Integrated Resource Planning

Coal Finance 2013

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Resource Planning – Some Basic Concepts

• Integrated Resource Planning (IRP) – consider both supply-side and demand-side alternatives.

• Least cost planning – looking for the plan or portfolio that has the lowest net present value cost (e.g., NPVRR or the lowest societal cost).

• But need to consider both cost and the economic and financial risks of alternatives being evaluated.

• Need to ensure an adequate level of system reliability.

• Need a diverse fuel mix to address risk of reliance on any one fuel + to enhance system operability and reliability.
Prudent Resource Planning Practices

• Accept that you’re not a Cassandra – you really can’t see into the future.
• Therefore, emphasize importance of developing flexible portfolio of supply and demand side resources for when circumstances change.
• Include full consideration of energy efficiency and renewable alternatives.
• Develop a truly diverse resource mix – with EE, wind, solar, not just fossil and nuclear.
• Include a plan for aggressively reducing CO₂ emissions – include CO₂ price in base case.
• Analyze wide range of sensitivities for CO₂, fuel, load, EPA costs, construction costs.

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Imprudent Resource Planning Practices

• Refuse to accept that circumstances have changed or are in the process of changing – therefore future won’t be like the past.

• Refuse to reconsider past resource decisions that may no longer be economic or prudent.

• Overly constrain alternatives such as renewables and energy efficiency.

• Fail to develop an aggressive plan to reduce annual CO₂ emissions.

• Over-emphasize expensive investments in large central station facilities instead of developing a flexible portfolio of supply and demand side options.
Preferred Resource Plan includes 7,104 MW of new DSM and supply-side capacity by 2027.

This includes:

- 4,550 more MW from natural gas-fired combined cycle and combustion turbine units.
- 1,453 MW from a new nuclear unit – even though not part of a “least cost plan.”
- Only 34 MW of solar (eventhough admit state potential > 10,000 MW).
- Only 248 MW of onshore wind with none before 2022 (state’s onshore potential ~ 2,000 MW).
- Zero offshore wind through 2027. (potential between 2,000 MW and 28,000 MW).
How Dominion Benefits from Building Large New Central Station Generating Units

Growth in Regulated Net Plant (in $billions)

$30
$25
$20
$15
$10
$5
$0

2007 2008 2009 2010 2011 2012e

75% increase

$11 billion in 6 years

Net Plant at 2006  Regulated Electric Growth  Regulated Gas Growth

Please refer to page 2 for risks and uncertainties related to projections and forward looking statements.
### Failure to Have a Really Diverse Fuel Mix - Dominion Virginia Power

<table>
<thead>
<tr>
<th>Generation as % of Total Energy</th>
<th>2008</th>
<th>2010</th>
<th>2017</th>
<th>2022</th>
<th>2027</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>33%</td>
<td>31%</td>
<td>23%</td>
<td>24%</td>
<td>20%</td>
<td>18%</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>6%</td>
<td>10%</td>
<td>26%</td>
<td>34%</td>
<td>29%</td>
<td>29%</td>
</tr>
<tr>
<td>Net Purchases</td>
<td>17%</td>
<td>18%</td>
<td>13%</td>
<td>13%</td>
<td>13%</td>
<td>11%</td>
</tr>
<tr>
<td>Total Fossil</td>
<td>56%</td>
<td>59%</td>
<td>62%</td>
<td>70%</td>
<td>62%</td>
<td>58%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>31%</td>
<td>28%</td>
<td>30%</td>
<td>27%</td>
<td>37%</td>
<td>35%</td>
</tr>
<tr>
<td>NUGs</td>
<td>11%</td>
<td>10%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other (includes renewables)</td>
<td>1%</td>
<td>3%</td>
<td>4%</td>
<td>3%</td>
<td>2%</td>
<td>6%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>99%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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</tr>
</tbody>
</table>
Failure to Have Plan to Reduce Annual CO₂ Emissions – Dominion Virginia Power
However

• Preceding slide does not reflect CO₂ emissions from the millions of MWh that Dominion expects to purchase from PJM.

• All or many of these MWh likely will be generated at fossil-fired units.

• So annual CO₂ emissions will likely be much higher than even shown in preceding figure.