

University of São Paulo (USP), School of Business and Economics

Providing Interdisciplinary Education on Biofuels Technology

Markets, Economics and Policies



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Executive Director, Brazilian Sugarcane Industry Association (UNICA)

São Paulo, August 5, 2009

ABOUT UNICA

- UNICA is the **leading sugarcane industry association**, institutionally representing 127 mills in Brazil, responsible for **60% of all ethanol and sugar production** in Brazil
- Technical expertise in **Economics, Sustainability, International and Public Affairs, Communication, Law and Bioelectricity**
- International presence in Washington & Brussels, to engage in **constructive dialogue**

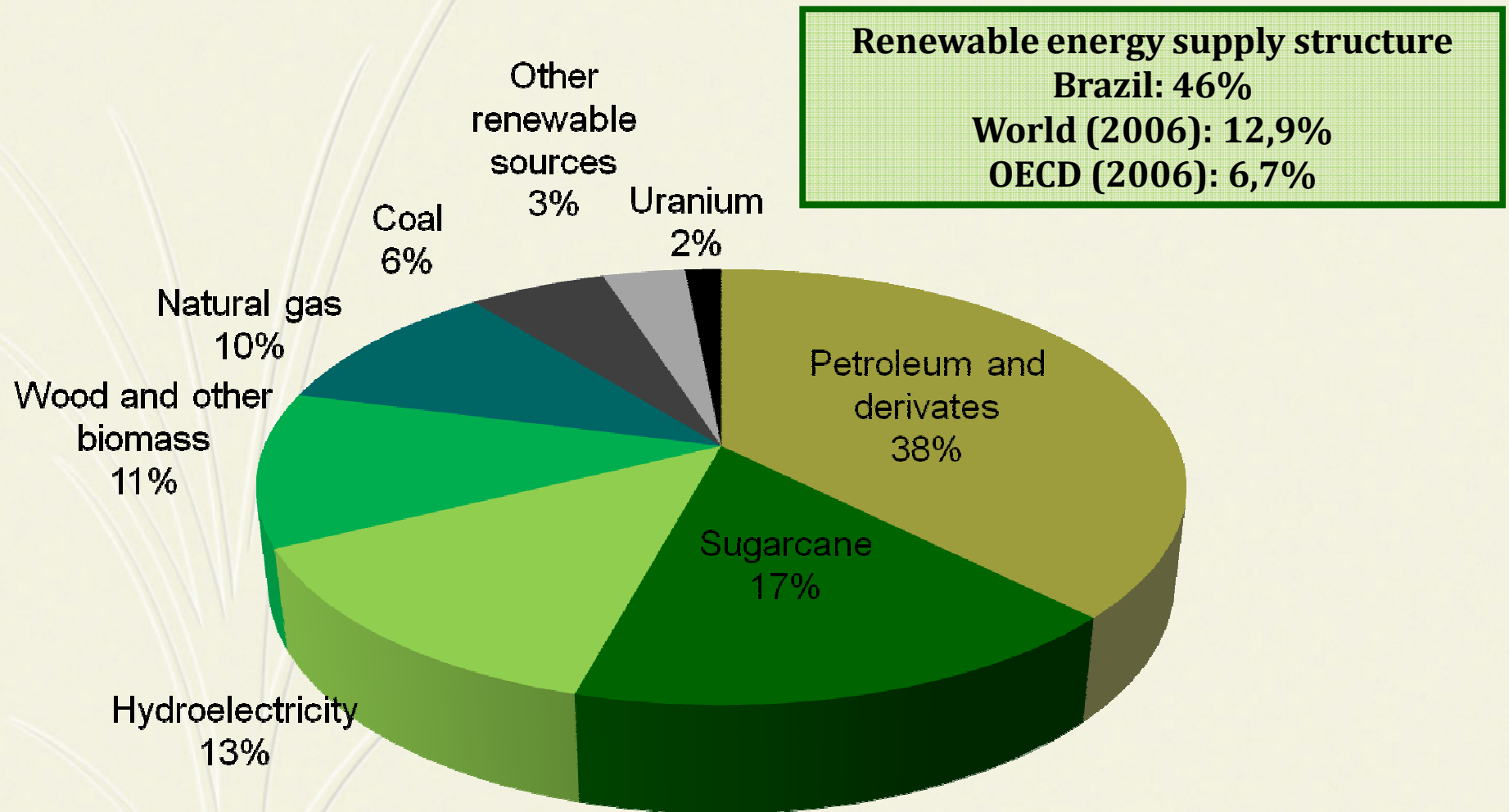


KEY NUMBERS OF BRAZILIAN SUGARCANE SECTOR



Annual gross earnings	US\$ 23 billion
Foreign revenue	US\$ 7.9 billion (2008)
Direct investments	more than US\$ 20 bln (2006-2009)
Composition	380 plants nationwide
Sugarcane growers	70,000
People directly employed	845,000
Participation in Brazilian energy matrix	16.4%, ahead of hydroelectricity
Sugarcane production	562 mln ton
Sugar production	31.2 mln ton
Ethanol production	27 bln liters
Avoided CO₂ emissions	45 mln tons since 2003

BRAZILIAN ENERGY MATRIX INPUT



Source: BEN (2009). Elaboration: UNICA

Ethanol Growth: What are the main drivers?

RECENT EVOLUTION OF THE BRAZILIAN SUGARCANE SECTOR

The growth of Brazil's ethanol production is currently driven by **two main factors**:

DOMESTIC MARKET:

- Increase of the flex-fuel vehicles market

INTERNATIONAL MARKET:

- Rising global interest in ethanol
 - ✓ Environmental concerns (global warming)
 - ✓ Energy security → f (dependence on foreign oil)
 - ✓ Support to farm incomes

Perspectives for Brazilian domestic market



THE BRAZILIAN FUEL ETHANOL HISTORY



Brazil is a pioneer in using ethanol as a vehicle fuel. It first began using ethanol as automotive fuel in the 1920s

PROÁLCOOL

- The “Proalcool” program started in 1977 as a response to the oil crisis and, at first, established a 5 mandatory blend on the gasoline, that increasingly achieved 25%
- This energy substitution also included the development and support to pure ethanol fueled cars (E-100)

*First domestic E-100 car
produced in Brazil,
known as the “the little
cachaça”*



FLEX FUEL VEHICLES (FFV) IN BRAZIL



Through some special electronic sensors, the on-board computer recognizes the fuel and properly adjust the engine combustion parameters, without any interference from the driver.

- Introduced in the Brazilian market on March 2003
- These vehicles are designed to be fueled with gas, ethanol, or any blend of gas and ethanol (today from E23 to E100)
- Thirteen brands and 63 models
- 33.000 gas stations all over the country with at least one dedicated E100 pump

GM



FIAT

CITROËN



RENAULT

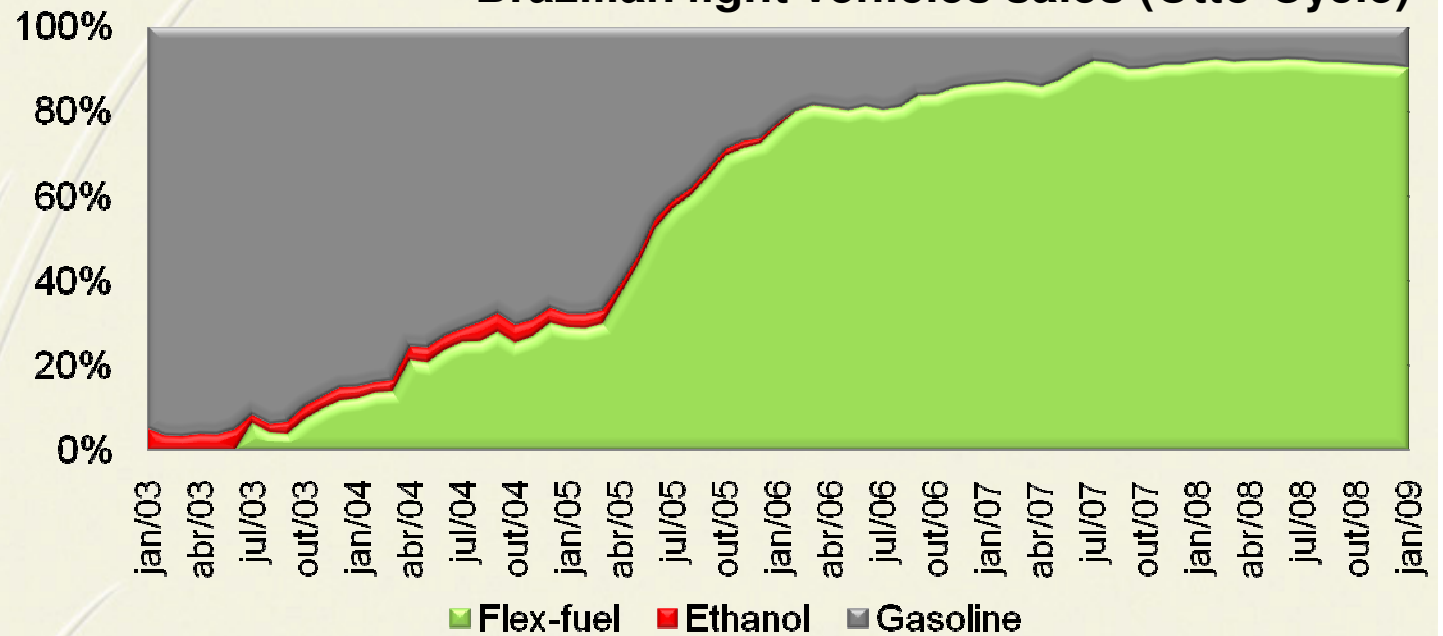
HONDA



TOYOTA

Unica

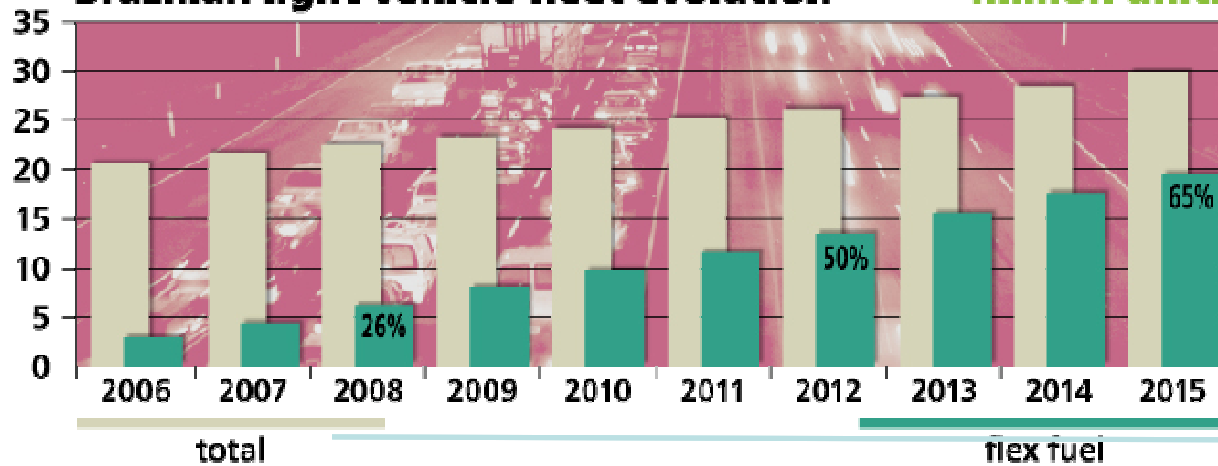
Brazilian light vehicles sales (Otto-Cycle)



Source: ANFAVEA. Elaboration: UNICA

Brazilian light vehicle fleet evolution

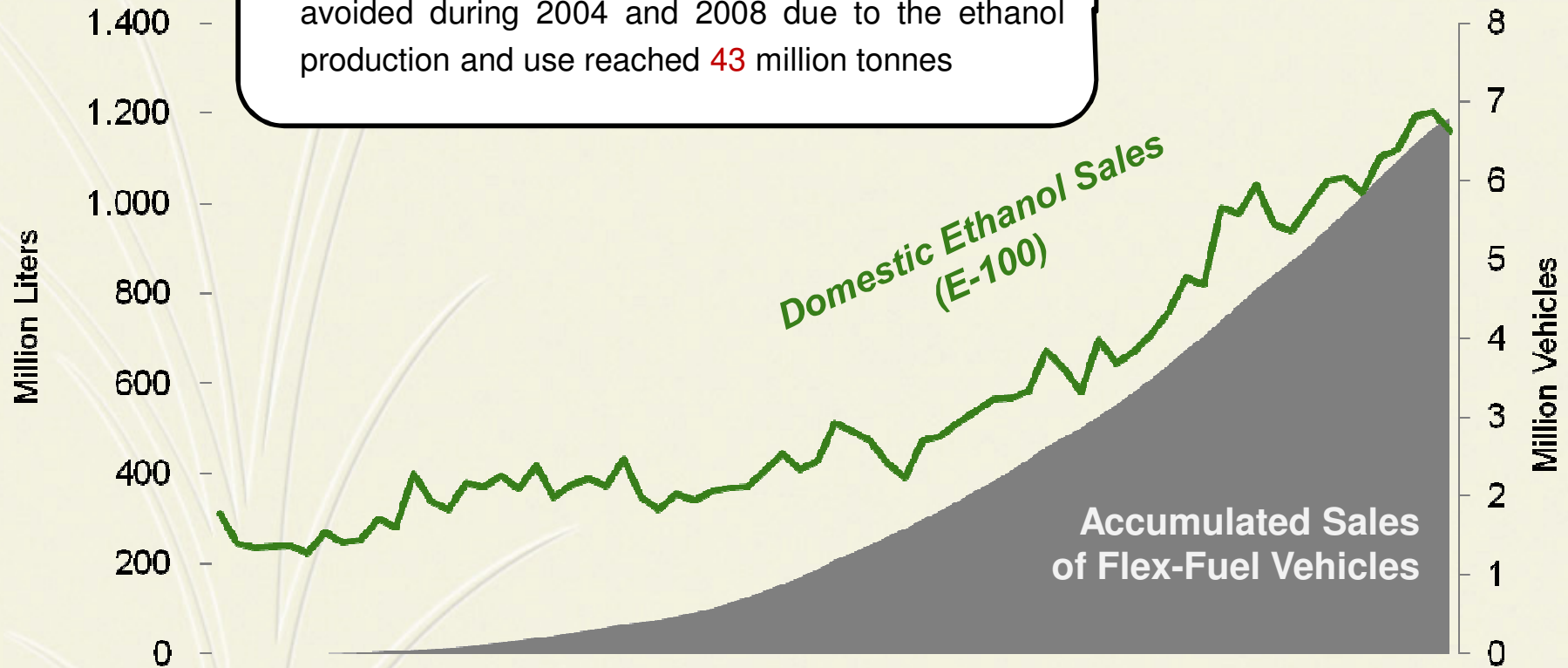
million units



Sources: Copersucar and Unica

FLEX FUEL CARS THAT USE ETHANOL...

Flex-Fuel technology contributes to reduce greenhouse gas (GHG) emissions. In Brazil, GHG emissions avoided during 2004 and 2008 due to the ethanol production and use reached **43** million tonnes



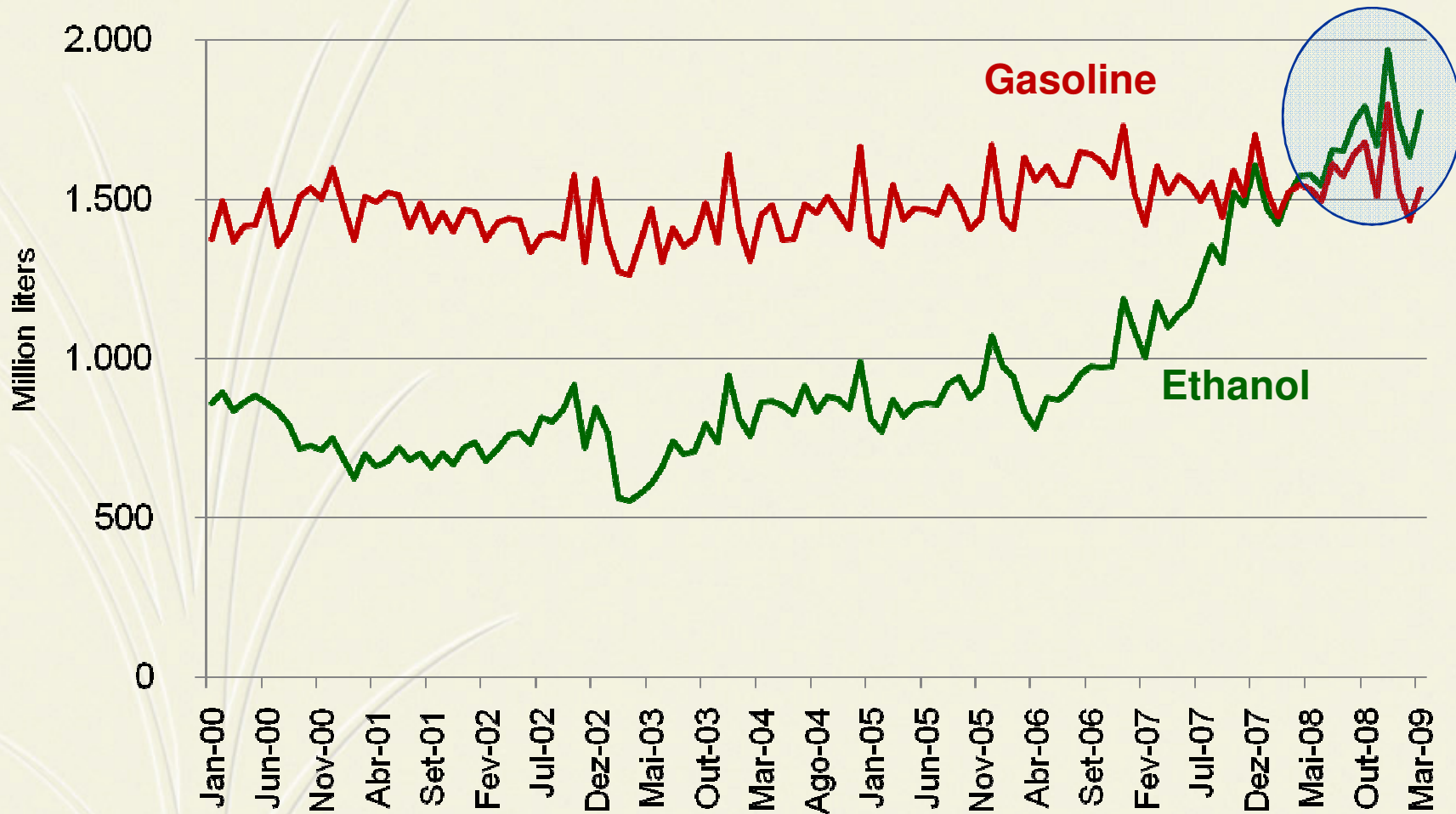


**MARCH 2009
HARVEST SEASON**

**DECEMBER 2008
ETHANOL INTER-
HARVEST PERIOD**



GASOLINE AND ETHANOL CONSUMPTION IN BRAZIL



Source: ANP and UNICA.

ETHANOL USE: NOT LIMITED TO PASSENGER CARS



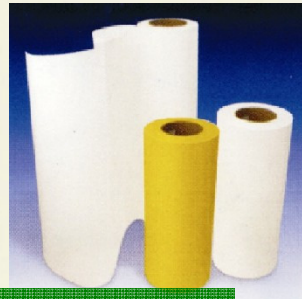
Ethanol-powered buses (E95) - still a pilot project in Brazil



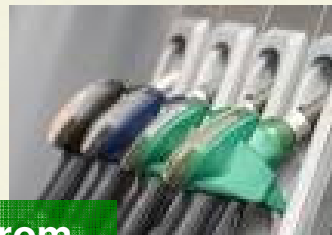
Flex-fuel motorcycles
Honda 150 cc Flex in the market



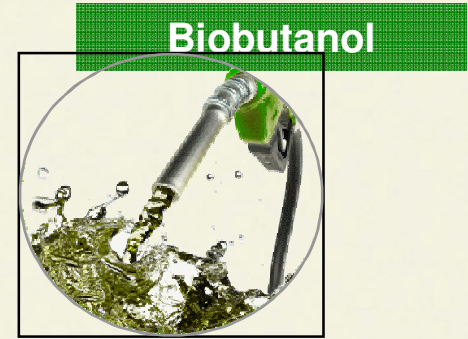
Brazilian-made crop dusting planes running on ethanol



Bio-plastics (PHB, polyethylene, PVC)



Production of diesel from sugarcane at commercial scale after 2010



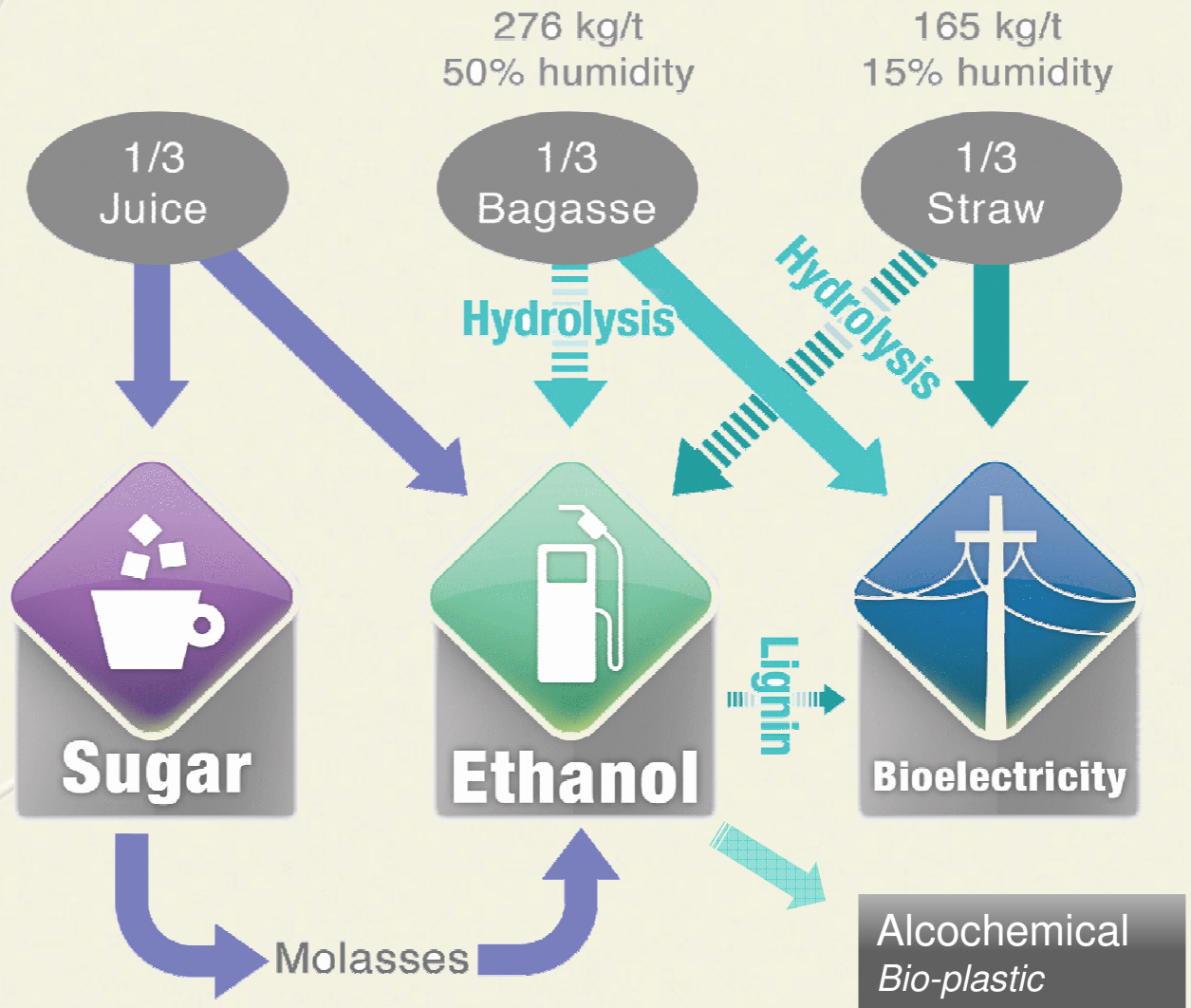
Biobutanol

Bioelectricity: sugarcane's next frontier

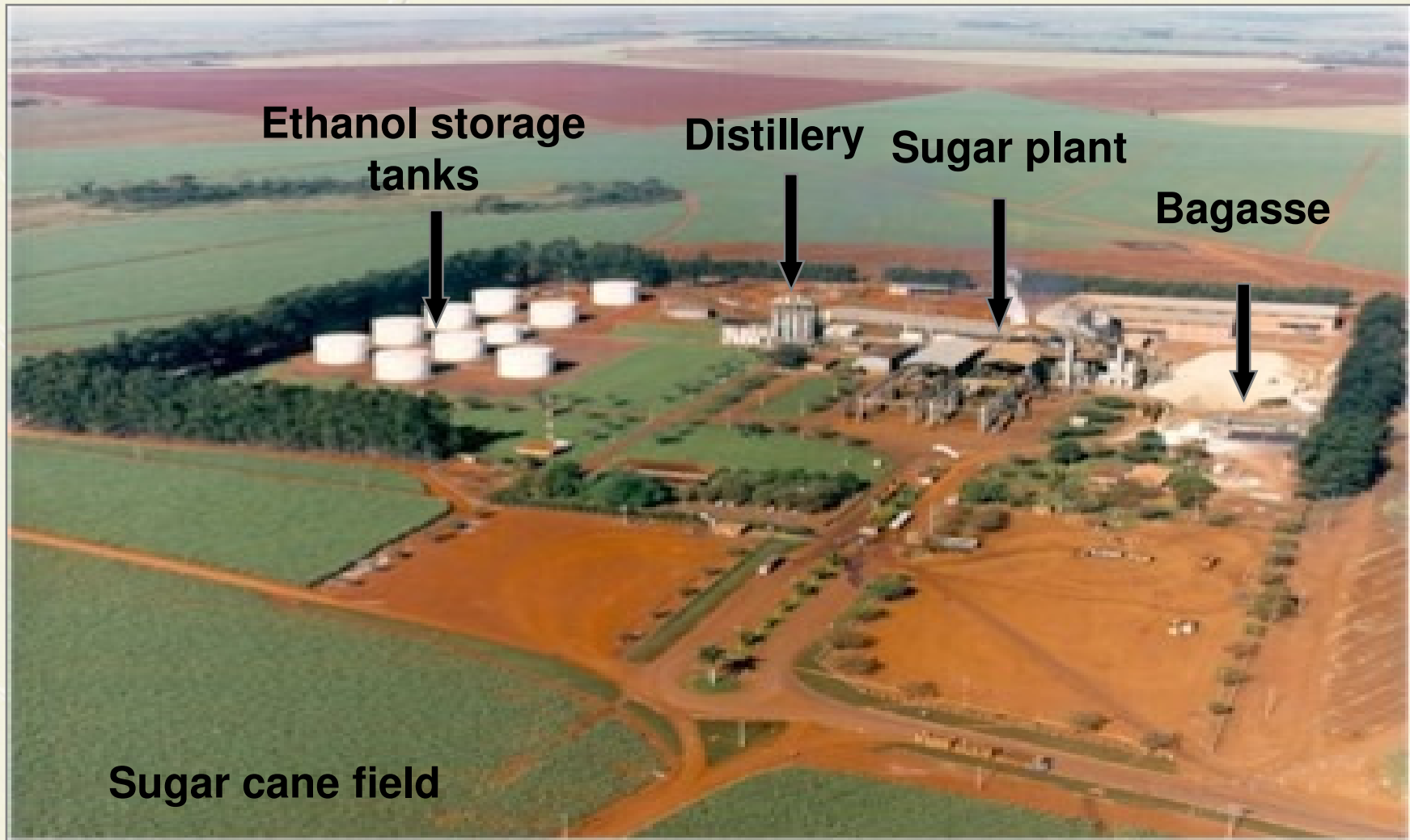
BREAKDOWN OF SUGARCANE'S ENERGY



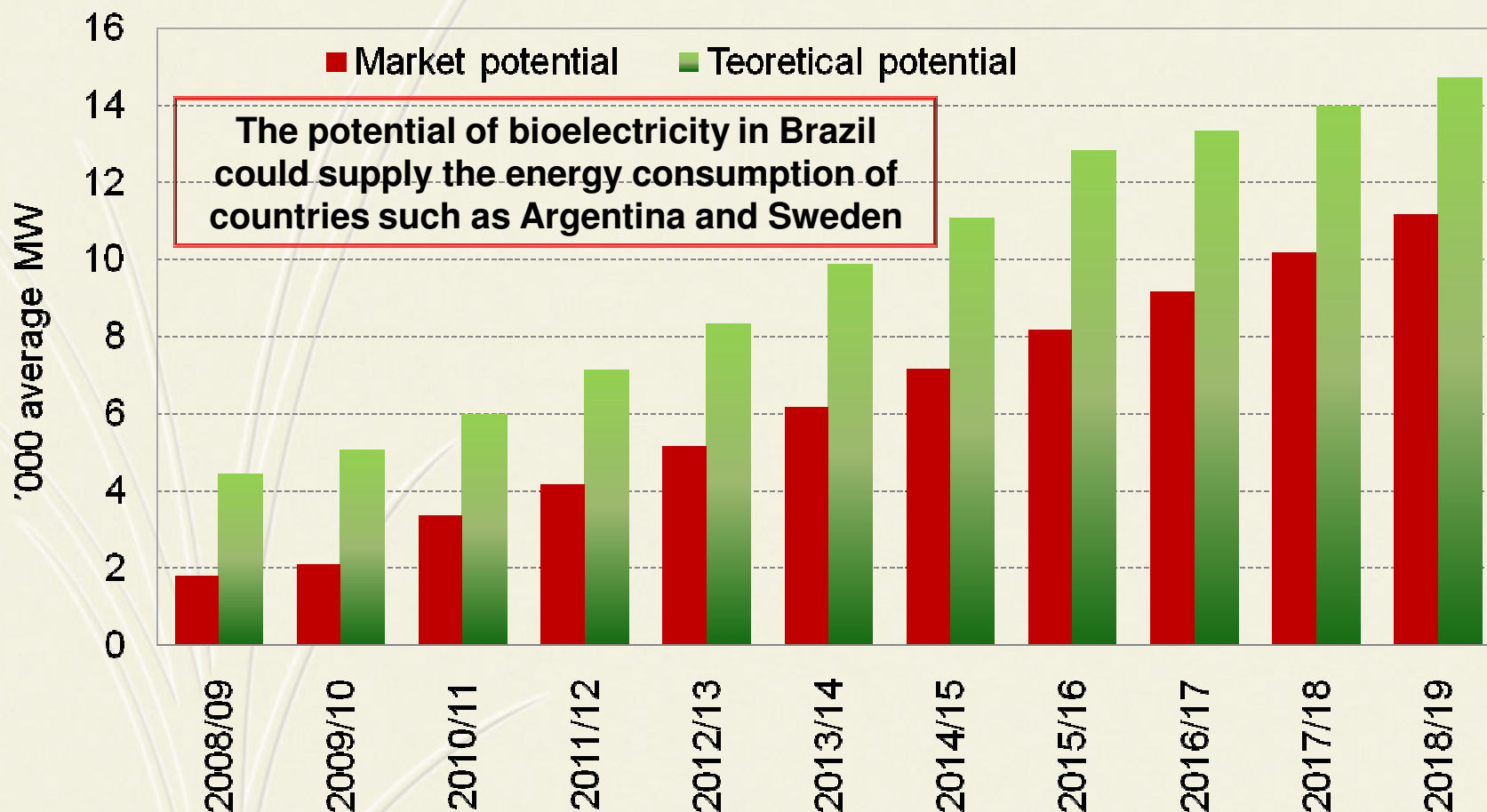
Energy equivalent of
1 ton of sugarcane
= 1.2 oil barrel



A SUGAR, ETHANOL & BIOELECTRICITY PLANT IN BRAZIL



BIOELECTRICITY: POTENTIAL IN BRAZIL



Notes: 1 ton of sugarcane produces 250 kg of bagasse and 204 kg of straw, 1 ton of sugarcane (bagasse + straw) generates 199,9 KWh for exporting; the straw inferior calorific value = 1,7 bagasse inferior calorific value; capacity factor = 0,5 (Koblitz). It is assumed that 75% of the bagasse is used for cogeneration. The percentage of straw use starts at 5% (2008) going up to 70% (2015) . Until 2010 the potential market prediction consider the regulated energy auctioning; for 2011 an increase of 1600 MW is assumed, for subsequent years a 2000 MW increase per year is assumed. Source: Cogen, UNICA.

BENEFITS OF BIOELECTRICITY

➤ Experience and know how

- Units are self-sufficient in energy

➤ Reduced construction period

- Construction in 24-30 months

➤ Renewable and clean energy

- Low environmental impact
- Provide carbon credits

➤ Synergy with hydro production pattern

- Bioelectricity is produced during the dry season

➤ Smaller projects and broader range of investors

- Eliminate risks of delay and construction problems

➤ Strengthen the national equipment industry and create jobs

➤ Location close to main load centers

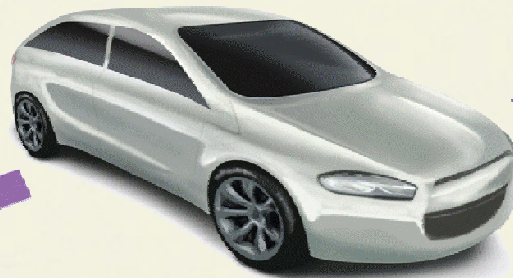
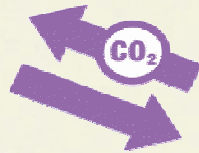


Sources: PSR, Cogen, UNICA, Elaboration: UNICA,

BREAKDOWN OF SUGARCANE'S INTEGRATED ENERGY SYSTEM

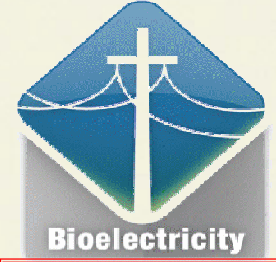


+495 mln tones



Pure Ethanol or Blends

22.5 bln liters



+ 3.000 MW



Bagasse



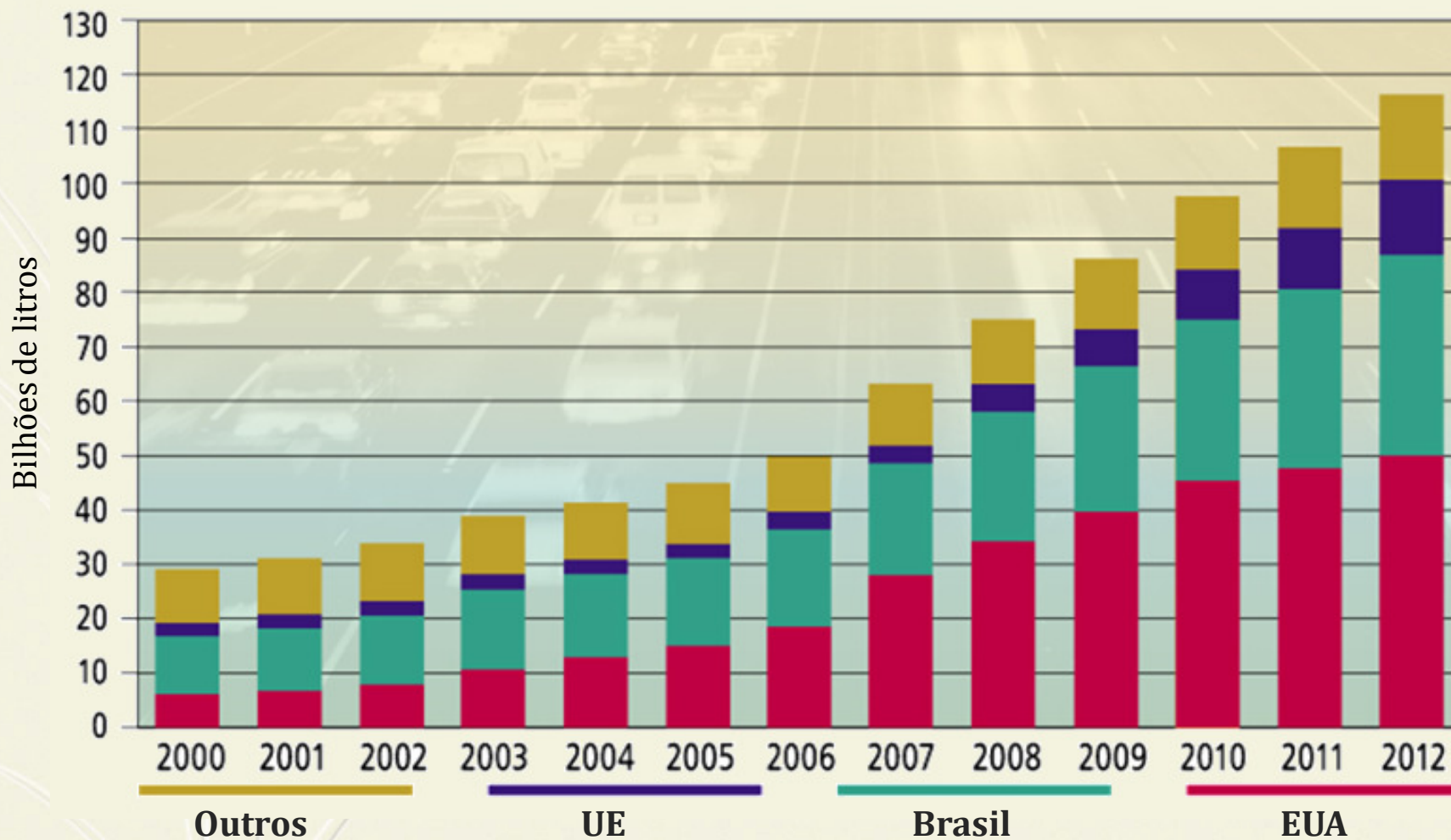
31 mln tones

Note: value s refers to 2007/08 crop season

Perspectives for international market



PRODUÇÃO MUNDIAL DE ETANOL



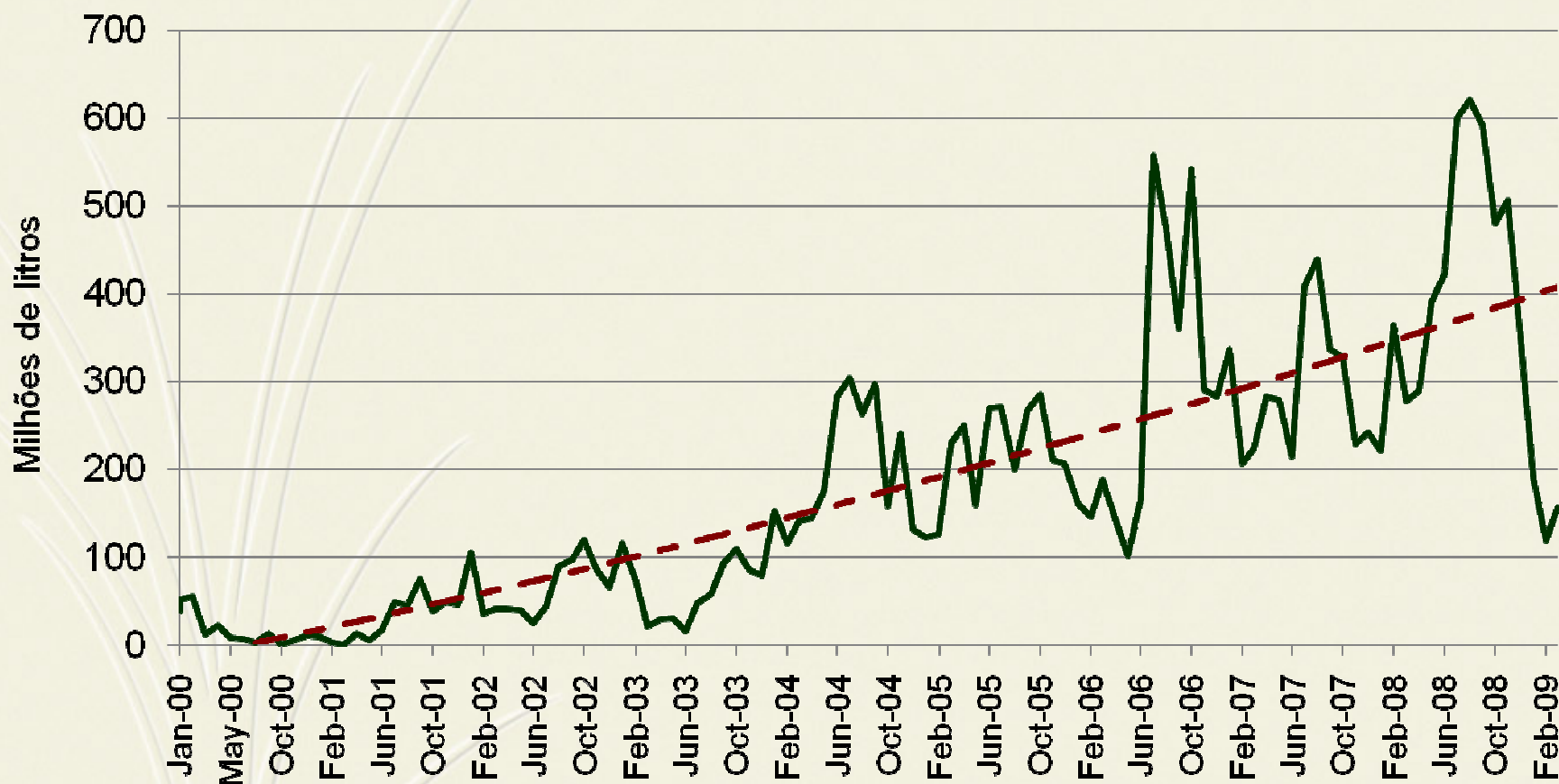
Nota: projeções para 2008/2012 baseadas na capacidade de produção e metas de consumo nos principais países. Fonte: Fapri, Acti, FO Licht, Unica e Toepfer. Elaboração: UNICA.

SHARE OF ETHANOL EXPORTS IN THE WORLD ETHANOL PRODUCTION



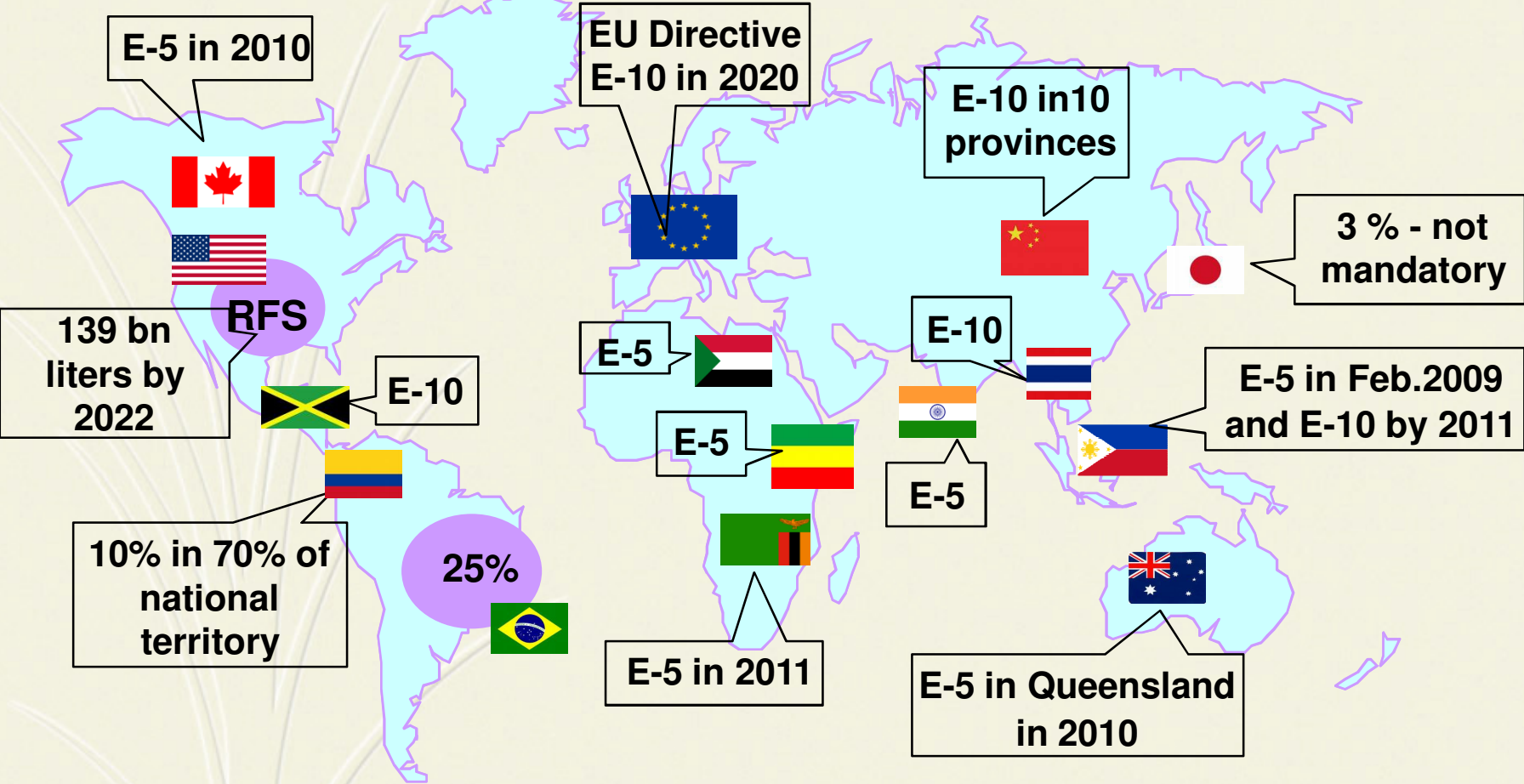
Sources: F.O.Licht, Secex, USITC, European Commission, LMC. Elaboration: UNICA. Note: 2008* - preliminary results.

BRAZILIAN ETHANOL EXPORTS



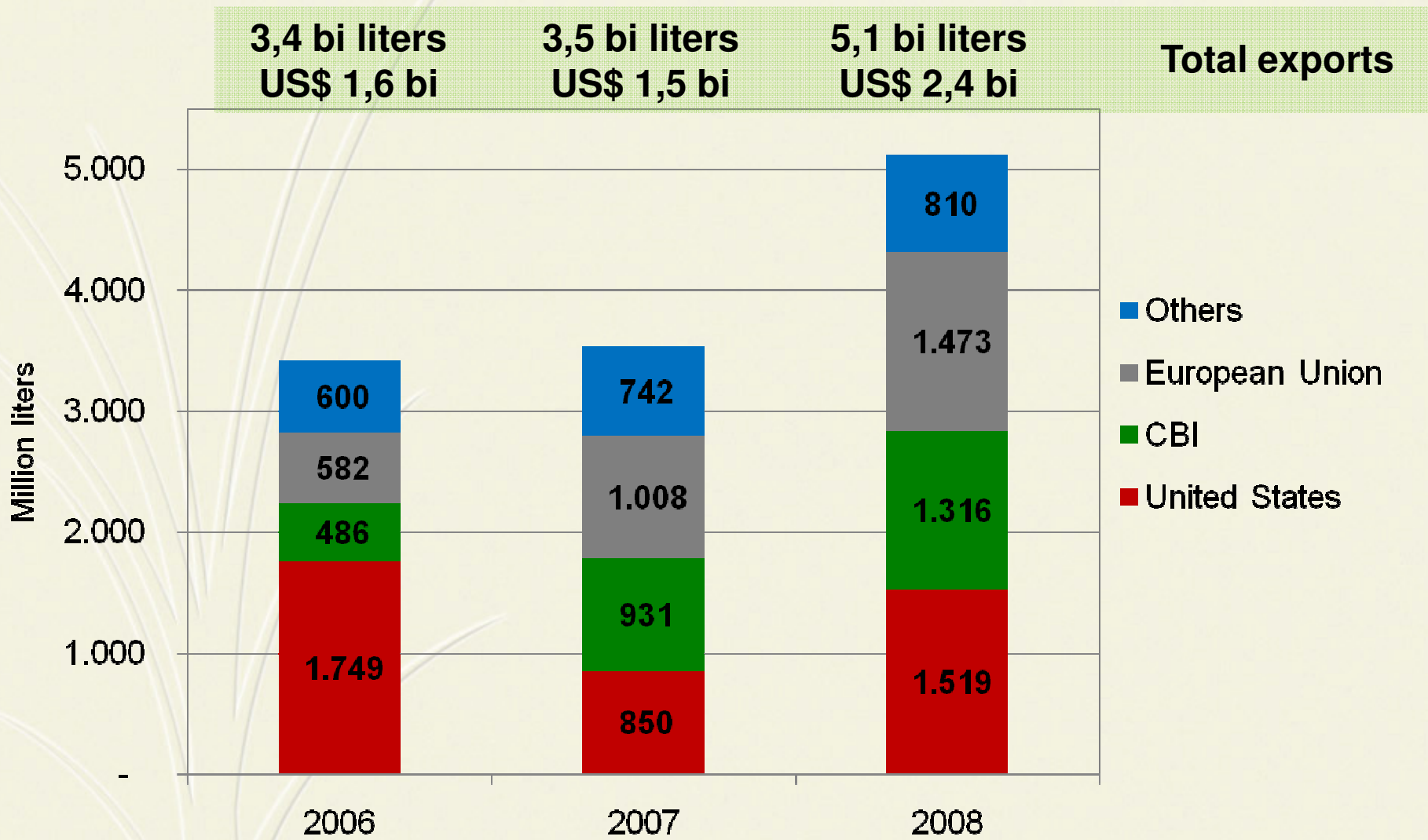
Despite the small and volatile international market, Brazilian exports have presented a continuous trend of growth

PUBLIC POLICIES FOR ETHANOL - MANDATORY BLEND



Source: JOLLY, Lindsay - Future Trends in World Food Security; WSRO Annual Meeting 2008 ; F.O.Licht and LMC International

BRAZILIAN ETHANOL EXPORTS BY DESTINATIONS



Source: SECEX. Elaboration: UNICA

SOME INSIGHTS ON THE U.S. MARKET



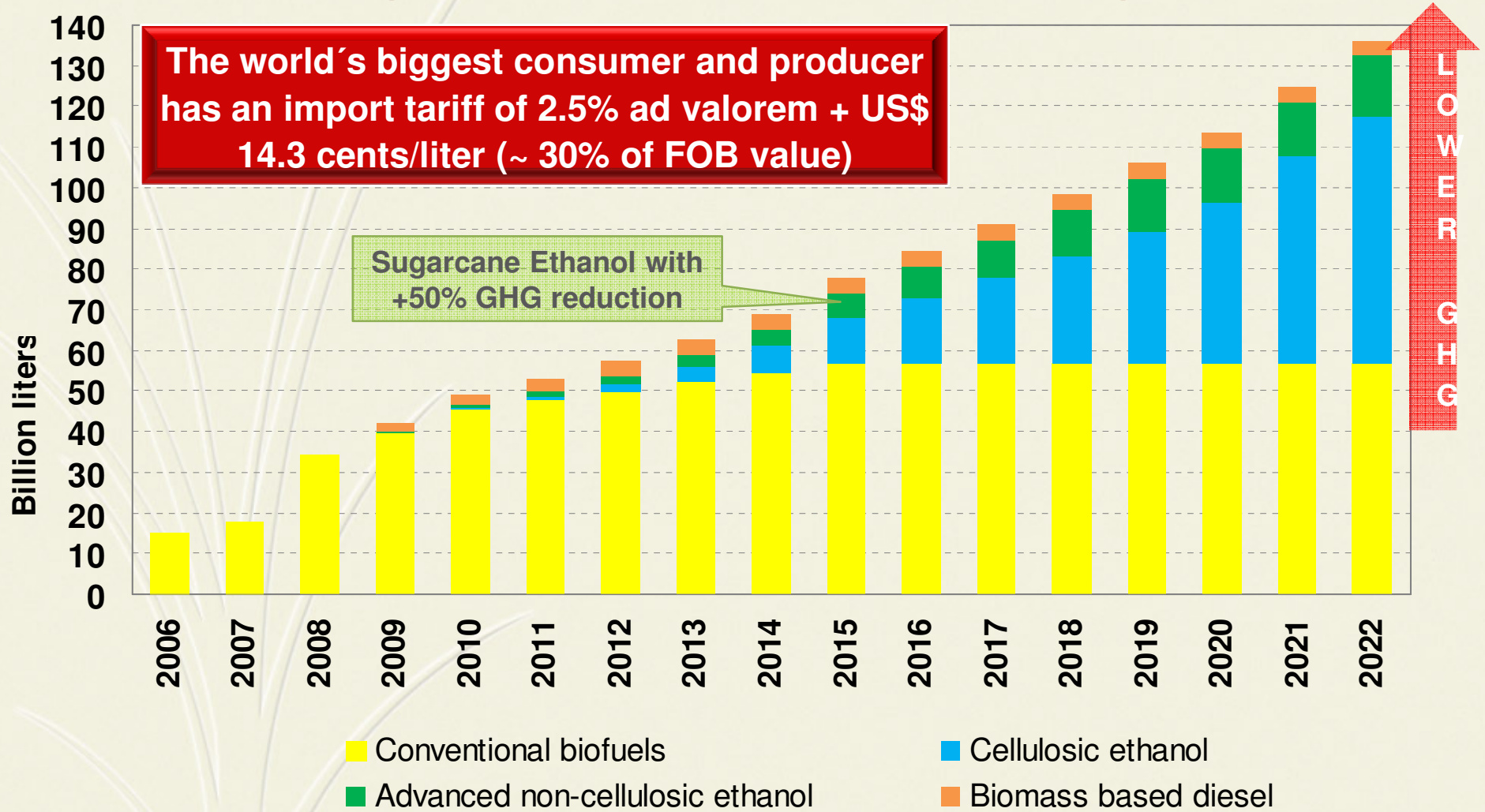
Largest ethanol producer and consumer in the world

- Consumption of 135 billion liter by 2022

Main issues

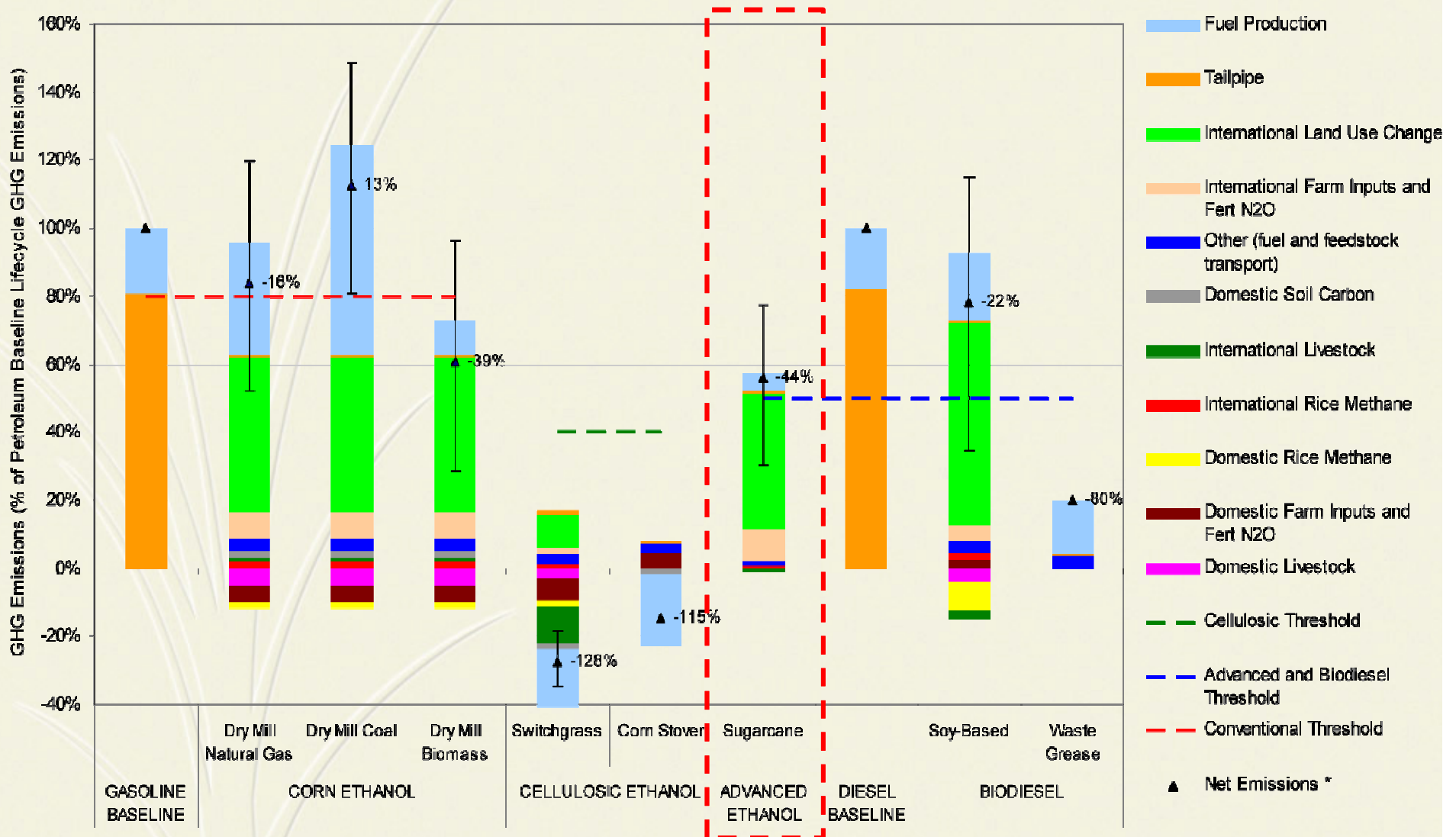
- Import tariff of US\$ 0.54/galon (or US\$ 14 cents/liter)
- Important debate for the implementation of the Renewable Fuels Standard (RFS)

ETHANOL CONSUMPTION IN THE U.S. (RFS - Renewable Fuels Standard)



Source: RFS Legislation. Elaboration: UNICA

EPA: "INDIRECT LAND USE" EFFECT



Sources See Figure 2-1-2 "Lifecycle GHG Results Using 100-Year-Net Present Value with 2% Discount Rate" in page 282 of Discussion Draft of Environmental Protection Agency (EPA) Regulatory Impact Analysis, May 2009. Range shows net emissions if EPA assumes all land conversion from forest (upper bound) and all from grassland (lower bound).

EU Perspectives for ethanol consumption



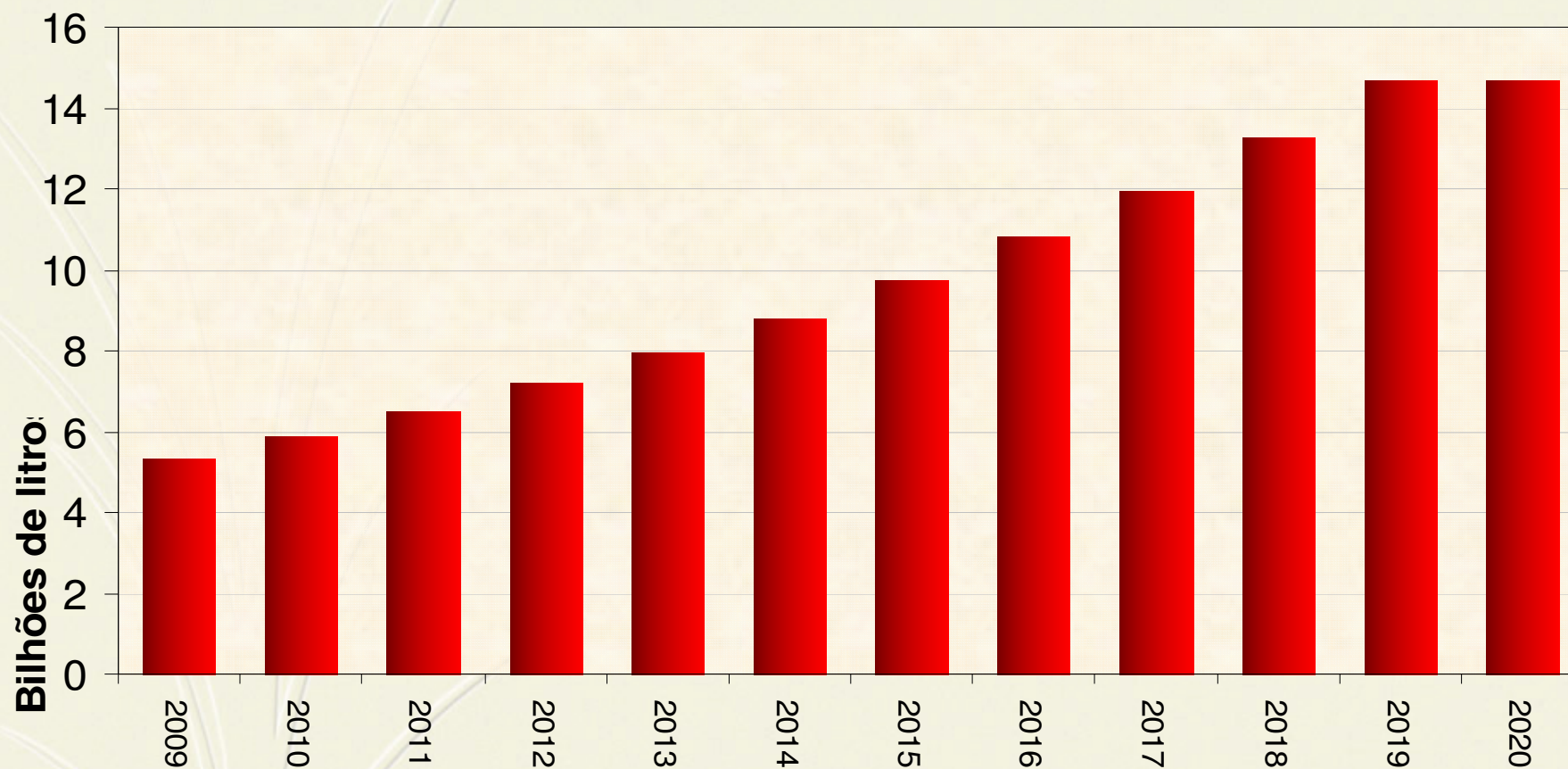
Mandatory target

- Second largest potential market in the world
- 10% of renewable energies in the transport sector by 2020

Issues

- EU ethanol tariff (EUR 0.19/liter)
- Some concepts of the sustainability criteria still to be clarified

POTENTIAL CONSUMPTION OF ETHANOL IN THE EUROPEAN UNION



Source: Eurostat e CERA. Elaboração: UNICA. Nota: dados a partir de 2008 são projeções. Demanda potencial de etanol calculada sob o consumo de gasolina informado pelo Eurostat e projetado pelo CERA, considerando percentual de adição de etanol à gasolina de 4%, em volume.

Sustainability initiatives for biofuels: A universe in constant expansion



SUSTAINABLE BIOFUELS

NATIONAL INITIATIVES

INTERNATIONAL BODIES

GLOBAL MULTISTAKEHOLDER INITIATIVES



EU Directives



CRAMER

Cramer Commission

RTFO

Renewable Transport Fuel Obligation

Meó/ISCC

Biofuel Quota Law-Ordinance for sustainability requirements

SEI

Stockholm Environment Institute

LCFS

Low Carbon Fuel Standard

PBCB

Brazilian Biofuels Certification Program

RFS

Renewable Fuel Standard

INMETRO

Scorecard

Equator Principles

PRIVATE BANKS

Task 39

Liquid Biofuels from Biomass

GBEP

Global Bioenergy Partnership

RSB

Round Table on Sustainable Biofuels

Prop. ABNT+DIN

CEN

European Committee for Standardization

Low CVP Fuels

VERIFIED SUSTAINABLE ETHANOL

SEKAB

BAFF

IB

Sistema de Verificação da Atividade Agropecuária

UNICA



SDG

Sugarcane Discussion Group

BSI

Better Sugarcane Initiative

RSPO

Roundtable on Sustainable Palm Oil

RTRS

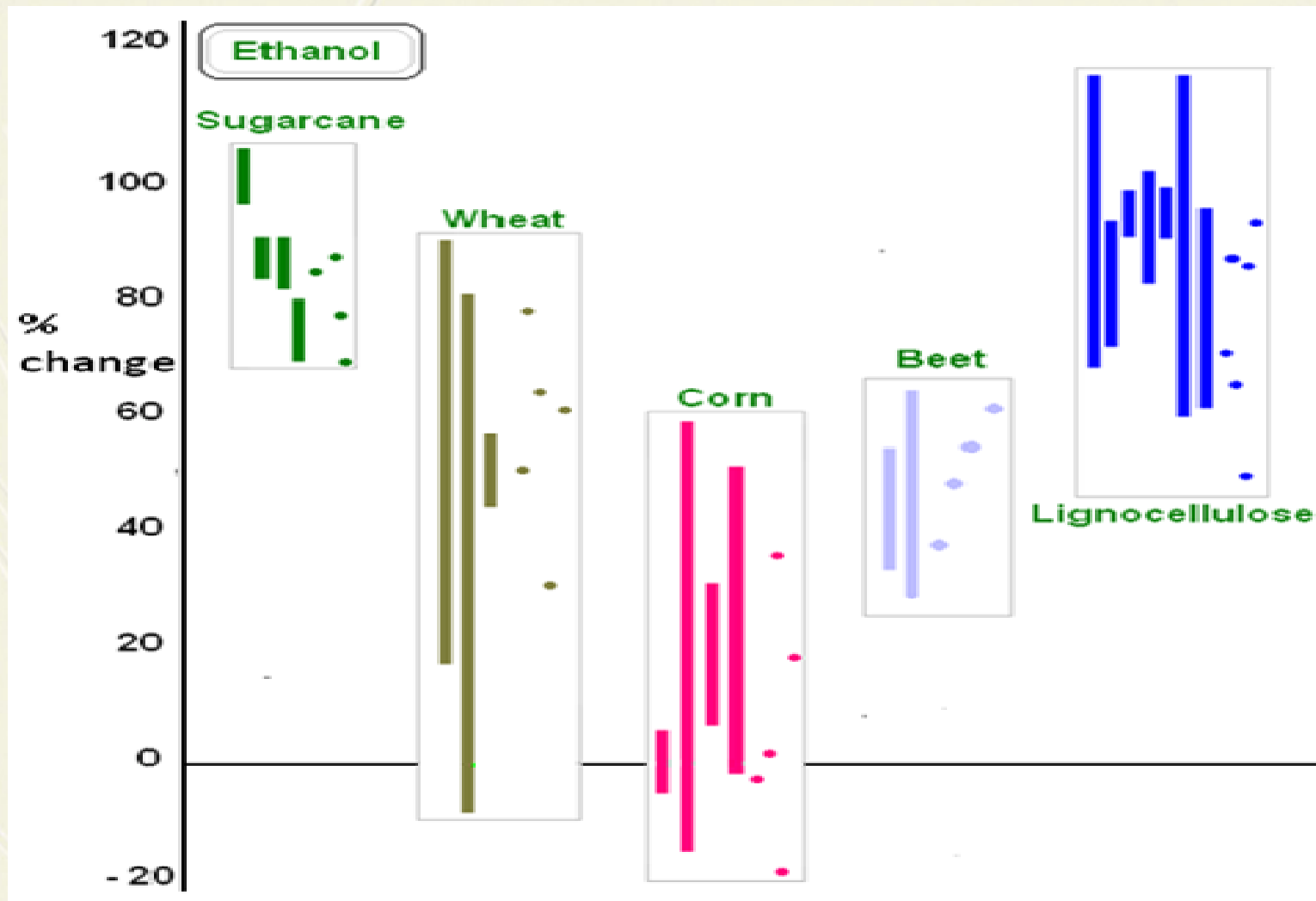
Roundtable on Responsible Soy



WWF

**Ethanol:
an instrument for climate change mitigation**

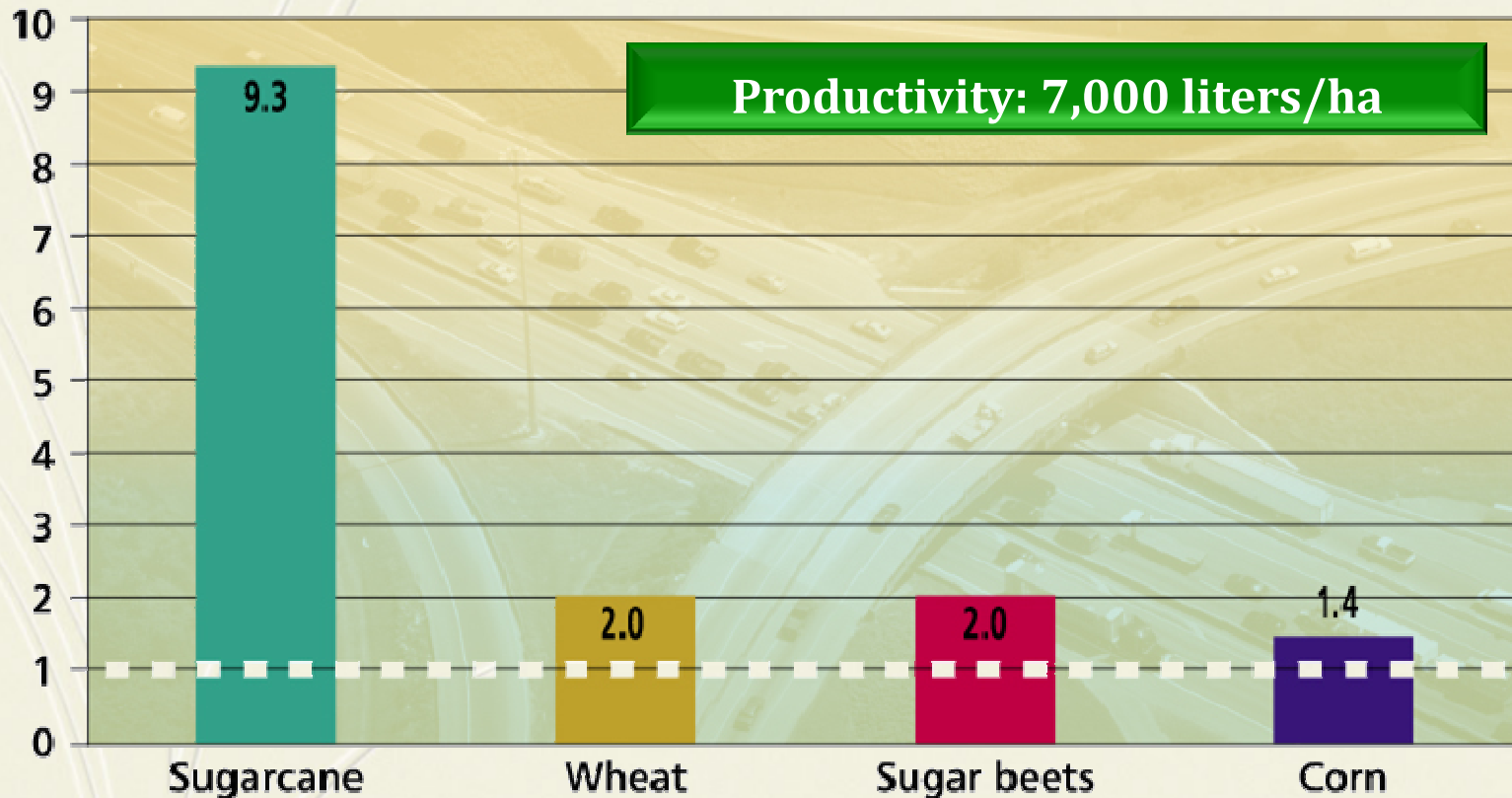
MITIGATING GLOBAL WARMING



Note: Reduction of GHG emissions avoided from unit of ethanol compared to gasoline, calculated on a life-cycle basis. Source: IEA and UNEP for OECD (2008), Economic assessment of biofuel support policies, based on a review of recent articles.

Energy Balance

Data represent the amount of energy contained in ethanol per unit of fossil fuel input.

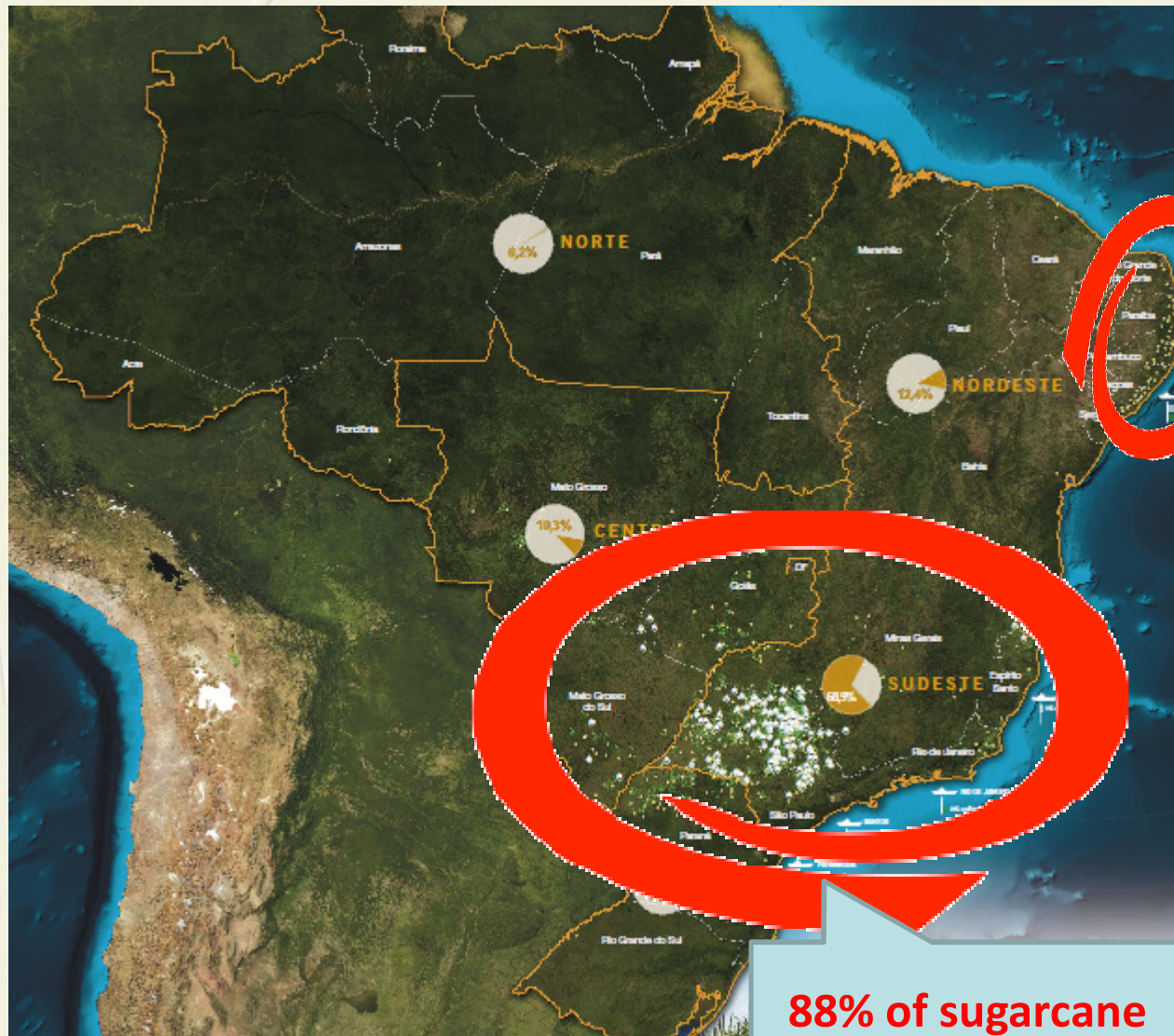


Note: estimated data

Source: World Watch Institute (2006) and Macedo et al (2008).

Data compiled by Icone and Unica

Where sugarcane is grown



88% of sugarcane production

Sources: NIPE-Unicamp, IBGE and CTC

... 1% OF ARABLE LAND DISPLACES 50% GASOLINE

Millions of Hectares (2007)		% total land	% arable land
BRAZIL	851		
TOTAL ARABLE LAND	354.8		
1. Total Crop Land	76.7	9.0%	21.6%
Soybean	20.6	2.4%	5.8%
Corn	14.0	1.6%	3.9%
Sugarcane	7.8	0.9%	2.2%
Sugarcane for ethanol	3.4	0.4%	1.0%
Orange	0.9	0.1%	0.3%
2. Pastures	172.3	20%	49%
3. Available area	105.8	12%	30%
Total arable land – (crop land + pastures)			

A CARBON ABSORBING MACHINE?

SUGARCANE X PASTURES: CARBON UPTAKE Annual tons carbon per hectare



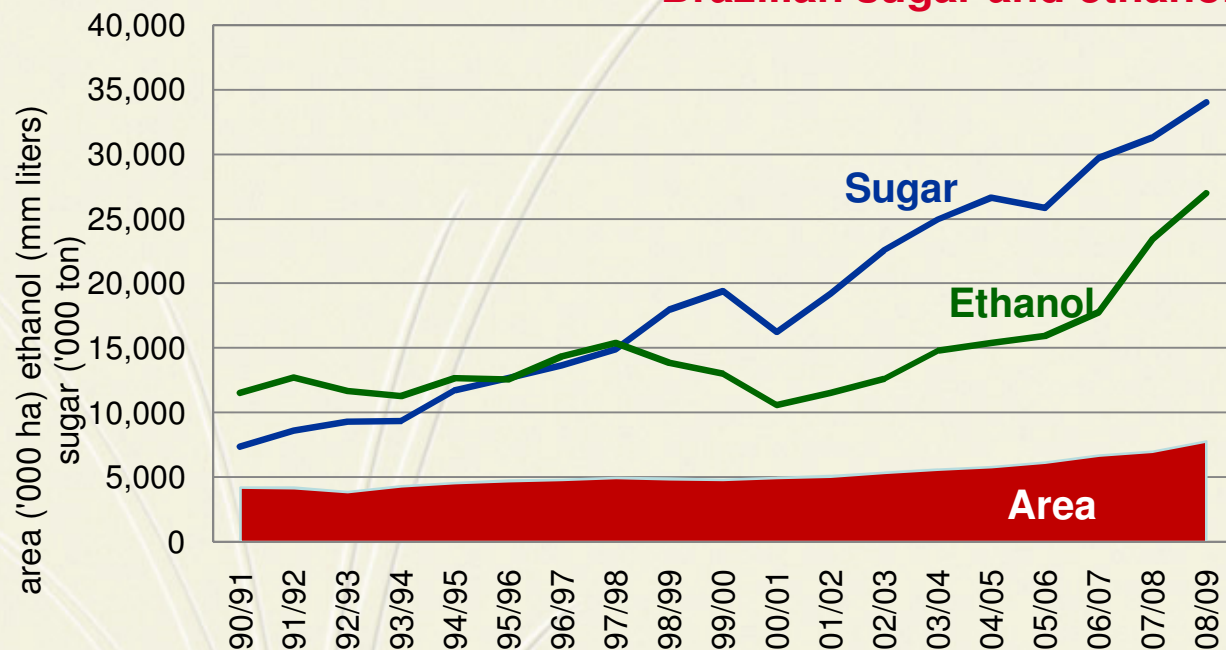
3-8 t C/ha



22-36 t C/ha

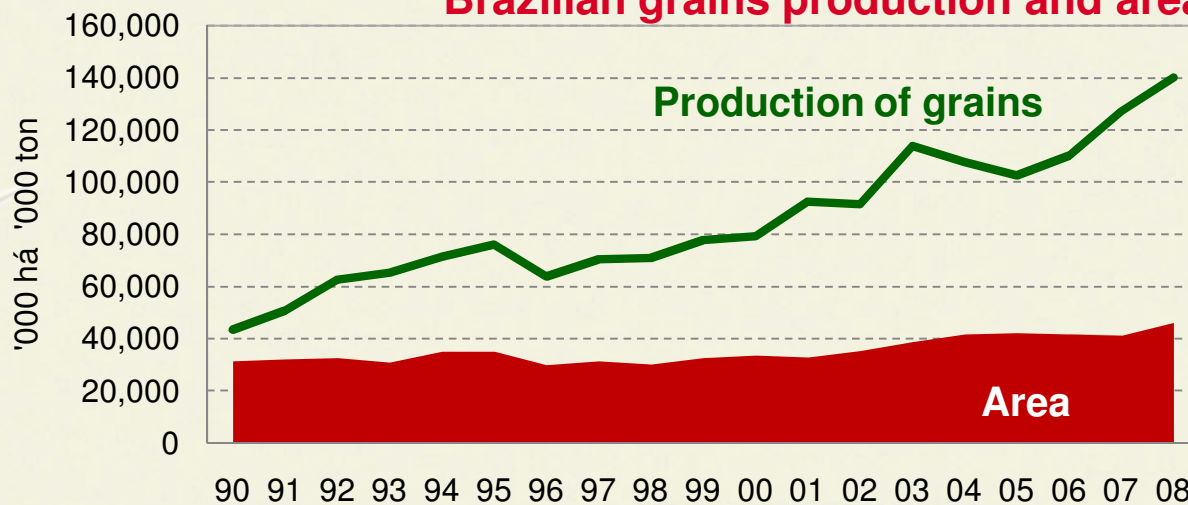
Source: Brazilian Center for Biofuels (www.polobio.esalq.usp.br Weber Amarall - from various sources),

Brazilian sugar and ethanol production and area



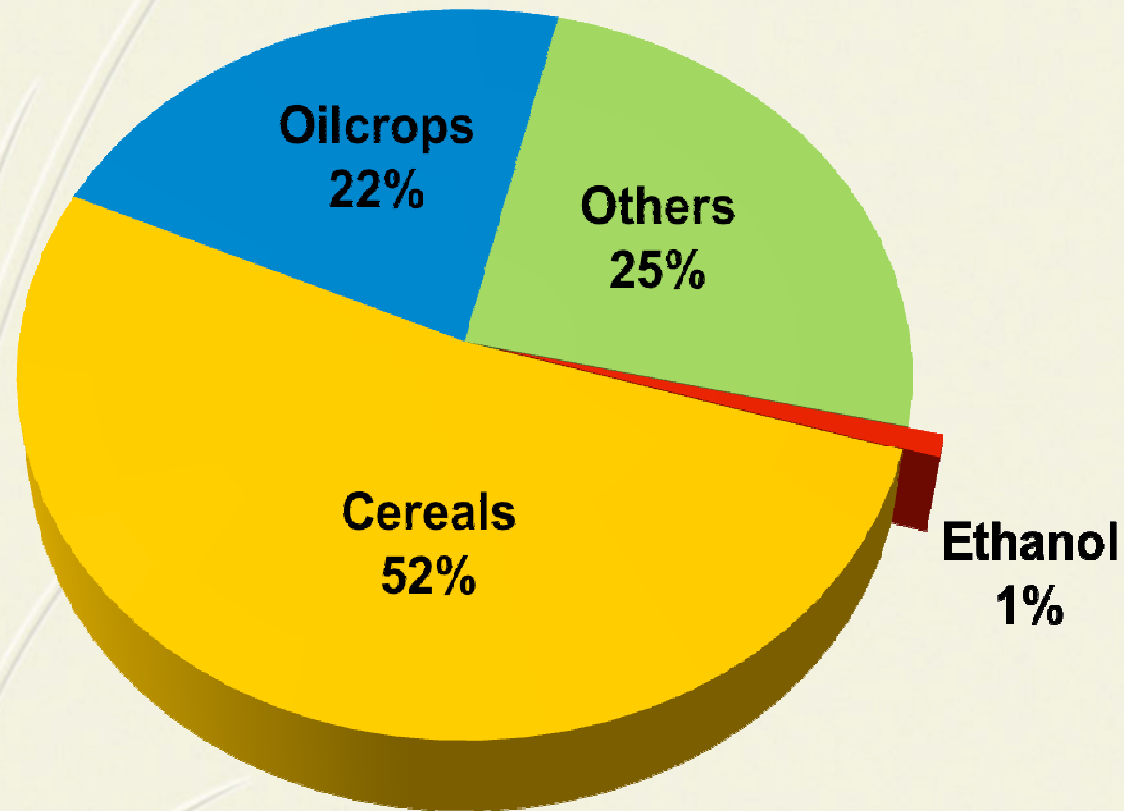
While sugarcane area increased 85% since 90/91, ethanol has increased 130% and sugar around 350%

Brazilian grains production and area



Production of food doubled in the last decade and more than tripled since 90/91, mainly due to yield gains

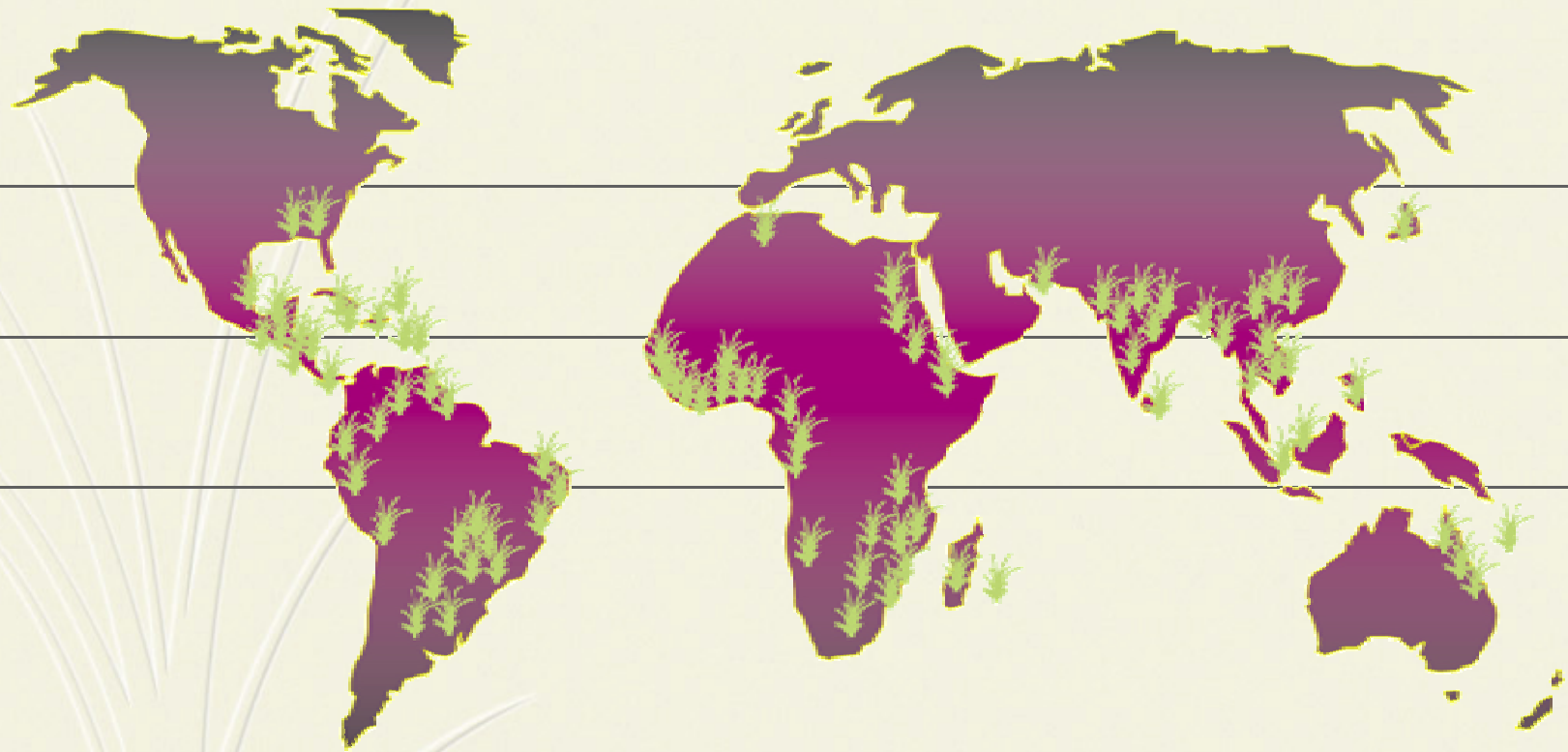
WORLD LAND USE



**The world's total harvested agricultural area is 1.4 billion hectares.
Only 15 million hectares are devoted to ethanol production.**

Note: "Others" include the harvested area for the remaining crops like fruits, fibers, nuts, pulses, roots and tubers, spices and other vegetables. Source: FAO, F.O. Licht, Datagro, USDA, EC, UNICA

SUGARCANE ETHANOL: A TOOL FOR DEVELOPMENT



**Ethanol production in 100 countries
are sugarcane producers and could produce ethanol**

UNICA:

**Some actions towards higher sustainability
and better communication**

Some of UNICA's actions on Sustainability

– Green Protocol;

The Green Protocol in São Paulo State

- Signed between the São Paulo state government and UNICA in June 2007.
- Mills and sugarcane suppliers are involved

Protocol Guidelines

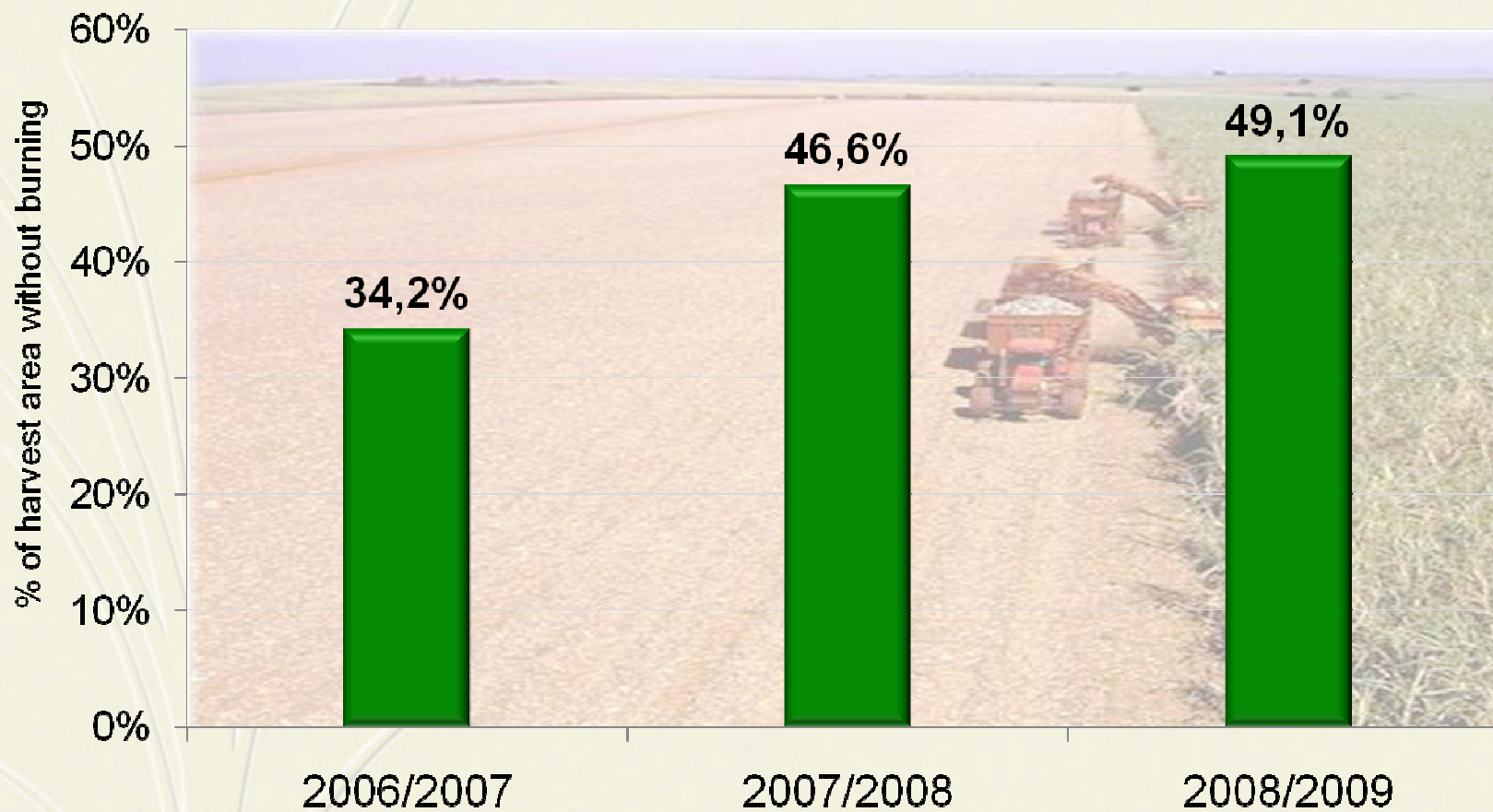
- **Elimination of sugarcane straw burning by 2014. 49% of the harvest is already mechanized**
- **Protection of river side woods and recovering of those near water streams (APPs)**
- **Adoption of technical plans for soil conservation and water resources**
- **Measures to reduce air emissions**
- **New sugarcane areas must be harvested mechanically.**

**PROTOCOLO
AGROAMBIENTAL DA
CANA-DE-AÇÚCAR**

**COLHEITA MECANIZADA,
SEM QUEIMA, JÁ REPRESENTA
QUASE METADE DA ÁREA
DE CANA DO ESTADO**



MECHANIZED HARVEST IN THE STATE OF SÃO PAULO



Source: INPE, UNICA and SMA.

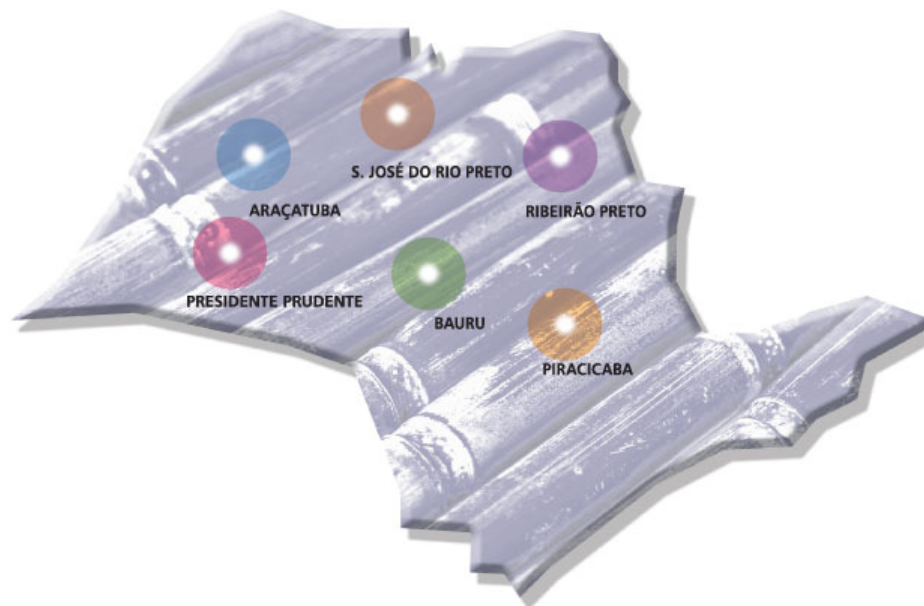
Some of UNICA's actions on Sustainability

- Green Protocol;
- Training and Requalification Program for cane-cutters;

Programa **renovAção**

Objective: Train and requalify 7,000 workers and community members per year for jobs in the sugar mills and ethanol plants and to work in other sectors, as an answer to the process of mechanizing the sugarcane harvest to eliminate burning.

Training courses for the sugar-energy sector	Retraining courses for other sectors*
Sugarcane field operator	Beekeeping and reforestation
Harvester operator	Horticulture
Harvester electrician	Handicrafts
Truck electrician	Information Technology
Harvester mechanic	Seamstress
Tractor mechanic	Civil construction
Tractor electrician	Hotel labor
Welder	Tourism



COORDENAÇÃO / COORDINATION

unica

UNIÃO DA INDÚSTRIA DE CANA-DE-AÇÚCAR

ETANOL • AÇÚCAR • ENERGIA SÃO PAULO • BRASIL



PATROCÍNIO / SPONSORS

syngenta



CASE IH
AGRICULTURE

APOIO / SUPORT

Banco Interamericano de Desenvolvimento (BID)
Interamerican Development Bank (IADB)

ica

Some of UNICA's actions on Sustainability

- Green Protocol;
- Training and Requalification Program for cane-cutters;
- Labor Protocol of Brasilia
- Active member of many roundtables on sustainability (Better Sugarcane Initiative and Roundtable for Sustainable Biofuels)

Better Sugarcane Initiative - BSI

What is

- **Multistakeholder forum**
- **~ 100 institutions and specialists**
retailers, investors, traders, producers and NGOs



Better Sugarcane Initiative

OBJECTIVES

- Sustainable sugarcane production by establishing principles and criteria that are applied in the sugar growing regions of the world through regionally specific strategies and tools.
- Encouragement of better management practices (BMP's),

STRUCTURE (GOVERNANCE)

Steering Committee
Driver process



Technical working groups
Propose draft standards

Production
agriculture and environment

Cane processing
Products and co-products

Social / Community



Some of UNICA's actions on Sustainability

- Green Protocol;
- Training and Requalification Program for cane-cutters;
- Labor Protocol of Brasilia
- Active member of many roundtables on sustainability (Better Sugarcane Initiative and Roundtable for Sustainable Biofuels)
- Global Reporting Initiative

Global Reporting Initiative (GRI)

➤ The Global Reporting Initiative (GRI) is a network-based organization that has pioneered the development of the world's most widely used sustainability reporting framework and is committed to its continuous improvement and application worldwide.

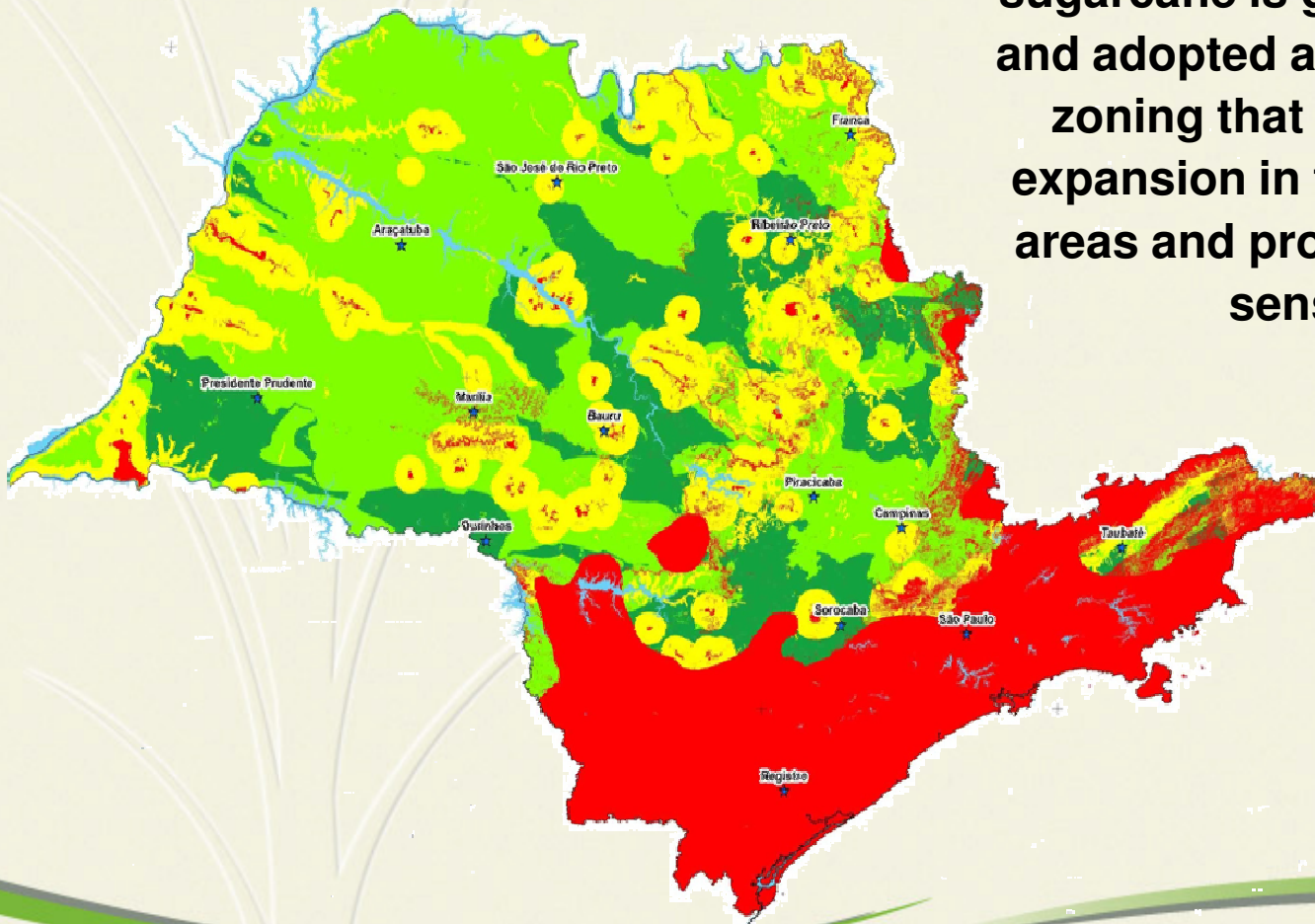
➤ UNICA is the first business association to release a (checked) sustainability GRI reporting framework in Brazil, and the first agribusiness association in the world to do so

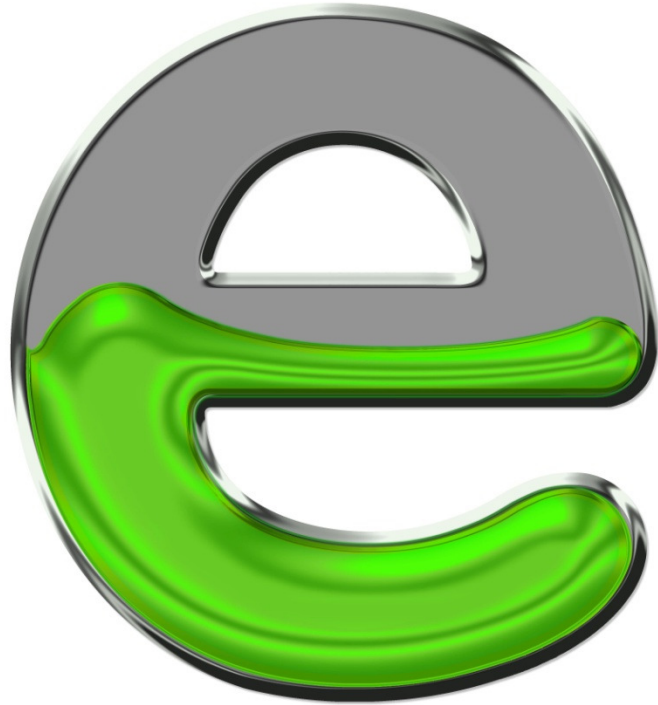
<http://english.unica.com.br/multi-media/publicacao/>



SUGARCANE AGRO-ENVIRONMENTAL ZONING IN SÃO PAULO STATE

São Paulo State, where 60% of sugarcane is grown, has performed and adopted an agro-environmental zoning that induces sugarcane expansion in the most appropriate areas and prohibit new planting in sensitive areas





sugarcane
ethanol
the smart choice

PUBLICITY CAMPAIGN IN USA

✓ When

- Opportunity of the 4th July holiday

✓ Focus

- Consumers and policy markers
- Import tariff cut

✓ Media

- **Orlando Sentinel** (Flórida) - 213.400 / day
- **Sacramento Bee** (Califórnia) - 264.410 / day
- **Roll Call** (Washington, DC) - Congress
- **RADIO:**
 - Flórida: 24 radio stations, 239 insertions
 - Califórnia: 31 stations, 244 insertions



This campaign was awarded with the **Bulldog Reporter Award (PR)**

Are We There Yet?



When it comes to energy independence, **the answer is no.**

- Gas costs more than \$4 a gallon - and still going up
- Oil prices are at all time highs - with no end in sight
- It's time for renewable fuels like sugarcane ethanol - that can reduce prices

This weekend, families across Sacramento will be hitting the road and their wallets. America is at a crossroads and faces a choice. We can continue our dependence on foreign oil or diversify and promote renewable biofuels like sugarcane ethanol.

Cane ethanol can cut gas prices by 30% and reduce emissions by 90% compared to today's gasoline. Instead of embracing cane ethanol, our government is taxing it - imposing a tariff that drives up prices and keeps us dependent on foreign oil.

Congress Needs to Repeal the Cane Ethanol Tax - Or We'll Never Get There

Help America Get There
Log on to www.SugarcaneEthanolFacts.com to find out how.

Paid for by Unica

UNICA

CAMPAIGN IN EUROPE

❖ When

- June to November


❖ Focus

- Members of the EU Parliament, policy makers, civil society
- Support to the 10% blend of renewables to fossil fuels (EU Directive)

❖ Where

- 20 announcements (The Economist, L' Express and European Voice newspaper)

Brazilian sugarcane ethanol reduces greenhouse gas emissions by up to **90%***



You can help fight climate change by supporting a mandatory 10% target for renewables in transport by 2020

According to the European Commission, transport is the fastest growing contributor to greenhouse gas emissions in Europe. Used as a transport fuel, Brazilian ethanol produced from sugarcane reduces greenhouse gas emissions by up to 90%, a reduction unmatched by any other ethanol produced with existing technology and comparable to current second-generation biofuels. Land use changes do not affect these results, since sugarcane expands mainly on degraded pastures and captures significantly more carbon than is stocked in this type of land, actually generating a carbon credit. With sugarcane ethanol, 0.3 units of renewable energy are generated for every unit of fossil energy used in its production, making for an extremely positive energy balance.

More information:
www.unica.com.br/en

UNICA
SUGAR CANE INDUSTRY ASSOCIATION
UNICA UNIAO UNICANOS

ApexBrasil
MEMBER OF THE APRECOM
ASSOCIATION OF EXPORTERS

*Based on scope of cellulosic ethanol from The International Energy Agency. Study by the European Commission, Directorate General for Economic and Financial Affairs, 2008.

Brazilian sugarcane ethanol
1% of arable land delivers
50% of Brazil's petrol needs



You can help fight climate change by supporting a mandatory 10% target for renewables in transport by 2020

The successful Brazilian experience shows that the EU's ambition to achieve 10% of renewable fuels in transport by 2020 is feasible. Brazil has replaced half its petrol needs with ethanol made from sugarcane, grown on only 1% of its arable land. Sugarcane expands primarily on degraded pastures and does not compete with food production or cause deforestation of the Amazon. In fact, 90% of the sugarcane harvest happens in South-Central Brazil and the remainder is in the Northeast. Both regions are more than 2,000 km from the Pantanal, or roughly the distance between Paris and Moscow. While sugarcane production has increased steadily in recent years, Brazil has doubled its grain production in the last decade and become the top global exporter of several key commodities. The Brazilian experience proves that food, fuel, feed and fiber can be produced simultaneously and sustainably.

More information:
www.unica.com.br/en

UNICA
SUGAR CANE INDUSTRY ASSOCIATION
UNICA UNIAO UNICANOS

UNICA

Ethanol Summit

Aquecimento global. Hora de reabastecer as ideias.

Inscriva-se agora: www.ethanolsummit.com.br

ethanol summit 2009

São Paulo vai sediar um dos mais importantes eventos mundiais sobre o futuro do álcool combustível, o etanol. Não há outra melhor cidade do Brasil para o mais bem-sucedido programa de uso de biocombustíveis do planeta. Aqui, 90% dos carros novos comercializados são flex, toda a gasolina contém 20% de etanol, todos os postos elevaram o limite de etanol para a escala de um litro e a primeira estação flex do mundo. Por isso, mais de 140 parlamentares e 1500 participantes de todas as partes do mundo vão se reunir no Sheraton WTC Hotel para discutir as últimas tendências, estratégias e tecnologias. Participe e entenda como os biocombustíveis estão se tornando cada vez mais essenciais para um futuro mais limpo e sustentável.
1º a 3 de junho | Sheraton WTC Hotel | São Paulo



Global Warming. Some solutions are simpler than you think.

Register now: www.ethanolsummit.com.br

ethanol summit 2009

Join us in Brazil, where ethanol has for more than three decades, innovated and led the world. The fight against global warming will be among the most important topics of one of this year's most important gatherings focused on renewable fuels. More than 140 speakers and 1500 participants from all continents will meet in São Paulo for the Ethanol Summit 2009 to explore the latest trends, strategies and technologies that make biofuels an increasingly vital tool for our common, sustainable future.
June 1-3 Sheraton WTC Hotel São Paulo, Brazil



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SUGARCANE INDUSTRY IN BRAZIL

Ethanol
Sugar
Bioelectricity

500-YEARS-YOUNG

Paralelamente ao crescimento econômico do Brasil, o setor de açúcar e álcool brasileiro também vem evoluindo rapidamente. O Brasil é hoje o maior produtor mundial de açúcar e o segundo maior produtor de etanol. O setor brasileiro de açúcar e álcool é considerado um dos mais modernos e tecnologicamente avançados do mundo. O Brasil é hoje o maior produtor mundial de açúcar e o segundo maior produtor de etanol. O setor brasileiro de açúcar e álcool é considerado um dos mais modernos e tecnologicamente avançados do mundo.



BRAZILIAN SUGARCANE ETHANOL

GET THE FACTS RIGHT AND KILL THE MYTHS

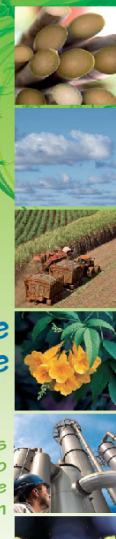


GIVEN THE ONGOING DEBATE ON ETHANOL BENEFITS, IT IS IMPORTANT TO DISTINGUISH FALLACIOUS MYTHS FROM HONEST FACTS



Take care of the planet in your daily life

Sugarcane's contribution to climate change mitigation



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COMMUNICATION ACTIVITIES IN BRAZIL



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CONCLUSIONS

- 1. Biofuels use will expand in the world, due to consumers demand and public policy interests.**
- 2. What are the factors contributing to the commoditization of ethanol?**
 - Adoption of targets for the use of biofuels in an increasing number of developed and developing countries.
 - Global firms from a wide range of sectors are investing in the production of ethanol.
 - Ethanol helps countries to achieve their emission reduction target and to mitigate climate change.
 - Sugarcane ethanol can be produced in many countries of the world (energy diversification and factor of development).

CONCLUSIONS

3. What are the factors preventing ethanol to become a global commodity?

- Tariffs and trade-distorting measures.
- The international market remains extremely small and volatile.
- Common standards must be adopted to avoid the distortive non-tariff barriers.
- The proliferation of sustainability criteria should be avoided (differences between firms and countries).

4. What needs to be done?

- An extensive work of communication must be done to repeal the fallacious myths and to inform about ethanol benefits to mitigate climate change.
- Third countries: technical and scientific cooperation, investments.
- Trade: complementing production/consumption policies, elimination of distorting support mechanisms.

Thank you

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