U.S. Nuclear Energy Program

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June 26, 2017
2017 EIA Energy Conference
Trends in Nuclear

- Recognition of the importance of nuclear – today and in the future
  - Energy Security
  - Economic Prosperity
  - Global Security
  - Environmental Sustainability

- Concern about financial viability of some currently operating plants, yet benefits from keeping them running

- Increased interest in nuclear in some domestic and international markets

- Innovators and utilities looking at advanced nuclear as a way to move beyond electricity

"If you really care about this environment that we live in... then you need to be a supporter of this [nuclear energy] amazingly clean, resilient, safe, reliable source of energy."

Secretary Rick Perry at Press conference, May 10th

- 20% of electricity (60% of non-emitting)
- 90% capacity factor of plants
- 99 operating (avg. age 36 yrs)
- 4 under construction
Global Growth and Market Opportunity

- 60 reactors under construction in 15 countries (20 in China)
- ~170 reactors planned in over 25 countries, worth as much as $700 billion over the next 5-10 years
- ~370 reactors proposed in 36 countries, worth as much as $1.6 trillion over the next 10-25 years

Potential Nuclear Power Expansion

- 35 countries taking steps to develop nuclear power
- 30 countries with operating reactors developing expansion plans
- ~450 reactors operating
  11% of electricity / 40% of clean electricity

Source: IAEA/PRIS & WNA
Enabling Multiple Nuclear Energy Pathways

A balanced and innovative National Nuclear Energy RD&D portfolio is needed to meet near-terms priorities and long-term objectives, given the long development and deployment period for nuclear technologies.

The partitioning between GE III+, SMRs, and GEN IV depend on the availability of the technologies and supply-chain considerations.

Life extension to 80 yrs for a portion of current capacity (younger and larger units)

LWR LIFE EXTENSION (80 yrs)  ADVANCED REACTORS
SMALL MODULAR REACTORS  USED FUEL STORAGE  GEOLOGIC REPOSITORY

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Improving the Economics of America’s Nuclear Power Plants

- Policy should be technology neutral
  - Focus on the end goal (i.e., reduced carbon emissions) rather than advancing a particular technology
  - Level the Playing Field – treat all clean technologies equally

- Outreach and education

- Near-term action by FERC on Price Formation

- Valuation needs to be considered by FERC/Markets
  - Zero-carbon, Reliability, Resiliency, Affordability,
  - Fuel Diversity, Sustainability, Security, Flexibility, etc.

- Clean Energy Standards

- Reduce Operating Costs
  - Delivering the Nuclear Promise
  - LWR Working Group – technical advances
  - Additional energy services (i.e., process heat)

- Power Purchase Agreements

- Legislation
  - Carbon Price, Production Tax Credit

- Re-regulate

Combined Construction and Operating Licenses (COLs)

<table>
<thead>
<tr>
<th>SITE/LOCATION</th>
<th>UTILITY</th>
<th>REACTOR/NO. UNITS</th>
<th>COLA DATES</th>
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<tr>
<td></td>
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<tr>
<td>Turkey Point FL</td>
<td>Florida Power and Light</td>
<td>AP1000 2</td>
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18 COLs have been docketed by the NRC since 2007
- 7 (totaling 12 reactors) have been approved
- 1 (totaling 2 reactors) is under review
- 10 (totaling 14 reactors) have been suspended and/or withdrawn
Small Modular Reactors

**NuScale**
- Design Certification Application (DCA) submitted to the NRC in January 2017
  - NRC accepted and docketed March 2017
  - DCA review and approval within 40 months

**NuScale/UAMPS Siting**
- Site use agreement for a site on the INL
  - Preferred site identified in August 2016

**TVA Siting**
- Submitted Early Site Permit Application to NRC
  - Review commenced January 2017, completed in approximately 30 months
Nuclear Beyond Electricity – Advanced Reactors

NOW

FUTURE

Flexible Generators ❖ Advanced Processes ❖ Revolutionary Design

Large LWRs

SMRs

Gen IV

Chemical Processes

H₂O

H₂

Desalination

Industrial Applications

Flexible Electricity Generation

Hydrogen Production

Baseload Electricity Generation
Gateway for Accelerated Innovation in Nuclear (GAIN)
Summary

• The demand for domestically-generated, reliable and clean sources of base-load electricity will continue to drive many countries toward nuclear energy as part of their “energy security” and national economic and environmental calculus.

• Profound opportunity for new nuclear growth:
  • Strong global market interest
  • Growing need for increased global access to electricity
  • Support energy security, economic and environmental goals
  • U.S. leadership to ensure safety & nonproliferation are as important as ever

• The Administration is committed to advancing nuclear energy in the U.S. and abroad.