# Diversification and Flexibility: Drivers for a Sustainable SugarCane Industry

## Sustainable Mobility: Ethanol Talks Vietnam

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SUSTAINABLE MOBILITY: ETHANOL TALKS VIETNAM

# About

APLA BRASIL

BRAZIL
Sugarcane Bioenergy Solution

PARQUE TECNOLÓGICO PIRACICABA

- APLA aims to unite the sugarcane industry to better cater to the agro-industrial supply chain of sugarcane
- Offering various services and solutions for mills, distilleries, cogeneration plants, biodiesel and biogas plants
- Since 2007, have partners in North, Central and South America, Caribbean, Africa, Asia and Oceania
- We export technology to more than 130 countries

SUSTAINABLE MOBILITY: ETHANOL TALKS Vietnam

Established in
**2007**

**Resulting in an annual output of**

**250 mi**
tons of sugarcane

**15 mi**
tons of sugar

**10 bi**
liters of ethanol

**105** sugar mills,
**150** industries, **20** public and private entities, and
**1** technology park

over
**US$ 8 bi**
in partnerships

# Timeline

## The evolution of ethanol in Brazil

**1931**
Beginning of 5% ethanol blending in gasoline

**1933**
Creation of the Sugar and Alcohol Institute

**1938**
IAA makes it compulsor y to mix anhydrous in gasoline

**1975**
Creation of the Nation Alcohol Program - PRÓALCOOL

**1975 - 1979**
PHASE 1 OF PRÓALCOOL: financing and credit for new production units.

**1980 - 1985**
PHASE 2: Launch of the first car powered by ethanol (hydrous). Tax differentiation policies between gasoline and hydrous.

**1999**
End to government control of ethanol prices

**2003**
Start of flex-fuel vehicles in Brazil

**2011**
Approval of the law that expanded the role of the National Agency of Petroleum, Natural Gas and Biofuels (ANP) in the ethanol market

**2017**
Publication of the law that created RenovaBio

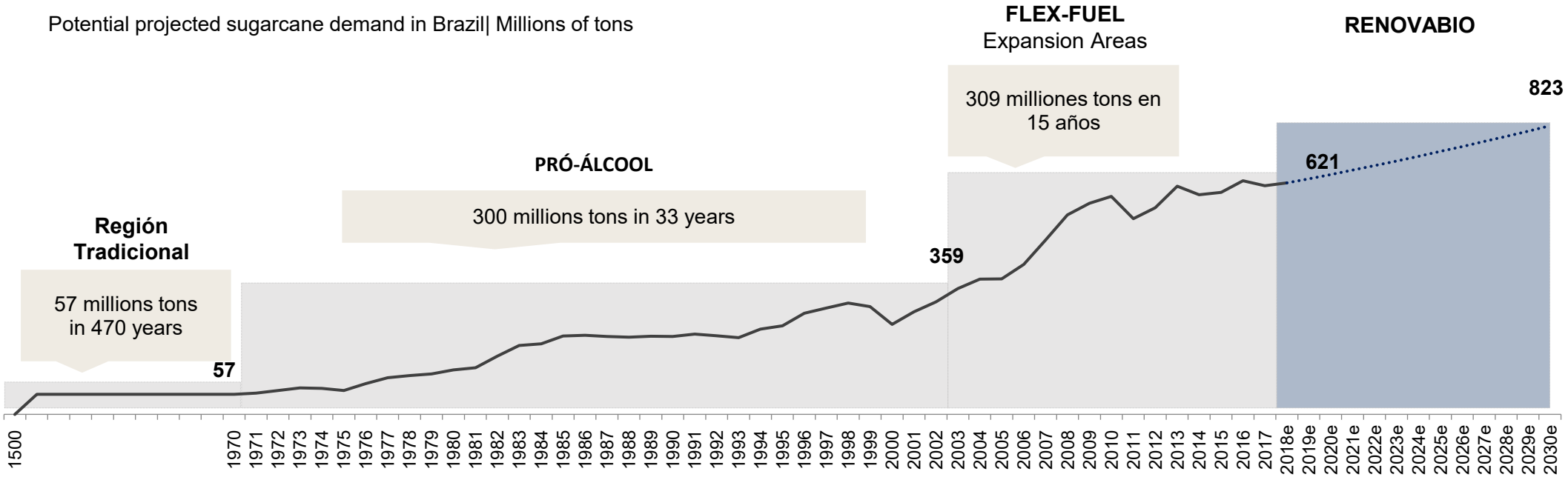
**2022**
Approval of Constitutional Amendment 123, which guarantees the tax differential between hydrous ethanol and gasoline

**2024**
Integrated discussions with the automobile industry under the Mover and Fuel of the Future programs

# Ethanol CycleSustained Growth in Demand for Sugarcane in Brazil

## Rising sugar demand and renewed interest in ethanol will drive future sugarcane demand

Potential projected sugarcane demand in Brazil| Millions of tons




- While sugar production will have to grow at a steady pace, the Brazilian ethanol market will enter a new phase of growth driven by the recently adopted Renovabio law.DATAGRO projects Brazil's share of the global sugar market, and estimates that sugarcane crushing in Brazil will reach 823 million tons by 2030 to reach this target.
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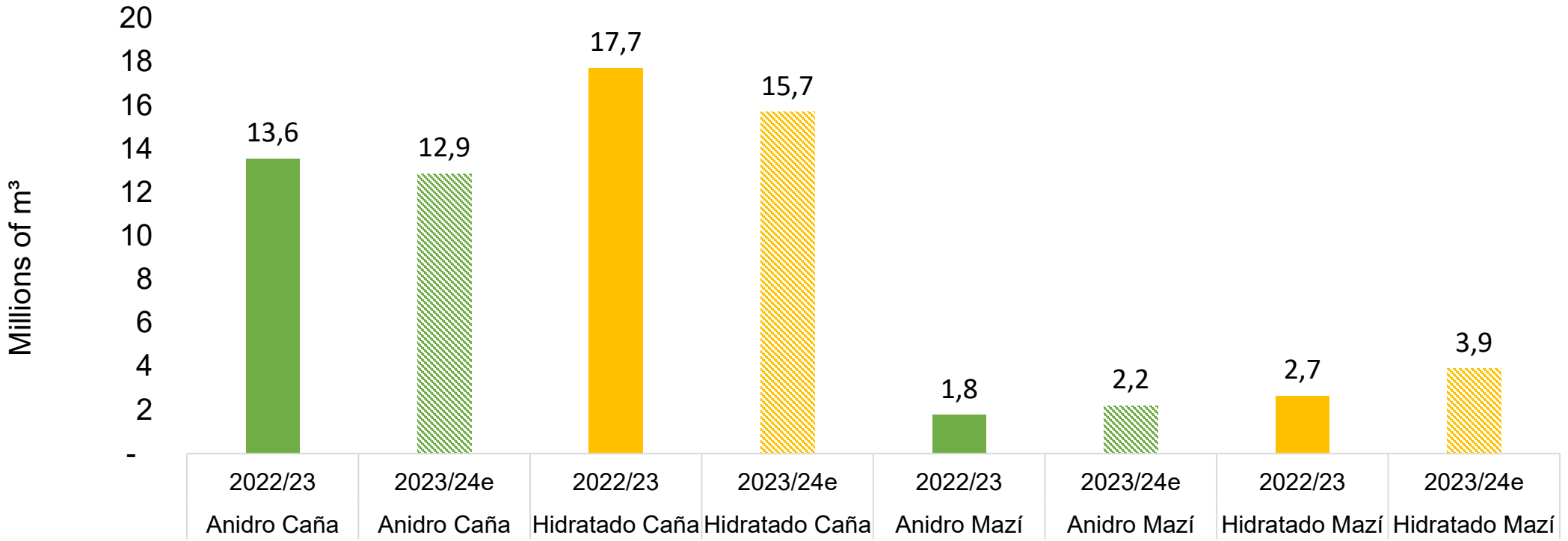
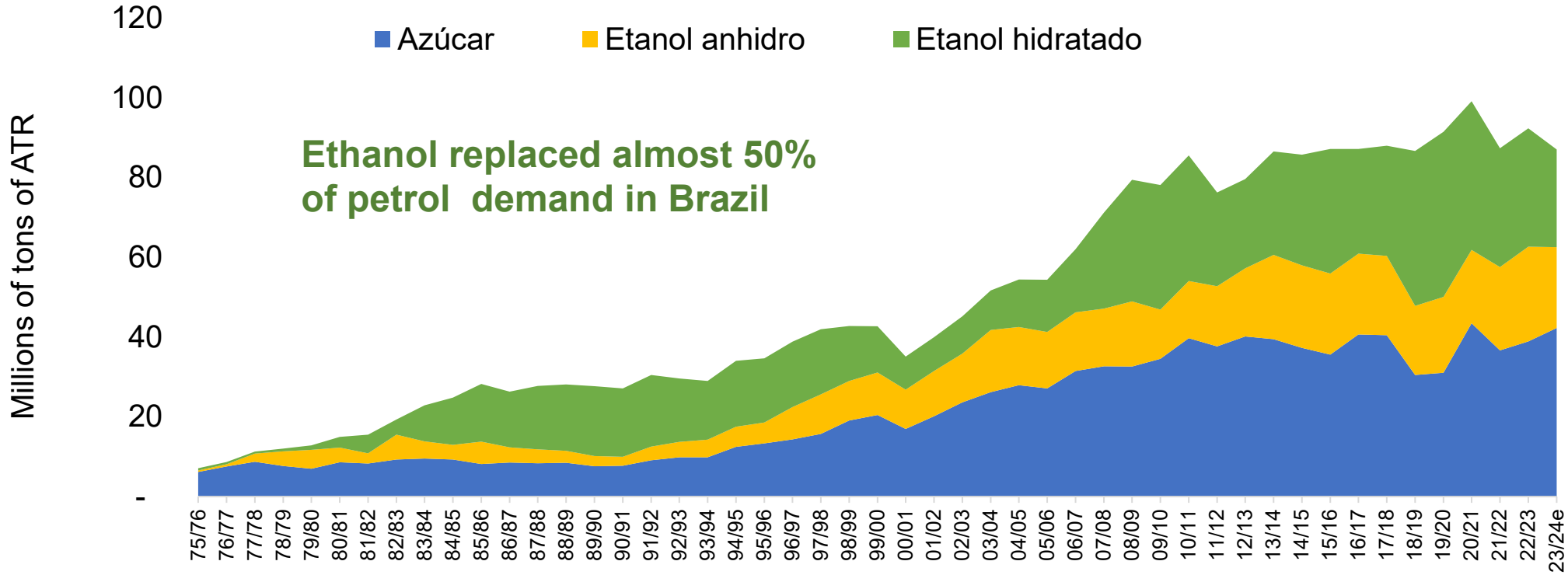
Source: **DATAGRO**

# Ethanol Productiom from Sugarcane and Corn Today in Brazil




**e: estimated: DATAGRO**
**Source: DATAGRO**

# Brazil, Sugarcane Development is an Example of Positive Integration




Source: **DATAGRO**

# Ethanol Cycle

Ethanol generates environmental benefits from the moment the sugarcane is planted in the field, absorbing most of the carbon dioxide gas generated in its production and consumption.

*The data below are relative to CO2 emissions for each thousand liters of ethanol produced and consumed.*

**1** **Cultivation and Harvesting:** Tractors, harvesters and agricultural inputs emit carbon dioxide (CO2). Manual harvesting requires straw burning, which also generates emissions. Total emissions: 2,961 kg CO2.

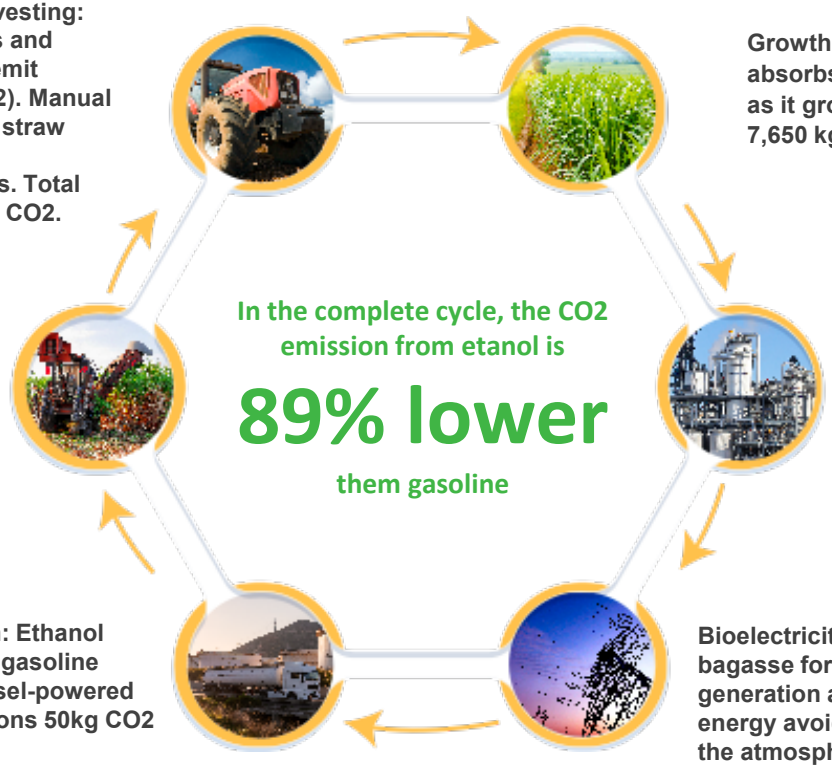
**2** **Growth:** The cane that absorbs volumes of CO2 as it grows. Absorption: 7,650 kg CO2

**3** **Processing:** Fermentation and burning of bagasse for energy generation emit CO2. Emission: 3. 604 kg CO2

**4** **Bioelectricity:** The use of bagasse for electricity generation and surplus energy avoids emissions into the atmosphere. Avoided emissions: 255 kg of CO2

**5** **Transportation:** Ethanol transported to gasoline stations in diesel-powered trucks. Emissions 50kg CO2

**6** **Car engine:** The burning of ethanol generates: 1,520 kg



In the complete cycle, the CO2 emission from etanol is

**89% lower**

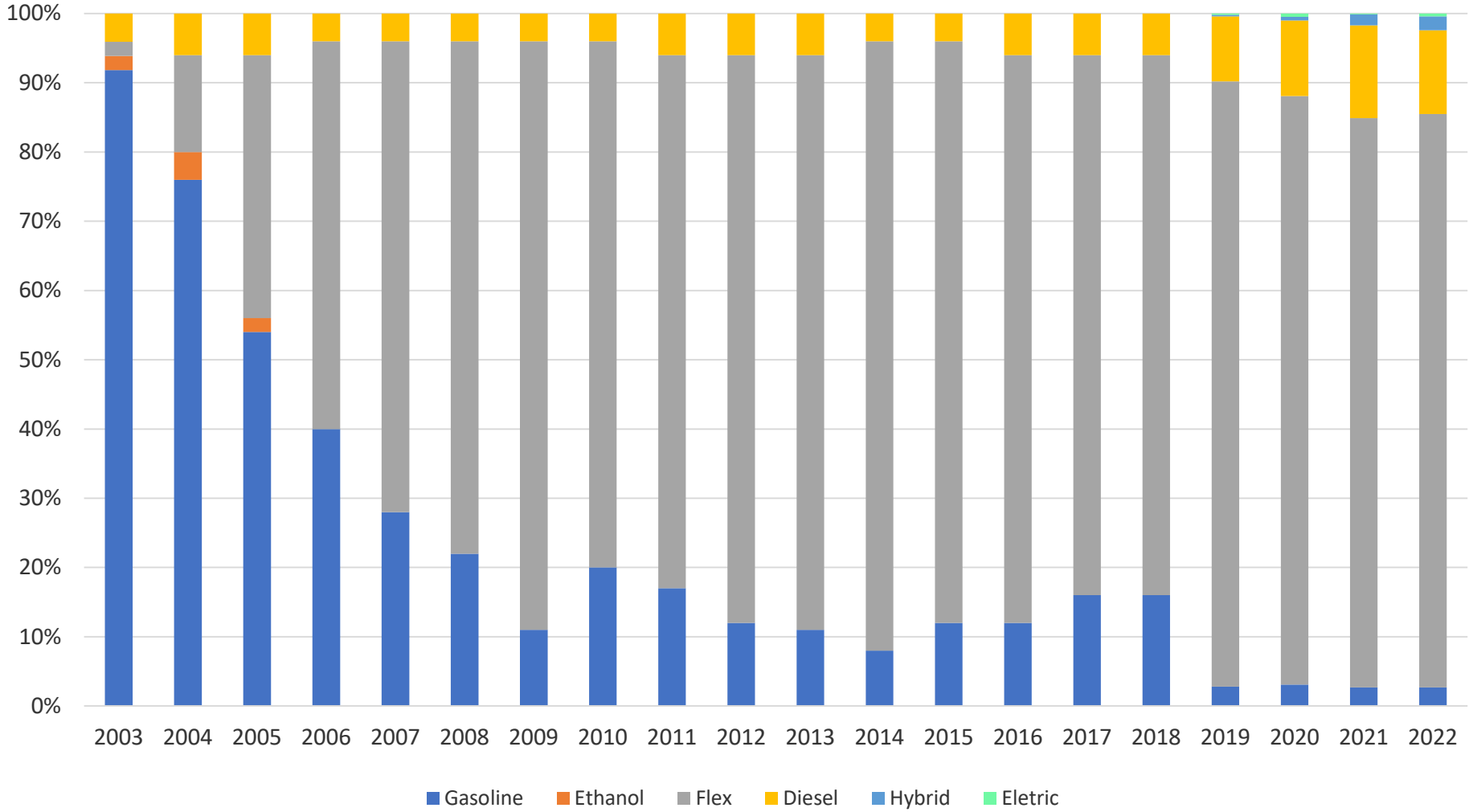
them gasoline

In 2008, the Brazilian sugarcane harvest reached approximately 27 billion liters. Consuming this volume of ethanol in cars avoids the emission of 53 million tons of carbon dioxide gas, equivalent to the CO2 absorption of a forest of millions of trees.

*Admitting 50% mechanized harvesting and 50% manual harvesting.*

***Sources: Teacher Isaias Macedo, UNICAMP; Joaquim Seabra, Tese de Doutorado UNICAMP 2008***

# Flexibility – Production Mix

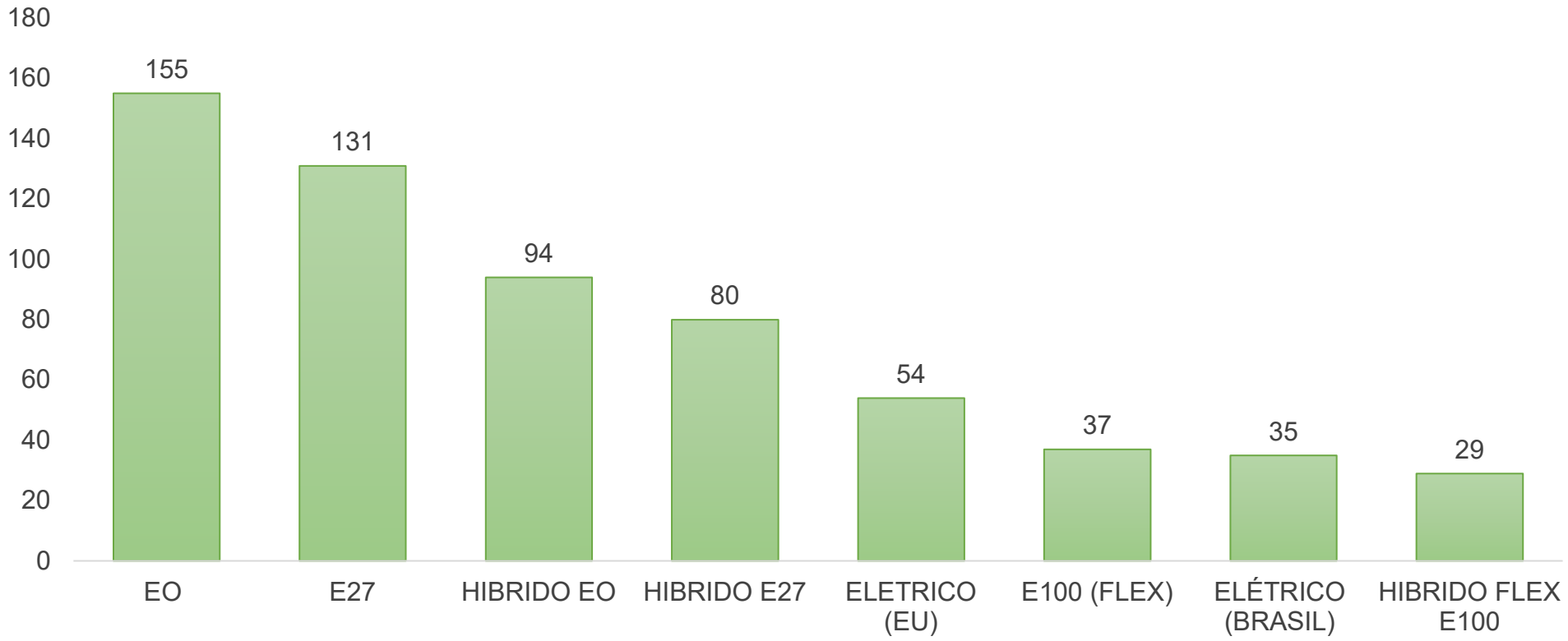



**Source: ANFAVEA**
**GRAPHIC BY: APLA**

# Flex Fuel Producers in Brazil

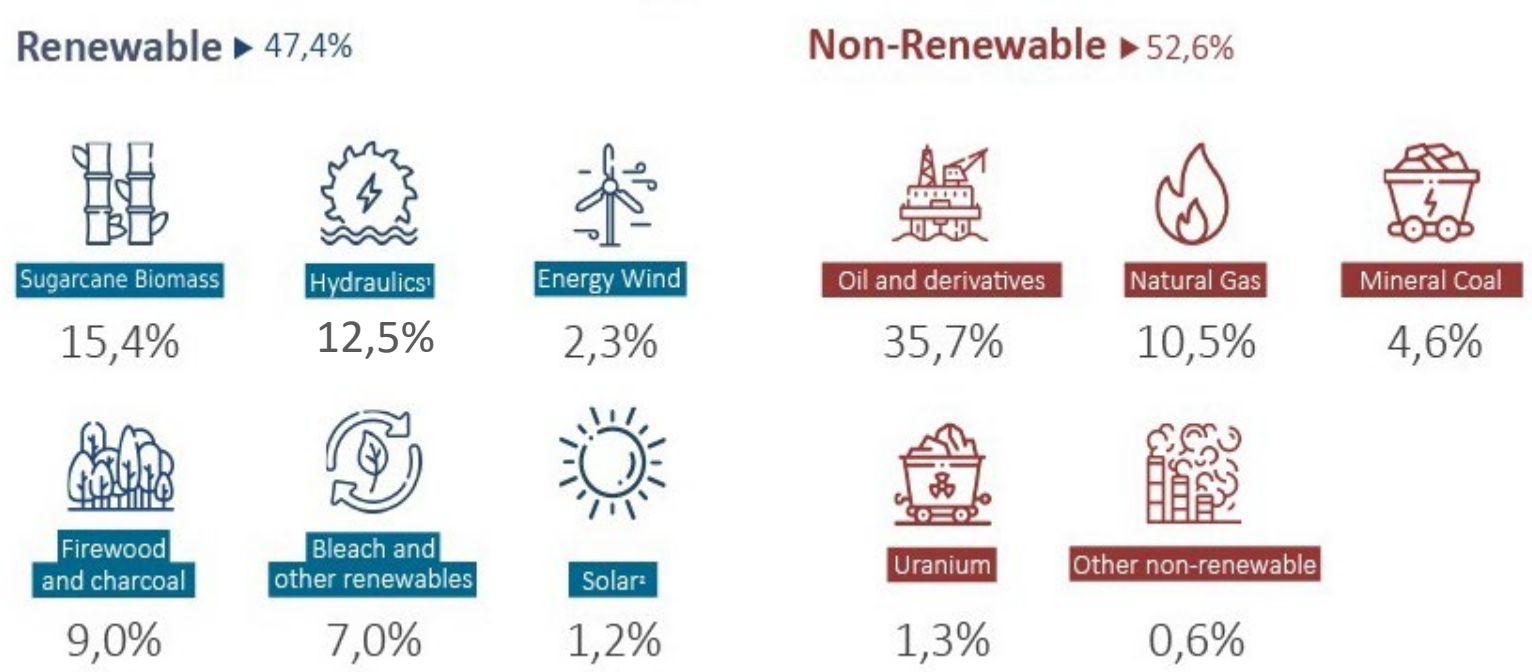
# Technologies & Fuels

Examples of GCO2/km emission standards - Well-to-wheel assessment




**Source: MME/2022**

# Diversification – Energy Matrix in Brazil – 2022




Source: National Energy Balance (BEN) 2023

# World Biofuels Supply

## sugarcane industry possibilities

### Ethanol
**(first gen.)**

Scalable and cost-competitive fossil fuel substitute

### Ethanol
**(second gen.)**


Produce +50% ethanol from the same planted area(1)

### Bioelectricity

Steam optimization for increased power generation

### Biogas(2)

Produce +50% energy from the same planted area(3)

### Pellets

Alternative to replace non-renewable sources

### Expand market


Sweetener


SAF

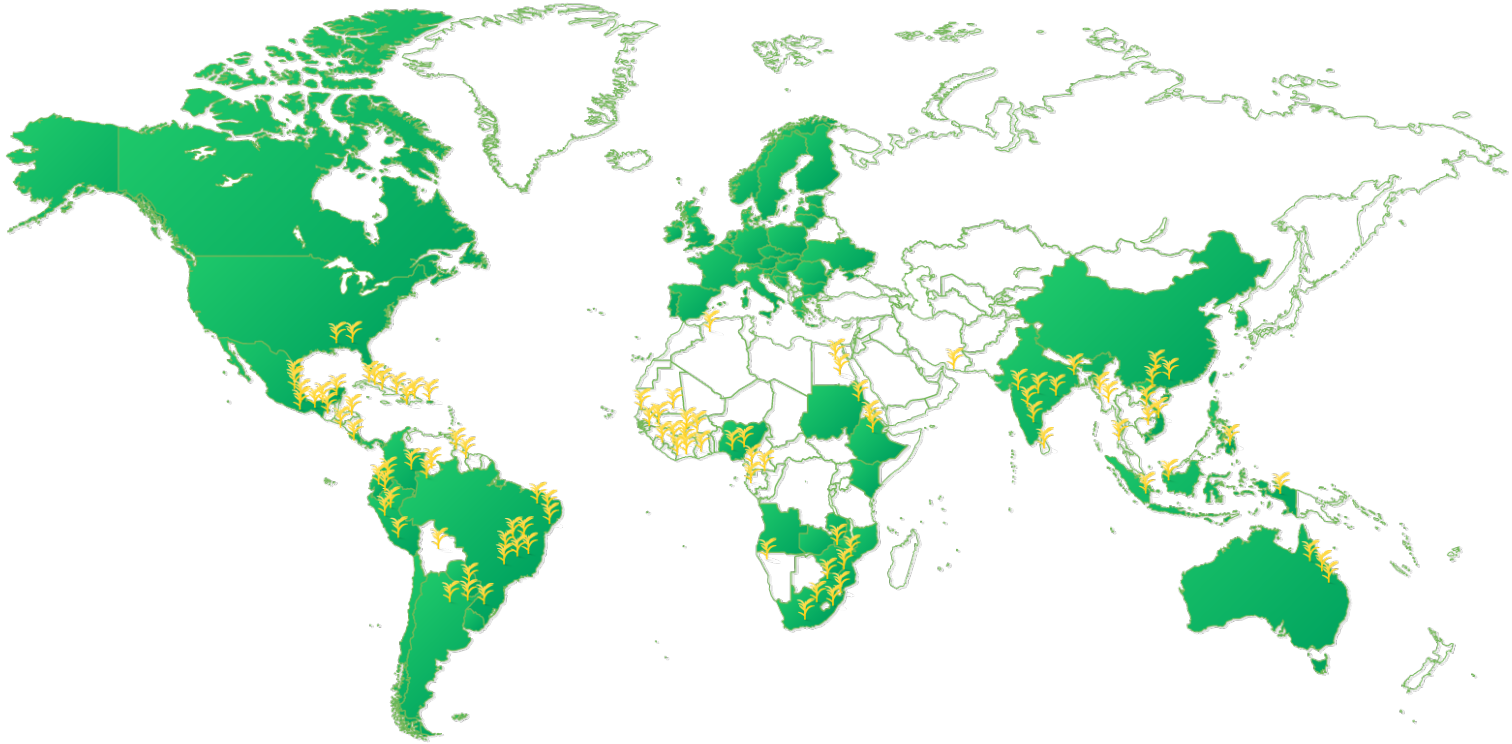

Hydrogen


Biobunker


Bioplastics

# World Sugarcane Map

100 countries could supply biofuels to 200 nations. Today, only 20 countries can offer gasoline to the world. The countries that are in green are the ones that are. According to Biofuels Digest, 66 countries already have (or intend to have) regulatory frameworks.



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Arranjo Produtivo Local do Álcool Ethanol Cluster Arreglo Productivo Local del Alcohol

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