



Session 4: **Utilization – Commercialization of Captured CO2**

USEA CCUS Roadshow – Washington, D.C. Workshop

Keith Tracy | January 2020

Cornerpost CO₂ LLC



Carbon
Capture
Consultant



Project
Development
Company



45Q / LCFS
Credit
Expert

Qualifications:

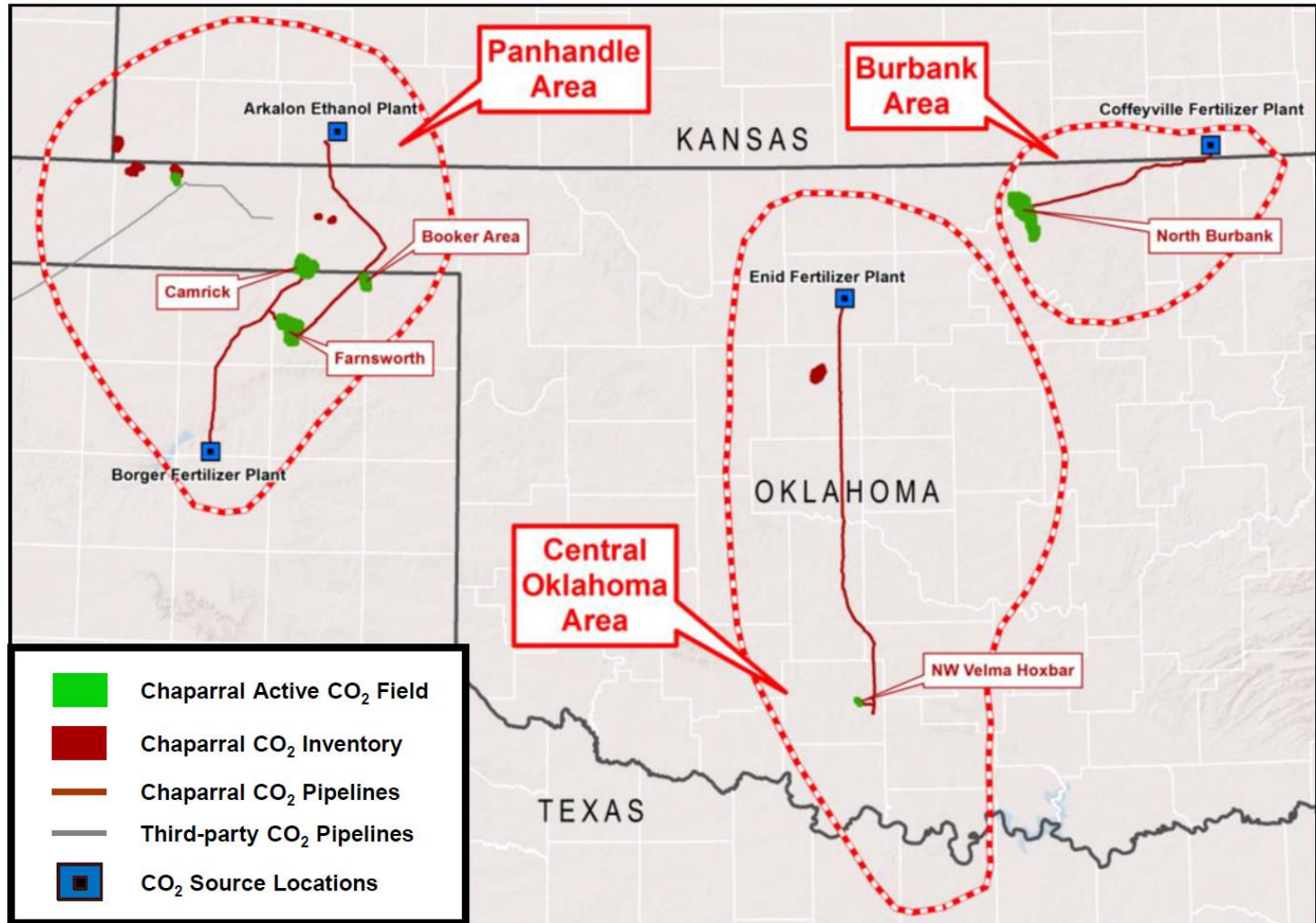
- Operations team leader of 3 carbon capture plants and 250 miles of CO₂ pipelines (installed cost of \$175 million)
- Developer of CO₂ capture plant and 70-mile CO₂ pipeline
- Management member of CO₂-EOR division of oil company
- 13 years experience in carbon capture industry; 25 years total in energy industry; legal background
- Founding participant in Carbon Capture Coalition
- Consulting clients include energy companies, carbon capture technology company, biofuel producers, renewable natural gas company, and direct air capture company

Carbon Capture “Utilization” and Storage (CCUS)

- The “U” of CCUS
 - “Utilization” includes CO₂-EOR (except in 45Q)
 - “Utilization” includes “beneficial use” (non-geologic use) of captured CO₂
- Some Markets for Captured Carbon
 - Enhanced Oil Recovery (EOR)
 - Ag fertilizers (i.e. urea)
 - Algae (fuels/chemicals, and ag/feed products)
 - Biochar, and other pyrolysis products
 - Bio-energy with carbon capture and storage (BECCS)
 - Chemicals (i.e. carbonates, formic acid)
 - Concrete
 - Fuels (i.e. methanol, syngas)
 - Plastics and polymers
 - Other products for which there is a market

CCUS Experience: EOR Utilization

Anthropogenic CO₂-EOR Operations (OK/TX)



Source: Chaparral Energy

“Utilization” and 45Q

- 45Q defines “utilization” to include virtually any beneficial use of the CO/CO₂ – except for EOR

“utilization of qualified carbon oxide means (i) the fixation of such qualified carbon oxide through photosynthesis or chemosynthesis, such as through the growing of algae or bacteria, (ii) the chemical conversion of such qualified carbon oxide to a material or chemical compound in which such qualified carbon oxide is securely stored, or (iii) the use of such qualified carbon oxide for any other purpose for which a commercial market exists (with the exception of use as a tertiary injectant in a qualified enhanced oil or natural gas recovery project), as determined by the Secretary.” *26 U.S. Code §45Q(f)(5)(A)*

- At least 25,000 metric tons per year of CO/CO₂ must be captured and “utilized” to qualify for 45Q

- “Utilized” amount of CO/CO₂ must be either:

- “(I) captured and permanently isolated from the atmosphere, or
- (II) displaced from being emitted into the atmosphere”

26 U.S. Code §45Q(f)(5)(B)(i)

- Calculation of amount is based on lifecycle analysis (LCA) in EPA’s Renewable Fuel Standard (RFS) (Clean Air Act § 211(o)(1)(H))
- IRS should clarify units of measurement
 - 45Q = metric tons of carbon oxide
 - RFS LCA = kilograms of *carbon dioxide-equivalent* emissions per million British thermal units of finished fuel/product (kgCO₂e/mmBtu)
- Minimum sized project = ~\$10 million in 45Q credits over 12 years

“Utilization” Transportation Fuels and 45Q

- IRS requested comments in 2019 for how to interpret 45Q
- “45Q Full Reg Project” responded by submitting comprehensive draft rules on virtually all 45Q issues
- The “Mathematical Displacement Safe Harbor” was suggested, to apply a lifecycle analysis when CO/CO₂ is *utilized* to make transportation fuels. The proposed safe harbor included the following formula:

$$IA + BA - UM - UE = \text{“Amount of qualified carbon oxide utilized”}$$

- IA = *Input amount*: amount of carbon either removed from the atmosphere or prevented from being emitted into the atmosphere (captured emission)
- BA = *Baseline amount*: amount of carbon released into the atmosphere at a reference facility that produces the same fuel (per Calif. or federal GREET)
- UM = *Utilization process direct measured amount*: amount of carbon emissions directly measured from the utilization process used to make the fuel
- UE = *Utilization process embodied amount*: amount of carbon oxide released into the atmosphere by production of a *supplied item* consumed by the utilization process



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