



BRAZIL

THE FUTURE OF NUCLEAR POWER

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INTRODUCTION

- The 1973 oil crisis – The importance of the hydroelectric sources
- The need for thermal energy to complement hydroelectric production

FIRST NUCLEAR POWER PLAN

Angra 1

PWR - 600 Mwe

- Brazilian and Westinghouse participation
- Selection of Contractors for Civil Construction and M-E Erection

- THE SECOND UNIT – ANGRA 2
- BRAZILIAN – GERMANY AGREEMENT
- NUCLEAR PROGRAM AND TECHNOLOGY TRANSFER

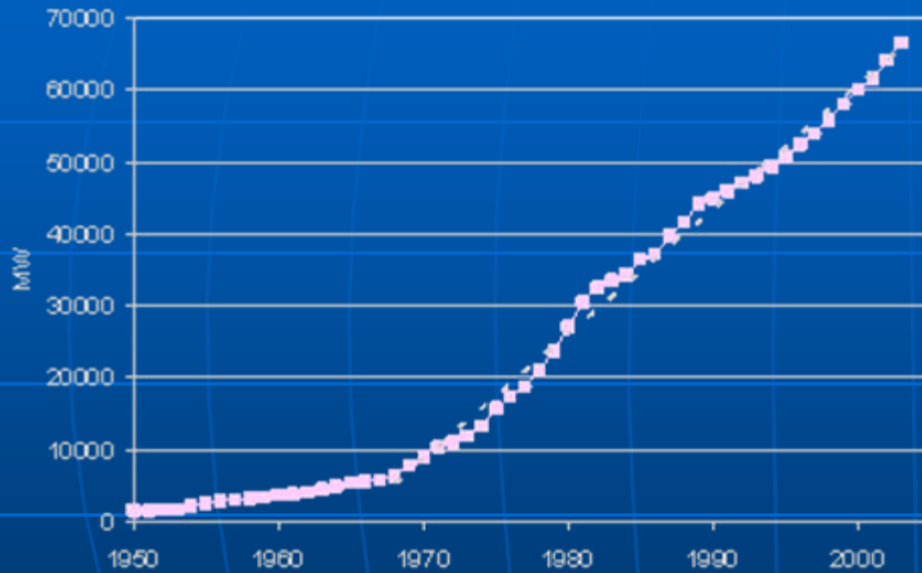
BRAZILIAN INFRASTRUCTURE

- Engineering, Design, Construction – Eletronuclear
- Manufacturing of Heavy Components – Nuclep
- Uranium Enrichment by ultra centrifuge and manufacture of fuel rods – INB
- Uranium Reserves – Measured – 300.000 t with only 30% of the territory prospected
 - Estimated – 600.000

- IMPLEMENTATION OF THE COMPLETE NUCLEAR FUEL CYCLE
- STRATEGY TO SUPPLY FUEL TO NUCLEAR PLANTS

Summary of the Electric Matrix Evolution

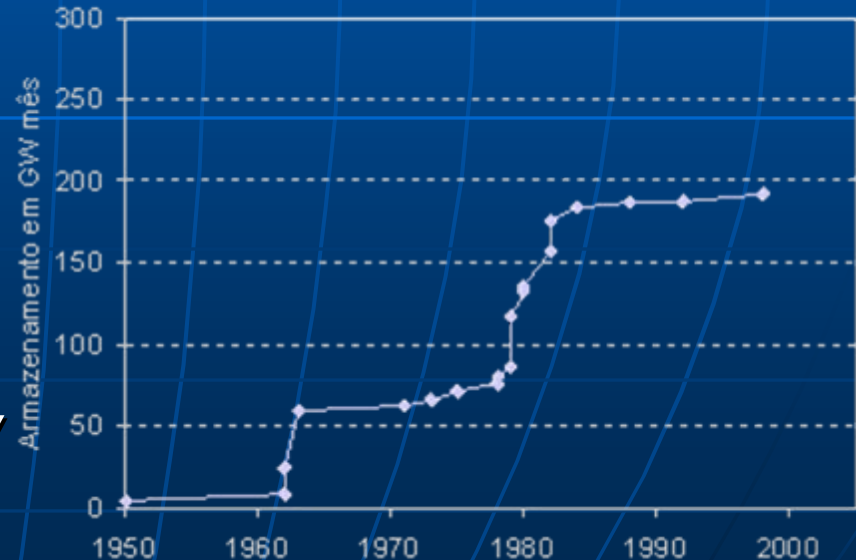
Potência Hídrica Instalada



Growth of Hydroelectric Installed Capacity

No Proportional Growth in Storage Capacity

Capacidade de Armazenamento
(Usinas Representando 75% do Armazenamento Total)



Trend of Hydraulic Potential Development in Brazil

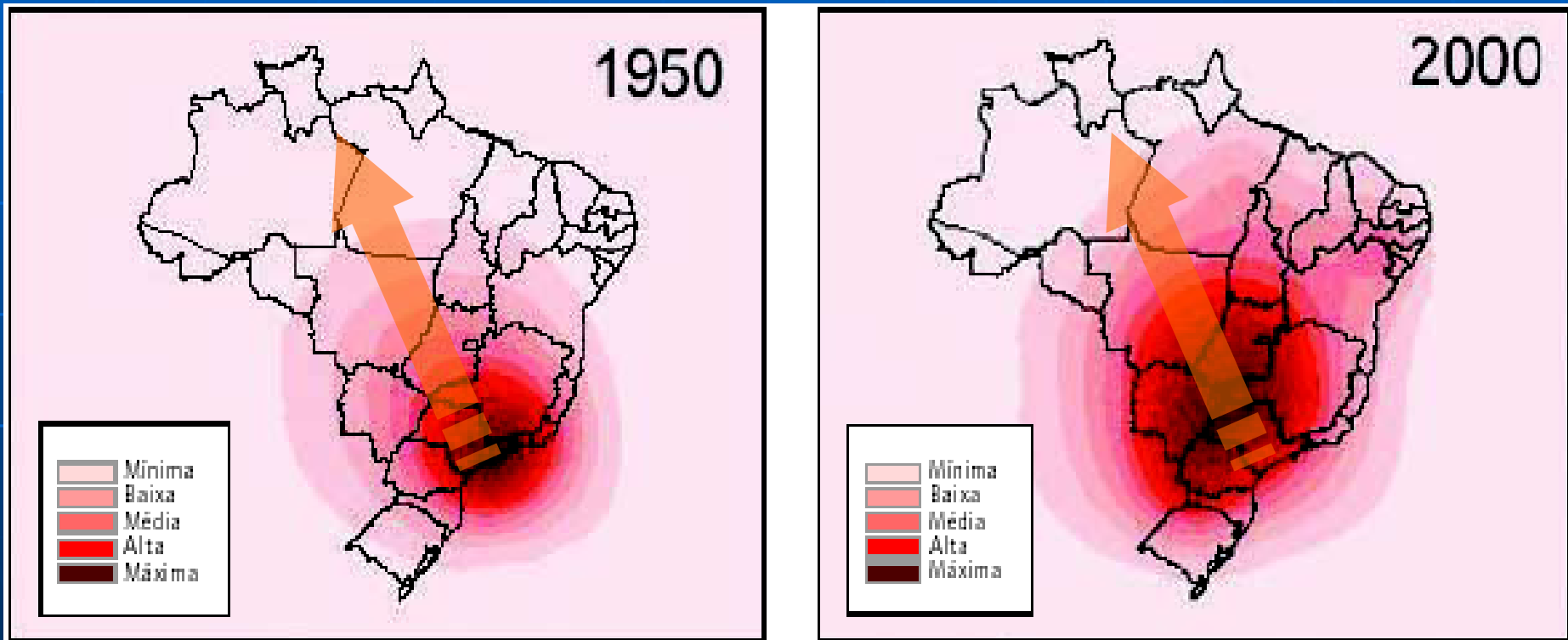
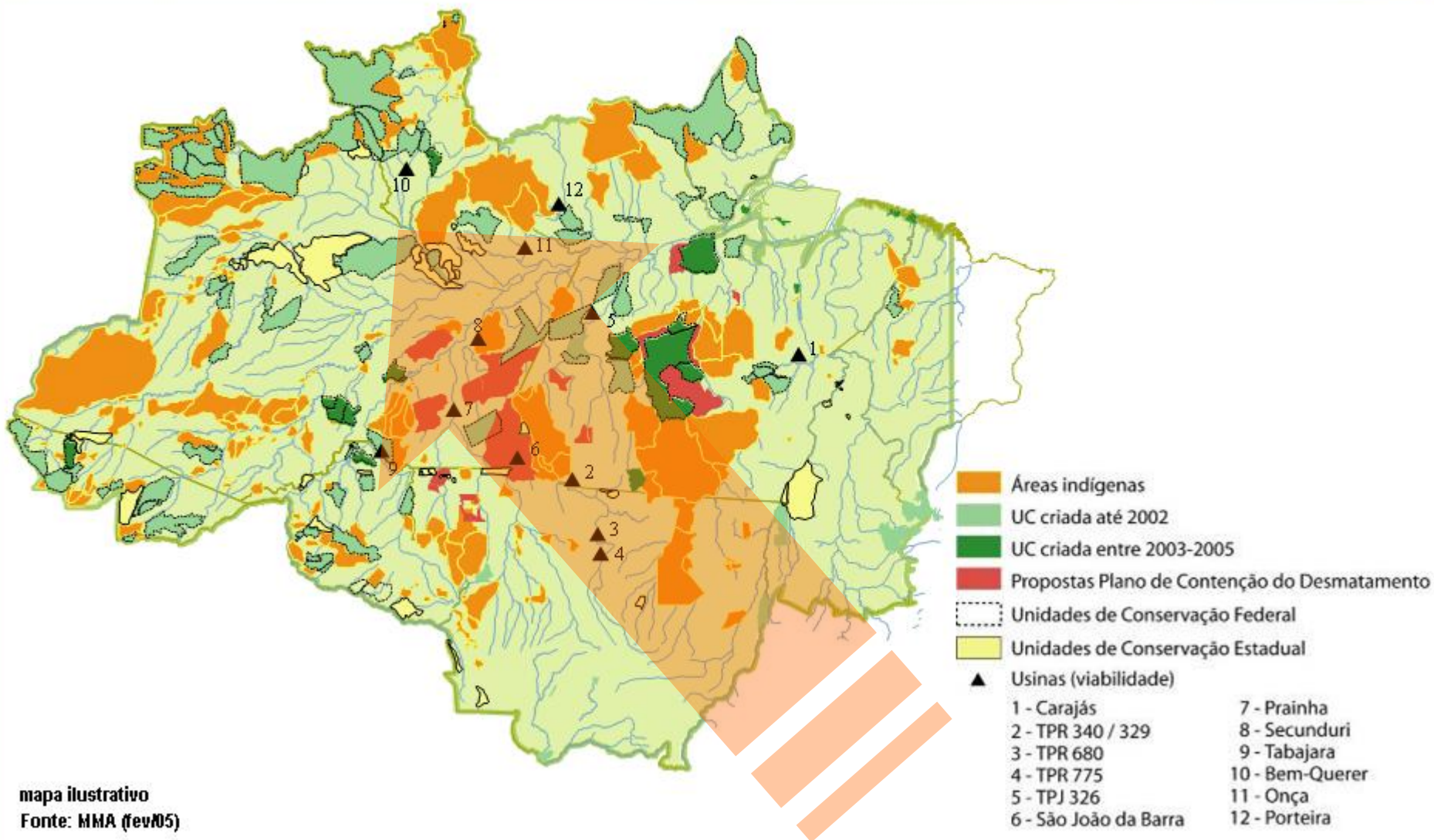


Figura 3.13 – Evolução da concentração das usinas hidrelétricas no Brasil (1950 e 2000)

EVOLUÇÃO DAS ÁREAS DE PROTEÇÃO

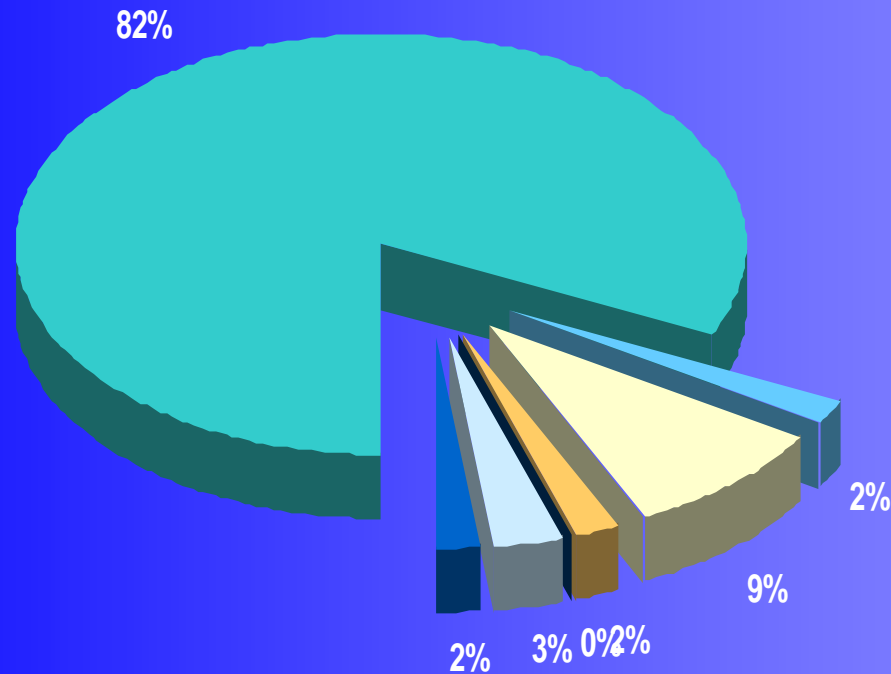


mapa ilustrativo
Fonte: MMA (fev/05)

Electric Matrix - Mwe Installed

2005

(Renewable: 84%)

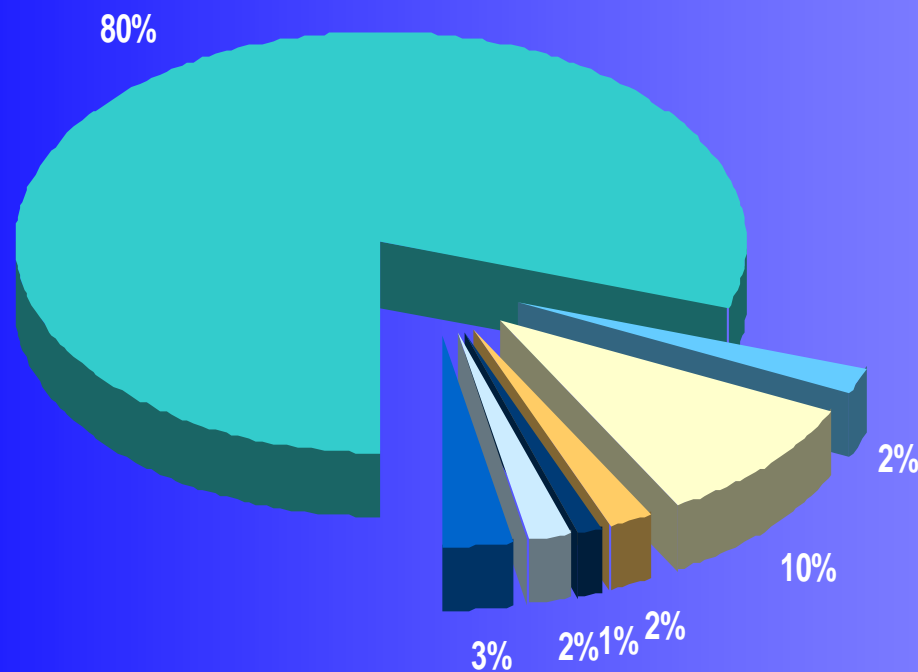


- Hydroelectricity (including small hidro plants)
- Thermolectricity (Coal)
- Thermolectricity (Natural gas)
- Thermolectricity (Nuclear)
- Biomass
- Thermolectricity (Oil by Products)
- Wind and others

Electric Matrix - Mwe Installed

2015

(Renewable: 83,7%)

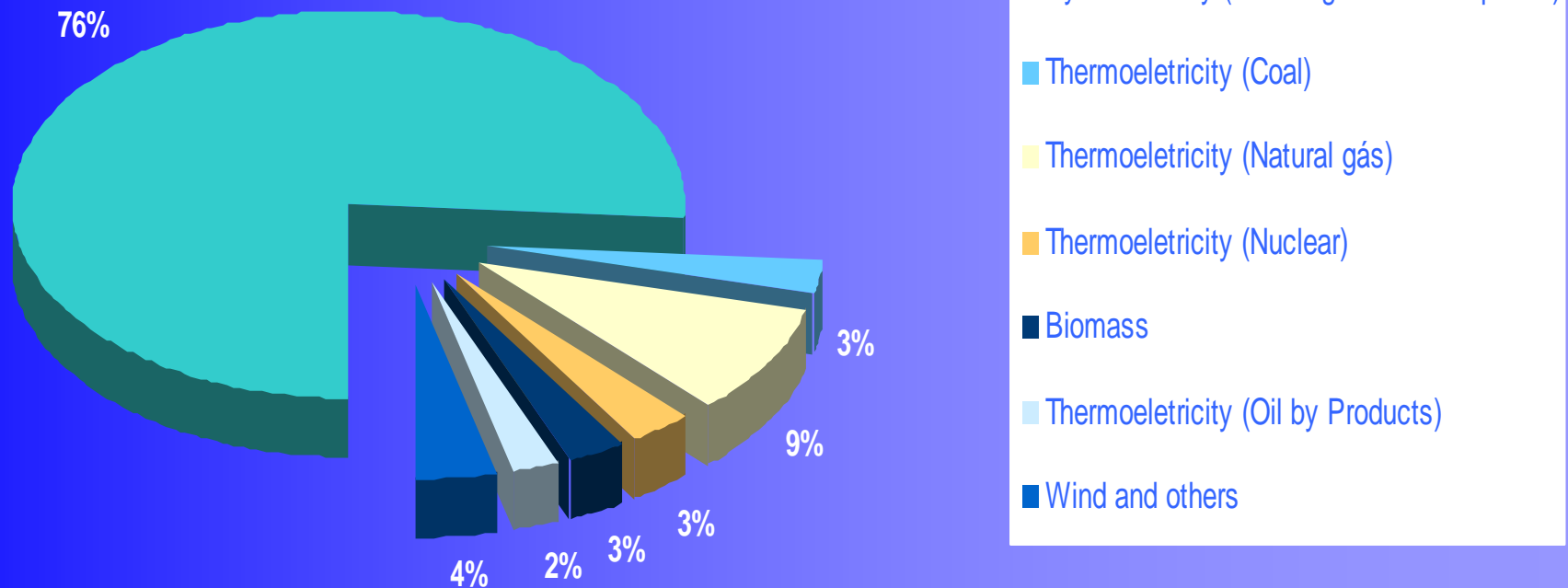


- Hydroelectricity (including small hidro plants)
- Thermolectricity (Coal)
- Thermolectricity (Natural gas)
- Thermolectricity (Nuclear)
- Biomass
- Thermolectricity (Oil by Products)
- Wind and others

Electric Matrix - Mwe Installed

2030

(Renewable: 83,1%)



ELECTRIC POWER PRODUCTION (Gw)

Source: Ministério de Minas e Energia

Sources	2005	2015	2030
Hydroelectric	68,6	99,0	156,3
Thermal	16,9	24,3	39,9
Natural Gás	8,7	13,0	21,0
Nuclear	2,0	3,3	7,3
Coal	1,4	2,5	6,0
Others	4,8	5,5	5,5
Alternatives	1,4	5,5	20,3
Small Hidroelectric Plants	1,3	2,3	7,7
Wind	-	1,4	4,7
Biomass	0,1	1,8	7,9
Import + Others	13,6	13,3	8,4
TOTAL	100,5	142,1	224,9

Summary of the Electric Matrix Evolution

- *Hydroelectricity will continue to be the main generation source among others.*
- *Renewable participation is kept around 83% high enough compared with the world average of 20%.*
- *Studies indicate the need of expansion through thermal sources operating on basis, with emphasis on coal and nuclear.*
- *Mineral coal increases from 2% to 4%.*
- *Nuclear participation progresses from 2% to 3%.*

UNTIL 2030

Three Sceneries

- LOW – 4.000 Mwe
- REFERENCE – 6.000 Mwe
- HIGH – 8.000 Mwe

AFTER 2030

- Exhaustion of Hydroelectric Potential
- Speed up of Thermal Program (Nuclear and Coal)
- Alternative sources
- Electrical Energy Efficiency Program

CONCLUSIONS

- Need of Nuclear Production in Brazil.
60.000 Mwe nuclear power plants up to 2060, statement of Mines and Energy Minister.
- Increase in the Uranium Production and due to Government monopoly, joint venture with private participation, is a must.
- Participation of Private Utilities Owning and Operation of Nuclear Power Plants and commercialization of the electricity produced.