

Quantifying Risk for Sequestration Success – A Look At Potential CO₂ Storage Hazards and Complications in Southern Louisiana

Evan J. MacDonald
Enverus

Summary

Recently, Louisiana has attracted a wave of CCS leasing activity owing to its leading capture breakevens, existing CO₂ pipelines, supportive regulatory structure and world-class geological formations. With the recent Inflation Reduction Act amplifying the financial outlook of CCS project economics, we anticipate this trend to continue but there are essential considerations to understand when diagnosing a region for future storage project potential. Not only does the reservoir have to be promising in terms of its ability to contain large volumes of CO₂, but an often-overlooked variable is the corresponding risk associated to that storage. Prior to being granted a class VI permit, a thorough site characterization is required to evaluate the subsurface sequestration system, and part of that process includes analyzing, characterizing, and delineating the risk parameters as they may exist across an operator's area of review.

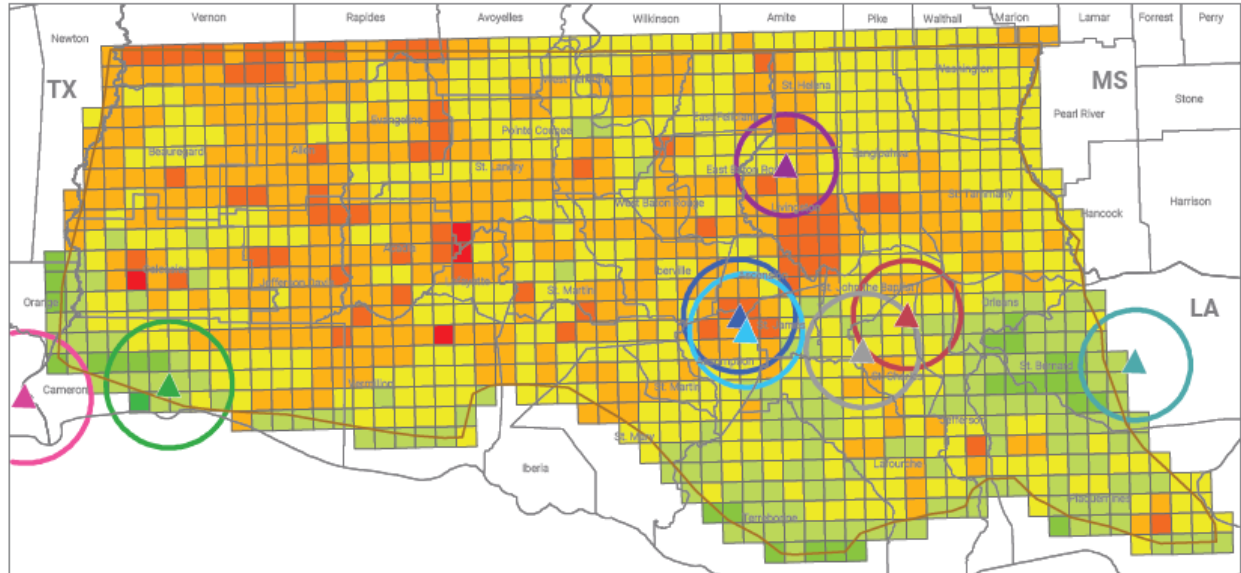
Theory / Method / Workflow

These risk parameters are variable and regionally specific. In Southern Louisiana, the complications to CCS projects as it pertains to risk include but are not limited to: Underground Sources of Drinking Water, caprock thickness/permeability, artificial penetrations, reservoir heterogeneity, faulting, salt domes and seismic history. In an effort to compile the impacts of these risks, a heat map can be generated to aid in the screening process as a single, interpretable data source. By sampling all the entities discussed above to a common grid of cells and normalizing the presence of these risks to a common scale, the impacts of each element can be compiled. By utilizing this combined data to create a single risk profile map, regions of high and low risk potential are interpretable for quick screening efforts in the Southern Louisiana CCS hub.

Results, Observations, Conclusions

This analysis can be leveraged for future screening efforts by operators looking to enter the space, while also offering the ability to benchmark current projects that have been announced in the region to glean insights into which projects are most at risk for CCS complications, and what those complications may entail. The presentation aims to bring light to the risks that must be considered and analyzed to successfully plan a CCS project, utilizing the CCS hotbed in Louisiana as a case study. It also looks to introduce a repeatable workflow that can be implemented across any basin or site to generate an idea of risk profiles as they pertain to CO₂ storage site selection and characterization.

Graphic



Sequestration Sites

DEN

- ▲ Assumption St. James
- ▲ Donaldsonville
- ▲ New Orleans

Lapis

- ▲ CCUS

OXY

- ▲ Livingston

TALO

- ▲ Bayou Bend
- ▲ River Bend

Venture Global LNG

- ▲ Calcasieu

Pressure Front

- 13.88 mi
- 13.77 mi
- 13.48 mi
- 13.94 mi
- 12.37 mi
- 16.07 mi
- 13.21 mi
- 15.49 mi

Risk Rating (low risk to high risk)

- <13
- 13 - 15
- 16 - 20
- 21 - 25
- 26 - 30
- 31 - 35
- >36
- ▭ Oligocene-Miocene Area of Inspection

Acknowledgements

I would like to thank my fellow Enverus teammates, Graham Bain, Brad Johnston and Heather Leahey for their assistance in compiling and analyzing the data and work reflected in this presentation.

References

Enverus Subsurface Studio, Enverus ESG Analytics, Enverus Geoscience Analytics