Bioenergy Policy Implementation in Africa - COMPETE

BIOENERGY IMPLEMENTATION IN BRAZIL

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National Reference Center on Biomass

Zambia, May 25-28, 2009

Fringilla Lodge

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PRESENT WORLD BIOFUEL SITUATION

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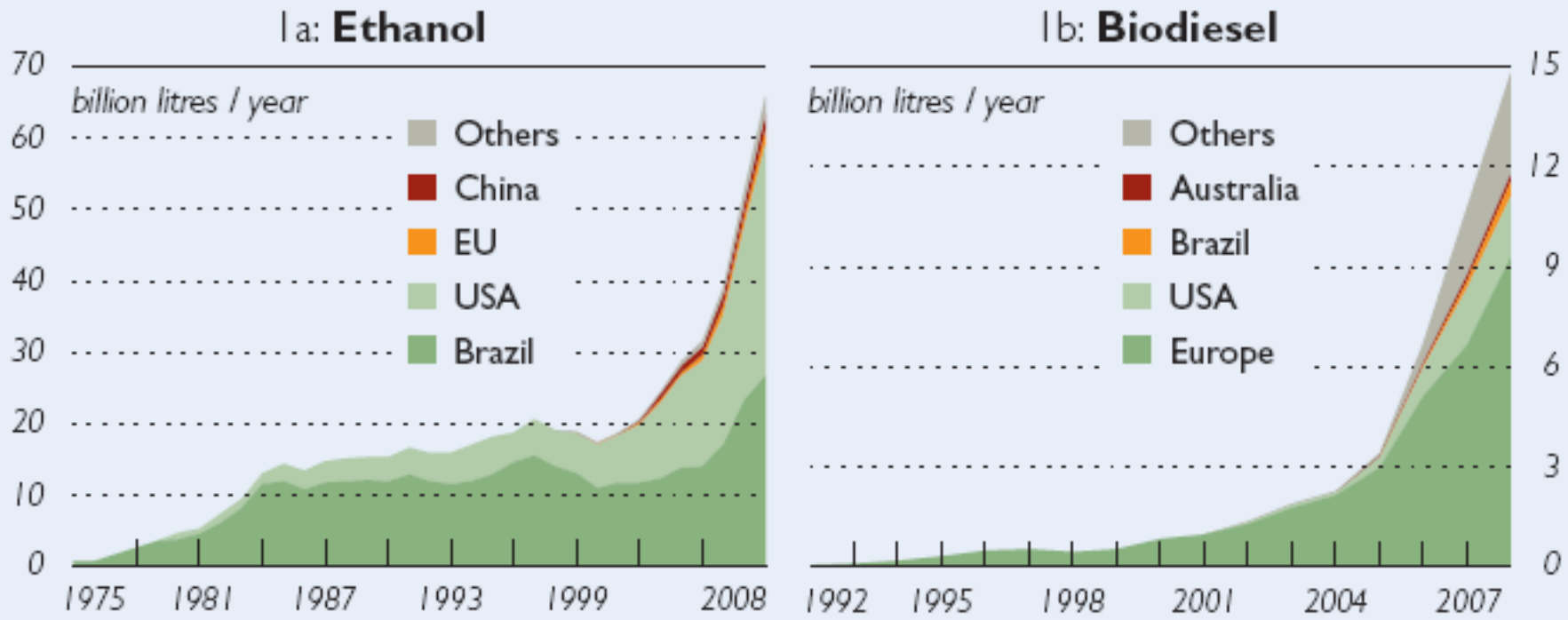
World fuel ethanol and biodiesel production

Figure 1



Source: F.O. Licht World Ethanol & Biofuels Report. October 2007 and May 2008.

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Table 2.2 Biofuel targets from selected non-OECD countries. T = target; M = mandatory. * indicates enhanced OECD engagement; ** indicates OECD ascension candidate. (adapted from Peterson 2008)

country	type	Quality & Blending Share
Argentina	T/M	5% ethanol share (2010) 5% biodiesel share (2010)
Bolivia	T/M	20% ethanol share (2015)
Brazil*	M	25% ethanol blend (2007) 5% biodiesel blend (2013)
China*	T	15% transport fuel demand (2020)
Columbia	T/M	10% ethanol share (2007) 5% biodiesel share (2015)
Dominican Rep.	T/M	5% ethanol share (2015) 2% biodiesel share (2015)
India*	M	10% ethanol blend (2008-09) 5% biodiesel blend (2012)
Indonesia*	T	10% biofuel share (2010)
Malaysia	M	5% biodiesel blend in public vehicle
Paraguay	T/M	5% biodiesel share (2009)
Peru	T/M	7.8% ethanol share (2010) 5% biodiesel share (2010)
Philippines	T	10% ethanol share (2011) 2% biodiesel blend (2010)
Thailand	T	5% biodiesel share (2011)
Uruguay	T/M	5% ethanol share (2014) 5% biodiesel share (2012)

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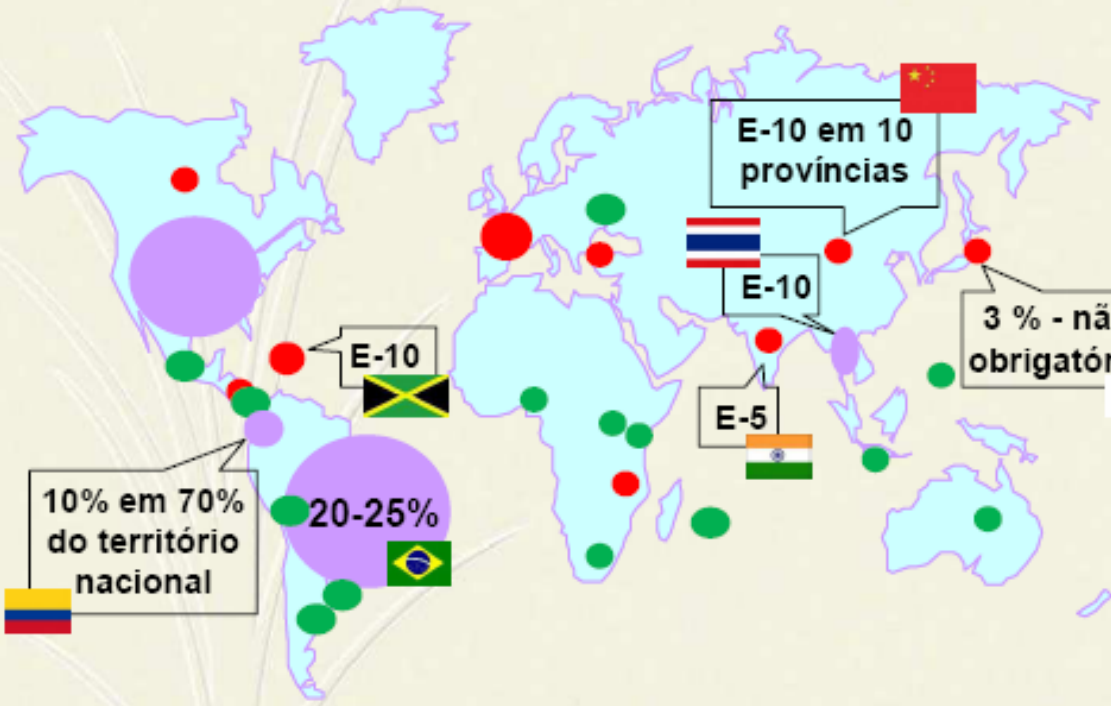
PUBLIC POLICIES - MANDATES FOR LIQUID BIOFUELS USE



Implemented programs

Programs under implementation

Programs under analysis

Fonte: JOLLY, Lindsay - Future Trends in World Food Security; WSRO Annual Meeting 2008 e F.O.Licht.

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The Historical Policy Development in Brazil

ETHANOL

Mandates, Incentives and Economic Drivers of Biofuels

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Brazil initiated large-scale biofuel production in the late 1970s after a 1975 law guaranteed price parity for ethanol and gasoline along with a system of tax rebates and subsidies for ethanol construction facilities This combined system of mandates, tax credits, and construction incentives has become the norm around the world.

The U.S. adopted a preferential tax incentive for ethanol in the Energy Policy Act of 1978, which has varied from $0.13 to $0.16 USD L-1 ($0.50 - $0.60 USD per gallon) over the years.

A 2003 directive adopted by the European Union required each member country to set targets for minimum shares of biofuels and set a non-binding goal of 5.75% for the end of 2010. A 2007 study by the OECD, drawing on work by the Global Subsidies Initiative, estimated total OECD subsidies for biofuels in 2006 at $11 billion USD

At the beginning of Proalcool several decisions were taken which evolved over time, such as:

• Mandatory blending of ethanol in the gasoline (still existing);

• the decision that the state – owned oil company, PETROBRAS, would purchase a guaranteed amount of ethanol (no more existing);

• alcohol prices to consumer were established to be lower than gasoline prices , by selling it at the pump for 59 percent of the price of gasoline (nowadays alcohol prices are lower than gasoline prices in a free market);

• prices paid to alcohol producers were defined by Federal Government to guarantee the payment of production costs (alcohol is now commercialized in a free market);

• special conditions to finance alcohol producers to enhance alcohol production (no more existing);

• pump stations were obliged to sell hydrated ethanol (nowadays every pump station in the country sells hydrated ethanol and gasohol in a free market).

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Government Intervention from 1975 to end of 80s

Ethanol:

- Level of guaranteed purchase, at controlled prices
- "Fixed" ratio of ethanol/gasoline selling prices:
- 0.59(1975) 0.75(1989)
- Low interest rate in loans for investment (1980-1985)

Sugar:

- Government issued "production quotas"
- Exports: by the Government
- From 1990-1999, production/commercialization were entirely de-regulated (both for ethanol and sugar)

Source: Macedo 2002

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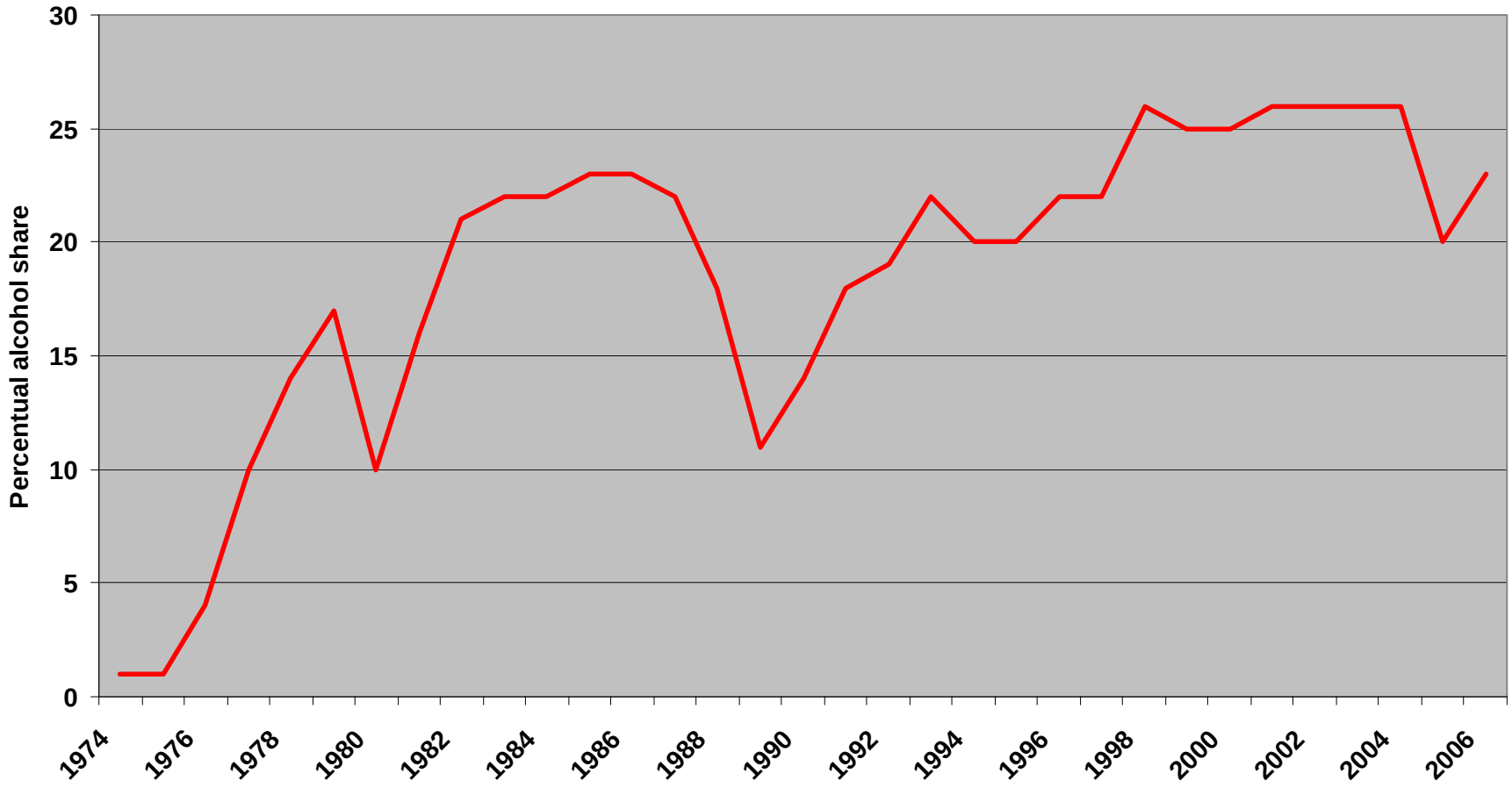
AMOUNT OF ETHANOL COMPULSORILY BLENDED TO GASOLINE



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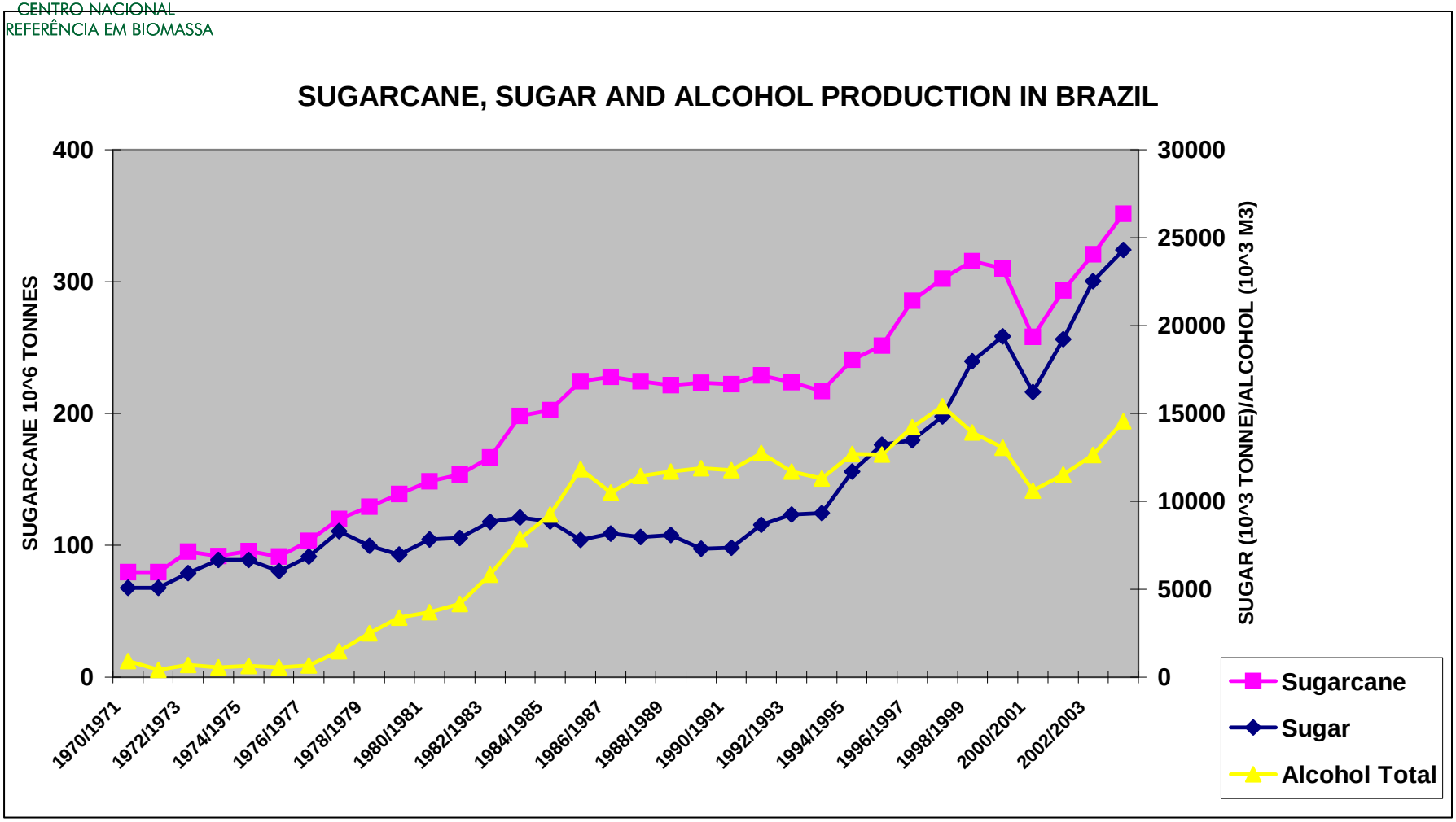
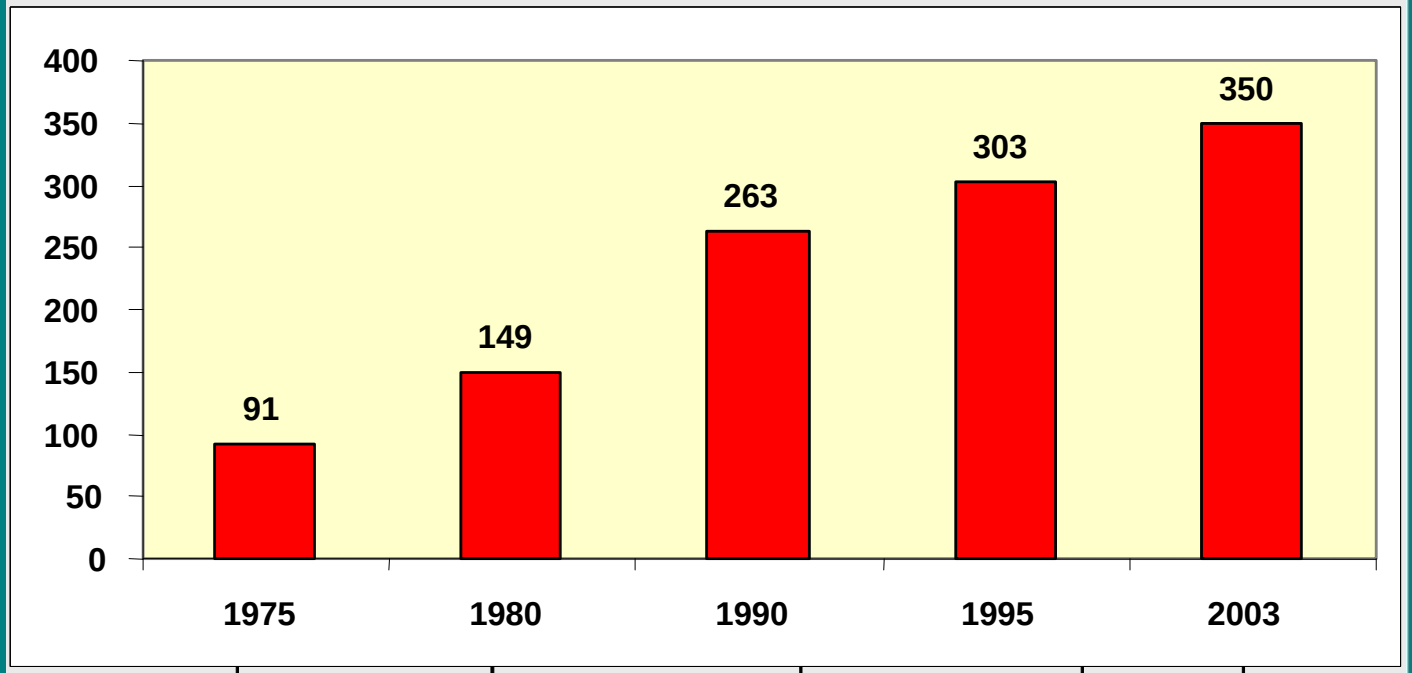


Brazil: raw sugar-cane production - million tons



Proalcool

Ethanol car is a success

Sugar exports by private sector

End of the control system

Flex fuel car

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União da Agroindústria Canavieira de São Paulo

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DEREGULATION OF OIL DERIVATIVES AND ALCOHOL MARKET - BRAZIL

1995	Monopoly flexibilization of national oil market
1996	End-users price liberalization – Alcohol & Gasoline
1997	Producers price liberalization – Anhydrous alcohol
	Oil Law – define transitions to free market
1998	
1999	Producers price liberatization – Hydrated alcohol
	End of hydrated alcohol subsidy
2000	
2001	Law creating new fossil fuel tax-CIDE
2002	End of price control on all fuels

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Biodiesel in Brazil

- **Launched in 2002, very similar to the ethanol program, to stimulate electricity generation in remote areas in Brazil;**
- **By December 2004, voluntary addition of 2% in mineral diesel;**
- **Since 2008 biodiesel addition in diesel became mandatory (3% on volume basis); June 2009 4%**
- **In 2013 the required percentage on biodiesel in diesel will be up to 5% on volume.**
- **Biodiesel Specification is established in the Brazilian oil agency in Act ANP Nº 07, of March 20th, 2008.**
- **Biodiesel producers are not IPI/COFINS taxed if they acquire oil feedstock from " Familiar Farming" based productions.**

Law # 11.097/95

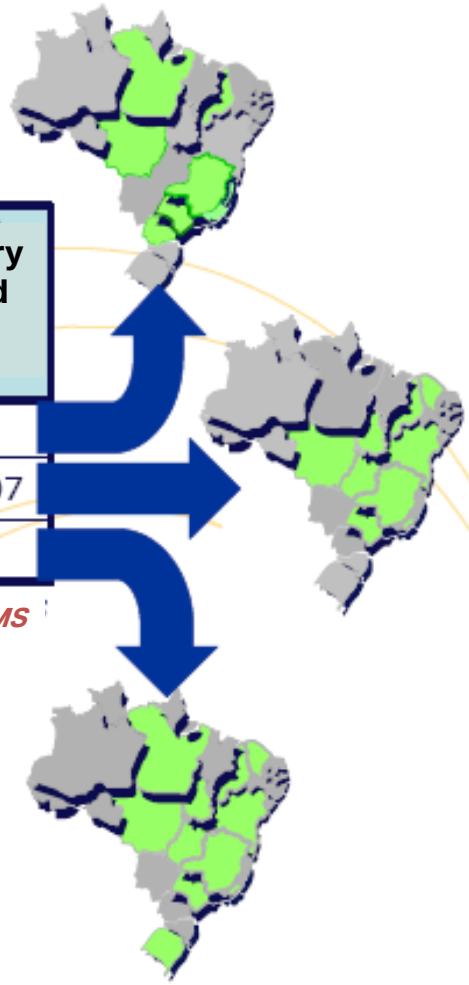
Establishes minimum percentages of biodiesel blend to diesel and monitoring of the insertion of the new fuel into the market.

2005 – 2007	2008 – 2012	2013 on
2 % Voluntary	**2 % Compulsory**	**5 % Compulsory**
Potential Market **840 million liters/yr**	Real Market **1 billion liters/yr**	Real Market **2.4 billion liters/yr**

ANP biodiesel auctions

Date of auction		Offered volume 10^6 liters/yr	Sold volume 10^6 liters	# plants	Average price (*) R$/liter	Delivery Period
1st	11-23-05	92,5	70	8	1,90	2006
2nd	03-30-06	315	170	13	1,86	2006/07
3rd & 4th	07-11-06	1.266	600	11	1,75	2007

(*) Including PIS and COFINS, excluding ICMS



BIODIESEL
O NOVO COMBUSTÍVEL DO BRASIL

The volume of biodiesel sold in the 3rd and 4th auctions corresponds to 1.5% of diesel consumption in 2005

Biodiesel: Regulatory Issues

Law 11,116/2005: Establishes the federal taxation system and creates the concept of Social Fuel

- **Tax levy – partial or total as a function of social producer status, region and crop**
- **Social Fuel: One produced through binding commitment between Biodiesel producer and familiar agriculture**

Tariffs on the Biodiesel production

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	Biodiesel				Mineral diesel
	Familiar farming in North, Northeast and Semi-arid (castor beans or palm)	Familiar farming In other areas	Intensive farming in North, Northeast and semi-arid (castor beans or palm)	Taxation for other producres	
	US$/liter	US$/liter	US$/liter	US$/liter	US$/liter
CIDE	none	none	none	none	0023
PIS/COFINS	100% reduction related to the general regulation (US$0,0 /liter)	68% reduction related to the general regulation (US$0,023 /liter)	32% reduction related to the general regulation (US$0,05/liter)	0.074	0.049
Sum of the federal tariffs	100% reduction related to the general regulation (US$0,0 /liter)	68% reduction related to the general regulation (US$0,023 /liter)	32% reduction related to the general regulation (US$0,05 /liter)	0.074	0.073

Note: Exchange rate > 1,0 US$ = 3,0 R$

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MME - Programs for bioelectricity support

PROINFA – Federal Program for Incentives to Alternative Fuels;

- **Program coordinated by the MME, and it establishes a contract of 3,300 MW from the National Interconnected System –SIN, produced by wind turbines, biomass sources and small hydroelectric power plants, being 1,100MW from each source of energy.**

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Programs for bioelectricity support
Monetary Values of Proinfa (US$/MWh)

Source	Fuel	Region 1*	Region 2**
Biomass	Biogas	81,13	82,99
	Rice residues	52,77	54,93
	Wood residues	56,61	59,44
	Sugar cane residues	58,35	45,74

* Region 1 : North and Northeast of Brazil.

**Region 2: Another regions of Brazil.

Source: MME, 2004.

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CURRENT BIOFUEL POLICY IN BRAZIL

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How is the current situation in Brazil?

- **Nowadays the only financial incentives still existing for alcohol fuel are related to taxes reduction;**

- **Biofuels have reduced taxes due to environmental benefits.**

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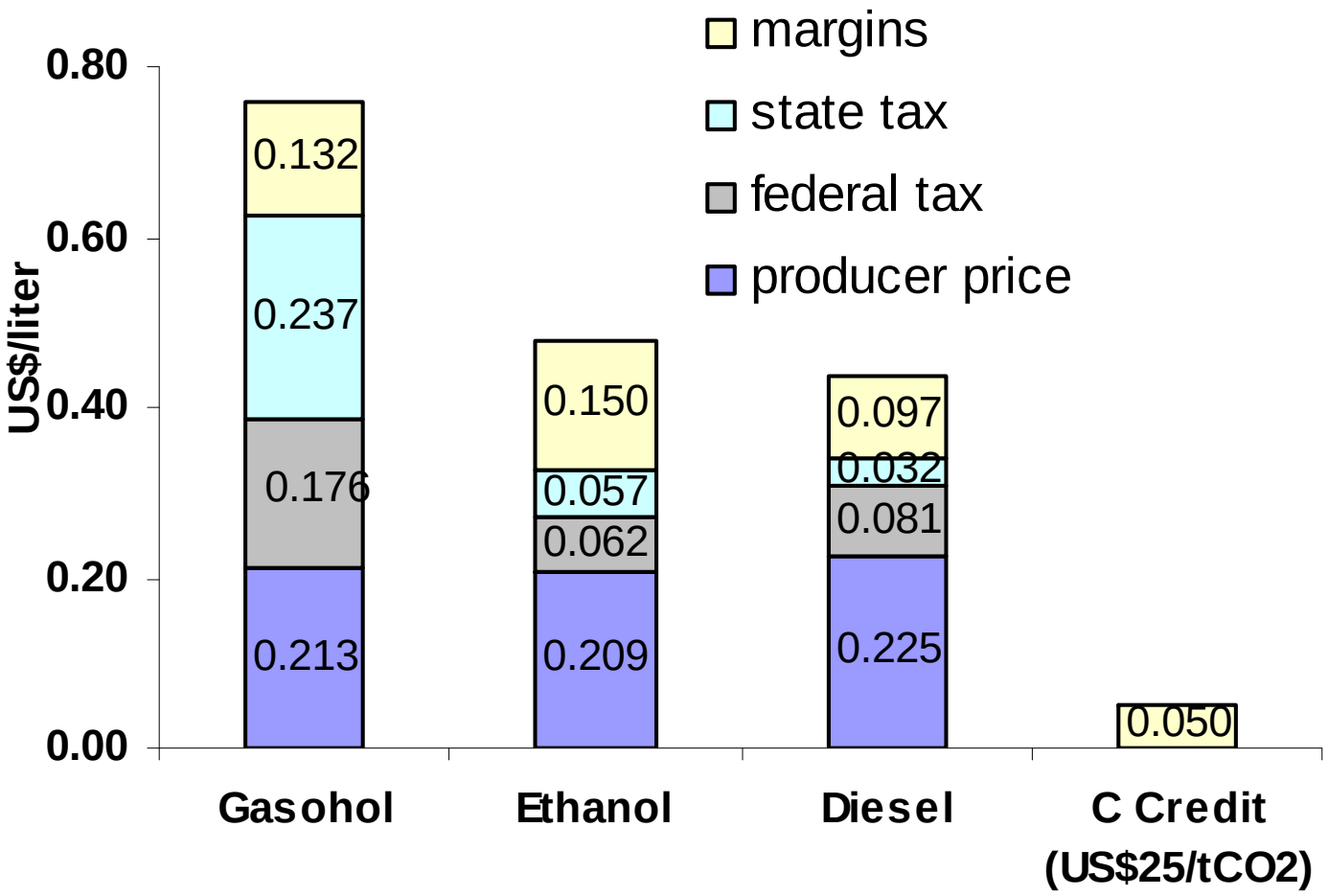

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Vehicles Federal Sales Taxes (IPI)

Type of Vehicles	Federal tax (IPI)
Gasohol **(vehicles powered by E25)**	**13% - 25%***
Flex fuel vehicles **(vehicles powered by any ethanol gasoline blend)**	**11% - 18%***

- Tax is variable according to the engine size from 1.000cm^3 to 3.000cm^3.

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Fuel Sales Taxes (State taxes - ICMS))

Fuel	ICMS*
Hydrated ethanol	12% - 31%
Gasoline	20% - 31%
Anhydrous ethanol (blended to gasoline)	Taxed on Gasohol (E25%)

* The tax on fuel varies according the State.

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Additional Fuel Sales Taxes - CIDE taxes

Fuel	CIDE tax
Natural Gas	zero
Ethanol	zero
Gasoline	US$ 248,80 / cubic meter**
Diesel Oil*	US$ 77,98 / cubic meter **

*Diesel, despite being a pollutant fuel, it is heavily subsidized because its importance in the public and road transportation.

** US Dollar = R$ 2,05 (Reuters)

Source: DCide (Law nº10.336, 19/12/2001), http://www.receita.fazenda.gov.br/PessoaJuridica/CIDEComb/default.htm

However, Brazil still employs a series of policies that secure ethanol's place in the country's energy matrix, including:

• A mandate requiring that all gasoline be blended with a minimum of 20 – 25 percent ethanol (flexible with respect to changing sugar and ethanol prices on the world market);

• An import tariff on ethanol as many developed countries

•An import tariff on gasoline that is one of the highest in the world;

• A ban on diesel-powered personal vehicles to boost the demand for ethanol powered vehicles.

• A mandate for all pump stations in Brazil to have ethanol pumps, what is fundamental to guarantee the offer of ethanol all over the country;

• A requirement that all government entities purchase 100-percent hydrated alcohol-fuelled vehicles; and

• Low interest loans for financing producer-owned stocks (RFA, 2005).

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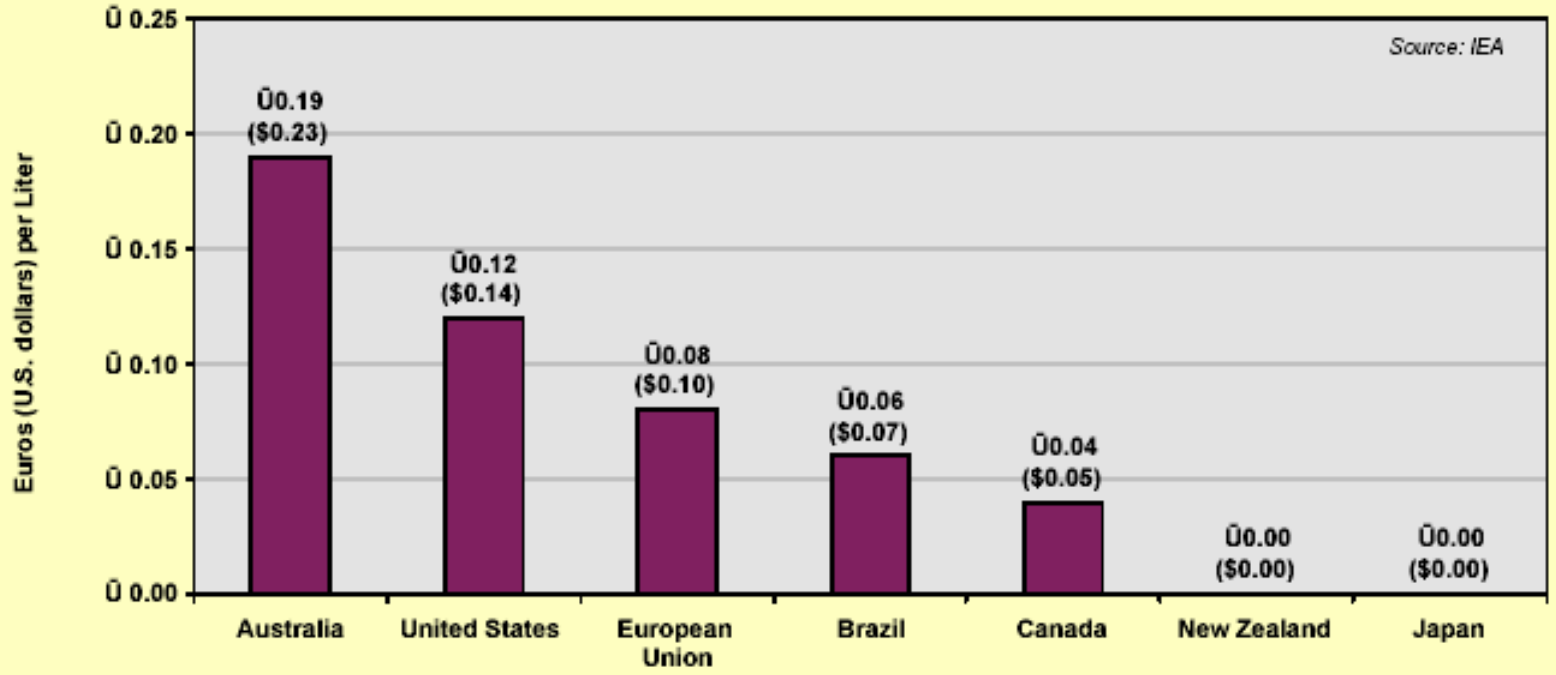
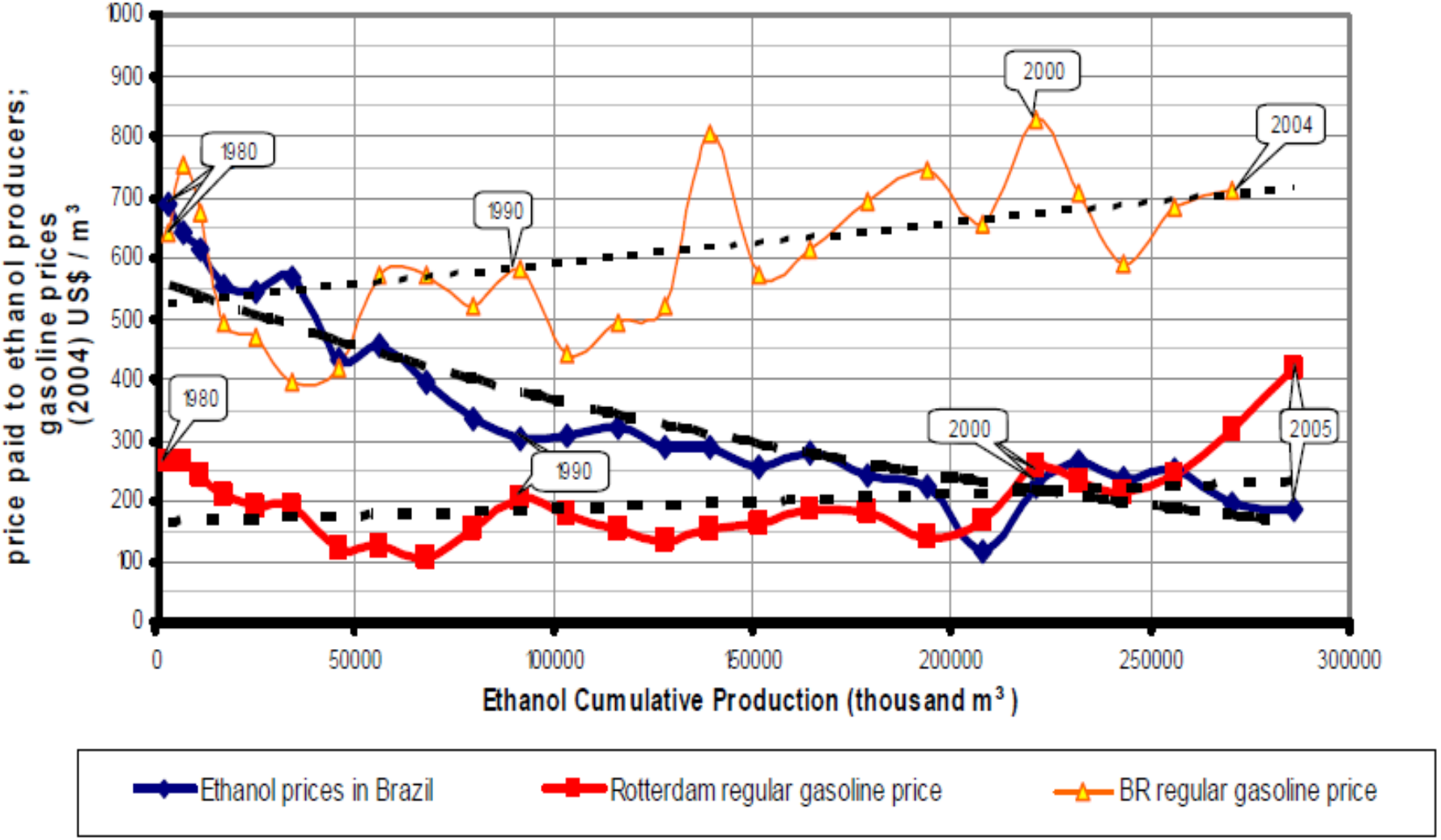
Figure 9–1. Ethanol Import Duties in Selected Countries, 2004



Brazilian ethanol competitiveness



Source: Goldemberg et al, 2003. Updated in 2006.

Law # 11.097/95

Establishes minimum percentages of biodiesel blend to diesel and monitoring of the insertion of the new fuel into the market.

2%
Voluntary

Potential Market
840 million liters/yr

3% 2008

4% June 2009

Compulsory

Real Market
1.5 billion liters/yr

5%

Compulsory

Real Market
2.4 billion liters/yr

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Increased cogeneration from sugar mills

- 11,025 GWh in 2007
- 15,768 GWh in 2008
- 45,180 GWh already contracted for 2012

Bio electricity > Auctions from 2005 to 2008

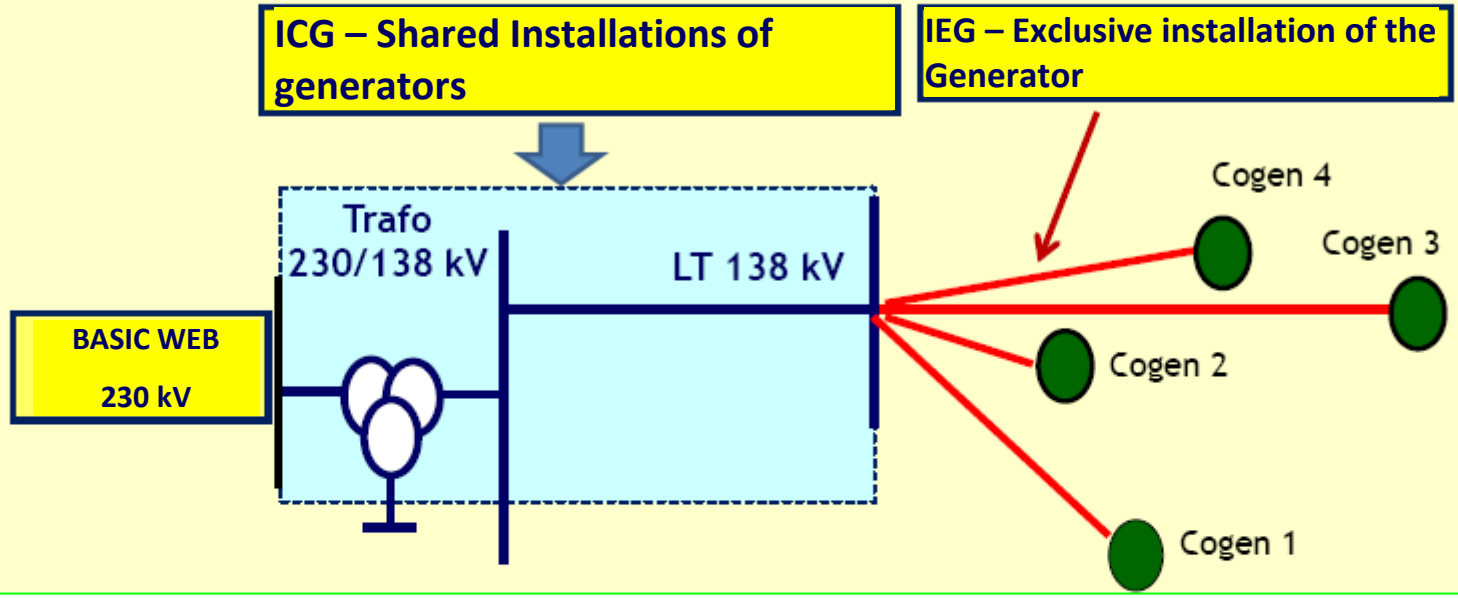
Auctions	Project Nº	MW Installed	Guarantee Average MW	Total Sold MW	Average Price US$/MWh	Average Price US$/MWh corrected*
2005 – LEN A–3 e A–5	7	230	123	97	73,46	82,49
2006 – LEN A-3	6	188	89	70	65,90	72,83
2006 – LEN A-5	5	234	89	61	69,02	75,95
2007 - LFA	12	542	214	140	69,56	74,39
2008 - LER	31	2.385	859**	548	79,95	75,95
2008 – LEN A-3	0	0	0	0	-	-
2008 – LEN A-5	1	114	45	35	70,73	70,73
TOTAL	62	3.732	1.418	951	73,37	75,95

Total Bio energy revenue sold > Auctions from 2005 to 2008 > 9,51 billions in 15 years

Total energy revenue of the Reservoir Auction > 5,46 billions in 15 years

* Value corrected by IPCA ** 311Mw for free market

Regulation for bioelectricity access to the grid



ANEEL Auction 008/2008 > 24/11/2008 > GO e MS

Part A > Cobra Instalaciones Y Servicios S.A. US$ 23.658,5–Discount 18,01%

Part B > Elecnor Transmissão de Energia S.A R$34.767.780 – Deságio 10,00%

Part C > Consórcio Transenergia Renovável (Furnas 49%; Delta 25,5%; Fuad Rossi 25, US$ 16.959.892–Discount 19,15%

Imposes concession 15/01/09 > System available until July 15th, 2010

Regulation > Decree 6460/2008 > May 5th, 2008 > ANEEL 320/2008 >PND > Decree 6608/2008 > October 22nd, 2008 > 27 ventures > 13 ICG > 20 IEGs > 2.000 MW

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R&D PROGRAMS

Examples of investments

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- **ANP - Since 1998, electrical concessionaires and oil companies are obliged by ANP regulation Nº 33/2005 to invest, at least, 1% of theirs gross earnings in research of energetic efficiency and staff qualification. In 2006, ANP authorized PETROBRAS to invest US$ 114 millions.**

- **MDL (Mechanism for Clean Development) – China, India and Brazil are the leaders in the number of activities in the world. Currently, 346 activities are in progress in Brazil;**

- **EMBRAPA – In 2008 Embrapa received from Monsanto US$ 3,8 millions (R$ 7,8 millions) as funds for researches in sugarcane for ethanol production.**

- **World Bank - Energy Generation in Sanitary Landfills (Funds for studies of feasibility for biogas - methane - capture).**

CNPq – R&D Programs for bioenergy development

- **CNPQ is an agency linked to the Ministry of Science and Technology (MCT), dedicated to the promotion of scientific and technological research and to the formation of human resources for research Brazil.**

- **Biomass Reference Centers: CENBIO-University of São Paulo, CERBIO-Paraná Institute of technology, CTC – Sugarcane Technology Center.**

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FAPESP - Programs of support to bioenergy

The State of São Paulo Research Foundation (FAPESP) is one of the main funding agencies for scientific and technological research in the country. It is linked to the State of São Paulo's Secretariat for Higher Education.

Example of project for bio energy research:

- **BIOEN**

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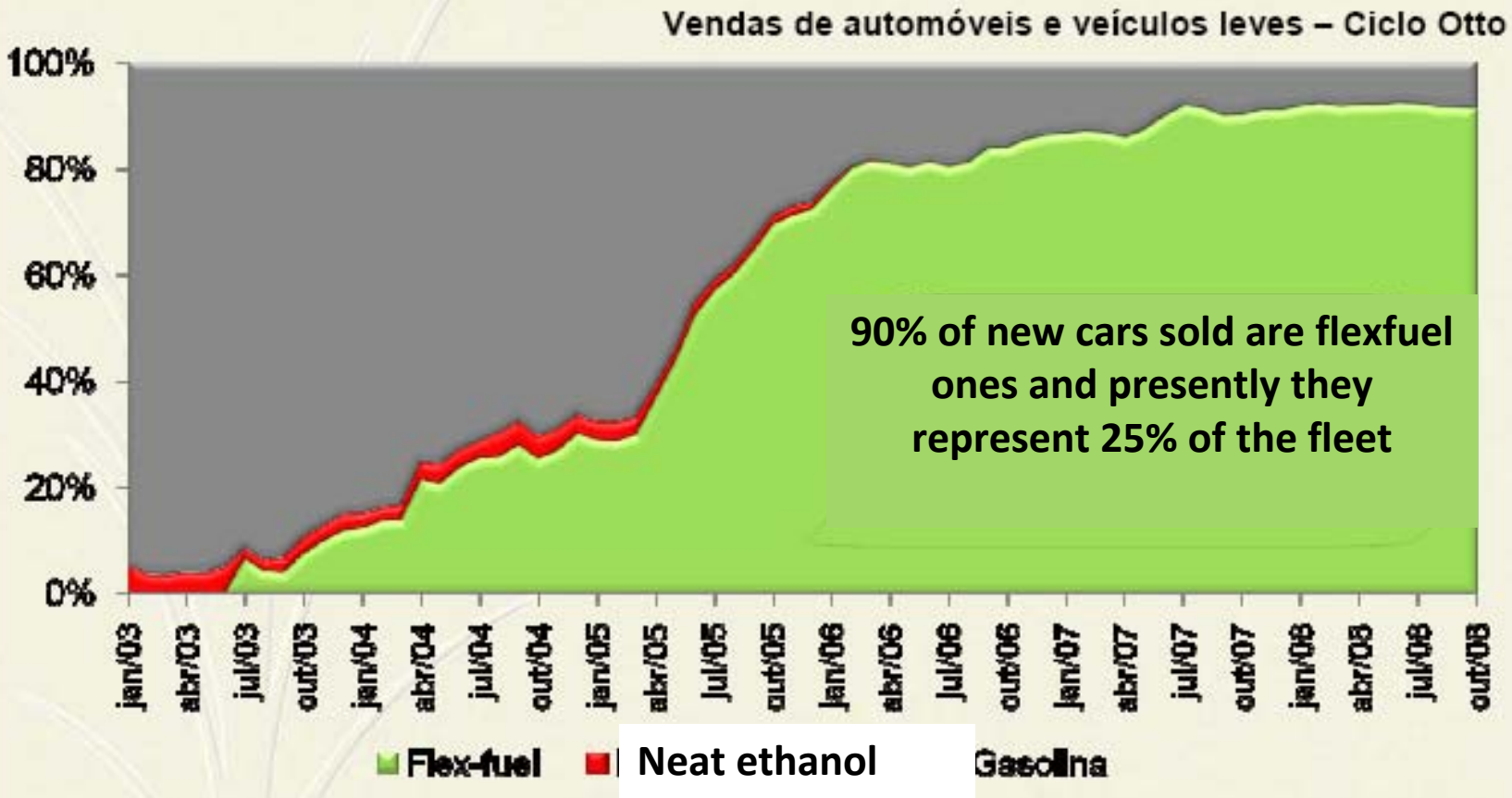
PRESENT BIOFUEL PROGRAM SITUATION IN BRAZIL

SUSTAINABILITY

Szwarc, A.

ETHANOL DEMAND BY NEW AUTOMOBILES



Nota: ciclo Otto refere-se aos veículos movidos a gasolina, a etanol e veículos flex-fuel. Fonte: ANFAVEA (2008). Elaboração: UNICA.

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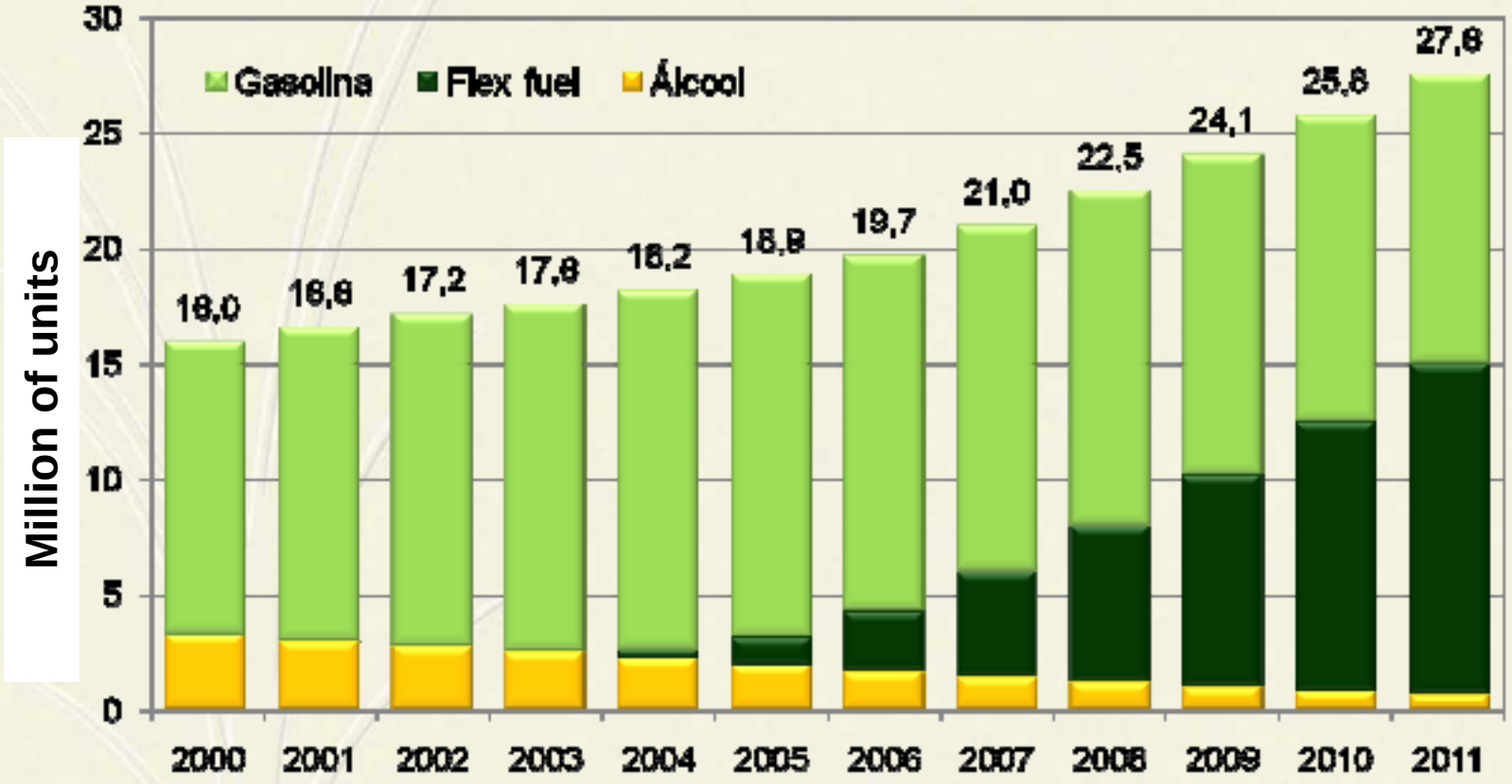
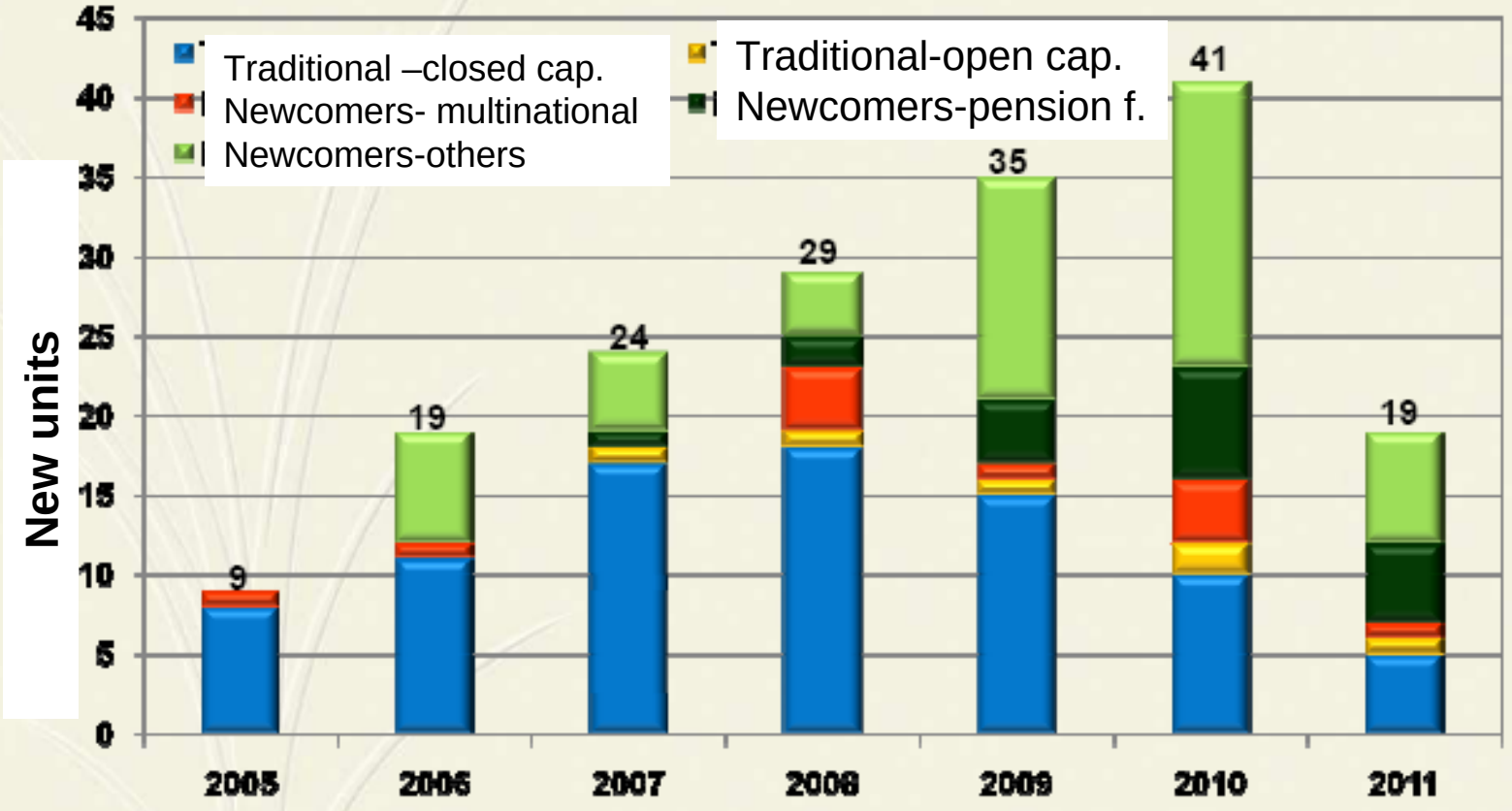
EVOLUTION OF AUTO AND LIGHT COMMERCIAL FLEETS IN BRAZIL (OTTO CYCLE)



Fonte: ANFAVEA e UNICA.

EVOLUTION IN THE NUMBER OF NEW PRODUCING SUGAR MILLS



Fonte: UNICA. Nota: levantamento realizado a partir das informações disponíveis até outubro de 2008. 2005, 2006, 2007 e 2008: unidades já instaladas. 2009: projetos em fase de implantação. 2010 e 2011: projetos e estudos.

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INVESTMENTS IN NEW UNITS TILL COMPLETITION

Em US$ bilhão

Start year	≤ 2005	2006	2007	2008	2009	2010	2011	Total 05-08	Total 09-11	TOTAL 05-11
TRADITIONAL ENTERPRIZES	0,9	3,8	4,3	5,6	4,7	4,5	2,1	14,6	11,3	25,9
Capital fechado	0,9	3,8	4,0	5,2	4,3	3,7	1,6	13,9	9,6	23,5
Capital aberto	0,0	0,0	0,3	0,4	0,5	0,8	0,5	0,7	1,7	2,4
NEWCOMERS	0,1	1,4	0,8	3,0	6,6	8,6	5,1	5,3	20,3	25,6
Fundos de investimento	0,0	0,0	0,1	0,4	1,6	2,2	1,8	0,6	5,6	6,2
Multinacionais	0,1	0,5	0,0	1,6	0,3	1,4	0,4	2,2	2,1	4,3
Outros	0,0	0,9	0,7	0,9	4,7	5,0	2,9	2,5	12,6	15,1
TOTAL	1,1	5,1	5,1	8,5	11,3	13,1	7,2	19,8	31,7	51,5

Fonte: UNICA. Nota: levantamento realizado a partir das informações disponíveis até outubro de 2008. 2005, 2006, 2007 e 2008: unidades já instaladas. 2009: projetos em fase de implantação. 2010 e 2011: projetos e estudos.

Novas unidades possuem um período médio de maturação de 3-4 anos. Portanto, as novas usinas que entraram em operação e aquelas que irão iniciar suas atividades em 2009, precisam de crédito para finalizar os investimentos previstos

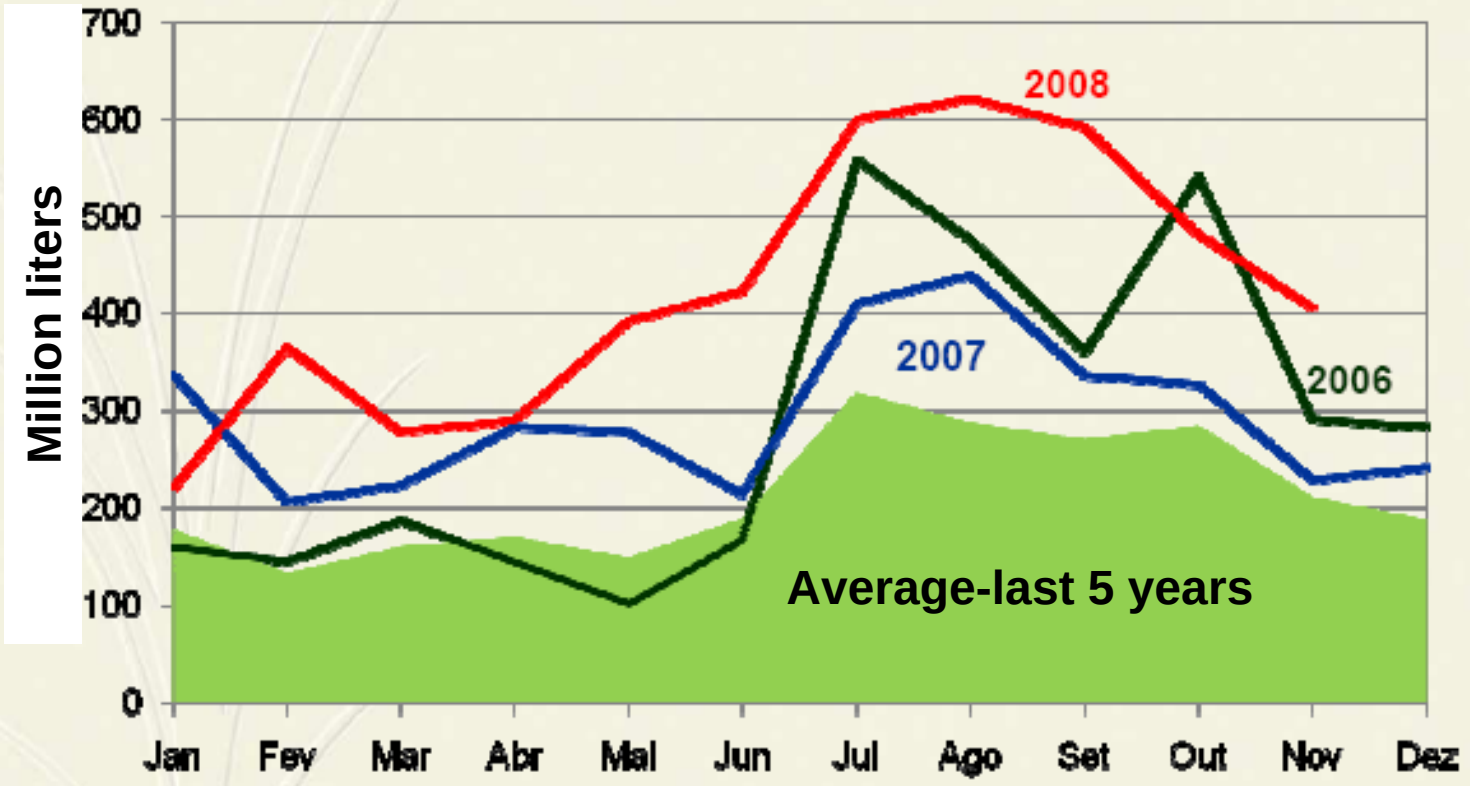
ETHANOL FOR OTHER USES

- Na safra 2007/2008, foram consumidos cerca de 1 bilhão de litros de etanol não carburante no mercado doméstico
- Essa demanda deverá dobrar nos próximos anos devido ao desenvolvimento da **indústria alcoolquímica**

Empresa	Produtos	Consumo de etanol	US$ milhões	Conclusão
BRASKEM Triunfo-RS	ETENO/POLIETILENOS (via álcool) 200 mil toneladas	500 milhões litros	150,0	2010
DOW BRASIL/ CRYSTALSEV Santa Vitória-MG	ETENO/POLIETILENOS (via processamento de 8 milhões de toneladas de cana-de-açúcar) 350 mil toneladas	700 milhões litros	1.000,00	2011
QUATTOR Mauá-SP	PROPENO/POLIPROPILENO (via glicerina proveniente da produção de biodiesel)	-	50,0	2013
SOLVAY INDUPA Santo André-SP	ETENO/PVC (via cana-de-açúcar) 60 mil toneladas	150 milhões litros	300,00	2010

Fonte: Braskem, Dow, Solvay e EPE

ETHANOL EXPORTATION FROM BRAZIL



Fonte: Secex. Elaboração: UNICA

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Trade

Because of import tariffs and a range of preferential measures for domestic production, only around 8% of world ethanol, and 12% of biodiesel is traded internationally (OECD 2008).

OECD countries apply tariffs at rates of 6% to 50%, including a $0.14 USD L-1 duty on imported ethanol by the U.S., and a € 0.192 per liter denatured ethanol duty imposed by the EU (Doornbush and Steenblik 2007).

Developing countries apply their own tariffs between 14% and 50% (Doornbursh and Steenblik 2007).

The U.S. waives its tariff for certain countries in the Caribbean Basin, and Europe does the same for Africa, but none of the countries that benefit have significant ethanol industries (Jank et al. 2007).

BIOFUEL CERTIFICATION

Table 1. Examples of selected criteria with related indicators and reporting requirements developed by the Cramer Commission

Theme 1: Greenhouse gas emissions	
Principle 1: The greenhouse gas balance of the production chain and application of the biomass must be positive	
Criterion 1.1: In the application of biomass a net emission reduction of greenhouse gases must take place along the whole chain. The reduction is calculated in relation to a reference situation with fossil fuels.	**Indicator 1.1.1 (minimum requirement):** The emission reduction of greenhouse gases amounts to at least 50–70 per cent for electricity production and at least 30 per cent for biofuels, calculated with the method developed by the project group. These are minimum requirements. Here the basic principle must be that policy instruments should promote a higher percentage above the minimum requirement by differentiating strongly on the basis of the emission reduction of greenhouse gases.
Theme 3: Biodiversity	
Criterion 4.4: In new or recent developments, there is maintenance or recovery of biodiversity within biomass production units.	**Indicator 4.4.1 (minimum requirement):** If biomass production is taking place in recently cultivated areas (after 1 January 2007), room will be given to set-aside areas (at least 10 per cent).
	Reporting 4.4.2: If biomass production is taking place in recently cultivated areas (after 1 January 2007), it has to be indicated: - In which land use zones the biomass production unit can be found; - How fragmentation is discouraged; - If ecological corridors are applied; - If the restoration of degraded areas is involved.

Source: Testing framework for sustainable biomass. Final report from the project group "Sustainable production of biomass." March 2007.

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On 23 January 2008, the European Commission introduced the draft directive on the promotion of the use of energy from renewable sources,

(a) the use of biofuels and other bioliquids shall lead to greenhouse gas emission saving of at least 35 per cent calculated through the life cycle of the product;

(b) biofuels and other bioliquids shall not be made from raw material obtained from land with recognized high biodiversity value;

(c) biofuels and other bioliquids shall not be made from raw material obtained from land with high carbon stock;

(d) where biofuels and other bioliquids are made from raw material produced in the European Union, they should also comply with the union's environmental requirements for agriculture.

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CONCLUSIONS

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WORLD DEVELOPMENT (1)

Much of the World's Gasoline could be replaced with ethanol from 10 to 15 major producer countries and from domestic production in more than 100 others.

- **More ambitious role for Brazil**
- **More participation of other developing countries in the market through technologies+policies**
- **Foster biofuel consumption in developed countries through policies and trade**
- **Renewable fuel for world's vehicles**

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WORLD DEVELOPMENT (2)

USA and EU Should Import a Share of their Use

- **Encourage gasoline substitute – lower world petroleum prices**
- **More independence from OPEC**
- **Lower CO_2 emissions**
- **Help other developing nations, not only OPEC**

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THANK YOU

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