

Research on CO₂ geological storage in Romania

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Overview on the research projects

Started in 2001 with affiliation of GeoEcoMar to ENERG

International research projects

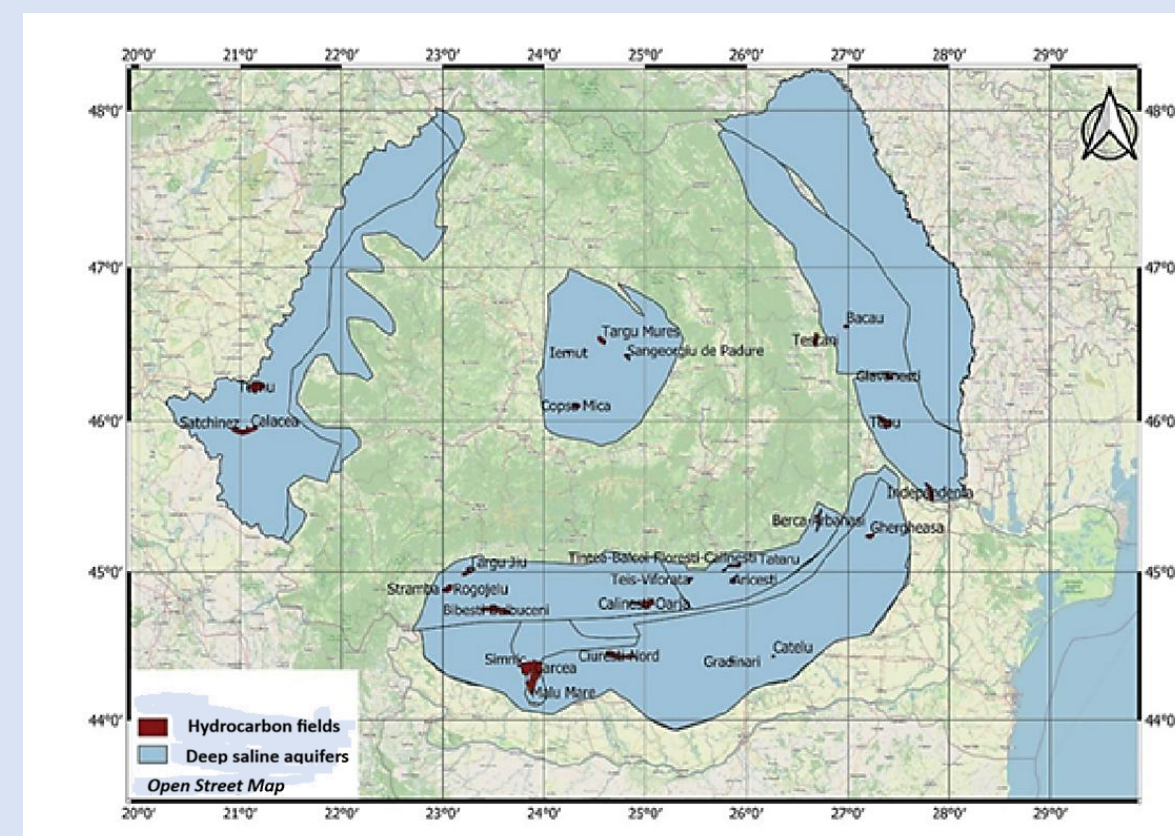
- ✓ FP6: **EUGeoCapacity**, CO₂NetEast,
- ✓ FP7: **CO₂Stop**, ENOS
- ✓ Horizon 2020: **STRATEGY CCUS**
- ✓ ACT: ECOBASE, ALIGN CCUS, **REX-CO₂**, Action
- ✓ CETP: **CTS**, RamonCO
- ✓ Horizon Europe: Eastern Lights

National projects

- ✓ **GETICA CCS**
- ✓ National plan for carbon capture and storage time horizon 2020
- ✓ Projects funded by the Ministry of Research under the **Core Program** for national research institutes

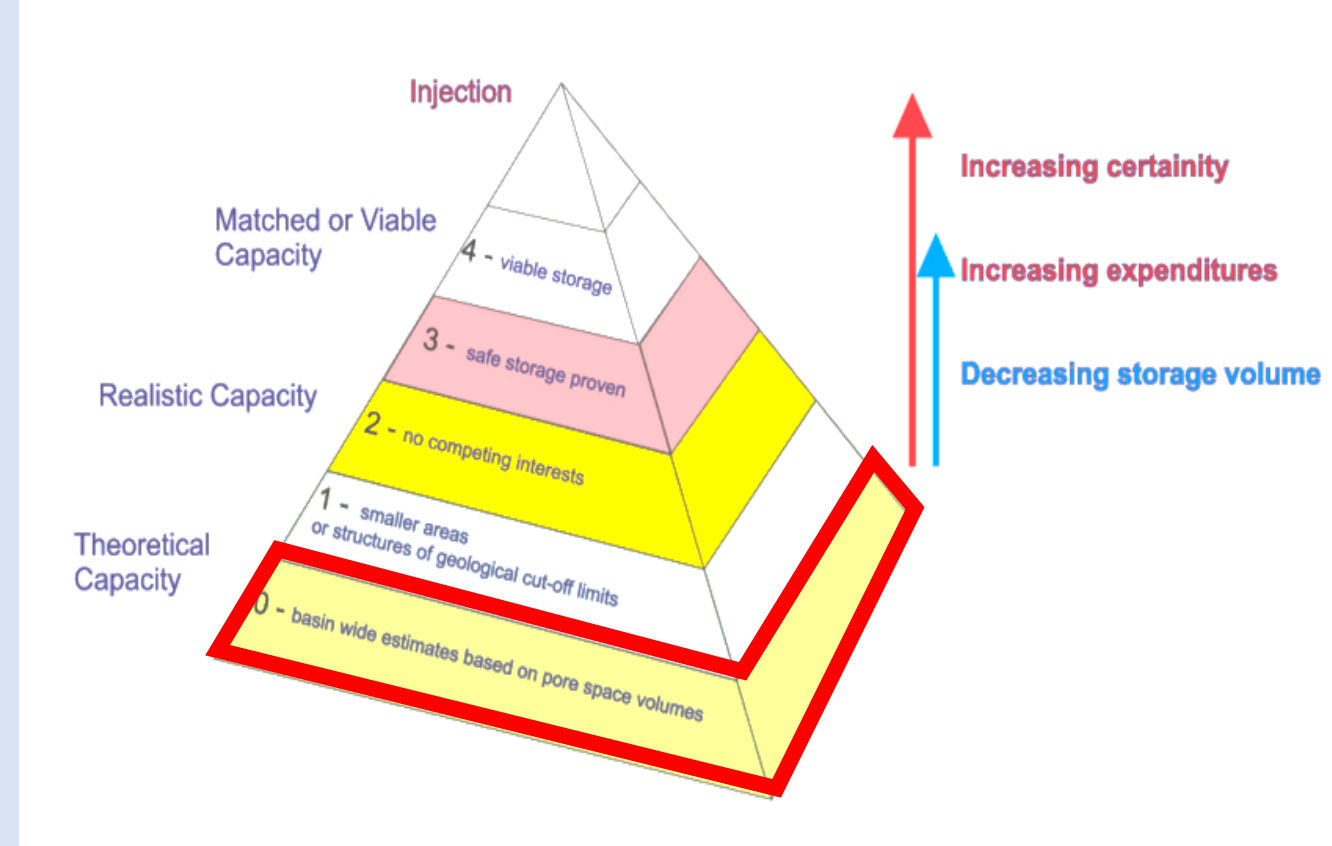
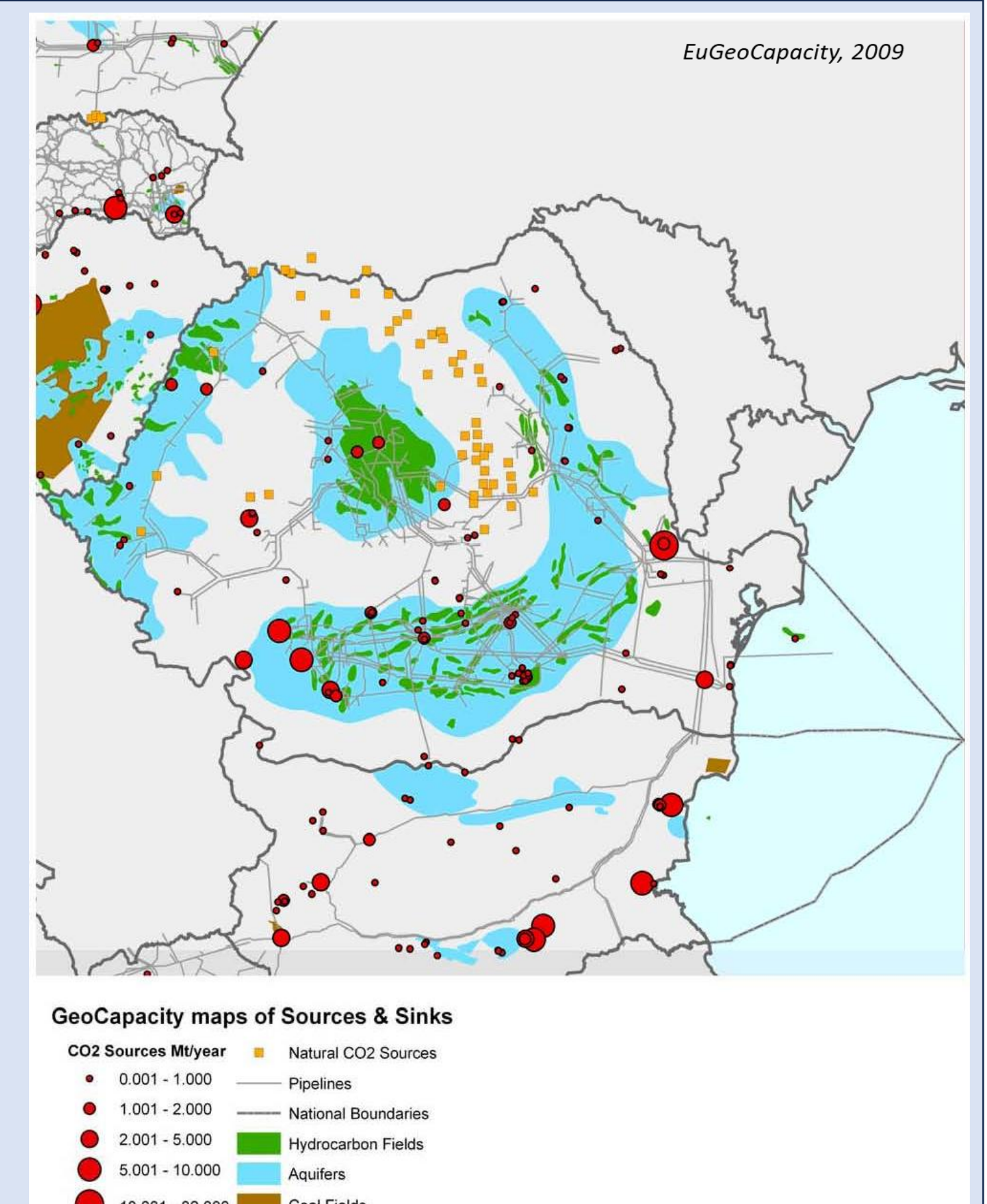
CO₂ Stop - CO₂ Storage Potential in Europe

- Financed by EC
- Re-estimation of storage capacity
- Database with potential storage locations GIS database publicly available
- To feed the European CO₂ storage Atlas
- Romania – re-evaluation of EUGeoCapacity formations and sites



EUGeoCapacity project (2006-2008)

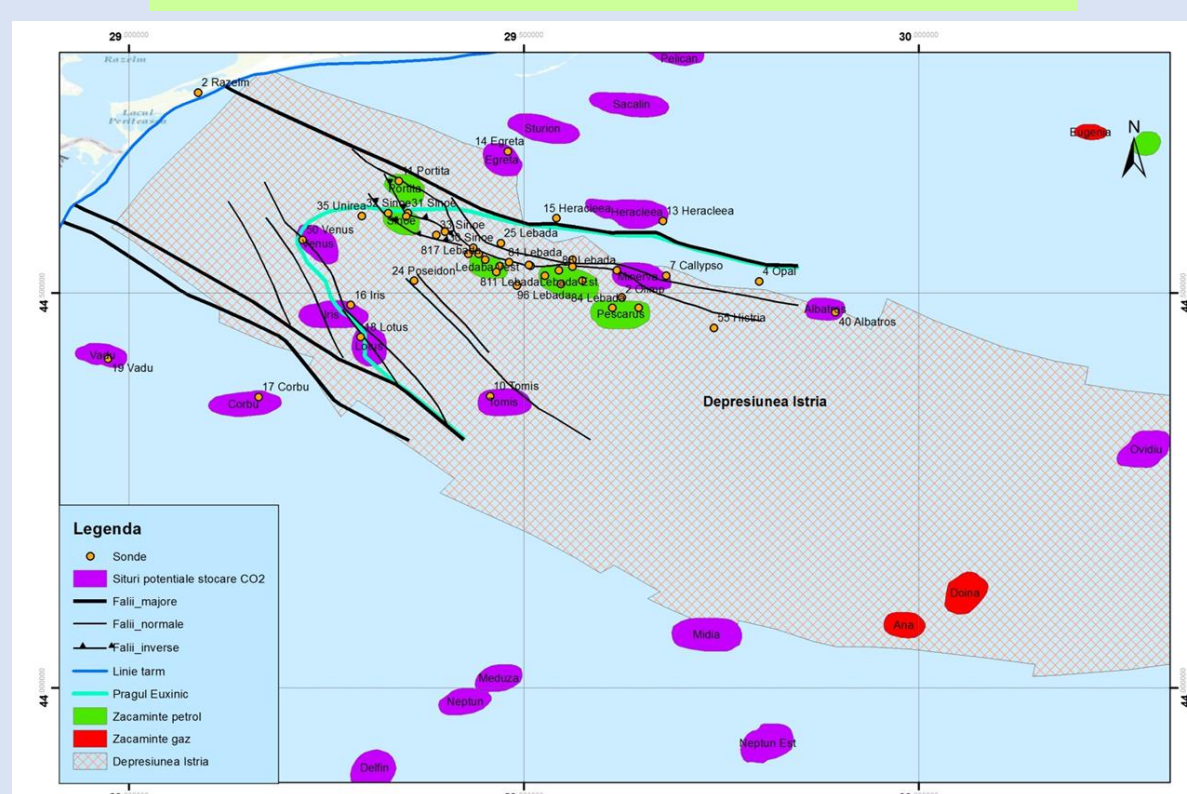
- FP6 funded project coordinated by GEUS
- Pan-european – 26 partners from 21 countries
- Primary objective: evaluation of CO₂ geological storage capacity at European level
- Romanian contribution provided by GeoEcoMar
- Selection of potential storage areas at country level – only onshore for Romania



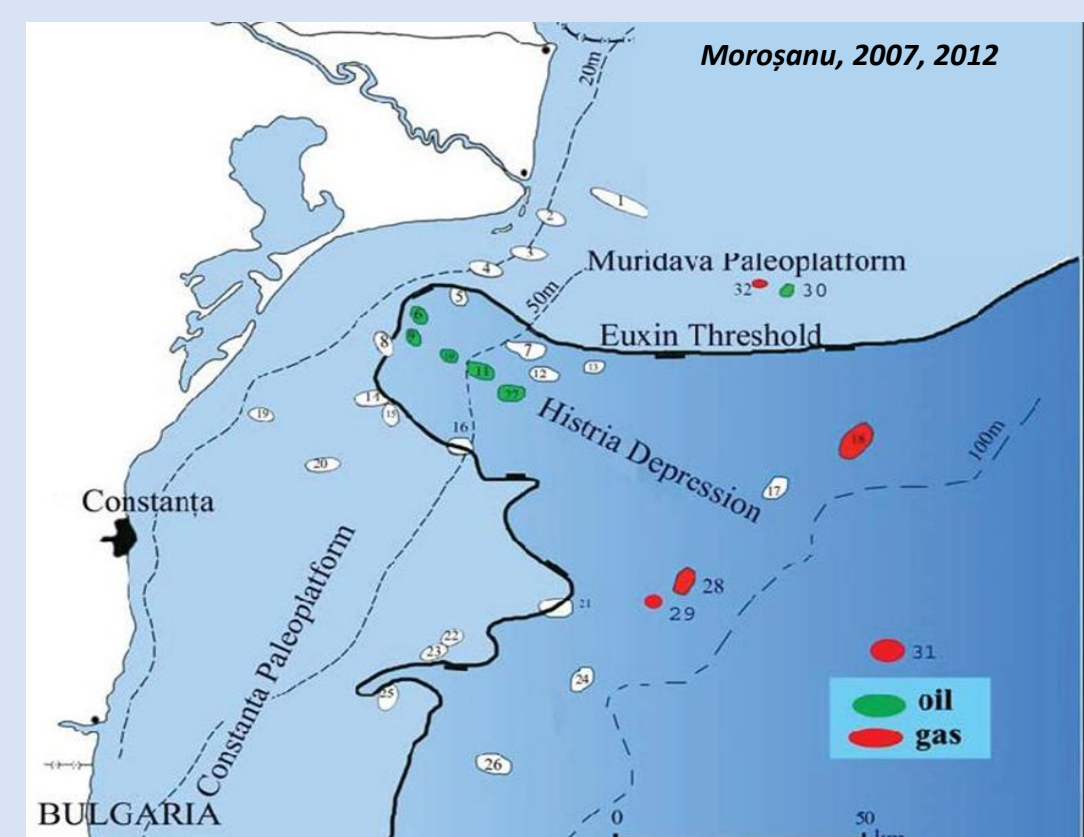
- Estimation of **theoretical** CO₂ geological storage capacity for Romania (2009)
- 18 Gt deep saline aquifers (regional aquifers extended at the level of suitable formations)
 - 4 Gt hydrocarbon fields (all)

Projects funded by the Ministry of Research under the CORE PROGRAM for national research institutes

CORE PROGRAM - RESEARCH ON OFFSHORE STORAGE – BLACK SEA ROMANIA (2017)



- Focused on **Histria Depression**
- Evaluation of potential storage sites
 - Hydrocarbon fields: Lebăda, Pescaruș
 - Potential deep saline aquifers (structures found non-productive)

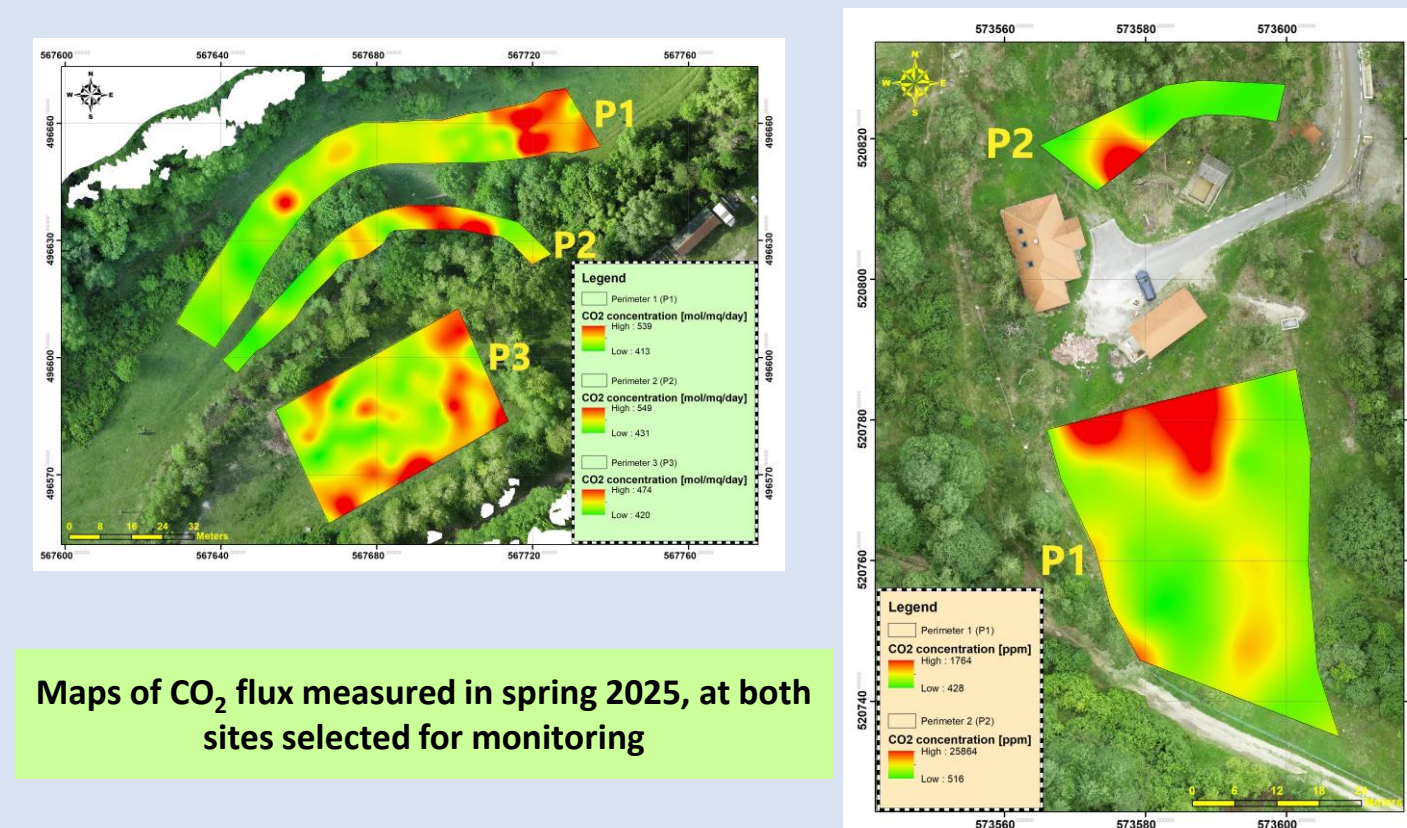


Development of a monitoring technology for CO₂ geological storage through the study of a natural analogue (Romania) (2023-2026)



Targets:

- Determining the feasibility of using shallow geophysical methods in environmental monitoring of CO₂ storage sites;
- Defining best practices for environmental monitoring of potential CO₂ storage sites in Romania;
- Definition of the environmental monitoring methodology based on the analysis of the environmental impact of potential leaks from a storage site and on the basis of the leaks mechanisms identified from the study of natural analogues;
- Stakeholder engagement and dissemination;
- Support the implementation of an onshore CO₂ storage project in Romania.

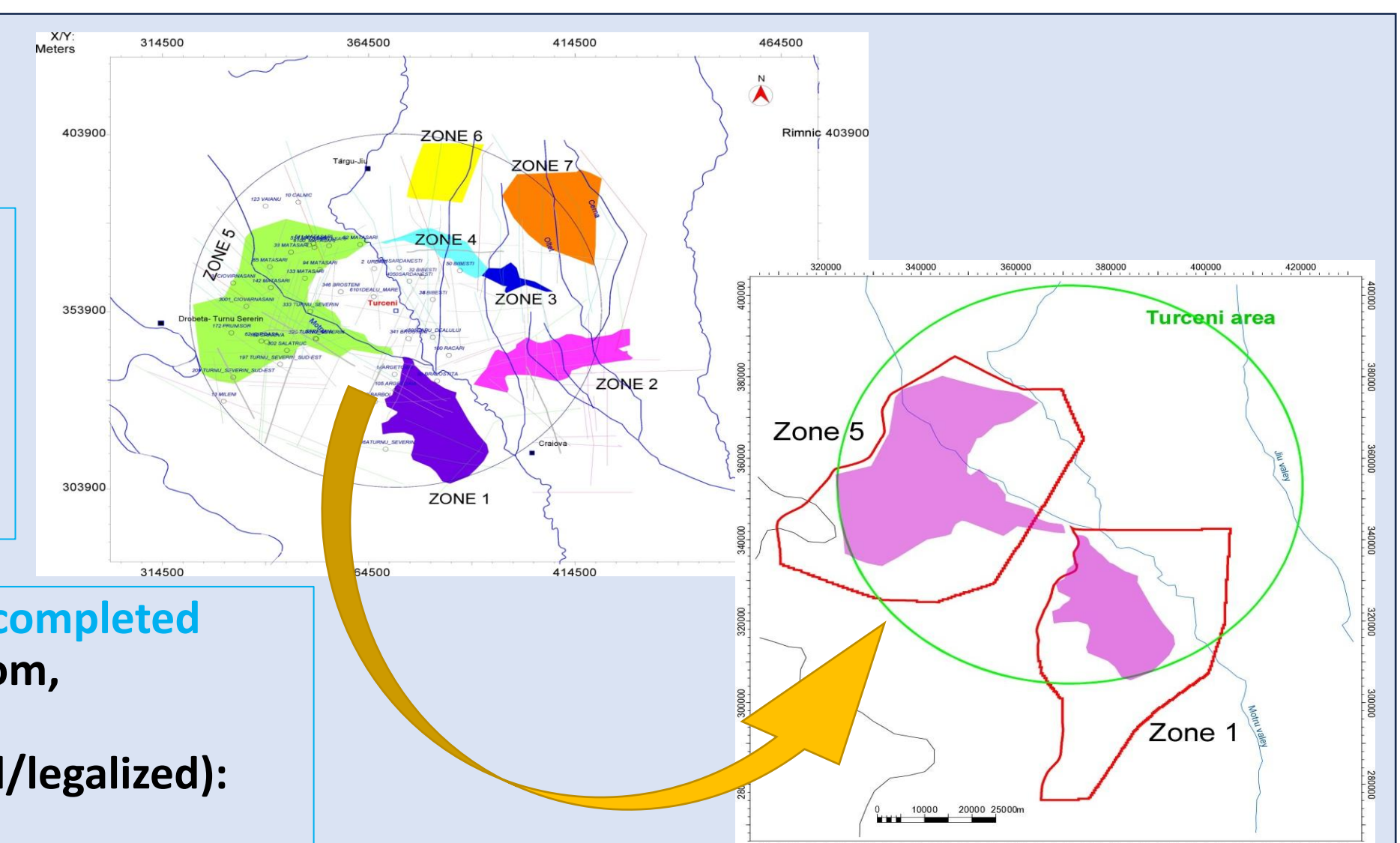


Maps of CO₂ flux measured in spring 2025, at both sites selected for monitoring

GETICA CCS

- **Capture:** Turceni – 1.5 Mt/y
- **Transport:** onshore pipelines
- **Storage:** deep saline aquifers
- **Feasibility study completed,** financed by GCCSI and Ministry of Economy

- **Appraisal and monitoring plans completed**
- Technical consortium: ISPE, Alstom, GeoEcoMar, Schlumberger
- Project company (not formalized/legalized): Turceni, Transgaz, Romgaz
- On the waiting list for NER 300

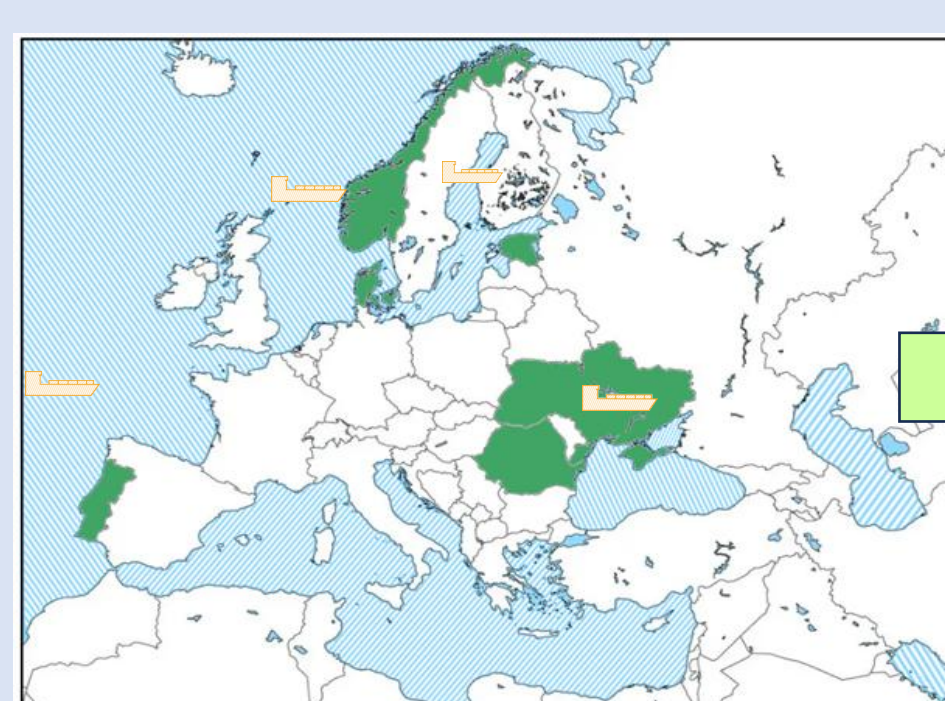


CTS - CO₂ TRANSPORT AND STORAGE DIRECTLY FROM A SHIP: Flexible and cost-effective solutions for European offshore storage



CETP project – 2024 – 2025, 11 partners from 5 countries

- **Main objective:** to demonstrate techno-economic feasibility of direct injection from ship to unlock CCS potential for the industry by increasing flexibility and versatility of the CCS value chain as well as to reduce costs.
- To screen for best candidates in the North Sea, Black Sea, Baltic Sea and Atlantic coast of Portugal for technology application.
- To design and evaluate CCS value chains with direct injection from 4 regions
- Stakeholder engagement



Romanian scenario

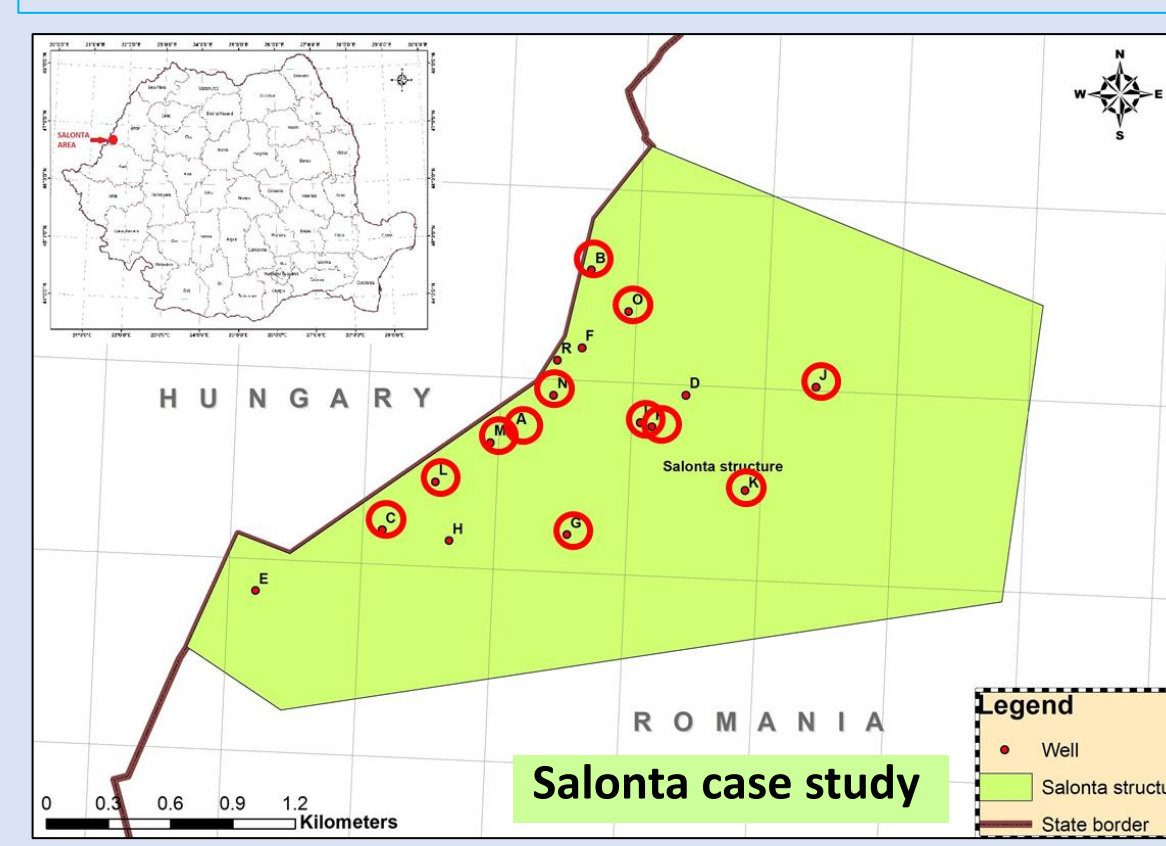


- **Capture:** 2 clusters Călărăși and Constanța; 7 emitters
- **Transport:** multi-modal (rail, short pipelines, barges on the Danube, offshore pipelines, ships and direct ship injection)
- **Storage:** Black Sea – deep saline aquifers and hydrocarbon fields
- Techno-economic analysis started

REX-CO₂ - RE-USING EXISTING WELLS FOR CO₂ STORAGE OPERATIONS

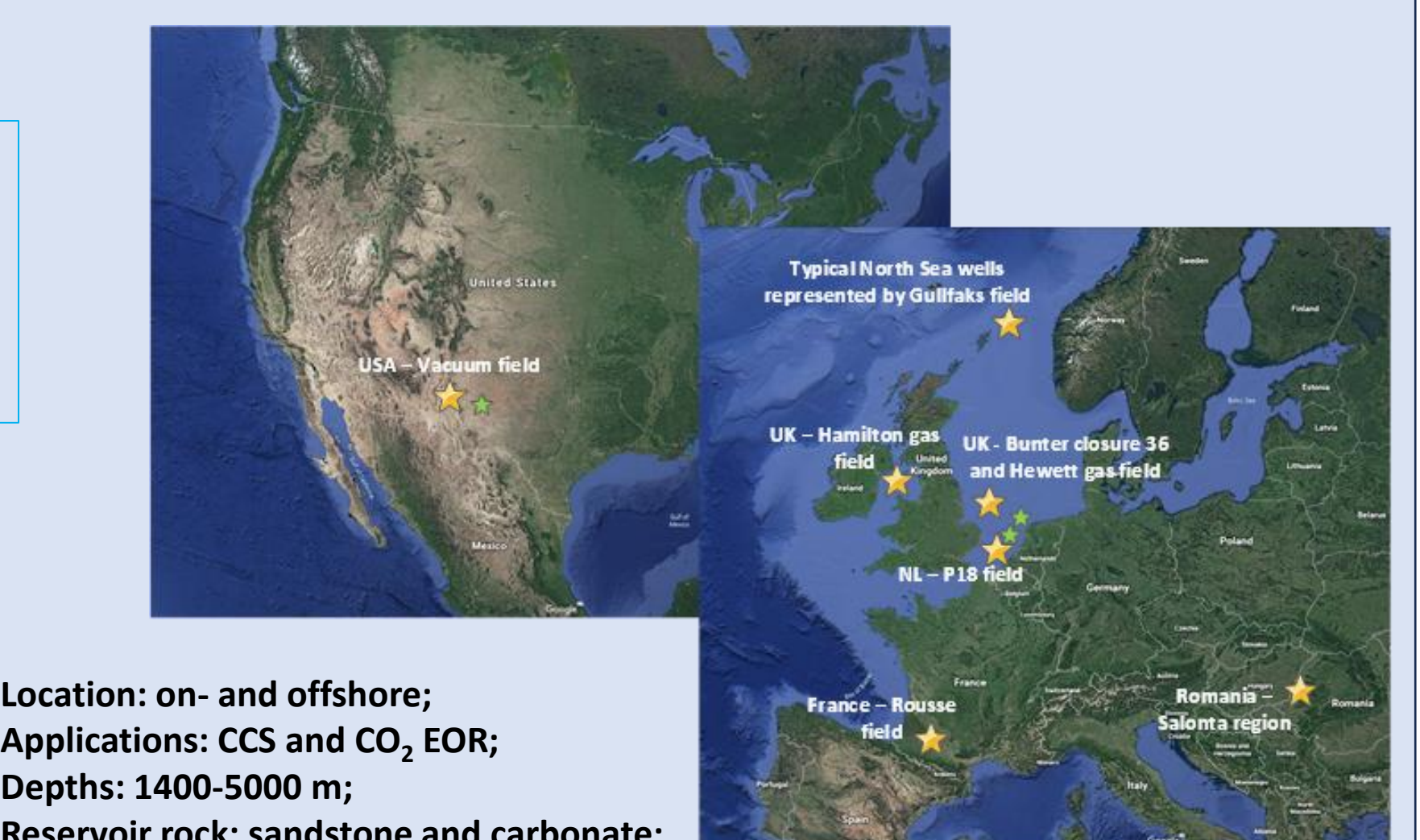
ACT project. Main objective: development of a tool and procedures to evaluate the feasibility of re-utilizing hydrocarbon wells for injection and storage of CO₂

10 National case studies



The recommendations are intended to:

- Provide industry with recommended means for qualification and re-purposing of wells;
- Assist regulators in understanding the potential for re-using wells;
- Provide a foundational knowledge-base for well re-use;
- Identify future research requirements



Location: on- and offshore;
Applications: CCS and CO₂ EOR;
Depths: 1400-5000 m;
Reservoir rock: sandstone and carbonate;
Reservoir type: gas field, oil field, saline aquifer;
Reservoir capacity: 37 – 280 Mt CO₂;
Number of available wells >100;
Only a few instances where existing wells have been considered for re-use have been documented (i.e. Porthos & K12-B CATO (Netherlands), Goldeneye & Hewett (UK), Rouse (France))

- **Out of Zone Injection.** No cement evaluation logs, no estimation of the fracture gradient, no leak-off test, no corrosion information;
- **Structural integrity.** No information on corrosion, formation strength;
- **Well integrity primary barrier.** No recent inspections to any of the barrier elements, no assessment of the quality of cement, cement integrity issues found and resolved
- **Well integrity secondary barrier.** Indications that no secondary well barrier exists
- **Material Compatibility.** No information on the steel grade, equipment suitability to new conditions

Summary and conclusions

1. Long research history on CO₂ geological storage;
2. Only **theoretical estimation of storage capacity at national level** (base of the pyramid, overestimation, based on poorly available public data);
3. Regional deep saline aquifers considered, only 2 onshore deep saline aquifers analysed within GETICA CCS;
4. Black Sea research ongoing;

5. Research challenges: **Limited access to data**;
6. Opportunities:
 - **Funding under Horizon Europe**
 - **Funding under CETP program**