Sustainable Growth in Brazil: Integrating CCUS into Economic and Industrial Strategies

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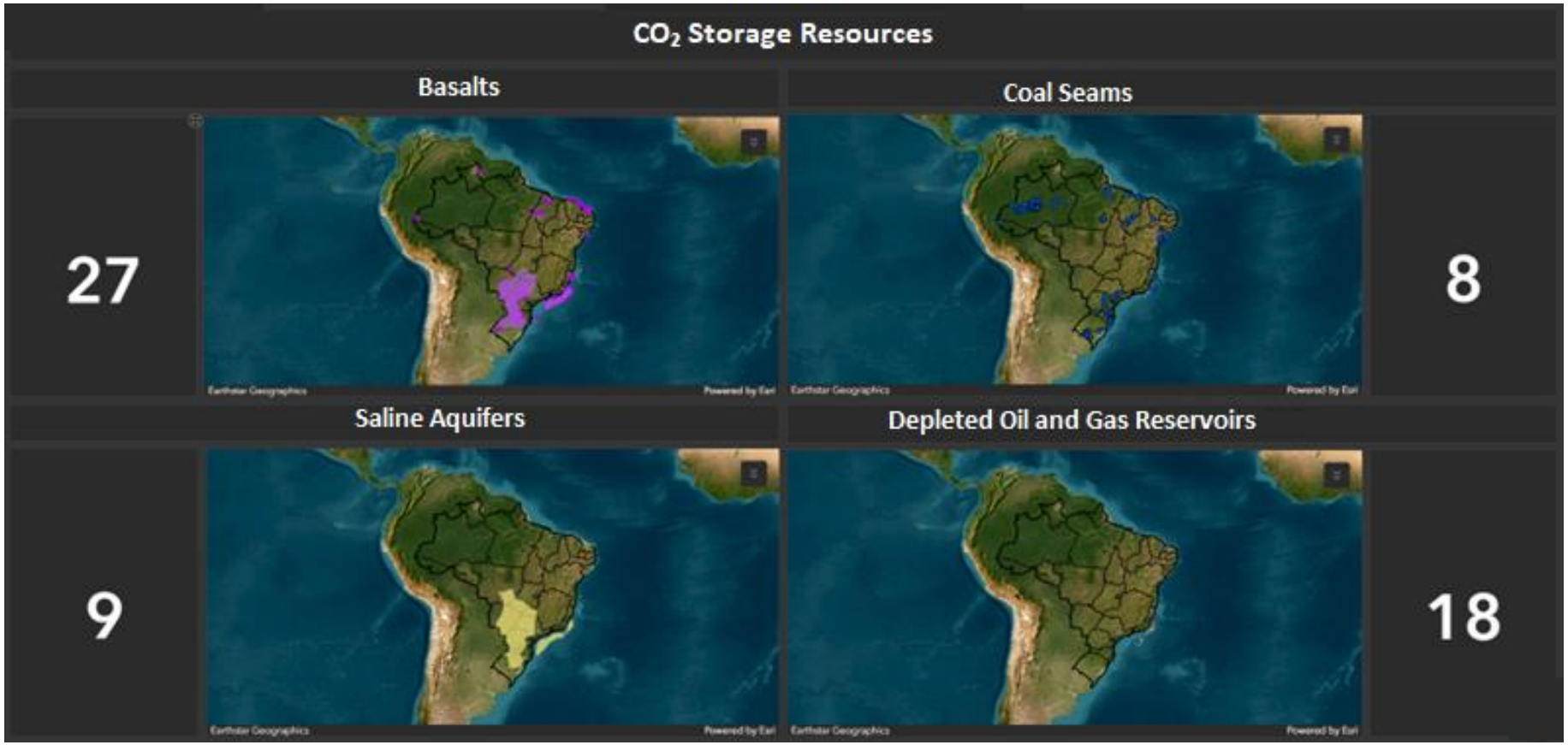
Carbon Capture Global Summit

#1

Geological Storage Potential

POTENTIAL FOR GEOLOGICAL STORAGE IN BRAZIL



Instituto do Petróleo e dos Recursos Naturais – IPR/PUC-RS

Estimated storage potential of 2.4 billion tCO_2

- Saline aquifers and depleted fields
- Paraná Basin under study

One of the pioneers in large-scale CO_2 capture

- Petrobras EOR experience in the Pre-Salt

BECCS and renewables with CCS

- Brazil's differentials in the international scenario

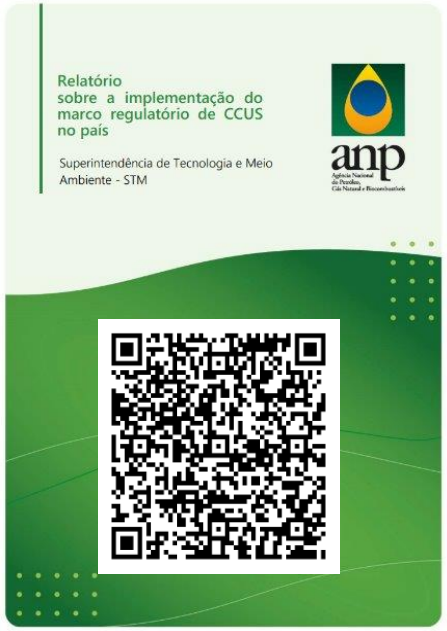
#2

Legal Framework

TIMELINE OF THE LEGAL AND REGULATORY FRAMEWORK

Apr/2024

ANP published a report on implementing the CCUS regulatory framework in Brazil.



Oct/2024

Law No. 14,993/2024 has been published (“Fuel of the Future”)

Responsibility for regulating CCS is assigned to ANP

Feb/2025

ANP's report has been updated to reflect the new legal framework

MAIN PROVISIONS OF LAW No. 14,993/2024

SCOPE OF ANP REGULATION

- Capture of CO_2 for geological storage
- Transportation via pipelines
- Geological storage of CO_2

GRANTING INSTRUMENT

- Authorization
- Eligibility of interested parties and conditions for approval and transfer of ownership.

TERM

- A duration of 30 years, with the option to renew for an additional 30 years.
- The Executive Branch may change this term for public interest.

SIMULTANEOUS DEVELOPMENT OF ACTIVITIES

- No conflict: ANP analysis conducted after hearing from the rights holder of exploration and production.
- Conflict: The Ministry of Mines and Energy (MME) will make decisions regarding the priority of resource utilization.

AREA PROSPECTING

- ANP will provide access to public technical data regarding Brazilian sedimentary basins for interested parties.

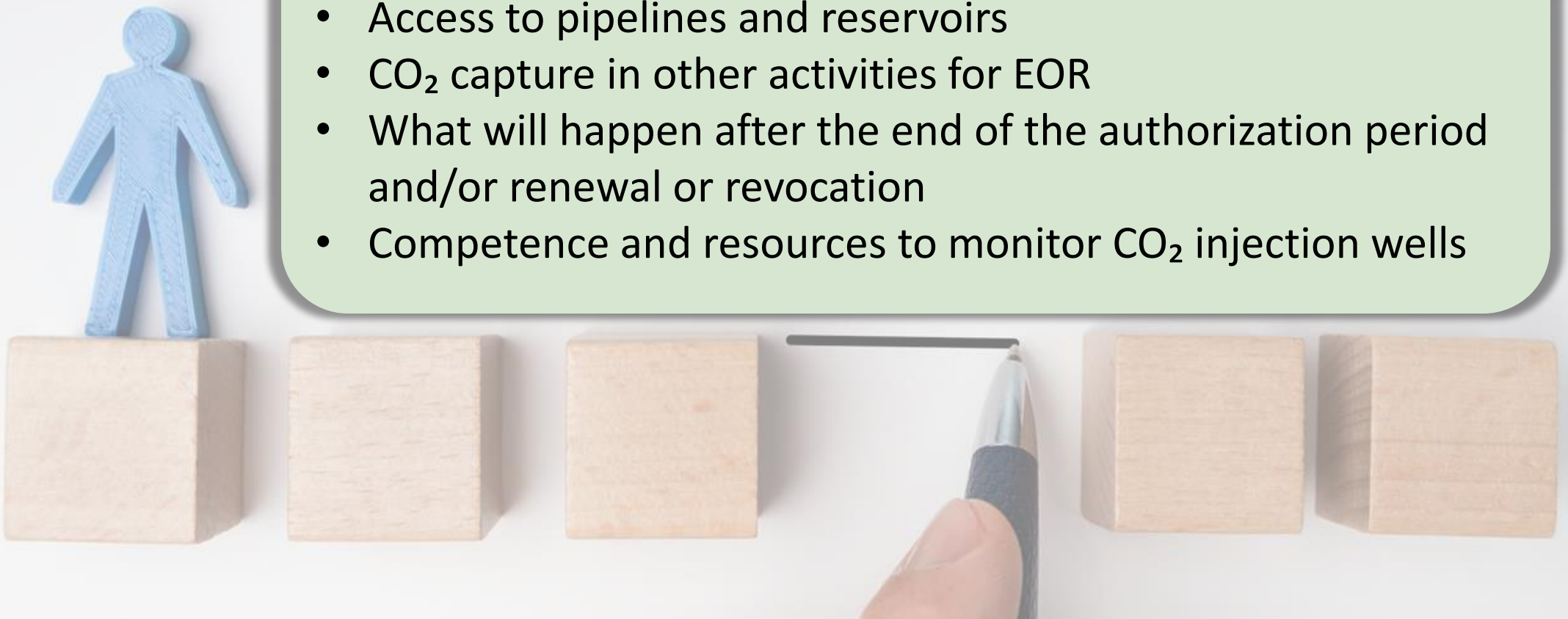
OTHER TOPICS

- Revocation of authorization may occur if authorized agents do not comply with the established rules of the Agency.

GAPS OF THE LEGAL FRAMEWORK

DETAILING THROUGH REGULATIONS?

- Monitoring of CCS activities
- Carbon credit certificate, which may be included in long-term contracts
- Access to pipelines and reservoirs
- CO_2 capture in other activities for EOR
- What will happen after the end of the authorization period and/or renewal or revocation
- Competence and resources to monitor CO_2 injection wells



#3

Regulatory Strategy: Experimental Regulation

EXPERIMENTAL REGULATION – TYPES

Regulatory Sandboxes: Controlled environment schemes are developed and monitored by the authority, allowing companies to test their innovations.

•Pilot regulation: A transitional regulatory framework that is temporary, intended to gather enough information for proposing a new regulatory system. It applies to any market agent interested in developing innovations that align with the proposed framework.

•Project-based regulation: real experiences implemented by the regulator to enable and support the testing of innovative solutions locally, each case will be approved by the regulator. The regulator defines the scope of experimentation, the qualification procedures, and the potential exemptions that may be granted.

Reference: European Commission, 2023. Making energy regulation fit for purpose. State of play of regulatory experimentation in the EU.

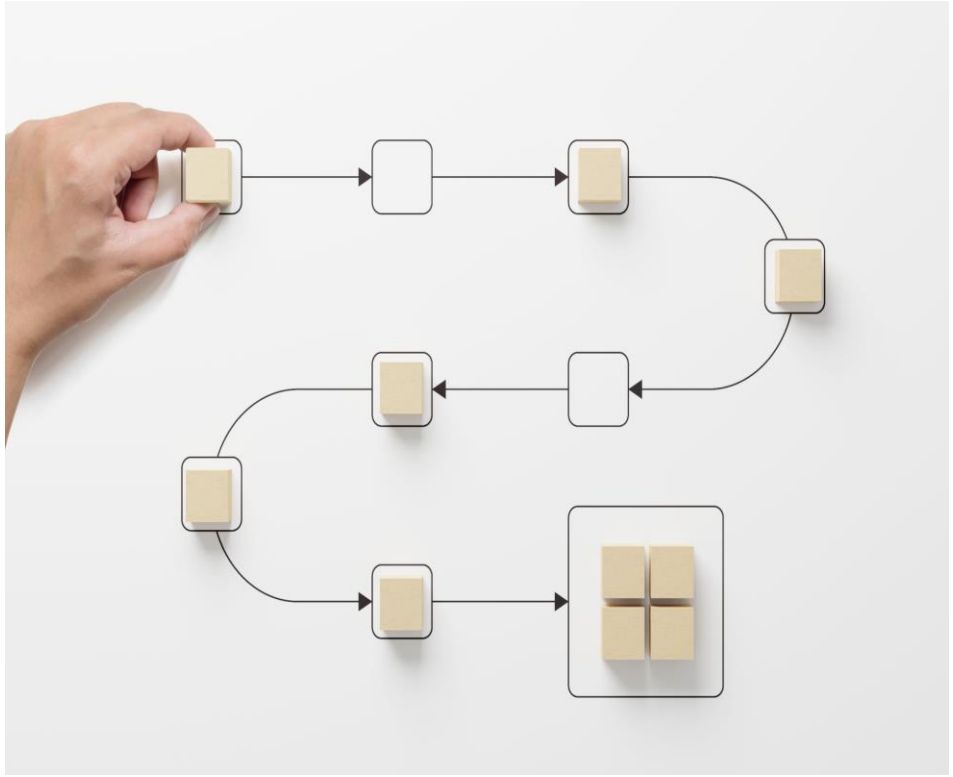
EXPERIMENTAL REGULATION - IMPLEMENTATION

LIST OF ANALOGOUS RULES APPLICABLE

- ANP E&P Resolutions
- Transnational norms or rules

ADDITIONAL CONDITIONS AND REQUIREMENTS

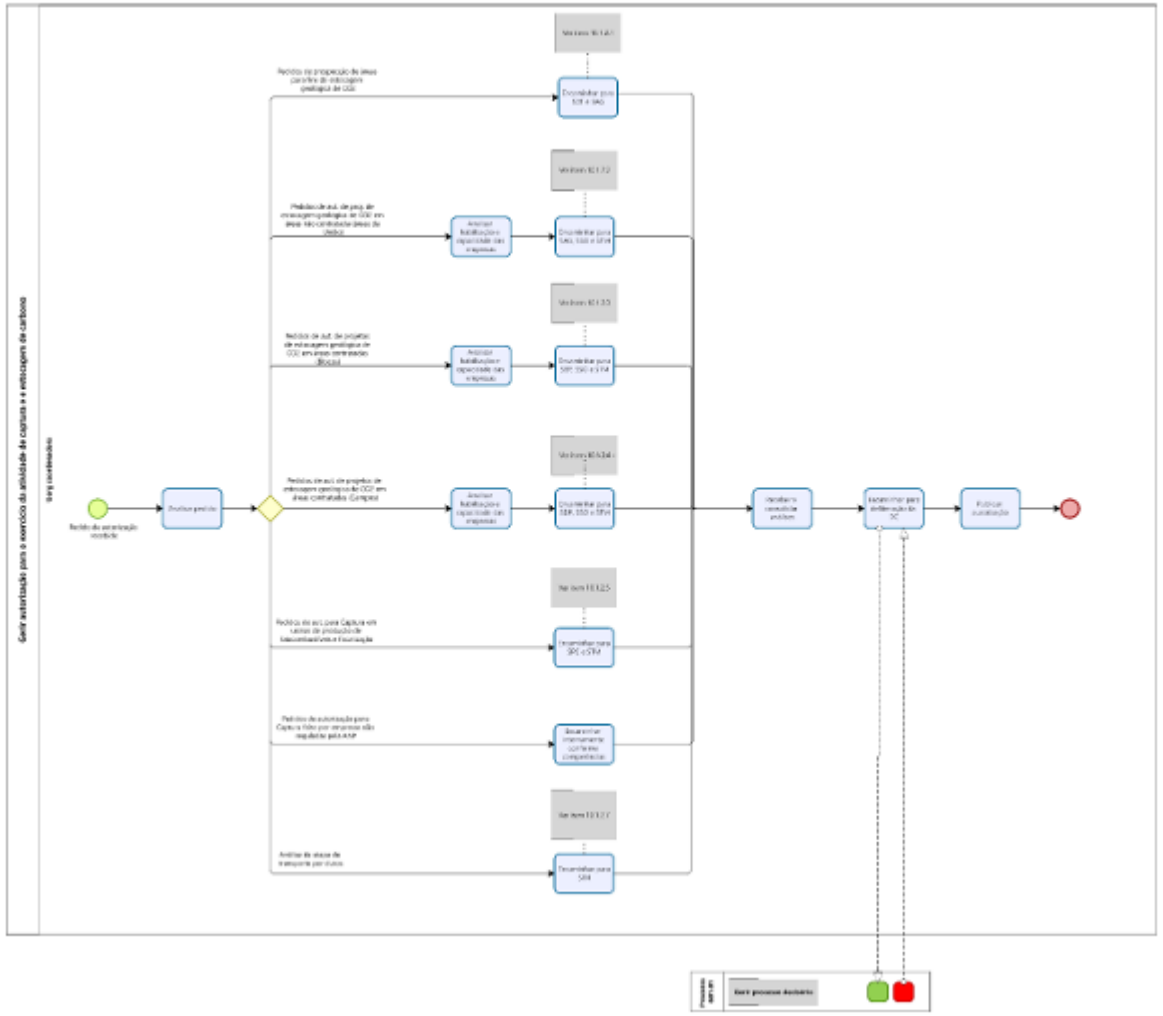
- Submission of Regular Reports
- Requirement to notify ANP in advance before conducting certain activities.



EXPERIMENTAL REGULATION – INTERNAL RULE

anp	GERIR AUTORIZAÇÃO PARA O EXERCÍCIO DA ATIVIDADE DE CAPTURA E ESTOCAGEM DE CARBONO	NORMA INTERNA ANP Nº NIANP-STM-STM-001	REV. Nº 00
		APROVADA EM JANEIRO/ 2025	PÁGINA 01/09
		ID 06.03.15	

Fluxograma do Processo de trabalho **GERIR AUTORIZAÇÃO PARA O EXERCÍCIO DA ATIVIDADE DE CAPTURA E ESTOCAGEM DE CARBONO**



EXPERIMENTAL REGULATION – AUTHORIZATION REQUEST

Authorization for the performance of Bioenergy with Carbon Capture and Storage (BECCS) activities

Company: FS Indústria de Biocombustíveis Ltda.

Location: Lucas do Rio Verde/MT

#4

R&D&I Projects

PROJECTS WITH RESOURCES FROM THE R&D CLAUSE – Examples

- 2017 - 2025: + 200 RD&I projects

Technologies for CO_2 capture: Investigation of carbon capture methods, including solvents, membranes, and optimized thermal processes.

CO_2 storage and alternative use: Initiatives focused on both geological storage and CO_2 utilization in production processes, such as chemical manufacturing or materials;

Infrastructure development: Construction of laboratories and acquisition of testing equipment for CCS development;

Technical and economic assessment: Analysis of the technical, economic, and environmental feasibility of various carbon capture and storage pathways;

Innovation in materials and methods: Development of advanced materials, such as adsorbents, and improving methods for the characterization and monitoring of captured CO_2.

PROJECTS FUNDED BY THE RD&I CLAUSE

Title: Vale da Gávea: Integration of technological innovations for implementing a CO_2 capture and sustainability hub in the heart of Rio de Janeiro.

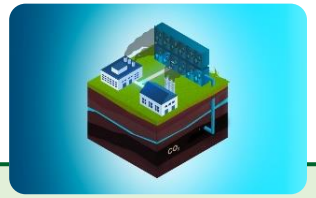
Estimated value: US$ 4.9 million.

Executor: PUC-Rio

Title: Direct Air Carbon Capture and Storage: A study on the integration and optimization of processes for removing greenhouse gases from the atmosphere, as well as the identification of favorable areas for implementing emissions technologies.

Estimated value: US$ 1.8 million.

Executors: Repsol and PUC-RS.



Title: Research, analysis, and methodology development for assessing the potential of CO_2 capture, storage, and sequestration in the sandstone reservoirs of the Parnaíba Basin in northeastern Brazil.

Estimated value: US$1.6 million.

Executors: Repsol, UFRN, and Geowellex do Brasil Serviços Petrolíferos..

Title: Utilization of Non-Metallic Pipeline Technologies for CO_2 Transportation.

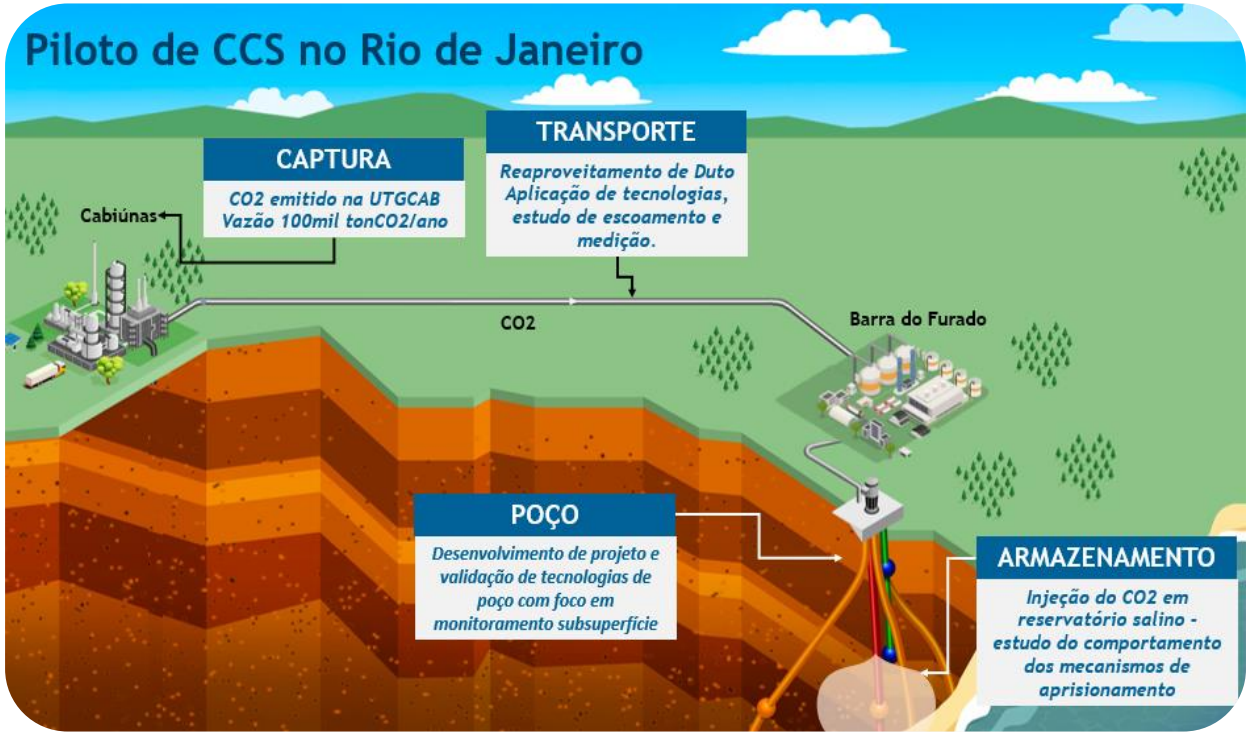
Estimated value: US$0.2 million.

Executor: Petrobras.

Title:
CCUS Pilot in Cabiúnas

Estimated value:
US$ 120 million

Executor: Petrobras



#4

Next Steps

TO MOVE FORWARD...

RD&I

Invest in the research and development of CCUS technologies, focusing on innovative materials, processes, and applications to reduce high CAPEX risks for the energy sector and beyond.

+

Experimental regulation

Develop a robust regulatory framework for CCUS that sets safety, liability, and monitoring standards tailored to the specific characteristics of the activity as soon as possible.

+

Partnership and Information

Encourage collaborations between government and industry to implement large-scale CCUS projects, supported by necessary incentives.

Create a communication and information strategy to secure social license to operate.

Daniel Maia Vieira
Director

Thank you!