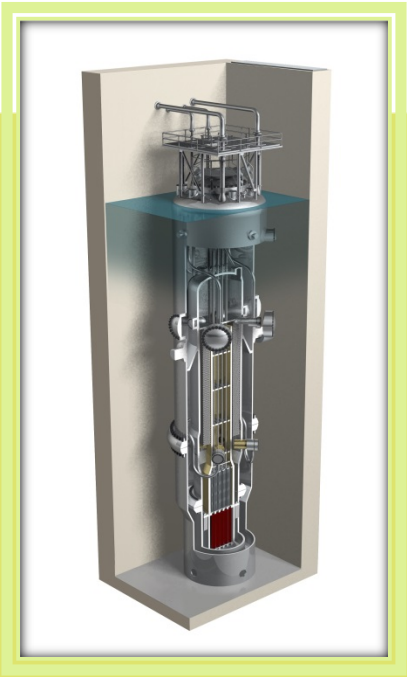
Welcome



Washington State Joint Select Task Force on Nuclear Energy

Corvallis, OR
November 7, 2014

NuScale Power™

Disclaimer

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Welcome

- Introductions

Safety Message

- Fire Exits
- Nuclear Safety Topic – Personal Accountability
- Industrial Safety – Slips Trips and Falls
  - Use three point contact when ascending/descending stairs
  - Eyes on path
  - Be cognizant of slippery conditions in a damp environment and use appropriate footwear.

Agenda

NuScale Power™

Washington Joint Nuclear Task Force
November 7, 2014

Friday, November 7th

Time	Topic	Presented by:
8:00 am	Welcome, Intros, Agenda Review	Dale Atkinson
8:15 am	NuScale History, Technology, Testing Programs	Dr. Jose Reyes
9:00 am	Program WIN Plan, Schedule Overview	Chris Colbert
9:20 am	Potential Role of NuScale in Washington State	Dale Atkinson
9:50 am	**BREAK**	
10:00 am	Control Room Simulator Tour	Ross Snuggerud
10:45 am	NIST Tour	Dr. Jose Reyes
11:45 am	Reconvene/Summary	Dale Atkinson
12:00 pm	Adjourn Meeting	

NuScale Presenters:

Dale Atkinson	Chief Operating Officer, Chief Nuclear Officer
Dr. Jose Reyes	Chief Technology Officer
Chris Colbert	Chief Strategy Officer
Ross Snuggerrud	Operations Engineer, Plant Operations

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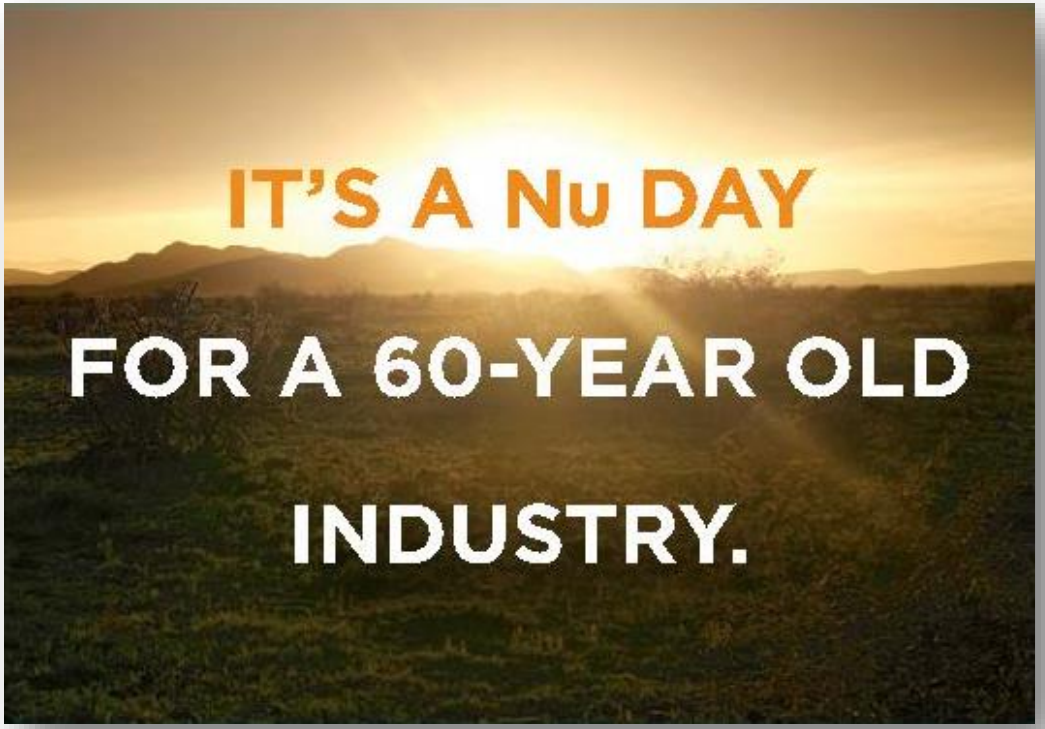

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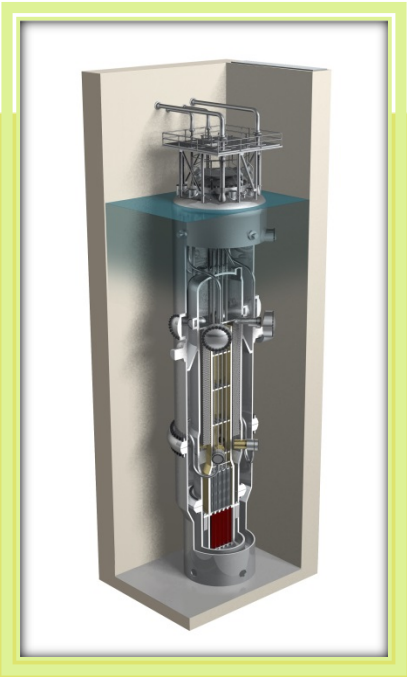
NuScale History, Technology, and Testing



Dr. Jose Reyes

Chief Technology Officer

NuScale Power™

NuScale Power History

- NuScale first of current US SMRs to begin design of commercial NPP.
- NuScale technology in development and design since 2000 (DOE) MASLWR program, lessons from AP1000 ¼-scale testing
- Electrically-heated 1/3-scale Integral test facility first operational in 2003
- Began NRC design certification (DC) pre-application project in April 2008
- Fluor became lead investor Oct 2011.
- ~380 FTE's currently on project, ~$230MM spent project life-to-date
- Twelve-reactor simulated control room operational in May 2012 for Human Factors Engineering development
- DOE announces FOA win in 2013
- 159 Patents Granted or Pending in 17 Countries

NuScale Engineering Offices Corvallis

One-third scale Test Facility

NuScale Control Room Simulator

NuScale Power™

FLUOR® - an American Company

- Acquired majority interest in NuScale in October 2011
- One of the world's leading publicly traded engineering, procurement, construction, maintenance, and project management companies
- #110 in the FORTUNE 500 in 2013
- More than 1,000 projects annually, serving more than 600 clients in 66 countries
- More than 43,000 employees worldwide
- Offices in more than 28 countries on 6 continents
- Over 100 years of experience

Fluor Corporate Headquarters
Dallas, Texas

Revenue	$27.6 billion
New awards	$27.1 billion
Backlog	$38.2 billion

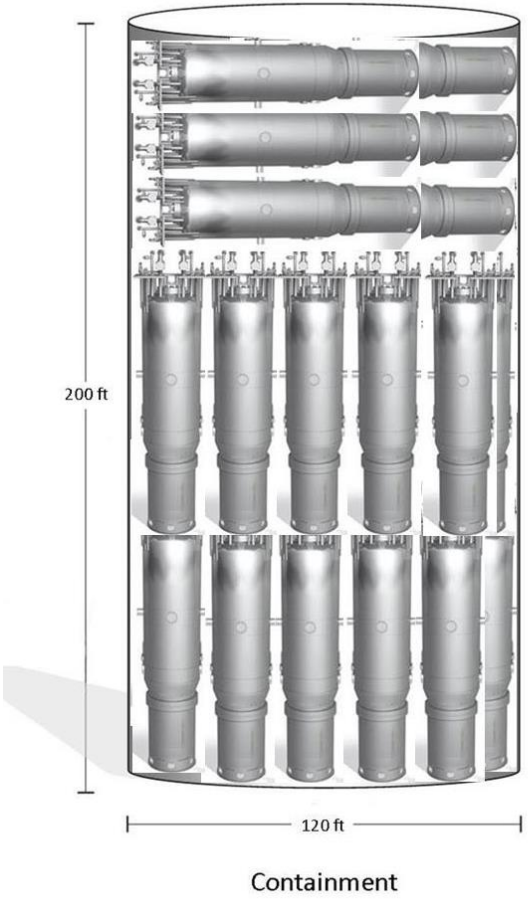
Investment Grade Credit Ratings:

S&P	A-
Moody's	A3
Fitch	A-

Size Comparison

Comparison size envelope of new nuclear plants currently under construction in the United States

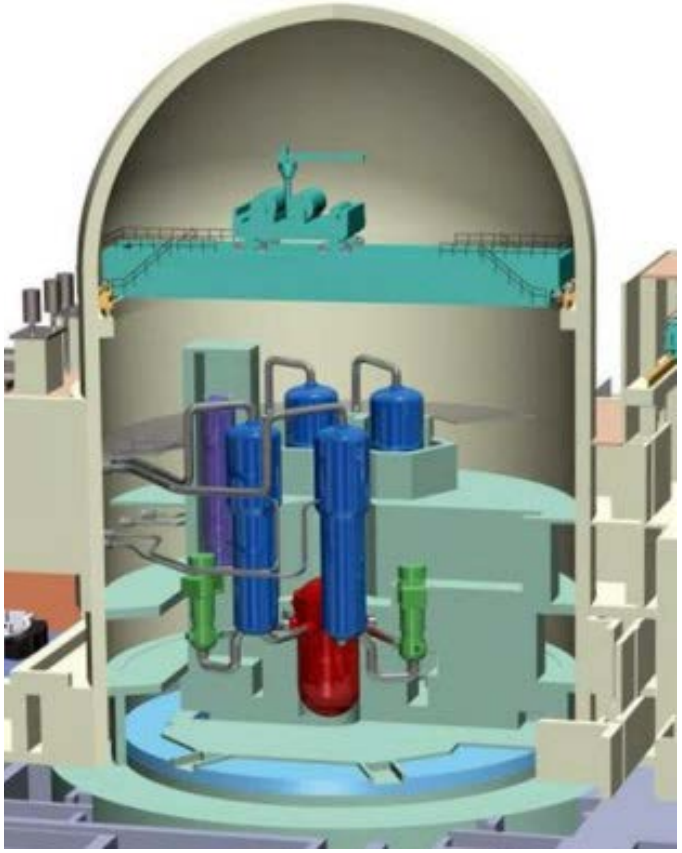
126 NuScale Power Modules



Containment

NuScale's combined containment vessel and reactor system

Typical Pressurized Water Reactor



*Source: NRC

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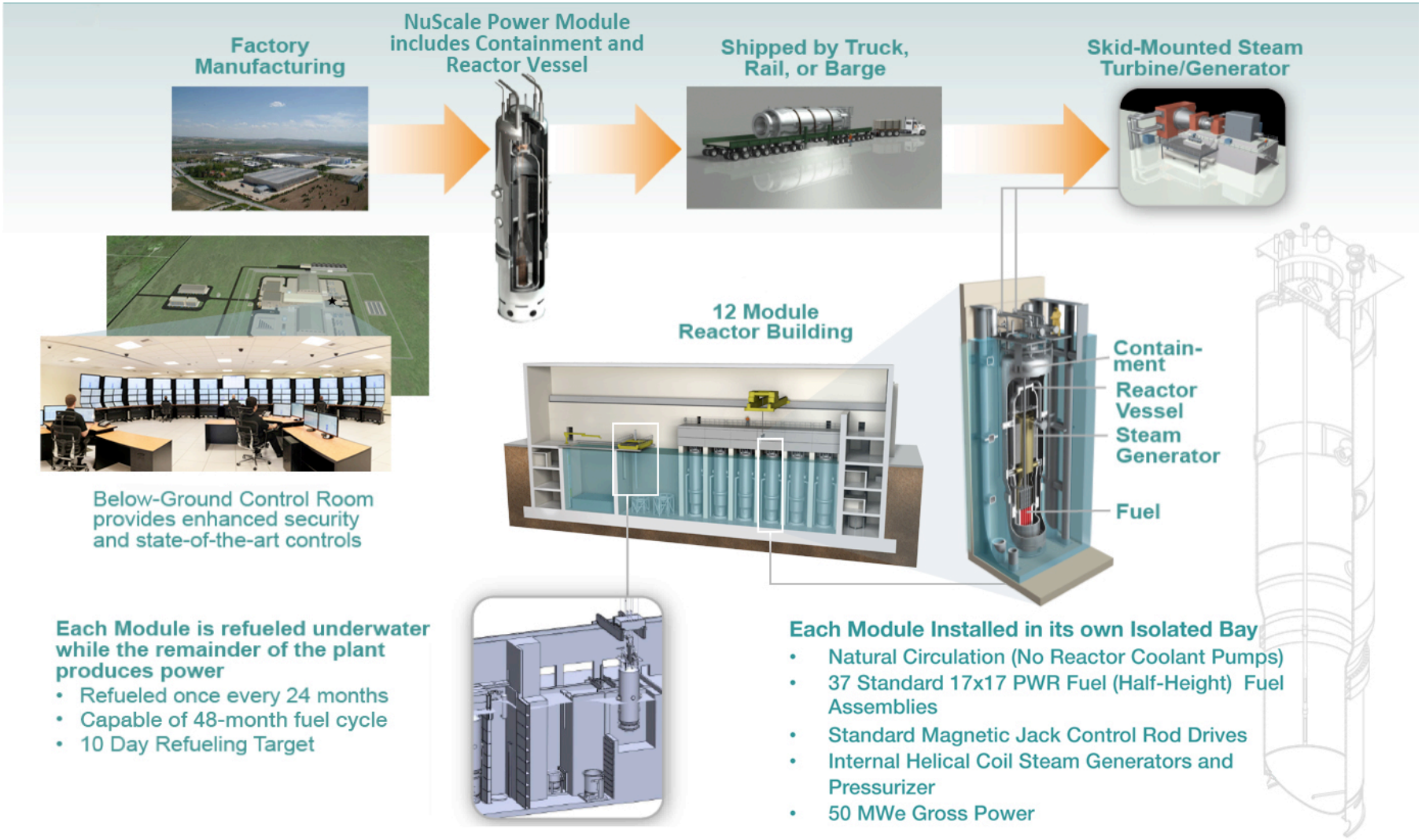
Plant Design Overview



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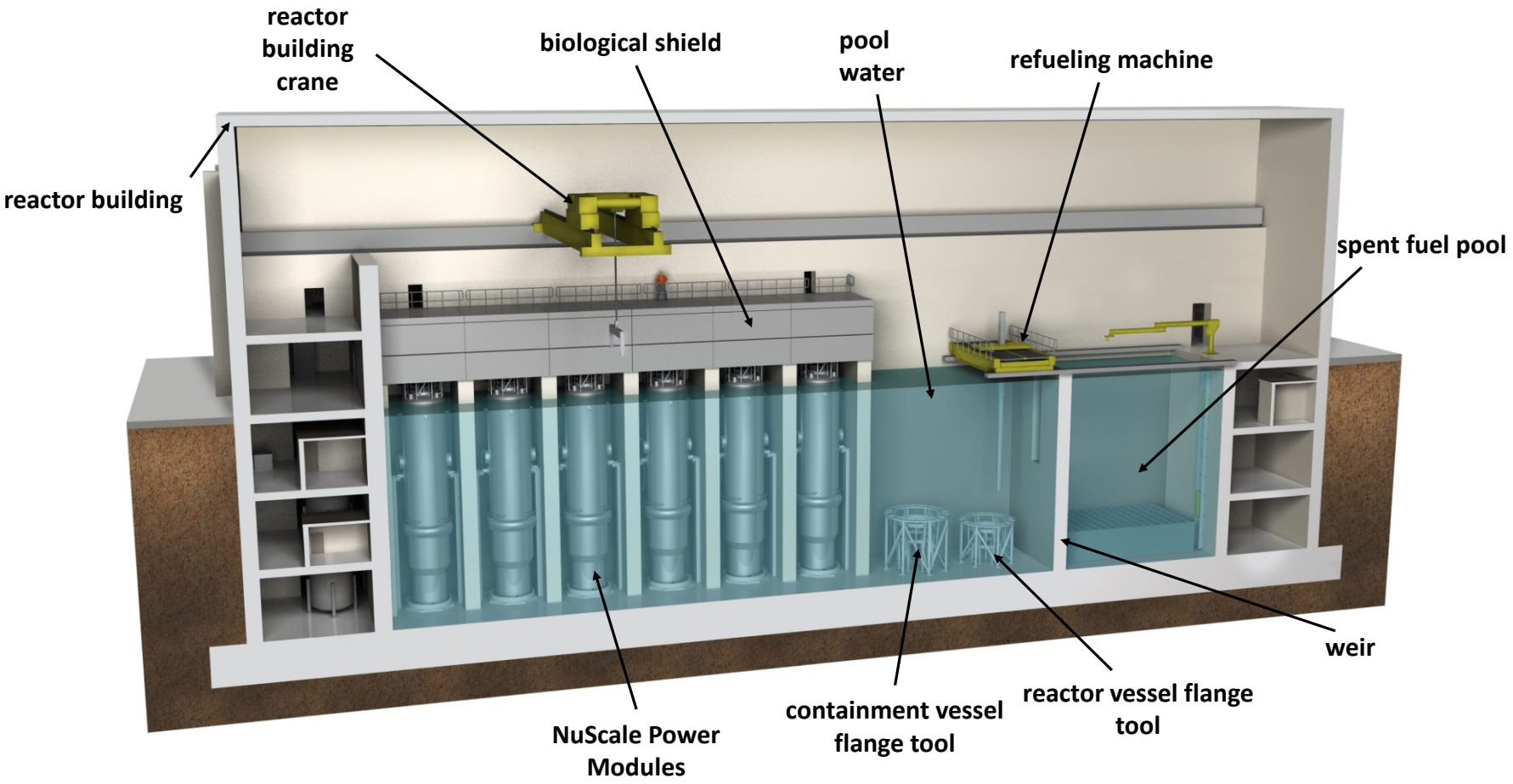
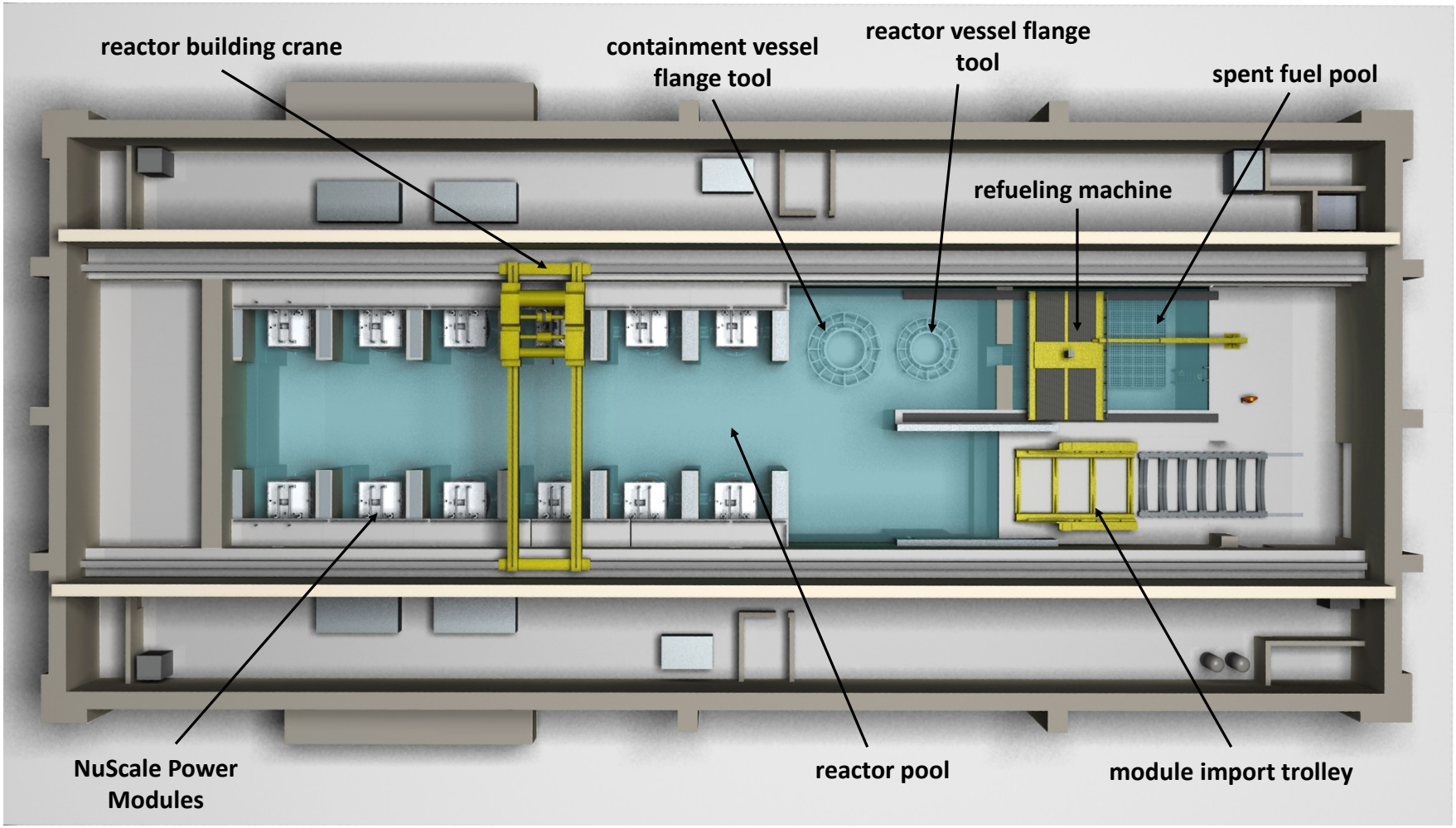
Reactor Building Cross-Section

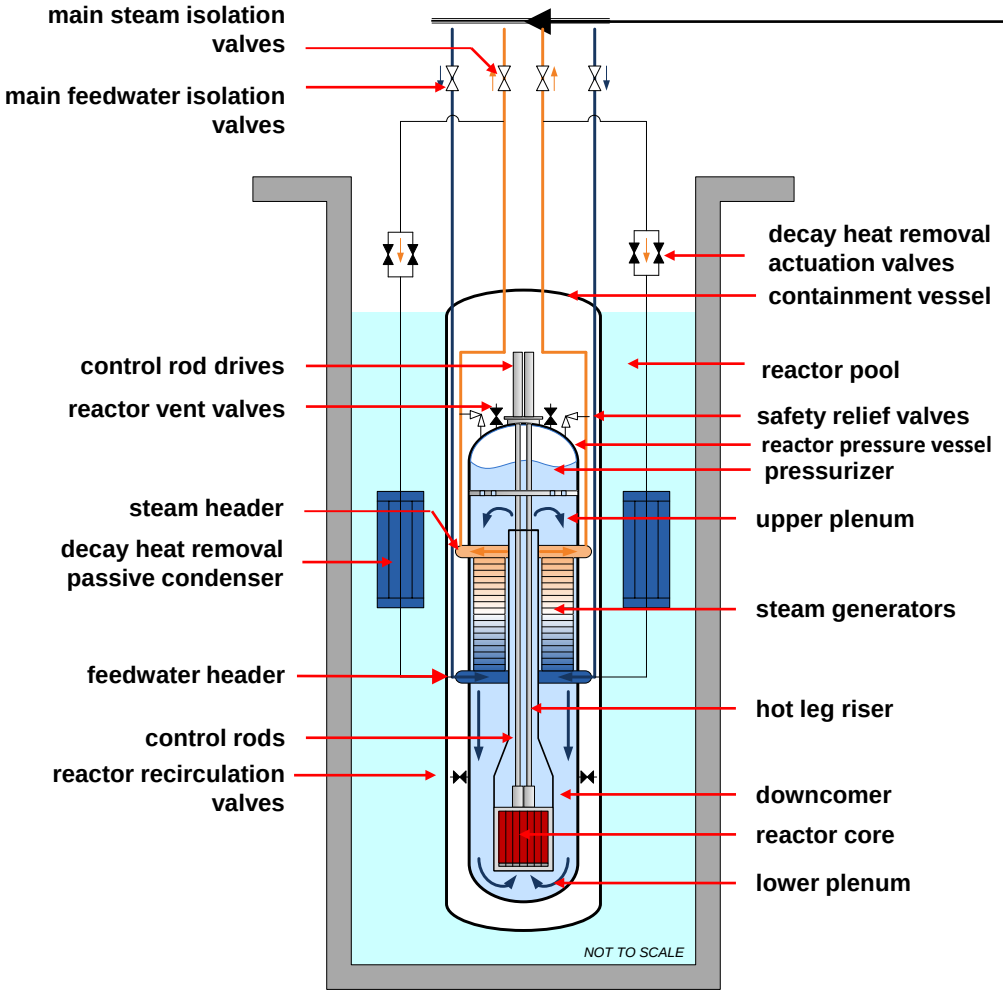
Reactor building houses reactor modules, spent fuel pool, and reactor pool

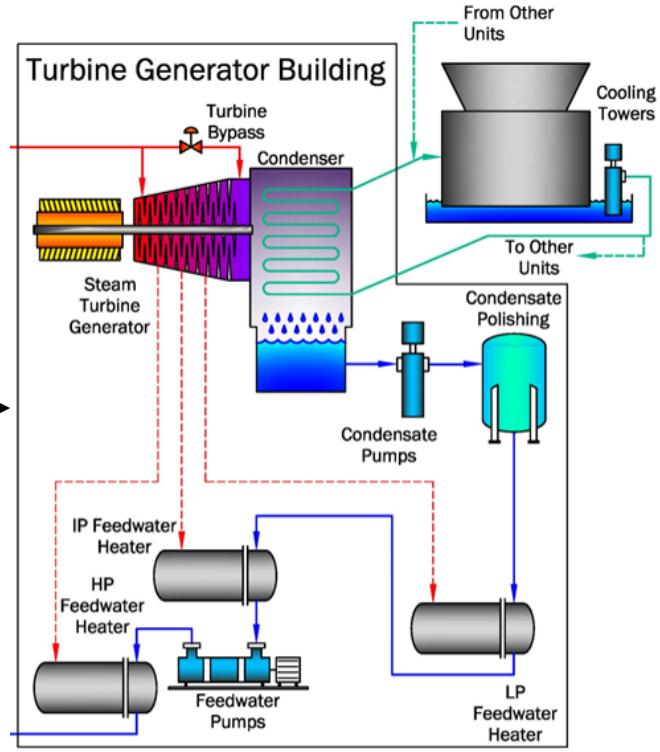


Reactor Building Overhead View



NuScale Power Train (Video)





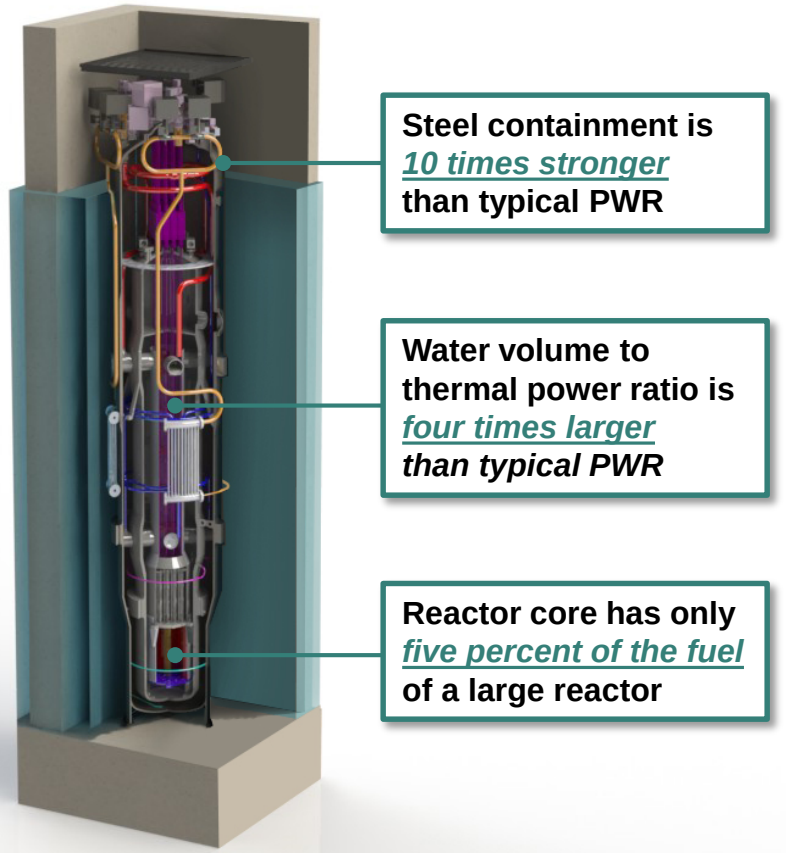
- Each reactor module feeds one turbine generator (TG) train eliminating single-shaft risk
- Small, simple components support short simple refueling outages

NuScale Power™

Simplicity Enhances Safety

All safety equipment needed to protect the core is shown on this picture

- Natural Convection for Cooling
  - Passively safe, driven by gravity, natural circulation of water over the fuel
  - No pumps, no need for emergency generators
- Seismically Robust
  - System submerged in a below-ground pool of water in an earthquake resistant building
  - Reactor pool attenuates ground motion and dissipates energy
- Simple and Small
  - Reactor core is 1/20th the size of large reactor cores
  - Integrated reactor design, no large-break loss-of-coolant accidents
- Defense-in-Depth
  - Multiple additional barriers to protect against the release of radiation to the environment



160 MWt NuScale Power Module

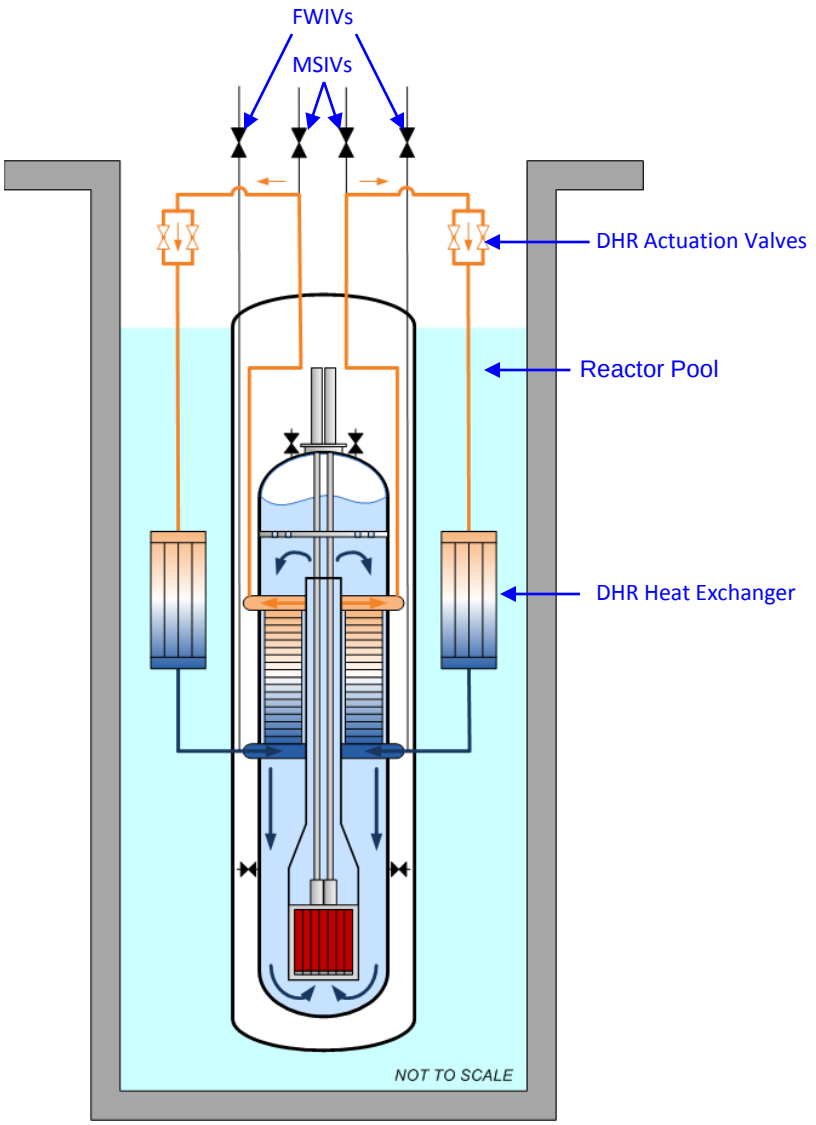
NuScale Power™

Decay Heat Removal System

The DHR system is composed of:

- DHR actuation valves
- DHR heat exchangers
- Main steam and feedwater isolation valves
- Ultimate heat sink (reactor pool)

Two 100% redundant trains



DHR System Video

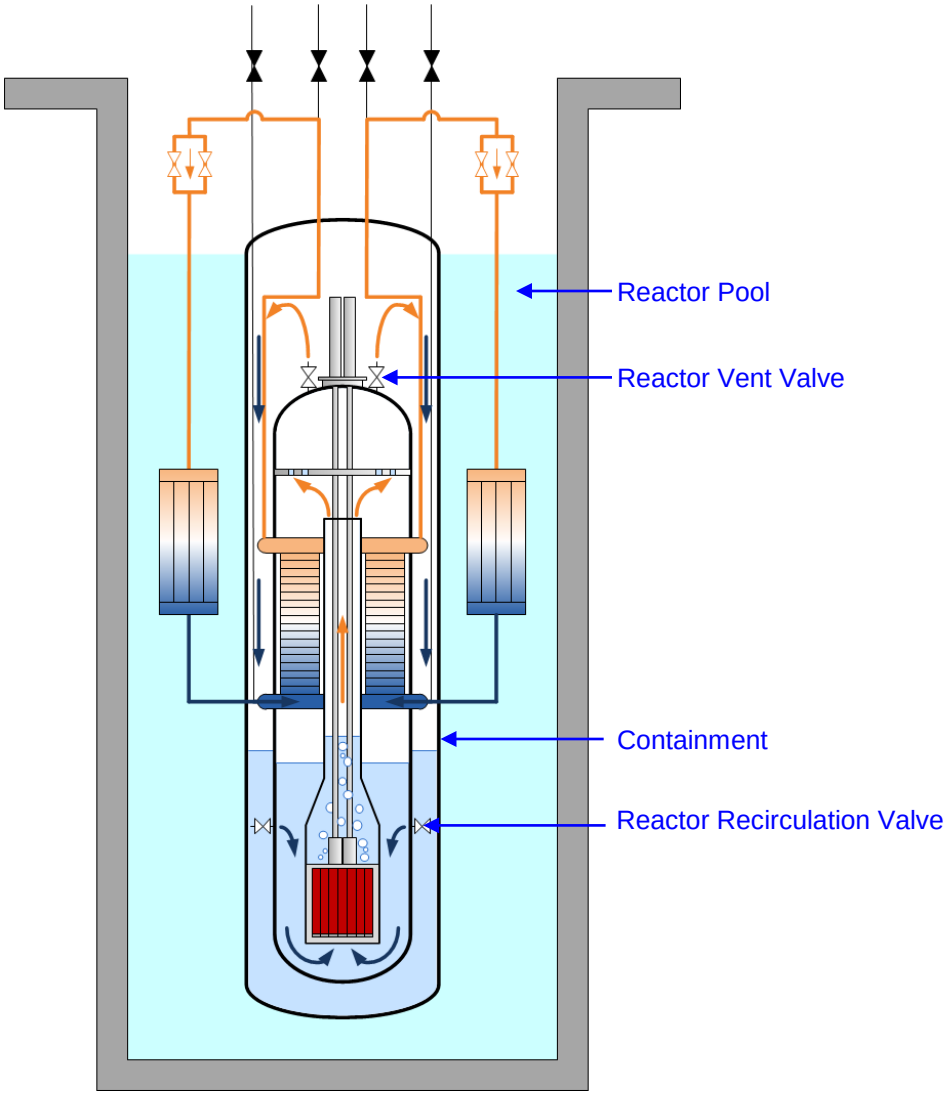
Emergency Core Cooling System

The ECC system is composed of:

- Two reactor vent valves
- Two reactor recirculation valves
- Containment vessel
- Containment isolation valves
- Ultimate heat sink (reactor pool)

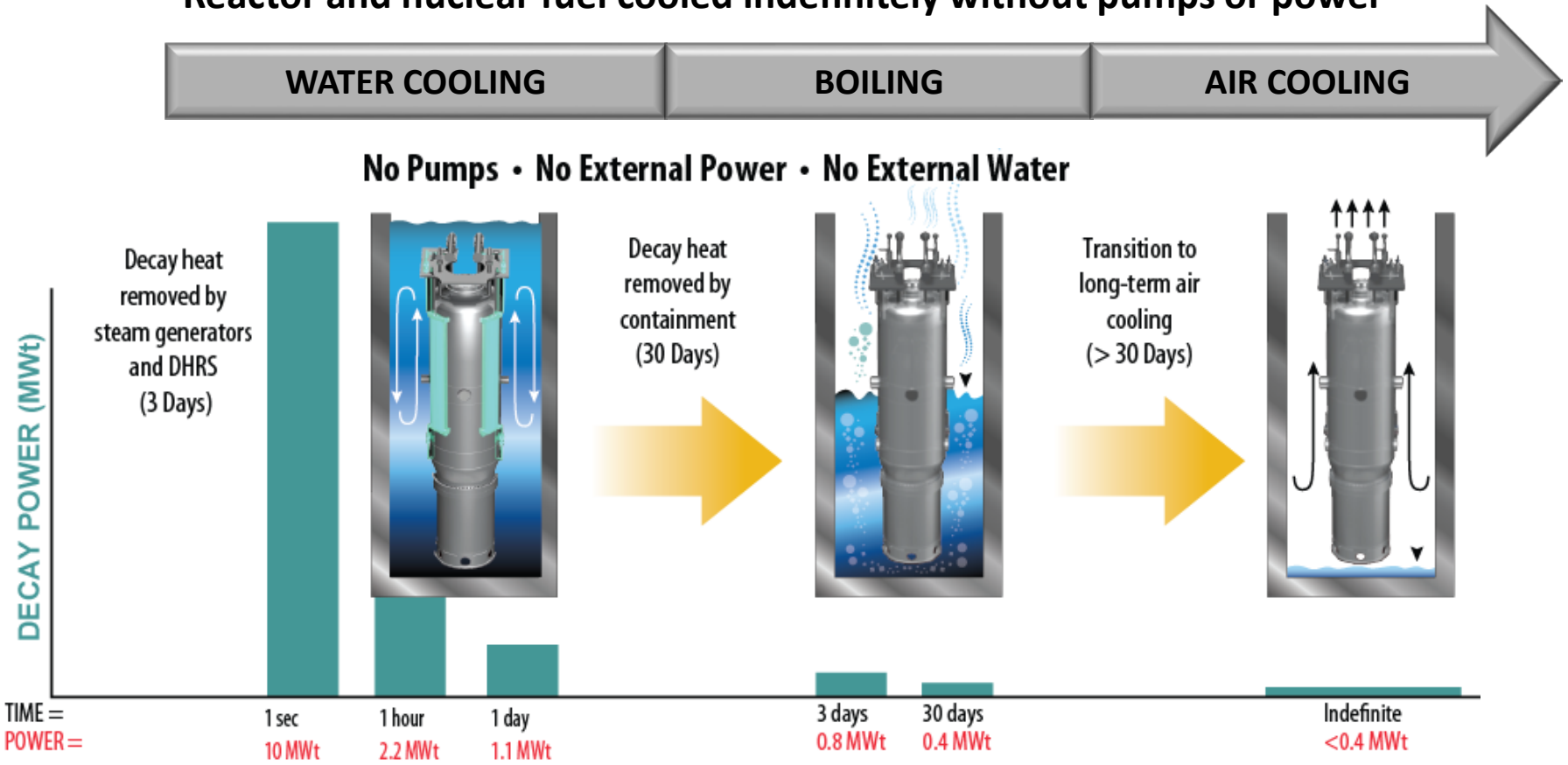
Only 1 RVV and 1 RRV needed

ECC System Video



Station Blackout Response

Stable Long-Term Cooling Under all Conditions
Reactor and nuclear fuel cooled indefinitely without pumps or power

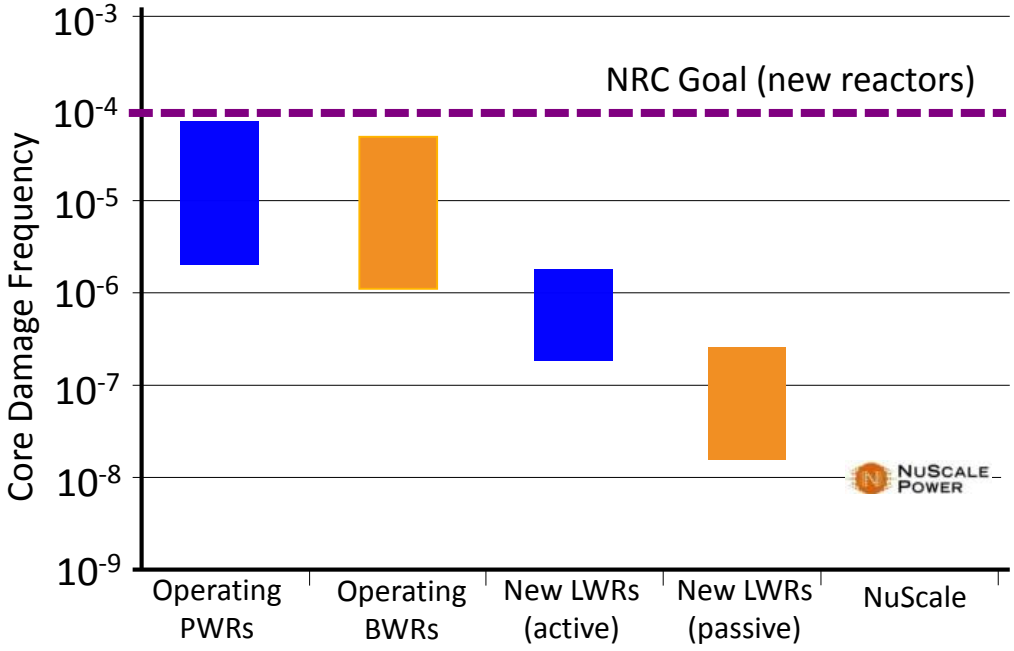


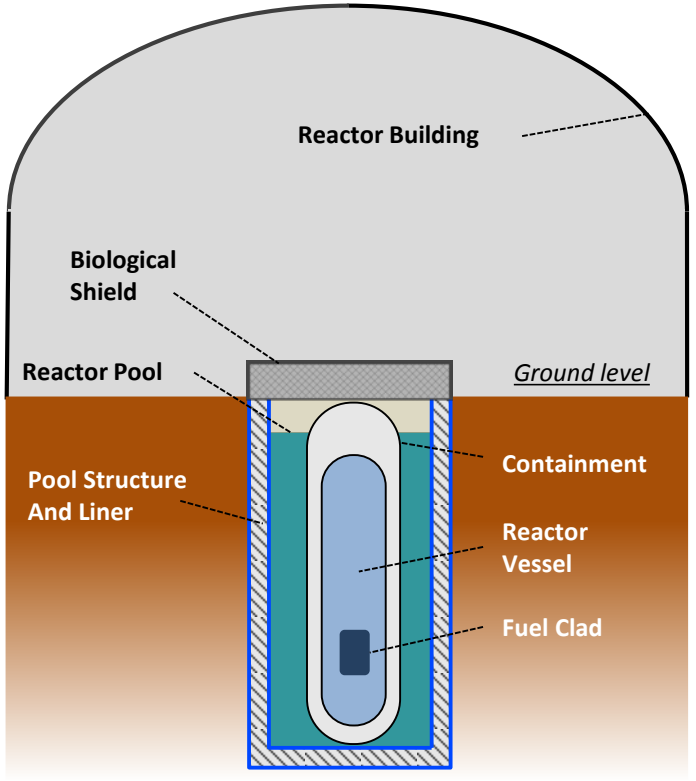
** Based on conservative calculations assuming all 12 modules in simultaneous upset conditions and reduced pool water inventory*

SBO Video

Reducing Plant Risk

Risk = (frequency of failure) X (consequences)

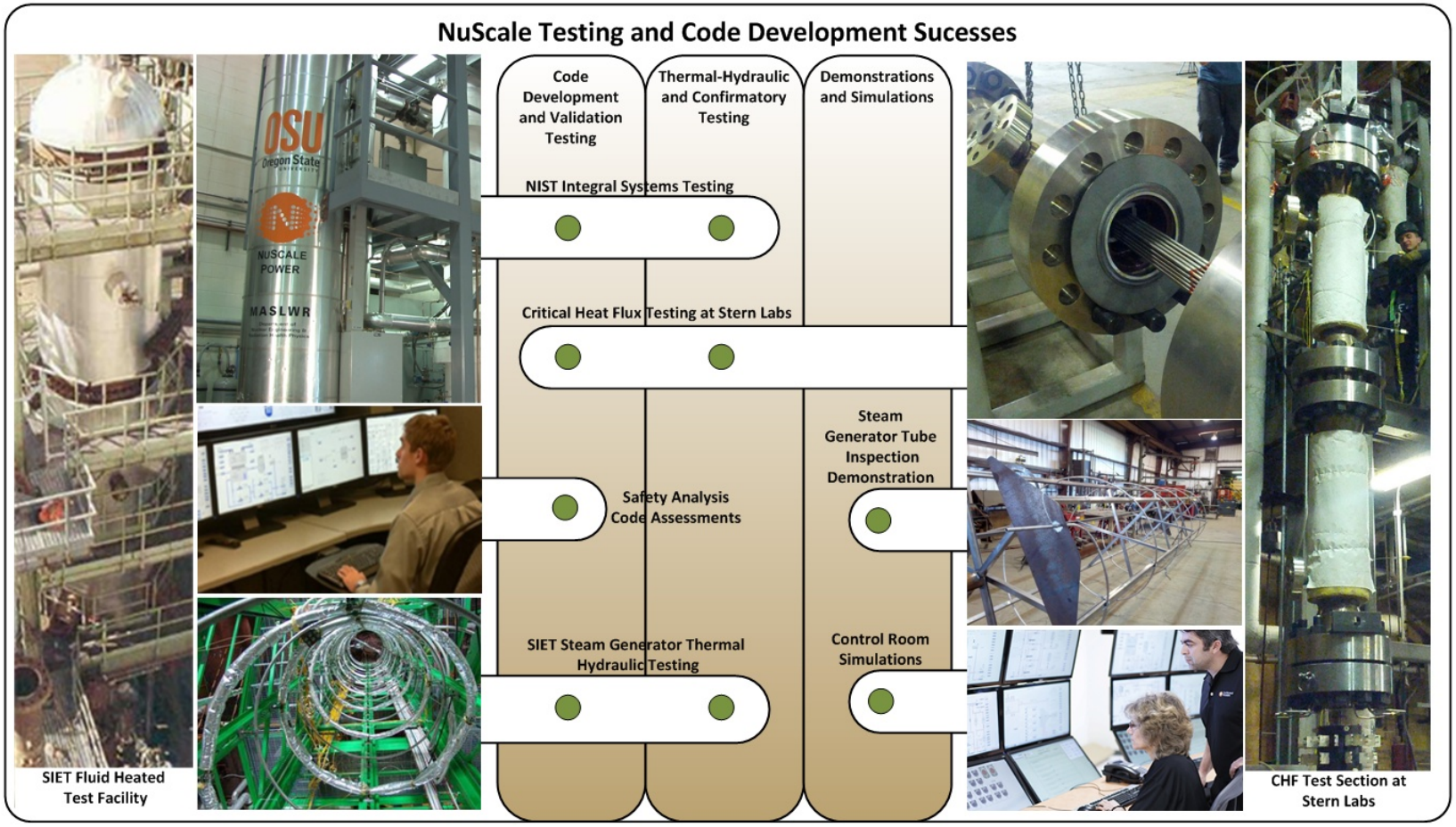




*Probability of core damage due to NuScale reactor equipment failures is **1 in 100,000,000 years***

Testing Progress

Our testing supports reactor safety code development and validation, reactor design, and technology maturation to reduce FOAK risk.



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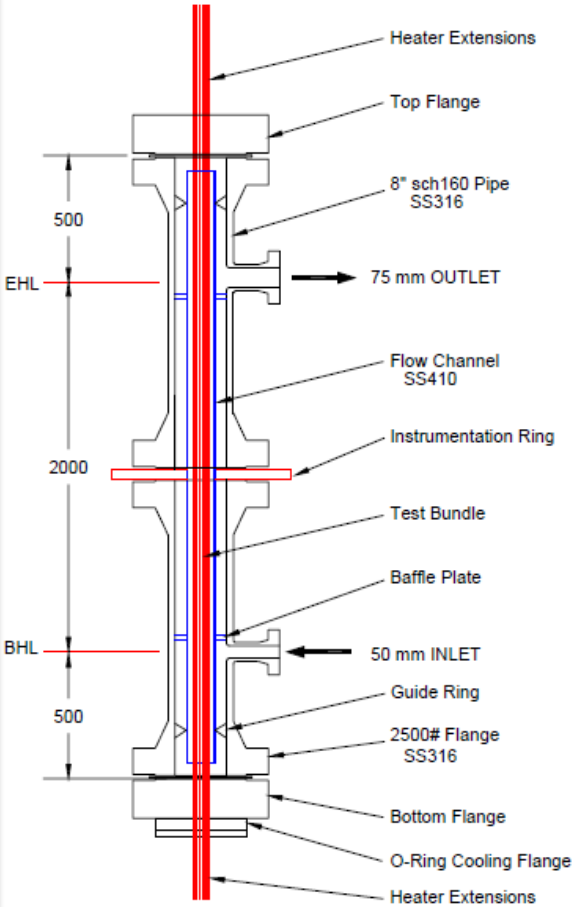
Stern Lab - Critical Heat Flux Test

Objective: obtain prototypic full-scale thermal-hydraulic data for validating our SCANR sub-channel code for NRC design certification.

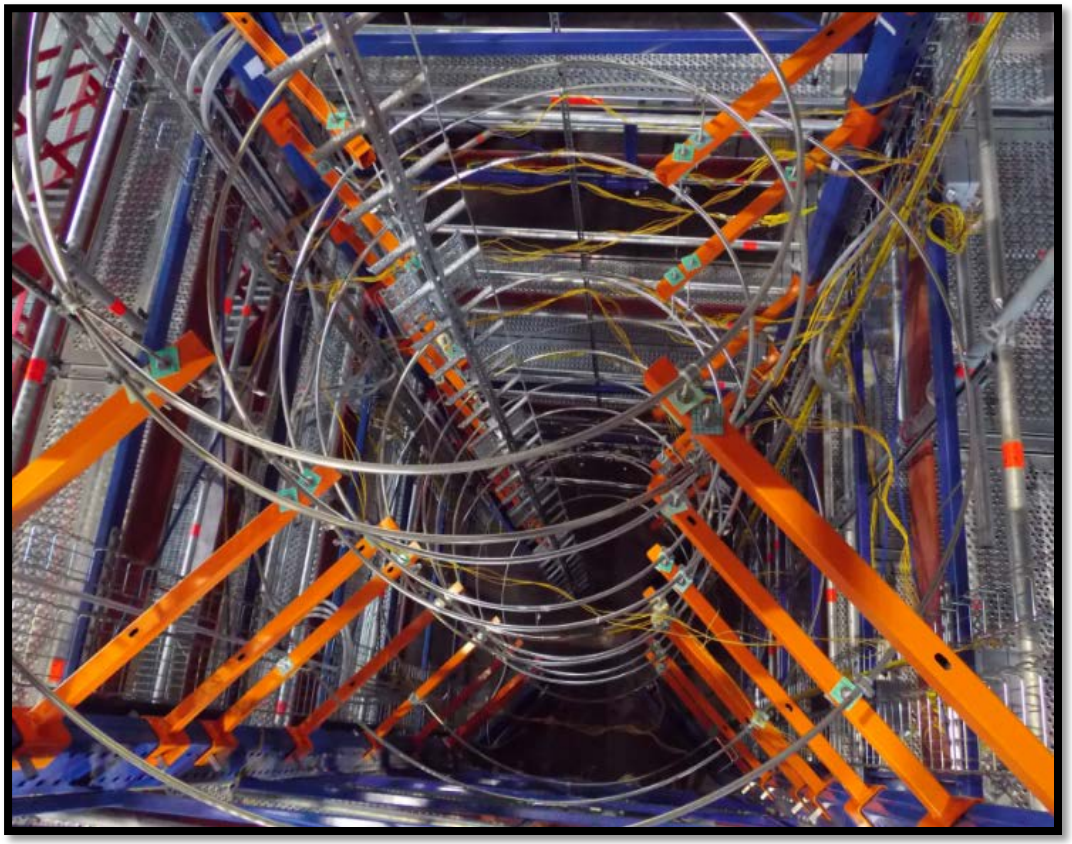


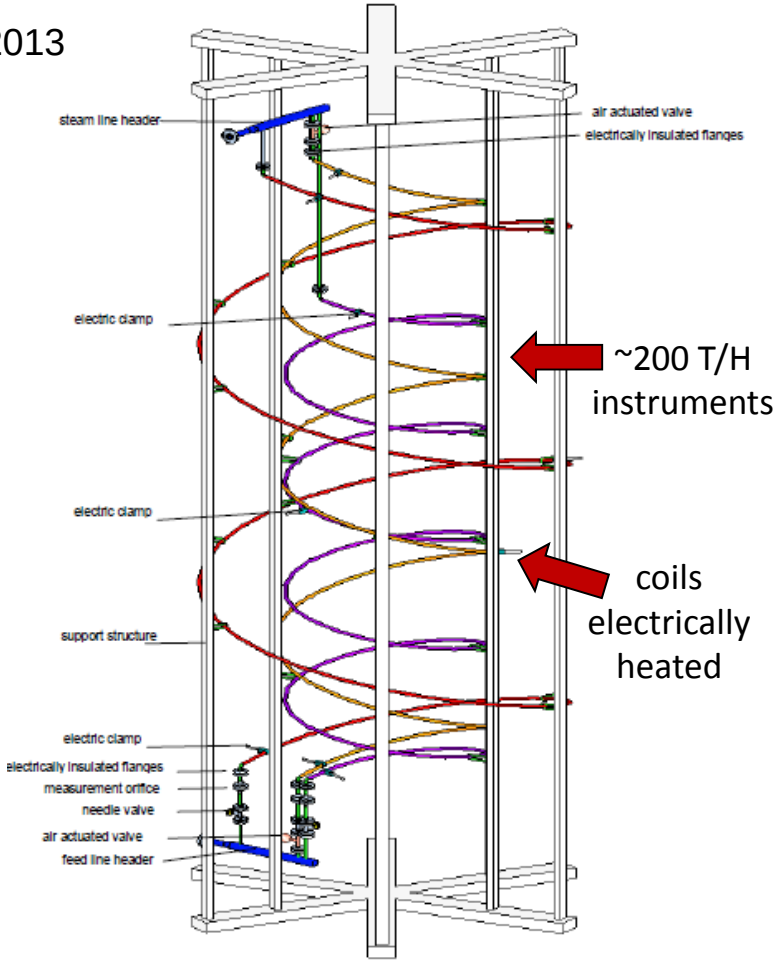
- Full-length NuScale fuel design
- 5x5 electrically heated array
- Uniform and symmetric cosine power peaking test sections

SIET - Separate-Effects Test

Objective: obtain detailed in-tube thermal-hydraulic and flow induced vibration data for NRELAP5 and M-GILA code development.

Testing completed with successful NRC inspection in December 2013





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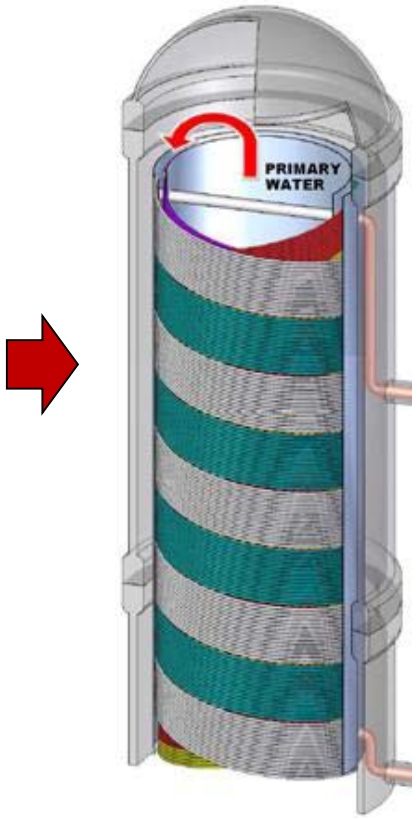
SIET - Integral Test

Objective: obtain overall tube bundle thermal-hydraulic and flow induced vibration data for NRELAP5 and M-GILA code validation.

- Large tube bundle array w/252 tubes
- Prototypic fluid conditions inside and outside of tubes
- Instrumented to characterize global parameters
- Preliminary facility design complete
- Start of testing in Jan 2015



SG Tube Inspection Test

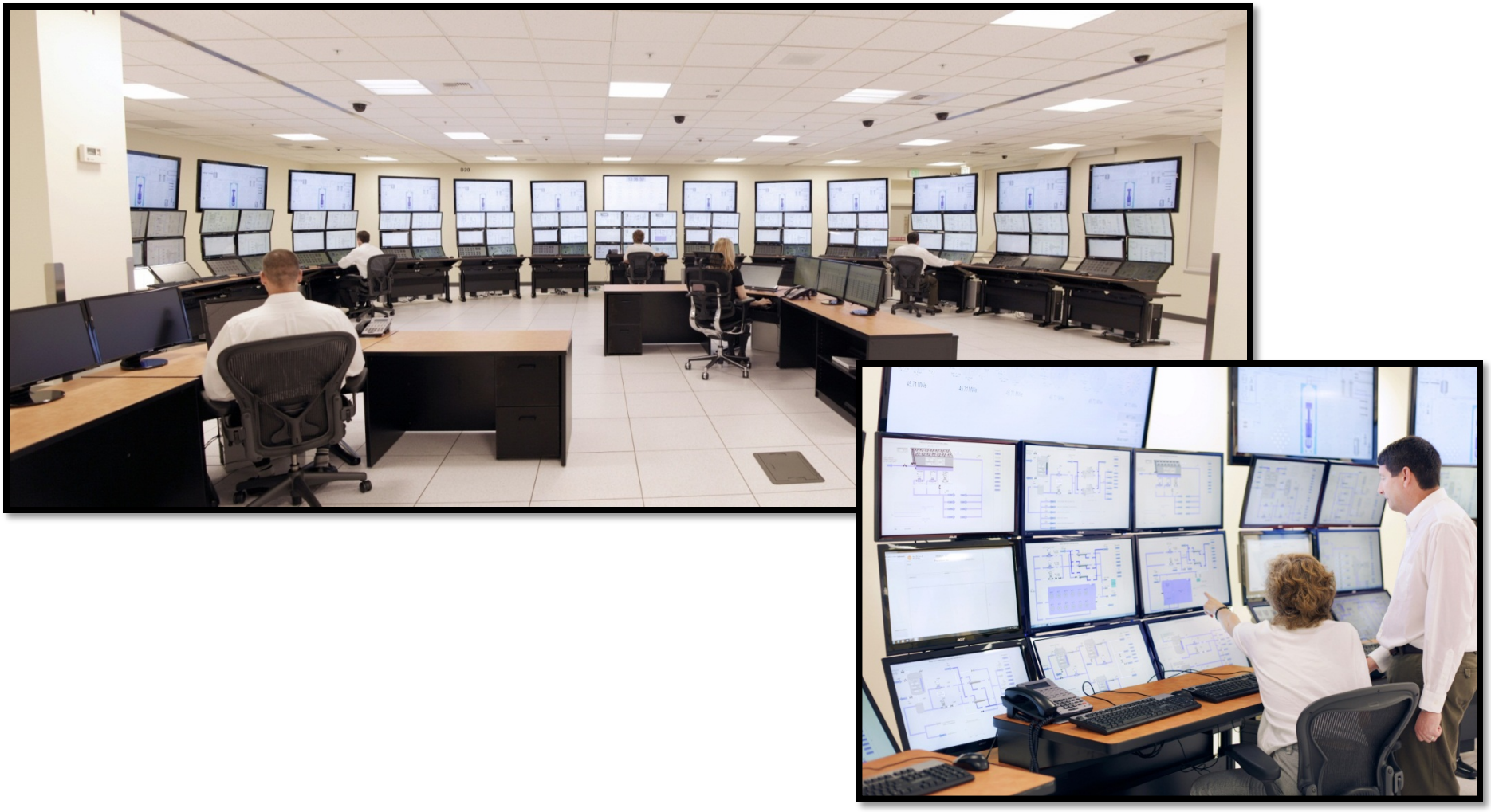
Objective: Design and demonstrate a proof-of-concept inspection system for the helical coil steam generator using available Supplier tooling

- Periodic in-service inspection of steam generator tubing is required
- NuScale steam generator tube inspection differences:
  - Helical tube geometry
  - Tube entry and exit radii
  - Small tube ID
  - Nozzle/plenum geometry limits access to tubes
- Proof of principle tests successfully completed

NIST - Integral Systems Test

Objective: Obtain large-scale real-time integral-effects systems data for SBLOCAs, long term core cooling, and non-LOCA transients to validate NRELAP5 and our reactor design for design certification.

Full-Scale Main Control Room Simulator for HFE/HMI Studies



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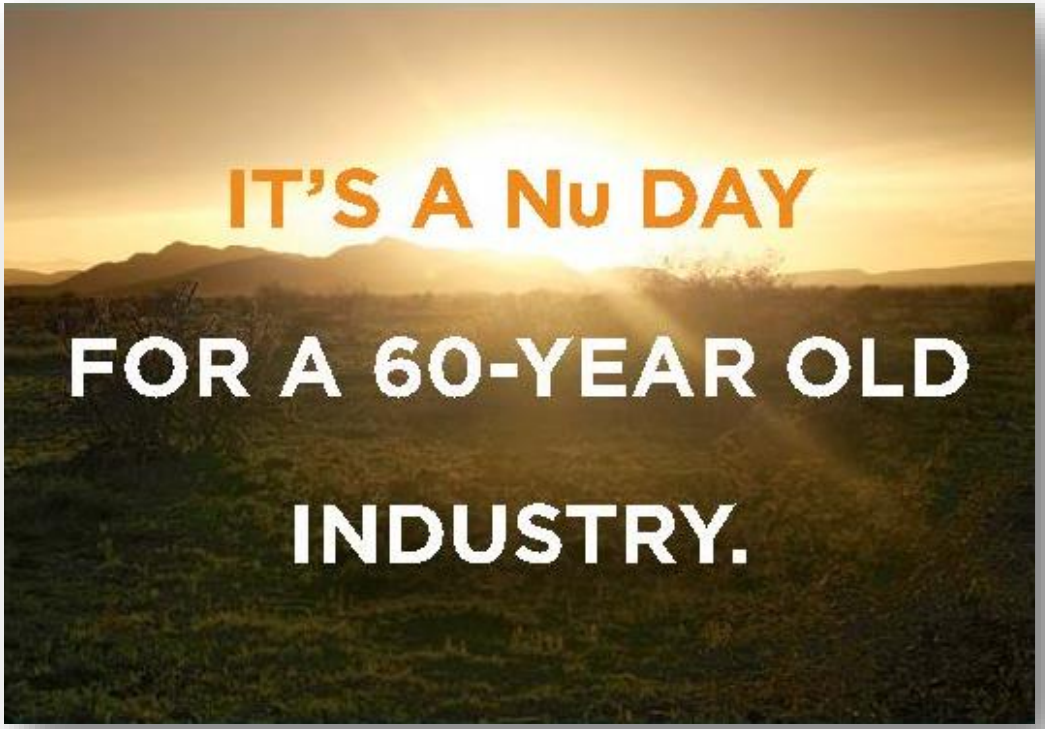

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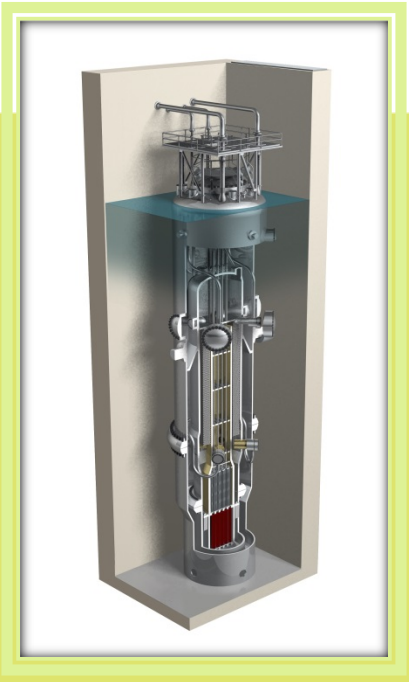
Program WIN



Chris Colbert

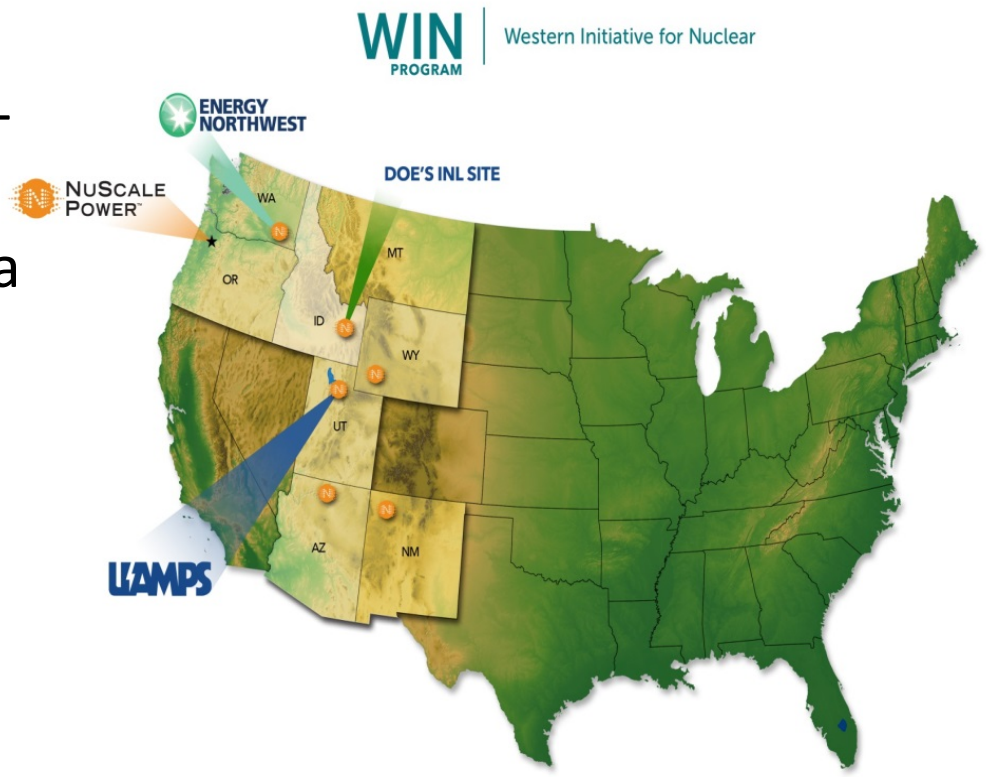
Chief Strategy Officer

NuScale Power™

Program WIN

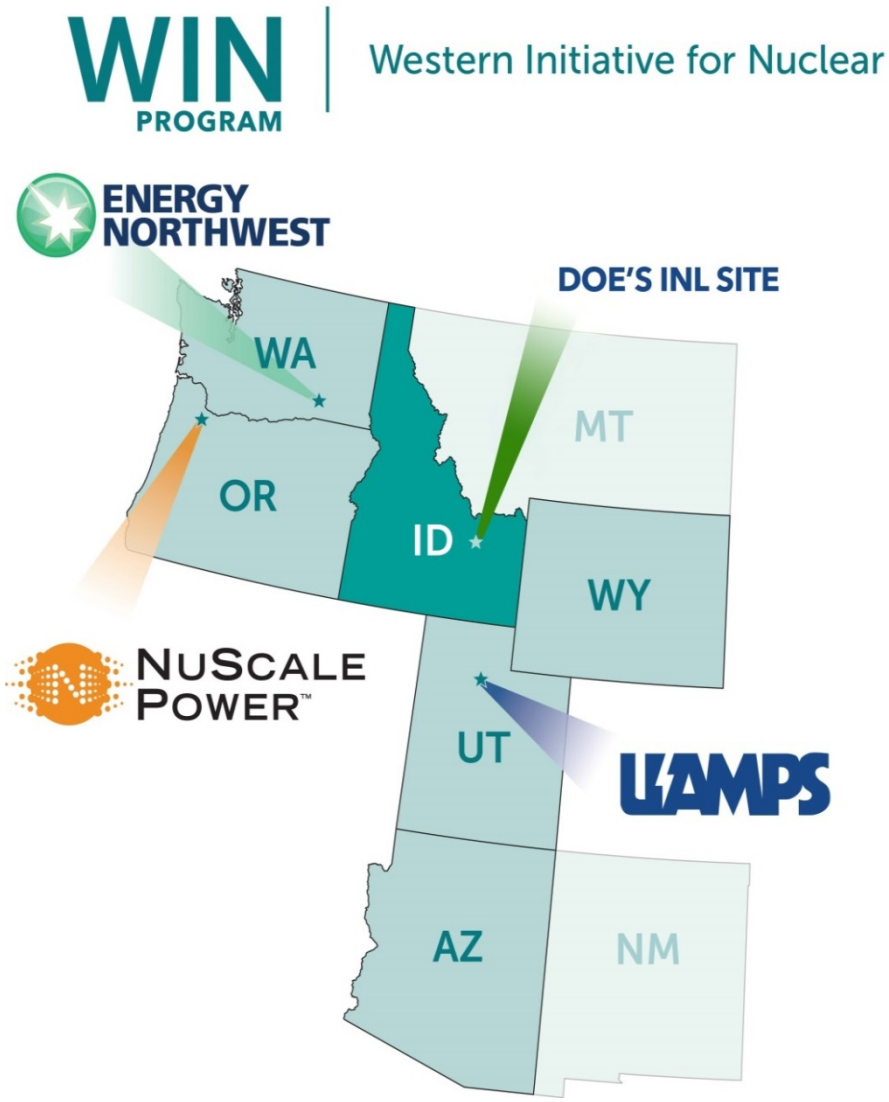
- Western Initiative for Nuclear (WIN) is a multi-western state collaboration to deploy a series of NuScale Power Projects

- Involved Program WIN participants: NuScale, UAMPS, Energy Northwest, ID, UT, OR, WA, WY, AZ, NM?, MT?

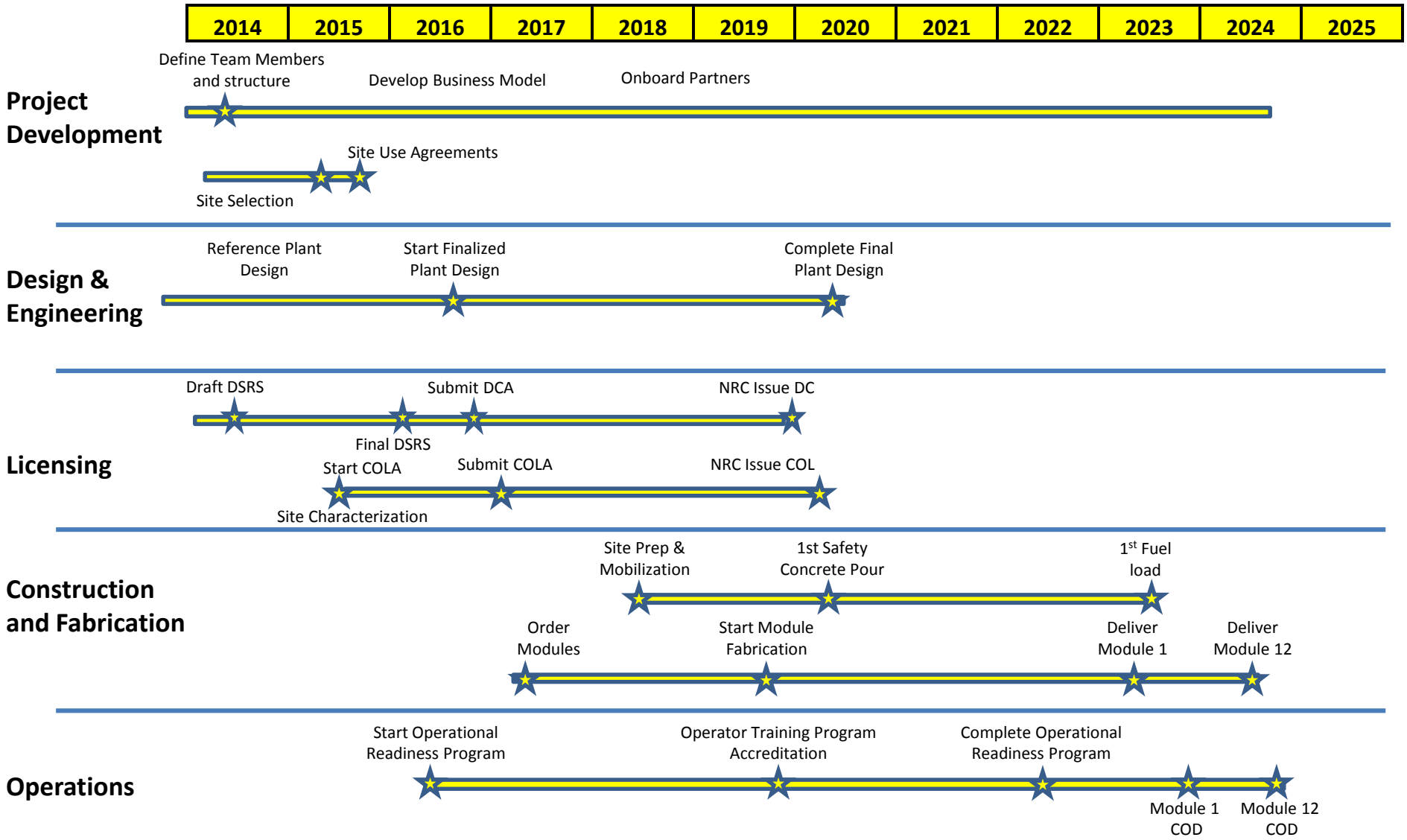


First WIN Project: UAMPS CFPP

- Utah Associated Municipal Power Systems (UAMPS) Carbon Free Power Project (CFPP) will be first deployment, sited somewhere in Idaho.
- UAMPS consists of 46 members serving load in 8 western states.



Overall UAMPS CFPP Schedule



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What Would a WIN Project do for WA?

- Establishes Washington as key player in SMR deployment
- Establishes Washington as potential desired location for NuScale supply chain members
- Project will create ~1000 construction jobs at peak, for duration of 2-3 years
- Full-time plant employment ~360 at average salaries $85K
- Indirect economic benefits and associated job multipliers

What is Needed for a WIN Project?

- Need a committed owner/buyer – will ultimately drive site selection decision for first project
- Project will need to demonstrate sufficient need for/use of generated power(e.g. long-term PPA's)
- State should consider doing economic impact study
- Suitable plant economics/investment profile
- Favorable/supportive local and state permitting and approval processes
- Economic development incentives
- Sufficient capable facility workforce

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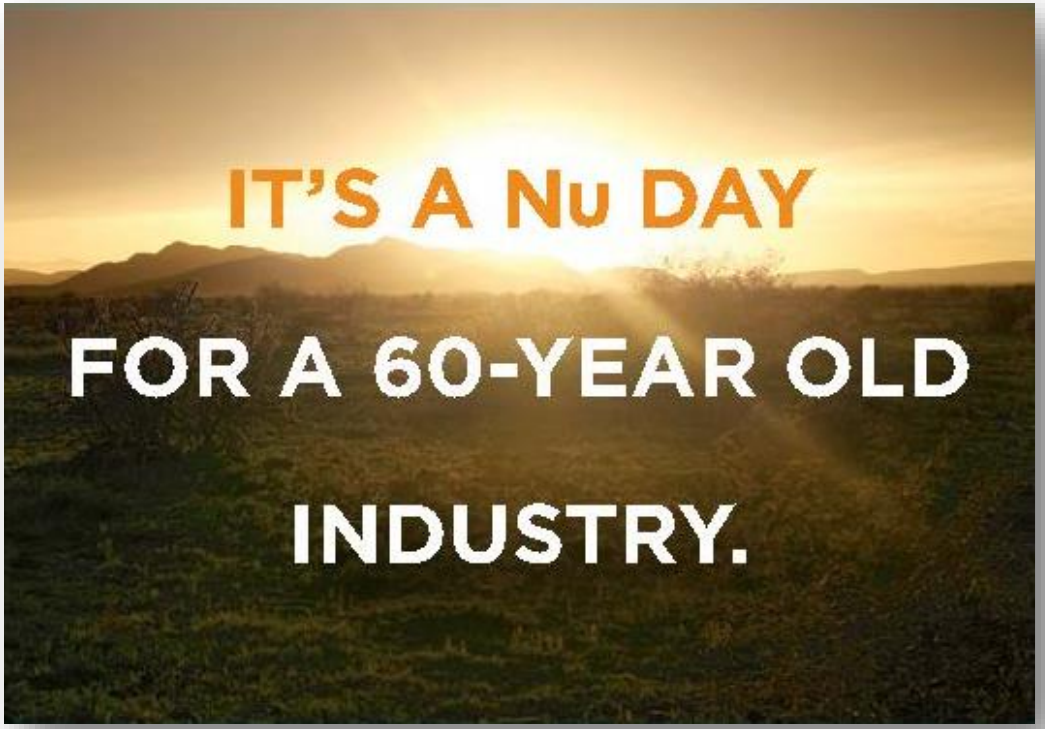

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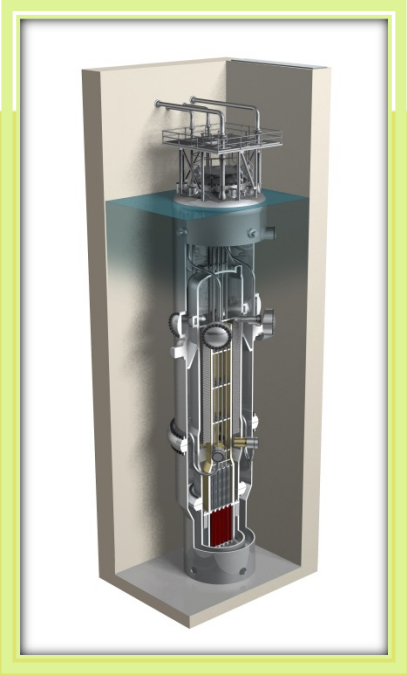
Potential Role of NuScale Power in Washington State



Dale Atkinson

Chief Operating Officer and

Chief Nuclear Officer

NuScale Power™

Energy Demand in WA State

- Energy demand is growing slowly in Washington state due to efficiencies gained through conservation and lack of industrial growth.
- But eventually there will be a demand, and Energy Northwest believes our involvement on the ground floor of NuScale-developed small modular reactor operation will position us to help bring this technology to Washington and the Tri-Cities when demand calls for it.

Integration with Coal Phase Out

- The size and modularity of the NuScale SMR allow a high degree of flexibility for deployment in support of both electrical and non-electrical applications.
- The scalability feature makes the technology well-suited as a replacement for retiring coal-fired plants.
- Relative to contemporary full-scale nuclear plants, NuScale SMRs have more siting flexibility on existing transmission grids, especially when used as replacement for retiring coal plants.

- In addition, because only one SMR module is refueled at a time, 92% of the power from a 12 module plant can remain on-line during refueling, providing continuous power throughout the plant lifetime.
  - We estimate that the plant's full power output will be available >95 percent of the time – making it one of the most reliable electric generation systems available.

Integration with Intermittent Sources

- NuScale's SMR technology includes unique capabilities for following electric load requirements as they vary with customer demand and availability of renewable generation. This singular load following capability gives NuScale's SMRs greater base load flexibility and allows them to be operated in a complementary mode with renewable energy sources, filling the supply gaps associated with intermittent wind and solar power.

Cost Competitiveness

- NuScale's Power Module enables utility companies to "right-size" their power plants for current needs, then add capacity as necessary.
- Off-site fabrication and assembly reduces cost, and components are delivered to the site in "ready-to-install" form.
  - As a result, construction occurs in a shorter, more predictable period of time.
- The workforce required to construct NuScale power plants is much smaller than larger plants, for a much shorter duration.
- Our short 3-year construction schedule provides greater assurance that the plant will achieve operation before unforeseen external events impact the schedule.
- Projected first plant Levelized Cost of Energy (LCOE) <$85-105/MWh and improving.

Predictability of Fuel Costs

- Because nuclear plants refuel every 18-24 months, they are not subject to fuel price volatility like natural gas and oil power plants.
- Additionally, long term fuel contracts at historically low rates as well as the ability to own significant inventory further insulates the utility from price volatility. (Note: Energy Northwest owns fuel inventory out through 2028 at very low costs. This enables predictable energy costs.)

Load Following Capabilities

- A NuScale power plant has the ability to maneuver power quickly as needed to compensate for variable generation sources and to match load demand
- There are two ways of meeting varying load demand with the NuScale design:
  - Scalable design: ability to take units offline for extended periods to match load demand
  - Adjustable Power Level: individual or multiple units adjusting reactor power as needed using control rods only. The NuScale turbine bypass capability allows rapid electric power adjustments without changing reactor thermal power
- The challenge of compensation for the owner for capacity

NuScale's SMR technology

- Unprecedented safety margins
- Simplicity of operation and maintenance
- Ability to integrate with variable sources such as renewables
- Scalability to utility needs
- Compatibility with sites needing a small footprint

Inclusion in the Integrated Resource Plans in the State

- Utility integrated resource plans must be updated periodically to reflect changing conditions with respect to load forecasts, fuel prices, capital costs, conditions in the electricity markets, environmental regulations, and other factors.
- In Washington State, updates are required every two years.
- Energy Northwest strives to develop a robust base of diverse energy assets to address the current and future power needs of Washington's public power utilities.
  - As a power generation agency Energy Northwest has particular expertise in the operation and maintenance of existing power plants and development of new projects using a variety of traditional and emerging technologies.

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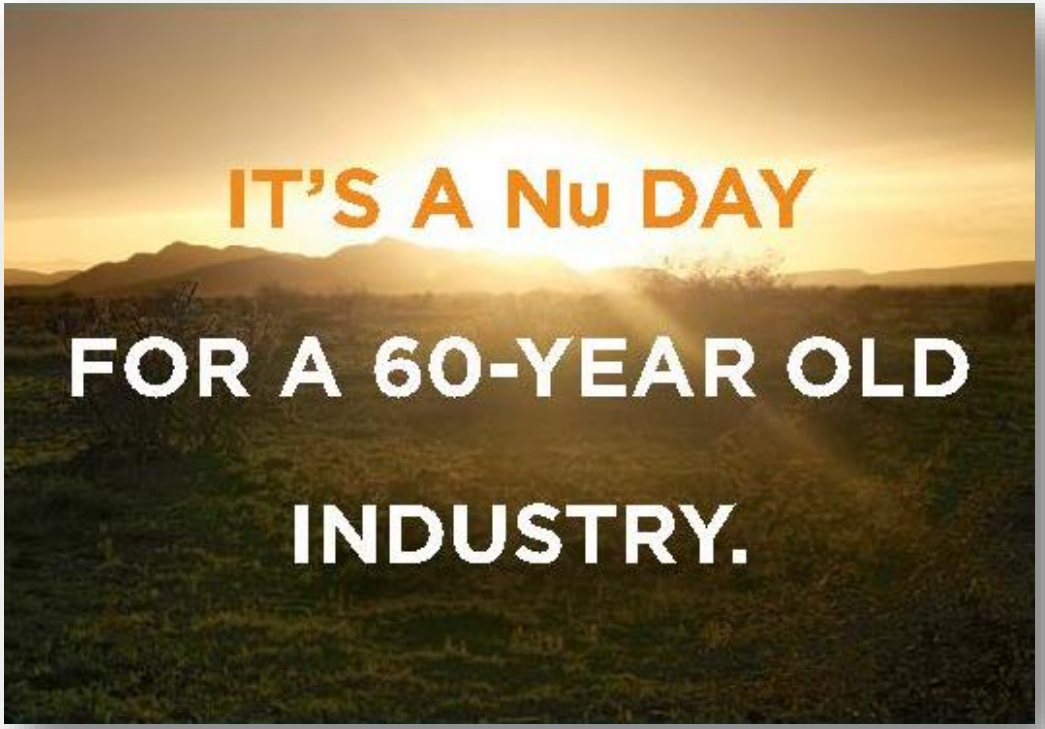

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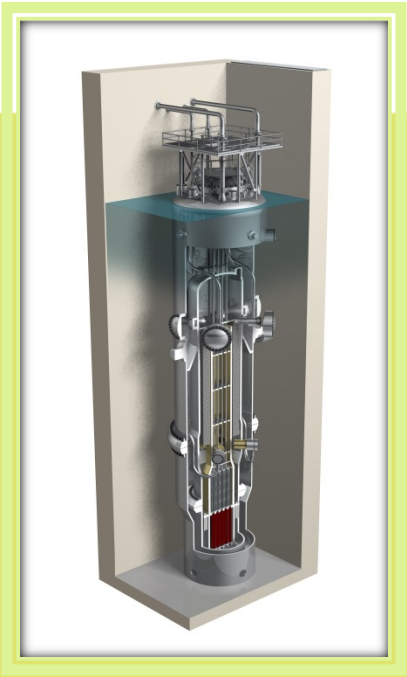
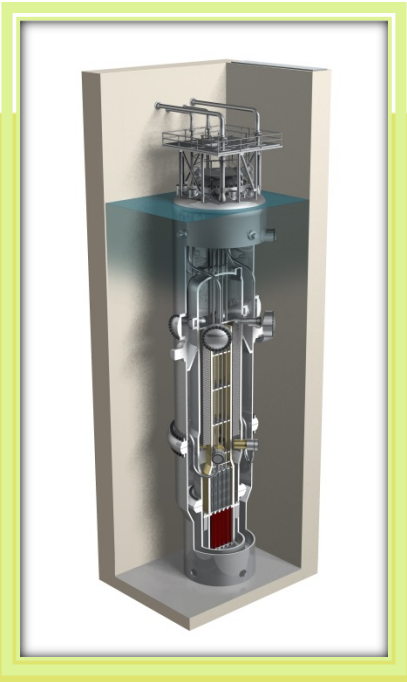
Break



10 Minutes

NuScale Power™

Control Room Simulator Tour

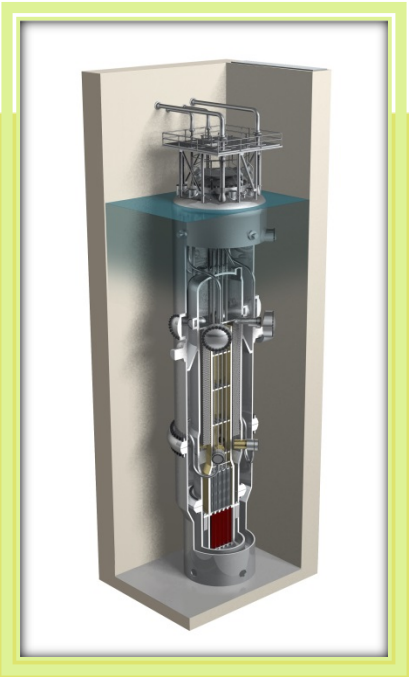


Ross Snuggerud

Operations Engineer, Plant Operations

NuScale Power™

NIST Tour

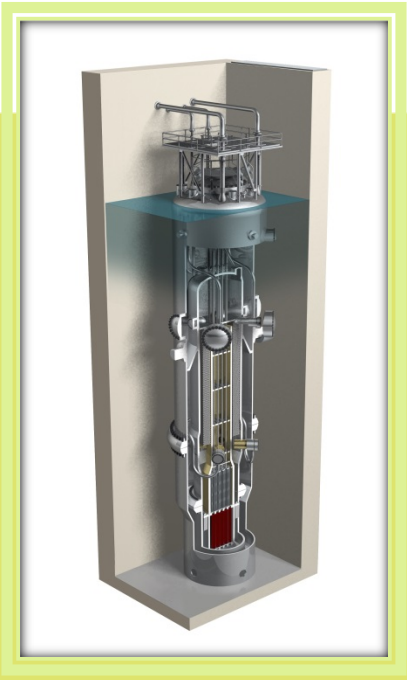


Dr. Jose Reyes

Chief Technology Officer

NuScale Power™

Reconvene/Summary



Dale Atkinson

Chief Operating Officer and

Chief Nuclear Officer

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