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# CARBON CAPTURE, UTILIZATION & SEQUESTRATION

SEPTEMBER 14, 2021

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**A LexMundi Member**

# CARBON CAPTURE

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- Capture CO<sub>2</sub> to either reuse it or store it so it will not enter the atmosphere
- CO<sub>2</sub> Sources:
  - Power sector
    - Coal- and gas-fired power plants
  - Industrial sector
    - Cement, steel, paper mills
  - Fermentation
    - Breweries or fermented corn used to make ethanol
  - Direct air capture
    - Newer, expensive technology (e.g., Climeworks)

# EXISTING CCUS TECHNOLOGIES INCLUDE ENHANCED OIL RECOVERY

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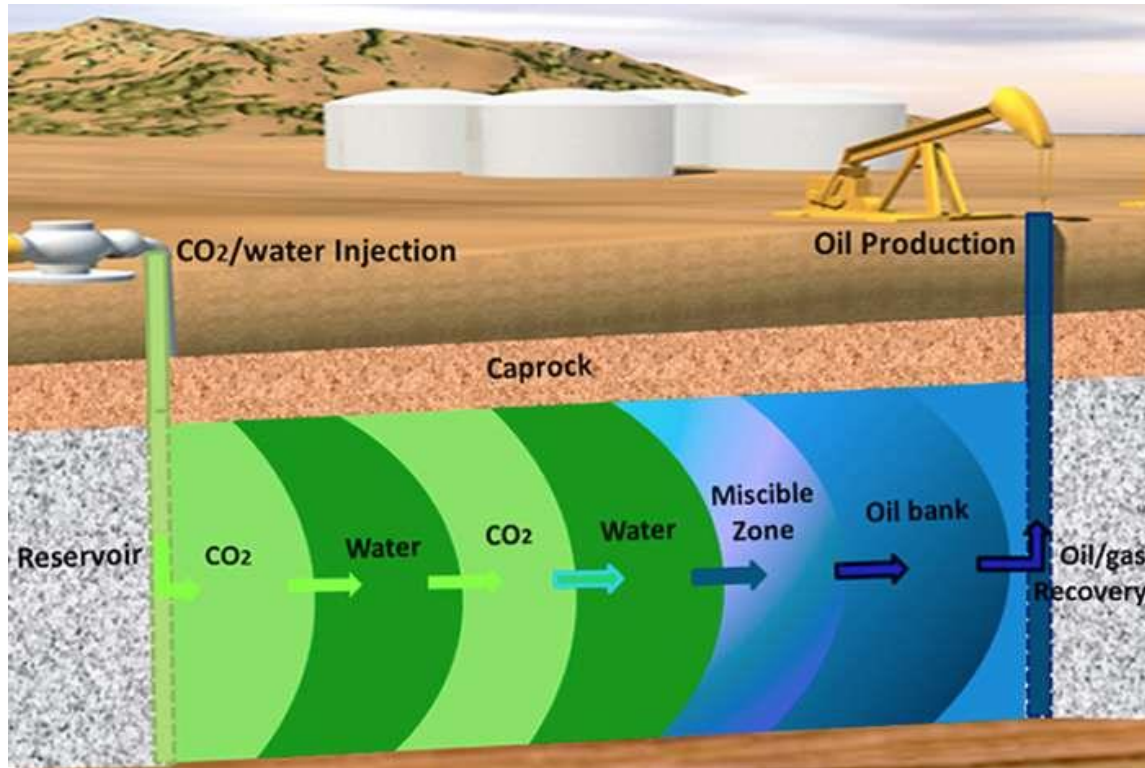
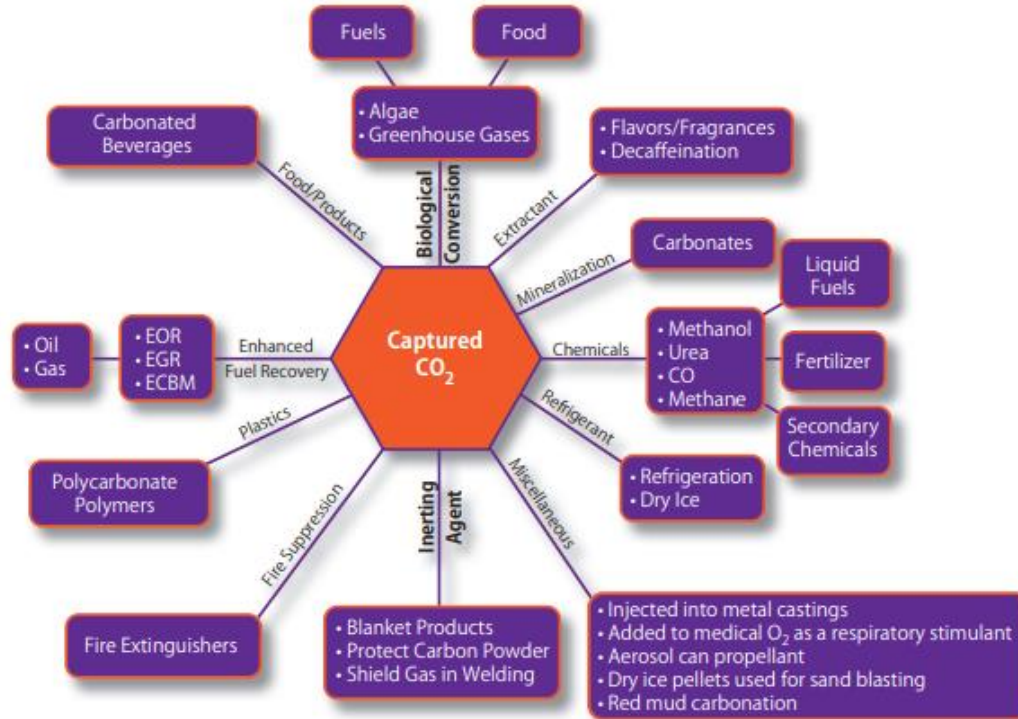


Image Source: <https://phys.org/news/2017-04-analysis-co2-sequestration-oil-recovery.html>

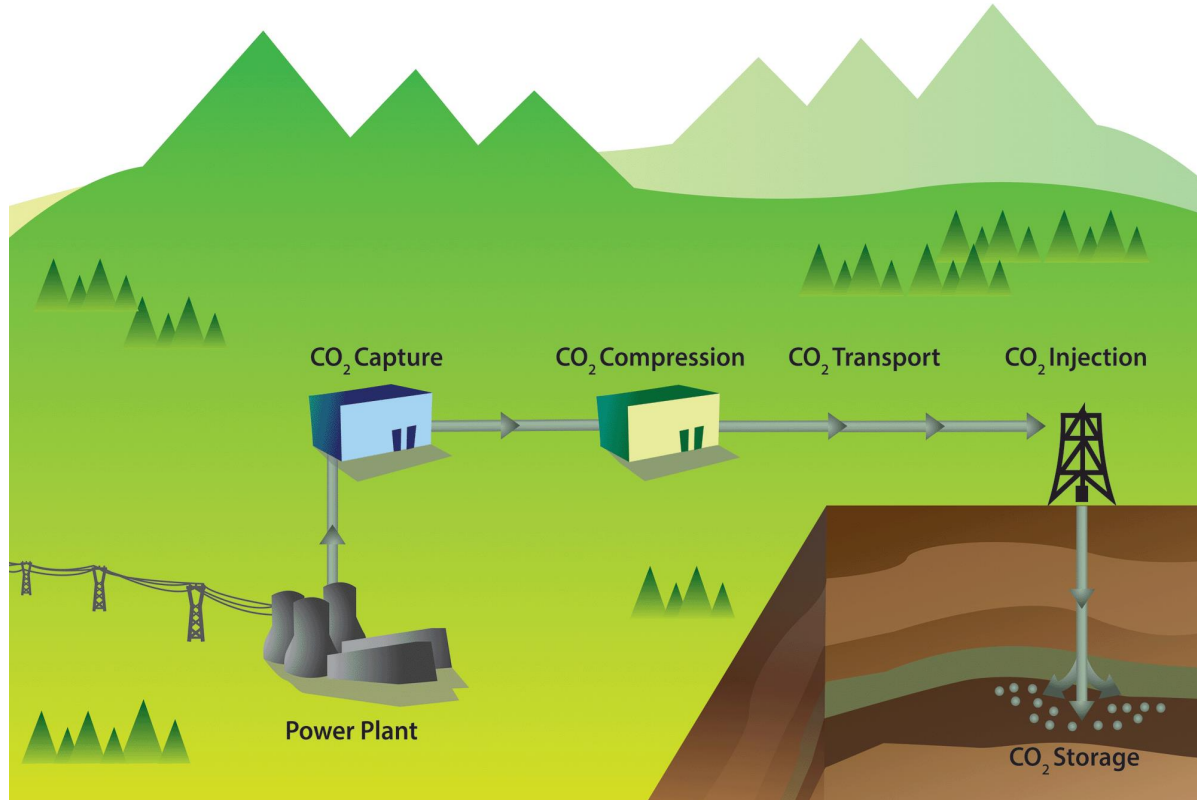
# CARBON UTILIZATION

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# CARBON SEQUESTRATION

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# CCUS INCENTIVES

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- Internal Revenue Code Section 45Q tax credit
- California's Low Carbon Fuel Standard ("LCFS")
- Department of Energy's RDD&D funding opportunities
- Environmental, social, and governance ("ESG") benefits

# SECTION 45Q TAX CREDIT

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- Available to taxpayers who:
  - (1) own the relevant carbon capture equipment, and
  - (2) physically or “contractually ensures” the sequestration of qualified carbon oxide
  
- Limitations:
  - Construction begin on or before December 31, 2025;
  - Minimum carbon oxide capture thresholds;
  - The credit is available for a 12-year period; and
  - Potential recapturing of tax credits after a leakage event

# SECTION 45Q TAX CREDIT

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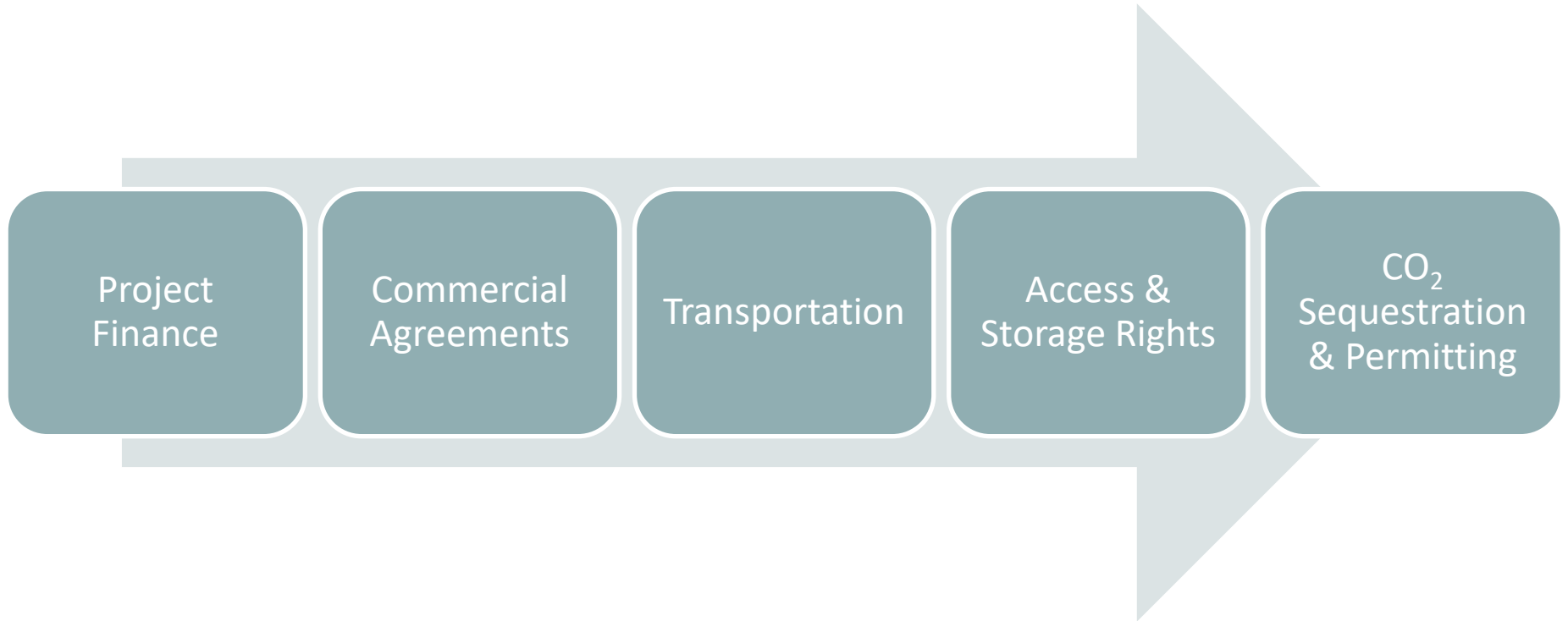
Year	Utilization and Injection (per metric ton)	Disposal (per metric ton)
2017	\$12.83	\$22.66
2018	\$15.29	\$25.70
2019	\$17.76	\$28.75
2020	\$20.22	\$31.77
2021	\$22.68	\$34.81
2022	\$25.15	\$37.85
2023	\$27.61	\$40.89
2024	\$30.07	\$43.92
2025	\$32.54	\$46.96
2026	\$35.00	\$50.00



# CCUS PROJECT LIFE CYCLE

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# PARTNERSHIP FLIPS WILL LIKELY BE THE MOST COMMON FORM OF PROJECT FINANCE.

- Advantages – Flexibility:
  - Developer receives cash generated by the project company
  - Investor receives Section 45Q tax credits
  - CAVEAT: Pure sequestration projects do not create cash, absent future policy changes for direct payment of Section 45Q tax credits
- Disadvantages:
  - Complicated agreements

	Developer		Investor	
	Cash	Gross Income/Loss & Section 45Q Credits	Cash	Gross Income/Loss & Section 45Q Credits
Period 1	100%	1%	0%	99%
Period 2	0%	1%	100%	99%
Period 3	95%	95%	5%	5%

# CO<sub>2</sub> PURCHASE AND SALE AGREEMENTS

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- Different structures depending on which party is capturing
  - Supply agreements
  - Offtake agreements
- Key Terms
  - Volumes, Pricing, Exclusivity, and Term
  - Line Pressure and Delivery Points
  - Permitted Uses (e.g., EOR, Sequestration, etc.)
  - Risk of Loss and Indemnities
- Tax Provisions
  - Apportionment of Tax Credits and Tax Liability

- Transportation Agreements
  - CO<sub>2</sub> (Usually Liquid Form) Transported by Pipeline
  - Surface Easement and Pipeline Construction
- Pipeline Regulation
- Wyoming Pipeline Corridor Initiative

# CCUS ACCESS AND STORAGE RIGHTS

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- Subsurface Easements
  - Parties
  - Depths are key
  - Consider Expansion of Sequestered Carbon Plume
- Surface Use Agreements
  - Similar to oil and gas SUAs
  - Cover site of and access to injection well(s)
- Agreements from other potentially impacted interests

# PORE SPACE OWNERSHIP

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- From whom do you obtain storage rights?
- Common law rule is that pore space belongs to surface estate.
  - Pore space ownership unsettled in Colorado
  - Defined by statute in Wyoming and North Dakota
  - Some uncertainty with respect to split estate above federal minerals
- Where pore space belongs to surface estate, consider impacts to use of mineral estate.

- What happens with nonconsenting owners of pore space in a geologic reservoir?
- Not addressed by Colorado law
- Some states (Wyoming, North Dakota) have statutes addressing unitization

# CO<sub>2</sub> INJECTION REGULATION

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Safe Drinking Water Act (SDWA)

Clean Air Act

RCRA Subtitle C



- SDWA is the most directly applicable federal law
- To protect underground sources of drinking water (USDW) from injection of wastes
- Water and CO<sub>2</sub> flood operations for enhanced oil recovery (EOR) use Class II wells
- Geologic storage projects use Class VI wells

- Class II UIC wells injecting CO<sub>2</sub> for EOR do not differentiate on source of fluid
- May not be used to inject CO<sub>2</sub> after EOR project is completed
- Only Class VI wells allow for geologic storage
- Class VI requirements most stringent
  - Technical, monitoring, and post-closure

# SDWA UIC CLASS VI WELL REQUIREMENTS

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- Must track, model, and predict CO<sub>2</sub> plume, with monitoring, post-closure for 30-60 years
- Imposes more comprehensive performance requirements
- Requires seismicity, injection pressure, and groundwater quality monitoring
- Post-injection site care and remedial requirements unique to Class VI program

# SDWA CLASS II TO CLASS VI TRANSITION

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- EPA guidance suggests a risk-based approach to permitting
- Factors include injection rates, reservoir pressures, and geologic characterization
- EPA memo on key transition principles possibly discouraging EOR transitions to Class VI wells?

# SDWA UIC CLASS VI WELLS

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- Two Class VI wells permitted in U.S.
- Both in Illinois, injecting CO<sub>2</sub> from ADM ethanol plant into saline aquifer
- No state has issued a Class VI UIC permit
- State primacy for Class VI wells implemented under SDWA Section 1422

- CAA regulates CO<sub>2</sub> as a GHG
- GHG reporting required for both CO<sub>2</sub>-EOR and geologic storage operations
- Report all CO<sub>2</sub> received, injected, produced, escaped or emitted, and sequestered
- Subpart RR of GHGRR for geologic sequestration

- EPA found CO<sub>2</sub> injected for GS a solid waste
- Does not exhibit HW characteristics
- 2014 rule grants conditional exclusion from RCRA requirements provided:
  - U.S. DOT compliant transport and
  - UIC Class VI well compliant injection

# CCUS RISKS AND UNCERTAINTIES

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- CO<sub>2</sub> Sequestration Permanence
  - Long-term liability and ownership
- Potential Increase of Ammonia Emissions
- Phase-out of 45Q Tax Credits



## LOOKING AHEAD

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- Senator Barrasso's (R-WY) proposal for increased CCUS incentives
- Biden's Infrastructure Plan
- Colorado CCUS Task Force

# QUESTIONS?

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