Nuclear Energy: Recognizing the Value

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Today’s Briefing

• Industry Snapshot – Continued Strong Performance, Life after 60
• Nuclear Value Proposition – Diversity, Zero-Carbon, Reliable
• Economic Challenges – Recognition and Remedies
  - FERC and RTOs
  - State Actions – IL and OH
• New Nuclear Nearing Completion in TN, GA and SC
• Strong Popular Support
Strong Performance – Record Capacity Factor in 2014

- U.S. reactors set record capacity factor: 91.9%
- Nuclear plants generated 798.4 billion kWh in 2014
- Refueling outage duration declined again:
  - 2014: 37.2 days
  - 2013: 41 days
  - 2012: 46 days

Source: Energy Information Administration
* NEI estimate
Status of First License Renewal

Applications for License Renewal

- 74 Reactors Approved
- 8 Reactors Intend to Renew
- 17 Reactors Under Review

Steam generator replacement in progress

Source: Nuclear Regulatory Commission
Nuclear Energy’s Solid Value Proposition
Safe, Reliable Electricity 24/7 Plus ...

- Supports Grid Stability
- Provides Price Stability
- Runs When Needed (Fuel on Site)
- Provides Clean Air Compliance Value
- Contributes to Fuel and Technology Diversity (Portfolio Value)
- Avoids Carbon Emissions
- Anchors the Local Community: Jobs, Tax Base
America’s Power Supply Challenge: Fuel Diversity at Risk

• As much as one-third of today’s coal-fired capacity may be lost in next 5-10 years
• 342,000 megawatts of gas-fired generation built since 1995 (75% of all new capacity)
• Renewables will expand, but they’re not baseload
Impacts of Losing Electricity Diversity

- $93 billion increase in cost of electricity per year
- 25% increase in retail power prices, along with increased price volatility
- $200 billion reduction in GDP each year due to higher electricity prices
- 1 million fewer jobs resulting from lower GDP
- $2,100 increase in electricity costs per year for the typical household
Spotlight on Nuclear Energy’s Value

- Powering through the Polar Vortex
  - Value of baseload capacity with firm fuel supply
- EPA Clean Power Plan proposal to reduce CO₂ emissions by 30% by 2030
  - Cannot be achieved and sustained without preserving existing nuclear generating capacity and building new nuclear capacity
Industry Recommendations for EPA’s Clean Power Plan

- States should demonstrate how they intend to preserve existing nuclear capacity in State Implementation Plans.
- Power uprates completed after 2012 should count toward compliance.
- License renewals after 2012 should be considered new capacity and count toward compliance.
- Plants under construction should not be part of rate-setting formula, should count toward compliance when operating.
Change and Economic Challenges

• Low gas prices;
• Low or zero electricity demand growth;
• State policies that mandate production from certain sources of electricity;
• Growing reliance on renewable and intermittent resources, which creates operational challenges;
• Growing reliance on Out-of-Market revenues;
• Greater reliance on demand resources, which represent a challenge to the definition of the capacity product.
FERC Initiatives to Address Market Issues

• Technical workshop on capacity markets (Sept. 2013)
• Lessons learned from Polar Vortex (April 2014)
• 3 technical workshops on price formation in energy markets
• Order to RTOs on fuel assurance (Nov. 2014)
• Approves PJM Capacity Performance Product (June 2015)
FERC Recognizes Value of Baseload Capacity

“[T]he Commission is right now actively considering – both how our capacity markets are designed, and whether the full value of a baseload plant is included in the payments they’re getting from the capacity market, but also whether we have the right set of products out there, that will incent the resources that can provide reliability ....”

– Arnold Quinn, Director, FERC Division of Economic and Technical Analysis, at joint FERC-NRC Meeting, May 28, 2014
The Evolution at PJM: From April 2014 ...

“...I think we may look at potentially paying more for firm winter fuels. And obviously I think nuclear would easily fall into that. [...] It concerns us when nuclear units start to prematurely retire, only because we're not going to get them back once they go. And so we are taking a very hard look at our markets, and we may be coming to you with changes if our markets are not paying enough.”

—Michael Kormos, Executive Vice President, PJM, at FERC Workshop, April 1, 2014
“[T]he PJM Board has authorized the filing of a Capacity Performance initiative at FERC. ...Stronger incentives within the existing capacity market structure should be established to encourage needed investment by both new and existing resources. PJM is acting now to begin reversing trends in generation performance and fuel security that will continue to deteriorate reliability.”

— Terry Boston, PJM President and CEO, December 3, 2014
Growing Recognition of Nuclear Energy’s Value

• FERC, EPA, RTOs, states recognize value of nuclear power plants, consequences of nuclear plant shutdowns
  - Electricity consumers lose long-term, low-cost power at stable price
  - Jobs, state and local economies suffer
  - Reliability at risk
• Initiatives underway to monetize that value

“Vernon [is] now facing the loss of its largest employer and taxpayer, significant budget cuts, and mounting questions about its financial footing.”

– Patricia O’Donnell
Chair
Board of Selectmen
Vernon, Vermont
Impact of Plant Shutdowns in Illinois

- PJM analysis for Illinois Commerce Commission:
  - $307 million-$437 million annual increase in load payments in ComEd zone
  - $752 million-$1.3 billion annual increase in load payments in PJM
  - “Significant thermal and voltage violations”

- NEI analysis:
  - 2,500 direct jobs lost; 9,000 direct and indirect
  - $2.4 billion in direct lost economic value; $3.6 billion direct and indirect
Recent State Activities

• Illinois Low-Carbon Portfolio Standard
  - Requires State’s Utilities to obtain low carbon energy credits matching an amount = 70% of the electricity used on the Distribution System.

• Ohio: Tax Legislation and Regulation
  - Shift of property tax on generation to T & D ratepayers
  - Pending Rate Case would require 3 regional distribution companies to by all power from large nuclear and coal plants
Nuclear Energy Does Matter

CARBON-FREE BENEFITS OF AMERICA’S NUCLEAR ENERGY PLANTS

Our largest source of carbon-free energy

<table>
<thead>
<tr>
<th>Source</th>
<th>Carbon-Free Energy %</th>
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<tbody>
<tr>
<td>Nuclear</td>
<td>63.3%</td>
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<tr>
<td>Natural Gas</td>
<td>21.3%</td>
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<tr>
<td>Hydro, Wind</td>
<td>11.4%</td>
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<tr>
<td>Other</td>
<td>3.0%</td>
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I can't believe what I believe on climate change and oppose nuclear energy. Nuclear is an important part of how we make energy in this country.”

CAROL L. BROWER
Chairman of the Board of Trustees, Nuclear Energy Institute

THE Brattle GROUP

Nuclear Matters Co-Chairs -- Former Sens. Evan Bayh and Judd Gregg
Brattle Group Study
“The Nuclear Industry’s Contributions to the U.S. Economy”

- ADDS $60 BILLION TO THE COUNTRY’S GDP
- SUPPORTS 475,000 JOBS
- SAVES CONSUMERS AN AVERAGE OF 6% ON ELECTRICITY BILLS
- AVOIDS OVER 1/2 BILLION TONS OF CARBON EMISSIONS EACH YEAR
- VALUED AT A SOCIAL COST OF $25 BILLION ANNUALLY
Watts Bar 2 Nearing Completion

Operation begins early 2016
Progress at Vogtle 3 & 4, Summer 2 & 3
Strong Public Support Continues

- 68% Favor Use of Nuclear Energy
- 86% Favor Renewing Licenses
- 78% Important for Our Energy Future
- 62% Definitely Build New Reactors
- 66% Acceptable at Nearest Site

Source: Bisconti Research Inc.
March 2015 poll of 1,000 U.S. adults; margin of error is +/- 3%
Plant Neighbors More Favorable to Nuclear Energy Than General Public

Overall, do you strongly favor, somewhat favor, somewhat oppose, or strongly oppose the use of nuclear as one of the ways to provide electricity in the United States? (%)

- **Plant Neighbors June 2015**
  - Strongly favor: 83%
  - Somewhat favor: 50%
  - Somewhat oppose: 33%
  - Strongly oppose: 16%

- **General Public March 2015**
  - Strongly favor: 68%
  - Somewhat favor: 27%
  - Somewhat oppose: 42%
  - Strongly oppose: 14%

*6th Biennial National Survey of U.S. Nuclear Power Plant Neighbors 2015*
Questions?

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