7th International Workshop on Offshore Geologic CO_2 Storage

Update on the design of the offshore CO_2 injection site in Portugal

Pedro Pereira

Institute for Advanced Studies and Research/ Institute of Earth Sciences, University of Évora, Portugal

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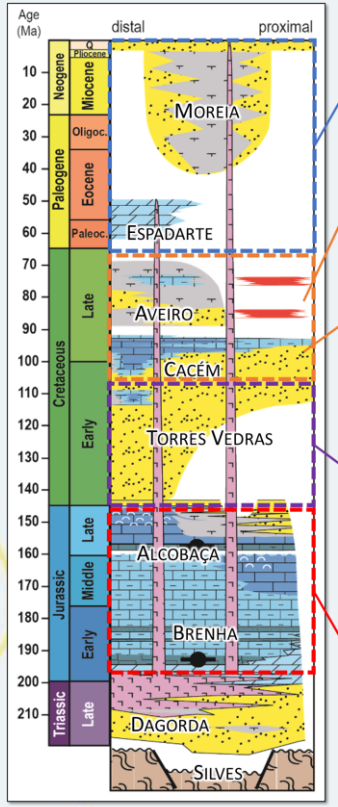
PilotSTRATEGY Project

Scaling up CO_2 storage – pilot studies in regions with promising geological resources

- **5 years R&D Project** (2021-2026)
- **Research and Industrial partners** of 7 countries
- **Detailed characterization of CO_2 geological storage pilot sites** in selected areas of interest
- **Deep saline aquifers:** large capacity for storing CO_2
- **Support the development** of large-scale carbon capture and storage (CCS) in **Southern and Eastern Europe**
- **Pre-investment proposal** for the **3 pilots in France, Portugal and Spain**
- **Increase maturity of storage capacity** for Poland and Greece regions

Q4-TV1 Prospect – Offshore Lusitanian Basin

CO_2 Storage Complex



Overburden

Cenozoic siliciclastic deposits and dolomites (Espadarte Fm.)

Potential Secondary seal

Upper Cretaceous siliciclastic deposits and carbonates (Aveiro Group)

Primary seal

Upper Cretaceous limestones, argillaceous limestones and shales (Cacém Fm.)

Reservoir

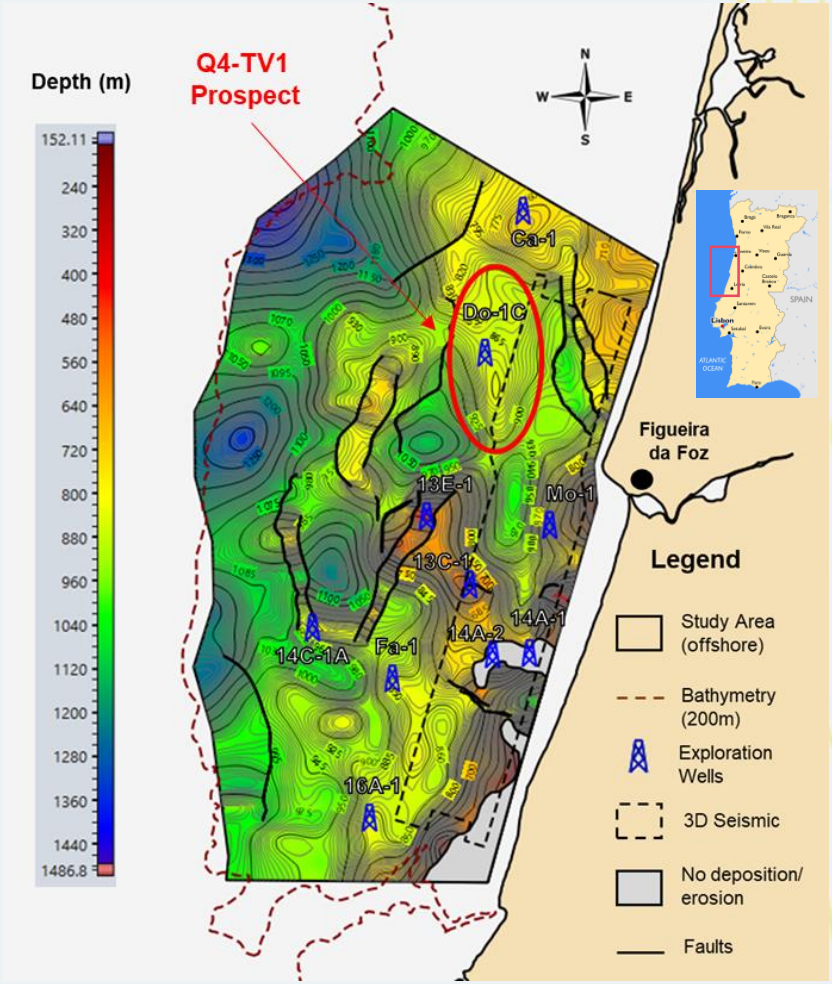
Lower Cretaceous siliciclastic deposits, with coaser sediments at the bottom evolving to sandstones and interbbeded claystones towards the top (Torres Vedras Group)

Underburden

Upper Jurassic layers with intercalated sandstones/ claystones (Alcobaça Fm.) and Middle Jurassic carbonate-rich rocks (Brenha Group)

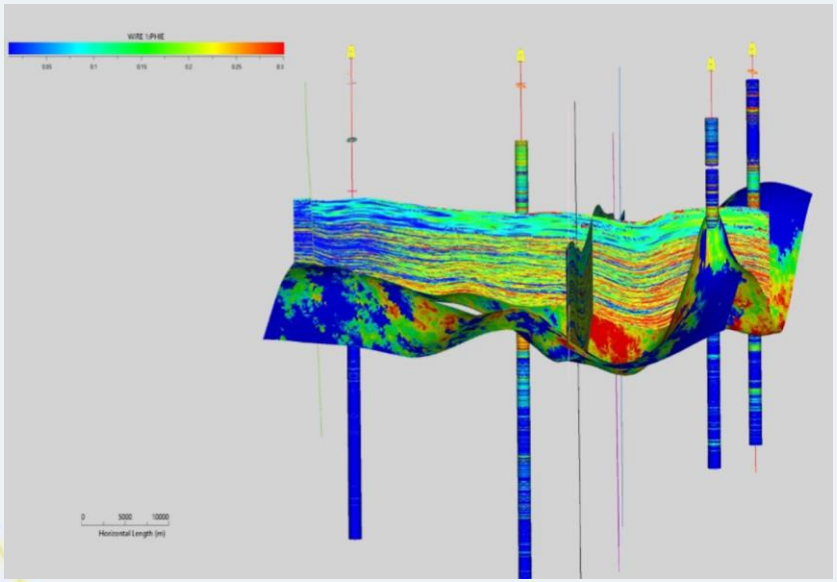
- Located in the northern area of the Lusitanian Basin, approx. **20km from the shoreline** (Figueira da Foz)
- **Target reservoir unit of Q4-TV1 prospect**: Lower Cretaceous (Torres Vedras Group)
- Main risks include the presence of a **hydrocarbon exploration legacy well** Dourada-1C (Do-1C) and faults
- Potential upside opportunity by **upscaling from pilot- to commercial-scale**

Reservoir Top Depth

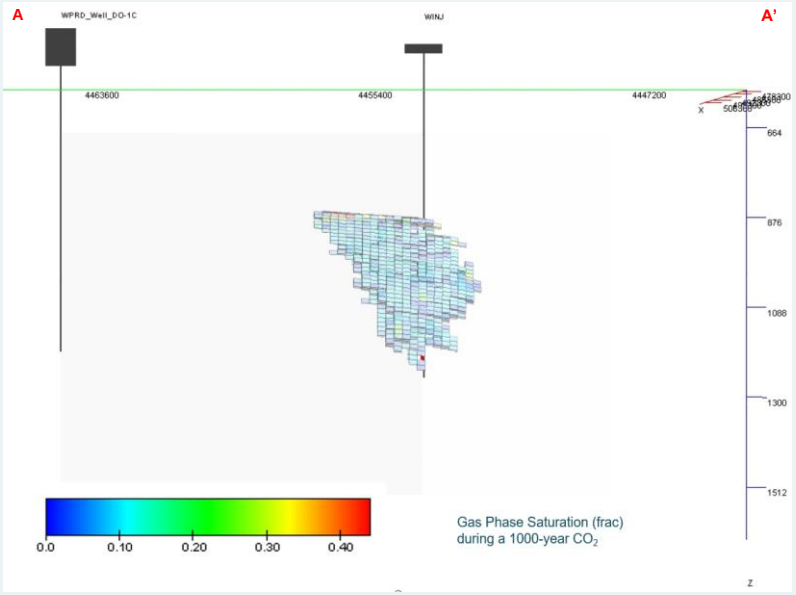


Selection of the CO_2 Pilot Injection Well Location

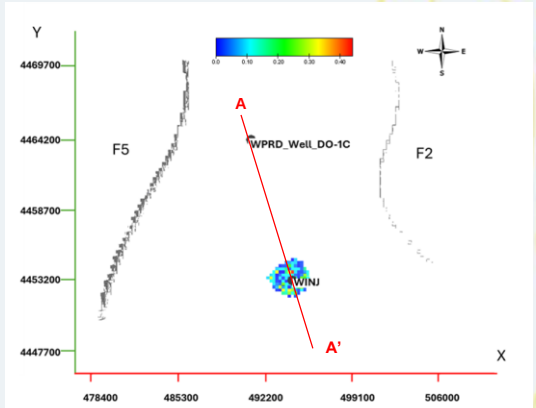
3D Static Modelling – Q4-TV1 Prospect



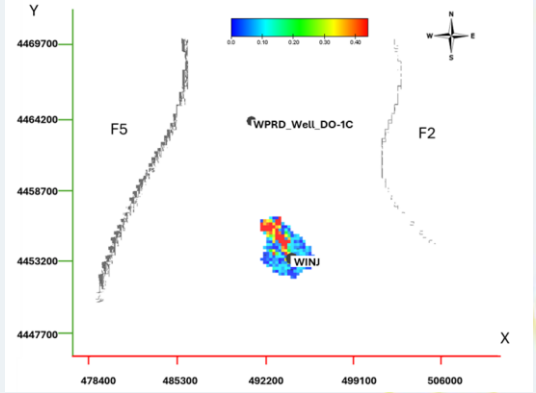
Reservoir Dynamic Simulation and Optimization of Well Placement



Gas Phase Saturation after 30-years injection



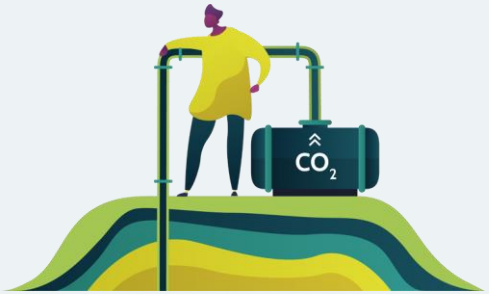
Gas Phase Saturation after 1000-years



- **Water Column Depth (average):** 85m
- **Reservoir Top Depth (average):** 860m
- **Reservoir Bottom Depth (average):** 1200m
- **Reservoir Thickness (average):** 300m
- **Petrophysical Properties (average):**
  - **Reservoir:** ϕ = 22% | k = 229mD
  - **Seal:** ϕ = 7% | k = 0.04mD

- **Bayesian Optimization Integrating Geological Uncertainties:**
  - **Dual-Objective Function:** Maximizing CO_2 total well mass injection and minimizing associated risks (legacy well and faults)
  - **Injection Period:** 30 years | **Simulation of CO_2 plume:** Over a period of 1000 years
  - **Perforation Interval:** 50m | **Perforation Depth:** 1205-1250m
  - **CO_2 total well mass injection:** 16Mt CO_2

Pilot Storage Site – Development Strategies



Key Aspects:

- **Pilot-scale:** inject up to 100kton CO_2 over max. of 3 years (1 injection well);
- **Transportation by ship** based on the support **infrastructure of Port of Figueira da Foz**;
- Study the **storage complex and facilities**, as well as **surface conditions** (CO_2 capture not included);
- Propose **monitoring techniques** in the well and adjacent areas of the storage site;
- Study **business models** and plan the **upscaling of the pilot- to commercial-scale**.

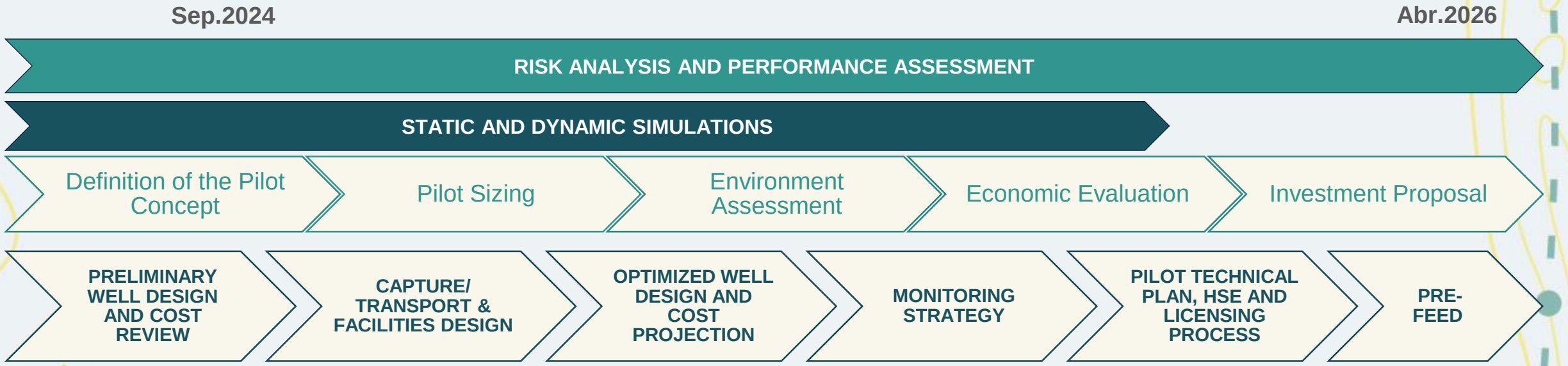
Challenges:

- **Source of CO_2 at the pilot-scale** (for ship transportation and direct injection – intermittent injection strategy);
- Increase **public awareness** of CCS (local communities and authorities, stakeholders, etc.);
- **Offshore regulatory framework** for CCS (subject to specific regulations).

Progress Overview of the Project Technical Work

- **Analysis and quantification of risks** through dynamic reservoir simulation studies to evaluate **reservoir performance and containment** at both pilot- and commercial-scales.

- **Development of strategies and scenarios** for designing the offshore pilot storage site, addressing **environmental** and **economic assessments**, as well as the **investment proposal**.



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INSTITUTO DE CIÊNCIAS SOCIAIS

UNIVERSIDADE DE ÉVORA

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Thank you for listening

Pedro Pereira

(pmpereira@uevora.pt)

info@pilotstrategy.eu **@pilotstrategy** **www.pilotstrategy.eu**