National and Regional Developments in the Nuclear Industry
Rod McCullum, NEI
The Council of State Governments
Midwestern Radioactive Materials Transportation Committee
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Madison WI

Nuclear Power in the U.S.
- 98 operating reactors at 59 sites, in 30 states
- 99,010 MWe of baseload capacity
- 20% of the U.S. energy generation comes from nuclear

U.S. Emissions-free Fuel Shares In 2017
- Over 56% of the U.S. Clean Energy Comes from Nuclear

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Capacity Factors by Fuel Type in 2017

- Generation: 804.9 billion kWh
- Capacity Factor: 92.2%

2017 costs compared to 2016:
- Fuel costs decreased by $0.46/MWh
- Operating costs decreased by $0.44/MWh
- Capital costs decreased by $0.25/MWh

Total Generating Costs: $33.50

Efficiency Improvements

Reduction of 19.0%
Used Fuel in Storage

- Used fuel inventory*
  - Approximately 85,965 MTU
  - Increases 2 - 2.4k MTU annually
- ISFSI storage*
  - 117,579 assemblies
  - 35,315 MTU (SPS)
  - 2,698 casks/modules loaded
  - 120 ISFSIs loaded
  - 2 post-SPS: 1 modular vault
- Projections for 2020
  - Estimating 86,000 MTU total
  - Estimating 35,000 MTU at ISFSI
  - 3,200 casks/modules loaded
  - All 14 ISFSIs
  - All at plant sites + Morris & INEL
  - Fuel from 119 reactors

*As of December 31, 2017

Used Fuel in Storage at Shutdown Plants

- California
  - Humboldt Bay
  - Rancho Seco
  - San Onofre
- Colorado
  - Ft. St. Vrain
- Connecticut
  - Connecticut Yankee
- Florida
  - Crystal River
- Illinois
  - Byron
  - Dresden
  - Maine Yankee
- Massachusetts
  - Yankee Rowe
- Michigan
  - Big Rock Point
- Nebraska
  - Ft Calhoun
- New Jersey
  - Oyster Creek
- Oregon
  - Trojan
- Vermont
  - Vermont Yankee
- Wisconsin
  - LaCrosse
  - Monticello

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## Pending Growth of Shutdown Plants

<table>
<thead>
<tr>
<th>Plant</th>
<th>MWe</th>
<th>Closure Year</th>
<th>Reason</th>
<th>Final Year Generation (billion kWh per year)</th>
<th>Final Year CO2 Avoided (M tons/year)</th>
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<tbody>
<tr>
<td>Crystal River 3</td>
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<td>Mechanical</td>
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<td>Three Mile Island 3</td>
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<td>Palisades</td>
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<td>TOTAL</td>
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<td>89.5</td>
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Source: Emissions avoided are calculated using regional and national fossil fuel emissions rates from the U.S. Environmental Protection Agency and latest plant generation data from the U.S. Energy Information Administration. Updated: September 2018.

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## DECOMMISSIONING AND THE NUCLEAR VALUE CHAIN

**Success Factors**

- Efficient Regulatory Framework
- Planning for Best use of Resources
- Innovative Business Models
  - Energy Solutions (Zion, Lacrosse, & San Onofre)
  - Accelerated Decommissioning Partners (Vermont Yankee)
- Minimizing the Impacts of Used Fuel

**Industry Driving to Faster Decommissioning**

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## Consolidated Interim Storage and Yucca

- Target State to Enact Comprehensive Used Fuel Legislation
- Transport Readiness
- Secure Transport and Yucca Support
- Yucca Timeline
- DRI Permit License
- NRC License
- Operations

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Movement to accelerate decommissioning at increasing number of plants will increase LLW shipments
Used Fuel will begin moving from commercial reactor sites in the next 5 years – with or without federal action
Used Fuel transportation will be THE topic of greatest interest as large scale used fuel movements approach
- Third party experts will be an important part of the dialogue
- NEI will conduct transportation tabletop exercise to demonstrate process
- NEI is developing resources to support effective public communications

The Future of Radioactive Materials Transport

Used Fuel Transportation Table Top

- Exercise scheduled for May 21, 2019
- Will test assumptions/challenges/processes and identify opportunities for improvement
- Virtual site to represent physical attributes of Kewaunee and political, community and tribal aspects of Prairie Island
- Private shipment model for initial scenario
- Routing will utilize intermodal transportation resources
- Consolidated Interim Storage location reflects the border between New Mexico and Texas
- Exercise NRC and Price-Anderson requirements
- Video will be made available afterwards

Questions?
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