The United States Must Prepare For a Nuclear Renaissance

by Marsha Freeman

A renaissance in nuclear power-plant construction in the United States will not be possible without the declaration of a national economic emergency, and the enactment of Lyndon LaRouche's U.S. Economy Recovery Act of 2006. No incremental approach to rebuilding this vital industry, which has been virtually dismantled since the 1980s, will meet the needs of either the U.S. economy, or what this economy should be contributing to reshaping the economies of rest of the world.

Rebuilding the manufacturing base of the nuclear industry cannot be done with timeless, "business as usual," methods. Over the next decade, dozens of new nuclear power plants must be built here, and hundreds must be built in developing countries. By the middle of this century, nuclear power, through the introduction of a series of more advanced technologies, should be the universal energy source worldwide.

In motivating his drafting of Federal economic recovery legislation, LaRouche explained in the May 12 issue of *EIR:* "For a little less than two generations, about forty-two years, the presently leading circles of government and private enterprise in our national economy have been persuaded to adopt the delusion that a so-called 'post-industrial' orientation for our nation's economy is both an available, and even an inevitable long-term option." The result, LaRouche states, is that agriculture, manufacturing, health-care systems, and basic economic infrastructure have been collapsing. Nowhere is this now more obvious than in the energy and electricity supply system.

This Summer saw blackouts in New York City, due to an ancient and rotting electricity distribution system, calls for conservation, and the shutdown of power delivery systems, where supplies could not meet demand in many parts of the country. Investments of many hundreds of billions of dollars in new nuclear power plants, new electric transmission lines, and updated local distribution systems are needed, before the rest of the economy can even start to recover. These investments will not be made under the present economic "post-industrial," deregulated paradigm.

As LaRouche describes, the decrepit condition of manufacturing and infrastructure of the United States today makes the Great Depression that President Franklin Roosevelt faced in 1993, pale by comparison. The most immediate crisis is in the auto and machine-tool industries. Without Federal intervention to retool these vital resources to manufacture transportation vehicles, other infrastructure, and nuclear power plants, this capability of men and machines will disappear. At this moment, dozens more plants are threatened with shutdown, and hundreds of thousands more skilled workers face the prospect of joining the unemployment lines.

The declaration of a national economic emergency, and credit-generation policies vectored toward infrastructure investment, will return economic policy by government and industry to advancements which promote the general welfare, in a turn away from hedge-fund looting and speculation, and "Enronomics."

The accompanying interview with two executives of nuclear supplier Westinghouse highlights the physical problems facing the nuclear industry in building new nuclear power plants.

Westinghouse has designed its improved AP-1000 reactor, which has been certified by the Nuclear Regulatory Commission. A dozen utilities have selected this safer, more efficient, and less complex version of light-water reactor for construction, as they plan to go through the regulatory process to license new plants.

But under present conditions, the nuclear industry, and the utilities proposing to build new plants, will take a "toe-in-the-water" approach, planning to build only a few plants, instead of creating the mass-production capability that is required.

For them to have the confidence to make the capital and human investments necessary to mass-produce nuclear plants, 30 years of post-industrial policy have to be overturned. It is now the responsibility of the Congress to provide the economic policy framework under which a renaissance in nuclear power-plant production can actually get under way.

Interview: Ed Cummins, Jack Lanzoni

Ed Cummins is the vice president for regulatory affairs and standardization; and Jack Lanzoni is the vice president for supply chain management, at the Nuclear Power Plants Business Unit of Westinghouse Electric Company. They were interviewed on Aug. 22 by Marsha Freeman.

EIR: For the benefit of those who are not familiar with how the nuclear industry was created in the United States, could you recall some of that history?

Ed Cummins

Cummins: In the U.S., the nuclear industry basically grew out of the Navy program in the 1950s. After the [World War II] Manhattan Project, the Navy recognized that nuclear power would be a wonderful propulsion system for submarines, because it doesn't use any air and you can submerge and have umlimited endurance under water. So Adm. Hyman G. Rickover, who I guess was a captain at that time, created a group and an industry in the late 1950s, that included Westinghouse, General Electric, and others, and they ended up building the first real nuclear submarine, which was the *Nautilus,* in 1957 or '58. It was built by the drive of Admiral Rickover and his team.

The Navy program evolved into over 100 nuclear-powered ships, including aircraft carriers, all the subs, and a cruiser and a destroyer were also nuclear-powered. Admiral Rickover was encouraged by the industry to demonstrate that a commercial reactor could produce power. He sponsored the first commercial reactor in the U.S. in Shippingport, Pennsylvania, right here, near Pittsburgh, and it was a demonstration program that was managed by Admiral Rickover.

After that, both GE and Westinghouse started to go off on their own and build plants. Westinghouse built plants very similar to the Navy design—pressurized water reactors—and General Electric evolved a slightly different variation, which was a boiling-water reactor. Most of the plants built in the world today grew out of those two programs. Both Westinghouse and GE licensed their technology to Japan, the Europeans, and so forth, and there were a few other competing technologies. The Canadians had a heavy-water technology, and the British had a gas reactor-technology, and there have been a few other attempts, such as a breeder reactor demonstration, in the U.S., Europe, and Russia.

So the commercial nuclear industry in the U.S. and really the world, grew out of the Navy's desire for nuclear-powered submarines and the drive of Admiral Rickover. He remained an admiral until near his death, so for 30 or 40 years, he was managing the Navy nuclear program. He's the father of the nuclear industry.

EIR: And the nuclear Navy provided the training of people who could then go ahead and create the commercial industry?
Cummins: Yes, I was in the Navy nuclear-submarine program for seven years. You got the training and background in that program. Many executives in the utility industry grew out of the Navy program. Then many of the international programs grew out of the U.S. technologies. For example, the French have a big program which was based on a Westinghouse license—the pressurized-water technology. The Japanese have both the boiling-water reactors and pressurized water reactors.

EIR: Didn't the South Korean program also originate from American designs?
Cummins: That's correct. The South Korean design grew out of Combustion Engineering, which is now owned by Westinghouse Technology. In the U.S., the vendors expanded after GE and Westinghouse, to include three other nuclear steam supply system vendors. There was Combustion Engineering, Babcock & Wilcox, and General Atomics, which designed a gas reactor. They had one gas reactor built in Ft. Saint Vrain in Colorado, which had some, not safety difficulties, but operational difficulties, so the gas reactors weren't picked up at that stage by the utilities.

EIR: That technology is now being developed for commercial applications again, but this time in South Africa and China. Westinghouse had been involved in the Pebble Bed Modular Reactor [PBMR] program in South Africa. Can you describe what Wesingthouse's involvement is in the PBMR program?
Cummins: We are participating in the program. We are a small-percentage owner and we took the BNFL [British Nuclear Fuels Limited] share of the investment in the South Africa program. We have two people who are on the board of directors of the PBMR program. The South Africans are continuing to pursue that. They are getting a license and it looks like the South African government will provide financial support, so there is a good likelihood that a demonstration plant will be built in South Africa.

EIR: What is the Westinghouse contribution to the program?
Cummins: We're contributing funds, and management, and some specific equipment designs, like the reactor internals and the instrumentation and control. We're primarily in a management role at the moment, but as they decide on their suppliers for various components, we are also interested in supplying some of those components, such as instrumentation, and control and reactor internals.

EIR: To go back to the 1970s, when we had a very robust nuclear manufacturing industry, how was that industry created? At that time, I recall that we could build everything we needed for a new nuclear plant.
Cummins: Yes, although in some cases we did import some things. But the capability by *someone* [in the U.S.] to build every part of a nuclear plant existed. I would characterize the industry as growing out of the power industry. There are similarities in component manufacture between what people need for a coal or gas plant, and what you need for a nuclear plant, so generally the suppliers tended to be people who built

boilers or turbines for the electric-supply industry for coal, and oil, and gas-fired plants, who would expand their facilities to handle nuclear components.

Then, when it became such a big business, as demand increased, people created factories that made only nuclear components because there was sufficient demand to keep them busy. So in 1970, for example, I think that in the U.S., people who could build steam generators were Westingthouse, Combustion Engineering, and Babcock & Wilcox; all three of them had factories that could build steam generators, which is one of the big components.

As demand for new large components decreased after [the] Three Mile Island [incident], people made business decisions to exit the market, at various stages. So [now] there is nobody who builds steam generators in the United States.

EIR: There is some movement, as evidenced by the recent development with BWXT being recertified for nuclear work, of some companies getting back into the nuclear business. What has been identified as a bottleneck is forgings that are then machined into pressure vessels and large components. Weren't we producing the forgings in the United States in the 1970s?

Cummins: The steel industry, I think Bethlehem Steel, made big forgings.

Lanzoni: It's a well-known fact that the biggest bottleneck we have is in the ultra-heavy forgings, where there is only one supplier today, JSW [Japan Steel Works], which is capable of making nuclear-quality forgings of that size. That is going to be a problem for a number of years, until JSW increases its capacity, and possibly other capacity comes on line from other locations. We believe that China is putting in capabilities to be able to produce the ultra-large forging. Doosan [in South Korea] might also have the physical capabilities, but not necessarily the technical competency yet to be able to do that, but that could be developed over time.

Jack Lanzoni

We believe that in the longer term, there is going to be a solution, but in the near term, there is going to be a constraint on the ultra-large forgings. We believe that around 2010, there will be additional capacity available at JSW, but we don't know how much of their capacity will satisfy the worldwide demand at that point.

In different parts of the world, it is important to have a single ultra-heavy forging. In the U.S., it is important, because we don't want to have welds in those areas where we have to increase the cost of in-service inspections. In other parts of the world, they don't necessarily have that concern, so a single, large forging could be replaced by two smaller forgings. That would be another way of minimizing the impact of that capacity constraint.

EIR: Is there any discussion of reconstituting that part of the industry in the United States?

Lanzoni: I've had a couple of conversations with forgings manufacturers in the U.S. The barriers seem to be two things: [one is] the cost. If you include the melting in addition to the forging, I've heard of estimates of anywhere from three quarters of a billion dollars to a billion-dollar investment to get into that. The other concern that people have is the risk associated with the fact that there is no other industry that requires the ultra-heavy forgings of that size, except for the nuclear industry. They view it as a very high cost of entering the market, and it is a limited market, once you get into it.

Cummins: The forging people do build for things other than nuclear plants—for coal plants, petrochemical plants. So when Jack says that the ultra-heavy forgings are only used for nuclear plants, that's the case, but the forging people have business outside of the nuclear business, making forgings for turbines, and other things, as well.

EIR: So forgings for nuclear plants could be an add-on for a company already making forgings for other industries?

Lanzoni: Generally speaking, there is a capacity constraint in forgings, so there has to be an investment in the U.S. to increase forging capability, and that is regardless of the nuclear impact. The other aspect, on the specific area of the ultra-heavy forgings, [is that it] requires a very significant investment. I'm not aware of any U.S. company that has the equipment capable of making those warm meltings. That would require a very, very significant investment, for a limited market.

EIR: Are there other areas that are constraints for building new nuclear plants? You mentioned steam generators.

Cummins: Currently, we import all of our steam generators. There is a B&W plant in Canada that provides steam generators, but the predominant manufactures are in Japan, Korea, and Spain, Italy, and France. They get their forgings from JSW and use those to manufacture those large components. The steam generators we're talking about are nuclear-specific components. In fossil plants they use boilers, and I believe the boilers are manufactured in the United States.

EIR: Looking ahead, are there other areas that will present supply-chain problems, if we were to build dozens of new nuclear plants at the same time in the United States, rather than only a handful? It is readily admitted that what we need is at least 50-100 new plants as quickly as possible.

Lanzoni: I think it's been generally accepted in the industry that we do have the potential for significant capacity con-

PDM

In the 1970s, the Pittsburgh-Des Moines Steel Company was a major manufacturer of aerospace and aeronautics test facilities, buildings, and bridges, and pressure vessels and structural components for nuclear power plants. Their nuclear manufacturing facilities, which no longer exist, built the containment vessel for the TVA's Browns Ferry nuclear plant in Alabama (shown at the top under construction), and both containment vessels for California's Diablo Canyon plants (bottom). In 1973, it was involved in 27 nuclear power plant projects.

straints in this area. The Nuclear Energy Institute has formed an infrastructure task force, which I sit on, and has representation from constructors, utilities, and suppliers like ourselves; Areva participates, as does GE. We're all working toward a common goal, which is to identify those potential bottlenecks today, and what plans we would put in place to counteract the effects of those capacity constraints.

For some things, it's physical capacity, like the large valves and reactor coolant pumps. But there's also an issue around plants getting recertified for nuclear quality. Many plants still have the capability to manufacture, but have long since given up their N-stamp [nuclear certification]. We need the ability to produce nuclear-quality product.

EIR: We have been looking at the dramatic shutdown of the auto industry, which is accelerating, as a way to produce manufacturing capacity for new nuclear plants. During World War II, within six months, auto plants were retooled to produce aircraft, and other matériel needed for the war. The new generation of nuclear plants, such as the Westinghouse AP-1000, is based on a standard and modular design. What about building modular components in idled auto plants?

Cummins: The reason Westinghouse worked hard on modularization was because the utilities, when they specified their desires for new plants, wanted a short construction schedule. If you do modularization, you can decrease the construction schedule, because more work is done at the manufacturing shop, and less at the site. The kind of modules we have vary, but they have the characteristics of being semi-heavy steel structures that are put together and shipped, and often have piping and valves and other things on them. The characteristics of a module-maker for these kind of modules are a pipe shop that fabricates piping, a steel fabricator, or something like a shipyard. Those are the kinds of places we would look at, that have existing talents or competencies that would be useful in developing the modules for the AP-1000.

Lanzoni: On the supply aspect, we have industries in the U.S. that are making modules today, or could easily adapt to making the types of modules that would fit into a nuclear power plant. We're keenly aware of what is happening with the auto industry, and certainly we're looking for every opportunity to develop alternatives or expand capabilities to meet what our requirements are. The auto industry is one place we're taking a hard look.

EIR: Can you be more specific as to where auto-industry capacity could be used for AP-1000 modules?

Lanzoni: It's hard to say right now. We're in the process of doing the definition of our modules in terms of largeness and complexity. If I look at how I perceive the auto industry in manufacturing [its] product, obviously they do build [cars] in modules; they have plants that build engines and others do the bodies, and then they integrate. So they have the basic skills and they have the supply chain and software capabilities to do that.

We're talking about something different. We're talking about piping; we're talking about valves and pumps and

things that could be added to the different modules. So it's a different type of product, but the basic attributes of being able to build it would be the same.

EIR: If you consider that we have to basically rebuild an entire nuclear industry to be able to produce new nuclear plants, rather than build the manufacturing infrastructure from scratch, our proposal is to retrain the skilled manpower and retool the auto plants and equipment for that purpose.

Lanzoni: I think it's the right way to be looking at it, but I'm just not sure we're at a point where we could give you a real definitive answer on that. The reason is that right now, as far as our biggest bottlenecks are concerned, modular manufacture is not an area I'd be most concerned with, based on today's environment.

If I look ahead at 50 plants being built, obviously our position could change on that. But if I look at it in a hierarchy of things we have to attack, first in terms of assuring certainty of schedule, module manufacture capacity wouldn't be a major area. Part of that is because we haven't fully defined yet all of the modules, and gone off to try to source them. But we do believe that there are a number of types of industries—from shipbuilding for the complex, very large modules, down to pipe fabricators—that could do the smaller modules. So it's not a matter of saying that it's one type of industry or one type of manufacturer. It's multiple types and industries that can do this work.

Cummins: I'll give you an example from Westinghouse. We make nuclear fuel. As we look at these plants coming on line, we say there might be a shortage in nuclear-fuel manufacturing capability. Then we start scratching our heads, and say, "Okay, how do we expand our capacity to meet the future need? When do we need to start the expansion? When do you need to do the design?" So people are doing some of this analysis prior to self-investments, particularly in cases where the investment is modest in comparison to the big steel investment of billions of dollars. If we decide to expand or build a new fuel factory in the United States, which I think we will decide to do over time, then it will be a modest investment, and there will be an increase in capacity in the U.S. Pipe shops and steel shops will deal with that the same way. They are able to take a look at their future work and make judgments on whether they need to expand their capacity or not, based on their projection of the future.

EIR: A majority of U.S. companies that will be filing licensing applications with the Nuclear Regulatory Commission to build new nuclear power plants have specified the Westinghouse AP-1000 as the reactor they will choose. What is your timetable for being able to start building the first reactors?

Cummins: What companies have actually decided to do is obtain a site license from the NRC to build the AP-1000. The process of getting the license involves developing the application and having the NRC review it, and then there is a public hearing process. That whole process takes approximately five years. We're projecting that the first approvals could occur in late 2009, or early 2010, and then the utilities could make their firm decision to proceed with a new nuclear plant. We would start the project at about that time.

But the discussion we've had about long lead time materials might make it important for the utilities to make some incremental initial investment before that time, so they can have the plant when they would like it available to generate electricity. And most of the early customers say they would like that in 2015, to have the plant on line. Others are a little later.

EIR: If you want to have a plant up and running by 2015, when would you need the go-ahead to order the forgings and other long lead-time components?

Lanzoni: We're pretty close to that time window right now. Actually, I am going over to Japan next week, to get a more definitive answer on that. But the process as it's going today, in terms of ultra-heavy forgings at least, is that there are already some number of AP-1000 [forging manufacturing] slots available to us from JSW. Those will be in support of the 2015 operating date. Now we just have to firm up when they will become available to the fabricator, and when the utility will have to make a commitment, in terms of putting in a reservation for those forgings. The timeline is pretty much upon us right now in terms of the ultra-heavy forgings.

Cummins: After you get past that, there will be a timeline for other things. There will be a series of things identified, that need to have an early procurement. That will be balanced by the utility's desire to save money until they have the final permission to go, so there will be a tension between the need to invest in order to make the schedule, and the need to conserve your funds. Either they'll have to relax their 2015 date, or they'll have to come up with funds now.

EIR: It is important that the Tennessee Valley Authority is reopening the Browns Ferry nuclear plant, and is looking at completing the Watts Bar plant. It would seem that the Federally chartered TVA is a good prospect to be involved in a new build.

Cummins: TVA is one of the power companies that has selected the AP-1000 to apply for a license at the Bellefonte site, as part of the NuStart organization, which is supporting the funding, along with the Department of Energy. TVA is one of our key customers. TVA has been proactive in finishing Browns Ferry, and I think they will ultimately decide to finish Watts Bar, which was greater than 60% complete [when construction was halted in the mid-1980s]. And I think they will decide to build AP-1000s at Bellefonte. Those will be sequential decisions.