

Tulare County Carbon Storage Project

DE-FE0032264

A CarbonSAFE Phase II Project

PI: **Manoj Valluri**, Advanced Resources International, Inc.

Co-PI: **Chuck Miller**, Calgren Renewable Fuels

Prepared for:

U.S. Department of Energy/National Energy Technology Lab

The logo for the Tulare County Carbon Storage Project (TCCSP) features the acronym 'TCCSP' in a large, bold, black sans-serif font. The letters are set against a white background that is shaped like a map of Tulare County, California. The map outline is white and has a slightly irregular, hand-drawn appearance.

Tulare County Carbon Storage Project

Acknowledgment



This material is based upon work supported by the Department of Energy Office of Fossil Energy and Carbon Management under Award Number DE-FE0032264.

Disclaimer



This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Outline

- Project Overview
- Current Status
- Accomplishments to Date
- Lessons Learned
- Next Steps

Project Overview

■ Objectives

- ✓ Acquire site-specific characterization data to validate CO₂ storage prospects in Tulare County.
- ✓ Reduce future investment risk by assessing technical, economic, and stakeholder considerations.

■ Schedule

- ✓ Start: October 2023
- ✓ Estimated end: June 2025

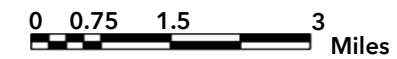
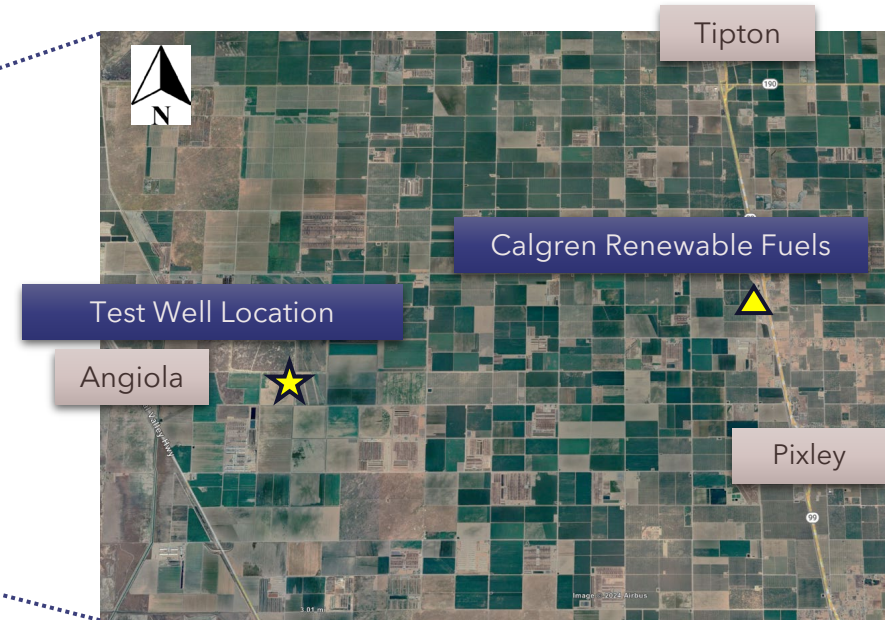
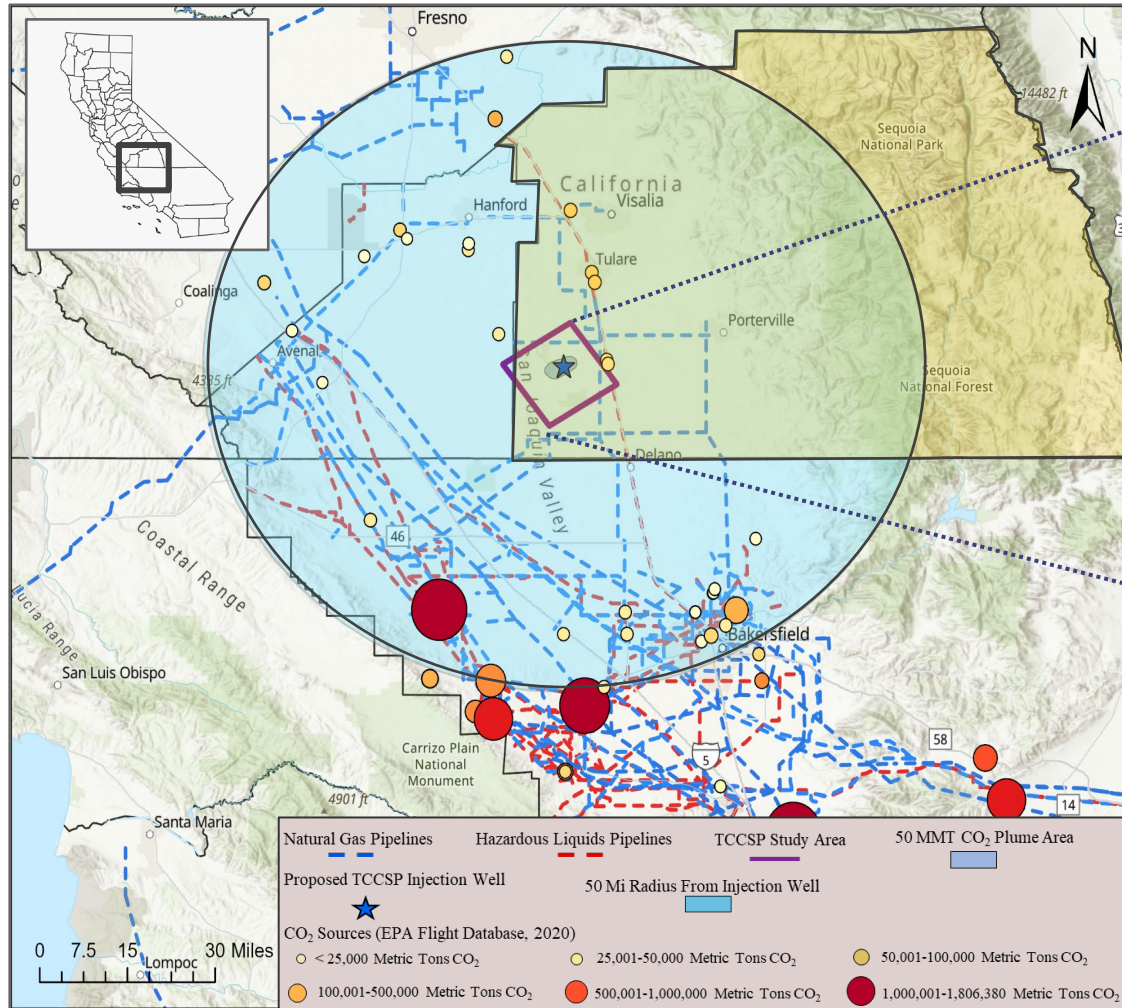
■ Funding Summary

- ✓ DOE share - \$9,312,293 (77% of total project value)
- ✓ Cost share - \$2,776,228 (23% of total project value)

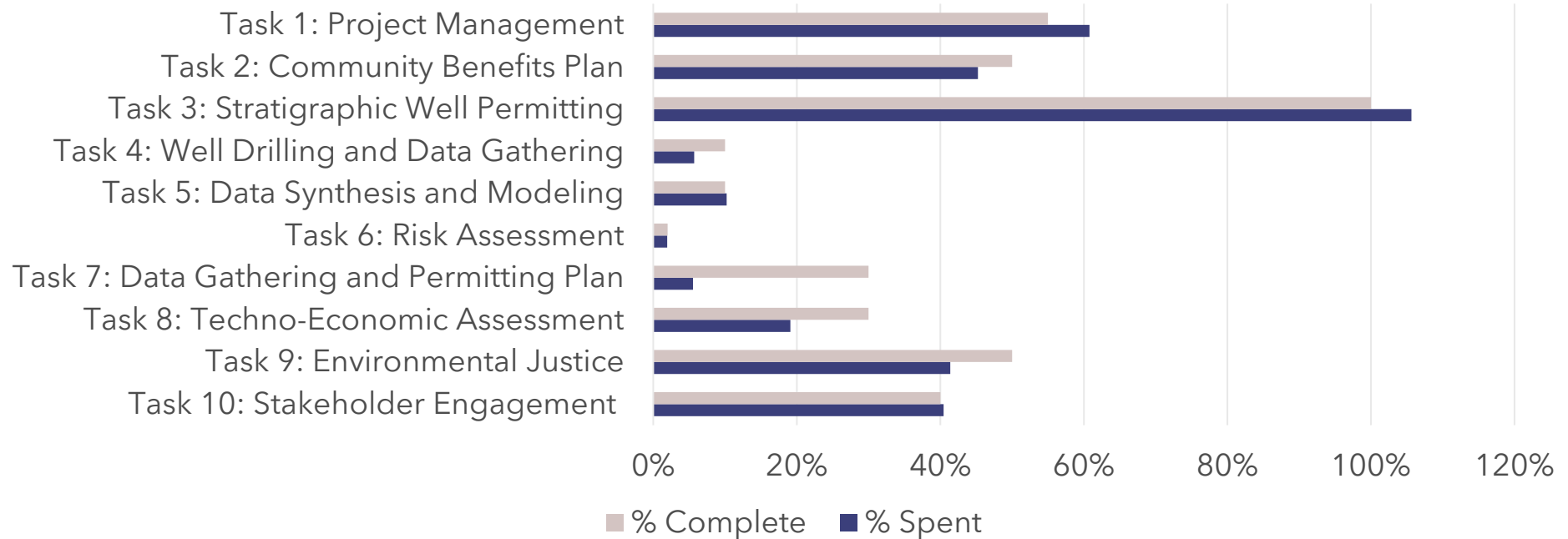
■ Partners

- ✓ Stanford University, SocioEnvironmental and Education Network (SEEN), LANL, Visage Energy, Dr. Cari Johnson (Utah), Kiewit Corporation (vendor)

Project Location



Current Status - Scope vs Spend

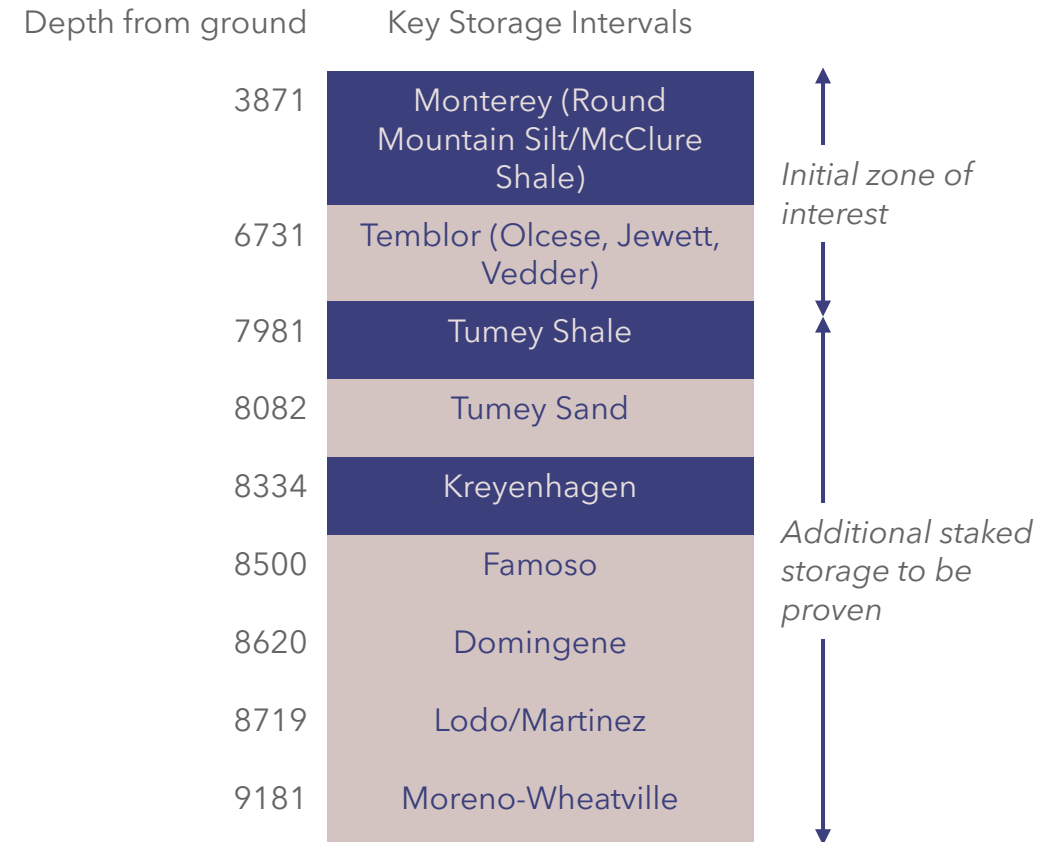


- Overall spend has been lagging due to delays in well permitting
- Expected to make up in Q3 2024.
- Total spend to date (June actuals) is \$1.21M

Key Accomplishment to Date

Conceptual Storage Model developed for the site confirmed additional stacked storage systems deeper than the Temblor

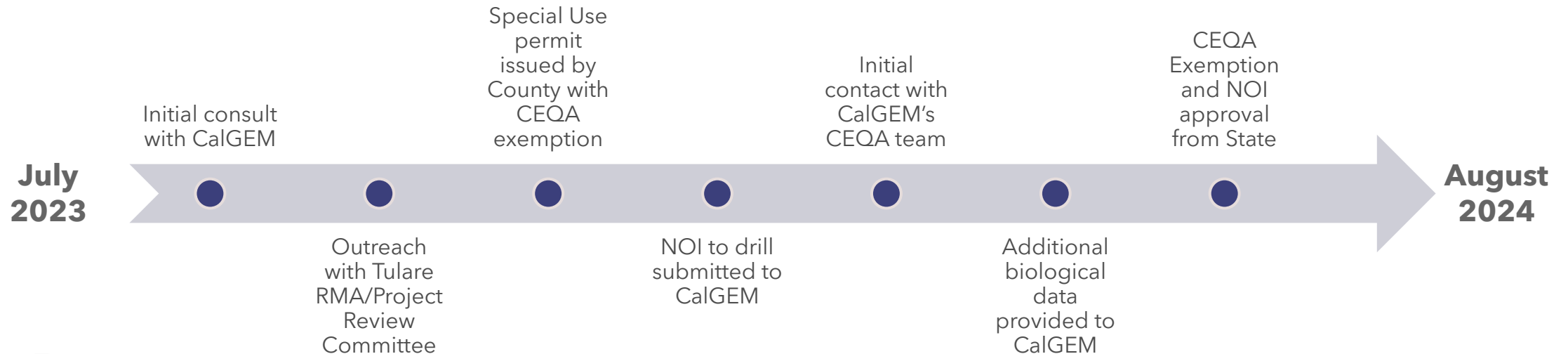
- Nearly 1,500 feet highly porous sand intervals below the Kreyenhagen add verticality to the storage complex.
 - ✓ Can be vital to constraining the lateral extent of CO₂ plume and elevated pressure for hub-scale volumes.
- Lack of well log coverage in deeper targets underscores the value of the test well at site.



Key Accomplishment to Date

Test well has been approved to drill at the county and state level after several months of review, outreach and education

- Developed a strong relationship with the landowner for well site access.
- Engaged regulators early through detailed design reviews, and project discussions.
 - ✓ Provided a cradle-to-grave overview of the project which helped establish trust.



Key Accomplishment to Date

A financially sound business case has been developed with interest from potential emitters

- Received interest from emitters in Tulare and Kern counties with offers to potentially co-locate at Pixley for favorable geology and financial terms.
 - ✓ Calgren's experience with CO₂ truck and rail provides the flexibility required to transport CO₂ in California.
 - ✓ Prospects of solar and renewable natural gas near site can lower burden on current grid while offering emitters optionality for utilities.
- A phased design and construction approach has been developed to transport and store at least 0.7 MMtpa on day 1 of operations, scaling up to an average of 2.5 MMtpa.
- An initial project proforma was developed to seek investor approval to accelerate development.
 - ✓ Plan to apply for Phase III funding asap to keep project on track for operations starting Q2 2027.

Key Accomplishment to Date

Gathered actionable feedback from local communities through townhalls and the first community engagement workshop

- Hosted a townhall meeting on May 24, 2024, and the first Community Engagement Workshop (CEW) on June 15, 2024.
 - ✓ Gathered valuable information on local influences and community dynamics to inform subsequent outreach activities.
- Developed bi-lingual project materials (brochures, FAQs, and slides) to share with stakeholders.
- Gathered data on local air and water quality issues and mitigation methods to include in overall project J40 planning.
- Drafted project DEIA charter and surveys to share with project partners.
- Calgren hosted local regulators, SEEN staff, and Pixley School District at their ethanol and dairy fuels plant in Pixley, CA.



First community engagement workshop was held at the Pixley Memorial Hall on June 14, 2024

Key Accomplishment to Date

Formed partnerships to accelerate workforce development at school and collegiate levels

- Feedback from local communities indicated a strong need to stable, environmentally responsible jobs for locals.
- Engaged local educators and nonprofits to develop a workforce development program for Pixley
 - ✓ K-12: Connected with the Lawrence Livermore Foundation (LLF) to kickstart their Climate in Classroom program with Pixley School District.
 - ✓ High school: Calgren is formalizing a tuition assistance program for at least one high school student
 - ✓ College: In discussions with the California Renewable Energy Lab (CREL) to collaborate on their Centers of Excellence program with Porterville College.
- Coordinating with Porterville College and University of Merced to arrange visits to the filed site and Calgren's Pixley facility.

Lessons Learned

Frequent outreach and education with regulators is critical for timely permitting

- Regulatory delays and ambiguity can derail a project schedule.
 - ✓ Jurisdiction for CCS exploratory wells is an issue for regulators and project developers.
 - ✓ Lack of CCS expertise and advocacy at agencies is a hindrance for CCS adoption.

- CEQA process is time consuming, and its requirements are unclear.
 - ✓ Inter-agency environmental reviews and recommendations are incoherent.
 - ✓ Constant outreach and education of CCS and project details is critical.

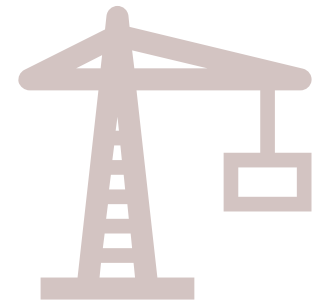
- Regulatory ambiguity in applying oil and gas type environmental due-diligence to CCS can lead to unavoidable project delays.
 - ✓ E.g. application of SB 1137 to CCS exploration wells



Lessons Learned

CCS in California faces massive supply chain challenges

- Dwindling well drilling activity could place a massive strain on service providers when CCS well drilling picks up.
 - ✓ Based on EPA's Class VI tracker, over 10 projects could be construction ready by Q1 2026.
- Only two drillers in the state that can support deep and specialized wells for CCS and geothermal.
 - ✓ Result of reduced new well activity and regulatory challenges associated with air permitting.
- Any regulatory delays paired with a tight schedule to procure services can be a challenge for project execution
 - ✓ Regulators, project developers, and service providers must work together to establish best drilling practices and safety standards.



Community Engagement on a Phase II Project

Expectation



Reality



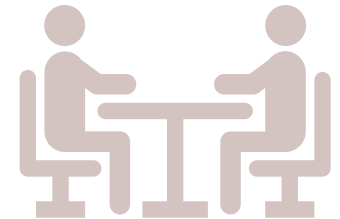
Lessons Learned

Projects requires extensive community and environmental research prior to drafting meaningful community benefits plans

- Local community dynamics must inform the nature and frequency of outreach activities
 - ✓ Unincorporated communities like Pixley often exhibit fragmented dynamics which require a significant effort to engage and gather actionable feedback.
 - ✓ Community priorities are vastly influenced by local alliances and influences.

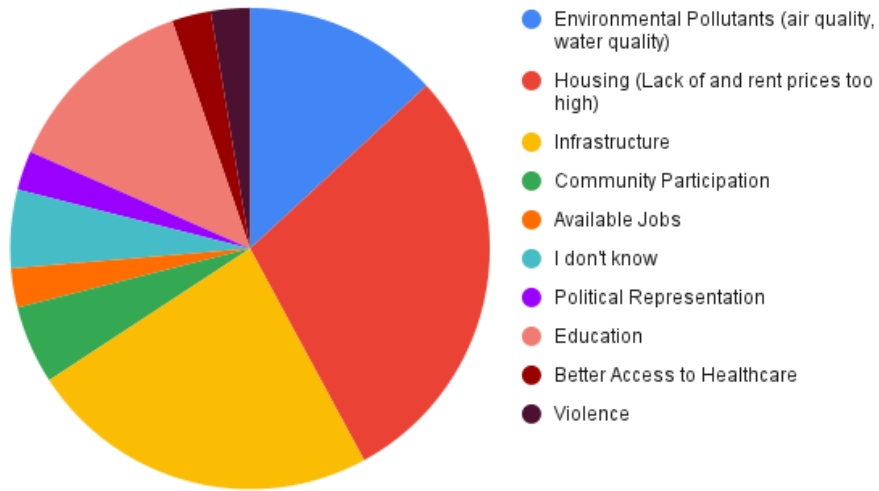
- Grassroots education is critical before introducing project plans
 - ✓ Lack of basic understanding of CCS technology hinders discussion of community benefits agreements.

- Building a strong and transparent relationship with local communities is a priority.
 - ✓ Business perceptions are shaped by their environmental impacts, especially in the Central Valley where the strain on natural resources is enormous.
 - ✓ Decades of mistrust could require frequent, action-based outreach to change public perceptions.

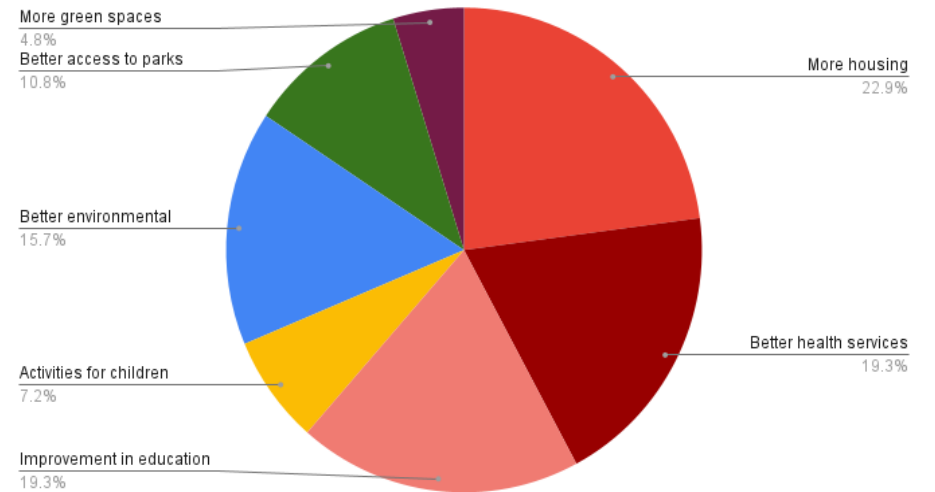


Community Survey Takeaways

What is the most pressing issue in your area?



What is does your community need most?



Community benefit plans must address local education and infrastructure needs while tracking and minimizing the burden on natural resources.

Surveys results reflect opinions of 27 respondents from Pixley, Delano, Earlimart, Alpaugh and Tipton areas collected over the last eight months.

Lessons Learned

Project economics, especially in California, heavily rely on storage location

- Projects need ideal land positions to navigate subsurface complexity and surface restrictions to increase investment confidence.
 - ✓ Location of oil and gas fields/wells and nearby faulting
 - ✓ Stacked storage potential
 - ✓ Proximity to existing ROW and emitters
 - ✓ Away from 'sensitive receptors' as defined by SB 1137
- Biological and environmental requirements further narrow land prospects
 - ✓ Added cost of project development for environmental monitoring and compliance.
- 45Q requirements for apprenticeships and prevailing wage coupled with cost of living in CA must be reflected in tax credit rates
 - ✓ Project economics for lower purity emitters can be challenging without such adjustments or pass through costs to rate payers and customers.



Next Steps - Technical

- Subsurface Design
 - ✓ Well site preparation is ongoing with expected spud of August 16
 - ✓ Plan to complete drilling and close out by Q4 2024
 - ✓ Data synthesis and reservoir model updates to follow
 - ✓ Design/update Class VI infrastructure based on model updates
 - ✓ Finalize path to Class VI permitting

- Surface Facilities
 - ✓ Finalize BOD, bill of materials, and WBS for EPC
 - ✓ Develop Class IV level costs for capture, on-site CO₂ storage, and transport for project BOD
 - ✓ Define permitting matrix and begin outreach with local agencies

- Logistical
 - ✓ Finalize commitments with potential emitters and execute necessary contracts/MoUs
 - ✓ Refine project schedule and proforma based on emitter discussions
 - ✓ Define and assess project risks and identify mitigation steps
 - ✓ Compile Project Implementation Plan

Next Steps - CBP

- Community Engagement
 - ✓ Establish frequent check-ins with Pixley townhall and school district.
 - ✓ Identify opportunities for project team to participate and engage larger communities.
 - ✓ Develop a stronger relationship with Pixley school district through meal programs and infrastructure support.
- Justice40
 - ✓ Assess infrastructure and support needs to track and assess project impacts on local air and water quality.
 - ✓ Tie findings into the overall project implementation plan.
- Quality Jobs
 - ✓ Further work with LLF and CREL to develop a phased approach to workforce development at all school and collegiate levels to match Calgren's and TCCSP's needs with local talent.
- DEIA
 - ✓ Conduct a culture survey and use results to adapt project's DEIA charter.

Acknowledgments



Advanced Resources
International, Inc.

TCCSP

Tulare County Carbon Storage Project

Contact Us

tccsp@adv-res.com

Reach out
with any
questions or
concerns



Current Status - Forecasted vs Actual

