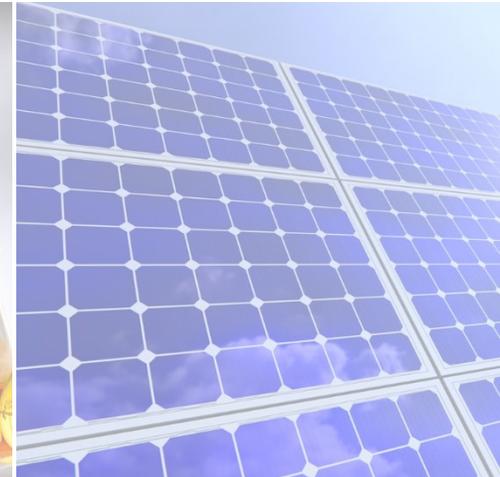




FINDING NEW OPPORTUNITIES FOR CARBON CAPTURE WITH CO₂NCORD

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Acknowledgements

This material is based upon work supported by the National Science Foundation under Grant No. 2216541. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.





CO₂NCORD

- Team
- Data and workflow
- Use cases
- Application

White Paper

- Scope of study
- U.S. overview
- Regional analysis
- 45Q analysis

Conclusions



CO₂NCORD



Kat Sale
Chemical Engineering



Jeff Bennett
Engineering, LCA,
Software Development



Jessi Eidbo
Engagement



Veronika Lubeck
GIS



Carl Talsma
Software Engineering



Chris Gilhooley
GIScience, Urban
Planning



Erin Middleton
Energy Equity & Env.
Justice



Jacqueline Taylor
Environment, Policy



Andrew Harrison
Economics



Daniel Rodriguez
LCA, GIScience



Richard Middleton
CEO, Science Leader

Goal

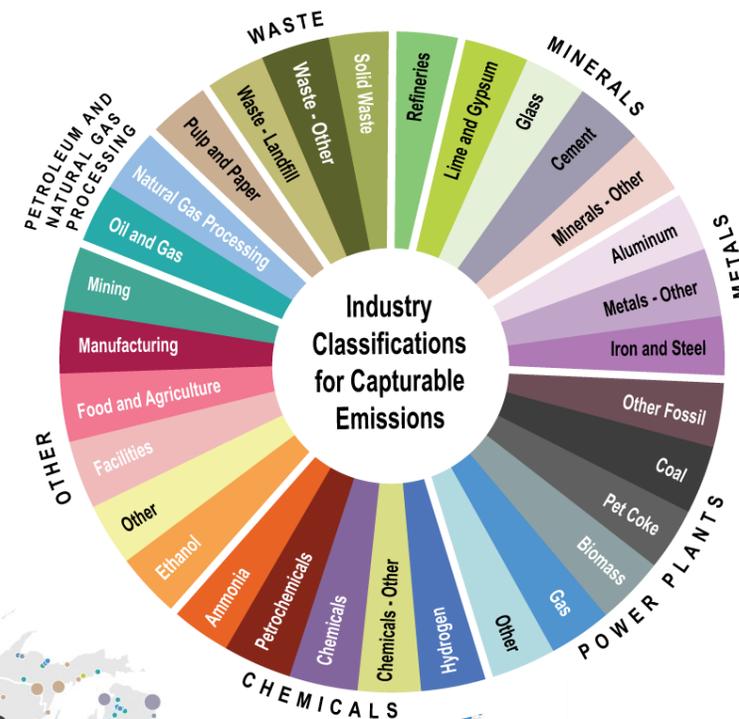
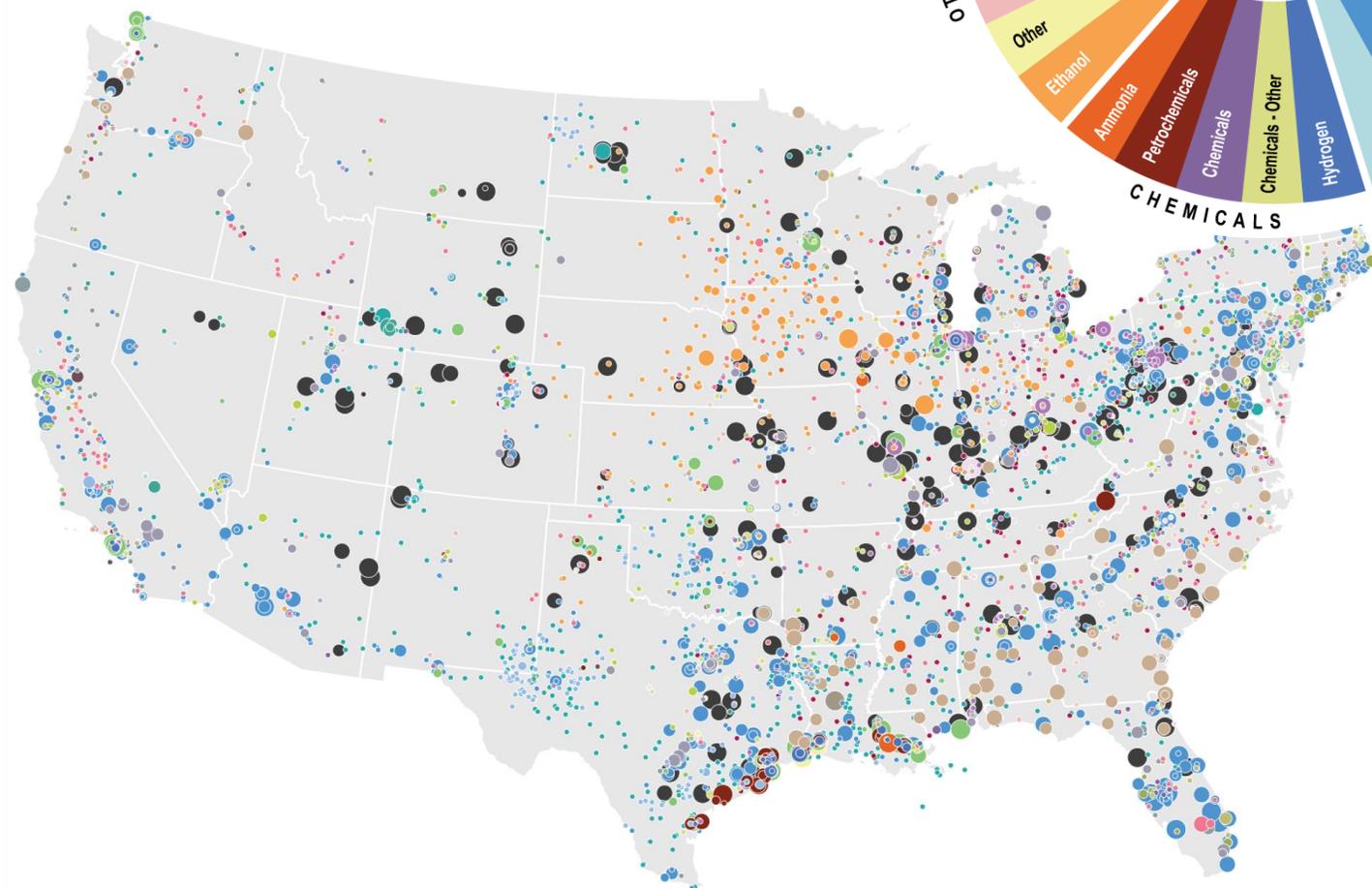
Identify opportunities for carbon capture at industrial facilities and power plants

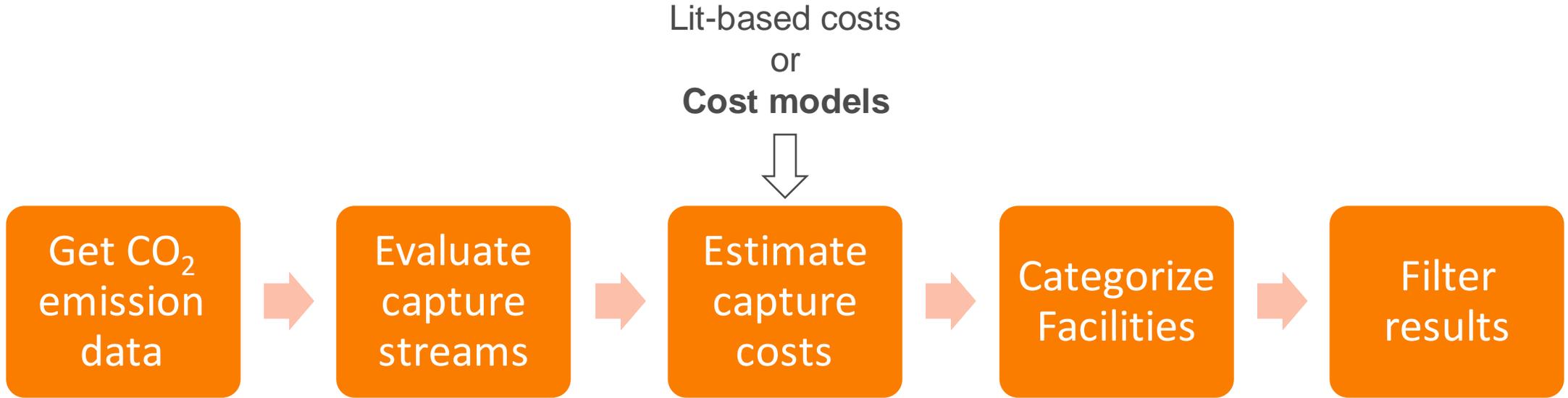
Provides the starting point for:

- Life cycle assessment
- Waste heat estimates
- Health co-benefit evaluations

CO₂NCORD

The CO₂ National Capture Opportunities and Readiness Database





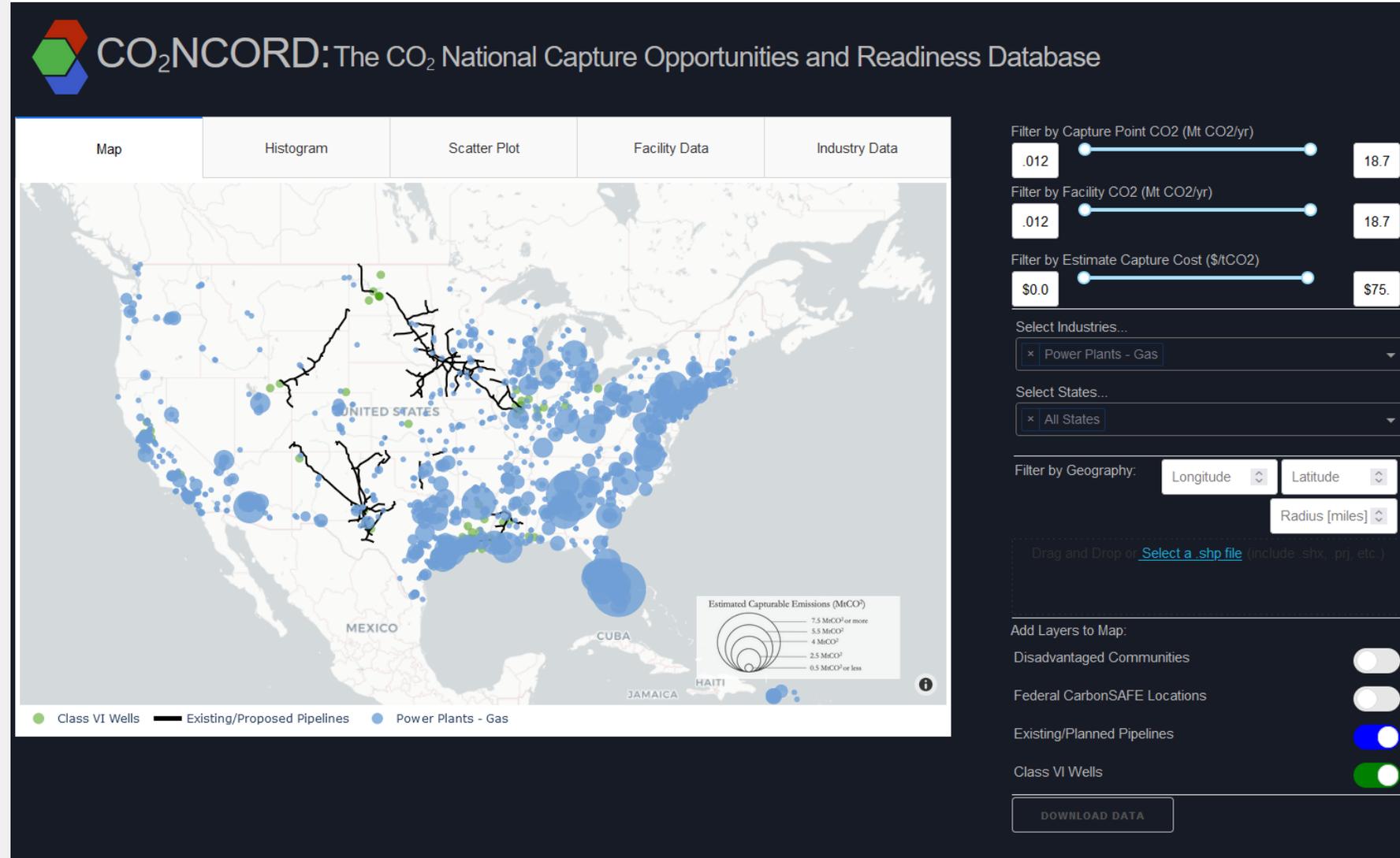
Emission source	Data Source
Industrial and power facility emissions	GHGRP
Power facility emissions	eGRID
Ethanol production	U.S. Fuel Ethanol Plant Production Capacity
	RFA Website

- 45Q
- Location
- Facility type

Use cases for CO₂NCORD



- 1) Storage companies can identify nearby emitters
- 2) Provide emitters with screening information and discovery of volumes and costs of nearby emitters
- 3) Identify deployment opportunities for capture tech companies
- 4) Explore CCS infrastructure close to emitters
- 5) Support regional and national CCS planning studies



Web application walkthrough



CO₂NCORD: The CO₂ National Capture Opportunities and Readiness Database



Filter by Capture Point CO₂ (Mt CO₂/yr)

.0125 18.75

Filter by Facility CO₂ (Mt CO₂/yr)

.0125 18.75

Filter by Estimate Capture Cost (\$/tCO₂)

\$0.00 \$75.9

Select Industries...

× All Industries

Select States...

× All States

Filter by Geography:

Longitude

Latitude

Radius [miles]

Drag and Drop or [Select a .shp file](#) (include .shx, .prj, & .dbf)

Add Layers to Map:

Disadvantaged Communities

Federal CarbonSAFE Locations

Existing/Planned Pipelines

Class VI Wells

DOWNLOAD DATA

Released at the end of this webinar

Provides an in-depth example of using CO₂NCORD to analyze capture opportunities across the contiguous United States

Scope and approach:

- Screening level study
- Contiguous U.S.
- Cost models

Finding New Opportunities for Carbon Capture with CO₂NCORD



Authors: Kat J. Sale, Jeffrey A. Bennett, Jessi B. Eidbo, Christopher G. Gilhooley, Andrew F. Harrison, Veronika L. Lubeck, Erin J. Middleton, Daniel S. Rodriguez, Carl J. Talsma, Jacqueline R. Taylor, Richard S. Middleton

Date: March 27, 2024

U.S. Overview – Capturable emissions



Power production:

- 835 million tonnes from coal production
- 624 million tonnes from natural gas production

Industrial sources:

- 160 million tonnes from petroleum refineries
- 140 million tonnes from pulp and paper

CO₂NCORD

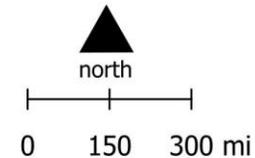
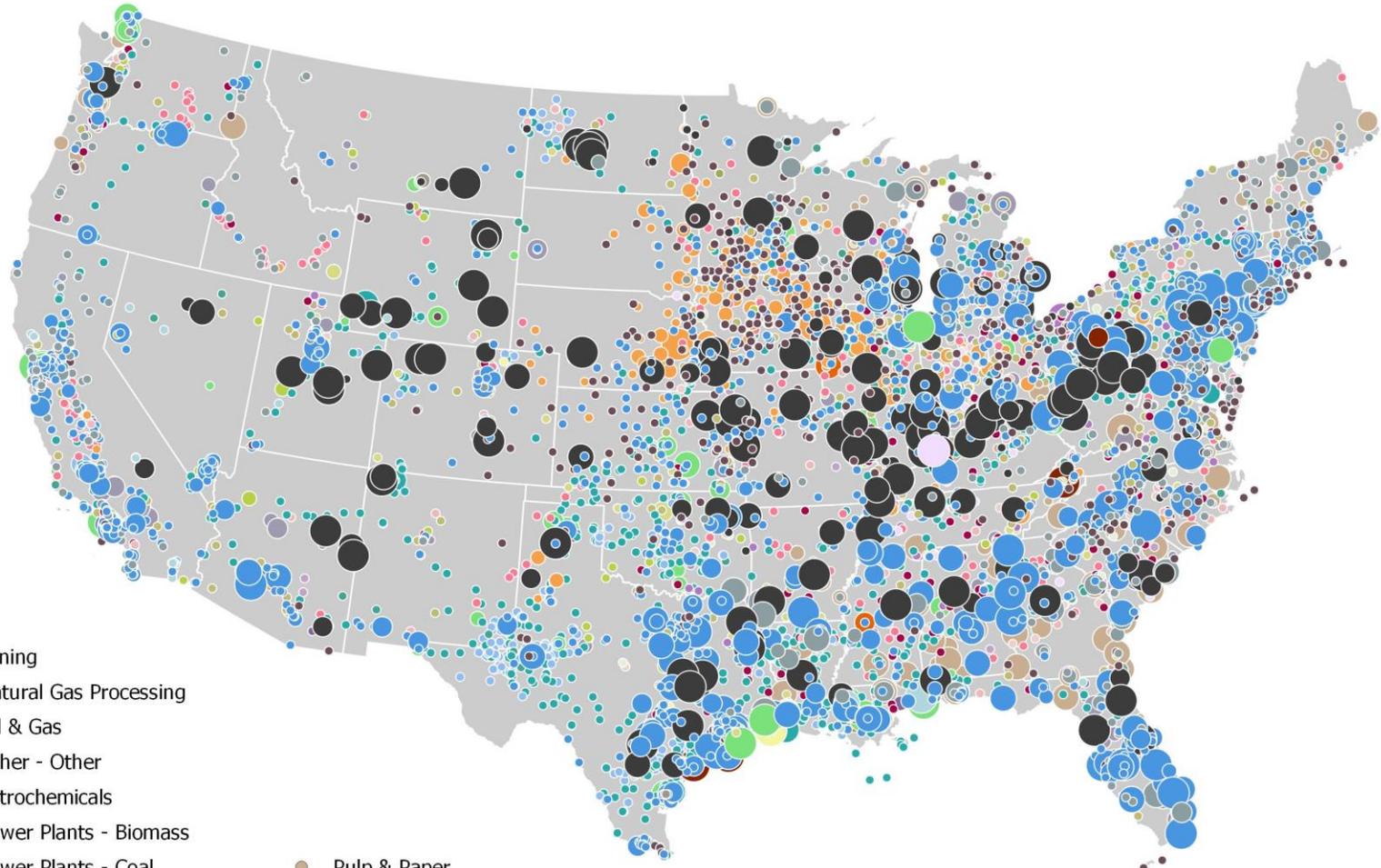
The CO₂ National Capture Opportunities and Readiness Database

Capturable Emissions (MtCO₂)

- 0.00 - 0.50
- 0.50 - 0.85
- 0.85 - 1.50
- 1.50 - 3.00
- 3.00+

Industry Category

- Aluminum
- Ammonia
- Cement
- Chemicals
- Chemicals - Other
- Ethanol
- Facilities
- Food & Ag
- Glass
- Hydrogen
- Iron & Steel
- Lime & Gypsum
- Manufacturing
- Metals - Other
- Minerals - Other
- Mining
- Natural Gas Processing
- Oil & Gas
- Other - Other
- Petrochemicals
- Power Plants - Biomass
- Power Plants - Coal
- Power Plants - Gas
- Power Plants - Other
- Power Plants - Other Fossil
- Power Plants - Pet Coke
- Pulp & Paper
- Refineries
- Solid Waste
- Waste - Landfill
- Waste - Other





Values in 2022
USD with
\$500/tonne cap

General trend of
high emissions,
low cost

Exceptions: high-
purity CO₂ sources

- Ethanol
- Oil and gas production
- Natural gas processing

CO₂ NCORD

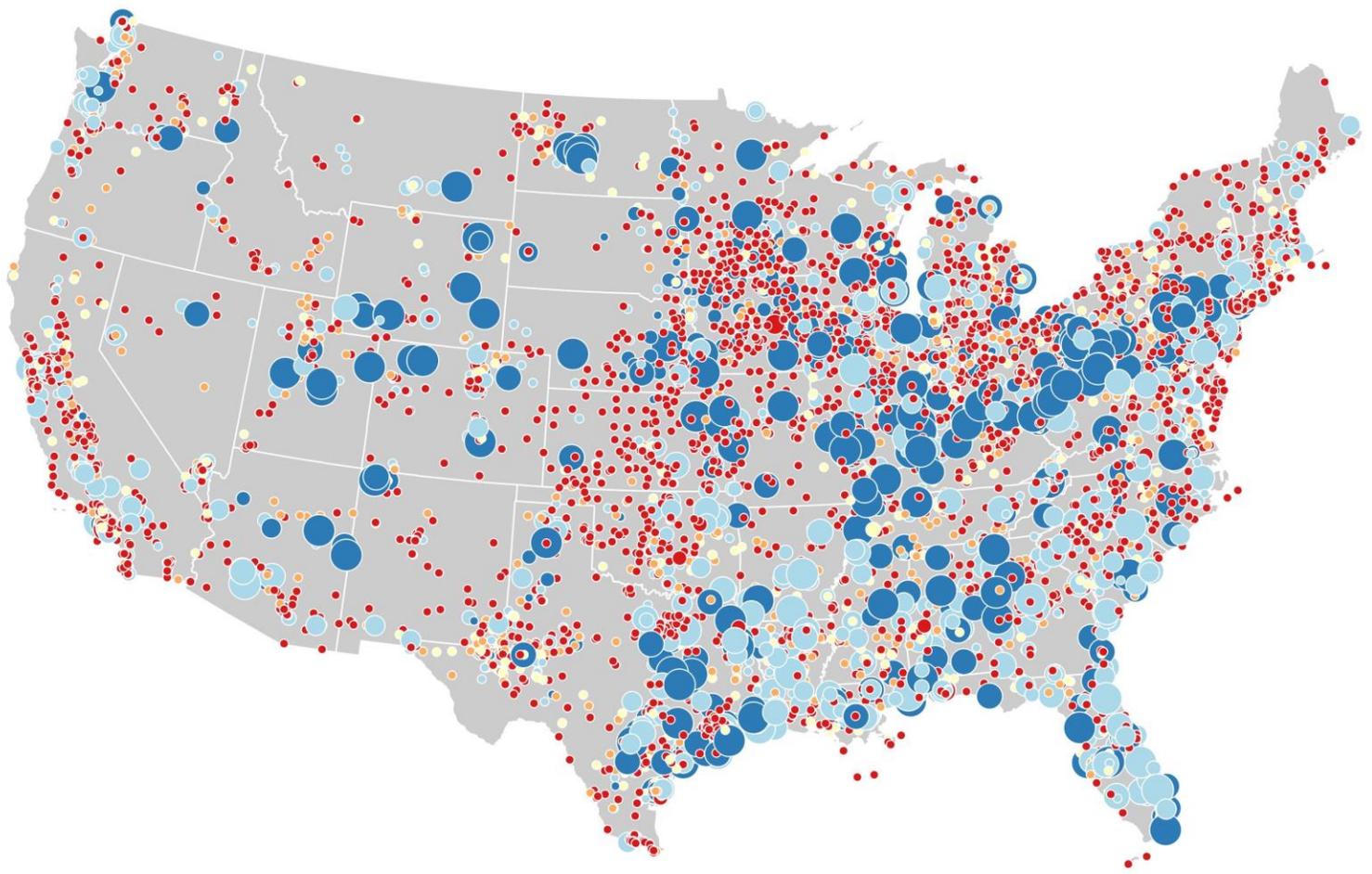
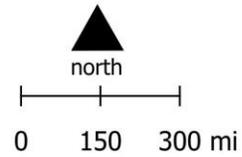
The CO₂ National
Capture Opportunities
and Readiness Database

Total Unit Cost (\$/tCO₂)

- 26 - 100
- 100 - 200
- 200 - 300
- 300 - 400
- 400 - 500

Capturable Emissions (MtCO₂)

- 0.00 - 0.50
- 0.50 - 0.85
- 0.85 - 1.50
- 1.50 - 3.00
- 3.00+

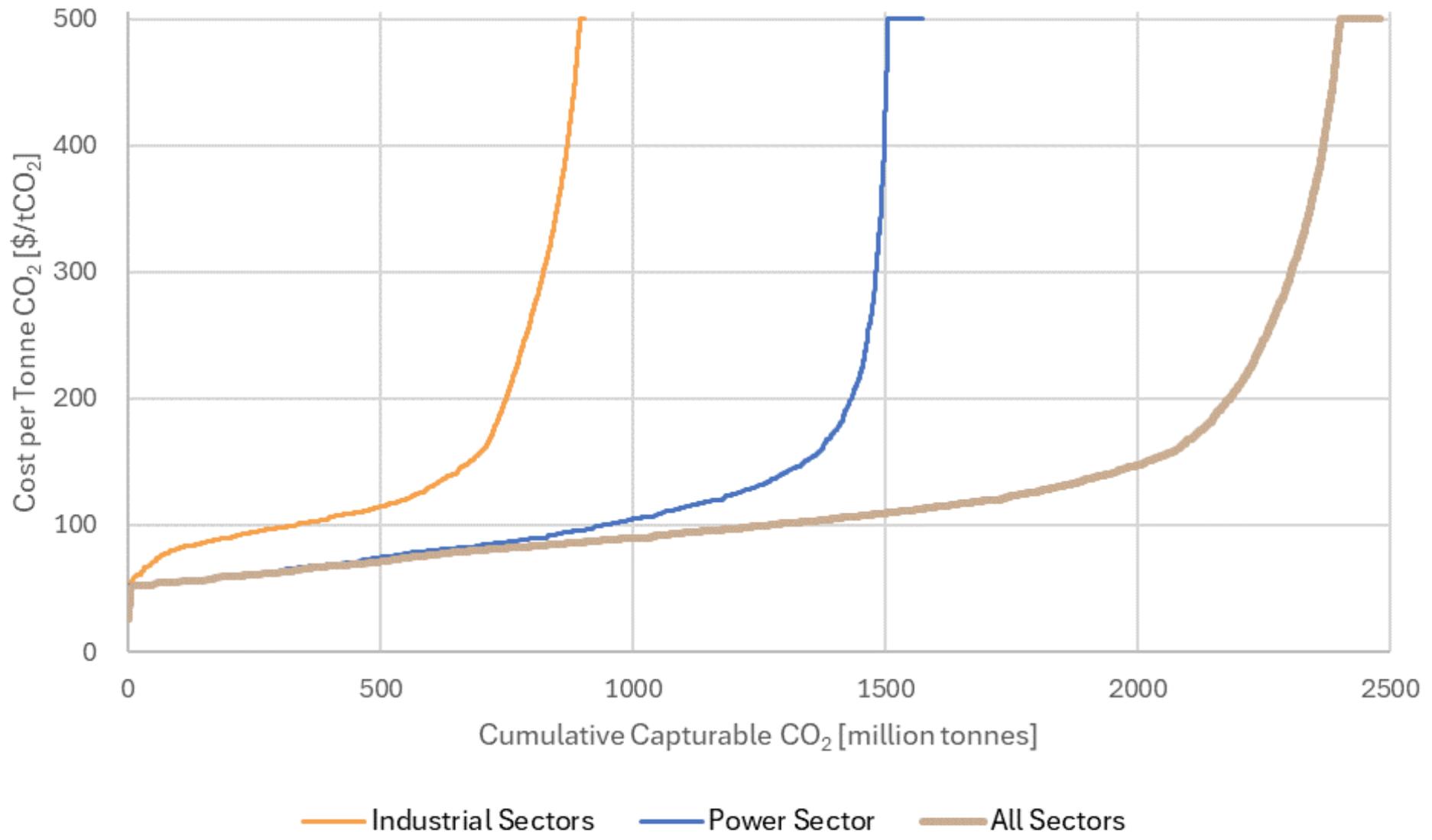




Supply curves visualize cumulative capturable CO₂ for each sector, sorted lowest to highest cost

85% of identified capturable emissions below \$170/tonne

- 2,100 million tonnes below \$170
- 1,400 million tonnes from power
- 700 million tonnes from industry



U.S. Overview – Selected industry supply curves



Refineries:

- 90% below \$150
- 45% below \$100

Pulp and paper:

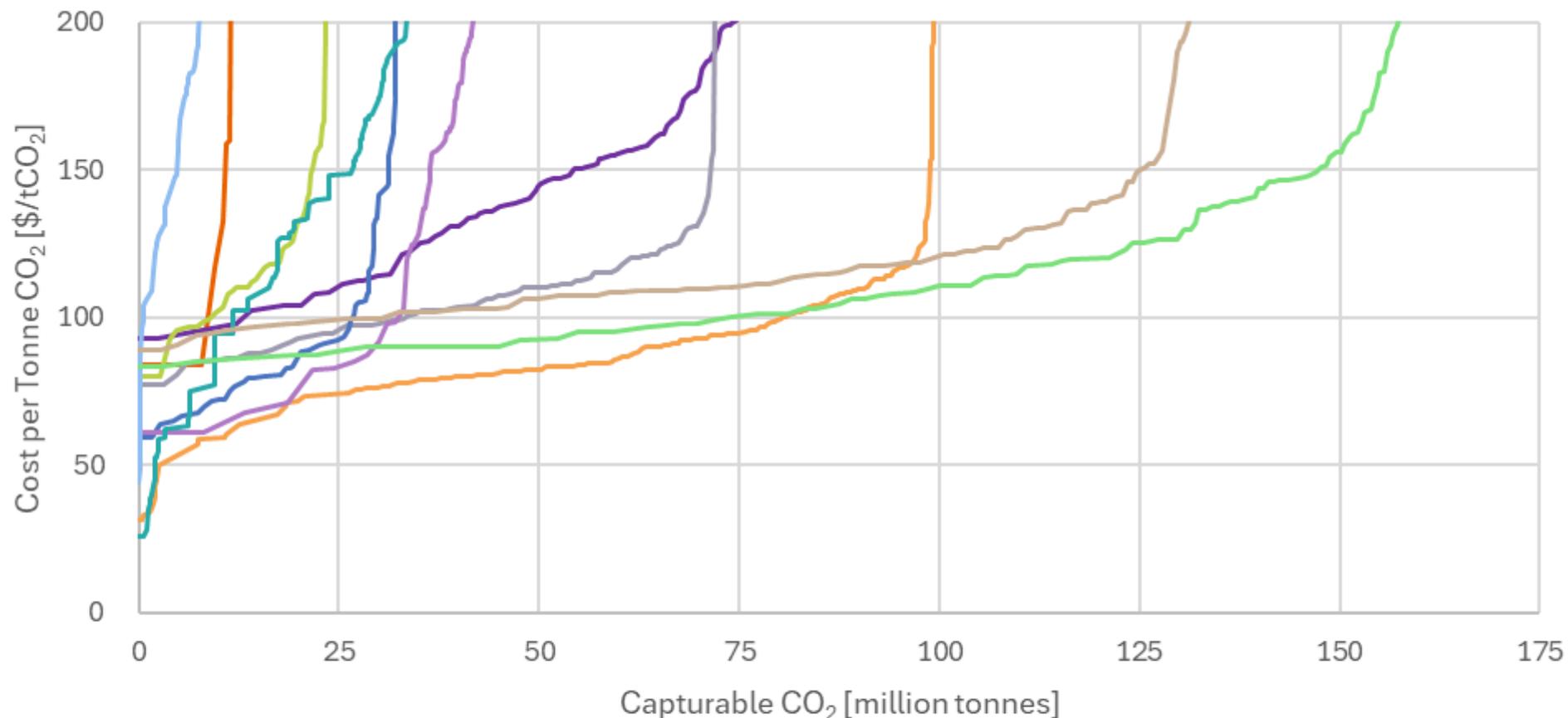
- 89% below \$150
- 22% below \$100

Iron and steel:

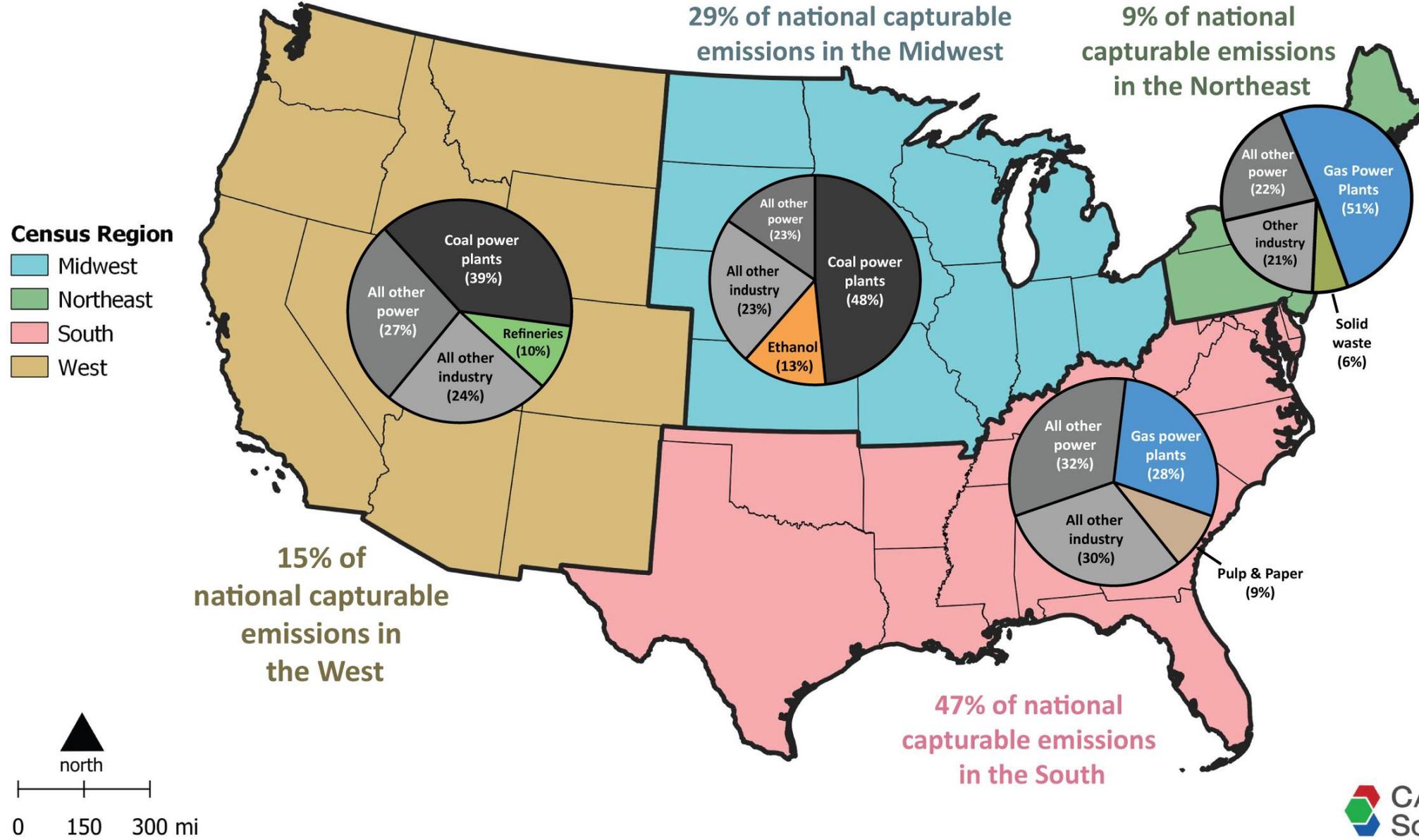
- 67% below \$100

Cement

- 47% below \$100



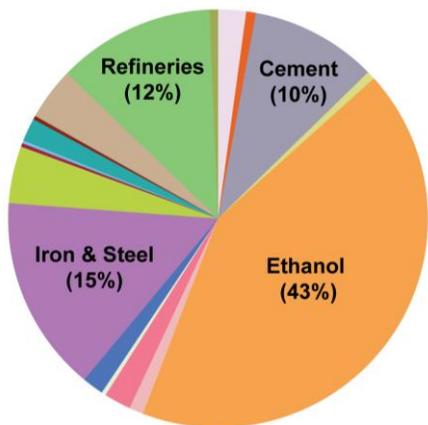
Regional analysis – Capturable emissions



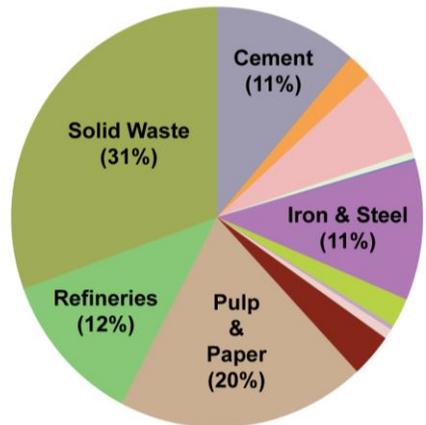
Regional analysis – Industrial emissions below \$200/tonne



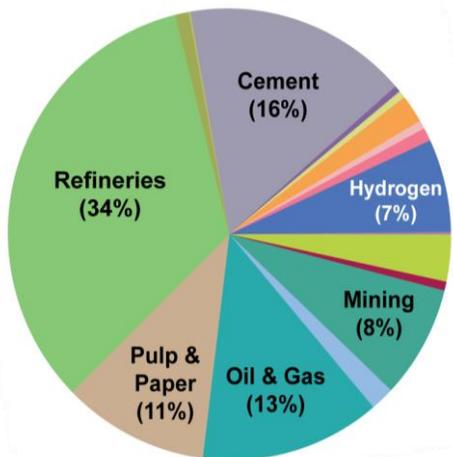
A) Midwest



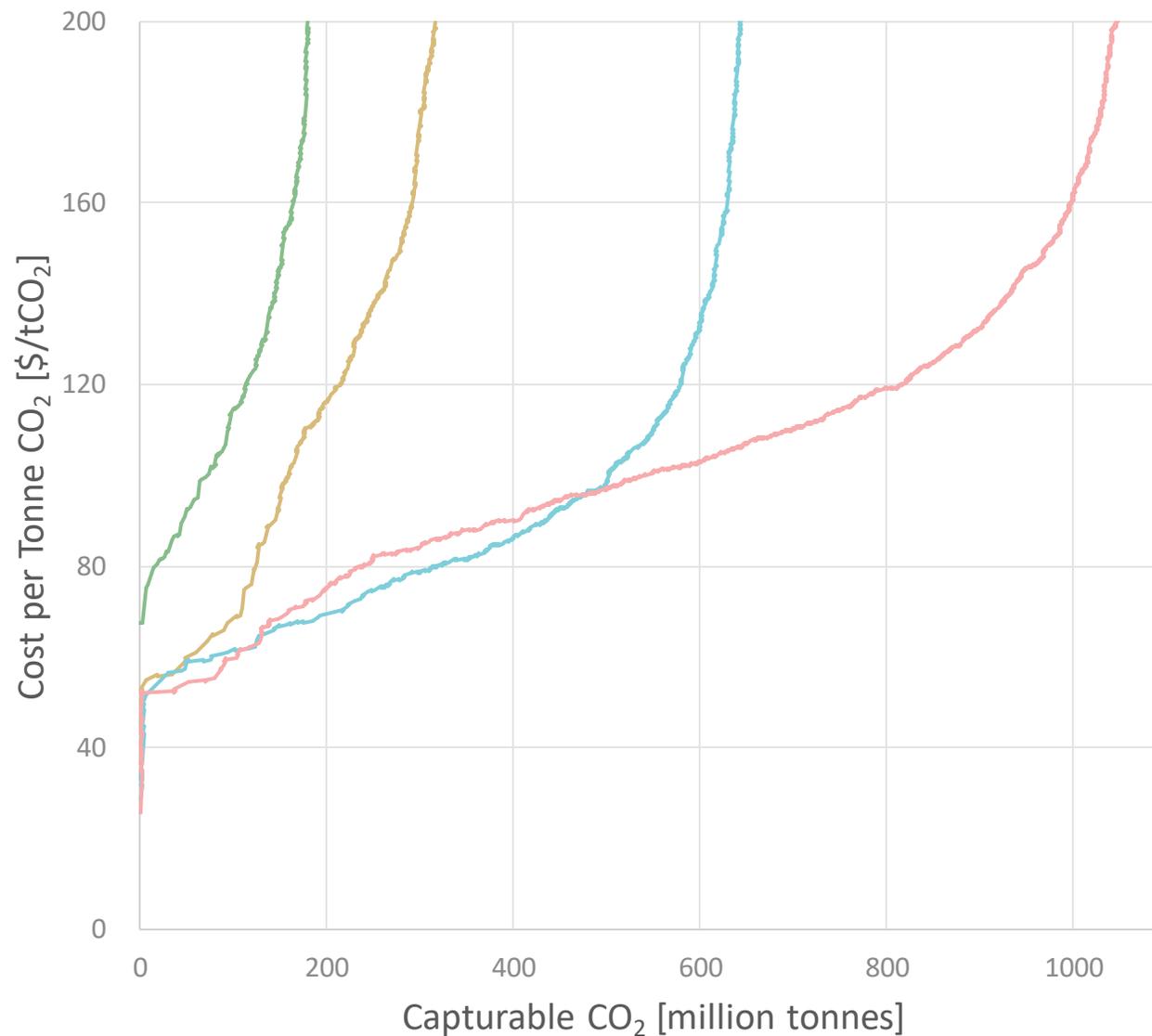
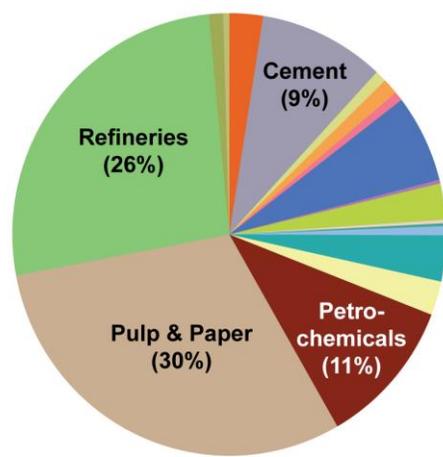
B) Northeast



C) West



D) South



— Northeast — West — Midwest — South



CO₂ capturable below \$85/tonne

74% from 94 coal power plants

7% from 77 ethanol plants

CO₂ NCORD

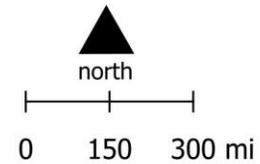
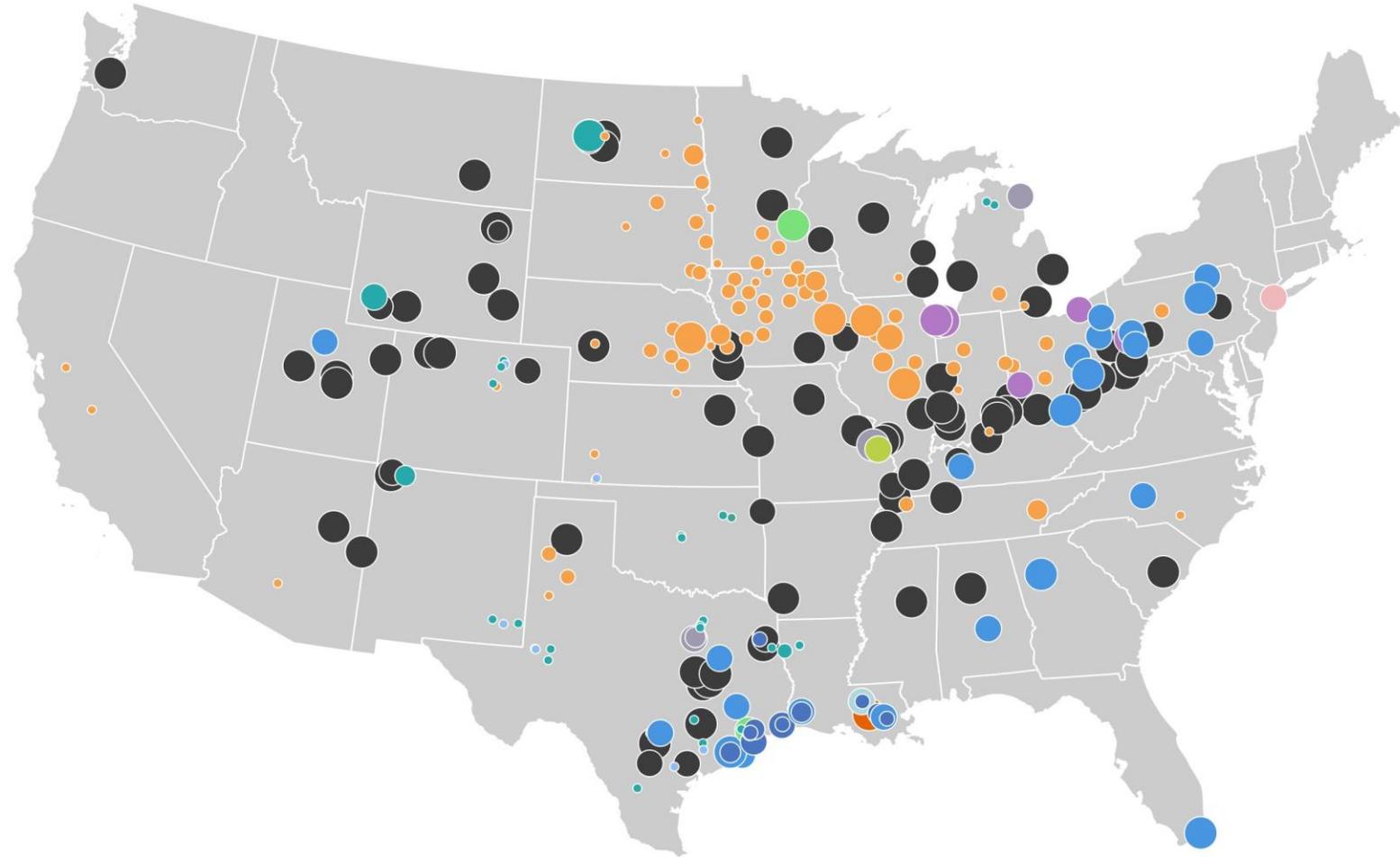
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- Cement
- Ethanol
- Facilities
- Hydrogen
- Iron & Steel
- Lime & Gypsum
- Mining
- Natural Gas Processing
- Oil & Gas
- Power Plants - Coal
- Power Plants - Gas
- Power Plants - Other Fossil
- Refineries

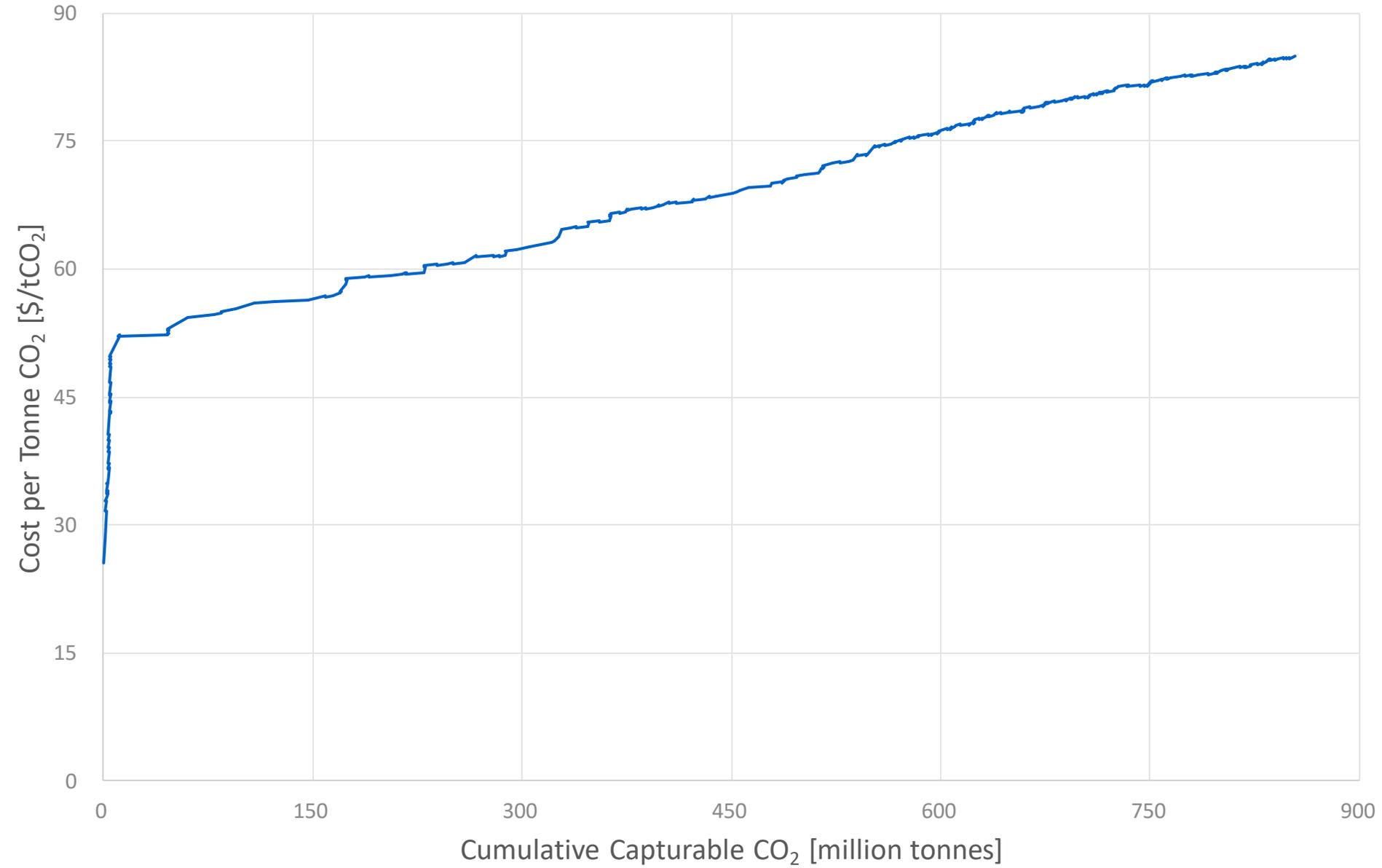


45Q analysis – Supply curve



Linear relationship between \$52-\$84/tonne

\$1/tonne increase per 25 million tonnes CO₂ captured





Thank you! Any Questions?

White paper (Released today)

https://carbonsolutionsus.sharepoint.com/:b:/s/SocialMedia/EXCqK9VWVw5OkugBrPP7riwBf-NFlp8Z3UOEw3iczkjA_g?e=zfMIBj

CO₂NCORD Application

<https://co2ncord-app.azurewebsites.net/>

Conference Paper (March 13, 2024)

<https://ccusevent.org/portals/32/abstracts/4014460.pdf>



**CARBON
SOLUTIONS**

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