



An aerial photograph of a vast, dense tropical rainforest. A winding river or stream flows through the center of the forest, creating a series of meanders and small islands of land. The forest is a deep green color, and the water is a dark blue-grey. The overall scene is a lush, natural landscape.

BRAZILIAN SCENARIO IN ENERGY TRANSITION



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BRAZIL'S ENERGY TRANSITION

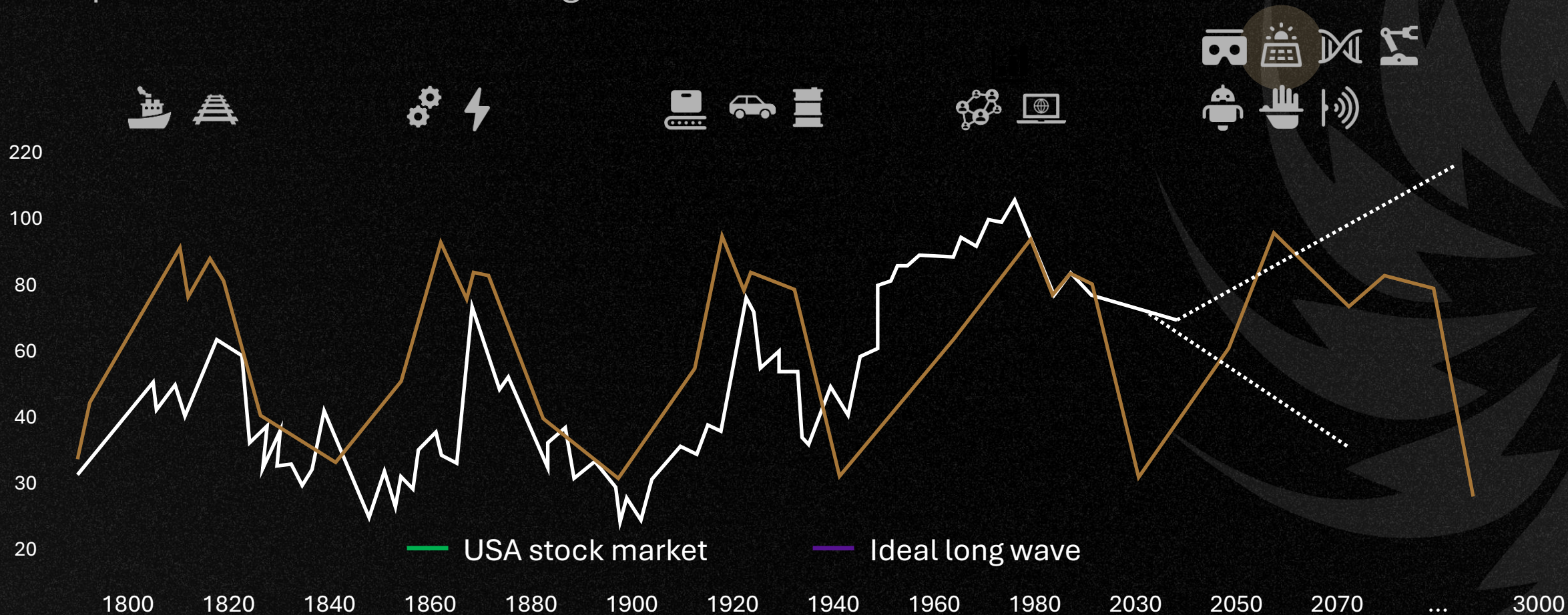
01

ECONOMIC SCENARIO

BRAZIL'S STRATEGIC POSITION WORLDWIDE

KONDRATIEFF CYCLES

Schumpeter-Freeman-Perez Paradigm



20 YEARS LATER



INTERNATIONAL GEOPOLITICS

TOO MANY POINTS OF BOILING

USA Election

46 countries will have elections in 2024 with possible change of president in the world's biggest economy.

Venezuela x Guiana

Territory dispute over land with oil and gas big reserves.

BRICS restructuring

In 2024 BRICS doubled its size with the accession of Egypt, Ethiopia, Saudi Arabia, United Arab Emirates and Iran.

Middle East Conflict

Risk of worsening and spreading the Israel X Hamas conflict.

OTAN restructuring

Accession of Finland in 2023 and Sweden in 2024.

Russia x Ukraine Conflict

The isolation of Russian economy by the West will probably be wideranging and long-lasting. The country is seeking new markets.

Chinese military exercises

Biden: USA will engage in military conflict in case China invades Taiwan.

North Korean nuclear missiles

North Korean government frequently engages in military power demonstration

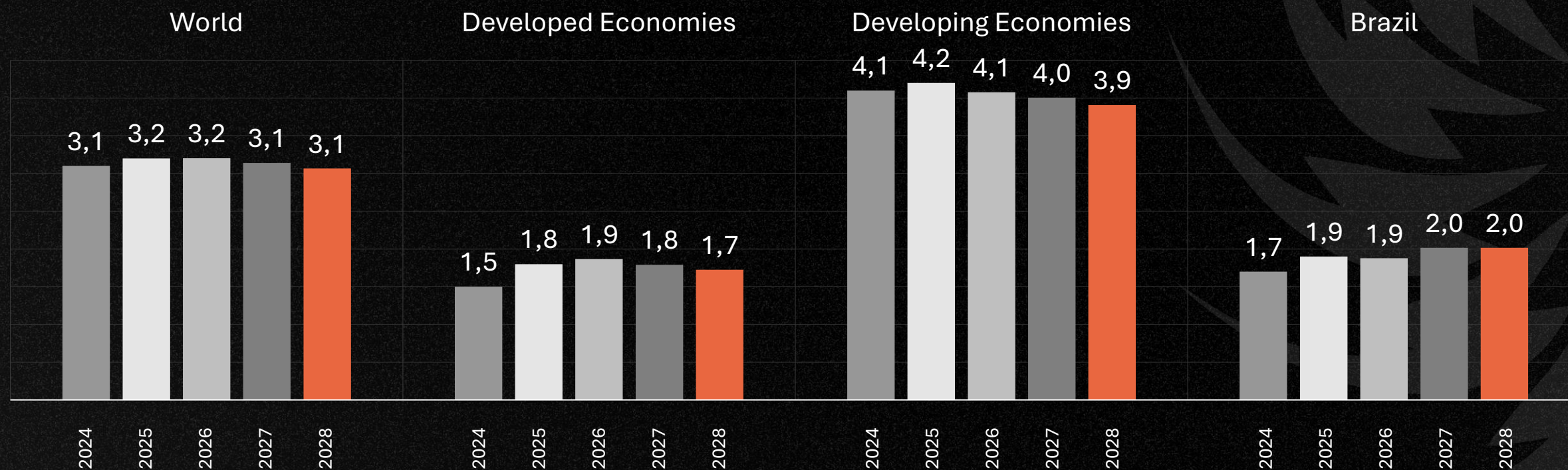
Japan's recession

Japan lost its 3rd position as the world's largest economy to Germany.

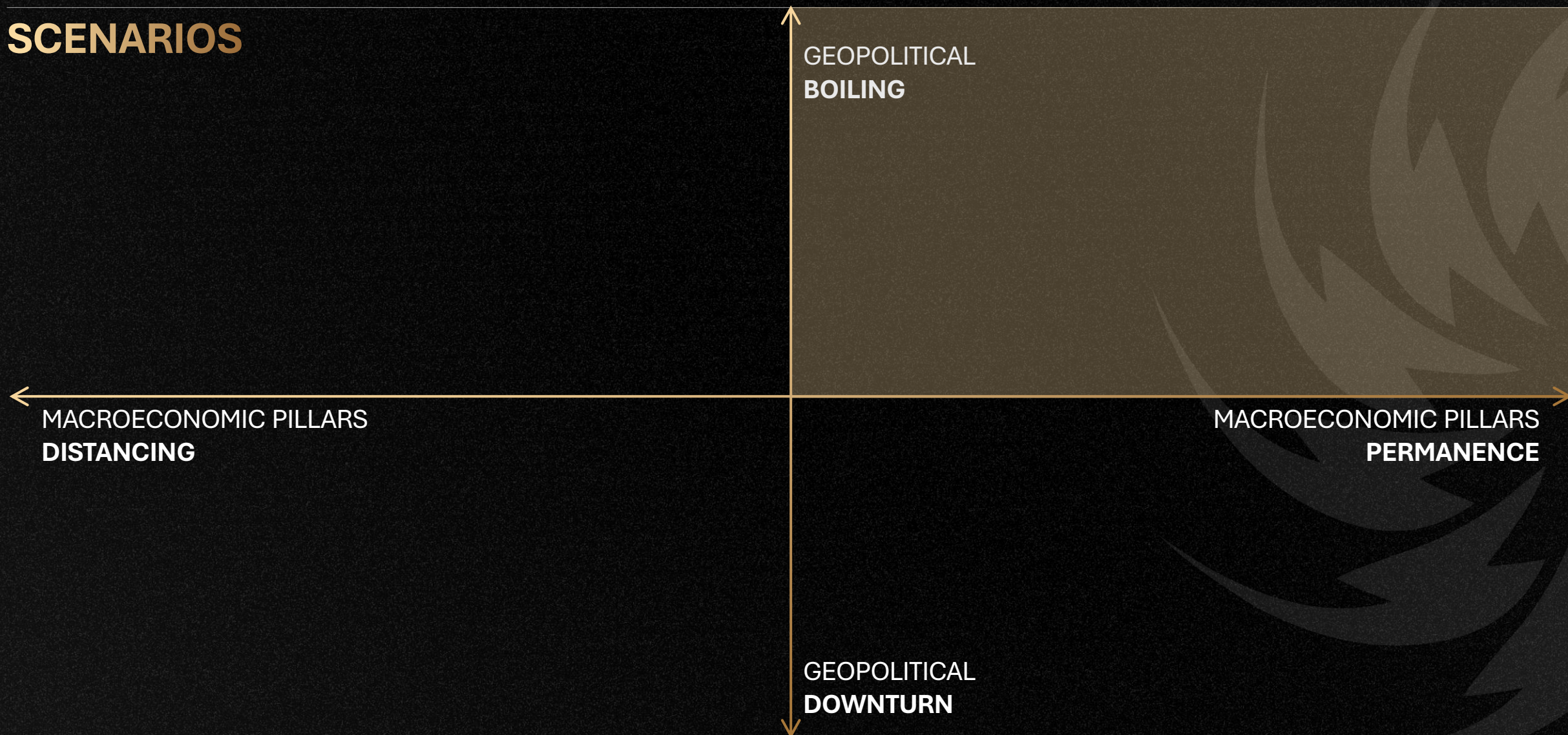
WORLD GROWTH

a) The world grows less, and so does Brazil.

b) International investors turn to Brazil as an option to East European countries.



SCENARIOS

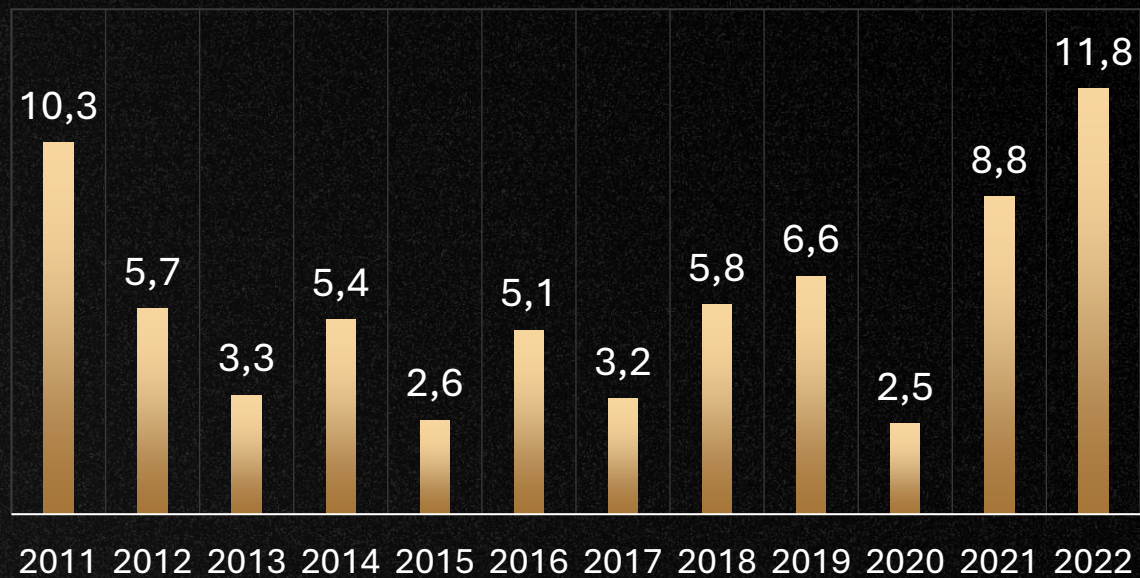


FOREIGN INVESTMENT

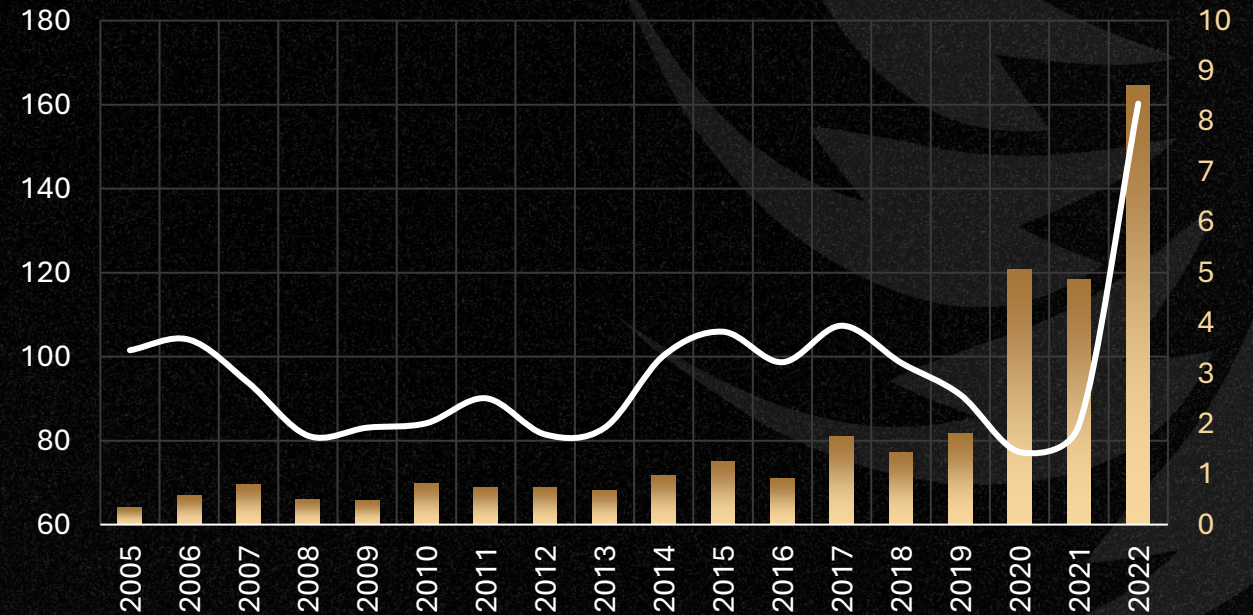
FDI's 3rd top destination among G20 economies

Attraction: political and economic stability, energy transition lower cost and microeconomic reforms

Foreign Direct Investment (FDI)
US\$ Billions



Geopolitical Strain Ranking (Line) & Reshoring Attraction (Bar)



BRAZIL'S ENERGY TRANSITION

CLEAN ENERGY POTENTIAL AND FUNDING FOR ECONOMIC TRANSITION

BRAZIL IS AN ENERGY SUPERPOWER COUNTRY



**CRUDE OIL TOP
PRODUCER**

**3.4 million
barrels per day**



**AUTOMOTIVE FUEL TOP
CONSUMER MARKET**

**2.1 million
barrels per day**



**LIQUID BIOFUELS TOP
PRODUCER**

**409 thousand
barrels per day**

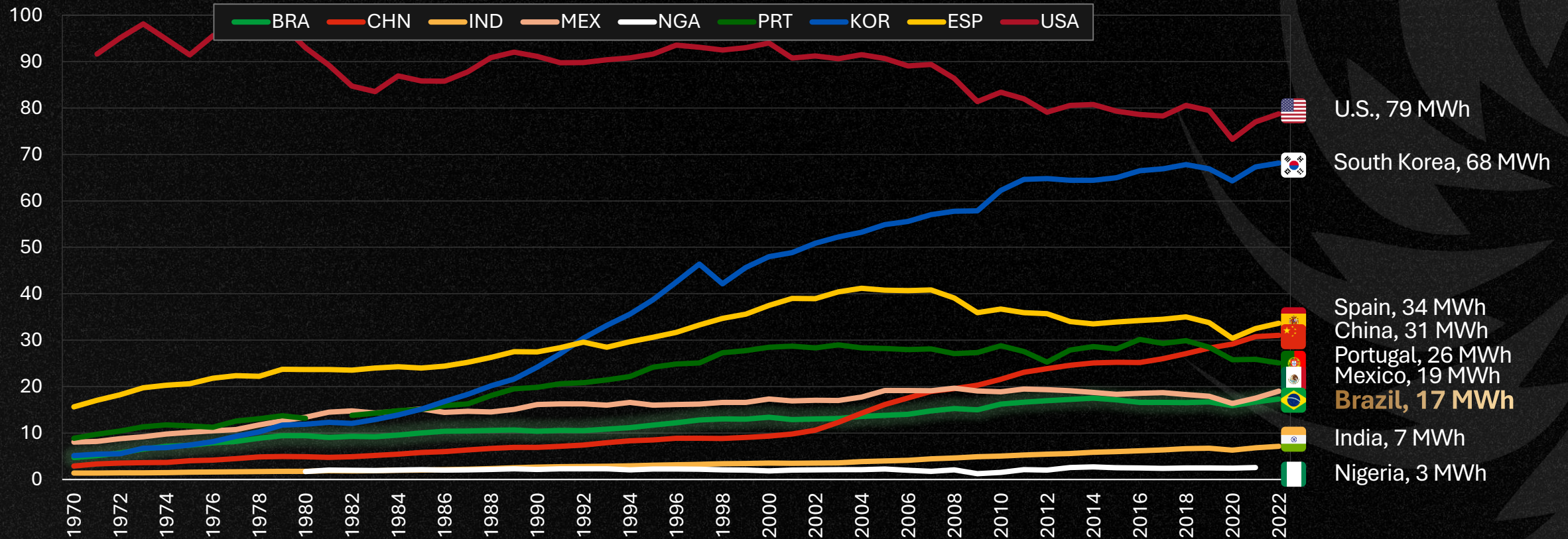


**ELECTRIC POWER TOP
PRODUCER**

690 TWh

BRAZIL'S ENERGY CONSUMPTION PER CAPITA WILL HAVE TO GROW TO ACHIEVE SOCIOECONOMIC NEEDS

ENERGY CONSUMPTION PER CAPITA Megawatt hour (MWh)



HOW TO MEET THIS GROWING DEMAND IN AN
ACCESSIBLE, SAFE AND **CLEAN** WAY IN A
CONTEXT OF RESTRICTIONS ON LOCAL AND GLOBAL
EMISSIONS?

BRAZIL AS A BIG HUB OF CLEAN ENERGY IN THE WORLD

ENERGY TRANSITION

Brazil is way ahead of the world. Transition cost will probably be lower.



Brazil's energy mix consists of
47%
of renewables



Global energy mix consists of
14%
of renewables

HYDROPOWER



2nd in the World

BIOENERGY



1st in Sugarcane Ethanol
3rd in Biodiesel
High potential for biogas
production

WIND



7th in the World

SOLAR

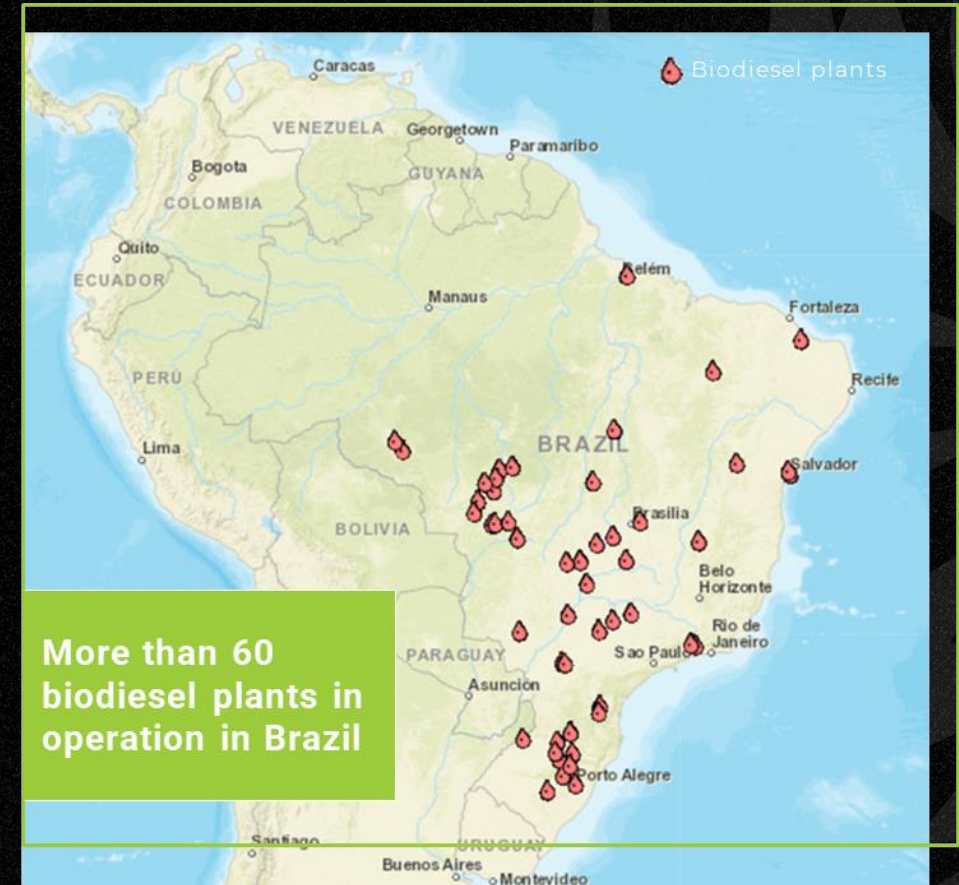
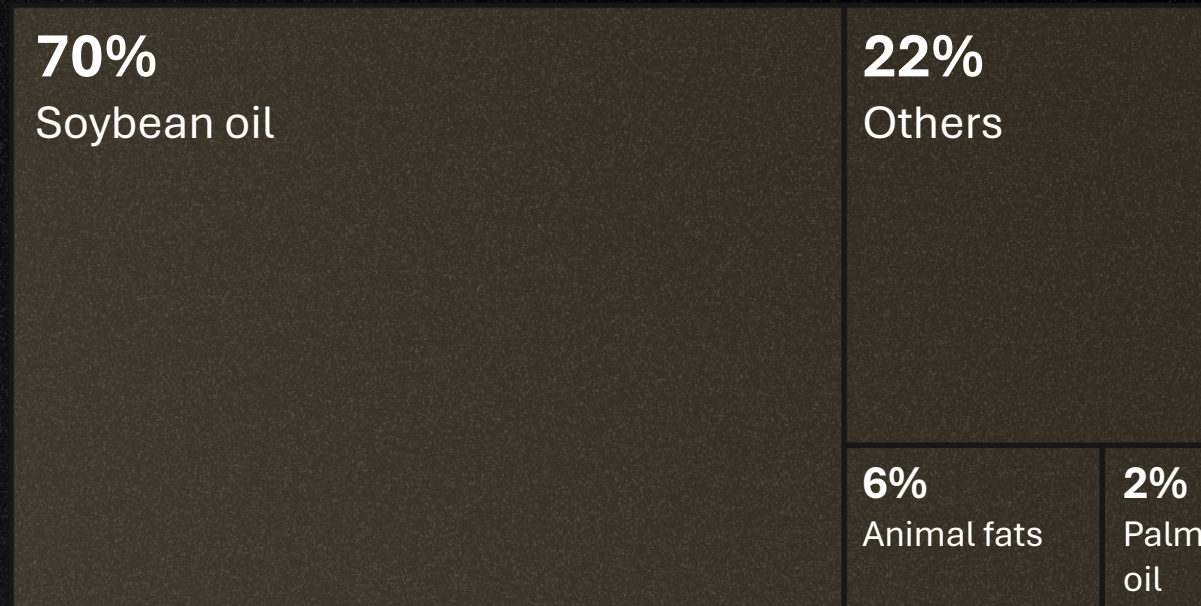


13% of current
power mix

BIOFUEL

Brazil is the 3rd largest biodiesel producer in the world, behind U.S. and Indonesia

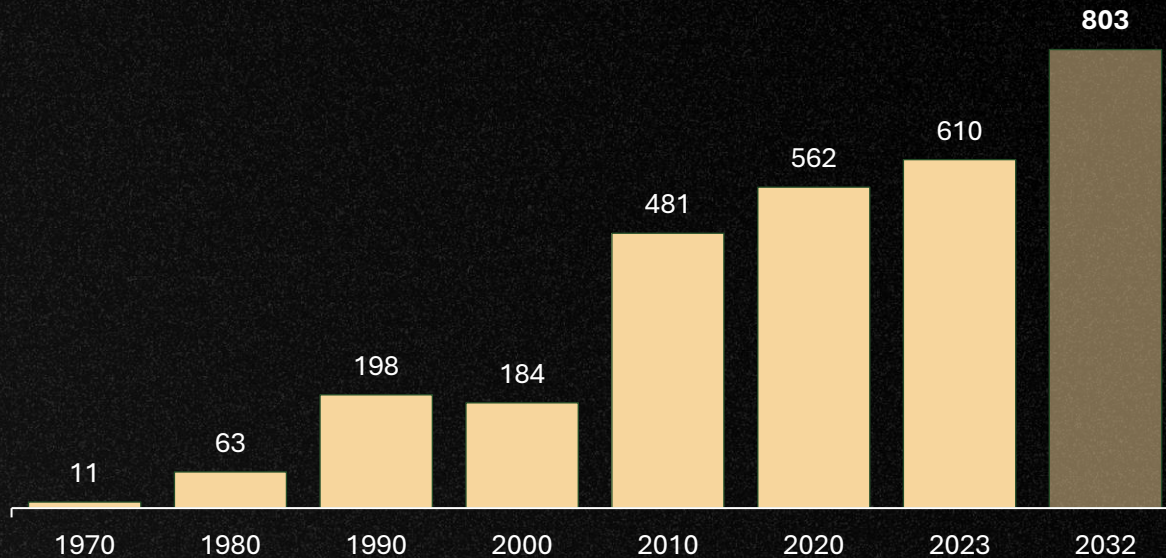
Brazil's biodiesel production in 2023 by feedstock (%)



BIOFUEL

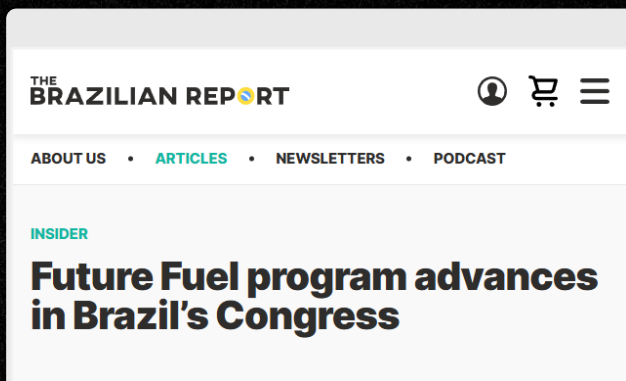
Brazil is the 2nd largest ethanol producer in the world, behind the U.S., being the largest in sugarcane ethanol

Brazil's ethanol production
(thousand barrels per day)



BIOFUEL

Brazil launched 'Fuel of the Future' program in September 2023



Key initiatives

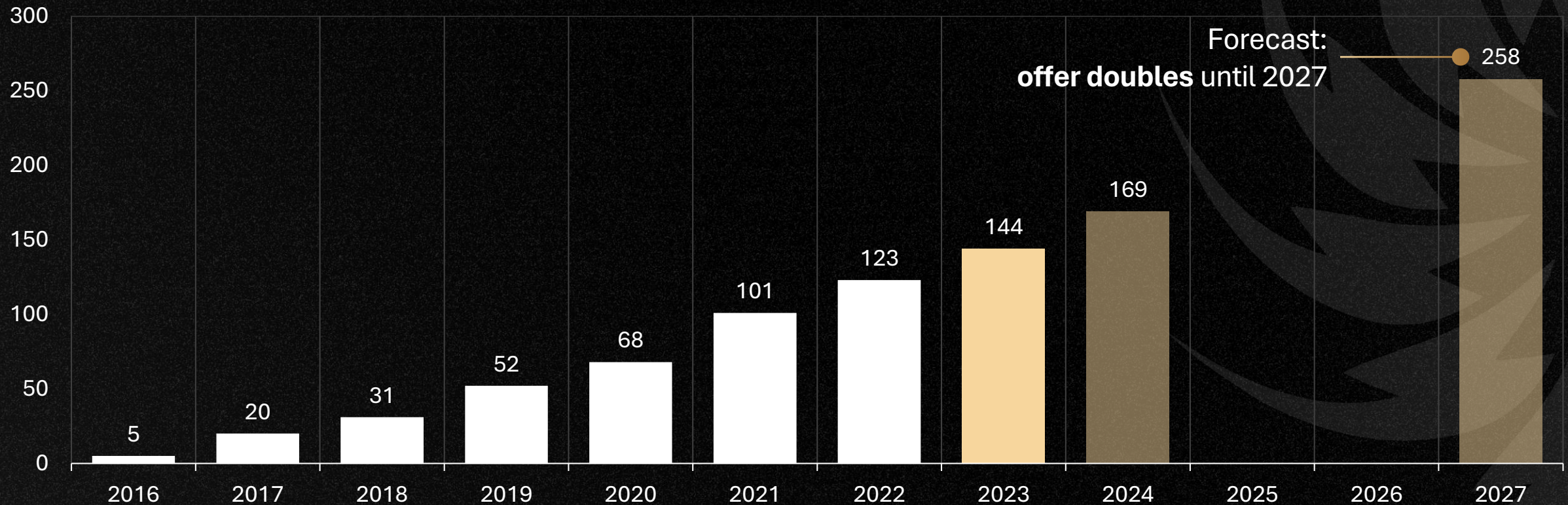
01	02	03	04	05	06
Integrates mobility and biofuel policy initiatives	Establishes the National Program for Sustainable Aviation Fuel (SAF)	Establishes the National Program for Renewable Diesel	Regulates carbon capture and storage (CCS)	Regulates synthetic fuels (e-fuels)	Raises ethanol blending mandate in gasoline from 27% to 30%

NATURAL GAS AS FUEL FOR ENERGY TRANSITION

NATURAL GAS PRODUCTION IN THE USA

Structural changes demand time (sometimes years)

MMT/Year

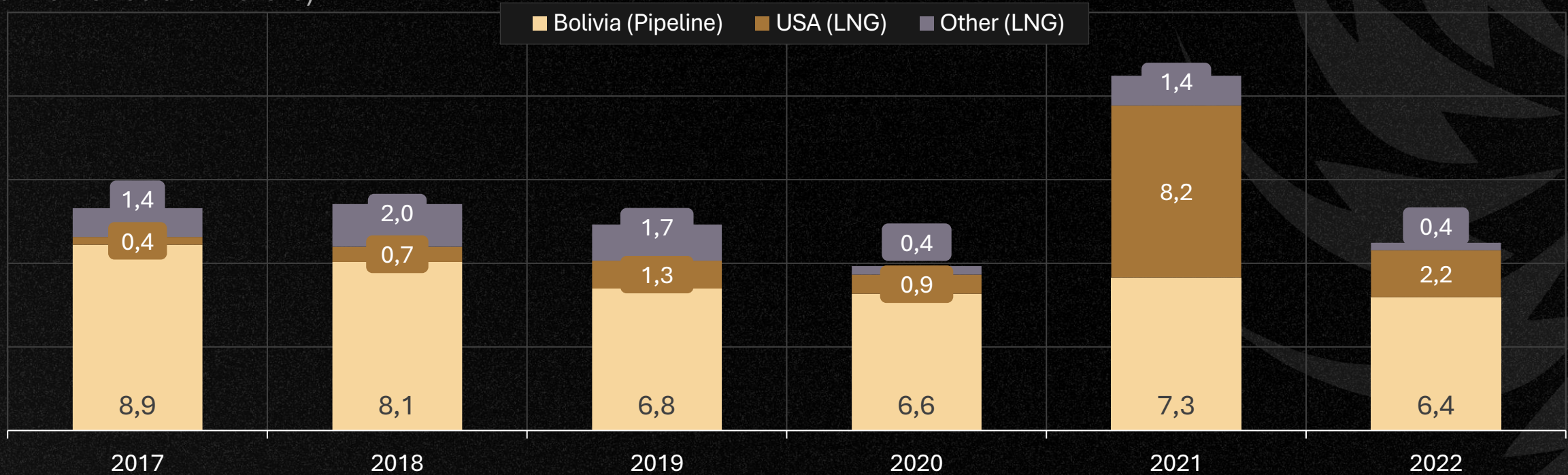


NATURAL GAS

BRAZIL REGULARLY IMPORTS NATURAL GAS VIA BOLIVIA PIPELINES AND LNG TERMINALS

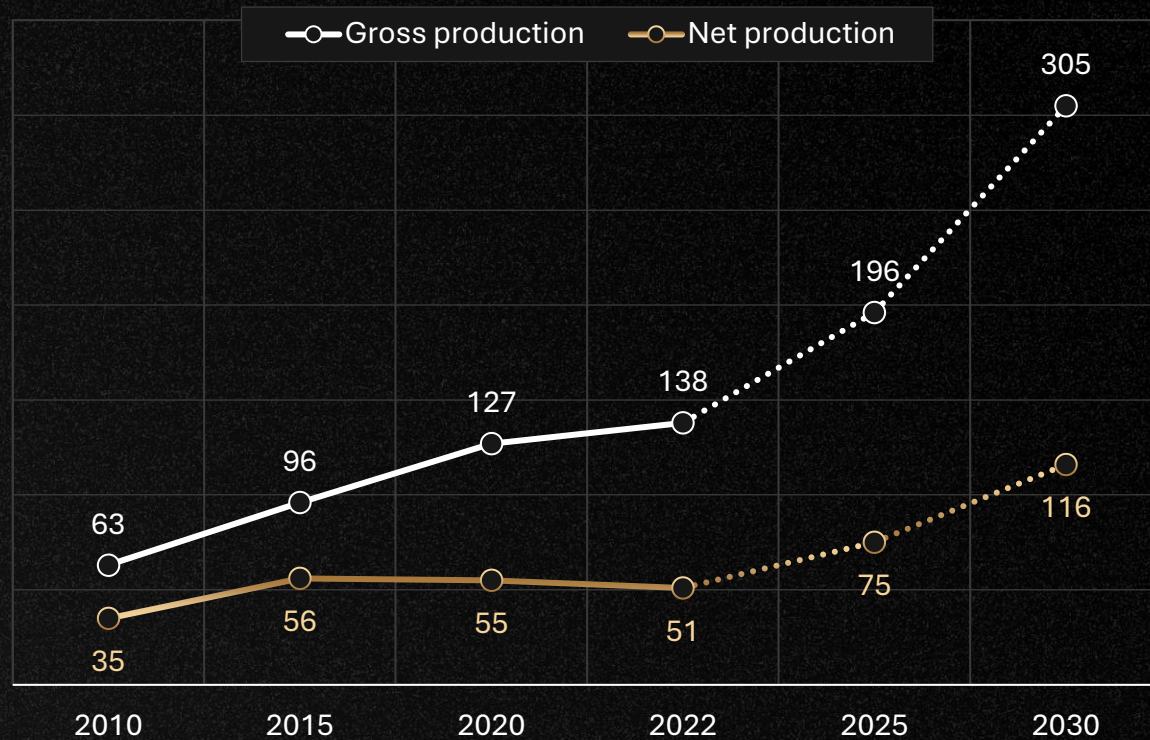
BRAZILIAN IMPORT OF NATURAL GAS BY ORIGIN

(billion of cubic meters)



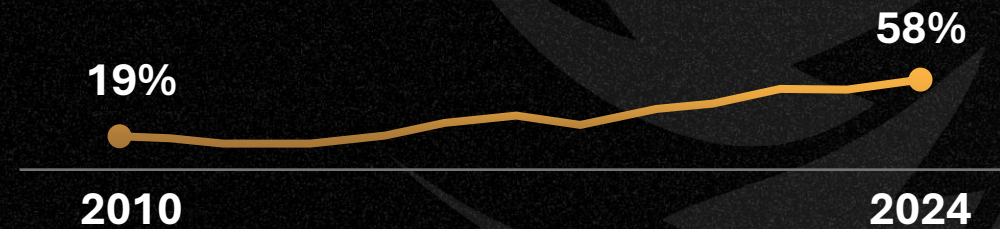
REINJECTION INCREASE HAS LIMITED LIQUID NATURAL GAS PRODUCTION GROWTH

MILLIONS OF CUBIC METERS PER DAY



It's a big challenge for Brazil to make good use of gas in the face of significant increase in reinjection over the last years

Percentage of natural gas production that is reinjected



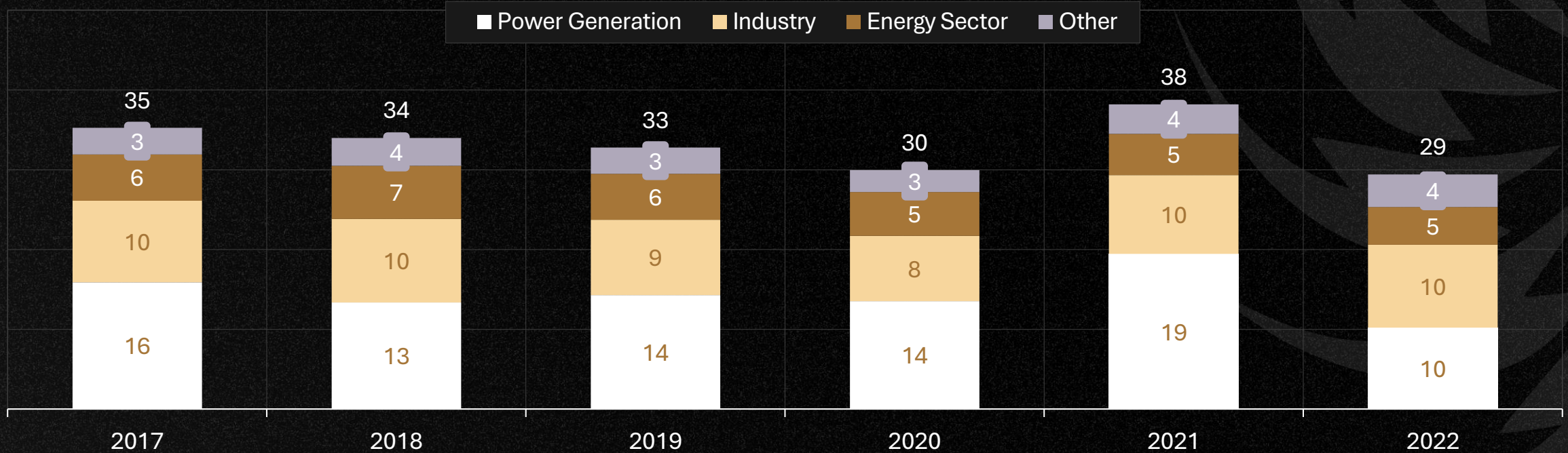
i The State of Rio de Janeiro is responsible for 69% of the natural gas domestic production

NATURAL GAS

DOMESTIC DEMAND STRONGLY RELATED TO THERMOELECTRIC POWER GENERATION; THERE IS A LOT OF ROOM IN THE INDUSTRY

DEMAND FOR NATURAL GAS BY DESTINY
(billion of cubic meters)

i Brazil is the 29th natural gas market in the world.



NATURAL GAS

OPPORTUNITIES

01

Monetization of Brazilian pre-salt

02

Industrial energy matrix cleaning

03

**Flexibility and less carbon in the
Brazilian electric system**

04

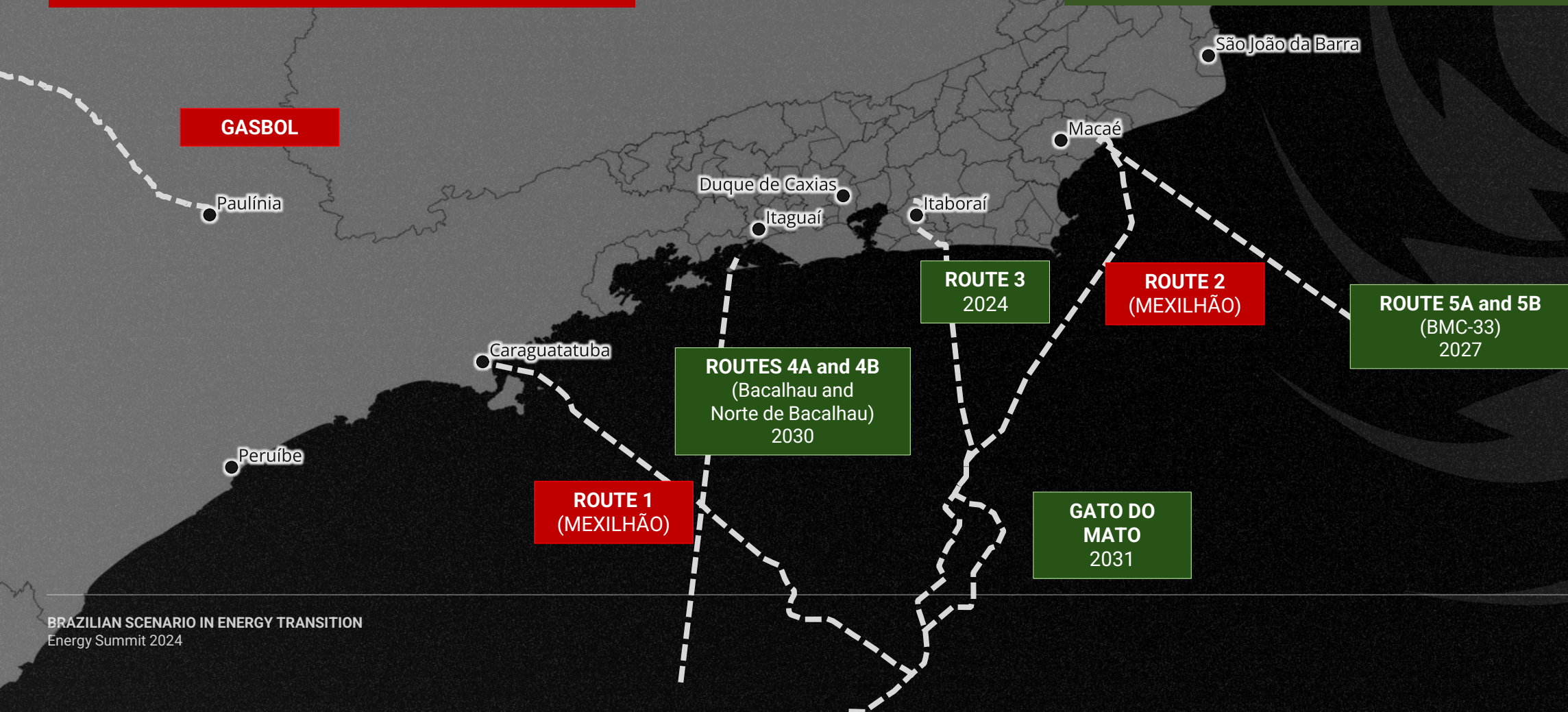
Development interiorization

NATURAL GAS PIPELINE

Opportunity: to be the energy solution for Brazil

SOUTHEAST OFFER RISK

HUGE POTENTIAL TO BE EXPLORED

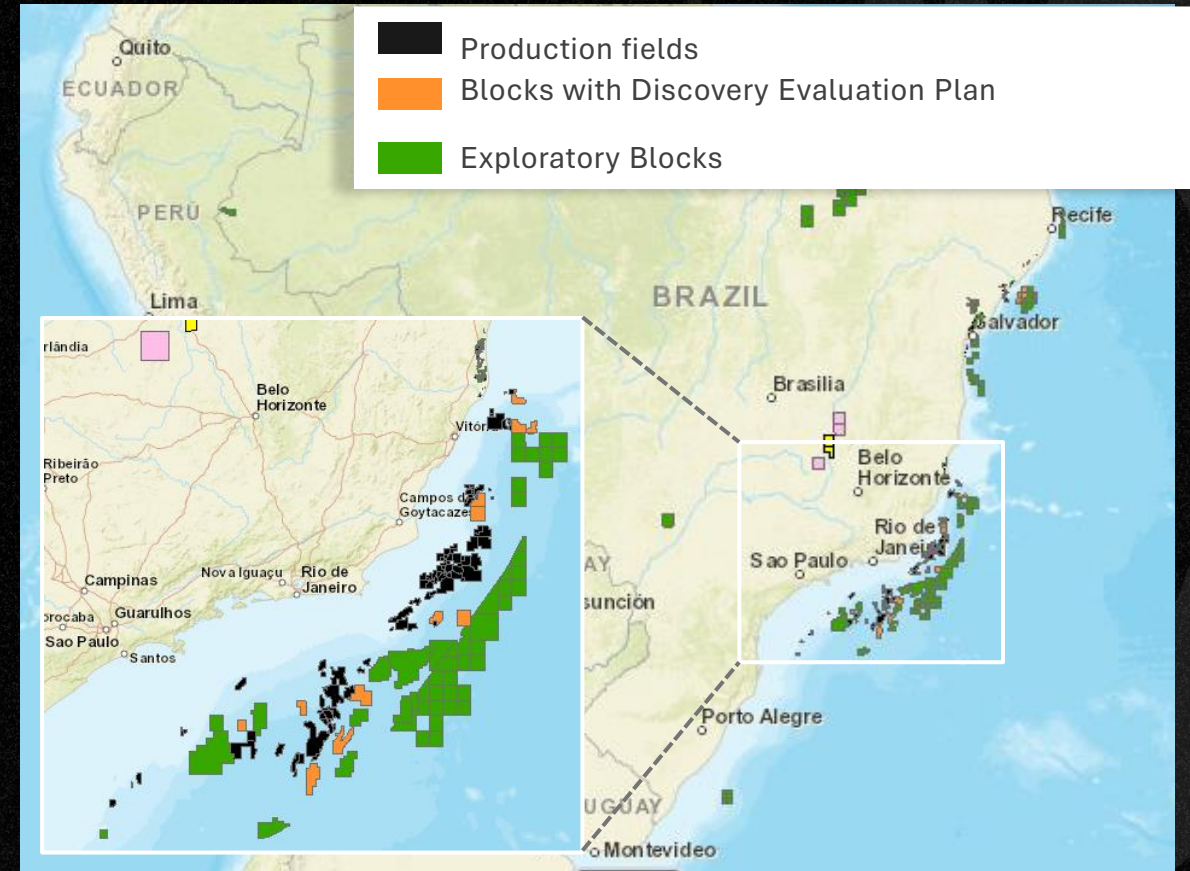
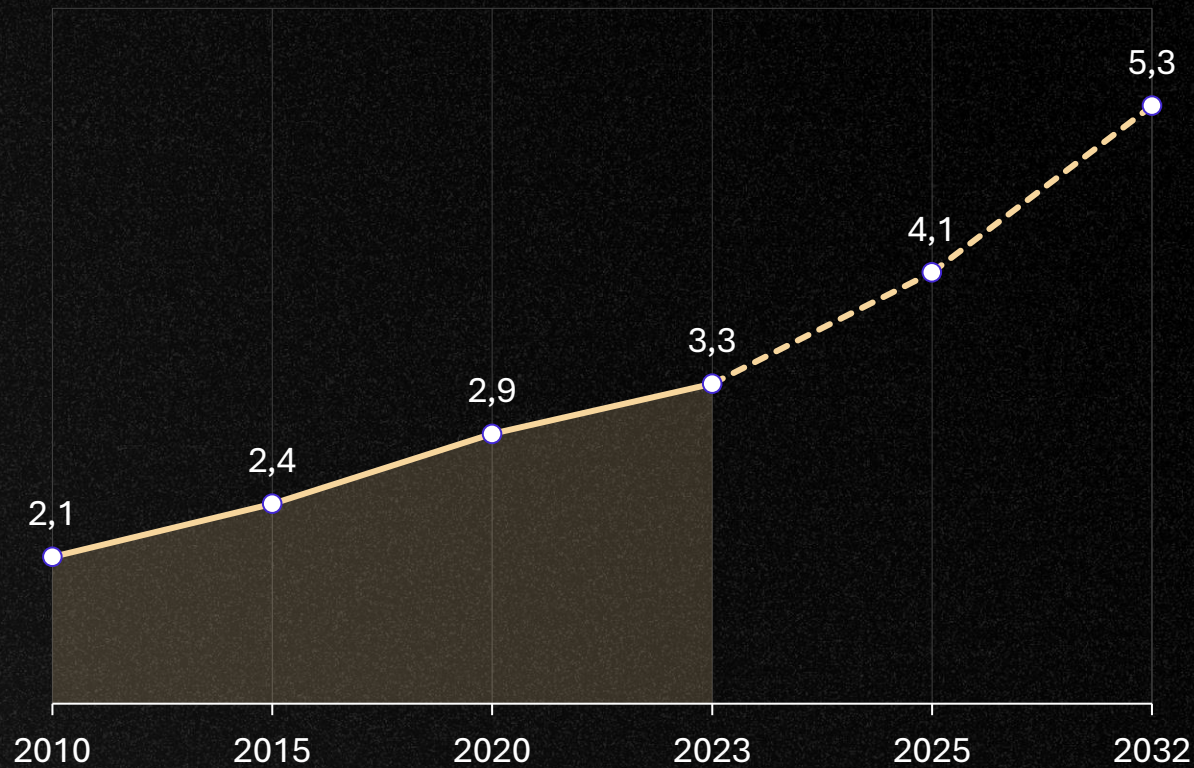


OIL AS FUNDING FOR ECONOMIC TRANSITION

OIL

PRODUCTION WILL INCREASE IN ALMOST 80% UNTIL 2032

BRAZILIAN OIL PRODUCTION
(million of barrels per day, 2010-2032)



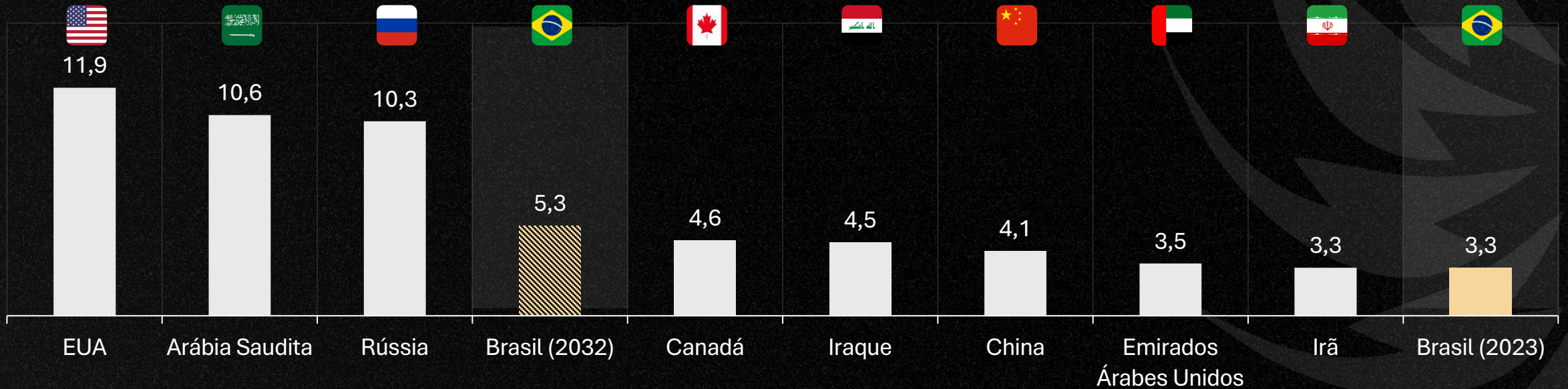
OIL

BRAZIL WILL BE ONE OF THE 5 BIGGEST PRODUCERS AND EXPORTERS OF OIL IN THE WORLD

OIL PRODUCTION

(million of barrels/day, 2023, and Brazil 2032)

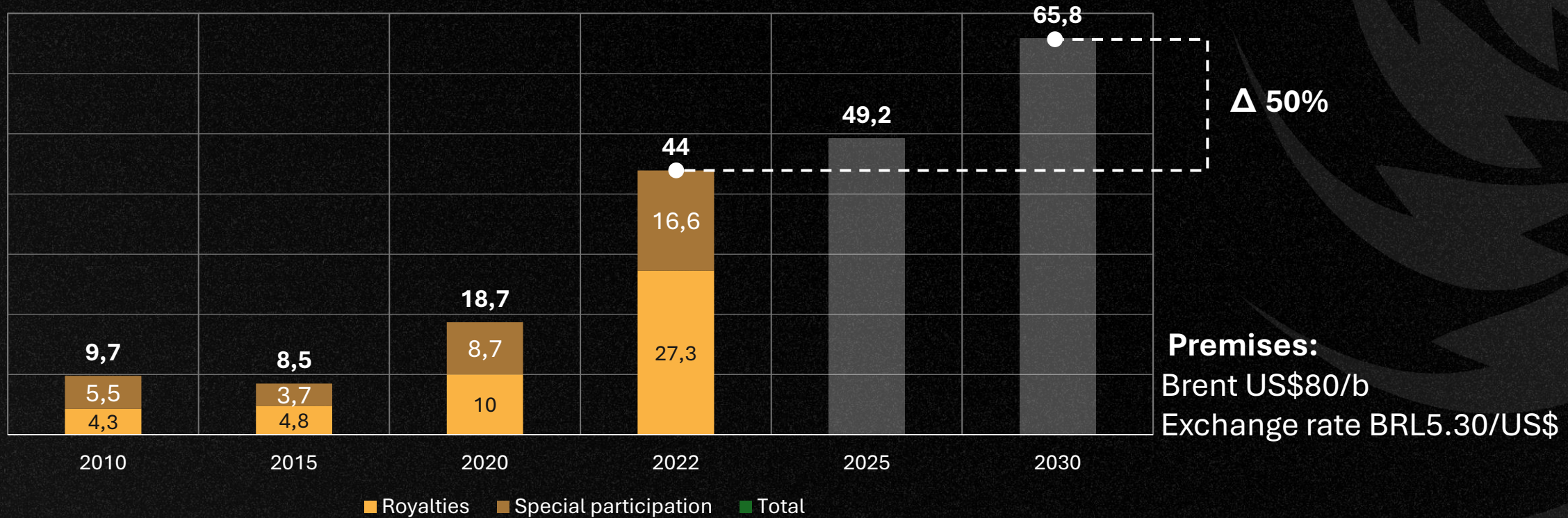
“Margem Equatorial” in North and Northeast is the new Pre-salt.



OIL

ROYALTIES NEED TO BE THE FUNDING FOR ECONOMIC TRANSITION

ROYALTY REVENUE AND SPECIAL PARTICIPATION FROM STATE AND MUNICIPALITIES OF RIO DE JANEIRO
(billion of BRL)



OIL

THERE ARE ONLY 18 OIL REFINERIES IN OPERATION IN BRAZIL, MOST OF THEM LOCATED NEAR THE COAST AND CLOSE TO MAJOR URBAN AREAS



8 OIL REFINING COMPANIES



PETROBRAS

acelen

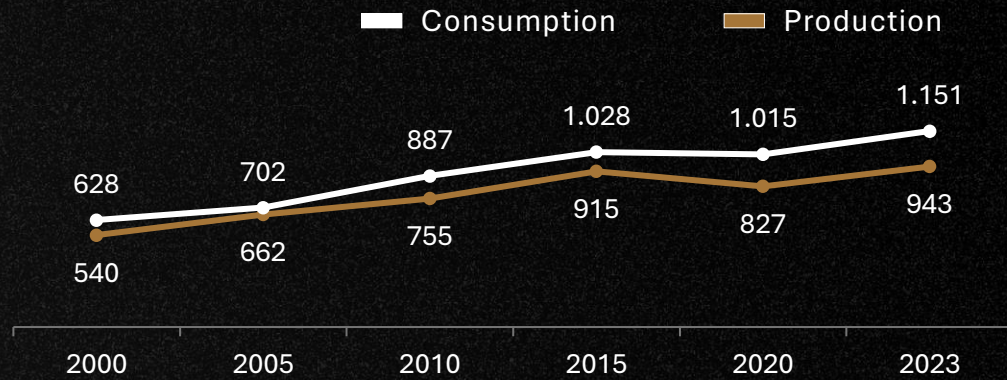


OIL

BRAZIL DEPENDS ON DIESEL E GASOLINE IMPORT

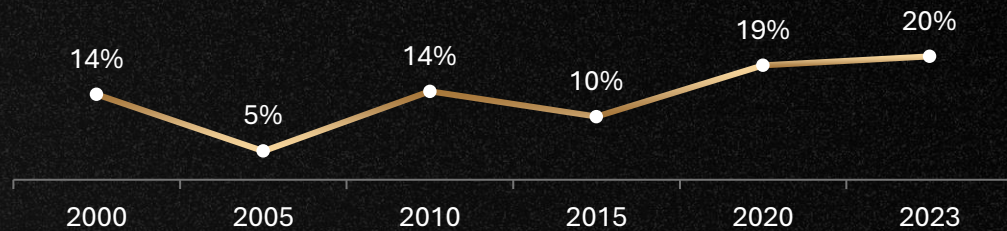
BRAZILIAN PRODUCTION AND CONSUMPTION OF DIESEL

(thousand barrels per day)



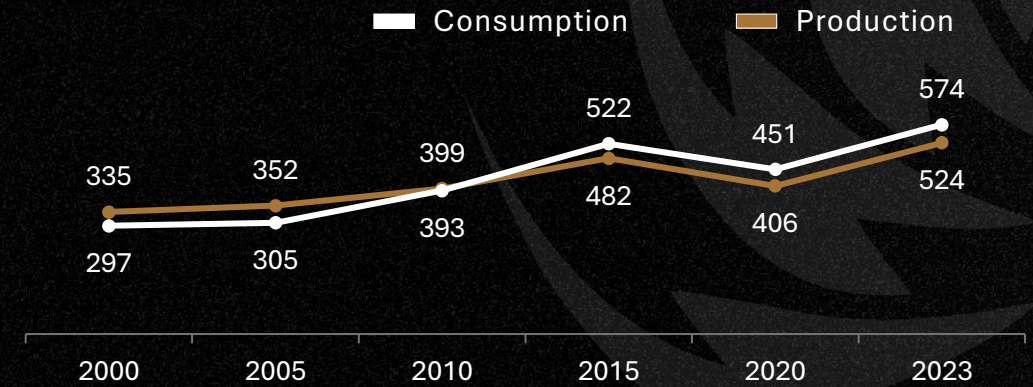
BRAZIL'S DIESEL IMPORT DEPENDENCE

(% of net imports in total consumption)



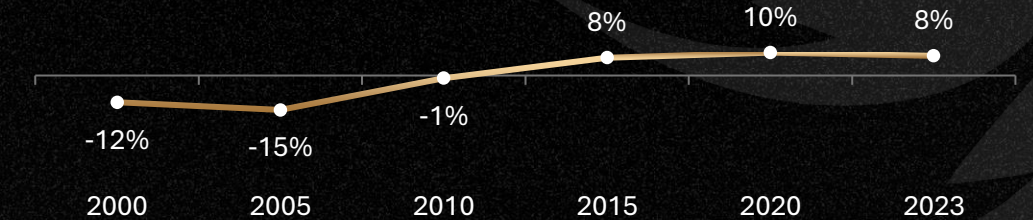
BRAZILIAN PRODUCTION AND CONSUMPTION OF GASOLINE

(thousand barrels per day)



BRAZIL'S GASOLINE IMPORT DEPENDENCE

(% of net imports in total consumption)



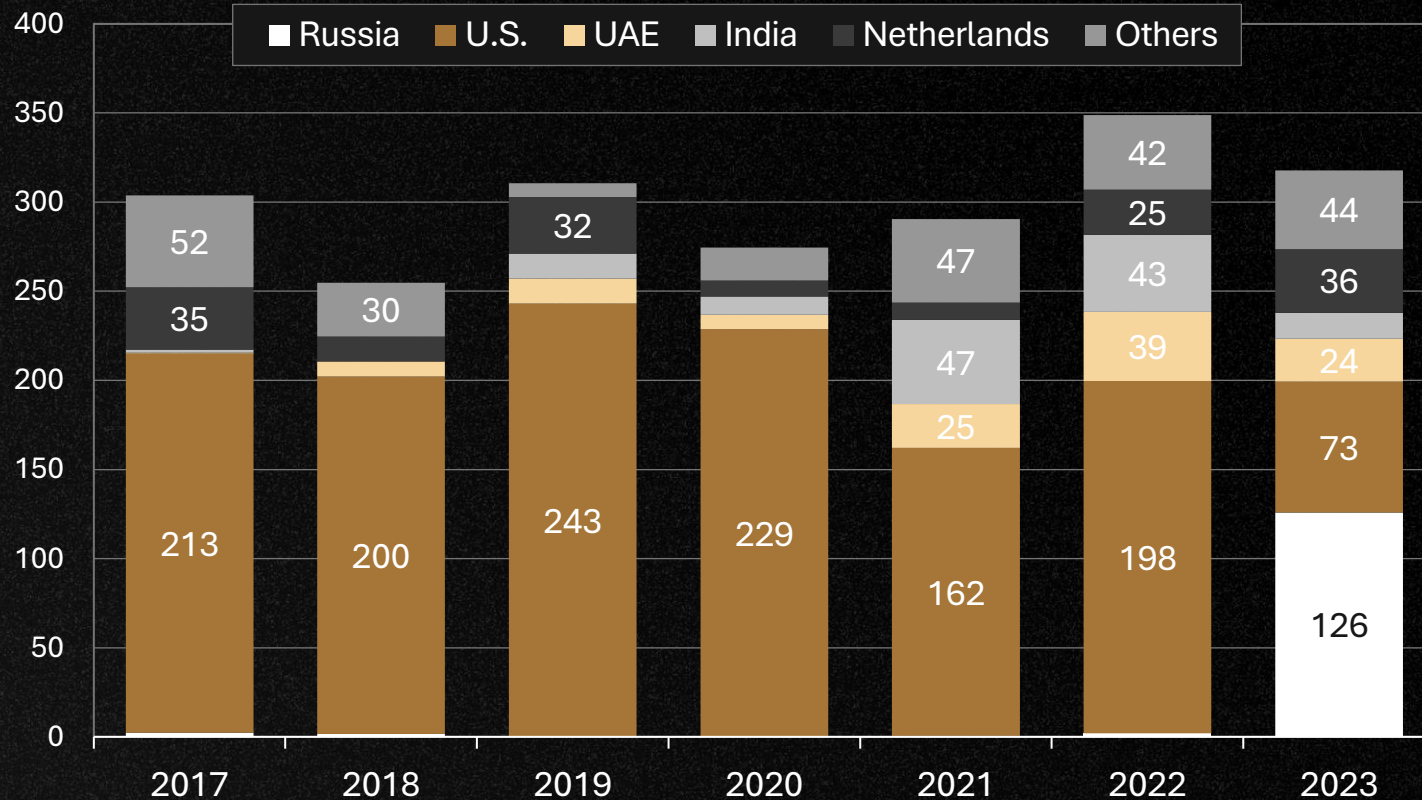
OIL

IN 2023, RUSSIA OVERTOOK U.S. IN BRAZIL'S DIESEL IMPORTS

BRAZIL'S DIESEL AND GASOLINE IMPORTS BY ORIGIN

(thousand barrels per day)

53% from Russia



SÃO LUIS PORT IN BRAZIL'S NORTHEAST REGION,
LARGEST DIESEL AND GASOLINE IMPORT PORT



FINAL REMARKS

01

Brazil is **an energy superpower**, rich in **natural resources**, with a low-carbon energy mix, allowing a wide range of **alternatives for its energy transition strategy**.

02

Brazil is a **global protagonist in biofuels**, in which industry plays an important role in the **country's decarbonization pathway**.

03

Brazil has a growing and **competitive O&G industry** that will **require large investments** over the next decades.



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