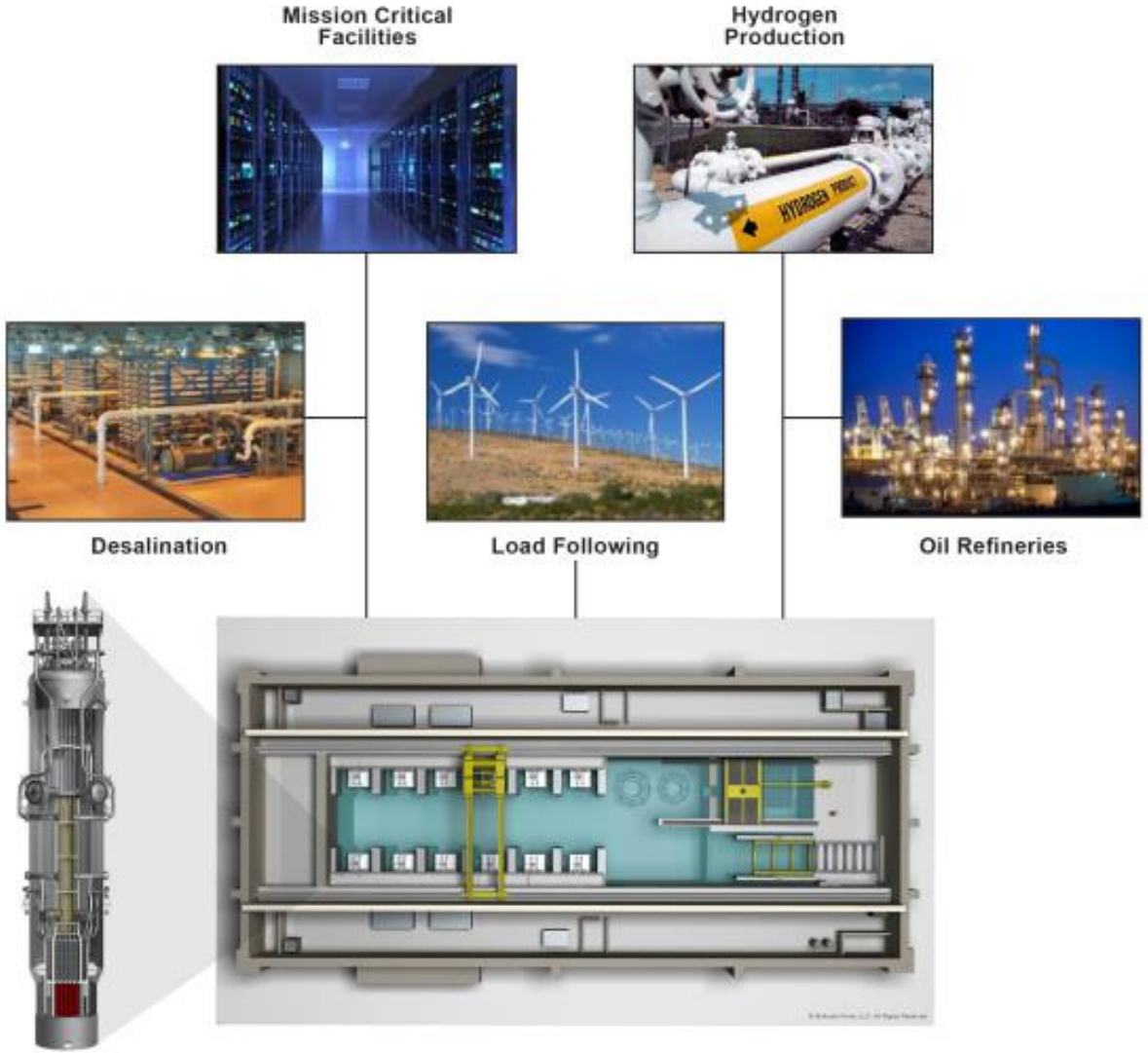
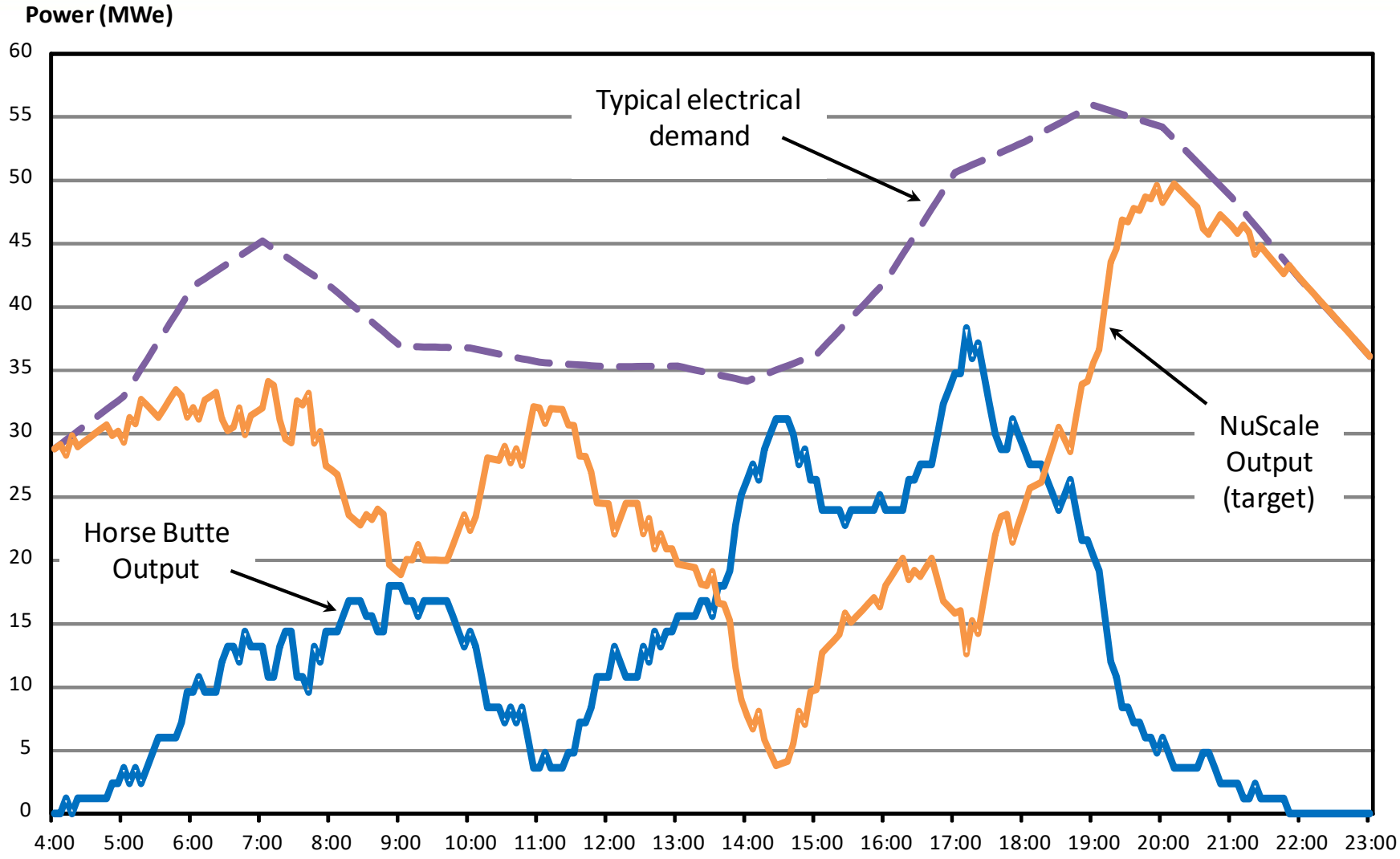
NuScale Diverse Energy Platform



Load-Following with Wind



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Reliable Power for Mission Critical Facilities

UTILITY MACROGRID

470 MWe (net)
> 95% Capacity

NuScale 12-Module Plant

DEDICATED MICROGRID
100 MWe (net)
> 99.99% Availability

MISSION CRITICAL FACILITY

- Connection to a micro-grid, island mode capability, and the ability for 100% turbine bypass allows a NuScale plant to assure 100MWe net power at 99.99% reliability over a 60 year lifetime
- Using highly robust power modules and a multi-module plant design can provide clean, abundant and highly reliable power to those utility customers who require it
- Working with utilities and customers to get "Five 9s"

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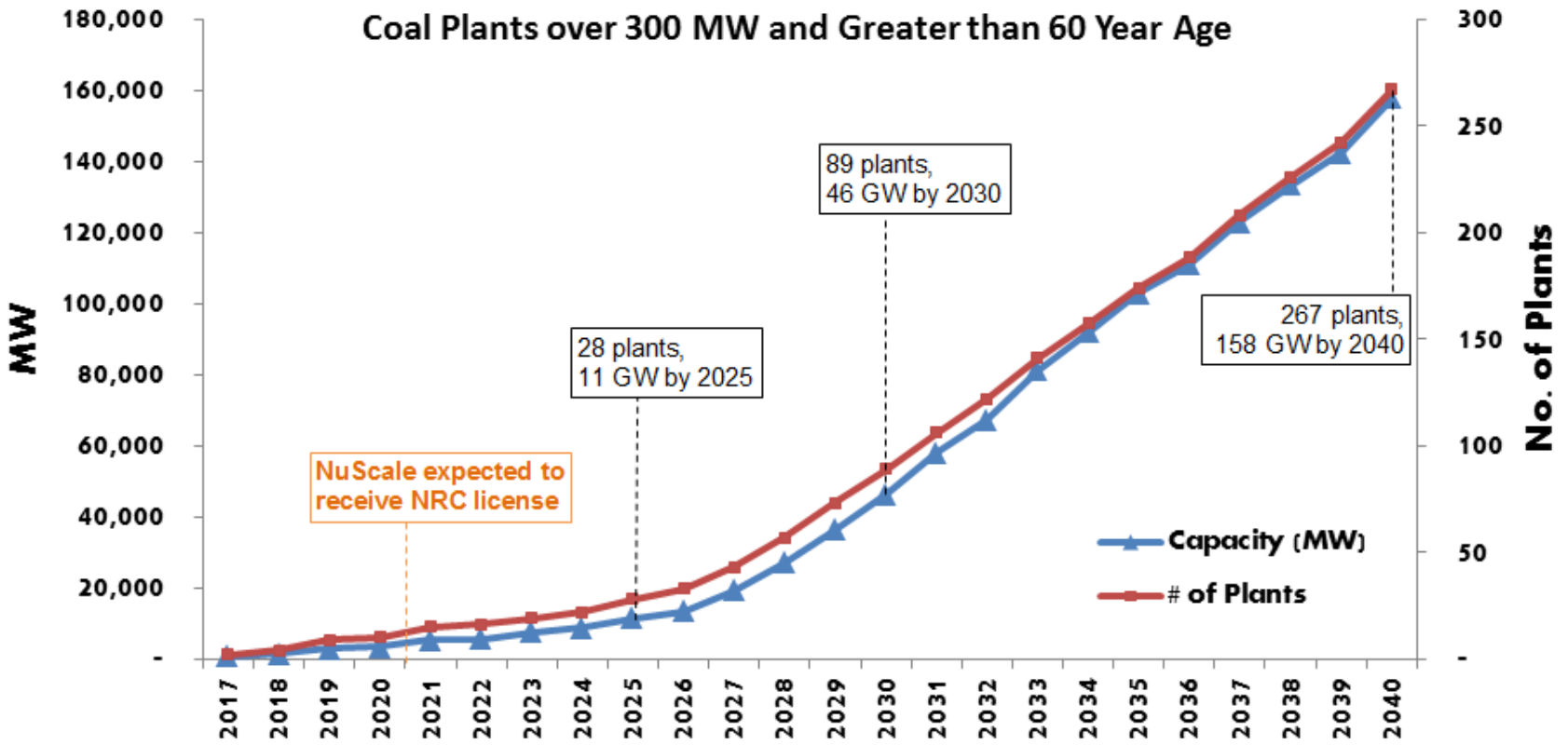
Coal Plant Re-Powering



- Each NuScale Plant employs **360 people full-time**, with **1200 peak construction jobs**
- Domestic supply chain for manufacturing 36 modules per year generates about **12,000 jobs**

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Where do we go from here?

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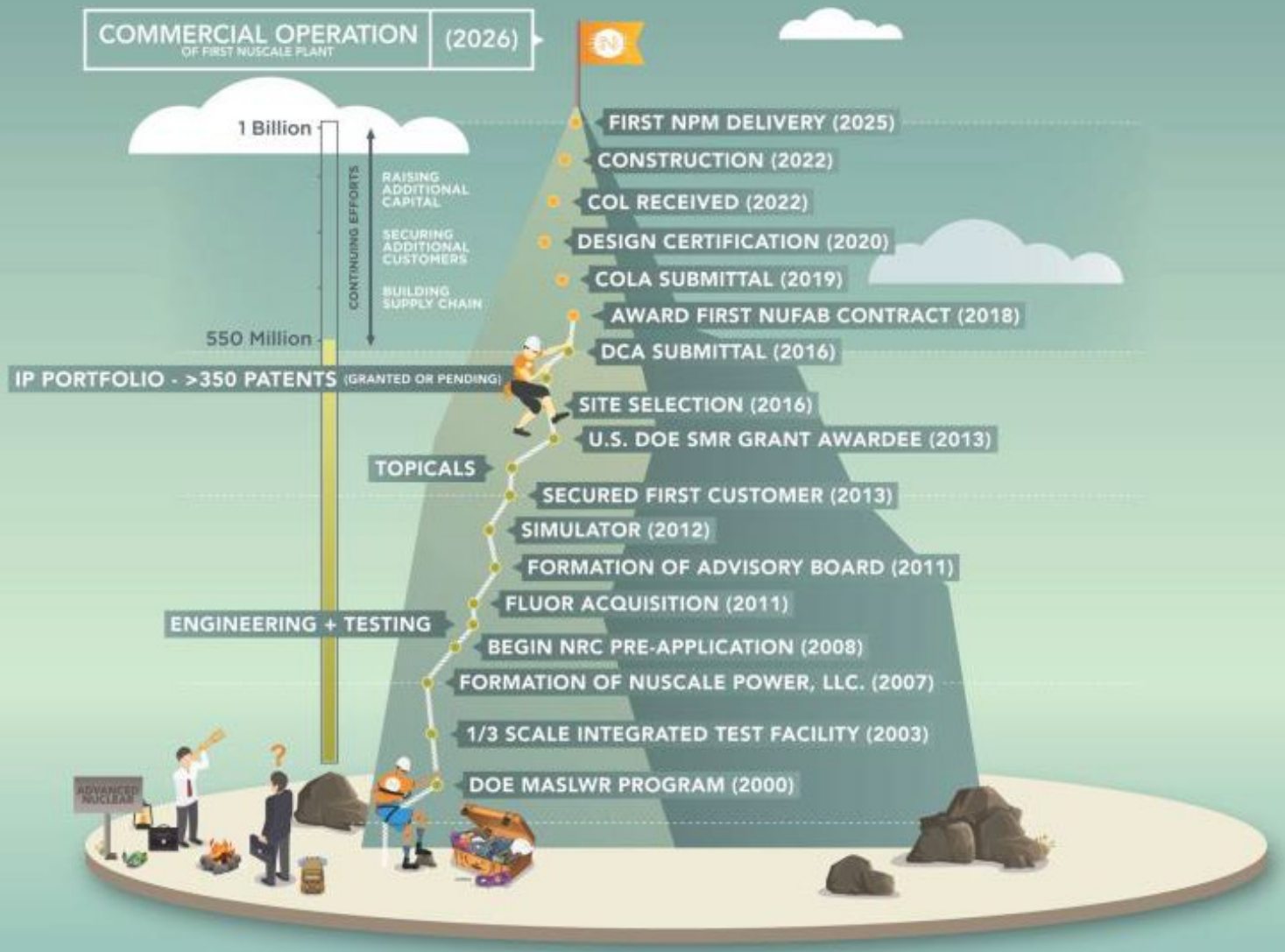
Blazing the Trail to Deployment



NuScale Power

Design Certification Status

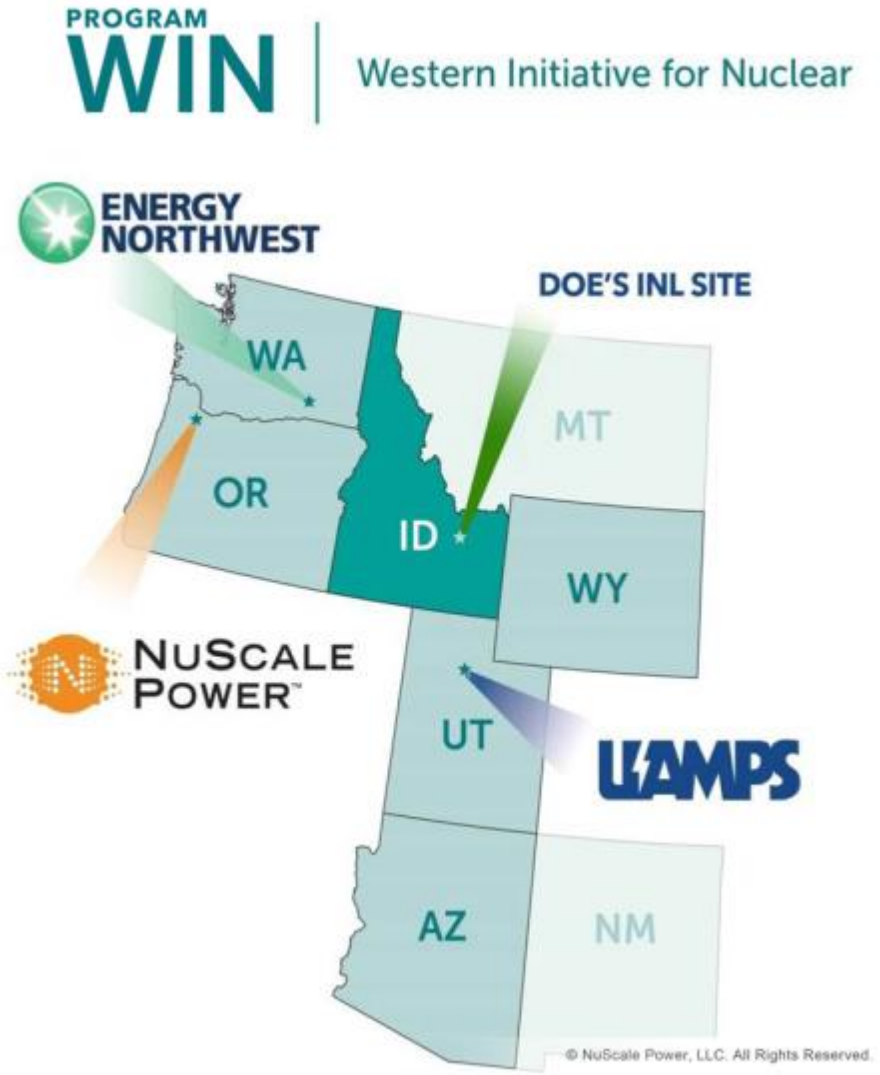
- Application completed December 31, 2016
  - application about 12,000 pages total
  - 14 topical reports (15th – emergency planning zone)
  - 17 technical reports
  - human factors engineering information
- Application accepted for review March 15, 2017
- NRC estimates certification rule complete in **January 2021**
- In phase 1 of review (preliminary safety evaluation report)
  - ~14 audits in process
  - Quality Assurance inspection completed June 9, 2017
  - 74+ Requests for Additional Information (RAIs) submitted to NRC
- Over 2 million pages-equivalent submitted on docket

NuScale Supply Chain

- Unique—not like a traditional power plant
  - More like manufacturing (e.g. Boeing), less like construction (e.g., EPC company)
  - NPM fabrication occurs *in parallel* to plant construction (~3 years)
- Supply chain is on track to support first module commercial operation date for first US project (2026)
  - NPM Fabrication Request for Proposals issued; targeting fabricator selection by mid 2018
  - Fluor has secured a preferred role as the engineering, procurement, and construction (EPC) services provider
  - Executed critical supply agreements
    - Fuel assembly fabrication – AREVA
    - Safety instrumentation and controls – Ultra Electronics
  - N-Stamp Program under development

First Deployment: UAMPS CFPP

- Utah Associated Municipal Power Systems (UAMPS) Carbon Free Power Project (CFPP) will be first deployment
- Preferred location within the Idaho National Laboratory (INL) site
- A 12-module plant (600 MWe gross)
- DOE awarded $16 million in cost sharing to perform site selection, secure site and water, and prepare combined operating and license application to NRC
- 2026 commercial operation

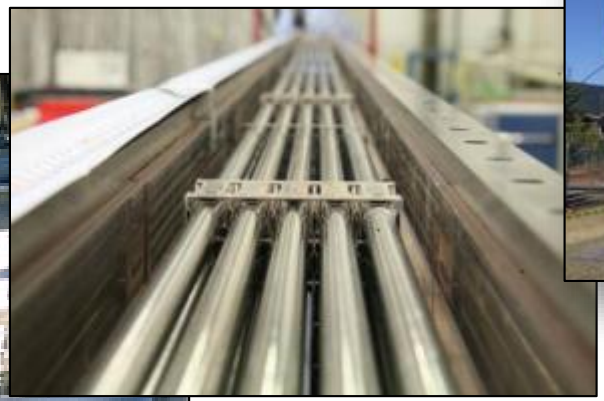


The Future of Energy Getting Closer

NuScale RPV Head Ingot Being Forged

NuScale Control Room Simulator

NuScale Full-scale Upper Module Mockup



NuFuel HTP2 Testing

NuScale Integral System Test Facility (Oregon State University)

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Acknowledgement & Disclaimer

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Questions?

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