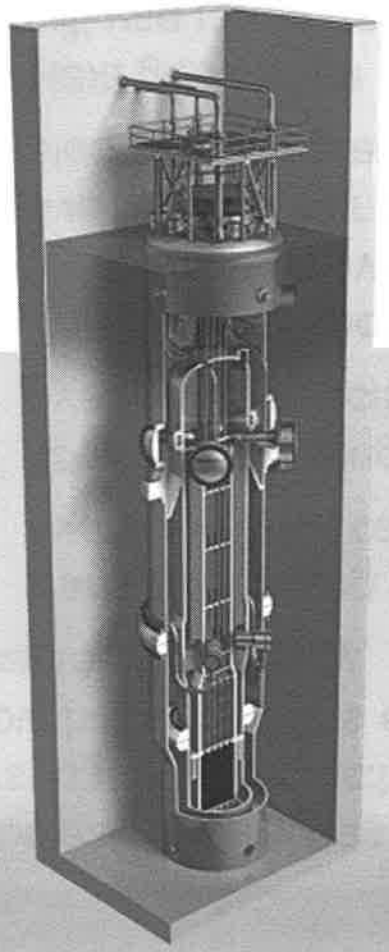


A ROLE FOR NUCLEAR
Supporting Oregon HB 3445

Jose N. Reyes, Ph.D.
Chief Technology Officer

Dale Atkinson
Chief Operating Officer and Chief Nuclear Officer

May 19, 2015

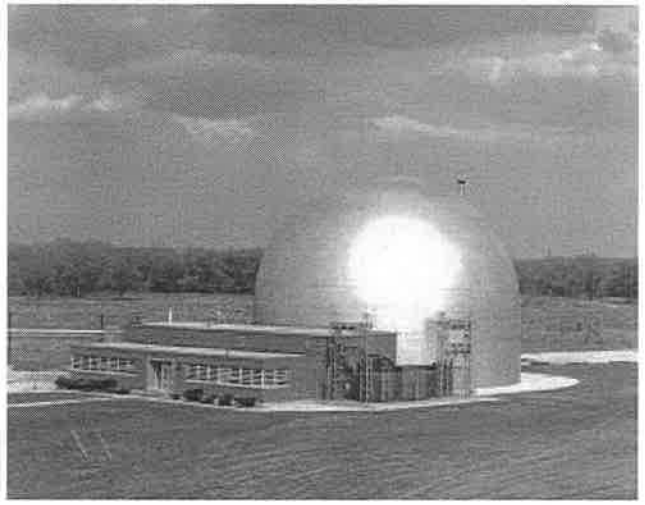
Nonproprietary

NuScale Power™

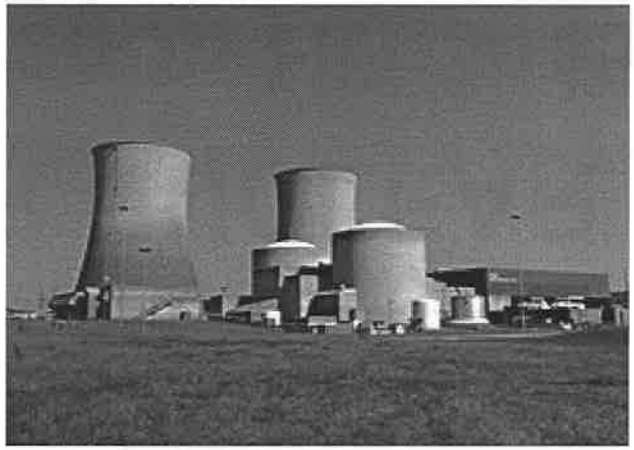
Nuclear Energy Today

Nuclear Energy has come a long way since its first use for electricity in the United States. We now have 70 years experience with light water reactor technology.

- Early generating plants from the 1970's averaged 50% capacity factors.
- Today's operating fleet routinely exceeds over 90% capacity factor.
- The 99 active power reactors in the U.S. today provide over 19% of our electricity and over 66% of our greenhouse-gas free electrical generation.
- Next generation reactors under construction will use many passive safety systems, instead of relying on human actions or power.
- NuScale's Small Modular Reactors are the newest class in safe reactor design.



EBR-1 at the Idaho National Engineering Laboratory in 1956.

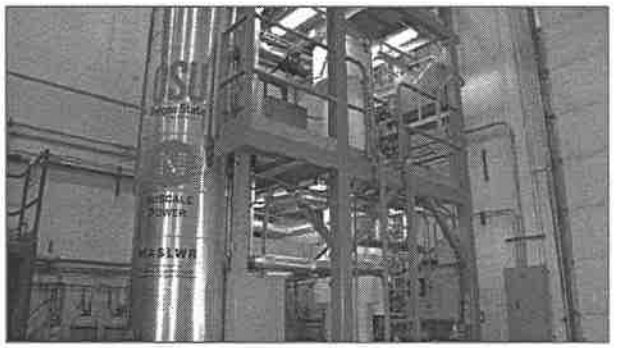


Watts Bar 1, last nuclear power plant licensed to operate in the U.S.

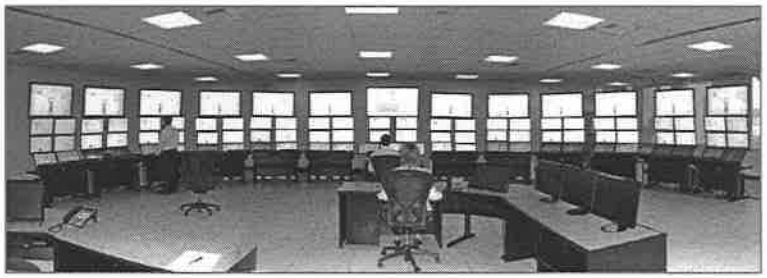
NuScale Power History/Status

- NuScale technology in development and design since 2000 (DOE) MASLWR program
- Electrically-heated 1/3-scale Integral test facility first operational in 2003
- Began NRC design certification (DC) pre-application project in April 2008
- Twelve-reactor, simulated control room operational in May 2012 for Human Factors Engineering development
- 189 Patents Granted/Pending in 19 countries
- >600 people currently on project; ~$300M invested in project life-to-date
- US DOE SMR Grant Awardee, 12/12/13, $217M matching funds
- Acquired by Fluor in October 2011
- Plan to submit the Design Certification Application to NRC last half of 2016

NuScale Engineering Offices Corvallis



One-third scale Test Facility



NuScale Control Room Simulator

Reactor Module Overview

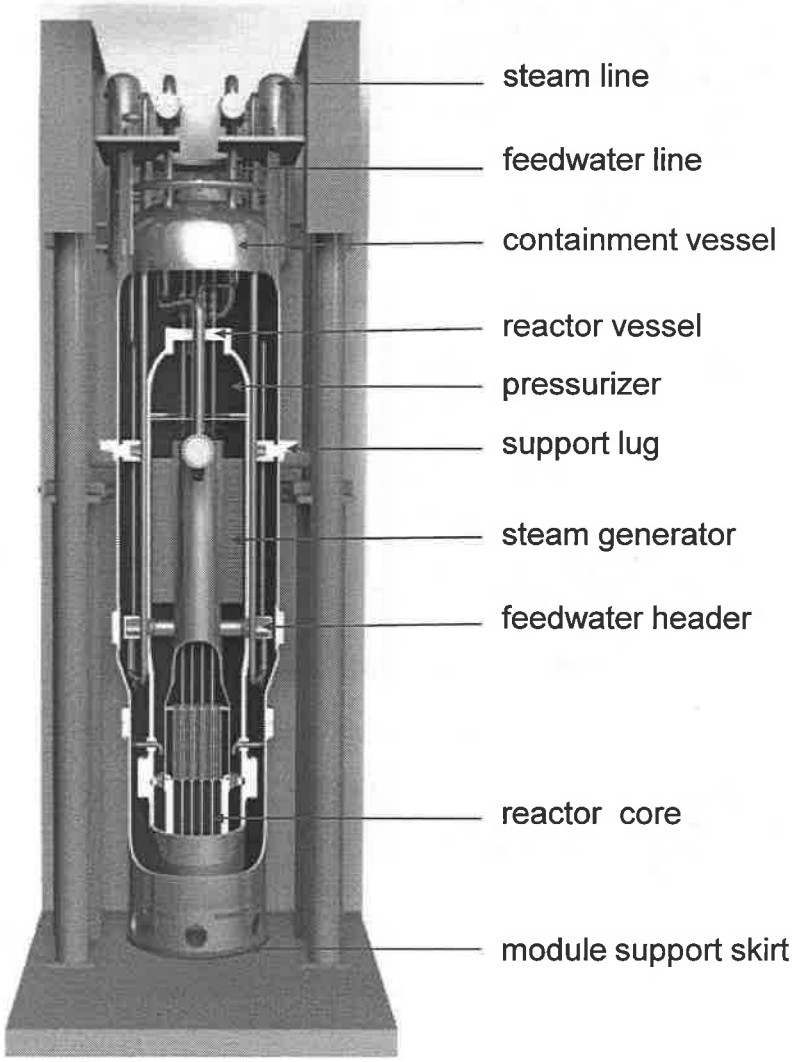
Natural convection for cooling

- passively safe, driven by gravity, natural circulation of water over the fuel
- no safety-related pumps, no need for emergency generators

Simple and small

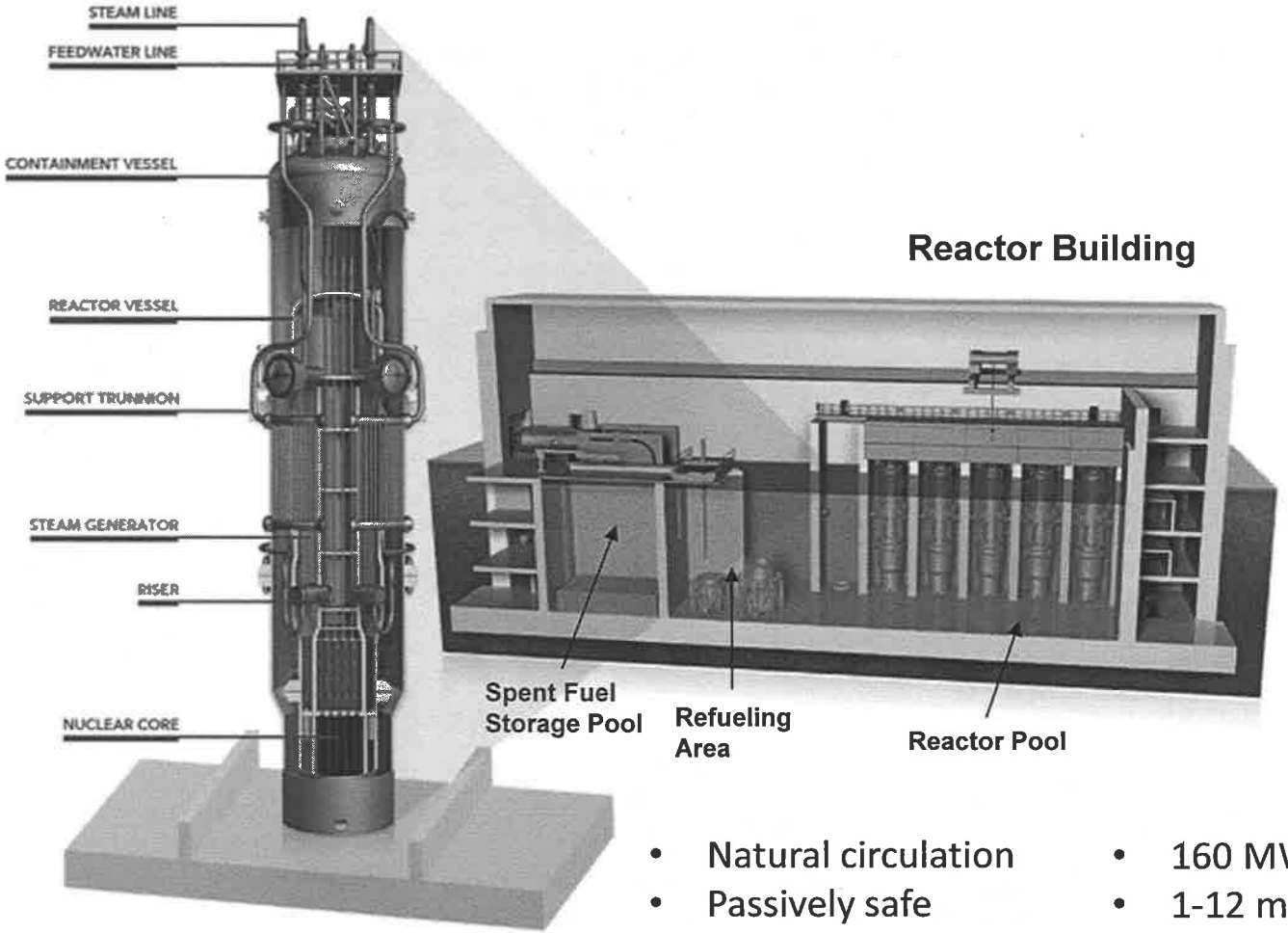
- reactor is 1/20th the size of large reactors
- integrated reactor design, no large-break loss-of-coolant accidents

Click HERE for video



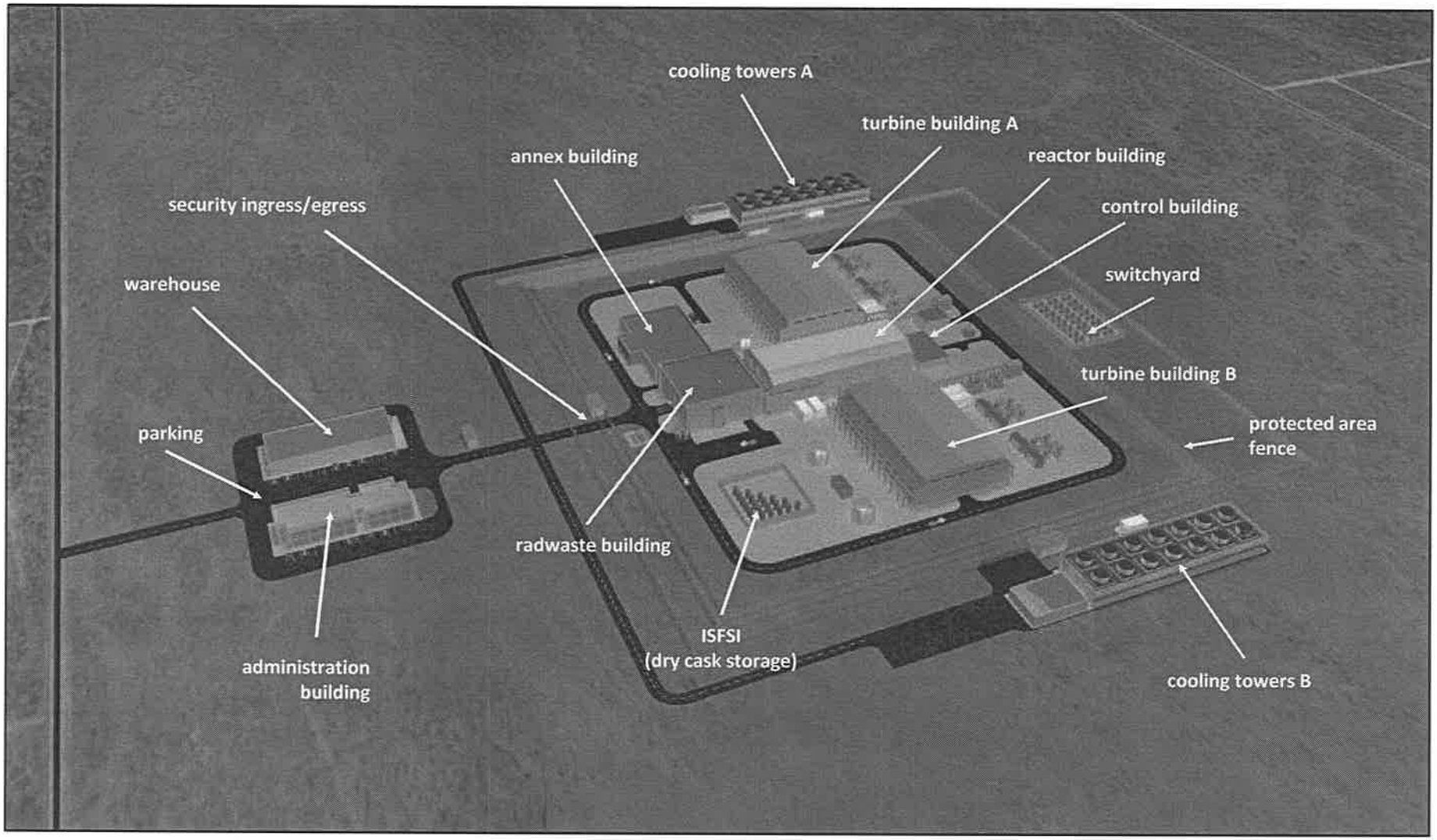
NuScale Modular Plant

NuScale Power Module



- Natural circulation
- Passively safe
- 2 Year Refueling per module
- 160 MWt/module
- 1-12 modules/plant

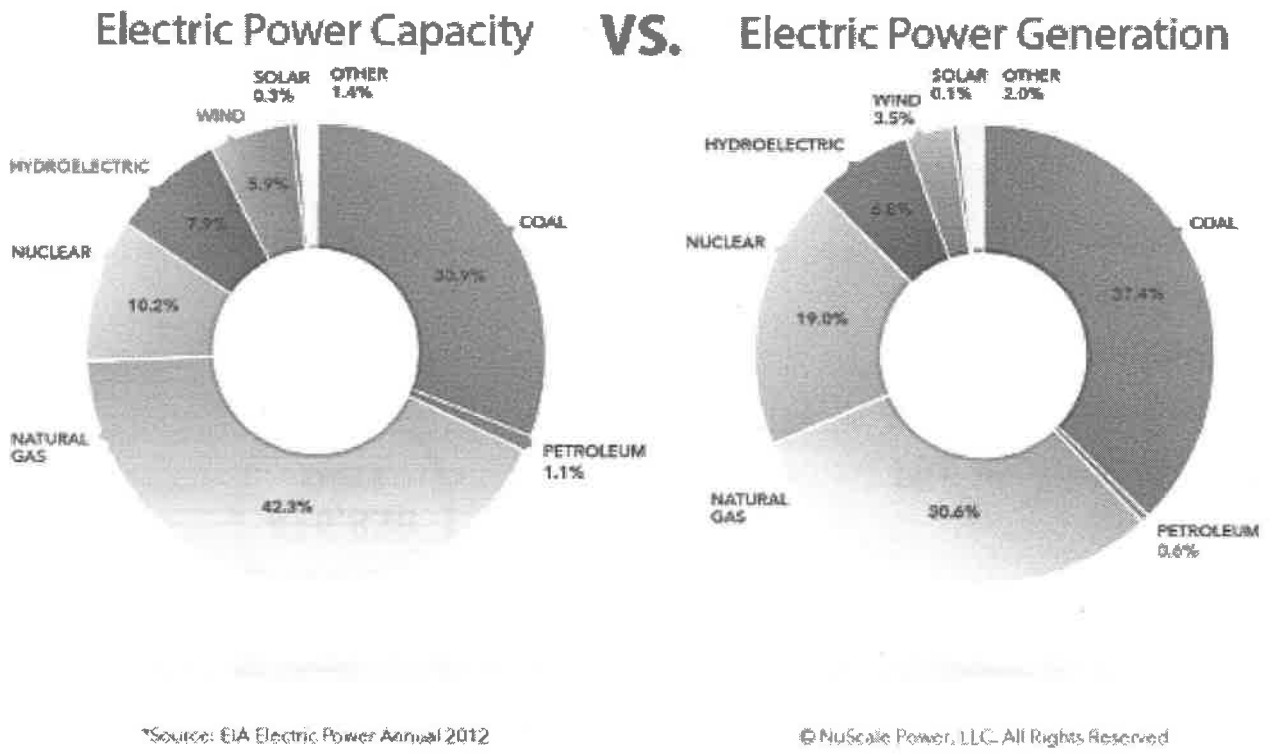
Site Aerial View



NuScale Power

Reliability – Capacity vs. Generation

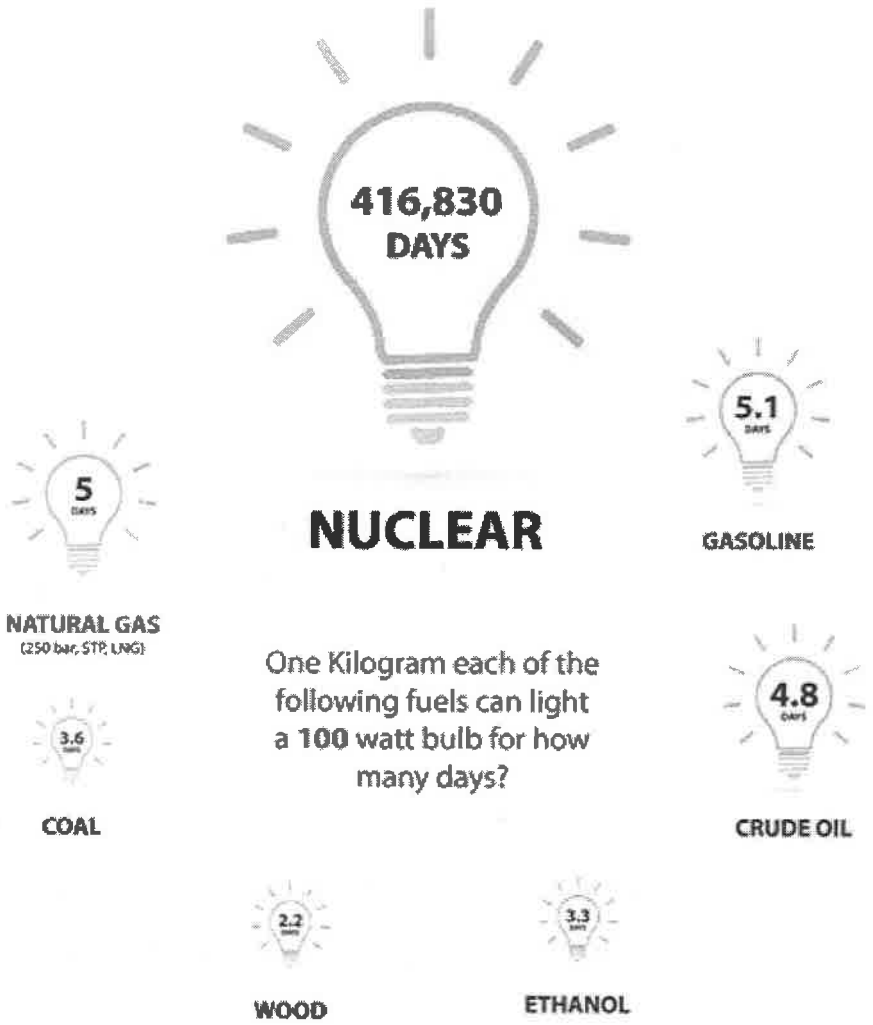
Base on nameplate capacity, you would expect nuclear plants to generate about 10% of the nation's electricity. In fact, it generates 19% - nearly twice expectations. Many other sources generate less than expected based on their nameplate capacities.



*Source: EIA Electric Power Annual 2012

NuScale Power™

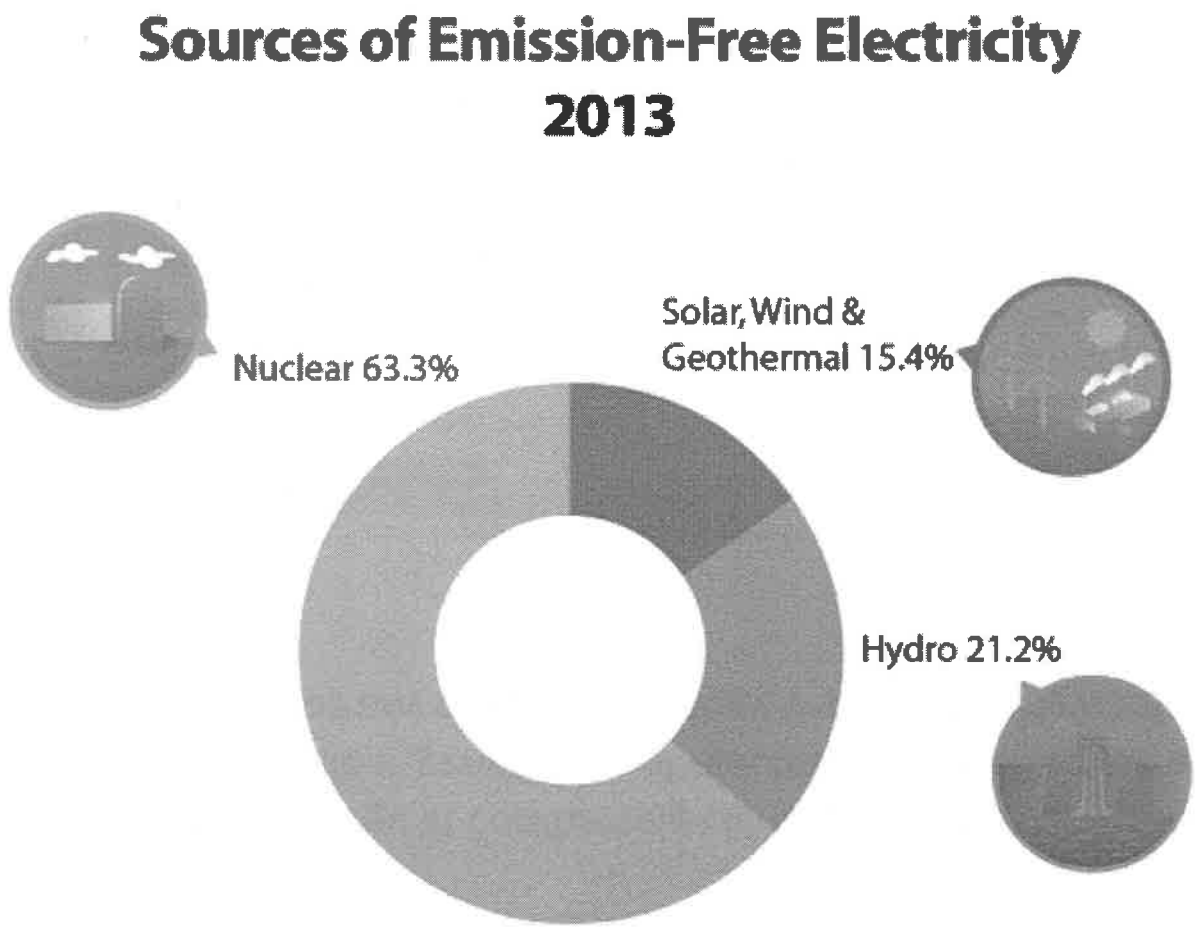
Impact of Fuel Density



The more fuel needed for a given amount of energy, the greater the likelihood and size of associated effects – more land use, more air and water pollution.

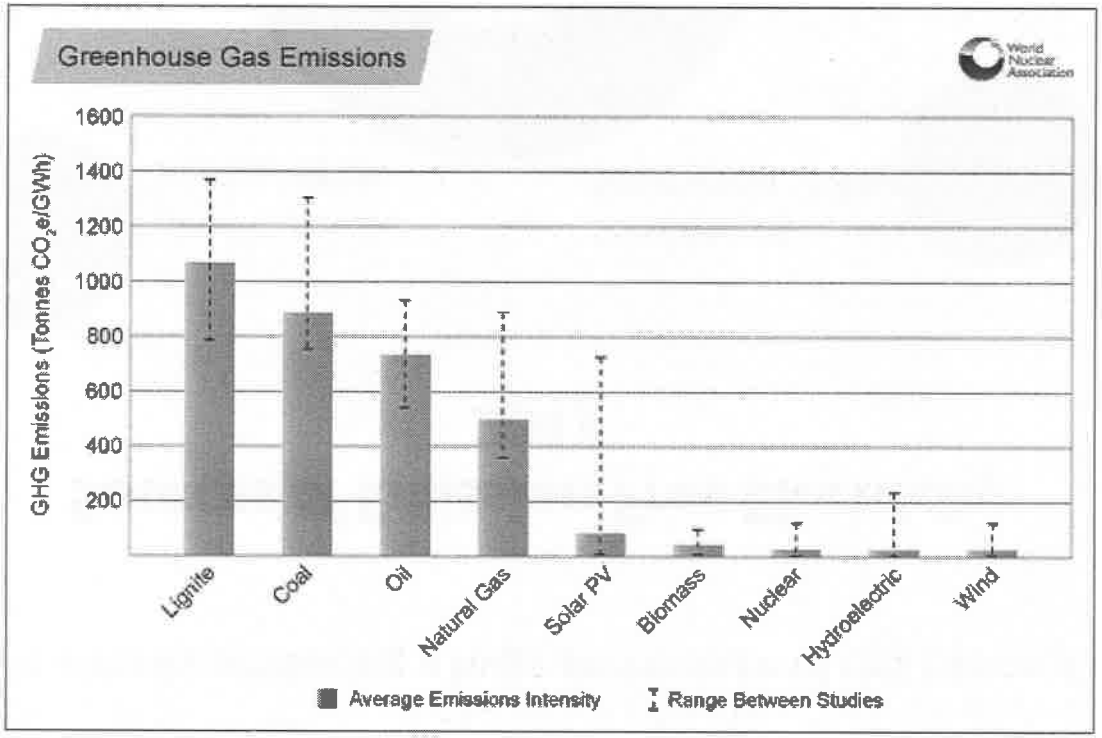
Nuclear - Already Clean

Nuclear Power is already producing a huge percentage of this nation's emission –free electricity.

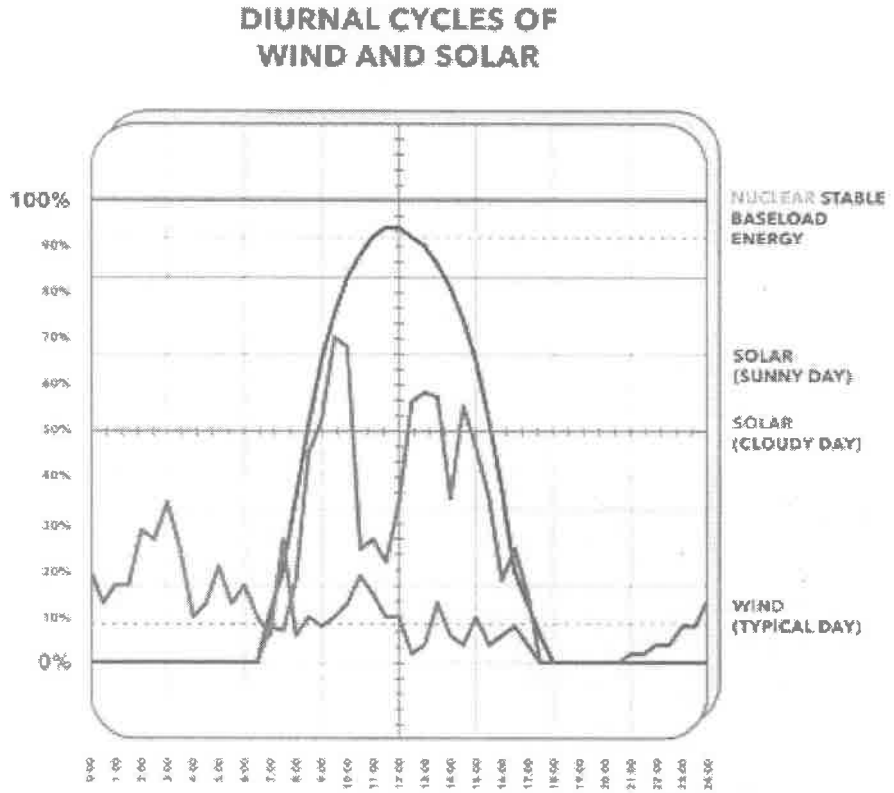


Nuclear and Climate Change

Just how good is nuclear energy at combatting climate change? Numerous studies have consistently shown that nuclear generation of electricity is as effective at reducing greenhouse gas emissions as any other technology, including renewables.



Nuclear as Reliable Baseload

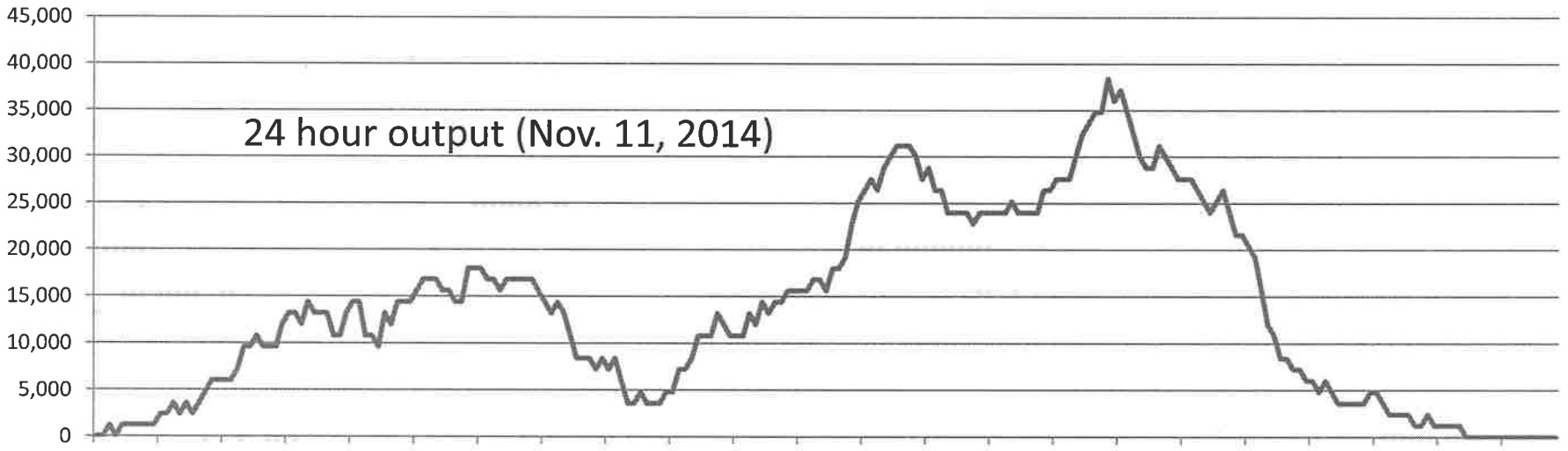


NuScale Power™

Nuclear to Support Renewables

Horse Butte Wind Farm

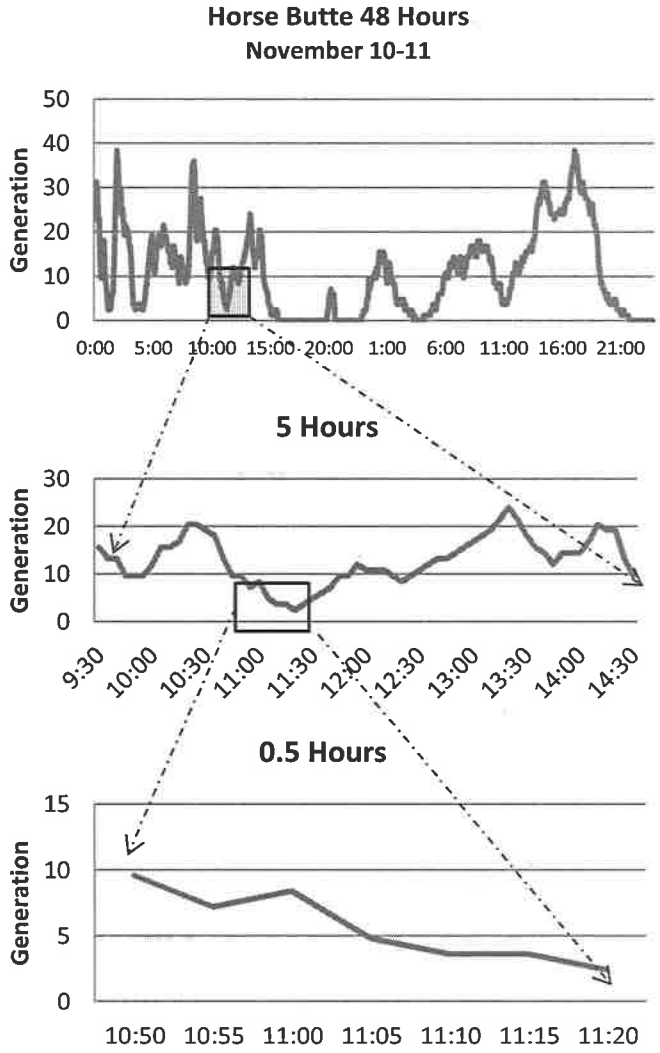
- Commissioned in 2012
- 32 Vestas V100 turbines
- 1.8 MWe capacity per turbine
- 57.6 MWe total capacity
- 17,600 acres



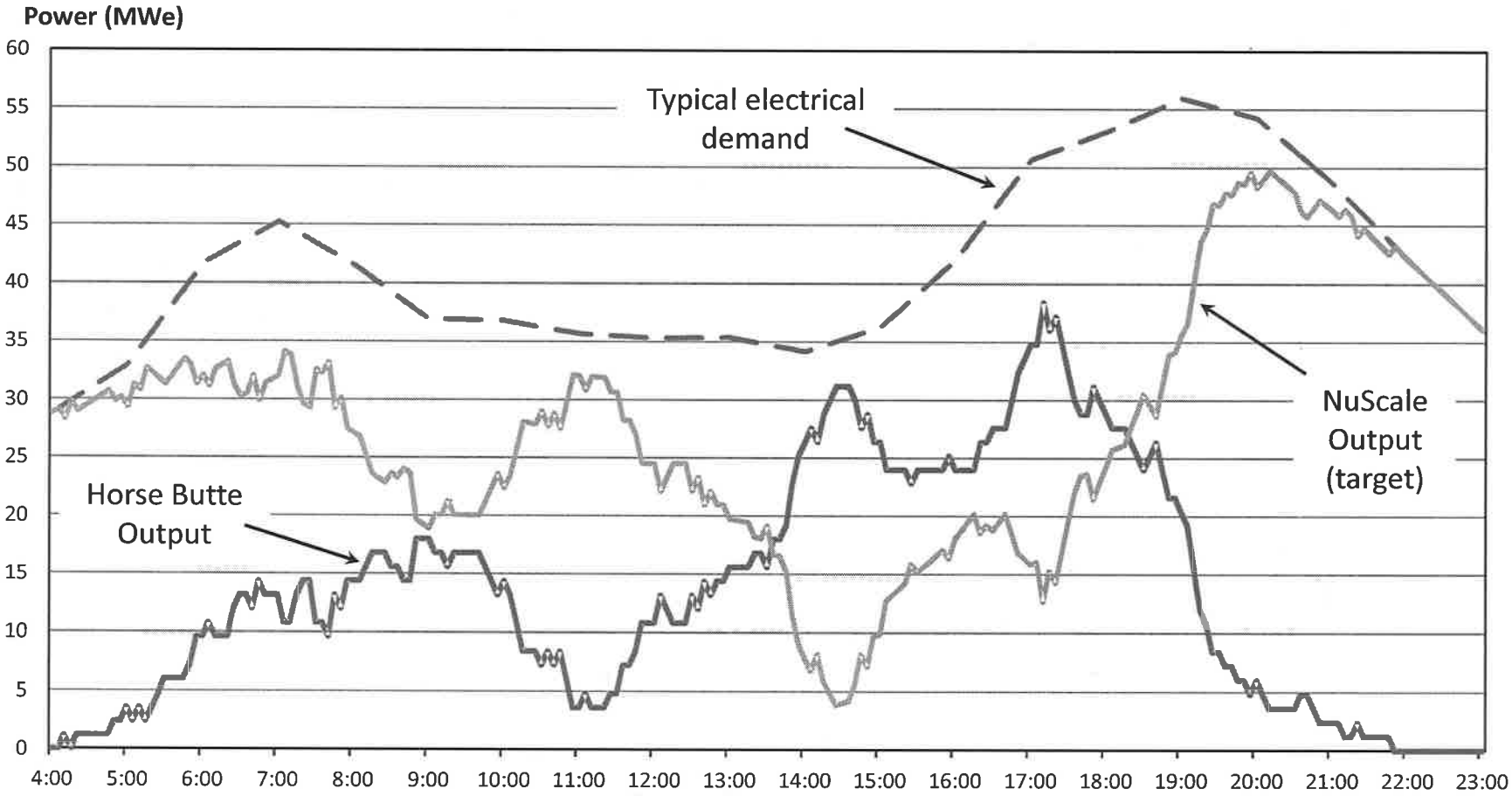
NuScale Power™

NuFollow™ and Horse Butte, Idaho

- NuScale includes unique capabilities for following electric load requirements as they vary with customer demand and rapid changes experienced with some renewables
- There are three means to change power output from a NuScale facility:
  - **Dispatchable modules** – taking one or more reactors offline and subsequently putting back online over a period of days/hours
  - **Power Maneuverability** – adjusting reactor power over a period of minutes/hours
  - **Turbine Bypass** – bypassing turbine steam to the condenser over a period of seconds/minutes
- This capability, called **NuFollow™**, is unique to NuScale and holds the promise of expanding the deployment of renewables without backup from greenhouse gas emitting generation sources, such as natural gas-fired, combined cycle gas turbines (CCGTs)



Meeting Demand with Wind Plus Small Nuclear



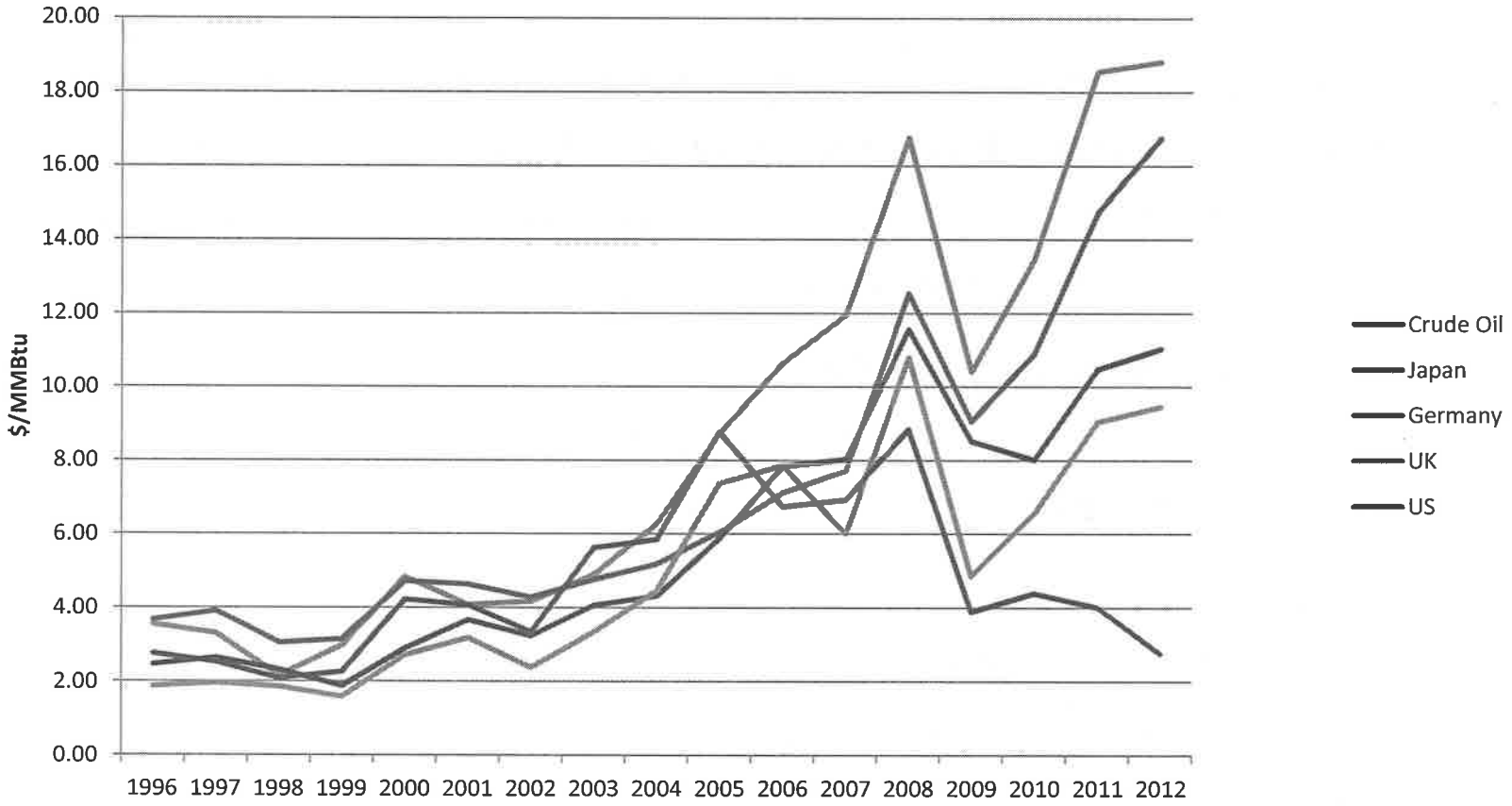
NuScale Power™

Cost Competitiveness

- NuScale's power module enables utility companies to "right-size" their power plants for current needs, then add capacity as necessary
- Design simplification enhances safety, reduces maintenance, and improves plant availability
- 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 are measured in the hundreds, not the thousands
- 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) $95/MWhr, and improving

Natural Gas Prices Vary Widely

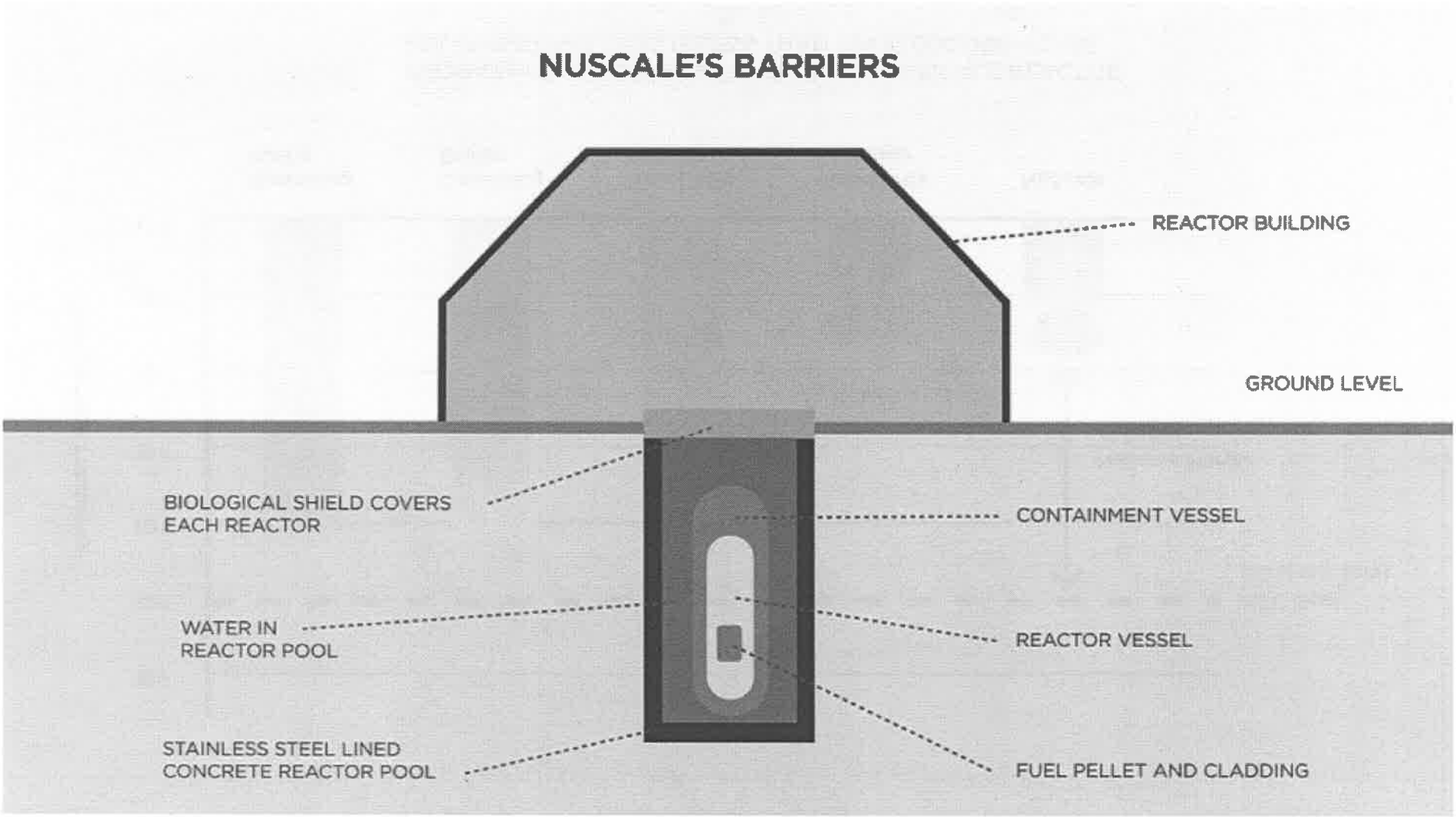
Gas Prices in Selected Global Markets



Source: BP Statistical Review of World Energy, June 2013

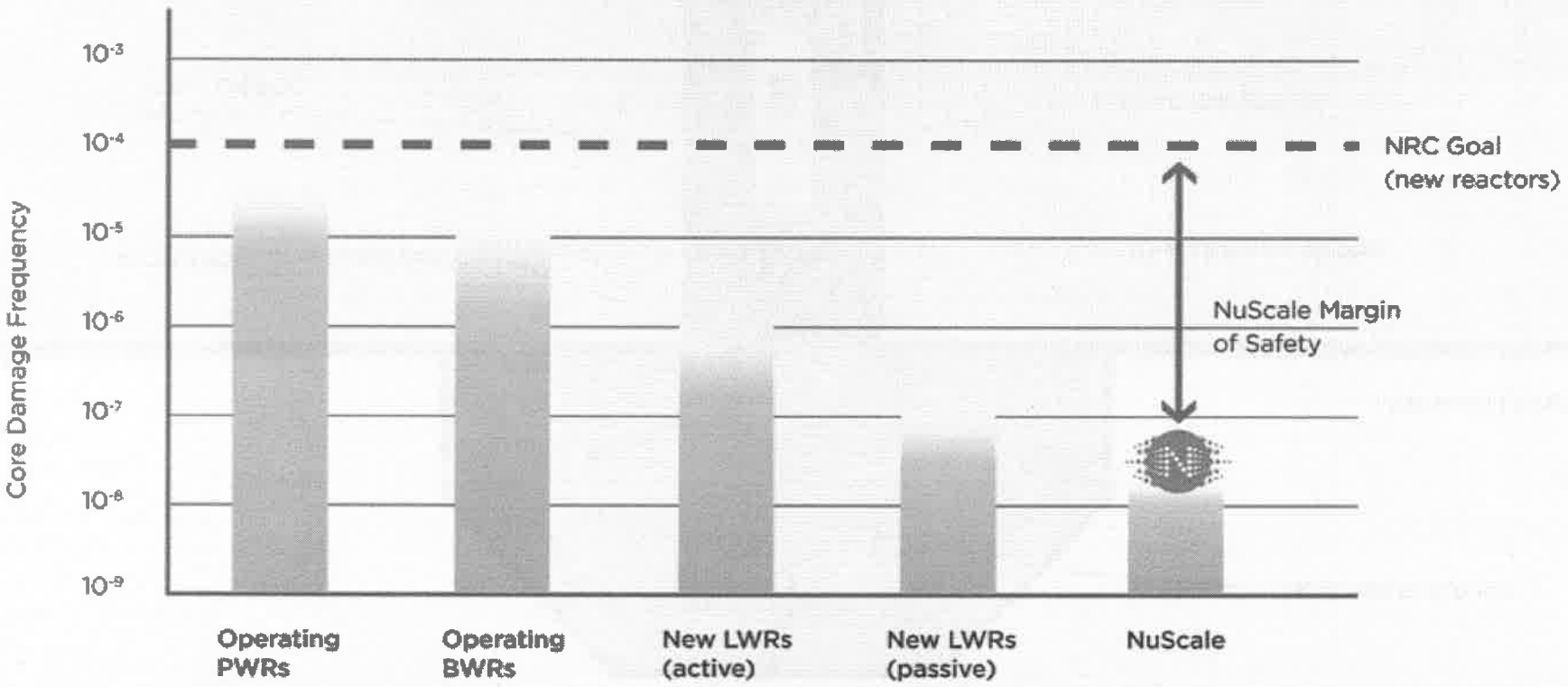
NuScale Power

Barriers to Protect the Public



NuScale Power™

Protection Against Extreme Events

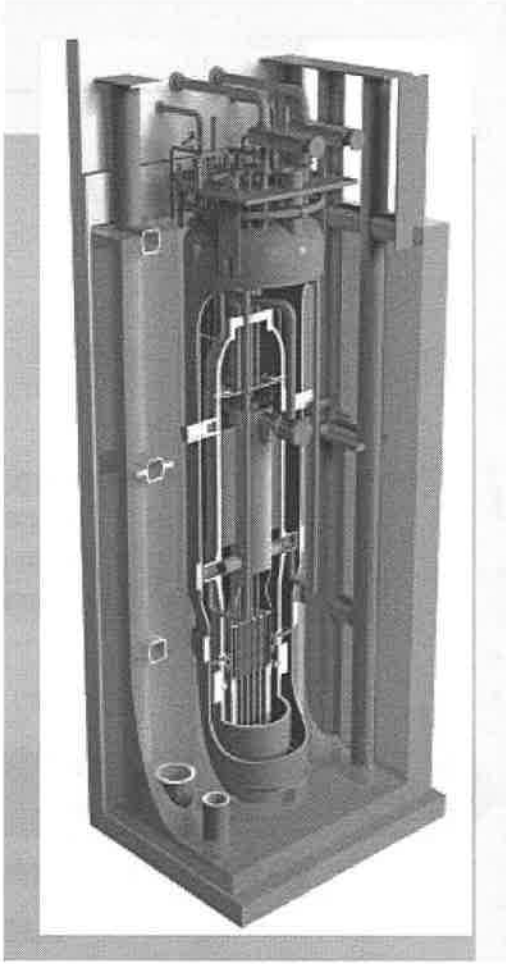


PROBABILITY OF CORE DAMAGE DUE TO NUSCALE REACTOR EQUIPMENT FAILURES IS LESS THAN 1 IN 10,000,000 YEARS

NuScale Power™

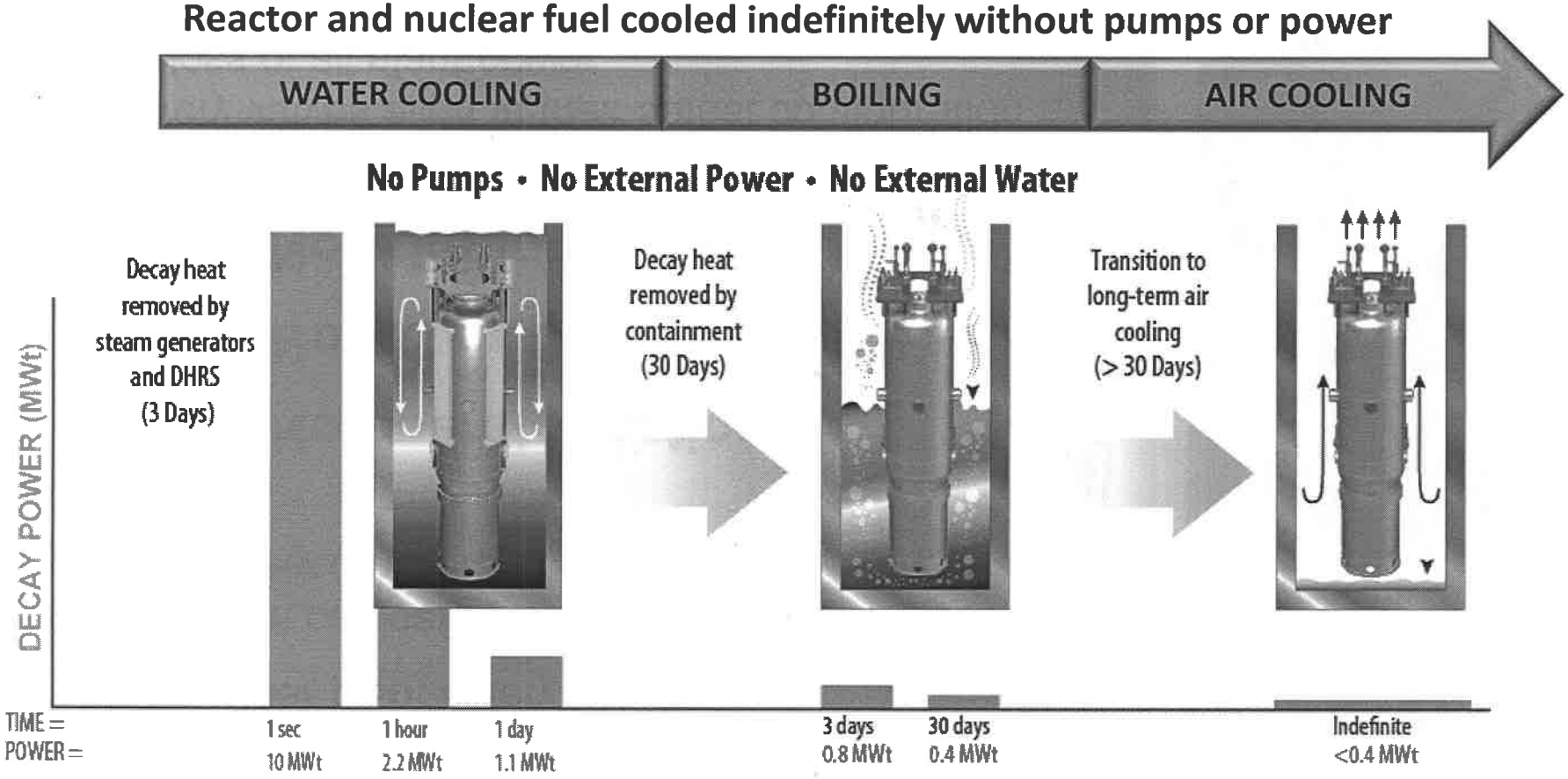
NuScale Major Breakthrough in Safety

- NuScale design has achieved the "Triple Crown" for nuclear plant safety.
- The plant can safely shut down and self-cool indefinitely (unlimited coping period), with:
  - **No operator action**
  - **No AC or DC power**
  - **No additional water**
- Safety valves align in their safest configuration on loss of all plant power.
- Details of the alternate system fail-safe concept were presented to the NRC in December 2012.



Extended Loss of AC and DC Power*

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*

NuScale Safety Systems

NuScale's Design Needs only 8 Systems and Components to Protect the Reactor Core:

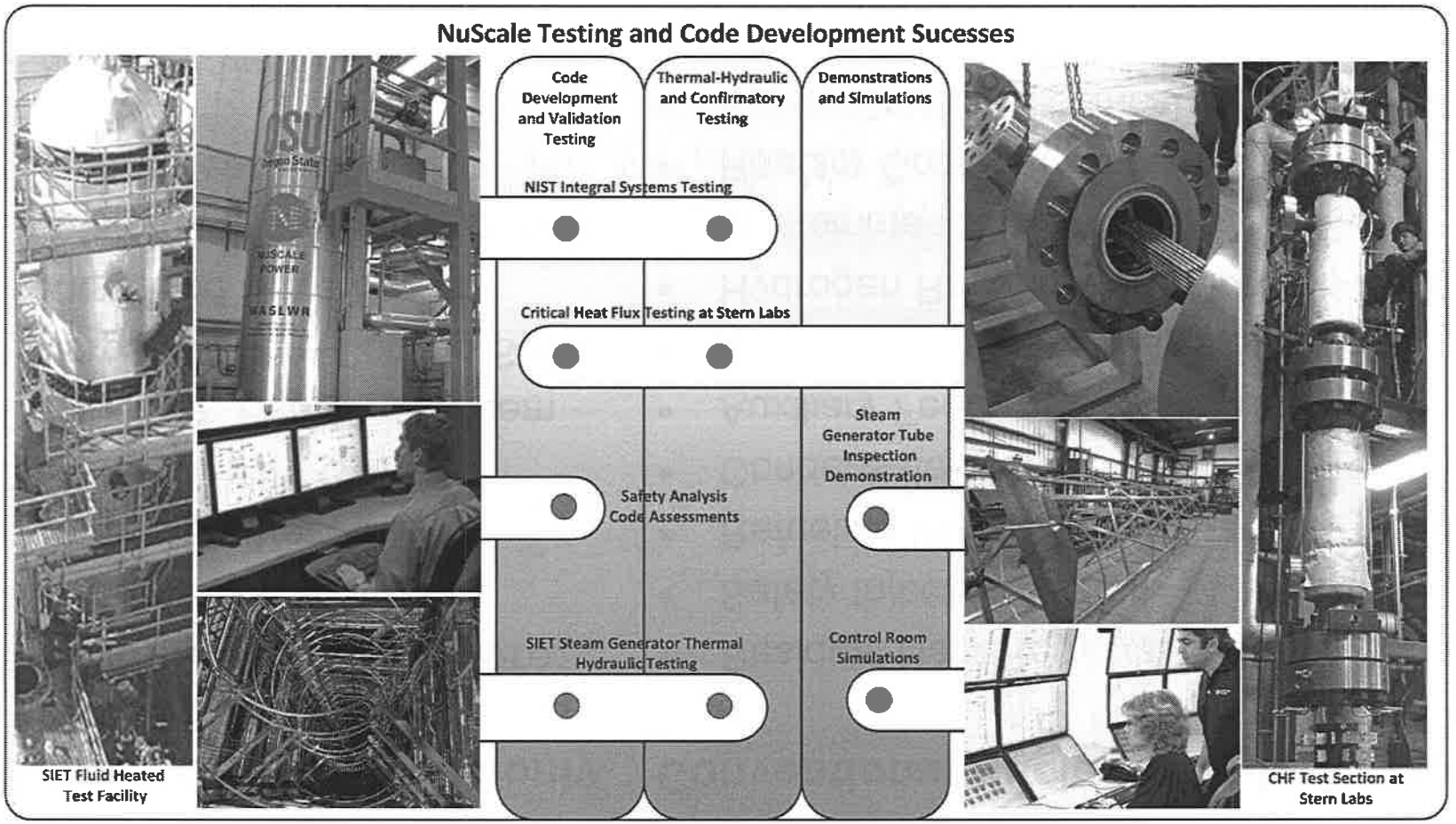
- Reactor Pressure Vessel
- Containment Vessel
- Reactor Coolant System
- Decay Heat Removal System
- Emergency Core Cooling System
- Control Rod Drive System
- Containment Isolation System
- Ultimate Heat Sink

Conventional Nuclear Needs Those 8 Plus:

- Residual Heat Removal System
- Safety Injection System
- Refueling Water Storage Tank
- Condensate Storage Tank
- Auxiliary Feedwater System
- Emergency Service Water System
- Hydrogen Recombiner or Ignition System
- Containment Spray System
- Reactor Coolant Pumps
- Safety Related Electrical Distribution
- Alternative Off-site Power
- Emergency Diesel Generators
- Safety Related 1E Battery System
- Anticipated Transient without Scram System

Ensuring the NuScale Power Module Is Safe

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



NuScale Power™

NuScale Integrated System Test Facility

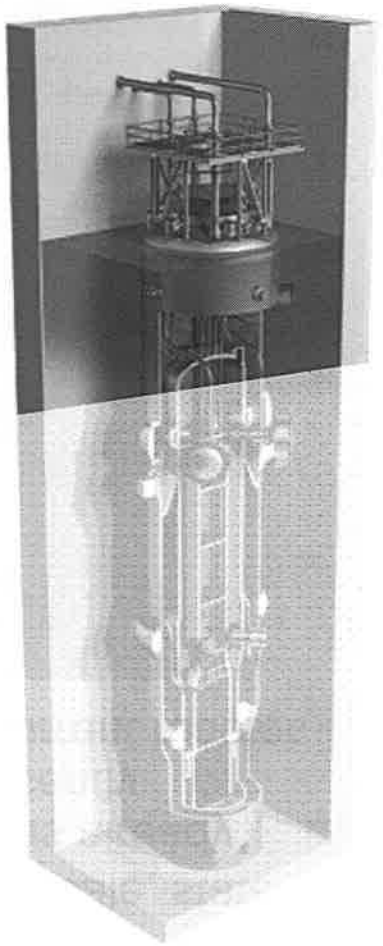
NuScale's has designed and built an exclusive access, one-third scale, state-of-the-art, electrically-heated prototype test facility. This facility has already demonstrated the viability of NuScale Power's SMR, and was recently upgraded to provide an enhanced representation of NuScale's current reactor design.

One-third scale Test Facility

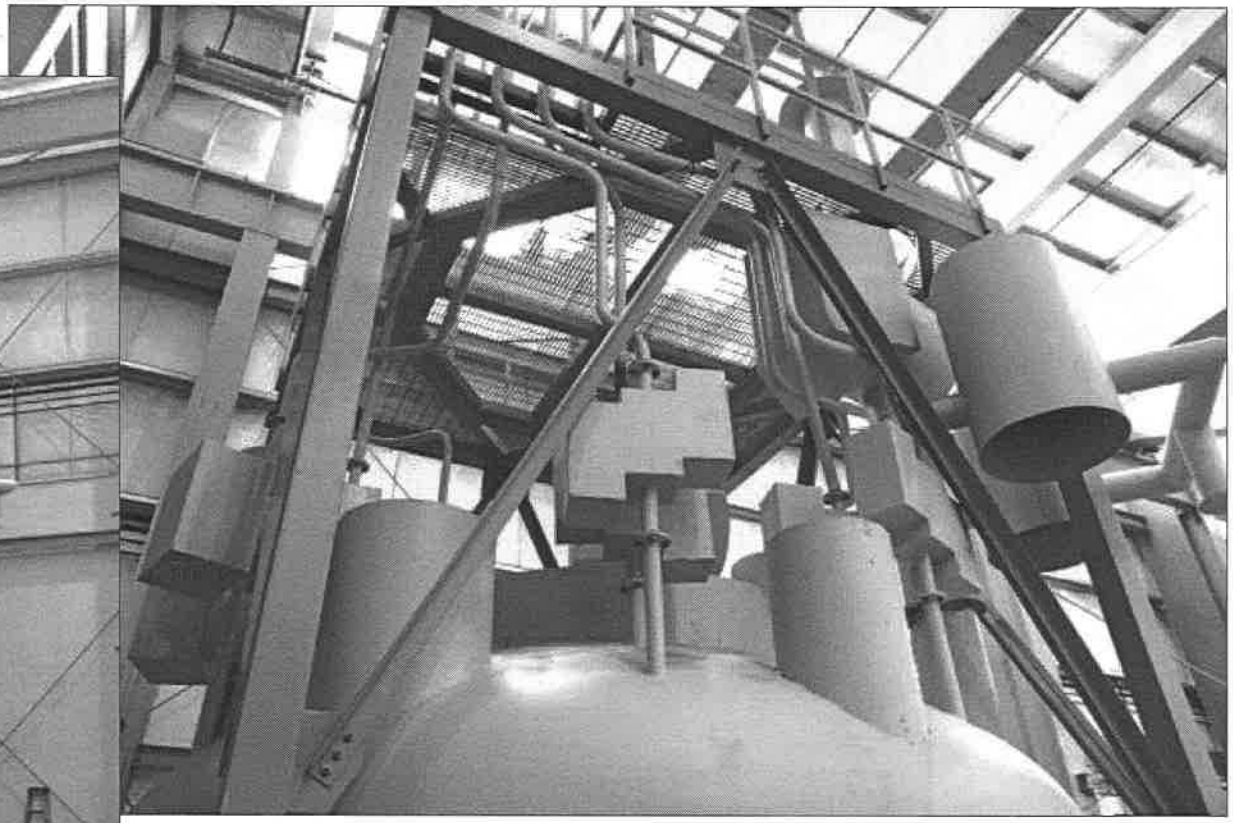
Upper Module Mockup

UMM. What is it?

- A full scale mockup of the reactor module
- "Upper" means that the mockup geometry only includes the top of the NuScale Power Module from the module access platform down to the elevation of the reactor vessel head.
- All major components are mocked up including:
  - The upper portion of the containment vessel
  - Major piping such as steam, feed water, and CVC
  - Control Rod Drive Mechanisms
  - Major valves such as isolation valves and ECC valves
  - The module access platform



NuScale UMM 3/24/15

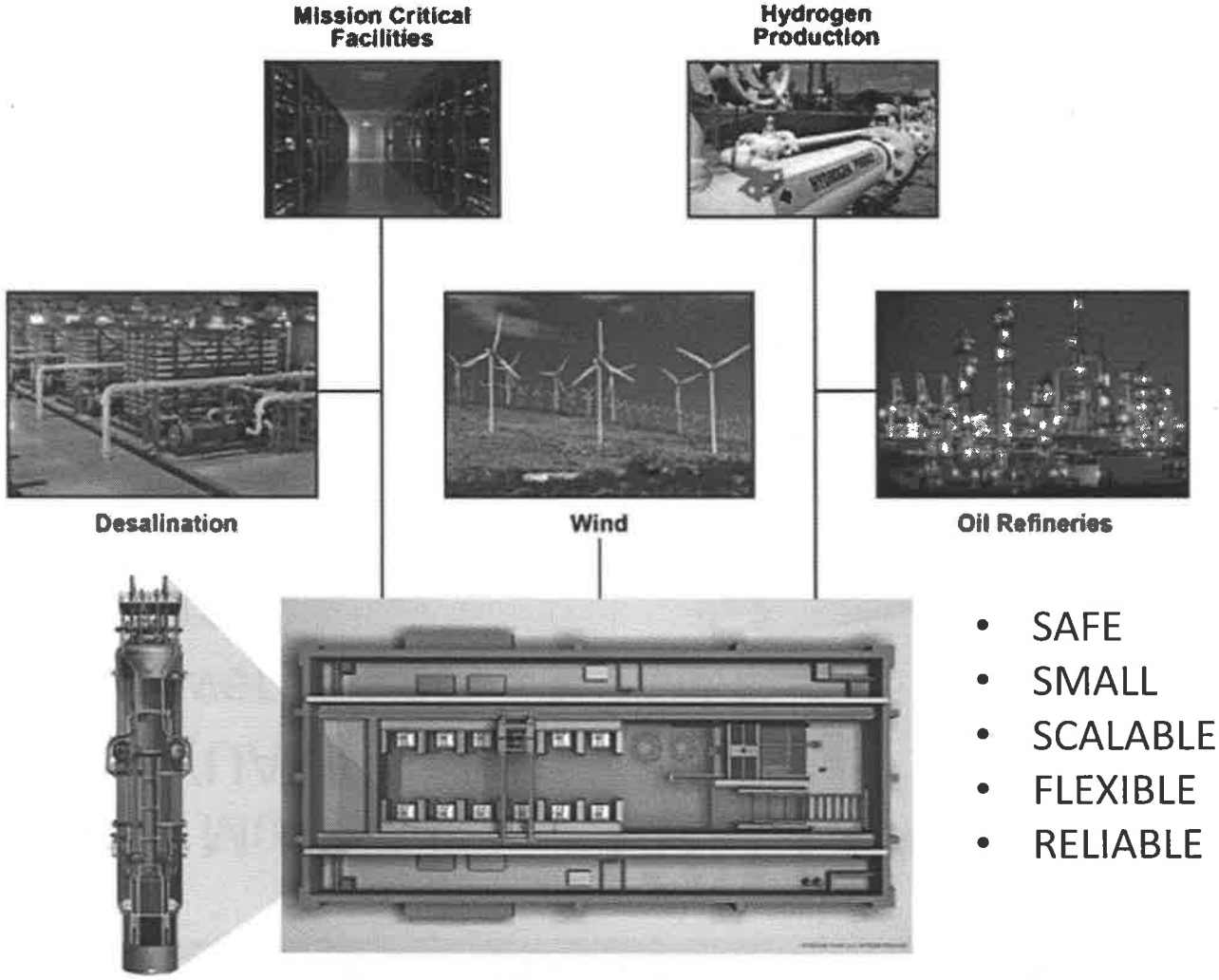


Full-Scale Main Control Room Simulator

NRC Review of HFE Program and Site Visit 1/13

NuScale Diverse Energy Platform (NuDEP) Initiative

NuScale is pursuing studies with partners in a variety of areas to develop applications for its flexible technology.

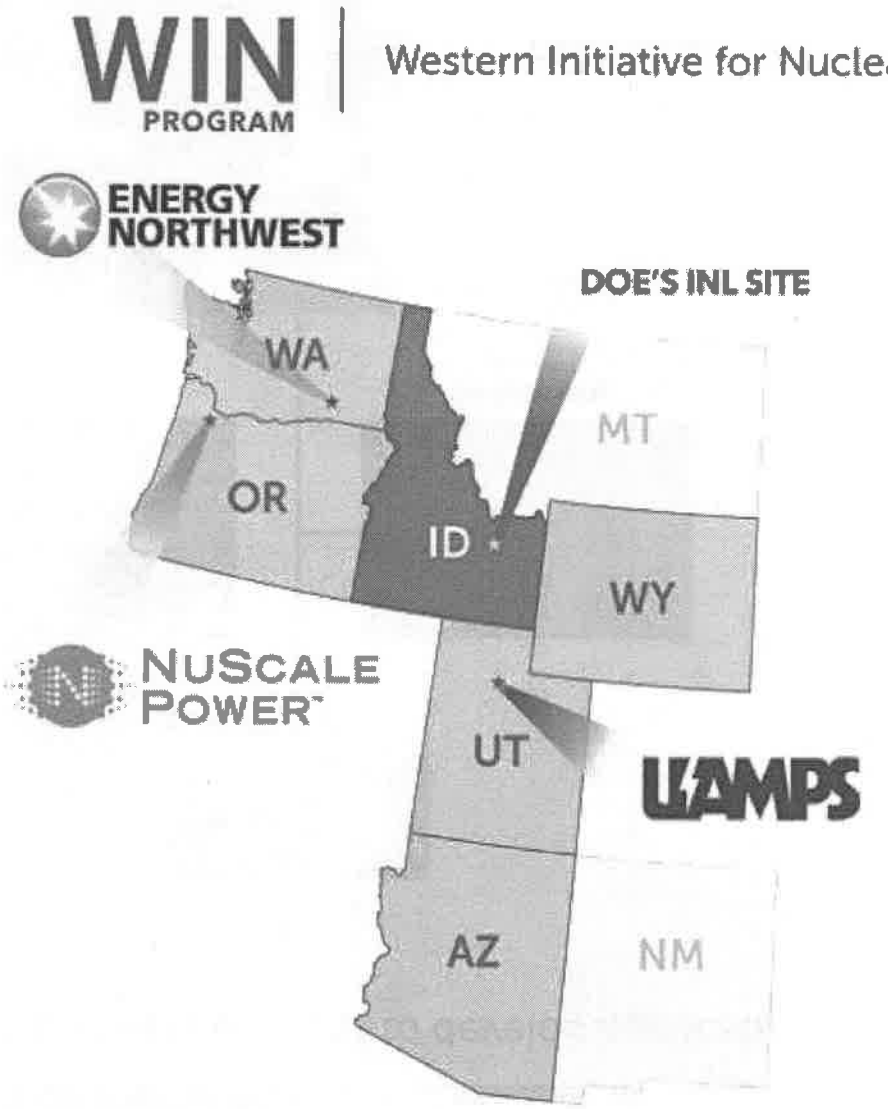


- SAFE
- SMALL
- SCALABLE
- FLEXIBLE
- RELIABLE

First Deployment: UAMPS CFPP

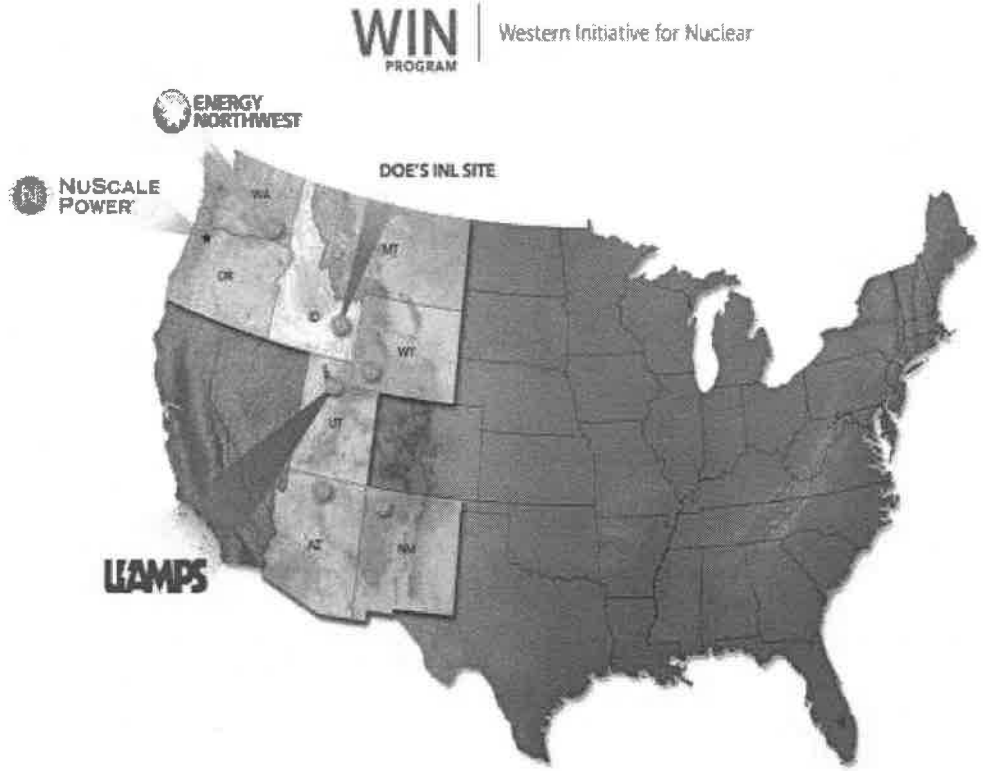
- Utah Associated Municipal Power Systems (UAMPS) Carbon Free Power Project (CFPP) will be first deployment, sited somewhere in Idaho.

- UAMPS consists of 46 members serving load in 8 western states.



Program WIN – Nuclear Future in the West

- Program WIN (Western Initiative for Nuclear) is a multi-western state collaboration to deploy a series of NuScale Power projects
- Involved Program WIN participants: NuScale, UAMPS, Energy Northwest
- 5 Other projects: WIN-WA, WIN-UT, WIN-AZ, WIN-NM, WIN-WY



Support for OR HB 3445

- Today's nuclear designs are not your father's nuclear power plant.
- NuScale's Small Modular Reactor design brings a new level of innovation to the nuclear industry to achieve unparalleled safety, affordability, and flexibility to nuclear power.
- This is a technology invented right here in the beautiful state of Oregon.
- By bringing new nuclear into the discussion, House Bill 3445 is a major step forward in helping to define a clean and reliable energy future for Oregon.