Reliability Implications of a Changing Generation Mix

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Emerging Issues

Source: 2010 NERC Long-Term Reliability Assessment
## Generation Mix Is Changing

<table>
<thead>
<tr>
<th>Fuel</th>
<th>2010</th>
<th>2019 Projected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>31%</td>
<td>26%</td>
</tr>
<tr>
<td>Gas</td>
<td>29%</td>
<td>30%</td>
</tr>
<tr>
<td>Dual Fuel</td>
<td>11%</td>
<td>13%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>11%</td>
<td>12%</td>
</tr>
<tr>
<td>Hydro</td>
<td>12%</td>
<td>9%</td>
</tr>
<tr>
<td>Renewables</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: 2010 NERC Long-Term Reliability Assessment
Primary Frequency Control

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Arresting Period
Rebound Period
Recovery Period

System Frequency

Power

Primary Frequency Control
[Governor response (and frequency-responsive demand response)]

Secondary Frequency Control
(Generators on Automatic Generation Control)

Tertiary Frequency Control
(Generators through operator dispatch)
Operating reserves

• Larger generating units may require increased contingency reserves
• Planners and design engineers need to avoid single points of failure in plants or switchyards
• Ability to reduce generation during minimum load periods may be desirable
Transmission

Source: 2010 NERC Long-Term Reliability Assessment
Thank you