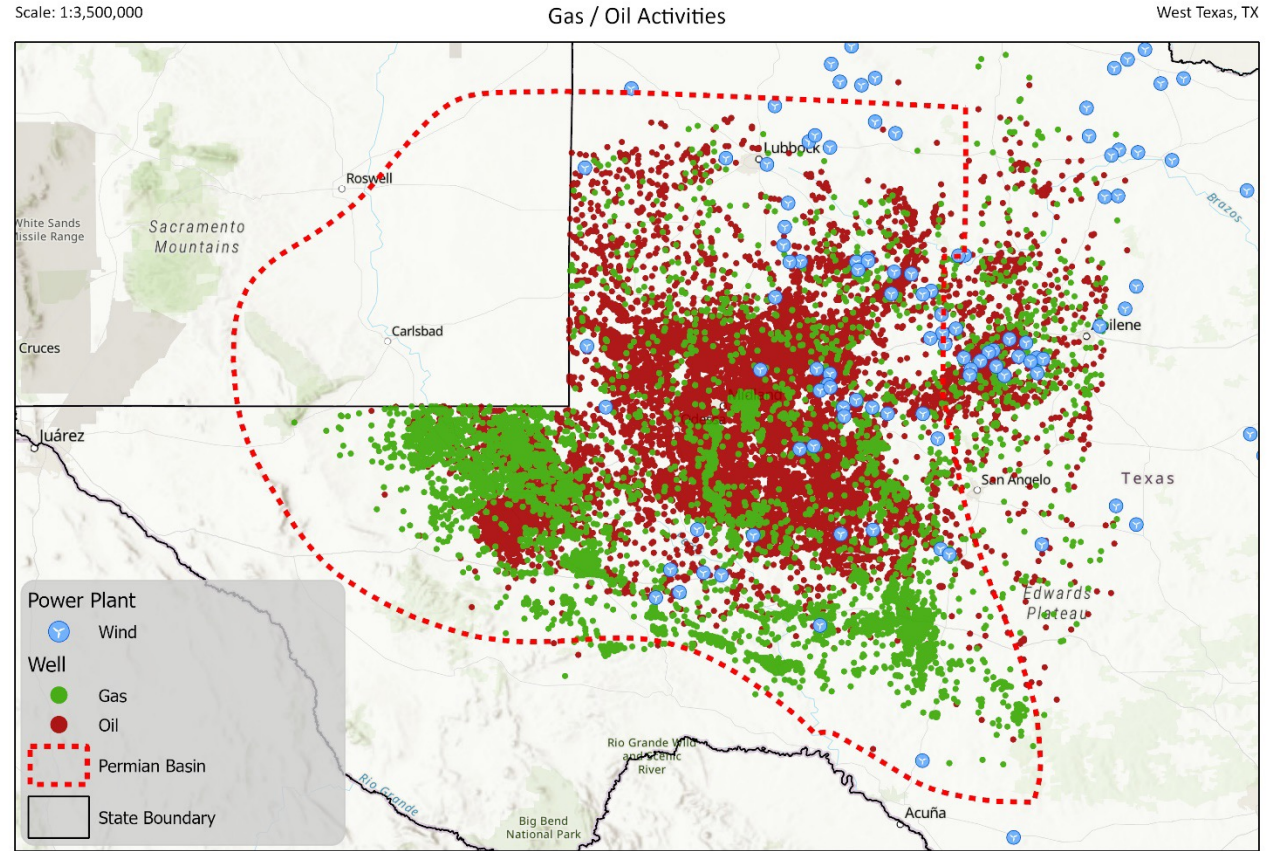
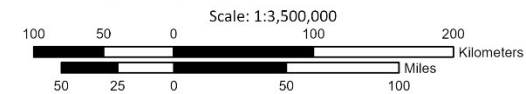


# Leveraging Permian Basin Assets for the Emerging Clean Hydrogen Energy Economy in Texas

- Hydrogen energy is viewed as a key component of the world's future lower-carbon energy
- Hydrogen can be sourced from many common and domestic feedstocks, including natural gas, wind, and solar power
- This project focuses on the Permian Basin with its abundant natural gas and wind power resources and explores pathways to leverage both industries and turn their current challenges into future opportunities via clean hydrogen energy



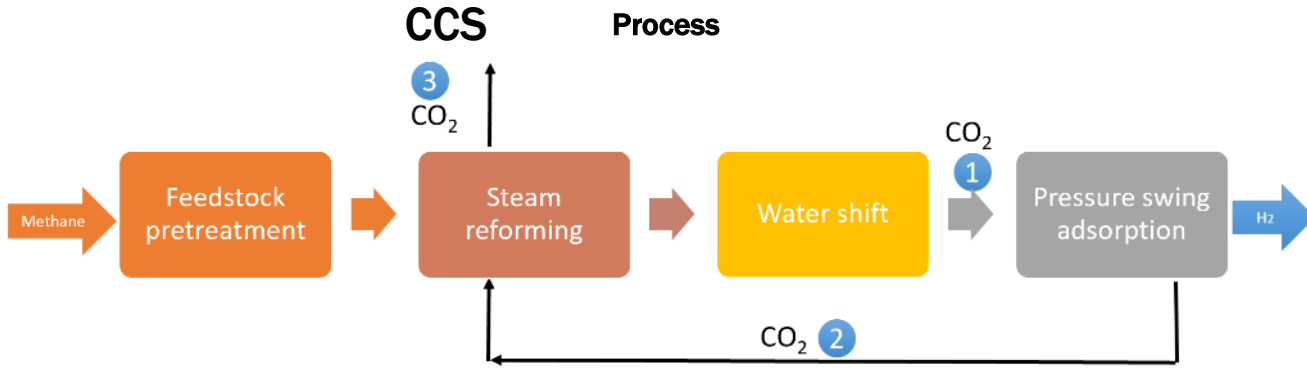
BUREAU OF ECONOMIC GEOLOGY  
Prepared by: Tony Santos  
Date: 3/22/2023  
PRODUCTION NOTES  
Data provided by: BEG, IRS, EIA, NREL  
Basemap provided by: Esri, FAO, NOAA, USGS,  
Texas Parks & Wildlife, CONANP, HERE, Garmin, EPA, NPS



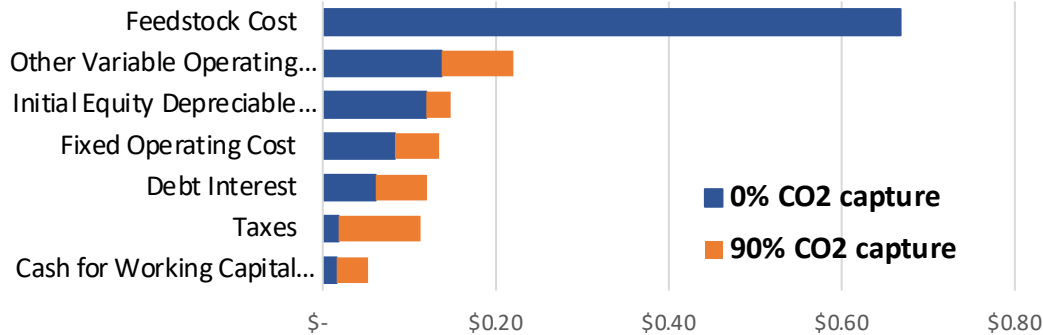
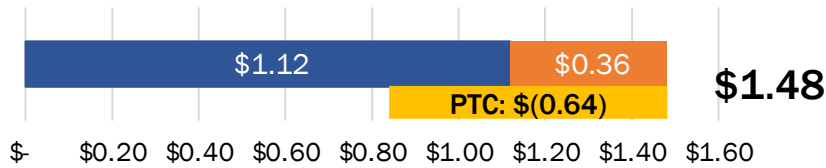
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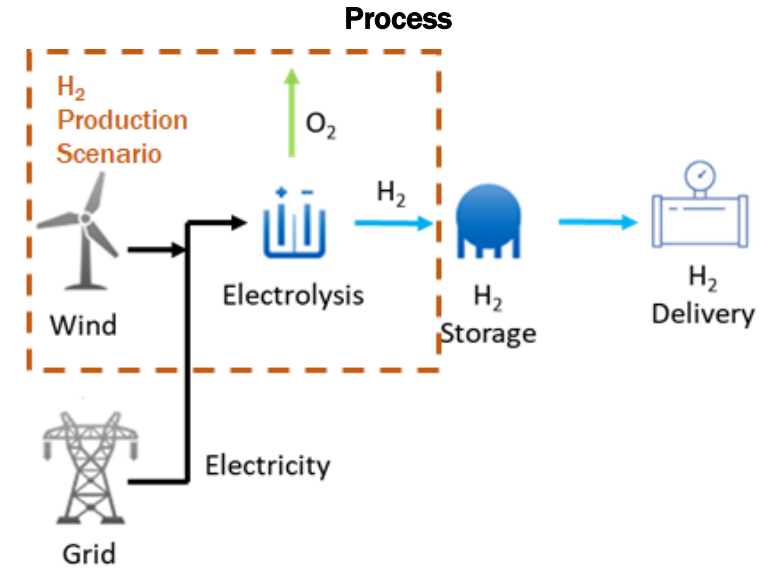
# Blue Hydrogen Overview



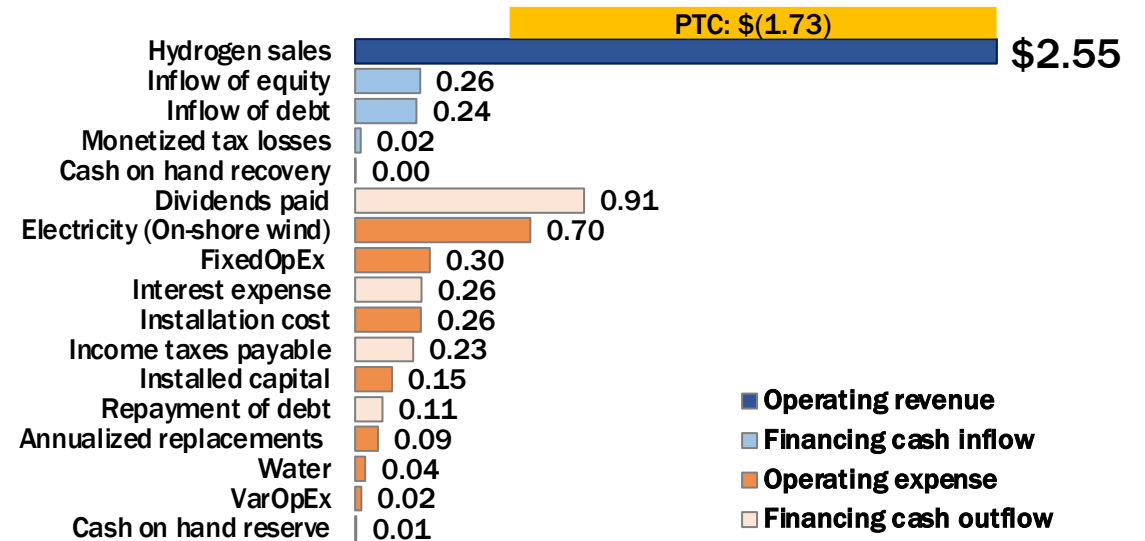
Levelized Cost



# Green Hydrogen Overview



Levelized Cost



■ Operating revenue  
 ■ Financing cash inflow  
 ■ Operating expense  
 ■ Financing cash outflow

# Key Findings and Next Steps

| H2 Production  | LCOH without PTC           | Assumed PTC value          | LCOH with PTC              | Water Use                   |
|--|----------------------------|----------------------------|----------------------------|-----------------------------|
| Steam Methane Reforming with 90% CCS                     | \$1.48 / kg H <sub>2</sub> | \$1.00 / kg H <sub>2</sub> | \$0.84 / kg H <sub>2</sub> | 4.8 gal / kg H <sub>2</sub> |
| Electrolysis of water with 100% Wind sourced electricity | \$2.55 / kg H <sub>2</sub> | \$3.00 / kg H <sub>2</sub> | \$0.61 / kg H <sub>2</sub> | 5.2 gal / kg H <sub>2</sub> |

## Next Steps

- Consider additional value of co-products. CO<sub>2</sub> from SMR for Enhanced Oil Recovery. O<sub>2</sub> from Electrolysis (potentially partnered with ATR hydrogen production.)
- Evaluate transport pathways from the Permian to Gulf Coast. Pipelines for gaseous hydrogen and carriers of hydrogen, such as ammonia.
- Investigate local hydrogen demand in the Permian region.