



BIOFUELS

BRAZIL IS THE LARGEST GLOBAL PRODUCER OF SUGARCANE ETHANOL

BRAZIL

BRAZIL ENERGY MATRIX

Brazil has created a unique energy matrix to meet its energy needs, and it includes a strong presence of renewable sources, particularly sugarcane and hydropower. In recent years, the country is focused on reducing its reliance on traditional fossil fuels by building and diversifying its renewable energy infrastructure.

NON RENEWABLE ENERGY

56.5%

43.5%

RENEWABLE ENERGY

SUGARCANE ETHANOL AND BIOELECTRICITY ARE THE MAIN SOURCE OF RENEWABLE ENERGY IN BRAZIL.

THEY ARE THE COUNTRY'S SECOND LARGEST ENERGY SOURCE:

17.5%



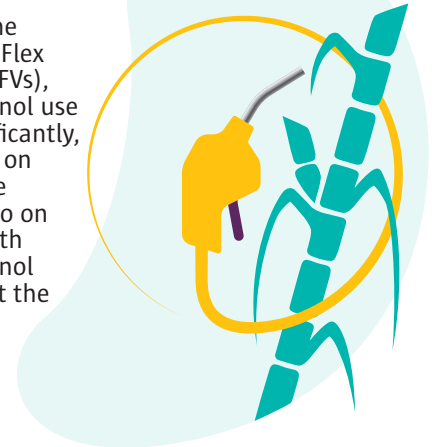
Source: Energy Research Office (EPE) for 2016

1. SUGARCANE ETHANOL RENEWABLE ENERGY TO REPLACE FOSSIL FUELS

BRAZIL PIONEERED THE USE OF SUGARCANE ETHANOL AS A CAR FUEL

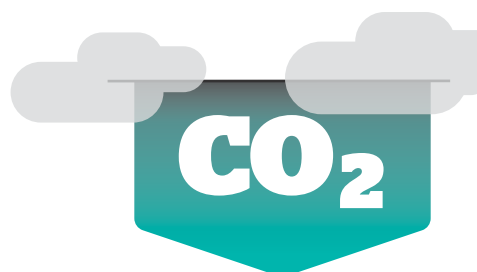
Brazil has over 40 years of experience in replacing gasoline with sugarcane ethanol. The story began in the 1970s, with the creation of the *Proálcool Program* (1975), which set the ground for the Brazilian biofuels policy. The program helped the country's evolution from an oil importer (of almost 80% of its total oil consumption) to an almost energy independent country.

In 2003, with the introduction of Flex Fuel Vehicles (FFVs), sugarcane ethanol use increased significantly, as FFVs can run on 100% sugarcane ethanol and also on any blend of both sugarcane ethanol and gasoline (at the pump).



SUGARCANE ETHANOL REDUCES CO₂ EMISSIONS

The Brazilian Agricultural Research Corporation (Embrapa) has compared CO₂ emission of both sugarcane ethanol and gasoline. According to the research, for each thousand litres of sugarcane ethanol, about 260kg of CO₂ are emitted. The same thousand litres of gasoline emit 2,280kg of CO₂.



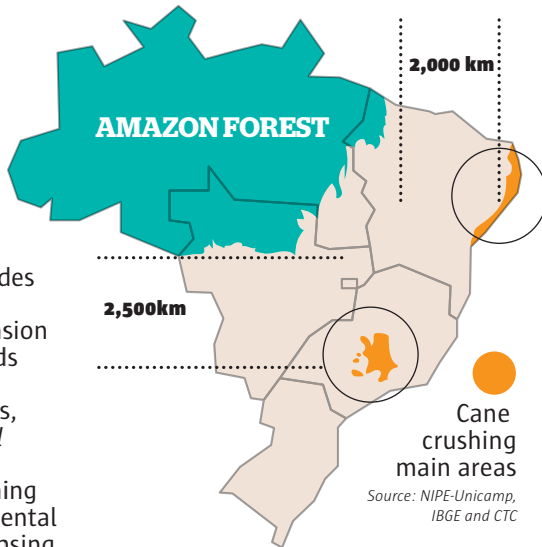
IN COMPARISON WITH GASOLINE, THE USE OF SUGARCANE ETHANOL REDUCES ABOUT 90% OF CO₂ EMISSIONS



2. BIOFUELS AND ENVIRONMENTAL PROTECTION

WHERE WE CRUSH SUGARCANE IN BRAZIL

Since 2009, the Sugarcane Agroecological Zoning (SAZ) guides the areas for sugarcane expansion in Brazil. It forbids the expansion in sensitive biomes, such as *Pantanal* (wetland) and Amazon. The zoning guides Environmental Agencies for licensing decisions. Today, sugarcane occupies 1.2% of the Brazilian total territory, concentrated in the Center-Southern region of the country. According to the SAZ, sugarcane can expand up to 7.5% of Brazilian total territory, taking place in degraded pasture or underutilised areas.



3. RESPONSIBLE INCREASE OF SUGARCANE ETHANOL PRODUCTION

The **RenovaBio** program, launched in 2018, aims to decarbonise the transport sector in Brazil. The initiative is promoted by the Department of Biofuels (DBIO) of the Office of Oil, Natural Gas and Biofuels (SPG) of the Ministry of Mines and Energy (MME).

The program ensures emissions reduction of the transport-sector through the sustainable expansion of biofuels supply in the country, guaranteeing the fulfillment of the commitments signed in the Paris Climate Agreement and increasing the guarantee of a sustainable supply.



Decarbonisation of the transport sector

Due to lesser GHG emissions from sugarcane ethanol in comparison to oil derivatives, sugarcane ethanol consumption in Brazil has continually increased, leading to an uptake in sugarcane ethanol production of over 116% since 1995. In 2017/2018, Brazilian production surpassed 28 billion litres.

SUGARCANE MILLS ARE ENERGY SELF-SUFFICIENT

Sugarcane mills produce bioelectricity from sugarcane biomass to power their own operations.

BIOELECTRICITY FROM SUGARCANE BIOMASS: 21 MILLION MWh

SUGARCANE BIOELECTRICITY OFFERED TO THE BRAZILIAN GRID IN 2017: 4.6% OF TOTAL ELECTRICAL ENERGY CONSUMPTION IN BRAZIL. IT IS EXPECTED THAT BIOENERGY WILL PROVIDE AROUND 18% OF BRAZIL'S ELECTRICITY NEEDS BY 2030.



28 BILLION LITRES BRAZIL IS THE 2ND WORLD PRODUCER OF SUGARCANE ETHANOL: 25% of production and 20% of global exports

Source: National Agency of Petroleum, Natural Gas and Biofuels (ANP).

SUGARCANE INDUSTRY IN BRAZIL

Sugarcane growers	70,000
Direct employment	795,000
Value Chain Revenue	US\$ 43,8 billion (~2% of Brazilian GDP/2017)