

January 2024

Reactive Capture Portfolio: FECM

Dan Hancu

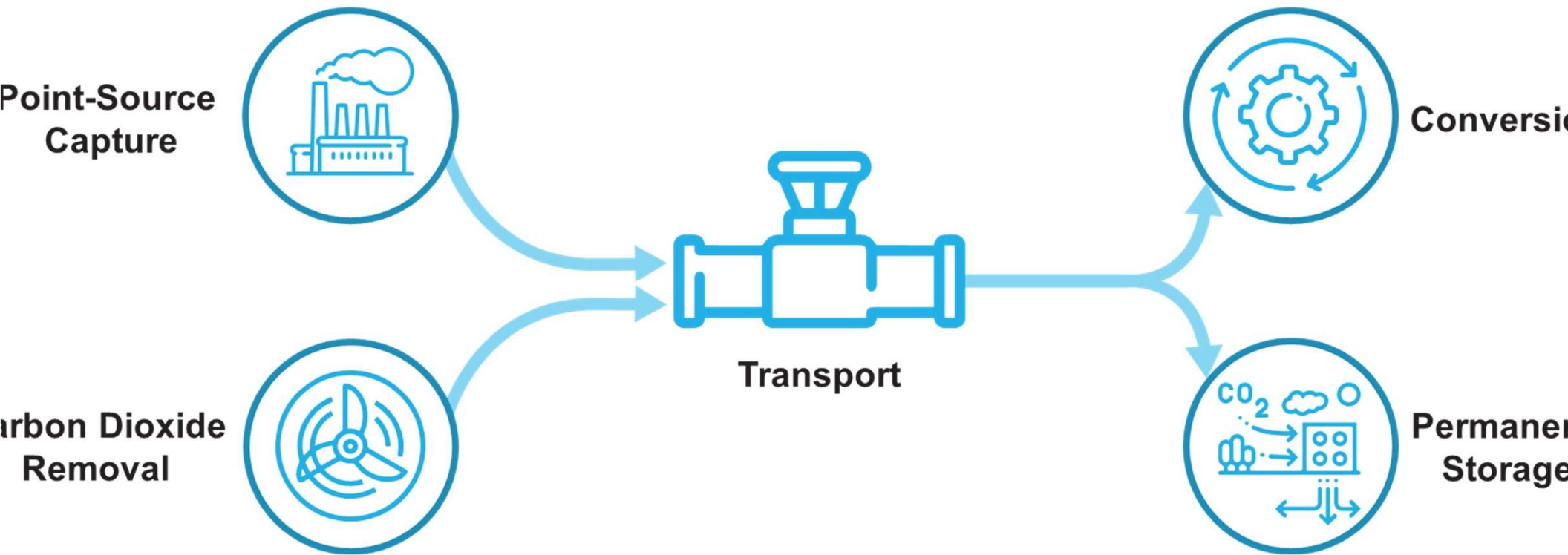
DIVISION DIRECTOR, POINT SOURCE CARBON CAPTURE
OFFICE OF FOSSIL ENERGY AND CARBON MANAGEMENT

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U.S. DEPARTMENT OF
ENERGY
Fossil Energy and
Carbon Management

“Carbon management” refers to:



Carbon management: FY23 Appropriations

Hydrogen with
Carbon Management

\$95 M

Carbon Transport
and Storage

\$110 M



Point Source
Carbon Capture

\$135 M

Carbon Dioxide Removal

\$ 70 M

Carbon Dioxide Conversion
\$ 50M

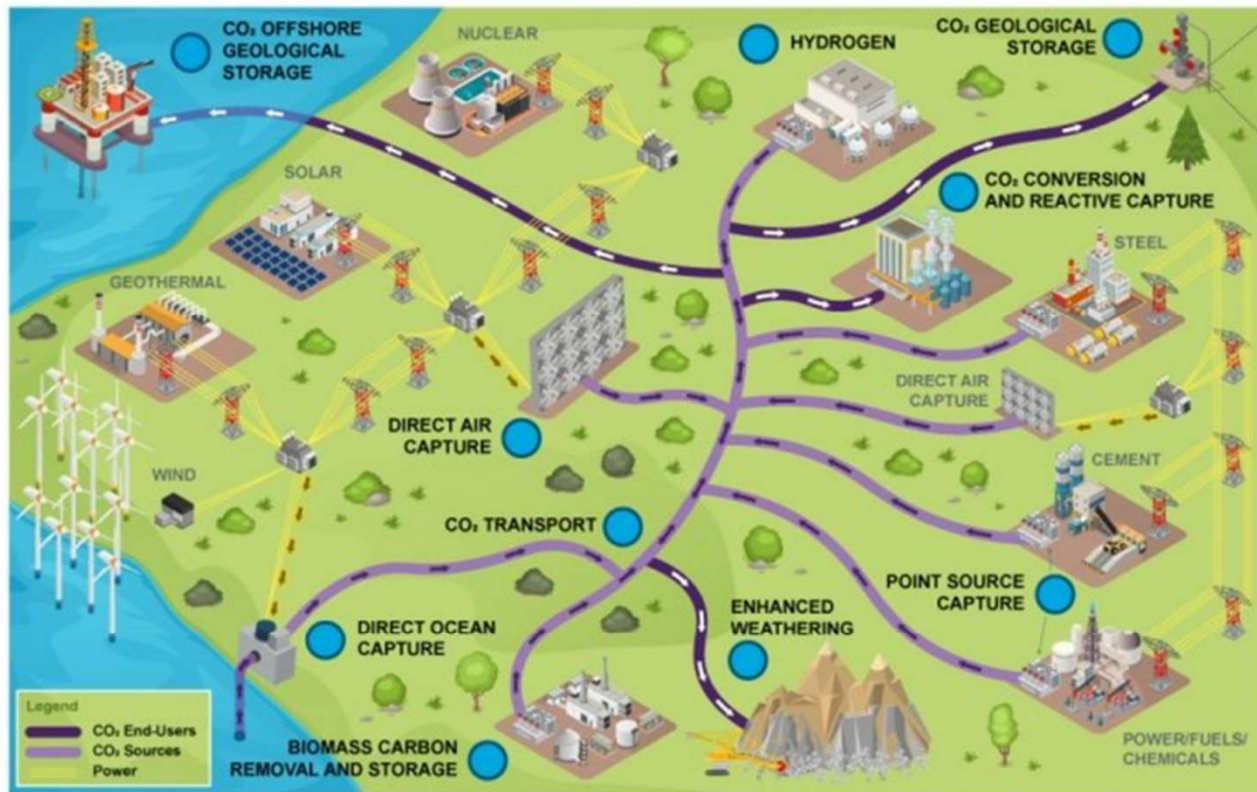
Carbon management: BIL & IRA funding

Carbon Transport and Storage

CO2 transportation loan guarantee program via CIFIA program

for CO2 transportation engineering studies

expanding storage capacity



Carbon Dioxide Conversion

\$310M: Utilization Procurement Grants (UPGrants) & CO2 Conversion

Carbon Capture & Industrial Decarb

\$2.5B Commercial CCS deployment

\$1B CCS pilots

\$6B: Industrial Decarbonization

\$8B: H2 Hubs

Carbon Dioxide Removal

\$3.5B for DAC Hubs

\$115M for DAC Pilot

FECM's Office of Carbon Management



The Office of Carbon Management Technologies

Leads and invests in research, development, demonstration, and deployment across five divisions...



Carbon Transport and Storage



CO₂ Conversion



CO₂ Removal



Point-Source Carbon Capture



The Office of Strategic Planning, Analysis, and Engagement

Leads in strategic activities and international, domestic, and intergovernmental coordination across two divisions...

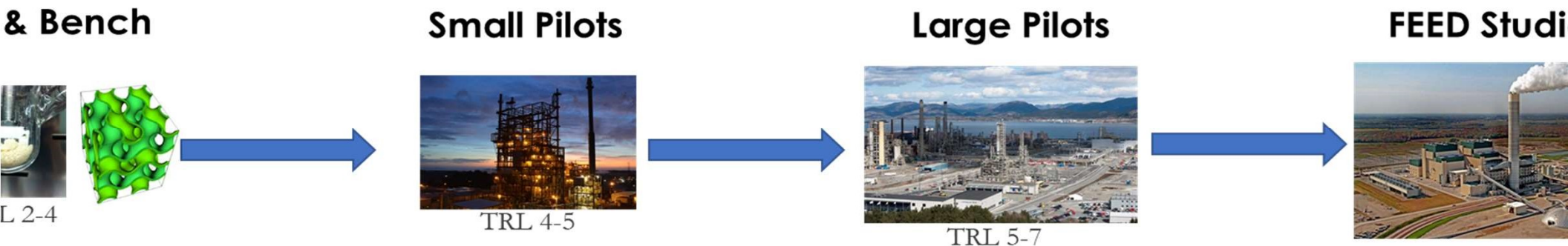


Systems, Economic, and Environmental Analysis

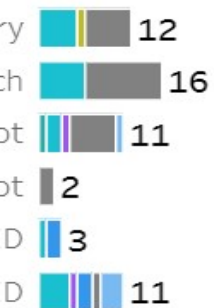


Strategic Engagement

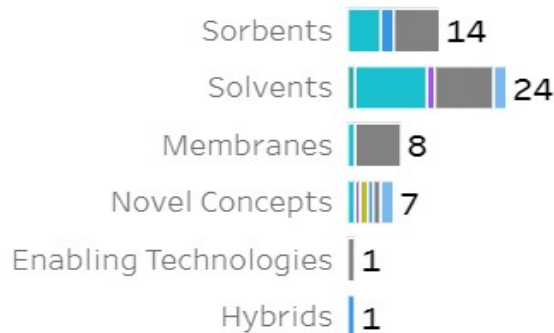
Point Source Carbon Capture



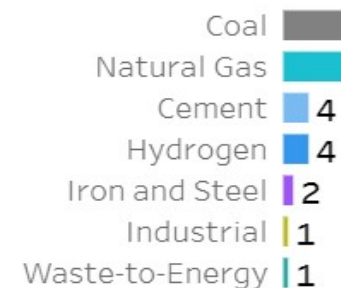
Operating Scale



Key Technology

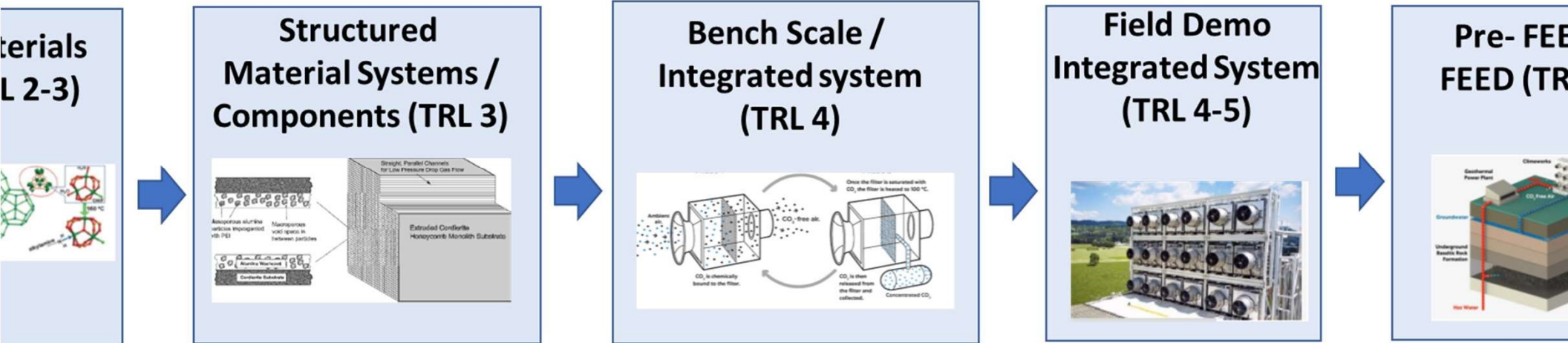


Application Type

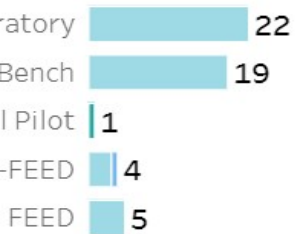


[Point Source Carbon Capture Project Map | n](#)

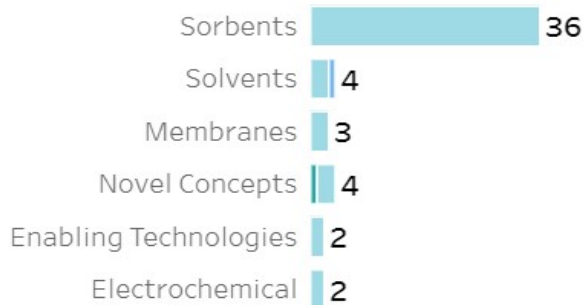
Carbon Dioxide Removal



Development Scale



Key Technology

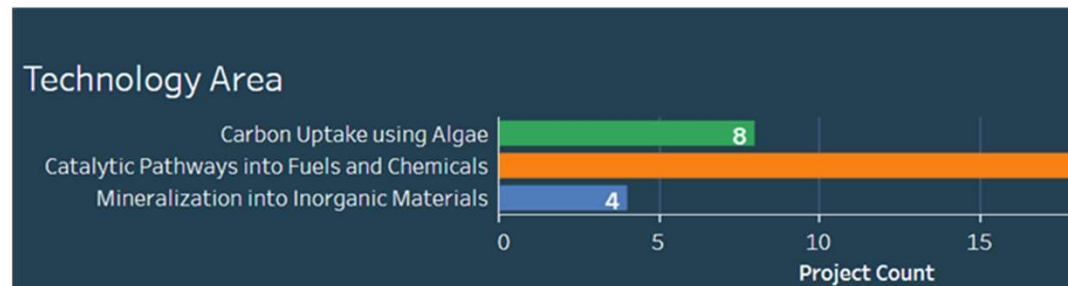
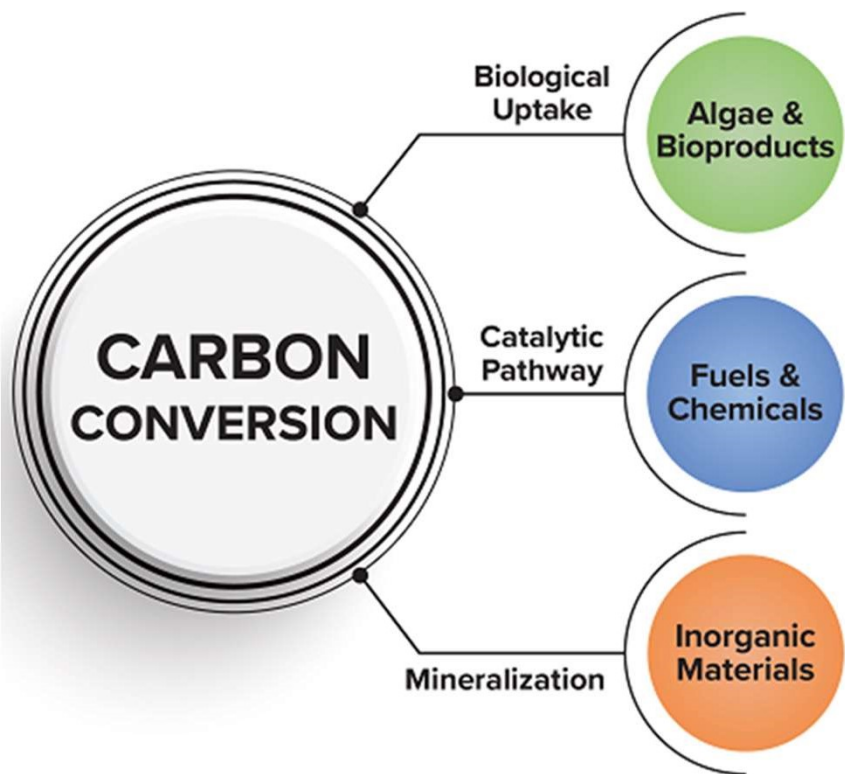


Application Type



[Carbon Dioxide Removal Project Map](#) | netl.doe.gov

Carbon Dioxide Conversion




netl.doe.gov/upgrants

[Carbon Dioxide Conversion Program | netl.doe.gov](https://netl.doe.gov)

Funding Opportunity Announcement

**FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT**



**Department of Energy (DOE)
Office of Fossil Energy and Carbon Management (FECM)**

CARBON MANAGEMENT
Funding Opportunity Announcement (FOA) Number: DE-FOA-0002614

AOI-1. Carbon Conversion Technology

The objective of AOI-1 is to support R&D investigating the conversion of carbon dioxide (CO₂) into environmentally responsible and economically feasible products.

AOI-2. Carbon Dioxide Removal Technology

The objective of AOI-2 is to solicit applications that develop carbon dioxide removal (CDR) technologies (e.g., direct air capture with durable storage, biomass carbon removal and storage, enhanced mineralization, ocean-based CDR, terrestrial sequestration) to support progress towards achieving the U.S. Department of Energy's Carbon Negative Shot target














AOI-3. Point Source Carbon Capture

The objective of AOI-3 is to solicit applications that are specifically focused on developing lower cost, highly-efficient, technologies for point source capture from fossil fuel power plants and industrial point sources.

AOI-4. Carbon Storage Technology


AOI-4 aims to support resource assessments to securely store large amounts of CO₂.


FEEM Reactive Capture Portfolio: National Labs

	CO ₂ Source	Capture Media	Conversion Process	Product
	Air 	Sorbents	Catalytic	RNG
	Point Sources 	Sorbents	Catalytic	MeOH
		Solvent (amino acids)	Electrochemical	EtOH
		Dual functional porous catalytic polymer	Catalytic	Formic A
	 	Water Lean Solvent	Lignin Fixation	Composite br material
		Water Lean Solvent	Catalytic	Methanol, meth ethylene g

ECM Reactive Capture Portfolio: SBIRs Examples





Methanol

 t & e-chem


CNT

 Li₂O & e-chem

DMC
MPT
 Membrane & catalyst

Concrete
C-Crete
 TECHNOLOGIES
 Mineralization

Construction Materials

 Mineralization

Methanol

 Nano-wire plasma catalytic capture

Ethanol

 Sorbent & e-chem

Concrete
C-Crete
 TECHNOLOGIES
 Mineralization

Natural Gas
Susteon
 Sorbent & catalyst

Fertilizer
 Fossil Energy Research
 + ammonia

FECM Reactive Capture Portfolio

2020-23: Lab Call & SBIR topic areas

Majority of the projects at TRL 3-4 (lab/bench materials & component R&D)

Broad distribution = f (products, CO₂ conversion, carbon capture material, CO₂ source)

Challenges..

Technical:

Kinetics mis-match for CO₂ capture process (fast) and CO₂ conversion

Process condition incompatibility capture (O₂, lower T) vs. conversion (reducing atmosphere, higher T)

Low capture efficiency for mineralization / CO₂ fixation approaches

Limited or no validation of integrated processes at bench/pilot scale under real conditions

Techno-economic & LCA:

Reactive capture vs. [capture + conversion]

CO₂ product market size