

Japan Without Nuclear Energy Is a Disaster for the World

by Ramtanu Maitra

Sept. 21—On Sept. 15, Japan shut down its Ohi 4 nuclear reactor for routine maintenance. This means that all of Japan's 50 nuclear reactors are now off-line, and the 30% of the country's power that had been generated by the nuclear reactors will have to met by imported oil and gas, at a much higher cost and greater environmental risk. Except for a brief period following the earthquake/tsunami-destroyed Fukushima reactors, when all but two of them were shut down for safety reasons, it is the first time since 1966 that the country is without nuclear power. Japan imported its first commercial nuclear power reactor from the UK—Tokai 1—a 160 MWe gas-cooled (Magneox) reactor built by GEC. It began operating in July 1966, and continued until March 1998.

Despite negative assessments dished out by the anti-nuclear lobby around the world on a daily basis, and the radical green policy of the previous DPJ governments, Prime Minister Shinzo Abe has abandoned all talk of phasing out nuclear power, in the way that Germany chose to do in the aftermath of the Fukushima accident in March 2011. Japan's Trade Minister Toshimitsu Motegi warned that the government would not allow its plans to revive the economy to be derailed by a commitment to going non-nuclear. "We need to reconsider the previous administration's policy that aimed to make zero nuclear power possible by the 2030s," he said, in January.

But it is not only Japan which will suffer should the anti-nuclear policy prevail. Japan's advanced industrial capability is central to answering the world's need for power to fuel an industrial and economic renaissance. As outlined below, many nations depend upon the output of Japan's nuclear-supply industries, and with the needed leap worldwide to a thermonuclear-powered economy, Japan is situated to play a central role.

Promise of Restarting Some Reactors

In fact, plans are afoot to restart some of the shut-down nuclear power plants. Japan's major supplier of nuclear-power-generating equipment, France's state-owned Areva nuclear group, recently announced Tokyo's plans to restart six reactors by the end of 2013. The chief executive officer of Areva, Luc Oursel, announced at a press conference in Paris in March that "there could be half a dozen reactors that will restart by the end of the year." "I think two-thirds of the reactors will restart" within several years, Oursel said, Russia Today reported March 5.

Not everyone agrees with Oursel's timetable. For instance, Japan's Kyodo press agency believes that the country's nuclear facilities will remain frozen through 2013. That could be true only if the Abe Administration chooses to go that way, given the fact that a significant portion of Japan's population wants nuclear power back. To begin with, the return to office of the conserva-



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Prime Minister Shinzo Abe has abandoned all talk of phasing out nuclear power in Japan, a stance that is supported by a majority of Japanese citizens.

tive Liberal Democratic Party (LDP) last December effectively killed the idea of a non-nuclear Japan, which the previous administration was seemingly committed to. Abe had made it a point during his election campaign to project the importance of nuclear power for Japan's economy. Apart from backing a return to nuclear power, Abe made the export of nuclear technology a major component of his economic plan.

Japan Macro Advisors managing director and chief economist Takuji Okubo told Oil and Energy Daily, a trade news website, on July 22, that other industries besides the nuclear industry itself were potential winners in the latest national election, notably "the nuclear-related industries, like heavy machineries industries, such as Toshiba, Hitachi, etc. I don't know how popular that nuclear push policy is, but it is the policy of the LDP to revive nuclear industries in Japan."

In addition, on the domestic front, despite the best efforts of the national and international anti-nuclear lobby, in September 2011, the pro-nuclear Mayor Shigemichi Kashiwabara was re-elected in Kaminoseki, over his opponent who ran on an anti-nuclear platform. That election took place a few months after the Fukushima catastrophe, at a time when images of Fukushima were being exploited to the full by the anti-nuclear lobby. This election, therefore, can be judged as a watershed that clearly showed the majority of people's loyalty to the Kaminoseki mayor who supports the building of a new nuclear plant.

What Is at Stake

Hence, it is a certainty that some, if not many, of the off-line nuclear reactors will be put back on the grid over the next couple of years. However, that delay itself could cost Japan, along with the rest of the world, dearly. In this context, what Abe must also ensure in the coming days is that Japan's nuclear power growth and all its inter-related aspects, such as the power-generation, heavy engineering industry associated with the nuclear industry, and research and development, do not get compromised. Such a compromise could deliver a heavy blow to Japan's economic, scientific, and technological future.

Last December, after he took office, Abe made clear that nuclear power remains essential for Japan (the growth in capacity from low energy-flux-density "green" sources, such as solar, wind, and other so-called "renewables," can never meet the world's growing need for energy), and that the world's number-three economy cannot afford the mounting costs of importing gas and oil. This is a challenge that he will have to face, now that the nuclear reactors are all off-line.

When he came to power in December 2012, Abe made clear that his administration would focus on reviving the nation's economy from the moribund state it has been in for at least 15 years. He announced a big fiscal expenditure program, despite Japan's heavy debt burden.

Abe said he would relax a variety of government controls, to attract private investment in medical, health, information technology, agriculture, energy, public infrastructure, etc., and to finance these programs also through a supplementary government budget filled with new public-works spending; and a program of reforms to achieve growth through stimulating private investment more broadly. The administration quickly swung into action with policies aimed at lifting the economy out of its long-lasting doldrums.

Abe appointed Haruhiko Kuroda, who had served for eight years at the Asia Development Bank, to implement a strong reflationary program through the Bank of Japan (BoJ).

Increasing Trade Deficits and Uncertainties

It is evident that the prime minister's economic program could run aground because of the huge additional expenses that the shutdown of the nuclear reactors will incur to the national economy day in and day out. The bad news is already out. Japan posted its widest August

trade deficit on record last month, as the country's soaring energy costs overshadowed a rise in exports to a three-year high. Exports climbed 14.7% in August to 5.8 trillion yen (£36.5 billion), as the weaker yen continued to boost demand for Japanese motor vehicles.

However, the rise in exports was more than offset by a 16% jump in imports, to 6.7 trillion yen. Coal imports rose 5% to 200 billion yen in August, while liquified natural gas (LNG) imports from the Middle East rose 19.1% to 182 billion yen. Japan, the world's largest buyer of LNG, imported a record 87.3 million metric tons (mt) in 2012, up 11.2% year-on-year. Its LNG imports last year cost an average of \$864.07/mt (\$16.60/MMBtu), up 13.4% from 2011. As the imports continue to mount, and the cost of LNG goes up, the fuel import bill for 2013 will be significantly higher, some analysts point out.

Japan's reliance on imported oil and gas has surged from about 60% of energy consumption to about 85%, thanks to the shutdown of the nuclear power plants. Japan posted a trade deficit in 2011 for the first time in 31 years, and another deficit of 8.2 trillion yen (\$82.4 billion) in 2012. About half of the increase stemmed from rising fuel costs, according to Trade Minister Motegi.

Without nuclear power, Japan would have to build natural gas power plants. According to Paul Joskow, president of the Alfred P. Sloan Foundation and a former professor of economics at MIT, "In Japan, natural-gas power plants can cost several times as much to operate as nuclear power plants,"

Moreover, Japan cannot but realize that the Middle East, a major source of LNG, is mired in turmoil, which threatens to disrupt the normal flow of oil and gas out of the area. Under those circumstances, Japan's industries, which are the backbone of its economy, will come to a halt, posing a threat the population as a whole.

Makoto Yagi, chairman of the Federation of Electric Power Companies, told reporters in Tokyo on Sept. 13



Kansai Electric Power Co.

With the shutdown of the Ohi nuclear reactor (shown here) for maintenance, all of Japan's 50 nuclear plants are now off-line. But there is strong support from Prime Minister Abe for reviving the nuclear industry.

that Japan may not have enough capacity this Winter without nuclear power. Japan's 10 regional power companies are still assessing Winter power demand and supply, Yagi said.

The World Needs Japan's Nuclear Industry

In addition to the economic and social turmoil that awaits Japan itself because of its decision to close down its nuclear reactors, even temporarily, the entire world's nuclear industry may undergo another shock. The hype about the "Fukushima disaster," and how it threatens the entire world, has become the mantra to convince the world to reject nuclear power, without pointing out that the so-called "Fukushima disaster" did not claim a single life. The cost of abandoning the Fukushima reactors was substantial, but it did not kill anyone.

Here are some of the reasons that the slowing down of Japan's heavy industry threatens the world nuclear power generation capability:

- The largest and best-known supplier of heavy forgings in the world is Japan Steel Works (JSW), founded in 1907 by two British companies and a Japanese partner, Hokkaido Steel & Iron Co. It produces large forgings for reactor pressure vessels, steam gen-

erators, and turbine shafts, and claims 80% of the world market for large forged components for nuclear plants. It has the distinction of having supplied the pressure vessels for the first two 1650 MWe Areva EPR plants in Finland and France. It has a 2008 contract with Dongfang Electric Corporation (DEC) to supply forged components, including for reactor pressure vessels to Dongfang (Guangzhou) Heavy Machinery Company Limited (DFHM) in China. JSW is contracted to supply Areva with large forged parts until at least 2016.

The United States has *no* capacity to build heavy forgings.

JSW's Muroran plant has 3,000-14,000-ton hydraulic forging presses, the largest of which is able to handle 600-ton steel ingots, and a 12,000-ton pipe-forming press. Its capacity in 2007 had been to produce only 4 reactor pressure vessels and associated major components per year, but this had been tripled to 12 by early 2011.

JSW has been manufacturing forgings for nuclear plant components to conform to U.S. Nuclear Regulatory Commission standards since 1974, and some 130 JSW reactor pressure vessels are in service around the world today. The company has said that one of its main targets is to supply nuclear reactor pressure vessels to the Chinese and American markets, and it has advanced orders from GE-Hitachi for ABWR and ESBWR components, as well as EPR pressure vessels. New orders are coming from China, India, the USA, and Europe. And if Abe can bring back nuclear power usage to what is required, JSW will be called on to supply pressure vessels for the future Japanese reactors as well.

The world's nuclear industry is inter-connected and inter-dependent on Japan-manufactured engineering products. For instance, France's Areva has secured a contract from India to supply two 1600-MW reactors for installation in Jaitapur in Maharashtra. India has a plan to set up 9,900 MW of nuclear-generated power in Jaitapur, which would make it the single-largest nuclear-power-generating cluster. However, Areva cannot deliver these large pressure vessels. Those have to be forged by JSW.

Moreover, India has plans to build 20 GWe of new nuclear reactors in the next 10-15 years. Some of those pressure vessels have to be cold-forged at JSW, no matter who in the West gets the contract to set those up. If the Abe Administration cannot revive nuclear power generation in Japan, and resolve the ensuing power shortage crisis, it is unlikely that JSW will be able to

deliver any of these pressure vessels to India, China, or any other nation in the coming years.

- IHI Corporation, formerly Ishikawajima-Harima Heavy Industries, is one of Japan's leading heavy machinery manufacturers, with its 19th- and 20th-Century origins in shipbuilding. Its energy plant segment provides boilers, gas turbines, nuclear power equipment, BWR pressure vessels and containment vessels, and also oil and gas plants. It holds a 3% interest in Westinghouse, and collaborates with Toshiba in building power plants. It expects to make pressure vessels and steam generators for Toshiba and Westinghouse PWR nuclear plants, and in 2011, completed a new Japanese 2 billion yen factory for steam generators at Yokohama. In February 2009, IHI received an order from Westinghouse for two AP1000 reactor containment vessels for a U.S. plant.

- Babcock-Hitachi KK was set up by Babcock & Wilcox of the U.K. in 1908, as a boiler parts supplier. In 1953, it became a joint venture of Hitachi Ltd with B&W, and in 1987, the Hitachi Group took it over. It produces reactor pressure vessels, steam generators, containment vessels, and other nuclear power equipment. It has supplied 15 pressure vessels for nuclear plants, and is also focused on major components for high-temperature gas-cooled reactors and fast breeder reactors.

It goes on and on.

Beyond Japan's heavy engineering capability that allows many capital-rich companies in Japan, Europe, and the United States, to receive orders and build nuclear power plants around the world, Japan has done an enormous amount of research and development in the field of nuclear technology. Even in the midst of the present turmoil that surrounds the nuclear power sector, on Sept. 6, Osaka University and Sumitomo Corporation, both of Japan, announced that they have finished developing a practical system for boron neutron capture therapy (BILLIONCT).

BILLIONCT systems employ a state-of-the-art method to treat cancer, utilizing boron's neutron-capture properties. The boron is first delivered to cancer cells, which are then irradiated by neutrons, leading to the internal selective destruction of the targeted cancer. Such systems are innovatively effective in the treatment of refractory cancers (those that do not respond to treatment), as the whole body receives a low exposure. This will be the first time such a system will be made available for hospitals.