Interview: Dr. Nils Diaz

What Nuclear Power Gives To the General Welfare

by Marsha Freeman

No issue of public policy in this country has been more contentious, more beleaguered by public ignorance, more tortured by an aggressive, well-financed disorganizing campaign, than nuclear power. It is incredible that this technology, which was largely developed in the United States, and extensively commercially deployed over two decades, has become almost extinct in terms of future growth.

It is more than 20 years since a new nuclear power plant was ordered and built in this country. While the government poured billions of dollars of "incentives" into wasteful and regressive energy sources such as wind, solar, and ethanol, the American public was being constantly bombarded about the dangers of radiation, the exorbitant cost of nuclear plants, and the "impossibility" of dealing with the waste.

Some nations, such as France, Japan, and South Korea, forged ahead and built new nuclear plants, and so have relied less and less on finite and politically and financially unstable fossil fuels. Other nations' leaders buckled under the anti-nuclear pressure, and followed America's "lead" in disavowing the importance of nuclear energy in their future. At the same time, industrializing nations, including South Africa, China, Argentina, and Brazi,l have deployed nuclear power plants, and developed more advanced nuclear technologies, with near-term plans for next-generation reactor systems.

Returning the United States to a sane policy requires leadership in the political arena, in the engineering and scientific communities, and in government.

Dr. Nils Diaz, the recently appointed Chairman of the Nuclear Regulatory Commission (NRC), has been outspoken in his view that developing and deploying advanced, next generation nuclear power reactors is critical to the national and economic security of the nation. He discussed this, and related issues of nuclear policy, with this writer in his office at the Nuclear Regulatory Commission on June 18. Dr. Diaz brings to his job the expertise and experience required to help usher in the "renaissance" in nuclear power in America which he sees under way. Most important, he brings a deep commitment to progress, and a willingness to stand firm, which are qualities that have been sorely lacking among most experts in academia and the nuclear industry.

Dr. Diaz, who grew up in Cuba, earned master's and doctoral degrees in nuclear science from the University of Florida, and has been a Professor of Nuclear Energy Sciences there. In 1985, he became the director of the newly established Innovative Nuclear Space Power Institute at the university, for the Defense Department's Ballistic Missile Defense Organization. After 11 years at the institute, Dr. Diaz consulted on nuclear engineering for private industry, the U.S. government, and governments overseas. In 1996, President William Clinton nominated Nils Diaz to a five-year term on the NRC. In July 2001, he was renominated by President George W. Bush for a second term, and on April 1, he was appointed NRC chairman.

In testimony before the Senate Subcommittee on Clean Water, Wetlands, Private Property, and Nuclear Safety, of the Committee on Environment and Public Works, on July 30, 1998, Commissioner Diaz had said, "It is worth recalling that one of the declared purposes of the Atomic Energy Act is 'to make the maximum contribution to the general welfare.' " He re-emphasized that idea to *EIR* on June 18, stating, "That quote is perfectly correct, and I'm very proud or it. . . . We [at the Nuclear Regulatory Commission] have the mandate to license and regulate, in accordance with the laws of this country. We need to provide the regulatory framework to allow this technology to be established and to be used for the benefit of the American people."

What Happened to Nuclear Energy?

In another 1998 speech, before a forum of the Senate Nuclear Issues Caucus, Dr. Diaz advised: "Before we can talk about a cure for what ails the nuclear option, we need to know what the ailment is." He outlined four prerequisites for a sensible and successful nuclear power program: political stability, financial stability, financial capability, and effectiveness in the technical and regulatory infrastructure. 1973-83 was the greatest period of construction of commercial nuclear power plants in America, despite the "worst economic conditions for large capital investment projects," he explained. "We had double-digit inflation and soaring interest rates." The "so-called energy crises" of 1973-74 and 1979 were the initiating events. The resulting financial turmoil led to the escalating cost of nuclear plants, which had to be financed over a number of years, at a higher and higher cost of borrowing money.

But the Nuclear Regulatory Commission itself was also a part of the "plant construction debacle," because the "mandated hearing process, established to provide checks and balances to power plant licensing, was imbalanced and unchecked." Nuclear power plant construction was effectively

This North Anna, Virginia nuclear complex could be the first site in over 20 years in the United States to see a newly-built nuclear unit operate. Dominion Resources is one of three companies applying to the Nuclear Regulatory Commission this Fall, to build a new reactor at an existing nuclear plant site.

sabotaged by up to 20 years of legal challenges; the cost of the Shoreham plant in New York, for example, was driven up from $100 million to $6 billion, making it impossible to complete. Dr. Diaz says that there was a "costly overreaction" by the NRC to the Three Mile Island accident in 1979, which added to the delays in construction and financial burden already striking the electric utility and nuclear industries.

Asked how the Nuclear Regulatory Commission has changed its procedures now, to prevent years of legal wrangling triggered by "intervenors," Dr. Diaz said that the Commission "is maintaining the opportunity for anyone who has a valid reason to challenge the regulatory process. But the difference is that it has to be a very good reason. . . . Once the Commission approves the construction of a power plant, there is one hearing at that time," he continued, "and after that hearing process is finished, then the licensee will have the right to operate the power plant without being challenged again through a hearings process." In that way, "the process is not going to be abused to delay the construction of the plant."

A Nuclear Renaissance

In February 2002, the Department of Energy initiated the Nuclear 2010 program, to share with industry the cost of building at least one new nuclear power plant by the year 2010. The program goals are to help develop advanced nuclear reactor technologies; explore and choose sites that could host new power plants; and demonstrate new regulatory processes by the NRC, for the certifying of the new technologies and licensing of the plants. So far, Dominion Resources, Excelon, and Entergy are participating in the program. By this Fall, each will have selected and submitted to the NRC a site for a new power plant, one where it already operates a nuclear plant. The program is "on track" for the Fall, Dr. Diaz said. The early site process, he explained, means "they are going to say, 'this is the site that we're going to put the power plant on,' and these sites have been pre-approved, because each already has a power reactor on it." The companies thus can get started early on the environmental impact statement, and other requirements, before they go ahead with construction.

"One new aspect of this," Dr. Diaz said, "is that they do not want to designate very much up front, which type of reactor they want to build. They want to have a generic license. They don't want to be locked into selecting a reactor now, and then find out two years from now that there was one that was better. This is a very dynamic process right now, with a number of new reactors.

"If the companies select a reactor that has been already certified, it is easier. We have certified a number of advanced reactors, and we are ready to shortly certify at least one more. The companies want to submit an application for a reactor that could be built anywhere in the country, and then once we certify that design, the owner can choose the reactor he wants from a shopping list. It is very different when you have a standardized design." He added that the licensing process for new nuclear plants has been streamlined, so licensees will obtain a construction and operating permit in one step.

On June 10, the Senate passed legislation to provide loan guarantees for up to 50% of the cost of 8,400 megawatts (MW) of new nuclear power capacity. There have been com-

plaints from the anti-nuclear lobby and the press about "corporate welfare" for an already mature (really, moribund) industry. Dr. Diaz responded that what Energy Committee Chairman Sen. Pete Domenici (R-N.M.) is trying to do "is what is being done for other technologies, trying to level the playing field, trying to avoid a technology—in this case, because it has the name 'nuclear'—from being penalized."

He explained that "one of the largest penalties for a technology that is very capital-intensive, is the financing. It becomes very expensive; there are premiums that are paid for the money that is borrowed, and other types of economic penalties. Of course, the Congress does provide incentives for *all* energy technologies, whether it's wind or alcohol or ethanol. In this case, [critics] are saying, nuclear is already developed. But it is not already developed, in regard to these new types of reactors. In many ways, this is a new technology with new [economic] risk, and the Senate believes, therefore, they should be supported, to get started."

Nuclear Energy and National Security

Dr. Diaz has stated that developing nuclear energy is a matter of national security. "I said it several times," he reiterated during our discussion. "I believe that nuclear energy has a strategic value that is not appreciated very much. It provides a very stable baseload [power] capability at a very constant production price. I don't think they are independent of each other; if we don't have energy security, we don't have national security."

But after Sept. 11, 2001, new fears were manufactured. Two months later, Dr. Diaz spoke to a group of students and professors at the University of Florida. "I'm here to try to reassure the people of the United States that we are doing well. There has been no credible threat against any nuclear facility in this country; and if there was, we would be equipped to deal with it. The bottom line is that the public health and safety will be protected even if there is an attack. There are multiple layers of defense."

Dr. Diaz told *EIR* that while the question of nuclear power plant security has been addressed by the NRC every day since 9/11, "it is a 25-year process, since we started doing this systematically, in 1978. The NRC always considered the possibility of sabotage or terrorist attacks at nuclear plants." He emphasized that "beyond the design basis threat, there are other risks that are beyond what any civilian infrastructure, including nuclear, should have to defend against. That would be the responsibility of the Department of Homeland Security."

The health and safety of the American people will be protected, Dr. Diaz said, "because of the way the plant structures are, and the assistance that we have to protect in case of accidents, and because of the last layer of defense—emergency preparedness. That doesn't mean that a reactor could not be attacked by an airplane. It could. It doesn't mean that an airplane can break the containment [structure]. The bottom line is, will the American people be exposed to very high levels of radiation so their health and safety will be compromised? I am saying it is very unlikely. We have all of the systems in there to make that a very small probability."

At the same University of Florida presentation in November 2001, Dr. Diaz also addressed the second scare story making the rounds. He said that he did not believe that Osama bin Laden or al-Qaeda had access to nuclear weapons. "I believe they have no capabilities whatsoever. Some of those things are purposely planted to create fear," he said. Asked about that statement, he replied, "It goes back to 40 years of being in the [nuclear] business and in international relations. From the information that I had, most of which I cannot discuss, the fact is that to really develop a nuclear weapons capability, you have to have an infrastructure that is so precise, detailed, disciplined, organized, time-consuming, and dedicated, that I couldn't see, in any way, that any of these people could have those capabilities. And I think time has shown that that was correct.

"The press, over and over again, comes up with the fact that somebody can create an RDD—a radiological dispersal device," or so-called dirty bomb, he stated. "Probably so. With the amount of information that we've provided, we've made it almost interesting for somebody to do so. Still, that is really not a major public health and safety question. A radiological dispersal device, unless you are by its side, is not going to kill anyone. But if we are not prepared to handle the information from such an accident, then people could get hurt because of the *fear* that is going to be created. That is why it is so important that we are prepared, and that is what 'TOPOFF' and these exercises are doing, getting our first responders and communications to tell people, 'Don't run,' because you might get hurt running, and in a panic and fear.

"The other thing we need to realize is that radiation is a lot easier to detect and handle than what most people think. It is much easier than most other substances that could be dispersed. One of the key things about radiation is that we can detect it, we can clean it up, and we can take it out and do things with it. We have the capabilities to do so. It is not like what is in the minds of many people, that it is not visible and is something that comes at you. On the contrary, radiation is easy to detect, it is easy to protect our people from it, and we should use its characteristics to help us to defend from it, rather than to scare people from it."

An Understanding of Radiation Policy

Still, not only in the general public, but within the scientific community, there is uncertainty about the dangers of radiation. The approach taken in radiation protection has been based on a method of linear extrapolation: the idea that if a lot of radiation will kill you, then a little bit of radiation will hurt you. There has been a lot of research into the benficial effects of low-level radiation and hormesis. But "popular

opinion" believes that the tiniest amount of radiation is very harmful.

Diaz called this "a very difficult issue, because sometimes it goes beyond science and technology and becomes emotional. Fundamentally, the issue of a very small dose of radiation causing harm is easily discounted [by some groups] as not being a fact, or other groups as easily prove that it is a fact. The reality is that it is very difficult to prove either way. What needs to be realized is that for very small doses of radiation, you cannot distinguish the [effects] from other things you do in daily life."

He related his personal experience in trying to mediate this dispute. "Several years ago, there was a meeting on this issue. Everybody from the most anti-nuclear to the most pro-nuclear organizations were there. I was there in between as a regulator, trying to bring some rationality to the debate. Eventually, on the third day, when we were about ready to disband, I proposed that that instead of leaving without any agreement whatsoever, 'let's see if we can agree to this: At 100 millirems (mr) per year or less of radiation, you cannot distinguish those effects of radiation from anything that anybody does in everday life.' I used the fact that if you take a hot shower, a certain number of cells die. If you run, a certain number of cells die, or if you go to sleep. If you receive 100 mr of radiation in one year, whatever happens cannot be distingiushed from your life. There might be some cells affected, but the body can assimilate those changes very well. And that [formulation] was approved, including by Greenpeace, and Friends of the Earth. There were people saying, 'It should say 10,000 mr, because that was the threshold'; and there were some people saying, 'Well, 100 is a little too much, how about 10?' without any reason whatsoever."

"Why 100?"

"I chose 100 because it was with 100 mr that you can create policy, and policy is what we need. At 100 mr you cannot really distinguish it from anything. At 100 mr, Yucca Mountain [nuclear waste depository] could be licensed . . . so I was trying to go to the issue of policy. We cannot resolve the controversy at this time, scientifically. There is always something that comes up. Where we should agree, is in the policy matter, that at 100 or 200 or 500 mr you can't distinguish the effects on the human body from anything you do in your everyday life. If we can accept that, we can go forward."

Dr. Diaz reported that Sen. Domenici has a ten-year study going on at the Department of Energy "to try to put this issue in some context. We are only about five years from finishing that study."

Promise for the Future

One of the concerns in the "renaissance" of nuclear power is the availability of trained manpower. Since the demise of the construction of new plants, most of the nation's nuclear engineering departments at colleges and universities have closed. In its 2003 budget, the Department of Energy recognized this problem, by establishing a $5.5 million program to train nuclear engineers at four universities.

Dr. Diaz concurred, stating, "I do believe that we are going to have a problem if we start growing too quickly, because there are two things that have happened. The university pipeline has dried up and the [nuclear] Navy pipeline has dried up, because the Navy is not growing anymore, nor do they have as many ships. We used to rely on the Navy pipeline. Eventually this could become a problem. If there is a renaissance, the attractiveness will be there."

What inspired Dr. Diaz to become a nuclear engineer?

"I was actually a mechanical engineer, and as a very young engineer, I was asked to participate in the mechanical design of a nuclear power plant, and I just fell in love with the technology. I saw it as an intense source of energy that we could control, that would not disperse its waste all over the place; I used to see coal plants throwing everything out. I saw it as a more advanced technology that would keep evolving and would keep getting better and better with time. I think that's where the real challenge is. I think all of the nuclear engineers—the old and the new—should look at what we have today and say, 'It is almost like we stopped in time.' Technology is here and is available, and we should be able to advance it in the existing plants and in the new plants, to the point that we can make better and better use of it. That is the challenge, not only on the reactor side, but in instrumentation and control, and in energy conversion.

"I still say that we're not using nuclear energy the way we should. Eventually we should be able to convert it directly, at a very high temperature. What I always worked with was very high temperature reactors, because you have to have that high temperature. There is a promise in that, that we explored in space, because we couldn't work with low-temperature reactors. Eventually [that very high temperature reactor technology] will come down to terrestrial applications."

In addition to his 11 years working on space nuclear power systems for ballistic missile defense, Dr. Diaz holds the patent for a design of a high-temperature nuclear reactor using magnetohydrodyanmic direct conversion [of heat to electricity]. Did any of those programs go far enough to develop new advanced technologies for space exploration? "There was one program that was black [classified] that got pushed pretty hard," he reported. "That program was a particle bed [design] using very tiny [fuel] particles, that was extremely hot. But what happened was that the technology was not there to support it. A tremendous amount of money was spent on it."

"We, as engineers, need to be advanced but realistic, he reflected. "In these areas, there is enough known that we can make significant advances in the next generation of reactors, and still be realistic. I do believe that 25 years from now—which sounds like a lot but it's really not much—we are going to have the materials and the high temperature reactors to use nuclear energy in a way that we never imagined."