Nuclear Power Overview
Doug Lawrence
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Subject to Board of Directors’ and/or regulatory approvals.
Dominion Energy
At-a-Glance

Employees: 17,100
State with Operations: 13
Customers: 7 million (8 states)
Market Cap: $68 billion
Generating Capacity: 30.4 GW
Miles of Electric Lines: 88,700
Miles of Gas Pipeline: 101,700
Dominion Energy’s Nuclear Fleet

- **North Anna Power Station**
  - Mineral, VA

- **Surry Power Station**
  - Surry, VA

- **Virgil C. Summer Power Station**
  - Jenkinsville, SC

- **Millstone Power Station**
  - Waterford, CT
# Nuclear Relicensing

**Virginia (Cost-of-Service Investment)**

- **20-year license extensions**
- **Rider-recovery eligible** (subject to approval)
- **Significant customer & environmental value**

<table>
<thead>
<tr>
<th></th>
<th>Surry</th>
<th>North Anna</th>
</tr>
</thead>
<tbody>
<tr>
<td># of units</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Owned capacity (MW)</td>
<td>1,676</td>
<td>1,672</td>
</tr>
<tr>
<td>Regulated</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Current license expiration</td>
<td>2032/33</td>
<td>2038/40</td>
</tr>
<tr>
<td>% of VA generation¹</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>% of VA zero-carbon generation¹</td>
<td>45%</td>
<td>45%</td>
</tr>
<tr>
<td>Estimated avoided CO2/year²</td>
<td>8 million tons</td>
<td>8 million tons</td>
</tr>
</tbody>
</table>

**Key Milestones**

- **NRC extension application**: Q4 2018, Q3 2020
- **Estimated NRC approval**: 1H 2021, 1H 2022
- **Rider recovery filing**: 2H 2021, 2H 2021
- **Estimated rider approval**: Mid-2022, Mid-2022

¹ Based on 2019 MWh generation
² Illustrative: 3-year average nuclear generation multiplied by the PJM marginal CO2 intensity rate
Independent Spent Fuel Storage Installations

- Designated protected area, with concrete storage pad(s) and dry storage systems
- Licensed by the Nuclear Regulatory Commission under 10CFR Part 72
- Became necessary when the fuel storage pools began to reach capacity and the US Department of Energy breached their obligation to accept used commercial nuclear fuel beginning in 1998
- ISFSIs now present at almost all US commercial nuclear power plants
Dominion Energy Nuclear Sites with Independent Spent Fuel Storage Installations

- Keewaunee
- Millstone 2&3
- North Anna 1&2
- Surry 1&2
- VC Summer
North Anna
Surry
Millstone
VC Summer
Kewaunee (permanently shut down)
Original Dry Storage Systems

- Vertical metal casks used initially at Surry (1986) and then North Anna (1998)
  - System includes the cask and a transporter
  - Bolted lids, with full-time lid seal monitoring
  - Surry was the first nuclear power plant in the US to construct and operate an ISFSI
Next Generation Dry Storage Systems

• Stainless-Steel canisters stored in concrete bunkers
  • Canisters, concrete modules, transfer cask, and trailer/tugger
  • Lids welded shut with redundant multi-pass welds
  • Canisters stored horizontally in the concrete bunker

• Millstone ISFSI began operation using Transnuclear’s NUHOMS* system in 2005
• North Anna and Surry transitioned to NUHOMS in 2007
• Kewaunee ISFSI opened in 2009 with NUHOMS

*NUHOMS: NUclear HOrizontal Modular Storage
Next Generation Dry Storage Systems

- VC Summer ISFSI operations began in 2016
  - Holtec HI-STORM FW system used
  - Same concept as NUHOMS (welded stainless-steel canister in a concrete overpack), only vertical
<table>
<thead>
<tr>
<th>Cask Vendor</th>
<th>North Anna</th>
<th>Surry</th>
<th>Millstone</th>
<th>Kewaunee</th>
<th>VC Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transnuclear (Orano)</td>
<td></td>
<td>GNSI Westinghouse NAC</td>
<td>Transnuclear</td>
<td>Transnuclear</td>
<td>NAC Holtec</td>
</tr>
<tr>
<td>Gask Type</td>
<td>TN-32</td>
<td>NUNOMS 32PT</td>
<td>NUNOMS EOS</td>
<td>Castor, MC10, I-28</td>
<td>TN-32</td>
</tr>
<tr>
<td>Number of Casks</td>
<td>28*</td>
<td>40</td>
<td>3 of 46</td>
<td>28</td>
<td>27 of 28</td>
</tr>
<tr>
<td>Total Casks on Site</td>
<td>71</td>
<td>95</td>
<td></td>
<td>47</td>
<td>38</td>
</tr>
<tr>
<td>2022 ISFSI Loading Plan</td>
<td>3 casks</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

* includes the TN-32B High Burnup Demonstration Cask loaded in 2017
North Anna High Burnup Cask Demonstration Project

- **Purpose**: obtain actual data on high burnup spent fuel in dry storage to prove it is safe and stable, and can be safely transported off-site to a repository

- Initiated in 2012 by Dominion
  - We have our own site ISFSI license, and experience with bolted lid casks, high burnup fuel (> 45 GWd/MTU) from both fuel vendors, and demonstration programs

- Funded by the Dept of Energy and Electric Power Research Institute

- Dominion partnered with EPRI, Orano Federal Services, Transnuclear, Framatome, and Westinghouse
  - Developed test plan and fuel loading (2013)
  - Procured a new bolted lid TN-32 cask (2014)
  - Modified cask lid to accept thermocouples (2015-16)
  - Dominion submitted license amendment application to NRC (2015)
  - NRC approved the amendment (August 2017)
North Anna High Burnup Cask Demonstration Project

- Cask loaded in November 2017 and placed at the ISFSI
- Temperature data from 63 thermocouples recorded hourly
North Anna High Burnup Cask Demonstration Project

- Fuel temperature data shows expected slow, steady decline
- Natural variations in ambient temperature also seen inside cask
North Anna High Burnup Cask Demonstration Project

• Next Steps
  • Cask vendor Orano obtains transportation license (application submitted in 2021)
  • Prepare cask for loading onto conveyance and rail shipment ~2026
  • Dept. of Energy assumes ownership for shipment, receives cask (likely at a national lab) and performs additional inspections on fuel after transport