



NUSCALE™
Power for all humankind

NuScale Power Overview – Energiforsk Nuclear Seminar 2021

January 20, 2021

Dom Claudio
Director of Sales

The Global Reality

Energy is essential to human development.

1.1 billion people still live without any access to electricity.



Source: International Energy Agency (IEA)

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The Global Reality

By 2025, half of the world's population will be living in **water-stressed** areas.



Source: World Health Organization (WHO)

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The Global Reality

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



Source: Food and Agriculture Organization (FAO)

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The Global Reality

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



NuScale's Mission

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



Artistic concept of the NuScale Power Plant

A Bold, New Energy Source

- **Smarter Energy** – Flexible design can support multiple applications, integrate with renewable resources, provide highly reliable power to mission critical facilities, and serve as clean baseload power.
- **Cleaner Energy** – 100% carbon-free energy – as clean as wind or solar – with a small land footprint.
- **Safer Energy** – Should it become necessary, NuScale's SMR shuts itself down and self-cools for an indefinite period of time, with no operator action required, no additional water, and no AC or DC power needed.
- **Cost Competitive** – The NuScale SMR is far less complex than other designs. Off-site fabrication and assembly reduce cost. Components are delivered to the site in ready-to-install form. All of this results in construction occurring in a shorter, more predictable period of time.



Who is NuScale Power?

- NuScale Power was formed in 2007 for the sole purpose of completing the design and commercializing a small modular reactor (SMR) – the NuScale Power Module™
- Initial concept was in development and testing since the 2000 U.S. Department of Energy (DOE) MASLWR program
- Fluor, global engineering and construction company, became lead investor in 2011
- In 2013, NuScale won a competitive U.S. DOE Funding Opportunity for matching funds, and has been awarded over \$300M in DOE funding since then
- >530 patents granted or pending in nearly 20 countries
- >400 employees in 5 offices in the U.S. and 1 office in the U.K.
- Rigorous design review by the U.S. Nuclear Regulatory Commission (NRC)—NuScale received Design Approval in August 2020
- Total investment in NuScale to date is greater than US\$1B



NuScale Engineering Offices Corvallis



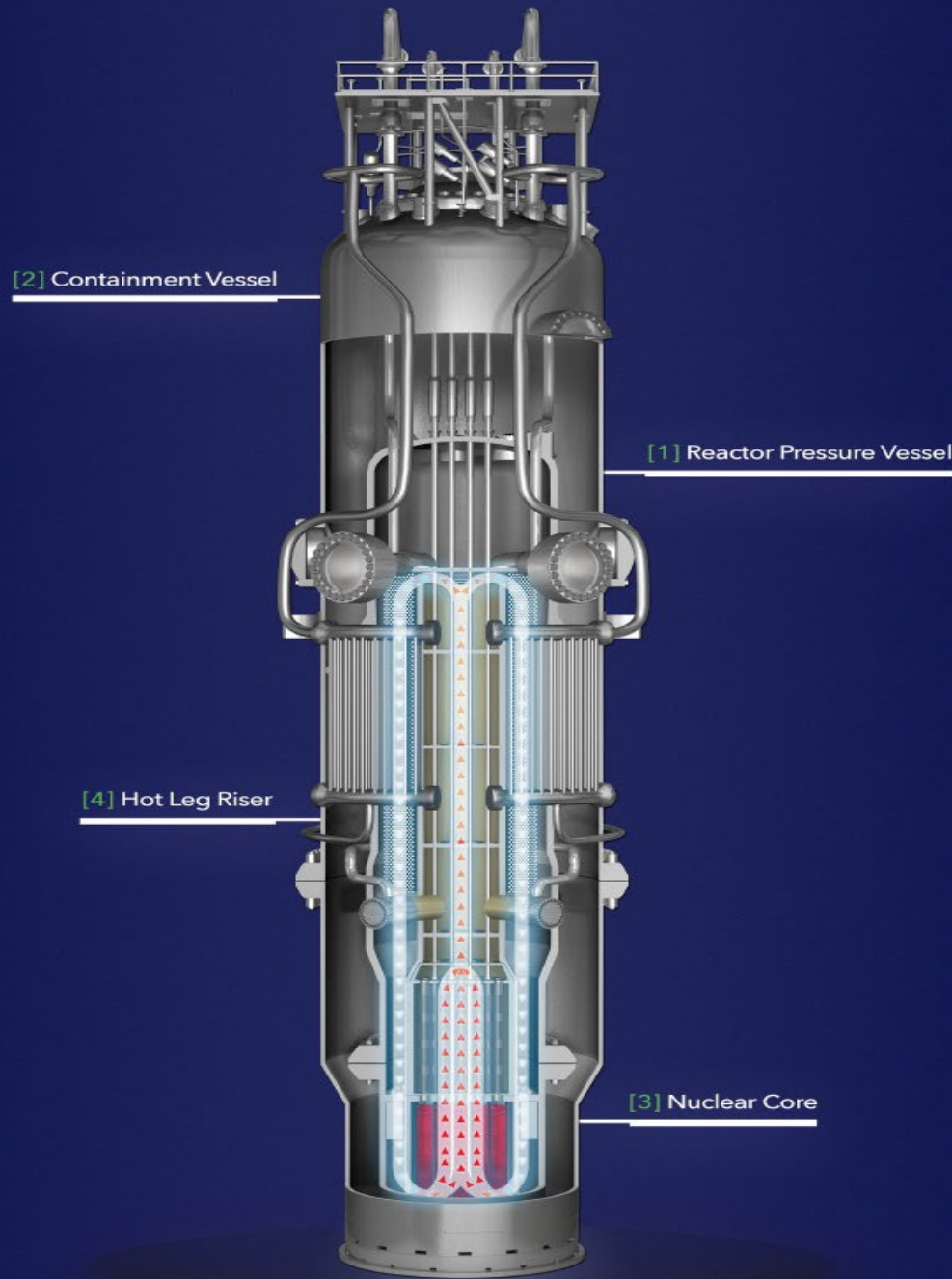
One-third Scale NIST-2 Test Facility



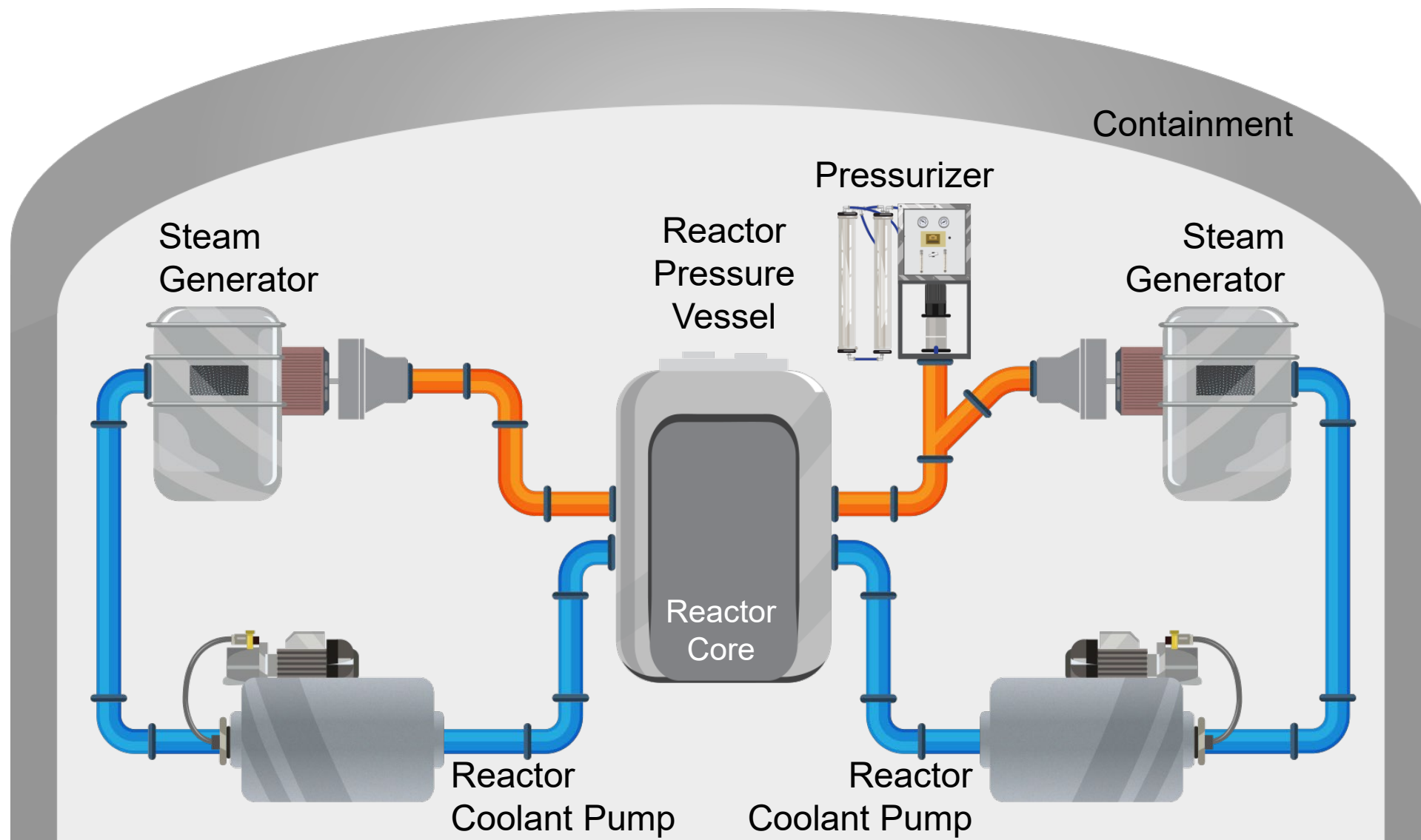
NuScale Control Room Simulator

Core Technology: NuScale Power Module™

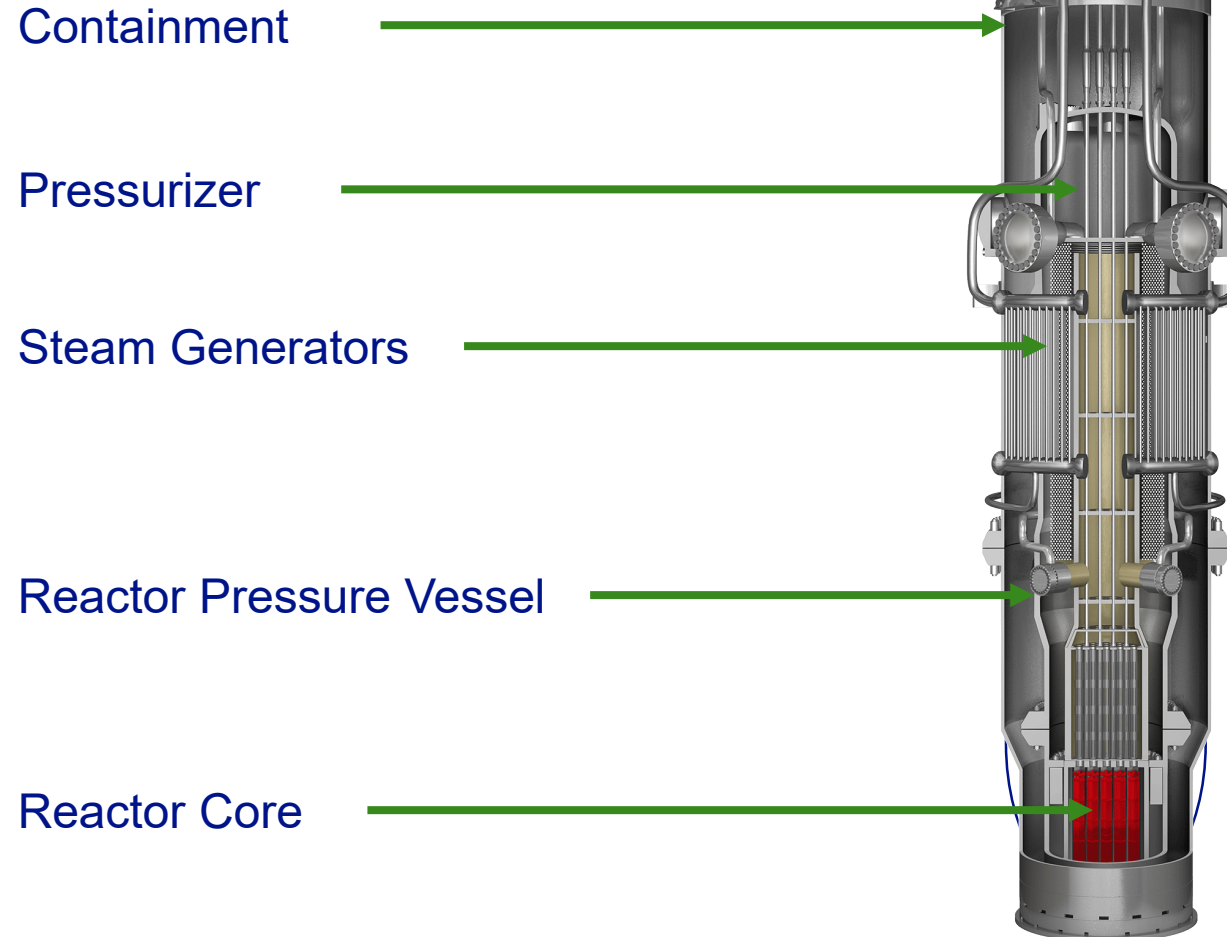
- A **NuScale Power Module™ (NPM)** includes the reactor vessel, steam generators, pressurizer, and containment in an **integral package** – simple design that eliminates reactor coolant pumps, large bore piping and other systems and components found in conventional reactors
- Each module produces **up to 77 MWe**
 - Small enough to be factory built for easy transport and installation
 - Dedicated power conversion system for flexible, independent operation
- Modules are incrementally added to match load growth
 - Up to **12 modules for 924 MWe** gross output
 - Smaller power plant solutions available for 4-module (308 MWe) and 6-module (462 MWe) plants



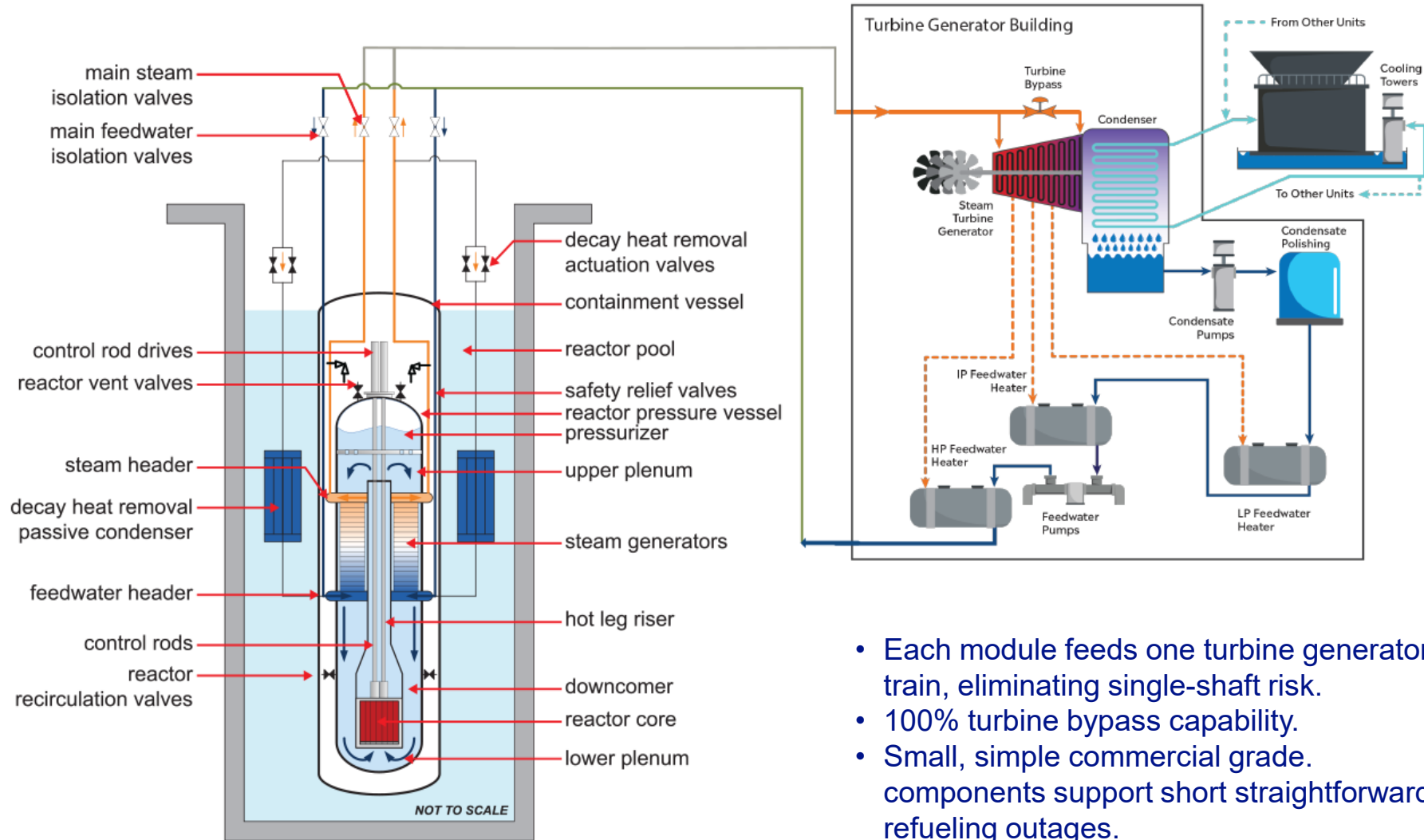
Typical Pressurized Water Reactor



NuScale Power Module™ Components

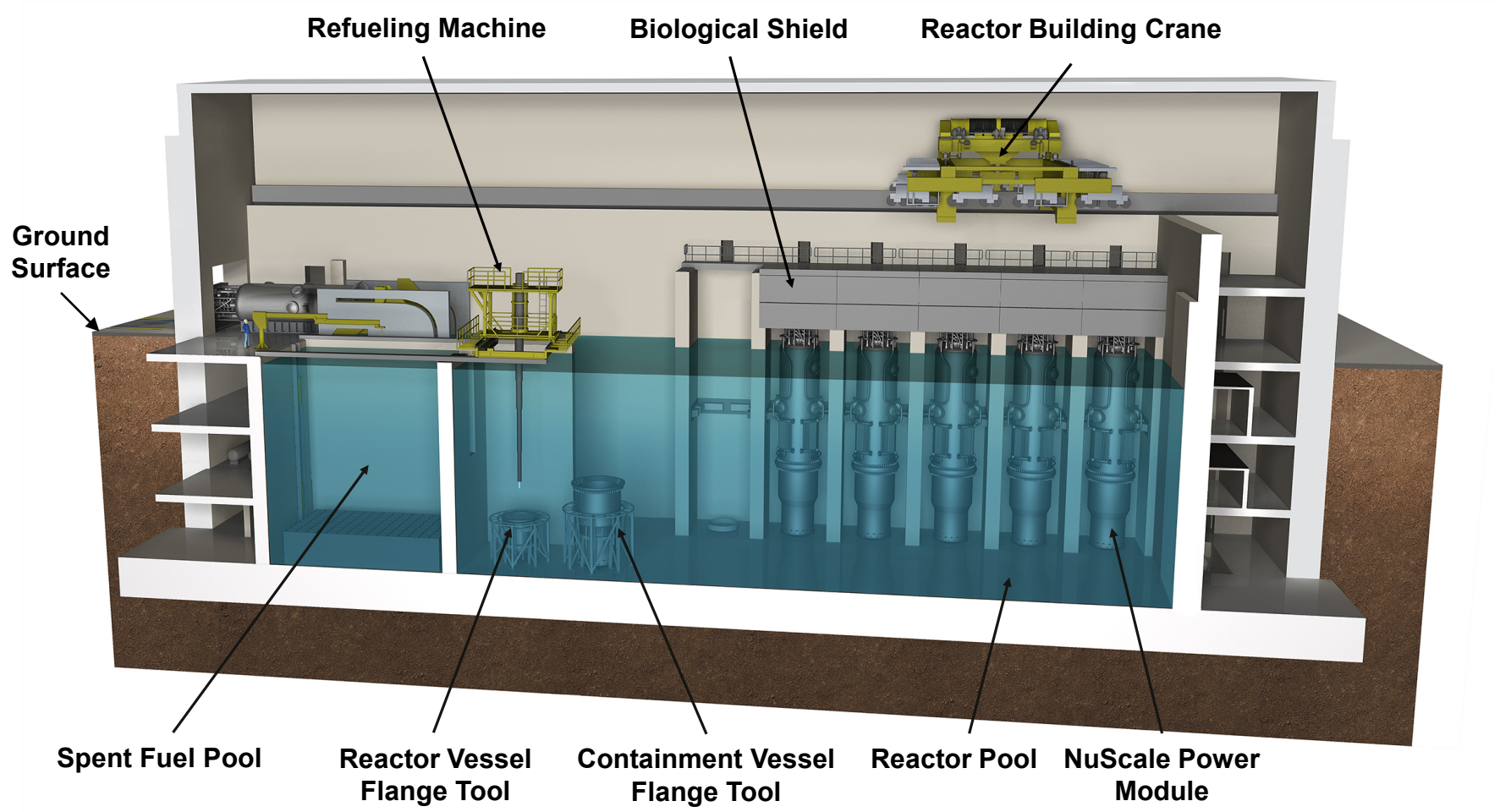


NuScale Power Train

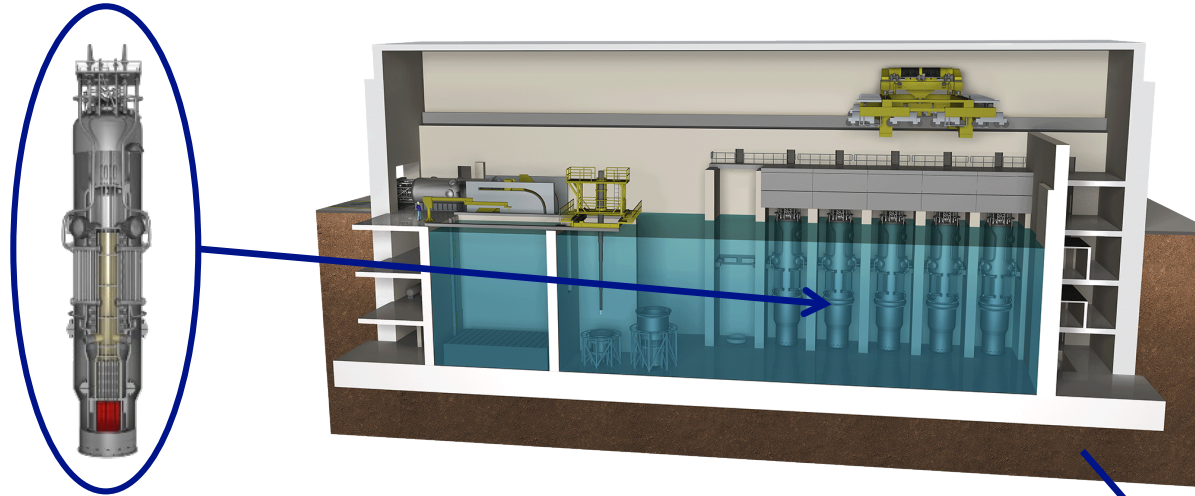


- Each module feeds one turbine generator train, eliminating single-shaft risk.
- 100% turbine bypass capability.
- Small, simple commercial grade. components support short straightforward refueling outages.

Reactor Building Houses NuScale Power Modules™, Spent Fuel Pool, and Reactor Pool



NuScale Advanced Small Reactor Overview

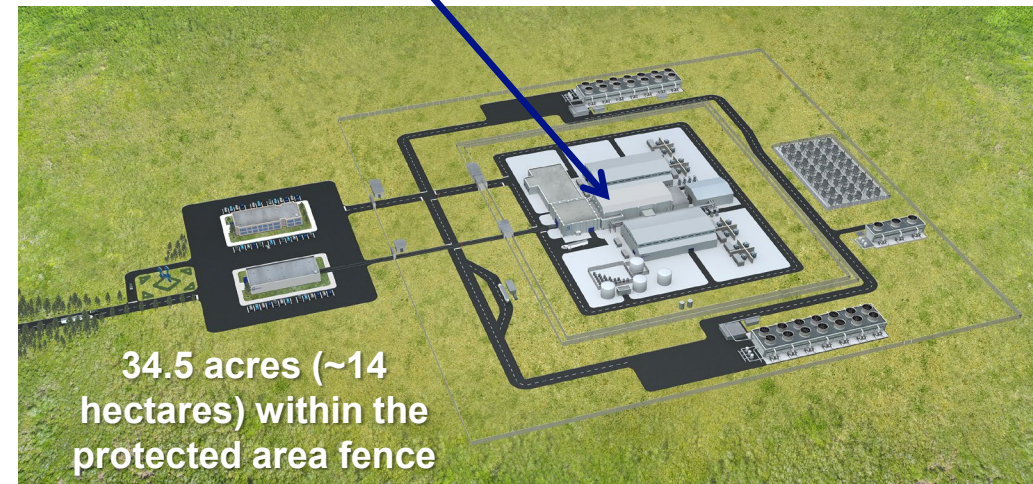


- Each module produces up to **77 MWe**
- Up to **12 modules** for **924 MWe** gross plant output
- Smaller power plant solutions available for 4-module (308 MWe) and 6-module (462 MWe) plants

Triple Crown of Safety - NuScale Plant safely shuts down with:

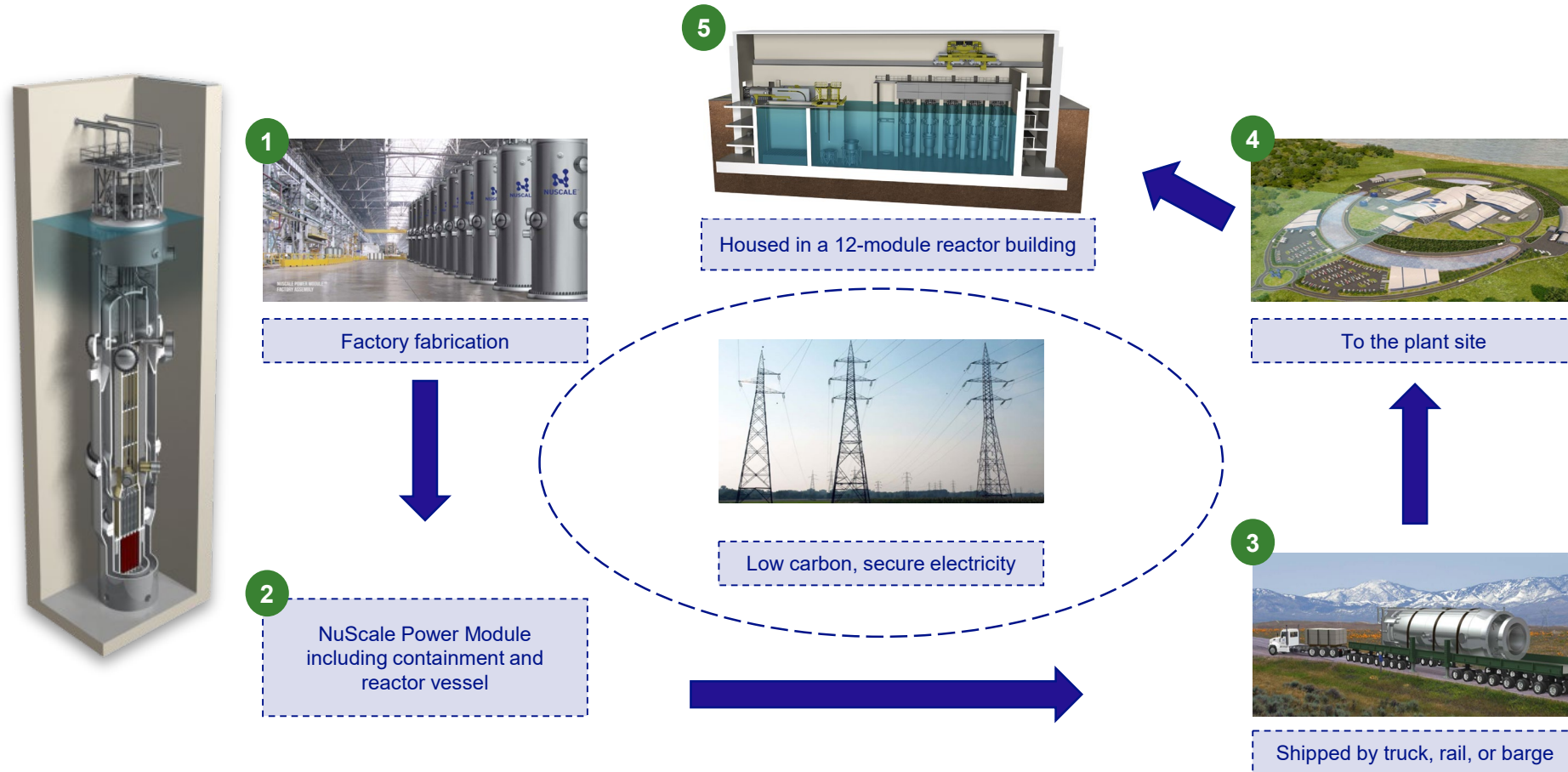
- No operator or control system actions
- No AC/DC power
- No additional water

Emergency planning zone (EPZ) ends at site boundary



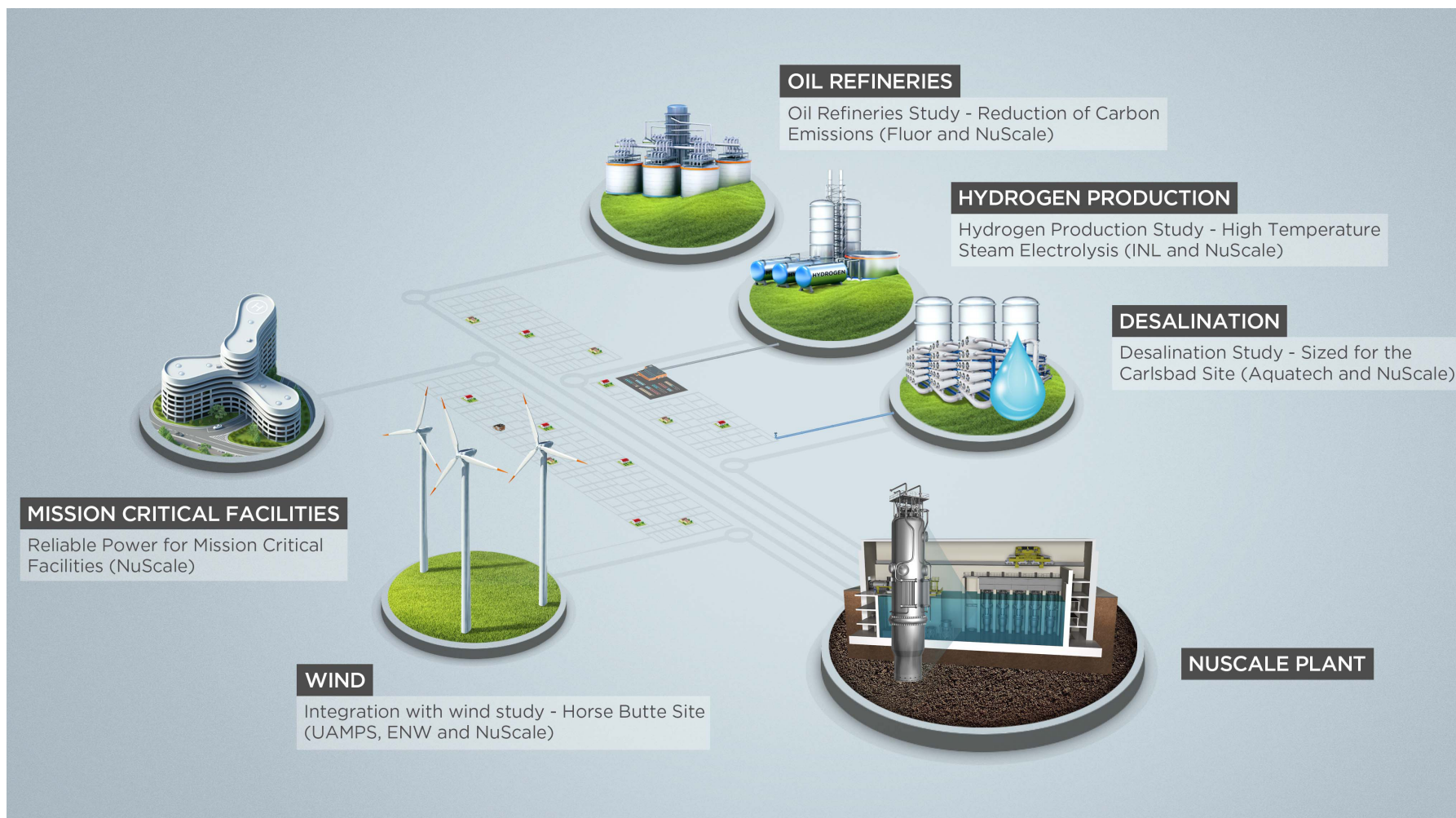
A New Approach to Construction and Operation

NuScale has revolutionized the nuclear supply chain with modular manufacturing of NPM units in-house that are shipped to sites



Beyond Baseload: NuScale Diverse Energy Platform

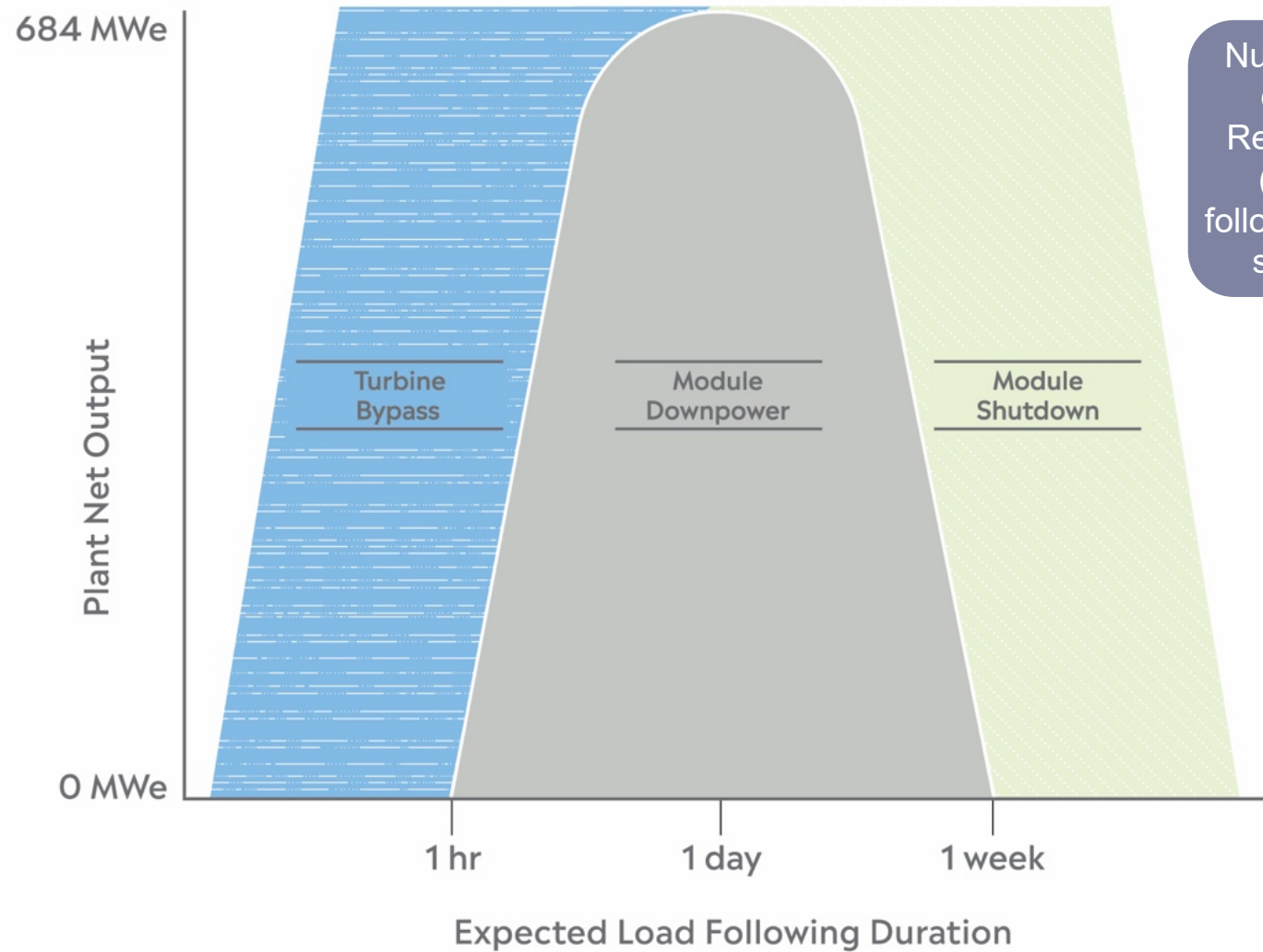
MORE THAN RELIABLE BASELOAD AND LOAD-FOLLOWING ELECTRICITY GENERATION



Reports for associated technical studies are available at: www.nuscalepower.com/technology/technical-publications

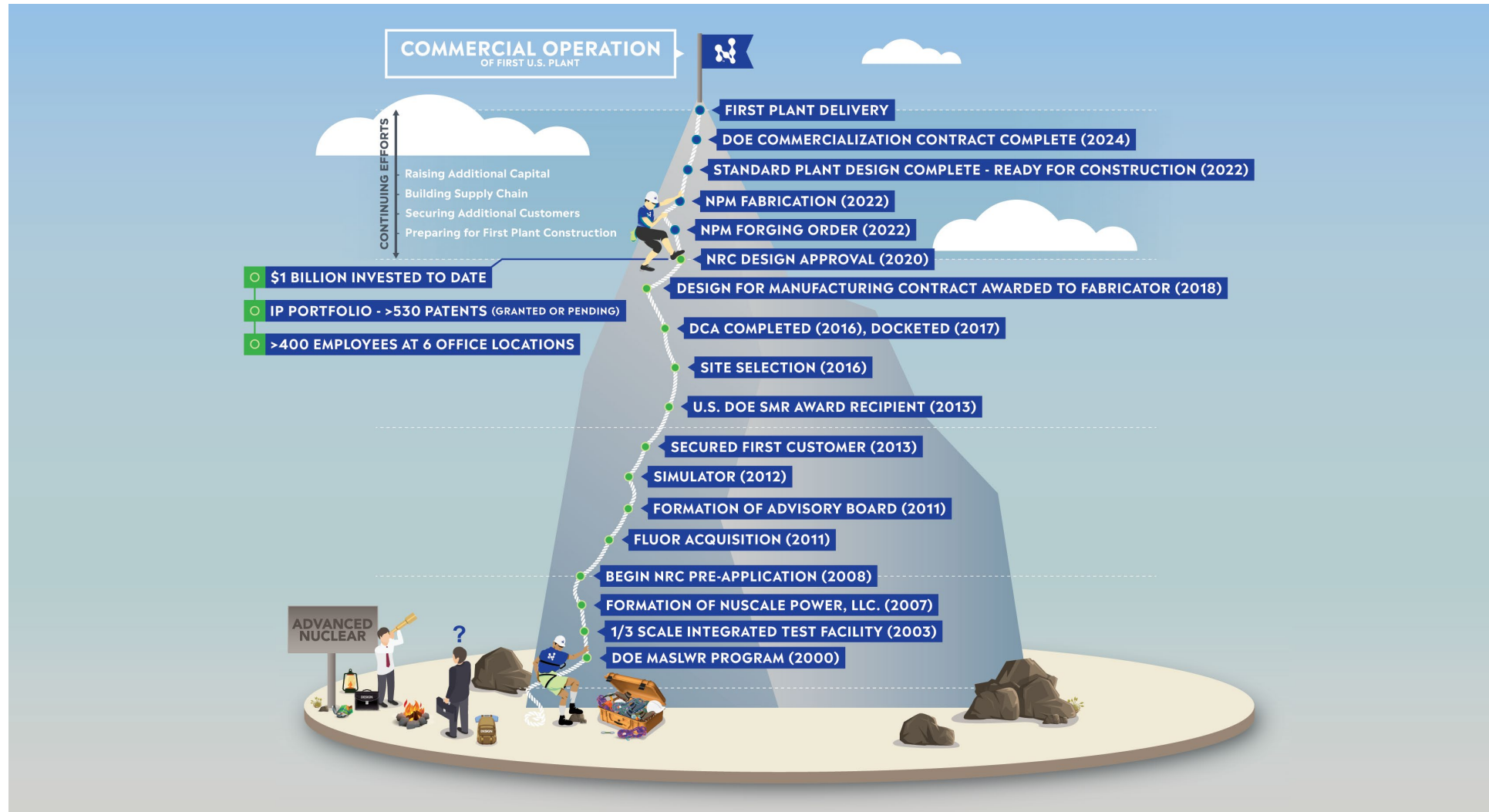
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Load Follow Strategies of the NuScale Plant



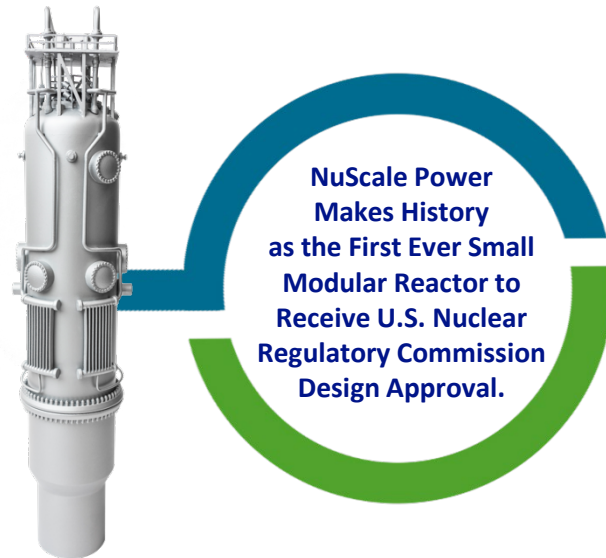
NuScale design meets or exceeds EPRI Utility Requirements Document (URD), Rev. 13, load following and other ancillary service requirements.

Blazing the Trail to Commercialization



First SMR to Undergo Licensing in the U.S.

- Design Certification Application (DCA) completed in December 2016.
- Docketed and review commenced by U.S. Nuclear Regulatory Commission (NRC) in March 2017.
- NuScale received standard design approval in September 2020.



DCA Statistics

- **12,000+** pages
- **14** Topical Reports
- **>2 million** labor hours
- **>800** people
- **>50** supplier/partners
- Over **\$500M**

NuScale 924 MWe U.S. Plant Cost Summary

**Nth-of-a-Kind
Cost (NOAK)**

\$2,458,735,000

\$2,850/KW

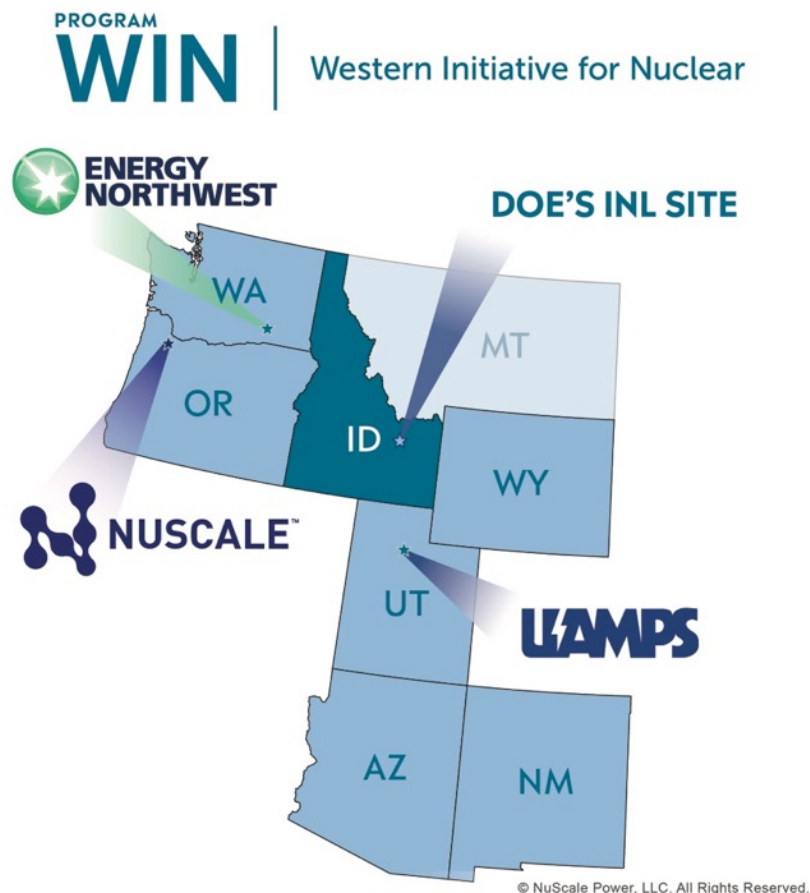
- ✓ 2017 USD
- ✓ **Generic Southeast U.S. Site**
- ✓ 12 module plant
- ✓ 884 MWe net

Excludes:

- Warranty
- Contingency
- Fee

- NOAK based on the following First-of-a-Kind (FOAK) cost:
- Design maturity
 - 2014 original estimate updated in 2017.
 - Equipment lists, P&IDs, 3D plant models, etc.
- Rigorous and systematic “bottoms up” approach
 - Conforms to AACE International 18R-97 – Class 4 cost estimate.
 - Over 14,000 line items (equipment, material, etc.) priced using Fluor’s current proprietary cost data or actual vendor quotes.
 - Labor costs and productivity data from recent U.S. new build projects or applicable Fluor EPC experience and industry data.
- NuScale Power Module™ cost estimate – conforms to AACE International Class 3 cost estimate
 - Performed by experienced large nuclear component manufacturer Includes:
 - Manufacturing bill of material.
 - Welding, machining, and non-destructive examination processes developed.
 - Transportation costs developed by expert heavy load transport engineering team.
 - Fluor estimated EPC scope.
- *NOAK based on assumed learning from FOAK cost estimate*

First Deployment: UAMPS Carbon Free Power Project



- Utah Associated Municipal Power Systems (UAMPS) provides energy services to community-owned power systems throughout the Intermountain West
- First deployment will be a 12-module plant within the Idaho National Laboratory (INL) site

“We have three coal plants and two of them already have closure dates. Some of that coal generation will be replaced by energy efficiency, some will be replaced by renewables and the remainder we will replace with [the NuScale plant].”

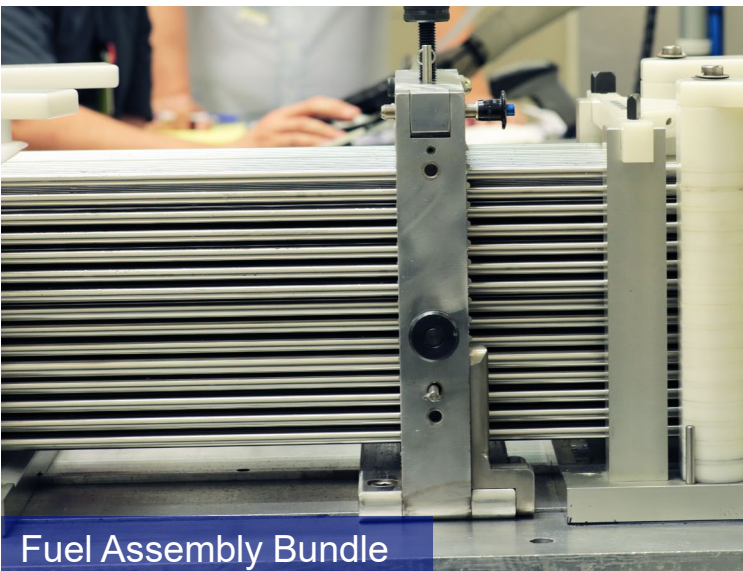
– Doug Hunter, CEO, UAMPS

OPB, March 2019

International Opportunities

- NuScale made its first submittal to the Canadian Nuclear Safety Commission (CNSC) for pre-licensing vendor design review (VDR) and signed MOUs with Ontario Power Generation (OPG) and Bruce Power.
- NuScale has been actively involved in the United Kingdom's SMR market activity for several years and is now exploring deployment opportunities.
- NuScale and Nuclearelectrica SA signed MOU to evaluate SMRs for Romania's energy needs.
- NuScale signed an MOU with ČEZ Group to explore SMR opportunities in the Czech Republic and broader region.
- NuScale signed MOU with Jordan Atomic Energy Commission (JAEC) to evaluate NuScale's SMR for use in Jordan.
- Many international opportunities for NuScale SMR deployment in Europe, the Middle East, Southeast Asia, and Africa.

The Future of Energy is Here



Fuel Assembly Bundle



One-third Scale NIST-2 Test Facility



NuScale Control Room Simulator