Global Outlook for Nuclear Power

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Vogtle 3 and 4 Project
A Global Crossroads for Energy
Planning for Future Baseload Energy Demand Must Begin Now

- With worldwide demand for energy expected to double by 2030, the need for safe, clean, reliable energy is essential
- Renewable energy sources are impractical for meeting baseload energy needs
- Continued reliance on fossil fuels is counterproductive to efforts to reduce CO$_2$ and other greenhouse gasses
## The Interest in Nuclear Energy is Global

### 2030: Projected Top 10 Nuclear Countries

<table>
<thead>
<tr>
<th>2030 Rank</th>
<th>Country</th>
<th>2030 GWe</th>
<th>2008 Rank</th>
<th>Added GWe</th>
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<tr>
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<tr>
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<td>18.0</td>
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<tr>
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<td>10</td>
<td>Germany</td>
<td>14</td>
<td>5</td>
<td>-6.1</td>
</tr>
</tbody>
</table>

Source: UxC
The Interest in Nuclear Energy is Global

Regional Market Drivers

• Need for economically competitive electricity driven by
  • Economic growth
  • Replacement of aging generation supply
  • Security of energy supply
• Optimum generation size to match country infrastructure
• Benefit to country’s economy
• Reliability of supplier of new nuclear plants
The Interest in Nuclear Energy is Global

Nuclear Is Well Positioned

- Meets needs to reduce greenhouse gas emissions
- Highest capacity factors
- Low cost per kilowatt hour
- More stable fuel sources, less fluctuation in price
- Public acceptance at all-time high
- Proven high standards in:
  - Safety
  - Availability
  - Financial performance
The Interest in Nuclear Energy is Global
Even in Countries Who Have No Current Nuclear Capacity

**Americas**
- Argentina
- Brazil
- Canada
- Chile
- United States

**Asia**
- China
- India
- Indonesia
- Japan
- South Korea
- Taiwan
- Vietnam

**Europe**
- Belgium
- Bulgaria
- Czech Republic
- France
- Germany
- Hungary
- Italy
- Lithuania
- Netherlands
- Poland
- Romania
- Slovakia
- Slovenia
- Spain
- Switzerland
- Turkey
- Ukraine
- United Kingdom
- Finland
- Sweden

**Oceana**
- Australia
- New Zealand

**Africa**
- South Africa
- Egypt
- Morocco
- Nigeria

**Other**
- Belarus
- Russia
Today’s Nuclear Industry
The number of operating plants is significant and expected to grow

World Nuclear Association Estimate of Reactors Worldwide

- **Today**: 435 Reactors
- **By 2020**: 580 Reactors
- **By 2030**: 821 Reactors
Today’s Nuclear Industry
New Designs Must Deliver

• **Cost basis that can compete with other energy sources**
  - High degree of certainty for schedule
  - Reduced construction time and cost

• **Increased levels of safety**

• **Easier to operate and maintain**

• **Standardized plants**

• **Regulatory certainty**
A Key Factor in Project Success - Simplification

- Simplicity in **Design** through reduced number of components and bulk commodities
- Simplicity in **Safety** through use of passive safety systems
- Simplicity in **Construction** through modularization
- Simplicity in **Procurement** through standardization of components and plant design
- Simplicity in **Operation and Maintenance** through use of proven systems and components, and man-machine interface advancements
Simpler Design Requires Less Equipment and Less Concrete, and Fewer Human Resources

Comparison of Building Volumes

- 50% Fewer Valves
- 35% Fewer Pumps
- 80% Less Pipe
- 45% Less Seismic Building Volume
- 85% Less Cable
Today’s Nuclear Industry

Shorter Construction Schedules Through Modular Construction

More Work Done In Parallel = Shorter Construction Schedule
Today’s Nuclear Industry
Challenges Still to be Met

- World financial conditions
- Short term energy options
- Deliver new plants on budget and on schedule
- Regulatory process
- Lack of certainty of CO₂ treatment
- Waste and security issues
- Maintain operating fleet performance
- Human resources
- Supply chain
On-Going Commitment to Human Resources
We have been preparing!
On-Going Commitment to Supply Chain
Supply Chain Solutions: Major AP1000™ Suppliers

China - 100% Localization by 2015
- EMD - Reactor Coolant Pumps
- WEC-Shaw Modules
- Chicago Bridges & Iron - Containment Vessel
- PAR Fuel Handling
- WEC-Newington Internals - CRDM
- Electric Boat Modules
- GSE Systems Simulator
- Toshiba Turbine - Generators
- Japan Steel Works Heavy Forgings
- Sumitomo SG Tubes
- Toshiba Turbine - Generators
- Doosan Steam Gen, RV, Piping, Pressurizer
- China - 100% Localization by 2015
- Japan Steel Works Heavy Forgings
- Sumitomo SG Tubes
- Toshiba Turbine - Generators
- Doosan Steam Gen, RV, Piping, Pressurizer
- Other Nuclear Industrial Centers
  - Czech Republic
  - France
  - Brazil
Westinghouse China Projects
Fourteen Planned AP1000™ Units

China
14 units planned
4 units under contract
Operation begins 2013
Projects are currently on schedule.
Westinghouse China Projects
Module Placement at Sanmen

- Module manufacturing and placement for the lead AP1000 in China is progressing on schedule
- The CA20 module (fuel building) and the CA01 (reactor cavity)
Westinghouse U.S. Projects
AP1000™ Status

USA
14 units planned
6 units under contract
Operation begins 2016

South Texas
2 ABWRs
Westinghouse U.S. Projects
AP1000™ Projects are the First in the U.S. in 30 Years

VC Summer Units 2 & 3
Westinghouse U.S. Projects
VC Summer 2 & 3 Progress

- Completed plant access road including Mayo Creek Bridge from Hwy 213 to the tabletop
- Erected concrete batch plant #1, connecting electrical and water to support testing in June
- Excavated Unit 2 power block to 15-20 feet with no issues to date
- Poured concrete slab for Module Assembly Building (football size footprint 13 stories tall)
- Installed over 400 sections of circulating water pipe for Units 2 and 3

VC Summer Units 2 & 3
Westinghouse U.S. Projects
AP1000™ Projects are the First in the U.S. in 30 Years

Vogtle Units 3 & 4
Westinghouse U.S. Projects
Vogtle 3 and 4 Progress

- Received the Full Notice to Proceed March 2009
- Received Early Site Permit & Limited Work Authorization in August 2009 (allows backfill up to rebar placement)
- Commenced Site Excavation on August 10, 2009, completed Unit 3 on February 2010
- Commenced backfill of Unit 3 on March 8, 2010
- Issued Design procurement packages for CA-20 (Auxiliary Building) and CA-01 (Steam Generator & Refueling Canal) for fabrication
Going Forward

Europe is Next

- AP1000™ was certified by the EUR in 2007
- Working through licensing process in the UK
- Passed pre-qualification by CEZ
- A growing number of countries have expressed interest in the AP1000
- There are still regional challenges to overcome:
  - Political
  - Regulatory
  - Financial
  - CO₂ pricing

Bulgaria
Czech Republic
France
Hungary
Italy
Lithuania
Netherlands
Poland
Romania

EU Countries Pursuing Nuclear
Going Forward
Advanced Plant Development Road Map

- New, Advanced LWRs
- Small Modular Reactors (SMRs)
- High-Temperature Gas Reactors
- Fast Reactors

- Large, Passive Plant (1700+ MWe)

- 2013
- 2023
- 2025
- 2030+
Summary

- New nuclear projects worldwide are proceeding
- Broad-based support exists in the government and the public
- The technology/designs are available
- Regulators are prepared
- Must maintain the safety and performance of the operating fleet
- It is up to the industry to deliver new build projects safely, on schedule and within budget!
Thank you.