Testimony to the Blue Ribbon Commission on America's Nuclear Future

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Introduction

Mr. Chairman:

Good morning. My name is Kate Jackson, and I'm the senior vice president and chief technology officer of the Westinghouse Electric Company, headquartered near Pittsburgh, Pennsylvania.

On behalf of the 15,000 Westinghouse employees working around the world, and around the clock to keep nuclear power a safe and secure energy source, I'd like to begin by expressing my thanks to President Obama and Secretary Chu for commitment to a strong, transformative, carbon-free, American nuclear power industry.

I also want to thank the members and staff of the Blue Ribbon Commission, and this subcommittee, for the opportunity to make some short remarks and participate in the panel discussion on the critical issues of federal energy policy that the Commission is addressing. Westinghouse President and CEO, Aris Candris, was unable to be present here today and has asked me to convey to you his regrets..

Reactor Design Expertise

Westinghouse Electric Company has been the leader in the nuclear reactor design industry for six decades. Of the 104 reactors currently operating in the U.S., 62 are Westinghouse designs. Westinghouse has vast experience in reactor design and innovation, most notably the AP1000™ - a breakthrough design in enhanced safety, performance, and fuel efficiency. Other

Westinghouse technologies include liquid metal fast reactor designs that are especially effective for reprocessing and remanufacturing fuel for optimum efficiency.

In the 1950s, Westinghouse began assembling the world-class group of scientists and engineers – and the resulting innovation of a standardized design – that produced the AP1000™, the flagship of our Generation III+ product line. And since 1995, we have been investing in the development of smaller modular reactors that hold great promise for delivering environmental benefits to a broad array of customers.

Global Leadership

When a Westinghouse customer anywhere in the world buys a reactor or fuel product from us, they get the added benefit of our competency in licensing and nuclear regulatory affairs, in the U.S. and internationally. U.S. nuclear policies represent the highest standards of regulated safety and environmental protection and Westinghouse rigorously deploys those standards around the world.

But if we are to grow our American fleet of nuclear reactors, we must have a new and improved set of standards for fuel processing and management. And those standards must be as rigorous and sustainable as our safety and operating framework.

U.S. leadership on this policy will result in U.S. leadership in technology. This will provide greater certainty for worldwide safety and security standards. With more public investment in the earliest phases of design in basic research, U.S. industry will more effectively develop technologies and products based on the resulting standards and deliver solutions in the U.S. and international markets. This means American jobs.

Current Fuel Policy

Westinghouse provides approximately 54 percent of the nuclear fuel to the U.S. pressurized and boiling water reactor market, as well as a significant share of the world market. This expertise and resource capacity provides us with an exceptional understanding of fuel management, including the physics, financial, technical and regulatory aspects of every stage of the fuel cycle, for almost every fuel.

Up to now, the industry has segmented the nuclear fuel cycle into pieces. Vendors and utilities have focused on the front end, optimizing the efficiency and cost of producing both fuel and electricity. The assumption has been that the back end will be "optimized" by the federal government and that once the fuel is used, the payments made to the federal government by the utilities for waste management will cover the full range of back end management. This compartmentalization does not provide financial incentives for improvements in front end fuel cycle efficiency, waste prevention, or reduction. Nor does it allow the needs and requirements of the back end objectives to drive improvements in the front end for desirable back end results.

We believe these practices must change. We must manage the technical, economic, environmental, and policy issues as a coherent system.

Physics-Driven Approach

With the perspective of the entire fuel cycle, we believe a physics-driven approach that begins with the determination of public acceptability is the most effective and viable new fuel policy path. The challenge for the back end has been to take the existing legacy of used fuel and store it permanently – designing for safe, secure, permanent storage has led to vigorous debate. How long is permanent? How safe is safe? If we were to start with the goal – say time for storage that is conceivable to the public, perhaps 300 years, and a toxicity target at that time of no greater than the original uranium – then we could design back through the fuel cycle to achieve these targets.

Technologies developed for application to the back end of the nuclear fuel cycle were designed decades ago in different policy regimes to address slightly different issues. For example, mixed oxide fuel production does not reduce the volume of used fuel significantly, we do not get significantly more energy from the fuel, and it produces greater amounts of minor actinides that must be handled later.

Redesigning the cycle for the back end helps, but we are living with the legacy of light water reactor used fuel. Therefore, we need to invest in technologies that dramatically improve the fuel cycle economics and decrease the waste stream, including technologies ranging from recladding and reshuffling, to some form of recycling.

We think the incentives need to be changed through new federal policy.

Controlling the Waste Stream

Once the goal is established, this sets the specifications for the technologies that must be developed.

At Westinghouse we've been looking at new processing strategies to reduce minor actinides to meet a 300-year final waste target. For example - minor actinides (such as americium, curium, and neptunium) must be removed to very low levels in the final waste to meet a 300-year criteria. This leads to performance criteria for the reprocessing plant to have 99 percent removal of the minor actinides from the back end high-level waste. The minor actinides that don't go into the high-level waste must then be put into a reactor. This reactor must be able to reduce their concentration over the life of the fuel so that the spent fuel that comes out and goes back to the reprocessing plant has fewer minor actinides than were sent to it by the reprocessing plant.

Even if the Commission were to enact new requirements for fuel cycle integration with a physics-driven strategy, the industry would need adequate time to implement the changes. The path from our current baseload energy portfolio, to a mixed program where we produce an even larger proportion of our power from nuclear fuel will require the development of new reprocessing technologies that achieve the required levels of bad actor separation from the waste, as well as reactors that can handle the volume. Besides technology, the U.S. must have a road map of how we will get from where we are today to a new era of nuclear energy. Ad hoc solutions that address only part of the problem will only lead to ineffective resource investments, and, perhaps, a generation of wastes that have no means of final disposal.

Investment Pays Off

As I indicated, Westinghouse is investing in a strategy to generate a rational approach to back-end fuel problems. We took on this task because we have a stake in finding a solution to the high-level waste problem that is acceptable to the general public, as well as economically acceptable to our customers who supply low-cost, carbon-free electricity.

We have significant capabilities to solve this problem and a strong interest in finding solutions. Our technology and product lines include advanced light water reactors, gas reactors, and fast spectrum reactors. A few notable programs in which Westinghouse was a primary technology partner are the Fast Flux Test Facility, the Clinch River Breeder Reactor, the Nuclear Engine for Rocket Vehicle Application, and the Pebble Bed Modular Reactor, among others.

In the areas of high-level waste handling, Westinghouse was the prime contractor in the successful cleanup of high-level waste at both West Valley and Savannah River. Our investments in these projects produced invaluable lessons, expertise and unmatched capability. We have a team of experienced people familiar with the technology needs to solve the waste problem produced by the current reactor fleet, and we have a growing number of younger people who are learning these technologies. This is opportune time to leverage and transfer the technical knowledge of our experienced personnel to future experts who will become the backbone of the nuclear industry.

Recommendations

Define a new policy by starting with outcomes that are publically acceptable.

The prevention and reduction of toxicity and volume of used fuel are desirable and will drive investments in and standards for reactors and technologies that can produce those desired outcomes.

Develop new fuel cycle policy using science as the means to get to acceptable outcomes.

We must define what's publically acceptable then use a physics-driven strategy to reach those targets.

Develop a new, publically acceptable fuel policy with collaboration from all stakeholders.

A successful new policy will need to focus on waste acceptability, economics, and proliferation controls. Westinghouse advocates that a collaborative process include: the Department of Energy, which needs to act as a funding source to develop new separation and reactor technologies that meet public expectations; the national labs which need to serve as the brain trust to generate the technology required by industry; the nuclear industry, which must continue to communicate the things we need from government in order to keep our businesses technically proficient and economically cost effective; and it includes the political process that must protect and promote a transformative national energy future of carbon-free, baseload nuclear energy.

Increase government investment in research and development to shoulder a greater proportion of risk early in technology development projects.

Government must offset the risk of exceptionally long time horizons, assuring private capital markets and companies that their investments will pay off. Westinghouse competes with subsidized, nationalized nuclear energy companies. We need a clear national policy goal for fuels, and we need to be assured that government will take on the majority of risk in the early stages of technology development that will move the industry to new policy goals.

Increase funding for the Nuclear Regulatory Commission so it can build capacity to be involved in technology development.

The sophisticated and collaborative licensing process of the Nuclear Regulatory Commission (NRC) must be brought to bear earlier in the technology development process to identify issues that need to be addressed and reduce the risk of technical innovation later in the process. To support this imperative, the NRC needs more resources now to prepare for the technologies and processes that emerge from an integrated fuel-cycle strategy. They will need to be prepared to evaluate and efficiently perform testing to ensure public safety without delaying the industry as it adapts to an integrated strategy.

Stay on two parallel tracks to resolve our legacy waste issues while taking action to create the future of a physics-driven policy.

At Westinghouse, we believe that a fresh and effective policy framework for fuels could potentially alter the debate on disposition in a positive way. Prevention and reduction of toxicity and reduced volume of used fuel are desirable. If we are investing in reactors that produce those desired outcomes, then we have new long-term storage options available to us.

But we must proceed on at least two tracks. While we pursue a long-term, physics-driven strategy for the future, we must also work to get more efficiency from fuel through recycling technologies. Spent fuel is, and will continue to be, stored safely in interim locations. In the short term, maintaining our current storage policies can actually provide some flexibility for getting additional energy out of the current stock of stored, used fuel that would otherwise be shipped off to final disposition.

Mr. Chairman, again, on behalf of the 15,000 employees who take great pride in over 100 years of Westinghouse innovation in science and technology, I thank you for your service and your serious consideration of our views and recommendations.

I'll be most happy to entertain any questions from you or members of the subcommittee at the appropriate time.

Thank you.