Economic Analysis of Potential for CCUS in the Gulf of Mexico

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Summary

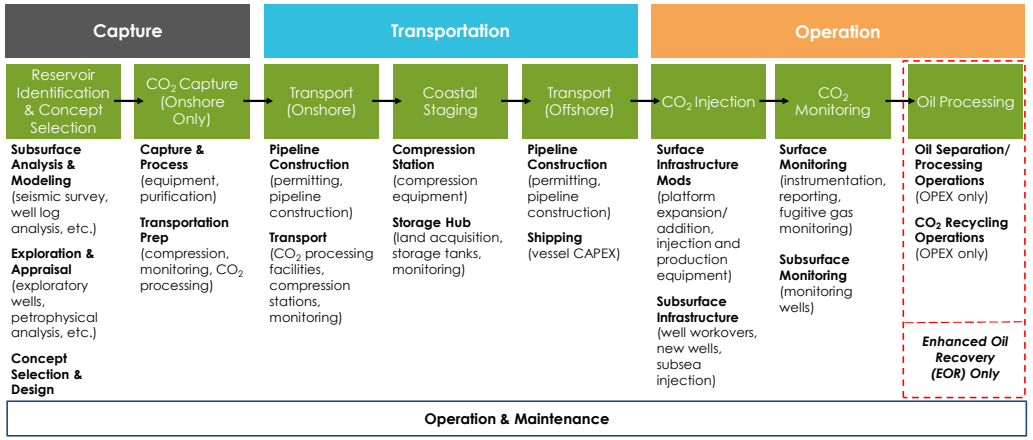
Offshore CCUS economic viability requires a favorable market environment, including	
Storage – tax credits of $75/tonne of CO_2, storing 2 million tonnes CO_2/year, 30% reduction in capture technology costs	***EOR*** – oil prices > $90/bbl, capture sites within 25 miles of coast or CO_2 pipeline, deep water fields within 100 miles of shore, reserves > 40 million bbls
Roadblocks extend beyond economics for CCUS supply chain	
Storage – lack of federal offshore regulations detailing safety & environmental requirements, timing is aggressive to qualify for incentives	***EOR*** – uncertainty of field performance limits operator willingness to commit to long-term partnerships
Start with Brownfields utilizing existing knowledge of fields and estimated financials	
Storage – ability to leverage existing infrastructure, reduces exploration & development costs	***EOR*** – brownfield financials on par with greenfield, but greenfield bears significantly more risk

Offshore CCUS Success

Supply chain – optimized, and incentives aligned
Infrastructure scaling – integrated transportation networks
CO_2 supply pooling – storage hubs to reduce supply uncertainty
Cost reduction – improved capture technology efficiency
Incentive matching – clear regulatory definitions & benefits provided throughout supply chain

Supply Chain for Offshore CCUS

Biggest supply chain costs - CO_2 capture through operations



Recommendations

Explore solutions promoting an ecosystem for offshore CCUS growth

Integrated infrastructure – reduce capital costs for projects and provide EOR/storage operators with a "pay as you go" service using a toll-based offshore transportation network

Supply pooling – reduce the risk of offtake for capture operators and risk of long-term contracts to EOR/storage operators with a metered storage hub system

Complementary incentives – align goals and drive collaboration between capture operators and EOR/storage operators by designing a supply chain incentive program that targets pain points of the individual stakeholders

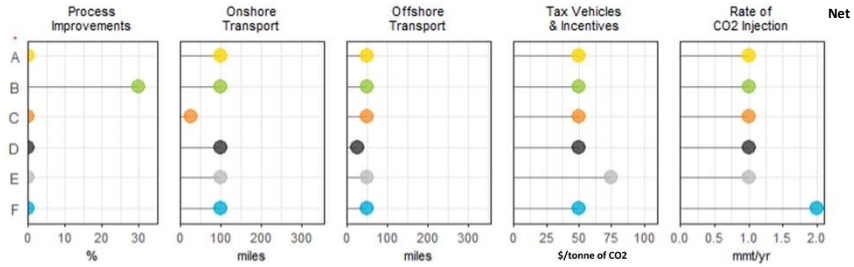
Flexible storage – allow EOR/storage operators flexibility to transfer between permitted EOR to storage operations depending on how a field responds to CO_2 injection

Defining regulations – develop monitoring and liability regulations for federal waters that allow storage programs for power and industrial sources and provide the ability of EOR/storage operators to assess the risk

Most Economic Supply Chain Model Results

Changing one variable and holding others constant - Ceteris Paribus

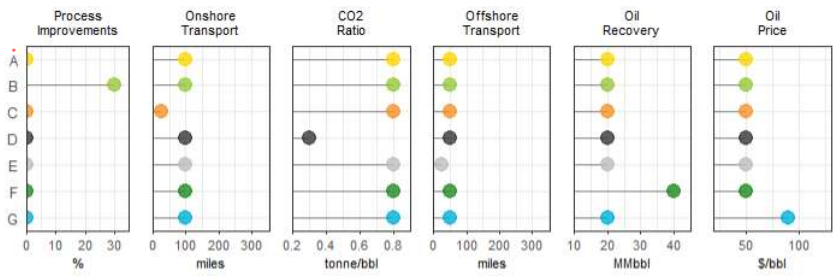
Brownfield – State Shallow Water CO_2 Storage Sensitivity



Brownfield storage – leverages existing infrastructure & data resources to offset supply chain costs

- Increased **Rate of CO_2 Injection** has the most significant impact on **Net Present Value**

Greenfield – Federal Shallow Water EOR Sensitivity



Greenfield EOR – economical viability is reliant on combinations of market factors

- Increased **Oil Price** has the most significant impact on **Net Present Value**
- Increased **Oil Recovery** over life of project has the most significant impact on **Cost per Barrel**

*"A" is the base-case scenario

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