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Appalachian CO_2 Storage Potential in the Oriskany Sandstone

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Summary

Widespread emissions and state-proposed net-zero emission targets in the Appalachia region necessitate the characterization of local carbon sequestration targets. In this study, we evaluate the reservoir properties and viability for CO_2 injection and sequestration in the Oriskany sandstone in Ohio, West Virginia and Pennsylvania.

Theory / Method / Workflow

The carbon sequestration landscape is evolving rapidly, with new projects being proposed and more and more companies, and industries, looking for ways to offset their carbon emissions. The recently announced Inflation Reduction Act, which increased the government subsidy for capturing CO_2 from $50 to $85 per metric ton, was a major milestone for the carbon capture industry. This increased incentive opened the door for many sequestration projects that were previously uneconomic.

Much of the recent activity in CO_2 sequestration has been focused on the Gulf Coast Tertiary sands. Widespread and thick, porous sands make CO_2 injection and sequestration viable in much of the Gulf Coast region. Abundant emission sources in the Appalachia region, however, necessitate the characterization of local sequestration targets. The growing blue hydrogen industry in the area also contributes to the need for CO_2 storage. Unlike the extensive, thick sands of the Gulf Coast region, a lack of obvious sequestration reservoirs in Appalachia requires more detailed and localized reservoir characterization. In this study, we evaluate the reservoir properties and viability for CO_2 injection and sequestration in the Oriskany sandstone in Ohio, West Virginia and Pennsylvania.

Results, Observations, Conclusions

The Lower Devonian Oriskany Sandstone is a tight, often carbonate-cemented, sandstone that varies in thickness from 0 feet to over 100 feet in our study area. Porosity and permeability of the Oriskany are generally low, with localized regions of increased porosity. The Oriskany Sandstone is separated from the overlying, unconventionally drilled, Marcellus Shale by the Onondaga Limestone and Needmore Shale (among other, regional units) by a thickness ranging from only a few feet to over 300 feet. The cap rock thickness, low porosity and

permeability and interval thickness all contribute to sequestration risk in the Oriskany and limit its potential as a successful CO_2 sequestration interval to more localized regions.

Further to storage potential, we also evaluate injectivity and estimated storage costs for CO_2 sequestration in the Oriskany Sandstone.

References

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