



# Mitigating Risks within SMR Designs

How AP300 SMR mitigates FOAK risks, more cost-effective, etc.



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# The Path to Mitigating Risk

## THE PATH



**Proven  
Technology**



**Easier to  
License**



**Modular  
Design**



**New Build  
Experience**

## THE RESULT



**Lower  
Cost**



**Quicker  
Deployment**



# AP300 SMR

The only SMR based on deployed, operating & advanced reactor technology



## Proven Technology

**28** AP1000 reactor-years of safe operations

Based on the fully licensed & operating AP1000 technology



## Licensing Advantage

More than **30** years licensing passive technologies with global regulators

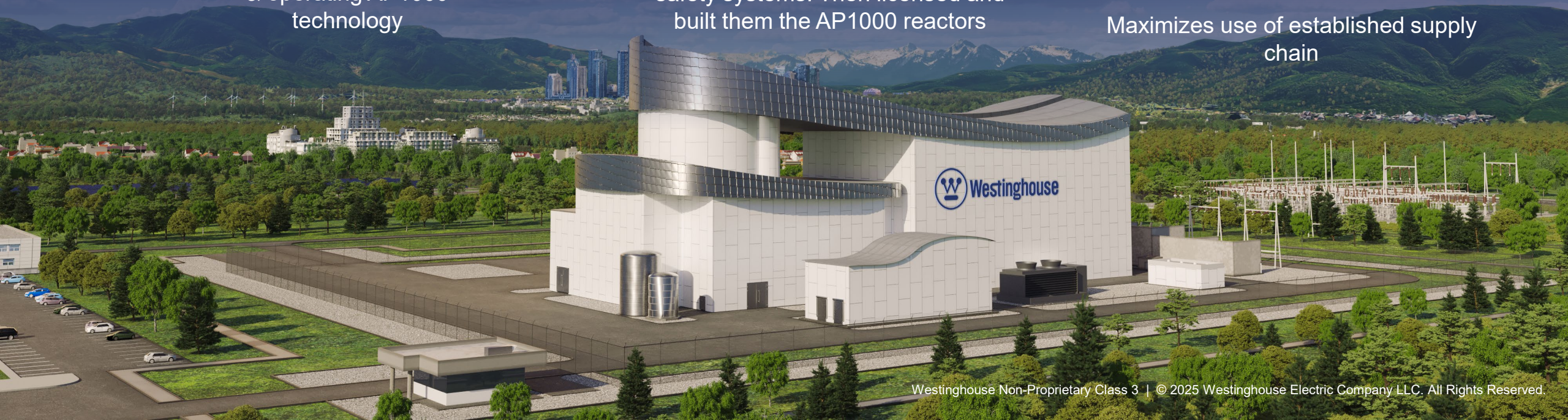
Westinghouse pioneered passive safety systems. Then licensed and built them the AP1000 reactors



## Readily Deployable

Approximately **0.4** acres needed for safety related buildings

Ultra-compact, simplified design reduces construction timeframes. Maximizes use of established supply chain





# Nth-of-a-Kind AP Technology

- 38 units where AP1000 PWR selected, is under construction, or is in commercial operation
- 18 units based on AP technology will be in operation in the next decade
- The “Fleet Effect” of the AP1000 helps avoid the pitfalls of typical First-of-a-Kind (FOAK) designs

## CUSTOMERS CONTINUE TO SELECT WESTINGHOUSE

### AP1000 PWR



China has 4 AP1000s in operation, 12 under construction



Poland contracts for 3 AP1000 reactors



Bulgaria contracts for 2 AP1000 reactors



2 operating AP1000s, 1st new is USA in 30 yrs



Ukraine contracts for 9 AP1000 reactors



India selects 6 AP1000 reactors

### AP300 SMR



UK's Community Nuclear Power (CNP) selects 4 AP300 SMRs



France's Data4 data center developer signs MOU to explore AP300 SMRs across Europe



# Readily Deployable

Proven pedigree throughout the plant lifecycle ensures deployment & operations success



## Technology Readiness

**Tens of millions of hours** dedicated to AP1000 reactor development

**6 AP1000 reactors** operating



## Licensing Certainty

Based on licensed & operating AP1000 technology, the only technology to be fully licensed by the U.S NRC



## Established Supply Chain

Incumbent AP1000 suppliers can deliver major equipment

Demonstrated capability to localize supply chain



## Modular Construction

Simplified, modular, ultra compact nuclear island (costliest portion of any reactor) reduces construction costs/schedule



## Reliable O&M

Record setting AP1000 operational & outage performance

Targeting **+80-year** life cycle





# Proven Technology

Leveraging AP1000 technology with demonstrated industry leading reliability



330MWe (990MWth) 1-loop PWR  
with demonstrated reliability



Westinghouse AP1000 reactor  
passive safety technology



Reduces overall components  
creating a simpler plant compared  
to other SMRs



Identical Technology as  
AP1000 including:

- | Design & licensing methodologies
- | Major equipment & components
- | Passive safety systems
- | Proven Fuel
- | I&C systems
- | Proven Supply Chain
- | Constructability lessons learned
- | Steel-Composite structural modules
- | O&M procedures & practices
- | Fast load follow capabilities



# AP300 Focus on Cost Drivers

While minimizing regulatory and operational risks

Passive safety design reduces number of components

Extended refueling cycle

Optimized main control room and safety power

Factory outfitted room modules and equipment skids

Robust composite steel-concrete (SC) structural modules

Spent fuel pool integrated inside containment





# AP300 Focus on the “Small”

Ultra-compact footprint reduces construction, operating & maintenance costs and risks



Accelerate deployment schedule by leveraging AP1000 design basis; minimize changes to NSSS components and maintain passive safety features

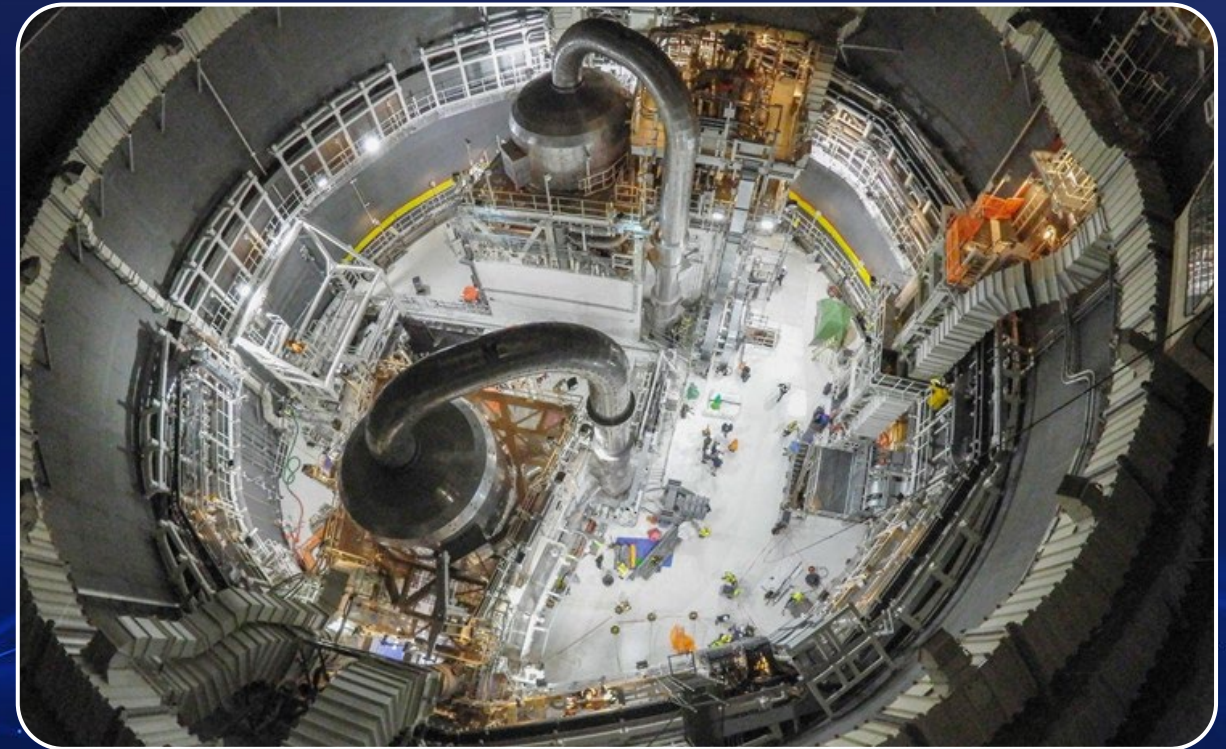


Focus innovation on the key cost drivers for nuclear plant; innovative compacting of plant footprint



Extensive modularization and design optimized for construction

**Most other SMR concepts focus on unproven NSSS designs that carry extreme risks for low overall cost impact, while not addressing the key drivers of plant cost**



Courtesy of Georgia Power Company



# AP Technology Licensing Pedigree

## AP1000 PWR

### United States / USNRC



- Design Certification under 10CFR52 (2006 & 2011)
- Multiple approvals of utility COL applications (2012)
- Construction inspections (ongoing)

### China / NNSA



- PSAR Review / Construction Permits (2009)
- FSAR Review / Fuel Load Permit (2018)

### United Kingdom / ONR



- Generic Design Assessment concluded with issuance of Design Acceptance Certificate (2017)

### Canada / CNSC



- Pre-project Design Review Phase 2 concluded no fundamental barriers to licensing AP1000 plant design in Canada (2013)

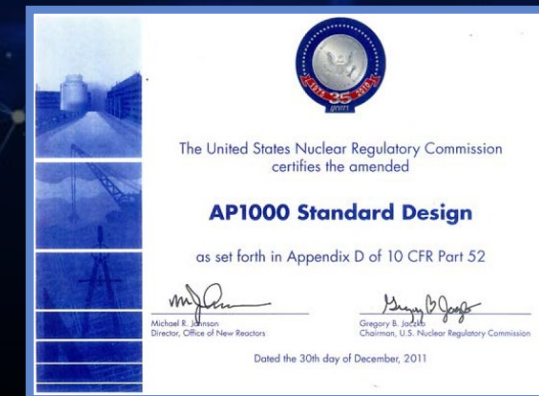
## AP300 SMR

### United States / USNRC

- Conceptual design complete & pre-submittal dialogue with US NRC initiated (2023)

### USNRC / ONR / CNSC Cooperation

- Trilateral Memorandum of Cooperation (MoC) with to collaborate on the assessment of Small Modular Reactor (SMR) and Advanced Modular Reactor (AMR) designs (2024)





# Modular Construction Experience

Shorter Construction Schedules – Improved Quality – Reduced Field Work

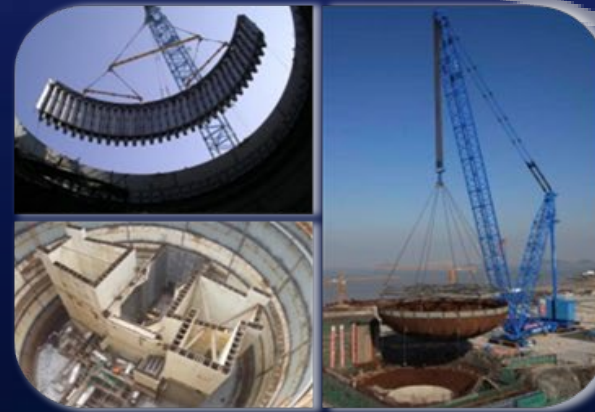
Factory production of modules



Transport Modules



On-site module assembly



Site Survey and Preparation



Site Construction



Construction and module assembly



Completed AP1000 Plant





# Operational Confidence

AP300 SMR is based on the world's best performing GW-scale reactor

**6 operating units with world class performance AP1000 units early performance:**

- Excellence performance operating in-load follow mode - a feature in AP300 SMR
- Exceptional response to grid issues (e.g. load rejections), without leading to a reactor shutdown
- Industry leading **availability factor over 90%** - (vs. 80.9% avg of 9 newest non-AP1000 technologies)
- Record breaking planned outage durations – achieving 19 day planned refueling outage



# AP300 SMR Roadmap

Leverages our AP1000 reactor design and licensing experience to achieve deployment by early 2030's



**2023:** Conceptual design complete & pre-submittal dialogue with US NRC initiated

**2024:** Basic design underway



# AP300 SMR

Lowering risk as the only SMR based on N<sup>th</sup> of a kind operating plants



**Proven Technology**



**Efficient Construction**



**Readily Deployable**





# Thank You

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