

PAH BUSINESS MEETING

# The role of Pipelines in a low carbon energy future

**Aura Informatica**

*Connecting the dots in the energy value chain*

**May 5, 2025**

Pipeline Association of Houston



# PIPELINES: ADAPTING TO A NET-ZERO ECONOMY

## **Pipelines: A Vital Part of the Clean Energy Future:**

Efficient and reliable energy transportation remains crucial, even as the energy mix evolves

## **Strategic Investment is Key:**

Planning and investment are essential to ensure pipelines support a sustainable energy system

## **Multiple Pathways to Net-Zero:**

Pipeline infrastructure can be leveraged for:

- Hydrogen transport
- Biogas distribution
- CO2 transport for Carbon Capture and Storage (CCS)

# THE EVOLVING CCUS LANDSCAPE

## Significant CCUS Project Pipeline:

Approximately 330 MMTPA of CCUS projects are currently in various stages of development

## Ambitious DAC Hub on the Horizon:

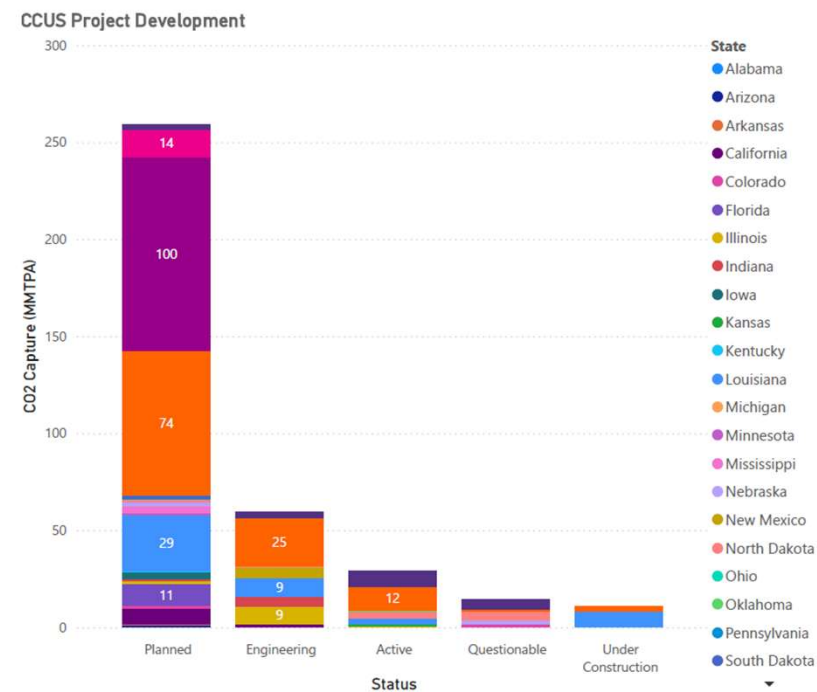
A feasibility study is underway for the Red Rocks Direct Air Capture (DAC) Hub in southwest Utah. This geothermal-driven hub aims to capture approximately 100 MMTPA of CO<sub>2</sub>

## Texas Leads in CCUS Development:

Texas accounts for roughly 30% of all CCUS projects currently under development, demonstrating its prominent role in this sector

## Louisiana - Center of Current CCUS Construction:

The majority of CCUS projects presently under construction are in Louisiana, indicating its current focus on implementation



Source: Aura Informatica - EnergyConnexions

# CO2 CAPTURE PROCESS OVERVIEW

## Established Capture Technologies:

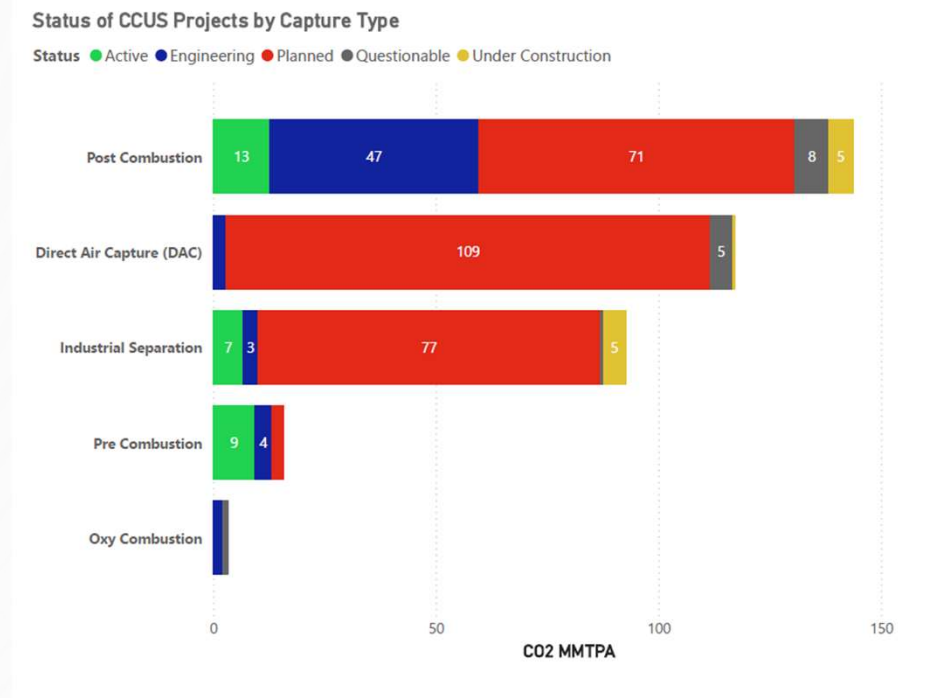
Existing capture technology is evenly distributed across Pre & Post Combustion and Industrial Separation

## Focus on Post-combustion and Industrial Separation:

Majority of the new projects are based on Post Combustion technology followed by Industrial Separation

## DAC – High Potential, Dependent on advancements:

Significant potential for future scale up, contingent upon further technology enhancements and achieving commercial viability



Source: Aura Informatica - EnergyConnexions

# CCUS: KEY ROLE IN DECARBONIZING HARD-TO-ABATE SECTORS

## Key GHG Emission sources:

The Power generation & industrial sectors combined accounted for nearly 50% of the US GHG emissions as of 2022\*

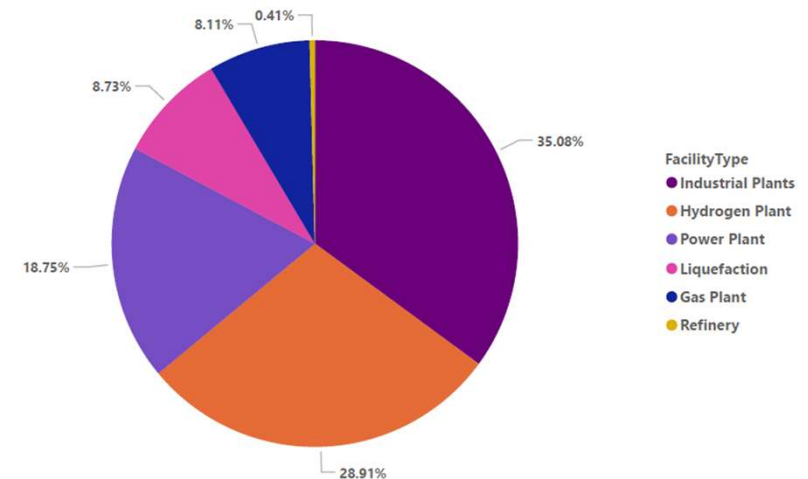
## CCUS Focus: Key Industries:

Over 70% of the projected CO2 capture initiatives are focused on these hard-to-abate sectors (power, industrial, processing etc.)

## CCUS: Enabling low carbon Hydrogen:

CCUS emerging as a key enabler for realizing low-carbon Hydrogen potential – Blue Hydrogen projects make up 65% of the US hydrogen development pipeline

CCUS Development by Facility Type



Source: Aura Informatica - EnergyConnexions

\*Source: EPA GHG Emissions

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# PIPELINES ARE A CRITICAL LINK IN THE CCUS VALUE CHAIN

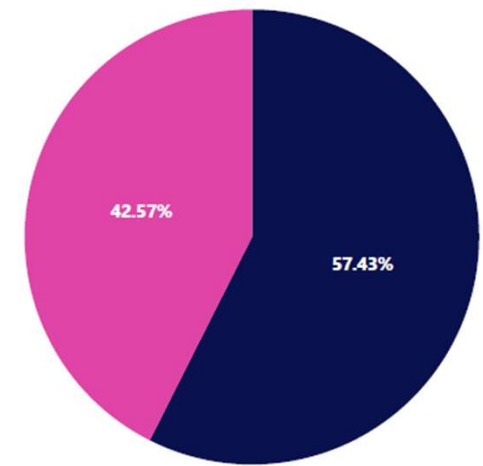
## On-site capture and pipeline transport:

Almost 60% of the announced CCUS projects will capture CO2 at the source and then transport it via pipelines to sequestration hubs

## Growing importance of Pipelines:

As DAC projects (most currently in their early feasibility stages) evolve, the role of pipelines in transporting sequestered CO2 will become even more critical

Captured CO2 Transport Modes



CO2TransportMode ● Pipeline ● Direct Injection

Source: Aura Informatica - EnergyConnexions



# PIPELINES ARE A CRITICAL LINK IN THE CCUS VALUE CHAIN

## Extensive existing infrastructure:

The US boasts a substantial CO2 pipeline network, currently exceeding 5,000 miles

## Key Players:

ExxonMobil (via Denbury) and Kinder Morgan are the dominant operators in the CO2 pipeline sector

## Significant expansion planned:

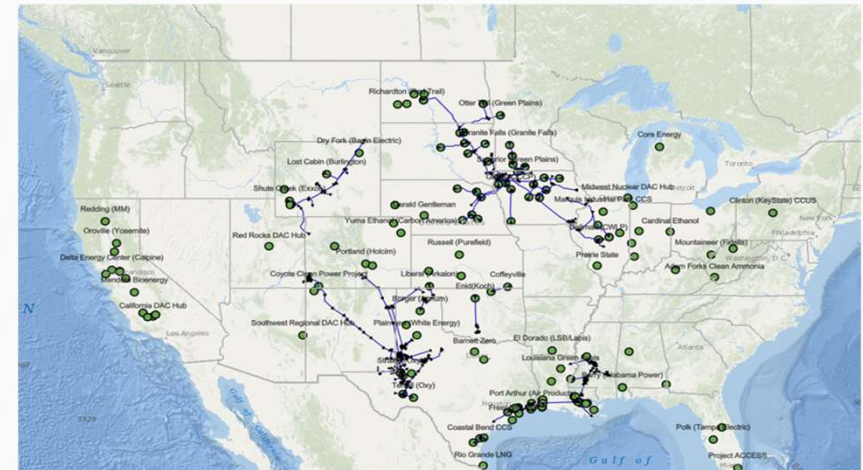
Approximately 2,300 miles of new CO2 pipelines are in the planning stages

## Mega-Project dominates development:

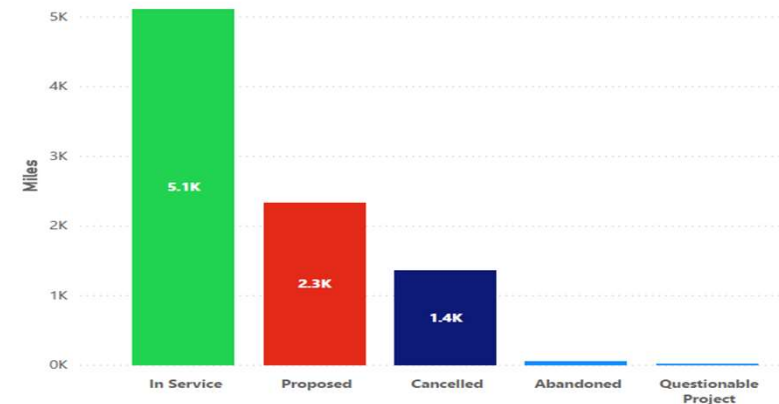
Summit Carbon Solutions' "Midwest Carbon Express" project, a 2,100-mile pipeline, accounts for most of the planned construction. This project will collect CO2 from 59 ethanol plants across five states and transport it for sequestration in North Dakota

## Regional Focus:

The remaining planned pipeline projects (approximately 200 miles total) are concentrated in the Gulf Coast region



CO2 Pipelines



Source: Aura Informatica - EnergyConnexions

# PIPELINES ARE A CRITICAL LINK IN THE CCUS VALUE CHAIN

## Project Lochridge (Crescent Midstream):

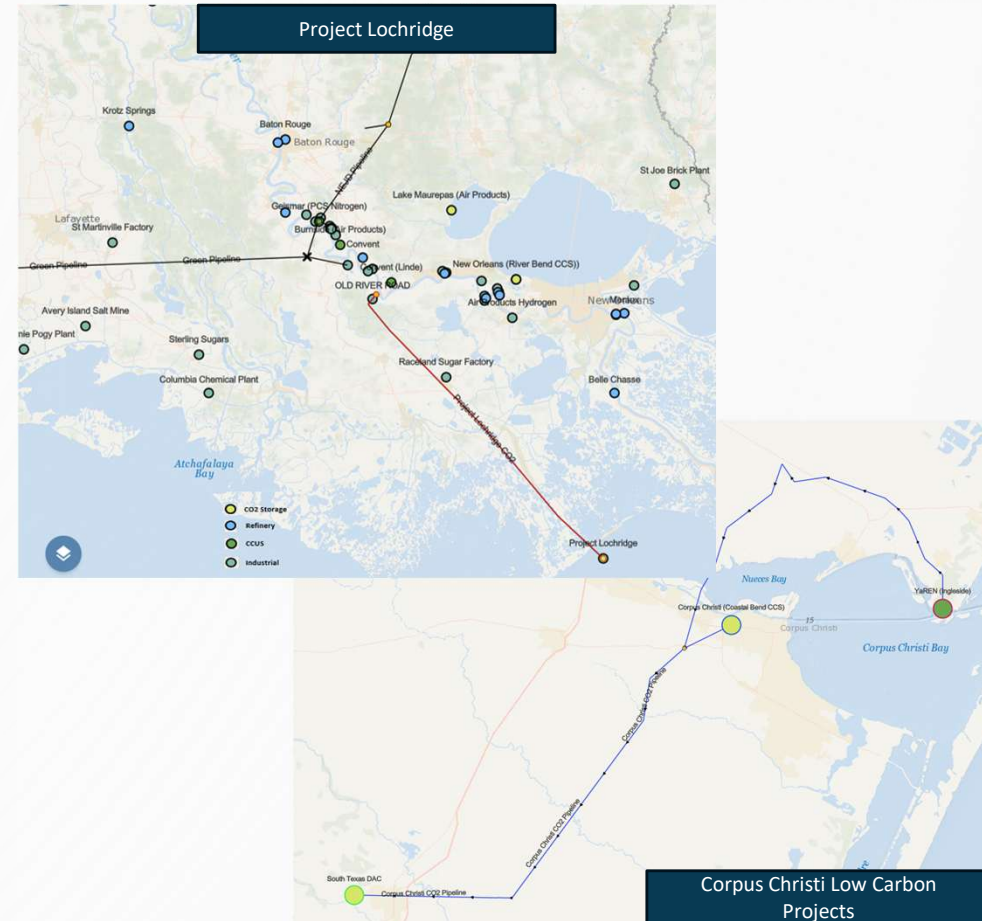
Repurposing a 110-mile pipeline corridor to transport captured CO<sub>2</sub> from industrial facilities in the Geismar, LA area to an offshore Louisiana sequestration hub

## Project YaREN (Enbridge & Yara):

A joint venture to develop a low carbon ammonia production facility at an Enbridge's Ingleside Energy Center

## OLCV/ Enbridge CO<sub>2</sub> pipeline:

A proposed 64-mile CO<sub>2</sub> pipeline system that would transport the captured CO<sub>2</sub> from the ammonia facility along with multiple other receipt points to OLCV's South Texas DAC/Sequestration Hub



Source: Aura Informatica - EnergyConnexions

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# KEY TAKEAWAYS

- Integration of pipelines with other low-carbon technologies is essential
- Achieving zero emissions will require extensive use of carbon capture utilization and sequestration (CCUS) and significant policy support to drive the adoption of zero-carbon fuels
- Significant investment in CO2 pipeline infrastructure is required for large-scale CCUS deployment, with estimates ranging from \$16.3 billion to \$230 billion for new pipelines by 2050

# Unravel the complexity of Energy Infrastructure dependencies with **EnergyConnexions**

## Uncover hidden dependencies:

Identify critical infrastructure connections and dependencies

## Gain competitive insights:

Analyze basin landscapes for informed M&A and JV decisions

## Map your low-carbon future:

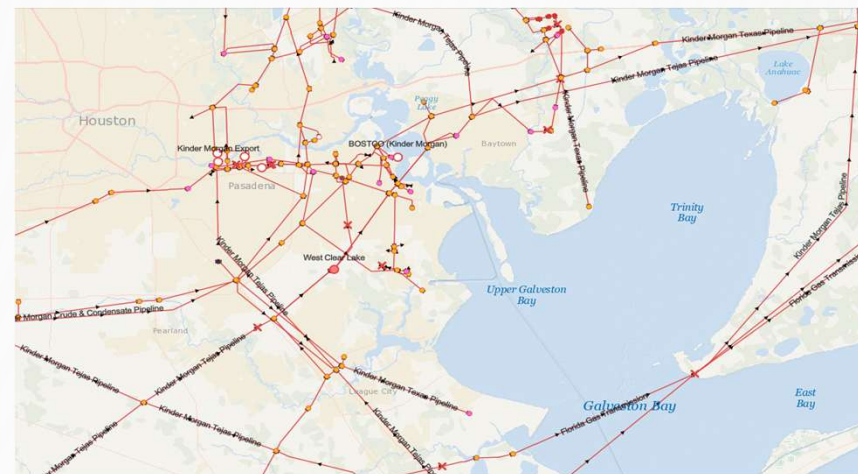
Develop and optimize sustainable infrastructure strategies

## Optimize transportation costs:

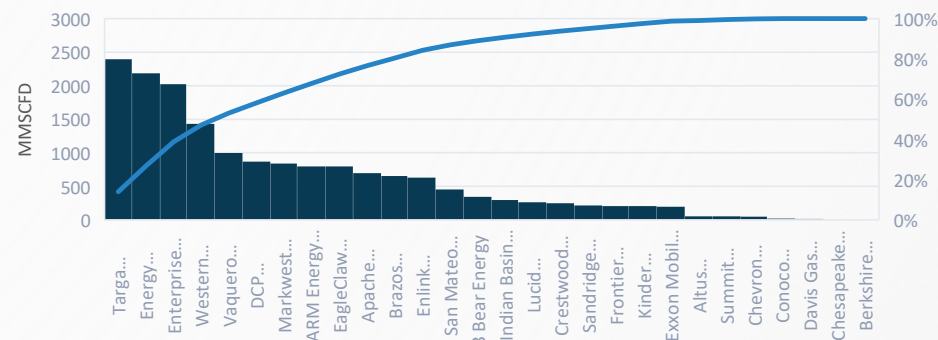
Analyze flow data, tariffs, shippers and choose the most efficient pipeline routes

## Reduce logistics complexity:

Leverage existing infrastructure interconnections for smoother product movement



Active Gas Processing Plants - Delaware Basin



## PAH Business Meeting

# Thank You

Prasun Chaudhury  
CEO, Aura Informatica  
Email: [pc@aurainformatica.com](mailto:pc@aurainformatica.com)  
Phone: +1 832 876 2034

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