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BRAZIL: A PIONEER IN BIOFUELS

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BRASIL UM PAÍS DE TODOS GOVERNO FEDERAL

Ministry of Agriculture, Livestock and Food Supply

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SUMMARY

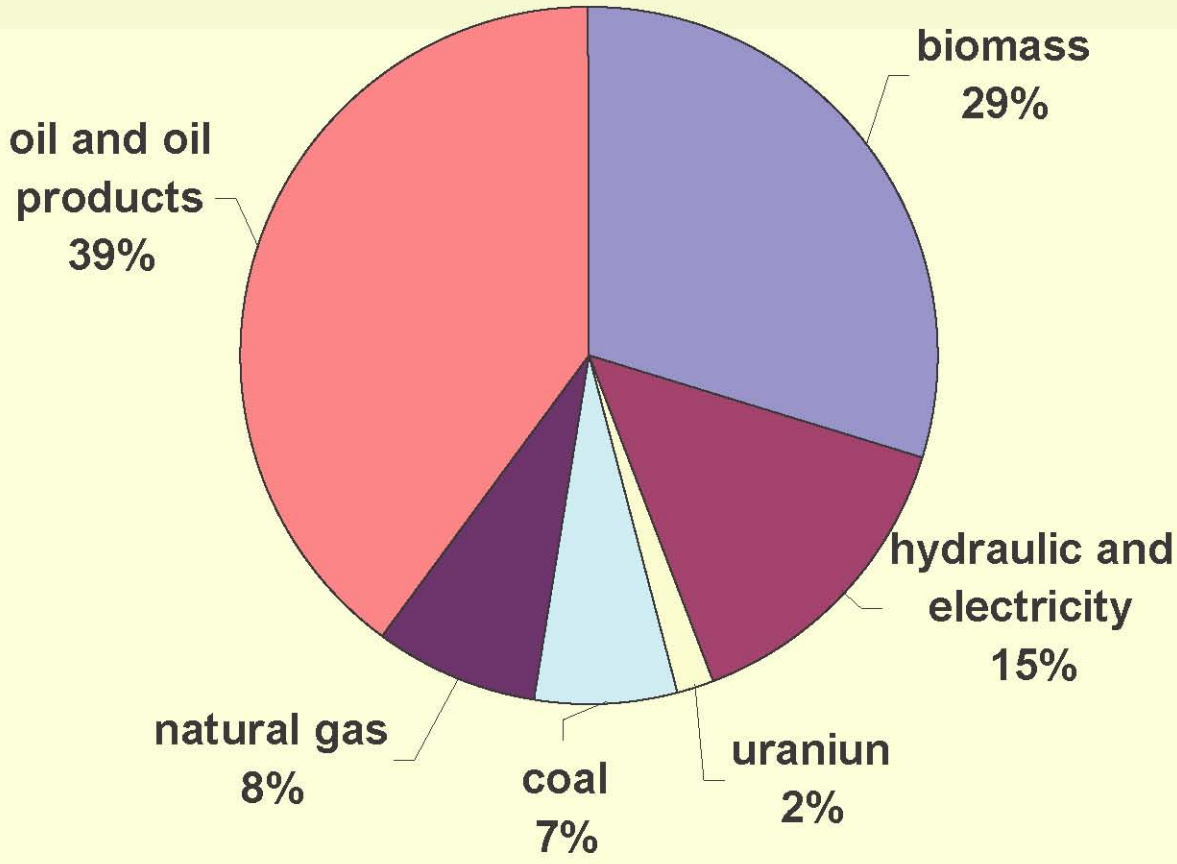
1. BIOFUELS IN BRAZIL'S ENERGY MATRIX

2. BRAZIL'S ETHANOL: PRODUCTION, POLICIES AND PROSPECTS

3. BIODIESEL: THE NEW CHALLENGE

4. FINAL REMARKS

BRAZILIAN ENERGY MIX



World: biomass 11%; hydraulic and electricity 2%

Source: MME/BEN (2005)

Why BIOFUELS?

- Environmental gains
  - carbon sequestration
  - lower emission levels in consumption
- Renewability
  - short production cycle
  - man-controlled process
- Economic aspects
  - new demand component
  - impacts on trade balance
- Social aspects
  - jobs creation
  - income deconcentration
- Norman Borlaug

BRAZILIAN ETHANOL: PRODUCTION, POLICIES AND PROSPECTS

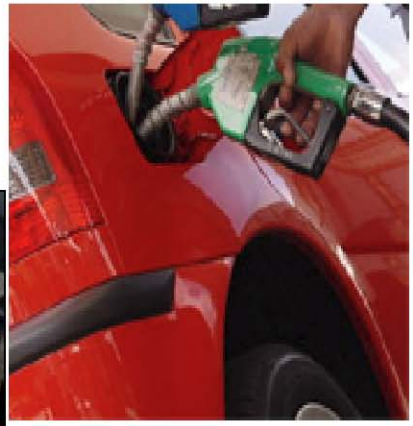
THE BRAZILIAN SUGAR CANE AND ETHANOL EXPERIENCES

1532: Martim Afonso de Sousa introduces sugar cane in Brazil

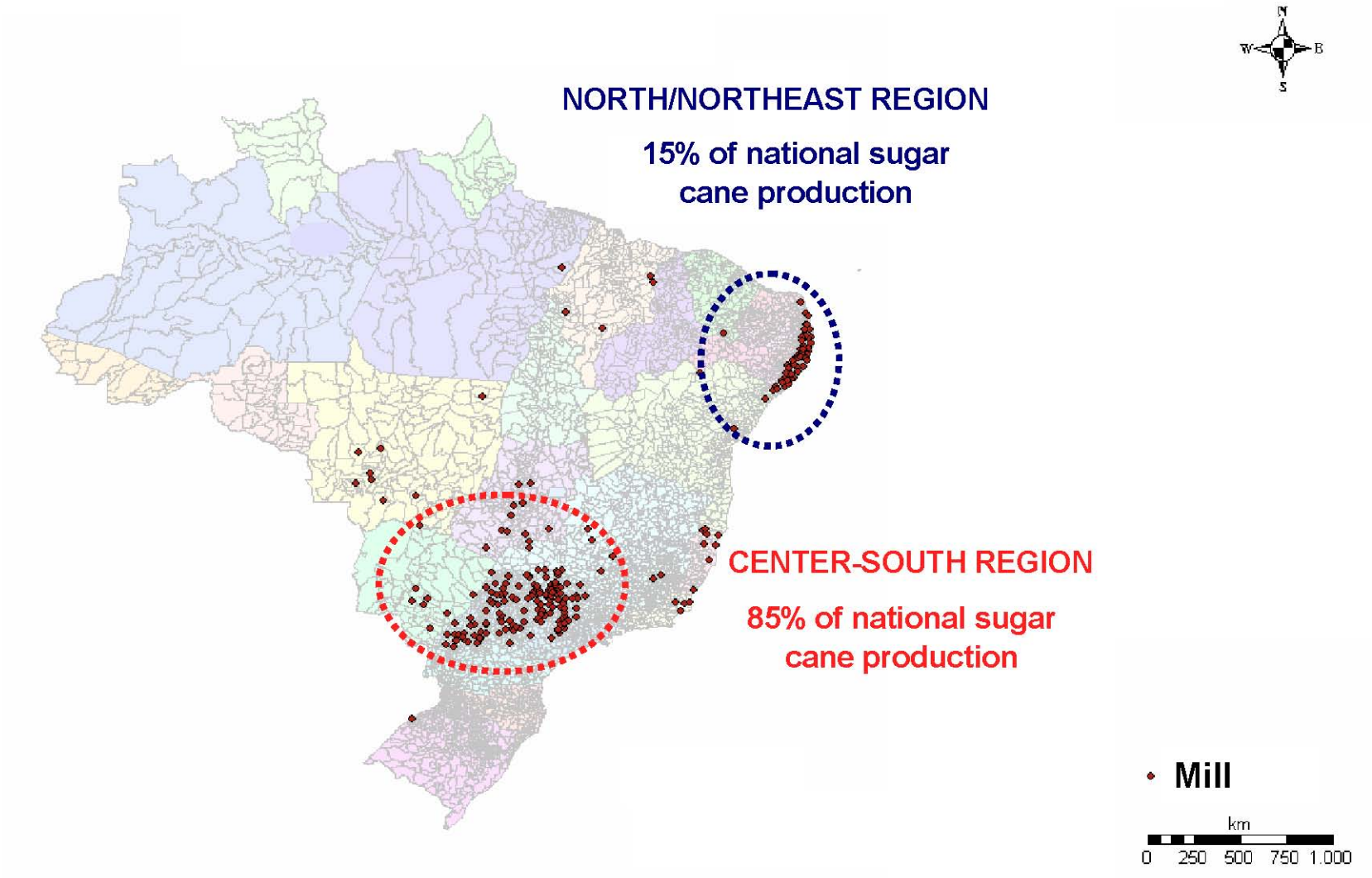
1925: First ethanol powered vehicle tested in Brazil

1979: First commercial ethanol moved vehicle in Brazil

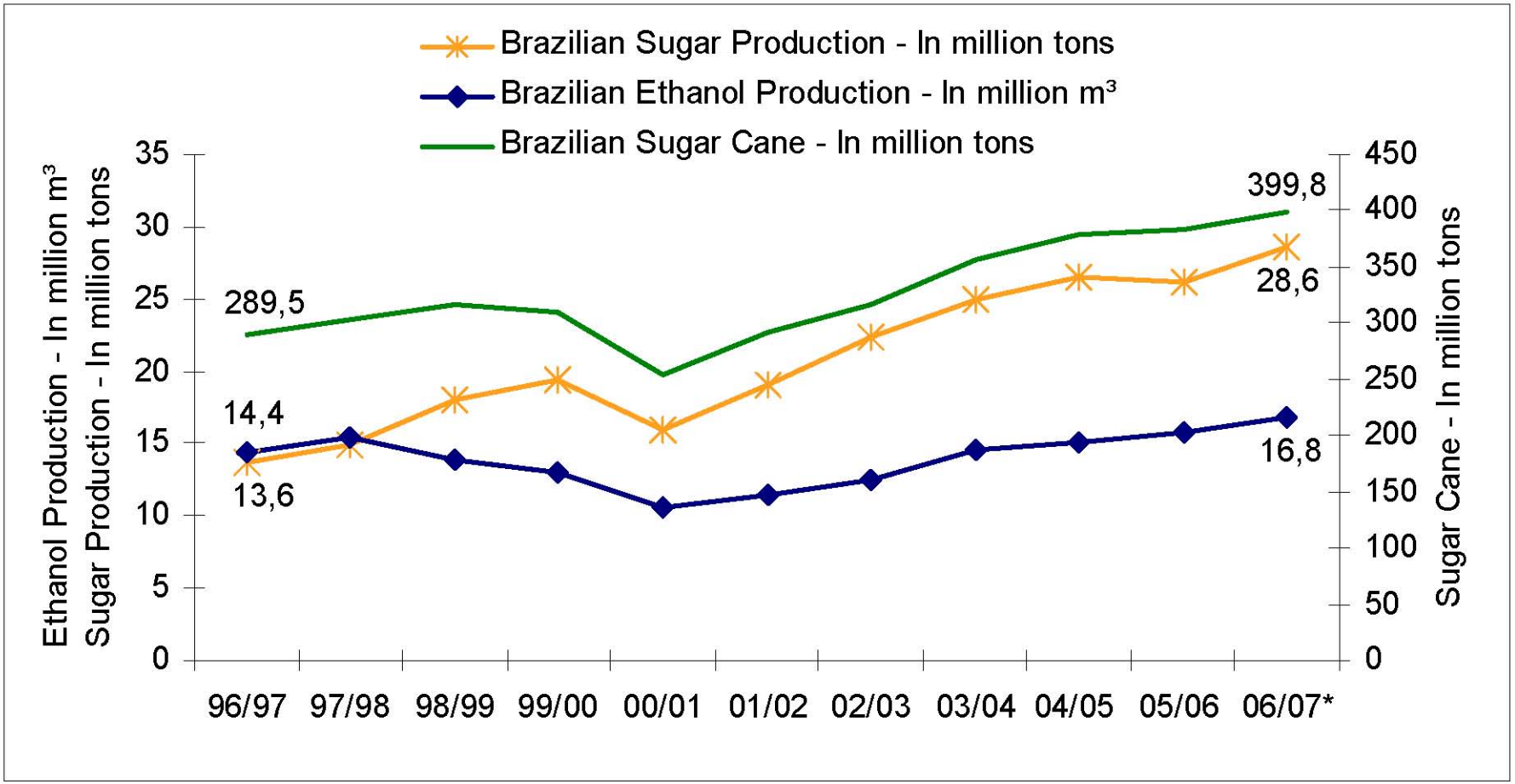
2003:
***Flex fuel* motors are launched**



SUGAR CANE IN BRAZIL



PRODUCTION DATA FROM THE BRAZILAN SUGAR CANE SECTOR



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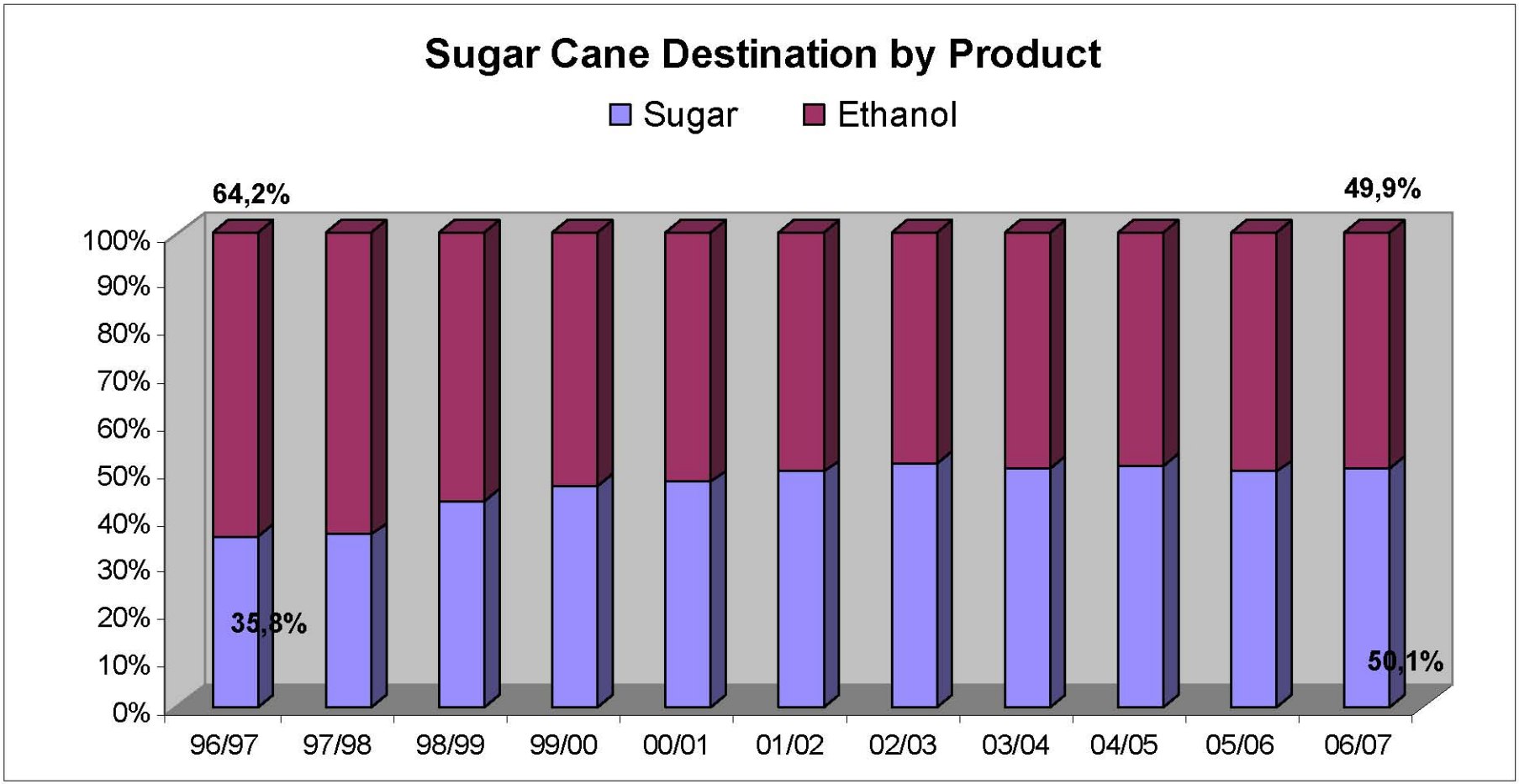


BRAZILIAN ETHANOL PROGRAMS

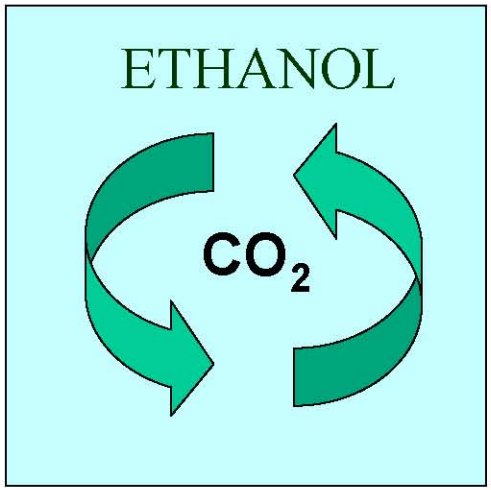
YEAR	PROGRAMS
1975	**- HYDROUS ETHANOL -**
1985	**- ANHYDROUS ETHANOL -** FIXES THE MIX LEVEL AT A MANDATORY 22%
2003	**FLEX FUEL VEHICLES**

ENERGY EFFICIENCY OF ETHANOL IN BRAZIL

Raw material	Energy output / Energy input
Wheat[1]	1.2
Corn[1]	1.3 – 1.8
Sugar Beet[1]	1.9
Sugar Cane[2]	**8.3**

[1] F.O. Licht, 2004.

[2] Macedo, I et al., 2004 – Under Brazilian production conditions.



- High photosynthesis efficiency (C4 crop).

- Possibility for using the sugar cane by-products in the production process, avoiding external energy sources.

CO-GENERATION WITH SUGAR CANE BAGASSE IN BRAZIL

CURRENT POWER: ~ 2200 MW

(700 MW are exported to the grid and 1500 MW are consumed in the own mills)

ACTUAL MEASURED POTENTIAL:

3.000 MW – 14.000 MW (extra)

Depending of the technology applied in the generation process.

- **Possibility to obtain carbon credits from CDM Projects (Kyoto Protocol)**

- **Complementary to the hydraulic generation in the Center-South Region**

THE USES OF VINASSES IN BRAZIL

Good fertilizer: high amount of potassium (K_2O)

Vinasses can be applied on the soil by irrigation

A new technology is being developed in Brazil: to dehydrate and transform vinasses into a new commercial product

THE FLEX FUEL CAR – A NEW DOMESTIC ETHANOL DEMAND

- **Flex-Fuel Engine: allows the use of ethanol or gasoline in any concentration of these fuels**
- **Current Manufactures: VW,GM, Ford, Fiat, Renault, Peugeot, Citroen and Honda**
- **Sales of Flex-Fuel Vehicles in Brazil:**
  - **2003: 48.000 units**
  - **2004: 330.000 units**
  - **2005: 865.000 units**
  - **2006: 1.447.000 units**

15,5 million gasohol cars (20% anhydrous ethanol blend

2,6 million flex fuel cars

3,6 million motorbites (20% anhydrous)

ETHANOL: The Brazilian Experience

- Total production: 18 billion liters
- Production per ton of sugar cane: 82 L/t
- Production per hectare: 7000 L/ha
- Production ratio: 160 thousand ha to produce 1 billion liters ethanol

EXPORTS: ETHANOL AND GASOLINE PRICE RELATIONSHIP

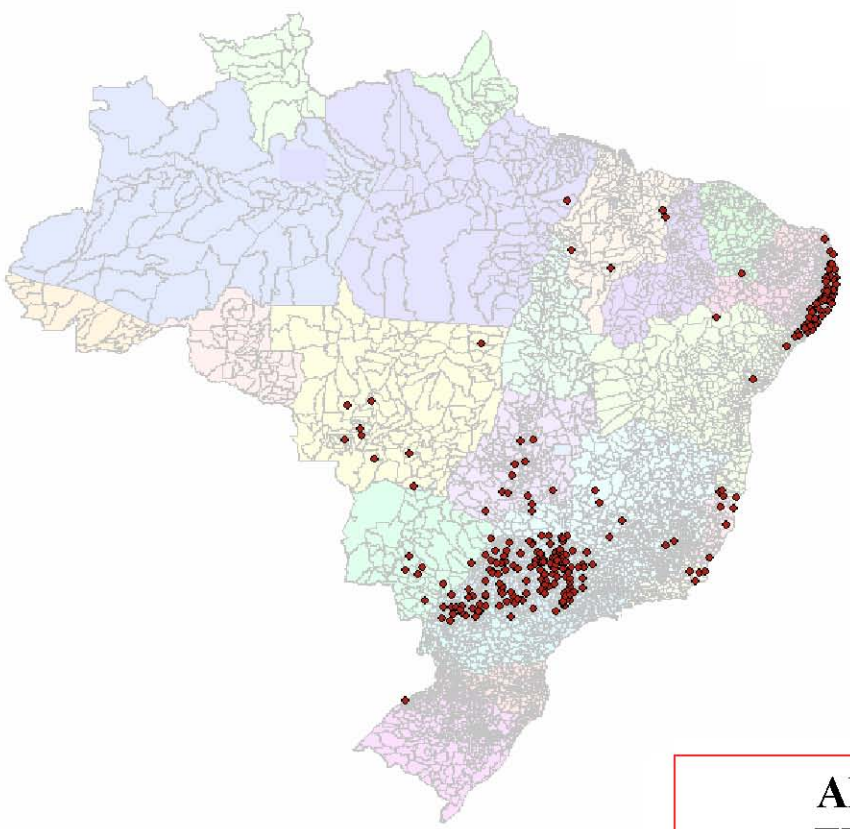
YEARS	ETHANOL			GASOLINE			PRICE RELATIONSHIP Ethanol x Gas
	Million US$ F.O.B.	Liters (Billion)	Average US$/m³	Million US$ F.O.B.	Liters (Billion)	Average US$/m³	
2003	158,0	0,757	208,56	548,0	2,640	207,48	-0,5%
2004	498,0	2,408	206,68	570,0	2,002	284,49	+37,7%
2005	766,0	2,592	295,31	1.066,0	2,857	373,01	+26,3%

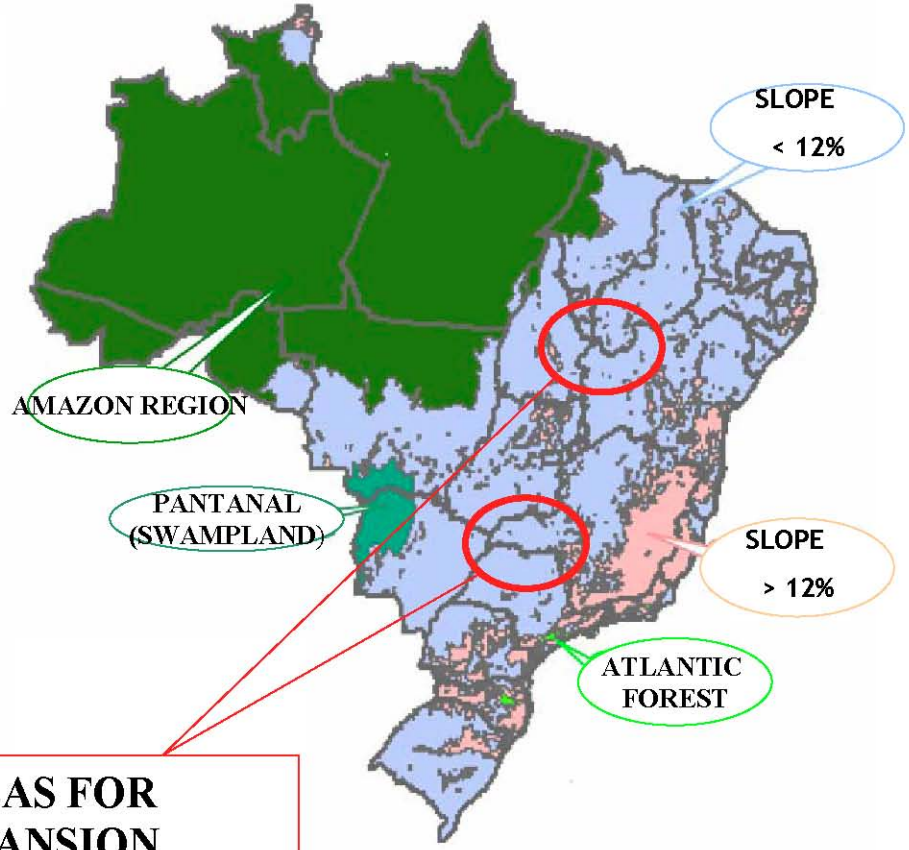
Source: MDIC (Alice System)

THE FUTURE OF ETHANOL

The Brazilian aim is to transform ethanol in a great commodity, together with other countries

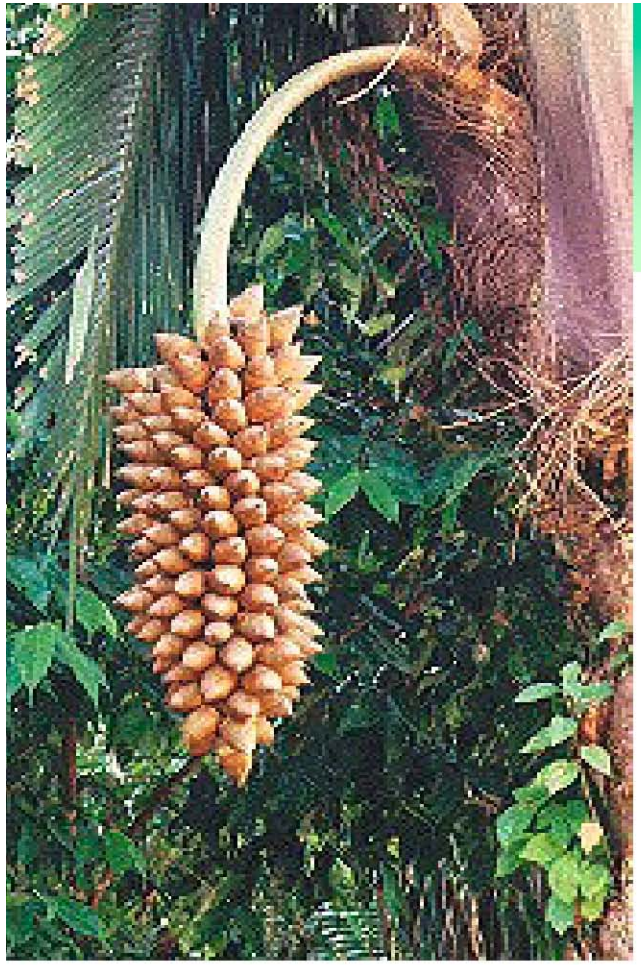
HOW TO EXPAND SUGAR CANE WITH SUSTAINABILITY?





Production, Export and Consumption of Sugar and Ethanol

	2005			2015		
	Production	**Export**	**Consumption**	**Production**	**Export**	**Consumption**
Sugar	26.714	14.624	12.090	43.199	25.317	16.201
Ethanol	16.216	2.661	13.555	36.849	8.484	28.365



BIODIESEL:

THE NEW CHALLENGE

BIODIESEL in Brazil

1970: first experiences (obstacle: vegetable oil prices)

1980: first biodiesel patent in the world (Federal University of Ceará)

2002: Government Agenda (Working Group)

Dec/2003: Inter-ministerial Executive Committee and a management group, responsible for a program implementation

Dec/2004: Program launching, with 14 Ministries and various Research Centers

2005: States structure research nets

Basic Objectives of the Biodiesel Program:

- Reduce oil dependency
- Produce environmental gains
- Introduce family agriculture into the raw material production process
- Allowed mixture: up to 800 million liters/year
- 2008: Mixture of 2% made compulsory
- 2013: Mixture increases to 5%

FINAL REMARKS

BIG CHALLENGES

FREE INTERNATIONAL MARKET FOR AGROENERGY

FUTURE PRICE OF PETROLEUM

BIODIESEL EFFICIENCY; AGRICULTURAL AND INDUSTRIAL

GOVERNMENT POLICIES

TECHNOLOGY DEVELOPMENT FOR BIODIESEL

GOVERNMENT POLICIES

1. GOVERNMENT SUPPORT AT THE BEGINNING: PROALCOOL (1980s) AND BIODIESEL (NOW!).
2. REGULATION AND SUPERVISION OF THE MARKET
3. FINANCING SUGAR AND ALCOHOL MILLS
4. SOME TECHNOLOGY SUPPORT
5. DRIVE FORCE: MARKET

BRAZIL HAS A GREAT POTENTIAL FOR BIOFUELS PRODUCTION...