Direct Air Capture Recovery of Energy for CCUS Partnership (DAC RECO₂UP)
Project Number: DE-FE0031961
Southern States Energy Board (SSEB): Kenneth J. Nemeth (PI), Kimberly Gray (Co-PI)
AirCapture LLC (AC): Matt Attwood, Bran Raskovic

U.S. Department of Energy
National Energy Technology Laboratory
Direct Air Capture Kickoff Meeting
February 24-25, 2021
Acknowledgement

• This material is based upon work supported by the Department of Energy under Award Number(s) DE-FE0031961.

• 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.
Objective 1. Conduct applied research and development to decrease the cost of DAC from atmospheric air and mixtures of air and simulated industrial gases available in a test bay at the National Carbon Capture Center (NCCC).

Objective 2. Develop and scale-up an integrated system utilizing energy recovery at the NCCC.

Objective 3. Increase the integrated system’s fidelity by validating and demonstrating operations in a simulated commercial environment by maximizing capital efficiency, energy efficiency.

Objective 4. Identify and address key technical barriers, within a representative operating environment, in support of DAC technology commercialization.

Objective 5. Perform a pre-screening techno-economic analysis (TEA) and life cycle analysis (LCA) to determine the environmental sustainability (amount of carbon negativity) and economic viability (cost impacts) of the integrated DAC system.

Program Overview

Funding: DOE: $2,500,000, Cost Share: $635,805
Overall Project Performance Dates: 10/1/20 to 1/31/24
Team and Facilities

• Fabrication Facilities
• Testing Facilities
  • Simulations
  • Integrated Systems at the NCCC in Wilsonville, Alabama
• Laboratories

Synapse Build Labs

National Carbon Capture Center
https://www.nationalcarboncapturecenter.com
Technical Approach/Project Scope

- Project Schedule
  - Design Phase I (BP1)
    • 10/1/20 – 10/31/21
  - Construction Phase II (BP2)
    • 11/1/21 – 10/31/22
  - Integrated Systems Testing Phase III (BP3)
    • 11/1/22 – 1/31/24

- Project Success Criteria:
  - TBD
    • PMP is currently under revision.
Technology Background

3 skids:
- Heat Integration/Recovery
- DAC
- CO₂ Liquefaction

Heat skid will enable simulation of varying qualities of industrial waste heat.

DAC will run in multiple modes of operation to demonstrate integration.

CO₂ processing skid will produce CO₂ in varying qualities for testing.

Integrated process will demonstrate economics, LCA and product carbon footprint.
Opportunities for Collaboration

- Testing of produced CO$_2$ in commercial processes
  - i.e., agtech; food and beverage; materials
- Evaluation / Integration of process in varying commercial / industrial applications.
- Commercialization
  - Scale-up modeling
  - Integrated engineering & design
  - Fabrication / Construction & Manufacturing
  - CO$_2$ utilization / off-take
  - Project Finance
Direct Air Capture Recovery of Energy for CCUS Partnership (DAC RECO₂UP)
Project Number: DE-FE0031961

Southern States Energy Board (SSEB): Kenneth J. Nemeth (PI), Kimberly Gray (Co-PI)
AirCapture LLC (AC): Matt Attwood, Bran Raskovic