Duke Energy Nuclear License Renewal Update for the South Carolina Nuclear Advisory Council

Rounette Nader – Director, Nuclear Engineering
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Current Nuclear Fleet

Duke Energy owns 100% of all units except the Catawba units.

<table>
<thead>
<tr>
<th>Station</th>
<th>Capacity (MW)</th>
<th>Units</th>
<th>Commercial Operation</th>
<th>License Expiration (current)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oconee</td>
<td>2,554</td>
<td>3 PWR</td>
<td>1973</td>
<td>2033, 2034</td>
</tr>
<tr>
<td>McGuire</td>
<td>2,316</td>
<td>2 PWR</td>
<td>1981</td>
<td>2041, 2043</td>
</tr>
<tr>
<td>Catawba*</td>
<td>2,310</td>
<td>2 PWR</td>
<td>1985</td>
<td>2043</td>
</tr>
<tr>
<td>Brunswick</td>
<td>1,870</td>
<td>2 BWR</td>
<td>1975</td>
<td>2034, 2036</td>
</tr>
<tr>
<td>Harris</td>
<td>964</td>
<td>1 PWR</td>
<td>1987</td>
<td>2046</td>
</tr>
<tr>
<td>Robinson</td>
<td>741</td>
<td>1 PWR</td>
<td>1971</td>
<td>2030</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10,755</strong></td>
<td><strong>11</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Duke Energy Climate Goals

Duke Energy’s path to a low-carbon future
- Collaborate and align with our states and stakeholders as we transform.
- Accelerate our transition to cleaner energy solutions.
- Continue to operate our existing carbon-free technologies, including nuclear and renewables.
- Modernize our electric grid.
- Advocate for sound public policy that advances technology and innovation.

Companywide CO₂ Emissions Reduction Goals
- Cut CO₂ emissions by at least 50% by 2030
- Attain net-zero CO₂ emissions by 2050

Duke Energy has connected more than 140 megawatts of solar in South Carolina and expect 800 megawatts total to come onto our system by the end of 2025.

Duke Energy has reduced CO₂ emissions in South Carolina by 40% since 2005.
# Duke Energy Climate Goals

## Passenger Vehicle Equivalent of Duke Energy’s Goals

<table>
<thead>
<tr>
<th>TARGET YEAR</th>
<th>2018</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duke Energy CO₂ Reductions**</td>
<td>31%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>Passenger Vehicle CO₂ Equivalence***</td>
<td>More than 9 million vehicles</td>
<td>More than 14 million vehicles</td>
<td>More than 29 million vehicles</td>
</tr>
</tbody>
</table>

1,000,000 passenger vehicles = 1 car

Equivalent to taking all the cars off the road in:

* All calculations are expressed in short tons
** Calculated from a 2005 baseline of 153 million tons
*** Source: EPA Greenhouse Gas Equivalencies
Duke License Renewal Announcement

• As we plan to meet our customers’ future energy needs and continue to reduce our carbon footprint, we are seeking to renew the licenses of the 11 nuclear units we operate at six plant sites in the Carolinas.

• This provides the option to operate these plants for an additional 20 years.

• We expect to submit the license renewal application for Oconee Nuclear Station in 2021, followed by our other nuclear stations.
Nuclear Subsequent License Renewal
Meeting Customers’ Energy Needs with Safe, Clean, Reliable Electricity

• Environmentally Sound
  ▪ In 2018, avoided the release of about 54 million tons of CO$_2$.

• Technologically Safe and Reliable
  ▪ In 2018, provided half of our Carolinas customers’ electricity.
  ▪ In 2018, marked its 20th consecutive year with a fleet capacity factor greater than 90%.

• Economically Beneficial
  ▪ In 2018, employed about 5,000 nuclear employees across the Carolinas.
  ▪ In 2018, paid approximately $135 million in property and payroll taxes in SC plant communities.
  ▪ Every year, our nuclear teammates provide community support through donations and volunteer efforts.
Subsequent License Renewal (SLR)

• The Nuclear Regulatory Commission (NRC) Commissioners decided to leave 10 CFR 54 intact for SLR.

• The NRC has updated guidance for SLR

• The Department of Energy (DOE), Electric Power Research Institute (EPRI) and the nuclear industry have conducted research that has shown nuclear plants can be safely operated during a second license renewal period.

• Three SLR Applications are in NRC review and on schedule to receive renewed licenses in 2019 and 2020.
# Duke Nuclear Fleet Licenses

## Fleet Subsequent License Renewal (SLR) Timeline

<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>2018</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2040</th>
<th>2045</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robinson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oconee</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brunswick</td>
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<td></td>
</tr>
<tr>
<td>McGuire</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catawba</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harris</td>
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</tbody>
</table>

- **Period of Extended Operation (PEO)**
- **Prepare SLR Application**
- **NRC Review**

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Industry Subsequent License Renewal – What It Means

Life Extension as Strategic Bridge for Nuclear Power

Most plants in the U.S. have already received extensions of their original 40-year licenses to 60 years, and the oldest units will reach their 60-year limit in the early 2030s.

Without life extension from 60 to 80 years, the fleet's available capacity will drop significantly between 2032 and 2050.

License renewal of the U.S. nuclear fleet to 80 years can sustain 100 gigawatts of carbon-free electricity generation for two decades, providing a bridge to the next generation of nuclear reactors.

Beginning in the 2020s, new light water reactors, small modular reactors, and other next-generation nuclear reactors are deployed. Their installed capacity increases as existing reactors approach the end of their 80-year lives.

Sources: U.S. Energy Information Administration (capacity data); U.S. Nuclear Regulatory Commission (license expiration)
Questions ?