Global Challenges in New Build Applications

Status of AP1000 Projects

Mike Corletti

Director, UK AP1000 Technical Integration and Licensing

June 2, 2016

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AP1000 Plant – Key Attributes

Proven Technology and Innovative Passive Safety Systems

Passive safety replaces mechanical and electrical systems – harnesses natural forces like gravity, convection, and condensation to achieve safe shutdown

Delivery Certainty

Standard design, experience from current projects and modular construction enable "nth of a kind" delivery performance

Regulatory Certainty

Reviewed by multiple countries; first Generation III+ reactor to receive design certification from the U.S. NRC

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AP1000 Plant: Safe, Simple and Standardized

AP1000 *Plant Site at Sanmen, China*

- **Passive safety** replaces mechanical and electrical systems – harnesses natural forces like gravity, convection and condensation to achieve safe shutdown
- **Strong licensing pedigree** based on reviews in multiple countries; first and only Generation III+ reactor to receive design certification from the U.S. NRC
- **Simplified design and modular construction** provide a plant that is easier and less expensive to build, operate and maintain

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Passive Safety Through Proven Technology

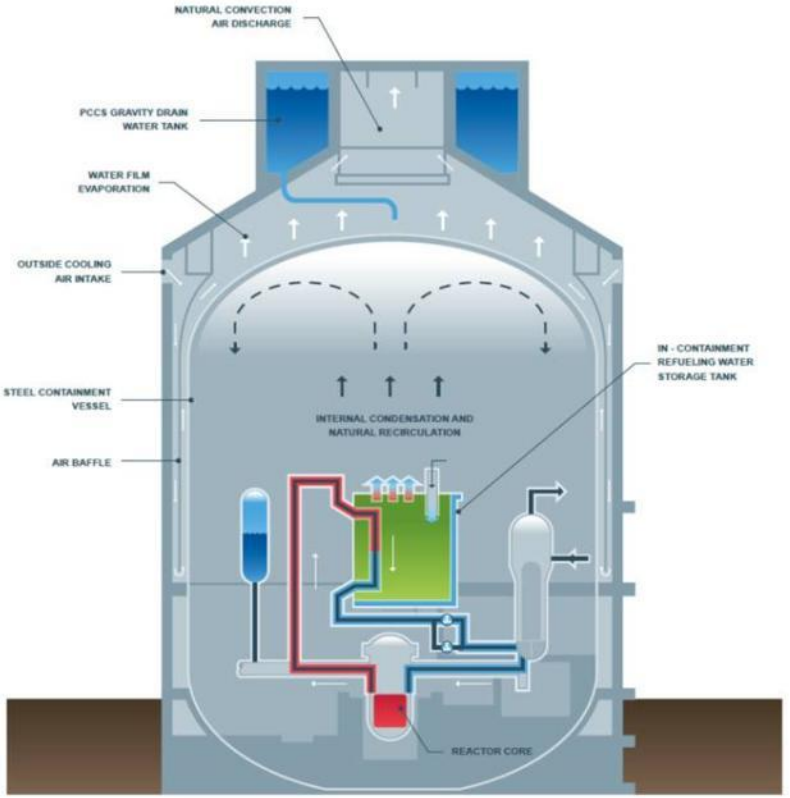
Passive Safety-Related Systems

- Use “passive” processes only, no active pumps, diesels, ….
- One-time alignment of valves
- No support systems required after actuation
- Greatly reduced dependency on operator actions

Active Defense in Depth-Related Systems

- Reliably support normal operation
- Redundant equipment powered by onsite diesels
- Minimize challenges to passive safety systems
- Not necessary to mitigate design basis accidents

Severe accident scenario effects are mitigated by in-vessel retention of the melted fuel



The **AP1000** plant is designed to reduce or eliminate the chances of a core meltdown and explosion in situations where the plant experiences a total loss of power, similar to the accident at Fukushima.

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The **AP1000** PWR: Designed for Greater Project Certainty and Shorter Schedule

Modular construction means more work done in parallel

Plant Order

Site Survey and Preparation

Site Construction

Construction and module assembly

Factory production of modules

Transport Modules

On-site module assembly

Plant Operation

Shorter schedule – increased safety – improved quality

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AP1000 Plant Modular Construction
An Innovative Approach Unique in our Industry

Improved Quality Control and Efficiency
Reduced Construction Schedule and Optimized Costs

AP1000 Plant Experience Driving Global Delivery Certainty

- Eight **AP1000** units under construction
  - Four units in China (Sanmen and Haiyang)
  - Four units in the United States (Vogtle and V.C. Summer)





Establishing delivery improvements from eight units worth of experience

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Sanmen Site Progress: Time Lapse View *2009 to 2016*

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China Projects Recent Achievements

- Completed four Reactor Coolant Pump (RCP) installations at Sanmen 1 (fourth completed on March 1)
- First two RCP installations completed at Haiyang 1 on March 23 and 25; second set of RCPs delivered April 5 and installed on April 26
- Completed Cold Hydro Test at Sanmen 1 on May 26

Haiyang 1 First Two RCPs at Site – March 2, 2016

Sanmen 1 RCP Installation – February 2016

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The Path to Completion: Next Milestones for Sanmen and Haiyang

RCP Deliveries/ Installations

100% Power Operation

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U.S. Projects Updates

Vogtle Unit 3 Containment – March 2016

Vogtle 4 Turbine Building – February 2016

V.C. Summer 3 Shield Building – February 2016

V.C. Summer Site – Fall 2015

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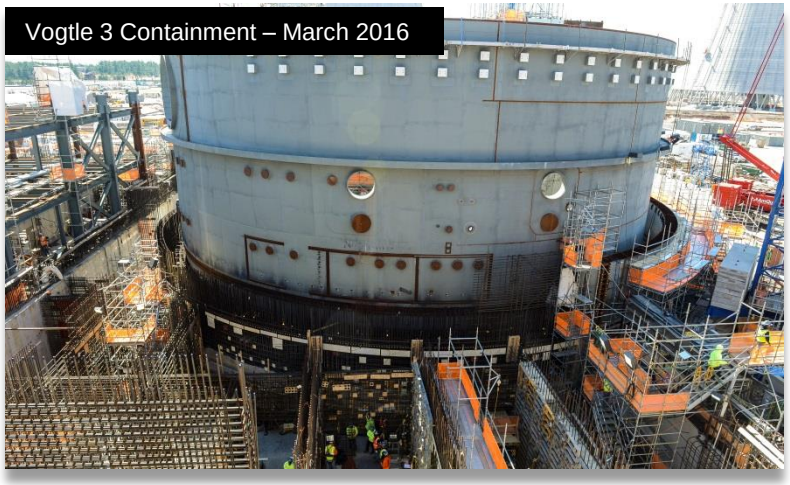
U.S. Projects Recent Achievements

- V.C. Summer
  - Unit 2 Shield Building layer F1 wedge concrete placed in February
  - Unit 2 Annex Building – concrete placed for two of three base slab sections in March
  - Unit 3 CA20 Part 1 lift and set completed in March

V.C. Summer 2 Nuclear Island and Turbine Building – March 2016

- Vogtle
  - Unit 3 Annex Building concrete placed in March
  - Unit 3 concrete fill of CA20 module completed in March
  - Unit 3 Shield Building concrete fill inside panels completed in March

Vogtle 3 Containment – March 2016



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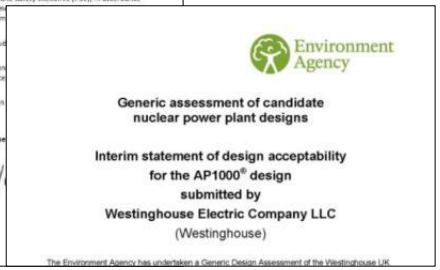
Westinghouse AP1000 PWR
Regulatory Certainty

- EUR confirms the **AP1000** plant can be **successfully deployed** in Europe (May 2007)
- **AP1000** plant amended design **approved** by NRC (December 2011)
- UK regulators grant **Interim Design approval** (December 2011) – **Final Approval** planned March 2017
- China licencing activities on-track, with **Final Safety Analysis Report** (FSAR) submitted to customer (2012)
- Combined construction and operating licences (COL) approved for **Vogtle 3&4** site (February 2012) and **V.C. Summer 2&3** site (March 2012)
- Canada (CNSC) Phase 2 Pre-Licence (2013)



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Progress of Moorside Project:
Adapting a Proven Delivery Model

- Maximise standardisation/minimise customisation of the AP1000 plant design to achieve delivery certainty
- Project adaptation in progress
  - Vogtle reference plant
  - Regulatory-driven change
  - 50 Hz incorporation
  - EU/UK/owner/site requirements
  - Product/delivery improvements from eight units worth of experience
- Generic Design Assessment (GDA)
  - Intensive effort focused on reaching convergence and closing out GDA issues
  - Scheduled to receive Design Acceptance Confirmation/Statement of Design Acceptability by March 2017 from HMG

Moorside Site

Drill Rig - Moorside Site

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QUESTIONS???