Do You Want to Stimulate the Economy? Then Build New Nuclear Power Plants

by Marsha Freeman

While policymakers in Washington try to determine how an infusion of Federal funds can be vectored toward an economic recovery, certain fundamental principles must be adopted as the basis for decision-making.

No attempt to pull the U.S. banking system out of a bottomless bankruptcy will be successful without a return of the U.S. Federal budget to capital budgeting rules. All reorganization of bankrupt institutions must be premised on that general rule. This means that assets which meet the standard for chartered national or state banks will be protected as if the Glass-Steagall rules had been still in effect.

After the financial sector is put through bankruptcy reorganization, and the fanciful financial instruments commonly known as "toxic waste" are put to one side, so as to make no further claim on the good faith and credit of the United States, the nation can return to its Constitutional duty to initiate internal improvements, in order to promote the general welfare.

It is necessary to ensure that the basic needs of the population are met, through measures such as moratoria on housing foreclosures, extended unemployment benefits, and broadened health-care insurance, and, that bankrupt Federal states continue to provide basic services for their citizens.

Economic growth will depend upon trillions of dollars of Federal capital investments which will ameliorate the immediate situation, *by laying the basis for the long-term increased productivity* of the economy, as a whole. It is not a question of simply creating jobs, but increasing the physical expression of capital intensity of the economy, and raising the productive level of the nation's workforce. Such will be the function of investments in basic economic infrastructure.

There could be no economic recovery, without a massive expansion of production of power, through measures which emphasize growth, and without a similar expansion and upgrading of the nation's power supply and distribution system. Contrary to "popular opinion," which has been shaped by scam artists like T. Boone "Windbag" Pickens, and "green" ideologues, such as Al Gore, only nuclear energy can provide the quality and quantity of power that a 21st-Century economy requires.

Although the first tentative steps have been taken by electric utilities to restart the construction of new nuclear power plants, with more than two dozen reactor license applications filed with the Nuclear Regulatory Commission (NRC), this "renaissance" in nuclear power will not materialize without a federally directed "stimulus." Similarly, the disappearance of the U.S. nuclear manufacturing industry has begun to be reversed with initial steps taken. But the reconstitution of a nuclear industry, based on the most modern power plant designs and advanced manufacturing techniques, will not happen without a nationally directed effort.

For decades, the mass-production auto industry, and its component manufacturers, created 1 of every 13 industrial jobs in the United States. This was the reservoir of the nation's machine-tool design and industrial engineering talent. The industry, which now lies in ruin, must be re-tooled and mobilized by measures which depend, in large degree, on recreating a nuclear manufacturing industry.

For the past three years, the Congress, led by misleadership Nancy Pelosi and her supporting cast of Anglo/Dutch/Wall Street financiers, sabotaged the initiatives by Lyndon LaRouche, to reorganize the bankrupt banking system, and redirect credit to retool the auto/machine-tool industry.

LaRouche has called for the creation of a Federal corporation to assume, employ, and expand the idled portion of the machine-tool and auto-manufacturing industry, not to produce more cars, but to make capital improvements in certain categories of production-related essentials, including high-speed rail and magnetically levitated (maglev) transport systems, advanced nuclear power plants, desalination plants, and water control and navigation infrastructure. On Jan. 4,

"Shovel ready": UniStar Nuclear Energy has proposed to build a third nuclear plant at the Calvert Cliffs site in Lusby, Maryland, one of the 28 sites identifed in Figure 1.

he described it as a "50-year, $1 trillion-a-year technology and machine-tool mission."

Why Is a 'Stimulus' Needed?

There is no possibility that the dozens of nuclear power plants that need to be constructed in the United States over the next ten years, could be built without Federal support.

Contrary to widespread miseducation of the public during the recent 40 years, there could be no recovery of the U.S. economy from its presently ongoing breakdown, without a capital-intensive mode which places heavy emphasis on the included role of nuclear-power installations.

The electric utility industry is the most capital-intensive sector of the U.S. economy, and nuclear power plants are the most capital-intensive investments made in the utility sector. Nuclear reactions produce the most energy-dense form of energy, many thousand-fold more dense than the so-called renewables. To produce usable energy from fission reactions, requires highly skilled labor for the construction, and then, operation of the plant, and high-quality nuclear-certified materials and components. The majority of the cost of nuclear energy is the construction of the plant. Because the amount of energy-dense fuel used is minimal compared to any fossil fuel, the operating costs are modest.

Today, utilities planning to build new nuclear plants do not have billions of dollars of cash-on-hand for this investment; they must raise capital. Just as companies have started to plan nuclear investments, millions of home foreclosures, empty factories, ballooning unemployment, and rising prices have cut energy use, and utility revenues, making access to credit all the more urgent. Before the start of this year, the top ten utility companies annnounced that more than $2.7 billion in capital investements would be delayed, due to falling revenues. This need for credit leaves the fate of a community's electricity supply in the hands of Wall Street bankers, who set the terms by which companies can borrow money. High interest rates on borrowed capital have put nuclear power plant costs out of reach.

On Dec. 9, 2008, it was revealed in documents sent to the Nuclear Regulatory Commission, that the Tennessee Valley Authority (TVA) estimated that the updated cost of building two new nuclear power plants was in a range of $9.9-17.5 billion. This was *more than double* the original cost estimate, largely due to last year's artifically created hyperinflationary rise in the price of steel, concrete, metal and copper wiring, and other materials.

Responding to queries, and disbelief from TVA's customers, that they would have to bear the burden of that inflated cost, Terry Johnson, a TVA spokesman, had a proposal on how to lower it. He explained that if the TVA built the new plants *without having to pay interest on a loan*, they would cost $4-5 billion per unit, or about half.

Last June, Ernst & Young released a research report that had been commissioned by the U.K. government, which similarly found that the cost of *financing* construction of a new nuclear plant amounts to about *55%*

of the final cost of electricity. Bring down the interest rate, and the cost can be cut in half.

As commercial credit has been all but frozen, interest rates have risen, putting a further strain on electric utility investments. On Dec. 17, it was reported that the Virginia Electric and Power Company paid an interest rate of 8.875% to sell $700 million worth of 30-year bonds, which was up from 6.35% the year before. This rise in interest rates adds hundreds of millions of dollars to any nuclear power plant cost.

The solution is to create a federally chartered corporation, which will extend long-term credit, with a maximal 2% interest rate, for the most efficient construction of new nuclear plants. It is not important how much these power plants cost, per se; it is critical that they get built.

As the financial system has imploded, it is becoming less and less possible for U.S. utilities to gain access to credit *at any cost*. This credit crisis has become so severe, that last year, the Japanese government was asked by the Secretary of the U.S. Department of Energy to study the possibility of using the resources of the Japan Bank for International Cooperation and Nippon Export and Investment Insurance to support construction of nuclear plants in the U.S.!

'Smart' Fraud

While the Administration's "stimulus package" includes funding for what is described as a "smart" electric grid, do not mistake this so-called "modernization" for what is required. This is an attempt to run time backwards—to "re-engineer" the grid to accommodate small, inefficient, unreliable, and intermittent "renewables" projects, such as wind power, solar energy, and biomass. Such a "redesign" of the grid will increase instability in the power supply, and lower the reliability of our transmission network.

The application of Internet-like communication and control technologies, touted as part of the "high-technology" thrust of the stimulus plan, is simply a way for consumers to police themselves, to "adjust their energy use," meaning cut back, when they see they are using more energy than they will be able to pay for.

Other "automatic control" systems would allow the utility to shut off electricity delivery when demand is too high, which, according to the environmentalists, is an appropriate alternative to building new power plants to meet demand.

The electric grid *does* need to be modernized and expanded. The incorporation of technologies such as superconducting cable, where transmission capacity is increased multiple-fold, is being done only on a small, pilot basis with the support of the Department of Energy. This is the kind of leap in transmission technology, which would create a real "21st-Century" grid.

Current Capabilities

Were all of the necessary steps to create the policy and credit to jump-start nuclear power plant construction taken, the nuclear renaissance would still be stalled. At the present time, there is not the manufacturing capacity to build more than a handful of new nuclear power plants, per year, *worldwide*.

For nearly 30 years, no new nuclear power plant has been ordered and completed in the United States. From the mid-1970s through the mid-1980s, more than 100 nuclear power plants on order were cancelled. Today's 103 operating plants are not even a pale shadow of the "2,000 by 2000" that the nuclear community expected to be in operation by the turn of the century, nine years ago.

By the mid-1980s, the U.S. nuclear manufacturing industry had all but disappeared. Today, not even one nuclear power plant could be built in the U.S., without importing some of the largest, and most important components.

But this is not just a crisis facing this country. Excluding Russia, which builds complete nuclear plants indigenously, and China and India, which are constructing the factories to be able to do that, the rest of the world depends upon a small handful of major suppliers, which, with the upsurge in orders globally, is now stretched to the limit of its capacity.

In a speech on Oct. 27, 2008, NRC chairman Dale Klein observed that "We can't make a living cutting one another's hair. At some point, you've got to make things. You can't be a total service economy."

In the 1970s and 1980s, he explained, there were about 500 U.S. companies with what is called a nuclear stamp. This certifies that they meet the strict standards to manufacture nuclear plant components. Today there are 100.

As the most dramatic example, Japan Steel Works (JSW) is the only company in the world, outside of Russia, that makes the massive forgings needed for full-sized nuclear pressure vessels, and other large components. The ultra-heavy nuclear forgings, up to 600 tons in weight, which house the nuclear reactor core, are then machined in a handful of plants, such as at the Chalon/Saint Marcel site in northern France, of the nu-

Japan Steel Works

A nuclear reactor pressure vessel component: Japan Steel Works produces more than 80% of the heavy forgings needed for nuclear power plants worldwide. In this photograph, a plant worker stands next to the 80-ton bottom "petal" of a reactor pressure vessel. There is a four-year waiting list for Japan Steel forgings.

clear giant, Areva.

Currently JSW has a four-year waiting list for vessel forgings. Nuclear vendors planning to build new plants are now in a bidding war to make downpayments to JSW in order to reserve their place in line.

Early last year, JSW announced a $523 million expansion plan, to double its forging capacity by mid-2011. This would enable it to produce eight reactor pressure vessels, and associated components, such as steam generator parts and turbine motor shafts, per year. In November, Areva signed a deal to ensure its supply of heavy forgings to 2016. A few weeks later, JSW announced a second, $314 million expansion phase, to triple capacity, to 12 units per year.

Recognizing that Japan Steel's tripled capacity will not come close to meeting the need, and that shortages of other components are almost as severe, numbers of companies are planning to enter, or in some cases, reenter, the nuclear supply industry.

U.S. manufacturers which let their nuclear stamps expire are renewing their certificates. For example, Chicago Bridge and Iron (CB&I), in the past, had built 75% of the nuclear power plant containment vessels in the United States, and over 130 worldwide, as well as 41 pressure vessels for nuclear plants. CB&I announced in October that it had been awarded a contract by Westinghouse to build two containment vessels. Last year, CB&I renewed its nuclear stamp. It plans to start fabrication of the Westinghouse units this year, with completion scheduled for 2014 and 2015.

Eurasian Developments

Future nuclear powerhouses—China and India—are preparing to enter the large forgings industry. China's Harbin Boiler Works, Dongfang Boiler Group, and Shanghai Electric Group are in this category. India's Larsen & Toubro hopes to export forgings in the future, in addition to serving the Indian domestic nuclear market.

South Korea's Doosan Heavy Industries announced last May that it had completed its program to become self-sufficient in nuclear power technology, a national project begun in 2001, to manufacture plants independently. A month later, Doosan signed a contract with Westinghouse to supply equipment for new reactors in the U.S. It also announced plans to spend $395 million by the end of 2011 to increase production capacity for castings and forgings.

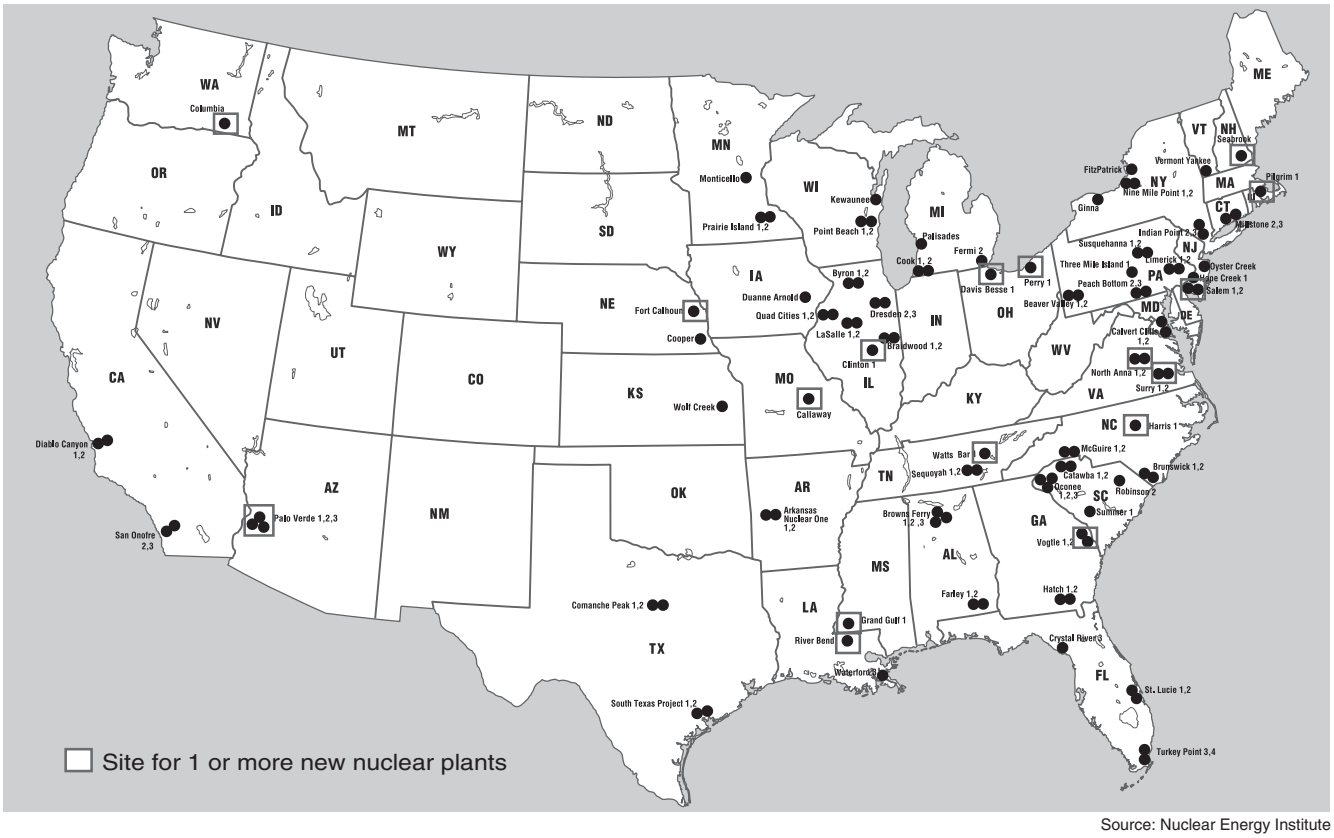
Sheffield Forgemaster, in England, won a contract on Sept. 2, 2008, to produce nuclear-grade steel components for new Westinghouse reactors that are being built in China. Two months later, Westinghouse ordered components for new reactors that are being planned for North and South Carolina. Now, the U.K. government is considering a $45 million financial package for Sheffield, to enable it to purchase a larger press, and increase the scope of nuclear components that it can manufacture.

Since a 1722 decree of Peter the Great, manufacturing plants that are part of the Izhora group have produced parts for ships for the Russian Navy. Today, the Uralmash-Izhora Group (OMZ), or United Machine-Building Plants, is Russia's leading company for the production of specialty steels, and equipment and machines for the nuclear and other heavy industries.

Over the past decades, OMZ has supplied reactor containment vessels for more than 60 plants in Russia, countries of the former Soviet Union, India, China, and

FIGURE 1

Ready Sites for 28 New Nuclear Plants, at 17 Current Nuclear Power Locations



Source: Nuclear Energy Institute

Iran. It is producing the containment vessels for the first floating nuclear plants in the world, which are being built in Russia.

More than a year ago, OMZ embarked upon a plan to modernize and expand its manufacturing capabilities. That five-year plan, costing hundreds of millions of dollars, will double its capacity, allowing Russia to meet its own ambitious plans, to commission at least one new nuclear plant *per year*, as well as export reactors globally.

Forges in the Czech Republic are considering retooling, to be able to produce pressure vessel forgings in two years. Additional Japanese heavy industry giants, such as Mitubishi Heavy Industries, are planning expansions.

As impressive as some of these projects may be, they are a drop in the bucket compared to what is necessary.

We must build new nuclear power plants as quickly as we can, everywhere in the world. This cannot be done without a mobilization of the talent and potential industrial capabilities of the United States.

Auto to Nuclear

In the 1970s, the U.S. had an extensive nuclear industry, in breadth and depth, with the capacity to work on more than 100 nuclear plants simultaneously, in various stages of planning, engineering, design, and construction. That magnitude of capability must be recreated as quickly as possible.

Four years ago, LaRouche outlined how the auto/machine-tool industry should be retooled to be able to manufacture desperately needed infrastructure, such as nuclear power plants. Considering that six months after the start of World War II, auto parts-producing and assembly plants were manufacturing tanks, airplanes, and ammunition, this is absolutely doable.

Since 2006, more than 30 million square feet of machine-tool and manufacturing capacity in the auto and related industries have been idled. More than 300,000 jobs have been lost. It is clear that reopening those plants to produce millions more cars is folly.

The production of nuclear power components has been made simpler by the move from one-of-a-kind nu-

clear plants, typical of the 1970s and 1980s, to standardized designs, and modular construction techniques. Modular production is the approach being used in Japan, where on-site construction time has been reduced to 36 months. Integrated modules are mass produced in factories, transported to the construction site, and then assembled there. In Europe, nuclear companies expect that 18 months could be chopped off standard construction time if modular methods, similar to those used to build offshore oil platforms, were used for nuclear plants.

In August, Westinghouse and Shaw signed a letter of intent to create a joint venture, called Global Modular Solutions LLC, for the fabrication and assembly of modules for Westinghouse AP1000 nuclear reactors. The improved AP1000 has been designed to be built with approximately 600 such standardized modules. The factory will be built at the Port of Lake Charles, in Louisiana, to produce structural, piping, and equipment modules. It is scheduled to begin operating in the third quarter of this year and will employ 1,400 people. The plant will support the construction of two reactors per year.

This modular approach is perfectly suited to a retooled auto/machine-tool industry, where standardized parts can be manufactured in large quantities.

There are numerous components required for nuclear power plants that are susceptible to large-scale mass production, pre-assembly into components, and then assembly into a modular unit. **Table 1** is indicative of some of these large-volume components, including prefabricated equipment modules. Individual modules might comprise piping, electrical equipment units, structural elements, and even ready-built stairs and platforms for on-site assembly.

Many of the new nuclear plants will be produced for nations that do not have large concentrations of population, or in-place electric grid systems. Large-scale, 1,000 MW plants will not be suitable. Next, or fourth-generation reactors, will be designed in a variety of sizes, and by operating at higher temperatures than today's conventional plants, will bring desalination and other benefits to populations, in addition to electricity.

Prof. Andrew Kadak, at the Nuclear Science and Engineering Department at the Massachusetts Institute of Technology (MIT), has supervised a student project begun in 1998, to develop a conceptual design for a high-temperature pebble bed nuclear reactor that could be economically produced in small sizes for developing nations.

TABLE 1
Large-Volume Components for a New Advanced Nuclear Plant (1200-1500 MW range)

Equipment	Number (Range)	Comments
Pumps, large	71-100	
Pumps, small	80-484	
Tanks	49-150	from 600-150,000 pounds
Heat exchangers	47-104	All sizes, types, material 2,100-250,000 pounds
Compressors, vacuum pumps	12-26	
Fans	61-123	600-45,000 pounds
Damper/louvers	730-1,170	
Cranes and hoists	25-50	
Diesel generators	2	10 MWe
Prefabricated equipment modules	64-133	Preassembled packages including mechanical equipment, piping, valves, instruments, wiring, etc.
Instruments of all kinds	1,852-3,440	
Valves of all kinds	9,633-17,891	

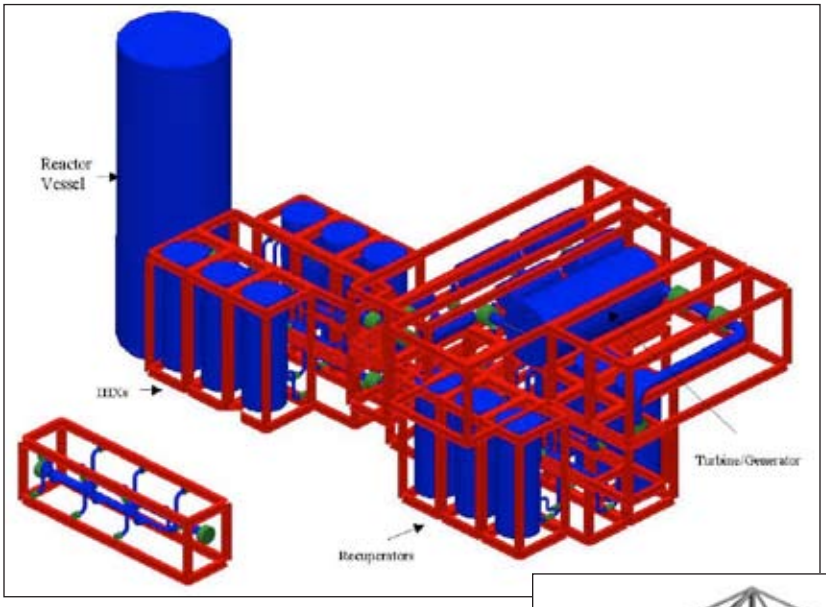
Source: *US. Job Creation Due to Nuclear Power Resurgence in the United States,* Volume 2, page A-125, November 2004, Idaho National Engineering and Environment Laboratory.

The students have focused not only on the nuclear technology, but also how to build the reactors most economically. In the MIT modular design, component manufacturers would provide all components, piping connections, electric power connections, and electronics to fit in a standard steel "space frame." The frames would then be assembled at the plant site, some components using a "lego-like" assembly process to bolt them together. In addition, modules could be replaced rather than parts repaired, greatly reducing maintenance costs and down time (see **Figure 2**).

In this study, the constraint on size in transporting modules was a critical factor in the design. In order to be able to deliver components for the 120 MW reactor, not only by barge, but by truck or rail, an upper weight limit was imposed, of 200,000 pounds, with maximum dimensions of 8 feet wide, 12 feet tall, and 60 feet long. For their current reactor design, 27 modules are required, each of which is rail and truck transportable.

A reconstructed nuclear industry will face the immediate problem of a lack of skilled manpower, from nuclear engineers to construction workers, welders, and electricians. Approximately 4,000 workers are needed

FIGURE 2



Courtesy of Prof. Andrew Kadak, MIT

Modular Construction for Small Pebble Bed Reactors: Standardized steel "space frames" (inset) are used in this MIT design, each containing various components for new nuclear plants. The frame modules are then attached on site, bolted together, and plugged in, dramatically reducing construction time.

at each site at the peak of construction, and each new plant requires 400-700 employees. To build about 35 new reactors, about 38,000 jobs will be created in the nuclear manufacturing industry.

Over the next five years, 35% of the current nuclear workforce will be eligible to retire. So, in addition to the tens of thousands of new workers required for the expansion of plant construction and operation, more than 20,000 are needed, just to replace those who will leave the workforce.

To start to meet the demand for skilled jobs, Mark Ayers, president of the Building and Construction Trades Department of the AFL-CIO, has proposed that the nuclear industry "set up on-site training centers," that the union, itself, would build. "We would recruit from the local community and help train them to be craftsmen," he stated. The Building Trades already spends $800 million per year for job training, Ayers reported, and Federal "stimulus" support would speed the process.

'Shovel Ready'

The Congress is necessarily concerned with initiating programs that "stimulate" the economy, as quickly as possible. But this should not be an excuse to put people to work doing less-than-useless, non-productive jobs, such as cleaning off solar energy collectors.

While major modes of transportation must move from liquid fuel—in cars, trucks, and airplanes—to electric systems, such as rail, maglev transport, and electric cars, as the *Detroit News* observed in a Jan. 13 editorial: "the nation remains clueless about where the electricity will come from." They add that "anyone who thinks the additional demand can be met solely by alternative energy sources—windmills, etc.—is delusional."

There are two dozen new nuclear plants that could be built quickly on what are called brownfield sites. These are sites where there is at least one reactor in operation, and where additional reactors had been planned, but were never built. Construction could start almost immediately, because unlike new greenfield sites, much of the transport, energy, and manpower infrastructure is already there.

The recommendation to immediately start plant construction on these 28 sites was made in the June 17, 2005 issue of *EIR* and was reiterated recently by nuclear engineer Joseph Somsel, in an article published in the Jan. 23 issue of *American Thinker*. Infrastructure investments, he points out, greatly increase economic productivity, which should be the criterion upon which "stimulus" investments are made.

All that is needed, he suggests, is "tweaking" current regulations for limited work authorizations. This would mean that companies could start "turning dirt" within a couple of months, as they start site preparation.

While construction begins on the first couple dozen nuclear plants, an Apollo-style mobilization to rebuild America's steel and specialty steel industries, machine-tool capabilities, and auto-related plus additional manufacturing facilities, using the most advanced technologies, must get underway.

It will take some time, and trillions of dollars of credit, to restore the physical economy to a pathway of growth. The longer we wait to start, the more difficult it is going to be.