

**XXV BRAZIL – GERMANY BUSINESS MEETING (XXV
ENCONTRO EMPRESARIAL BRASIL–ALEMANHA)**

PETROBRAS' Experience in Energy Efficiency Projects

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A Brief History

Since the first oil crisis (1973) PETROBRAS has been developing two different strategies to face the challenge for supplying the market with oil byproducts:

1. Decrease the internal oil consumption in its refineries improving energy efficiency in the processes, e.g.: installing air pre-heaters in all distillation furnaces; enhancing steam condensate collection; installing vacuum pumps in distillation towers, etc. All these improvements still remains in operation and others are nowadays under development.
2. Began its off-shore exploration.

All these initiatives were well succeed.

- **Producing and Consuming power causes environmental impacts**
- **The sustainability is possible, only depending on**
 - » Public policies
 - » Individual habits changes
 - » Companies initiatives

Energy Efficiency

GHG Mitigation

CO₂ Emissions to be avoided

- “82% may be obtained by means of **energy efficiency** actions in the production processes and energy end use”
 - 45% in end use
 - 34% in power generation
 - 3% in CO₂ capture and storage arising out of fuels transformation
- 7% with the use of a fuel mix in the industrial sector and buildings
- 5% in the industrial sector CO₂ capture and storage
- 6% in transportations.

Source: Gurria, Angel, OECD 2006

IMPROVING ENERGY EFFICIENCY IS OFTEN THE CHEAPEST, FASTEST AND MOST ENVIRONMENT-FRIENDLY WAY TO BRING NEEDS AND SUPPLIES INTO BALANCE.

RAISING ENERGY EFFICIENCY ALSO REDUCES THE NEED TO INVEST IN ENERGY-SUPPLY INFRASTRUCTURE.

MANY ENERGY EFFICIENCY MEASURES ARE ECONOMIC: THEY WILL PAY FOR THEMSELVES OVER THE LIFETIME OF EQUIPMENT THROUGH REDUCED ENERGY COSTS.

WIDESPREAD DISSEMINATION OF BEST PRACTICE AND TECHNOLOGIES ALSO HELPS REDUCE LOCAL AND REGIONAL AIR POLLUTANTS, AS WELL AS GREENHOUSE-GAS EMISSIONS.

Source: WEO/2006 - IEA

CONPET

**NATIONAL PROGRAM FOR THE RATIONAL USE OF OIL
AND NATURAL GAS BYPRODUCTS
(Supported by Petrobras)**

Apparatus Labeling

Labeling

Classifies all models

Energia (Gás)	
Fabricante Marca	FOGÃO A GÁS ARCEPE VIGOR
Modelo Tipo de Gás	9000 GLP
QUEIMADORES DA MESA Mais eficiente	A
Menos eficiente	
RENDIMENTO MÉDIO - %	61,5
FORNO	
VOLUME INTERNO - litros	43,0
CONSUMO DE MANUTENÇÃO - litros	0,128
Classificação quanto ao consumo	A B C D E
<small>A: mais econômica E: menos econômica</small>	
 Regulamento Brasileiro Para o Uso do Etiqueta Nacional de Conservação de Energia Centro de Apoio e Promoção e Recomendações de Uso Instruções de instalação e recomendações de uso, teste e manual do aparelho. Informações técnicas para o consumidor IMPORTANTE: a instalação desta unidade deve ser feita em conformidade com o código de normas de conservação	

CONPET Label

To the most Efficient



Energy Efficiency Act 10.295

Requires Minimum Levels of Efficiency

Domestic Stoves

In 10 years, the average efficiency increased from 50% to 60%

400 Models were

Estimate for 2008:

Efficiency for CONPET Label

from 61% to 62%

Minimum Efficiency under the Law from 52% to 56%



Water Heaters

60 Models were Labeled As For Today

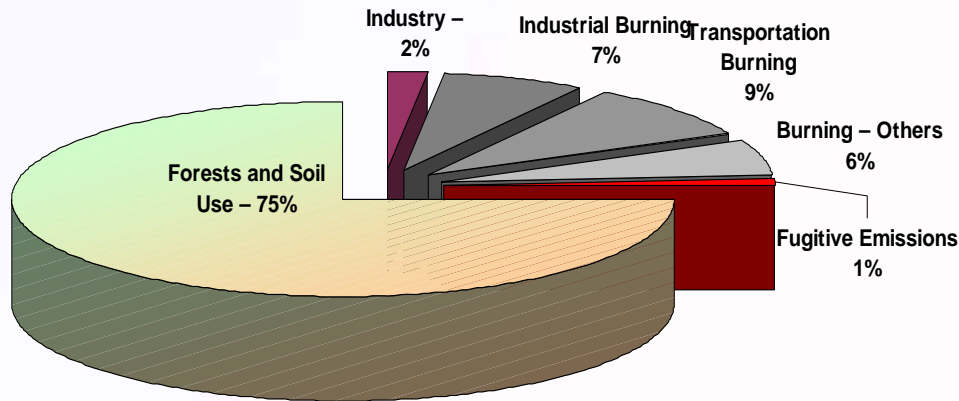
Efficiency for CONPET Label - 82%

Minimum Efficiency under the Law

In 2008, from 72% to 54%

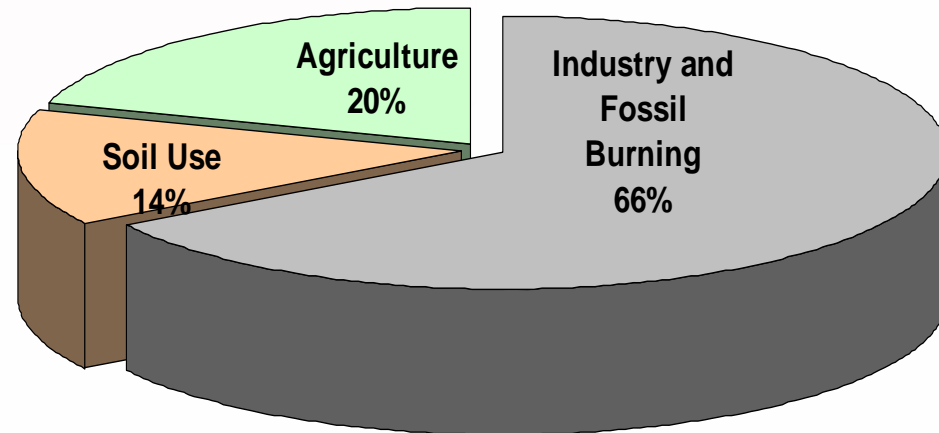


BRAZIL



Greenhouse Gases (GEE) Inventory

WORLD



Source: Ministry of Science and Technology (MCT
Convenção-Quadro), Brazilian National
Communication to Framework Convention, 2004

Course of Action

- **Management**
- **Research and Development**
- **Follow-up of Energy Efficiency Projects**
- **Follow-up of Energy Conservation Commissions (CICEs)**

Management

- **Promote the Qualification in Energy Efficiency**
 - **Courses**
 - **Production Plant Energy Efficiency**
 - **Speed variators in centrifugal pumps**

- **Disclose the Best Practices in Energy Efficiency**
 - **Intranet Website**
 - **Petrobras Energy Conservation Internal Week**
 - **Newsletter**

- **Energy Efficiency Projects Management – GPEE**
 - **New Projects database**
 - **Follow-up of projects performance in progress**
 - **Energy Efficiency project disclosure**

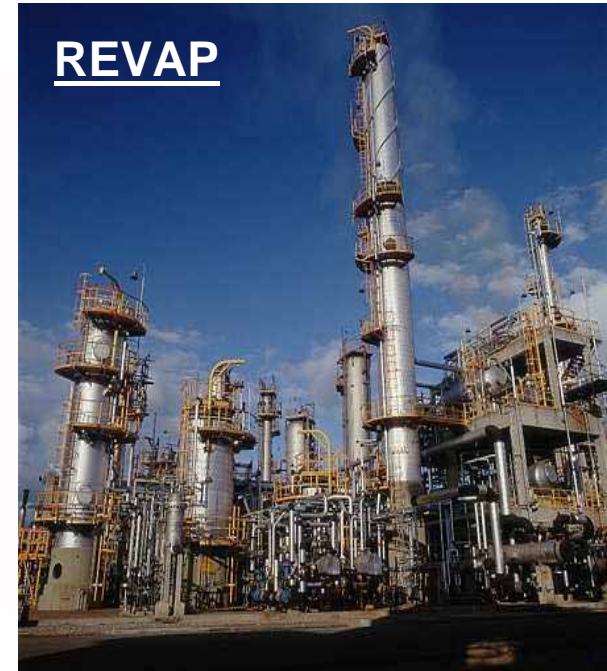
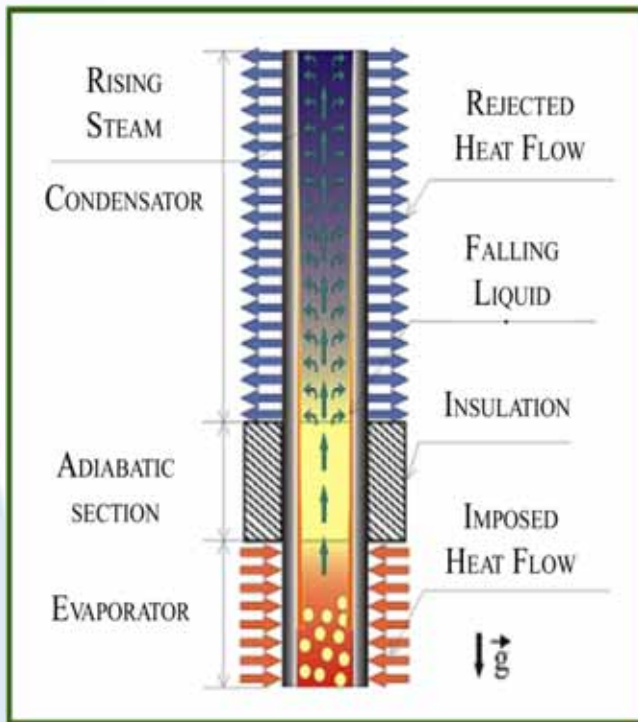
- **Energy Internal Consumption Database**

R&D Projects

■ LUBNOR

■ Project ASFALTER

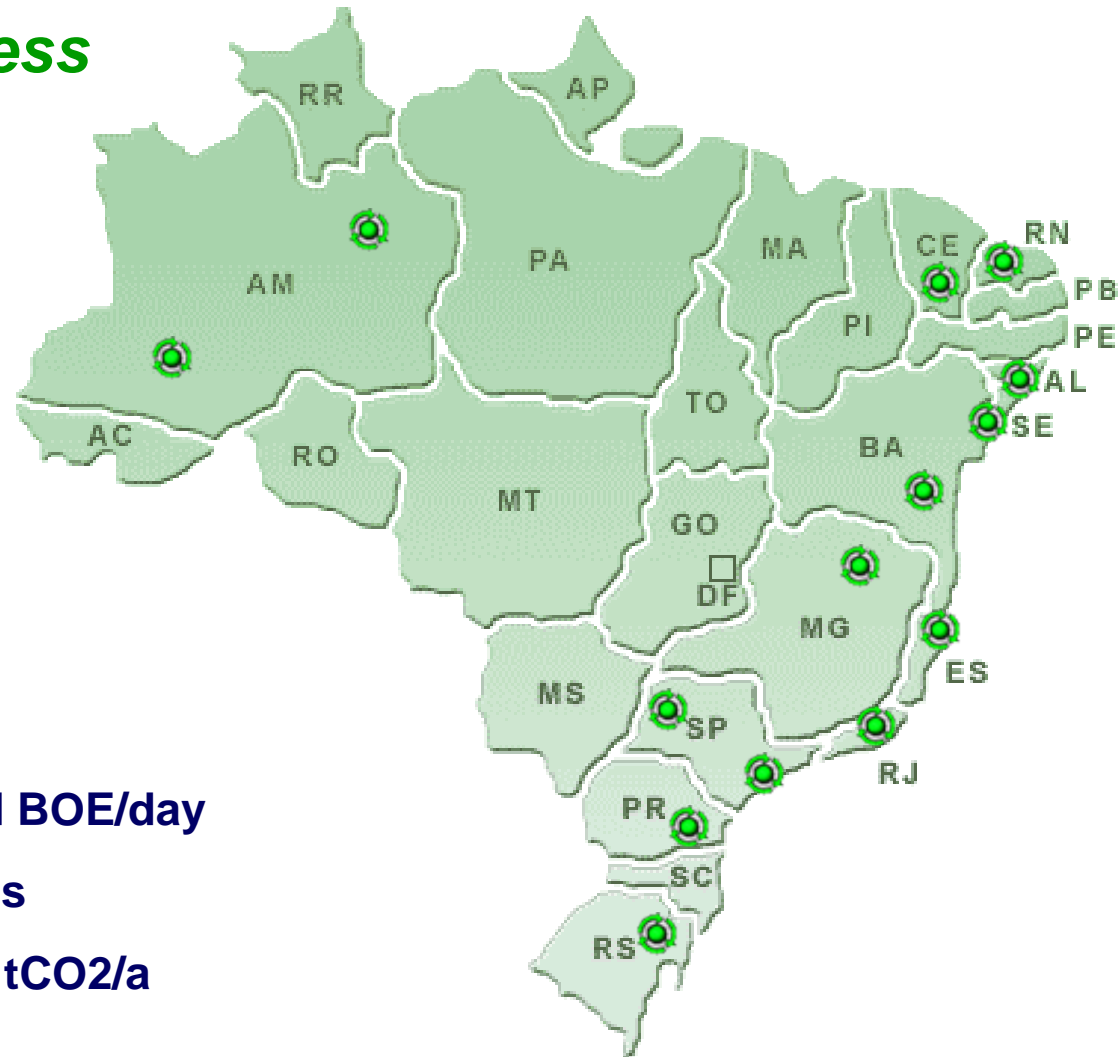
- Heating of asphalt tanks with heat pipes, replacing the steam heating



• PETROBRAS/AB

- Energy Analysis and Methodological Assessment in 5 units
 - Energy Diagnosis
 - Energy Efficiency studies dealing with the environmental aspect

Projects in Progress



- **Investments**

- US\$ 273 million

- Energy savings

- 884 thousand BOE/day

- Avoided emissions

- 583 thousand tCO₂/a

REPLAN – Turbo Expander

- **Scope**
 - Use the fuel gases energy of FCC unit to the generation of power, currently lost in a light-tight chamber
- **Investment**
 - US\$43.3 million
- **Generated Energy**
 - 14.4 MW
- **Avoided Emissions**
 - 49 thousand tons of CO2 per year
- **Completion estimate term**
 - 2 years
- **Status today**
 - In progress, procurement of equipment

REDUC

- **Scope**
 - Improve the thermal exchange between currents to be cooled and heated, using the Pinch technology
- **Investment**
 - US\$10.6million
- **Energy Economy**
 - 10.385m3 OCPE/year
- **Avoided Emissions**
 - 37.8 thousand tons of CO2 per year
- **Completion estimate term**
 - 3 years
- **Status**
 - It depends upon the UU -1210 unit stoppage estimated to 2010

Transpetro/SP

- **Scope**
 - Installation of speed variators in 3 pumps of high power, replacing the control made by valves restraining the post-pumping flow
- **Investment**
 - US\$850 thousand
- **Energy Economy**
 - 1,769 MWh/y
- **Avoided Emissions**
 - 460 tons of CO2 per year
- **Completion estimate term**
 - 8 months
- **Status**
 - Equipment supply contract execution

Increase in Recovery Of Energy in Distillation Unit V - RPBC

- **Scope**
 - Promote the thermal exchange between currents to be cooled and heated, using the *Pinch* technology
- **Investment**
 - US\$ 16.65 million
- **Energy economy**
 - 23 thousand tons of oil per year, because of a furnace deactivation
- **Net Present Value (NPV)**
 - US\$ 24.98 million
- **Avoided Emissions**
 - 73.4 thousand tons of CO2 per year



**This Project Won
Two Prizes of Energy
Efficiency in 2006**

**Energy Efficiency
Prize (FIESP) and
National Prize
Energy Conservation**

Cogeneration of Energy in Fazenda Alegre UN-ES

- **Scope**
 - Cogeneration of energy, replacing the steam generation in conventional boilers and purchase of power provided by concessionaire
- **Investment**
 - US\$ 16.1 million
- **Installed Power**
 - 3MW.5MW
- **Net Present Value (NPV)**
 - US\$ 1.4 million
- **Avoided Emissions**
 - 2 thousand tons of CO2 per year
- **Generation**
 - 30 t/h of steam to inject in oil wells

Future Projects

UNIT	Investment 10 ³ R\$	Net Present Value 10 ³ R\$	NG Economy m ³ /d	Fuels Economy boe/day	EE Economy MWh/y	Avoided Emissions tCO ₂ /y
TRANSPETRO	29,650	26,230	57,600	380	11,500	46,300
E & P	126,000	149,744	731,500	4,824		551,500
REFINING	147,205	134,460*	-	2,166	162,800	221,740
G & E**	438,085	6,000	1,640,000	10,816	-	650,000
PETROBRAS TOTAL	740,940	316,434	2,431,266	18,186	174,300+	1,469,540

Note:

* Four projects being reassessed

** Two UTEs – combined cycle implementation – Três Lagoas/MS and Canoas/RS

+Equivalent to 105,625.8 boe/year or 293.4 boe/day

THANKS

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