



# **Southeast Regional Carbon Storage Partnership: Offshore Gulf of Mexico (DE-FE0031557)**

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Southern States Energy Board



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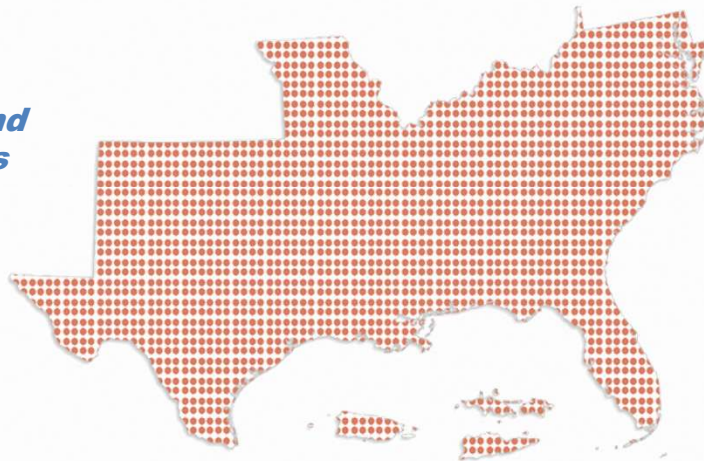
 **SECARB: Offshore**



# Southern States Energy Board

- Interstate Compact Organization, created by state law and consented to by Congress (PL 87-563, PL 92-440)
- 16 U.S. States and Two Territories
- Each jurisdiction represented by the governor, a legislator from the House and Senate, and a governor's alternate
- Federal Representative appointed by U.S. President
- Secretary, who serves as Executive Director

*“Through innovations in energy and environmental policies, programs and technologies, the Southern States Energy Board enhances economic development and the quality of life in the South.”*  
SSEB Mission Statement



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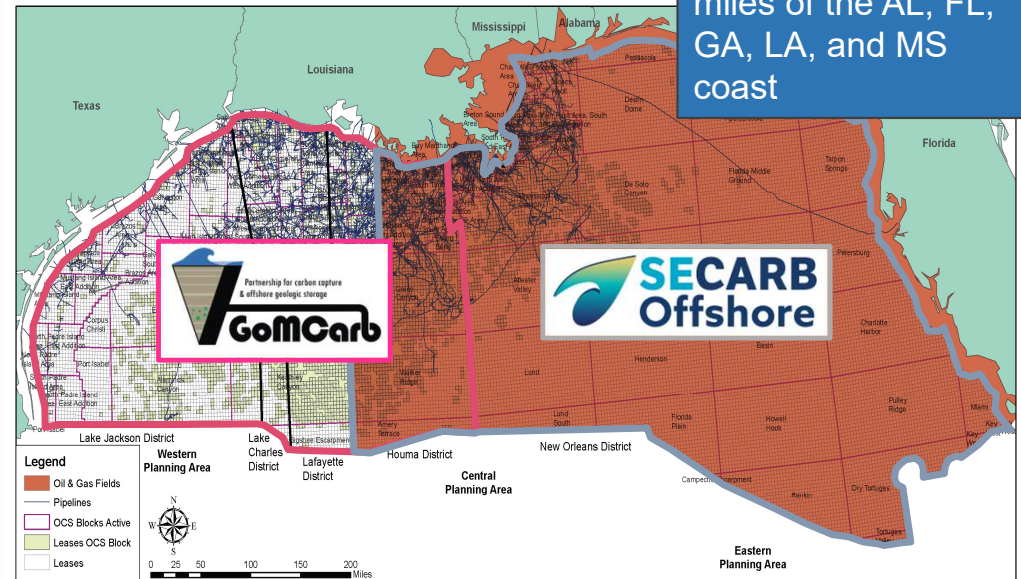


# Offshore Partnership - Overview

- Establishing the knowledge base required for secure, long-term, large-scale, subseafloor storage of CO<sub>2</sub> with or without enhanced hydrocarbon recovery



**260 MMT CO<sub>2</sub>e per year**  
 From point sources annually within 50 miles of the AL, FL, GA, LA, and MS coast



Division of the SECARB Offshore and GoMCarb study areas. Figure courtesy of Advanced Resources International and modified by SSEB.

# Offshore Partnership – Student Participation



## PhD

- Mohamed Abdelaal – storage capacity estimation



## PhD

- Joshua Ademilola – seismic interpretation and reservoir characterization
- Rupom Bhattejee – data analytics
- Justin Spears – mapping and seismic interpretation

## MSc

- Kodjo Botchway – data analytics
- Xitong Hu (graduated) – data analytics
- Seyi Sholanke (graduated) – seismic interpretation



## PhD

- Lars Koehn – reservoir modeling
- Charlie Schlosser – numerical modeling of faults

## Undergraduate

- Abdullah Alsawyan



# Project Timeline





# Offshore Partnership - Overview

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Subsurface characterization utilizing existing data

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Subsurface modeling informed by subsurface characterization

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Identification of risks – legacy infrastructure

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Infrastructure evaluation

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Evaluation of legal and regulatory considerations

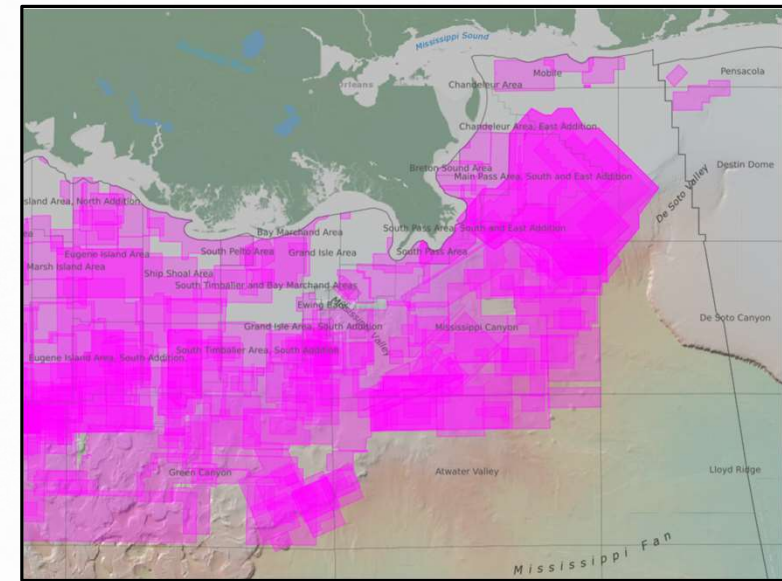
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Outreach

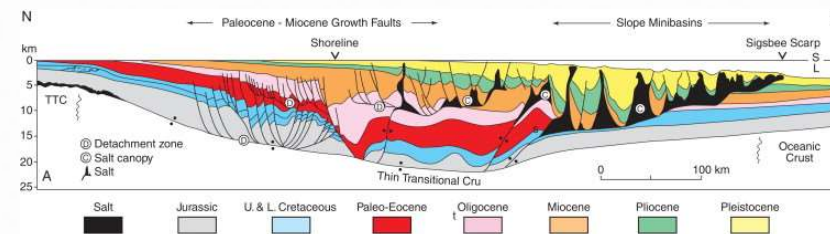


# Characterization

- Building on the foundation established by the Southeast Offshore Storage Resource Assessment (SOSRA)
- Targets are largely Miocene through Pleistocene
- Shelf dominated by high gas-oil ratio; slope dominated by low gas-oil ratio
- Structure in the region related growth faulting and salt tectonics
- **Impressive capacity, more than sufficient to support an extensive offshore CCS industry**



Existing seismic data available through the Bureau of Ocean Energy Management



Schematic illustration of shelf-slope Miocene geology of the central Gulf of Mexico and associated structure. From Galloway et al. (2008)



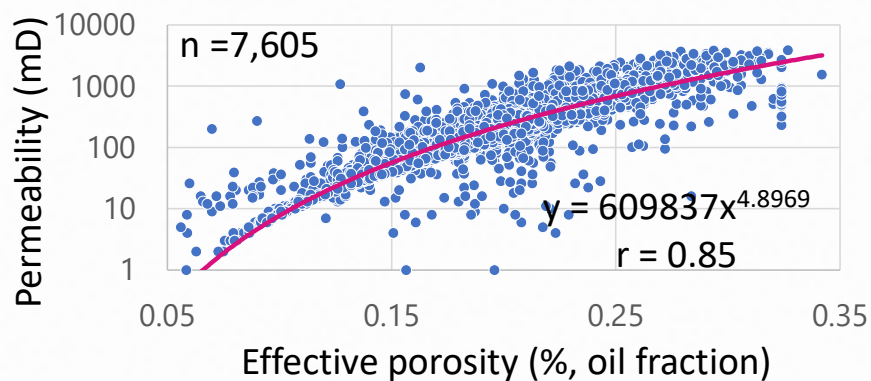
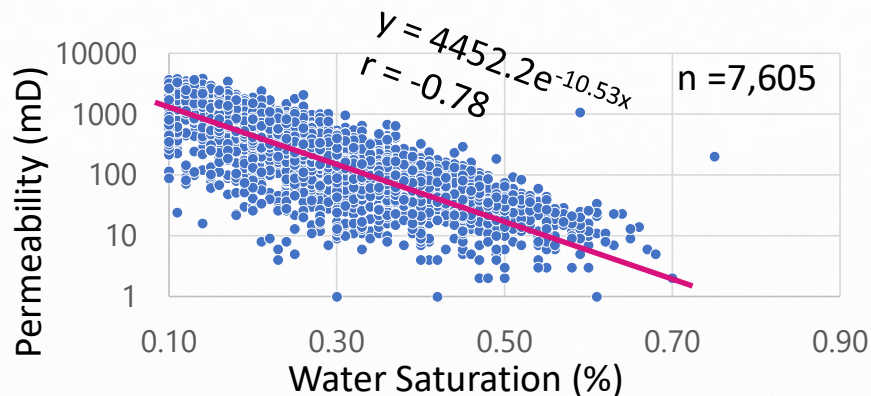
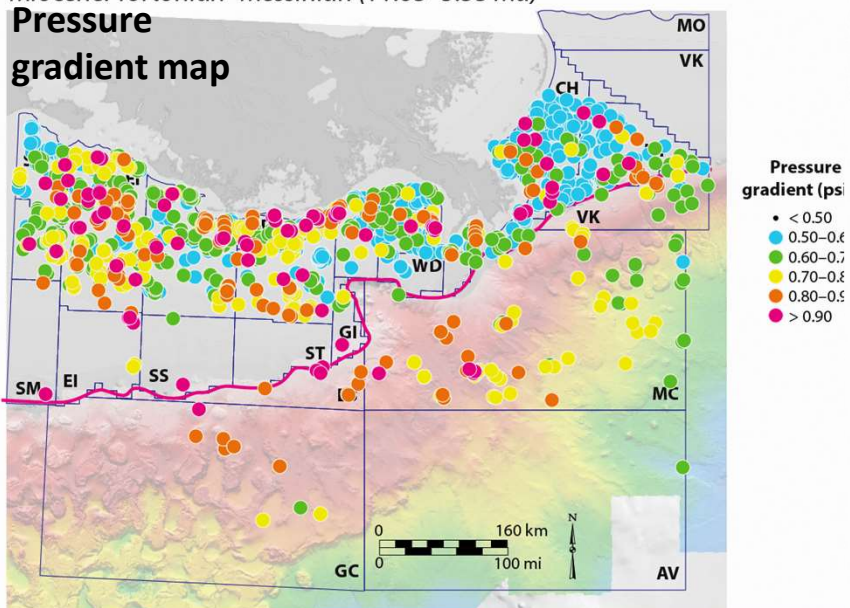


# High-Level Screening

- BOEM Sands database was curated and integrated into SAS Viya to screen for prospective storage opportunities.
- Screening included pressure, temperature, reservoir, and fluid properties.
- Initial screening revealed the most prospective areas in the Mississippi Canyon and Green Canyon protraction areas

Miocene: Tortonian–Messinian (11.63–5.33 Ma)

## Pressure gradient map



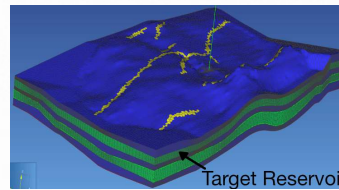
# Reservoir Modeling - Saline

- Constrain uncertainty of CO<sub>2</sub> storage with stochastic reservoir modeling and ensemble simulation
- Permeability variability accounts for  $\pm 20\%$  CO<sub>2</sub> saturation
- Temperature is a precursor to CO<sub>2</sub> breakthrough
- Fault compartmentalization drive pressure build-up – more research is needed

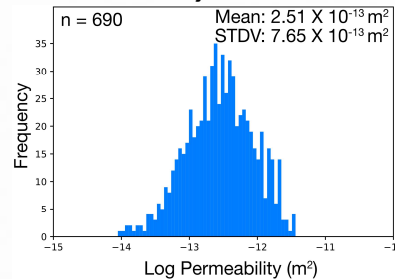
Study Area



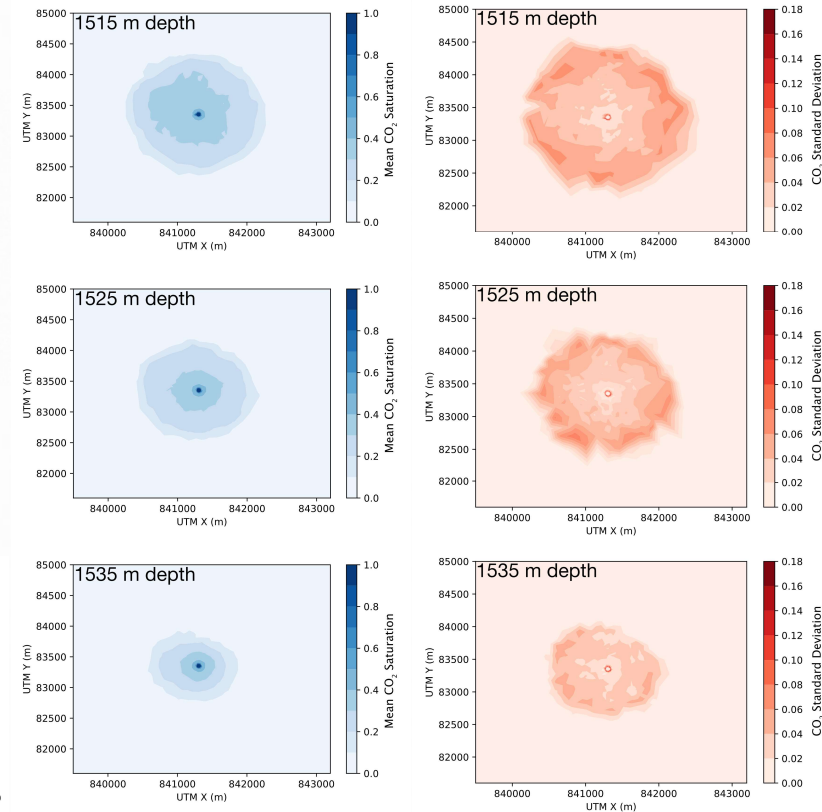
Reservoir Model



Permeability Distribution

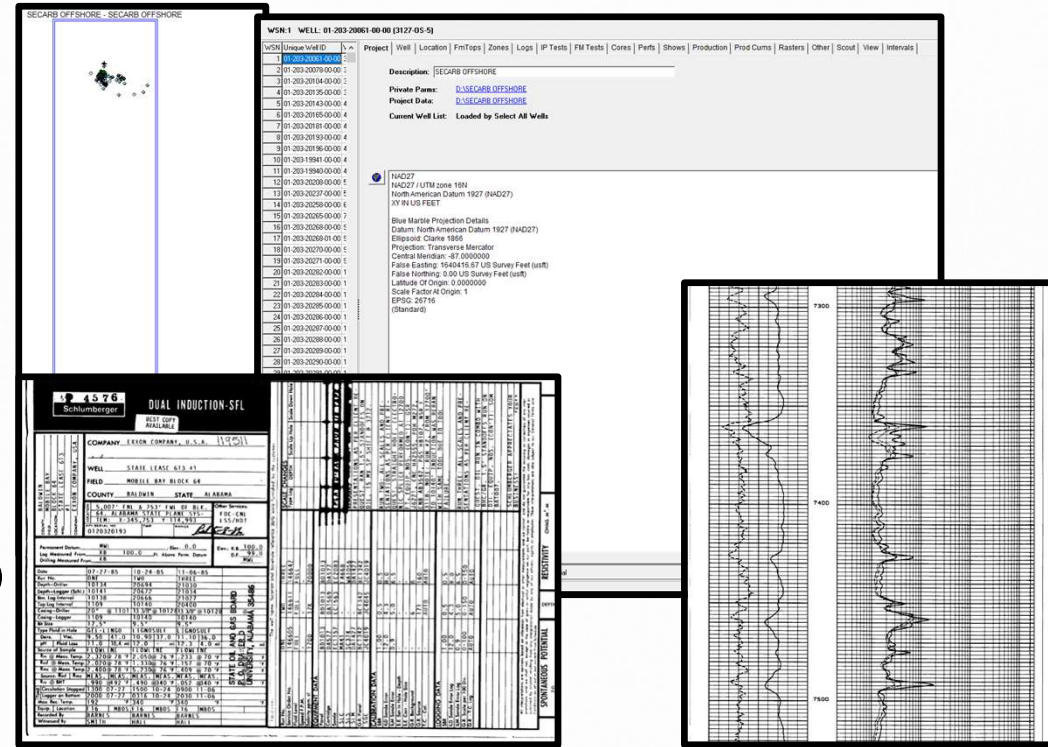


Results from 50 equally probable reservoirs:



# Reservoir Modeling – Shallow Reservoirs

- **Building shallow reservoir model**
- **574 Wells** currently. Located in State and Federal waters offshore Alabama - Gulf of Mexico Shelf.
- Digital logs with some scanned rasters.
- **Petra Project** being migrated to **Kingdom Suite**.
- Working to locate any available **Production Data** available



Existing data to construct shallow reservoir model for the continental shelf.



Advanced Resources  
International, Inc.



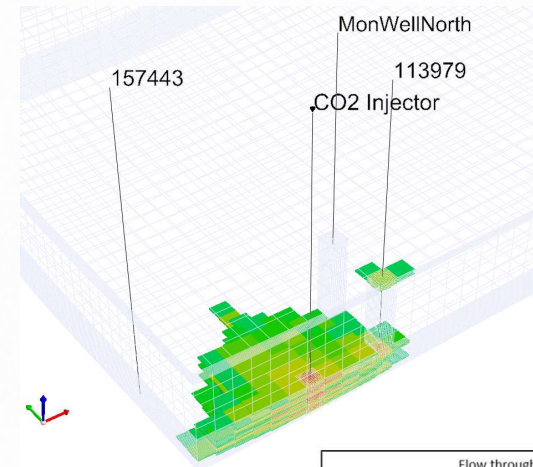
**SECARB: Offshore**



# Storage and Operational Risk

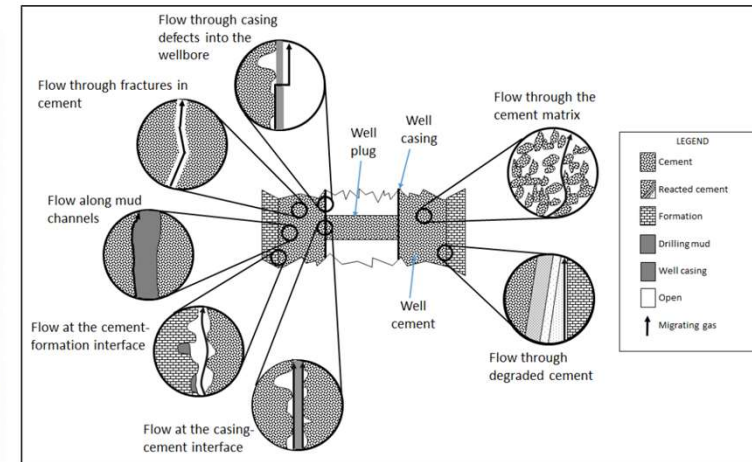


- Developed a risk registry that considers operation risks including (1) subsurface risks; (2) regulatory risks; (3) infrastructure risks; (4) MVA risks; (5) commercialization risks; and (6) public perception
- **Risk assessment protocol for existing well penetrations in the GOM**
  - Three case studies

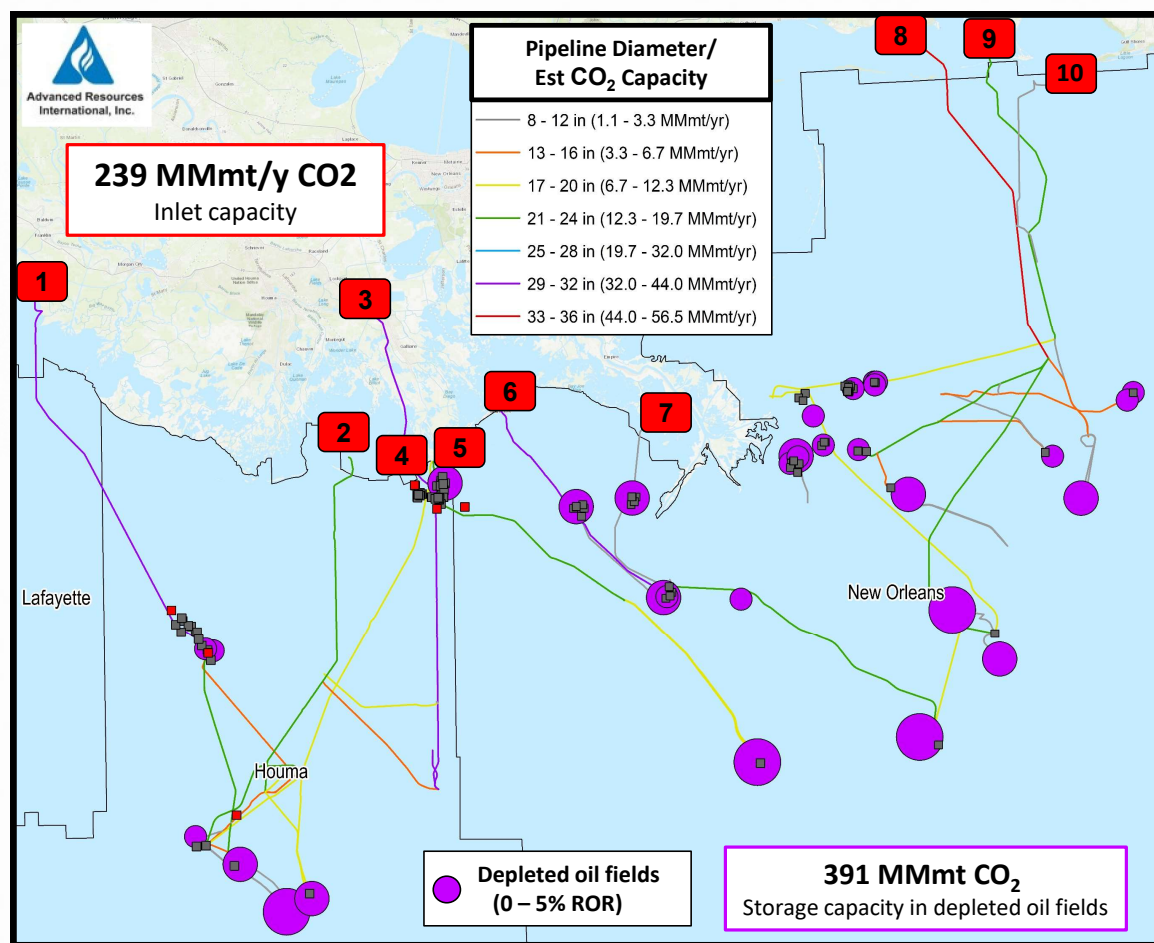


Above zone monitoring technique utilizing the dynamic model generated for the South Marsh Island area in the state waters of Louisiana. Here, an above zone monitoring well is located north of a leaky legacy well. Figure courtesy of Mehdi Zeidouni of LSU.

Illustration of potential leakage pathways for CO<sub>2</sub> through cement defects and casing defects. Figure from Gasda et al., 2004.



# Evaluating Existing Infrastructure

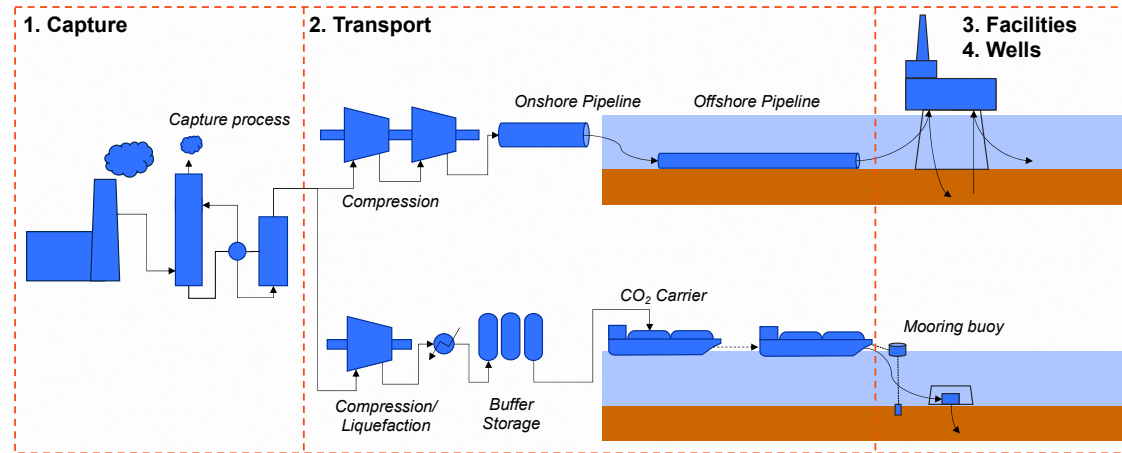
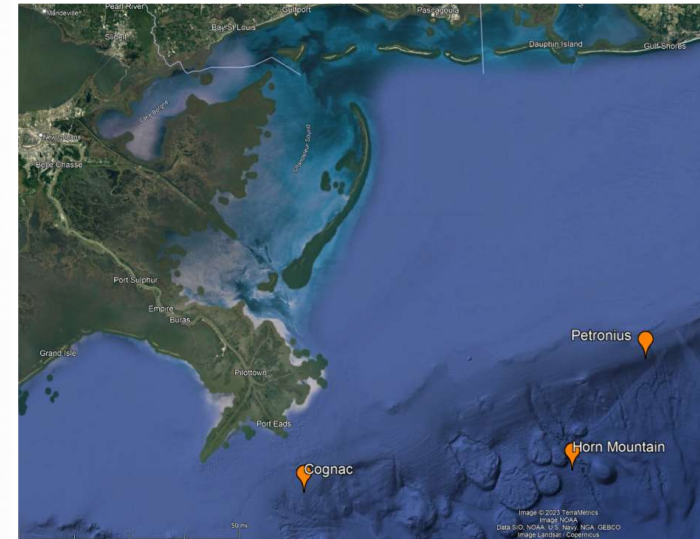


## Screened O&G Infrastructure

- 82 pipeline segments totaling 1,784 miles
- 125 offshore platforms; 6 scheduled for abandonment.
- **239 MMmt CO<sub>2</sub> inlet capacity** at 10 onshore pipeline connections.
- A total of **391 MMmt of CO<sub>2</sub> storage capacity** in 31 depleted oil reservoirs

# Development Scenarios **STOREGDA**

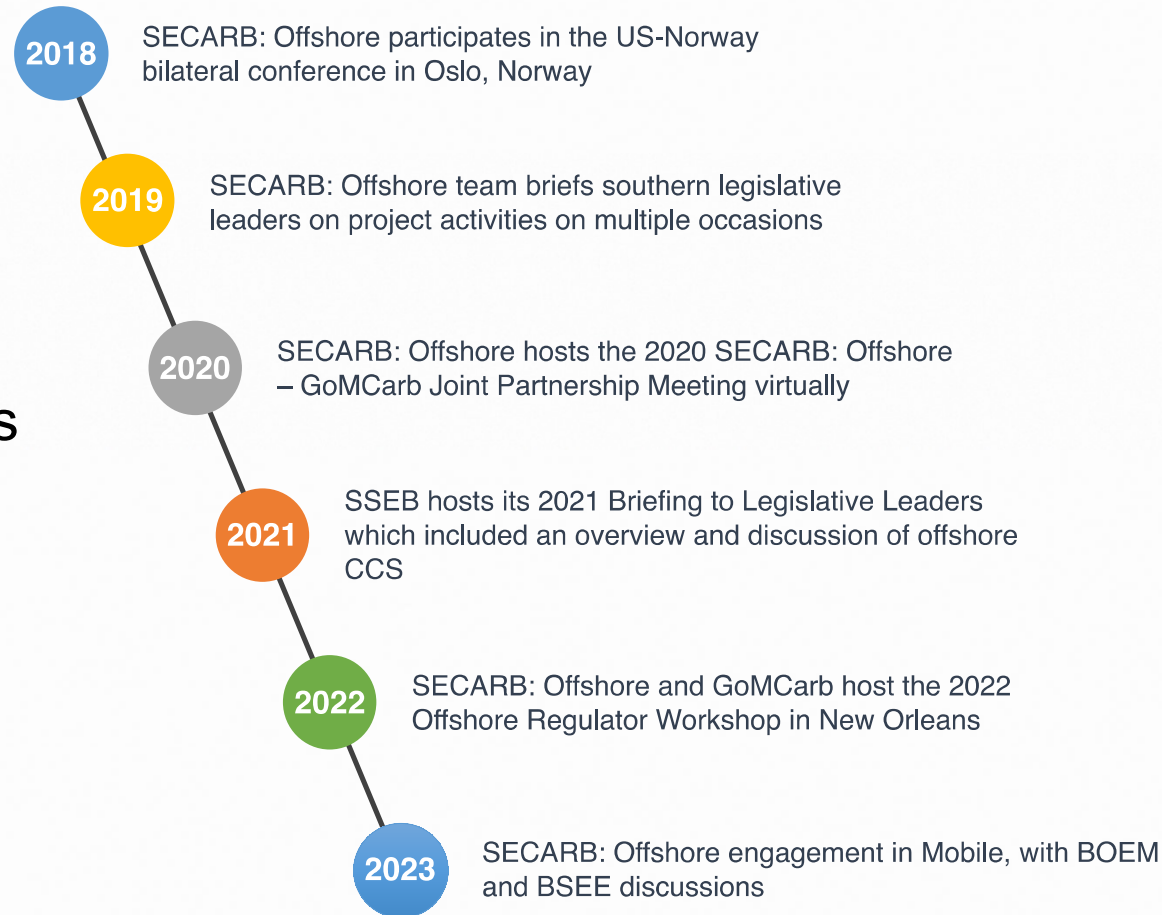
- Project development scenarios utilizing three historic fields – assess storage and EOR use cases
- **Review infrastructure → identify sources → design technical solutions → estimate costs**
- **Pipeline scenarios are high capex, low opex, and suited for large projects**
  - Opposite is true for ship-based scenarios





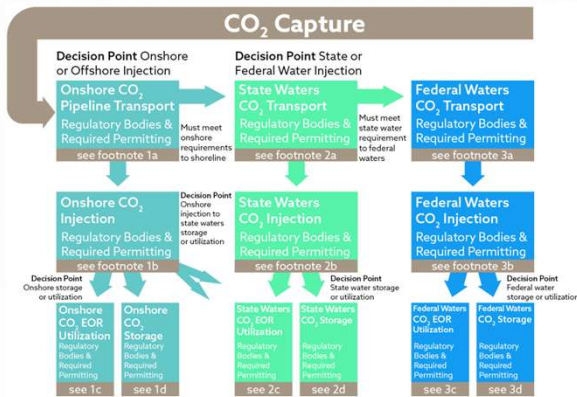
# Outreach and Engagement Overview

- Participated in Joint Meeting in April
- Multiple meetings with state regulators interesting in pursuing primacy
- Community engagement events in Mobile, AL and Houston, TX
- Host the 2023 CCS Briefing to state legislative leaders in Charleston, SC
- AL, AR, and MS interested in primacy (consolidating authority)



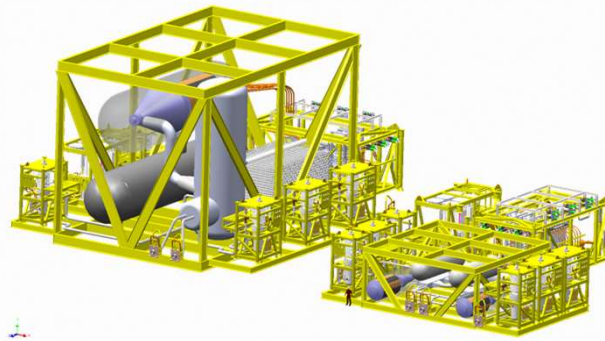
# Other Activities

## 1. Legal and Regulatory



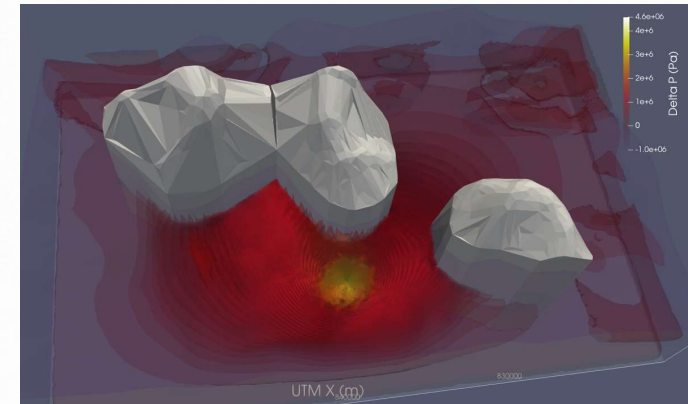
Developing a conceptual flow diagram that includes legal and regulatory considerations for project developers

## 2. Infrastructure



Developing subsea completions for CO<sub>2</sub> processing from natural gas fields

## 3. Risk



Developing models to evaluate CO<sub>2</sub> pressure plume interaction with local structural features (e.g., salt diapirs)

# Moving Forward

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Evaluate reservoir data, refine geologic models

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Finalize representative models

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Complete infrastructure and development scenarios

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Continue outreach with regulators and legislative leaders

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Develop educational video







**Thanks!**  
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