

Laying the Cornerstones of a Regional Storage Hub in California

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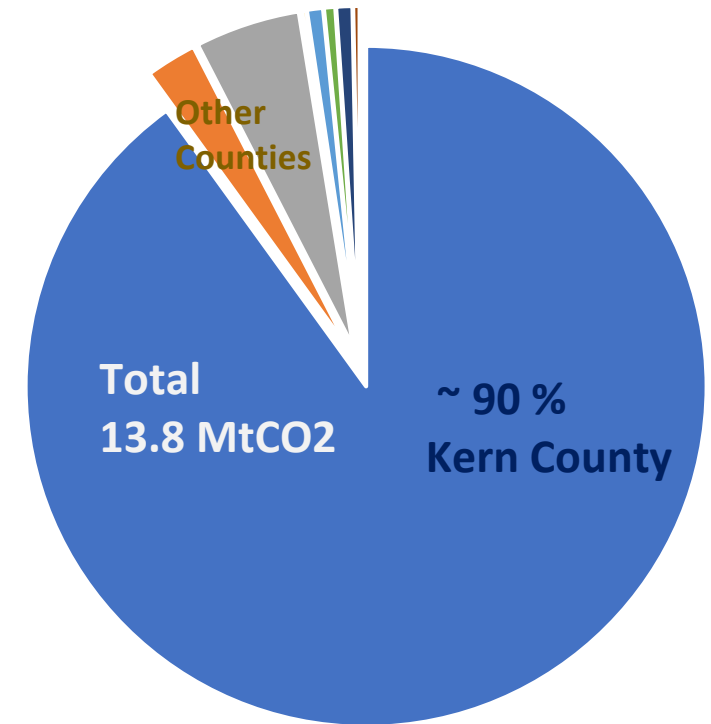
Project overview

- Industrial Partner: Sentinel Peak Resources (SPR)
- Research Partners: Carbon Solutions LLC, Montana State University
- Target emitters: Oil & gas production facilities in Kern Co.
- Storage site: Saline formation in the Southern San Joaquin Basin
- Goals
 - Accelerate pilot project to capture, transport, and store 70 ktCO₂/y.
 - Support an EPA Class VI well permit application
 - Demonstrate the feasibility of a CCS storage hub in Kern Co.

Objectives

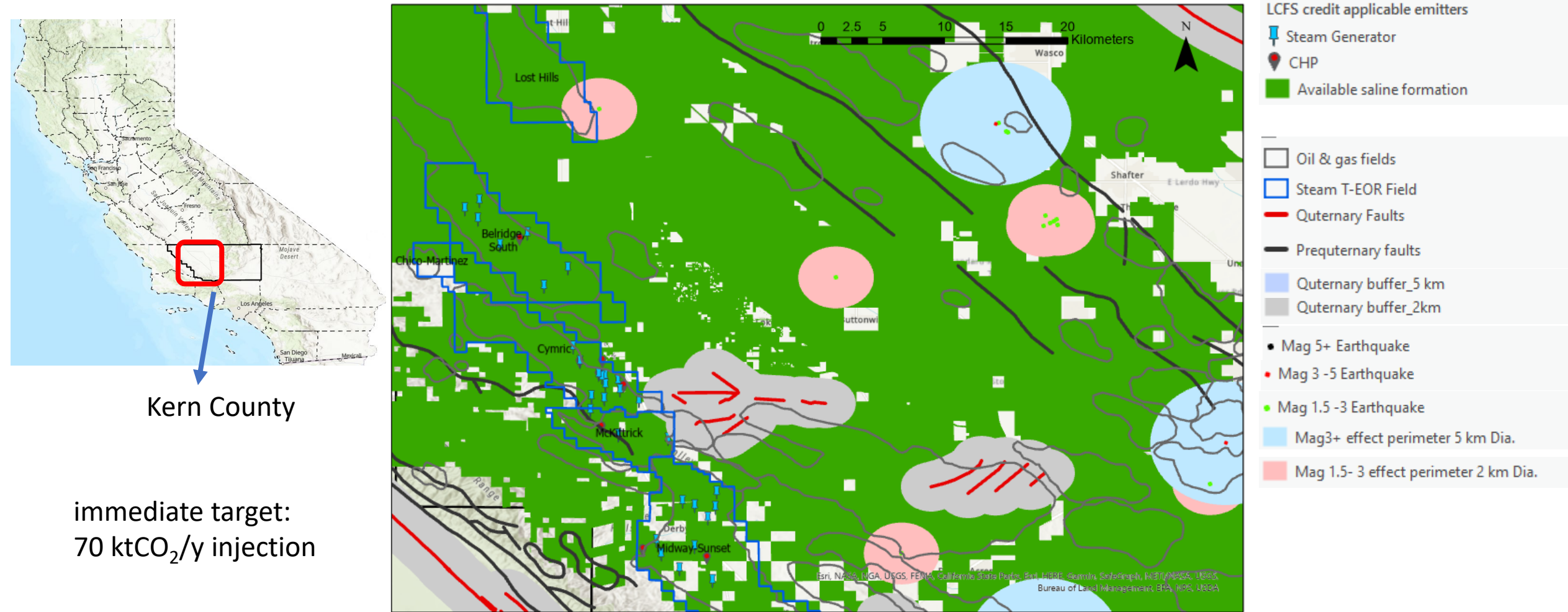
- Leverage LCFS (low carbon fuel standard) credits to deploy a CCS project in California
- Investigate storage volumes and dynamic storage capacity in targeted saline formation
- Establish similar projects for oil & gas companies
- Forge a pathway to deploy a regional storage hub in the Southern San Joaquin Basin

Oil & Gas Production Emissions
2018-2019, (CARB, 2021)



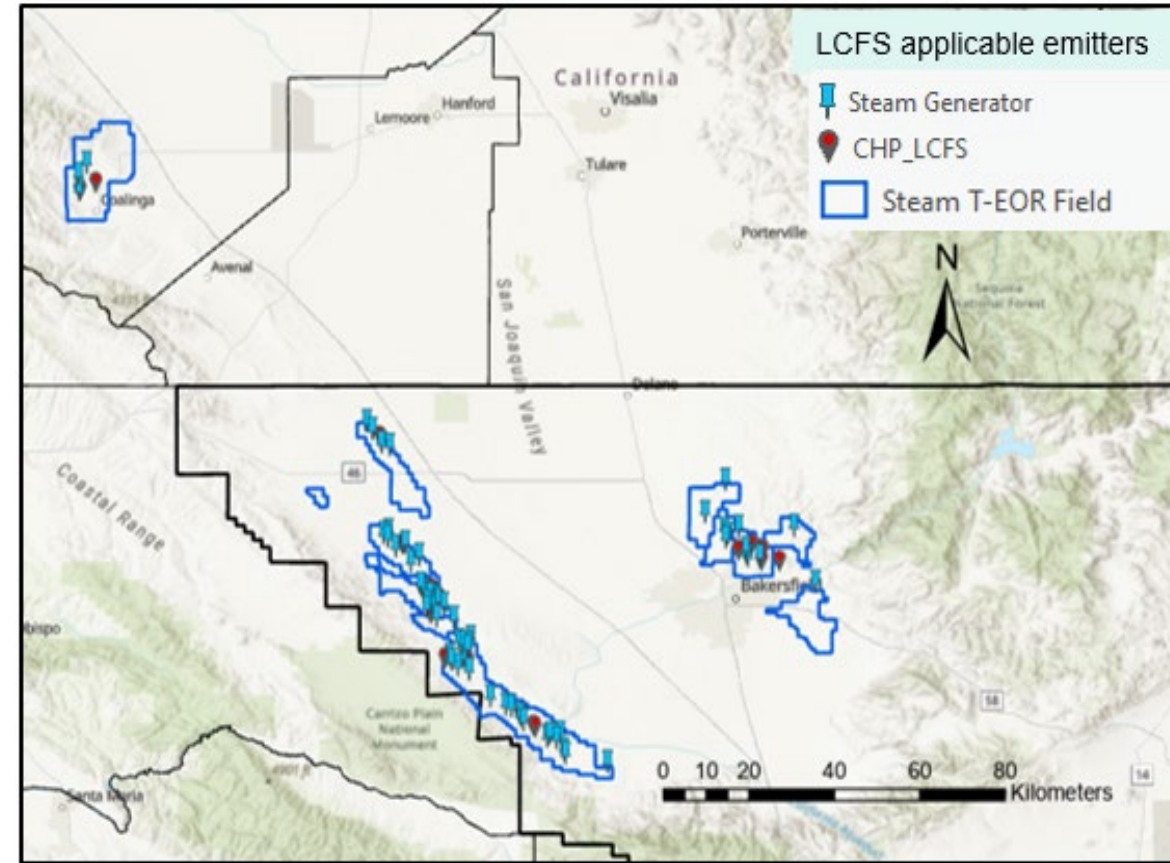
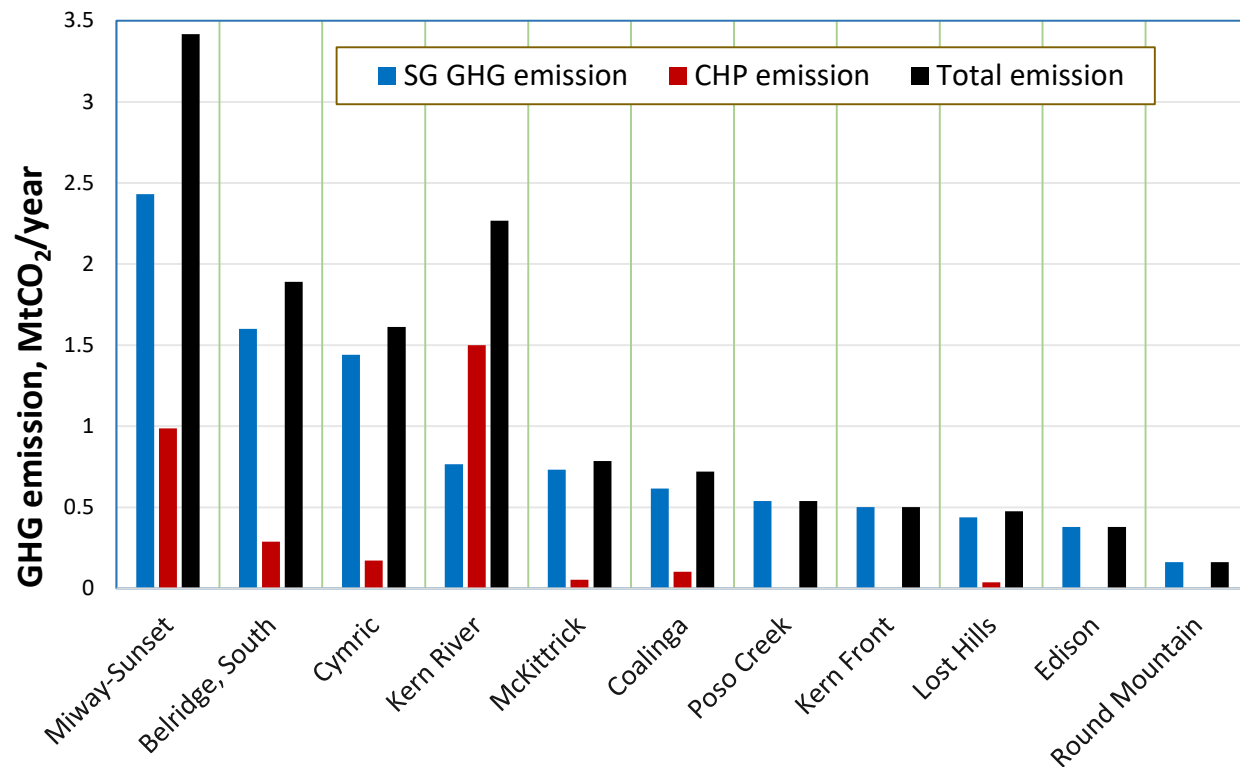
1. Focus Area, option 1

After 3-stage screening process



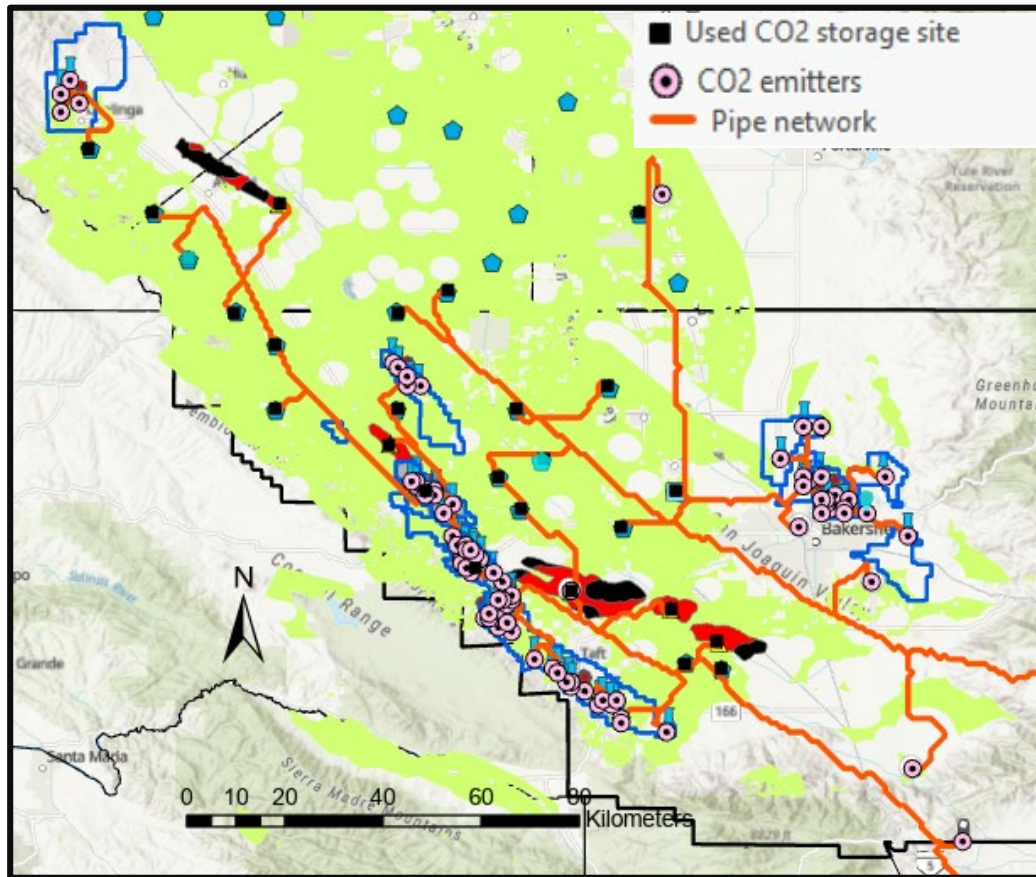
1. Identification of distributed emitters

- 63 O&G sites (SG w/~400 units), 20 sites (CHP)
- Emissions per SG: 0.15 MtCO₂/y
- Total emissions: 9.6 MtCO₂/y (SG) and 3.1 MtCO₂/y (CHP)
- **90 % capture 11.4 MtCO₂/y**

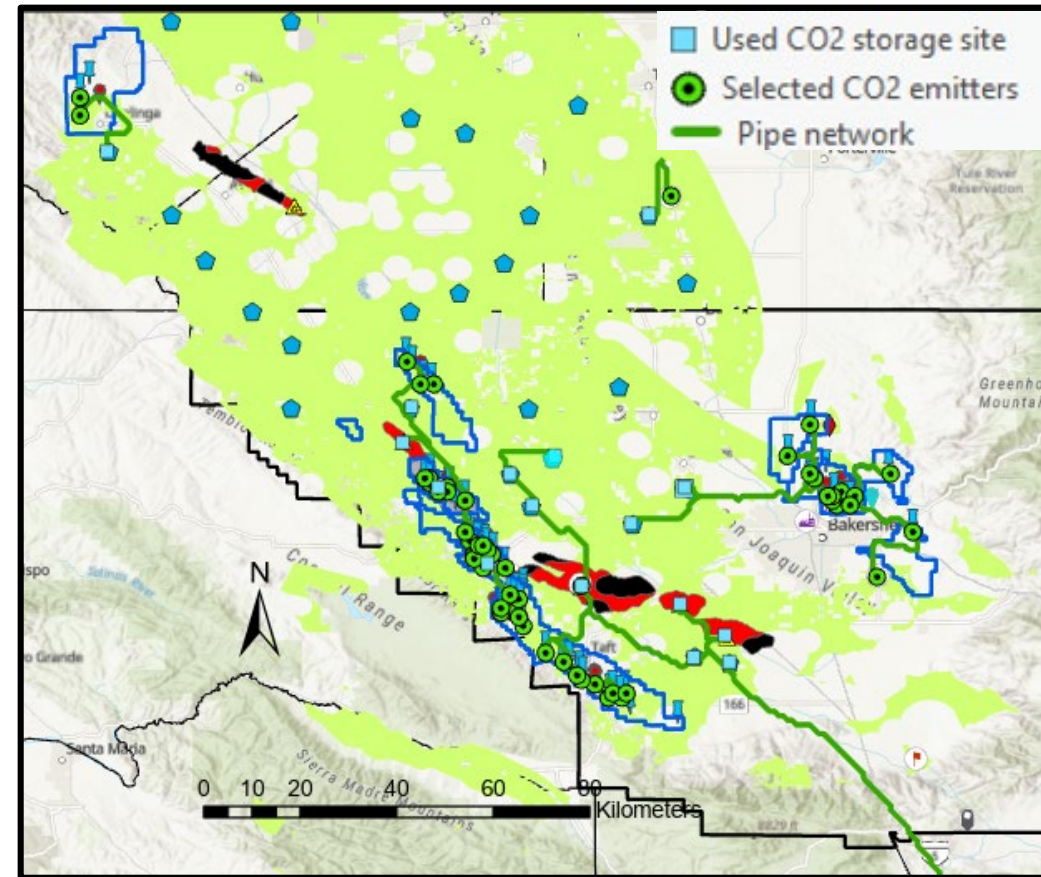


1. Storage Hub for Kern Co. & Southern California

- Storage resource estimate: 5.8 GtCO₂; 41 optimal storage sites.
- SIMCCS CAP mode: Capture and store for all emissions
- SIMCCS PRICE mode: Capture and store for cost-beneficial projects (pipeline network is limited)



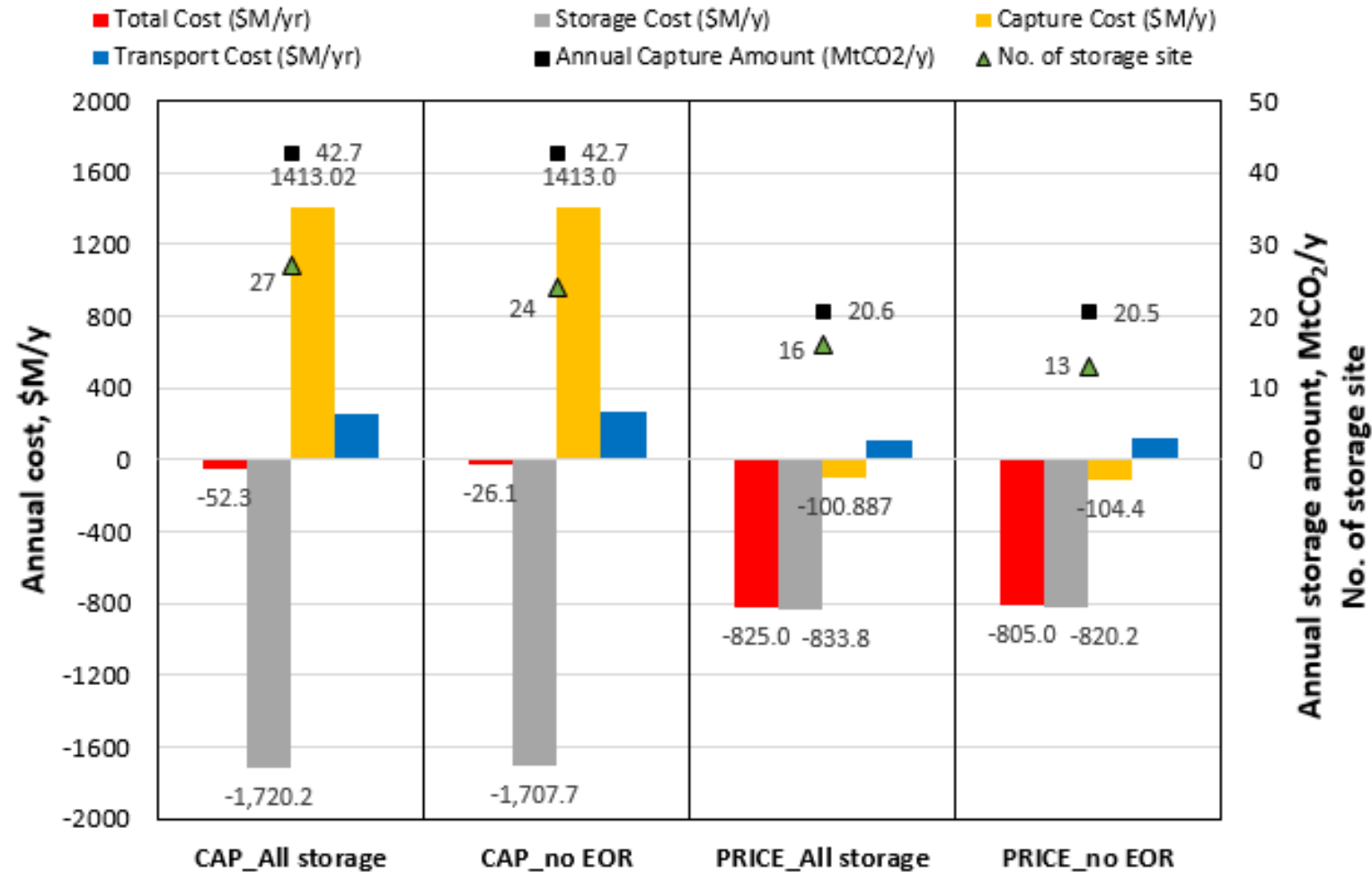
CAP mode



PRICE mode

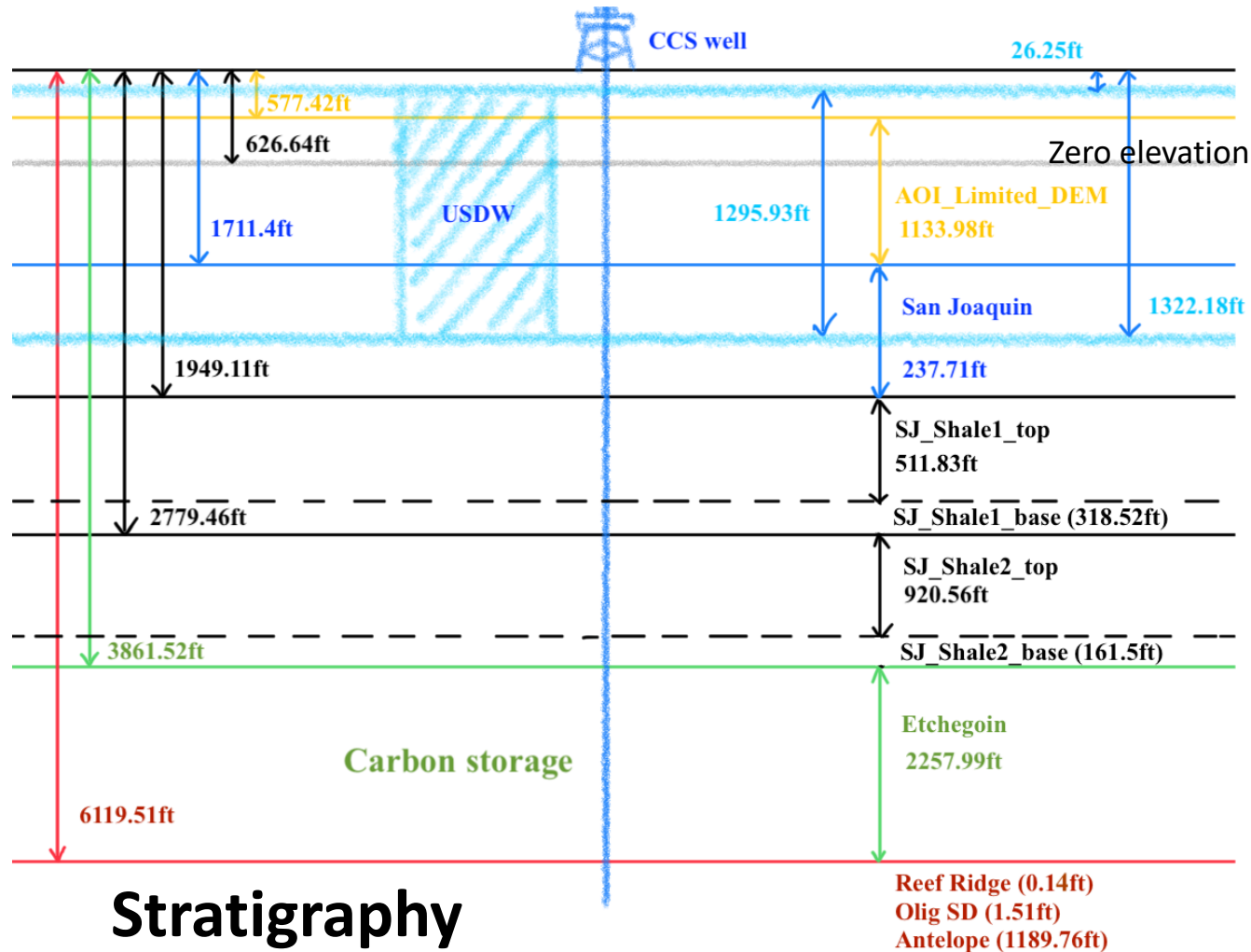
1. Storage Hub for Kern Co. & Southern California

Kim et al. (2022b) Proceedings of the SPE Western Regional Meeting

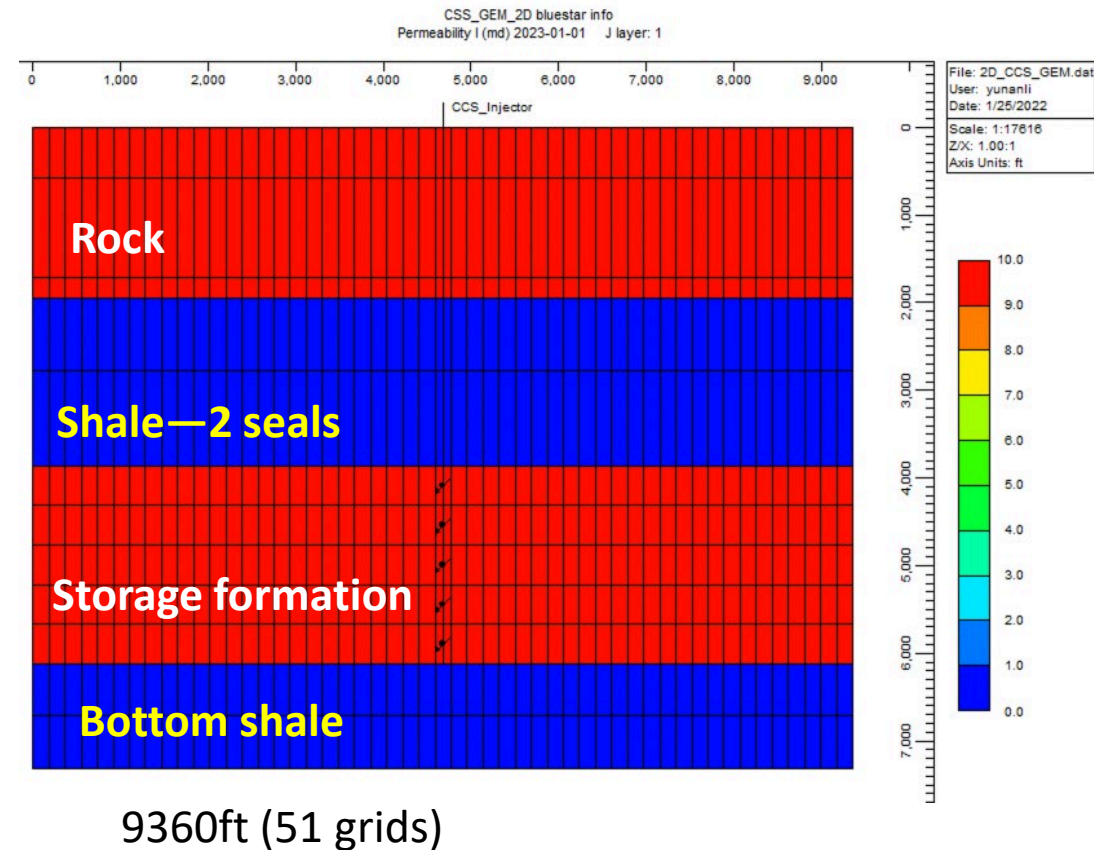


- SIMCCS technoeconomics
- Storage generates income with the right set of incentives
- 12 year-operation
- California: \$100/tCO₂ LCFS credit
- Federal: \$35 (EOR)/\$50 (Saline) 45Q Federal Tax Credit
- EOR = enhanced oil recovery

2. Subsurface model

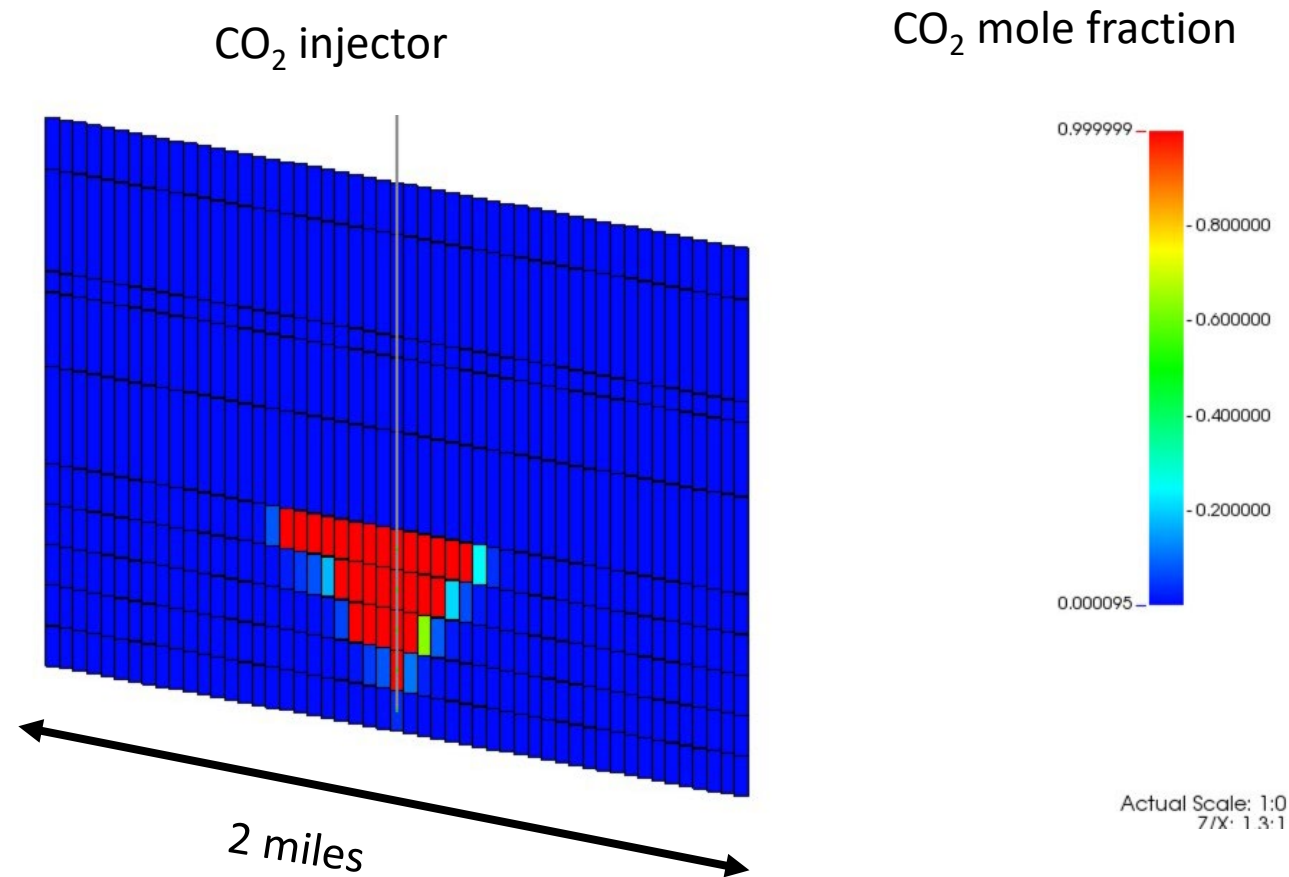


- Storage formation: 30 mD
- Seal: 0.01 mD
- Initial conditions:
 - Pressure: 1672 psi
 - Temperature: 104 °F (40 °C)



2. CCS plume dynamics

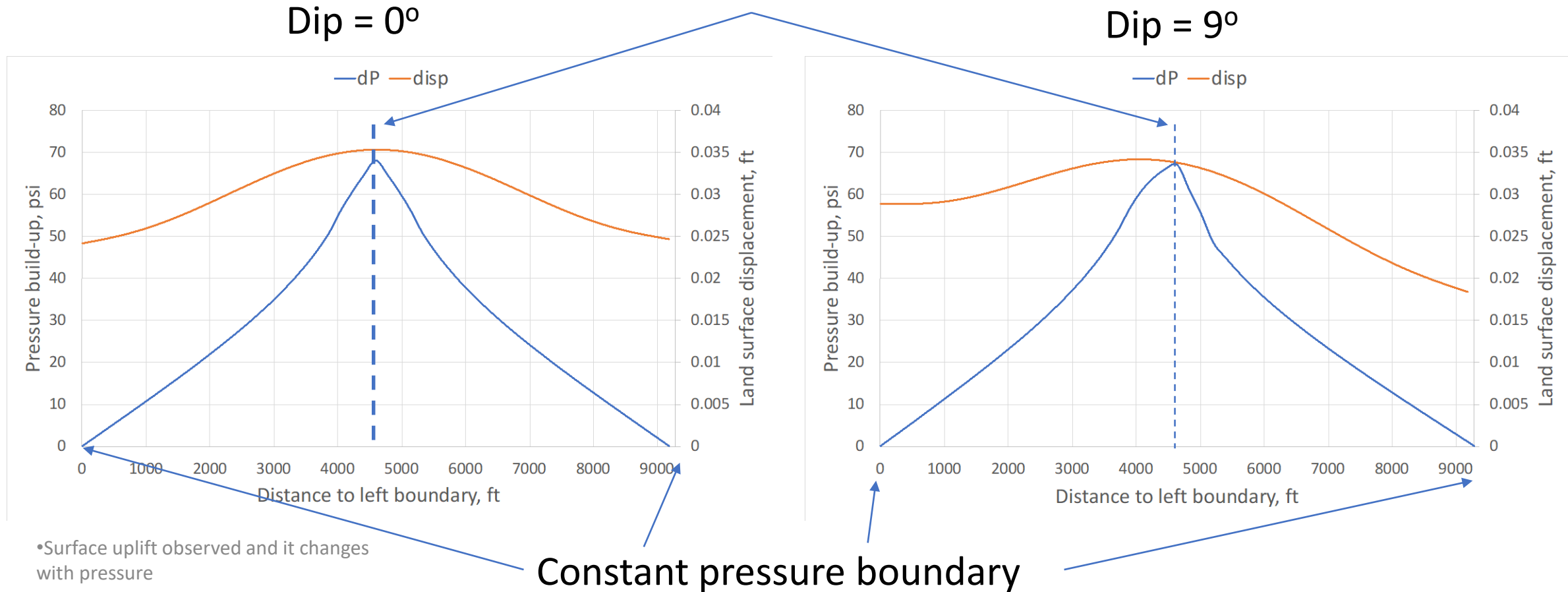
CO₂ plume at 100 years, 53 years post injection,
28.2 Mt CO₂ injected
coupled flow and mechanics simulation



2. CCS induced land surface uplift

Time step = 47 years of CO₂ injection

CCS injection well



Tasks and deliverables

Tasks	Year 1				Year 2				Deliverables	Partner		
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8		SU	SPR	Carbon Solutions /MSU
1. Distributed emitters									- Identification of OG prod. facilities - Techno-economic analysis	✓	✓	✓
2. Subsurface model									- Build a reservoir model of saline formation	✓	✓	
3. Storage assessment									- Assess the dynamic storage capacity	✓	✓	✓
4. Plume migration									- Predict CO ₂ plume transport and leak	✓	✓	✓
5. Field project									- Assist with planning, monitoring, and pipeline network	✓	✓	✓
6. Risk assessment									- Investigate geomechanical risk	✓	✓	
7. Industrial engagement									- Present the results at conferences or workshops	✓	✓	✓
8. Forward look									- Provide the regional CCS scenarios	✓		✓