Exploring new energy for Intermountain West—well retrofits and hydrogen could be key to cleaner energy

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Two new papers, both authored by Mohamed Mehana of the Earth and Environmental Sciences division at Los Alamos National Laboratory,

explore the feasibility of well retrofitting and clean hydrogen production from fossil fuels.

"With no action taken, over 5 million metric tons of carbon dioxide will leak into the atmosphere annually from the Intermountain West region," Mehana wrote in the paper. "This volume is the equivalent of 1 million cars' annual exhausts."

The Intermountain West region encompasses several states, including Arizona, Colorado, Montana, New Mexico, Utah and Wyoming. Given the shared characteristics of these states, there are solutions that can work across the region to move toward a net-zero future.

By focusing on place-based approaches to climate issues, the two papers map out the economic and logistical path forward for these two methods. "To facilitate an energy transition, a holistic understanding of the region's resources and characteristics is needed," Mehana said. Both systems utilize legacy infrastructure from other energy sources to lower the cost of clean methods.

"To accelerate this transition in the area, you need to consider that fossil energy is a major contributor to the economy and the communities," Mehana explained. "Close proximity would reduce transport costs. Energy-system optimization is critical, and the interdependence of various energy resources is crucial for energy security."

The first paper, which discusses well retrofits in the Journal of Environmental Management, proposes using legacy well bores as storage sites for carbon sequestration. While repurposing old wells costs more than plugging and abandoning them, it costs less than creating new storage sites. The Intermountain West states contain approximately 11% of the drilled oil and gas wells in the U.S.

The second paper focuses on clean hydrogen production in Renewable and Sustainable Energy Transition, and uses the proximity of energy sources, H_2 storage sites, CO_2 sequestration sites, and high energy-demand regions to make clean hydrogen more attainable. Production tax credits, which are now available for up to $3 per kilogram, make various clean hydrogen methods more economically feasible than ever.

More information: Joseph Heimerl et al, Sustainable energy solutions: Well retrofit analysis and emission reduction for a net-zero future in the Intermountain West, United States of America, *Journal of Environmental Management* (2024). DOI: 10.1016/j.jenvman.2024.121271

Fangxuan Chen et al, Economic assessment of clean hydrogen production from fossil fuels in the intermountain-west region, USA, *Renewable and Sustainable Energy Transition* (2024). DOI: 10.1016/j.rset.2024.100077

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