Scientists Propose: 'Let's Go Nuclear!'

by Marsha Freeman

Dr. C. Paul Robinson, chairman of the U.S. delegation at the American-Russian meeting of nuclear and energy experts, told EIR*: "The time has come to develop a comprehensive and realistic plan to ensure the development and deployment of nuclear energy. It must preserve access to nuclear energy sources for all countries in the world."*

An extraordinary meeting took place at the headquarters of the International Atomic Energy Agency in Vienna, Austria between July 19 and 21, involving the heads of seven U.S. energy laboratories, and nine Russian scientific nuclear organizations and institutes. The scientists met to follow up the summit discussions between Presidents George Bush and Vladimir Putin in 2002, which included a call for both sides to look at the future of nuclear power.

The July meeting produced a joint document advocating the global expansion of new nuclear energy technologies. The laboratories represented included the three nuclear weapons facilities in the U.S. and their counterparts in Russia. The document states that, "in addition to providing a virtually limitless supply of secure and reliable energy, greater use of nuclear energy would greatly reduce the risk of nuclear weapon proliferation and nuclear terrorism," as well as improve human health.

"The time has come to develop a comprehensive and realistic plan to ensure the development and deployment of nuclear energy. It must preserve access to nuclear energy sources for all countries of the world." This view harkens back to President Eisenhower's 1950s Atoms for Peace program, where the widespread civilian use of nuclear energy was seen as a way to uplift developing nations, by giving them access to advanced technologies.

This global development view has been buried over the past 30 years, under a policy of technological apartheid, which has created a widening gap between industrialized and developing nations. Anti-nuclear policies have also greatly damaged the economies in the now formerly-industrialized West.

The participants at the Vienna conference agreed that of all current or imminently developable energy technologies, only nuclear power is capable of meeting the growing world demand for safe, clean, plentiful, and economically viable sources of electricity. The scientists added that the use of nuclear energy for the production of fresh water, through desalination, and the production of hydrogen, as a limitless and nonpolluting fuel, are a critical part of the future deployment of nuclear technology.

Dr. C. Paul Robinson was chosen by the U.S. laboratory directors as the chairman of the American delegation. Before becoming Director of Sandia National Laboratory in 1995, Dr. Robinson was an advisor to the Defense Department, and headed arms control negotiations with the Soviet Union.

In an interview with *EIR* on Aug. 16, Dr. Robinson elaborated some of the thinking of the group of U.S. and Russian laboratory directors who met in July.

The goal stated in the joint document is to have 30-40% of the world's electricity be provided by nuclear energy by the year 2050. Today that figure is about 16%, produced by 445 nuclear power plants around the world. Depending upon the assumptions that are made regarding the rate of growth of worldwide electricity demand over the coming four decades, the percentage of electricity generated by nuclear power plants could translate into the required number of nuclear power plants varying over a very wide range.

Dr. Robinson explained that energy economists at Sandia Laboratory study projections of world energy growth, but that the perceived limit on the number of plants by 2050, or "where the 30-40% came from, is based on looking at how feasible it is that you could have that many plants up," and running.

Their estimate is that between 800 and 1,500 units, of 1,000 Megawatt-size-equivalent, could be built worldwide in the designated timeframe. Smaller reactors, more suitable for developing nations, would at least double that number of individual reactors.

Since the halt in building new nuclear energy plants starting in the late 1970s, the United States has lost its capability to manufacture major power plant components. Were a U.S. utility to order a new nuclear plant, it would have to import the pressure vessel, for example.

But Russian institutes have continued to develop new designs and options for nuclear technology. For example, the Russian government has been trying to attract interest and

investment in producing small floating nuclear plants, that could be built and deployed quickly.

Dr. Robinson said that the Russians have "presented a lot of material to us," on that program. "They've converted a lot of their shipbuilding facilities, that used to build nuclear ships. And they had done far more than the United States, or anybody in the West has done, in terms of nuclear-powered surface ships, nuclear-powered icebreaking ships, nuclear-powered submarines.

"When the bottom fell out of the defense industry, they started converting the manufacturing parts to offshore drilling rigs. The Russians have been building a lot of high-value offshore platforms, and believe it's a small step back the other way, to build floating platforms that are power stations."

The floating nuclear power plants concept that the American scientists liked, he explained, "was to tow it to an area where there is a need for power and have a small canal dug from the shore into which you would tow it, and emplace it, so you're isolated from sea states and adverse weather. Then when you're ready to change out the fuel you tow it back to the central factory."

Fresh Water and New Fuel

One initiative by the scientists that is critical to solve the huge deficits in especially, but not exclusively, developing economies, is the provision of new sources of fresh water, and the development of unlimited fuel resources. The two most important "non-electric" uses of nuclear energy, mentioned in the joint document, are the production of hydrogen for fuel, and fresh water, through desalination.

"Those are both big, big deals," Dr. Robinson agreed. "We tried to look—both the U.S. and Russian sides—at so-called system solutions, where you look at the total performance of a system. Nuclear plants have always been bothered by the fact that you have to build them considerably larger, in order to meet the peak daytime loads.

"But then at night, you have this very expensive capital resource, without much to do with the power. You try to cut them back as much as you can, but end up having to burn some of the power just into resistors in the evening hours. If you could produce a commodity whose rate of production you could vary day to night—and hydrogen was the first one that we looked at—you can really help the overall sizing issue for nuclear plants, making them more efficient and productive," because the plants could be running at full power, 24 hours a day.

"You would just switch the balance between electrical generation and production of either hydrogen or water," depending upon the demand for electricity.

The idea that the energy produced by a nuclear plant can be used as a centralized heat source and electricity supplier, around which entire new cities, farms, and factories could be built, goes back to the 1970s. At that time, there were designs for what were called nuclear-powered agro-industrial complexes, or nuplexes.

One of the industrial processes described at that time, was the use of high-temperature nuclear reactors to thermally crack water to produce hydrogen, rather than use the limited supplies of natural gas as a feedstock, which is what is done today.

Dr. Robinson concurred, adding that another option being looked at is "what you could do with coal or coal slurries. Argonne National Lab has done some interesting demonstrations of what you could do with high temperatures" from nuclear reactors, he added.

While the United States virtually abandoned even most written studies of the applications of next-generation nuclear technology over past decades, the Russians have continued to pursue more advanced nuclear designs.

What was evident, and "amazing," to the U.S. scientists during the discussions with their Russian counterparts, was "how much work they've continued to do in nuclear engineering," Dr. Robinson reported. "They've got the full spectrum of reactors still being evaluated and operating in pilot stage. They've got lead as the coolant, lead bismuth eutectics as coolant material, they've got sodium cooled loops with reactor power operating, and they've got a high-temperature gas reactor operating."

The intention is for each side to contribute in their areas of expertise to the overall effort to resurrect nuclear technology for global deployment. The Russians clearly have the lead in new reactor designs, experimental pilot projects in next-generation technologies, and manufacturing capabilities.

"The United States truly has the edge on anybody in terms of high reliability for manufactured items, or plants. As you know, just within the last decade, nuclear power has finally come into its own, in not only being reliable when it's operating, but bringing up the overall operation times to meet the original expectations. The predictive reliability is the name we give to the technology in the United States that would be so important for the next generation of nuclear plants," Dr. Robinson stated.

"The other area that the United States excels at is control systems. After the troubles at Chernobyl, the Russians realized it would be hard to sell Russian-designed reactors in the international market. But with a U.S.-Russian collaboration, with us bringing the safety and operational controls into being, you get the best of both sides."

In terms of implementation, Dr. Robinson said, "Each side is introducing the document into their government. We've hit several of the Departments here, primarily Energy, and the Russians are doing the same over there. We'll try to move this forward. Both of us are looking at a potential future summit as a next step, on the presidential level. That's how we got started, as a matter of fact, following the Bush-Putin summit in Moscow, in 2002, [which] had an initiative calling for the two sides to look at the future of nuclear power."