

Testimony of E. James Ferland, Jr.
President, Americas
Westinghouse Electric Company LLC
Before the
Subcommittee on Energy and Water Development Appropriations
U.S. Senate

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Chairman Feinstein, Ranking Member Alexander, and Members of the Committee. Thank you for the opportunity to provide Westinghouse's views on the importance of proceeding with the Department of Energy's program to develop and license Light Water Small Modular Reactors (SMRs). The advancement of this technology is certain to benefit the American energy landscape by offering new investment options for emissions-free, baseload electricity that operates as an increasingly safe and secure generating resource. Westinghouse has appreciated the opportunity to provide input to DOE on the development of the SMR program and will continue to offer our finest scientists, engineers, and analysts in this productive partnership.

Westinghouse has been at the forefront of applying advanced nuclear energy technology since 1953 and approximately half of the operating plants in the world today are based on Westinghouse reactor technology. We are currently working with the NRC, and utilities in Georgia and South Carolina, to build four Westinghouse **AP1000**[®] reactors¹. NRC licensing of these projects is anticipated to be completed around the end of this year and will benefit the nuclear fleet by demonstrating passive safety design.

These projects have already created thousands of jobs across the U.S. to support engineering, manufacturing, and construction preparation. Thousands more American jobs will be created when safety-related construction begins next year. Moreover, these communities will benefit from the economic multipliers of career employment for thousands of professional and specialized labor personnel who will operate the plants over their lifetime.

As I'm sure you know, the Georgia and South Carolina projects were made possible by the Department of Energy's Nuclear Power 2010 Program. We thank the Department, this Committee, and the entire Congress for their support of this technology development partnership. We believe that the SMR initiative represents an even more valuable investment because we will be incorporating the improved safety and power performance levels developed with the DOE NP2010 program into the SMR design. Leveraging these technology breakthroughs, and combining them with the customer choice for lower capital cost, significantly smaller footprint, and incremental build-out, will open new markets for emissions-free nuclear energy in the U.S.

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The Department of Energy's investment in the NP 2010 Program was an unprecedentedly successful model for collaboration between government and industry that we believe should be reproduced. This public/private partnership provides value to the public, the DOE, utility customers and their rate payers, the NRC, and commercial vendors. The model produces multiple benefits: it allows the DOE to focus on research and technology development that ensures US leadership in safe nuclear technology; it involves the NRC early to result in the highest safety possible in licensable designs; it invests in job creation; and it reduces investment and market risk to encourage large private sector investment.

Around the globe, the hunger for emissions-free, baseload electricity supply has invigorated a vibrant export market for Westinghouse technology bearing the stamp of stringent U.S. federal government review. Sales of Westinghouse technology and expertise has created thousands more jobs for Americans who are managing the construction, installation, fuel supply, and supply-chain for **AP1000** plant projects in China.

The essential technology advancement of the SMR designs being considered for the DOE program is the *passive* safety system, pioneered and licensed by Westinghouse for its **AP1000** plant design. Passive design means that – in the event of a significant, abnormal event – cooling to the nuclear reactor is produced by the physics of nature using gravity, evaporation, and natural circulation. In contrast, all of the nuclear plants operating in the world today have active safety equipment which relies on pumps and mechanical means requiring uninterrupted sources of electricity to respond to emergencies. Rigorous evaluation proves that passive systems perform as expected with full confidence, without requiring human intervention or back-up electrical sources, and can be sustained for days instead of hours without outside intervention.

The SMR reactor power output is about one-fifth that of our **AP1000** reactor design and uses a dramatically smaller containment vessel to enclose the reactor. The reactor coolant system comprises a single, tall vessel with no need for loop system piping. This simplification and reduction of components cuts costs while it improves safety by eliminating accident scenarios associated with pipe breakage. Moreover, the small, robust containment can be buried underground, adding protection against outside events.

In light of recent events, it's important to note that the Westinghouse SMR design will not require any human operator action for seven days after a shutdown or accident. And because the Westinghouse SMRs are stand-alone units that will not share equipment, structures, or operating personnel, concerns about response to simultaneous accidents at multiple units on the same site will be avoided. On-site, used fuel storage will benefit from the same passive safety technology that works much like the reactor safety system.

After safety, the most important factor in our ability to develop a viable SMR market is that it be economically competitive. The Westinghouse design achieves major efficiencies by dramatically increasing the use of factory fabrication for modules that can be used to build the plant.

Almost all of the nuclear plants currently operating in the world today were designed to be unique, assembling every system and structure, one stick at a time. In contrast, the Westinghouse SMR uses a process that fabricates standardized systems and structures into modules in an assembly-line, factory environment for installation on site. Modular design allows tremendous advantages in productivity and schedule controls. Likewise, fabrication, transportation, and construction costs have greater certainty. And because of the compact size, it will allow us to fabricate major components, such as the reactor vessel and steam generator, here in the U.S. for shipping overseas, creating thousands more high-paying jobs here at home.

The laws of economy-of-scale would say that – all things being equal – a 225 MWe nuclear plant would be much more expensive than an 1,117 MWe nuclear plant, on a per-unit-of-power basis. But our evaluations indicate that making extensive use of inherent SMR features trumps the economy of scale penalty.

In the interest of time, I will close my comments by addressing two specific issues that we believe are at the heart of the committee's final approval to move forward with the DOE SMR Program.

First, in regard to price and economic competitiveness of SMRs, I can assure you that Westinghouse does not casually guess or estimate the market potential for any of the products or services in any of our business lines. As we designed our SMR, our team focused design on the least-cost engineering solutions and developed new and improved configurations. Our customers want the safest technology with the most efficient design. Both retail and wholesale utilities tell us there will be a substantial market for SMRs if the per-megawatt cost is close to that of large nuclear plants.

In testimony to this committee on June 7 of this year, Dr. Edwin Lyman of the Union of Concerned Scientists referenced a 2007 paper by Westinghouse employees, which estimated that factors such as passive safety technology and modular fabrication could produce costs for a particular SMR as being only slightly above the cost of a large nuclear plant, when compared on a per MWe basis. Four years later, Westinghouse believes our passive technology and increased modularity can enable SMR delivery at or below the current costs per MWe for today's plants.

Many utilities in the U.S. and overseas simply cannot afford to invest several billion dollars all at once for a large plant, but they could invest in small portions for one or more SMRs. In an increasingly carbon-regulated world, utilities are looking at nuclear as a preferred, emissions-free, baseload investment. And in many cases, the SMRs are the best business strategy for long-term asset investment and fuel portfolio strategy.

On the second issue, we disagree with, and object to statements made by nuclear power critics that NRC safety standards and regulation will be weakened to accommodate SMRs in order to help them achieve economic competitiveness. Westinghouse, and the entire nuclear industry, has a vested interest in insuring that nuclear energy is supplied in a safe

and reliable manner. As such, Westinghouse and others in the nuclear industry support thorough and transparent regulation and oversight conducted by the NRC. We have never asked the NRC to lower its standards or alter a regulation merely to increase the economic competitiveness of SMRs; and we would never make such a request at the expense of safety.

A safety focus is engrained in our company culture as it is in our customers' culture. There are few business sectors that depend more on maintaining and improving upon safety than the nuclear industry.

As a final note on safety, I want to say that as a leader in the nuclear industry, Westinghouse understands how the events at Fukushima have undermined public confidence in nuclear energy, and the expertise of the nuclear industry. The unique situation in Japan has caused a legitimate review of our own U.S. nuclear regulatory standards and we are participating fully in those reviews.

At Westinghouse, we believe that a partnership between industry and the DOE is the most effective path for making progress on the policy, regulatory, economic, and infrastructure issues related to deployment of SMRs. We can launch the SMR Program and produce the same level of success as we've enjoyed working as investment partners on the NP2010 Program. We stand ready to work with DOE on the exciting potential for small nuclear technology.

On behalf of the 15,000 Westinghouse employees, we thank the committee for seriously considering our views. I would be pleased to answer any questions.