The Westinghouse **AP1000®** Nuclear Power Plant
A Perfect-Fit Technology for Poland

April 2018

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Westinghouse

Westinghouse Electric Company

- Founded in 1886 in Pittsburgh, Pennsylvania, by George Westinghouse
- Responsible for some of the world's most important achievements:
  - Commercializing alternating current technology
  - First commercial radio broadcast (KDKA-1920)
  - USS Nautilus nuclear submarine propulsion unit
  - First camera on the moon
  - **Commercial nuclear power**

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130 YEARS 1886-2016

AP1000 Plant Value Proposition

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, driving towards "Nth of a Kind" delivery performance

Regulatory Certainty

First Gen III+ reactor to receive design certification from U.S. NRC, Generic Design Assessment in UK, Reviewed and Approved in China

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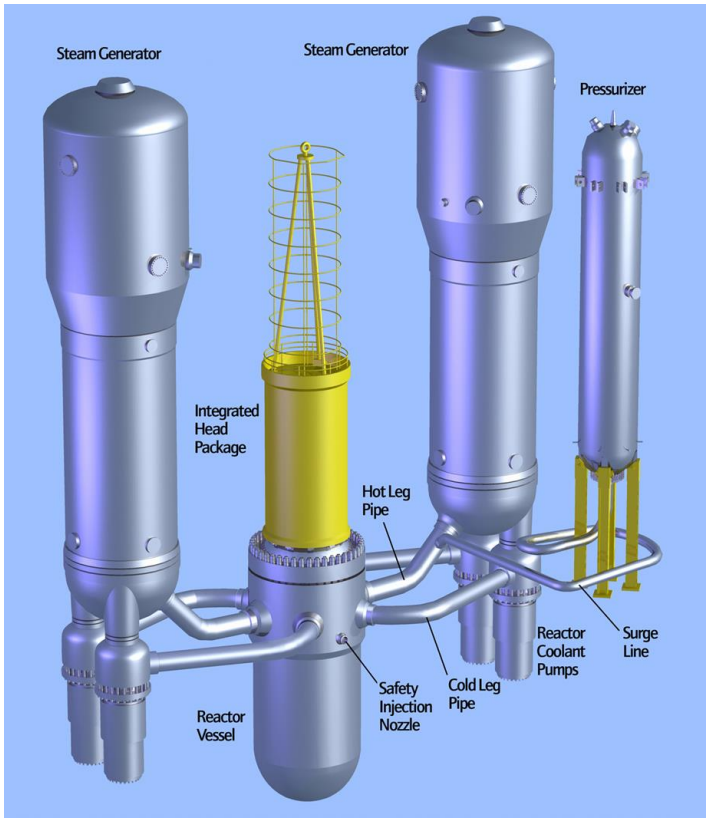
AP1000 Plant Technology



- 2-loops, 2 steam generators reactor coolant system
- Familiar but improved reactor coolant system
  - Larger pressurizer to eliminate the power operated relief valves
  - Seal-less reactor coolant pumps
  - Simplified reactor coolant loops
- PWR is compatible with cogeneration
- Passive safety systems supplemented with simple, active defense-in-depth systems and equipment to provide multiple lines of defense
- Compact 3415 MWt / ~1150 MWe Plant

Perfectly Sized for the Polish Grid

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Load Follow Capability

- **The Westinghouse AP1000 plant is designed to respond to various load change transients:**
  - ± 5%/minute ramp load change from 15% to 100% power
  - 100-50-100% daily load follow for 90% of fuel cycle
  - Control using “grey rods” for more stable generation and less water usage and waste
- **Load follow operations utilize *MSHIM*™ operating strategy**
  - Power maneuvers accomplished without cycling of boron systems

The AP1000 plant is flexible and responsive to frequent changes in electrical demands

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Benefits of MSHIM Operating Strategy

- Multiple banks of rods with different compositions target different functions
- Allows the plant to quickly change power in response to changing electrical loads and exercise fine reactivity control
- Significantly reduces number of boron changes, (i.e. chemical shim), required during load follow operations
- Up to **20x less water & chemical usage** compared to a standard PWR in load follow mode
- Typically, requires only weekly boron changes to compensate fuel burn up
- Simplifies operator actions by reducing frequency of soluble boron changes and automating control rod movements required to control reactor temperature and axial power distribution during baseload operations
- Automated strategies to cover daily load follow, extended power down and recovery, initial plant start-up and restart after trip, using 3D core kinetic techniques

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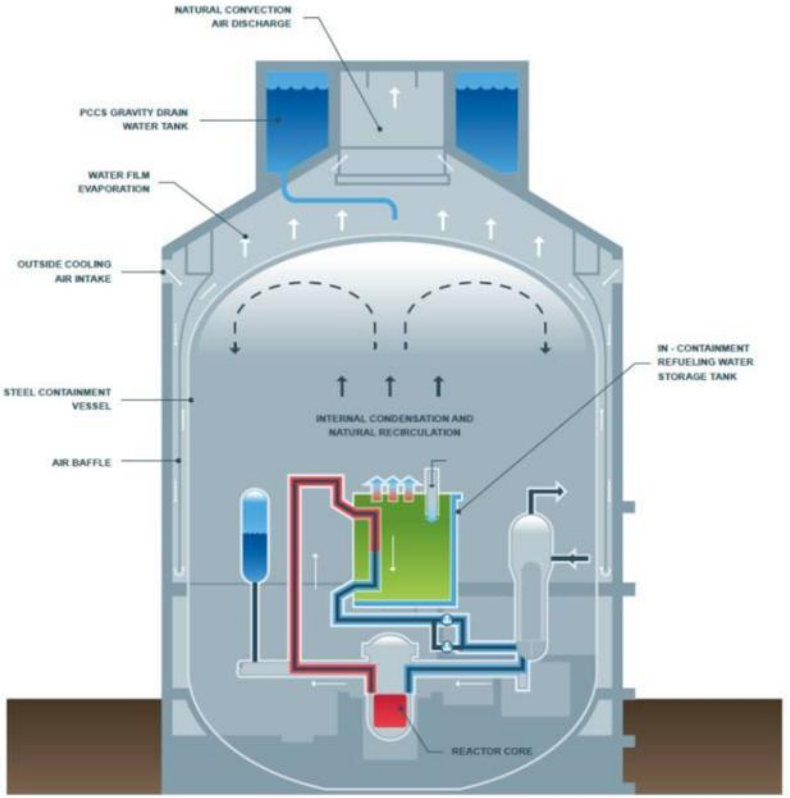
Passive Safety Through Proven Technology

- **Passive Safety-Related Systems**
  - Use “passive” processes only, no active pumps, diesels, …. No Reliance on AC Power
  - Designed to meet Station Blackout
  - Meets Post-Fukushima requirements
  - Reduced reliance on operators - no operator actions required to assure plant safety for 72 hours
  - No support systems required after actuation
- **Active Defense in Depth-Related Systems**
  - Reliably support normal operation
  - Redundant equipment powered by onsite diesels
  - Provide a FIRST line of defense
  - 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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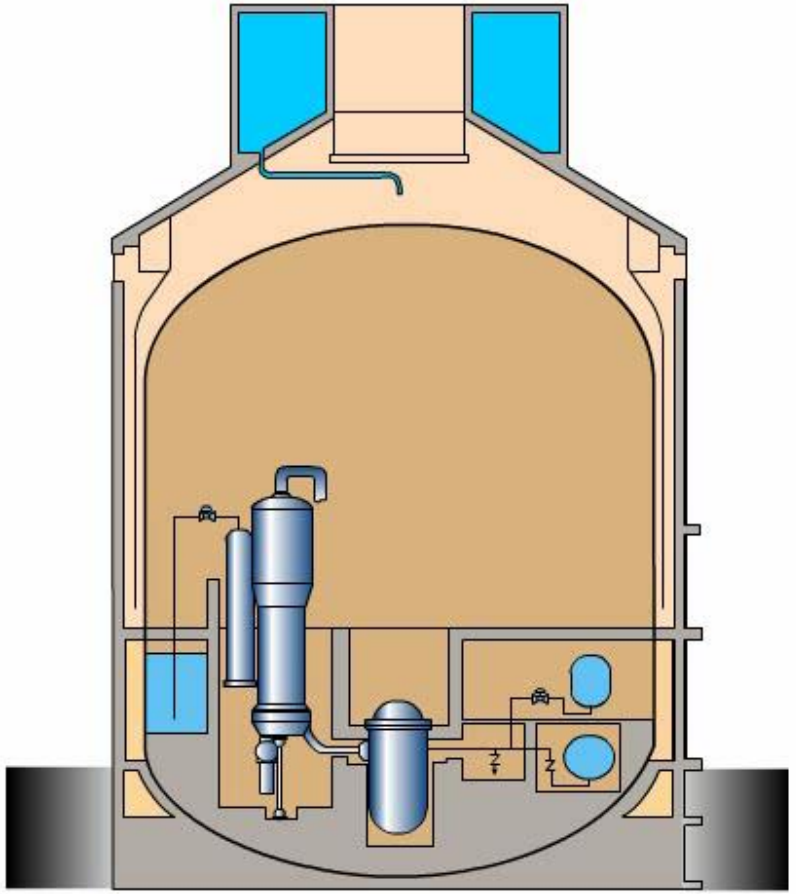
Passive Containment Cooling System (PCS)

- **Passive Safety-Related Systems**
  - Passive Containment cooling with no reliance on AC Power for extended period of time
  - Designed to meet Station Blackout challenges
  - No operator actions required to assure plant safety for 72 hours
- **Simplified Safety-Related Systems**
  - No reliance on pumps, motors, diesel generators
  - Significantly reduces equipment costs, maintenance costs, decommissioning costs



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Sanmen Site Development

Photos © Sanmen Nuclear Power Company Ltd.

2009 to 2017

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AP1000 Plant Design Implementation

Sanmen site

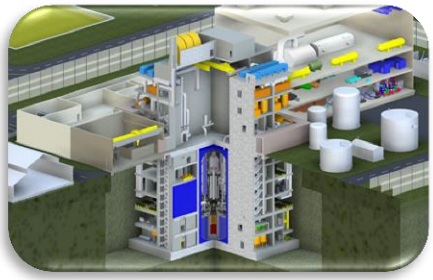
Haiyang 1

- Construction complete at all 4 China Wave 1 plants
  - Sanmen 1/Haiyang 1 ready for Fuel Load
  - Sanmen 2 Hot Functional Testing (HFT) Completed in less than 85 days
- Vogtle Unit 3&4
  - Key NSSS components already installed
  - Implementation of China lessons learned and ease of construction initiatives
  - First of a kind (FOAK) challenges resolved

Vogtle Unit 3 Steam Generator – August 2017

Vogtle Unit 3 Containment – October 2017

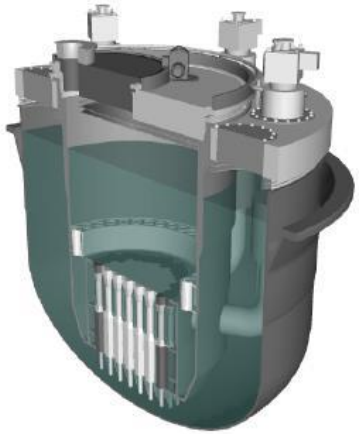
Decades of pioneering global NPP experience
A portfolio of power plant technologies



Over 60 Years of Westinghouse Knowledge, Capabilities, Licensing and Operating Experience

AP1000 Plant Technology Implementation

Westinghouse SMR, eVinci and LFR Technology Development



1950 1960 1970 1980 1990 2000 2010 2020 2030 2040

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Summary

- Westinghouse is motivated and capable of delivering the Polish NPP project
- The AP1000 reactor is a perfect fit for the Polish market
- The AP1000 reactor is the only fully-passive, Gen III+, non-FOAK design
- AP1000 plants are nearing fuel load in China.
- Westinghouse has a long history of localization, technology transfer and development of local nuclear sector expertise.
- There is a growing fleet of AP1000 plants worldwide, giving many opportunities for supplier companies to compete in a global marketplace.
- A Polish project would benefit by leveraging experience gained from China and USA construction projects and India and UK development projects.
- Opportunities exist for collaboration on advanced reactor projects

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Dziękuję!