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Thank you, and good morning. I appreciate the opportunity to address this council and to share some of my views on the nuclear renaissance, and how the U.S. Department of Energy's is responding. Just over two years ago, President Obama asserted that we must harness the power of nuclear energy to combat climate change and to advance peace and opportunity for all people. The President has made it clear that his administration and the United States remain committed to nuclear energy's role as part of a diversified, low-carbon energy portfolio whose goal is to reduce global air pollution and promote energy security.

During the President's State of the Union speech earlier this year, the President outlined his vision for powering the future. Part of that vision was the need for innovation and, in particular, innovation in clean energy technologies. He set an ambitious goal of obtaining 80 percent of our electricity from clean energy sources by 2035. Since nuclear power currently accounts for 70 percent of the carbon free electricity, this goal can only be achieved with the addition of safe nuclear energy to our future energy portfolio.

I would be remiss if I did not acknowledge the accident at Fukushima and its potential impact on the commercial nuclear industry here and abroad. It represents the most serious nuclear crisis the world has seen in nearly a quarter century. Japanese efforts are ongoing to contain the accident and mitigate further environmental effects. In the US, DOE has launched a review of its nuclear facilities and NRC is reviewing the current operating plants. There is no doubt that the nuclear community will be studying the accident at Fukushima for some time to learn from that accident and determine the best course of action for existing and future nuclear power plants.

It will be our challenge – the DOE, the U.S. Nuclear Regulatory Commission, and the U.S. nuclear industry – to take the lessons learned from the Fukushima accident and strengthen safety and security at our existing plant sites, as well as incorporating these into future advanced reactor designs. The continued safe operation of the U.S. nuclear fleet is of paramount importance, and we at the Department of Energy are committed to continuous safety improvements of all our nuclear facilities.

Before continuing, I would like to point out that the Department's guiding principle for its RD&D programs over the last three decades has been to support advanced technologies that offer improvements over GEN II reactor designs in terms of safety, security, and economics.

This morning, I'd like to review some of our RD&D programs that address current and future advanced reactor systems. These programs are aimed at improving the safety, security and economics of nuclear power as well as building the nuclear infrastructure to sustain the Nuclear Renaissance. I'll conclude with my thoughts on the future of nuclear power in the United States.

Passive Safety

The accident sequence at Fukushima, even though not fully understood yet, clearly challenged the operators in many complex ways. The complete station blackout and loss of ultimate heat sinks were extremely difficult to handle. One approach to dealing with such challenging scenarios is to emphasize passive safety features that rely on natural forces (e.g. gravity) and require less operator intervention.

In general, passive designs require far fewer operator actions and rely on extensive use of natural phenomena, such as large quantities of stored water for cooling, gravity feed of cooling water rather than pumps, and convective cooling in accident conditions. They do not require operator actions for long periods after an accident and do not depend on offsite or emergency diesel generator power to maintain safety. Nuclear plants with passive safety features offer the greatest promise for still safer operations in the future.

With such an emphasis in mind, the U.S. government undertook a cost-shared effort with industry to advance 2 passive reactor designs toward realization. This was the NP2010 program. There were many important outcomes of this program not the least of the which is that the U.S. Nuclear Regulatory Commission is now in the final stages of evaluations of design certifications for both the Westinghouse AP1000 and the General Electric ESBWR.

Features of AP1000

The AP1000 is a two-loop pressurized water reactor (PWR) with passive safety systems and extensive plant simplifications that improve plant operation and maintenance, while reducing construction cost and schedule. The AP1000 plant safety systems use only natural forces such as gravity, natural circulation, and compressed gas to provide driving forces for the systems that cool the reactor core following an accident. These critical safety systems do not rely on pumps, fans, chillers, or diesel generators for accident response nor is there any reliance on safety-grade power. Some of the AP1000's passive safety features include the core make-up system, pressurized accumulators, passive residual heat removal, automatic depressurization, and passive containment cooling. Safety systems have been simplified to minimize the number of active components that need to be actuated following an accident; for example, there are very few motor-operated valves and, in most cases, these valves are fail-safe. By using in-containment storage of water, the need for the pumping of water after an accident is eliminated. Containment heat removal is accomplished through the use of passive water- and air-cooling systems.

The AP 1000 is designed to maintain safe shutdown for 72 hours after a design base event. In our view, using passive technology features to prevent and mitigate the effects of accidents offers us the best path forward in terms of safety, and the AP 1000 has many advanced passive safety features.

Currently, the AP1000 design is part of six projects in the U.S. Worldwide, there are four under construction in China and four in the U.S. are proceeding under a Limited Work Authorization. China has indicated the potential for ordering an additional units. In our view, the reality of these orders is directly correlated to the successes of the NP2010 program .

Features of ESBWR

The Economic Simplified Boiling Water Reactor, or ESBWR, is a 1,594 MWe version of the Advanced Boiling Water Reactor that used economies of scale, proven technology, and components from that reactor to create a new reactor at reduced capital cost. The ESBWR plant design relies on the use of natural circulation and passive safety features to enhance the plant performance and simplify the design. The use of natural circulation allows the elimination of several systems and components such as the emergency core cooling system pumps and the recirculation system and its support systems. The ESBWR utilizes the isolation condenser system for high pressure inventory control and decay heat removal. After initiation of the automatic depressurization system, low pressure inventory control is provided by the gravity driven cooling system. Containment cooling is provided by the Passive Containment Cooling System (PCCS), which is the only major new system. It is designed to provide core cooling for 72 hours without external AC power or operator action and the risk of core damage from station blackout is a factor of 100 less than conventional boiling water reactors. In the ESBWR, the core will remain covered for the entire range of design basis accidents. As mentioned previously, the design certification for the ESWBR is expected to be issued this year.

Small Modular Reactor Concepts

I’d like to turn now to Small Modular Reactors – or SMRs. These are an area of intense interest at DOE, and we see SMR designs as game changing technology, offering notable safety, security and economic advantages.

For example, the light water reactor SMR designs incorporate passive safety features that utilize gravity-driven systems rather than engineered, pump-driven systems to supply backup cooling in unusual circumstances. Some concepts use natural circulation for normal operations, requiring no primary system pumps and providing a still more robust safety case. In addition, many SMR designs utilize integral designs for which all major primary components are located in a single pressure vessel. That feature results in a much lower susceptibility to certain potential events, such as a loss of coolant accident, because there is no large external primary piping. Lastly, because of their lower power level, SMRs have a much lower level of decay heat and therefore require less cooling after reactor shutdown.   SMRs have been designed to address both safety and security and lower the capital cost barrier for market penetration.

The SMR concepts of immediate interest are based upon the well-understood light water reactor technology. This is important because the regulatory knowledge base and experience are built on this technology. The choice to stay within the proven performance envelope of the existing commercial, low-enriched uranium, nuclear fuel cycle has two important benefits. First, it means that the most promising near-term SMRs can build upon the well-established LWR fuel industry, avoiding the need to establish a parallel fuel manufacturing capability. Second, this fuel cycle minimizes the technical risk of the most demanding technology component of any new nuclear reactor system, a new fuel design, and improves the time to license within the NRC regulatory system.

The Department is working with the House and Senate Appropriations Committees as required under the FY11 CR to determine a path forward for the program for the remainder of the fiscal year. This program would assist industry in their efforts to receive design certification for the reactor design and to obtain construction and operating licenses for the nuclear plant with a target of first deployment within a decade.

DOE also supports the development of advanced reactor concepts, whether small or large, could prove more revolutionary over time. These designs which include GEN IV systems tend to move away from light water as the coolant to enable a broader set of capabilities such as inherent safety. Several of these promising designs are based on high-temperature gas, liquid-metal cooled, and advanced thermal reactor technologies. Moving beyond light water reactors would open the door for systems that are well suited to serve markets that can't be reached today such as nuclear energy for process heat or transportable deployments. The fuel cycles for these reactors could also open the possibilities of long-lived cores or nuclear waste transmutation.

Further improvements in safety may also result from ongoing work in advanced reactor and fuel systems. High Temperature Gas Reactors – or HTGRs – as a class of inherently safe reactors, offer unique safety features. Current HTGR concepts incorporate inherent physical characteristics that do not rely on active engineering systems or operator actions during accident scenarios.

The R&D performed today will establish the knowledge base that will be needed to design and license these systems tomorrow. We expect that we could begin to see these advanced designs deployed beyond the next decade.

Nuclear Energy University Programs

In addition to our programs on advance reactor systems, DOE is also investing in the capabilities for the future. Perhaps the most important of these is the people who will lead the industry in the future. The Office of Nuclear Energy does this by continuing to support research at universities in a many areas related to nuclear energy. This research program plays an essential role in training the future generation of nuclear energy professionals upon whom the safety of future nuclear power systems will depend.

In the past two years, the university programs have competitively awarded over $110 million to support innovative research, infrastructure grants, and scholarships and fellowships. Today, the nuclear engineering programs at U.S. universities are graduating more engineers and scientists than in the late 1980's and 1990s.

The scholarships and fellowships have helped to bring in a new wave of young researchers to generate the ideas and workforce needed for the long-term health of the nuclear industry and the Nuclear Renaissance.

The Nuclear Energy Innovation Hub

Another capability that gives the US a competitive advantage is Modeling and Simulation. The Nuclear Energy Innovation Hub was the first Hub to be announced by the Secretary in May 2010 with the Consortium for Advanced Simulation of Light Water Reactors – or "CASL" – centered at Oak Ridge National Laboratory. The establishment of this energy HUB provides the U.S. nuclear industry with a demonstrated state-of-the-art modeling and simulation capability which had not significantly progressed since 1980's.

The CASL collaboration is applying leading edge computational capabilities to advance the state-of-the-art in nuclear reactor simulations. By improving our understanding of key mechanical, chemical, and nuclear interactions, the Hub may enable enhanced safety, prolonged life of nuclear fuel, increased power outputs, and enhanced reliability. As such, it is CASL's vision is to eventually embrace the full range of light water reactors including boiling water reactors and the new light-water-based small modular reactors that are being designed.

Conclusion – The Nuclear Renaissance

As we know, the last decade has seen a resurgence of interest by US companies in building new nuclear reactors. The Nuclear Regulatory Commission is reviewing 12 applications for combined construction and operating licenses for 20 new reactors. The LES/Urenco enrichment plant is operating in New Mexico and the Department of Energy has approved a conditional loan guarantee for a new Areva enrichment plant in Idaho.

In 2010, the President announced the first conditional loan guarantee to the Vogtle project which will construct two AP1000 plants in the state of Georgia. More recently, the President's 2012 budget request included an additional $36 billion in loan guarantee authority to support new nuclear reactor construction and other green energy projects.

Pre-construction has begun at the Vogtle site in Georgia and at the Summer site in the state of South Carolina. We anticipate that the Nuclear Regulatory Commission may issue a decision on the Combined Construction and Operation License later this year.

I was asked to provide my views on the status of the Nuclear Renaissance. I've read numerous editorials, trade magazine, and the like which have stated that the Nuclear Renaissance never had an opportunity to begin or has stalled – especially in the post-Fukishima environment.

I see this very differently – while we may be moving slower than some would like , we are still moving. For the first time in a generation, electric power utilities are actively considering adding nuclear energy to their portfolios and this is more than just rhetoric; nuclear vendors are engaged with NRC in licensing of their advanced reactor designs; the Department of Energy is making important investments in nuclear RD&D to improve the safety and operation of the current U.S. nuclear fleet and to support advanced nuclear system deployments; and the nuclear engineering programs of our Universities are healthy again. This revival is driven by a complex set of considerations including financial, technical, regulatory and political, and it takes a long time for all these to be properly aligned. I continue to see progress in all areas and this a very hopeful sign.

Let me close by saying that the United States is well positioned to lead the Nuclear Renaissance. We have the support of the Administration and are in sync with the nuclear industry. Nuclear power must play an important role in addressing climate change as the need for more energy increases in the years to come. The Office of Nuclear Energy is committed to support the research and development to assure that nuclear power is safe, secure, and economical.

Thank you for the opportunity to speak to you this morning.