

# PETROBRAS – Business & Environment

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## GLOBAL ISSUES: THINK GLOBALLY

- Globalization, liberalization, technology advances
- Global stakeholder empowerment
- Social accountability“CNN world”Climate change

## ENERGY TRENDS

### Primary energy use per capita (1997)

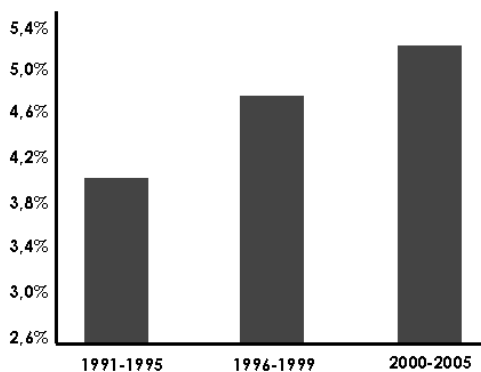
- Latin America: 47 Gigajoule
- North America: 272 Gigajoule
- OECD Europe: 141 Gigajoule

### Annual growth rate (1990 – 1997)

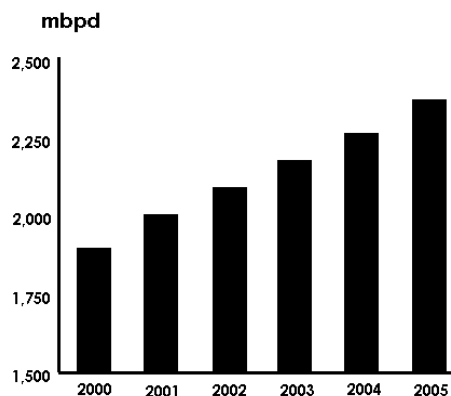
- Latin America: 2.1%
- North America: 0.5%
- OECD Europe: 0.5%

## BRAZIL'S PETROLEUM AND NATURAL GAS DEMANDS

**Brazil's Demand Growth Rates**



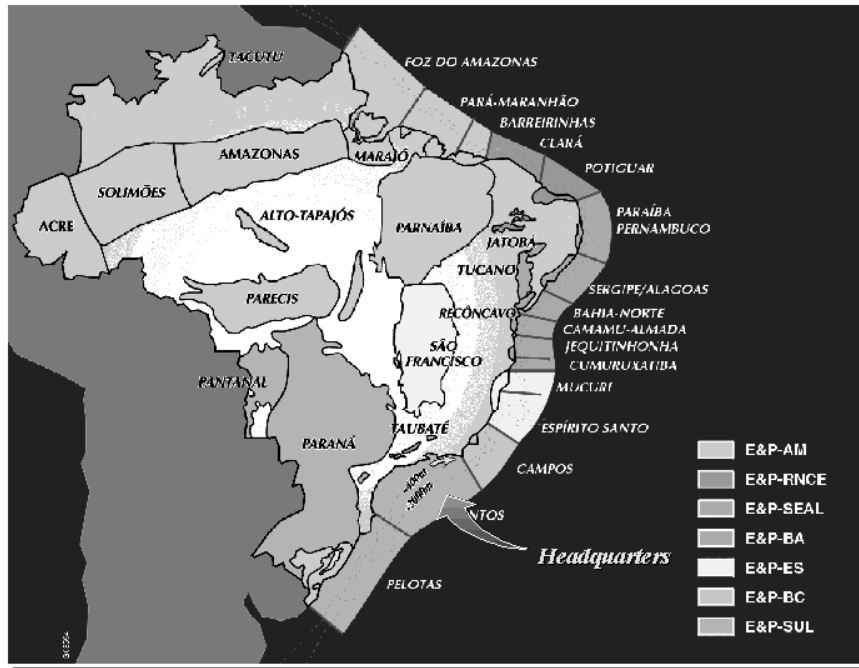
**Brazil's Demand Forecast**



**PETROBRAS REFINERIES**



**PETROBRAS E&P**



**PETROBRAS OBJECTIVES AND POLICIES**

Petrobras objective is to reach international standards of excellence in environment, health and safety practices, minimizing operational risks, investing in environmental conservation, promoting career progression and operating under the principles of sustainable development.

## PETROBRAS INTERNATIONAL



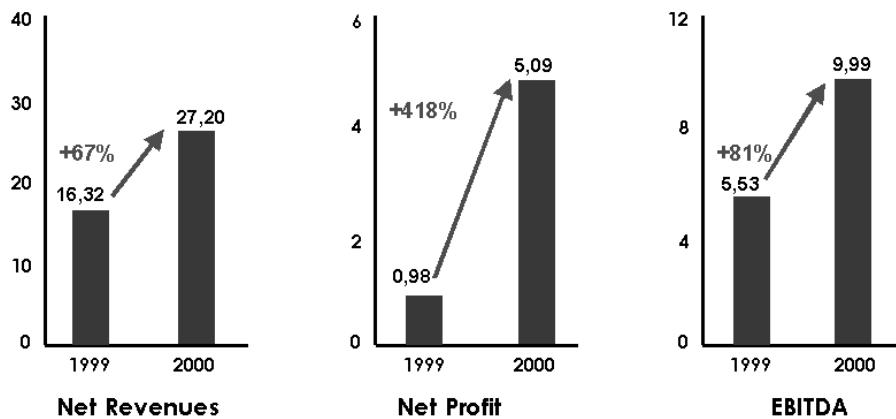
## SUSTAINABLE DEVELOPMENT PROGRAMME

### MAIN OBJECTIVES

- To give support, monitoring and evaluation of the Company's operations, aiming at business sustainability
- To establish sustainability criteria to be applied in project evaluation, including CDM eligibility

## PETROBRAS FINANCIAL DATA

US\$ billion



## **PETROBRAS HIGHLIGHTS**

- OTC AWARDS
- Offshore Technological Conference
- Formula 1 Gasoline

## **ENVIRONMENTAL PROTECTION**

- Development of environment preservation and management strategies for Pantanal biosphere (US\$ 0.7 MM)
- Monitoring of Guanabara Bay hydric pollution (US\$ 0.6 MM)
- ISO 14001/BS 8800-OHSAS18001 certification  
35 units certified in Brazil
- PETROBRAS SO<sub>x</sub>, NO<sub>x</sub>, VOC, CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and PM emissions inventory  
Top down inventory based on fuel consumption relative to 1990 – 1998: already concluded

### **Environmental education projects**

- US\$ 0.6 MM invested in 2000

### **Atlantic Forest Project (US\$ 0.4MM)**

### **TAMAR Project**

- 3 million turtles released
- US\$ 0.3 MM invested in 2000

## **SOCIAL RESPONSIBILITY**

### *“Programa de Criança” Project*

- 4,000 needy students
- US\$ 1.2 MM invested in 2000
- *“Leia Brasil” Project*
  - 600,000 students and 16,500 teachers
  - US\$ 0.7 MM to be invested in 2001
- *“Caravana PETROBRAS da Cultura” Project* 95 shows and 228,000 spectators during 2000
  - US\$ 0.5 MM invested in 2000

**PROGRAM OF EXCELLENCE ON ENVIRONMENTAL AND OPERATIONAL SAFETY**

To guarantee the operational safety of Petrobras facilities, minimizing the environmental risks and contributing to sustainable development.

- Investment: US\$ 1.3 billion
- 3,000 Projects
- Conclusion 2003

**CLIMATE CHANGE AND THE PETROLEUM INDUSTRY**

**UN Convention on Climate Change (1992):**

- greenhouse gas emission reduction targets established

**Petroleum industry challenge:**

- non-renewable resources
- Energy consumption in processes

**Positive Agenda:**

- emission reduction
- energy conservation
- alternative energy sources viabilization

**PETROBRAS ACTIONS**

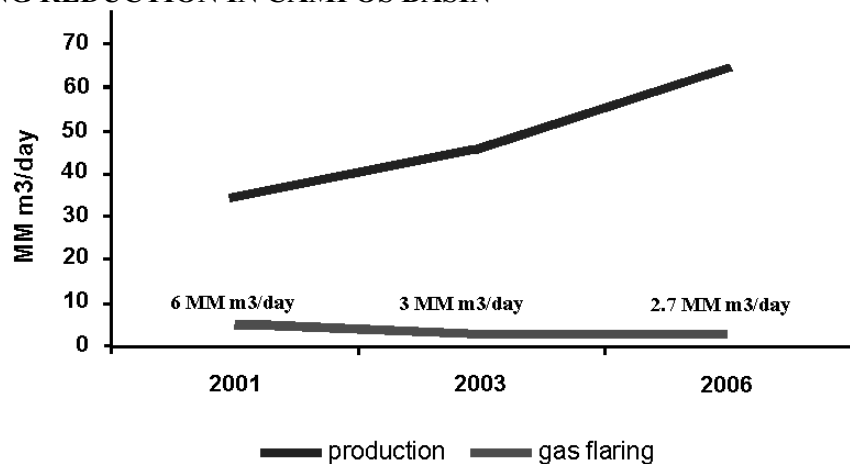
PETROBRAS Energy Conservation Programme

- 1992 - 2000: 4 MM tons of CO<sub>2</sub> emission avoided

FRONAPE (National oil tankers fleet) Programme

- 1994 - 2000: 0.6 MM tons of CO<sub>2</sub> emission avoided
- • Photovoltaic systems already installed - 50 kW

**GAS FLARING REDUCTION IN CAMPOS BASIN**



**2003 forecast: 2 Mtons a year of CO<sub>2</sub> emission avoided**

## **BRAZIL'S NATIONAL PROGRAMME FOR RATIONAL USE OF NATURAL GAS AND PETROLEUM PRODUCTS**

### ***ECONOMIZAR Program - 1997/2000*** Ministry of Mines and Energy / Petrobras/ National Transportation Confederation

- 21 states
- 5,500 companies
- 61,132 vehicles
- 150 MM liters a year of diesel oil consumption reduction
- 400,000 tons a year of CO<sub>2</sub> and 11,000 tons a year of particulated matter emission avoided

Mobile monitor units availability:

- 2001: 40; 2003: 80.

Investments:

- Petrobras (1997 to 2001) – US\$0.4 MM
- Partners (1997 to 2000) – US\$0.9 MM

### ***SIGA BEM Project - 1995/2000*** Ministry of Mines and Energy / Petrobras/ National Transportation Confederation

- 22 states
- 103 service stations
- 150,000 inspections
- Engine consumption diagnosis
- Diesel oil quality check
- Economic driving guidance
- 44% of inspected trucks showed excessive consumption, corrected with simple interventions
- 15% diesel oil consumption reduction

## **ALTERNATIVE AND RENEWABLE ENERGY**

PETROBRAS Energy Business Unit

- Gas and Energy Research, Development and Engineering Management at PETROBRAS R&D Center

- US\$25MM a year to be invested in renewable energy

### **NATURAL GAS**

- 2005 Natural Gas Prospective:
  - PETROBRAS supplying 70 MM m<sup>3</sup> a day and producing 45 MM m<sup>3</sup> a day;
- Vehicular natural gas:
  - 660 MM m<sup>3</sup> a year through 250 supply stations;
  - 312 MM m<sup>3</sup> a year supplied by PETROBRAS, through 140 supply stations
- **Gas to Liquids** technology development for natural gas processing

### **RENEWABLE ENERGY SOURCES**

#### **BIODIESEL**

- Research on the use of esterified vegetal oils as diesel alternatives
  - Pure biodiesel as fuel for diesel motor-generators in remote regions
- Use of a diesel blend in conventional diesel engines

#### **BIOMASS**

- Generation of electric power from natural gas and bagasse on sugar cane processing plants
- São Paulo State:
  - 50 cane processing plants, 60% of Brazilian ethanol production;
  - Total potential power 1,000 MW;
  - 2 MM ton a year potential CO<sub>2</sub> emission abatement.

#### **WIND POWER**

- Wind power potential evaluation in selected Brazilian regions (27,000 MW estimated total of Brazilian wind power potential)
- Installation of three pilot wind farms in Brazilian Northeastern, Southeastern and Southern regions (9 MW total power capacity)

#### **SOLAR ENERGY**

- Electrical power production through solar heated fluid thermal machines (30 MW estimated power)
- Photovoltaic electrical power production at PETROBRAS R&D Center and two service stations (50 kW power)

- Replacement of electrical water heating systems by solar powered units at facilities and service stations (electric energy savings of 4,000 kW, 8,400 MWh a year).