# Pelican Gulf Coast Carbon Removal

# DE-FE0032381

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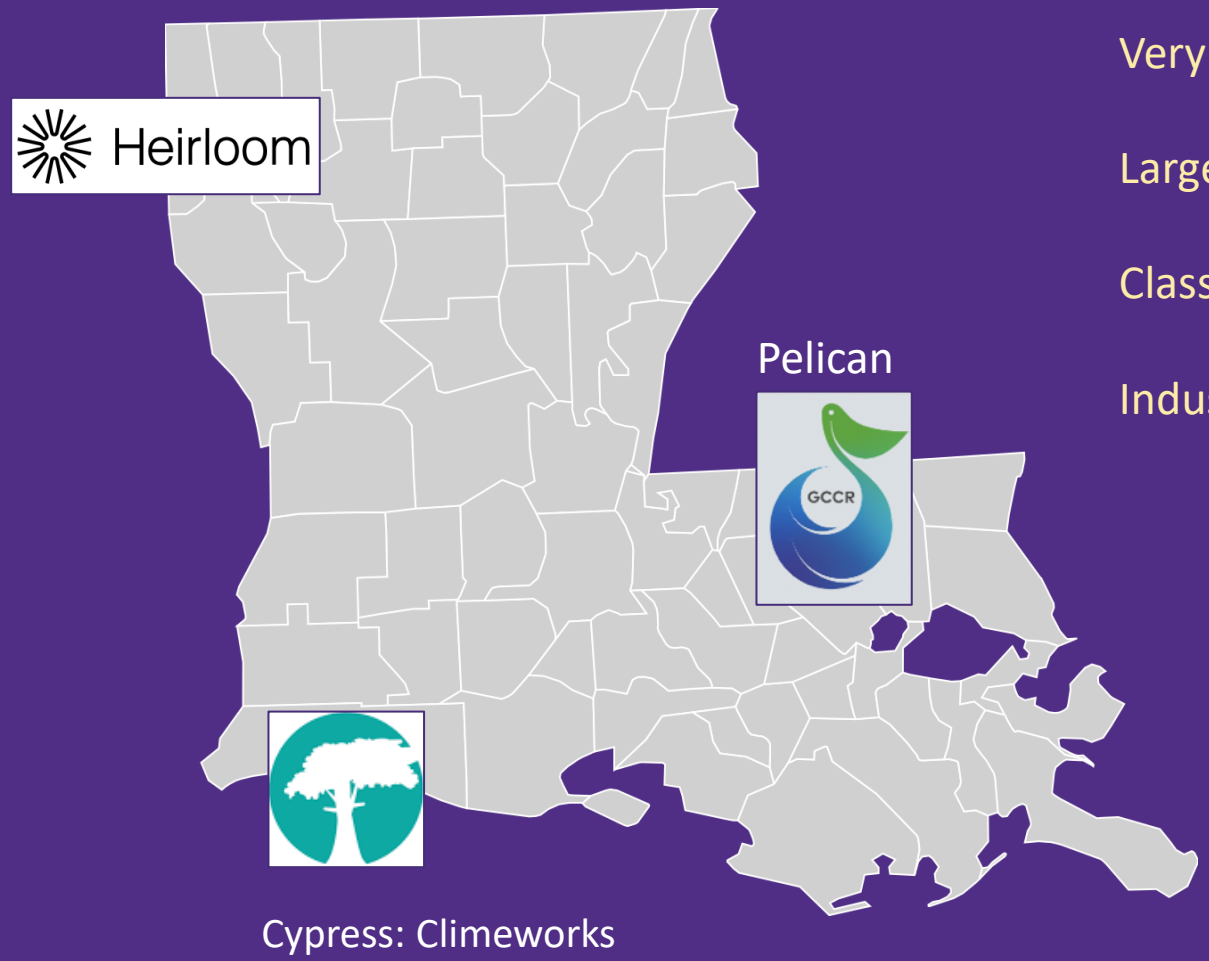
# Project Overview

- Funding
  - DOE: $3 million
  - Non-DOE Funding: $1.9 million
- Overall Project Performance Dates
  - June 2024-March 2026
- Project Participants
  - LSU, Shell, University of Houston

*Pelican-Gulf Coast Carbon Removal* — **Louisiana State University** (Baton Rouge, Louisiana) intends to evaluate the feasibility of building a DAC hub in Louisiana that would remove $CO_2$ already in the atmosphere and permanently store it. The Pelican consortium, including the University of Houston and Shell, proposes developing technologies that can enable accelerated and replicable carbon removal and permanent storage in ways that protect and generate workforce opportunities.

# Louisiana DAC Activity




- Very high sequestration capacity
- Largest $CO_2$ pipeline Infrastructure
- Class VI primacy: 65 applications
- Industrial waste heat availability

# Project Team

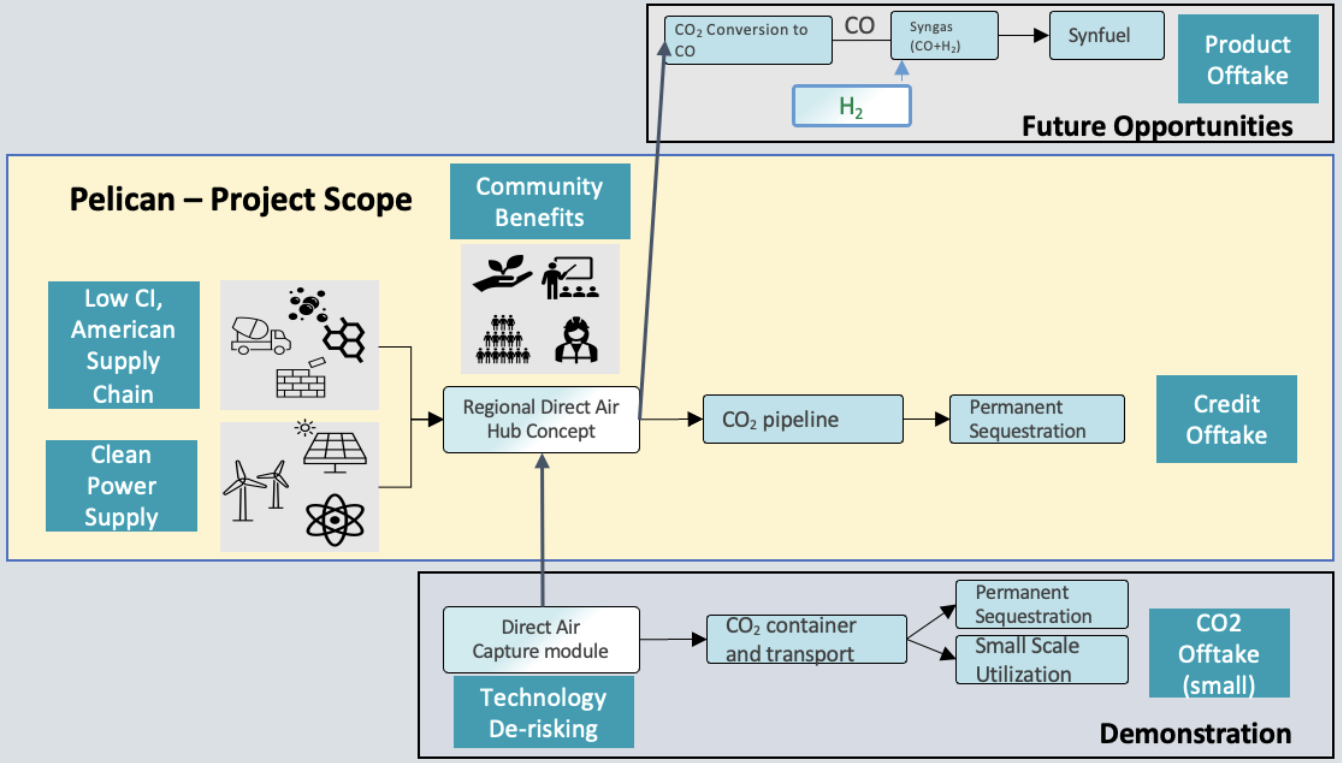
| Key/Senior Personnel | Position/Title | Role |
|---|---|---|
| Robert Twilley | LSU - VP Office of Research & Development | Community Benefits Development Plan |
| Greg Upton | LSU - Executive Director - Center for Energy Studies | Community Benefits Development Plan, Community Engagement, Localized Economic & Tax Impacts, and input/feedback on LCA/TEA |
| Sarah Riling-Hall | Shell - DAC Business Manager | Technical Lead |
| Saratu Mohammed | Shell - Project Manager | Project Manager |
| Stephen Tessarolo | Shell - Front-end Development Manager | Project development |
| Joe Powell | University of Houston – Executive Director, Energy Transition Institute | Technology evaluation, TEA, LCA. |
| Margaret Reams | LSU – Professor, Department of Environmental Sciences | Community Benefits Development Plan |
| Tim Slack | LSU – Professor, Department of Sociology | Community Benefits Development Plan |
| Karsten Thompson | LSU – Professor, Department of Petroleum Engineering | Technical input |
| Brian Snyder | LSU – Associate Professor, Department of Environmental Sciences | Community Benefits Development Plan |

# Pelican – DAC Hub Vision

## Develop and de-risk an integrated methodology for developing DAC hubs

- Replicable at other sites along the Gulf Coast, other parts of the US, and globally
- Accelerate carbon capture technology development
- Address engineering challenges of DAC hubs in collaboration with participating technologies
- Evaluate risks, technical, economic and social considerations related to DAC hubs

## Work with local communities to identify and address concerns, impacts and opportunities related to DAC hubs in ways that lead to shared benefits and positive working relationships.



# Campus $CO_2$ well and flow loop installation

**ENABLED R&D (WELLBORE)**

Wellbore flow and fluid mechanics
Well control for CCS
Detection of simulated leaks
Fiber-optic sensing for CO2 storage
Downhole tools and instrumentation
Monitoring of cement response
Temperature transient testing
High-rate injection with limited PVT data
Full-scale heat transfer analysis
Shut-in and startup
Injection into depleted reservoirs
Effect of impurities on injection

**ENABLED R&D (FLOWLOOP)**

Fluid mechanics and flow visualization
Gas/SC transition & phase behavior
Subsurface CO2 safety valve testing
Equations of state; impurities testing
Reservoir core testing
(mineralization, accelerated time experiments, injectivity)
Water and hydrate testing
Flow assurance
Sensing and automation
Long-term exposure of fiber to CO2
Pipeline materials and drag reduction
Testing old pipeline materials
Chemical treatments
Depressurization of pipeline (leaks, dry ice)
Clogging of pipeline; fluid hammer, metering

# Project Success Metrics

**Phase 0a:**

- ❑ **Feasible technology option for initial deployment** selected, including project plan for subsequent development phases and testing commerciality of carbon removal credit offtake with customers
- ❑ Initial **deployment site** has been selected and a CO2 transport and storage strategy available to meet potential deployment plans
- ❑ DAC hub **concept is identified that incorporates technology maturation plans of multiple potential technologies** and available CO2 transportation and storage
- ❑ Credible **LCA framework** is developed to test net carbon removal of initial deployment and inform the DAC hub concept
- ❑ **Community benefits plan** draft completed.

**Phase 0b:**

- ❑ **Pre-Front End Engineering Design and Balance Of Plant** completed to assess potential for further development of initial DAC deployment. If a commercially viable opportunity is identified:
  - ❑ Commercial business model defined with technology developer(s)
  - ❑ Customer interest for carbon removal credit purchases is secured
- ❑ **DAC Technology is sufficiently de-risked** to proceed with commercial deployment and continued technology maturation plan is agreed to support DAC hub concept
- ❑ **Preliminary LCA** framework has been completed on the proposed initial deployment
- ❑ **Updated community benefits plan** draft, including estimated economic and tax impacts.

# Technology Background

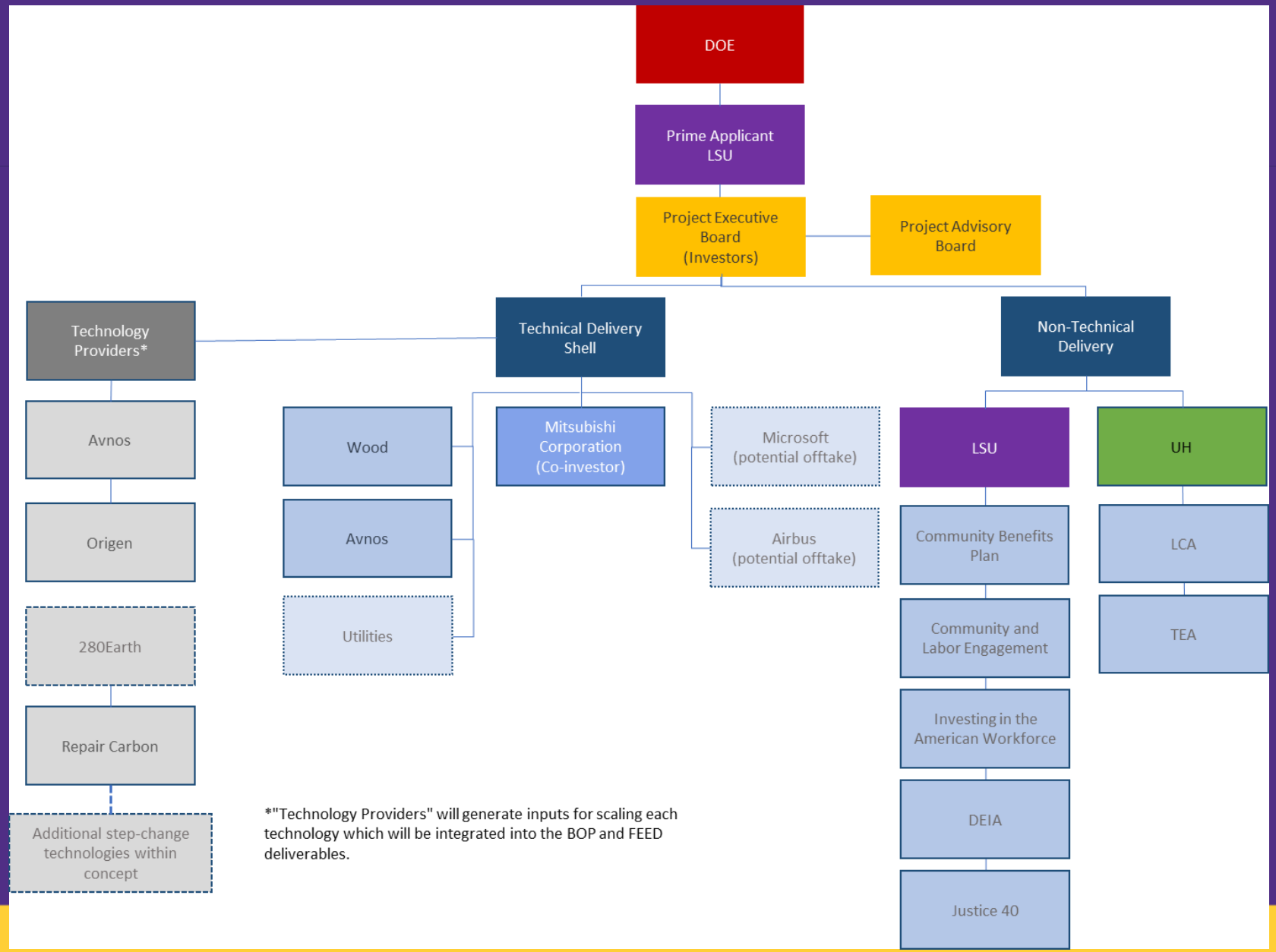
| | Company | Technology | Tech Strength | Development Status |
|---|---|---|---|---|
| Tranche 1: priority technologies | AVNOS | HDAC<br>Solid Sorbent<br>×<br>Moisture Swing | • Hybrid DAC capturing water from atmosphere | • 30tpa demo operating in California<br>• 300tpa demo module in construction and planned operation in 2024<br>• 3,000tpa commercial scale operation planned 2026 |
| | Confidential | Confidential | • Confidential | • Confidential |
| | Origen | Passive Carbonation<br>Solid Sorbent<br>×<br>Temperature Swing<br>(High) | • Low-cost limestone sorbent<br>• Fuel Flexible (nat gas, RNG, H2)<br>• Low electricity demand | • 1,000tpa fully integrated demo operational in 2024Q4 in North Dakota |
| Tranche 2 | A | **Electrical Swing Absorption** | Additional technologies in evaluation: seeking lower energy consumption, lower water use, and modular design | |
| | B | **Membrane** | | |
| | C | **TBC** | | |
| | D | **TBC** | | |

# Summary of Community Benefits

LSU is currently developing the LSU Model for Community Benefits Planning. The model has four components:

1. Structured Listening
2. Community Mapping
3. Local Economic & Tax Implications
4. Communication back to Community

# Organization Chart



# Summary Slide

a. Pelican DAC is currently in **feasibility study stage**.

b. Through this process, we hope to assess the **technical and economic viability** of multiple technologies.
   - TEA/LCA will be lead by the University of Houston.

c. Results will inform whether this project moves forward to design and eventually implementation.

d. Results will also assist Shell in **better understanding community perspectives** of a potential project that can be considered in future stages.

# Project Milestone Summary – Phase 0a

| Deliverables | | | | | |
|---|---|---|---|---|---|
| Phase 0a | | | | | |
| Task/ Subtask Number | Deliverable Title | FOA Requirement | Verification Method | Success Criteria | Planned Completion Date |
| 1.1 | Project Management Plan for Phase 0a | Required 30-days after project award | PMP Submission | PMP reviewed and accepted by DOE. | 6/30/2024 |
| 1.4 | Technology Maturation Plan for Phase 0a | Initial TMP(s) due 45-days prior to Phase 0a completion | TMP Submission | TMP reviewed and accepted by DOE. | 1/14/2025 |
| 1.5 | Community Benefits Plan Development Proposal | Due 45 day prior to Phase 0a completion | CBP Submission | CBP reviewed and accepted by DOE. | 1/14/2025 |
| 2 | DAC Hub Description | Due date not detailed | Quarterly Report | Quarterly report reviewed by DOE. | 1/14/2025 |
| 3.1 | DAC Technology Selection Report | Due date not detailed | Quarterly Report | | 1/14/2025 |
| 3.2 | Conceptual Design for the Initial DAC Hub Capacity Report | Due date not detailed | Quarterly Report | | 1/14/2025 |
| 4 | DAC Hub Data Tables | Due date not detailed | Quarterly Report | Information outlined in Appendix N provided. | 1/14/2025 |
| 5.1 & 5.2 | Safety, Security, and Regulatory Requirements Summary for Phase 0a | Due date not detailed | Quarterly Report | | 1/14/2025 |
| 6 | Preliminary LCA for Phase 0a | Due 45 day prior to Phase 0a completion | Preliminary LCA submitted to DOE. | Information outlined in Appendix H provided. | 1/14/2025 |
| N/A | Continuation Application | Due 45 day prior to Phase 0a completion | | | 1/14/2025 |

Tranche 2