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# ***Doing the deal: Legal and regulatory aspects of the evolving CCS regime in the USA***

*From EOR to CCS*

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# Wisdom from the past

- *“What’s in a name? That which we call a rose, by any other name would smell as sweet; so Romeo would, were he not Romeo call’d.”*
  - Shakespeare, *Romeo and Juliet* (1597) (Act II, scene 2)
- *“Il a plus de quarante ans que je dis de la prose sans que j’en susse rien. . .”*
  - Molière, *Le Bourgeois gentilhomme*, (1670) Acte II, scène 4.

« *Il a plus de quarante ans que je fais de la CCS sans que j'en susse rien . . . .* »

- Much of the *legal* and *regulatory* structure for CCS in the US is already in place under another name – Enhanced Oil Recovery (EOR)
- A more-than-embryonic *physical* infrastructure for CO<sub>2</sub> transport and injection is also in place
  - » Over 4,000 CO<sub>2</sub> injection wells
  - » Over 5,000 km of CO<sub>2</sub> pipeline; evolving regional networks
  - » Injections exceed 30 million tonnes per year

THE WAY FORWARD is to *adapt this legal and regulatory regime for the new CCS paradigm*, filling gaps and repairing flaws

# What *is* the law? – CCS means multiple legal and regulatory frameworks

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- Capture – the purchase and sale of anthropogenic CO<sub>2</sub>
- Transport – siting and regulation of CO<sub>2</sub> pipelines;
- Injection for storage –
  - » Acquisition of property rights
  - » Unitization
  - » Permitting

## Elements of EOR regulation apply to CCS

- **CO2 Sources** -- ownership, contracts, leasing, etc.
- **CO2 Pipelines** – right of way access; eminent domain/condemnation; access and rates for transportation; “contract carriage”, “common carriage” and variants;
- **CO2 Injection for EOR** – permitting for EOR, not for storage
- **Post-EOR injection phase – not addressed**
- **Post-closure “storage” phase – not addressed**

# 40 Years of CO<sub>2</sub>-based EOR – *CO<sub>2</sub> supply sources*

- Initial sources were *anthropogenic* (captured from natural gas production)
- Replaced by naturally-occurring CO<sub>2</sub> in 1980s
  - » Developed like oil or natural gas reserves – trillions of cubic feet of proved reserves in inventory
- New anthropogenic sources include old coal-to-gas plant (North Dakota) and gas processing (Labarge)
- Next phase (2007-2012) anthropogenic sources will be fertilizer, ammonia, Coal-to-Liquids (CTL),  
***Power plant CO<sub>2</sub> will have to compete with established base of lower-cost supplies***

# FIRST PHASE of anthropogenic purchases

## – Natural Gas Processing Plants

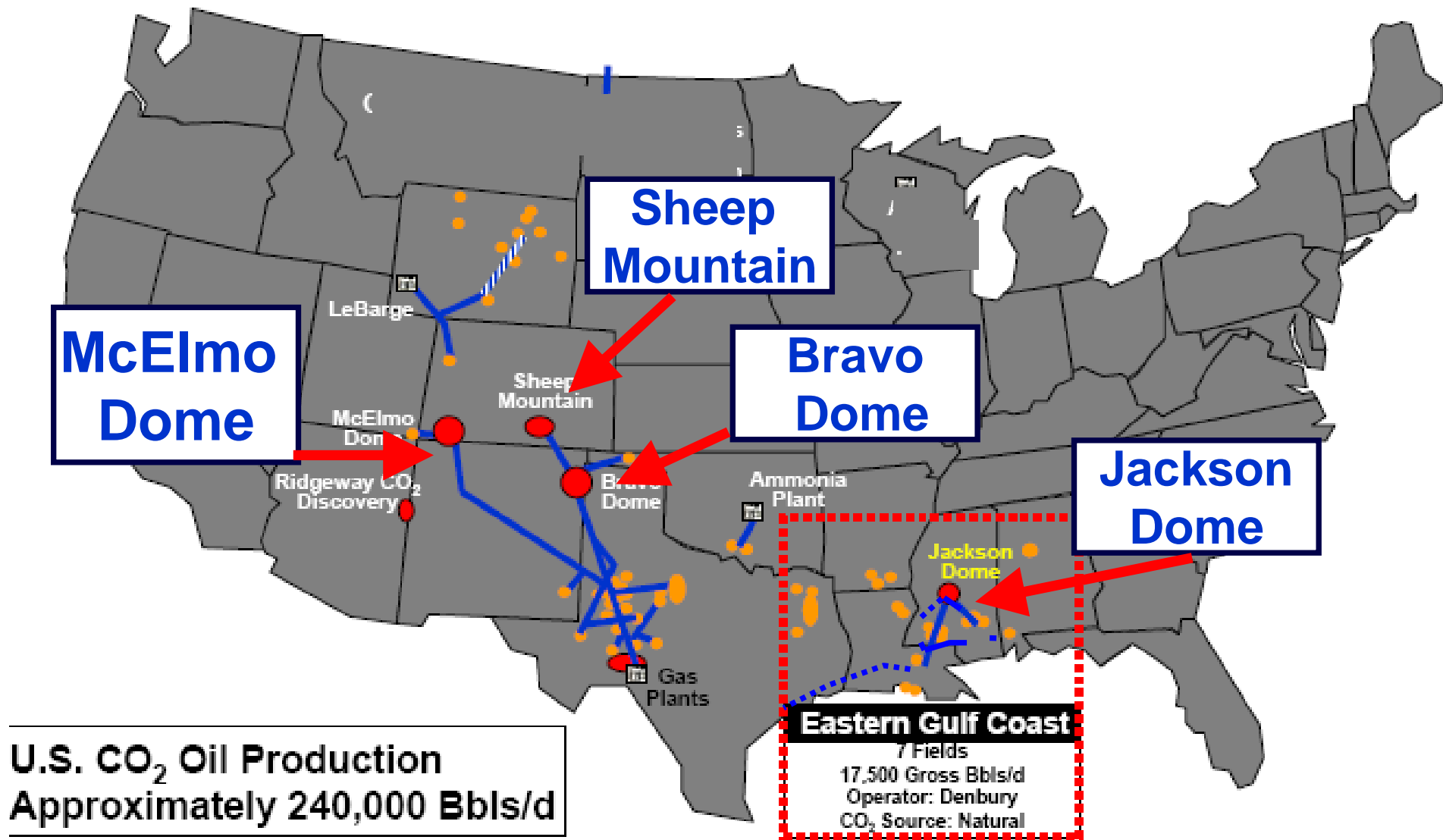
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- Pennzoil's SACROC unit in Permian basin (1973)
- 170 mile pipeline (about 50 MMcd/d)
- Val Verde gas processing plants in west Texas
- ExxonMobil's Labarge Gas Plant facility (Wyoming) (currently sells 200+ MMcf/d high-quality CO<sub>2</sub> for injection and vents about same amount of low-grade gases (~65% CO<sub>2</sub>))

# SECOND Phase –naturally occurring reserves developed like natural gas reserves

- McElmo Dome (southwestern Colorado)
  - » Kinder Morgan & ExxonMobil
  - » 10 trillion cubic feet (Tcf) reserves (roughly 1 Bcf/d)
- Jackson Dome (Mississippi)
  - » Denbury Resources
  - » 5.5 Tcf proved reserves (> 500 MM cf/d)
- Bravo Dome (NE New Mexico/Texas/Oklahoma panhandle)
  - » Kinder Morgan, Occidental, Amerada Hess
  - » 8 Tcf of initial reserves (~ 400 MM cf/d from 350+ wells)
- Sheep Mountain (southern Colorado)
  - » BP, ExxonMobil
  - » about 2 Tcf reserves

# CO<sub>2</sub> Sources –naturally occurring

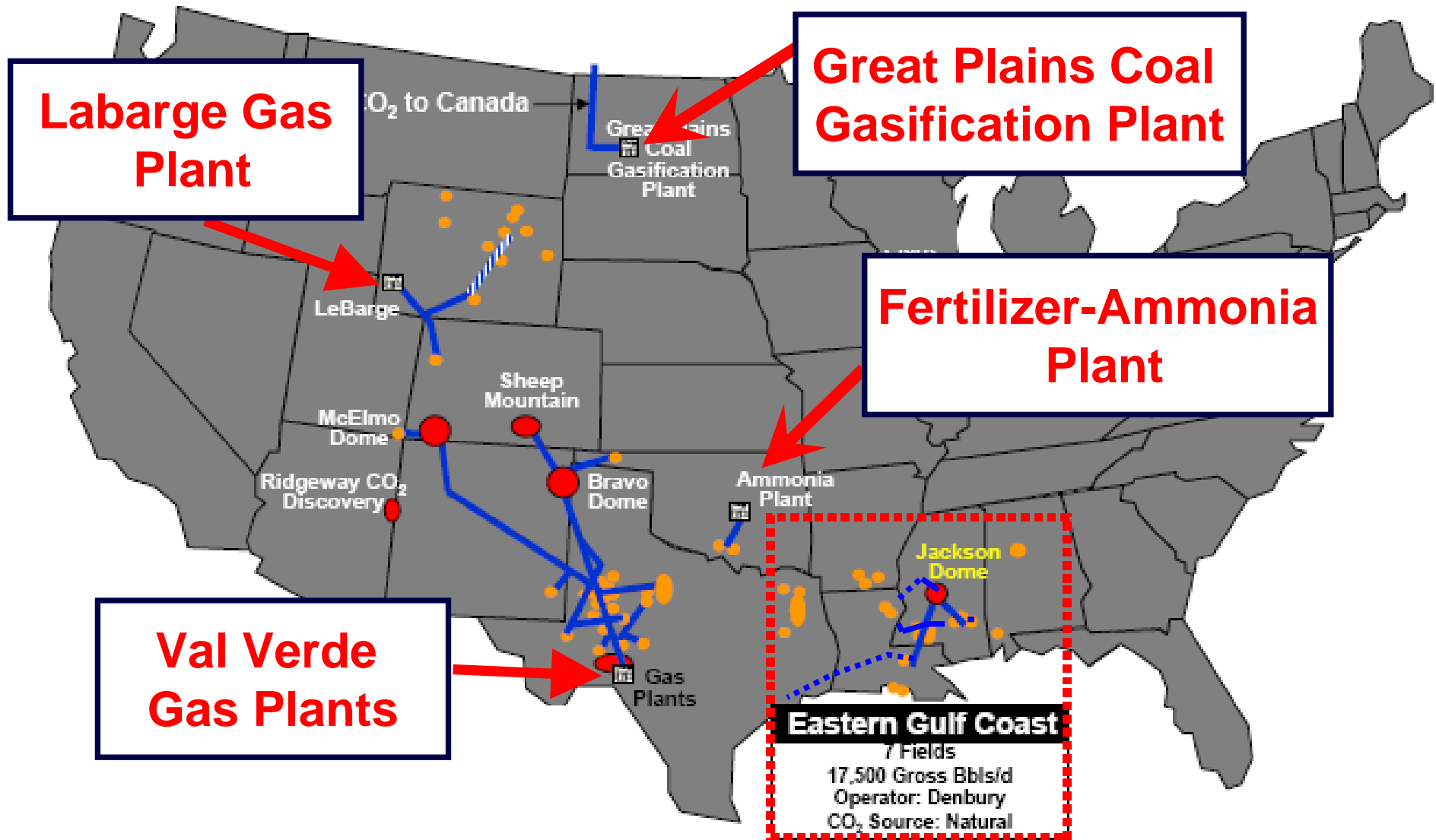


Source: Denbury Resources, Inc. (Sept 2007)

## THIRD PHASE was anthropogenic purchases – “Synfuels” coal-to-gas plant

- Developed under Carter Administration in late 1970s; commenced operation in 1984
- Synthesized methane to offset natural gas shortages
- About 160 MM Dth/d of CH<sub>4</sub>
- CO<sub>2</sub> byproduct sold for EOR (Weyburn Project)
  - 10 million+ tonnes injected since 2000

# CO2 Sources – Anthropogenic

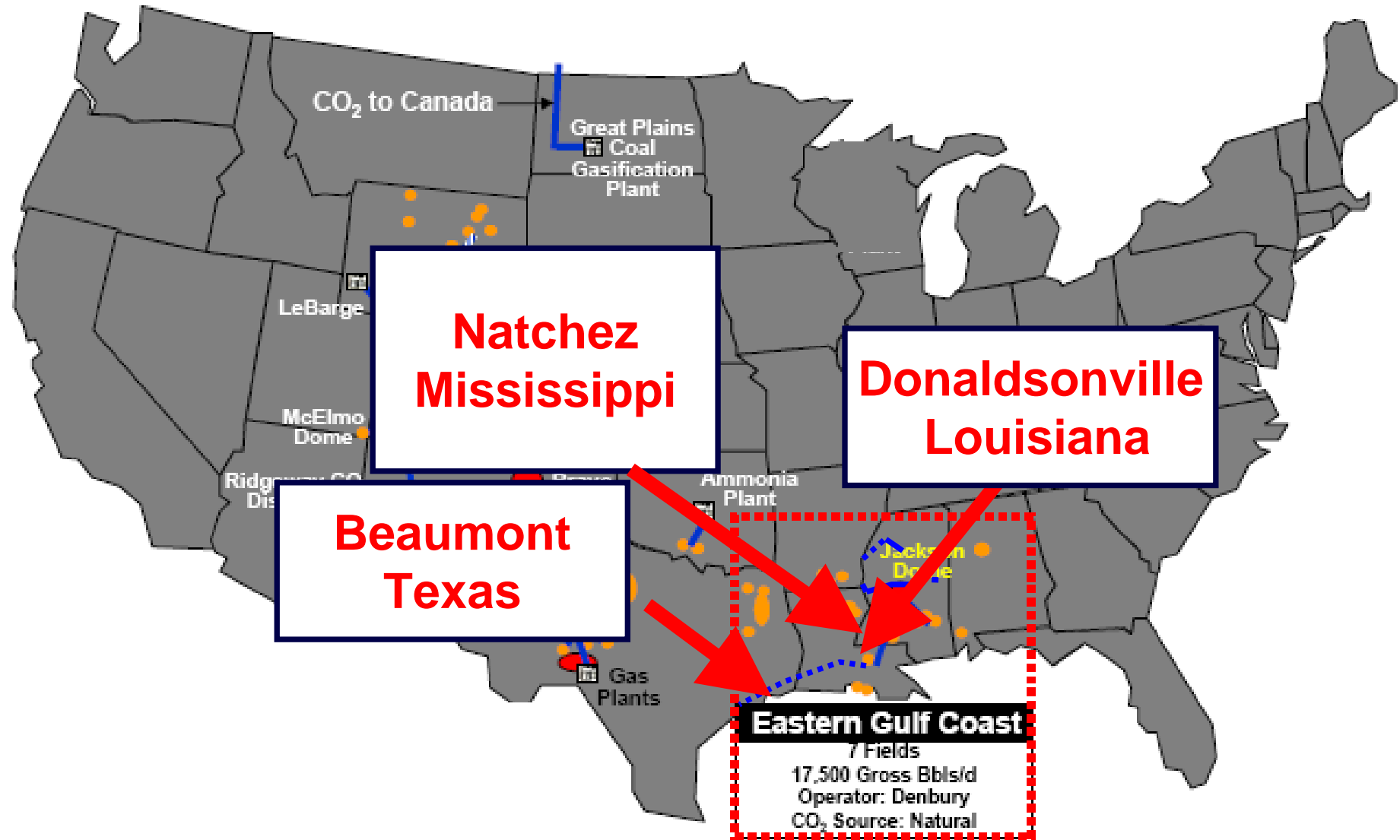


## FOURTH PHASE will be anthropogenic purchases of industrially-produced CO<sub>2</sub>

- Fertilizer plants (Oklahoma)
- Petroleum coke to ammonia plant
- Coal-to-liquids facilities
- Natural gas processing
- Ethanol (small quantities)

*Power plant CO<sub>2</sub> will be a FIFTH supply wave (depending on technology and economics)*

# Anthropogenic sources – industrial sources



Source: Denbury Resources, Inc. (Sept 2007)

# 40 Years of CO<sub>2</sub>-based EOR – *Injection and oil production operations*

- Over 4,000 CO<sub>2</sub> injection wells
- Recycling CO<sub>2</sub> (~ 50 percent of initial injections)
- Developed ownership rules, contracts, leases, permitting and environmental standards for injection and for plugging and abandoning wells following oil production
- Existing permitting and standards for trillions of cubic feet of natural gas storage facilities
- Existing regulatory agencies and experienced staff

# 40 Years of CO<sub>2</sub>-based EOR – *Pipeline infrastructure*

- Several thousand miles of existing CO<sub>2</sub> pipeline
  - » Multiple pipelines in Permian Basin (West Texas)
  - » Pipelines from Labarge gas plant (Rocky Mountains)
  - » Denbury's Jackson Dome Header System (Mississippi and Louisiana)
  - » North Dakota coal gasification plant to Weyburn site (Saskatchewan, Canada)
- Major expansions announced by Denbury to link anthropogenic sources to EOR projects
  - » Conversion of existing natural gas pipeline
  - » “Green Line” from Louisiana to Texas Gulf Coast

# State, not federal, law governs purchase and sale of CO<sub>2</sub>

- CO<sub>2</sub> is a “good” thing
  - » Uniform Commercial Code (UCC) Section 2-105: “goods” are “all things ... which are movable at the time of identification to the contract for sale”
- UCC Section 2-107 specifically governs sales of minerals, including “oil and gas” to be removed from realty – but sale of reserves in the ground is subject to law governing sales of real property
- Natural-source CO<sub>2</sub> probably under 2-107 while anthropogenically-sourced CO<sub>2</sub> probably under 2-105

# CO2 Pipeline regulation – generally regulated by States, not Federal government

- Non-jurisdictional under Interstate Commerce Act
  - » *Cortez Pipeline Co.*, 46 Fed. Reg. 18805 (1981) (Interstate Commerce Commission (now Surface Transportation Board) concludes that pipeline transportation of CO2 “is not subject to its jurisdiction”)
- Non-jurisdictional under Natural Gas Act:
  - » *Cortez Pipeline Co.*, 7 FERC ¶ 61,024 (1979) (pipeline to carry 98 % CO2 with traces of methane not subject to Federal Energy Regulatory jurisdiction )
- CO2 pipelines across Federal lands may be subject to a common carrier obligation under 1920 Mineral Leasing Act
  - » *Exxon v. Lujan*, 970 F.2d 757 (10th Cir. 1992)

# CO2 Pipeline regulation – State approaches vary

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- Private carriers
- “Common carriers”
- Grant of Eminent Domain – ability to condemn land
- No regulation

# Geologic sequestration is not accepted under any current carbon regulation scheme

- Clean Development Mechanism
  - » Basic policy issued to be discussed at Bali meeting (December 2007)
  - » Methodology Panel
- European Union ETS (Guidance in Nov. '07?)
- US Regional Greenhouse Gas Initiative (RGGI)
- US legislative proposals
  - » Bingaman – Specter July 11, 2007 Draft
  - » Other proposals

# Requirements for “paradigm shift” from EOR to CCS

- Remove uncertainties in ownership (surface, subsurface, sales, transport, and injection; quality specifications)
- Protocols for “post-injection” phase
- Protocols for the “post-closure” or “storage” phase
  - » Who bears *operational* responsibility?
  - » Who bears the *financial* responsibility (for both *ordinary* and *extraordinary* problems?)
- Qualification standards for offset or reduction for *compliance* market
  - » CDM
  - » EU ETS
  - » US regional plans (e.g. RGGI, WCI)
  - » US Federal legislation

# “Build-out” of legal and regulatory infrastructure -- IOGCC Model Statute & Rules

- “Published by “Interstate Oil and Gas Compact Commission” (September 26, 2007)  
([http://www.iogcc.state.ok.us/docs/MeetingDocs/Master-Document-September-252007-FINAL-\(2\).pdf](http://www.iogcc.state.ok.us/docs/MeetingDocs/Master-Document-September-252007-FINAL-(2).pdf))
- For adoption by USA State Governments and Canadian Provinces
- Detailed rules based on existing regulations for EOR, natural gas storage, and acid gas injection
- Ownership, permitting, liability, verification, monitoring, remediation and remediation funding
- Industry financed Mitigation Fund will assure mitigation
- State governments will choose whether or not to adopt the IOGCC models, modify them – or just ignore them

# The key to the IOGCC approach

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- » *“Together, the EOR, natural gas storage, and acid gas injection models provide a technical, economic, and regulatory pathway for long-term CO<sub>2</sub> storage”*

# IOGCC – *What is regulated?*

- Anthropogenically-sourced CO<sub>2</sub>
  - » “including CO<sub>2</sub> generated from oil and gas production and processing operations
- Quality standard is a *performance* standard not a percentage standard:
  - » “of sufficient purity and quality as to not compromise the safety and efficiency of the reservoir”
  - » administered by State Regulatory Agency
- Contaminants (e.g. H<sub>2</sub>S, NO<sub>x</sub> and SO<sub>x</sub>) remain regulated under existing law

# IOGCC – *Who is the regulator?*

- State Regulatory Agency (“SRA”), not new Federal agency
  - » Typically an *existing oil & gas regulatory agency* for drilling, permitting, unitization, etc.
  - » States may designate public utility commission (economic regulator) or environmental regulatory agency
- **Not** the Federal Environmental Protection Agency

# IOGCC – *How would CCS be regulated?*

- **“CF”:**
  - » “CO<sub>2</sub> Facility” includes surface and subsurface infrastructure (with flow lines but not including the main CO<sub>2</sub> pipeline)
- **“GSU”:**
  - » “Geological Storage Unit” is the subsurface reservoir
- **“CSP” or “CO<sub>2</sub> Storage Project”**
  - » CO<sub>2</sub> Facility; plus the
  - » Geological Storage Unit
- **“CSP Permit”:**
  - » State Regulatory Agency permit to operate a CSP

# IOGCC – CSP Permit Requirements (§ 4.0)

- Must have “necessary and sufficient” property rights
- Availability of compulsory mechanisms
  - » Eminent domain
  - » “Forced unitization”
- Define boundaries
- Full technical evaluation
- Public safety and emergency response plan
- Detailed worker safety plan
- Corrosion monitoring and prevention plan
- Leak detection and monitoring plans
  - » for all wells and surface facilities
  - » for subsurface GSU (storage unit)

# IOGCC – CSP Permit Application and issuance

- Following issuance of CSP permit, must obtain authorizations for each CO<sub>2</sub> storage well (similar to existing rules) (§ 6.0)
- Underground Sources of Drinking Water (USDW) identified; special drilling and casing protocols
- Proof that casing and cement will confine CO<sub>2</sub> to storage unit (cement bond log or result of fluid movement study, etc.)
- Standards for casing, cement, tubing, corrosion resistance, etc. to insure isolation from USDW
- Down-hole safety shut-off valves for injection wells
- Reporting requirements

# IOGCC – CSP Operational Standards (§ 7.0)

- Public safety and worker safety plans
- Leak detectors at all injection and subsurface observation wells (with semi-annual testing)
- Maintain inspection records for 5 years
- Reporting requirements for leaks, pressure changes, lack of containment, etc.
- Quarterly operational reporting (volumes, temperature, pressures, etc.)
- Corrosion monitoring
- Signage/identification at each facility (and each plugged well)

## IOGCC – CSP Closure (§ 9.0)

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- Monitoring plan submitted to State Agency for approval
- Protocols for plugging wells (individual well bonds released as plugged)
- Operator performance bond released at end of closure period
- Responsibility for monitoring and remediation passes to designated state or federal agency and CSP operator and CO<sub>2</sub> generator “released from further SRA regulatory liability”

# IOGCC – Post-injection and Post-closure regulation and liability

- **Operator** remains liable for 10 years (or other period) following end of injections (the “Closure Period”)
  - » Each well is bonded; bonds released as wells are plugged
  - » Operator bond (and liability) remains through Closure Period
- **“CSP” or “CO2 Storage Project”**
  - » CO2 Facility; plus the
  - » Geological Storage Unit
- **“CSP Permit”:**
  - » State Regulatory Agency permit to operate a CSP

# Select Research Resources

1. New Mexico Energy, Minerals, Natural Resources Department (Oil Conservation Division), "Carbon Dioxide Sequestration: Interim Report on Identified Statutory and Regulatory Issues" (June 27, 2007) ([www.emnrd.state.nm.us/OCD/documents/InterimReportCO2Sequestration.pdf](http://www.emnrd.state.nm.us/OCD/documents/InterimReportCO2Sequestration.pdf) );
2. L. Stephen Melzer, "The History and Development of CO2 EOR in the Permian Basin with an Emphasis on Pipelines" (June 26, 2007) ([http://eori.gg.uwyo.edu/downloads/Steve\\_Melzer\\_%20HistoryofPBCO2EOR.pdf](http://eori.gg.uwyo.edu/downloads/Steve_Melzer_%20HistoryofPBCO2EOR.pdf) )
3. Xina Xie, "CO2 EOR and Sequestration Potential" (August 24, 2007) (<http://eori.gg.uwyo.edu/downloads/XinaXieBigSky070824.pdf> );
4. Brian Jeffries, "CO2 in Wyoming" (June 26, 2007), ([http://eori.gg.uwyo.edu/downloads/Brian\\_Jeffries\\_CO2\\_Casper\\_June%2026\\_2007\(rev\).pdf](http://eori.gg.uwyo.edu/downloads/Brian_Jeffries_CO2_Casper_June%2026_2007(rev).pdf) );
5. Odd Magne Mathiassen, CO2 as Injection Gas for Enhanced Oil Recovery and Estimation of the Potential on the Norwegian Continental Shelf (May 2003) (<http://www.co2.no/download.asp?DAFID=28&DAAID=6> )
6. Snell, Dowd, Daly, Nibert, McDavid and Revels, "A Comparative Review of Oil and Gas Law in Texas, Oklahoma, Arkansas, New Mexico Mississippi & Louisiana" (2007) (<http://www.landman.org/content/anmtg07/Comparative%20Oil%20and%20Gas%20Law%202007.pdf> )
7. Holtkamp and Hill, "Regulatory Outlook for Geologic Sequestration of CO2" (2007) (<http://www.psc.state.ut.us/WCPSC%20Conference%202007/Speaker%20Presentations/HoltkampSequestration.ppt> )
8. The Interstate Oil and Gas Compact Commission Task Force on Carbon Capture and Geologic Storage : "Storage of Carbon Dioxide in Geologic Structures A Legal and Regulatory Guide for States and Province" (September 25, 2007) ([http://www.iogcc.state.ok.us/docs/MeetingDocs/Master-Document-September-252007-FINAL-\(2\).pdf](http://www.iogcc.state.ok.us/docs/MeetingDocs/Master-Document-September-252007-FINAL-(2).pdf) )

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# “Negative Rule of Capture”? – Two views

- “*Manziel*” -- 1962 Texas decision (*Railroad Commission of Texas v. Manziel*, 361 S.W. 2d 560, 568 (Tex. 1962))
  - » “[J]ust as under the rule of capture a land owner may capture such oil and gas as will migrate from adjoining premises. . . So also may [a landowner] inject into a formation substances which may migrate through the structure to the land of others”
  - » No trespass where the state regulatory body had permitted the injection project

# “Negative Rule of Capture”? – Two Views

- *Garza Energy Trust*: 2005 Texas decision in *Mission Resources v. Garza Energy Trust*
  - » Allowed action for “subsurface trespass” for secondary recovery fracture treatment
  - » Apparently limited to case of fracture treatment
- In any event, injection of CO<sub>2</sub> for storage may not interfere with production of other oil, gas or minerals



# Key differences between EOR and CCS will mean new legal & regulatory rules

## EOR:

- *Minimize CO<sub>2</sub> needed for oil output;*
- Environmental permitting *allows* injections and abandonment of CO<sub>2</sub> in place when production ceases
- Operational responsibility *ceases* with lease expiration
- *Leases terminate* after production ceases – plug and abandon
- Supply is principally naturally-occurring CO<sub>2</sub>, supplemented with anthropogenic supply

## CCS:

- *Maximize CO<sub>2</sub> injection at least cost*
- Environmental permitting does *not currently allow* for injections for storage only
- Operational responsibility *continues* post oil production
- *Property rights adequate* for storage *must continue* until alternative
- Supply must be anthropogenic *only* – certification of source required to prevent mislabeling