

An aerial photograph of a winding asphalt road cutting through a dense, lush green forest. Two cars are visible on the road: a dark-colored car in the upper left and a light-colored car in the lower right. The road curves gracefully through the trees. The image is partially covered by a large, semi-transparent green circle on the left side, which serves as a background for the text.

DECARBONIZATION: Challenge of 21st Century

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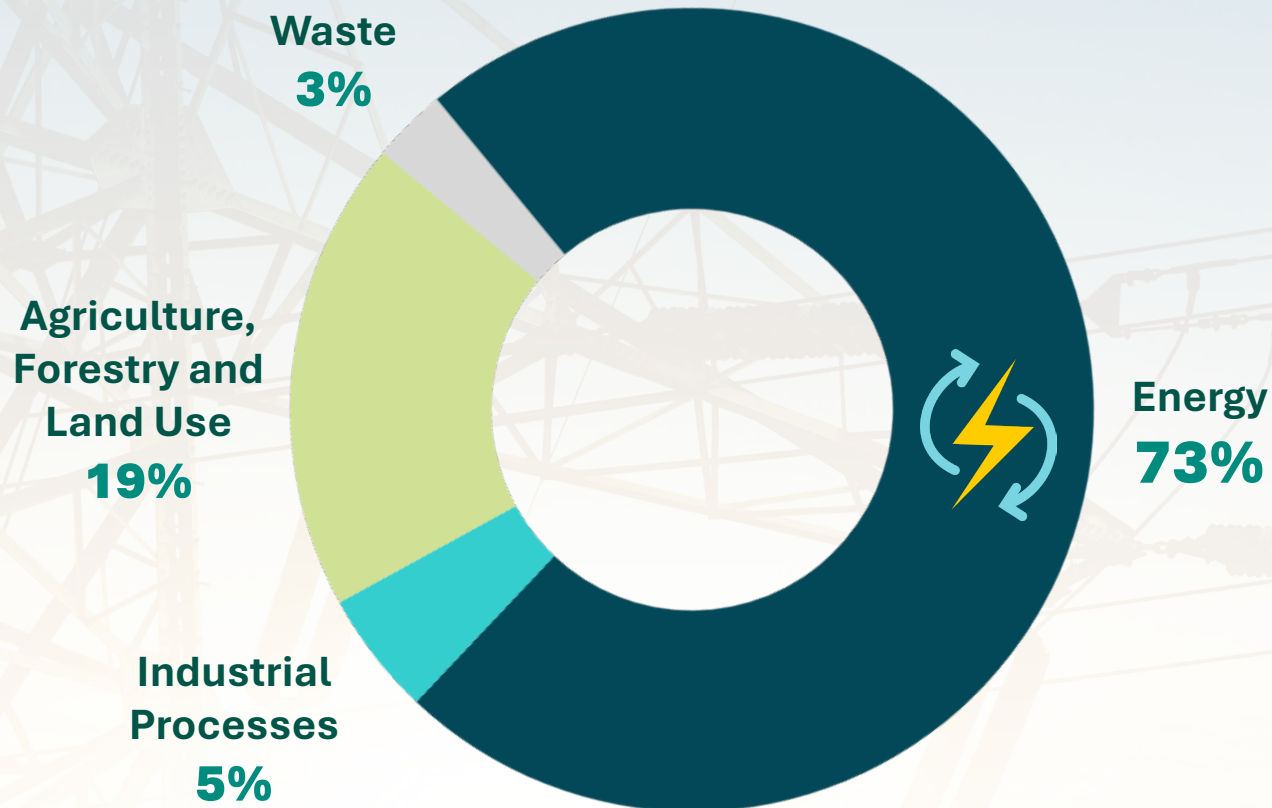
ENERGY SECURITY: One of the major challenges of this century

35% increase in
energy consumption
(International Energy Agency)

And in the midst of all of this:
Global Warming

ENERGY: **73% OF GLOBAL EMISSIONS**

OUT OF THIS: **22% TRANSPORT SECTORS**



33% Energy used in Industry

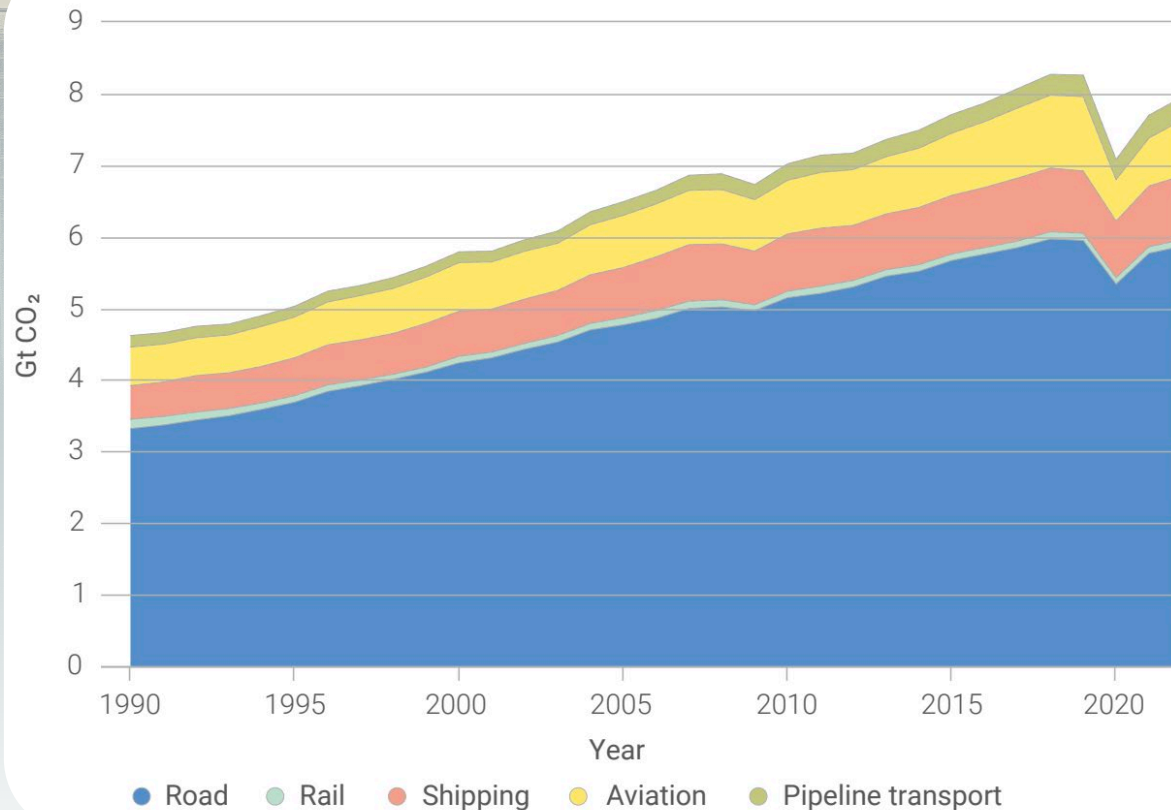
24% Electricity and Heat

22% Transport

21% Others

Source: Agroicone, based on IEA (2023); Ritchie et al. (2020).

DISTRIBUTION OF CO2 EMISSIONS BY THE TRANSPORTATION SECTOR GLOBALLY IN 2022 BY SUBSECTOR



Road - 72% (16%)

Maritime – 14% (3.0%)

Aviation - 11% (2.5%)

Source: [iea.org/energy-system/transport](https://www.iea.org/energy-system/transport)

BIOFUELS

ready, **economically viable**, and **scalable** solution:

Road

- Reduces emissions
- Creates Jobs
- Increases Revenue
- Enhances Diversification

Maritime Transport

Sustainable Aviation Fuel



THE BRAZILIAN

Experience



Getting to a Petrol Station in Brazil

E-30

E-100



Vehicle that runs on both ethanol-blended fuel and pure ethanol (E100)
All 42,000 gas stations with E100 available



45%

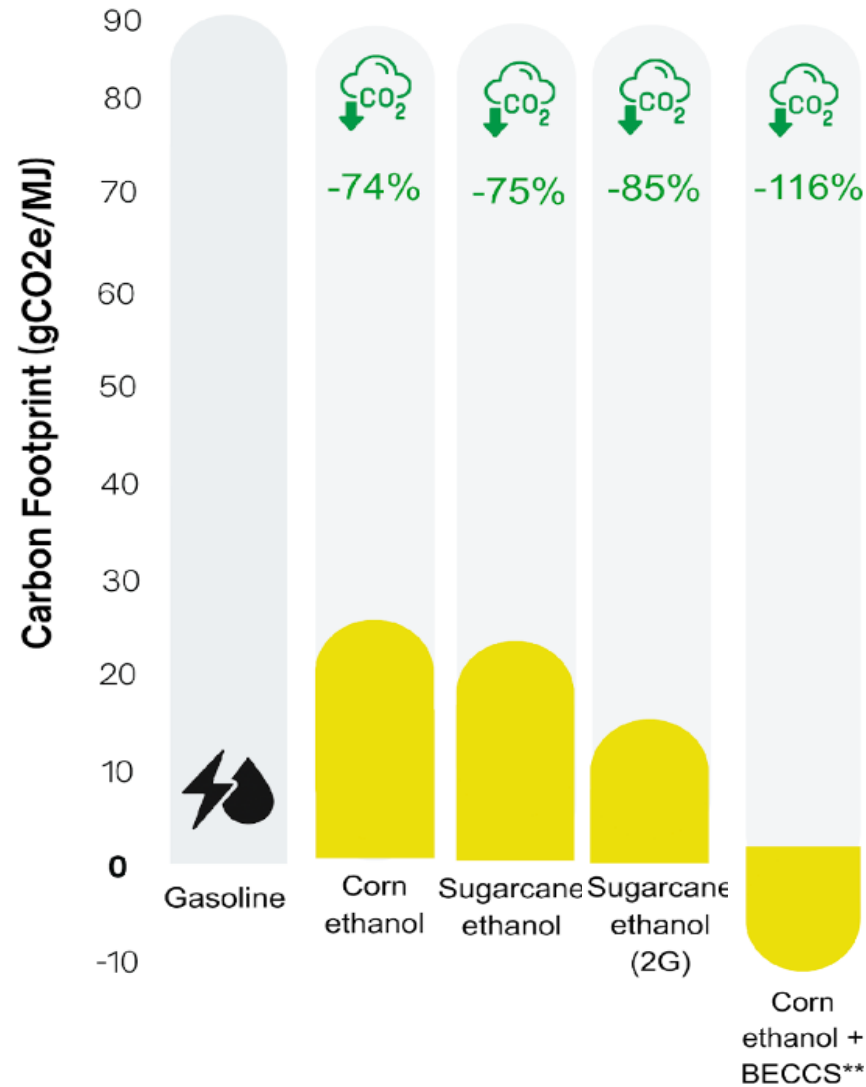
Ethanol replacement over petrol in Brazil

SINCE 2003
ETHANOL
PREVENTED
THE EMISSION OF


>730 million
tonnes of CO_{2eq}

Source: IEA

CARBON FOOTPRINT AND EMISSIONS REDUCTIONS OF BRAZILIAN ETHANOL COMPARED TO GASOLINE (LCA)



Brazilian second-generation (2G) sugarcane ethanol is a low-emission option and a strong candidate for unlocking a new generation of advanced biofuels, as well as the use of BECCS.



São Paulo: The 6th largest city in population in the world

**Ranking of the most polluted
cities in the world**

0 . 0 0 0

World's most polluted cities (2024)

Source: <https://www.iqair.com/>

ETHANOL BLENDING: WORLD SCENARIO



The benefit of using bioethanol blends is to reduce emissions from current vehicle fleets

ROAD TRANSPORTATION

16% of total
emissions

1.6
billion cars



2025

+70%
increase

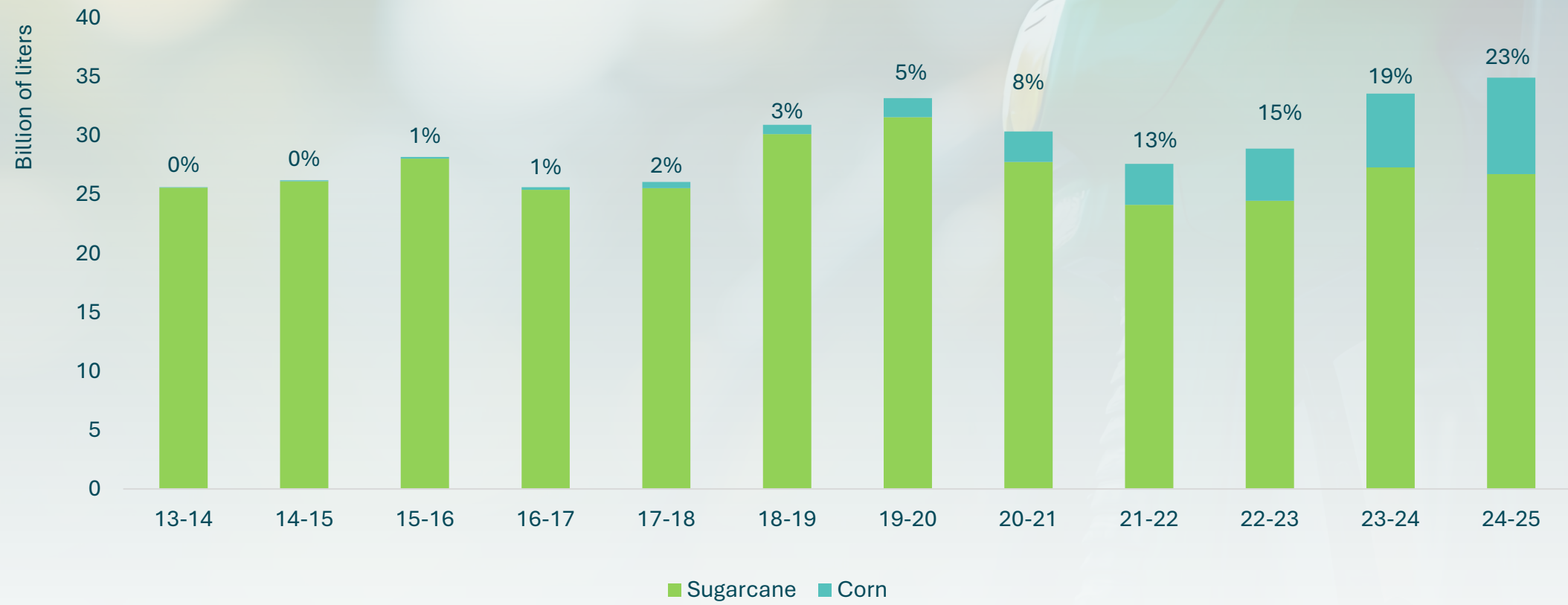
2.7
billion cars
(estimate)



2050

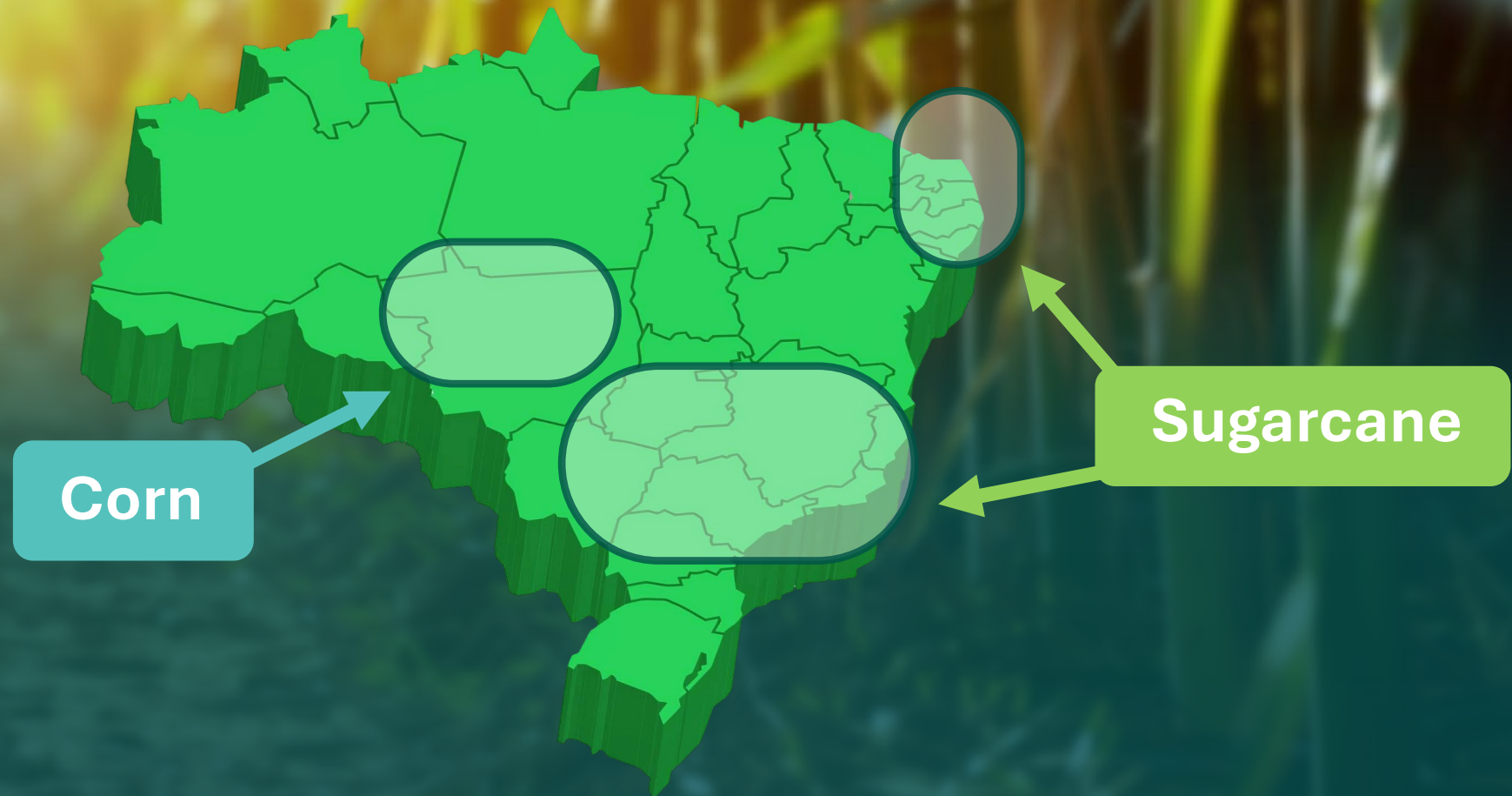
BRAZIL ETANOL: FEEDSTOCKS (DIVERSIFICATION)

Corn ethanol as a share of total ethanol production

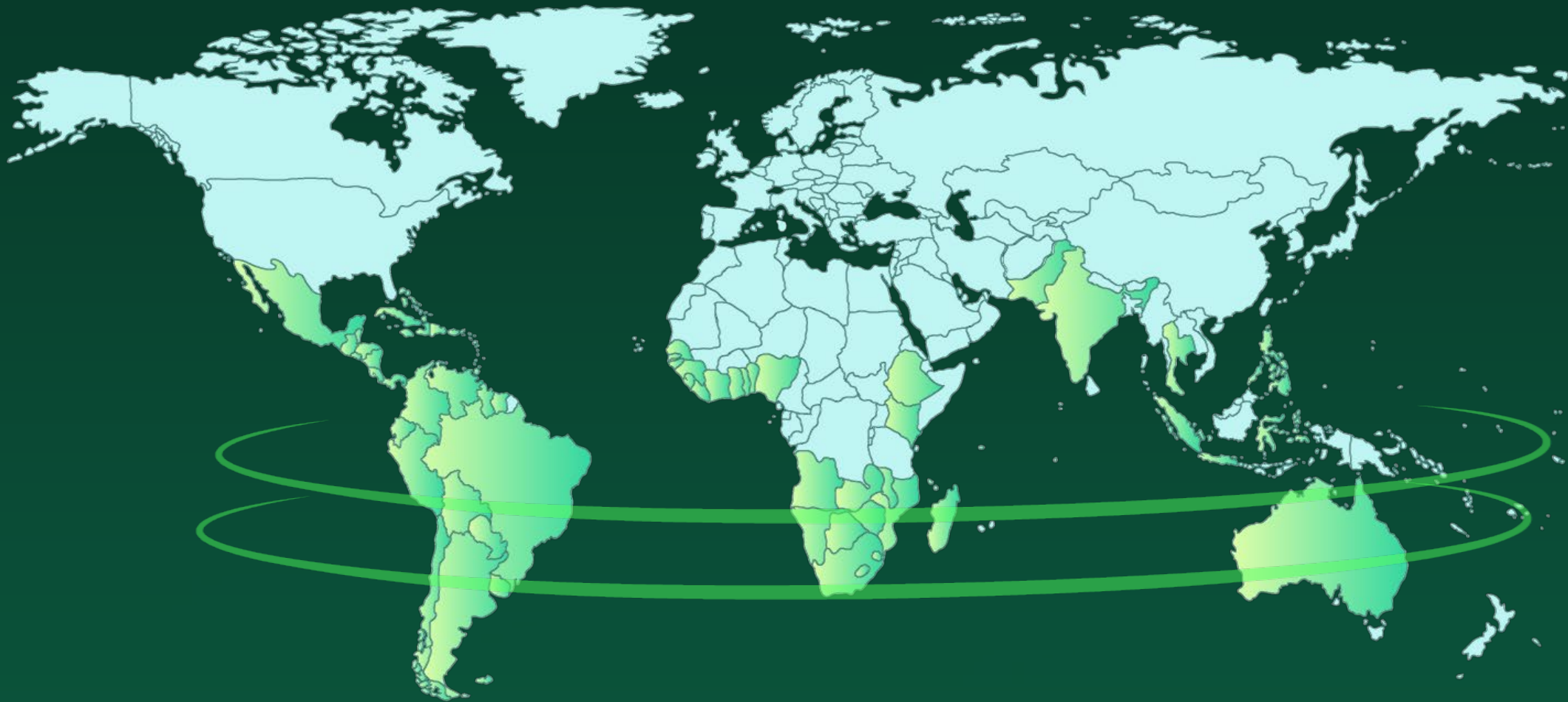


Source: MAPA e UNICA.

GEOGRAPHIC DIVERSIFICATION COMPLEMENTARITY (DIFFERENT HARVEST SEASONS)



Ethanol **green** belt



Mobility challenges

Biobunker

350 million tons by
2050 (IEA)
=
660 billion liters of
ethanol equivalent



SAF

450 billion liters by
2050 (IATA)
=
765 billion liters of
ethanol equivalent



BIOGAS BUS



BIOGAS BUS

Biomethane

150 billion m³ by 2050 (IEA)
=
250 billion liters of ethanol equivalent

POWER OF PUBLIC POLICIES: Current Regulatory and Policy Framework

- **FEDERAL TAX DIFFERENTIAL**

- **ETHANOL BLEND MANDATE IN GASOLINE INCREASED TO 30% (2025).**

- **NEW MANDATE FOR BIOMETHANE IN BRAZIL'S NATURAL GAS SECTOR (2026)**

- **NEW AUTOMOTIVE POLICY RECOGNIZES ETHANOL AS A LOW-CARBON FUEL (2025)**

- **RENOVABIO: 95% OF ETHANOL SUPPLY CERTIFIED**

- **NEW SAF MANDATE FOR DOMESTIC FLIGHTS (2027)**

MAIN CONCLUSIONS

- Decarbonization is one of the defining challenges of this century.
- Addressing transport is essential — on land, in the air (SAF), and at sea.
- Biofuels, including ethanol, are a proven and scalable part of the solution.
- Feedstock diversification and geographic dispersion enhance complementarity and provides greater supply security.
- Success depends on clear, stable, and long-term policies

An aerial photograph of a dense, lush green forest. A paved road with white lane markings runs diagonally through the trees. Two cars are visible on the road: one in the upper right and one in the lower left. The right side of the image is overlaid with a semi-transparent green shape that contains the text.

THANK YOU!

Eduardo Leao de Sousa

UNICA – Director of Strategic
Development and New Markets