

# Latin America Rethinks Nuclear Energy

By Eugenio Fernandez-Vazquez and Juan Pablo Pardo-Guerra | September 13, 2005

The nuclear power option once again is appealing to some opinion leaders in the hemisphere as an alternative to fossil fuels and looming energy crisis. After three decades of projects in the field, however, the problems and risks of nuclear energy in Latin America demand we think twice before venturing down this slippery road. Here we present a synthesis of the history of nuclear energy in the region and of the dangers that it entails.

In Venezuela, President Hugo Chavez announced on May 21 that his government will start to work on the research and construction of nuclear reactors for energy production. It is, he said, “one of the ways to diversify energy sources” and a possible solution to global warming and to the necessity to find alternatives to oil and other fossil fuels.

Around the time of Chavez’ declarations, U.S. environmentalist Stewart Brand declared, after years of opposing the nuclear option, that he had changed his opinion. “It is not that something new and important and good happened with nuclear,” he explained, “It’s that something new and important and bad has happened with climate change.”

Everybody is aware that the current energy situation is unsustainable in the medium term. The solution proposed by Chavez and Brand is, nevertheless, like covering one hole while digging another one. The danger resides in the fact that the nuclear hole is especially big and difficult to close, due to its environmental, economic, and geopolitical implications. It is also a solution that was already applied in Latin America, and failed.

## Nuclear Energy in Latin America: 4 Countries, 7 Facilities, 1 Failure

Three Latin American countries got on the nuclear bandwagon during the 20th century with some degree of success: Argentina, Brazil, and Mexico. (Cuba tried to follow the nuclear path but did not manage to start a successful program due to a lack of funds.) Today, these three countries face problems in some of their nuclear facilities and are considering closing them or have in fact already started to do so.

Argentina, regional pioneer in the field, started to build its first nuclear power plant, Atucha I, in 1964 and reached operational levels 10 years later. Afterwards, this

South American country built the Embalse facility, which entered into operations in 1984, and Atucha II, which has yet to be completed. Given that almost a quarter century has passed since the laying of the first stone and only 75% of the power plant has been completed, all points to its definitive cancellation. The final cost of this power plant would be on the order of \$1 billion.

After Argentina came Mexico. It began to build its only nuclear facility—Laguna Verde—in 1969, but did not manage to use the plant commercially until three decades later. Today, the Mexican government is considering dismantling it after 36 years of enduring a project that generates only 3.2% of the country’s electricity but represents 6.3% of the assets of the Federal Commission of Electricity, Mexico’s largest energy provider.

In 1974, Brazil joined the group when it started the construction of Angra I in the vicinity of Rio de Janeiro. Operations got underway in 1984. Construction began on Angra II in 1976, in the same complex as Angra I and with support from the German Federal Republic. In 1984 builders initiated Angra III, which has not been finished, will cost \$1.8 billion more than what has already been invested, and, like Atucha II in Argentina, will probably never go into operation.

## Pros and Cons of Nuclear Energy

The contentions of those who promoted the nuclear option in the region are quite different from those who promote it today. Back in those days, nuclear energy was deemed safer and cleaner. Today this position has been forgotten and the defense of the nuclear option orbits around the urgent need to stop greenhouse emissions and climate change.

Overall, there are several strong arguments in favor of nuclear energy. Backers argue that it brings more technological development than alternative energy sources; that



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it is a “proven” method for meeting large-scale energy demands, as in France, where more than 70% of the country’s electricity comes from reactors; that it provides a continuous supply of energy, unlike technologies such as hydroelectric and wind power that depend on environmental factors difficult to predict; that global stocks of uranium will outlive those of oil, solving the fuel supply problem in the medium term; and that the patterns of uranium dependency do not involve politically sensitive regions of the world, as happens with fossil fuels.

The supporters of the nuclear option forget, nevertheless, that a series of characteristics of nuclear energy require us to be highly cautious when dealing with atoms. First, it generates dangerous waste that is difficult to isolate, cannot be reprocessed by nature’s cycles, and lasts for several thousand years—therefore posing a tremendous threat to the environment and human health. Even though the conventional sources and methods used in electricity production generate residues that have to be managed, none of them pose as many risks as nuclear energy nor do they require such a long-term management program. (Plutonium disposition must contemplate prevention of leaks from containers and waste sites in a time frame of 100,000 years; in contrast, climate change remediation considers a time scale of hundreds of years.)

Second, nuclear energy is not entirely secure, as demonstrated by the accidents in Chernobyl and Three Mile Island. Though no energy source is inherently secure, an oil spill is not the same as a radioactive spill.

Third, as proved by Mexico and Brazil in Laguna Verde and Angra II, the construction, dismantling, and decommissioning of nuclear facilities is extremely expensive. In the case of Laguna Verde, for instance, it is estimated that the initial cost of dismantling it will be from \$500 million to \$1 billion.

Finally, and above all, nuclear energy is intrinsically linked to the shadow of nuclear proliferation, which humanity has sought to exorcise without success since the 1950s. Against all such efforts, the nuclear bomb is being reproduced throughout the world. In 1945, only the United States had the capacity to mount a nuclear attack. Today eight countries have joined the former club of one: The United Kingdom, France, India, Pakistan, Russia, Israel, and China have offensive nuclear capabilities—and no one is sure whether the nuclear programs of Iran and North Korea are heading in that direction.

Latin America has experienced these and other problems during the past quarter of a century. The first problems to emerge in the region were those of dependence on foreign technology and sending investment money abroad. The initial stage of a nuclear program, which aims to satisfy domestic electricity demand, requires a considerable investment—according to several authors, more than \$1 billion per reactor. In addition, a large part of the investment leaves the country to purchase technology abroad and hire or train technicians capable of maintaining stable operation. That’s because the nuclear energy market has been consolidated for several decades, creating very strict technological inertias.

The costs of research and development necessary for an endogenous nuclear program are prohibitive for most industrializing countries. Although Mexico had considerable technical and industrial resources in comparison to other developing countries in the 1970s, it had to rely on General Electric to build the two reactors at Laguna Verde. Brazil, after using technology from Westinghouse, had to import technology from the German Federal Republic. Not until a couple of years later did Brazil managed to develop its own competitive technology in the nuclear field.

Of the four Latin American countries that undertook nuclear programs, only Argentina managed to generate a critical mass of scientists capable of reducing dependency on foreign resources. The *murga*—as Jorge Sabato, father of Argentinean nuclear energy, called the group of technicians that he formed in the field—and their successors could carry on specialized activities that reduced the escape of knowledge and capital involved in the projects.

Accompanying the initial costs of the projects are the other expenses and risks in the rest of the nuclear fuel cycle, particularly in the management and utilization of the uranium that feeds the reactors. The nuclear fuel cycle is a series of complex and costly procedures that include the phases of extraction, purification, enrichment, exploitation, and reprocessing of the nuclear fuel.

Among the requirements for maintaining each step in the fuel cycle are sophisticated mining infrastructure, specialized capacities, an industrial basis for enrichment and reprocessing, and compliance with international safeguards. In addition, many non-quantifiable costs are derived from the pursuit of a nuclear program. The largest portion of these costs comes from the necessity to train personnel, to develop specific processes without diverting resources from other areas of research and development, and to generate a robust portfolio of alter-

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native energies. In a strategic long-term perspective, the alternatives are imperative because they are more sustainable and efficient than the conventional options and eventually can cover national energy requirements, thus relieving dependence on fossil fuels.

Nevertheless, the greatest cost and the most pressing challenge is that of nuclear proliferation. Even though Latin American countries live under the blanket of the Tlatelolco Treaty, which defines the region as a nuclear weapons-free zone, we must bear in mind that its de facto application did not occur until recently. Cuba and Argentina did not ratify the treaty until the mid-1990s and Brazil has had some confrontations with the International Atomic Energy Agency (IAEA) for not allowing inspectors to review its reprocessing and enrichment facilities. Brazil argued that it had to protect its technology, which allowed for enriching uranium 30% more than other countries could.

It is undeniable that undertaking a nuclear program conjures the ghost of the atom bomb. The technology used for a crude nuclear detonator is, in the opinion of many experts, little, if any. The complicated bit of the operation is obtaining highly enriched uranium or plutonium, both associated to some degree with the “peaceful” elements of the fuel cycle.

The 2005 Review Conference of the Non-Proliferation Treaty (NPT) recently dealt with this topic in New York. No international agreement was reached on mechanisms to control and eventually eliminate nuclear arsenals, evidence that the current regime on which peaceful nuclear energy development is based (and in which proliferation was banned) is tumbling.

The fundamental problem of this regime is the impossibility of enforcing the treaty and related international agreements. North Korea set a lamentable precedent in the regime. It was one of the treaty nations when it did not have nuclear capabilities or intentions to violate treaty terms. The moment its ambitions contradicted the NPT, the country simply abandoned the accord.

For Latin America, the erosion of the nonproliferation regime represents a challenge in the near future: Starting a nuclear program, even with peaceful aims, implies confronting international standards both tacit (i.e. scrutiny of other nations) and codified (verification mechanisms), which is increasingly costly in political terms. Nations choosing the nuclear energy path today would create tension with the existing nuclear sphere of influence. They would have to try and guarantee the security of their

facilities, entering a risky, costly, and intensive diplomatic game best avoided.

## New Society Demands Technological Innovation

From the triumph of the Worker’s Party in Brazil to the victories against the privatization of water in Bolivia, from factory production overhauls in Argentina to small farmers’ fight-backs throughout the hemisphere, the protagonists have shown they are willing to gamble on innovation in the social and economic realms.

The current situation surrounding the global energy crisis and its connection to anthropogenic climate change calls for a similar gamble on technological innovation and sustainability. In too many cases, alternative energy options, such as geothermal and wind, have been discarded with the argument that they have not been proven to work on a mass scale and are far from complete development. But the nuclear energy answer has left a trail of economic, social, and technological failures.

It is time to take the route of sustainability and integration. To generate enough energy to cover Latin America’s requirements, we have to undertake a process of integration of energy policies, which should include regional agreements on production and distribution similar to the energy ring announced by Mercosur for the extraction and distribution of natural gas.

This process requires a change of mentality not only in the administrative ranks, but also among all the actors involved in the development and exploitation of energy-related technologies, from scientists of regional research institutions to the producers of primary goods throughout the continent.

As a community of nations united by similar historical experiences, we must understand that nuclear energy—and conventional energy based on fossil fuels—is not cheaper or more efficient than alternative sources. On the contrary, exploiting the hydrologic potential of Latin America—probably the biggest in the world—along with the vast availability of coastlines, solar radiation, and active geothermal zones, is clearly a more sustainable option in environmental, social, and economic terms.

Pursuing the sustainable option would not only guarantee decentralized distribution systems that are ideal for the fragmented geography of the region, but it would also set the foundations for an unexplored industry and

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therefore open new investment niches and the possibility of endogenous economic growth.

If we avoid repeating the errors of nuclear power production and of rejecting fundamental innovation, we can find a solution to the problem of climate change, environmental degradation, and fossil fuel dependency, while guaranteeing equitable, sustainable development for Latin America.

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## FOR MORE INFORMATION:

Elementos para la discusión de la conclusión de Angra III: pros y contras | Luis Pinguelli Rosa  
<http://www.mma.gov.br/port/sqa/energia/docs/anexo3.pdf>

Article on Mexico's Laguna Verde nuclear plant in La Jornada | March 2005  
<http://www.jornada.unam.mx/2005/mar05/050313/020n1eco.php>

Mexico's Federal Electricity Commission  
<http://www.cfe.gob.mx/NR/exeres/2955F304-1D53-4A90-B40F-BE1BE30C1110>

Nucleoeléctrica Argentina (NA-SA)  
<http://www.na-sa.com.ar/>

Stewart Brand writes on nuclear energy in The Environmental Magazine online  
<http://www.emagazine.com/view/?2529>

Venezuelan President Hugo Chávez comments  
<http://www.gobiernoenlinea.ve/misc/alopresidente.html>  
<http://www.aporrea.org/dameverbo.php?docid=60908>

Tlatelolco Treaty  
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