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By Jose Pedro Martins

[The author is a journalist in Sao Paulo. He has written several books on the environment and human rights, including Tierra Nuestra Prometida and Tierra Cantata--Una historia de la sostenibilidad. He writes for Lima-based Noticias Aliadas/Latinamerica Press and Brazilian publications, including Correio Popular and A Provincia.]

Various sectors of civil society began an offensive against the unexpected announcement by the government of President Luiz Inacio Lula da Silva that it would resume expansion of its nuclear-energy program. Minister of Mines and Energy Edison Lobao, who made the announcement, said the government plans to construct between 50 and 60 new nuclear plants in Brazil in the next 50 years. Lobao made the announcement Sept. 12 at Angra dos Reis, in the state of Rio de Janeiro, at the site where the Lula administration wants to finish the country's third nuclear plant.

The minister said that the Angra 3 plant, which could be ready in five years, will have a 1,405 megawatt capacity. Those in the Lula administration favoring nuclear energy base their arguments for this new strategy on the unreliable supply of natural gas from Bolivia, the need for the country to find new sources of energy to satisfy future demand, and world efforts to fight global warming.

"The problems in Bolivia are another reason we need to continue our nuclear program. The president considers the nuclear policy a priority for Brazil and Angra 3 is a personal decision of the president–-based on the opinion of the Conselho Nacional de Politica Energetica (CNPE)," said the minister. Lobao said that plans had been made to construct four new nuclear reactors, two in the southeast of the country and two in the northeast.

Given the ambitiousness of the Lula administration's plans, Labao's statements have contributed to strengthening the sectors of society that oppose nuclear energy and finishing Angra 3.

Greenpeace leading opposition to Angra 3

Resuming construction of Angra 3 is very controversial. Lawyers for the environmental organization Greenpeace-Brasil filed a civil suit in court charging that finishing Angra 3 is illegal.

Greenpeace's argument, as outlined by lawyer Fernando Furriela, is based entirely on Brazilian law. He pointed out that the legislation stipulates that construction of a nuclear plant must be authorized initially by the president and must be explicitly approved by the Congress, according to Article 49, paragraph XIV, of the 1988 Constitution.

The law authorizing the expansion of the "Almirante Alvaro Alberto nuclear plant [the official name of the plant in Angra dos Ruis], by constructing and operating a third unit" is Decree

75.870 of June 13, 1975, signed by then President Gen. Ernesto Geisel (1974-1979). However, this decree, as lawyer Jose Afonso da Silva pointed out in an opinion for Greenpeace, was rescinded by another decree by President Fernando Collor de Mello (1990-1992) in March 1991.

Furriela noted that the completion of Angra 3 has not been debated or approved by Congress, as required by the Constitution.

Government lawyers argue that the present Constitution was promulgated after the publication of Decree 75.870, meaning that it is still in effect. This civil suit by Greenpeace is being heard in the First Federal Court of Angra dos Reis.

Beyond the legal issue, finishing Angra 3 is also controversial for economic reasons. Construction of the plant had been planned since 1975--it was to be the second of eight nuclear reactors that the military government wanted to buy from Germany. The first plant at Angra dos Reis used US technology. In the Brazil-Germany agreement, the Angra 2 and Angra 3 reactors were to be acquired from Kraftwerk Union AG (SWU), a Siemens subsidiary.

With the rising costs for the nuclear plants and growing world opposition to nuclear energy, especially after the accident at Chernobyl in 1986, only the Angra 2 plant, which began operating at the end of 2000, is still operating. And Angra 3 is the only plant still slated for completion, although most of the equipment has been purchased and stored for years.

Other sources of energy available

Estimates are that completing Angra 3 will cost at least US$3.7 billion (7 billion reais). This is enough money, according to Greenpeace, to build a wind power plant with double the output of the third nuclear plant in Brazil and without the risk of accidents or the problems of waste disposal that exist even when nuclear technology is not used to produce weapons.

Also, with an investment of only 12% of the estimated cost to finish Angra 3, the national energy-conservation program (Programa Nacional de Conservacao de Energia Eletrica, PROCEL) has saved 5,124 MW, almost four times the capacity of the new nuclear plant.

There is no plausible justification for Brazil to follow the nuclear path, as ecologists and many scientists have pointed out, including Celio Bermann, a researcher at the Instituto de Eletrotecnica e Energia (IEE) at the Universidade de Sao Paulo (USP).

More than 70% of Brazil's energy comes from hydroelectric and renewable sources, and it is also a leader in technology for producing ethanol from sugar cane. The country has sunshine year-round, which lends itself to increasing solar energy, and Brazil has more than 7,000 km of coastline, strategic for producing wind energy.

Thus, Brazil would be able to satisfy its energy demands with renewable sources. Also, ecologists and scientists say that the nuclear-fuel cycle in Brazil is a perfect example that this source of energy is not as clean as its defenders claim when they hold it up as a principal weapon against global warming.

In Brazil, this entire, complex process requires operations in various states and countries for the two nuclear plants in Angra dos Reis to generate electricity. The uranium is extracted from

deposits in the region of Pocos de Caldas in Minas Gerais state and Caetite and Lagoa Real in Bahia state. Extraction will begin soon in Itataia in Ceara state.

After the mineral extraction, a process that produces much waste as the immense deposits in Caldas confirm, the uranium is purified and concentrated into yellowcake, a form of yellow-colored salt. Yellowcake is converted into uranium hexafluoride and then enriched in Canada and Europe. The uranium hexafluoride is converted into uranium dioxide powder at the centrifuge plant at the Nuclear Fuel Factory (Fabrica de Combustivel Nuclear, FCN) in Resende in Rio de Janeiro state.

The second phase is the production of uranium pellets, also at the FCN, which are then ready to integrate in the fuel for nuclear plants. Nuclear power plants produce nuclear waste. At present, high-level radioactive waste is stored principally in pools at the site of the Angra plants. And, to close the cycle, there is the shutdown (or dismantling) phase of the plants.

Bermann believes that Brazil must consider the challenge of how to dispose of the waste before thinking about finishing Angra 3, for example.

Throughout the cycle, an intensive use of energy is required to produce nuclear energy. A study by electrical engineer Ricardo Baitelo for Greeenpeace-Brasil evaluated what the carbon dioxide emissions in all phases of the cycle of producing nuclear energy at the Angra 3 plant would be. His conclusion was that the emissions would be, at a minimum, 148 grams per KW hour (g/kWh) and a maximum of 400 g/kWh. This is much greater than emissions from hydroelectric sources, which are between 20 g/kWh and 300 g/kWh, or solar panels (30 g/kWh to 150 g/kWh), or biofuels (40 g/kWh to 80 g/kWh), or wind (10 g/kWh to 50 g/kWh).

Greenpeace cites studies by the Oxford Research Group, which indicate that reducing greenhouse gasses by 50% would take 2,500 nuclear reactors of 1,000 MW, requiring the construction of three new reactors a month for 70 years--and the planet cannot wait that long to reduce the gasses that are causing global warming. Not to mention the amount of waste generated by this hypothesis, constructing thousands of reactors, putting future generations at risk for thousands of years.

Dangers cited in nuclear-energy cycle

The cycle of uranium in Brazil has also produced its human victims, another indication that nuclear energy is not that clean, and thus should be rejected as an alternative in a country with so many sources of clean energy, say organizations such as Gamba (Grupo Ambientalista da Bahia). The group has spent years accompanying the residents in Caetite and Laguna Real, the site of uranium-extraction operations in Brazil.

In April 2008, Greenpeace collected several water and soil samples from various sources related to uranium mining in Caetite. The samples were sent to Great Britain for analysis by an independent laboratory contracted by the Greenpeace laboratory at the University of Exeter, in the United Kingdom. The analysis showed that in samples 4 and 14, "both collected from drinking-water sources, the concentration of uranium detected is significantly higher than the limit established by the World Health Organization (WHO), 0.015 mg per liter." Greenpeace said that the results "do not allow specific conclusions to be drawn regarding the cause of the

contamination and the potential role of the mining operation...." Nevertheless, the organization suggested that it is "imperative and urgent that a comprehensive protocol for following the environmental impacts and effects on human health be developed and applied."

"There is a great carelessness in the INB [Industrias Nucleares Brasileiras, which operates the uranium deposits] toward the consumer," said health official Elenilde Alves Cardoso, resident of the community of Riacho da Vaca near the INB mine. "The company's presence has not brought benefits to the community, everything has been done in absolute secrecy, without listening to or informing the community," she said emphasizing that the Greenpeace survey has heightened residents' concerns.

The concerns are no less among the residents of Angra dos Reis, "There is a ton of manipulation of information," said Daniel Ramalho of the Sociedade Angrense de Protecao Ecologica (SAPE).

The lack of an evacuation plan for the Angra population, in case of an accident in one of the nuclear reactors, is one of the principal concerns of residents, of SAPE, and of scientists. Bermann noted that, among its most serious logistical problems, the Angra emergency plan uses the Rio-Santos highway that "in the perimeter of the city of Angra dos Reis has speed bumps to reduce the speed and the flow of traffic." In case of an accident, the highway would make a rapid evacuation very difficult. "The region also has many low-income houses and disadvantaged barrios," said the researcher.

Chernobyl 2

In sum, throughout the chain of uranium extraction and nuclear energy in Brazil, the figures are worrisome. And the country is still feeling the effects of the accident with a capsule of a cesium-137 in Goiania, capital of the state of Goias, on Sept. 13, 1987. On that day, two scavengers were exploring the site of the abandoned cancer clinic Instituto Goiano de Radioterapia, where they found a radiotherapy machine that contained a cesium-137 canister.

The two broke open the canister and thus came into contact with 19.26 grams of cesium-137, a white powder that, in the dark, glowed blue. The material was sold to a scrap-metal dealer, Devair Ferreira, who also came into contact with the powder and, thrilled with the way the material glowed, began to show it to family members and friends. As a result, about 50 of his family and friends were exposed.

Devair died in 1994, and his niece Leide das Neves died Oct. 23, 1987. She was seven years old and had eaten a piece of bread tainted with particles of the radioactive material. Four people died very soon after exposure and 60 others died later. More than 13 tons of radioactive waste was produced by contamination from the cesium, including clothing and construction materials.

Another person who had contact with the material was Devair's brother Odesson Alves Ferreira, a bus driver in Goinia. He still has scars from the tragedy on both hands. "Something of only 19 grams has caused all this tragedy for my family and so many others. What would happen with a major nuclear accident?" asks Odesson. Odesson is a member of the Victimas de Cesium-137, Goiania. It is a question that many sectors of Brazilian society are asking now that the

federal government is initiating an ambitious plan to build nuclear facilities in the country-an activity that has always been tightly linked to the military and historically shrouded by a lack of transparency.