SIMCO2DEPL

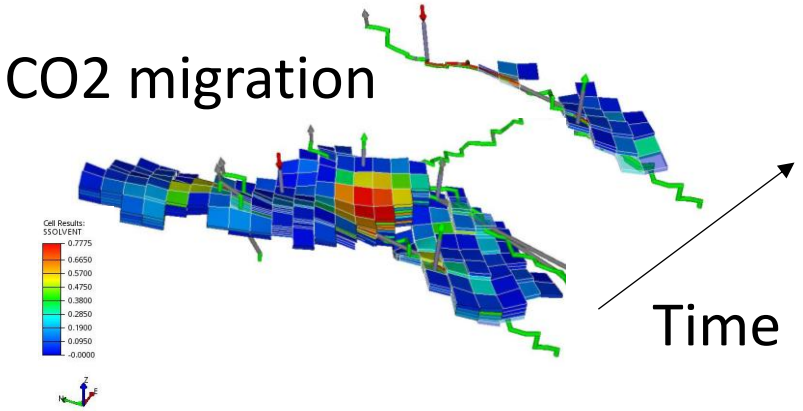
Compositional and Multiphysics Simulation for CO_2 Storage in Depleted Fields

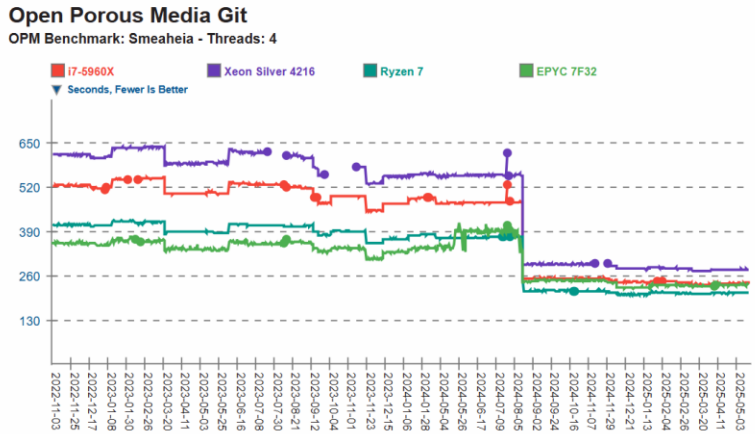
CLIMIT project History

2013–2020

Simulation tools for CO2-EOR.

- The blackoil simulator OPM Flow.
- Extended blackoil models.
- Milestone: Run Norne!





2022–2025

HPC-simulation software for the gigatonne-storage challenge

- The CO2STORE module
- Validation Equinor
- SPE11 100 million case

Project Motivation

Depleted oil and gas fields offer large, well-characterized CO_2 storage capacity with proven long-term containment

Re-use of existing wells and infrastructure can reduce cost, risk, and time to deployment for CCS projects

CO_2 injection into depleted fields involves complex coupled processes

No single existing simulator can robustly model all required processes within standard industrial workflows

Technical Scope

Extension of OPM Flow to compositional simulation for depleted hydrocarbon reservoirs

- Coupled modeling of CO_2–hydrocarbon–brine systems
- Thermal effects and phase transitions near critical conditions
- Focus on robustness, scalability, and industry-standard workflows

Advanced physics

- Thermal, geochemical, and geo-mechanical effects
- Near-well effects: injectivity, salt precipitation, hydrates
- CO_2 dissolution in brine with multi-salt composition

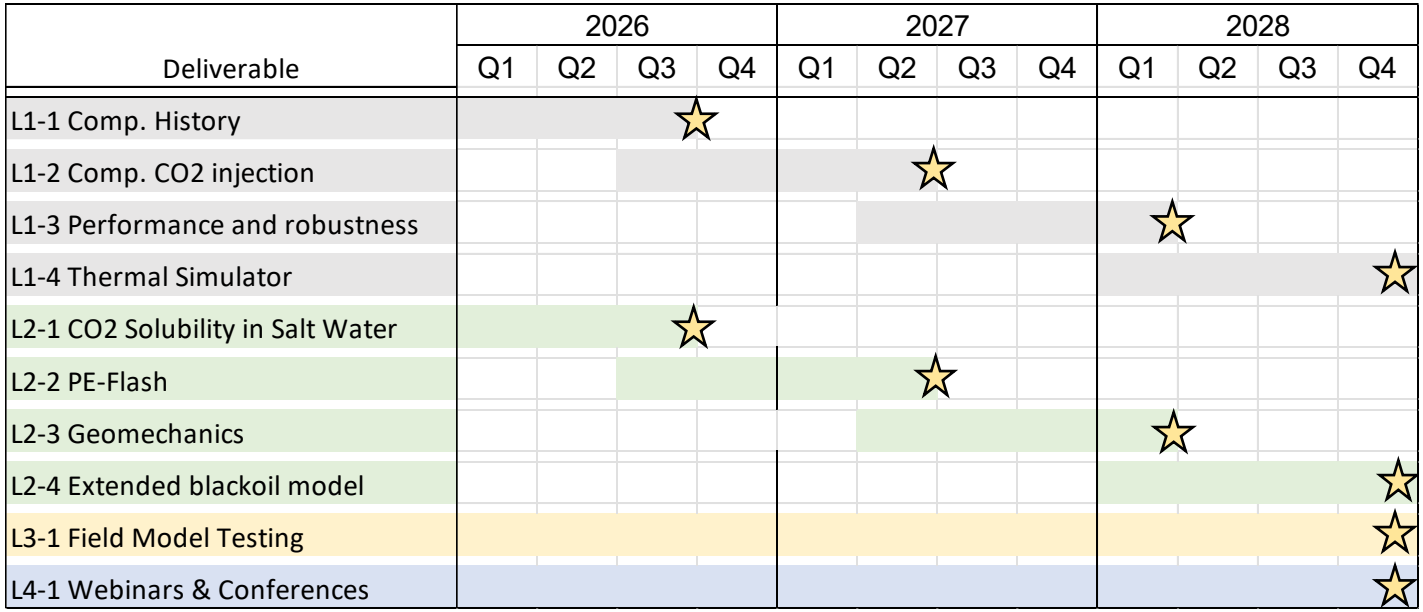
Work Package Structure (Phase 1)

WP1: Compositional field-scale simulator development

WP2: Advanced physics and prototype models

WP3: Testing on realistic field models

WP4: Dissemination and industry interaction



Key Deliverables (Phase 1)

- Validated compositional simulator in OPM Flow
- Thermal–compositional PE-Flash prototype
- Improved CO_2 solubility models
- Demonstration on real field models
- Open-source release and technical documentation