



Petrobras Brazilian Oil-Gas & Biofuels

Opportunities and Challenges

Innovation in renewable energies in Brazil

Workshop on Environmental Innovation and Global Markets

**OECD – Organisation for Economic Co-operation and
Development**

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Energy Efficiency Management
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***Management Challenges
New Strategic Projects Focusing***



Vision 2020

We will be one of the five largest integrated energy companies in the world and the preferred choice among our stakeholders

Mission

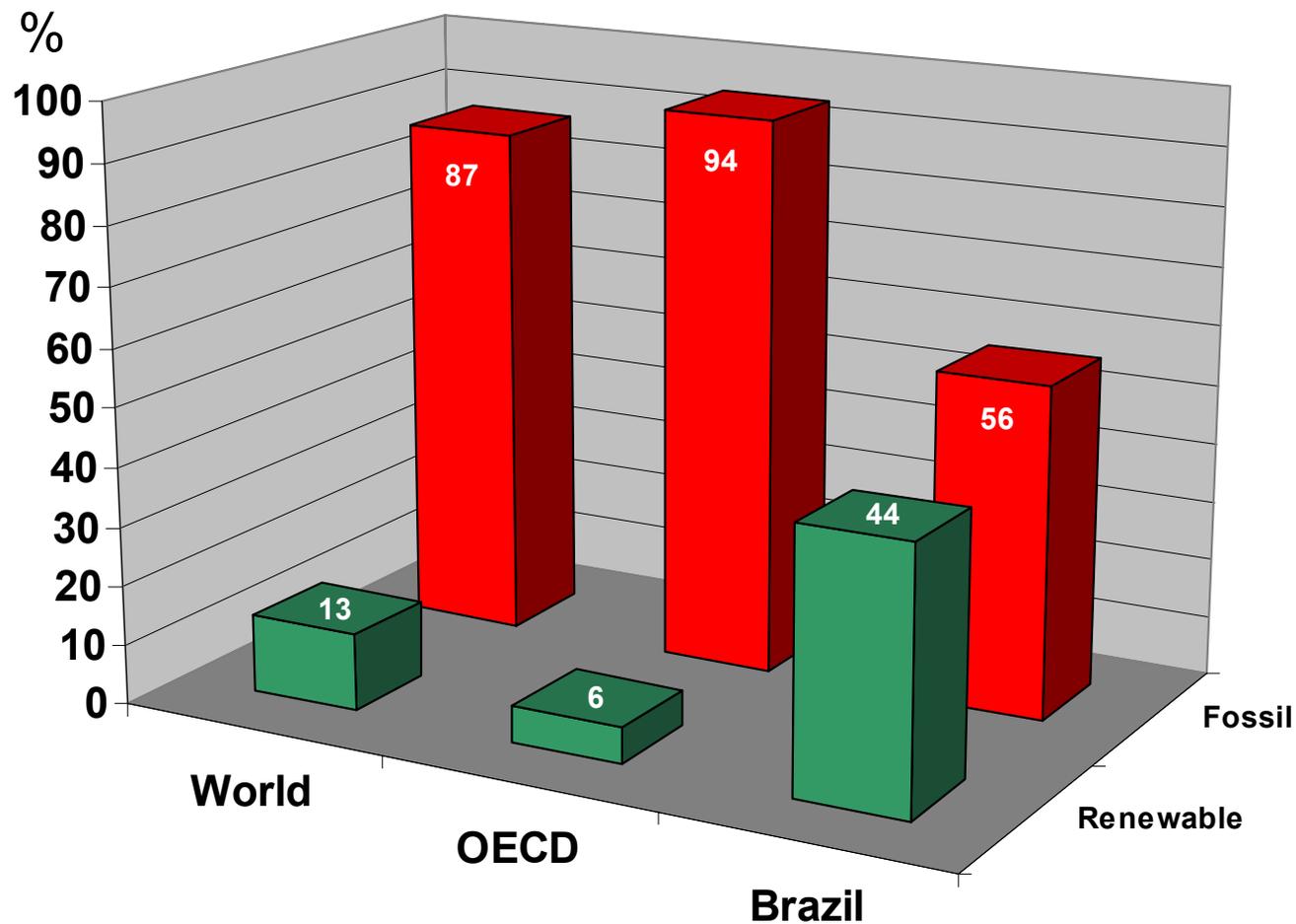
Operate in a safe and profitable manner in Brazil and abroad, with social and environmental responsibility, providing products and services that meet clients' needs and that contribute to the development of Brazil and the countries in which it operates



Renewables in the World and Brazil

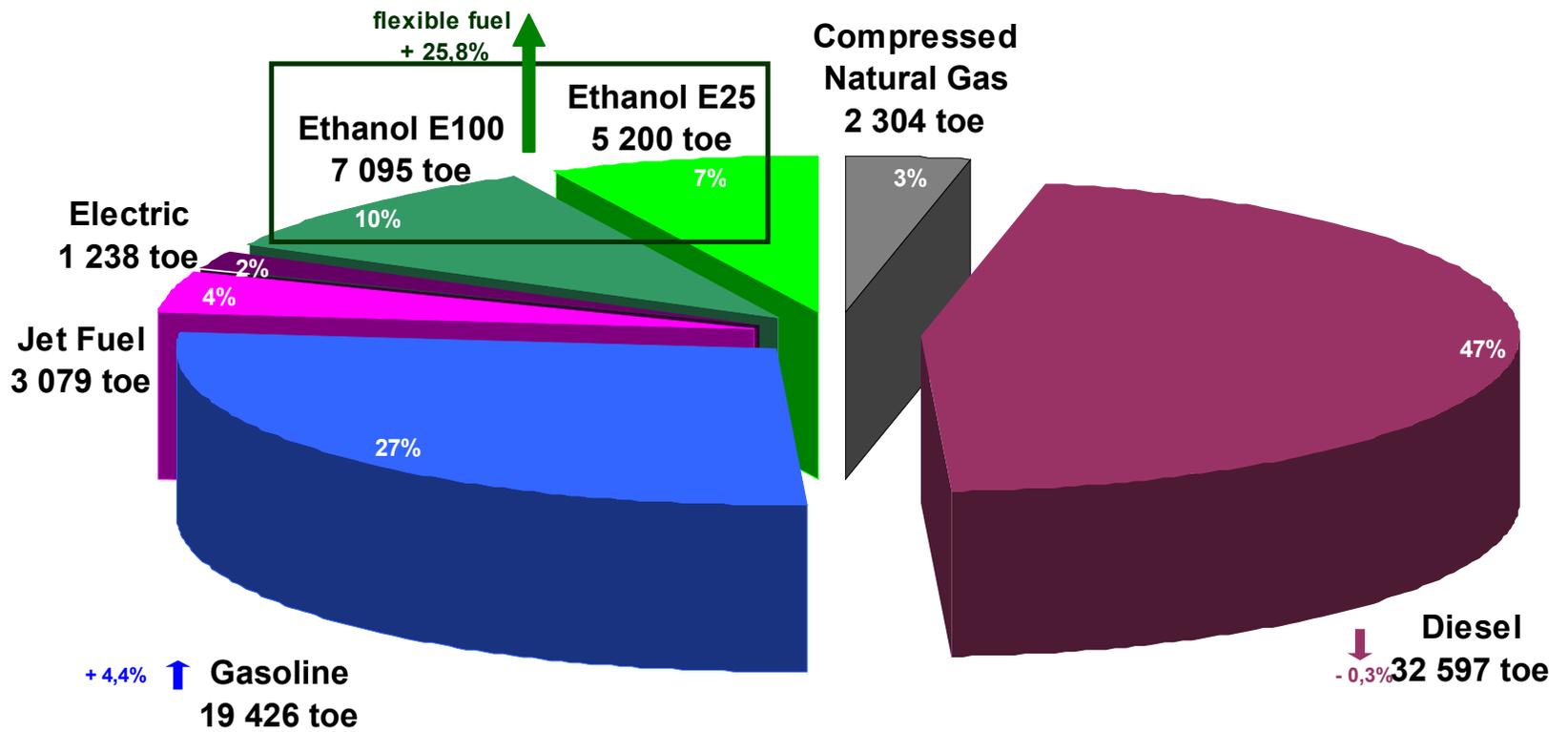


Primary Energy [%]





Transport Sector (2006)



Vehicle Models

Estimated fleet*	Gasoline/E25:	15.8 million
	E100:	2.3 million
	Flex-fuel:	2.6 million
	Diesel:	0.9 million

Source: Ministry of Energy/EPE 2007; * Petrobras



Biofuels Business Segment



To be a global company in biofuels sales and logistics, leading the domestic production of biodiesel and expanding participation in the ethanol segment

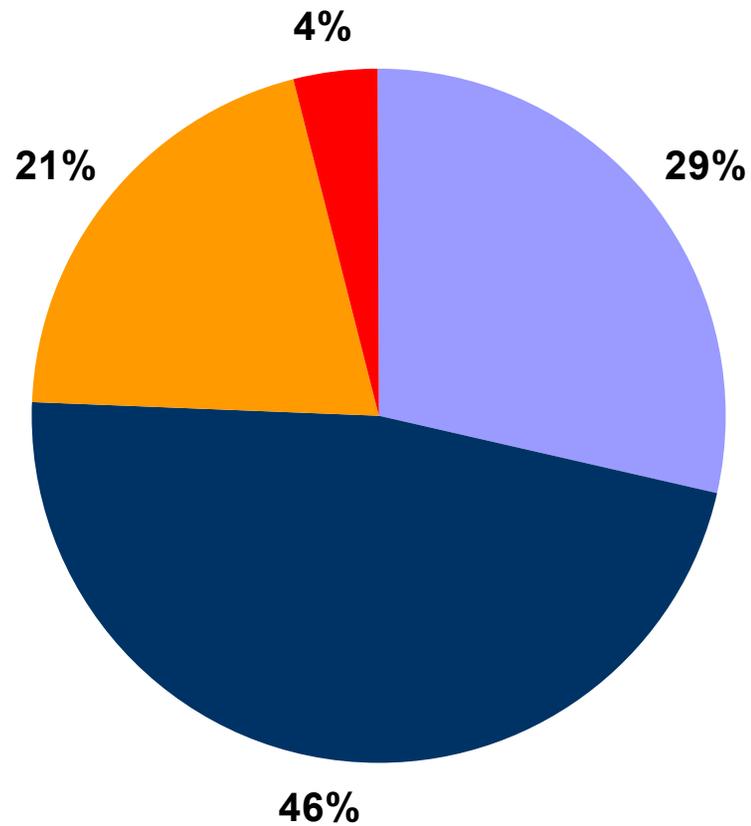
Strategies by Segment

- **Expand operations in the ethanol business by participating in the domestic production chain to develop international markets, focusing on logistics and sales**
- **Develop and spearhead the production of biodiesel to meet the requirements of the Brazilian market, as well as to capitalize on opportunities in overseas markets**
- **Develop technologies which ensure worldwide leadership in biofuels production, including technologies based on low value-added raw materials (residual biomass)**



Main Projects - Biofuels

US\$ 1.5 billion Investments



■ Biodiesel ■ Pipelines and Ethanol Pipelines ■ Others ■ H-Bio



Renewables in Petrobras

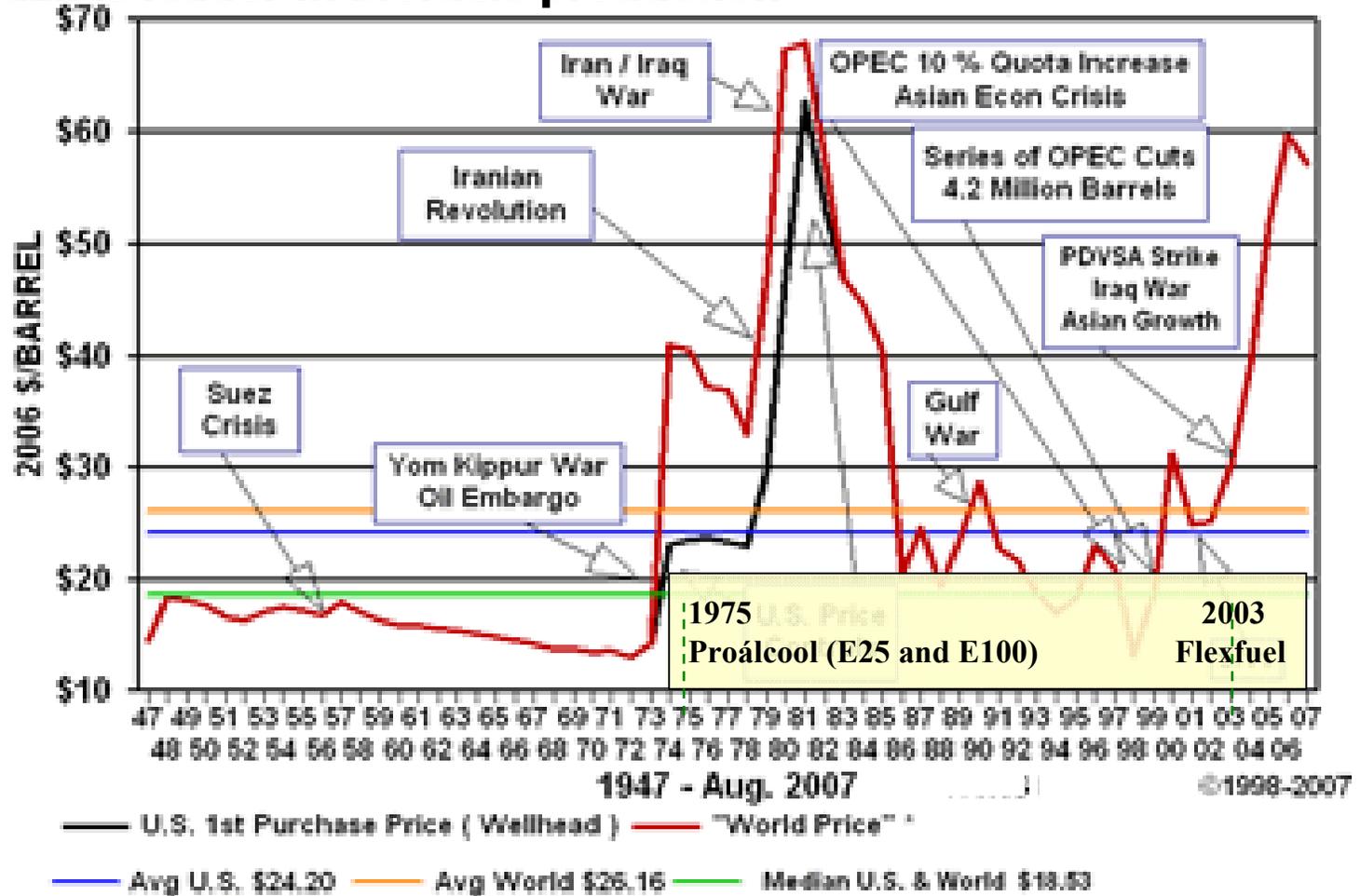
Ethanol



Proálcool (Brazilian Alcohol Programme)



- Oil prices increasing: crisis (1973 and 1979)
- The ethanol production is consolidated
- Brazil is leader in biofuels production



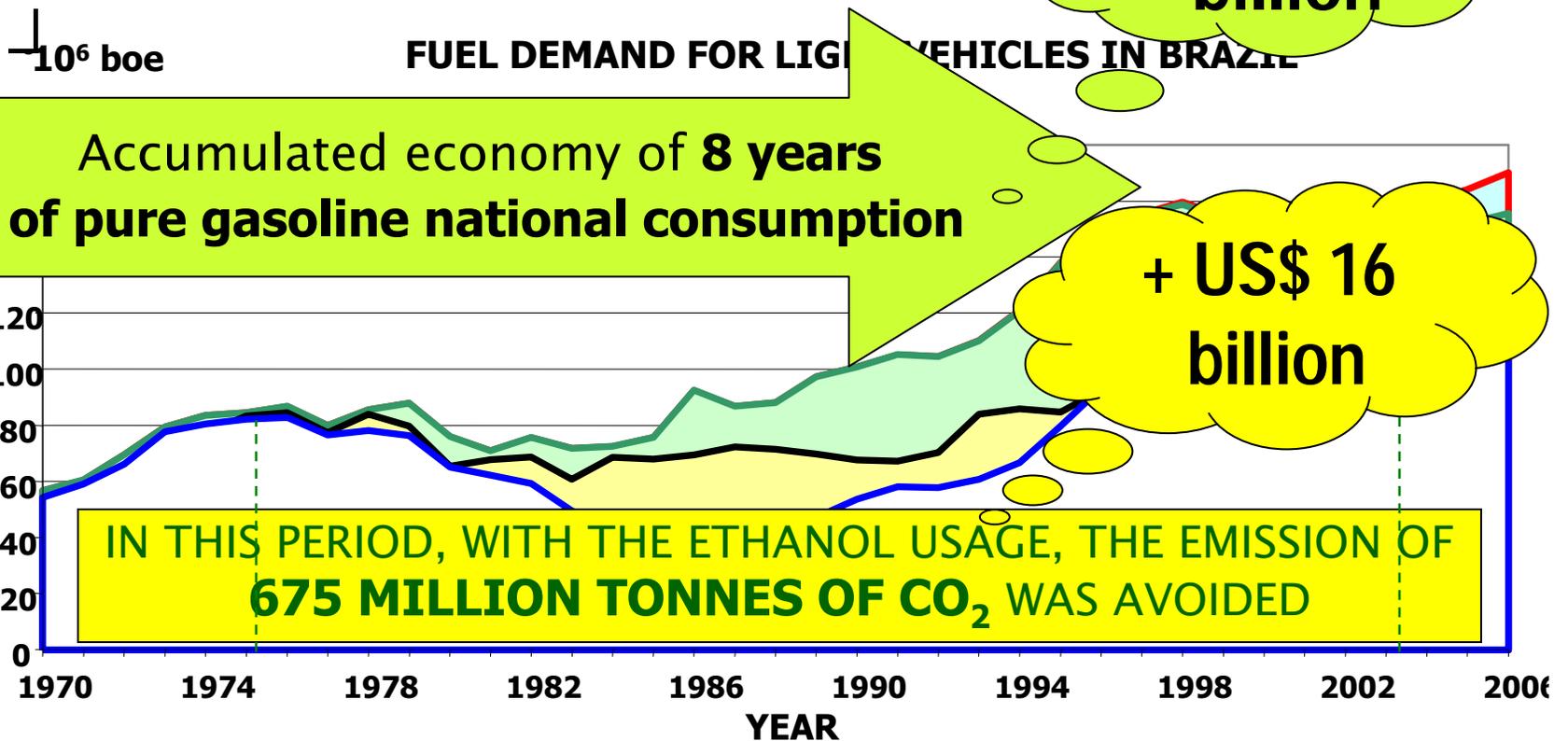
Source: Energy Economist Newsletter, 2007



Gasoline and Ethanol in Brazil



- TOTAL DEMAND FOR LIGHT VEHICLES (CNG INCLUDED)
- TOTAL DEMAND FOR LIGHT VEHICLES (WITHOUT CNG)
- GASOLINE PRODUCTION
- GASOLINE CONSUMPTION



Total economy of 1,194 billion boe or
23 months of the present Brazilian petroleum production

Source: MME, BEN 2006



Renewables in Petrobras Biodiesel

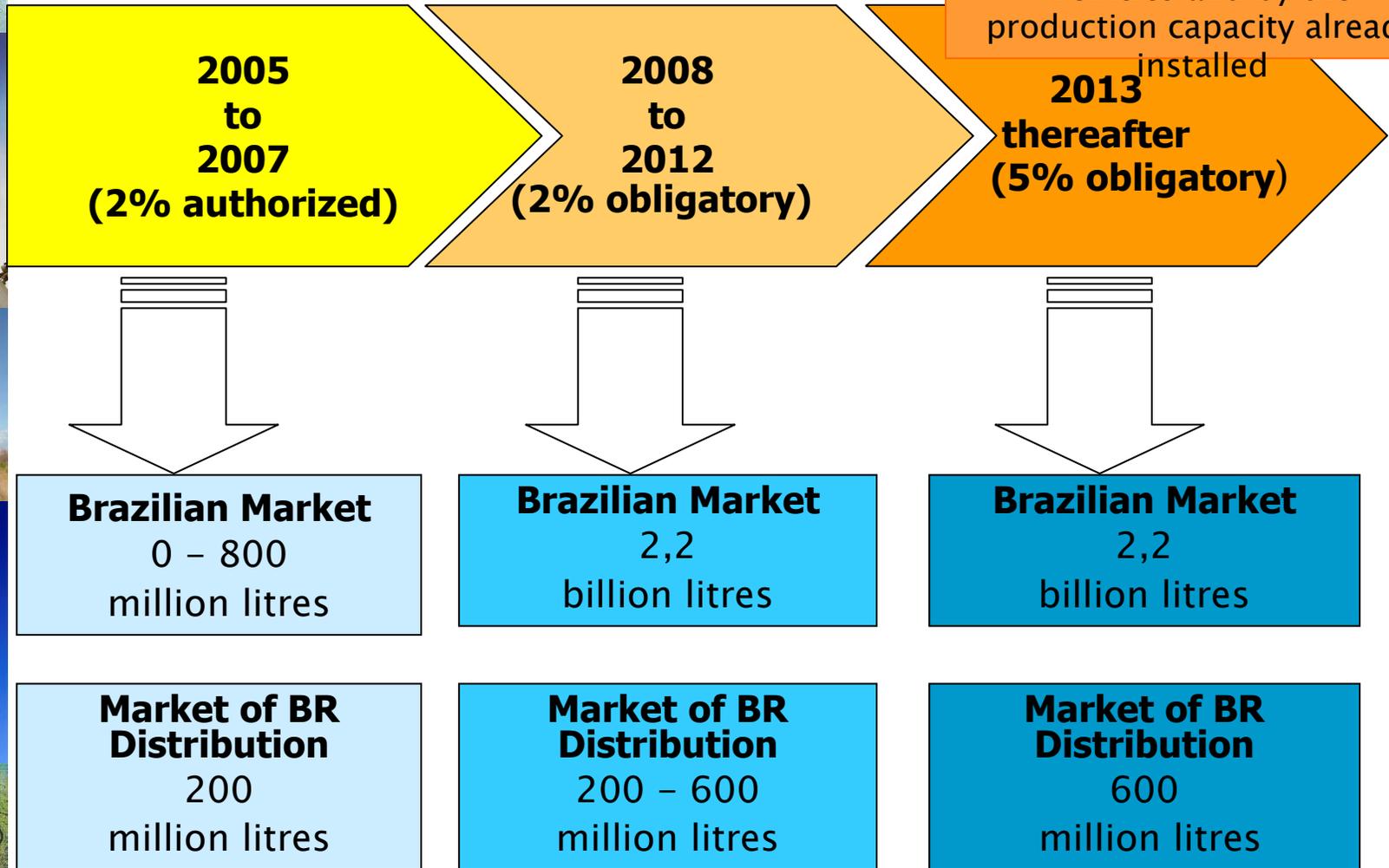


National Program of Biodiesel



Law 11.097/2005

B5: Target could be anticipated due to the results obtained by the tests with the vehicles and by the production capacity already installed





Energy Efficiency



Some Energy Efficiency Projects



REFINERY

Increase of the energy recovering in the Distillation Unit (UN-RPBC)

Energy savings: 23 thousand toe/year

Avoided emissions: 73.4 thousand ton CO₂/year

E&P

Co-generation in Fazenda Alegre (UN-ES) (3.5 MW)

Steam generation: 30 ton/h

Avoided emissions: 2 thousand ton CO₂/year

LOGISTICS

Pumping system adequacy in Rio Grande Terminal (TERIG)

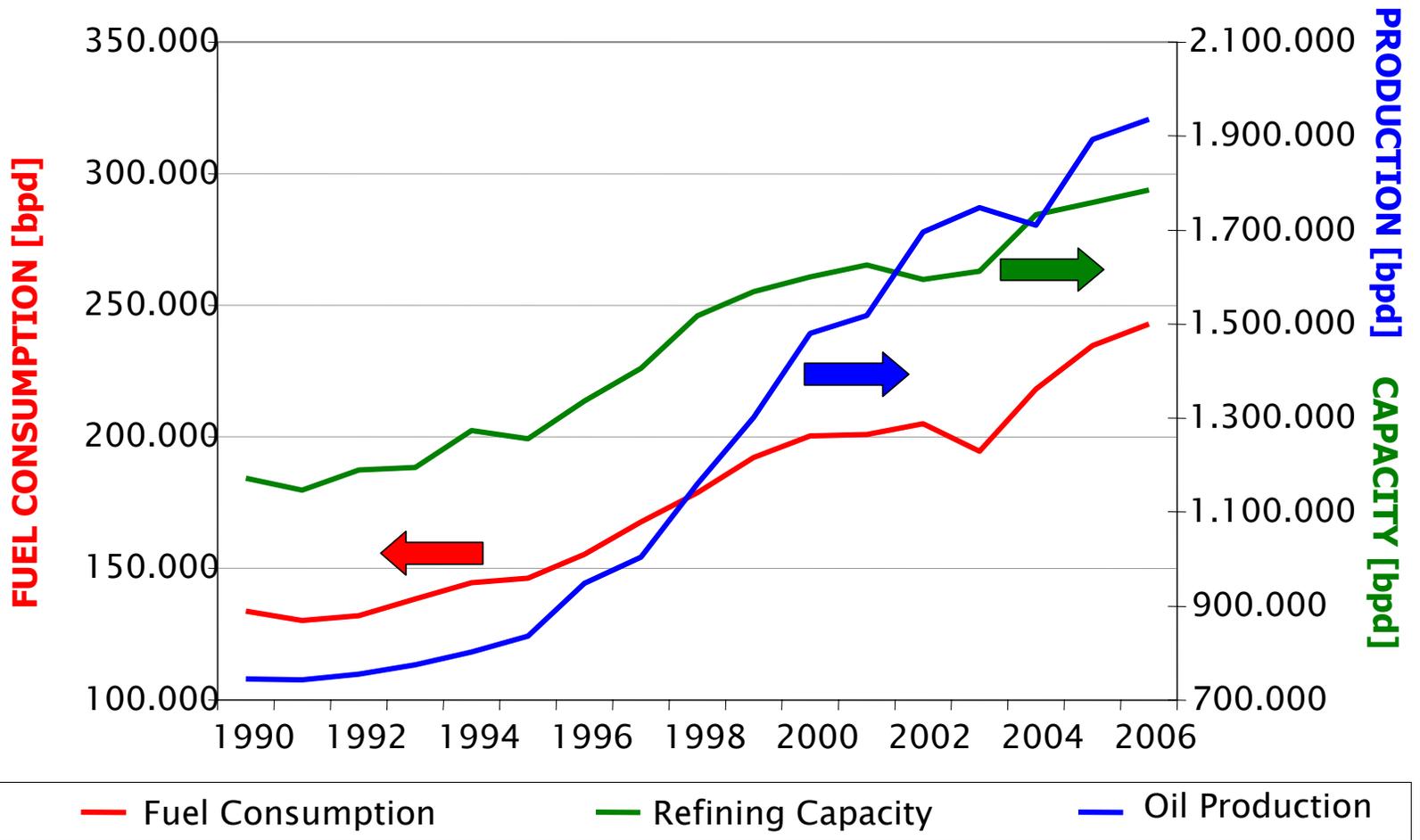
Energy savings: 1,752 MWh/year

Avoided emissions: 455 ton CO₂/year

Results



Energy efficiency increasing in PETROBRAS

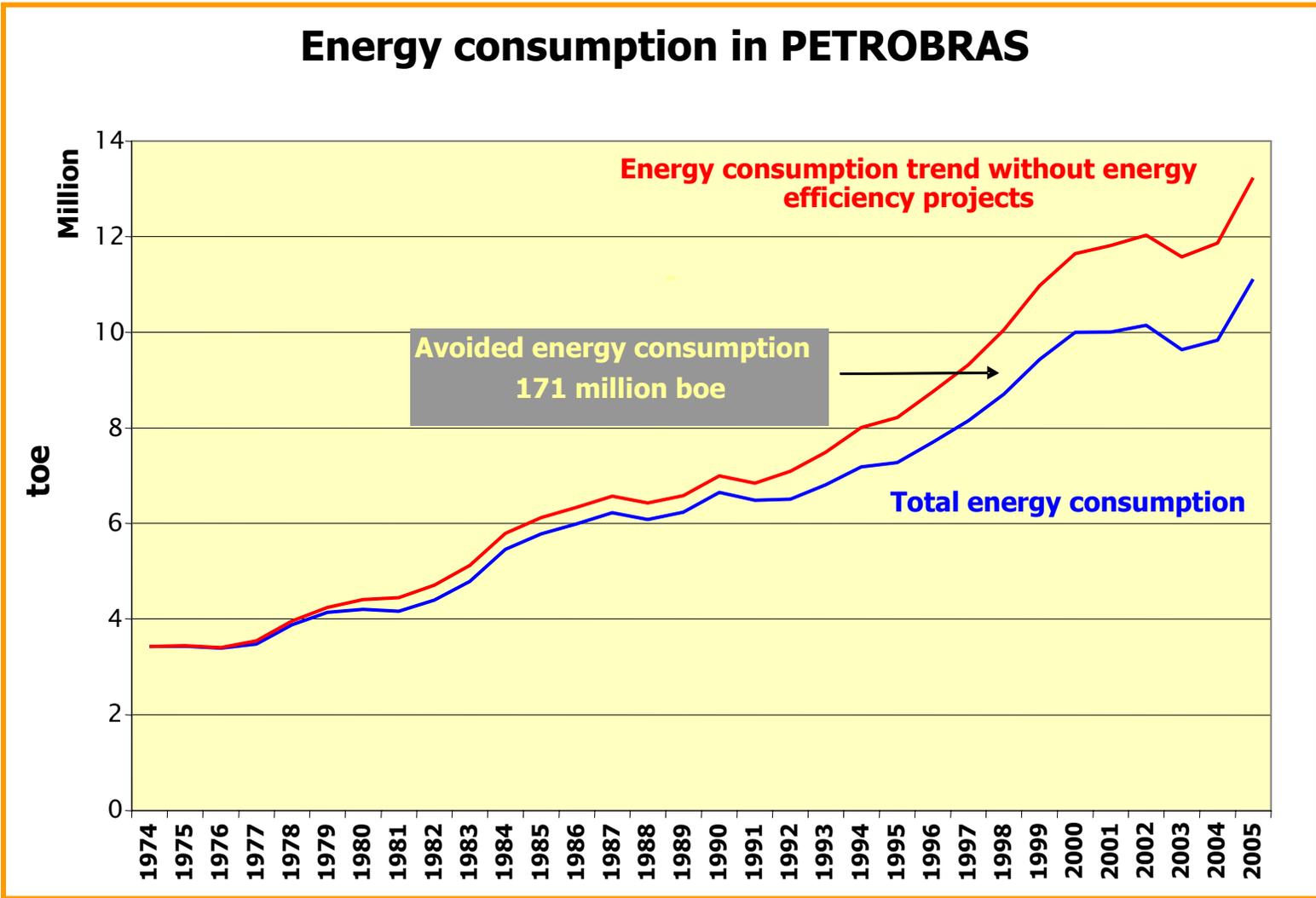




Results



Energy consumption in PETROBRAS





Answering the questions



What are the key factors driving the markets for environmental innovation in Petrobras?

Petrobras Research Centre (CENPES), where the company concentrates its efforts in research, development and technological innovation projects, acts through the Technological Environmental Program (PROAMB). This Program focuses in four technological themes which are fundamental to give company's environment strategy some support:

- a) Air quality and climate changes;**
- b) Water resources;**
- c) Residues and Impacted Areas;**
- d) Biodiversity and Special Ecosystems Protection.**

These four themes concern the following activities:

- Minimization of emissions and atmospheric impacts evaluation**
- Reduction of carbon concentration in the atmosphere**
- Minimization of water consumption and the generation and discarding of wastewater**
- Technologies to prevention and minimization of contaminants in raw material and internal chains**
- Advanced treatment to wastewater**
- Minimization of residues generation (recuperation, reuse and recycling)**
- New or non-conventional technologies to residues treatment and impacted areas**
- Evaluation, impact prevention, monitoring and treatment of Amazon ecosystems**
- Sustainable technologies**



Answering the questions



How is globalisation influencing Petrobras strategy for developing and marketing biofuels and engaging in renewable energies?

Looking into the evolution of the climate change science, the potential impact of that change on the environment and on natural resources as well as the role played by human activities, we believe that, despite current regulatory uncertainty, the new regulations will be probably more stringent and will demand some kind of commitment from countries not included today in Annex I to Kyoto Protocol, like Brazil, China and India. If Brazil, country, where Petrobras develops the most of its activities, has to comply with some emission reduction targets, pressure will be put on Petrobras to reduce its GHG emissions as well, which may affect both our productive process and our products, posing to our business threats like the following ones:

- a) Additional costs to comply with more stringent environmental regulations
- b) Additional investments to upgrade the energy efficiency of processes and equipments or to implement fuel switching initiatives
- c) Additional technological efforts to improve process
- d) Performance and implement alternative cleaner solutions
- e) Market share reduction of fossil fuels
- f) Additional investments to improve product quality and efficiency
- g) Reputation risks

Some good opportunities could be identified as well:

- Expansion of the market for less carbon intensive fuels, like natural gas
- Increasing demand for renewable fuels, like ethanol and biodiesel

Petrobras can operate competitively in these new markets as the company holds experience, technological knowledge and resources, including logistics and distribution infrastructure developed after many years of active participation in the Brazilian fuel ethanol market.



Answering the questions



What kind of measures does Petrobras expect from governments (both the Brazilian government and governments in countries in which Petrobras operates) to support environmental innovation?

As I mentioned in the presentation, we can expect:

- **Government incentives to support new development environmental technologies.**
- **Create environmental projects to support the innovation process of the companies, like the “alcohol and biodiesel” programs in Brazil.**



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