

# First of a Kind: A Closer Look at New Nuclear Reactor Technology and Risk

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NARUC Webinar

Chairman Kevin D. Gunn  
Missouri Public Service Commission



Westinghouse Electric Company LLC



# DOE INVESTMENT FUND ANNOUNCEMENT

- On March 22, the DOE announced \$452 million in potential investment funds to support design and commercialization of American-made small modular nuclear reactors (SMR)
  - Initiative for United States to become the world leader in design, development and manufacturing of SMR technology
  - Investment funds may be awarded to up to two SMR technology vendors and utility alliances
  - 50/50 cost sharing for design certification and obtaining a Combined Construction and Operating License (COL) from the Nuclear Regulatory Commission (NRC)
  - Requires applicants to include a plan with a plant in-service date in 2022 timeframe
- Westinghouse submitted application on May 18<sup>th</sup> (deadline May 21<sup>st</sup>)



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# WESTINGHOUSE – NUCLEAR TECHNOLOGY EXPERTISE

- More than 60 years of nuclear experience
  - Focused and dedicated strategic platform devoted solely to nuclear power
- Dedicated experts in all aspects of reactor design, licensing, operations and plant maintenance, and design and manufacturing of nuclear fuel
- AP1000® design: The first and only U.S.-licensed large passive safety reactor
  - Only nuclear plant being built in the U.S. today
  - Nuclear plant design already under construction in other countries
- State-of-the-art patented technologies and proprietary passive safety systems and technology

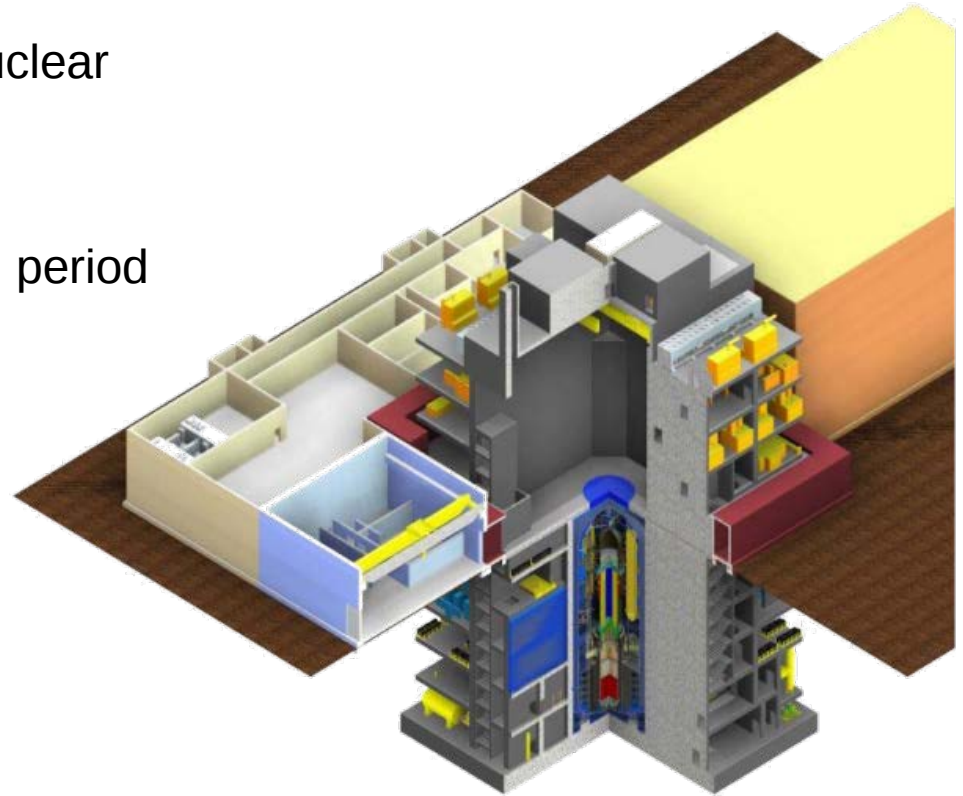


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# BENEFITS OF WESTINGHOUSE SMALL MODULAR REACTOR

- Incremental addition of baseload nuclear capacity (225 MWe)
- Competitive with large nuclear
- Approximately 24 month installation period
- Reduced components and systems
- Only licensed nuclear fuel design
- Reduced construction, operating and financial risks
- Stand-alone plant – independent systems and operations
- Small footprint
- More affordable and predictable costs to consumers



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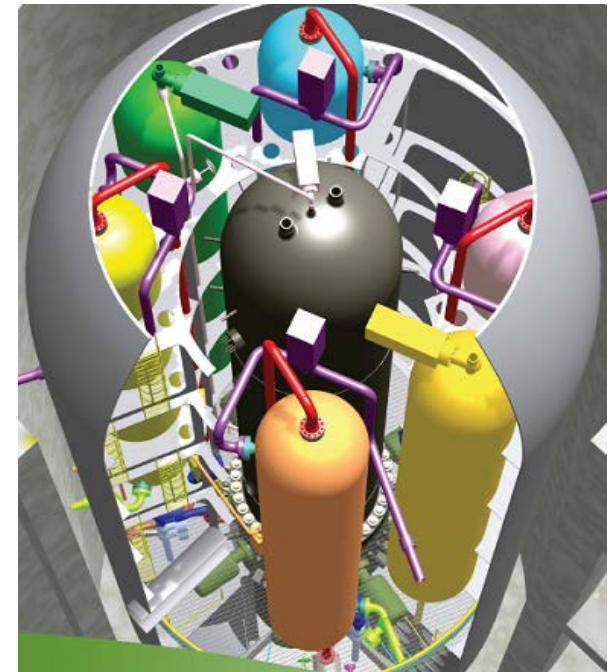


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# WESTINGHOUSE SMR – ENHANCED SAFETY FEATURES

- Redundant independent safety systems – implemented best practices from previous plant designs
- Numerous safety systems have built-in automatic features that do not require operator action or access to offsite power for seven days in order to achieve safe shut down
- Simplified design minimizes number of pipes, valves and other major equipment required for safe operation
- Below grade containment and spent fuel pool – additional protection from aircraft attack and natural disasters



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# WESTINGHOUSE ALLIANCE IN SUPPORT OF DOE INVESTMENT FUNDS

- On April 19<sup>th</sup>, Westinghouse and all of Missouri's electric service providers (cooperative, municipal and investor-owned) announced an unprecedented alliance to partner together in pursuit of DOE investment funds
- Westinghouse will seek design certification for their SMR from NRC and has submitted an application to DOE for SMR investment funds
- Ameren Missouri will be the first utility in the country to seek a combined construction and operating license (COL) from the NRC for the Westinghouse SMR, if DOE application is successful
- Westinghouse will explore SMR economic development opportunities in Missouri, including training, design, and manufacturing and innovative research and education programs

# MISSOURI'S CALLAWAY ENERGY CENTER

- Operating safely and reliably since December 1984
- 4<sup>th</sup> highest lifetime generation among the 104 U.S. nuclear power plants
- 19<sup>th</sup> highest lifetime generation among the 439 nuclear plants worldwide
- Provides nearly 20% of the total electricity generation for Ameren Missouri
- Nuclear is no. 1 source of emission free electricity in the U.S. – no sulfur, nitrogen dioxide or carbon dioxide emissions
- Two continuous runs between refueling outages in past three cycles



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# CALLAWAY SITE – FUTURE OPPORTUNITIES

- Key Site Factors:
  - Well suited for construction of additional nuclear units
  - Central location in state
  - Access to multiple off-site water and power sources
  - Stable geology over 250 ft above flood plain
- Efforts in support of nuclear development to date



# WHY MISSOURI?

- Missouri brings the following strengths to the Westinghouse team:
  - Strong nuclear operator with an excellent site for development
  - Expertise to support and obtain COL
  - Investment and supportive actions to date for new nuclear development
  - Highly skilled labor pool
  - Low energy costs
  - Ideal location in the heartland of the country to develop global component manufacturing and distribution base
  - Strong university nuclear engineering programs
  - Strong statewide support...

# STRONG STATEWIDE SUPPORT

- An unprecedented alliance including all of Missouri's electric service providers have formed the NexStart SMR Alliance in support Westinghouse's investment fund application to DOE:



- Strong support from Governor Jay Nixon, Senator Kehoe, Representative Riddle and other key bi-partisan state and federal policymakers, including U.S. Senator Blunt and U.S. Senator McCaskill and many others
- Additional statewide supporters include the University of Missouri, Local Chambers of Commerce, Trade Associations, International and Local Union Leadership and others

# ECONOMIC DEVELOPMENT OPPORTUNITIES CREATED BY DOE INVESTMENT FUNDS

- Foundation for U.S. Leadership in Next Generation Nuclear Energy Industry
  - Estimated Economic Impact of nearly \$3 billion<sup>1</sup> in greater than 15 states
  - Stimulate greater than 9500 direct U.S. Jobs
  - Sustain greater than 9000 indirect U.S. Jobs
  - Employs 250-300 permanent jobs at the plant site
- Establish Missouri as Hub for SMR Technology
  - Supply Chain Opportunities for Missouri Manufacturers
  - Alignment with Missouri University Research and Workforce Development
  - Building the SMR Industry Cluster

*<sup>1</sup>Based on independent economic impact analysis on U.S. economy for single SMR unit  
– Development Strategies, May 2012*

# WHAT THIS OPPORTUNITY MEANS FOR MISSOURI

- Continues to preserve nuclear power as an effective option to meet Missouri's long-term energy needs in light of aging infrastructure and significant environmental regulation uncertainties
- Positions Missouri to move forward in a timely fashion should conditions be right to build a Westinghouse SMR
- Tremendous opportunity to obtain DOE investment funding to save Missouri customers millions of dollars related to design certification and licensing
- Transformational economic development potential
  - First to market mover, SMR component manufacturing, Engineering and design center, Plant construction and Training
- Missouri-based Burns & McDonnell is partnering with Westinghouse to provide architectural and engineering support to design the power systems of the SMR
- Ability to leverage expertise and expand nuclear programs within the University of Missouri System (in particular Columbia and Rolla) and at vocational schools
- Should DOE application be denied, pursuit of an early site permit remains a viable option
  - Current legislative effort was put on hold due to recent developments
  - Better positioned to determine future legislative needs after DOE decision



# SUMMARY OF WESTINGHOUSE / MISSOURI ALLIANCE

- Proven team with extensive nuclear experience to achieve SMR deployment
  - Westinghouse is the global leader in nuclear technology and development
  - Westinghouse won and delivered on last DOE investment funding for nuclear deployment
  - Ameren Missouri is a strong nuclear operator
- Key technical advantages of Westinghouse design
  - Only design developed directly from a new state-of-the-art nuclear plant and fuel design that is already licensed and is being constructed in the US and China right now
  - The Westinghouse design team is unmatched in knowing how to: 1) obtain certification for their design, 2) obtain a COL, and 3) transition from licensing to actual construction.
- Strong support for Missouri to deploy SMR technology in timely fashion
  - Governor and legislators, all electric service providers, labor, businesses and Univ. of Missouri
- Ability of Alliance to deliver economic development potential for U.S.
  - Strategic location of Missouri for delivery
  - Low cost energy state
  - Labor pool to support effort
  - University of Missouri to support research and development
  - Strong supply chain network

# UPDATE ON SMR COMPETITION

- On November 20, 2012 DOE announced that Westinghouse and Ameren would NOT be a part of the initial award of funds
- However, DOE indicated that it was not the end of funds and that more money may be available
- Partnership between Babcock & Wilcox and TVA was chosen
- There may be very good reasons why B&W and TVA were chosen



# SOME RISKS TO CONSIDER

- **Unproven technologies**
  - Delays
  - Rise in costs
- **Prudency reviews for Investor-owned Utilities**
  - Will PSCs allow recovery and in what manner?
  - Missouri does not allow CWIP
- **Competition from China and South Korea**
  - More US regulation/bureaucracy may mean slower development
  - Slower development could mean lost opportunity
- **Environmental opposition**
  - Groups that hate nuclear, REALLY hate nuclear
- **Opposition from customers**
  - Costs are paramount to industrial customers



QUESTIONS?