Nuclear Energy in the United States: Status and Outlook

NCSL Task Force on Energy Supply

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Nuclear Energy in the United States ...  
At a Glance

• U.S. nuclear plant performance continues strong
  - ~ 90% capacity factor first half of 2013
• Political willingness, interest in addressing used fuel
• Effective industry response to lessons learned from Fukushima
• $30-billion new build program
  - Vogtle 3 and 4, Summer 2 and 3, Watts Bar 2
Trends in the Electricity Markets

- Electricity demand has not returned to 2007 level
- Fuel/technology diversity at risk
- Price signals in merchant power markets do not support investment in new capacity, or continued operation of existing capacity

### Generating Capacity Built in the United States in the Last 15 Years

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>25,922</td>
</tr>
<tr>
<td>Gas</td>
<td>341,771</td>
</tr>
<tr>
<td>Nuclear</td>
<td>1,413</td>
</tr>
<tr>
<td>Oil</td>
<td>7,458</td>
</tr>
<tr>
<td>Renewables</td>
<td>66,599</td>
</tr>
<tr>
<td>Other</td>
<td>4,270</td>
</tr>
<tr>
<td>Total</td>
<td>448,806</td>
</tr>
</tbody>
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Source: Ventyx
Nuclear Plant Shutdowns: The Situation

• Five reactors shut down
  □ Four in 2013
  □ One at the end of 2014

• Crystal River 3, San Onofre 2 and 3 were unique events
  □ Over 110 PWRs (57 in the U.S.) have replaced steam generators; three ended badly

• Kewaunee, Vermont Yankee shutdown because of adverse economics
Efficient Markets Do Not Make Inefficient Economic Decisions

$/MWh

- Kewaunee 2009-2011 capacity factor = ~ 95%
- Vermont Yankee 2010-2012 capacity factor = ~ 90%
- Nothing wrong with the plants; something wrong with the markets

Long-Term Fundamentals Still Strong

• Electricity demand will grow as the economy recovers
  - EIA forecast: 0.7% per year = 339,000 MW by 2040
• ~110 GW of fossil capacity retired 2011-2020, most by 2016
  - ~20% of coal-fired fleet shut down by 2020 (without carbon limits)
• Natural gas price volatility will continue
• Value of diverse fuel and technology portfolio will become clear

“We should be having policy discussions now about how we intend to replace 100 gigawatts of nuclear capacity that will be retired by about 2040. One hundred gigawatts can power 25 million typical households. Can we realistically expect natural gas and renewables to fill that void? As a practical matter, the answer is no. And the generation of electricity is about as practical as it gets.”

– Thomas Farrell
President and CEO
Dominion Resources
Nuclear Energy: A Solid Value Proposition
Safe, Reliable Electricity 24-by-7-by-365 Plus ...

- Provides Clean Air Compliance Value
- Supports Grid Stability
- Provides Price Stability
- Contributes to Fuel and Technology Diversity
- Avoids Carbon Emissions
- Anchors the Local Community: Jobs, Tax Base
Pricing the Attributes of Electricity

“Markets only efficiently allocate that which is given a price. Attributes that are not priced by markets are not (necessarily) allocated efficiently by them ….

“Paying more for diversity is not unprecedented. We call it insurance – consumers willingly pay a premium in return for being able to diversify their risks …. As deregulated power markets continue to evolve, one challenge faced by such markets is the pricing of the numerous attributes of electricity that accompany the energy itself. We have ‘green tags,’ could we not have ‘low price volatility tags’ as well?”

– DAI Management Consultants