

# Brazil

## 1. Location and capability of nuclear facilities

Brazil's research in the nuclear field began as early as the 1930s with nuclear fission research followed by the discovery of uranium deposits by mid-decade. Throughout the 1940s, Brazil's nuclear program grew, mostly through technology transfers from the United States. By 1956, Brazil decided to pursue an independent, indigenous program without control and oversight by the US. In 1965, Brazil built its first indigenous research reactor in Rio de Janeiro, though the US supplied the medium-grade enriched uranium and maintained strict control over their construction, in exchange for continued supplies of natural uranium to the US.

Brazil and Argentina embarked on a bilateral nuclear arms race in the 1970s and 80s. Through technology transfers from West Germany, which did not require IAEA safeguards, Brazil pursued a covert nuclear weapons program, replete with enrichment facilities (including a large ultracentrifuge enrichment plant and several laboratory-scale facilities), a limited reprocessing capability, a missile program, a uranium mining and processing industry, and fuel fabrication facilities.

By 1987, with Brazil able to enrich uranium to 20%, many predicted a Brazilian nuclear weapon by the end of the century. In 1990, President Fernando Collor de Mello symbolically closed a test site at Cachimbo, in Pará and exposed the military's secret plan to develop an atom bomb.

Through a series of agreements, Brazil and Argentina renounced their nuclear rivalry. On 13 December, 1991, they signed the Quadripartite agreement, at the IAEA headquarters, allowing for full-scope IAEA safeguards of Argentine and Brazilian nuclear installations.

<http://www.world-nuclear.org/info/inf95.html>

Brazil has the most advanced nuclear capabilities in Latin America, with a multi-faceted fissile material production program and the navy, air force and army involved in various sectors of its nuclear research and development program. Until 2009, Brazil plans to invest US\$8.2 billion annually to increase the capacity of generation of electric energy in the country. Currently, Brazil's two power reactors generate about 4% of the nation's electricity.

In May 2006, Brazil inaugurated its first uranium enrichment facility, which has actually been operating since 2004. Brazil has not permitted complete access to its centrifuges to the IAEA, claiming the need to protect proprietary information. In November 2004, the IAEA reached an agreement with Brazil on conducting safeguards inspections. Experts point out that Brazil's technological capability seems to be ahead of Iran's, yet Brazil's program has hardly been in the news, as the government has managed to assure the international community its intentions are industrial and commercial, not military.

<http://www.ens-newswire.com/ens/may2006/2006-05-08-04.asp>

<http://www.globalsecurity.org/wmd/world/brazil/nuke.htm>

<http://units.aps.org/units/fps/newsletters/2007/january/articles-panofsky.cfm>

### **Power Reactors**

Operational: 2

Planned: 7

<http://www.iaea.or.at/programmes/a2/>

<http://www.uic.com.au/nip95.htm>

<http://www.ens-newswire.com/ens/may2006/2006-05-08-04.asp>

### **Research Reactors**

Operational: 4

Planned: 0

<http://www.iaea.or.at/worldatom/rrdb/>

### **Uranium Mines**

Brazil embarked on systematic prospecting and exploration of radioactive minerals in 1952. From 1974 to 1991, the total amount spent in uranium exploration was equivalent to US\$150 million. Brazil has been producing uranium since 1982, with untapped uranium deposits believed to cover 50% of the Brazilian territory, which is home to the fifth-largest known natural reserves of uranium. Brazil has

known resources of 143,000 tonnes of uranium - 4% of world total.

<http://www.globalsecurity.org/wmd/world/brazil/nuke.htm>

<http://www.antenna.nl/wise/uranium/uosam.html#BR>

<http://www.uic.com.au/nip95.htm>

### **Uranium Enrichment and Reprocessing**

In 2004, an enrichment plant opened at Resende; production began in early 2004, though agreement on verification with the IAEA was not reached until November and the plant was not formally inaugurated until 2006. Until 2012, the plant will supply about 60% of the enriched uranium needed by Brazil's two nuclear power plants, and by 2015 the plant is expected to be supplying 100%.

The uranium enrichment program is partly operated and controlled by the Brazilian Navy, indicating possible military, as well as civilian applications. In their public statements, navy and civilian officials have suggested that Brazil sees uranium enrichment as a promising source of income that could ease those problems. The Brazilian Constitution bans the military use of nuclear energy.

<http://www.antenna.nl/wise/uranium/eproj.html#BR>; and <http://www.ens-newswire.com/ens/may2006/2006-05-08-04.asp>

In 1975, West Germany agreed to provide Brazil with a reprocessing plant, however, the facility was never constructed. [http://www.armscontrol.org/act/2005\\_10/Oct-Brazil.asp](http://www.armscontrol.org/act/2005_10/Oct-Brazil.asp)  
[http://www.armscontrol.org/act/2005\\_09/Fetter-VonHippel.asp](http://www.armscontrol.org/act/2005_09/Fetter-VonHippel.asp)

## **2. Fissile Material Holdings**

### **Irradiated plutonium end of 2003: 2.1 tons**

[http://www.isis-online.org/global\\_stocks/end2003/plutonium\\_watch2005.pdf](http://www.isis-online.org/global_stocks/end2003/plutonium_watch2005.pdf)

Highly Enriched Uranium end of 2003

In country: 0-0.0001 tons

Supplied by: US

[http://www.isis-online.org/global\\_stocks/end2003/civil\\_heu\\_watch2005.pdf](http://www.isis-online.org/global_stocks/end2003/civil_heu_watch2005.pdf)

### **Radioactive waste disposal**

Over the past 40 years, Brazil has generated about 14,000 cubic meters of nuclear waste, including material from nuclear power plants and medical use. A radioactive waste accident in 1987 in Goiânia, wherein 4 people died and at least 200 were contaminated, spurred greater care of radioactive wastes in Brazil.

<http://www.world-nuclear.org/info/inf95.html>

Nuclear waste is now disposed of in four temporary depositories owned by the National Commission of Nuclear Energy (CNEN). The government continues to explore options for the construction of permanent deposit sites for radioactive waste. <http://ehp.niehs.nih.gov/docs/2000/108-11/focus.html>

## **3. Nuclear Activities**

### **Research Centers**

CDTN: Centre for Nuclear Technology Development

CBPF: Centro Brasileiro de Pesquisas Fisicas

CENA: Centro de Energia Nuclear na Agricultura

IPEN: Institute for Energy and Nuclear Research

IEN: Institute for Nuclear Engineering

IRD: Institute for Radiation Protection and Dosimetry

LNLS: Laboratorio Nacional de Luz Sincrotron

Reator TRIGA IPR-R1

<http://www.radwaste.org/research.htm>

## **Nuclear Cooperation**

*US:* In 1940, President Getúlio Vargas signed an agreement with the United States for cooperative mining, including mining for uranium and monazite. During the 1940s, Brazil signed four agreements with the United States relating to mining and technology transfers.

<http://www.sipri.org/contents/expcon/cnsc2bra.html>

In 1955, Brazil signed a nuclear cooperation agreement with the United States, and in 1957 the Comissao Nacional de Energia Nuclear (CNEN) began operation of Brazil's first research reactor, which was supplied by the United States under the agreement.

<http://npc.sarov.ru/english/digest/22001/appendix8p1.html>

In June 2003, the United States Department of Energy and the Brazilian Ministry of Science and Technology signed a bilateral agreement jointly conduct research and development in the field of advanced reactor developments for future-generation nuclear energy systems; advanced reactor fuel and reactor fuel cycle-integration; life management and upgrading of current operating reactors; advanced fuel and material irradiation and use of experimental facilities; environmental and safety issues related to new reactor and fuel cycle technologies; and fundamental areas of nuclear engineering and science. [http://www.energetics.com/ineri\\_client/pdfs/Chap5.pdf](http://www.energetics.com/ineri_client/pdfs/Chap5.pdf)

*West Germany:* On 27 June 1975, West Germany agreed to supply Brazil with eight nuclear reactors, a commercial-scale uranium enrichment facility, a pilot-scale plutonium reprocessing plant, and Becker "jet nozzle" enrichment technology. This agreement was the first to ensure the transfer of technology for a complete nuclear fuel cycle, including enrichment and reprocessing. However, the deal collapsed before the reprocessing technology was transferred, the "Becker jet-nozzle" enrichment technology didn't work. Only one nuclear reactor was completed.

<http://npc.sarov.ru/english/digest/22001/appendix8p1.html>

[http://www.armscontrol.org/act/2005\\_10/Oct-Brazil.asp](http://www.armscontrol.org/act/2005_10/Oct-Brazil.asp)

*Russia:* In September 1994, Russia and Brazil agreed to cooperate in the development of nuclear energy, including nuclear safety. During talks in April 1995, the two sides considered the construction of small nuclear power plants in Brazil using low-capacity Russian reactors like those used on icebreakers.

<http://www.globalsecurity.org/wmd/world/brazil/nuke.htm>

<http://www-pub.iaea.org/MTCD/publications/PDF/cnpp2002/index.htm>

*Argentina:* Agreement in 1980 to cooperate in developing the nuclear fuel cycle; Joint Declaration of Nuclear Policy in 1985; Foz de Iguacu Declaration on Common Nuclear Policy in 1990 renouncing nuclear weapons and pledging to develop a system of safeguards; bilateral agreement in 1991 for the exclusively peaceful use of nuclear energy, creating the Argentine-Brazilian Accounting and Control Commission (ABACC) to verify implementation of the agreed-upon safeguards.

<http://www.wisconsinproject.org/countries/brazil/nuke-miles2004.html>

## **4. International Non-proliferation Efforts**

### **Treaties Signed and Ratified, date of deposit**

Antarctic Treaty, 16 May 1975

APM Convention, 30 April 1999

Biological Weapons Convention, 27 February 1973

Comprehensive Nuclear Test-Ban Treaty, 24 July 1998

Certain Conventional Weapons Convention, 17 October 1985

Chemical Weapons Convention, 13 March 1992

Convention on Nuclear Safety, 2 June 1997

Convention on the Physical Protection of Nuclear Material, 8 February 1987

Inter-American Convention on Transparency in Conventional Weapons Acquisitions, 28 Nov 2006

Nuclear Non-Proliferation Treaty, 18 September 1998  
Outer Space Treaty, 5 August 1963  
Seabed Treaty, 4 April 1988  
Treaty of Tlatelolco, 29 January 1968, Amended 30 May 1994  
Vienna Convention on Civil Liability for Nuclear Damage, 26 March 1993

Brazil has not yet signed the IAEA Additional Protocol.

#### **Multilateral Groups**

Conference on Disarmament  
Nuclear Suppliers Group  
Missile Technology Control Regime

### **5. Positions Taken in International Fora on Various Issues of Nuclear Disarmament**

*Non-proliferation:* "Horizontal proliferation is a real, serious concern. Parties to the NPT must take a sober look at current challenges to the regime and try hard not only to find ways to ensure compliance with its prohibitions, but also to make the Treaty universal. The threat posed by enduring nuclear arsenals is perceived by a large majority of NPT members to be at least as important as the risks of further proliferation. Non-proliferation efforts must, however, respect the basic and inalienable right of all States, to develop research, production and use of nuclear energy for peaceful purposes, without any discrimination and in conformity with applicable legal obligations." – **Statement at the 61st session of the General Assembly First Committee on Disarmament and International Security, 2 October 2006.** <http://www.reachingcriticalwill.org/political/1com/1com06/statements/Braziloct2.pdf>

*Nuclear Disarmament:* "Both individually and as a member of the New Agenda Coalition, Brazil has called upon the five Nuclear Weapon States to undo the effects of the nuclear proliferation they have engaged in through the accumulation of weapons, and hence to strive for nuclear disarmament. As other types of weapons of mass destruction - which are prohibited under their respective regimes - nuclear weapons should be completely eliminated. There should be no excuse for their use or for their indefinite possession; either for their development, or for their acquisition. The NPT is the main international instrument to achieving these ends." - **Statement by Ronaldo Sardenberg, Head of the Delegation, to the Seventh Review Conference of the NPT, 2 May 2005.** <http://www.reachingcriticalwill.org/legal/npt/RevCon05/GDstatements/Brazil.pdf>

*New Nukes:* "Although the NPT has no provision that expressly prohibits modernization of nuclear weapons and their means of delivery, the introduction of new weapon types and the announcement of strategic doctrines that tend to lower the threshold for the utilization of nuclear weapons run counter to the "unequivocal commitment" to full nuclear disarmament, and bypasses the "thirteen practical step" towards that goal adopted in 2000." - **Statement by Ronaldo Sardenberg, Head of the Delegation, to the Seventh Review Conference of the NPT, 2 May 2005.** <http://www.reachingcriticalwill.org/legal/npt/RevCon05/GDstatements/Brazil.pdf>