

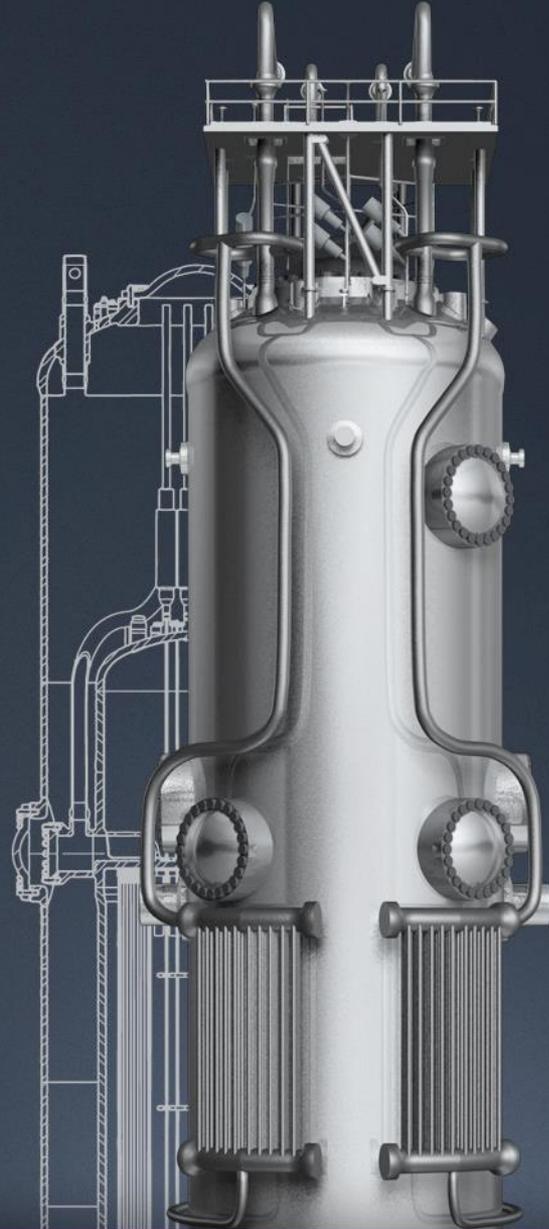


May 7, 2018

NuScale Power: A Nuclear Manufacturing Paradigm Shift

Scott Bailey

Vice President, Supply Chain

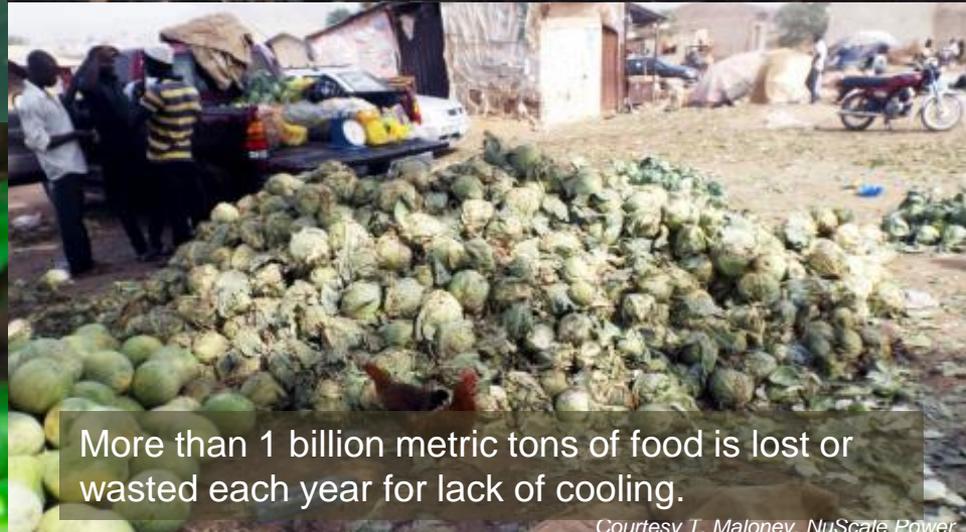


NuScale Nonproprietary

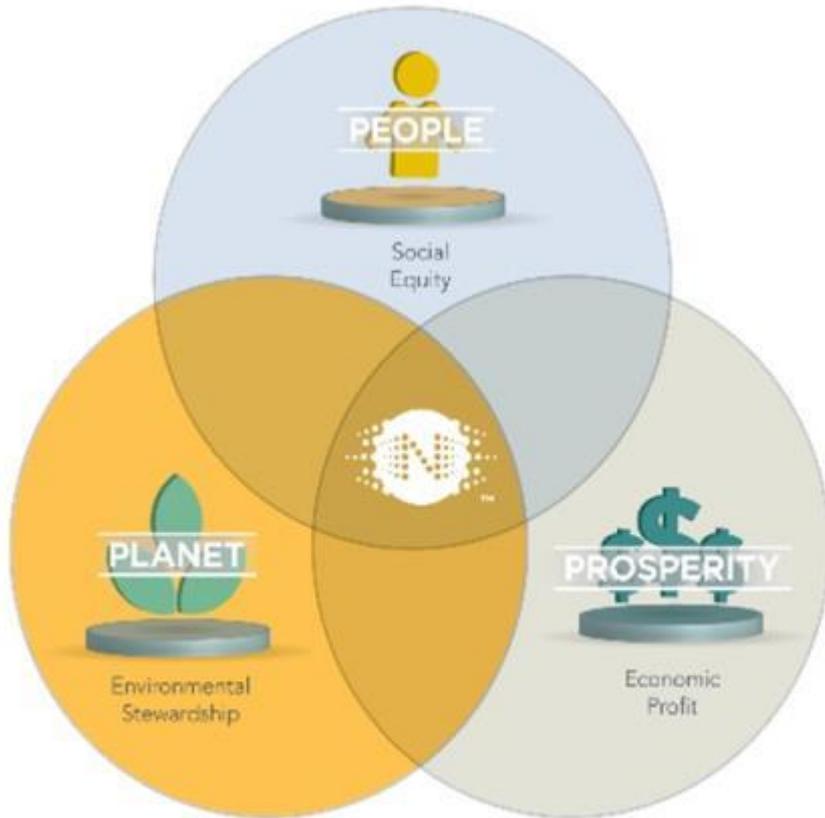
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The Global Reality



Commitment to People, Planet, Prosperity



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.

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 \$226M in matching funds in a competitive U.S. DOE funding opportunity.
- **>350 patents** granted or pending in nearly 20 countries.
- **~350 full-time employees** in 6 offices in the U.S. and 1 office 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

Core Technology: NuScale Power Module

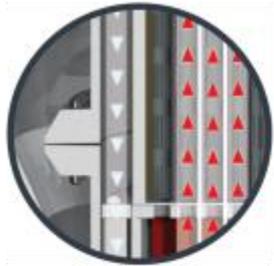
- A NuScale Power Module™ (NPM) includes the **reactor vessel, steam generators, pressurizer, and containment** in an integral package – simple design that eliminates reactor coolant pumps, large bore piping and other systems and components found in large conventional reactors.
- Each 50 MWe module: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



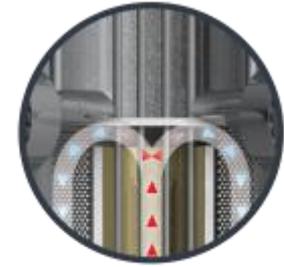
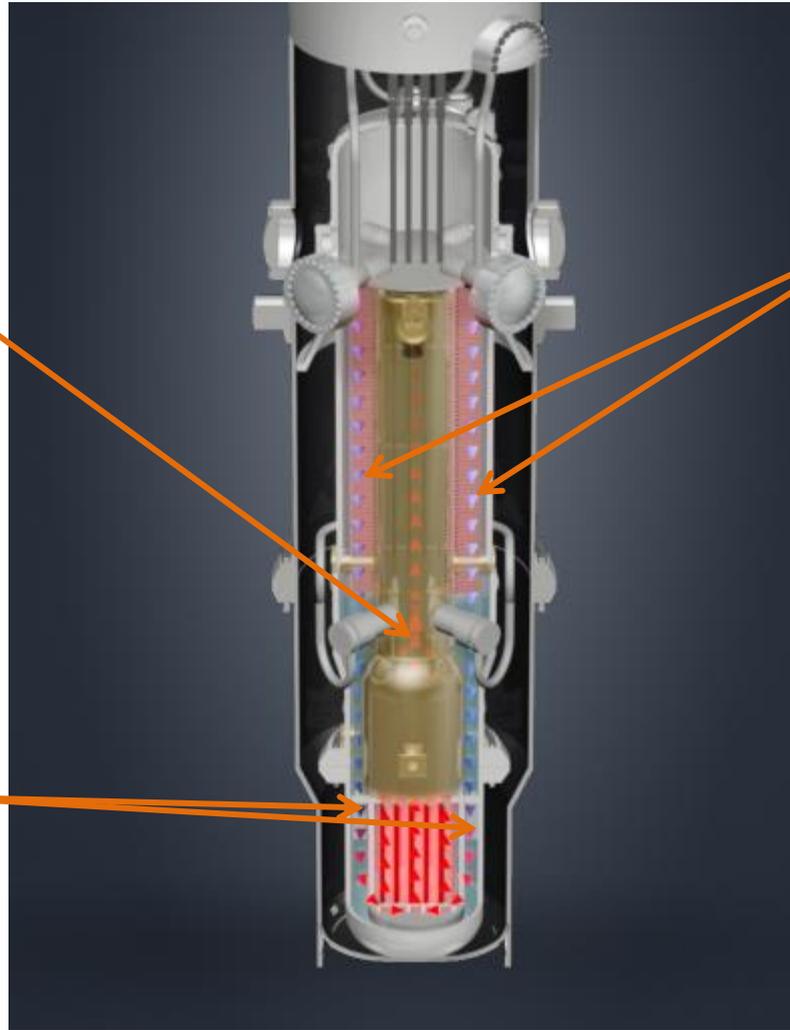
Coolant Flow Driven By Physics



Convection – energy from the nuclear reaction heats the primary reactor coolant causing it to rise by convection and natural buoyancy through the riser, much like a chimney effect

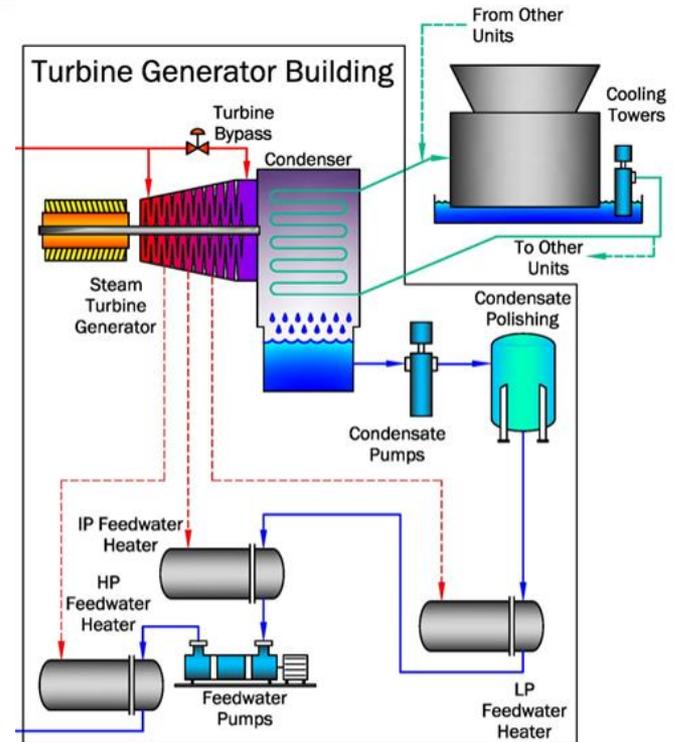
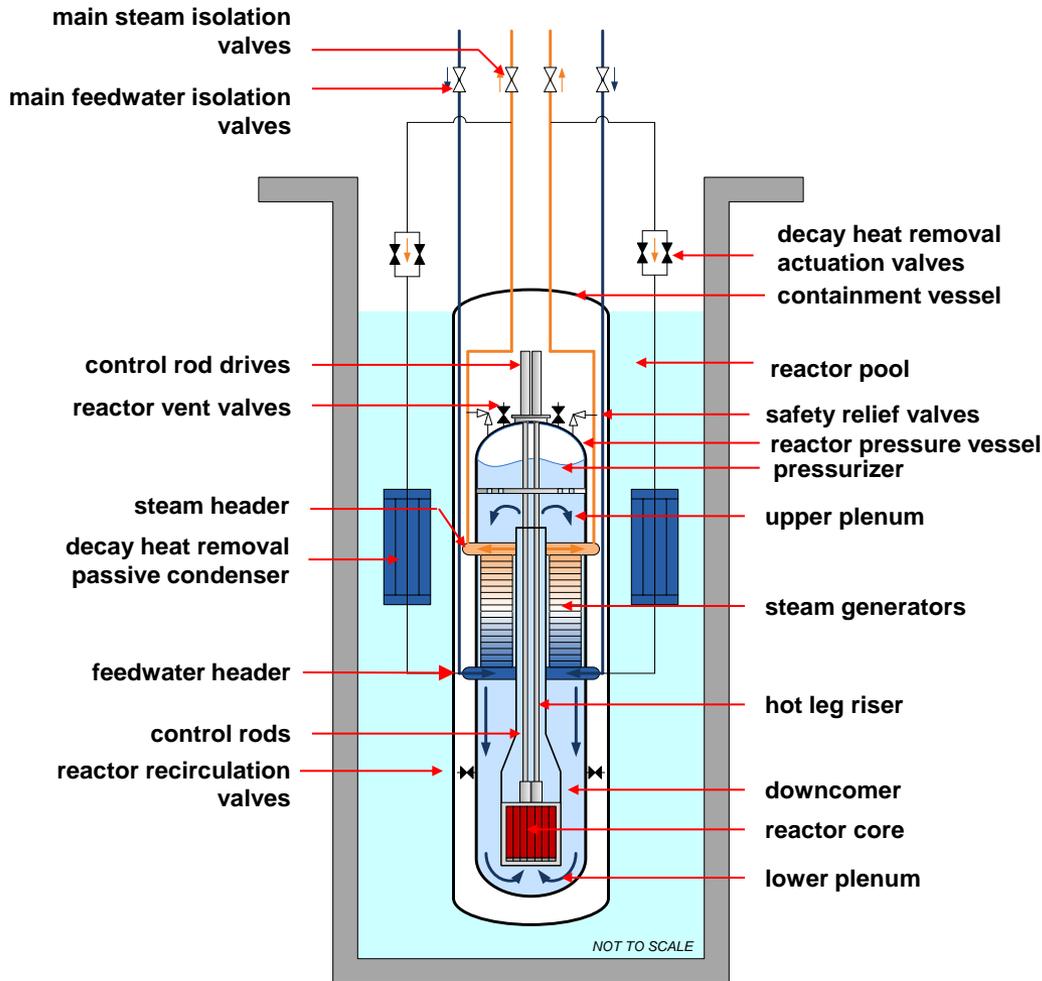


Gravity – colder (denser) primary coolant “falls” to bottom of reactor pressure vessel, cycle continues



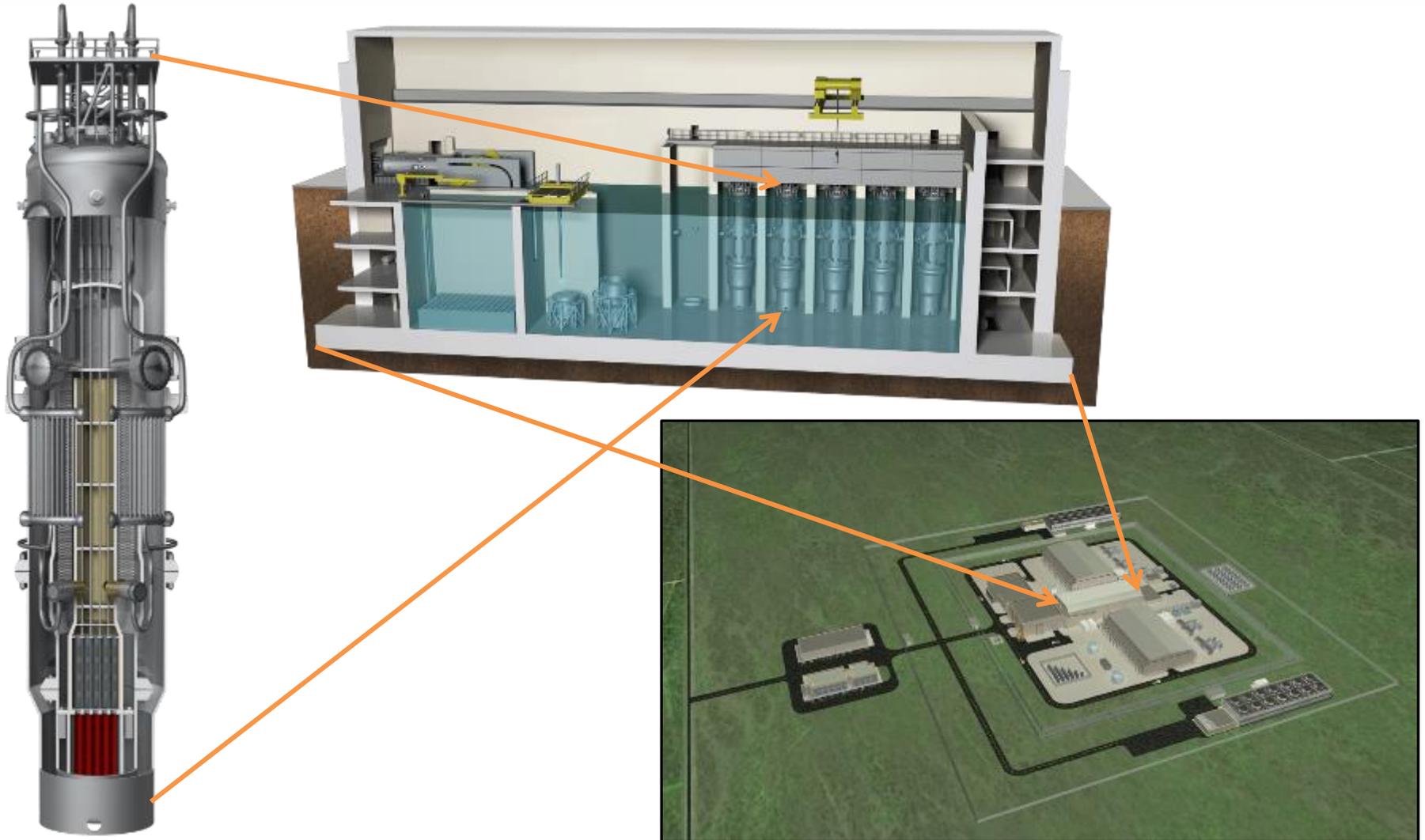
Conduction – heat is transferred through the walls of the tubes in the steam generator, heating the water (secondary coolant) inside them to turn it to steam. Primary water cools.

NuScale Power Train



- Each NuScale power module feeds one turbine generator train eliminating single-shaft risk
- 100% turbine bypass capability
- Generator is totally enclosed water to air cooled (no hydrogen cooling required)
- Small, simple components support short, simple refueling outages

NuScale Power Plant



Advantages of Small Modular Approach



Factory Fabrication



Small Footprint



Transportable

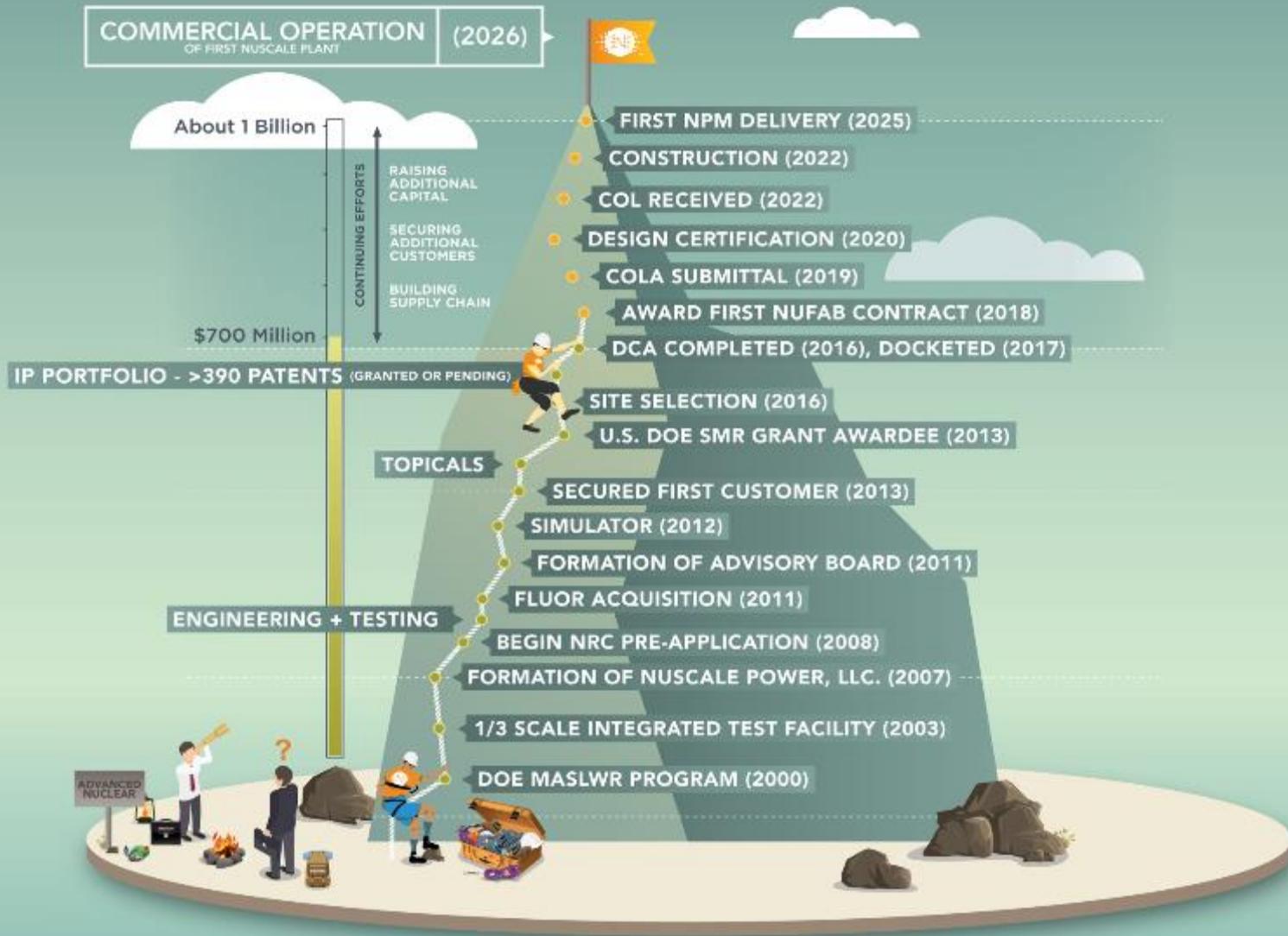


Flexible Operation

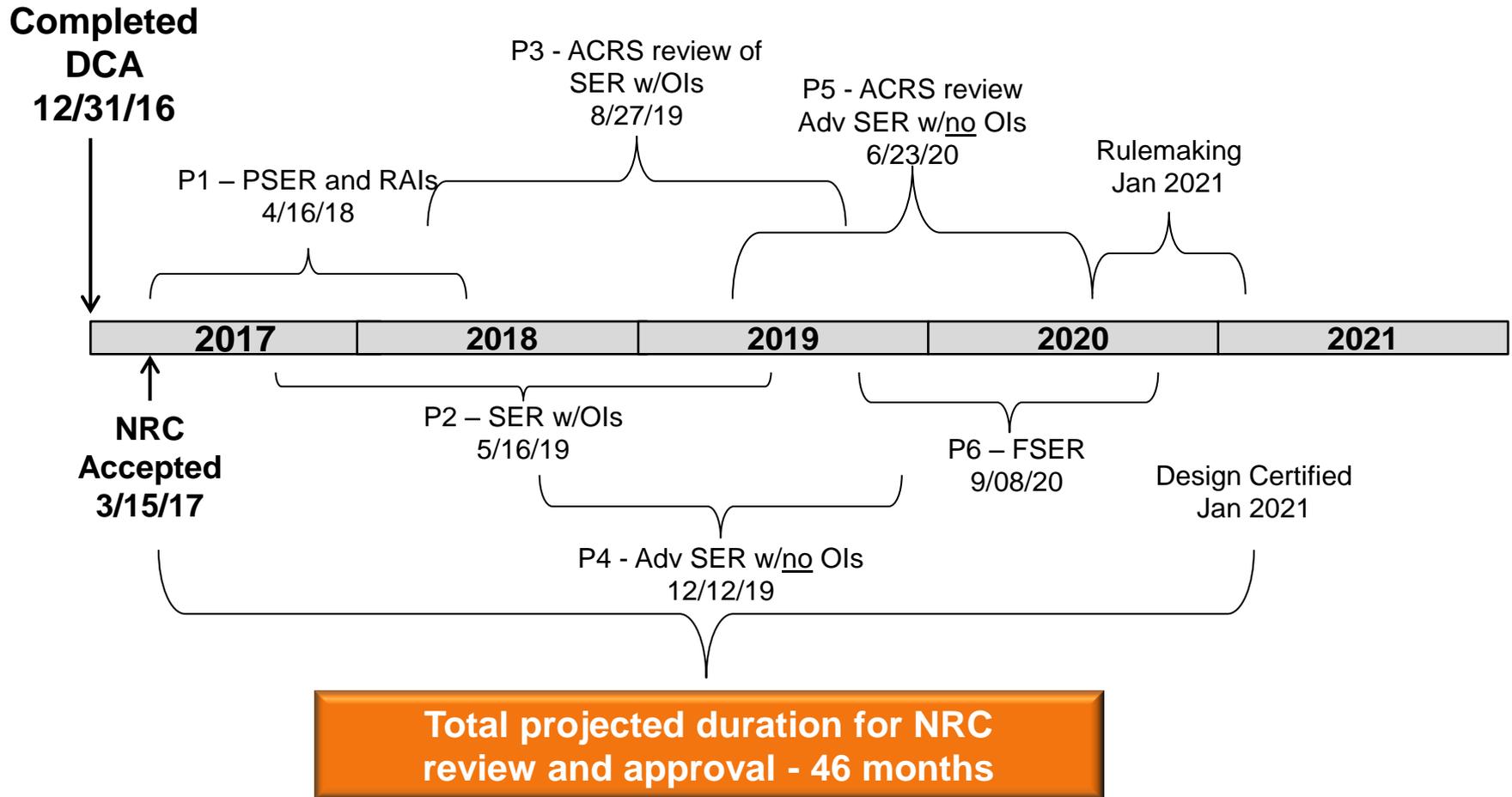
Where do we go from here?



Blazing the Trail to Commercialization



NuScale Baseline DC Review



Looking Ahead – Selected Milestones



Moving Beyond Licensing of the Design

So what's different?

- Nuclear Steam Supply System is all contained in the NuScale Power Module (NPM)
- The NPM is factory built
- The turbine buildings do not have nuclear safety related equipment
- The NPM is an ASME Section III reactor pressure vessel inside of an ASME Section III containment vessel
- Each NPM feeds steam to its own steam plant – that means 12 steam turbines and associated equipment
- It is truly small modular nuclear generation



The Paradigm Shift

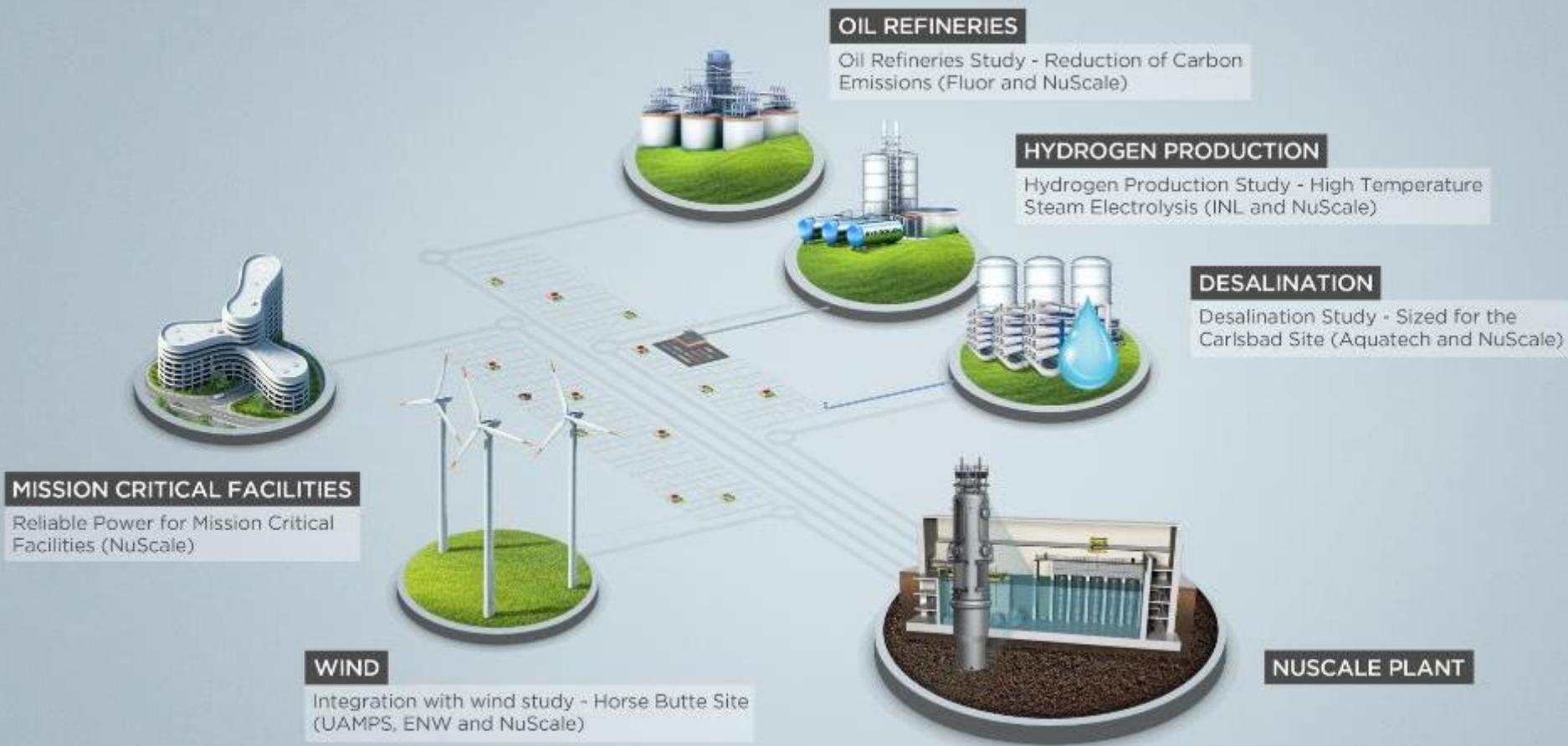
- Unique—not like a traditional power plant
- Steady-state manufacturing on a factory assembly line versus a site construction job
- Select and develop a set of supplier partners for all NuScale plants, not a bid list for one plant
 - close partnerships are critical
 - pricing models and terms negotiated in advance
 - suppliers are vested in the long term viability of NuScale
 - standard specifications

Impacts on the Industry

- Factory Focus
- Fixed pricing opportunities
- Quantities versus size
- Standardization
- Load shaping and load following
- Non-utility uses
 - Desalinization
 - Hydrogen production
 - Mission critical power



Beyond Baseload: NuScale Diverse Energy Platform (NuDEP)



The Future of Energy is Getting Closer



NuFuel HTP2 Testing



One-third scale NIST-1 Test Facility



NuScale Control Room Simulator

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