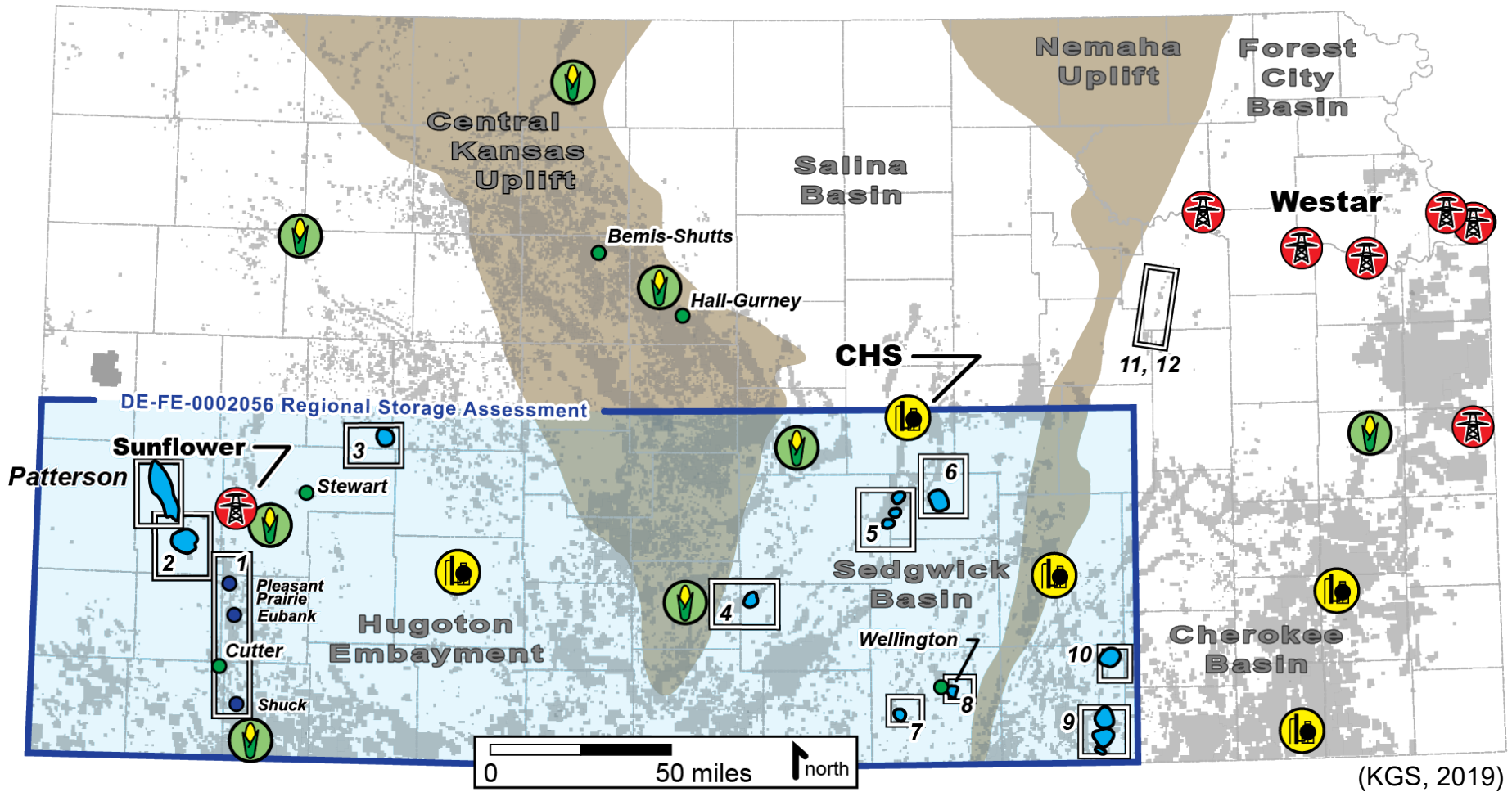


Figure 1: CCUS in Kansas



(KGS, 2019)








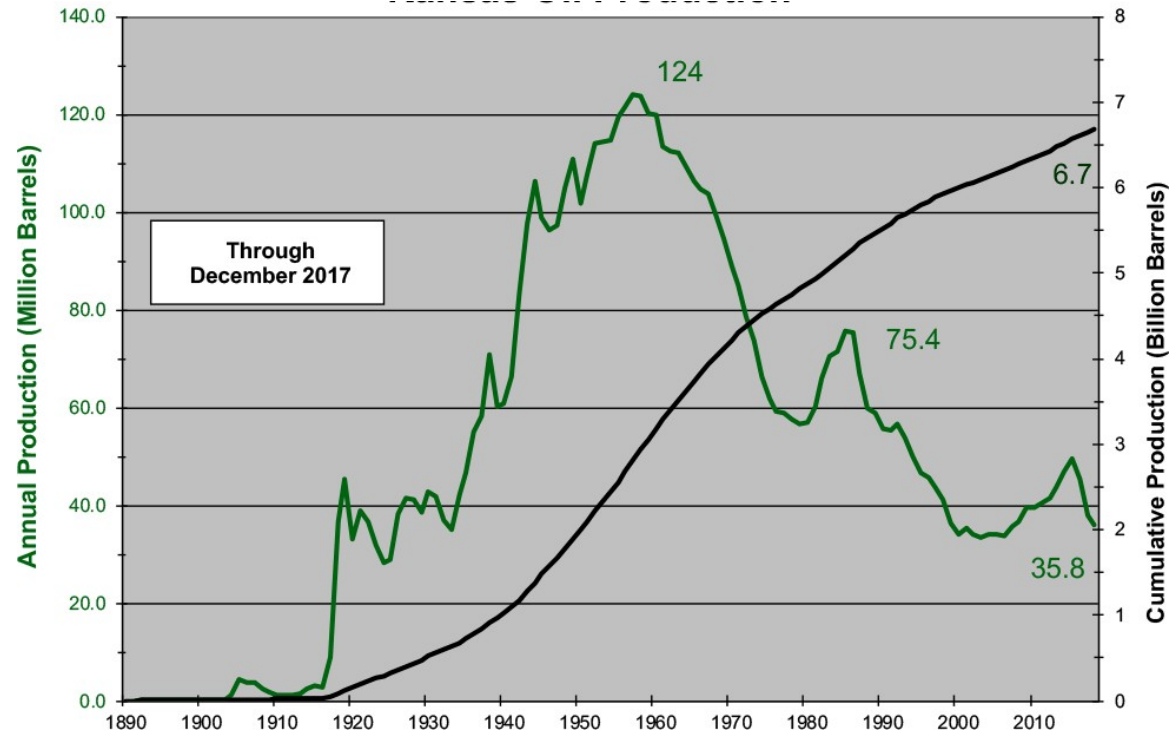
-  coal-fired power plant
-  ethanol plant
-  oil and gas fields
-  petroleum refinery or manufacturing plant (cement & fertilizer)
-  geologic storage complex study area and closure
-  DOE site characterization study
-  DOE EOR study

Figure 2: Kansas Oil Production is Falling

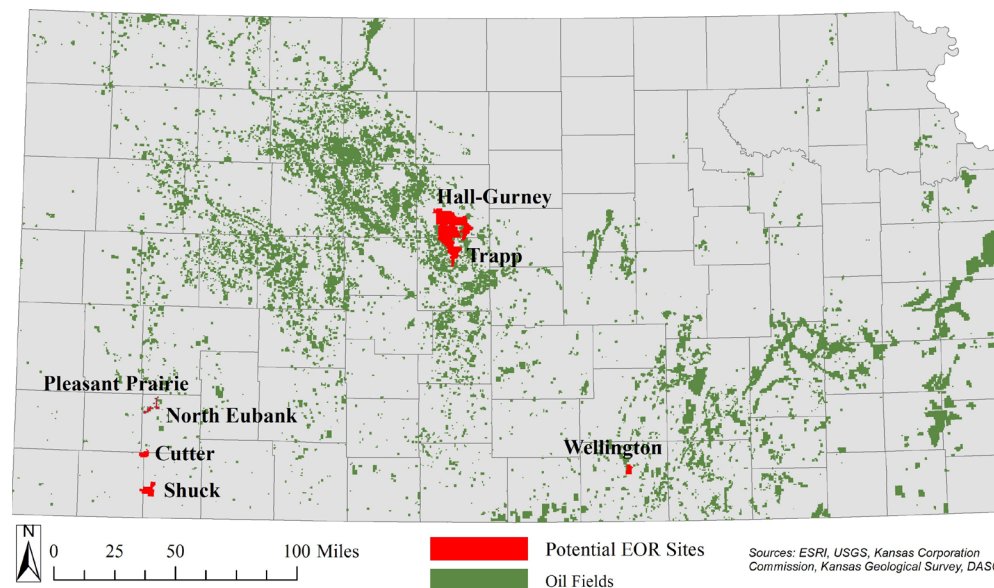


(KGS, accessed 2017)

| Basin | EOR Potential (M barrels) | Net CO ₂ Demand (MMT) | Direct Jobs Created |
|------------------|---------------------------|----------------------------------|---------------------|
| Illinois-Indiana | 500 | 160-250 | 1550-3100 |
| Ohio | 500 | 190-300 | 1550-3100 |
| Michigan | 250 | 80-130 | 800-1800 |
| Kansas | 750 | 240-370 | 2300-4600 |

(Crabtree, 2012)

Figure 3. Numerous Sites for EOR in Kansas



(KGS, 2018)

| | Injection Rate (M ton/yr) | CO ₂ Storage (M ton) | Primary and Secondary (M barrel) | Extra Oil Production (M barrel) | KGS Study |
|------------------|------------------------------|------------------------------------|--|---------------------------------------|---|
| Shuck | 0.4 | 1.5 | 7.9 | 3.6 | DE-FE0002056 |
| Cutter | 0.5 | 1.3 | 5.4 | 2.8 | DE-FE0002056 |
| N Eubank | 0.6 | 1.5 | 7.4 | 4.6 | DE-FE0002056 |
| Pleasant Prairie | 0.3 | 0.5 | 4.7 | 2.2 | DE-FE0002056 |
| Hall-Gurney | 1 | 11.3 | 62.5 | 26.8 | DE-AC26-00BC15124 and Pilot C12 Energy |
| Trapp | 0.5 | 4.3 | 31.3 | 10.3 | KGS reports |
| Wellington | 0.6 | 2.2 | 16.2 | 5.3 | DE-FE0002056 and Pilot |
| Totals | 3.9 | 22.8 | 135.4 | 55.7 | (KGS, 2018) |

Figure 4:

New Projects announced after 45Q Tax Credit Expansion

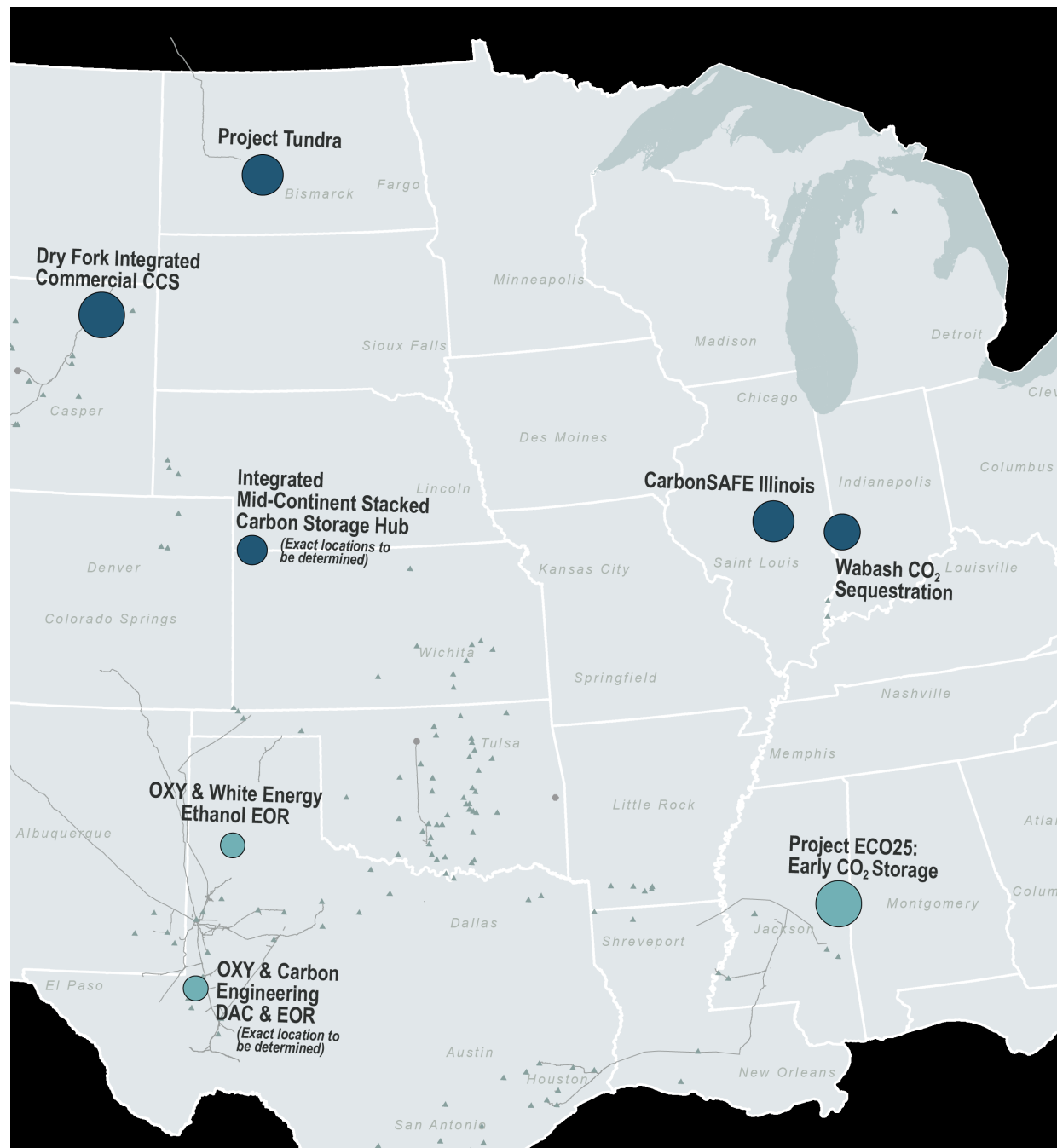
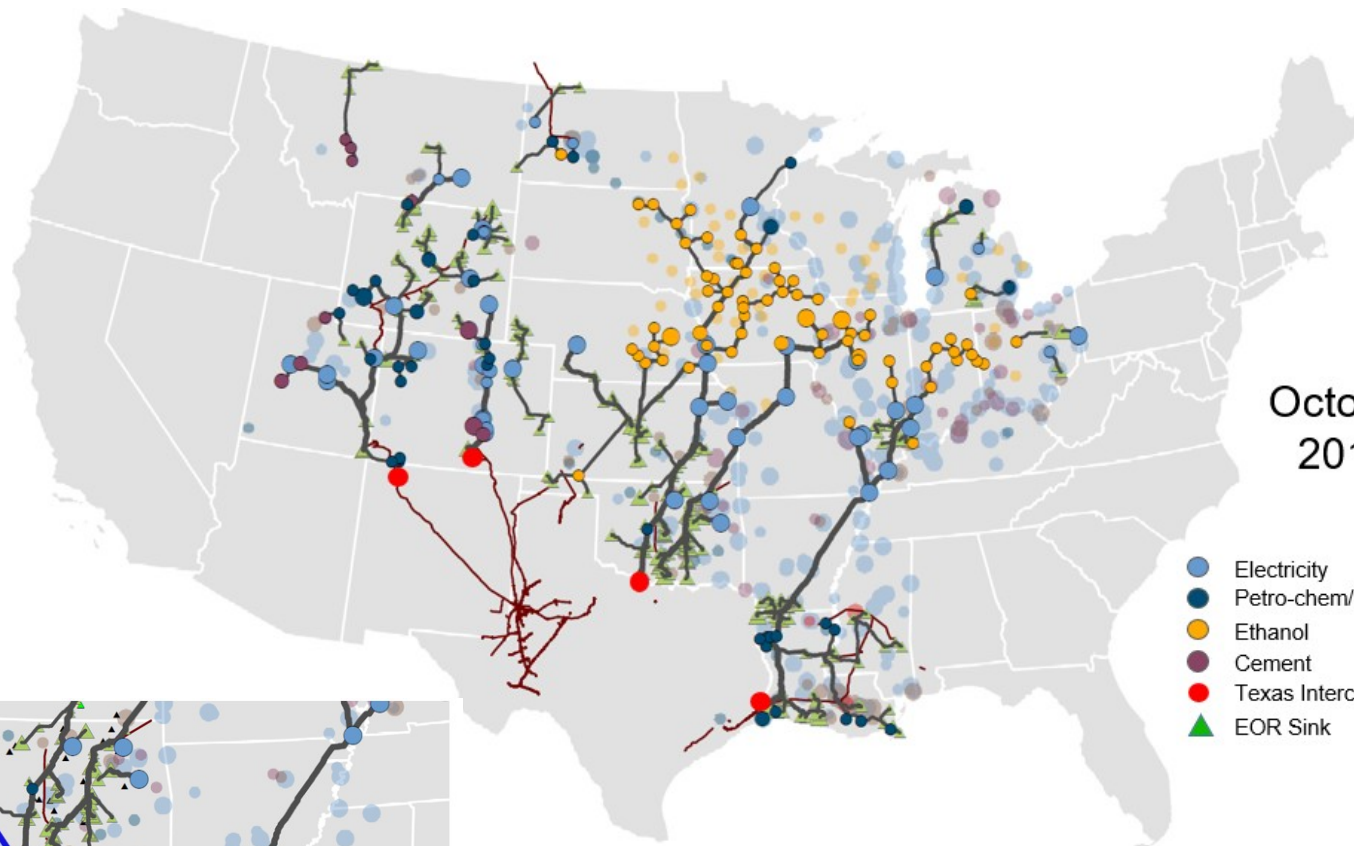


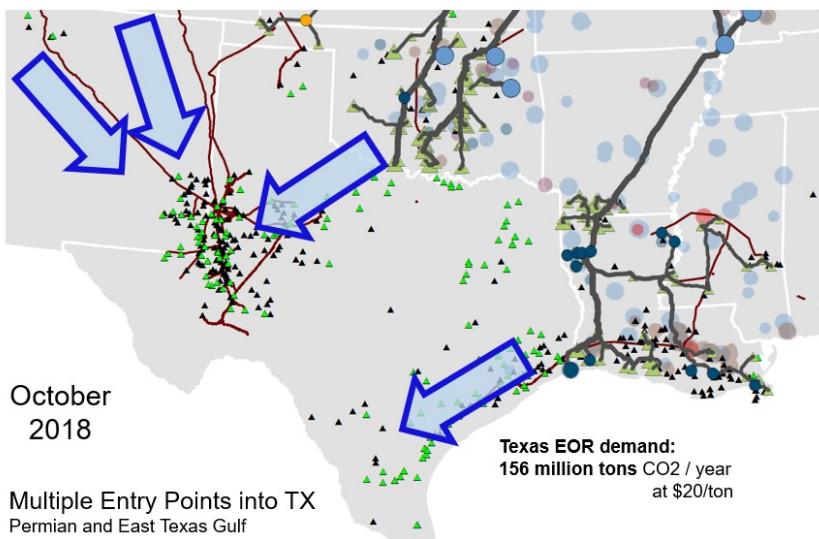
Figure 5: Many Potential Pipeline Routes Cross Kansas

REGIONAL
CARBON
CAPTURE
DEPLOYMENT
INITIATIVE



October
2018

- Electricity
- Petro-chem/NG Refining
- Ethanol
- Cement
- Texas Interconnection
- ▲ EOR Sink



October
2018

Texas EOR demand:
156 million tons CO₂ / year
at \$20/ton

Multiple Entry Points into TX
Permian and East Texas Gulf

Crabtree (2018)
Midwest Region Meeting

Figure 6: Kansas can Become a CCUS Hub

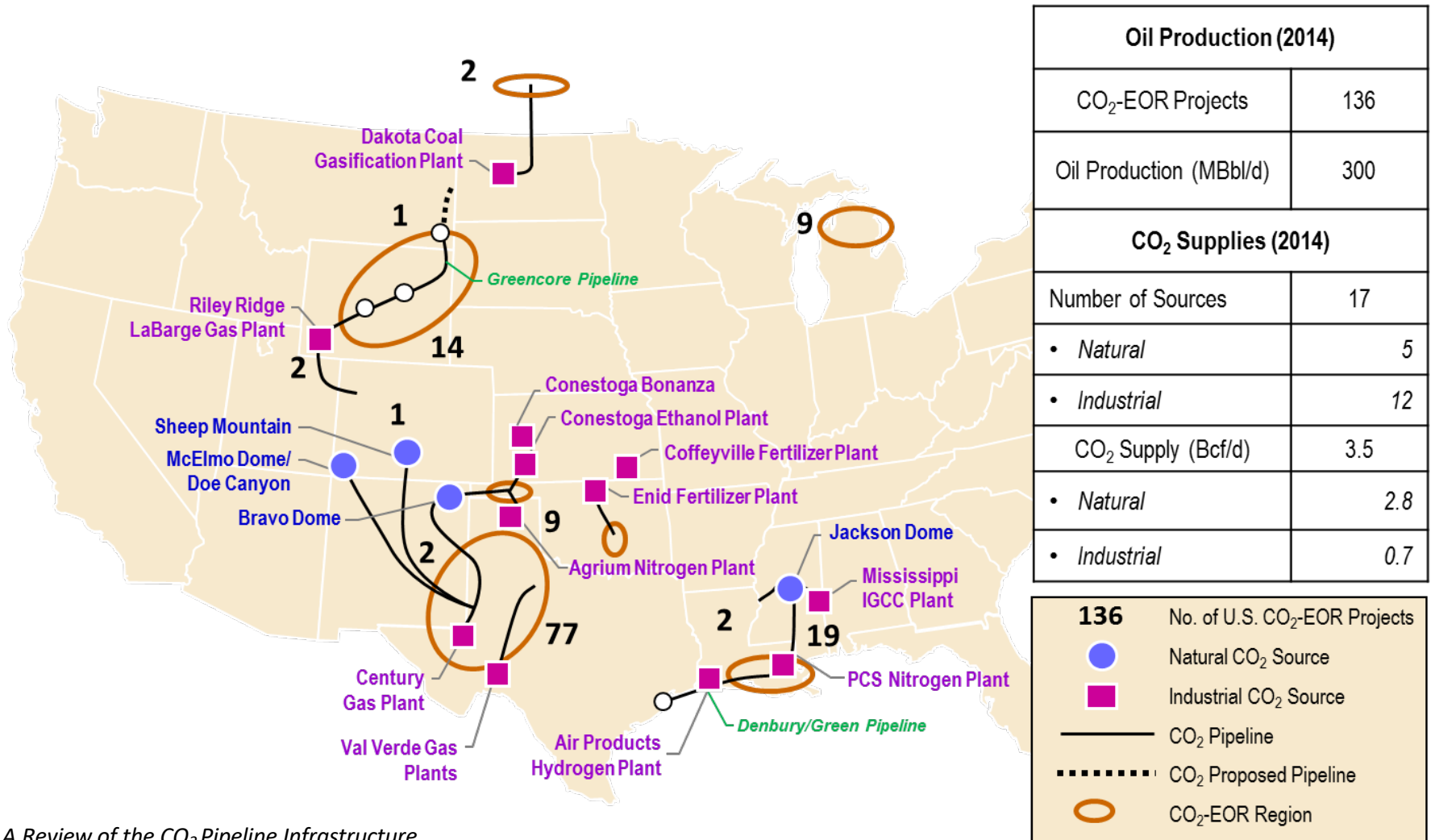
- **Kansas can become a CCUS hub** with multiple businesses and communities benefiting from this technological breakthrough
 - Petroleum, chemicals, cement, power generation
 - Rural economic development
- Legislation is required to...
 - Facilitate capture, transportation, injection and storage as a public utility
 - Allow for eminent domain to be used for pipeline right-of-way and pooling of pore space
- Streamlining EPA UIC Class VI well permit process
 - State primacy would further support development of commercial-scale CCS
 - North Dakota has primacy, Louisiana is pursuing primacy

*Cushing is the North American Oil Hub,
Who will be the CO₂ hub?*



Figure 7: Current CO₂ Pipelines are Limited

Geological and natural gas processing sources are declining



45Q Tax Credits are a Gamechanger

45Q tax credits make CCUS projects economically feasible

- Up to \$35/tonne for EOR and \$50/tonne for saline aquifer storage for CO₂ injected and stored

Kansas operators are well-positioned

- Kansas candidate oil fields have been delineated
- Within pathway of possible large-scale CO₂ pipeline system

CO₂ captured in NE and KS ethanol plants could be transported to Kansas oil fields cheaply - \$14 per tonne (\$0.75/mcf)

- Kansas oil production could *increase by 28% (10 million BO/yr)* through EOR

Low Carbon Fuel Standards

- California, Oregon, ...

What tax credits could be captured?

Hypothetical Scenario

- Construction in 2020, injection in 2022
- Tax credits
 - \$33/tonne CO₂ stored (for EOR) over 12-yr period
 - \$47/tonne for saline storage

| | Kansas Ethanol Plant | Kansas Oil Field | Large Pipeline to Kansas |
|--|----------------------|------------------|--------------------------|
| CO ₂ Injection Volume (Mt/yr) | 0.15 | 0.5 | 4.3 |
| Annual Tax Credits | \$5M | \$17M | \$142M |
| 12-years of Credits | \$59M | \$198M | \$1,703M |

(KGS, 2018)

For saline aquifer sequestration, credits would average
\$47/tonne and generate 42% more in tax credits

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Questions?

\$35

\$35

\$50

\$50

\$35

\$35

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