Tucuruí Hydropower Complex in Brazil

by William Webb CVEN 5838

Tucuruí Hydropower Complex at a Glance

- The Tucuruí Hydropower Complex is located on the lower Tocantins River in northeastern Brazil.
- 4th largest hydropower complex in the world, based on generation capacity.
- Tucurui has the capacity to generate 70% of all the electric power produced in Northern Brazil.
- The complex was built with the primary goal of producing hydropower and the secondary goal of providing a navigable river route – both combined were hoped to stimulate the local economy.
- Tucuruí is not used as a source of irrigation.
- Eletronorte provided 45.7% of the funding and the rest was from foreign banks and international credit agencies.


VENEZUELA
COLOMBIA
SURINAME
FRENCH GUIANA
GUYANA
ATLANTIC OCEAN
Ilha Bathina
MANAUS
Curua-Una
Tucurui Dam
BELÉM
FORTALEZA
RECIFE
SALVADOR
Samuel
Serra Da Mesa
PERU
BOLIVIA
PARAGUAY
BRAZIL
BRASILIA
BELO HORIZONTE
RIO DE JANEIRO
SAO PAULO
Area of Detail
Araguaia/Tocantins River Basin
Amazon River Basin
Dams and other engineering works
National Borders

Objectives of the Project

- Initially, the objective behind the construction of the hydropower complex was to provide electricity for the town of Belém and the surrounding region.
- This primary focus was later changed to providing power for the electro-metallurgical industry in the region.
- The secondary focus was the installation of two locks to ensure that the river from Belém to Santa Isabel was navigable – mainly for transporting ore and other natural resources.

Technical Description

- In total, 12,515 m of dam wall was constructed to form the reservoir.
- Formed by flooding a land area of 2,850 km^2
- The reservoir has a total volume of 45.5 km^3
- Has a useful reservoir volume of 32 km^3
- Tucurui has a maximum spillway capacity of 110,000 m^3/s.
- Tucurui has 23 turbines and the capacity to generate a max annual electricity production of 21 TW-hrs = 21 million MW-hrs.

Cost of Construction

Table ES.2: Timeline of estimated costs for the Tucuruí complex

(billion US$)	Feasibility study (1974)	Basic Design (1975)	Revision (1978)	Revision (1979)	Revision (1980)	Revision (1981)	Actual Cost (1986)
Without IDC	3.6	4.3	3.8	2.5	3.2	4.7	5.5
With IDC	4.2	5.8	4.3	2.9	3.7	5.4	7.5

- Built in 2 Phases: Nov. '75 – Nov. '84 and June '98 – Dec. '02.
- Total cost, with the interest during construction came to $7.5 billion (with a design estimate of $5.8 billion).
- After factoring in the cost of the power lines necessary to connect Tucuruí to the power grid, the total rises to $8.77 billion.
- In accounting for the IDC, there was a 76.6% cost overrun.

Effects on the Ecosystem

- The neo-tropics of the Amazonia are one of the most richly diverse ecosystems on the planet.
- Studies on the chosen site, prior to construction, showed that the area was home to 294 types of birds, 117 species of mammals and some 300 species of fish – many of which are endangered.
- Studies following the filling of the reservoir found that the quality of water decreased, fish mortality rates increased and mosquito populations exploded.
- The study also showed that substantial amounts of green house gases were being emitted from the reservoir – but still less than diesel, heavy oil and coal burning.

Notable Consequences

- Studies found that numerous impacts on the health of the surrounding populations resulted from the construction.
- During the construction phase masses of migrant workers settled in around the construction site, resulting in a local increase in alcoholism, STD's and AIDS.
- In 1984, the malaria outbreak peaked at 10,126 cases.
- In 1980, 410% of live births died before completing one year of age.

Benefits of the Project

- Over 90% of the electricity produced in Brazil comes from hydroelectric power, some argue that the national debt would be much higher without this saving on the costs of importing fossil fuels.
- When taking into account all of the monetary costs vs the power generated (US $58), and comparing this to the national average price for energy (US$70), the project is profitable.
- Growth rates for the communities near the dam site were very high during the construction period.

Any Questions?

flogtucuruí

sandro@fourminds.com.br