U.S. DEPARTMENT OF ENERGY | Office of NUCLEAR ENERGY

Carbon Free Power Project

NETWG Meeting

June 28-29, 2022

Melissa Bates: Program Manager / Technical Project Officer
Brad Brown: Technical Project Officer

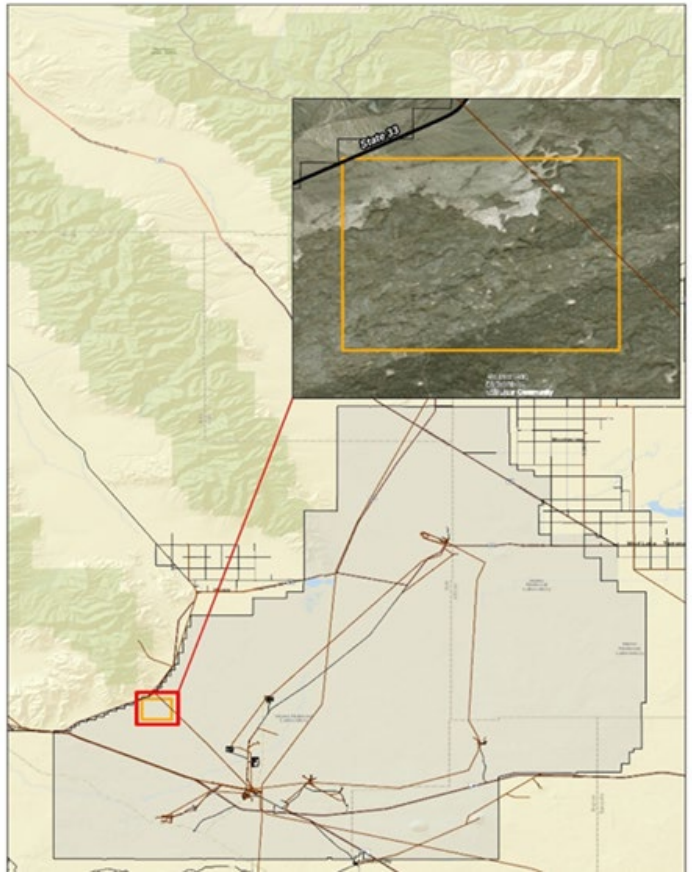
Outline

- Overview
- Carbon Free Power Project Details
- Site Selection
- Tribal Interaction
- Project Status

Carbon Free Power Project (CFPP)

- Construction and commercial deployment of a first-of-a-kind, 6-module NuScale small modular reactor
  - Owner: Utah Associated Municipal Power Systems (UAMPS)
  - Reactor Technology: NuScale Power, LLC (NuScale) small modular reactor (SMR)
  - Location: Idaho National Laboratory (INL)
  - Regulator: Nuclear Regulatory Commission (NRC)

CFPP Location on INL Site



Two Awards – One Objective – SMR Commercialization

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- Completes **standard licensing activities** with the Nuclear Regulatory Commission (NRC): **Design certification** (50 MWe) and **Standard Design Approval (SDA)** (77 MWe)
- Finalizes the **NuScale design** for procurement and manufacturing readiness -- provides increased confidence that the design is commercially viable
- Develops a **standard plant design** that improves plant cost competitiveness and provides schedule confidence for the first client
- Establishes a **supply chain** for the NuScale Power Module (NPM) -- Includes mechanical handling equipment, fuel, and instrumentation and controls systems

CFPP CARBON FREE POWER PROJECT

Completes all required activities to **achieve commercial operation** of an NRC-licensed, first-of-a- kind, NuScale small modular reactor (SMR) power plant.

- Project management
- Owner's development activities
- Combined License Application (COLA) development
- COLA review and approval by the NRC
- Site-specific engineering
- Component fabrication, transportation, and assembly
- Site mobilization and construction
- Staffing and operational accreditation
- Startup and commissioning

Design → **Deployment**

Road to NuScale SMR Deployment

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Initiate Site Characterization at CFPP Site

Core Borings Complete

Submit Standard Design Approval Application to NRC

Standard Plant Design Complete

Design Certification Issued by NRC

NRC Completes Staff Review of Design Certification Application

Submit Combined License Application (COLA) to NRC

Begin Site Preparation

Complete Supply Chain Readiness

Standard Design Approval Issued by NRC

Draft EIS Issued by NRC

Combined License (COL) Issued by NRC

UNDER CONSTRUCTION

1st Safety Related Concrete

1st NPM Fabricated

Turbine Building Construction Complete

1st NPM Received On-Site

6th NPM Fabricated

Commercial Operation of 1st NPM

Commercial Operation of Full NuScale SMR

CFPP
CARBON FREE POWER PROJECT

EIS: Environmental Impact Statement

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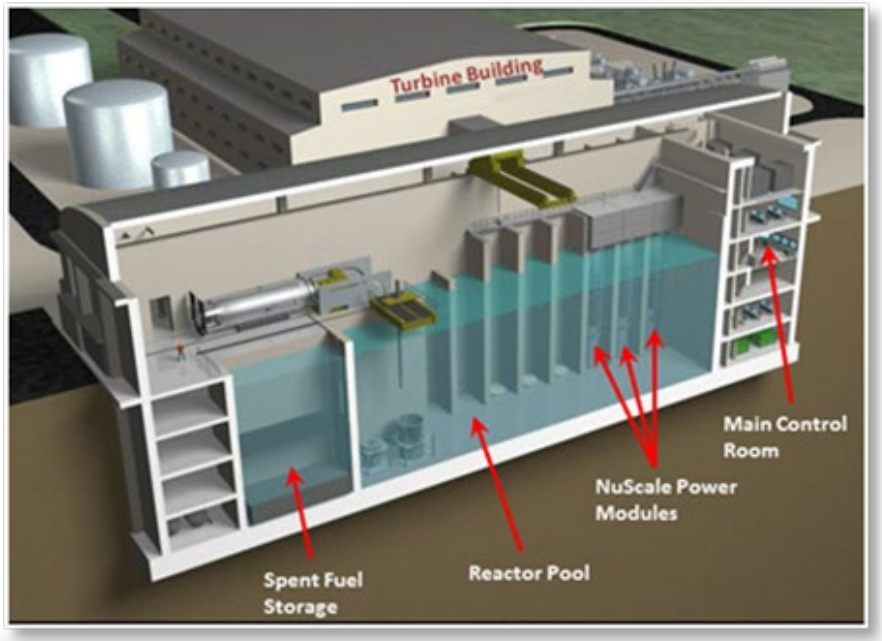
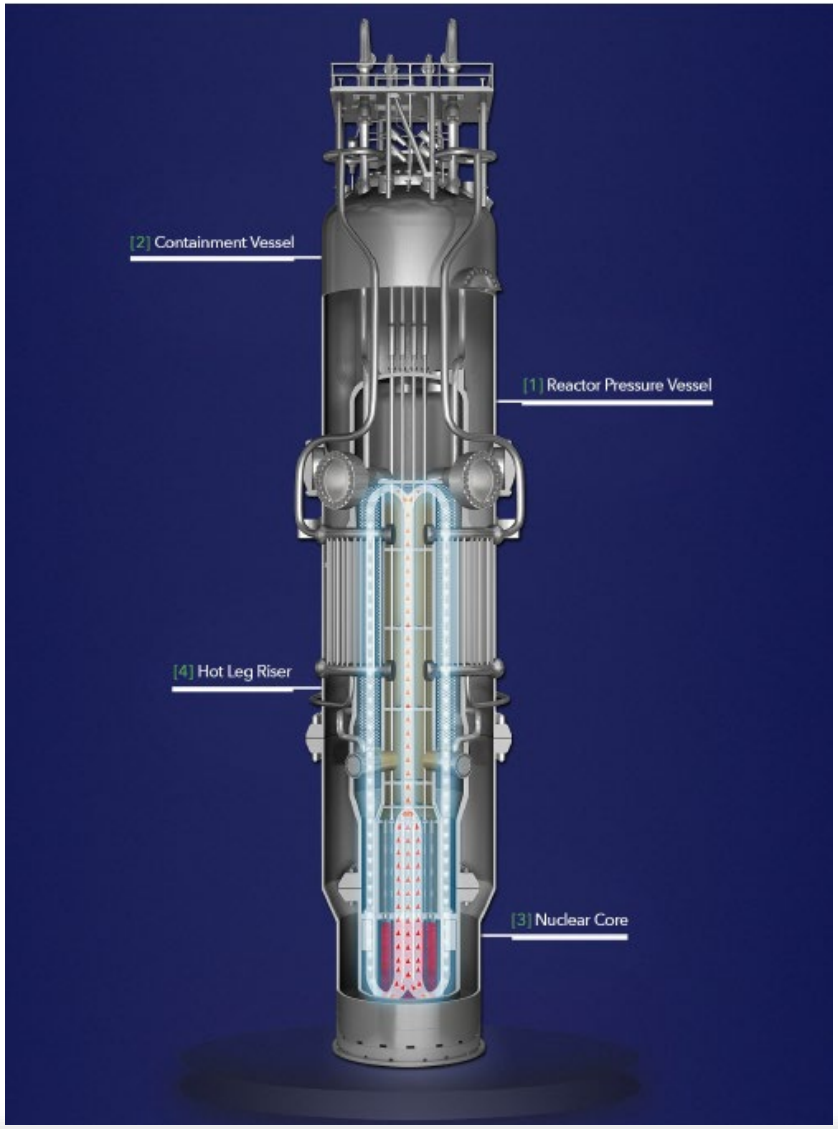
DOE Support for NuScale SMR Licensing and Demonstration

- DOE private-public partnership with NuScale supports design, licensing, supply chain development, and manufacturing readiness to enable a commercial demonstration by 2029
- NuScale submitted a Design Certification Application (DCA) to the Nuclear Regulatory Commission (NRC) in January 2017
  - NRC issued final safety evaluation report in August 2020
- Varying plant configurations are possible, with 6-module configuration as a baseline
- Standard Design Approval Application to NRC in December 2022
- Carbon Free Power Project
  - First planned commercial demonstration at INL by 2029



NuScale SMR Technology Overview

- NuScale is developing a nuclear SMR technology to produce **electricity for the grid** as well as electricity and process heat for a variety of industrial applications, including **hydrogen production** and **water desalinization**.
- NuScale Power Module™ (NPM) is a 77 MWe (mega-watt electric) integral pressurized water reactor (PWR)
  - Includes reactor vessel, steam generators, pressurizer, and containment in an integral package
- Designed to be simple – eliminates reactor coolant pumps, large bore piping and other systems and components found in conventional reactors
- Small enough to be factory built for easy transport and installation
- Dedicated power conversion system for flexible, independent operation



Typical Light Water Reactor (LWR) Safety Systems

Systems and Components Needed to Protect the Core:

- Reactor Pressure Vessel
- Containment Vessel
- Reactor Coolant System
- Decay Heat Removal System
- Emergency Core Cooling System
- Reactor Protection System
- Containment Isolation System
- Ultimate Heat Sink
- Residual Heat Removal System
- Safety Injection System
- Refueling Water Storage Tank
- Condensate Storage Tank
- Auxiliary Feedwater System
- Emergency Services Water System
- Hydrogen Recombiner or Ignition System
- Containment Spray System
- Reactor Coolant Pumps
- Safety Related Electrical Distribution Systems
- Alternative Off-site Power
- Emergency Diesel Generators
- Safety Related 1E Battery System
- Anticipated Transient without Scram (ATWS) System

NuScale Safety Systems

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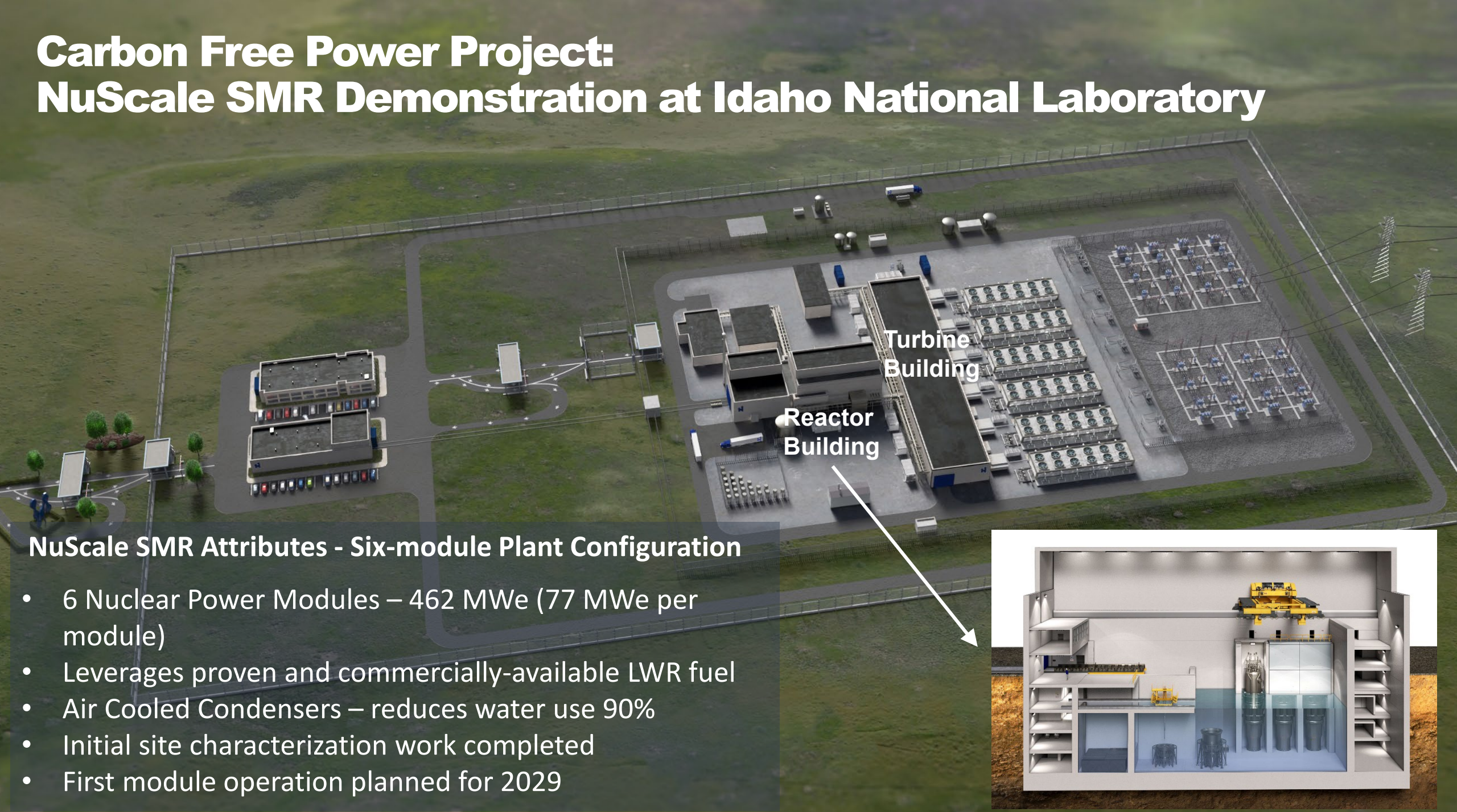
Carbon Free Power Project:
NuScale SMR Demonstration at Idaho National Laboratory

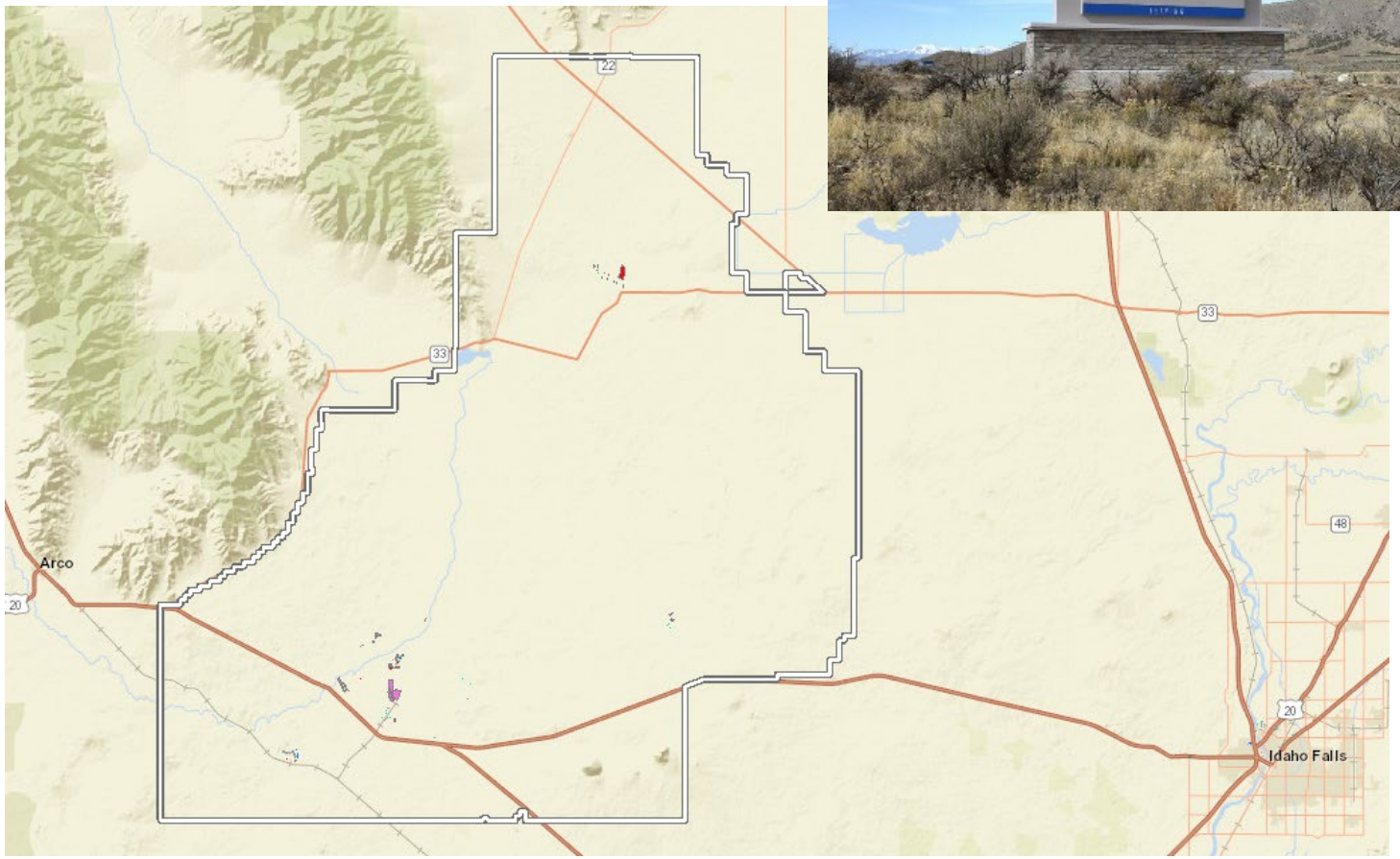


NuScale SMR Attributes - Six-module Plant Configuration

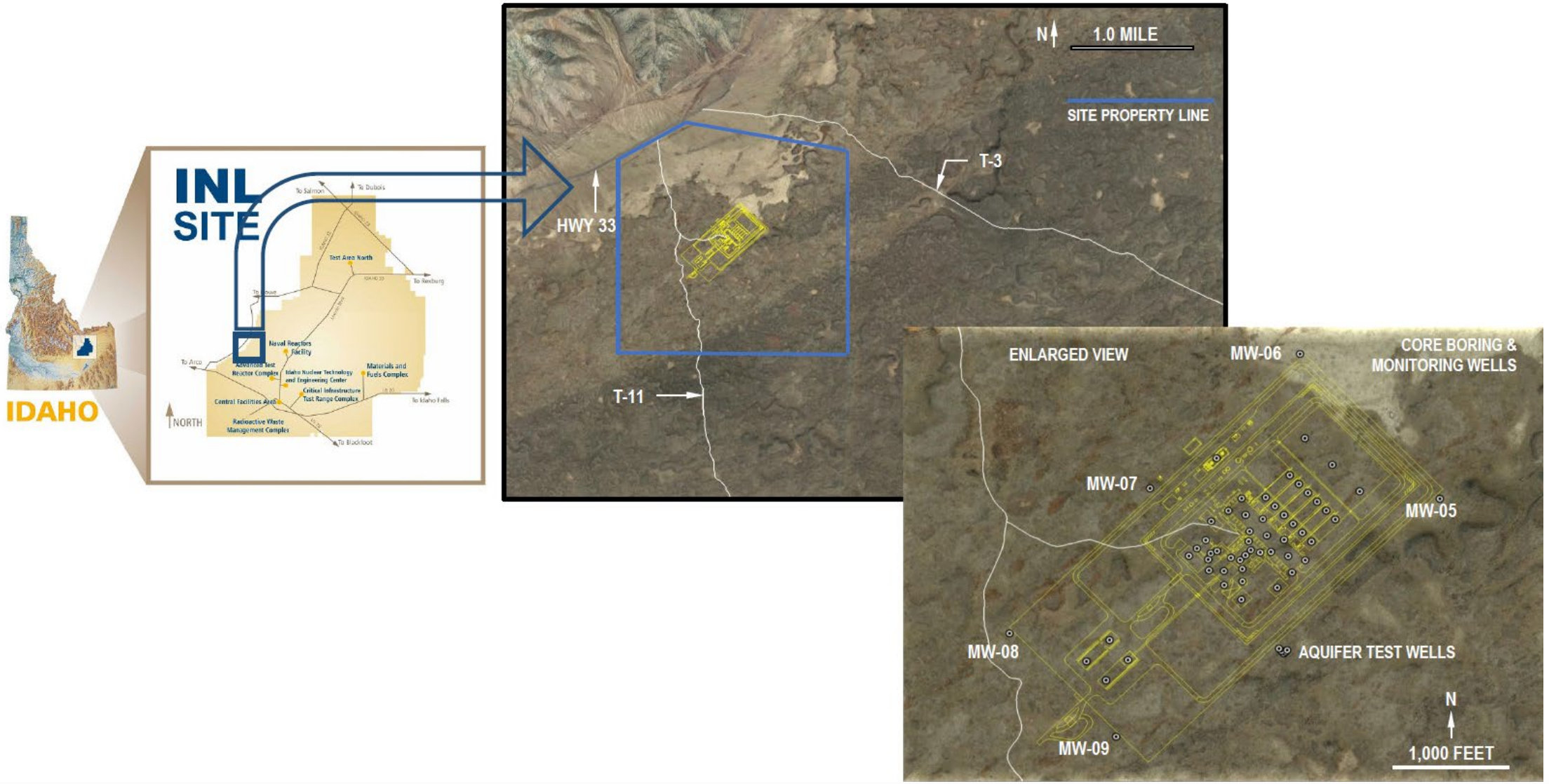
- 6 Nuclear Power Modules – 462 MWe (77 MWe per module)
- Leverages proven and commercially-available LWR fuel
- Air Cooled Condensers – reduces water use 90%
- Initial site characterization work completed
- First module operation planned for 2029

CFPP: Site Selection

- DOE-ID Site Use Permit – 2016
- DOE, INL, CFPP and Tribal Consultation
- Preferred Site Selection



CFPP: Site Selection

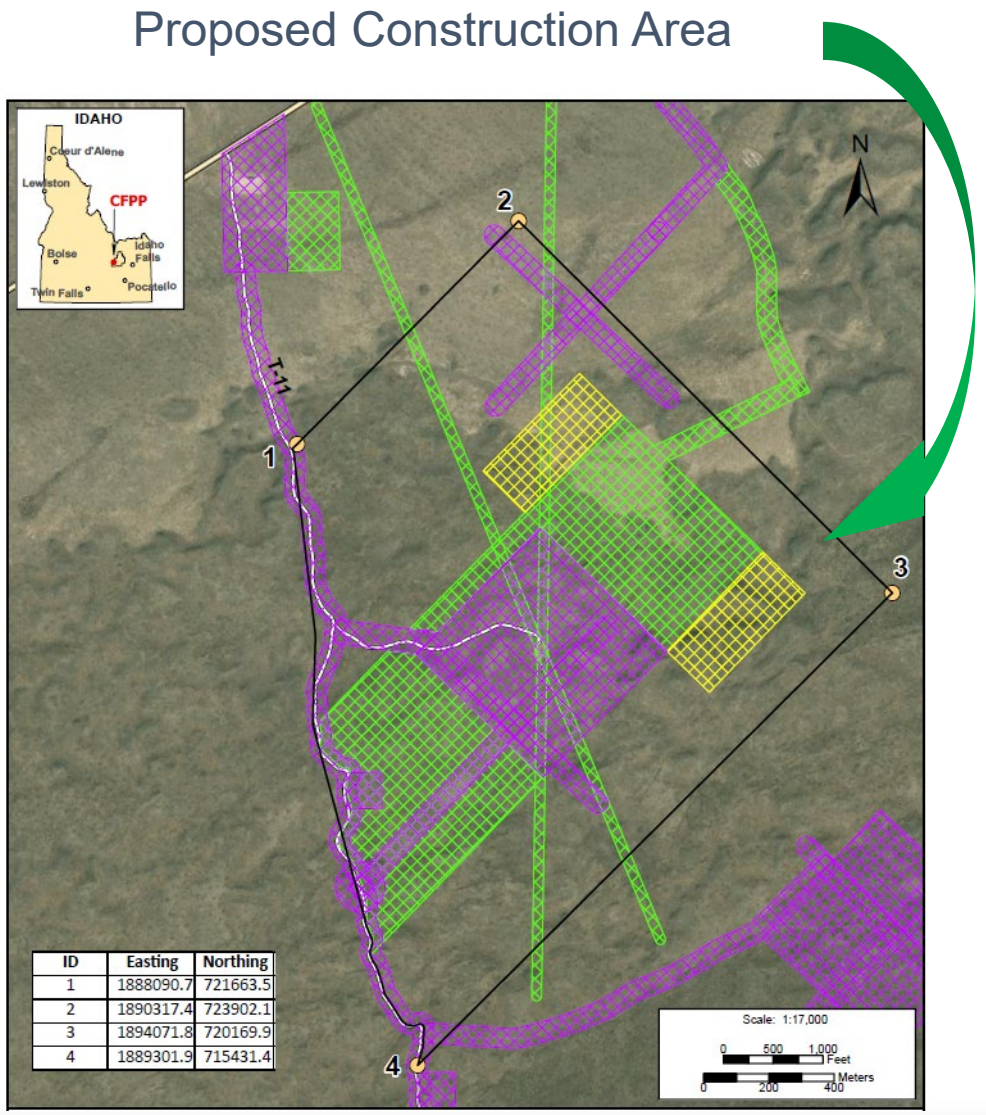


CFPP: Tribal Interactions

- DOE-ID Manager and FHBC
- DOE-ID Staff-to-Staff
- INL and Tribal Cultural Resources

CFPP: Cultural Resources Surveys

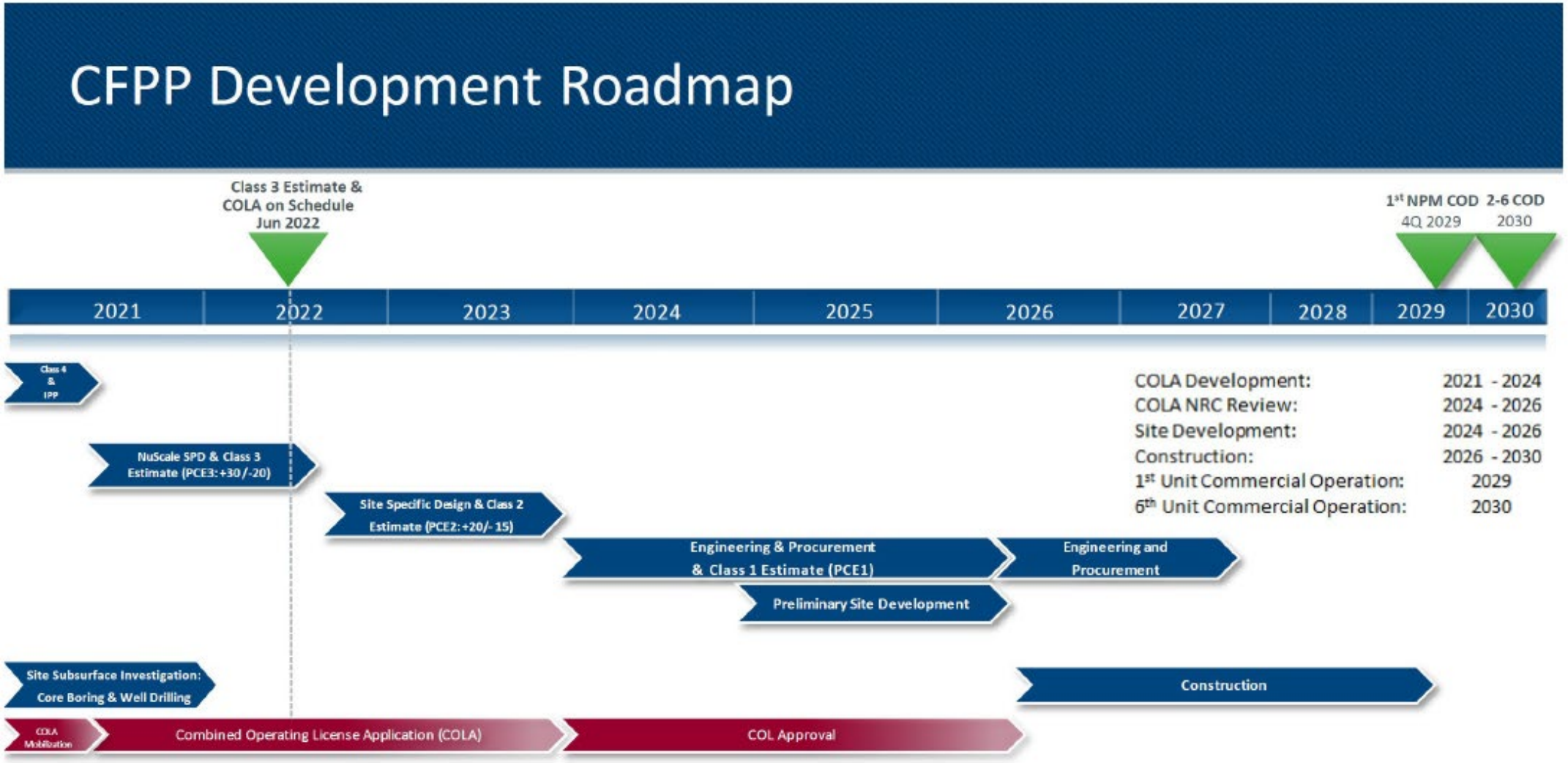
- ~322 acres have been inventoried (color highlights)
- Additional land (~308 acres) require Class III CR inventories by INL/SBT
  - Proposed construction area
  - T-11 modifications
  - Proposed utility/transmission corridors



Carbon Free Power Project: Project Status

- Core Boring
- Monitoring Wells
- Meteorological Tower
- Seismic Reflection Testing
- NRC Interactions and COLA Submittal

CFPP: Project Status



QUESTIONS?

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