



Brazilian Nuclear Program

PRESENT and FUTURE

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TOPICS

- The Brazilian Nuclear Program (PNB)
 - The Brazilian nuclear area
 - Present Status
 - Strategic plan – The future
 - Program coordination
 - PNB Present status
 - Controversial aspects

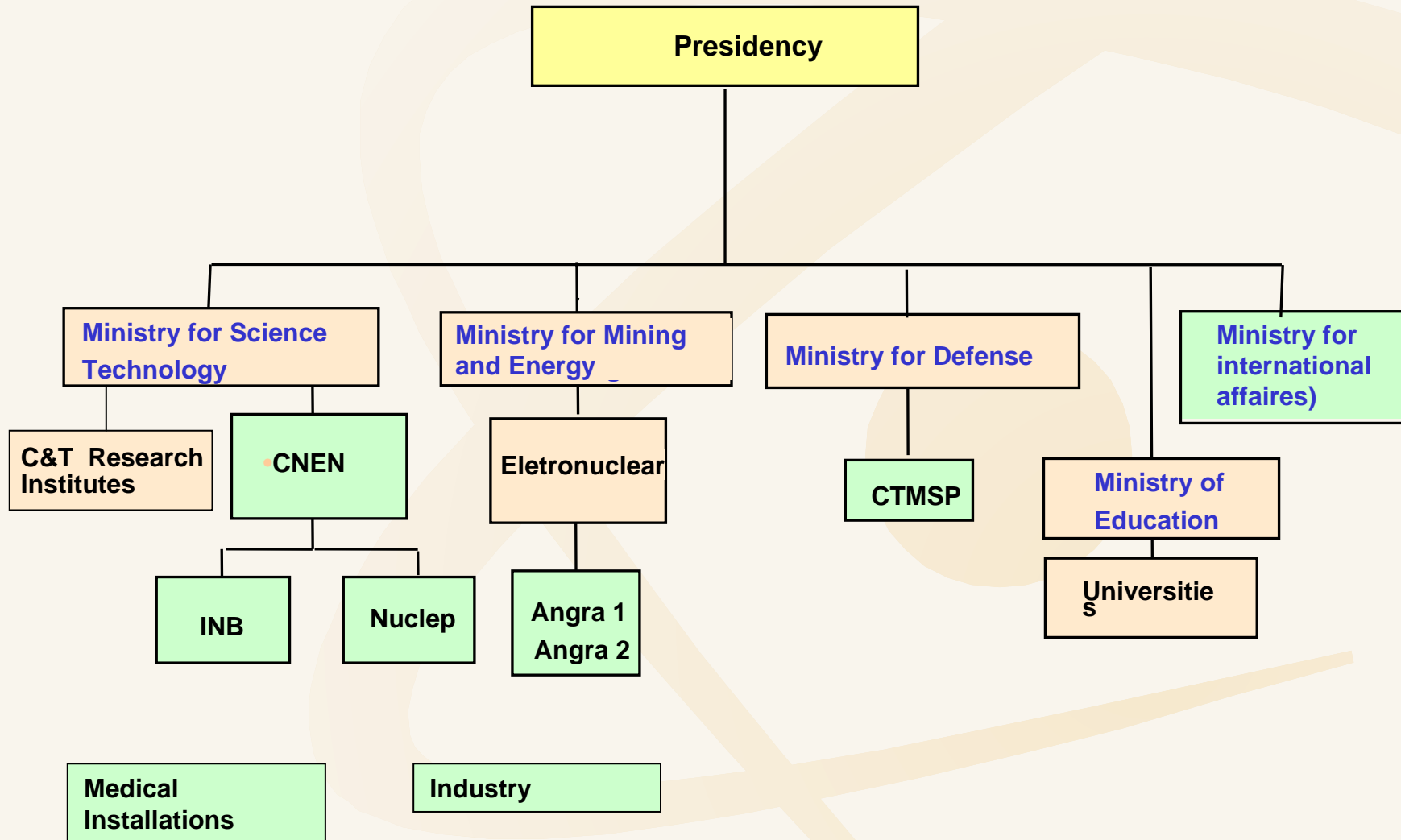


BRAZIL

- Population (2004): 180.000.000
- Area: 8,514,215 km²
- 12th economy in the world
- Electricity sector
 - Installed capacity: 75 GW
 - Hydro: 92,7%
 - Oil/gas(others): 4,8%
 - Nuclear: 3%



THE BRAZILIAN NUCLEAR AREA



FACILITIES

(Published in the Brazilian Reports for the Safety and Waste IAEA Conventions)

- 2 Nuclear Reactors
- 2 pools for temporary deposition of used nuclear fuel
- 3 temporary waste deposits for medium and low activity
- 4 High Intensity industrial irradiators
- 4 Research Reactors
- 3 Cyclotrons for radiopharmaceutical production (+ 2 in construction)
- 1 Synchrotron
- 5 Research Linear Accelerators
- ~ 25,000 sources in medical facilities for nuclear medicine
- ~ 30,000 sources used in industries

NUCLEAR POWER FACILITIES

- **ELECTRICITY PRODUCTION**
- **URANIUM MINING AND MILLING**
- **URANIUM ENRICHMENT**
- **UO₂ AND PELLET FABRICATION**
- **NUCLEAR FUEL FABRICATION**

* **Nuclear Energy represented 3% of installed capacity and 5% of energy production in 2004.**



NUCLEAR POWER PLANTS

- ANGRA 1 – 626 MWe - 2 loop PWR
In operation since 1981.
- ANGRA 2 – 1275 MWe - 4 loop PWR
In operation since 2001.
- ANGRA 3 – 1275 MWe - 4 loop PWR
in construction; expected to be ready in 2013

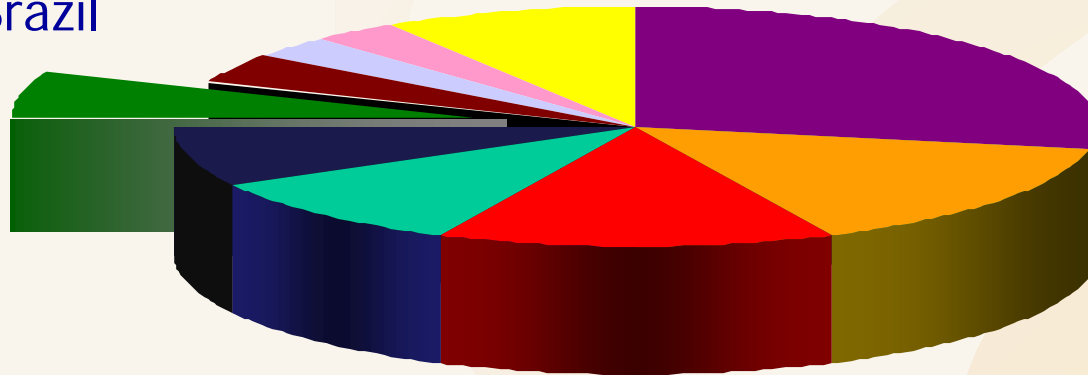
ANGRA SITE



Uranium around the World

Sources: OECD NEA & IAEA, 2001

Brazil



- Austrália = 28%
- Cazaquistão = 15%
- Canadá = 14%
- África do Sul = 10%
- Namíbia = 8%
- Brasil = 6%
- Rússia = 4%
- EUA = 3%
- Uzbequistão = 3%
- Resto = 9%

Brazil : Brazilian Uranium known reserves are around [309,000](#) tons, being the **6th largest in the world** . It corresponds to just **30%** of the national territory prospected until 100 m deep.

NUCLEAR APPLICATION FACILITIES

- 5 R&D INSTITUTES
- 4 RESEARCH REACTORS
- 3410 RADIOACTIVE INSTALLATIONS
 - 1100 INDUSTRIAL (including 6 irradiators)
 - 1390 MEDICAL
 - 675 RESEARCH INSTITUTIONS
 - 245 OTHERS (services/distribution)

STRATEGIC PLAN THE FUTURE

Since 2004 the Brazilian Government is studying the necessity and opportunity to launch a new program in the nuclear area, being this study conducted by MCT (through CNEN), MME and the Presidency, This program was developed following a methodology that involves all main institutions and comprises:

STRATEGIC PLAN - THE FUTURE

1- Establishing of some basic principles

- Peaceful uses and non proliferation
- Safety and Security
- Waste Management
- Human resources

STRATEGIC PLAN - THE FUTURE

2- Strategic goals

- Nuclear Energy – To reach the about 5.5% of the Brazilian electricity production in 2030,
- Fuel Cycle – Considering the uranium abundance in the country the Brazilian technical capacity, to reach in 2030 100% of the national fuel demands
- Application – To continue to invest on C&T in the nuclear applications as medical, industry and agro business to reach self sufficiency in 5 years.
- National technology – To do our best efforts to maintain and develop domestic capacity

STRATEGIC PLAN - THE FUTURE

3- Specific goals (overview)

- To Finish Angra 3
- To build between other 4 and 8 new reactors of 1,000 MW to be settled in 2 or 3 sites
- To invest in all areas of fuel cycle but the reprocessing: prospecting, oaring and mining, conversion, enrichment, reconversion and fuel assembly
- To invest in all areas of nuclear application
- To Increase the regulatory capacities to face the new necessities

STRATEGIC PLAN - THE FUTURE

3- Specific goals overview)

- To perform a comprehensive review of the legal framework of the nuclear activities and regulatory system
- To reassure international duties relating to safety and security
- To invest in Developing and Research in Nuclear Science and Technology, including fusion
- To launch supporting programs in Universities and Research Institutes in order to attract new scientists, engineers, students and other human resources to the nuclear area
- To create a national waste management company to deal with the waste of all kind and to establish final depositories in 10 year

PROGRAM COORDINATION

•Last February a Inter Ministerial committee was formed with the incumbency of coordinate the management of the Brazilian Nuclear Program. This committee is composed by:

- Secretary of Government
- Minister of Mining and Energy
- Minister of Science and Technology
- Minister of Defense
- Ministry of Industry and Commerce
- Ministry of Economy
- Ministry of Planning
- Ministry of Environment
- Secretary of Institutional Security
- Secretary for Strategic Policy

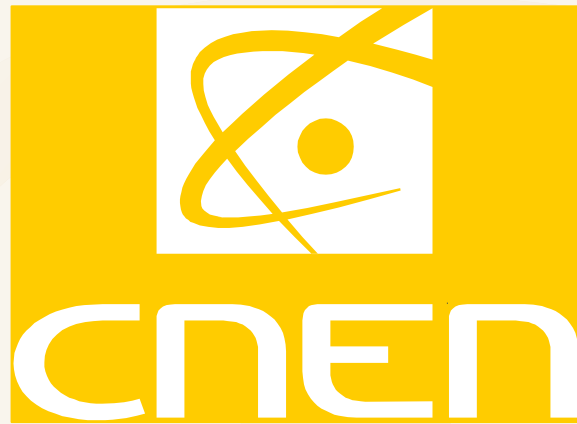
PRESENT STATUS

• Apart from the ratification of the decisions already made by the MME for the thermo nuclear energy generation (ELETRONUCLEAR), by the MCT for the fuel cycle (INB), regulatory aspects, waste management, and research and development (CNEN) and by the MD for the enrichment plant it was decided to create a new Regulatory Body, a new agency, still linked to the MCT. It was also decided to implement a special policy for providing human resources and new capacities necessary for such an ambitious program

CONTROVERSIAL POINTS

- **Uranium export policy**
- **Monopoly in the fuel cycle**
- **PNB structure**

The recent agreement between Brazil and Argentina implies a revision in some of the PNB actions in order to avoid duplication of efforts and resources.



Thank you

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