

# BIOFUEL INDUSTRY: A LOCAL AND GLOBAL VIEW



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President and CEO

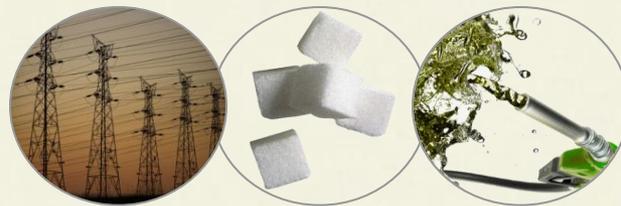
Brazilian Sugarcane Industry Association (UNICA)

Campos do Jordão

August 15<sup>th</sup>, 2011

# ABOUT UNICA

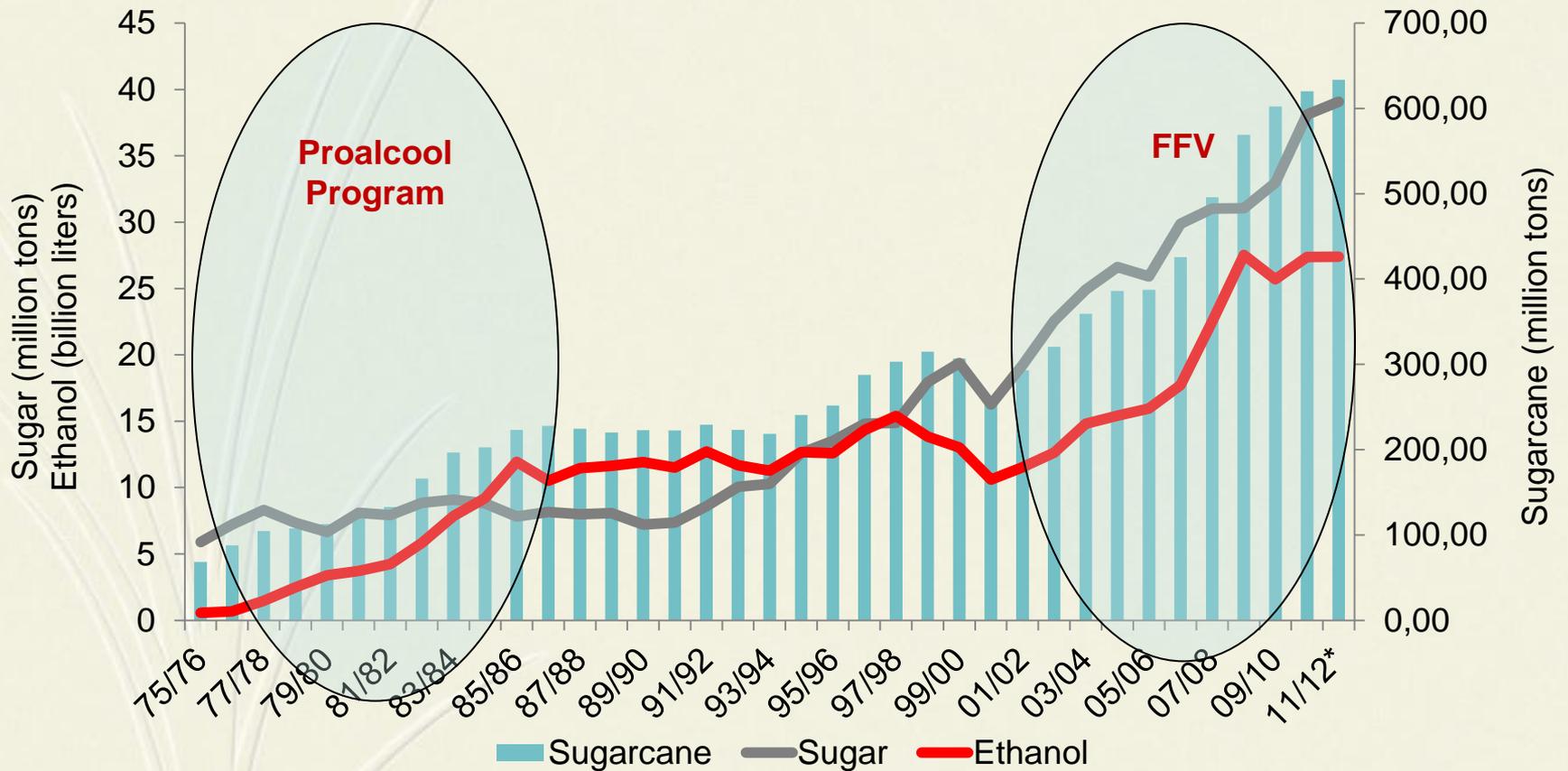
- ❖ The Brazilian Sugarcane Industry Association (UNICA) is the **leading sugarcane industry association** in Brazil. Its more than **140 member companies**, voluntarily **engaged**, represent over 50% of the ethanol and 60% of the sugar produced in Brazil.
- ❖ UNICA has **around 60 staff** and its expertise covers key areas including the **environment, energy, technology, international trade, corporate social responsibility, sustainability, regulation, economics and communications**
- ❖ It has offices in **five locations**: **São Paulo (headquarters)**, **Ribeirão Preto (in the heart of the sugarcane producing region)**, **Brasília (Brazilian capital)**, **Washington D.C**, and **Brussels**



# KEY NUMBERS OF BRAZILIAN SUGARCANE SECTOR

<b>Sector Revenue</b>	<b>More than US\$ 50 billion</b>
<b>Foreign revenue (exports)</b>	<b>US\$ 13.8 billion (2010)</b>
<b>Number of mills</b>	<b>More than 434 nationwide</b>
<b>Sugarcane growers</b>	<b>70,000</b>
<b>Job creation</b>	<b>1.28 million</b>
<b>Share of Brazilian energy use</b>	<b>18% (2<sup>nd</sup> source, &gt; hydroelectricity)</b>
<b>Avoided CO<sub>2</sub> emissions</b>	<b>&gt; 600 million tons since 1975</b>

# EVOLUTION OF SUGARCANE, SUGAR AND ETHANOL PRODUCTION IN BRAZIL



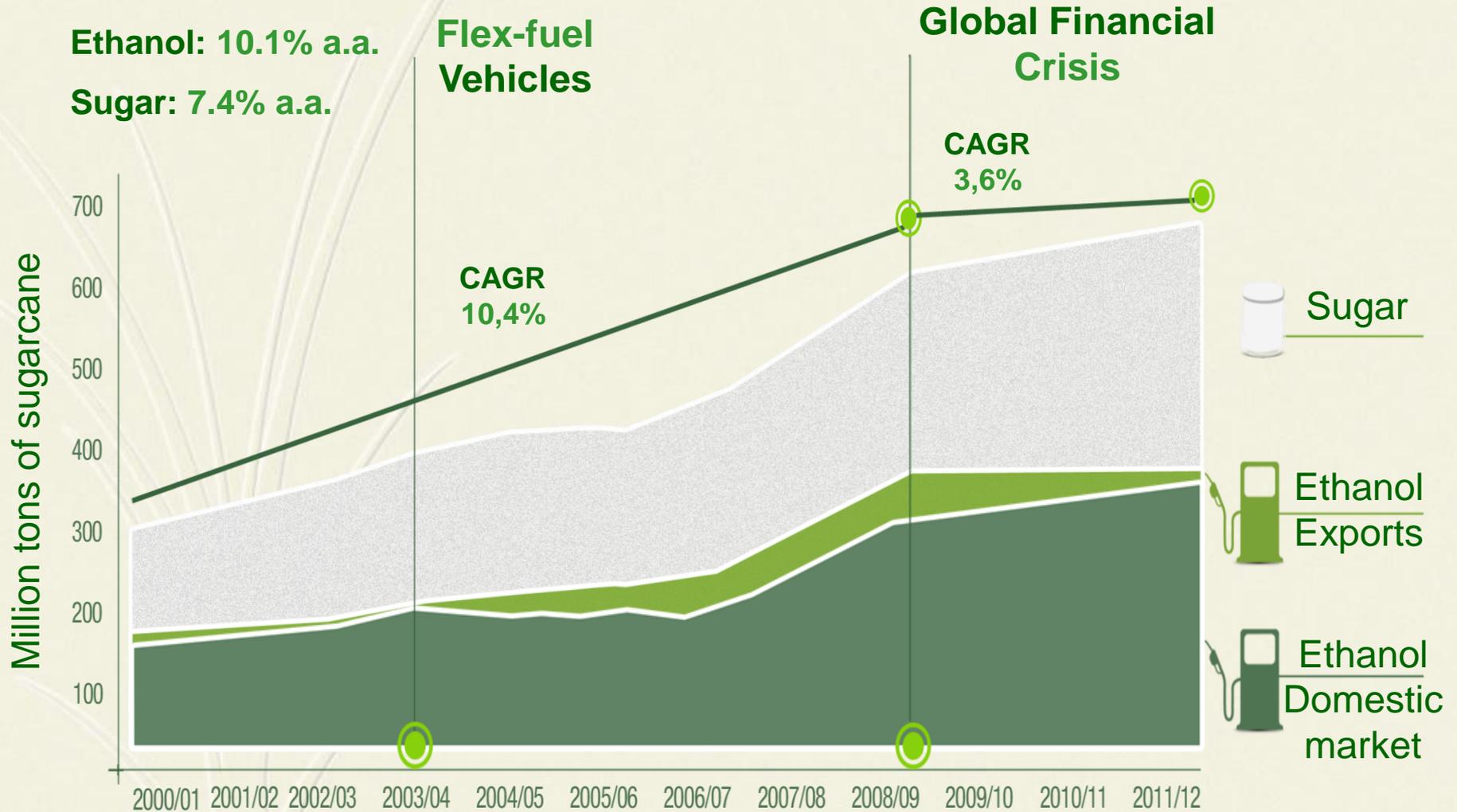
## 1<sup>st</sup> phase: Proalcohol

Strong government intervention  
Pure ethanol vehicles & distribution

## Flex Fuel Vehicles

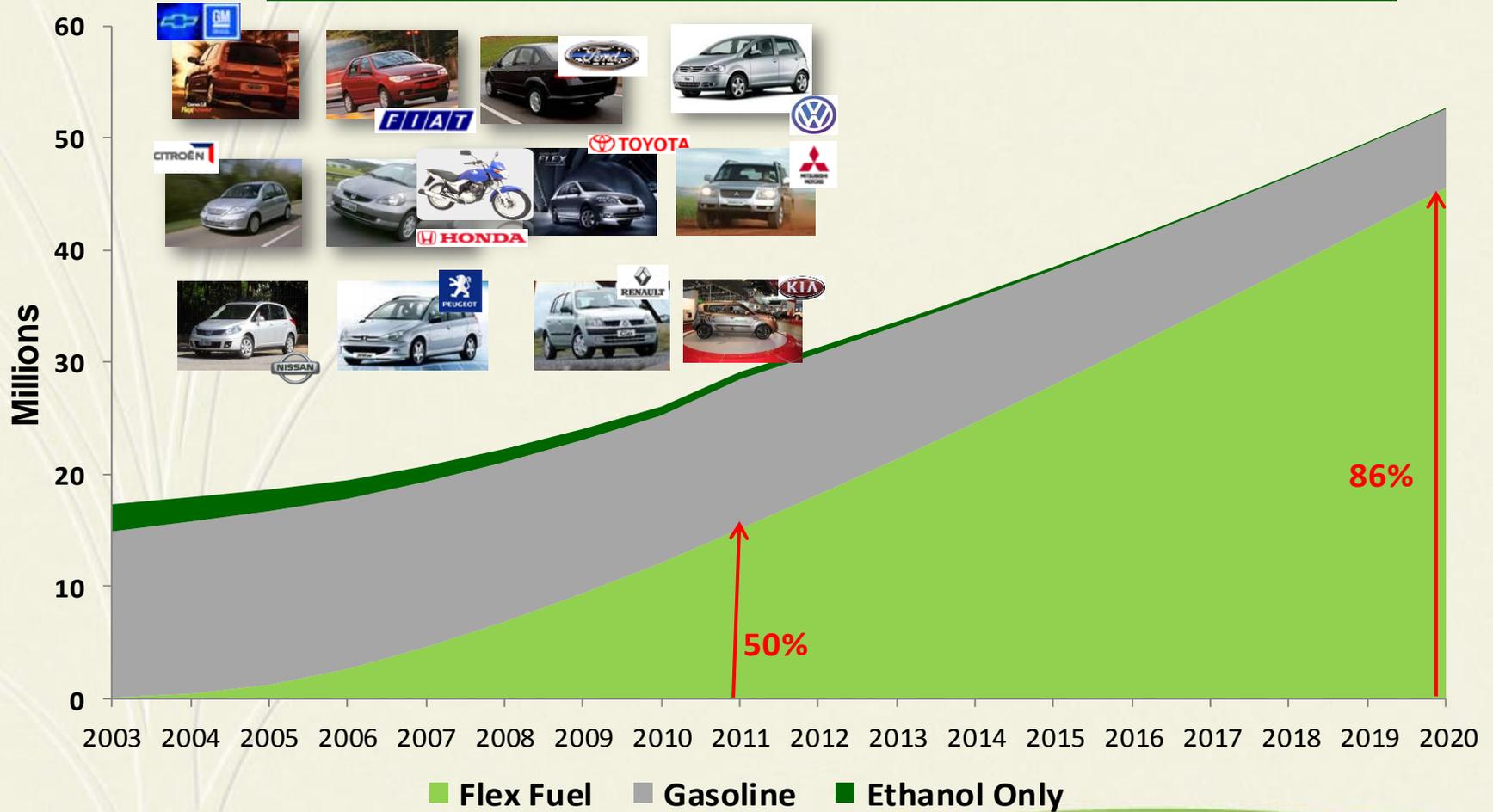
Automakers decision

# SUGARCANE SECTOR: OVERVIEW OF THE LAST DECADE

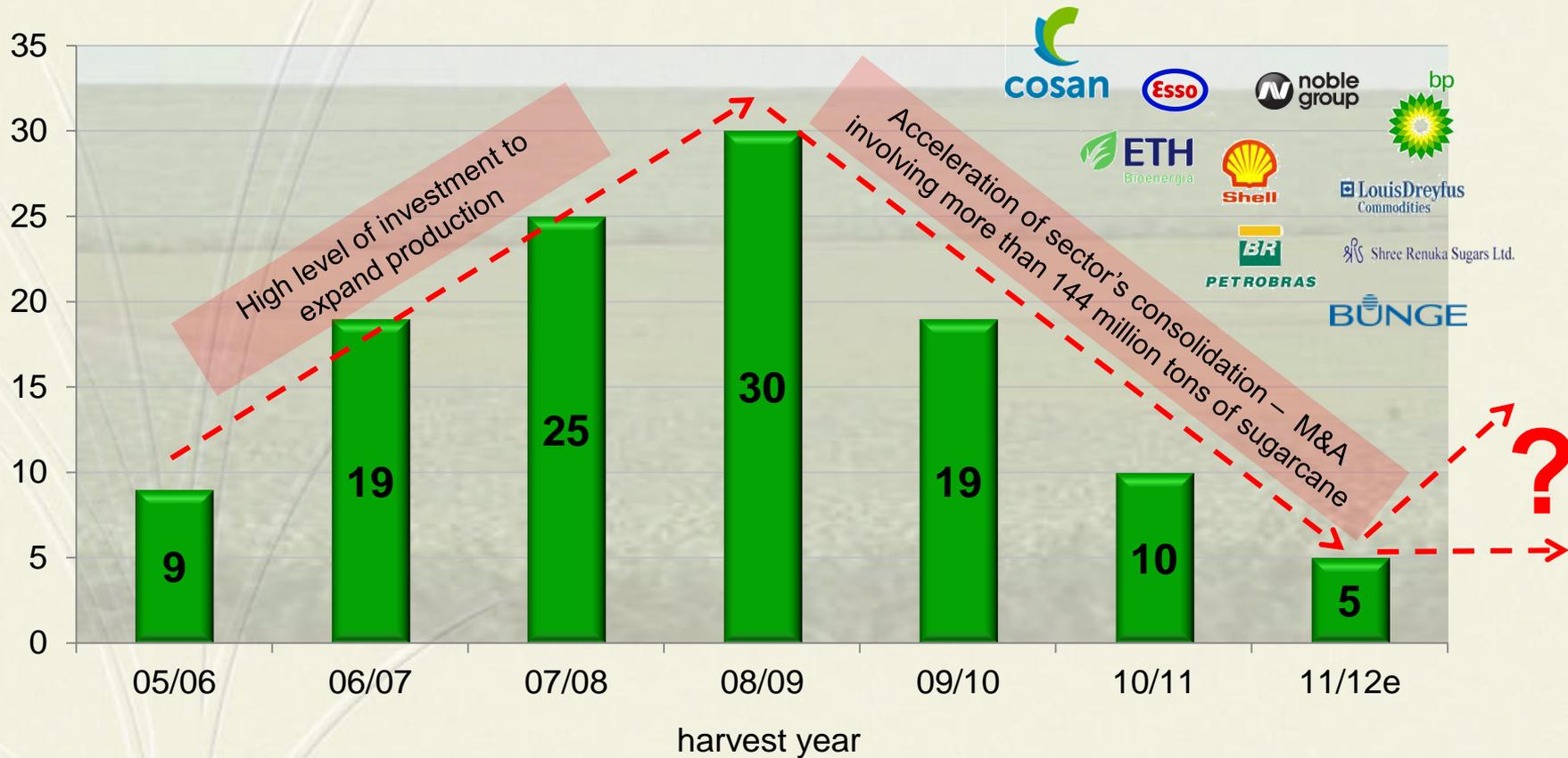


# NATIONAL LIGHT VEHICLE FLEET

Today, 12 automakers offer over 90 models of flex fuel vehicles, which already account for almost 50% of the Brazilian fleet of light commercial vehicles.



# NEW PLANTS IN THE CENTER-SOUTH OF BRAZIL



Since 2008/09, investment in the sector has slowed down and there are no indication of new investments to increase production in the next few years.

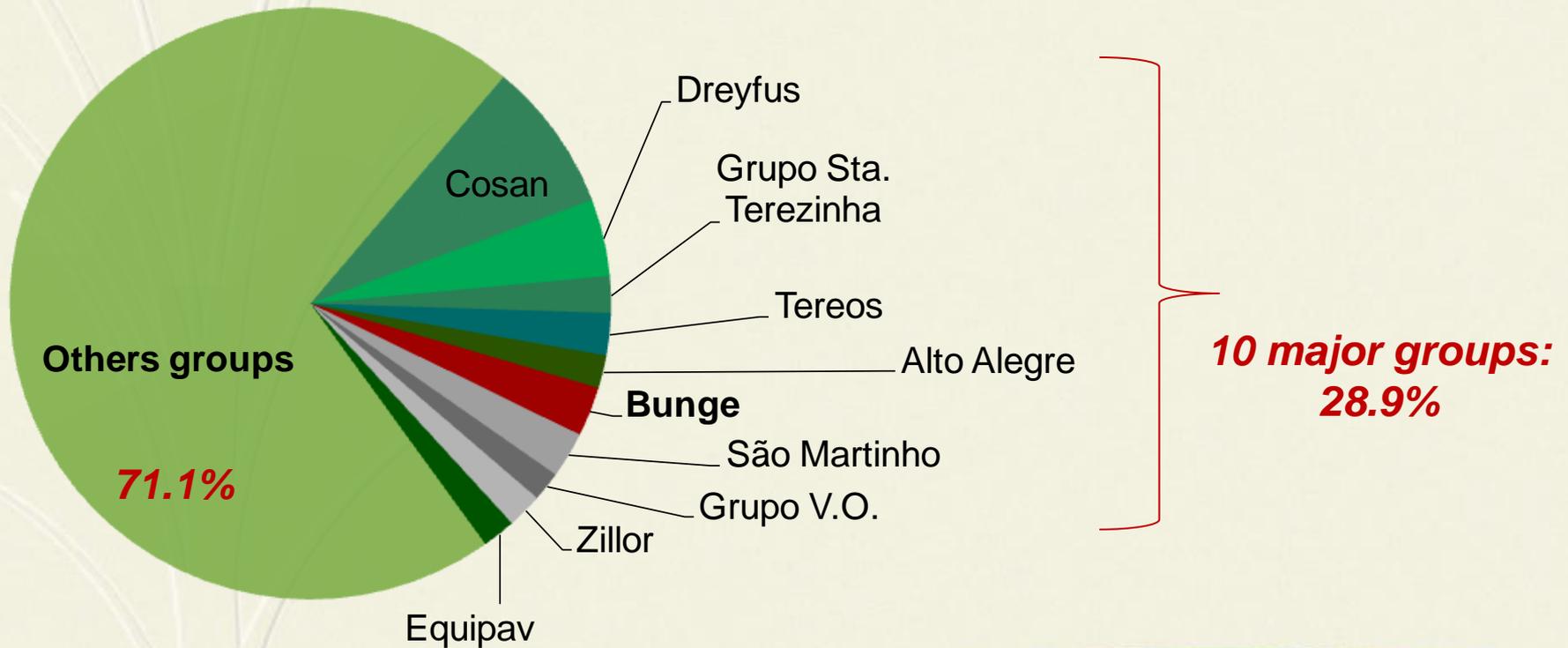
# STRONG CONSOLIDATION MOVEMENTS



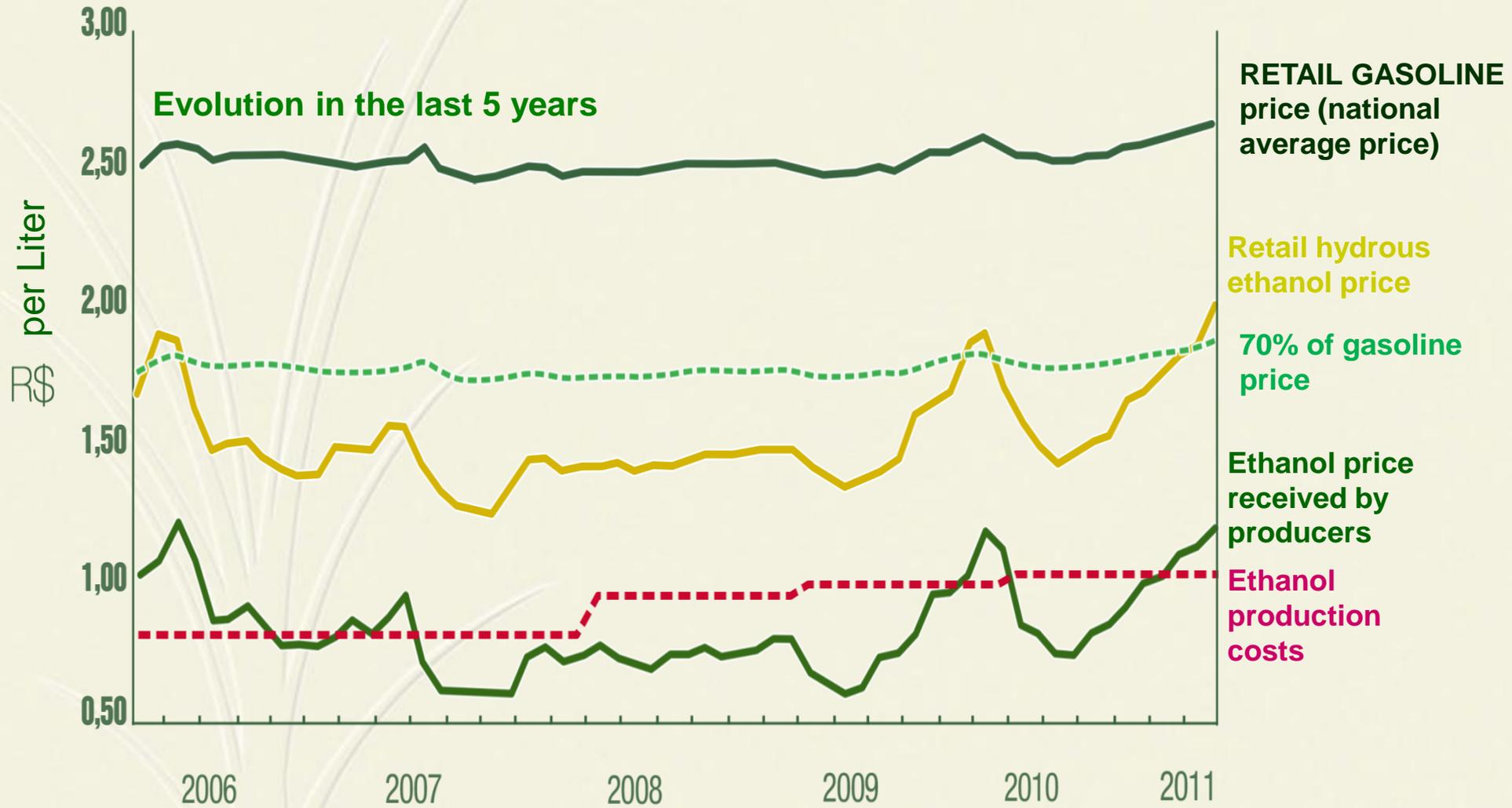
- Despite recent mergers and acquisitions, the industry is still very fragmented and with little entry barriers
- Higher concentration to increase competitiveness (economies of scale and scope)

# CONSOLIDATION

*Share of ethanol production in South-Central region controlled by major sugarcane industry groups*



# BRAZILIAN GASOLINE AND ETHANOL PRICES



# PROJECTION OF TOTAL FUEL CONSUMPTION IN BRAZIL

2020

2010

40

45%  
Ethanol

2015

61

Proportion  
of Ethanol

85

Proportion  
of Ethanol

?



27  
million



38,5  
million



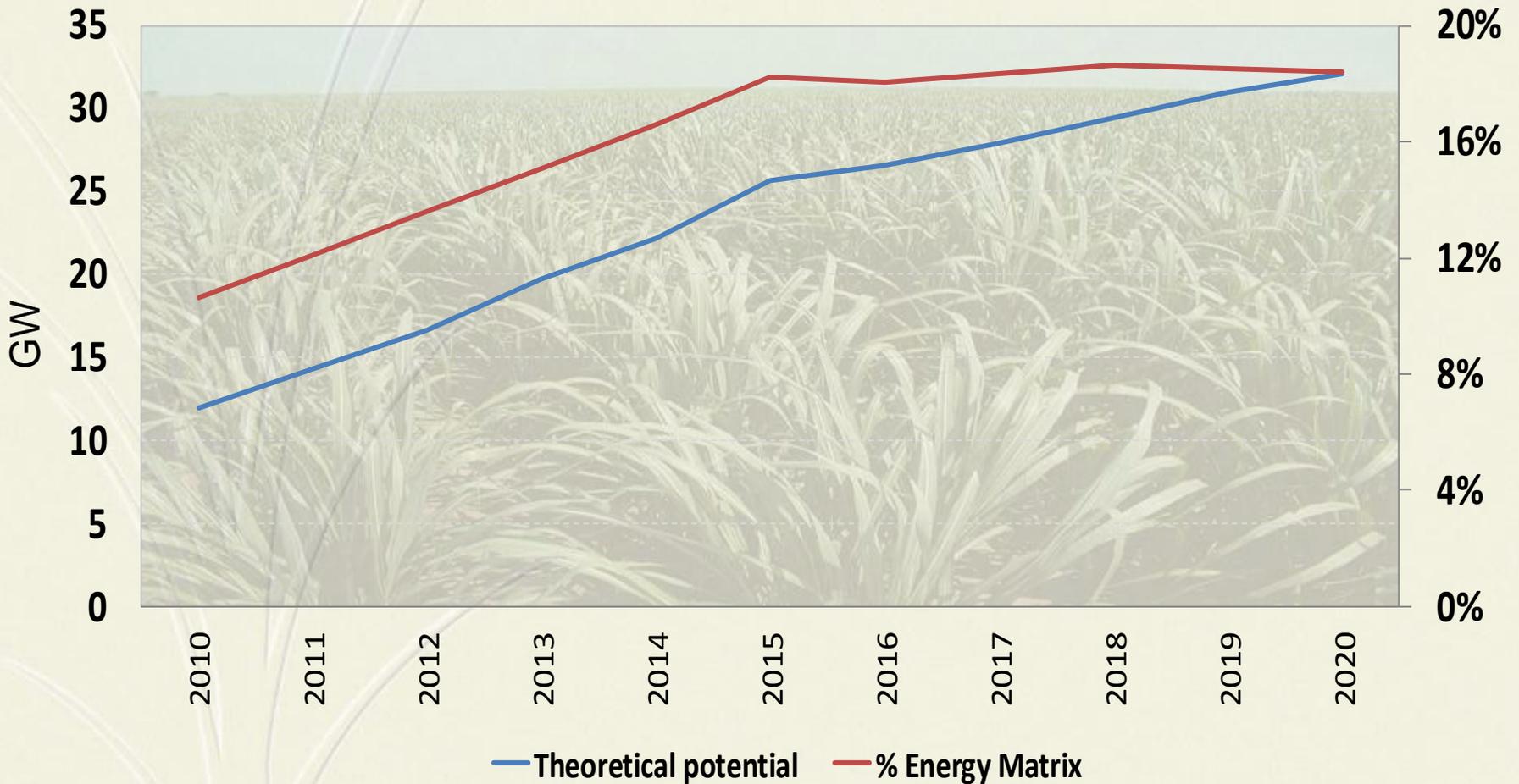
52,5  
million

**Billion  
Liters**  
(volume converted in  
gasoline equivalent)

**Light  
Vehicle  
Fleet**

# BIOELECTRICITY

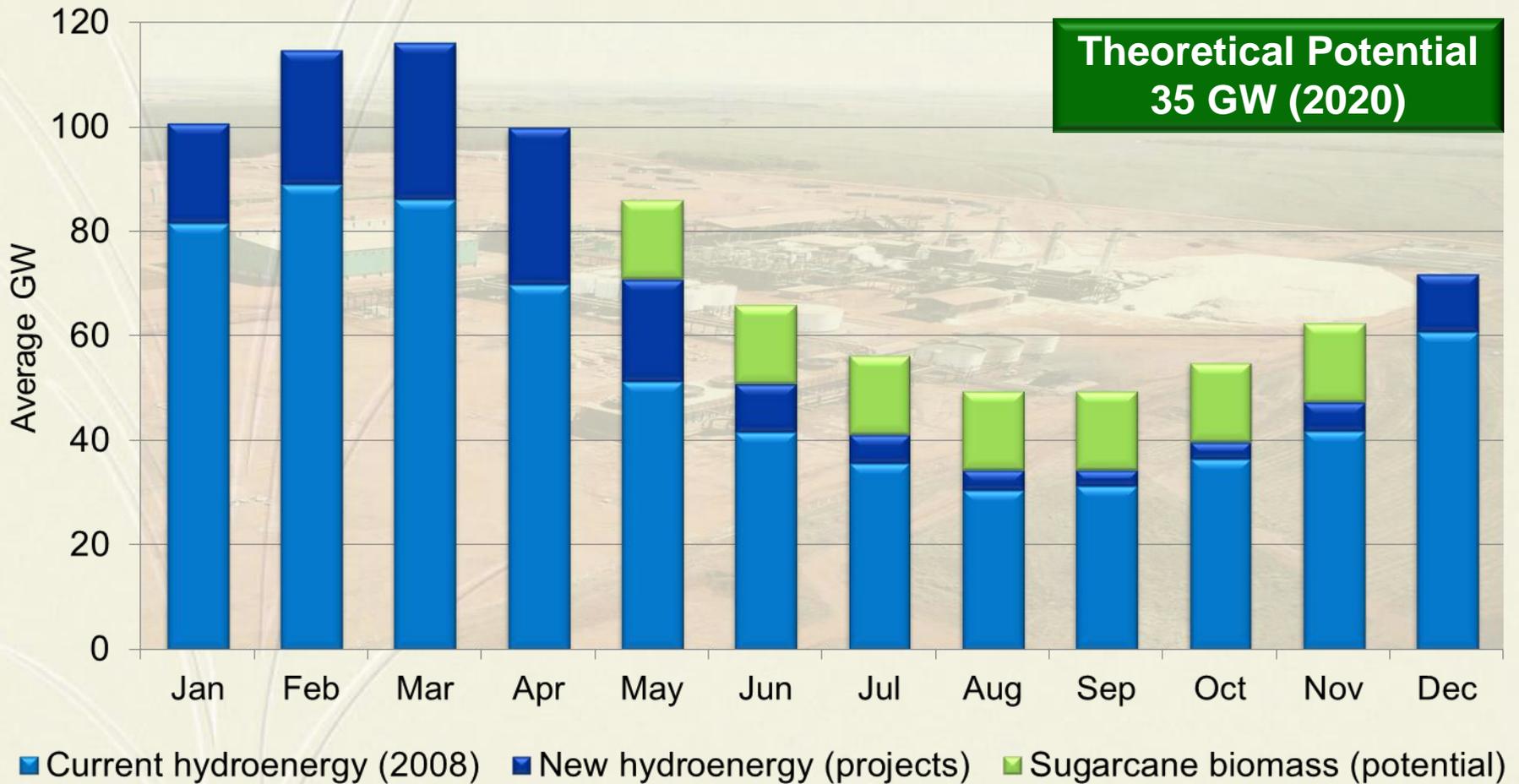
## *Brazilian potential to generate bioelectricity*



Note: 1 t of cane produces 250 kg of bagasse and 204 of straw and points, 1 t of cane (bagasse + straw) generates 199,9 kWh for export, Lower Calorific Value (LCV) of straw = 1,7 LCV of bagasse, capacity factor = 0,5 (Koblitz), using a 65 bar boiler. In 2008/09, it should be considered a use of 75% of available bagasse and 5% of available straw and, from 2015/16, a use of 75% of available bagasse and 70% of available straw. Up to 2010, it was considered the energy traded at Energy Auctions in a Regulated Contracting Environment, for 2011 an increment of 1600 MW was considered, and by 2012 an increment of 2000 MW per year. Source: Electricity Demand (EPE, 2011); Theoretical potential (UNICA, 2011).

# BIOELECTRICITY

*Sugarcane bioelectricity and hydroelectricity are complementary*



**ONS data indicate a 4% savings in reservoirs for every 1,000 MWa of bioelectricity generated during the dry season (April-November)**

# TECHNOLOGICAL EVOLUTION

## TURBINES AND MOTORS

**FLEX, BIOFUEL**  
**DEDICATED, HYBRID**  
(cars, stationary, moto, buses, trucks, aviation)



## BIO-ETHYLENE

**PHB, PET, PE, PP, PVC**



## OTHERS

**Fine chemicals**



**Use and applications**

## Processes

## BIO-HYDROCARBONS

**GENETIC ENGINEERING**  
**FERMENTATION**



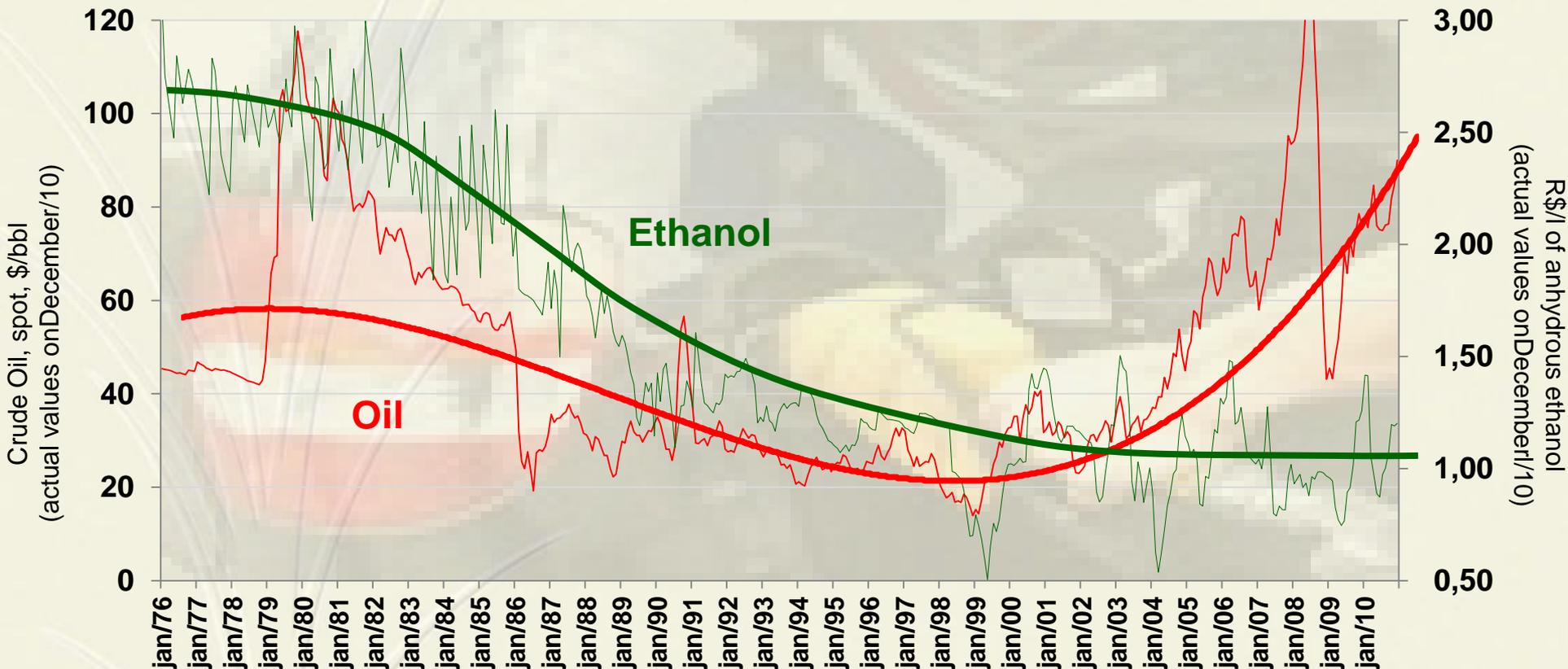
## BIOBUTANOL



**SECOND GENERATION BIOFUELS**



# EVOLUTION OF ANHYDROUS ETHANOL PRICES RECEIVED BY PRODUCERS AND INTERNATIONAL OIL PRICES

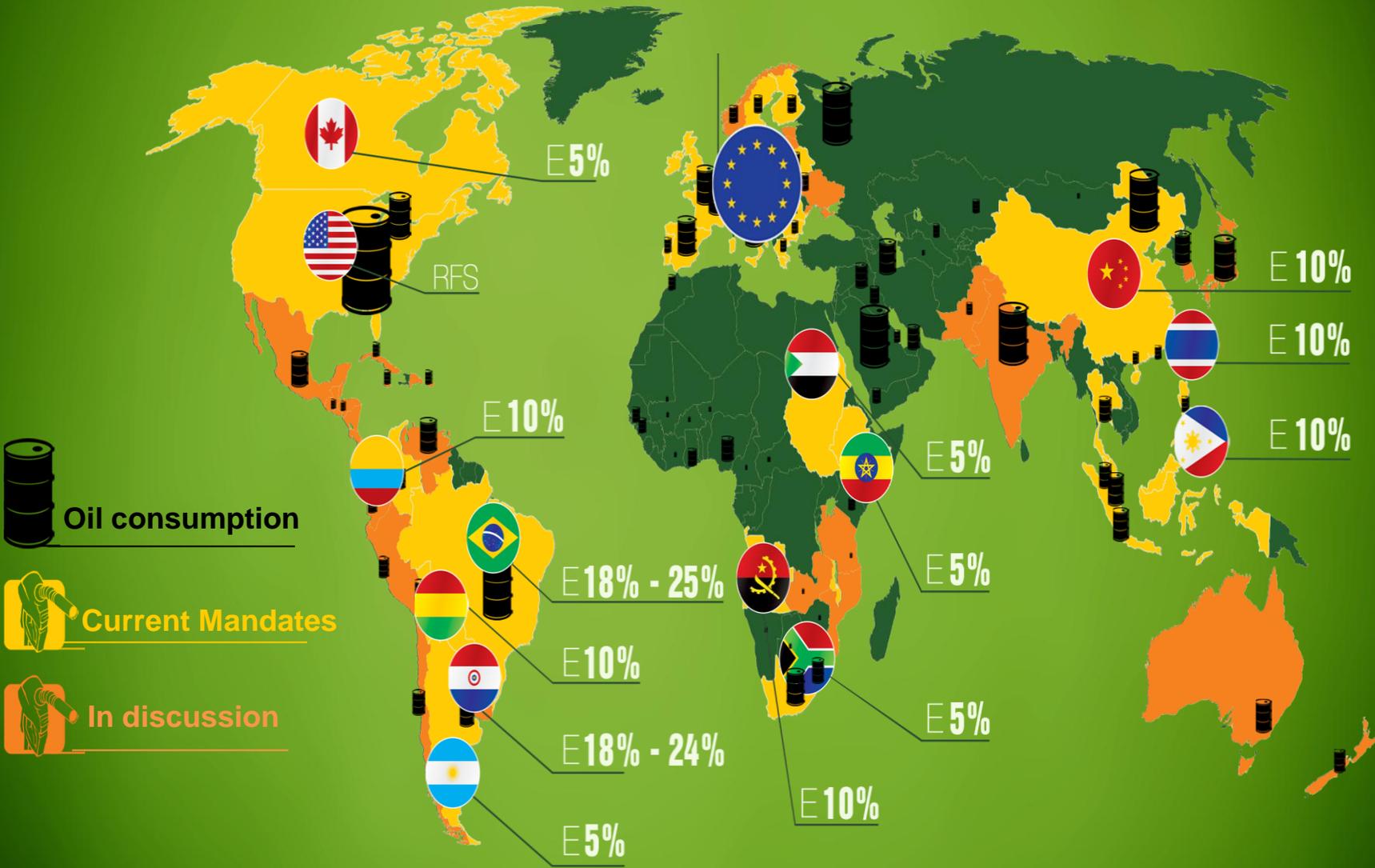


Thanks to efficiency gains, current ethanol prices are only about 30% of the observed price at the beginning of the Proálcool program

# International Market Trends

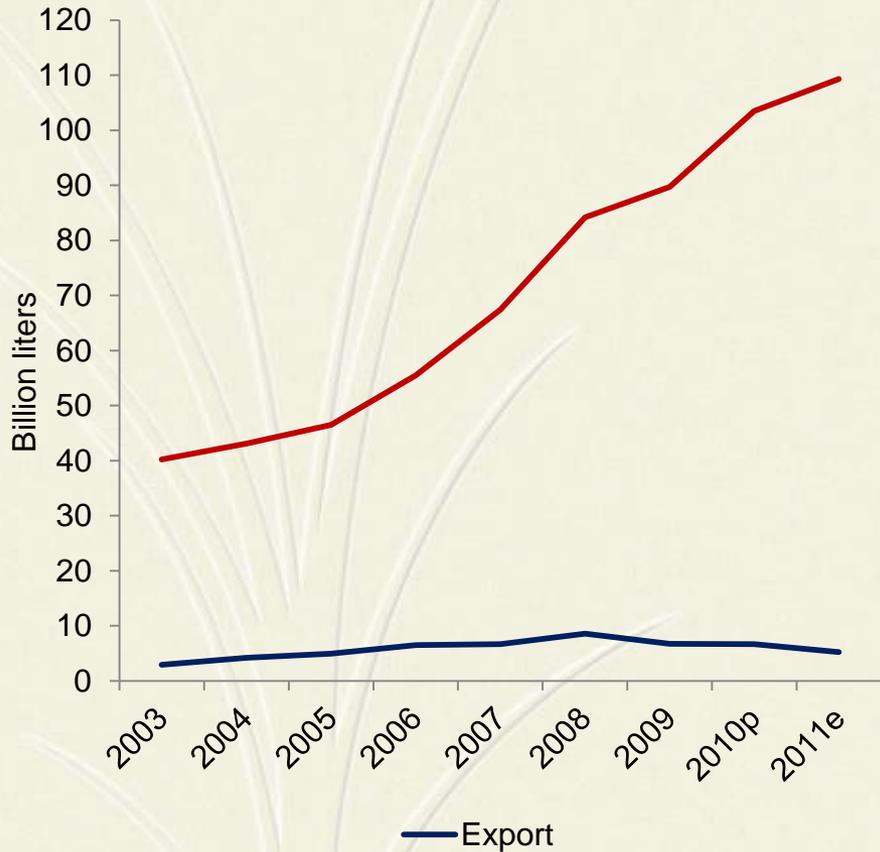


# WORLD BIOFUELS PROGRAMS

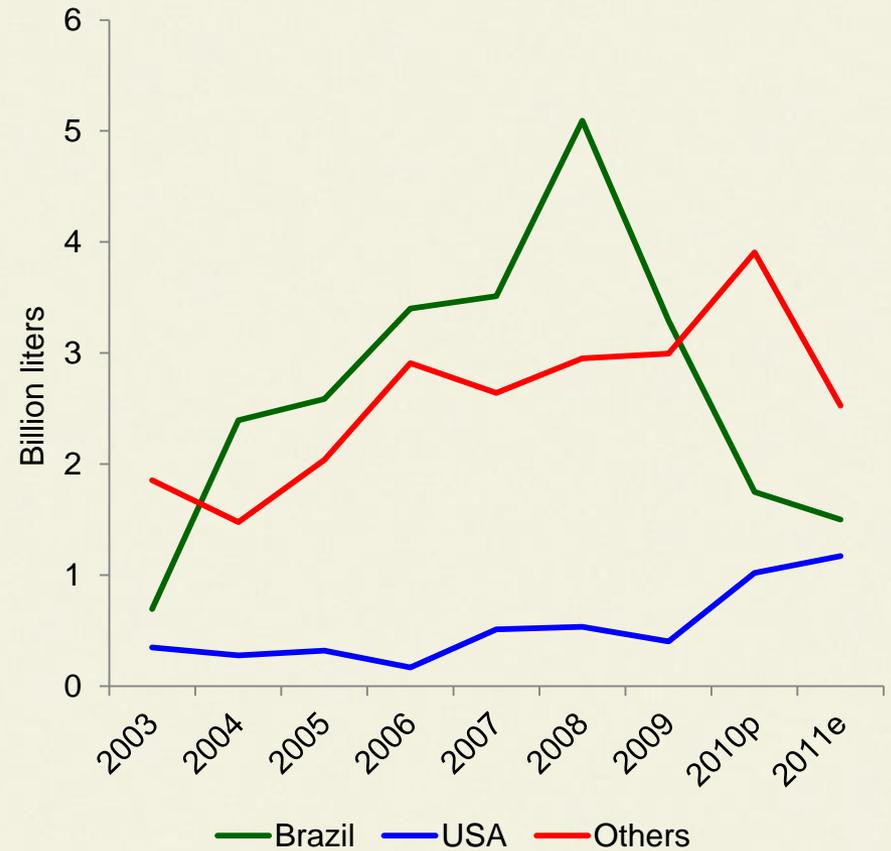


# WORLD ETHANOL PRODUCTION AND EXPORTS

## World Production X World Exports



## Exports by country



# ENVIRONMENTAL COMPETITIVENESS

## Advantages of sugarcane ethanol

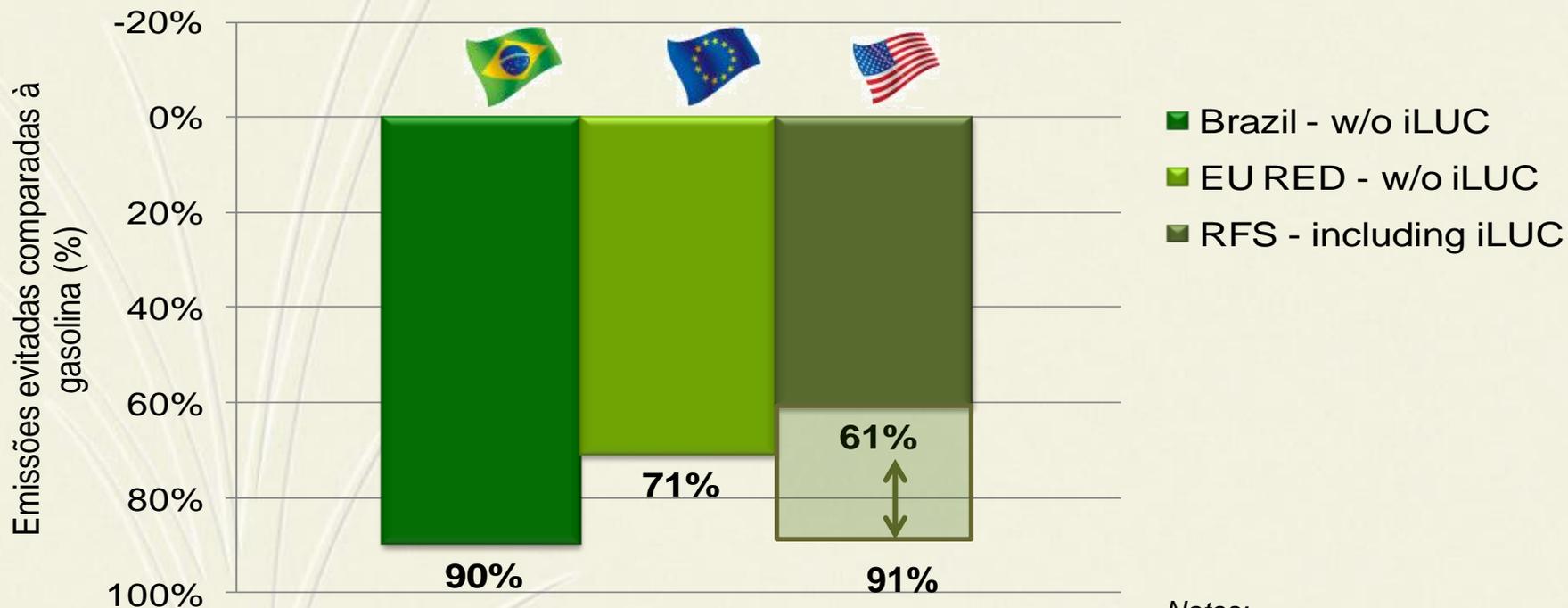
Source				
Country	<b>Brazil</b>	<b>USA</b>	<b>EU</b>	<b>EU</b>
Energy balance	<b>9.3</b>	1.4	2.0	2.0
Productivity (liters/hectare)	<b>7,000</b>	3,800	2,500	5,500
<b>GHG reduction</b> (from US and EU legislations)	<b>61%-91%</b>	0%-38%	16%-69%	52%

\*Note: reduction of avoided emissions with ethanol as a gasoline substitute and calculated according to life-cycle analysis. Source: World Watch Institute (2006) and Macedo et al. (2008) – energy balance. Productivity: IEA – International Energy Agency (2005), MTEC, EU Commission, EPA and UNICA. GEE: IEA – International Energy Agency (2004) and Macedo, I. de C. et al. (2004 and 2008). Elaboration: UNICA

# SUGARCANE ETHANOL: GHG REDUCTIONS

(SEVERAL METHODOLOGIES, COMPARED TO GASOLINE)

## SUGARCANE ETHANOL



Notes:

*iLUC: indirect land use change*

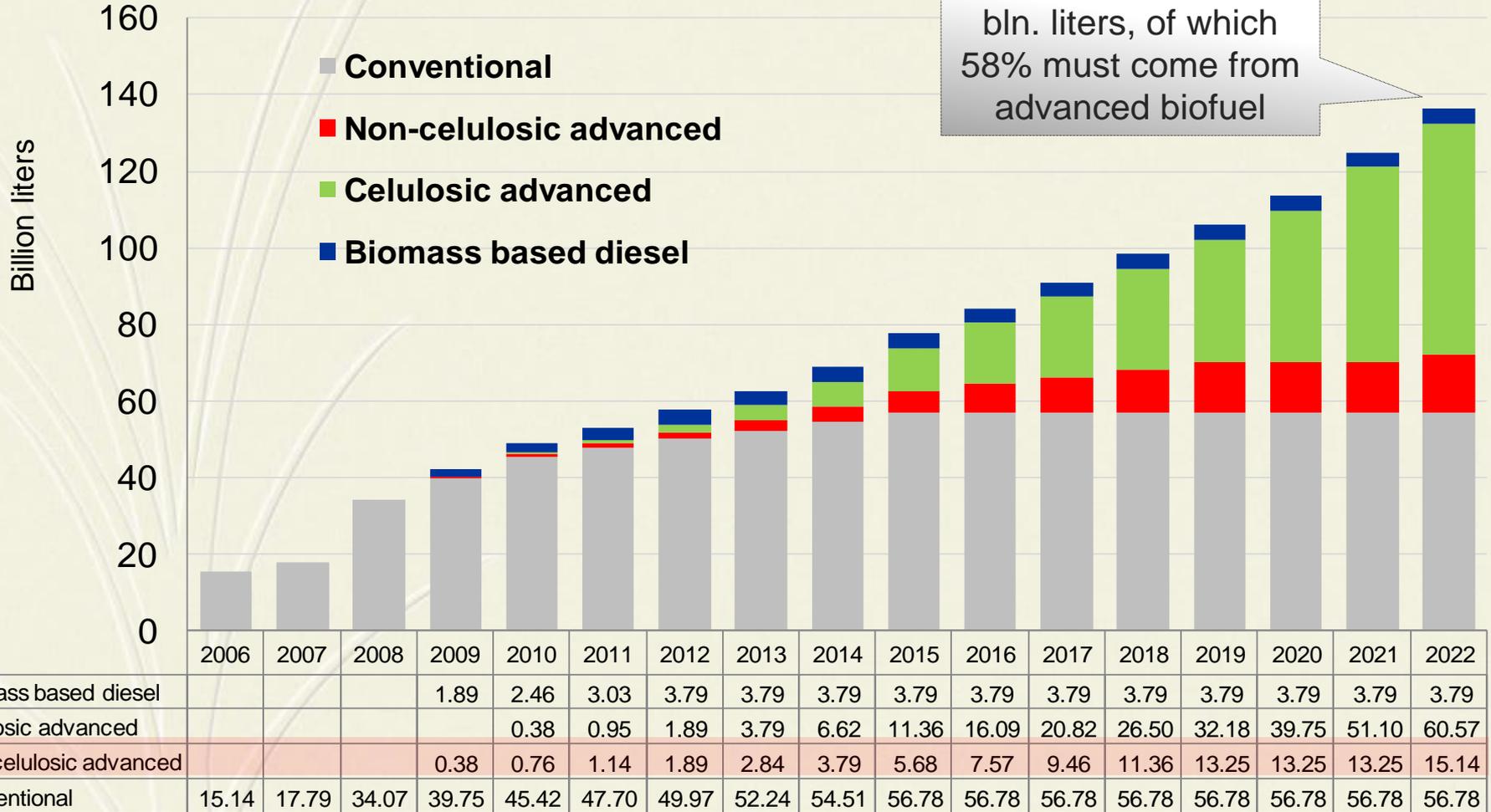
*EU RED: European Renewable Energy Directive*

*RFS: Renewable Fuels Standard*

**In the absence of sugarcane-based energy, Brazilian transport and electricity emissions would have being 22% higher**

# US - RENEWABLE FUEL STANDARD 2

## Consumption Targets



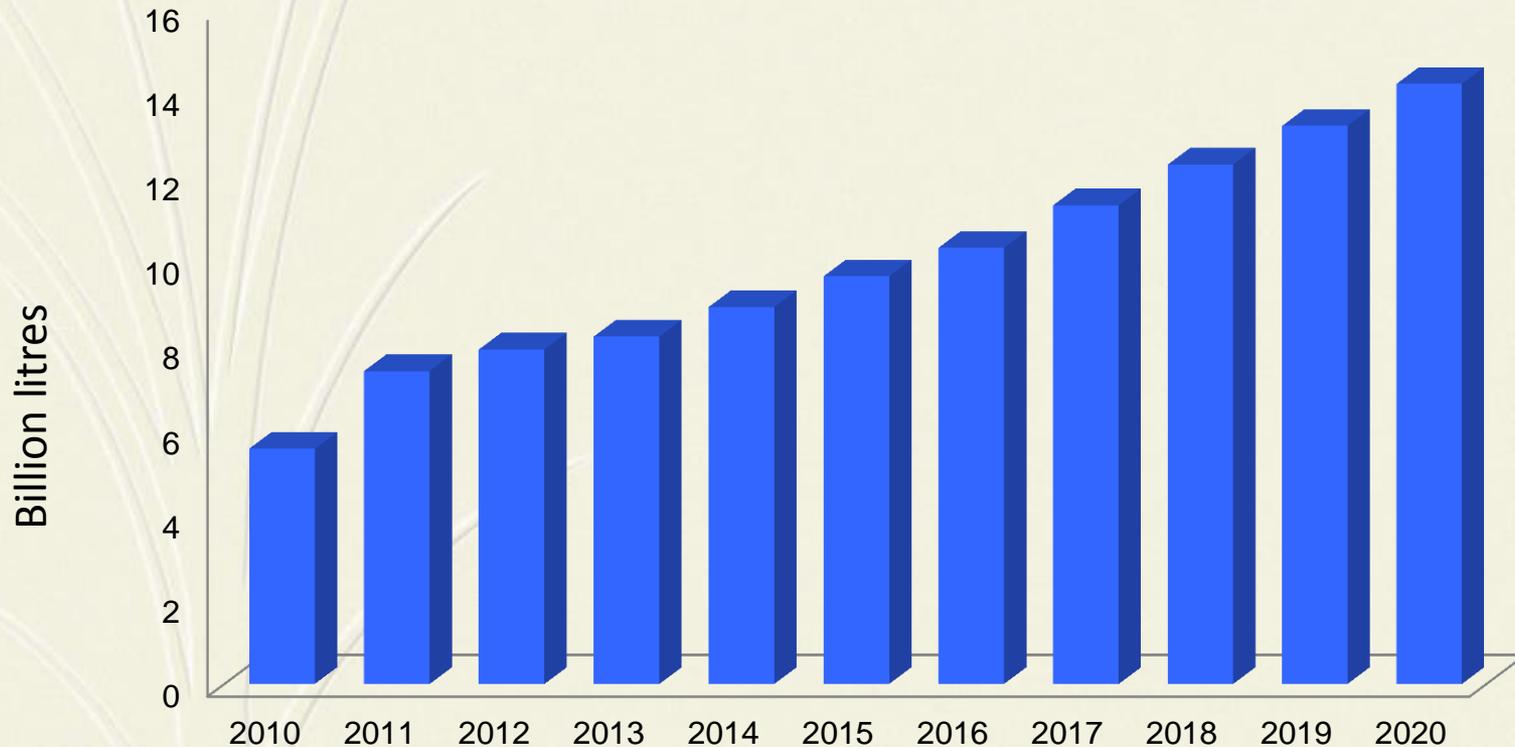
U.S. government imposes a US\$ 0.54/gallon import tariff and a US\$ 0.45/gallon subsidy



# EU LEGISLATIVE FRAMEWORK

- ❖ **10% of renewable energies in the transport sector by 2020** without specific targets for certain renewable energy sources and without intermediate targets.

Ethanol estimates according to the National Renewable Action Plans (EU 27)



# CHALLENGES

## ❖ **Tariff barriers:**

- US: 2.5% + US\$ 0.14/liter (US\$ 0.54/gallon)
- EU: € 0.19/liter

## ❖ **Non-tariff barriers:**

- Non-harmonized and questionable methodologies to measure avoided emissions
- Unbalanced sustainability criteria
- Discriminatory compliance schemes, including certification

# WORLD SUGARCANE MAP



**Ethanol production in 100 countries would enhance energy security by reducing world reliance on only 20 oil producing countries.**

# LAND USE

Millions of hectares\*

Total Area	Forests and Native Vegetation	Arable Land	Others
851	498	338	15
100%	58%	40%	2%

Available 30%

103

Pasture Land

172

51%

Crop Land

55

16%

Sugarcane

8,7

2,6%

Liters of ethanol per hectare



UNICA

# FINAL CONSIDERATIONS

## Domestic challenges

### *Short term*

- ❖ Improve the Brazilian transport fuels matrix strategic planning. Predictability and stability will allow for the anticipation of potential shortages and therefore increase the domestic security of supply ;

### *Medium and Long term*

- ❖ Increase the energy and environmental efficiency of flex vehicles, in order to boost ethanol competitiveness gains compared to gasoline
- ❖ Incentives for R&D programs and innovation focused on increasing productivity and production efficiency, to cut down prices
- ❖ Revision of the fuels tax structure, incorporating ethanol's positive externalities to the pricing system
- ❖ Incentives to increase the expansion of the use of bioelectricity, though regulation promoting the use of alternative energy sources.

**It's necessary to establish a clear, stable and enduring institutional framework to restore the competitiveness of the hydrous ethanol fuel**

**Thank you**



**[www.english.unica.com.br](http://www.english.unica.com.br)**

**[www.sugarcane.org](http://www.sugarcane.org)**