Who is NEI?

- Washington, D.C. policy organization
- A unified industry voice before U.S. government, international organizations and venues
- A forum to resolve technical and business issues for the industry
- A source of accurate and timely information to members, policymakers, the news media and the public
Multiple Factors Impact Supply

DOMESTIC INDUSTRY

R&D AND INNOVATION

GLOBAL SUPPLY

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Nuclear in the U.S.

- 99 reactors across 60 sites in 30 states
- 2 reactors under construction
- 98,672 MWe of baseload capacity
- 805.3 billion kWh in 2016
- 92.1% capacity factor in 2016
Domestic Nuclear Fleet

Supports 475,000 jobs

Contributes $10 billion in federal and $2.2 billion in state taxes each year

Prevents 315,000 short tons of NOx

Avoids 547.5 million metric tons of carbon emissions each year

Prevents 374,000 short tons of SO2 emissions

Adds $60 billion to the country's GDP

Supports 475,000 jobs

Saves consumers an average of 6% on electricity bills

Contributes 3.7% to solar, 17.7% to wind, 21.4% to hydro, 1.1% to geothermal, 56.1% to nuclear

Avoids 547.5 million metric tons of carbon emissions each year

Prevents 315,000 short tons of NOx

Adds $60 billion to the country's GDP

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Life of a Nuclear Power Station

Pre-Construction
- Engineering & procurement contract: $5-12 billion
- Siting and environmental analyses, licensing applications
- Long-lead items ordered (e.g. reactor vessel)

Construction
- 400,000 cubic yards of concrete
- 66,000 tons of steel
- 44 miles of piping and 300 miles of electric wiring
- 130,000 electrical components
- 1,400-1,800 jobs (peak employment as high as 2,400)

Operation
- Maintenance & refueling outages every 18 to 24 months (one third of fuel assemblies replaced; 1,000 additional workers)
- 20 metric tons of uranium fuel consumed annually*
- Steam generators and reactor vessel heads upgraded when necessary
- Power uprates occasionally implemented (~2% to 20% increase in megawatt capacity)
- Annually — $430 million in local sales of goods and services; $40 million in total labor income; $20 million in state and local taxes*
- 400-700 permanent jobs*
- Supplies electricity to 623,000 people each year (city the size of Boston or Seattle)*

Decommissioning
- Radioactive components and structures are cleaned or dismantled, packaged, and shipped to storage sites; containment and turbine buildings deconstructed

Used fuel management
- Used fuel stored in steel-lined, concrete pools or in massive steel and concrete canisters
- Reprocessing facilities recycle used fuel for new fuel and to reduce volume, heat and toxicity
- Recycling byproducts and/or used fuel sent to permanent repository

* Based on a 1,000 MW nuclear plant
Global Supply Chain

**CANADA**
- Auxiliary relief valves

**UNITED STATES**
- Modules
- Containment vessel
- Separators
- Degasifiers
- Demineralizers
- Control rod drive mechanism
- Polar and railcar bay cranes
- Squib, solenoid and instrumentation valves
- Integrated vessel head package
- Reactor vessel flowskirt
- Recirculation heaters
- Reactor coolant and air-operated pumps

**EUROPE**
- Containment recirc screens
- Pressurizer
- Reactor coolant piping

**BRAZIL**
- Cooling tower fans

**JAPAN**
- Transformer
- Containment vessel plate
- Turbine generator

**SOUTH KOREA**
- Reactor vessel
- Steam generators
- Condenser
- Demineralizer
- Heat exchangers

Sources: SCANA and Westinghouse
Continuum Of Innovation

- Advanced reactors
- Small modular reactors
- New light water reactors
- Existing plants

2010  2020  2040  2060  2080  2100

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## Portfolio of Complementary Nuclear Technologies

<table>
<thead>
<tr>
<th>Large Light Water Reactors</th>
<th>Light Water Small Modular Reactors</th>
<th>Non-Water Cooled Reactors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ~1,000 MWe</td>
<td>• &lt;300 MWe</td>
<td>• Large or small</td>
</tr>
<tr>
<td>• Advantages</td>
<td>• Advantages</td>
<td>• Advantages</td>
</tr>
<tr>
<td>• Use proven technology</td>
<td>• Enhanced safety</td>
<td>• Enhanced safety</td>
</tr>
<tr>
<td>• Applications</td>
<td>• Incremental addition of capacity</td>
<td>• Fuel cycle options</td>
</tr>
<tr>
<td>• Baseload electricity</td>
<td>• Applications</td>
<td>• Applications</td>
</tr>
<tr>
<td>• Large stable grids</td>
<td>• Small to large grids</td>
<td>• Electricity</td>
</tr>
<tr>
<td>• Coolant temp ~ 300 C</td>
<td>• Secure power source</td>
<td>• Industrial input</td>
</tr>
<tr>
<td>• Available: today</td>
<td>• Locate at retired fossil plants</td>
<td>• Hydrogen</td>
</tr>
<tr>
<td></td>
<td>• Coolant temp ~300 C</td>
<td>• Remote locations</td>
</tr>
<tr>
<td></td>
<td>• Available: 2020’s</td>
<td>• Coolant temps 500-750C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Available: 2030’s</td>
</tr>
</tbody>
</table>
U.S. Nuclear Supply

- Mature supply chain
- Regulatory oversight
- Codes and Standards
- Industry organizations
Notional Nuclear Power Development

Pre-project
- Feasibility study

Project Decision-making
- Bidding process

Construction
- Commissioning

Operations

Decommissioning
- Decommissioning and Decontamination Services
- Uprates and Modifications
- Operations and Maintenance
- Nuclear Fuel and Services

Environmental
- Component Manufacturing
- Design
- Communications
- Project Management
- Construction Management
- Infrastructure Development
- Engineering Services
- Training and Education

Legal and Regulatory
- Financial

Engineering Services
- Nuclear Fuel and Services
- Operations and Maintenance
- Decommissioning and Decontamination Services
- Uprates and Modifications
- Environmental
- Training and Education
- Legal and Regulatory
- Refueling

Design
- Communications
- Project Management
- Construction Management
- Nuclear Fuel and Services

Component Manufacturing
- Infrastructure Development
- Engineering Services
- Training and Education

Infrastructure Development
- Training and Education
- Nuclear Fuel and Services
- Operations and Maintenance
- Decommissioning and Decontamination Services
- Uprates and Modifications

Communications
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- Operations and Maintenance
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Project Management
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Construction Management
- Training and Education
- Nuclear Fuel and Services
- Operations and Maintenance
- Decommissioning and Decontamination Services
- Uprates and Modifications

Infrastructure Development
- Design
- Communications
- Project Management
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- Nuclear Fuel and Services
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- Nuclear Fuel and Services
- Operations and Maintenance
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Feasibility study
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Bidding process
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Commissioning
- Training and Education
- Nuclear Fuel and Services
- Operations and Maintenance
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- Uprates and Modifications
U.S. Regulatory Oversight

- Appendix B to 10 CFR 50—Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants
- 10 CFR 21—Reporting of Defects and Noncompliance
- Vendor inspection
- Third party oversight
U.S. Nuclear Industry Organizations

**NEI**

Nuclear Energy Institute (NEI)

• Trade association for nuclear technologies industry that establishes unified policy
• Represents industry at NRC, Congress, Executive Branch

**INPO**

Institute of Nuclear Power Operations (INPO)

• Industry self-regulator formed in 1979 after Three Mile Island incident
• Promotes highest levels of safety and reliability – excellence in operations

**EPRI**

Electric Power Research Institute (EPRI)

• Independent non-profit that conducts research, development, and demonstration projects focused on electricity generation, delivery, and use in collaboration with the electricity sector

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Questions?

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