



Comitê de Cooperação Econômica

BRASIL-JAPÃO



Keidanren
Policy & Action



Confederação Nacional da Indústria

CNI. A FORÇA DO BRASIL INDÚSTRIA



Comitê de Cooperação Econômica

BRASIL-JAPÃO

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NATURAL RESOURCES AND ENERGY: AN AGENDA ON THE ETHANOL SECTOR

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Executive Director



UNICA





Brazilian Sugarcane Sector - Key Numbers

Number of mills	380¹
Sugarcane growers	70,000
Direct employment	840 thousand²
Revenue	US\$ 40 billion
Foreign Revenue	US\$ 11.3 billion (2016/17)
% Energy matrix	16.9%
CO₂ emission reductions CO₂	> 600 million t since 1975

30 billion liters



2nd world producer: 25% of production and 20% of world exports

15 million MWh



4 % of Brazilian electricity consumption; 38% of annual planned production in Belo Monte complex

40 million ton.



Largest producer and exporter in the world: 20% of global production and 40% of exports

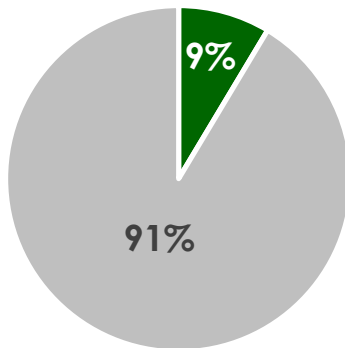
¹ ÚNICA(jul/2017); ² UNICA (jul / 2017) ; ³2016 (RAIS); ⁴BEN(2013); Unica, MAPA e LMC



Brazilian Energy Matrix: An Example for the World

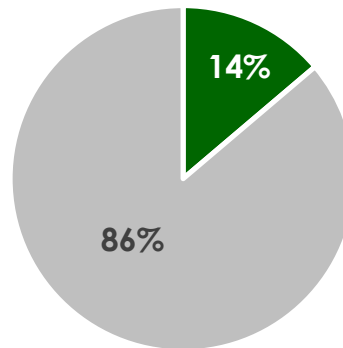
OECD

(2014)



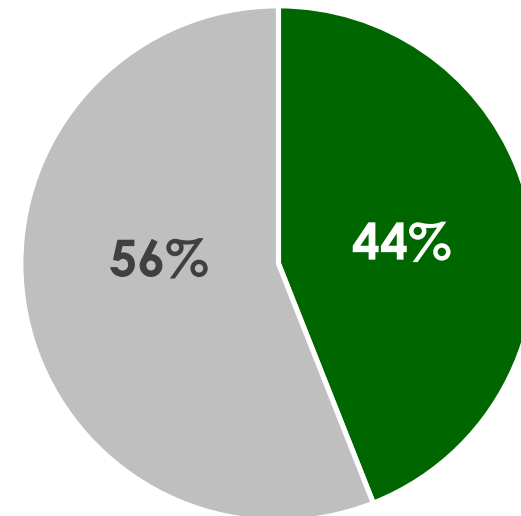
World

(2016)



Brazil

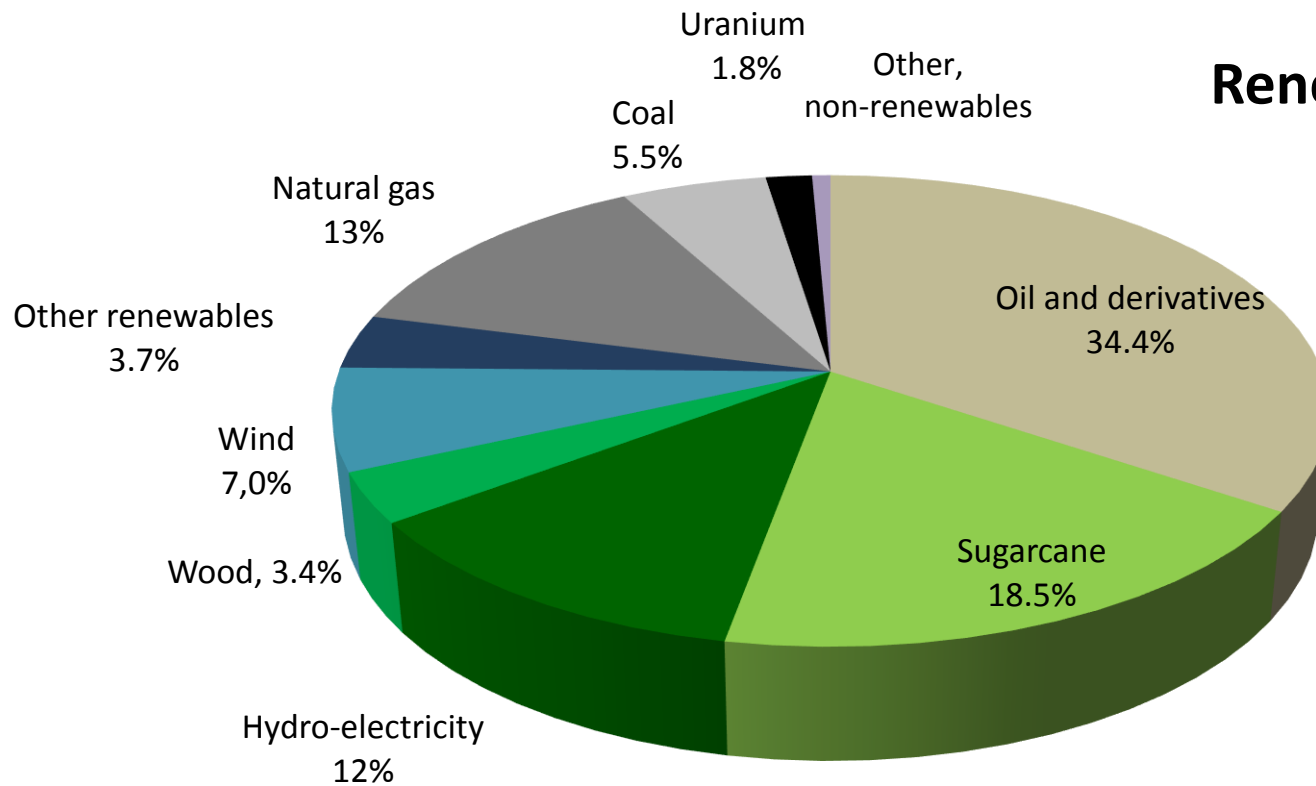
(2016)



■ Renewable Energy ■ Non-renewable Energy



Brazilian Energy Matrix (2016)



**Renewable sources:
44.6%**

#1 source of renewable energy



HOW ETHANOL IS CONSUMED IN BRAZIL

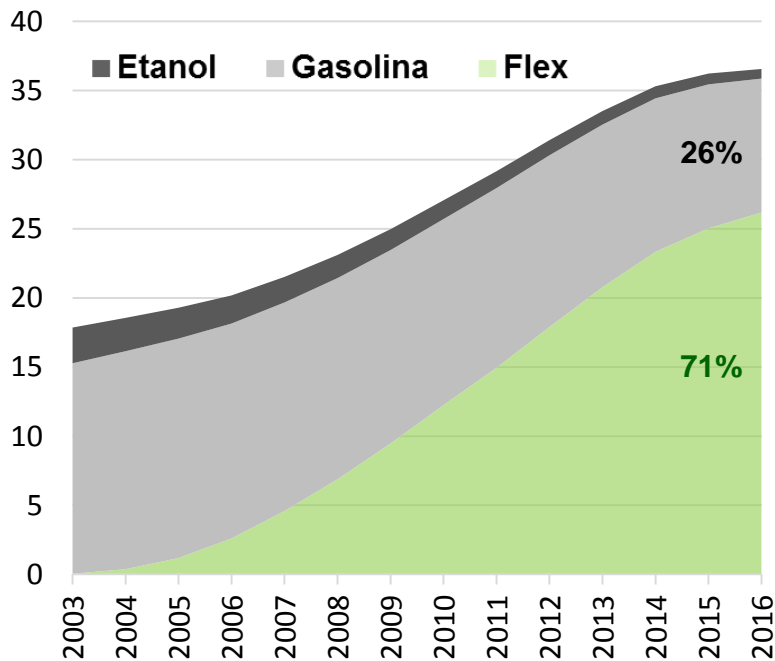
- **Mandatory blending:**
 - Blend mandated by the government: 18-27.5% (currently 27%)
 - No pure-gasoline sold in Brazil
 - Consumption: +/- 11 bn liters
- **Pure ethanol (flex fuel vehicles):**
 - Market-driven
 - Consumption: +/- 17 bn liters
 - 70% of the car fleet flex fuel
 - All the almost 42,000 fueling stations with dedicated ethanol pumps



FFV Vehicles

Thanks to the the continuous expansion of FFVs, the potential demand for hydrous ethanol is increasing...

Brazilian vehicle fleet (million units)



- ❖ 95% of Brazilian total automobile sales are flex vehicles (2016)
- ❖ 41% of Brazilian total motorcycle sales are flex vehicles (2016) and currently they represent 28% of the national motorcycle fleet



FLEX FUEL MARKET

20 automakers and over 200 models



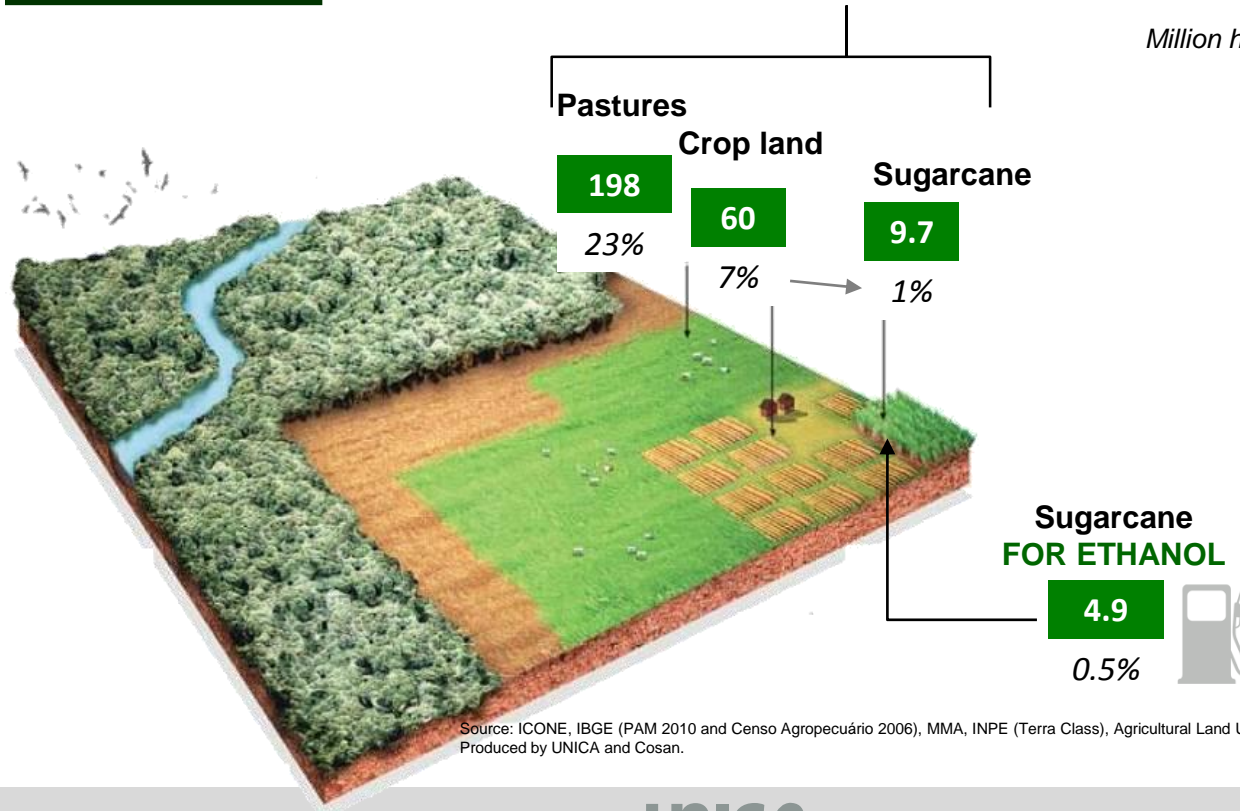
Source: ANFAVEA



LAND AVAILABILITY FOR THE EXPANSION OF SUGARCANE CROP...

Total area	Native vegetation	Pasture and crop land	Other uses
852	554	258	40
100%	65%	30%	5%

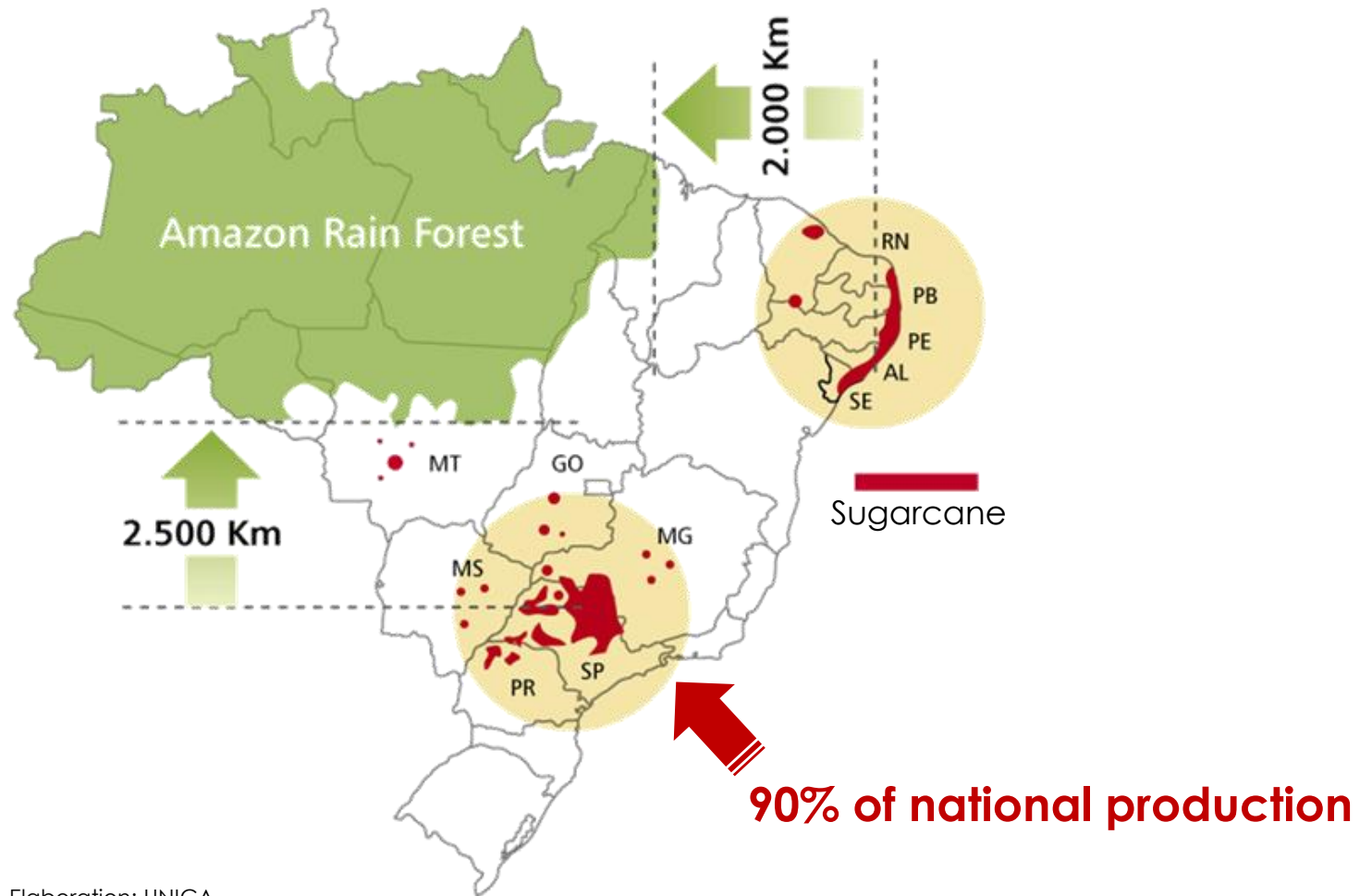
Million hectares



Source: ICONE, IBGE (PAM 2010 and Censo Agropecuário 2006), MMA, INPE (Terra Class), Agricultural Land Use and Expansion Model Brazil Ag-LUE-BR (Gerd Sparovek, ESALQ/USP), Produced by UNICA and Cosan.



Sugarcane in Brazil



Source: NIPE-Unicamp, IBGE and CTC. Elaboration: UNICA



Government Initiatives

SUGARCANE AGROECOLOGICAL ZONING IN BRAZIL

Guidelines for Sugarcane Expansion





1. It **excludes sugarcane expansion in the most sensitive biomes** – e.g. Amazonia and Pantanal
2. It **excludes sugarcane expansion on any type of native vegetation** (*Cerrados, Campos, etc.*)
3. Authorized areas for sugarcane expansion: **64.7** ml hectares, equivalent to **7.5%** of the Brazilian territory (currently 1% of the area is used for sugarcane)

It guides licensing decisions of the Brazilian environmental agencies. Public funding for sugarcane mills is subject to its compliance.





It is one of the most environmentally friendly biofuels supplying today's market

SOURCE				
Feedstock	<i>Sugarcane</i>	<i>Corn</i>	<i>Wheat</i>	<i>Beet</i>
Energy balance (units of renewable energy per unit of fossil fuel input)	9.3	1.4	2.0	2.0
Productivity (liters/hectare)	7,000	3,800	2,500	5,500
GHG reduction* (from US and EU legislations)	61%-91%	1%-49%	16%-69%	52%

Source: World Watch Institute (2006) and Macedo et al. (2008) – energy balance; International Energy Agency (2005), MTEC, EU Commission, EPA and UNICA – productivity; ongoing legislations for renewable energy in U.S. (RFS) and EU (Directive 2009/28/EC) – GHG reduction. Note: *reductions in well-to-wheel CO₂ eq. GHG emissions from ethanol compared to gasoline calculated on a life-cycle basis.



It is a tool to fight climate change...

» **90%**: ethanol reduction of GHG emissions compared to petrol

» **240** million tons of CO_{2eq}: accumulated GHG emissions reduction since March 2003 (date of the launch of FFVs in Brazil)



... and it improves the quality of life and fosters economies in public health expenditures

» If vehicles, in the main Brazilian urban centers, would go with:

» Pure gasoline



PM_{2.5}



1,384 deaths per year



9,247 hospital admissions per year

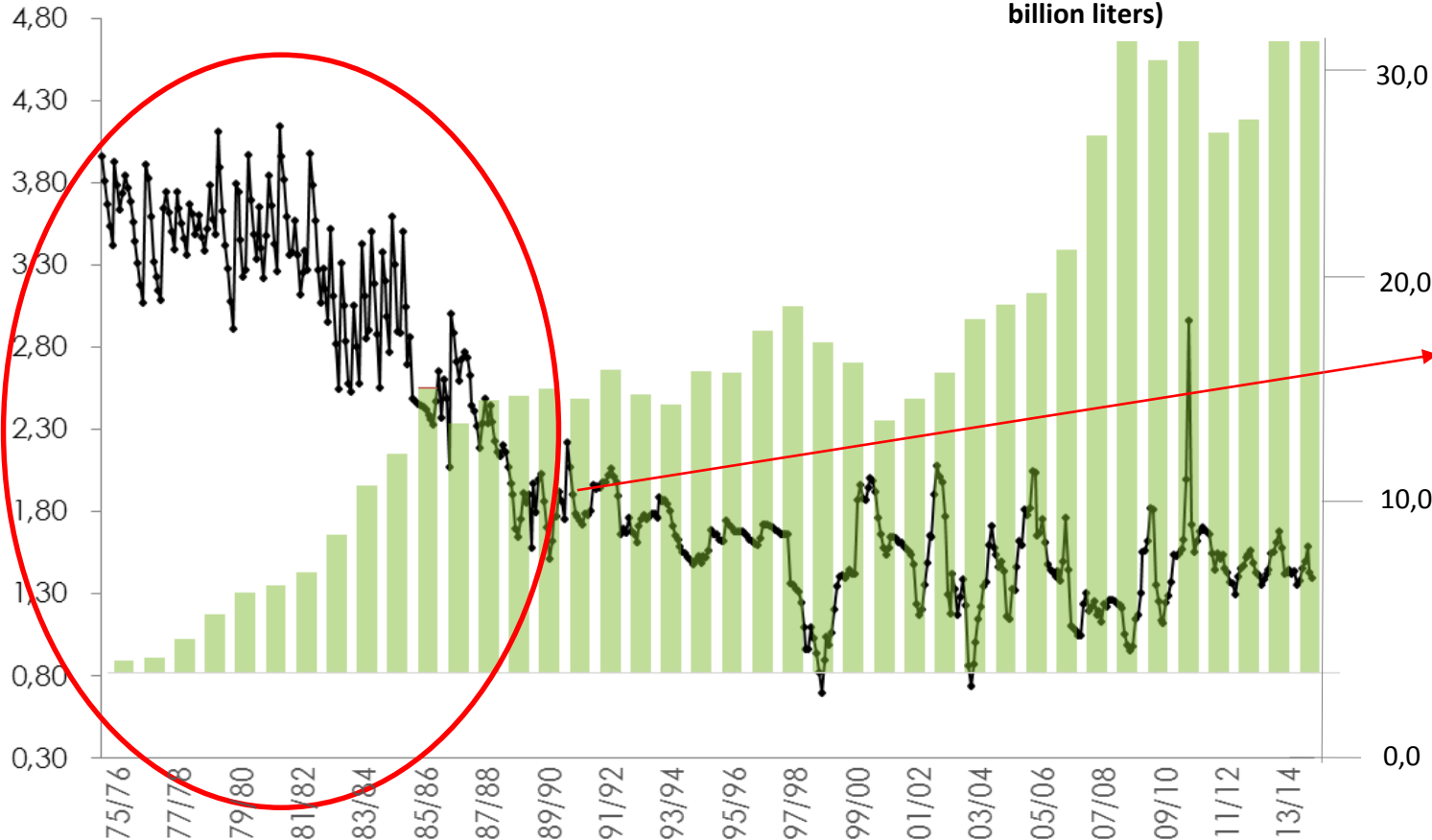
Additional cost for the health system:
US\$ 193.5 million per year



Technological perspectives for ethanol production

Anhydrous ethanol price to the producer (R\$/l)

Ethanol production (billion liters)



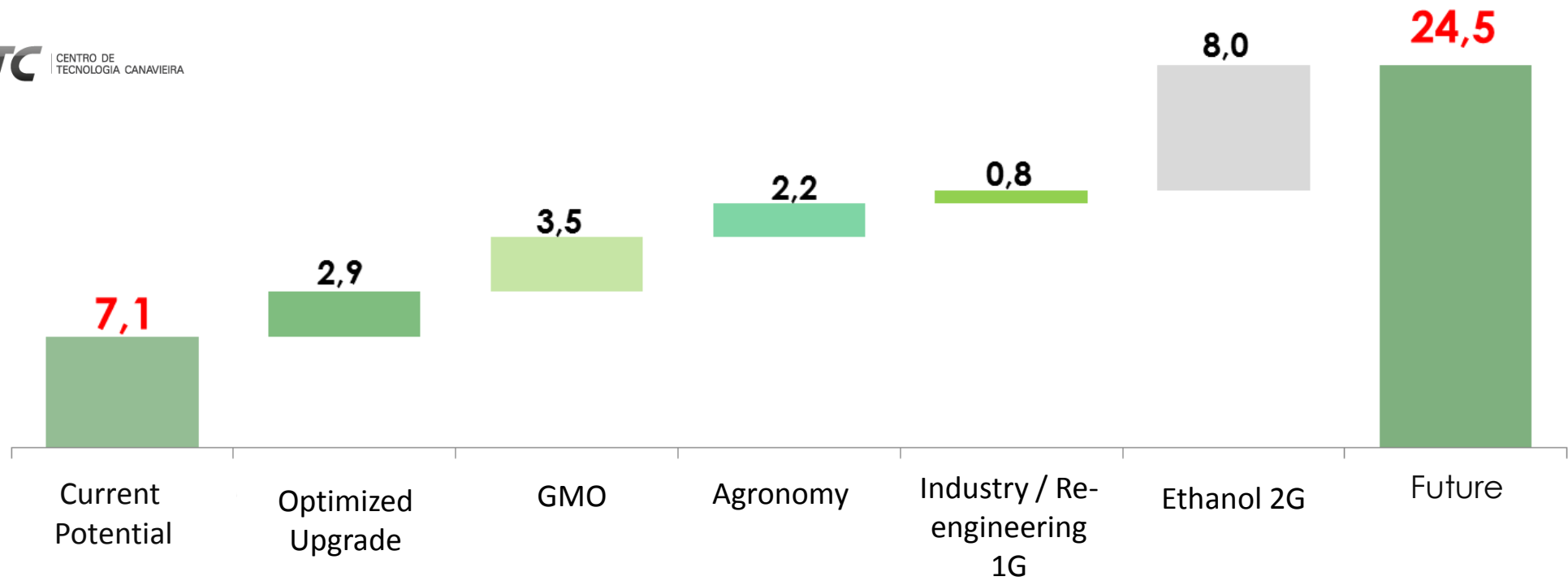
- ✓ In this period, ethanol **production** was **multiplied by 20**, yields **more than doubled** (from 3,000 liters/ha to 7,000 liters/ha), and the **price** was **reduced by half**.
- ✓ Current technological potential shows that a similar movement may be observed in the next years.



What are the potential gains in producing ethanol?

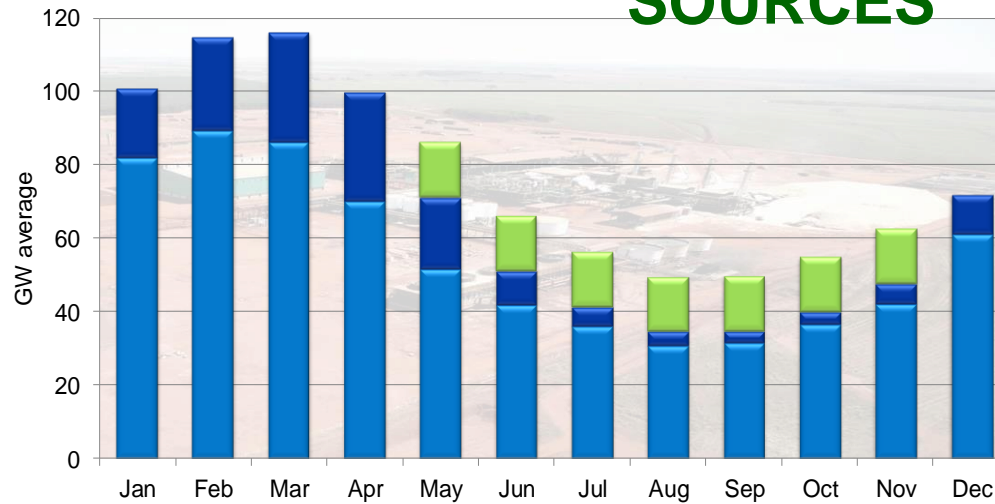
Potential gains in productivity for Brazilian sugarcane ethanol

(thousand liters of ethanol per hectare)





SINERGY BETWEEN HYDRO AND BIOMASS SOURCES

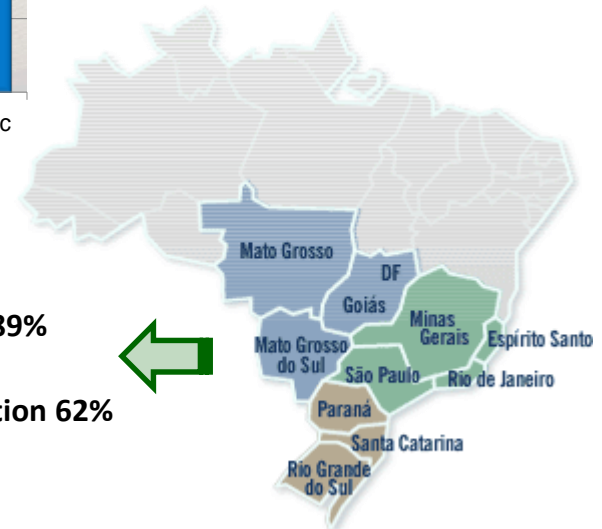


- Current "hydro" (2008)
- New "hydro" (projects)
- Biomass (potential)

Center South region

Sugarcane 89%

Energy consumption 62%





Trends for bioenergy and a green economy...

G7 Climate Commitment



- ❖ *In 2014, G7 agreed to support GHG reduction between 40% and 70% of emissions until 2050 (base 2010) and decarbonize the global economy (i.e., ban fossil fuels) in the course of this century ...*
- ❖ *CoP-21 in 2015: Over 190 countries have established a global commitment for net zero emissions and promised to try to significantly bring global emissions down from peak levels*
- ❖ *62 countries have (voluntary or compulsory) mandates defining the use of biofuel*
- ❖ *37 countries explicitly mentioned in their commitments the use of biofuel as a tool to reduce emissions*





What is the sector's new challenge?

- Contribute to meet the **ENVIRONMENTAL COMMITMENTS** made by Brazil in Paris Agreement, focusing at the same time on supplying the domestic market
- Fulfillment of Brazil's environmental goals will require a new cycle of investments and a technological breakthrough





Brazil intends to...

Reduce its GHG
emissions by
43% below
2005 levels in
2030

Increase the share of sustainable biofuels in Brazil's energy mix to **18%** “(...) by **expanding biofuel consumption, increasing ethanol supply**, including by increasing the share of advanced biofuels (2nd generation), and increasing the share of biodiesel in the diesel mix”

= ~ **40** billion liters of ethanol

Brazil's Nationally Determined Contribution (NDC) under the Paris Agreement



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Brazil-Japan

Forms of Cooperation





Enhancement of Ethanol Program in Japan

❖ Ethanol Sector:



Brazil and Japan can work together to increase the blending of ethanol in Gasoline to 10% in Japan, with clear benefits for the environment, improvement of air quality, and Japanese commitments on the Paris Agreement.



Technological Cooperation

❖ Second Generation Ethanol (2G):

Technology transfer and joint research projects to improve the production of second generation ethanol





2G SUSTAINABILITY: OPTIMIZING RESOURCES

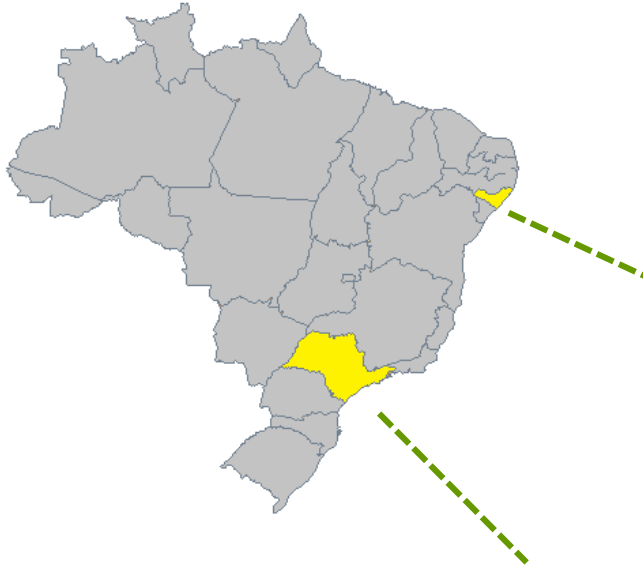
- **Biomass availability:** sugarcane bagasse (already available at production sites) and sugarcane trash (tops & leaves left in the field) need to be collected and transported to the mill.



- **Technology:** at present, enzymatic hydrolysis is the most feasible alternative for 2G ethanol - production can be integrated with 1G; other technologies becoming available to produce sugarcane-derived jet fuel, diesel and 'green' chemicals.



Ethanol 2G in Brazil: already a reality in Brazil



1st unit to produce ethanol 2G in the country (since set/2014), in a market scale . It uses straw and bagasse and intends to produce ~ 80 million liters/year¹



3

It produces ethanol from sugarcane bagasse
~ 40 million liters/ year¹

¹ Annual Productive Capacity



Sugarcane Pellets: JV between Cosan and Sumitomo Corporation

❖ **Agricultural Residue Utilization to Support Power Generation in Japan**

- New technology developed in Brazil
- Power generation Feed in tariffs (FIT) in Japan promote the creation of supply chains in order to kick-start the flow of agricultural waste to Japan
- Sugarcane bagasse is classified as industrial waste and does not enjoy the agricultural residue FIT necessary to create this flow – unlike Palm Kernel Shell (PKS) which does enjoy this FIT





Technological Cooperation

❖ Automotive Industry:



- Development of new technological solutions for **hybrid vehicles with ethanol engines or flex fuel**

- **Fuel cell from ethanol.**



Technological Cooperation – Ethanol-based fuel cell

Hidrogen cells fueled by ethanol

Nissan e-NV200 “E-Bio-Fuel-Cell”



- The cell extracts hydrogen to feed the engine, from **ethanol**, inside the car;
- It can be used **pure ethanol** or **or mixed up to 55% with water**, to charge a 24kWh battery, without any potency loss;
- In Brazil, the **logistics infrastructure** for ethanol is already there;
- Maximum speed is of 120km/h, guarantying autonomy for **over 600 km** with just 30 liters of ethanol;
- The system is “**carbon neutral**” when counted wheel-to-well.



Brazil-Japan - Market Access for sugar

- Currently, Japan has a requirement for a maximum polarization of 97.99% for raw sugar with tax free (beyond that there is a tariff of around US\$ 200,00/ton);
- Brazil has a minimum pol of 99%;
- Japan imports between 1,2 and 1,4 mln t of raw sugar to process in its refineries, mainly from Australia and Thailand;
- Therefore, despite the fact that Brazil is the largest exporter in the world, it has to pay a tariff to enter Japan even with a better quality and cheaper product;
- Brazil and Japan can work together to review this restriction, and provide to the Japanese market access to the Brazilian sugar





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THANK YOU!

