Idaho Advanced Energy Consortium

Kirt Marlow, IAEC Executive Director
June 28th, 2023
Consortium Purpose

• Convene Regional Advanced Energy Industry Stakeholders
  • Clean Energy = Nuclear, Solar, Wind, Battery, Hydroelectric, Hydrogen
  • Construction, Suppliers, Transportation, Manufacturing, State & Local Government, Education, Communities
• Alignment around priorities and pipeline development
• Deliverables to quantify needs and inform strategies
• Third-party advocacy
• Grant coordination
Working Groups & Deliverables

1. WORKFORCE & EDUCATION
   - Gather, validate, and communicate information
     - Workforce and Education needs coming from the industry
     - 2-way communication with elected officials at multiple levels
     - Supply Chain needs and roadblocks

2. STATE AND LOCAL IMPACTS

3. SUPPLY CHAIN
   - Publish annual energy report to the State of Idaho and the Leadership in Nuclear Energy (LINE) Commission
     - Recommended actions, insights, and benchmarking from other regions
U.S. utilities with emissions reduction targets

Advanced Nuclear Versatility

Spectrum of Sizes and Options
- Micro (Few MW)
- Mini (10s of MW)
- Small (100s of MW)
- Large (1,000+ MW)

Variety of Outputs
- Electricity
- H₂ Hydrogen
- Process Heat

Multitude of Uses
- Homes
- Vehicles
- Businesses
- Aviation
- Rail
- Shipping
- Concrete
- Steel
- Factories
- Water
- Space
VCE Study - Overview

- Commissioned Vibrant Clean Energy to model electricity system
  - 95% reduction in carbon emissions by 2050
  - Modest load growth, NREL assumptions for renewables, no CCS

- Nominal case
  - $3800/kW overnight cost
  - Non-binding constraint on expansion

- Constrained case
  - $5500/kW overnight cost
  - Conservative capacity to expand
Nominal Case

Generation: 2,718 TWh
Legacy: 491 TWh
Advanced: 2,227 TWh

Capacity: 404 GW
Legacy: 67 GW
Advanced: 336 GW

Share: 43%

Converted Fossil: 271
Constrained Case

Generation: 827 TWh
Legacy: 575 TWh
Advanced: 252 TWh

Capacity: 146 GW
Legacy: 85 GW
Advanced: 60 GW

Share: 13%

Converted Fossil: 42
Catalyzing the orderbook may require interventions to help manage completion risk

**Nuclear industry is in a stalemate**

The nuclear industry is stuck in a stalemate where utilities and other potential owners recognize an increasing need for nuclear power, but are too afraid of uncontrolled overrun and project abandonment risk to place committed orders

Developing a committed orderbook could be facilitated by **pooling demand**, e.g., with a consortium of utilities

Participation in such a model could be accelerated with **financial support** (either public or private) to help de-risk the first 5-10 projects

**Possible accelerants for generating orders**

<table>
<thead>
<tr>
<th>Cost overrun insurance</th>
<th>A percentage of construction costs over and above a certain amount are covered by the government or private insurer</th>
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<tbody>
<tr>
<td>Tiered grant</td>
<td>Large grant amount per kW, ramping down over each successive deployment, e.g., second reactor receives less than the first</td>
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<td>Government as the owner</td>
<td>Government commits to build and/or operate reactors to provide pooled demand</td>
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<td>Government as the off-taker</td>
<td>Government signs offtake contract for some or all of generation from an orderbook</td>
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QUESTIONS?
# NRC Licensing Processes

## U.S. Licensing Durations and Costs

<table>
<thead>
<tr>
<th>Type</th>
<th>Duration</th>
<th>Cost</th>
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<tbody>
<tr>
<td>DC</td>
<td>3 to 4 years (4 to 9)</td>
<td>$45M to $68M</td>
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<tr>
<td>COL</td>
<td>2.5 to 3.5 years (4)</td>
<td>$28M to $30M</td>
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<td>ESP</td>
<td>2 years (3 to 6)</td>
<td>$6M to $19M</td>
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<tr>
<td>OL</td>
<td>3 to 3.5 years (8)</td>
<td>$42M</td>
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1) DC = Design Certification, COL = Combined Operating License, ESP = Early Site Permit, OL = Operating License
2) NRC Generic Schedules: [https://www.nrc.gov/about-nrc/generic-schedules.html](https://www.nrc.gov/about-nrc/generic-schedules.html)
3) NRC Letter to Senator Inhofe April 7, 2015 (ML1508A361)
Advanced Reactor Licensing Progress

1. NuScale Power

*Non-commercial reactors
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<td>Renewables: offshore</td>
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¹ Additional applications include clean hydrogen generation, industrial process heat, desalination of water, district heating, off-grid power, and craft propulsion and power
² Renewables + storage includes Renewables coupled with long duration energy storage or Renewables coupled with hydrogen storage