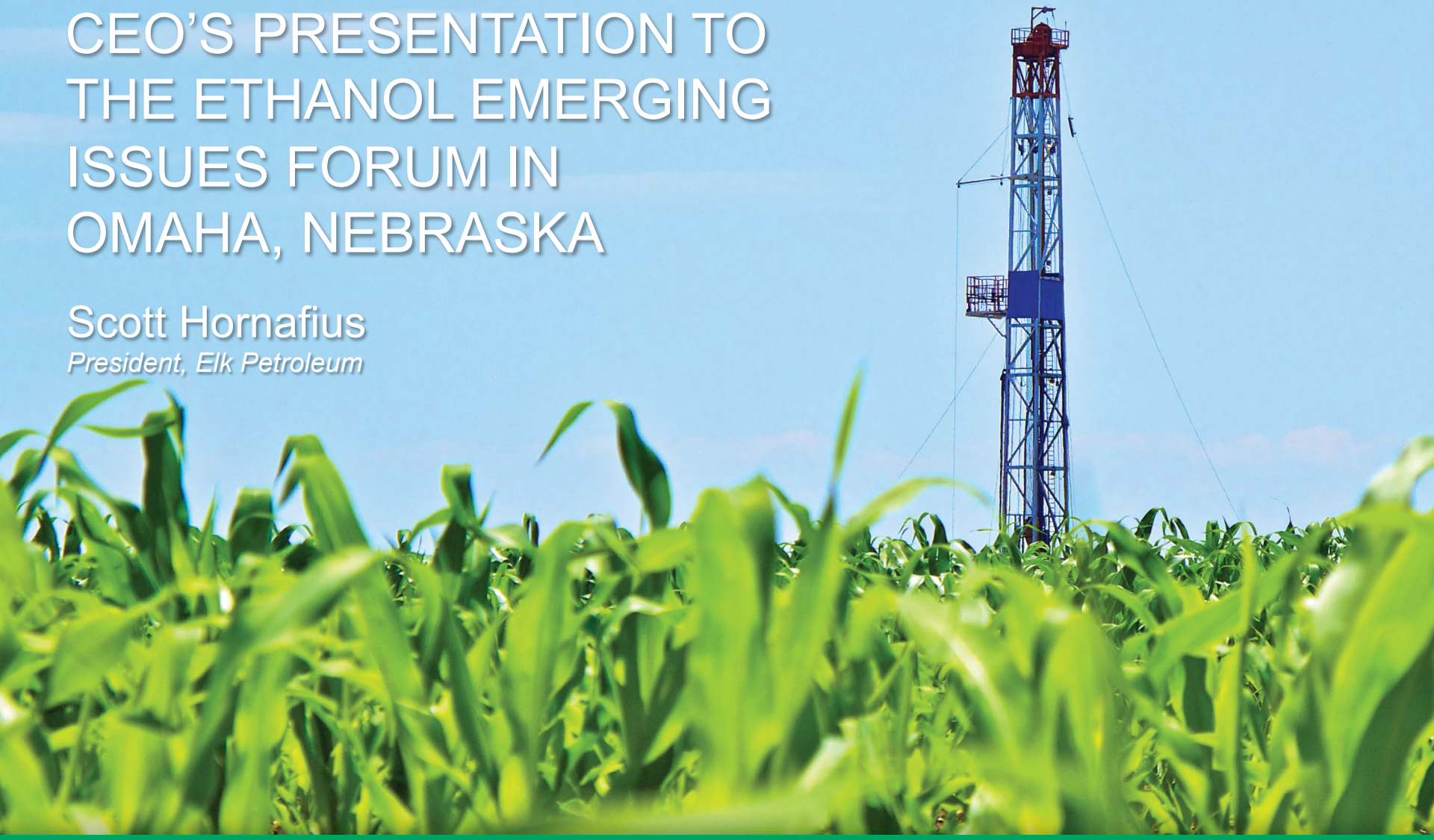
ELK PETROLEUM

CEO'S PRESENTATION TO THE ETHANOL EMERGING ISSUES FORUM IN OMAHA, NEBRASKA

Scott Hornafius
President, Elk Petroleum



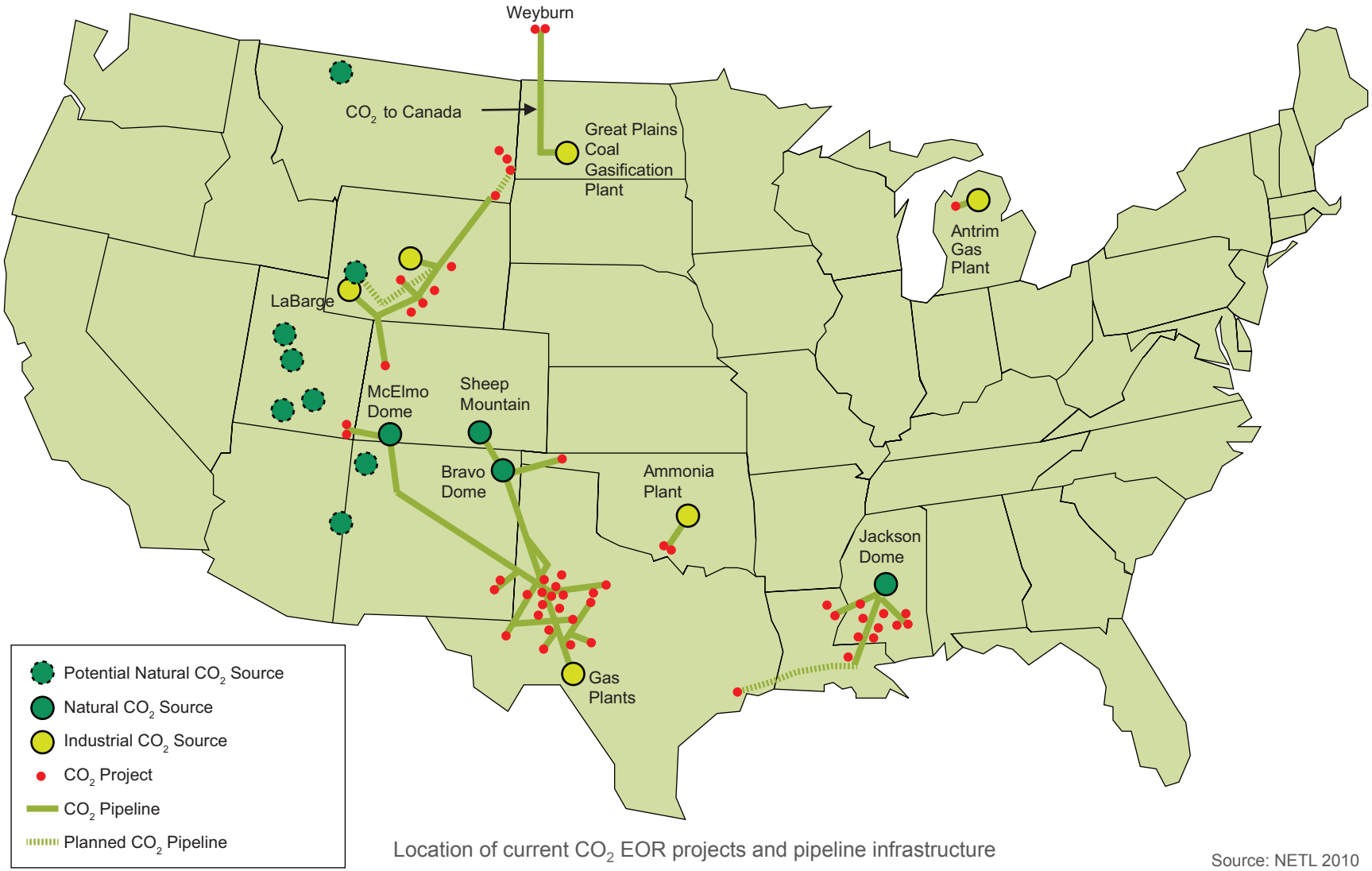
9 April 2014

CO_2 – EOR AND CORN ETHANOL

Presentation Outline

- CO_2-EOR in the United States
- CO_2 Sequestration and EOR
- Carbon Negative Oil
- Iowa to Wyoming CO_2 Pipeline Concept
- Carbon Value Chain
- California LCFS Credits
- Possible Ethanol – Oil Industry Partnerships

ESTABLISHED AND EXPANDING CO_2 INFRASTRUCTURE

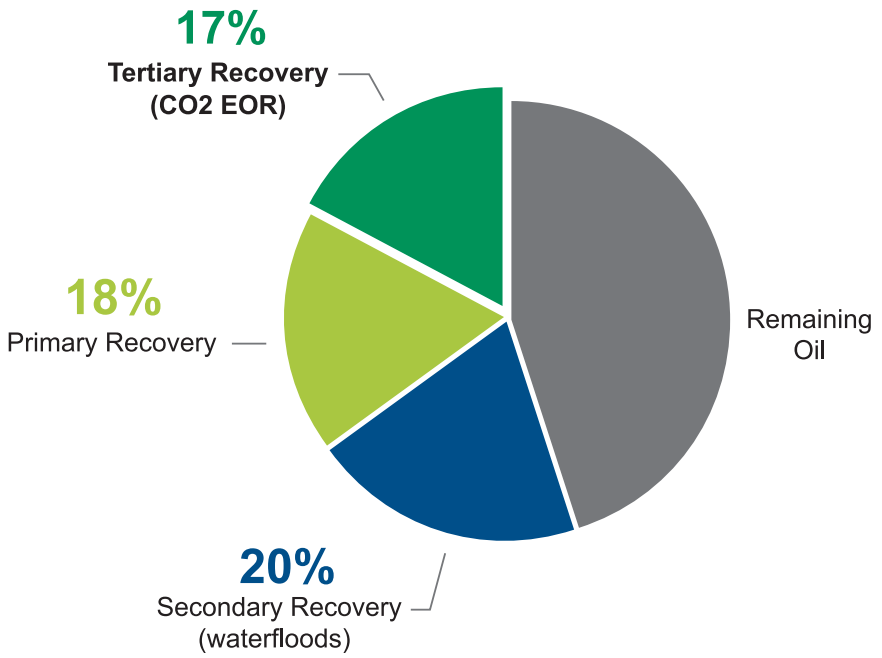


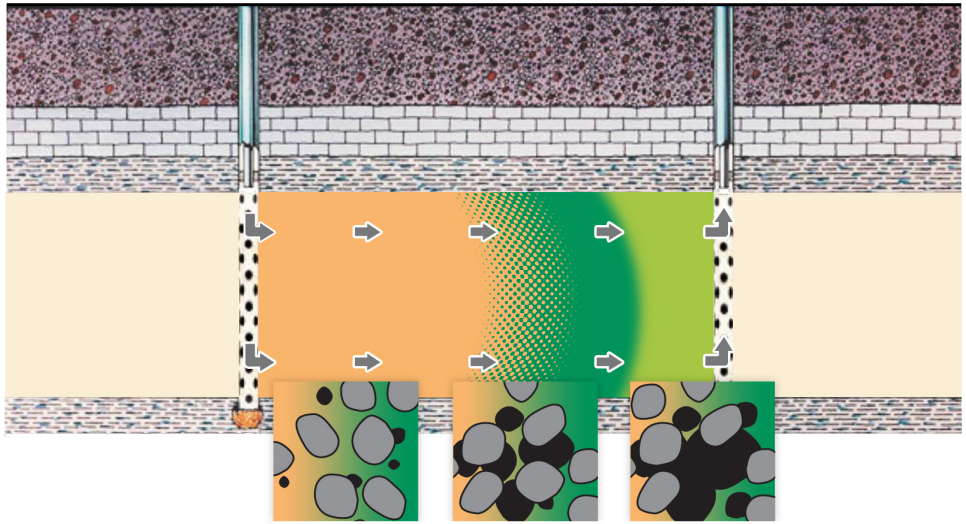
Location of current CO_2 EOR projects and pipeline infrastructure

Source: NETL 2010

WHAT IS CO_2 EOR

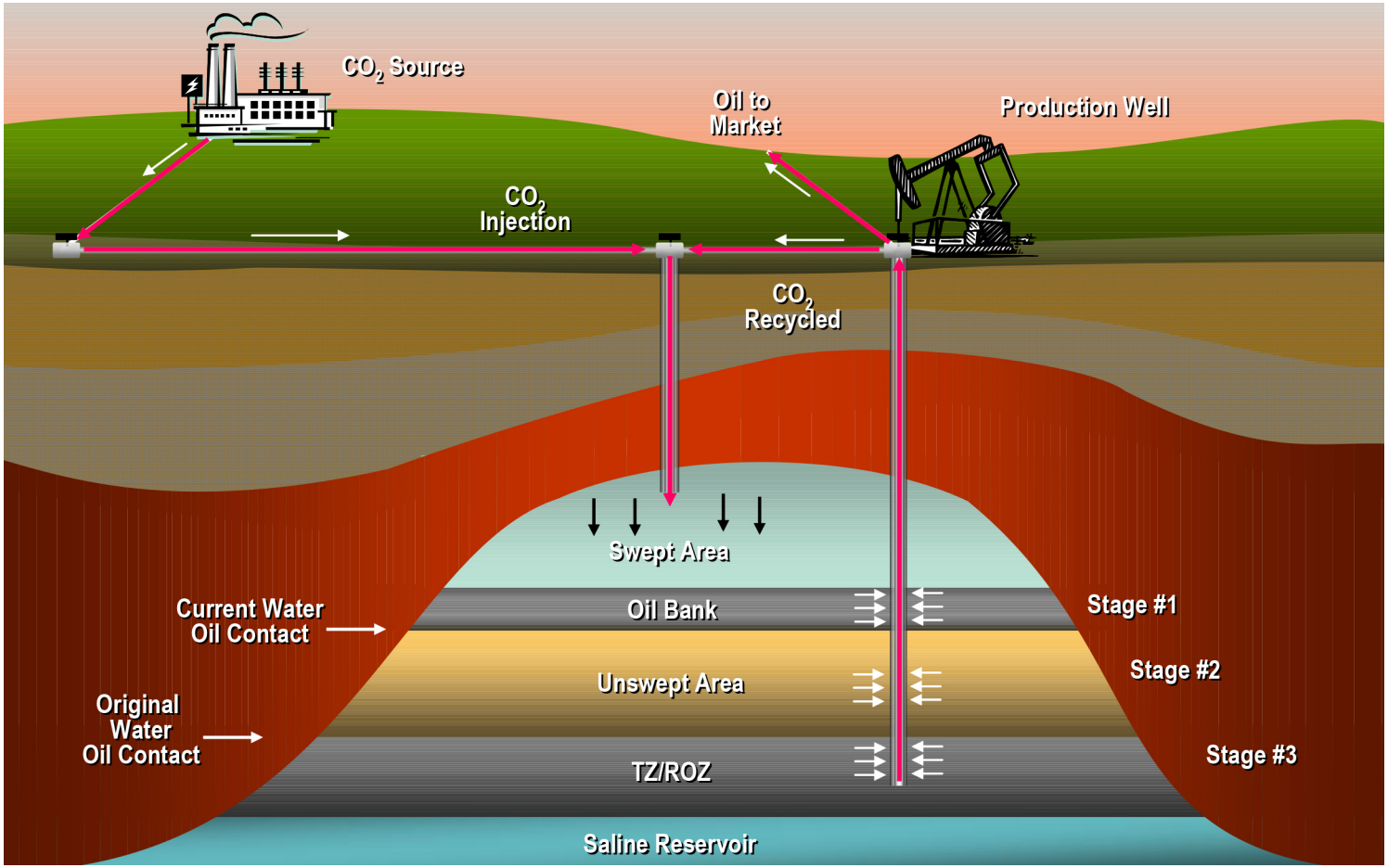
EOR (Enhanced Oil Recovery) delivers almost as much production as Primary and Secondary Recovery (1)





(1) Recovery of original oil in place based on history at Little Creek Field.

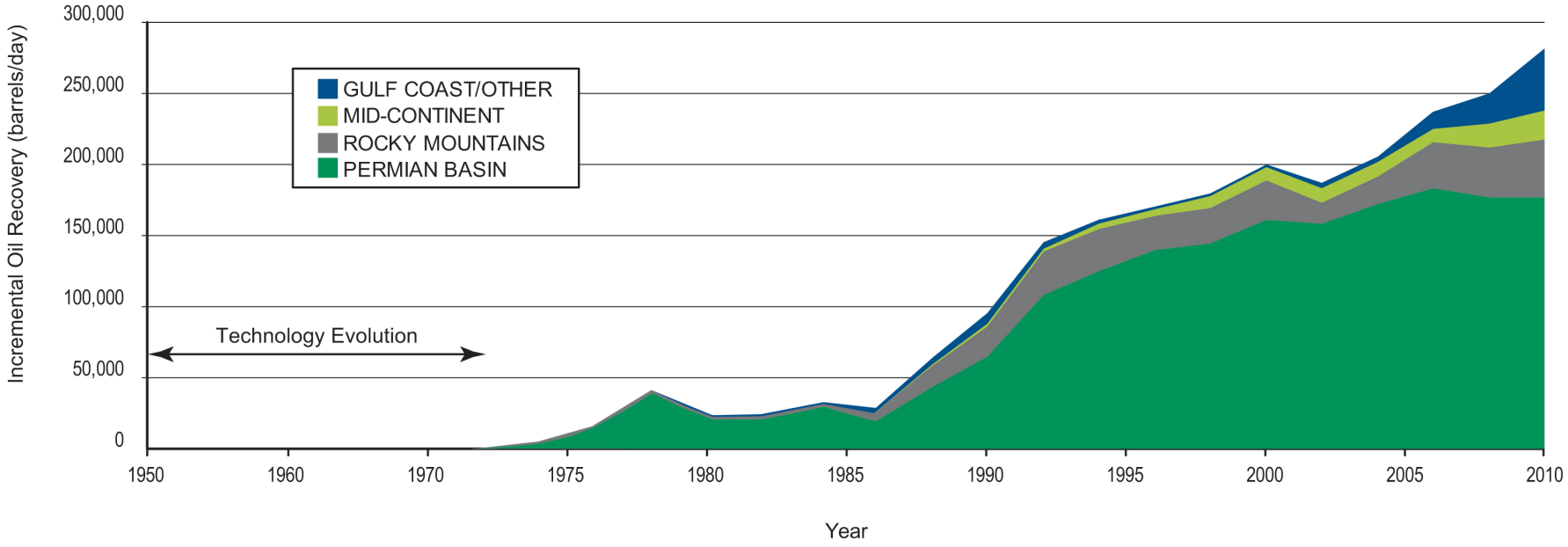
CARBON DIOXIDE ENHANCED OIL RECOVER (CO_2-EOR)



Source: Advanced Resources International

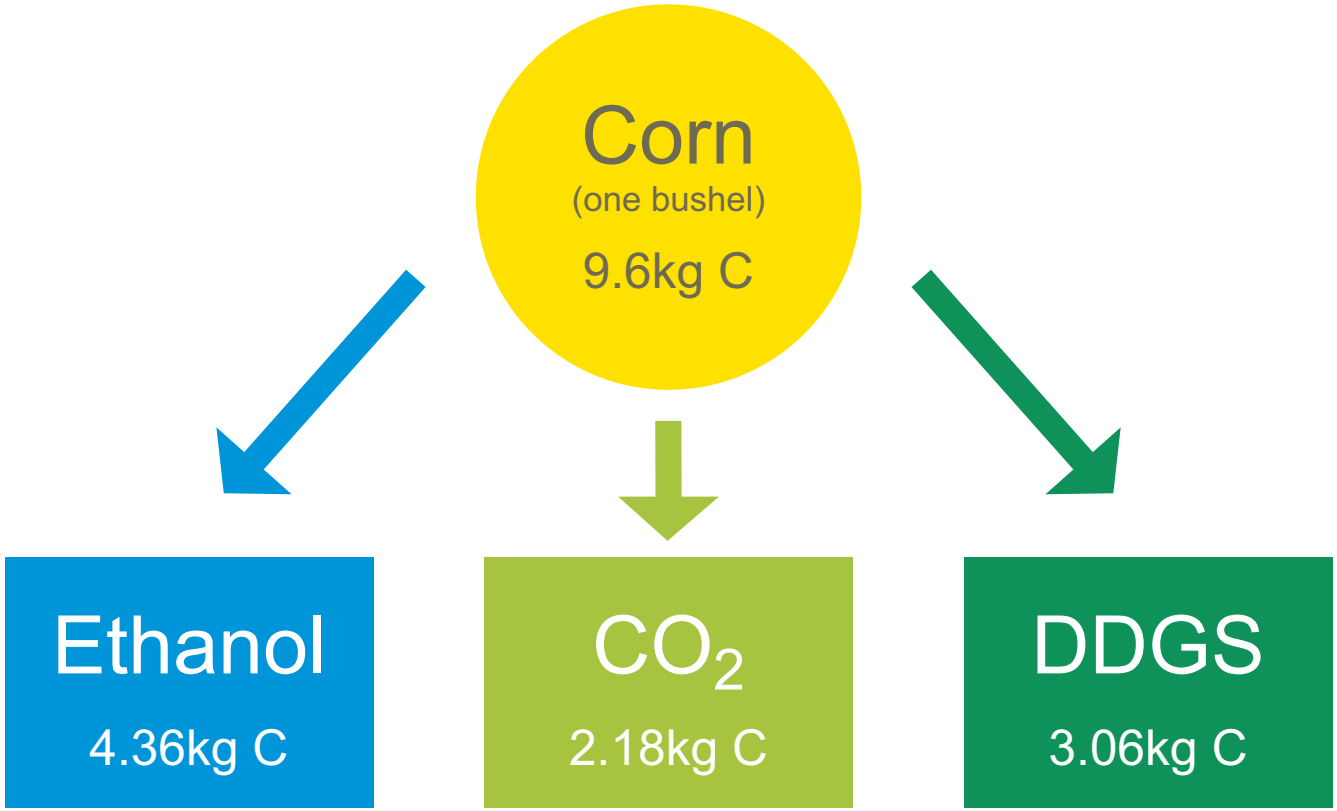
CO_2 EOR – PROVEN TECHNOLOGY

Growth of CO_2 EOR Production in the US.
A proven technology delivering growth in oil production and recovery.



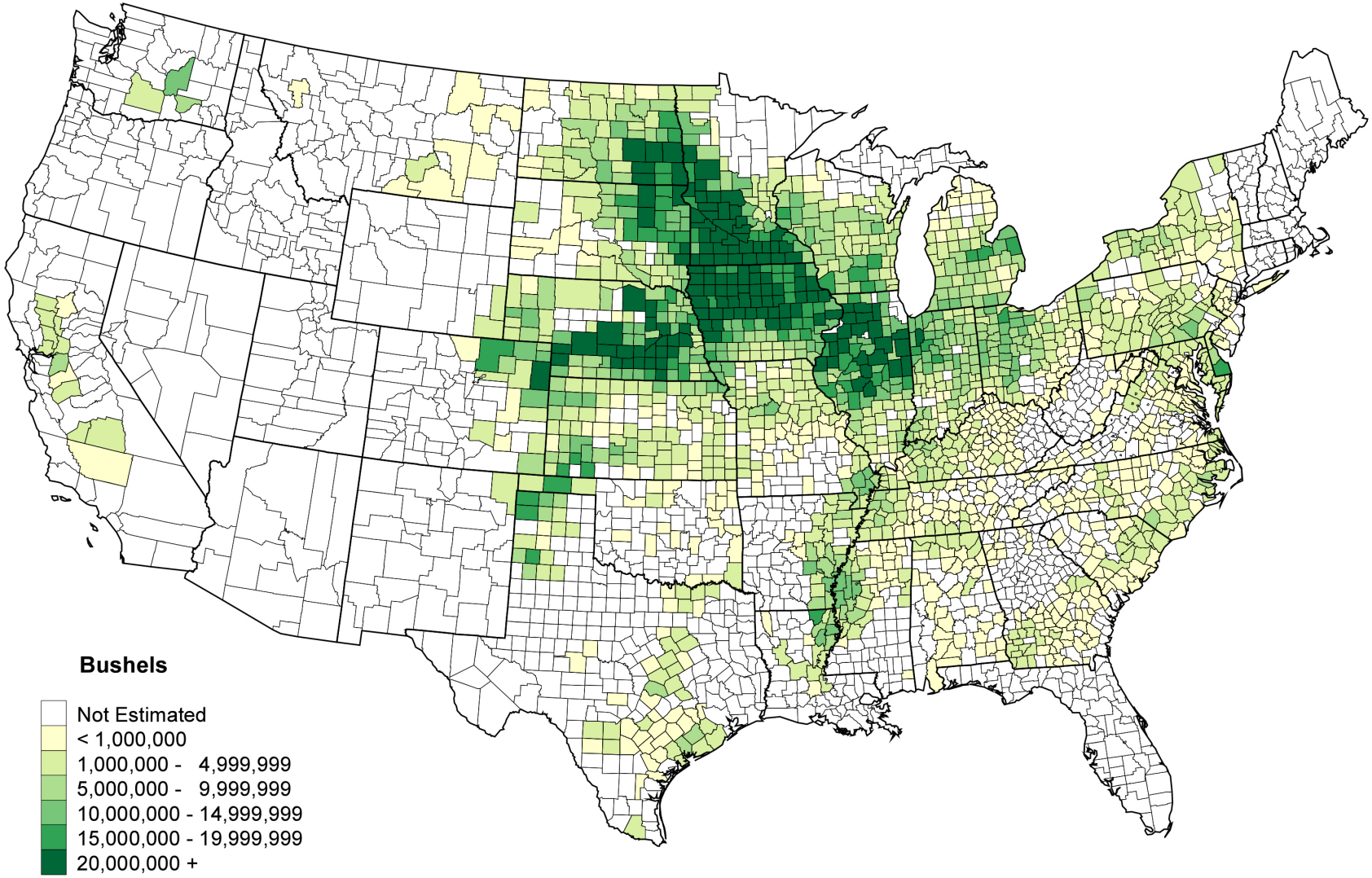
Source: Advanced Resources Int'l., based on Oil and Gas Journal, 2010.

CORN ETHANOL CO-PRODUCT CARBON CONTENT



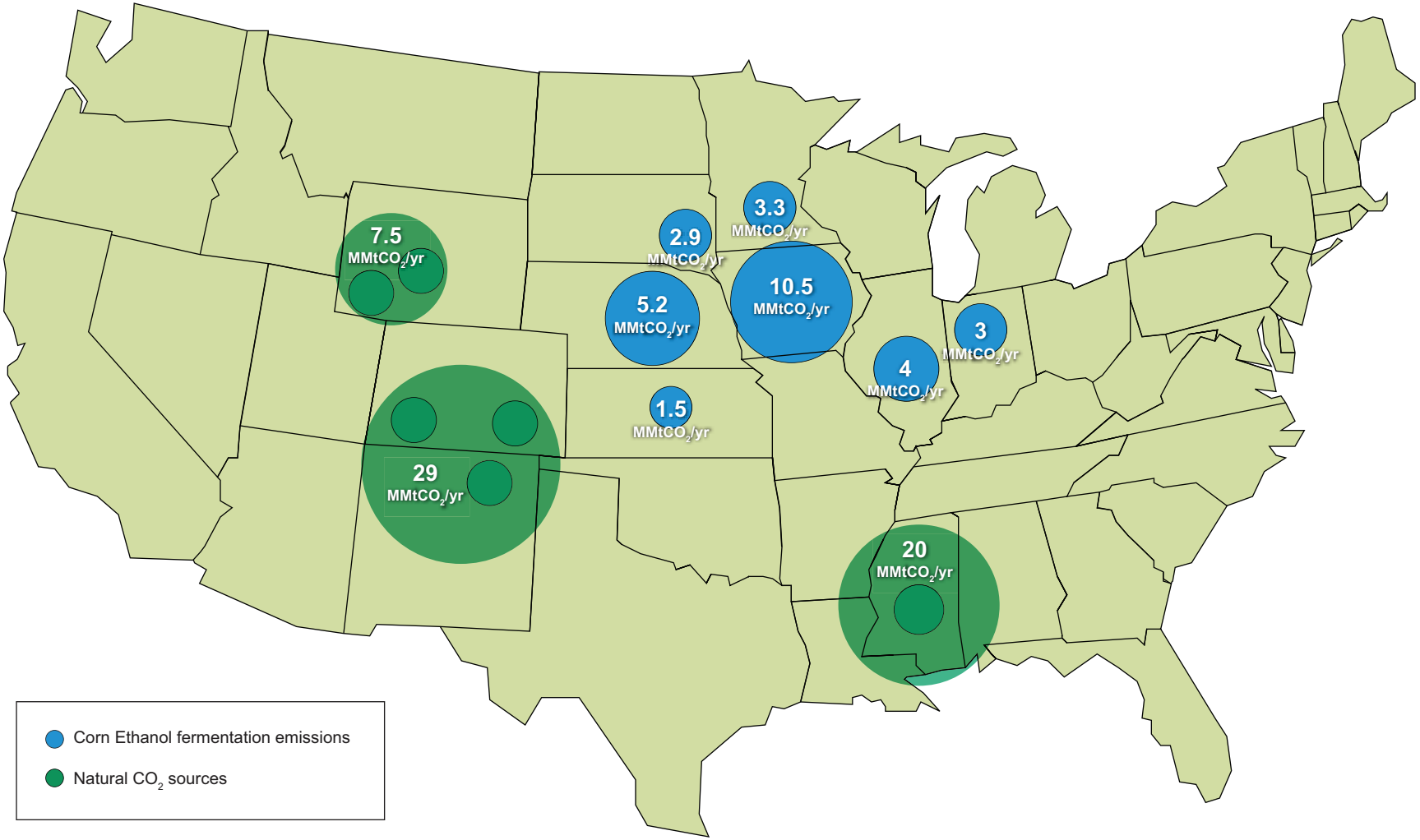
Source: Katherine Hornafius (2013)

CORN FOR GRAIN 2012 – Production by County in the United States



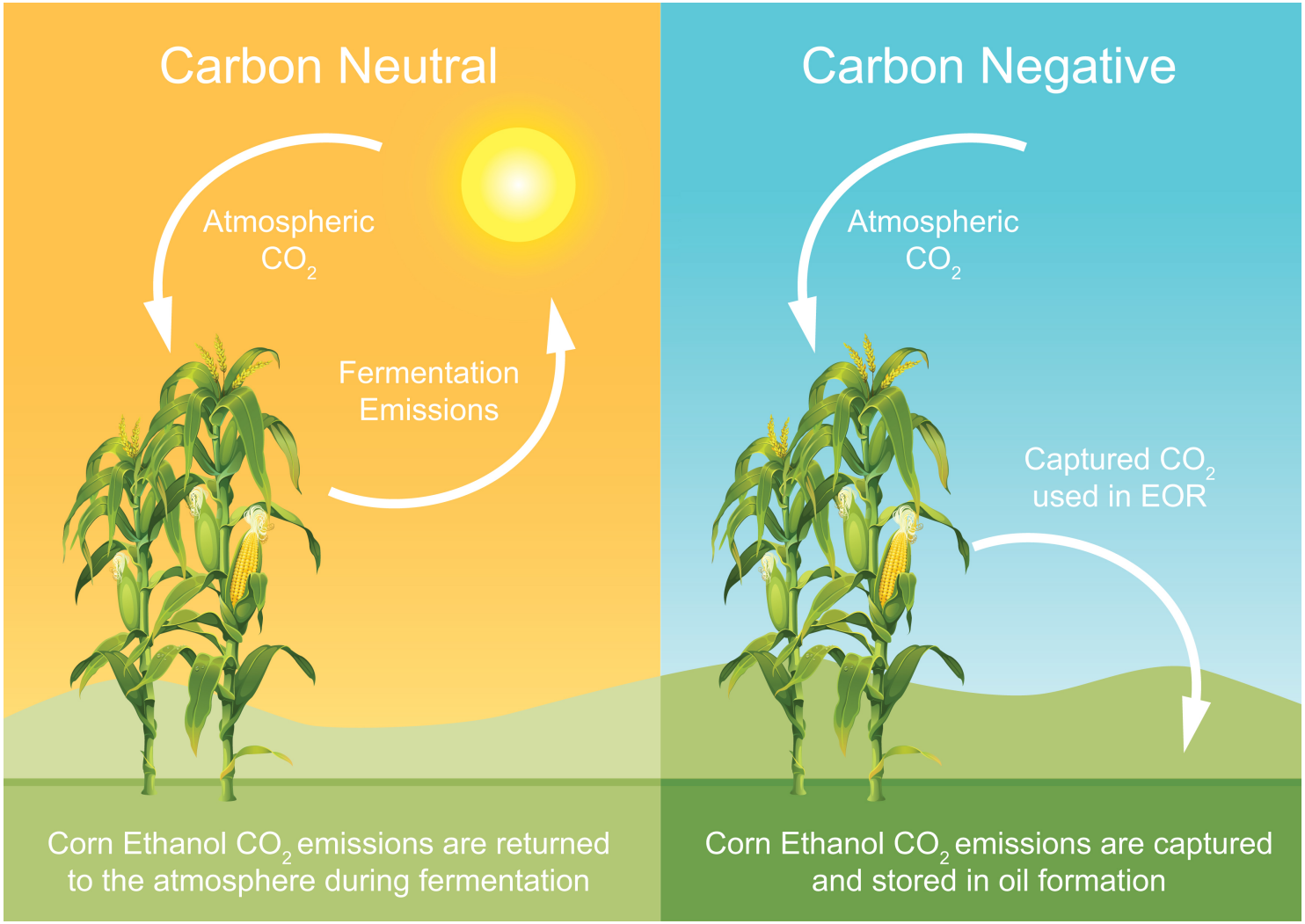
Source: US Department of Agriculture, National Agricultural Statistics Service

CO_2 SOURCES FOR CO_2-EOR



Sources: Katherine Hornafius (2014), EORI - NETL (2013)

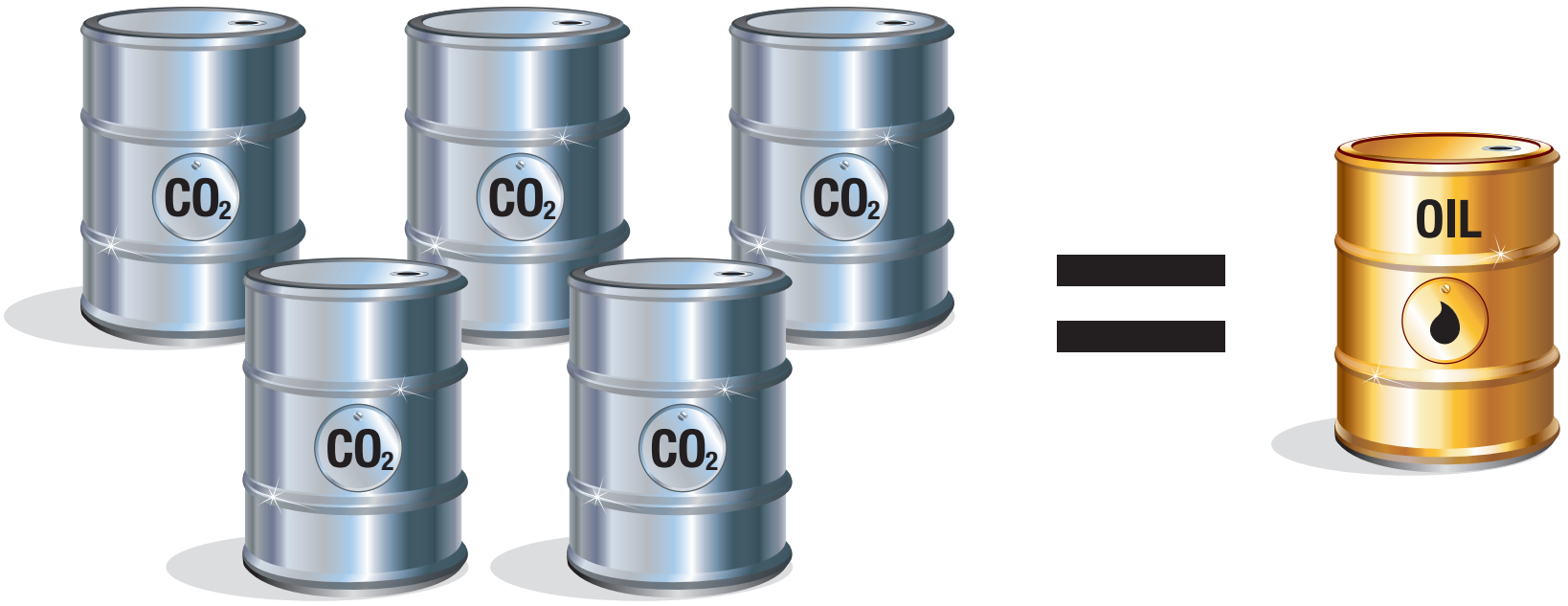
CORN ETHANOL CO_2 FERMENTATION EMISSIONS PATHWAYS



Source: Katherine Hornafius (2013)

CARBON NEGATIVE OIL

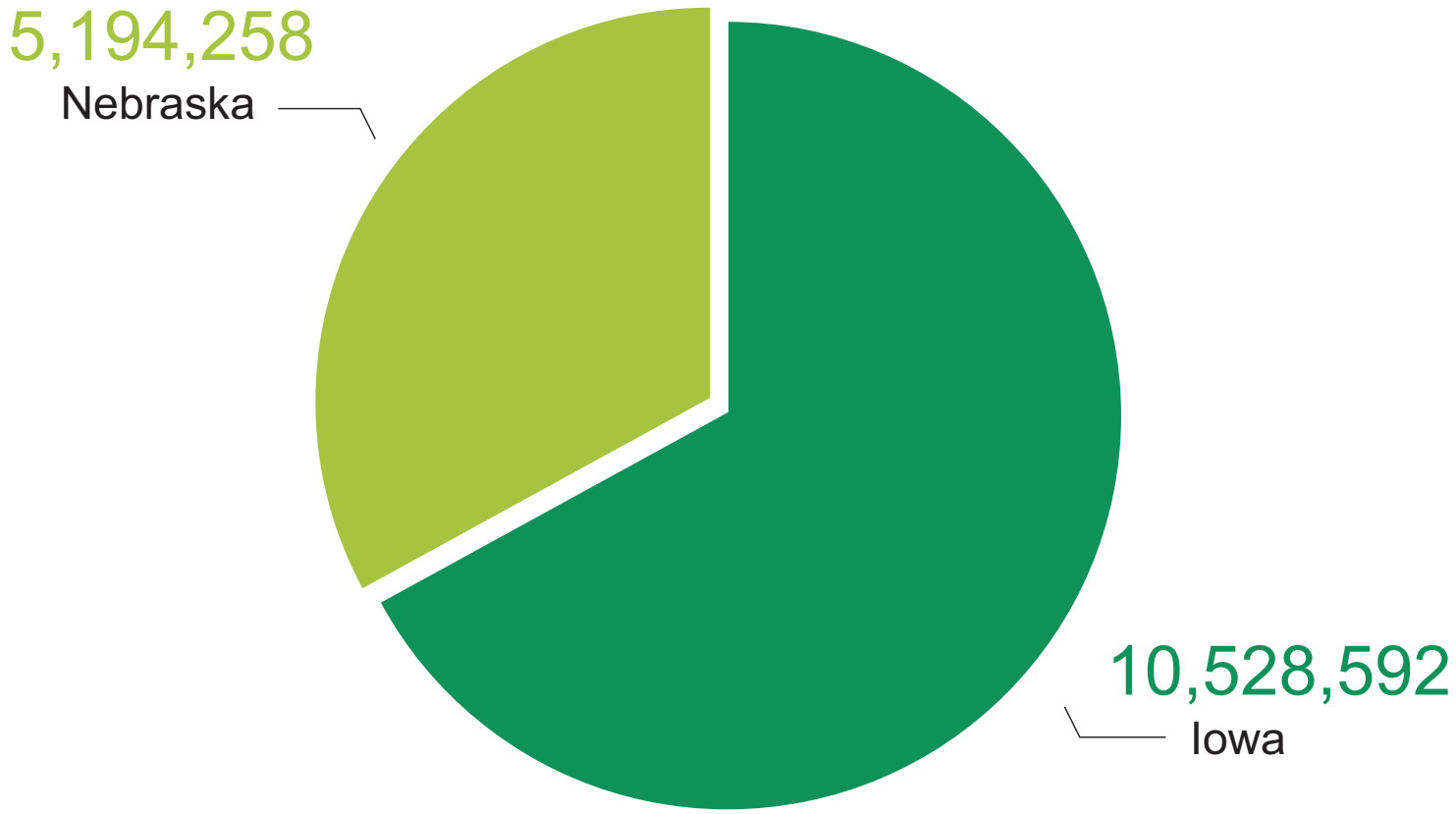
- 4 to 6 barrels of CO_2 produces one barrel of oil in a CO_2-EOR project.
- Burning one barrel of oil creates less CO_2 than is sequestered.



Source: Katherine Hornafius (2013)

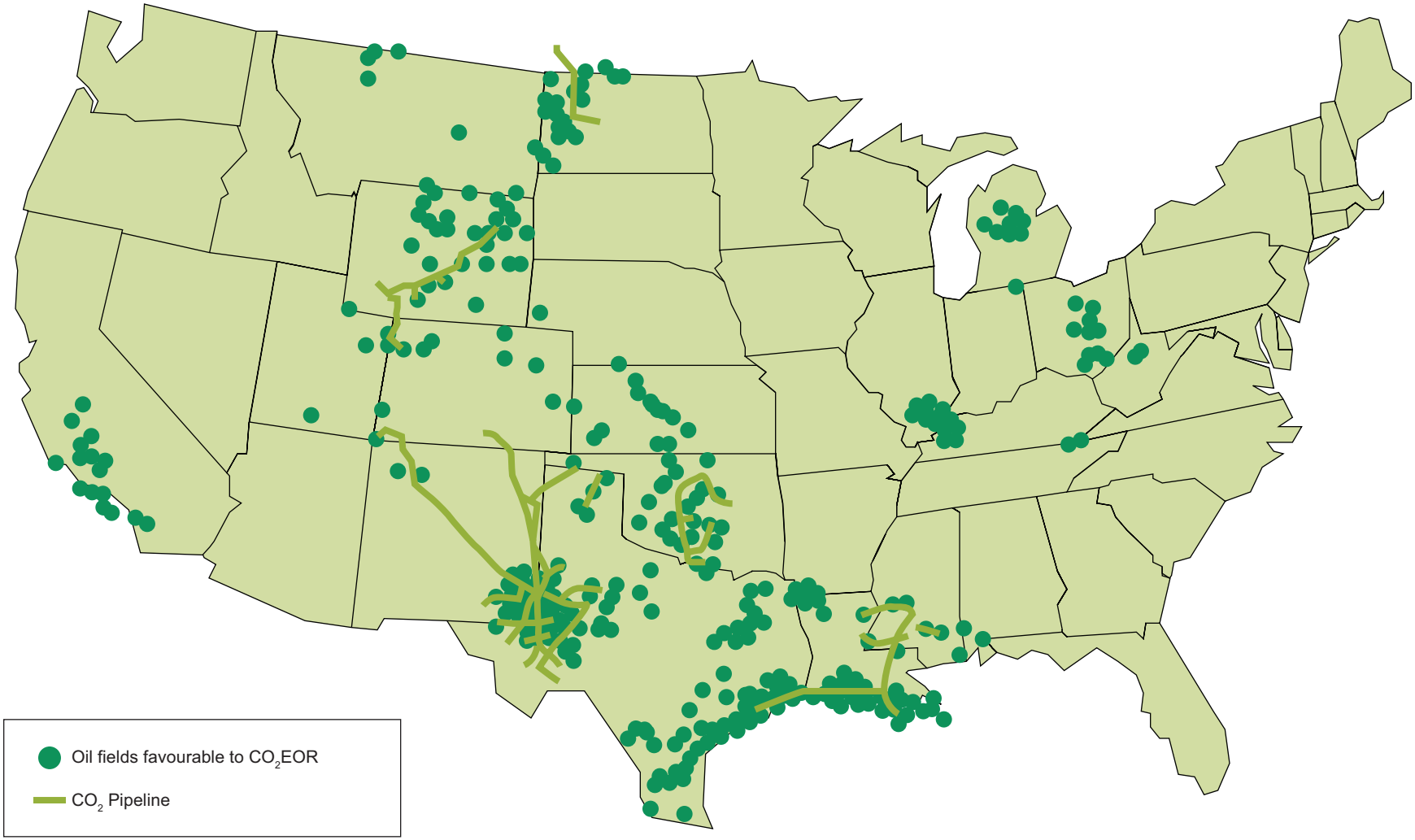
CO_2 FERMENTATION EMISSIONS

Annual CO_2 Fermentation Emissions for Iowa and Nebraska Ethanol Plants in $MtCO_2$/year

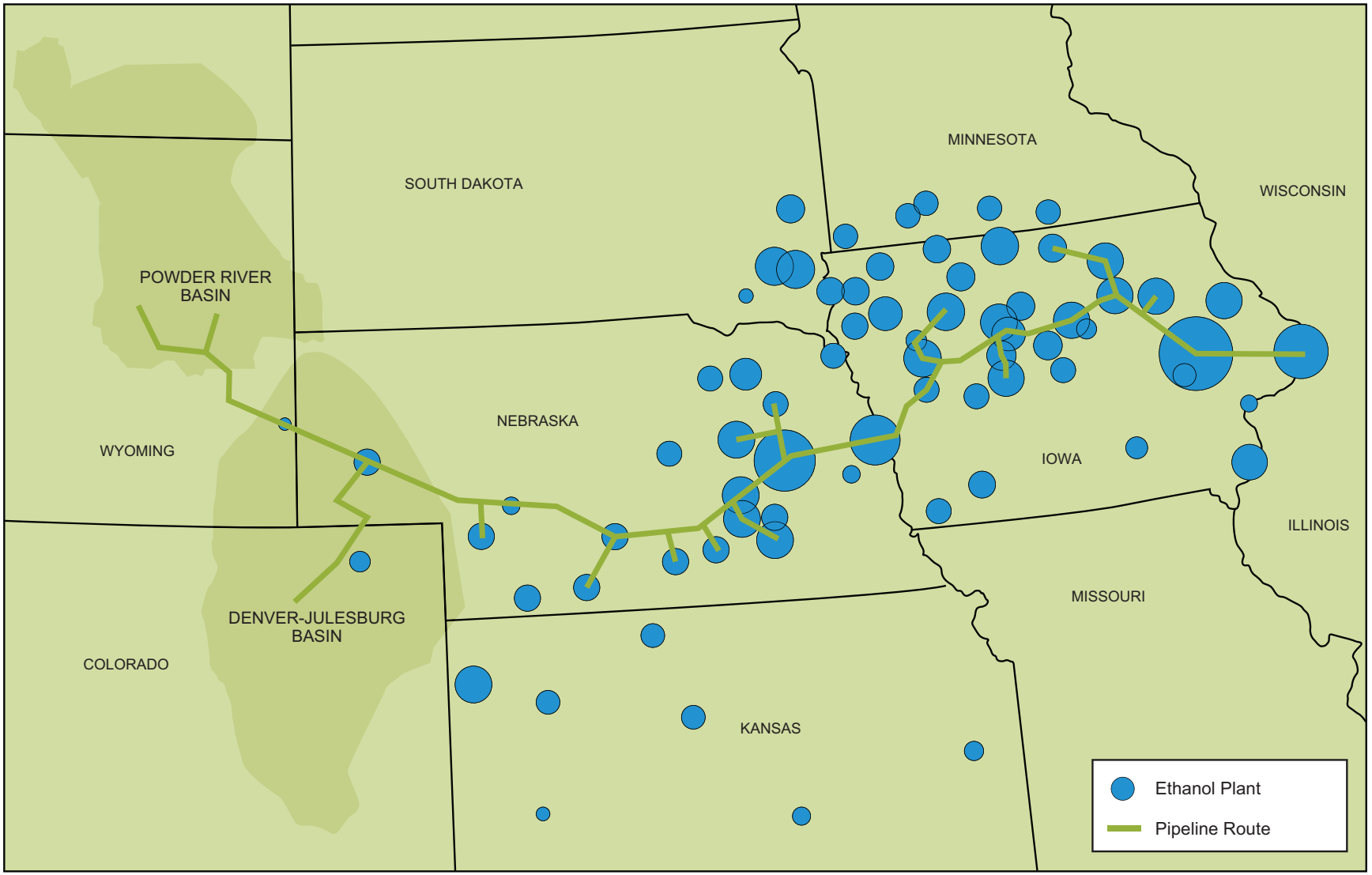


Source: Katherine Hornafius (2013)

CURRENT CO_2 PIPELINE INFRASTRUCTURE & OIL FIELDS FAVOURABE TO CO_2-EOR



POSSIBLE CO_2 PIPELINE– Relative Ethanol Plant Capacities



CO_2 PIPELINE CONSTRUCTION

- $1+ million/mile
- One year to construct
- 50 year life

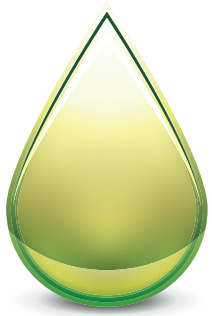
Source: Global CCS Institute

CARBON VALUE CHAIN

Ethanol

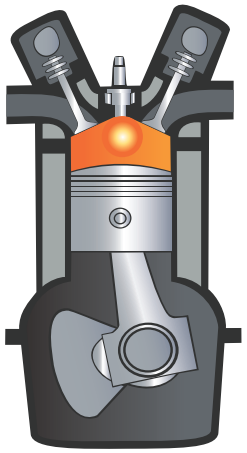
Carbon Capture

EOR



Storage

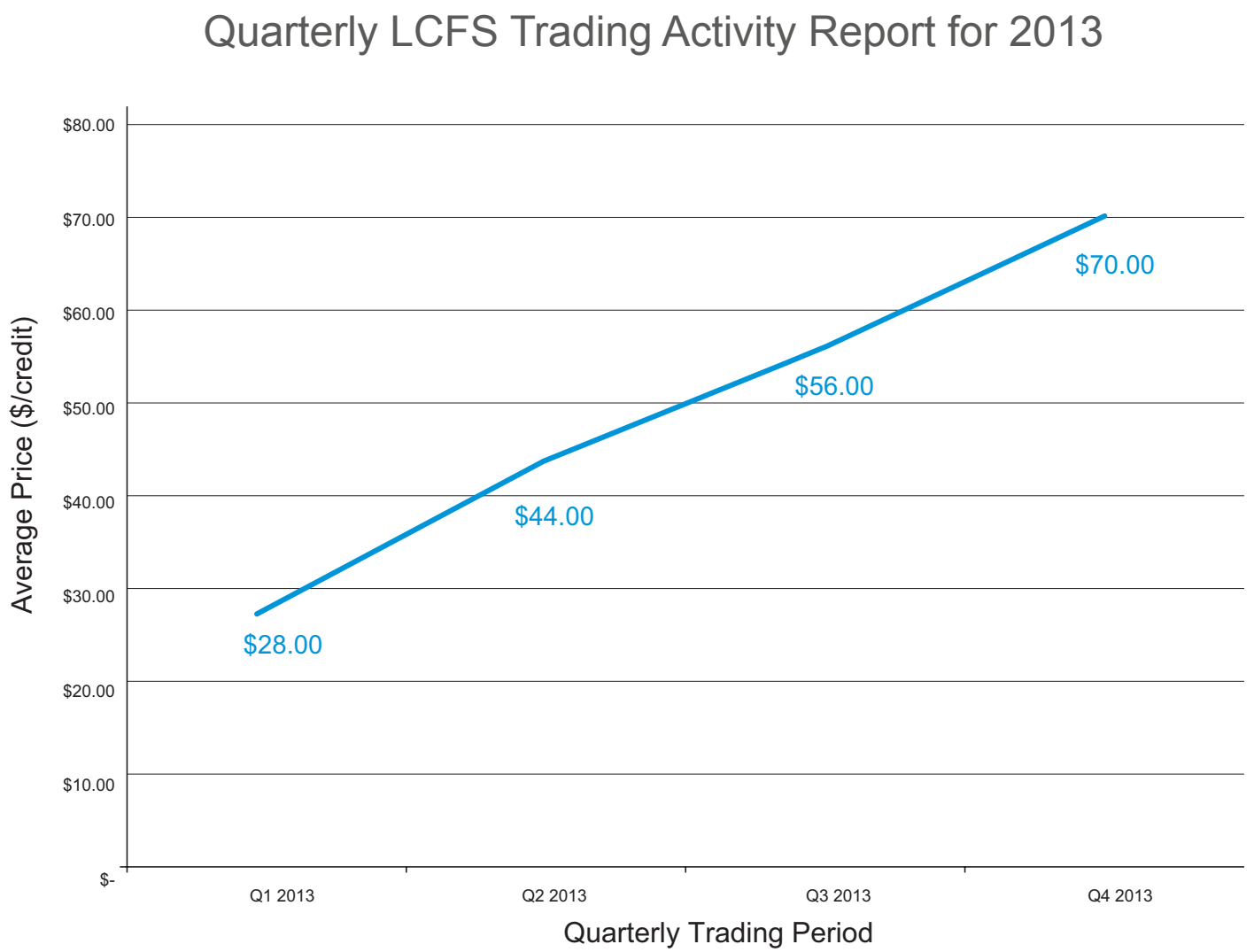
LCFS



Utilization

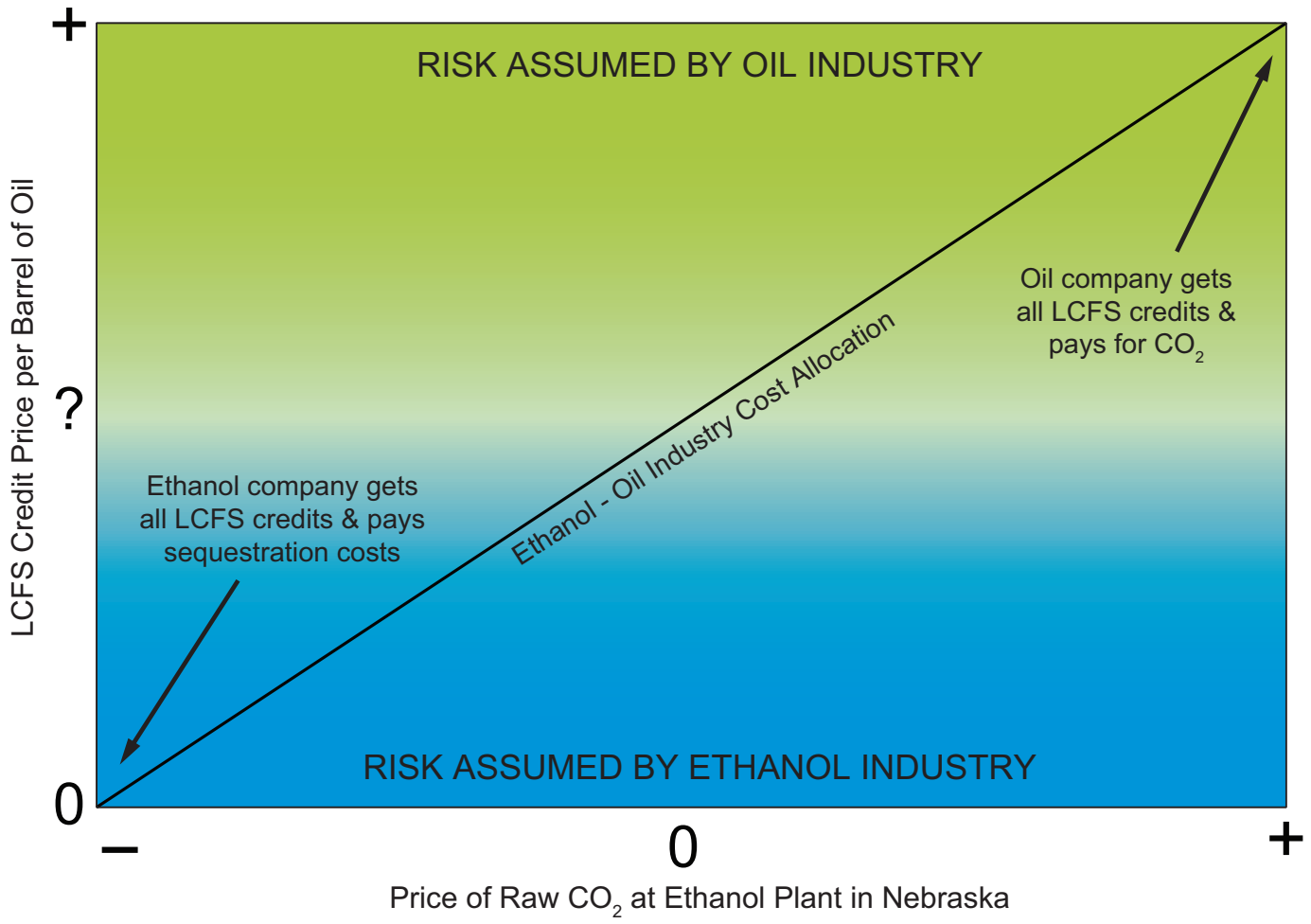
Source: Katherine Hornafius (2014)

CALIFORNIA LCFS CREDIT PRICE



INDUSTRY RISK ASSESSMENT

Nebraska Corn Ethanol CO2 Price for EOR vs. California LCFS Credit Price



CO_2 – EOR AND CORN ETHANOL

Conclusions

- Produces carbon negative oil, or reduces ethanol carbon intensity
- Potential additional revenue to ethanol producers from CO_2 sales, or additional carbon credits for ethanol
- Potentially helps achieve California's LCFS emission reduction goals