India's Revamped Nuclear Power Generation Plan Is Inadequate

by Ramtanu Maitra

Oct. 16—Following the successful completion of India's agreement with the Nuclear Suppliers Group (NSG) in September, and the subsequent signing of the U.S.-India nuclear deal, New Delhi has moved quickly to seal a similar agreement with France. In the coming months it is almost certain that India will reach agreements with Russia, and perhaps with Japan, as well.

All these nations—United States, France, Russia, and Japan—are manufacturers of enriched uranium-fueled nuclear reactors, and have the potential to become major purveyors of various nuclear technologies that India may require now, or in the future. Utilizing this opportunity to buy reactors, which will be fueled by the suppliers for perpetuity, India has already laid out a plan which calls for importation of at least a dozen large reactors.

According to the Indian news daily *The Asian Age*, on Oct. 14, plans are afoot to set up six French reactors of 1,600 megawatts maximum power capacity, four 1,000 MW Russian reactors, and four 1,500 MW American reactors within the next five years. Out of the four planned Russian reactors, two are already at an advanced stage of construction, and are expected to be commissioned in 2009.

Imported Reactors To Close the Power Gap

Senior sources in the Nuclear Power Corporation of India Ltd (NPCIL) said that each of these imported reactors is likely to cost a minimum of US$2 billion, and will collectively produce 30,000 MW of nuclear power. The French nuclear company Areva is setting up the French reactors; the Russian public sector unit Rosatom is setting up the Russian reactors; and General Electric and Westinghouse are likely to be shortlisted for setting up reactors supplied from the United States.

If this significant amount of generation of power through nuclear reactors in the next five years indeed takes place, it will provide some relief to the power-starved nation, but it would by no means resolve the massive power shortages that Indians have come to accept as the norm. India generates about 120 gigawatts (1 GW=1,000 MW), while a third of India's population, almost all in rural India where at least 700 million Indians reside, goes without power.

Most of the generated power is consumed by large and mid-sized industries and the urban population. Because of the dilapidated transport infrastructure, and lack of power in rural areas, most of the mid-sized, and some large, industries locate near the urban areas. This distortion has not only created huge urban slums, but also unacceptable infrastructural and income disparities between the urban population serving the service sectors, and the hundreds of millions of poverty-ridden Indians living in rural areas.

According to a recent report, if India is to grow at an average of 8% over the next ten years, then the demand for power is likely to rise from around 120 GW now to 315-335 GW by 2017. The global financial collapse will no doubt put a stop to the projected 8%, but the power requirement in India will still be no less than the projected 300 GW, if the powers-that-be in India develop the will to provide adequate electricity to the countryside.

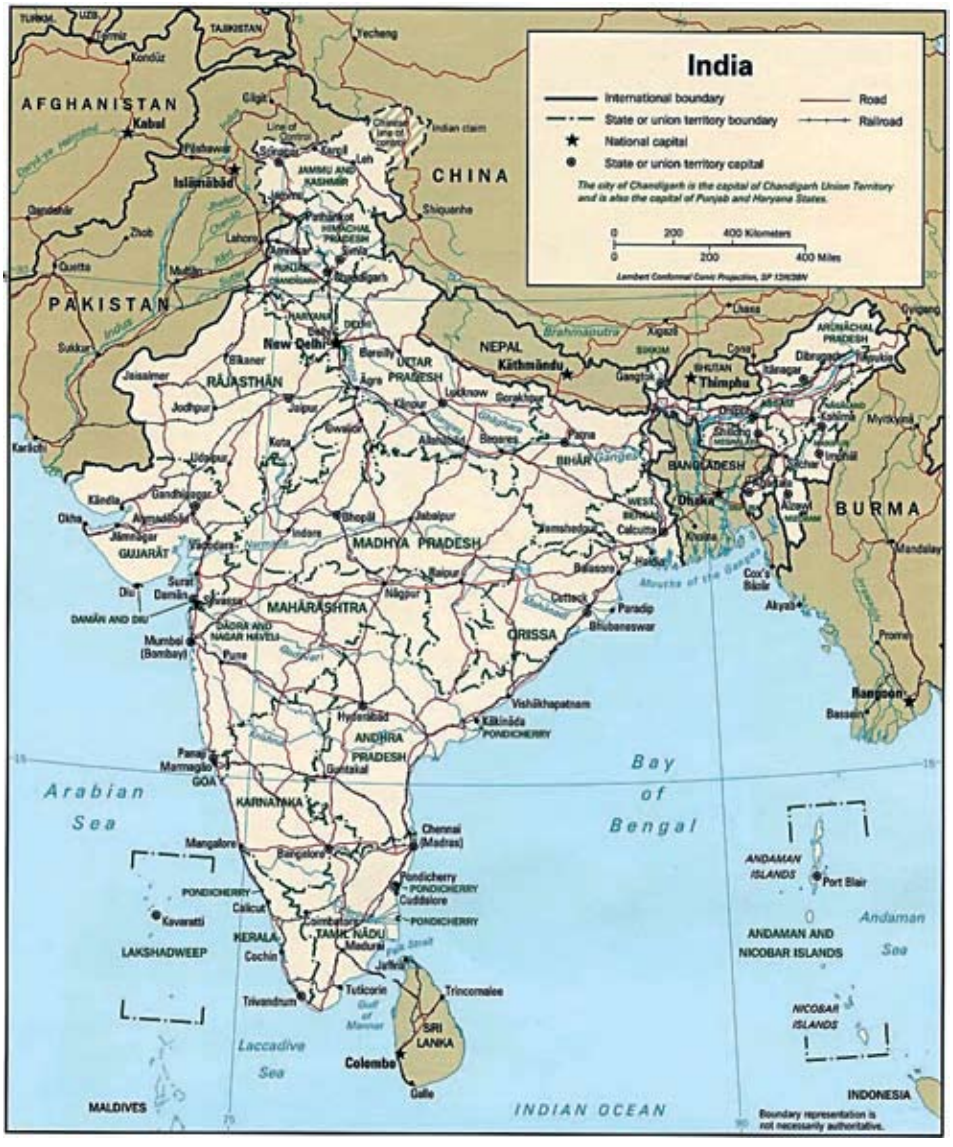
On the other hand, the powers-that-be will be left with little choice, when the quick money-making outsourced deals from the high-wage countries in the IT sector, or from the stock markets, or from the highly inflated real estate market, begin to crumble. At that point, New Delhi will have no choice but to depend on the huge agricultural sector and the small and medium-sized industries for maintaining social stability.

These two major employment sources—agriculture and small and medium-sized industry—in India have been grossly neglected in the recent period, because New Delhi found a way to generate faster growth. It was said that large-scale investment in these two sec-

tors was an impediment to maintaining a fast growth rate.

But, besides keeping people poor, the neglect of these two basic sectors, in the form of non-investment in power, water, high-speed railroads, broad-based education, and a health-care system in the rural areas, has helped to trigger violence all over India. Maoist movements have flourished and have become dangerous in a huge area spreading from the state of Bihar in the north, to the state of Tamil Nadu in the south. This entire swath of land is inhabited by poor people who have not benefitted from India's recent high growth rate, and have to contend with dilapidated, non-functional infrastructure.

Violence has spread all around India, showing up either as open religious conflicts, or surreptitious killings by exploding bombs in public places. But the bottom line in all this is that those who participate in these violent crimes are poor and highly vulnerable. Branding them as criminals, while enhancing income and consumption disparity, has not helped to slow down criminal activities. There is little doubt that violence is on the rise.



On the other hand, India's rural areas lack power, water, education, and health care. These requirements can be met by small reactors of about 80-100 MW electrical power capacity. As the basic requirements in any particular area grow, more of these small reactors can be installed together in a cluster to meet the demand. Such clusters can meet the overall power requirements of a village, and then of a district, and then of a division within a region.

The advantages of these small reactors are many. To begin with, the capital cost of one unit is much smaller than that of a large nuclear reactor. The infrastructural requirement to set up such a reactor is small, and the construction time is much shorter. In addition, these re-

Why Small Reactors?

While these large nuclear reactors imported from abroad will be able to close some of the power gap, they will do very little to help the rural situation. India does not have a national power grid worth mentioning. What it has instead are regional grids, and almost a third of India's population does not have access to grid power. Electrifying the whole country with grid power will take time, and the networks need to be built strongly, to withstand natural disasters.

actors can be set up almost anywhere, since the requirement for land, or cooling water, would be reasonably small. Besides providing power to the people who have none, electricity generated by these small reactors would also allow setting up of educational and healthcare facilities.

India is a water-short nation, but it has a huge coastline. In other words, it has access to unlimited amount of saline water, which, with the help of flash distillation using the heat of these reactors, can be converted into potable water. The Bhabha Atomic Research Center (BARC) has already exhibited success by implementing the flash distillation system near Chennai. Over the years, Indian planners and crisis managers have talked about a Peninsular river project. One part of the southern development project would consist of linking the Mahanadi, Godavari, Krishna, and Cauvery rivers by canals. Extra water storage dams would be built along these rivers. The purpose of this would be to transfer surplus water from the Mahanadi and Godavari rivers in the south of India. However, nothing much has seen the light of day yet, and it is anyone's guess when the actual interlinking would be done.

It is almost a certainty that in a water-short nation like India, states which have some surplus water in their rivers would object vehemently to such water transfer plans. Small reactors dotting India's coastline would vastly reduce water requirements of coastal states. The desalinated water could also be piped into the interior states such as Madhya Pradesh, Karnataka, and Chhattisgarh, to name a few, to meet their water requirements.

In addition, rural areas are, of course, the center of India's agricultural production, which is carted to the urban areas. However, with small reactors set up in the rural areas, producers would be enabled to use irradiators to enhance the shelf-life of their produce. According to Dr. Arun Sharma, head of the Food Technology Division, Bhabha Atomic Research Center, India's Department of Atomic Energy has set up two technology demonstration units for radiation processing of food and related products (see interview in last week's *EIR*). A Radiation Processing Plant at Vashi, Navi Mumbai has been operating since January 2000. It is a 30-ton-per-day unit capable of hygienizing spices and other dry ingredients, and is being operated by the Board of Radiation & Isotope Technology (BRIT). KRUSHAK (Krushi Utpadan Sanrakshan Kendra), at Lasalgaon near Nashik, is another technology demonstration unit being operated by the Food Technology Division, BARC, for sprout control in potato and onion and preservation of agricultural commodities. The unit has been operational since July 2003 and can process about five tons of onions per hour.

India's Advantage

Besides the necessity of developing rural areas to strengthen the nation and providing to generations to come a chance to contribute to the nation's needs, India has an inherent advantage, since it has developed the entire nuclear fuel cycle all by itself. India has produced a number of 235 MW heavy-water power reactors, which use natural uranium as fuel. What India needs to do now is to scale down the 235 MW reactors to the 80-100 MW range, while using the same technology to generate power and heat.

India is short of natural uranium. Hence, the Indian program was designed back in the 1960s to move on to developing thorium as the fissionable material. India has vast reserves of thorium, in the form of monazite on the beaches of the southwestern state of Kerala. India's future plans call for building 500 MW power capacity thorium-based nuclear reactors.

The agreement with the Nuclear Suppliers Group, however, has opened up to India an opportunity to get uranium from outside. Already South Africa has indicated its interest in supplying India with natural uranium, which contains about 0.7% of fissile U-235.

Using the imported uranium, India must move quickly to prototype an 80-100 MW nuclear reactor, and mass produce them. Buying these small reactors would be unwise, since India has developed the technology to build them itself.

As of now, no major reactor manufacturer has developed a line of small reactors, although Russia, France, South Korea, China, and Argentina are working on prototypes.

Such small reactors have a vast demand throughout India, Africa, China, and most of Central Asia, but the Indian authorities have seemed to ignore it Since the Indian expertise in the area is well-tested and about 40 years old, it is imperative for New Delhi to seize this opportunity to develop the rural areas. India's plan to utilize multi-dimensional nuclear power will truly be adequate only when the mass production of small reactors becomes a part of its overall nuclear program.