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RBN Energy

Low Resolution Version of Slides Presented to the
2021 CO₂ Conference

Midland, Texas

December 7th, 2021

The livestream recording is also available

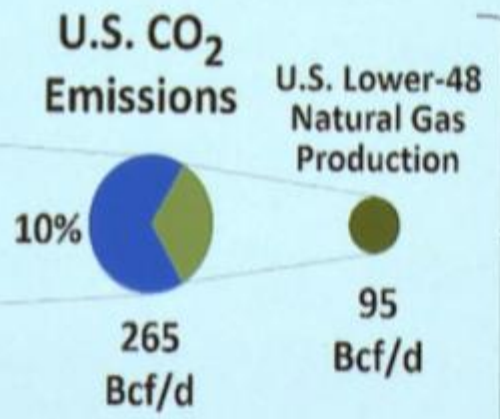
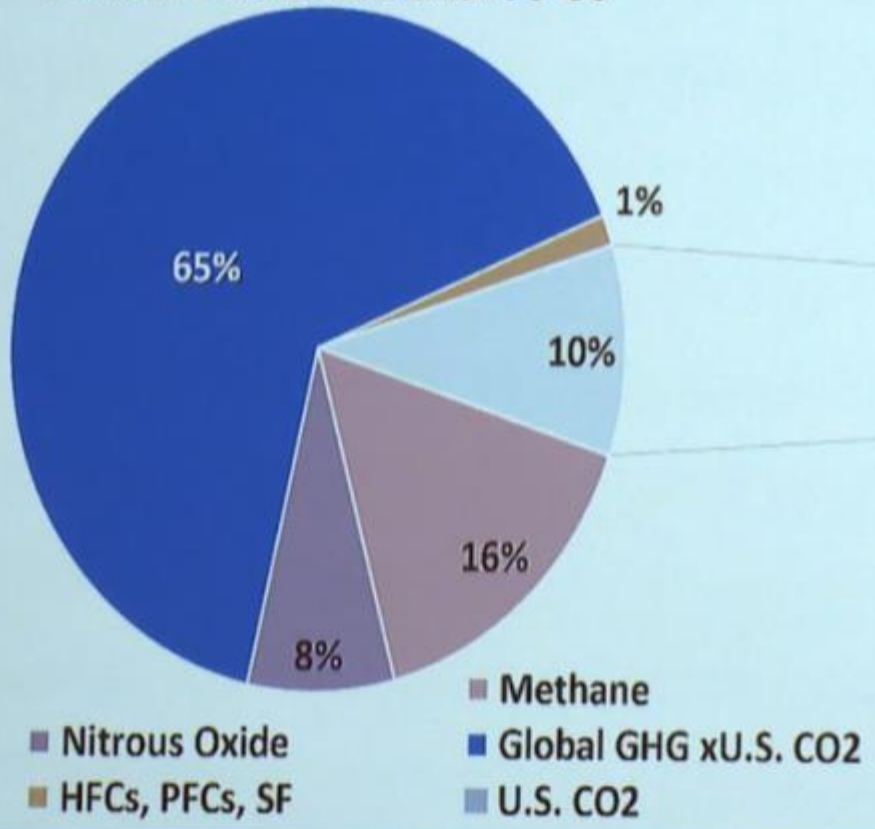
To access open the Word document for the link

The Problem With CO₂ EOR

- » The world is focused on the reduction of greenhouse gases from the atmosphere.
- » CO₂ is the #1 greenhouse gas.
- » Commitments are being made and billions are being appropriated across the globe to develop the technologies necessary to make it happen.
- » One of the best - CCUS/EOR is right here in the Permian and along the Gulf Coast, ready and waiting make a huge impact.
- » But CCUS/EOR has a marketing problem.

Greenhouse Gas Emissions Vs. Natural Gas Production

Global GHG Emissions: 50 Gt*



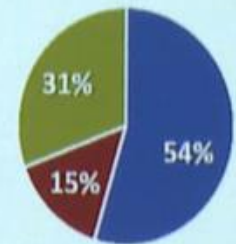
U.S produces about 2.8 times as much CO₂ each day than U.S. natural gas production.

Major CO₂ Producing Fields in the U.S.

- » **McElmo Dome (Kinder Morgan)**
 - » Largest source for Permian EOR
 - » 20+ years remaining life
- » **Bravo Dome (OXY)**
 - 2nd largest source of Permian CO₂
 - 5+ years remaining life
- » **Sheep Mountain (OXY)**
 - Minimal Production or Shut in
- » **Jackson Dome MS (Denbury)**
 - Serving Gulf Coast EOR



Natural CO₂ Production



- Mc Elmo and Doe Canyon
- Bravo Dome
- Jackson Dome

CO₂ Pipelines

Operational for EOR

- Pipeline - Operator - Approx. Capacity - Type - Hydrogen Source
1. Adair - Oxy Permian 100 MMbbl/d (E, H)
 2. Arctic - Enbridge 100 MMbbl/d (E, H)
 3. Beaver Creek - Denbury Resources 30 MMbbl/d (D, A)
 4. Burger - Peabody Petroleum 50 MMbbl/d (D, A)
 5. Basin - Oxy Permian 300 MMbbl/d (E, H)
 6. Canyon Reef - Enbridge Kinder Morgan 270 MMbbl/d (D, A)
 7. Cedar Creek - Enbridge Kinder Morgan 130 MMbbl/d (D, A)
 8. Centennial - Kinder Morgan 270 MMbbl/d (D, H)
 9. Central Basin - Kinder Morgan 100 MMbbl/d (D, H)
 10. Century - Oxy Permian 500 MMbbl/d (E, H)
 11. Coffeyville - Enbridge Peabody Petroleum 80 MMbbl/d (D, A)
 12. Cortez - Kinder Morgan 130 MMbbl/d (E, H)
 13. Dakota - Oxy Permian 180 MMbbl/d (D, A)
 14. Delta - Denbury Resources 300 MMbbl/d (D, A)
 15. Eastern Utah - Kinder Morgan 118 MMbbl/d (E, H)
 16. Eon - Oxy Permian 130 MMbbl/d (E, H)
 17. Free State - Denbury Resources 360 MMbbl/d (E, H)
 18. Green Line - Denbury Resources 930 MMbbl/d (E, H)
 19. Green River - Oxy Permian 100 MMbbl/d (E, H)
 20. Greenview - Denbury Resources 720 MMbbl/d (E, A)
 21. Lindbergh - Denbury Petroleum 80 MMbbl/d (D, A)
 22. Llanos - Trinity Pipeline 80 MMbbl/d (E, H)
 23. Lost Soldier - Enbridge Energy 40 MMbbl/d (E, A)
 24. Malin Ranch - Oxy Permian 110 MMbbl/d (E, H)
 25. Midland - Apache 50 MMbbl/d (D, H)
 26. Mirador - FCL Energy 88 MMbbl/d (E, A)
 27. Northwest - Enbridge Kinder Morgan 300 MMbbl/d (E, H)
 28. Pecos County - Kinder Morgan 88 MMbbl/d (E, A)
 29. Port Arthur - Air Products 66 MMbbl/d (E, A)
 30. Raven Ridge - Enbridge 220 MMbbl/d (D, A)
 31. Salt Creek - FCL Energy 270 MMbbl/d (D, A)
 32. Seminole Branch - FCL Energy 130 MMbbl/d (E, H)
 33. Sharp Mountain - Oxy Permian 300 MMbbl/d (E, H)
 34. Shute Creek/Hwy 69 - Enbridge 120 MMbbl/d (E, A)
 35. Sierra - Oxy Permian 110 MMbbl/d (E, H)
 36. Slaughter - Oxy Permian 130 MMbbl/d (E, H)
 37. Slaughter - Antero - Oxy Permian 80 MMbbl/d (E, H)
 38. Tequila - Peabody Petroleum 70 MMbbl/d (E, A)
 39. Transocean - Transocean 90 MMbbl/d (D, A)
 40. TVO - Harvest Midstream 66 MMbbl/d (D, A)
 41. Winkler - Oxy Permian 118 MMbbl/d (E, A)
 42. Wolfcamp - Enbridge Energy 70 MMbbl/d (E, H)
 43. West Gwinnett - Denbury Resources 170 MMbbl/d (E, H)
 44. West Texas - Trinity Pipeline 80 MMbbl/d (E, H)

Announced for CCS

- Operator - Approx. Capacity - Est. in service - Type
45. Heartland Gateway - Nueces CO₂ Ventures up to 800 MMbbl/d 2024/2025 (E, H)
 46. Midland Carbon Express - Summit Carbon Solutions 320 MMbbl/d (E, A)

Permanently Announced for CCS

- Operator - Approx. Capacity - Est. in service - Type
47. Heartland Gateway - Nueces CO₂ Ventures up to 800 MMbbl/d 2024/2025 (E, H)
 48. Midland Carbon Express - Summit Carbon Solutions 320 MMbbl/d (E, A)

Permanently Announced for CCS

- Operator - Approx. Capacity - Est. in service - Type
49. Heartland Gateway - Nueces CO₂ Ventures up to 800 MMbbl/d 2024/2025 (E, H)
 50. Midland Carbon Express - Summit Carbon Solutions 320 MMbbl/d (E, A)

Permanently Announced for CCS

- Operator - Approx. Capacity - Est. in service - Type
51. Heartland Gateway - Nueces CO₂ Ventures up to 800 MMbbl/d 2024/2025 (E, H)
 52. Midland Carbon Express - Summit Carbon Solutions 320 MMbbl/d (E, A)

Permanently Announced for CCS

- Operator - Approx. Capacity - Est. in service - Type
53. Heartland Gateway - Nueces CO₂ Ventures up to 800 MMbbl/d 2024/2025 (E, H)
 54. Midland Carbon Express - Summit Carbon Solutions 320 MMbbl/d (E, A)

Permanently Announced for CCS

- Operator - Approx. Capacity - Est. in service - Type
55. Heartland Gateway - Nueces CO₂ Ventures up to 800 MMbbl/d 2024/2025 (E, H)
 56. Midland Carbon Express - Summit Carbon Solutions 320 MMbbl/d (E, A)

Permanently Announced for CCS

- Operator - Approx. Capacity - Est. in service - Type
57. Heartland Gateway - Nueces CO₂ Ventures up to 800 MMbbl/d 2024/2025 (E, H)
 58. Midland Carbon Express - Summit Carbon Solutions 320 MMbbl/d (E, A)

Permanently Announced for CCS

- Operator - Approx. Capacity - Est. in service - Type
59. Heartland Gateway - Nueces CO₂ Ventures up to 800 MMbbl/d 2024/2025 (E, H)
 60. Midland Carbon Express - Summit Carbon Solutions 320 MMbbl/d (E, A)

U.S. CO₂ INFRASTRUCTURE

Major EOR CO₂ Sources

- Natural**
1. Midline Dome - Kinder Morgan - 730 MMbbl/d - 87
 2. Dier Canyon - Kinder Morgan - 80 MMbbl/d - 14
 3. Sharp Mountain - Oxy Permian - 500
 4. Basin Dome - Oxy Permian - 180 MMbbl/d - 70
 5. Jackson Dome - Denbury Resources - 400 MMbbl/d - 39
- Anthropogenic**
1. East Cabin Gas Plant - ConocoPhillips - 30 MMbbl/d - Denbury Resources
 2. Shute Creek Gas Plant - Enbridge - 130 MMbbl/d - Enbridge, Denbury Resources
 3. Ashville Ethanol Plant - Greenberg - 30 MMbbl/d - Peabody Petroleum
 4. Coffeyville Gasification Plant - ConocoPhillips - 50 MMbbl/d - Peabody
 5. Enbridge Petroleum Refinery - 40 MMbbl/d - Enbridge
 6. Burger Feedstock Plant - Husky - 10 MMbbl/d - Peabody
 7. Gwinnett Ammonia Plant - Husky - 20 MMbbl/d - Denbury Resources
 8. Port Arthur H₂ Plant - Air Products - 43 MMbbl/d - Denbury Resources
 9. Patsy Hesse - HGS Energy - 100 May 2024
 10. Century Gas Plant - Oxy Permian - 480 MMbbl/d - Oxy Permian, Kinder Morgan

Announced CCS Projects

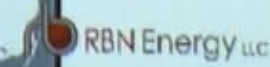
- Site - Operator - Est. in service
1. Hula Wood Gateway - Nueces CO₂ Ventures - 2024/2025
 2. Midland Carbon Express - Summit Carbon Solutions - 2025
 3. March Blaine Hydrogen - Inland Energy - 2026
 4. Ammonia Plant - Air Products - 2028
 5. Houston CCS Innovation Zone - Enbridge/Multiple Partners - TBD
 6. FLNG CO₂ Sales - Enbridge - 2024/2025
 7. San Francisco, CA - Baker - 2024
 8. Colton CO₂ - Andes - TBD
 9. H. L. Wiggins, WV - Air Liquide - 2022
 10. SoCalGas Lender - Enbridge/Transocean - TBD
 11. SoCalGas STAR3 - Enbridge/Transocean - TBD

Announced CCUS Projects

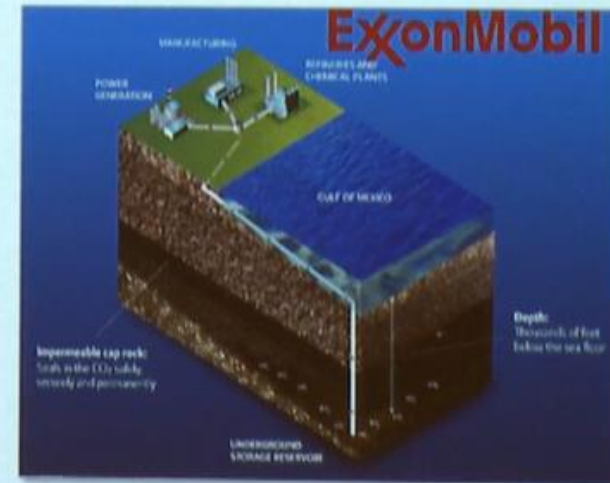
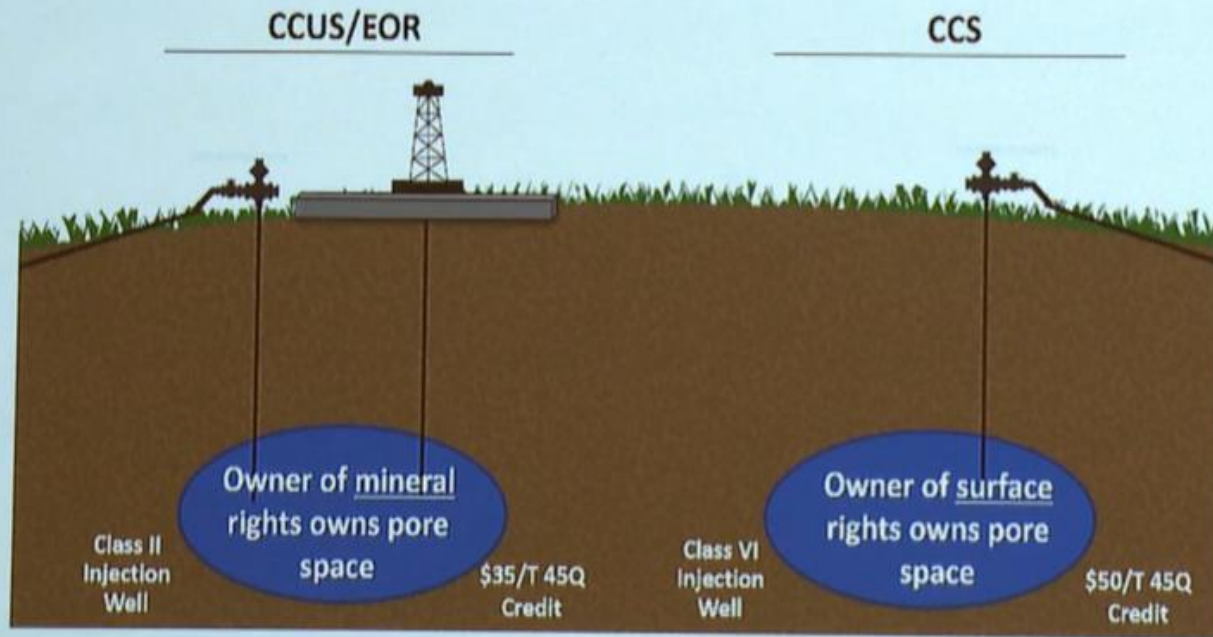
- Site - Operator - Est. in service
1. PennWell, TX - Haines - 2025
 2. Javelina - PCCC/Howard Energy - TBD



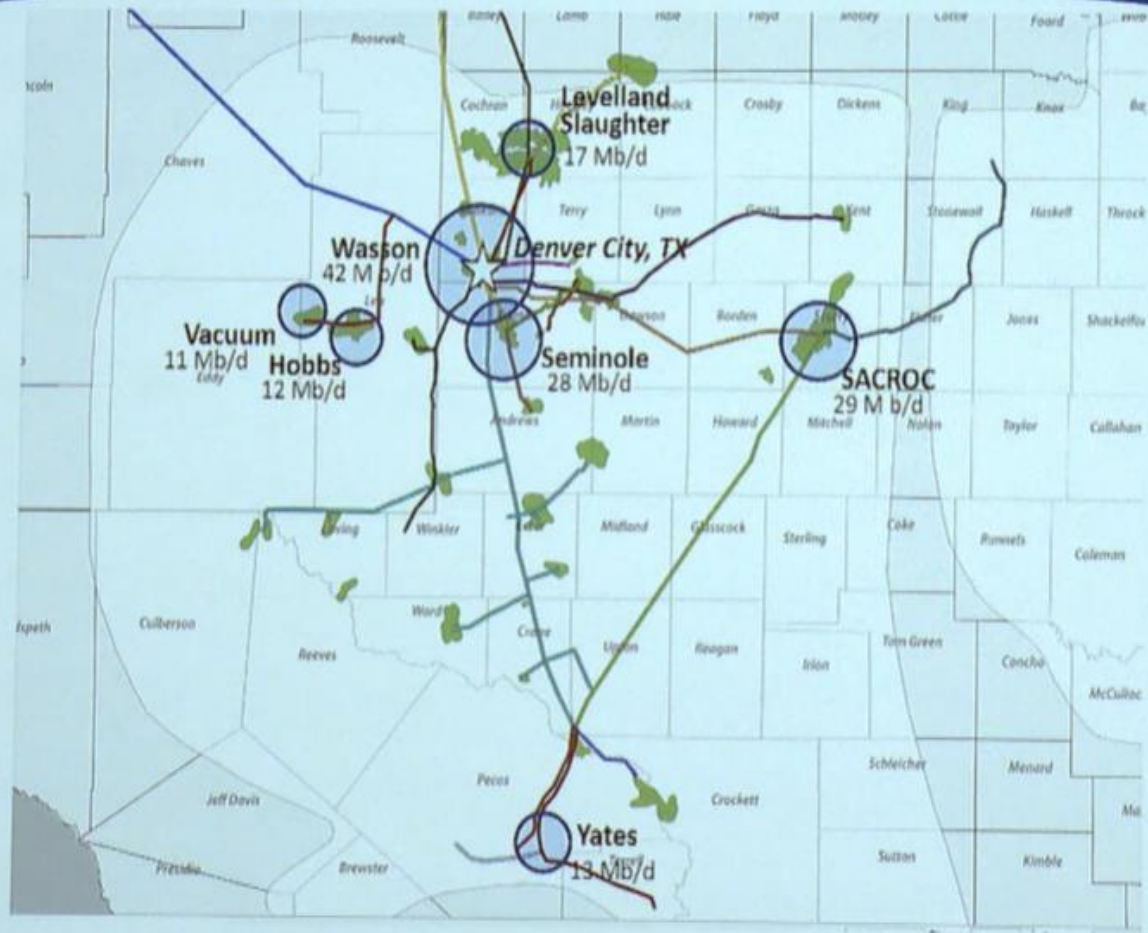
CO₂ Wall Map Available at rbnenergy.com



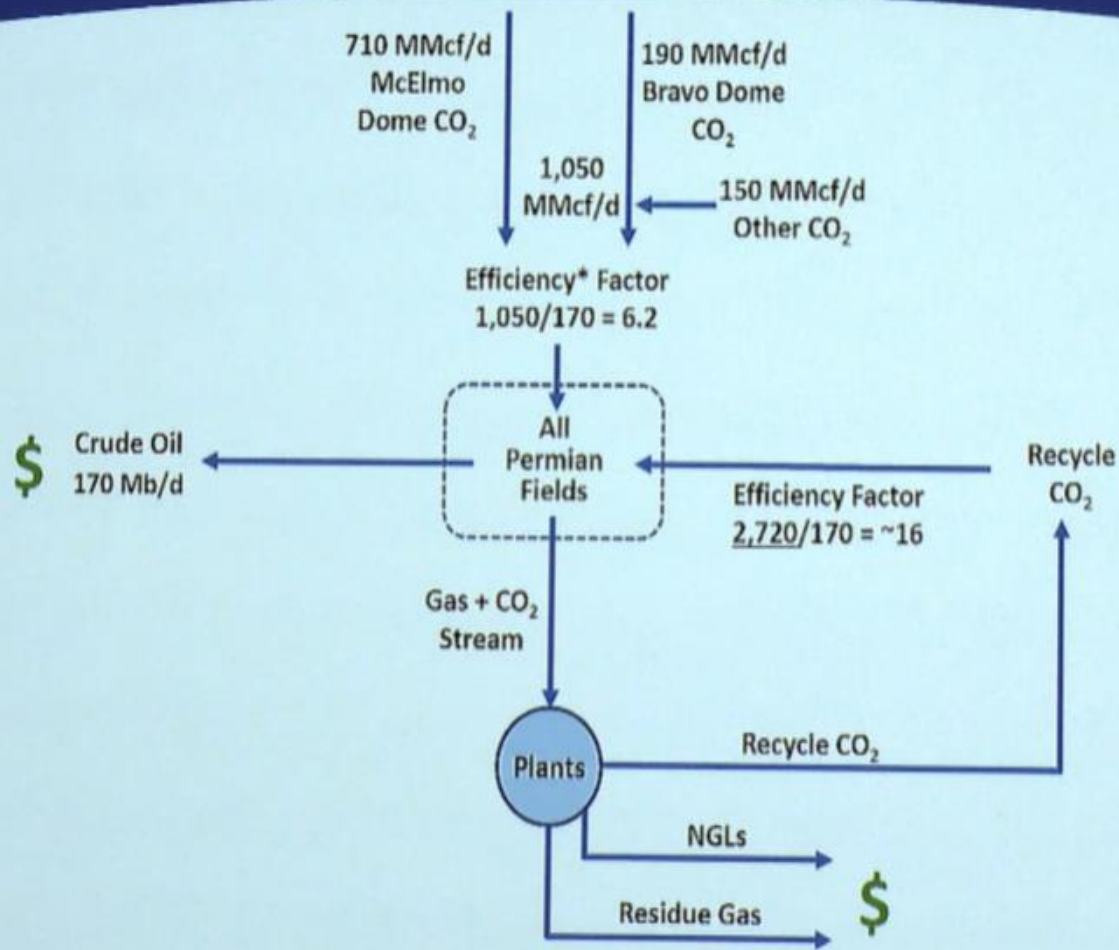
Pore Space, Injection Well Permitting, Tax Credits



Key Permian EOR Producing Fields

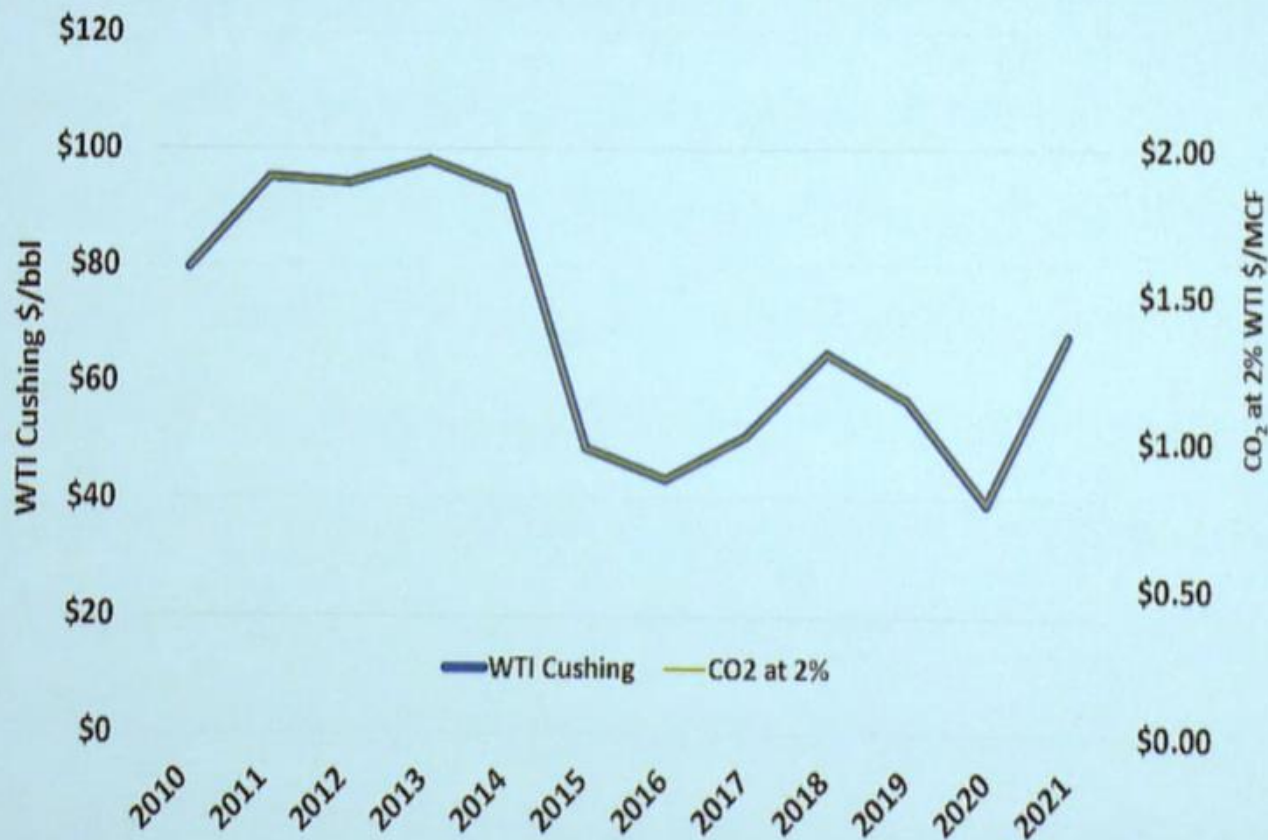


Simplified Total Permian CO₂ Balance – Estimated 2021

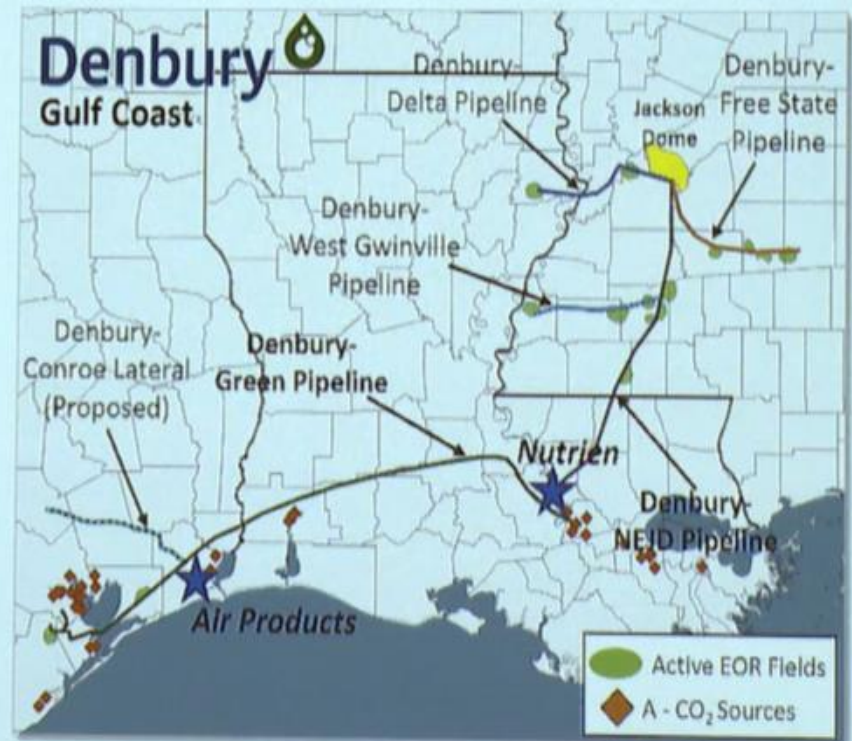


Crude Oil / CO₂ Price Relationship

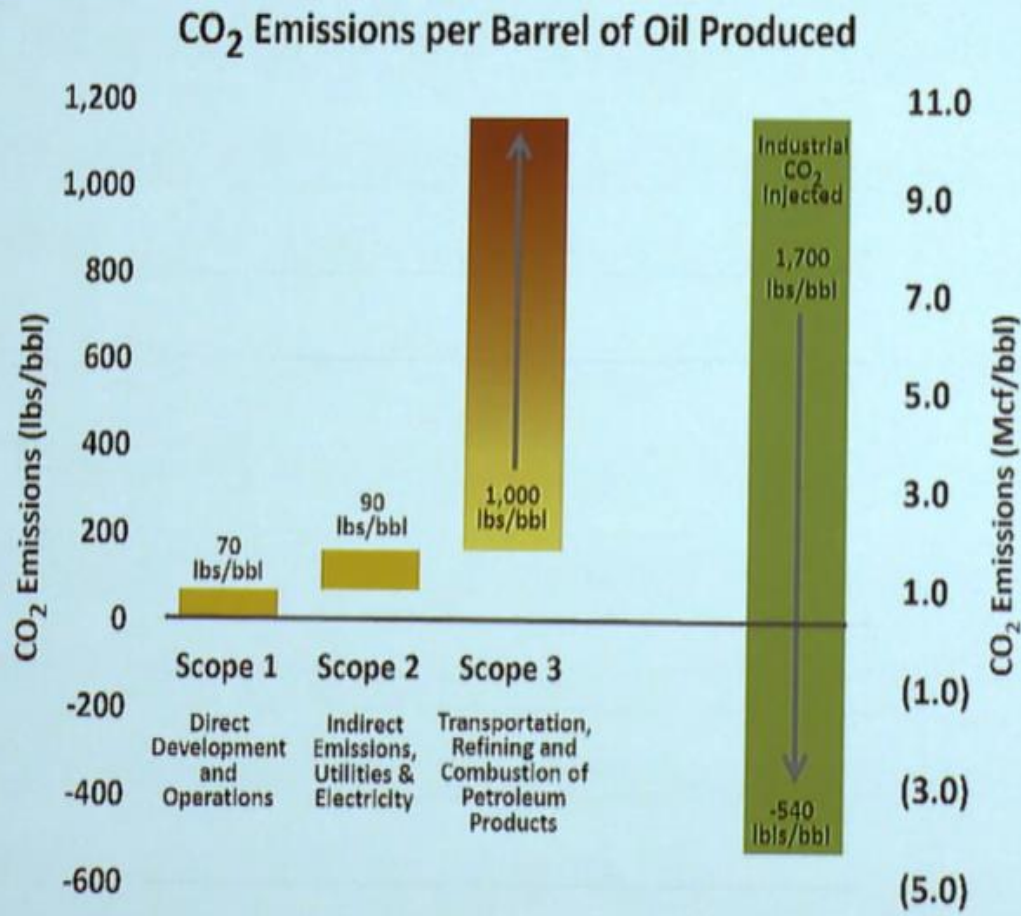
Permian CO₂ Typically priced at 2% of WTI Crude at Cushing



Denbury Carbon Negative Crude Oil

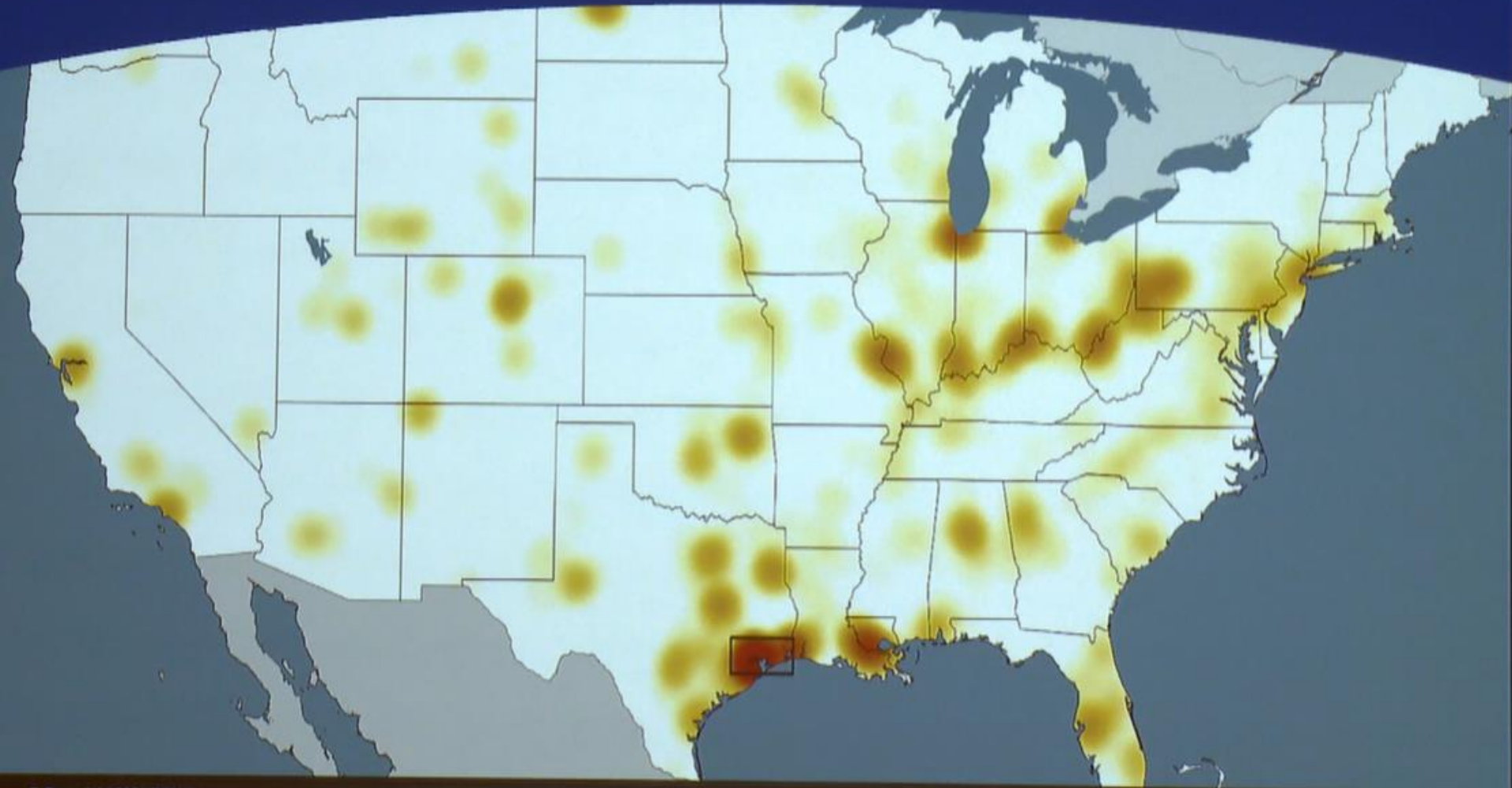


Denbury Carbon Negative Crude Oil

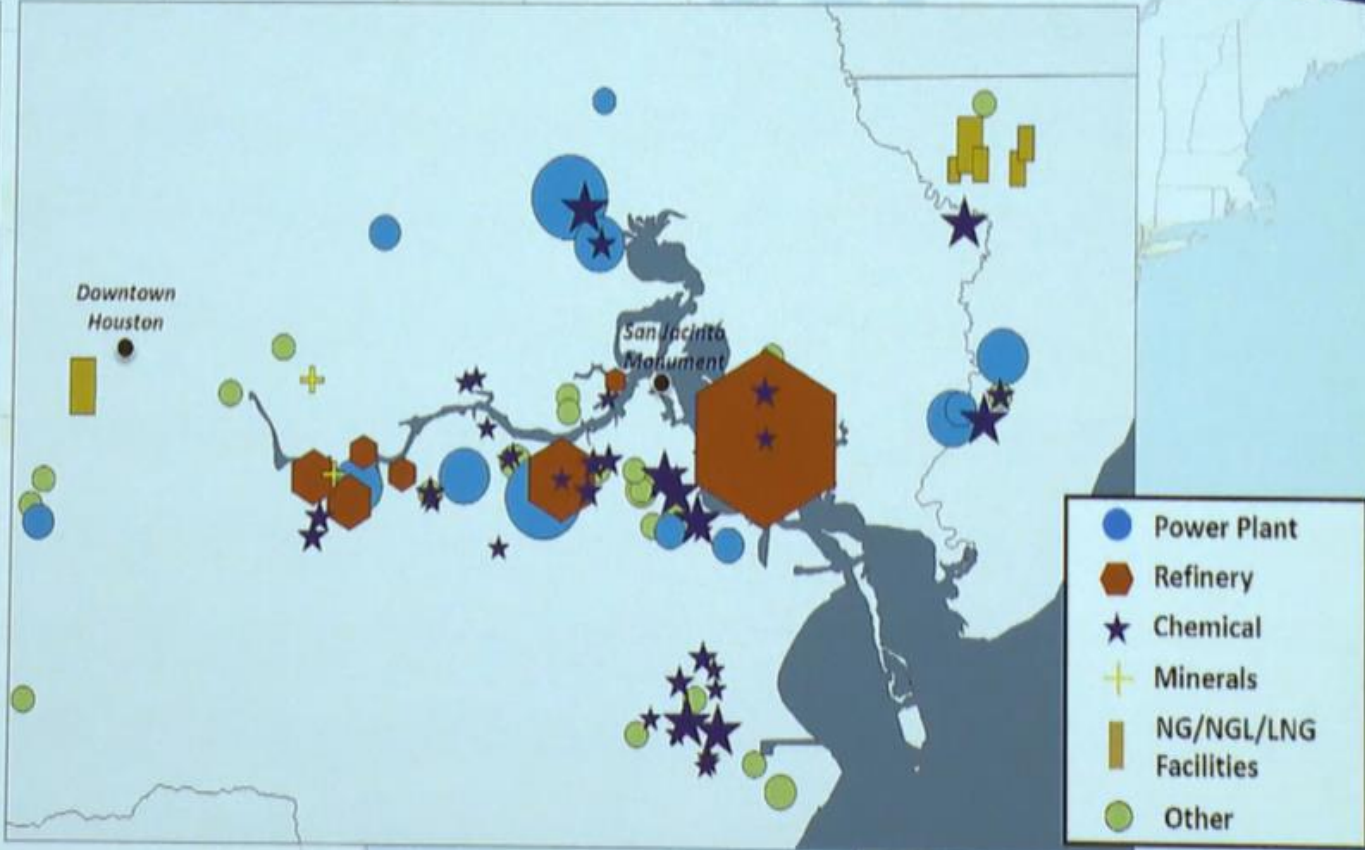
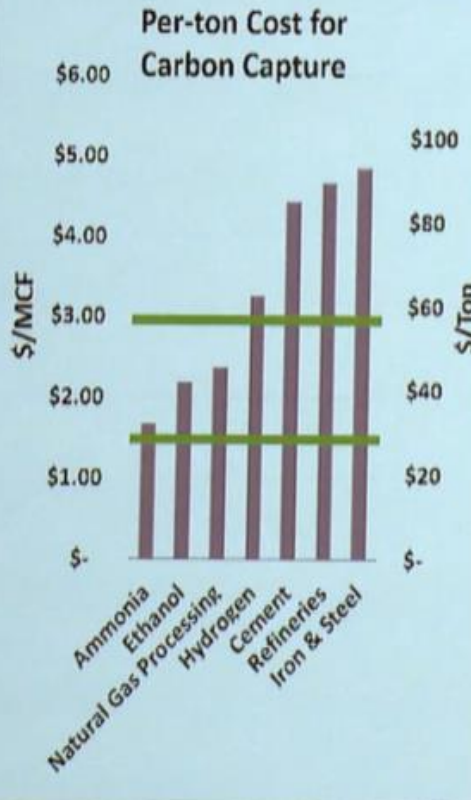


» When sequestration is the goal, the more CO₂ you use, the better the economics.

Houston Ship Channel CO₂ Emitters

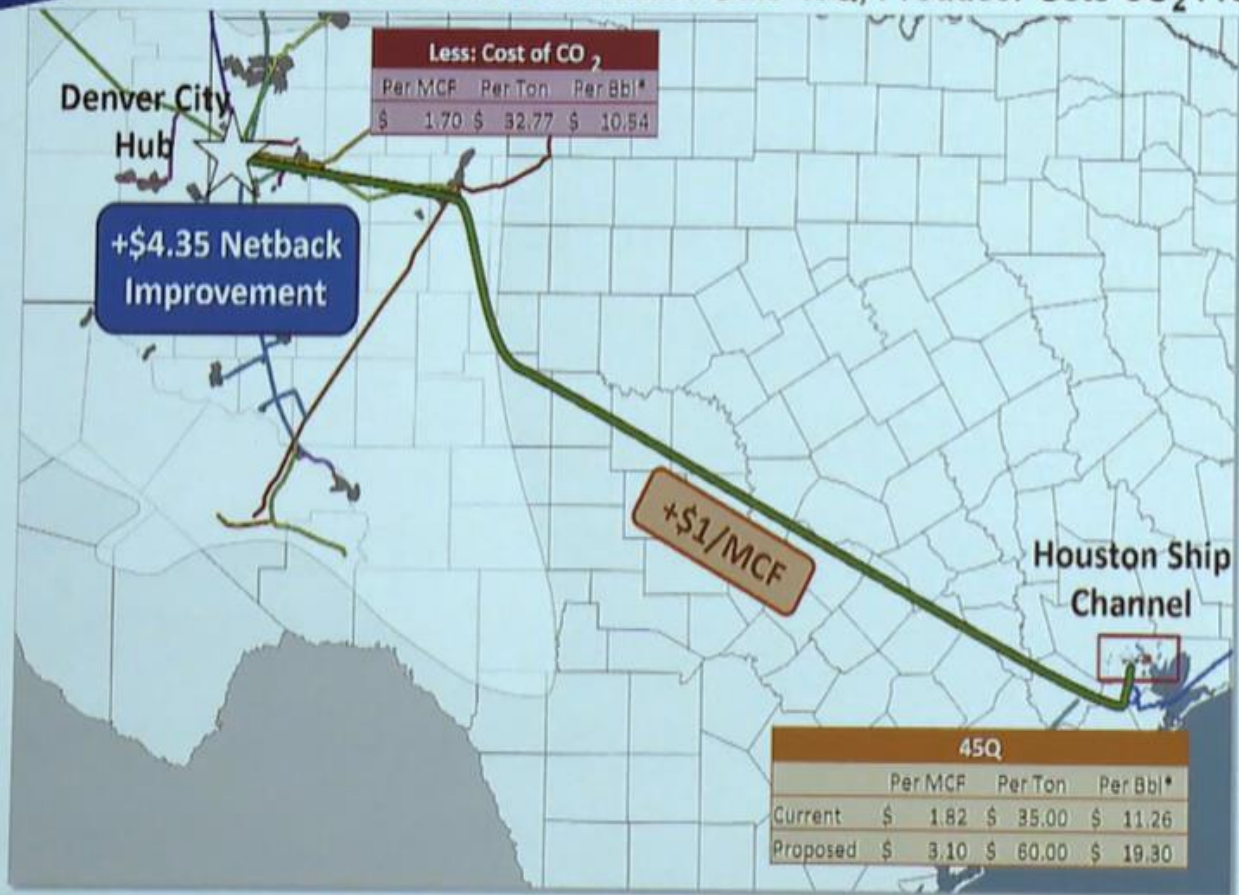


Houston Ship Channel CO₂ Emitters



Replace Natural CO₂ with Anthropogenic for Permian EOR

Possible Scenario: Emitter Gets 45Q, Producer Gets CO₂ Free but Pays Transport



- » CO₂ pipeline from the Houston Ship Channel (HSC) area to the Permian Denver City hub, designed to replace natural CO₂ in the Permian with Gulf Coast anthropogenic CO₂.
- » Pipe would move about 1 Bcf/d of CO₂; cost of about \$2 billion; justify a rate of \$1/Mcf.
- » Emitters get 45Q credit; Permian producers get HSC CO₂ for free.
- » Permian producers eliminate natural CO₂, replace with HSC volumes.

Replace Natural CO₂ with Anthropogenic for Permian EOR



