



# Technologies and R&D Investments in Innovations

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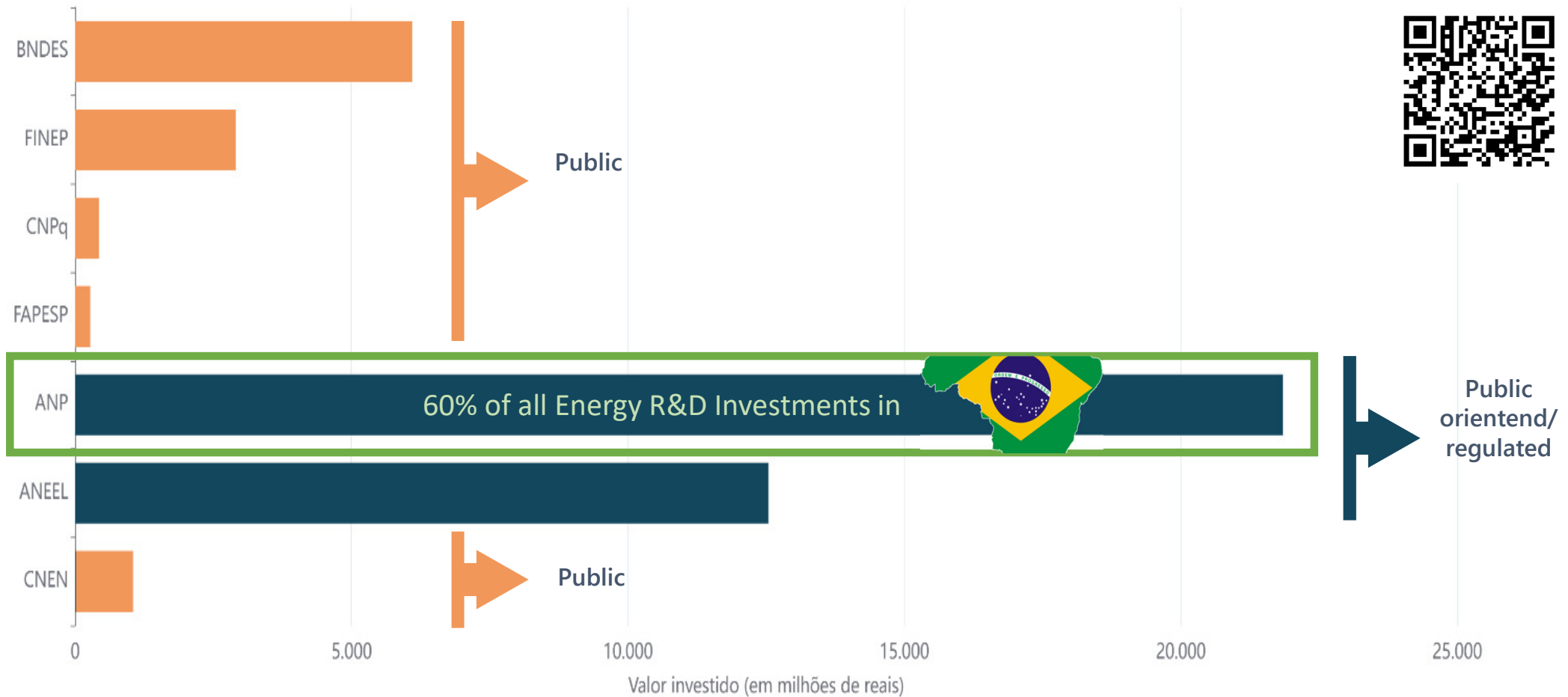
Director

Oct 31st, 2024



# RD&I Investments in Energy in Brazil according to EPE (2013-2022)

ANP R&D in perspective



60% of all Energy R&D Investments in



Public orientend/  
regulated

# RD&I Investment clause present in E&P Contracts



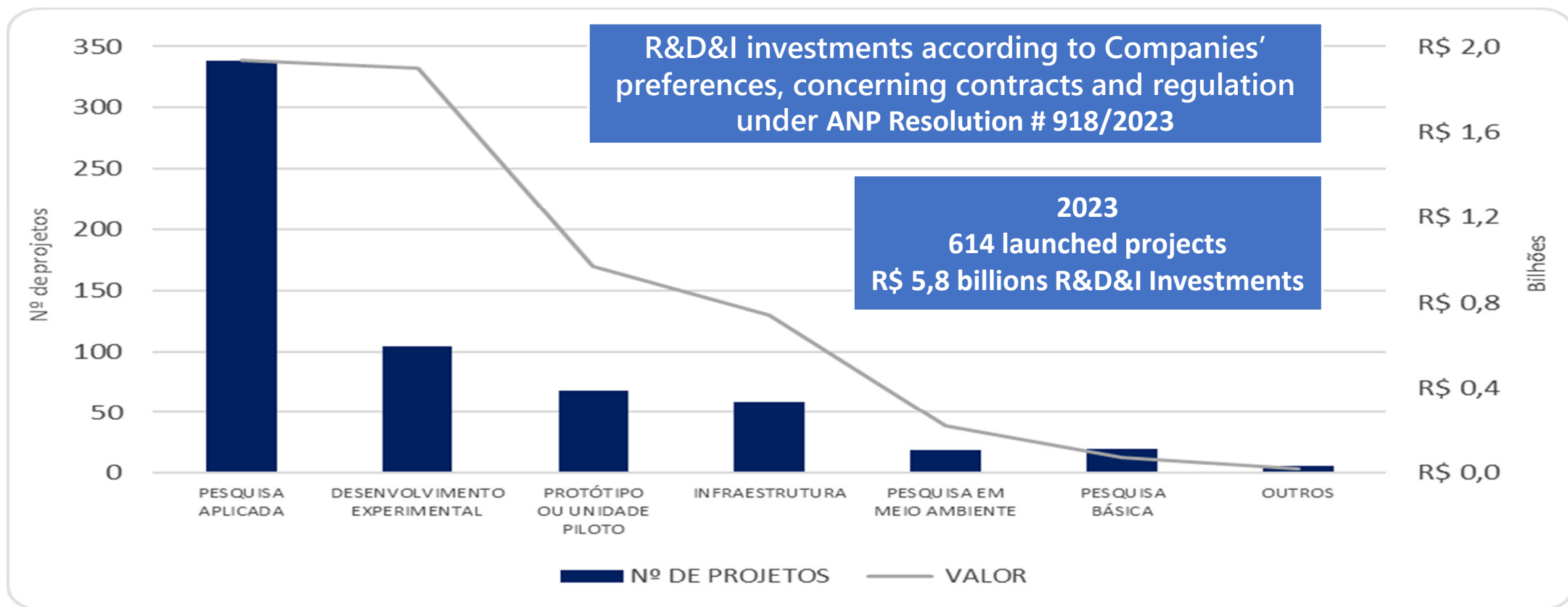
**R\$ 8,33 bln**  
just in 2022 and 2023

Valor Obrigação de Investimento em P&D

- Production Sharing Agreements
- Concession Contracts
- Transfer of Rights



# Profile of R&D&I investments in projects (2023)

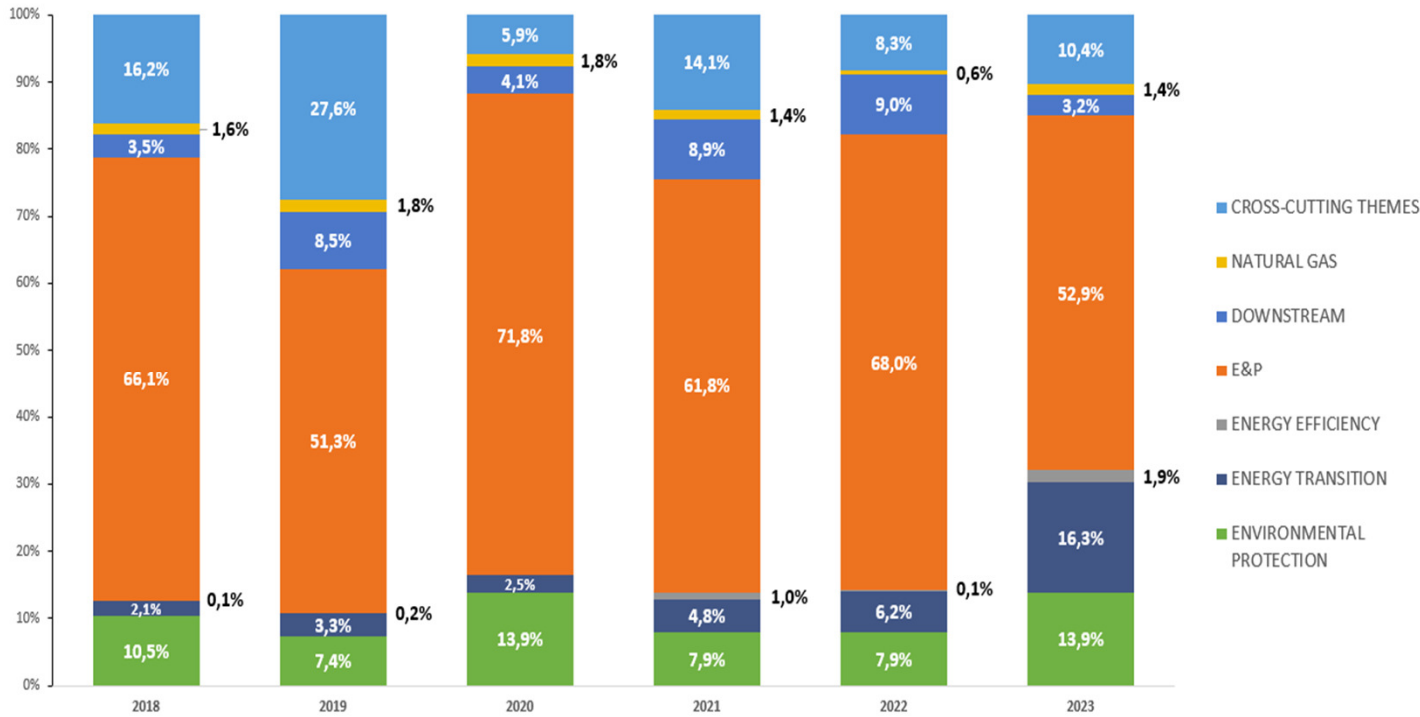
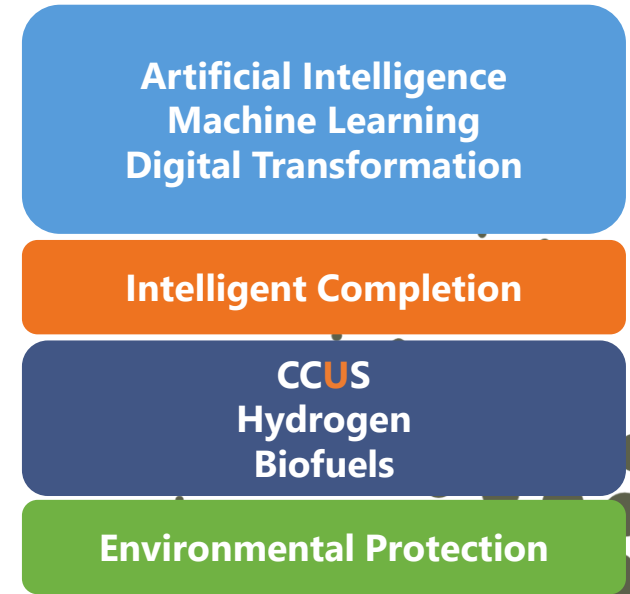


***Profile shift: applied research projects, experimental development, construction of prototypes, and pilot units.***

# How R&D&I resources have been used in Brazil

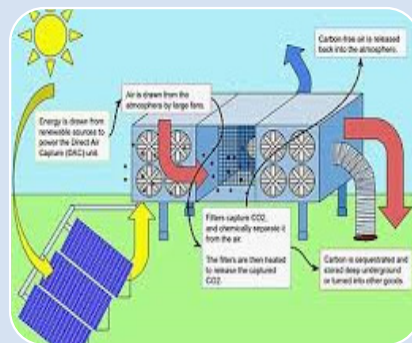
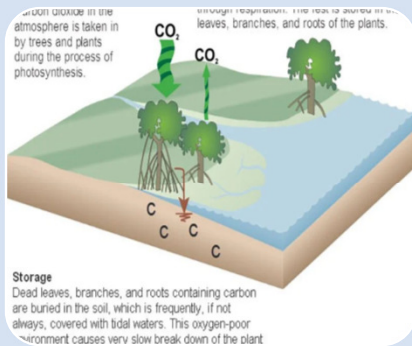


## R&D&I Trends:



2023: 614 projects started forecasting R\$ 5,8 billions

# Some examples of CCS projects



**Title:** Blue Carbon Forests for Offshore Climate Change Mitigation – BlueShore.

**Estimated Value:** R\$ 8 million

**Executor:** USP/Research Center for Gas Innovation (RCGI).

**Objective:** To understand and estimate the carbon sequestration potential of Brazilian mangrove forests as a natural greenhouse gas removal zone towards net-zero carbon emission goals.

**Title:** Direct Air Carbon Capture and Storage: Integration and Optimization Study of Greenhouse Gas Removal Processes from the Atmosphere and Identification of Favorable Areas for Technology Implementation.

**Estimated Value:** R\$ 9.6 million

**Executors:** Repsol and PUC-RS/Institute of Petroleum and Natural Resources.  
**Objective:** To conduct a study on Direct Air Carbon Capture and Storage technologies, evaluate integration and optimization strategies for greenhouse gas removal processes from the atmosphere, and identify favorable geographic areas for implementing negative emissions technologies (NET) in Brazil.

**Title:** CCUS Pilot in Cabiúnas.

**Estimated Value:** R\$ 7.5 million

**Executor:** Petrobras.

**Objective:** To develop and implement a CCUS pilot/demonstration project in Cabiúnas. The project will cover the stages of capture, transportation, usage, and geological storage of CO<sub>2</sub>/Monitoring.

**Title:** Mineral Carbonation Potential of Continental Basalt Flows in the Paraná-Etendeka Igneous Province.

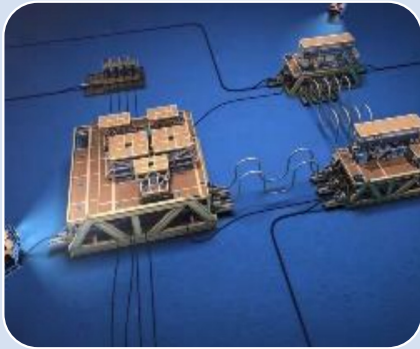
**Estimated Value:** R\$ 21 million

**Executor:** UNESP/Basin Studies Laboratory (LEBAC).

**Objective:** To evaluate the mineral carbonation potential of CO<sub>2</sub> in basalt flows (CFB) in the Paraná-Etendeka igneous province. Laboratory and field experiments will be conducted involving extensive characterization of the mineral and chemical composition and petrophysical properties of basaltic rocks, as well as determining the geometry and thickness of suitable intervals for CO<sub>2</sub> injection.

Several CCUS projects financed by ANP R&D, from basics to (mainly) prototypes and pilots

# Some examples of Energy Efficiency Projects



**Title:** Experimental Development of Dense Gas Pump, Cooling System, and Cyclonic Separator for the HISEP System.

**Estimated Value:** R\$ 23 million.

**Executor:** UNIFEI/Compact Separator Center.

**Objective:** To study, analyze, and test a scaled-down prototype representing an underwater separation station to process and inject the dense phase of production from an oil field in the pre-salt zone with a high gas-oil ratio (GOR), high CO<sub>2</sub> content, high pressure, and high oil flow rate. It also aims to prepare a multidisciplinary team capable of conducting experiments and developments involving multiphase flow.



**Title:** Reduction of Diesel Consumption and Greenhouse Gases (GHG) with the Use of Hydrogen in Internal Combustion Engines of Drilling Rigs.

**Estimated Value:** R\$ 16 million.

**Executors:** Shell, Odebrecht Oil and Gas, and LZ Energia.

**Objective:** R&D of a method to optimize diesel combustion in engines by introducing hydrogen as a gaseous additive and R&D for monitoring operational conditions to provide reports on energy efficiency, atmospheric emissions, and other operational parameters from engine monitoring data.



**Title:** Decarbonization in Offshore Drilling.

**Estimated Value:** R\$ 8.7 million.

**Executor:** Petrobras.

**Objective:** Technologies for increasing the energy efficiency of dynamically positioned drilling and light workover rigs (hydrogen injection and generation optimization simulator).



**Title:** Decarbonization of Marine Engines with Alternative Fuels.

**Estimated Value:** R\$ 17 million.

**Executors:** Shell, Raízen, ALIS, and PUC-Rio/Center for Energy and Vehicle Development (CDEV).

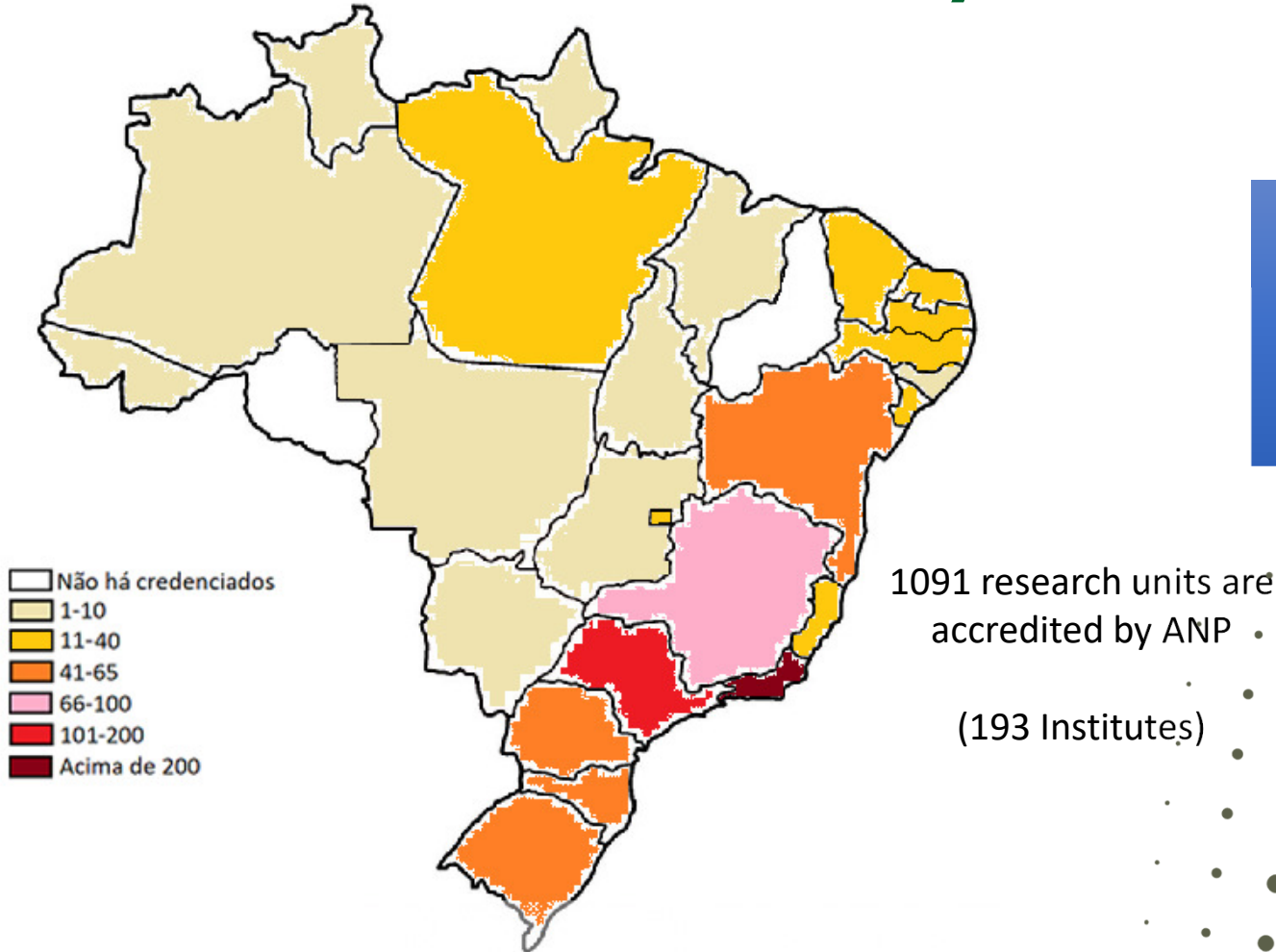
**Objective:** To evaluate and develop four different technological pathways for fuels to seek a reduction in GHG emissions and fossil fuel consumption, as well as to increase the efficiency of propulsion engines, focusing on offshore operations.



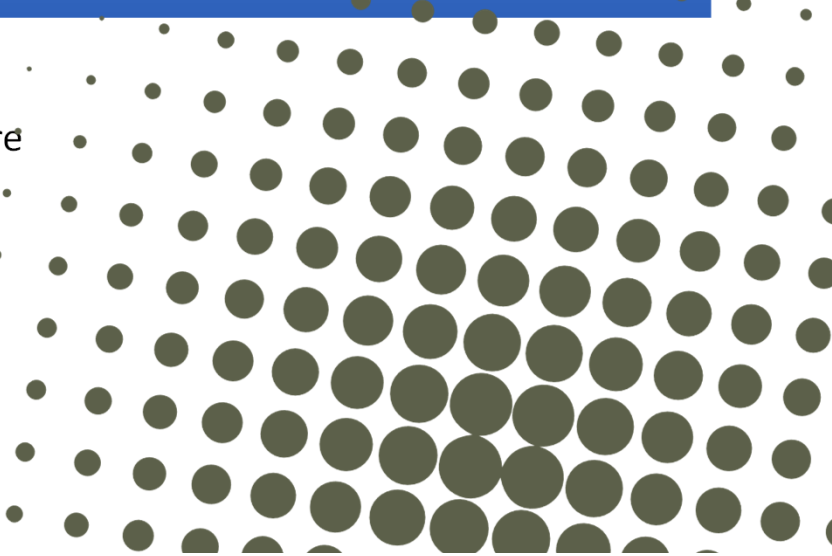
**HISEP® patented technology, awarded and  
with all development roadmap funded by  
ANP R&D**



# Accredited Institutions under ANP Resolution #917/2023



Oil companies can also develop projects in their R&D facilities and in Brazilian Companies



# Regulatory Agenda

## Accreditation Process - ANP Resolution # 917/2023 Revision

- Reduce bureaucracy and add value to the country's research ecosystem

## (Rules for application of R&D&I resources)

### ANP Resolution # 918/2023 Revision

- Exploring new possibilities for the application of R&D resources;
- Evaluating the flexibility in allocating resources across subdivisions through contractual addendums;
- Reviewing the supplier training program, aiming to increase the local content of goods and services;
- Reshaping the requirements and inspection processes, focusing on monitoring projects during their term and emphasizing results, rather than verifying expenses after project completion;
- Increasing flexibility in requirements for the management and oversight of the ANP Human Resources Program.

# Technological Development: ANP Programs



Scholarships  
in 3 levels:  
BSc., MSc., DSc.  
and PhD.



Open Innovation:  
ANP + FUNDEP +  
8 Energy Companies

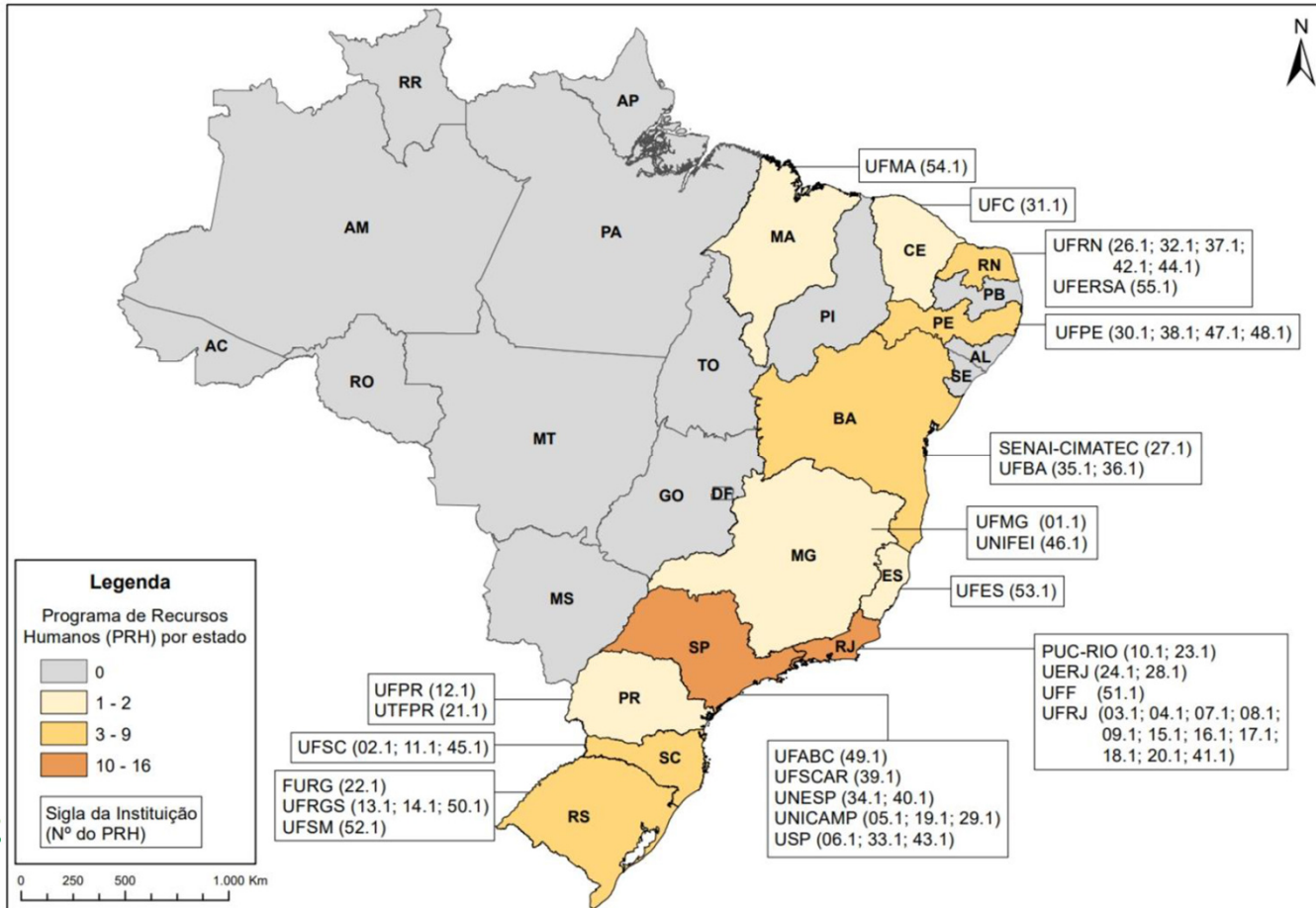
Just Launched!

- Early Liquidation benefit.
- ANP establishes the preference for technological routes.

# Human Resource Program



54 Programs in 32 Educational Institutes in 16 States



Current Management Entity



3.726 scholarships (2018-2024)



R\$ 314 Million



5.500 scientific publications



600 awards



42 Patents

# Entrepreneurship Program



## Technological Challenges for startups



Exploration,  
Production,  
Refinery and  
Decommissioning

Operational  
efficiency increase  
and cost  
optimization



Energy Safety,  
Energy Storage and  
Renewables

New low carbon  
fuels development,  
hybrid technologies  
and increase in  
energy efficiency



Digital  
Transformation

Industry 4.0,  
blockchain, IoT e AI  
to increase  
processes efficiency



ESG impact in  
energy and fuels  
production

Environmental,  
Social and  
Governance Impact.



Systems reliability,  
Operational Safety  
and Environment  
Protection

Operational Safety,  
human life and  
environment  
protection.

Current Management Entity



# Final Remarks



**R&D has been key to the development of this industry**

- training professionals
- establishment of laboratories/technology centers
- supply chain



**High relationship between industry and the R&D ecosystem**

- New markets in the context of energy transition



**Companies have organically invested in technologies aiming to reduce CO2 emissions.**

- Regulation has been supportive and encouraging this path



# Thank you!



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Pesquisa, desenvolvimento e inovação —  
Agência Nacional do Petróleo, Gás Natural e  
Biocombustíveis ([www.gov.br](http://www.gov.br))



[R&D BI Dynamic Panel](#)



**BRAZILIAN  
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CONFERENCE**  
4<sup>th</sup> EDITION **2024**