7th International Workshop on Offshore Geologic CO2 Storage

Petrobras' CCUS PROJECTS IN THE OFFSHORE SCENARIO, BRAZIL

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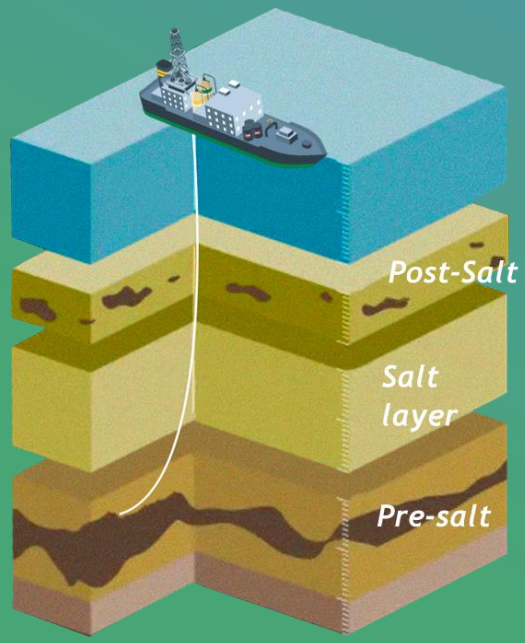
PRE-SALT - STRATEGIC ASSET IN THE ENERGY TRANSITION

The place where CCUS journey took off for Petrobras

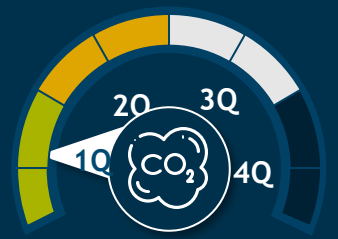
CARBON CAPTURE, UTILIZATION AND STORAGE



2,17 million boe/day - 78% of Petrobras production

High GOR (250 sm3/m3)

High CO2 content (20%)



Production emissions
on Pre-Salt Fields
First Quartile in O&G Offshore Industry

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A LONG TECHNOLOGICAL JOURNEY IN ULTRA-DEEP WATERS

Pioneering technologies for CCUS-EOR in Brazil's pre-salt reservoirs

Pre-Salt: Challenges and Opportunities

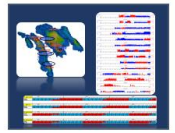
The implemented solution involves separating CO_2 from natural gas, compressing the CO_2-rich stream, and reinjecting it back into the reservoir associated with the EOR.

2015

Distinguished Achievement Awards for Companies, Organizations, and Institutions

First CO2 Separation from Associated Natural Gas in Ultra-deepwater with CO2 Re-injection

Deepest Offshore Well - 2,173 m Water Depth Injecting Gas with CO2



First water alternating gas management (WAG) in ultra-deepwaters

2008

CO2 CAPTURE, UTILIZATION AND STORAGE (CCUS)

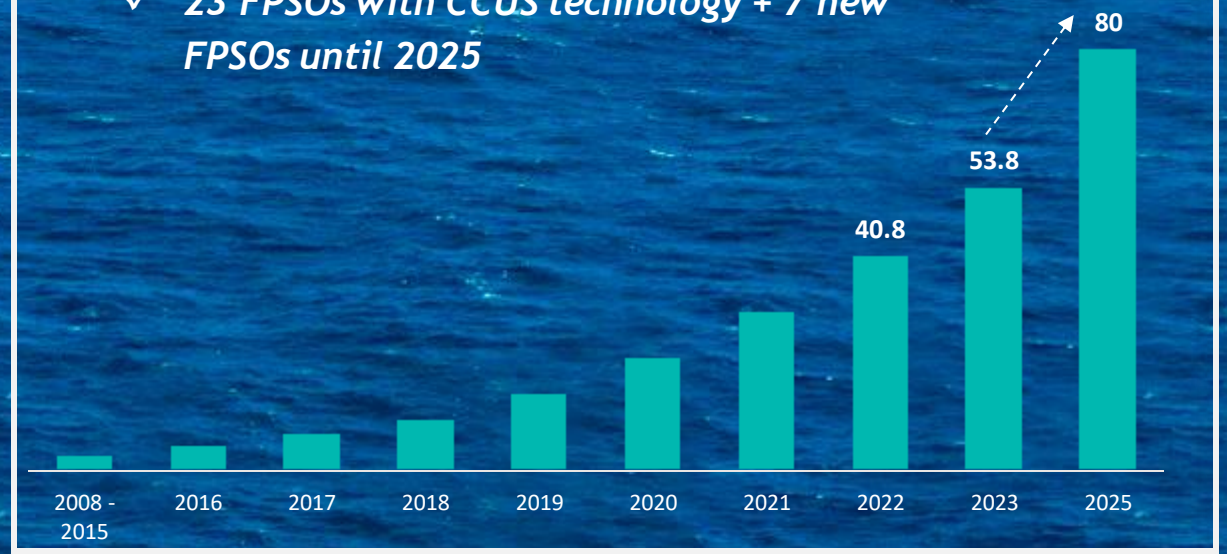
PRE SALT: PIONEER AND LARGEST CCUS PROJECT IN THE WORLD

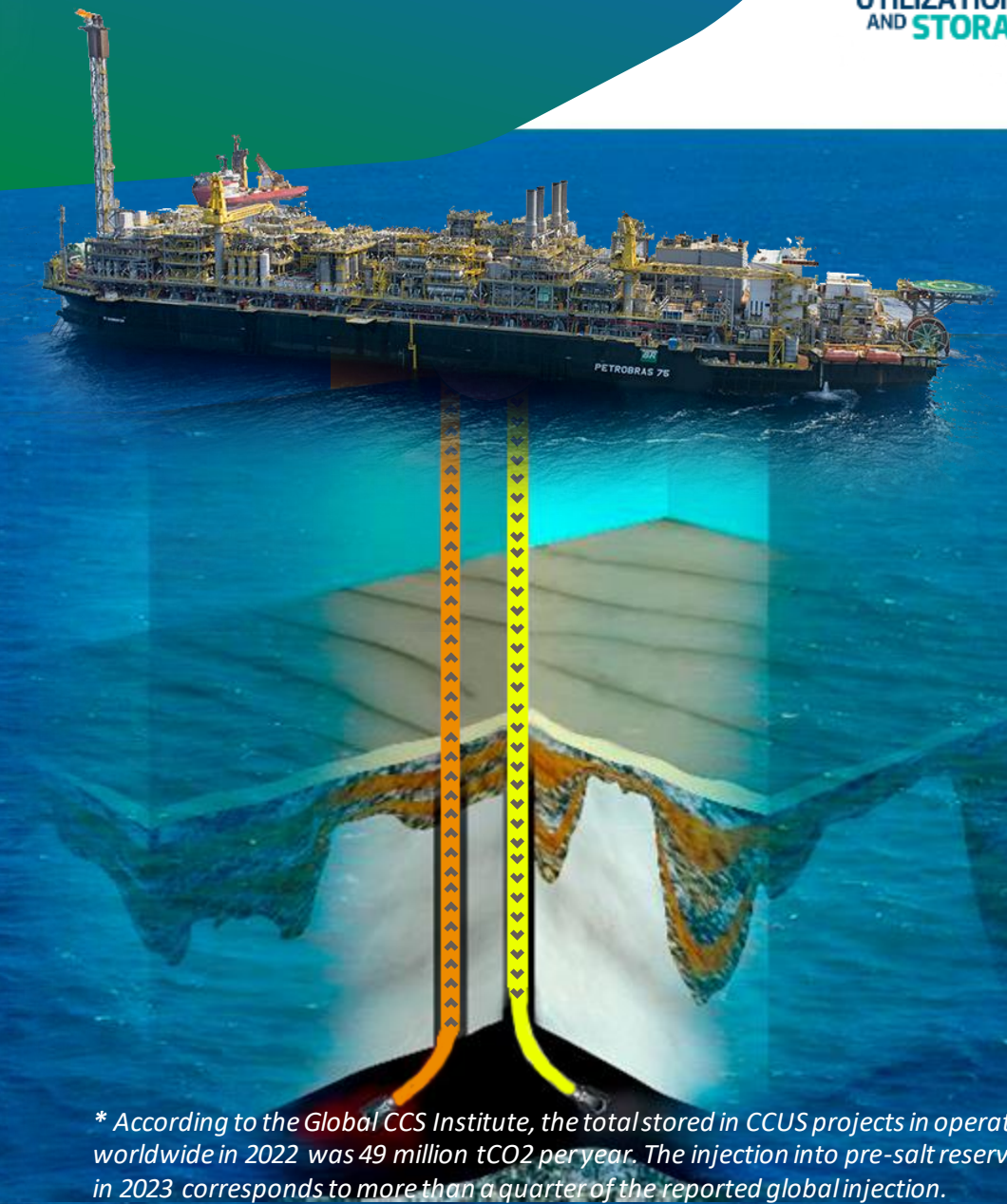
CARBON CAPTURE, UTILIZATION AND STORAGE

- ✓ *2023: 13 million tons of reinjected CO2 in 2023*
- ✓ *> 25% of the world's CO2 injection**

ACCUMULATED CO_2 REINJECTION (Million ton CO2)

- ✓ *23 FPSOs with CCUS technology + 7 new FPSOs until 2025*





** According to the Global CCS Institute, the total stored in CCUS projects in operation worldwide in 2022 was 49 million tCO2 per year. The injection into pre-salt reservoirs in 2023 corresponds to more than a quarter of the reported global injection.*

What's Coming Next?

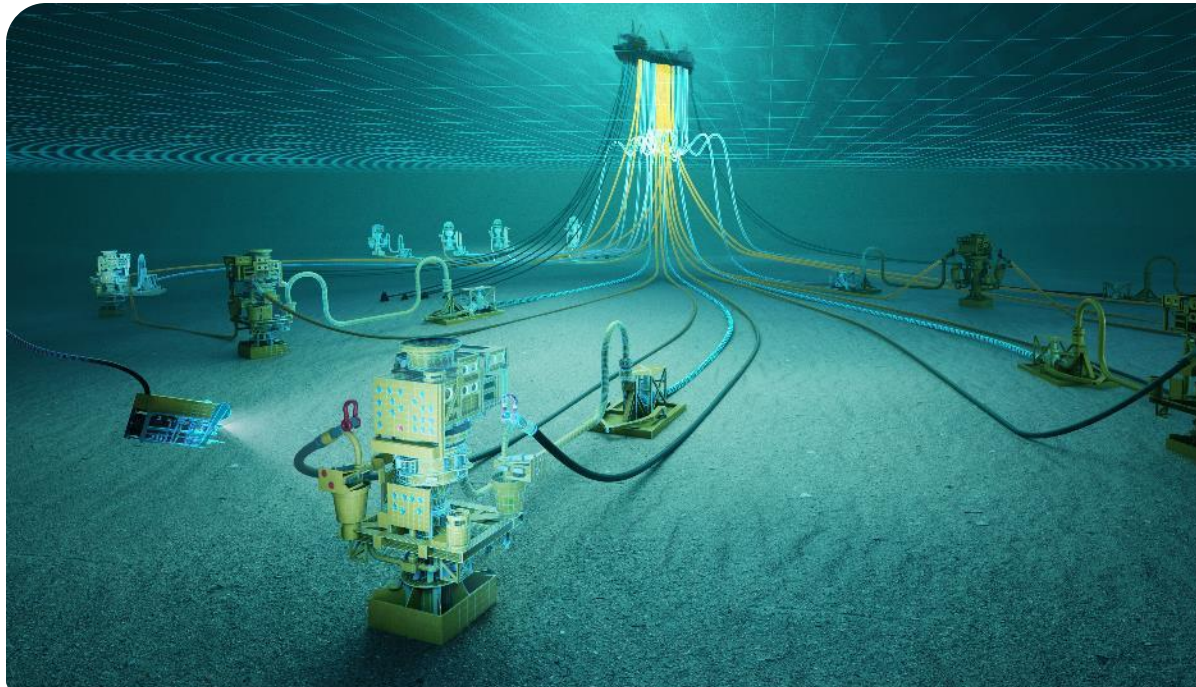
Engineering, Technology and Innovation to Increase Effiency

TOPSIDE

- *New materials for membranes*

SUBMARINE SYSTEMS

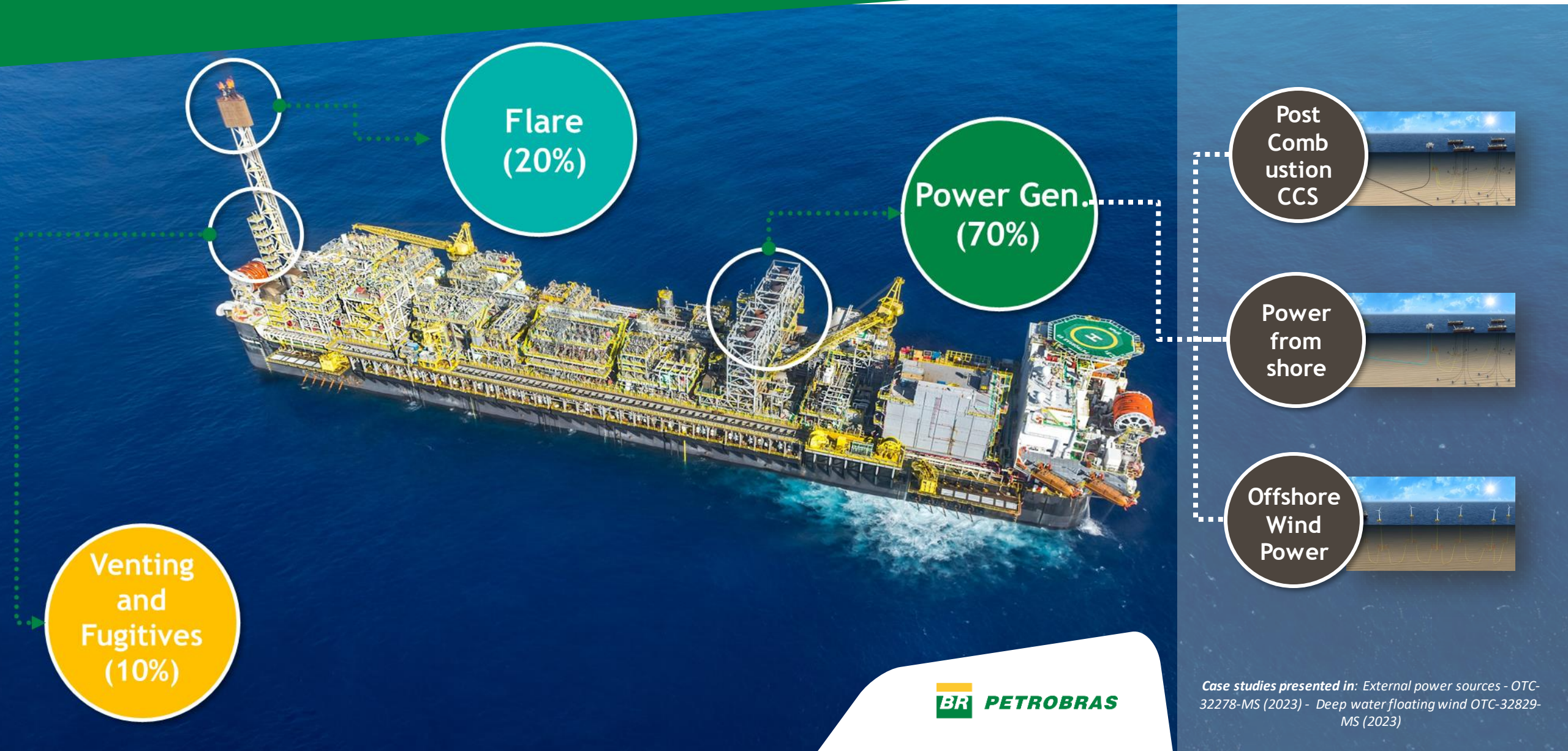
- ***HISEP™**, separation and reinjection of CO2-rich associated gas on the seabed*



Typical Offshore GHG Sources

Post-combustion CCUS as an alternative to offshore decarbonization

CARBON CAPTURE, UTILIZATION AND STORAGE



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Case studies presented in: *External power sources - OTC-32278-MS (2023) - Deep water floating wind OTC-32829-MS (2023)*

DRIVING CCUS BEYOND TO NET ZERO EMISSIONS

New opportunities and business models

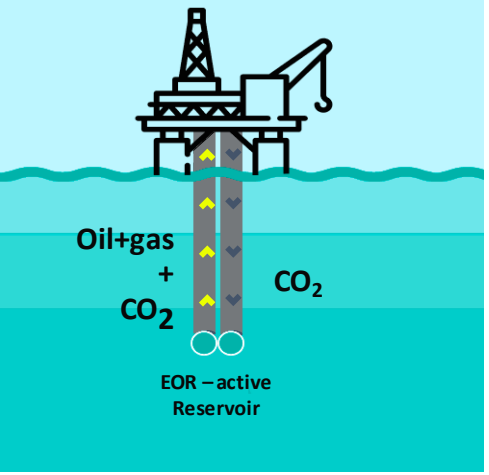
CARBON CAPTURE, UTILIZATION AND STORAGE

DECARBONIZATION STRATEGY

TODAY

The Largest Offshore CCUS in the World

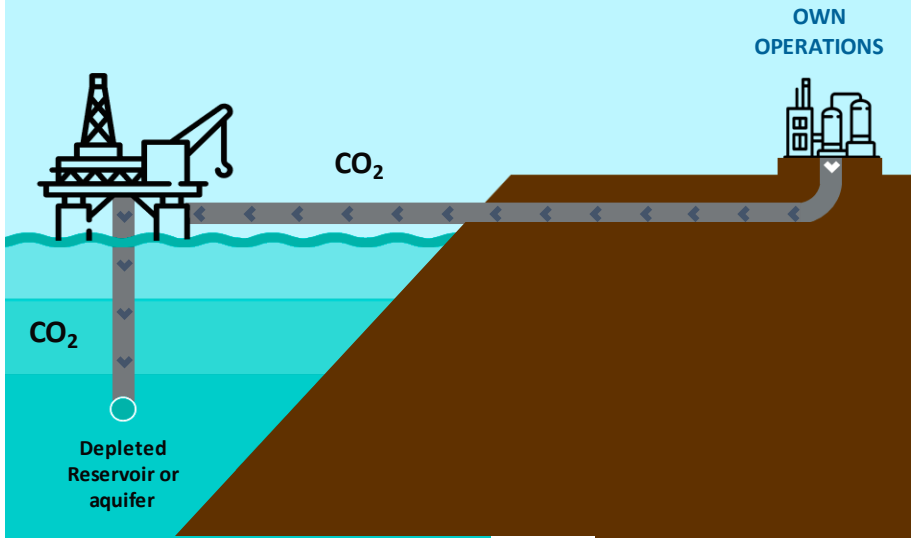
CO2 reinjected into reservoirs for enhanced oil recovery (EOR)



TOMORROW

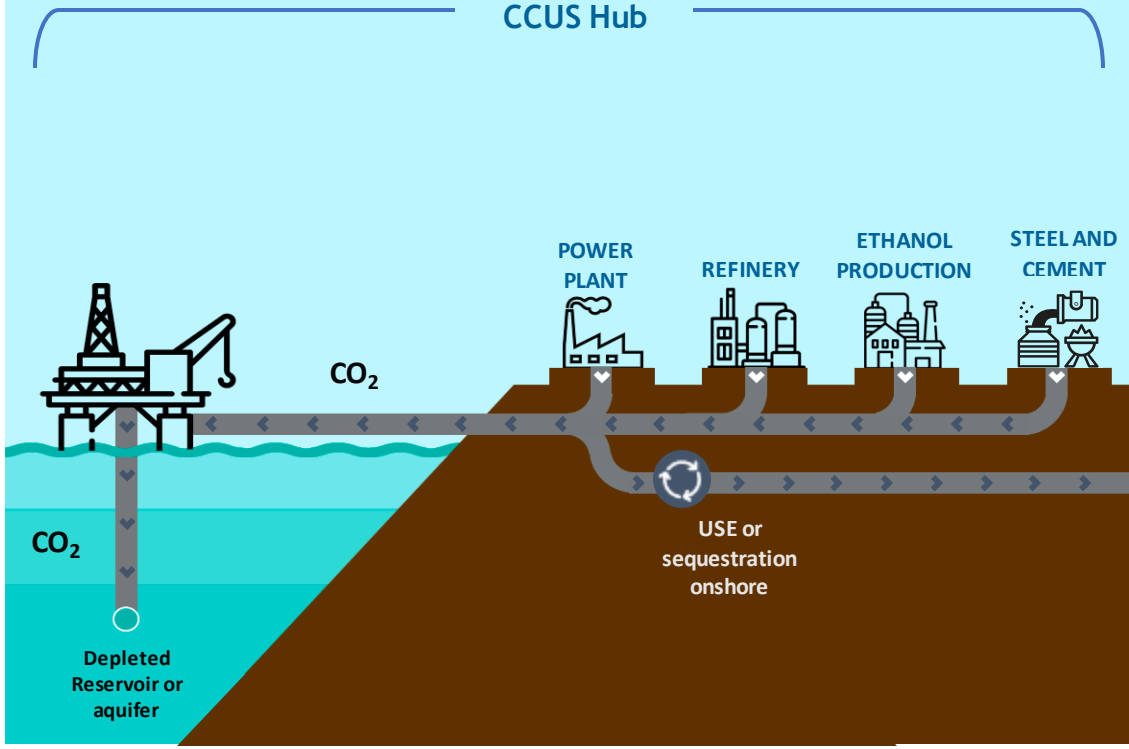
Reduction of GHG emissions

Reuse infrastructure: CCUS hub (Pilot) focused on abatement of own emissions



DECARBONIZATION/NEW BUSINESS MODEL

POSSIBLE FUTURE



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Brazil's emissions map

Potential for Implementation of CCUS Hubs in Brazil

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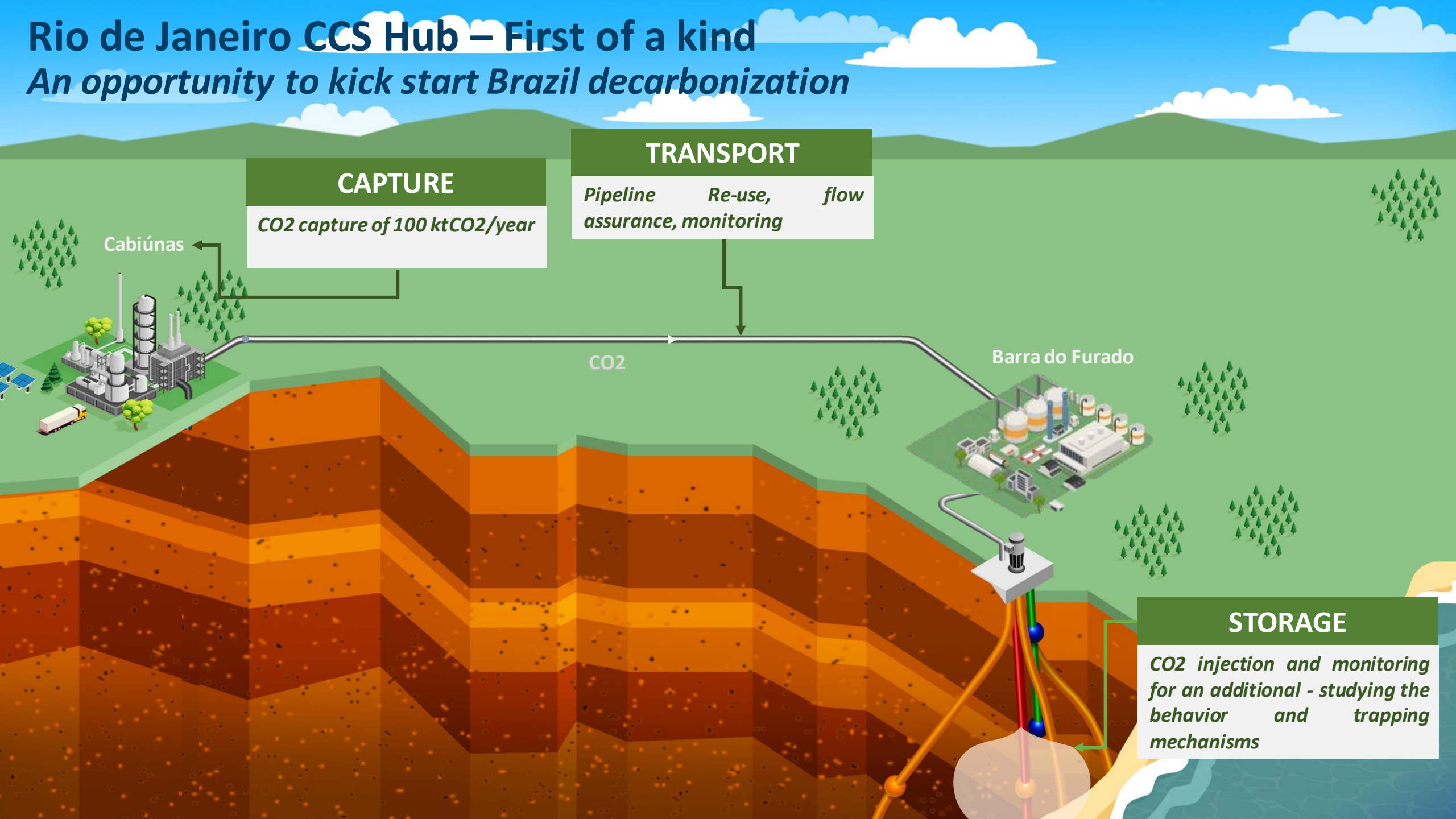
Rio de Janeiro CCS Hub – First of a kind

An opportunity to kick start Brazil decarbonization



Technological Roadmap to CCUS New Frontiers

CARBON CAPTURE, UTILIZATION AND STORAGE

TECHNOLOGY ROADMAP

TODAY

The Largest Offshore CCUS in the World

- NEW MATERIALS FOR MEMBRANES (CO_2, CH_4)
- SCALE-UP OF CO2 STORAGE SOLUTIONS
- MONITORING TECHNOLOGIES
- CCS from OFFSHORE EXHAUST GASES
- NEW MATERIALS
- BECCS
- H_2 LOW CARBON H2
- *SUBSEA CAPTURE*
- DAC
- OXI-COMBUSTÃO
- POWER HUB-CCS

2023

53,8

MtCO2 acumulated

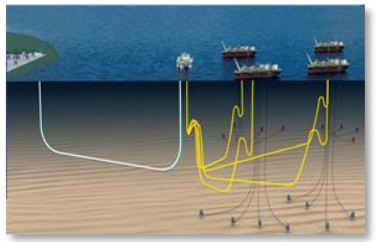
25% of the total CO2 injected by the industry worldwide

PETROBRAS CCUS AMBITION

2025: 80Mt CO_2 stored in the pre-salt CCUS-EOR project

First of a kind - CO2 storage in saline formation

Commercial Hub



Deep Offshore Decarbonization

2050 Net Zero Ambition

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Thank You

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