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Global Nuclear Energy Partnership: Another step on a long and winding road

By Will Keener

To many citizens, the announcement of a nuclear energy partnership in President Bush's February State of the Union address was news. For Sandians involved in helping to shape and achieve the vision of an environmentally and politically safe future fueled by nuclear power, it was another step in a decade-long journey.

The start of the journey came in the winter of 1996, when then-VP Tom Hunter made a presentation, embracing a vision he and colleagues Roger Hagengruber and Joan Woodard had developed, to the DOE's Bruce Twining. This was followed by some earnest discussions with Sen. Pete Domenici after what Tom Sanders (6020) describes as "the zeroing of the nuclear energy R&D budget" in Congress in 1997.

Sandia has continued to participate, often quietly in the background, in dozens of studies, meeting, briefings, and collaborations to further the cause of nuclear energy. Tom Sanders, manager of Sandia's Global Nuclear Futures initiative, stacks dozens of documents and presentations on his desk as he thinks back over the years.

"Basically, if you run through the chronology, we have been urging some of the things that came out of GNEP (Global Nuclear Energy Partnership) since 1996," he says. "Our concern as a national security lab has always been that you can't influence nuclear safety, security, and proliferation risks at the global level if you're not in the nuclear business. By that I mean we, as a country, have to be on the leading edge of research in both the universities and the labs and have an American-based nuclear supply industry that is capable of being a leading supplier across the globe."

Invisible leadership

With Tom as chief strategist and with help from dozens of Sandians from across the labs, Sandia set in motion a plan to work with nongovernmental organizations, other labs, DOE, Congress, and other decision-makers. "Our role has been invisible leadership," says Tom, "organizing and articulating the arguments for US leadership from the perspective of the national security implications of what might happen, domestically and globally, if we don't go forward with nuclear energy."

By 2001, Sandia had established a relationship with the Kurchatov Institute in Russia to develop and articulate an argument for the original nuclear powers providing global nuclear services together. This

effort was later expanded at a Vienna, Austria, meeting, chaired by Sandia's then-Director C. Paul Robinson, to involve seven US and nine Russian federation laboratories (*Lab News*, Aug. 20, 2004).

More recently, the effort took on new momentum with growing support of the White House and other leaders. A "kitchen cabinet" made up of high-level private advisors helped press the ideas forward. President Bush's August signing of the Energy Policy Act of 2005 at Sandia (Lab News, Aug. 19, 2005) further propelled the nuclear power agenda.

Uniquely positioned

GNEP will provide opportunities for Sandia to continue its efforts in a number of areas, says VP for Energy, Security, and Defense Technology Les Shephard (6000). "We are uniquely positioned to lead the efforts in nuclear facility safety, security and reliability, nonproliferation, current and future safeguard practices, and the myriad of issues associated with the disposal of radioactive waste." In addition, Les expects Sandia to be actively engaged with various laboratory, university, and industry partners in modeling and simulation using high-performance computing capabilities, advanced manufacturing, a center for transuranic fuel, and the development of small transportable reactors.

"This is a time for the multilab complex to really come together," says Les.

In fact, a seven-laboratory action plan — produced as a Sandia report in 2003 — set a tone of cooperation among DOE's laboratories and strongly advocated for measures that are included in the partnership proposal. (Los Alamos, Lawrence Livermore, Oak Ridge, Idaho National Laboratory, Argonne, Pacific Northwest National Laboratory, and Sandia comprise the group.)

One conclusion of that report was that the US needs "a technology leap to the 21st century" to reestablish global influence. Such a leap involves a new generation of large reactors with twice the efficiency of the current generation, with smart manufacturing to:

• reduce wastes by 90 percent,

• provide renewable fuel supplies for several centuries, and

• enable export of long-lived right-sized reactors to developing world markets.

Many roles to play

Some possible roles for Sandia include:

- Demonstrating new, smaller reactor systems for a substantial international market. By teaming with Los Alamos, Argonne, and others, Sandia can leverage its small-reactor design experience to support development of a new US nuclear supply industry.
- Using Sandia's Power Tower to study processes for hydrogen generation, Sandia can create a fast-track large-scale demonstration of the feasibility of hydrogen production in a nuclear reactor.
- Developing, testing, and qualifying new materials and electronics for the extreme radiation and

thermal environments of next-generation nuclear reactors.

- Contributing to the management and integration of repository science supporting Yucca Mountain, and in security, safety, and licensing efforts.
- Using science-based engineering to model and simulate the fuel cycle to improve the process of moving from raw materials to fuel to reprocessing and provide technology for process controls and transparent operations.
- Using Sandia's materials know-how to develop new fabrication techniques for specialty reactor components, providing a competitive advantage to US industry.
- Finding new approaches to physical security systems and new technologies needed to ensure control of materials in all phases of the nuclear energy process.

Far to go, but future is bright

While there is far to go along the road, Tom Sanders is optimistic that the vision of a nuclear-powered world is achievable, even inevitable. "There's no way that there's a future without global nuclear energy. You can't ignore the energy achievable from fission and fusion resources. It is renewable and sufficient to supply mankind for thousands of years," he says. In the short term, he plans to continue what he's been doing — staying on message, building an expanding constituency, leading from behind the scenes. "Leadership is earned not delegated," says Tom, "and we must keep moving forward, leading by doing."