



An event organized
by IBP and OTC

Panel Session
CCUS AND INITIATIVES TO REACH THE NET ZERO

Ronan Ávila - Deputy Superintendent of Geological and Economic Assessment [SAG]
October 26th, 2023, at 09:30 in ExpoMag Convention Center



NOTICE

The ANP's institutional presentation is based on current and reliable information, but no representation or warranty is made as to its accurateness and completeness, and it should not be relied upon as such.

Projections and estimated values are included without any guarantee as to their future realization.

Forward-looking data, information, projections and opinions expressed during the presentation are subject to change without prior notice.



CCUS and Initiatives To Reach the Net Zero

Room B6 | 09:30 – 12:00

This panel session aims not only to bring CCUS technologies but also initiatives that may be economically and technically feasible to make the O&G industry ready for the net zero target, including reforestation and carbon credits, among others.

Chairperson(s)

Sylvia Anjos, Geologist, UFRJ

Carlos Pedroso, Engineer, Enauta Energia SA


Moderator(s)

Claudio Marcos Ziglio, Coordinator, Petrobras

Nathalia Weber, Co-Founder, CCS-Brasil

Speaker(s)

Antonio Vicente Silva e Castro, General Manager
Downstream and Midstream Technology,
Petrobras CENPES

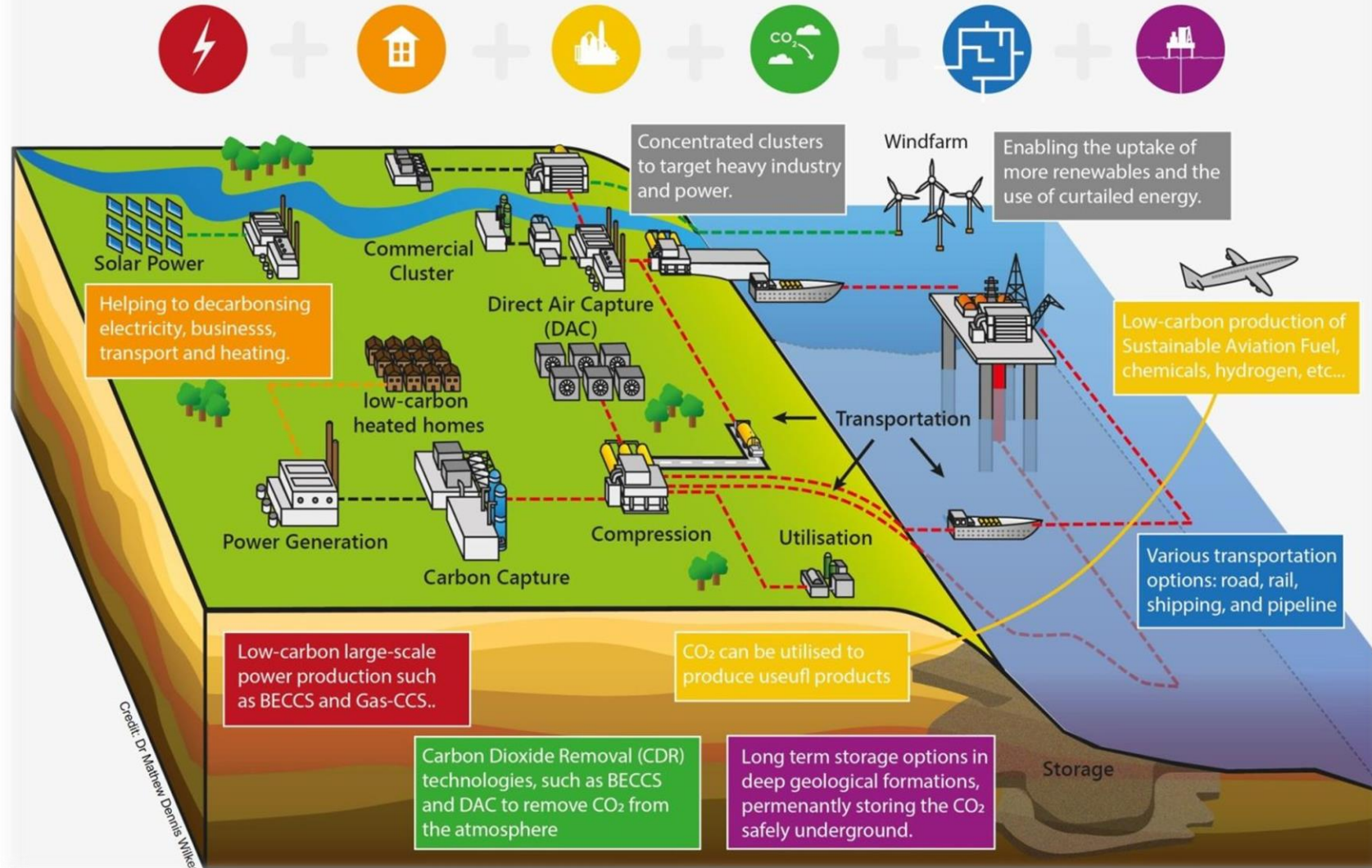
Ronan Magalhães Ávila, Manager (SAG),
ANP (Brazilian National Agency of Petroleum,
Natural Gas and Biofuels) 

Augusto Cesar Carvalho Da Silva,
Executive Manager, SLB

Felipe Dalla Vecchia, Director, PUCRS
Pontifical Catholic University of Rio Grande do Sul

CCUS & Net Zero

Carbon Capture, Utilisation and Storage (CCUS) enables the production of low-carbon power, decarbonised heating and industry, and carbon dioxide removal technologies, to prevent/remove CO₂ from the atmosphere and transport it to safe and secure storage sites. Ensuring a smooth transition to Net Zero by 2050.



Credit: Dr. Matthew Dennis Wilkes

Wilkes, M. (2023) CCUS & Net Zero Illustration.

Available at: <https://ukccsrc.ac.uk/ukccsrc-ecr-ccs-visual-communication-competition-2023/>

IPCC Intergovernmental Panel on Climate Change

IPCC's Sixth Assessment Report (AR6)



1202 modelled global emission pathways (pooled in C1-C8 categories) and
7 Illustrative Mitigation Pathways (IMPs)



Integrated Assessment Models (IAMs)

IAMs have been key for IPCC Reports and are being used for policymaking.

The use of IAMs in climate policy has become increasingly valuable in countries' NDC preparation, LTS development, and target negotiation during COPs.



One of them was developed in a Brazilian academic institution

Cenergia (PPE/COPPE-UFRJ)

COmputable **F**ramework **F**or **E**nergy and the **E**nvironment (**COFFEE**)

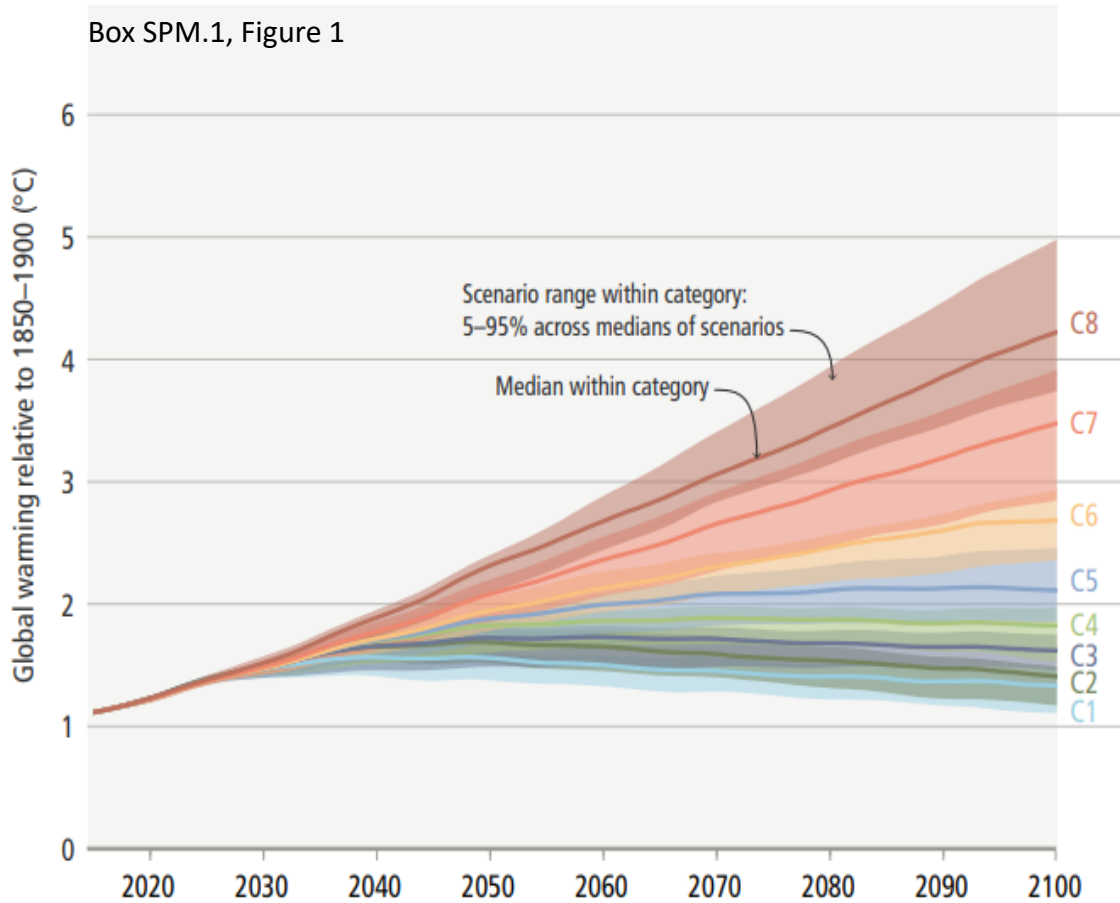
Model - DSc thesis, Programa de Planejamento Energético, COPPE/UFRJ, RJ (2016).

Acronym	Climate Category (II.3.2)	Model	Scenario name in the AR6 scenario database (II.3)	Reference
Cur-Pol	C7	GCAM 5.3	NGFS2_Current Policies	NGFS 2021
Mod-Act	C6	IMAGE 3.0	EN_INDCi2030_3000f	Riahi et al. 2021, Bertram et al. 2021, Hasegawa et al. 2021
Illustrative Mitigation Pathways (IMPs)				
Neg	C2*	COFFEE 1.1	EN_NPi2020_400f_lowBECCS	Riahi et al. 2021, Bertram et al. 2021, Hasegawa et al. 2021
Ren	C1	REMIND-MAgPIE 2.1-4.3	DeepElec_SSP2_HighRE_Budg900	Luderer et al. 2021
LD	C1	MESSAGEix-GLOBIOM 1.0	LowEnergyDemand_1.3_IPCC	Grubler et al. 2018
GS	C3	WITCH 5.0	CO_Bridge	van Soest et al. 2021
SP	C1	REMIND-MAgPIE 2.1-4.2	SusDev_SDP-PkBudg1000	Soergel et al. 2021
Sensitivity cases				
Neg-2.0	C3	AIM/CGE 2.2	EN_NPi2020_900f	Riahi et al. 2021, Bertram et al. 2021, Hasegawa et al. 2021
Ren-2.0	C3	MESSAGEix-GLOBIOM_GEI 1.0	SSP2_openres_lc_50	Guo et al. 2022, GEIDCO, WMO & IIASA 2019

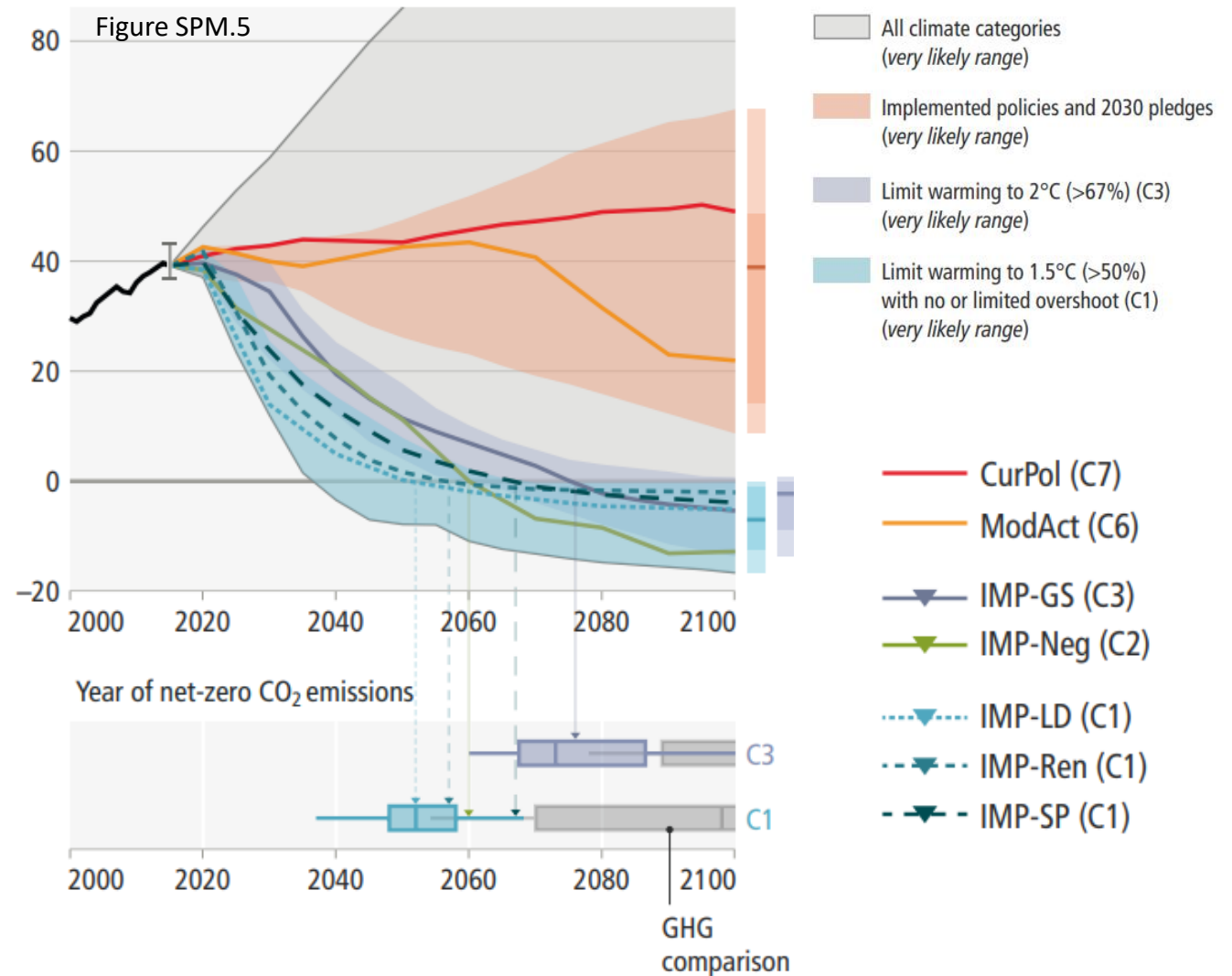
IPCC - Illustrative Mitigation Pathways

AR6 Scenario Explorer and Scenarios Database hosted by IIASA

a. Median global warming across scenarios in categories C1 to C8



b. Net global CO₂ emissions



Global greenhouse gas emissions and warming scenarios



- Each pathway comes with uncertainty, marked by the shading from low to high emissions under each scenario.
- Warming refers to the expected global temperature rise by 2100, relative to pre-industrial temperatures.

Annual global greenhouse gas emissions
in gigatonnes of carbon dioxide-equivalents

150 Gt

100 Gt

50 Gt

Greenhouse gas emissions
up to the present

0

1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100

No climate policies
4.1 – 4.8 °C

→ expected emissions in a baseline scenario if countries had not implemented climate reduction policies.

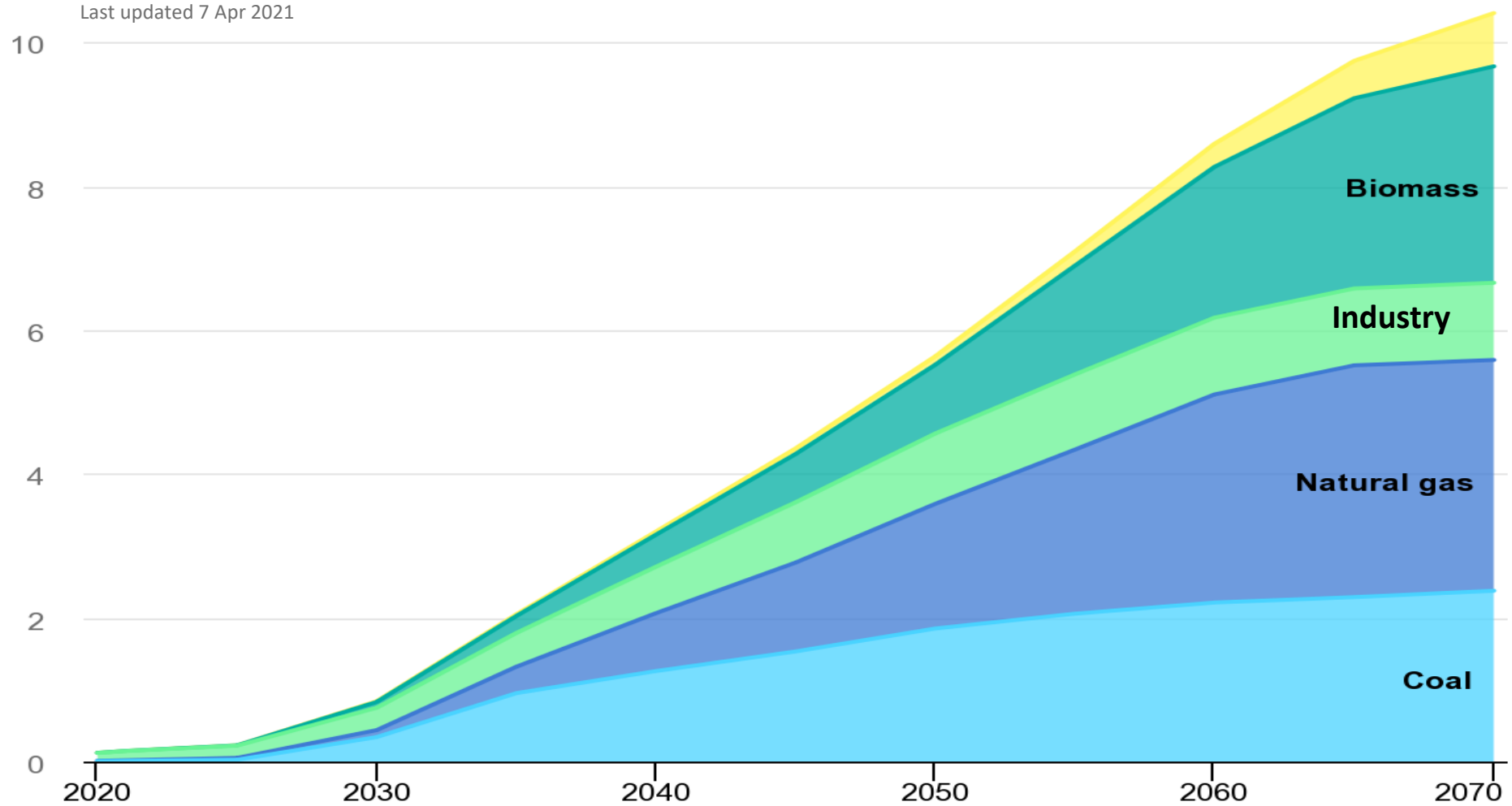
Current policies
2.5 – 2.9 °C

→ emissions with current climate policies in place result in warming of 2.5 to 2.9°C by 2100.

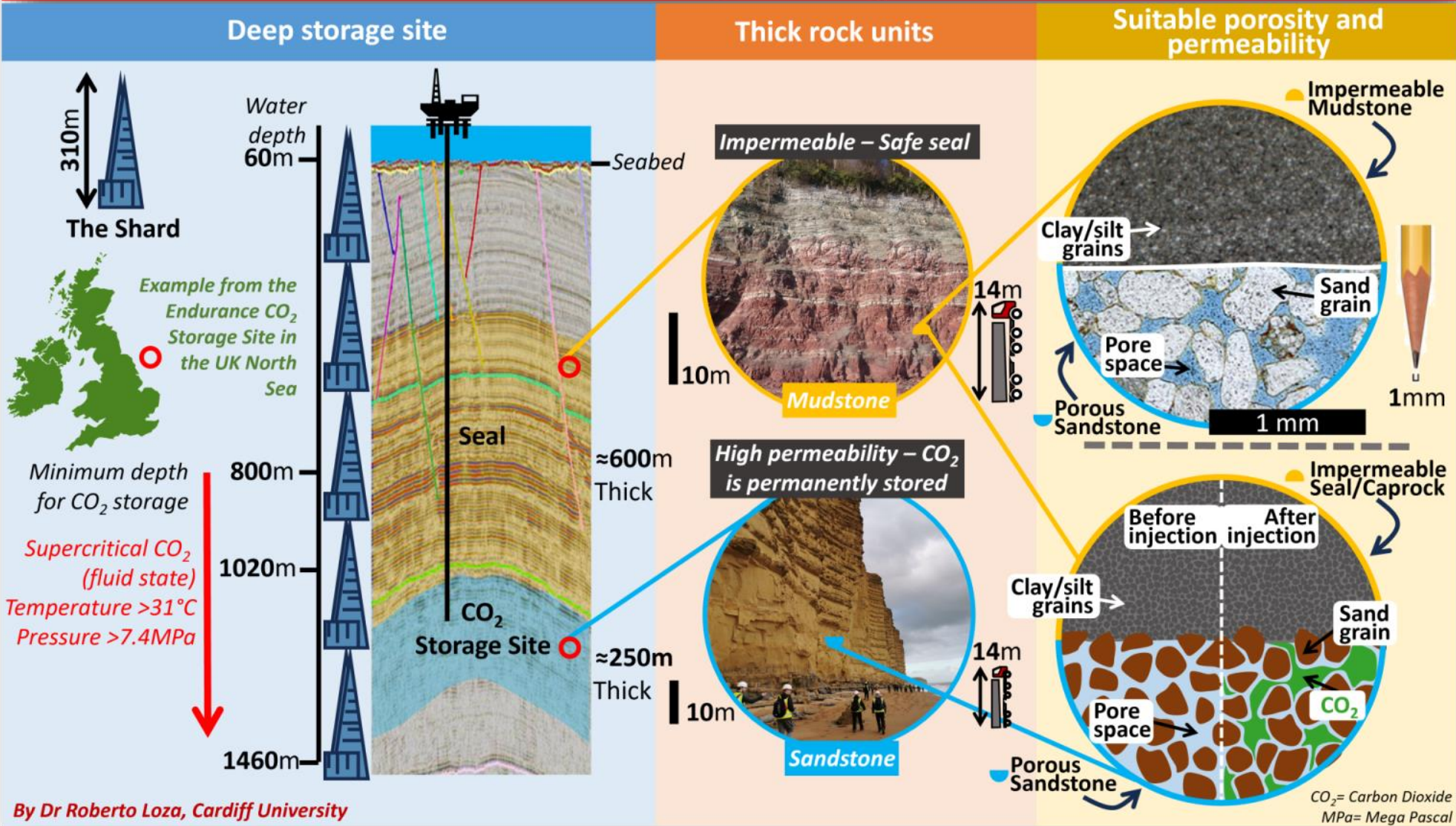
Pledges & targets (2.1 °C)
→ emissions if all countries delivered on reduction pledges result in warming of 2.1°C by 2100.

2°C pathways
1.5°C pathways

World captured CO₂ by source in the Sustainable Development Scenario, 2020-2070



What is needed to safely store CO₂ underground?

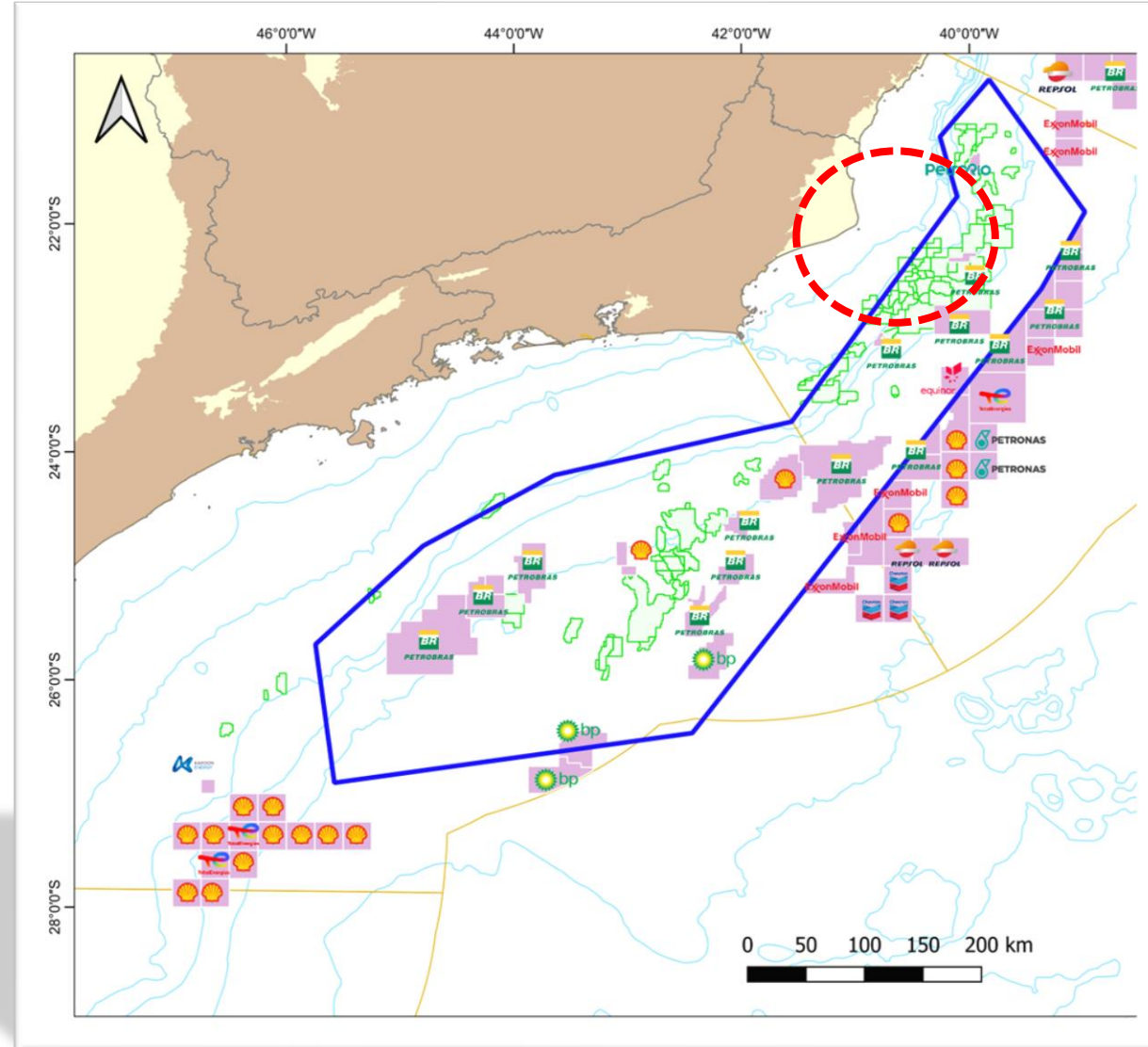


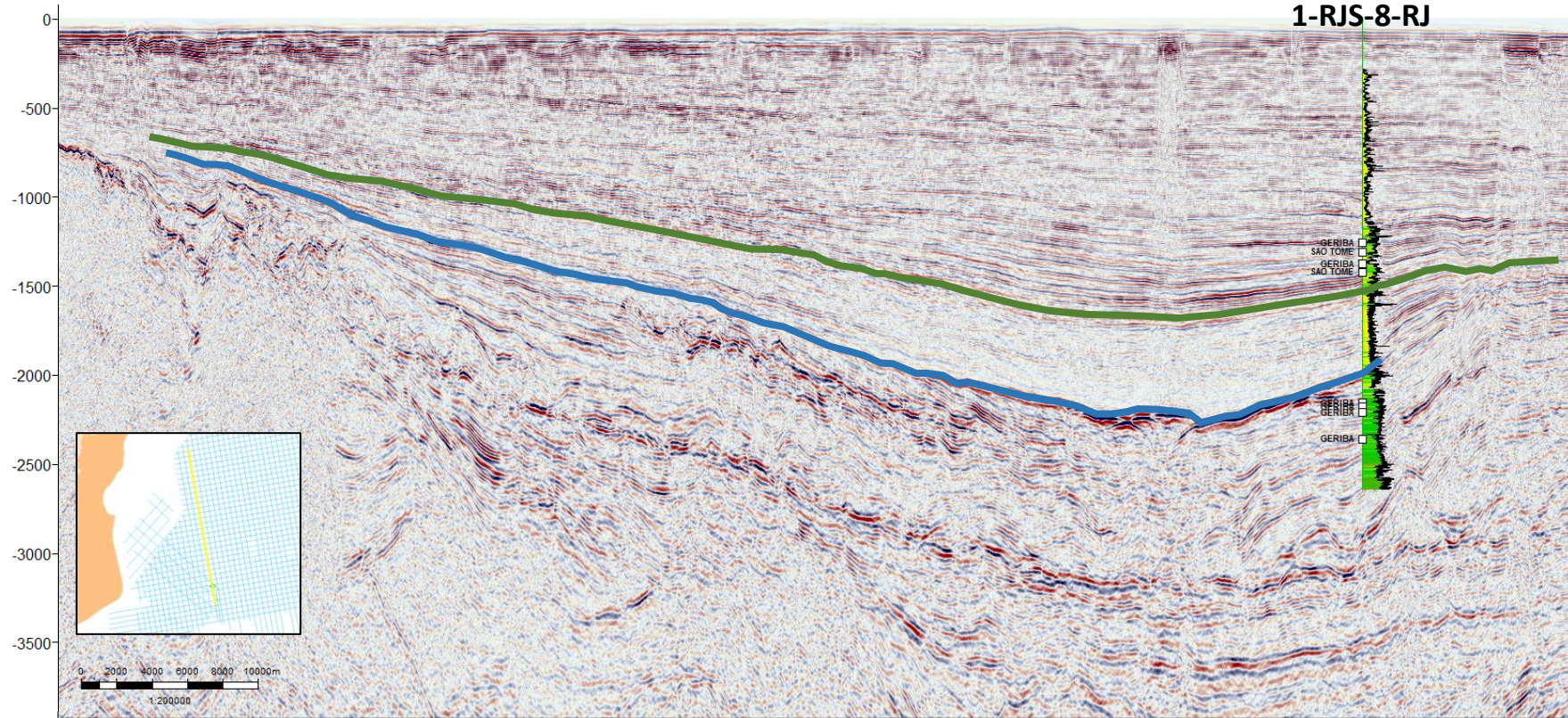
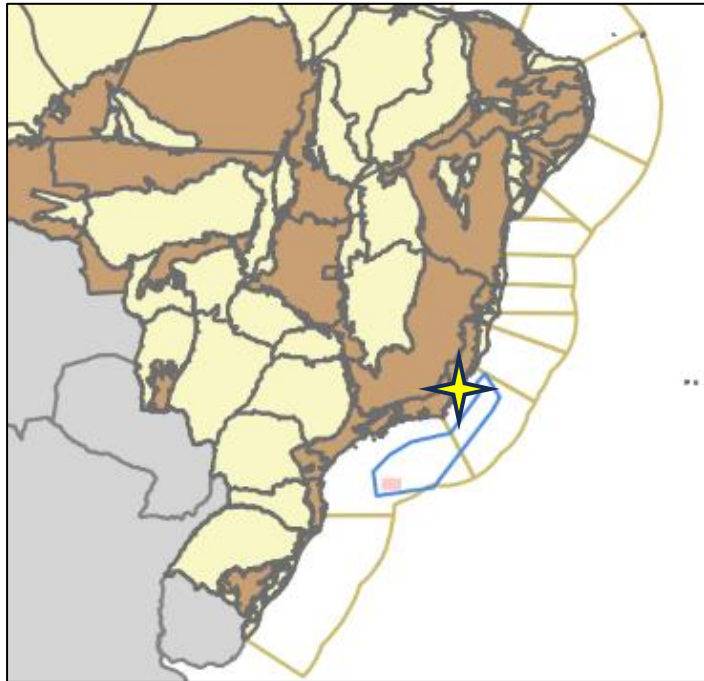
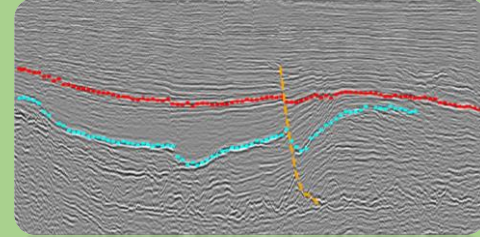
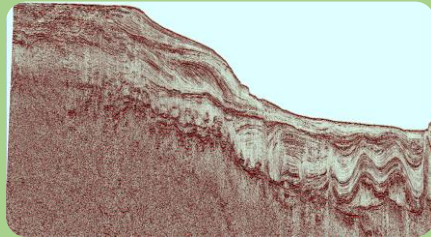
Loza, R. (2023). Available at: <https://ukccsrc.ac.uk/ukccsrc-ecr-ccs-visual-communication-competition-2023/>

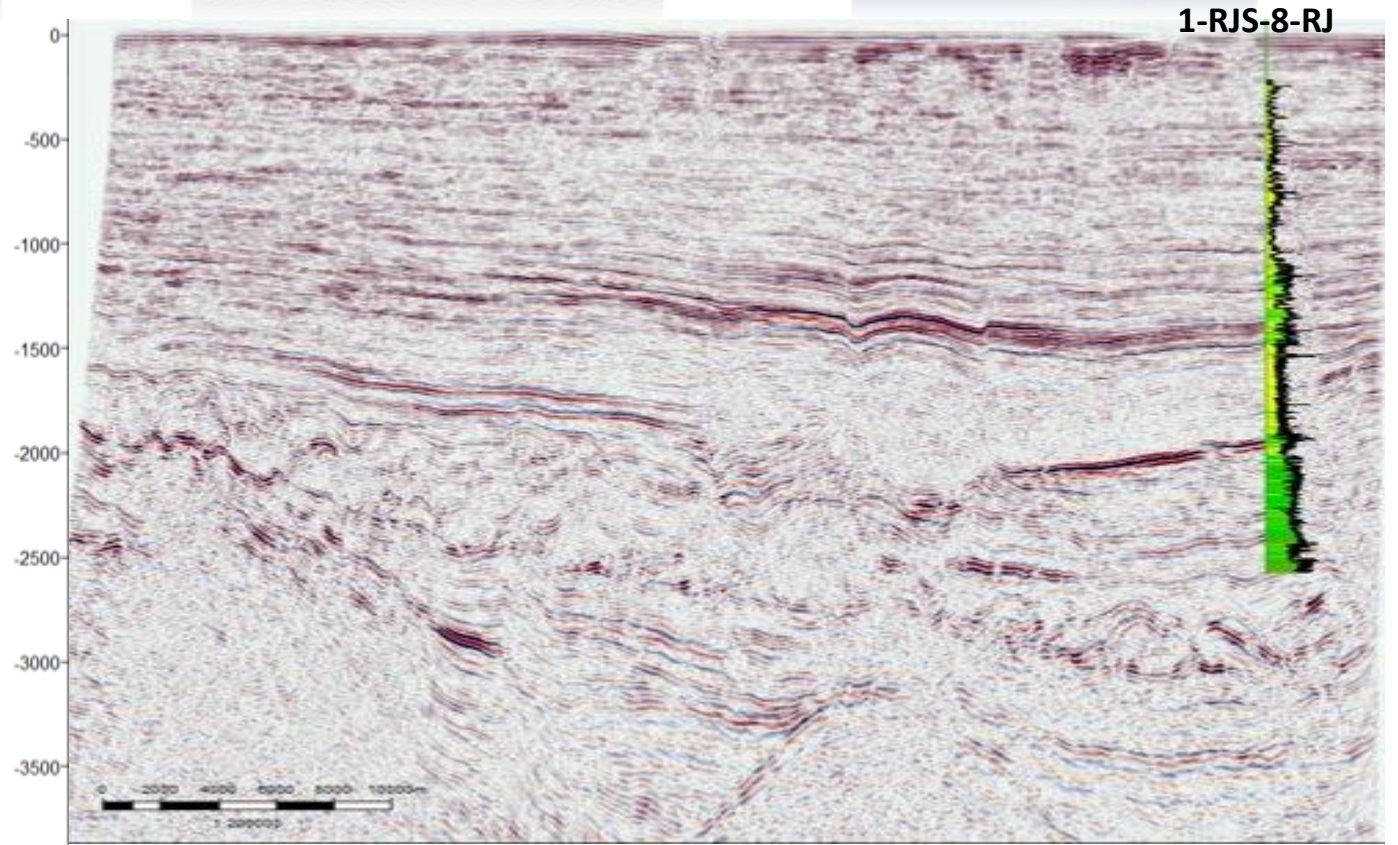
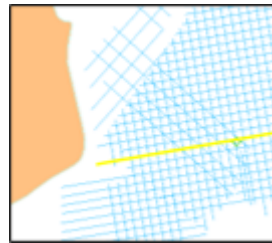
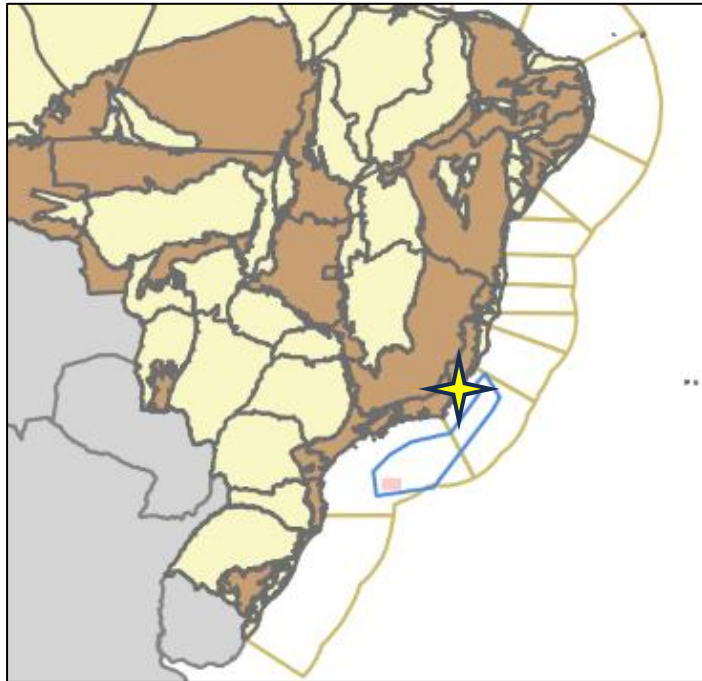
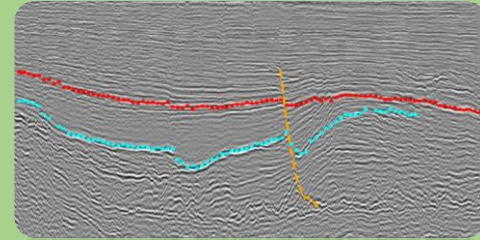
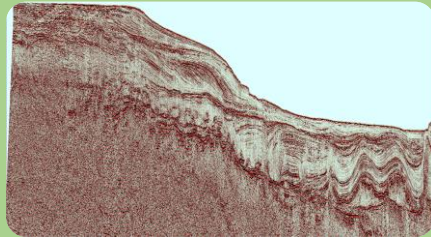
OFFSHORE

Campos Basin

The Campos Basin is located primarily in front of the state of Rio de Janeiro. This area is home to industries that produce high levels of CO₂ emissions, hard to abate, such as the cement, steel, and metallurgical industries. Additionally, there are large saline aquifers offshore, as well as depleted oil fields that can be studied for permanent storage purposes, possibly in a HUB model.





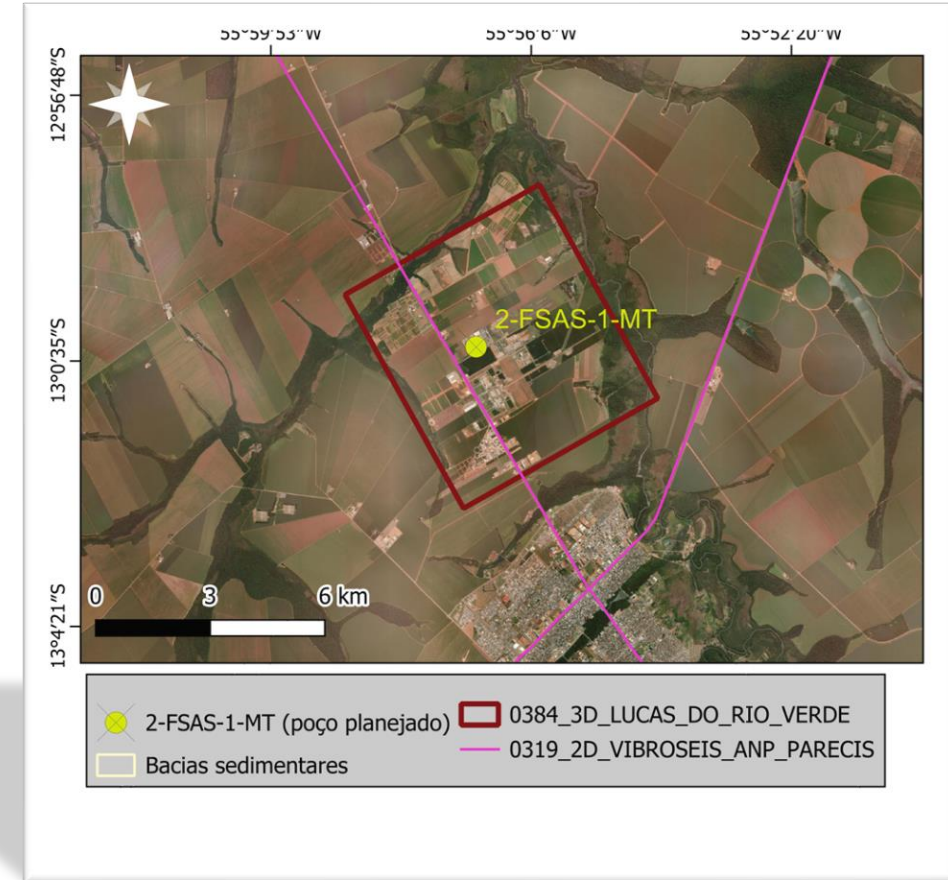


ONSHORE

Parecis Sedimentary Basin

FS Agrisolutions, a biofuels producer, presented a CCS project to ANP in two stages: (i) research, including feasibility analysis, and (ii) implementation^{*1}. ANP authorized the company to acquire geoscientific data from drilling a stratigraphic well in the Parecis basin.

^{*1} *The ANP authorization does not cover CO2 injection tests or the second stage of the project due to a lack of competence and regulation on the subject.*



SDT-ANP Authorization N°. 316/2022,
 complemented by SDT-ANP Order 555/2023

ONSHORE – REGIONAL VIEW



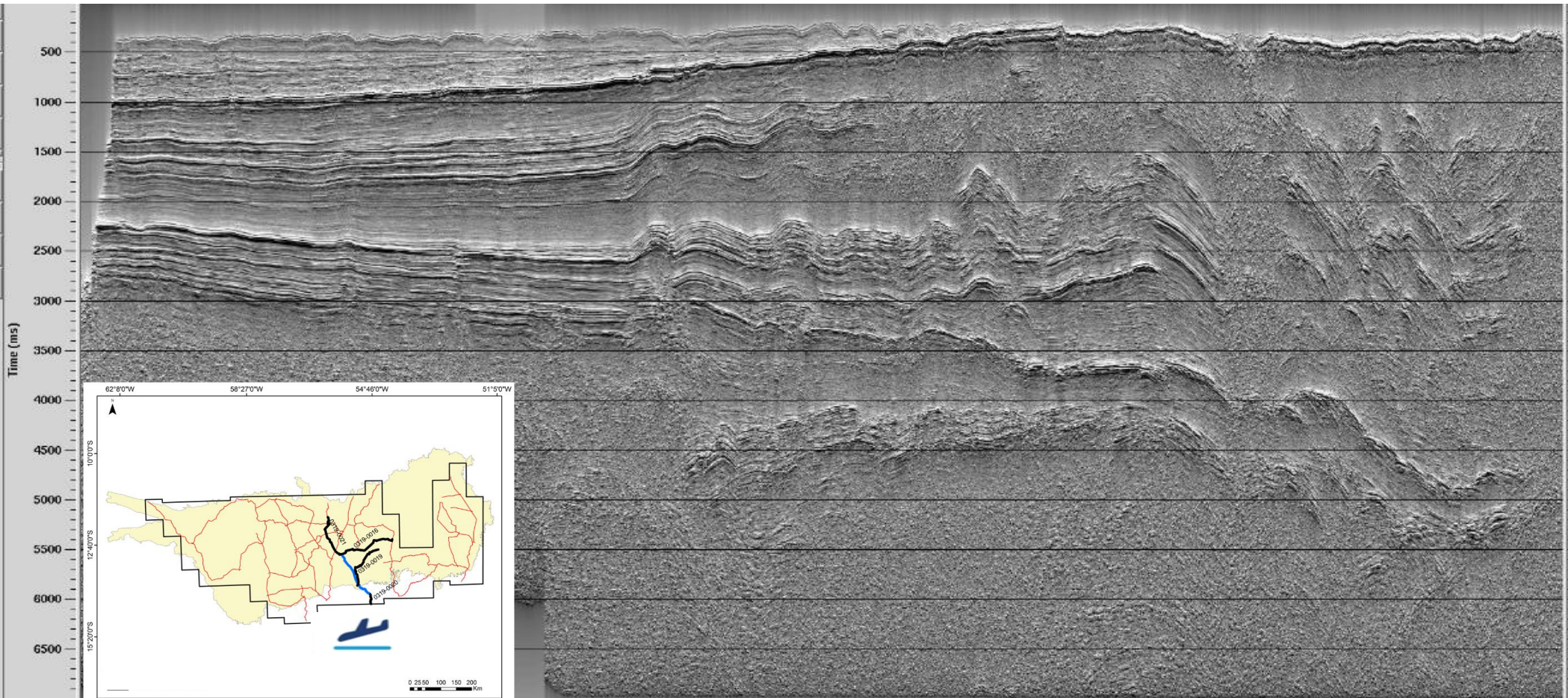
Agriculture: Soybeans and Cotton. Corn and mainly Sugarcane (Ethanol)



Limestone mining



Breeding of cattle. Euclayptus



Cuiabá Airport

ONSHORE – REGIONAL VIEW



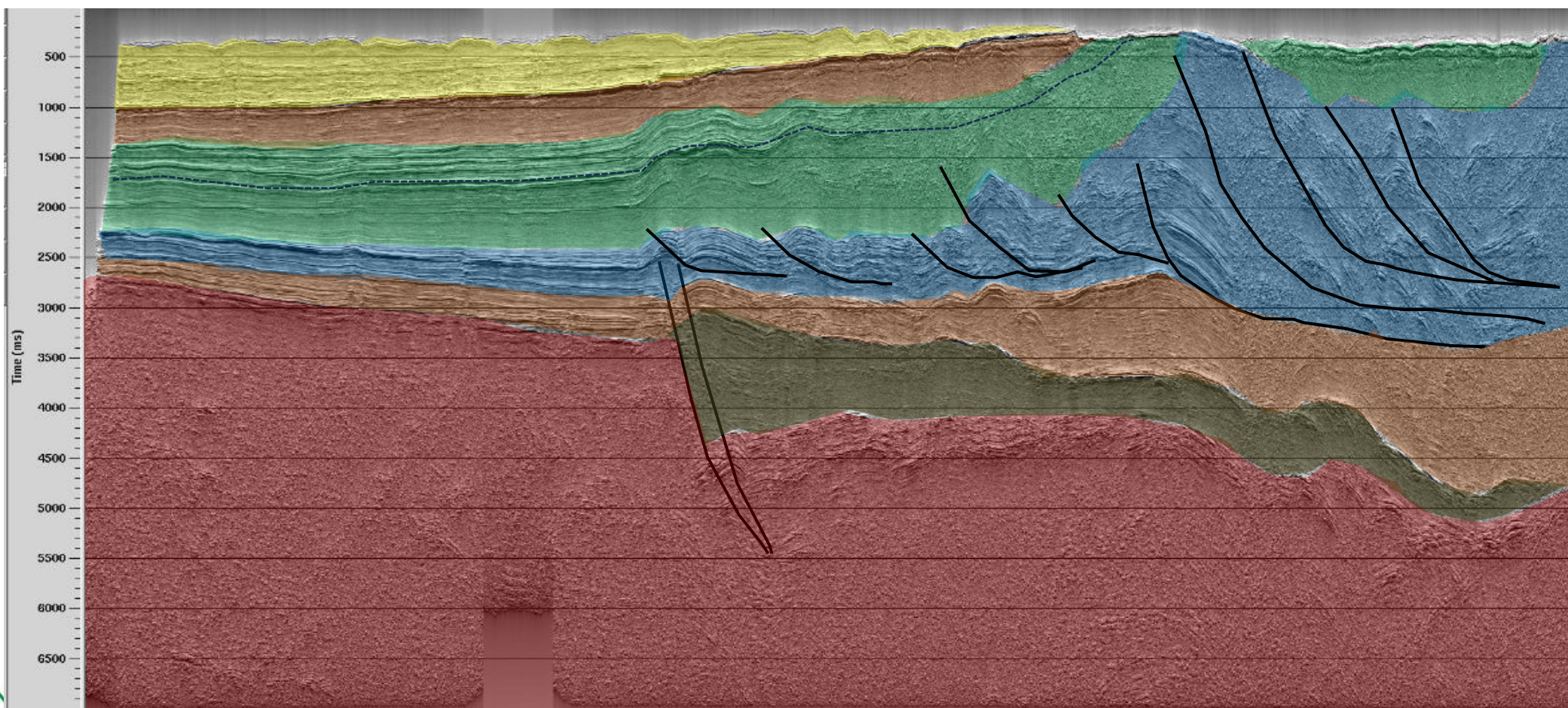
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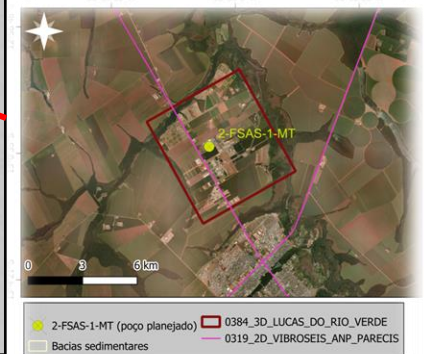
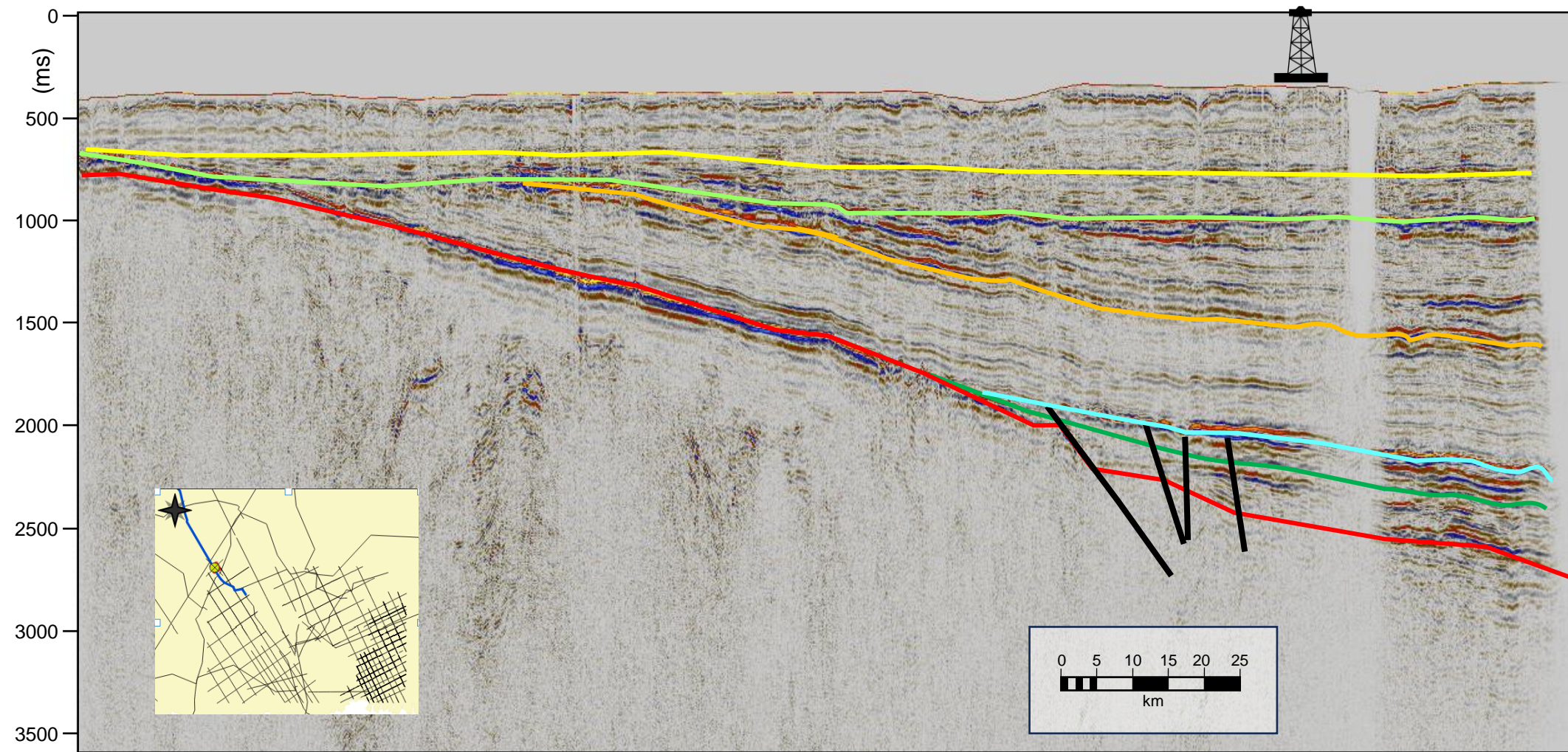


Breeding of cattle. Euclayptus

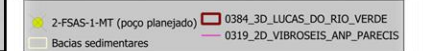
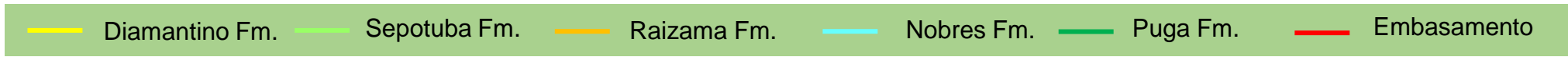


Cuiabá Airport

ONSHORE – ZOOM



Linha Pública 0319-0021 - Levantamento 0319_2D_VIBROSEIS_ANP_PARECIS



BRAZIL – FINAL REMARKS

PL 1425/2022

Bill currently being processed in the Federal Chamber.

<https://www25.senado.leg.br/web/atividade/materias/-/materia/153342>

PL 4516/2023

<https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2388242>

ProBioCCS - MME (BECCS)

<https://www.gov.br/mme/pt-br/assuntos/secretarias/petroleo-gas-natural-e-biocombustiveis/combustivel-do-futuro/subcomites-1/probioccs-1>

ANP

- Research and Development Projects (R&D)

Superintendency of Technology and Environment (STM)

<https://www.gov.br/anp/pt-br/centrais-de-conteudo/paineis-dinamicos-da-anp/paineis-dinamicos-sobre-exploracao-e-producao-de-petroleo-e-gas/painel-de-obrigacoes-de-investimento-em-pd-i>

- Geoscientific Study Program Aimed at Underground Gas Storage (PAG). Additionally, the PAG will assist the ANP in preparing for CCS (Carbon Capture and Storage) regulatory activities if appointed.

Superintendency of Geological and Economic Assessment (SAG).

https://www.gov.br/anp/pt-br/canais_atendimento/imprensa/noticias-comunicados/gas-natural-anp-cria-novo-programa-de-estudos-geocientificos-que-visa-o-armazenamento-subterraneo-de-gas

Thanks!

Q&A

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