



NRC NEWS

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Citizens for Nuclear Technology Awareness “Teller Lecture”

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It is an honor to be here—and follow in the footsteps of such eminent figures as Howard Baker, Pete Domenici, and Edward Teller himself—to deliver the annual Teller lecture before this distinguished audience.

Now, precisely because all of you are very well informed about issues relating to nuclear energy, I suspect that you already know about the so-called “Nuclear Renaissance” that seems to be unfolding. I would like to talk about some of the challenges this will pose, for both the NRC and industry, and how we all need to work together to “do it right.” Ensuring that any Nuclear Renaissance unfolds the right way—that is, with an appropriate attention to safety and security concerns—involves many considerations, including technological advances and sound policy decisions. But the two areas I want to focus on are: cooperation and leadership.

At first glance, these two ideas might seem to be contradictory, or at least in tension with one another. But in my view, they are complementary. In fact, each is necessary for the other to flourish. Leadership requires cooperation because you can’t lead if you are all alone. Likewise, the spirit of cooperation must have guidance and direction, or it becomes anarchy.

Before I address those themes, however, I would like to make one comment that I think this audience, especially, will appreciate. I think it is regrettable that Ed Teller passed away before he could see this renewed interest in building nuclear power plants. Teller, of course, was a tireless advocate on behalf of civilian nuclear energy. I am not. As a regulator, my job is not to advocate for or against commercial nuclear power. My focus is the safety and security of nuclear facilities and materials. But in that capacity, I do have interest in seeing that the general public has a fair, informed, and balanced understanding of radiological and nuclear issues. That was also a lifelong concern of Dr. Teller’s.

After the Three Mile Island accident there were a lot of popular misconceptions about what had happened, and the degree to which public health and safety were or were not jeopardized. But Teller used to say that the only casualty from Three Mile Island was himself; because he had a heart attack—which he survived—from criss-crossing the country explaining to people what had really happened! So I think Dr. Teller would appreciate that there seems to have been a real shift in public opinion, and a better understanding of these issues.

One of the factors driving this shift in public opinion, of course, is the steep increase in energy demand around the world. The Energy Department's statistical office estimates that the global demand for all energy sources, including transportation fuels, will increase by about 25 percent by the year 2020. The anticipated need for electric power generation is expected to rise even more sharply.

The need for clean and reliable energy to drive economic growth will be most intense in the developing world. While electricity generation in the United States is expected to increase by 50 percent in the next 30 years, the demand for electricity in developing nations is rising even faster. In fact, the combined electricity consumption of developing nations is expected to overtake electricity consumed by economically advanced nations some time around the year 2015.

To meet this demand over the long term most experts agree that renewable energy sources like wind and solar definitely need to be part of the mix. And certainly, we must not spare any effort to improve energy conservation. But it's hard to see how these will be enough. In fact, most analysts agree that they won't. While increased energy efficiency is a very good thing, it is not necessarily the case that making energy use more efficient will significantly reduce demand. As for renewable sources, they currently generate less than 5 percent of America's electricity—so even a doubling of their generation capacity would still mean that 90 percent of the expected needs are unaccounted for. Moreover, the land-use "footprint" for renewables can be quite high.

Clearly, then, coal and nuclear can be expected to have a role. But just for nuclear power to maintain its current share of the electricity supply in the United States, the industry would need to add 50 new power plants, with an average of 1,000 megawatts each. And not even the most enthusiastic pro-nuclear people think that there will be 50 new plants generating electricity any time soon. In fact, in my capacity as a regulator, let me take this occasion to assure anyone with such excessive exuberance for nuclear power that there will NOT be 50 new plants generating electricity any time soon!

So it seems that no single answer, by itself, can be the solution, which is a point that Sam Bodman, the Secretary of Energy, often makes. The expansion of nuclear power is now seen as part of a larger goal of enhancing the nation's energy security and energy diversity, which depends on a variety of different energy sources.

With that understanding in mind, how do we ensure that an expansion in commercial global nuclear power is done correctly? Let me mention a few of the most critical areas where cooperation, guided by intelligent leadership, will be essential. The first is in the area of nuclear components and manufacturing.

The United States was once the primary supplier of nuclear components. Three-quarters of the world's reactors are of United States origin in construction or design. But when reactor orders in the United States ground to a halt about 30 years ago, technological progress and manufacturing innovation moved abroad. According to data compiled by the American Society of Mechanical Engineers, the number of ASME Nuclear Certificates held worldwide fell from nearly 600 in 1980, to under 200 this year. But what is striking is that the number of certificates held by other nations has remained fairly steady—around 100—since 1980, but the number of American certificate holders today is one-fifth of what it was 27 years ago.

So whether it be major components, minor parts supplied by sub-vendors, computer software, or other elements, a new reactor today depends on a supply chain that is truly global in scope. For major components, the world's regulatory agencies can closely scrutinize the manufacturing process, to assure that quality components are produced. But this does not always apply with the same intensity to the sub-vendors located around the world that supply smaller parts and materials.

The question then is: Who will set the standards for quality assurance of these parts and components? I have consistently proposed in meetings with regulators from other nations that we establish more extensive channels of communication to share information about any components or equipment that may be substandard, counterfeit, inadequate or inappropriate to a nuclear power plant. And to promote this cooperative effort, the NRC is leading by example in setting high standards for the safety-related components in the reactors we license—standards which are often adopted by other nations. I mention this not to boast, but to point out how the NRC is already a de facto regulatory leader in the global nuclear renaissance.

Will the American nuclear manufacturing industry also be a leader? The answer to that will not—and cannot—be determined by the NRC, but rather by American suppliers and buyers of nuclear materials; in other words, many of you here tonight. And, right now, it seems to me that this is still an open question.

Another area where “doing it right” requires leadership and cooperation is in reactor designs and operations. Unlike this previous generation, the majority of plants to be built around the world in the next five to 15 years will likely be limited to a small number of relatively standardized designs, purchased from a limited number of multinational corporations. This presents an excellent opportunity to streamline the regulatory licensing process, promote greater efficiency and reliability through standardization, and enhance safety for the future nuclear fleet around the world.

To promote such harmonization, there are some good international initiatives already under way, such as the Multinational Design Evaluation Program. Over the last year, the United States and nine other nations have been working to leverage knowledge and experience on power plant design, and promote global convergence in associated codes, standards, and regulations. But as I recently told the members of the Institute of Nuclear Power Operations, this idea is too important to be confined to a worldwide effort—we should also try it here at home. So I have encouraged utility executives who

are applying to the NRC to build new reactors to cooperate and “red-team” each other’s license applications—to ensure completeness, accuracy, and quality. And, once again, I hope that some of you here in this room will step forward and be leaders in the effort.

Of course, for any of this to be possible, we must have trained people capable of doing the important work at every stage, from drafting the blueprints to safely operating the reactors. Human capital, therefore, is a significant issue for the future development, management and regulation of nuclear power. And once again, it requires both cooperation and leadership. Clearly, industry and government should work cooperatively to expand the available talent pool. But we must involve the schools as well. In fact, I think it is the educational institutions that must take the leadership role in this area.

Many of the people we need in the future workforce—including skilled craft workers such as electricians, welders, pipe-fitters, mechanics, electronics technicians, and others—require specialized training, but not advanced degrees. But we also need those advanced degrees, especially if the United States pursues fuel recycling and develops advanced and innovative fuel cycle facilities. The NRC would need additional chemical engineers with a detailed knowledge of reprocessing, actinide chemists, plutonium chemists, and radio-chemists. In addition, nuclear engineers with expertise in transmutation would be required to review fuel recycling facilities.

This will require a long-term effort to cultivate not one, but several, generations of scientists and engineers. While it takes many years of schooling to educate and train an individual scientist or engineer, it takes an even longer timeframe to build an adequate educational infrastructure to support oversight activities associated with a new set of advanced technologies. So, in a sense, the crisis of insufficient numbers of technical staff for advanced reactors is already here. Clearly, we must begin addressing this need immediately.

So I encourage everyone interested in the future of safe nuclear power to build on expanding the available educational resources, and continue getting universities, community colleges, business groups, government agencies, and utilities working together—to prepare a workforce that can help meet the needs of the nuclear workforce across all levels of training and education.

And that brings me to my final point, which is cooperation and leadership at the regional level. While nuclear power plants can be found throughout the United States, the momentum for adding new nuclear energy is clearly here in the Southeast. No doubt this is due in large part to the economic and demographic growth occurring here. By the year 2030, 40 percent of the United States population will be located in the Southeast, with a corresponding rise in the demand for reliable electricity.

So there is a reason that INPO is located in Atlanta, and why the NRC opened its new reactor construction inspection office in the same city. This region also has the highest and most experienced concentration of nuclear talent in the United States, with over 7,000 nuclear professionals in this immediate area—in large part because of the DOE facility at the Savannah River Site. So this region is well-positioned to take up the responsibilities of leadership. In particular, I think that you can point the way in

developing the next generation of the nuclear workforce, through a concentrated and cooperative effort among academia, industry and government. This will require vision, shared goals and combined efforts on all levels.

But I believe that this community—this “nuclear community,” if you don’t mind being called that—has enormous potential to develop this region’s talents, improve the lives of its people, and serve the larger needs of the nation.

Thank you very much.

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