

Third-Party Companies Expanding Water Treatment, Reuse And Disposal Capabilities

By Danny Boyd

Crude oil and natural gas production have rocketed to all-time highs in the Permian Basin, but so has the volume of water co-produced with all those hydrocarbons.

Long-lateral horizontal wells in the Permian’s multiple stacked tight oil plays are among the most productive ever completed in any onshore U.S. basin, but the reality is the typical well will produce a lot more formation water than oil over its lifetime. That makes effective water management a top priority for any operating strategy.

It also explains why third-party produced water management continues to grow across the Permian. In addition to developing pipelines, saltwater disposal wells and recycling facilities, water management companies are using new technologies to set service standards and convert a waste product into a major regional asset.

Numerous operators still manage their own water handling systems, but independent water midstream providers are rapidly increasing their share of total water management activity. These providers are building water infrastructure and sometimes buying systems from operators and adjoining midstream companies to gain economies of scale that will allow them to meet the growing need for recycled produced water in frac jobs. The segment also is anticipating beneficial reuse applications outside the oil and gas industry.



Permian Basin Reports

With the paramount need to preserve groundwater in a semi-arid region, Permian wells provide a compelling alternative. The average basin well produces about four barrels of water for each barrel of oil, with the average ratio even higher in the southern Delaware Basin.

Produced water generation in the nation's premier oil and gas region has grown from more than 6 million barrels a day in 2017 to almost 19 MMbbl/d this year as operators extend lateral lengths and intensify hydraulic fracturing to unlock new hydrocarbon production.

Despite that growth, demand from completions still leaves vast quantities of produced water unused. To relieve stress on freshwater aquifers and disposal wells, California-based Renovo Resources LLC plans to turn the Permian's excess produced water into non-potable freshwater for industrial uses. Chief Executive Officer Lnsip "Naggs" Nagghappan says Renovo is in negotiations with several companies to deploy its patent-pending treatment solution.

Rapid Progress

Backed by Dallas-based Tailwater Capital, Renovo anticipates a pilot program agreement soon, with work on the project expected to begin in the first quarter of 2024, he says.

Nagghappan indicates Renovo's treatment solution involves an integrated process that consists of pretreatment, desalination and post-treatment and is delivered on a turnkey basis.

Pretreatment involves oxidation, dissolved air flotation and walnut shell filtration for removing particulates and scale formers. Desalination uses a proprietary external heat exchanger design and a mechanical vapor recompression evaporator to remove salt, scale formers and dissolved gases. It is a core step to defining ultimate pre- and post-treatment designs, Nagghappan notes. He says the key benefits include lower maintenance requirements, higher freshwater recovery, lower SWD disposal volumes and improved environment, sustainability and governance performance.

Post-treatment includes a moving-bed bioreactor to reduce ammonia and benzene levels. The treated water would exceed beneficial reuse quality guidelines set by the New Mexico Produced Water Research Consortium.

"This is a clear value proposition for oil and gas companies," Nagghappan says. "Operators are trying to minimize SWD injection in the Permian and look for ways to improve their ESG compliance and sustainability. Our solution falls right in line with that."

Renovo's management team led the development and execution of four of only five similar facilities worldwide, he says. The founding members joined Renovo from Veolia, where they designed, built and operated systems that have treated more than 12 billion gallons of produced water in California, Nagghappan reports. These systems include the Chevron Water Reclamation Facility at San Ardo, which has generated more than 8.3 billion gallons of freshwater to recharge a groundwater aquifer since it began commercial operation.

A Permian facility can be built to accommodate volumes ranging from 50,000 to 300,000 bbl/d. By enabling beneficial reuse, Nagghappan indicates Renovo's treatment solution will reduce typical SWD injection volumes in the Permian by 60%-70%, limiting potential seismicity and other impacts. The higher salt content of Permian-produced water means waste streams will be larger than in California, representing 30%-40% of the intake stream compared with 10% on the West Coast, he mentions.

For specific sites, Renovo would partner with Goodnight Midstream, a Tailwater portfolio company, to dispose of the brine waste. Nagghappan says the company's ultimate goal is to include gathering, treatment and disposal in a turnkey solution for sustainably managing produced water. □