

# An Arctic Direct Air Capture (DAC) Testing Ground

DE-FE-0032385

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ASRC Energy Services, LLC

2024 FECM/NETL Carbon Management Research Project Review Meeting

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# Project Overview

## Project Title:

- An Arctic Direct Air Capture (DAC) Testing Ground

## Funding Opportunity:

- DE-FOA-0002735, Bipartisan Infrastructure Law: Regional Direct Air Capture (DAC) Hubs; Topic Area 1: Feasibility

## Prime Recipient:

- ASRC Energy Services, LLC (AES)

## Partners:

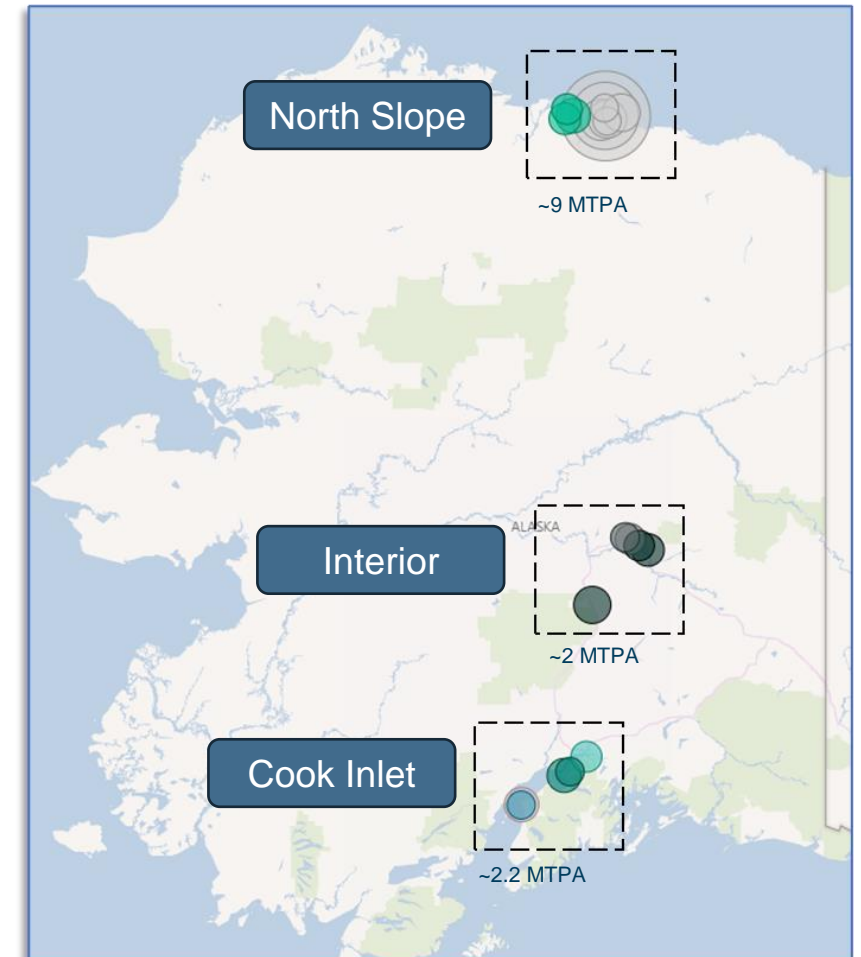
- Oil Search (Alaska), LLC (Santos)
- Repsol Earth Solutions LLC (Repsol)

## Cost Share:

- DOE Share: \$2,831,999
- Applicant(s) Cost Share: \$707,999

## Performance Period

- Budget Period 1: 7/1/2024 – 3/31/2025
- Budget Period 2: 4/1/2025 – 6/31/2026



Source: EPA FLIGHT Tool

# About the Alaska CCUS Consortium

## ASRC Energy Services, LLC

- AES, a subsidiary of Arctic Slope Regional Corporation, the Alaska Native Regional Corp. on the North Slope
- Engineering & Construction Co. with history of executing large Alaska projects, including for DOE
- CCS extends the life of existing operations near ASRC land, providing economic benefit to indigenous shareholders

## Santos

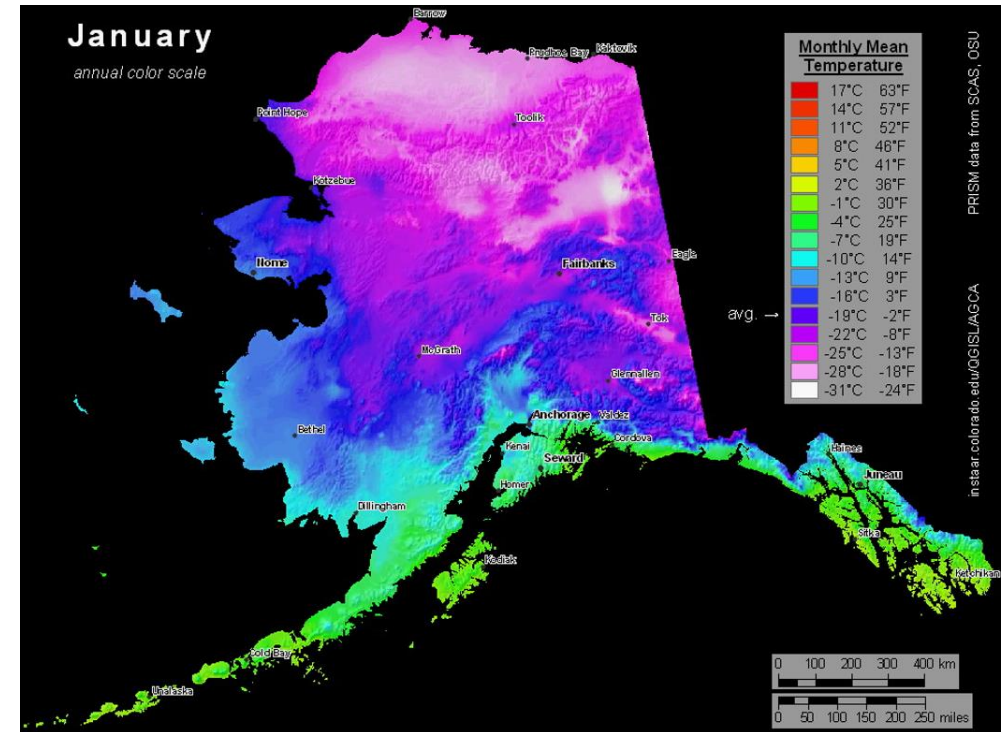
- Santos is a global energy company helping the world to decarbonize in an affordable & sustainable way
- Alaska key for Santos' activities: Pikka project, net-zero commitment and extend Santos Energy Solutions
- Expertise in CCS projects in Australia; ambition to grow worldwide

## Repsol

- Repsol is a global multi-energy provider motivated to drive the evolution of decarbonizing energy
- Operational excellence and CCS experience (Indonesia, southern Europe, offshore Louisiana)
- Alaska is in Repsol's core strategic plan with capital flexibility and growth potential

# Seeking Arctic-Capable Technology(ies)

- **Objective: Identify existing technologies that can successfully operate in remote and cold temperatures.**
- **Long-term averages of annual ambient average temperatures:**
  - North Slope: -46°C to 22°C (-52°F to 71°F); annual average -14°C / 7°F
  - Cook Inlet: -31°C to 23°C (-24°F to 74°F); annual average -3°C / 27°F
  - Interior: -44°C to 27°C (-48°F to 82°F); annual average -10°C / 14°F



Manley, W.F., and Daly, C., 2005, *Alaska Geospatial Climate Animations of Monthly Temperature and Precipitation: INSTAAR*, University of Colorado, <http://instaar.colorado.edu/QGISL/AGCA>.

# Seeking Arctic-Capable Technology(ies)

Preliminary list of technologies considered during application phase:

Technology Type	Liquid DAC (L-DAC)	Solid DAC (S-DAC)			Synthesized (L/S DAC)	Other	
Capture Method	Solvent (absorption)	Solid Sorbent (adsorption)			Solvent/Solid Sorbent	Mineralization	Membrane
Regeneration Cycle	Thermal	Temperature – Vacuum Swing	Electro – Swing	Moisture Swing	Temperature Vacuum Swing	Thermal	N/A
Examples	Carbon Engineering	<ul style="list-style-type: none"> <li>Global Thermostat</li> <li>Carbon Capture</li> <li>Carbyon</li> <li>TerraFixing</li> <li>Climeworks</li> <li>Sustaera</li> </ul>	<ul style="list-style-type: none"> <li>Mission Zero</li> <li>Verdox</li> <li>Holy Grail</li> </ul>	Carbon Collect	Carbon Assist	Heirloom	

# Challenges and Opportunities

## Technical Opportunities

- Co-location with potential CO<sub>2</sub> storage sites
- Prove up DAC technologies in the cold-weather conditions of the Arctic

## Technical Challenges

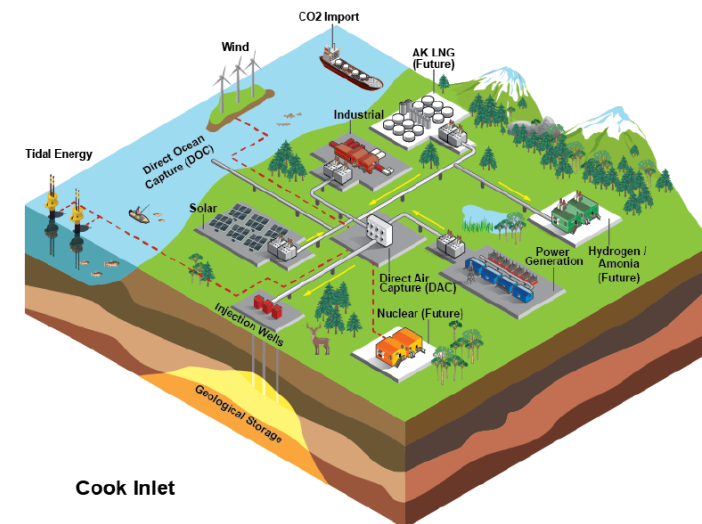
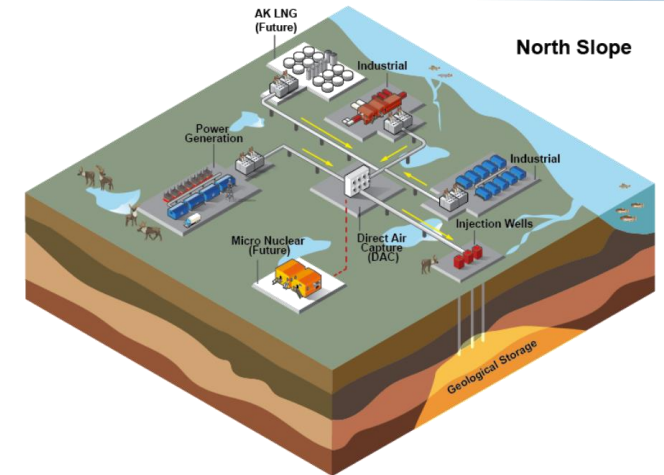
- Availability of Land, Power, Water
- Environmental Sensitivities
- Cold Temperatures
- Harsh and Remote Operating Environment
- Logistics

## Economic Opportunities

- Create and/or extend well-paying jobs
- Provide another revenue source for the State and/or Alaska Native corporations (ANCs) who own the pore space
- Leverage existing infrastructure
- Co-locate in areas where stationary emission sources are higher in Alaska

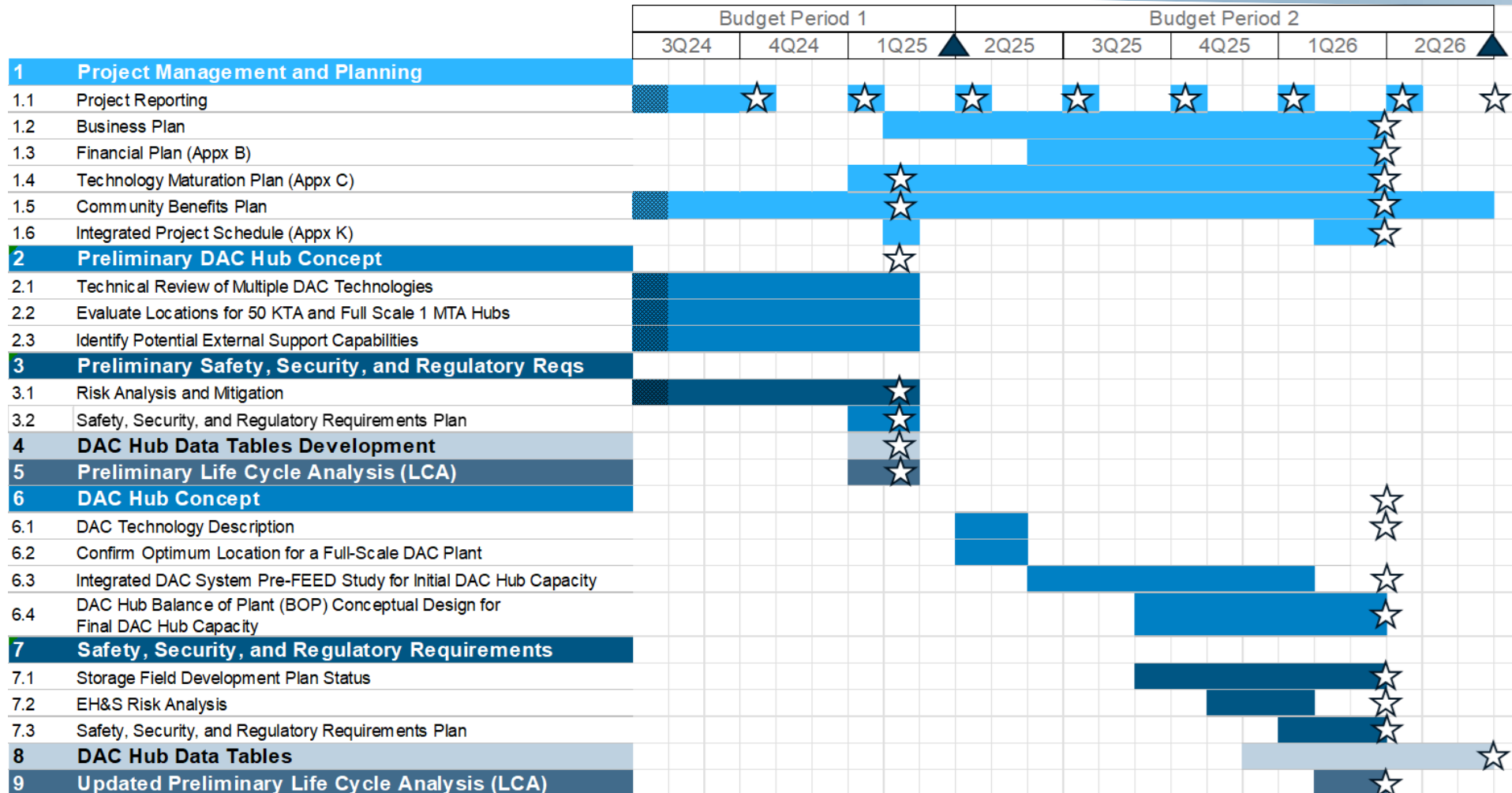
## Economic Challenges

- Higher construction and operating costs
- Higher power costs in certain areas



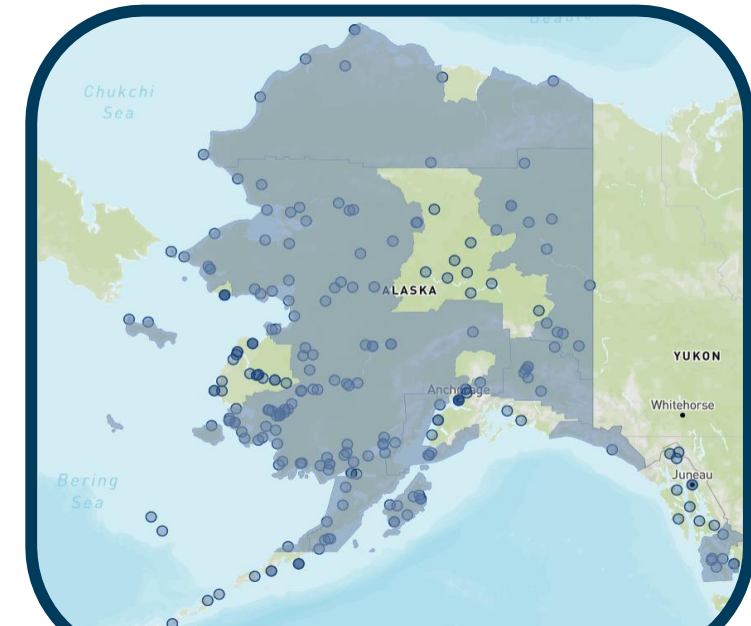


# Project Schedule



# Community Benefits

- **CBP Development Proposal will focus on confirming interested stakeholders by region**
- **Potential Benefits:**
  - Provide another revenue source for the State and/or Alaska Native corporations (ANCs) who own the pore space
  - Many Alaska Native Corporations provide an array of services to large construction projects
    - With ANC involvement, benefits would flow to indigenous shareholders and their communities, many of which are in economically distressed communities
  - Could lead to the expansion of existing training programs for the local indigenous workforce
- **Initiated discussions with labor unions, minority-serving institutions, and workforce development stakeholders**



*Blue denotes economically distressed communities per the US Climate and Economic Justice Screening Tool, date retrieved, 3/6/2023.*



# An Arctic DAC Hub Summary

## DAC Hub Summary:

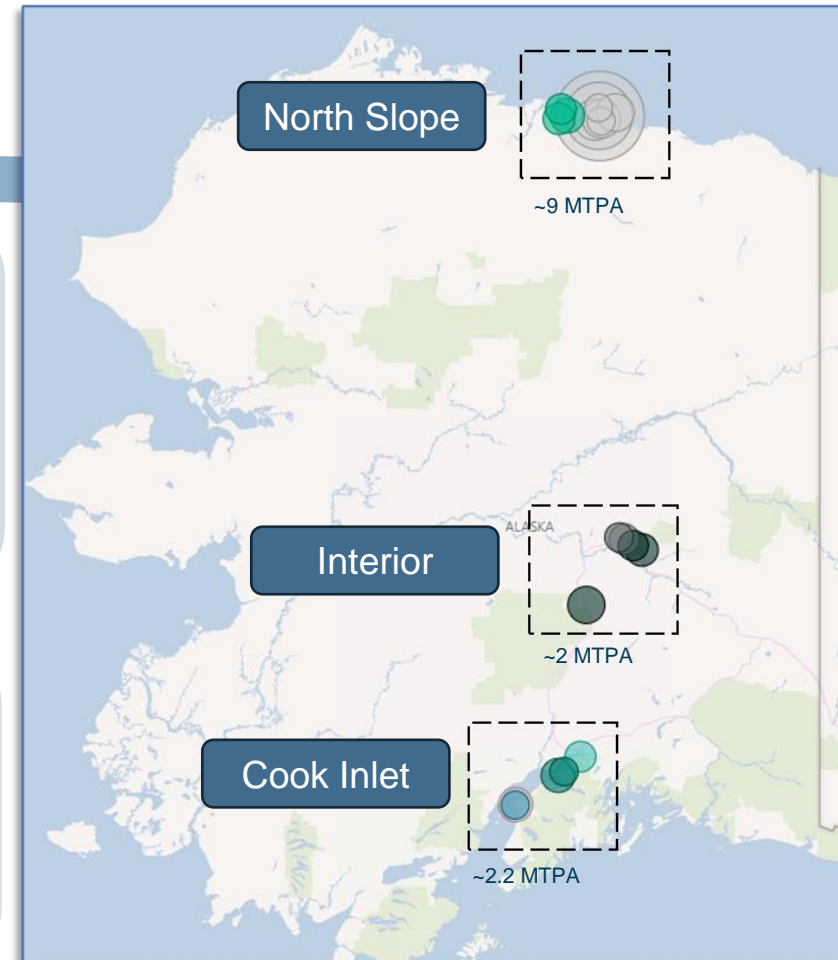
- Seeking to determine the feasibility of Direct Air Capture (DAC) technologies in Alaska and identify a likely location for a future DAC Hub
- Preliminary site screening have identified three areas where geologic storage is broadly possible (North Slope, Cook Inlet, and Interior)
- Two areas have had nearly 50 years of legacy oil and gas development and infrastructure (the North Slope and Cook Inlet) and the other (Interior) is a region fueled mainly by coal

## DAC Hub Impact:

- The discovery of oil on the Kenai Peninsula and the North Slope of Alaska provided the driving force for Alaska's statehood
- DAC, as part of larger carbon sequestration hub(s), has the clear potential to create and/or extend well-paying jobs, could provide another revenue source for the State and/or Alaska Native corporations (ANCs) who own the pore space, and sustain the environment

## Project's Key Idea/Takeaway:

- DOE investments in Alaska will accelerate and prove up DAC technologies in the cold-weather conditions of the Arctic



Source: EPA FLIGHT Tool



# Thank You

CONTACT

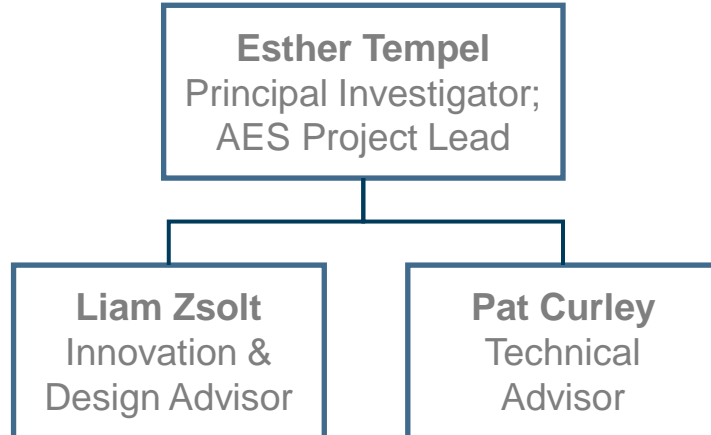
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# Organization Chart

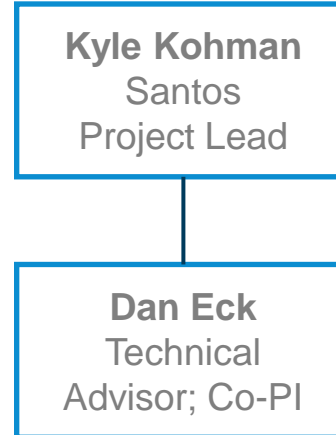
## ASRC Energy Services *Lead Applicant*

*(Project Management & Reporting,  
Stakeholder Outreach, Regulatory/HSE,  
Technical Evaluation)*



## Oil Search (Alaska), LLC *Subrecipient*

*(Technical Evaluation,  
Commercial/Economic  
Analysis)*



## Repsol Earth Solutions USA *Subrecipient*

*(Technical Evaluation,  
Commercial, Stakeholder  
Outreach)*

