

CCSU & a Commercial Value Chain



BEST+

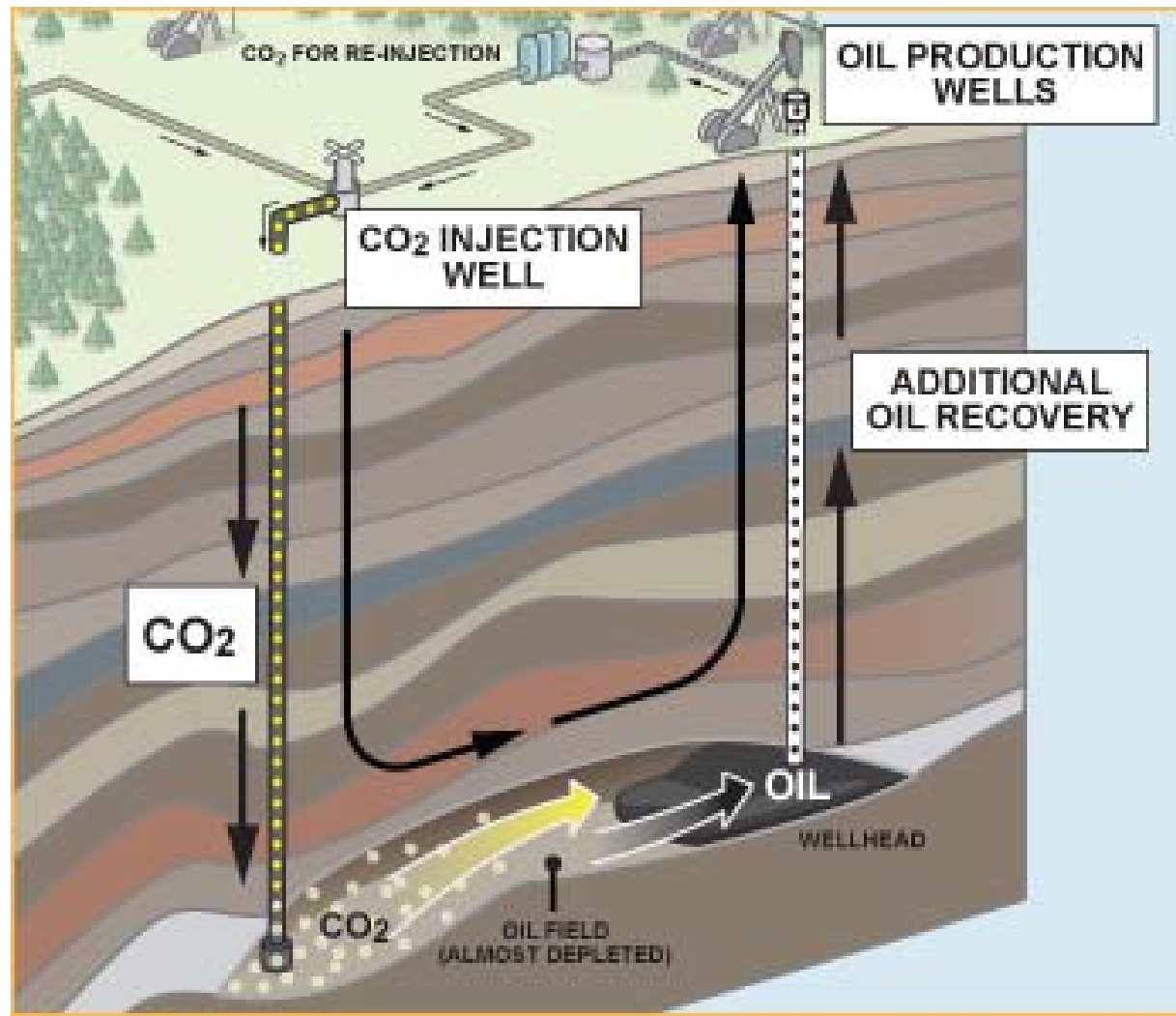
BELLONA
ENVIRONMENTAL
CCS
TEAM



- Can CCS be Profitable in Ukraine?
- What CO₂ Sources ?
- Is Enhanced Oil Recovery suitable in Ukraine?
- How much oil can be recovered ?
- Are there other opportunities ?

What is CO₂ EOR

	State of EOR Globally
CO₂ EOR Projects	130 +
Location	USA Canadian Hungary Turkey
CO₂ Source	75% Natural CO ₂
	25% Anthropogenic CO ₂



CO₂ EOR From Anthropogenic Sources

Great Plains Synfuels Plant



2 mT pre/a

334 km



Weyburn EOR Project



Koch Nitrogen Enid Fertilizer plant



680,000 Tonnes per/a

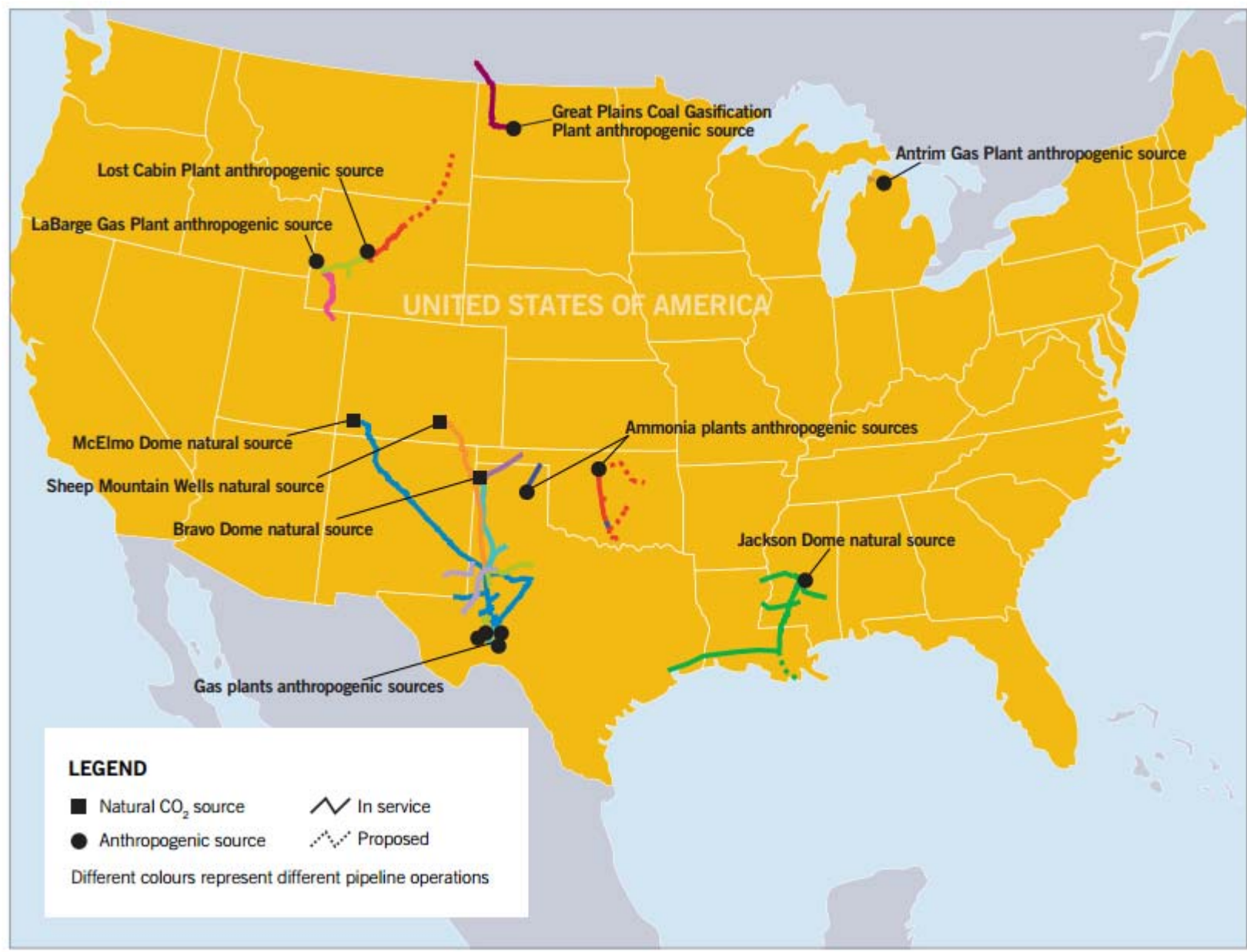
225 km



Golden Trend Field EOR



CO₂ EOR Projects in North America





Ammonia Production

- 4.2 million tonnes per year
- 8 producers
- World class producer
- Largest Ammonia pipeline



Ethanol & Biogas Production

- Growing Industry
- Many underutilised Alcohol plants
- Attracting Investment
- Large Potential
- Sustainable ?

Potential for EOR in Ukrainian



- Low average recovery rates
- Mature fields
- Complex oil charge/trapping mechanisms
- Complex and poorly imaged structural geology
- Relatively deep



- Industry
 - Pipeline construction
 - Control equipment
 - Project management
 - Expertise building
 - Growing CO₂ handling and transport market
 - New Revenue streams



Why CO₂ EOR



Actors	Driving Forces
State	Increased ultimate oil recovery
	Increase of energy security
	Builds CO ₂ storage business
	Provide a market for Ukrainian goods – manufacturing
	Increased oil production will result in large tax benefit
Oil & Gas Operators	Increased & continued return from existing capital investment
	Delayed decommissioning costs
	Predictable and reliable resource delivery (once CO ₂ injection established)
CCS Industry	Operational experience
	Value chain and infrastructure building
	Cross industry knowledge sharing
	Detailed storage characterisation



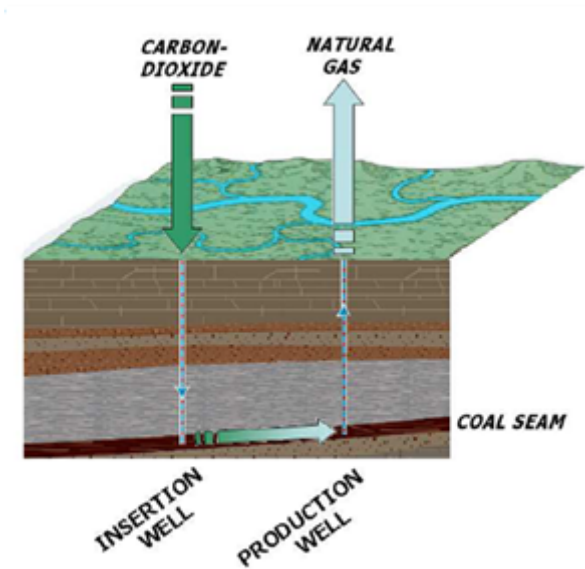
- Why CO₂ EOR ?
 - All parties gain from perusing the technology
- What CO₂ Source ?
 - Ammonia production offers a good first step (but others available)
- How much will capture and transport cost ?
 - Affordable CO₂ is available
- How much oil can be recovered ?
 - Dependent on reservoir conditions

Other Commercial opportunities for CO₂



Enhanced Coal Bed Methane Recovery

- CO₂ Recovers Methane efficiently



Enhanced Geothermal Systems

- CO₂ as working fluid
- High efficiency
- Permanent CO₂ Storage

