

## Riding the Wave

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With the proliferation of hydraulic fracturing since around 2010, the good news is that oil and gas production have exploded, reaching never-before-seen levels and practically eliminating net imports.

The challenge, however is that fracturing requires millions of barrels of water—fresh or recycled—and also produces millions of barrels of water that must be reused or returned to the ground in disposal wells.

For several years concerns have lingered about SWDs and a sharp uptick in anthropogenic earthquakes—and new studies show fracturing can also lead to temblors, although the latter form is only present during fracturing and can likely be contained even then.

A recently released paper shows a possible connection between hydraulic fracturing and anthropogenic tremors, said Bridget R. Scanlon, Ph. D., Senior Research Scientist at University of Texas at Austin Bureau of Economic Geology, Jackson School of Geosciences. While saltwater disposal wells have been linked with these temblors for a while, Scanlon noted that the fracturing link is new—but it can easily be managed.

She noted that some other producing states have instituted what she called a “traffic light system” to control frac-based tremors. “You see that immediately, so you can control it better.” Skipping a stage during the drilling process was one suggestion for controlling this activity, she said, noting that tremor control was outside her specialty.

The question might arise as to how experts distinguish between the various possible causes of earthquakes. Scanlon said it has to do with spacing and depth.

In northern Oklahoma, for example, the study found seismic activity in the deepest part of the formation, in an area where there was heavy SWD activity at that level, but little nearby fracturing. That was concentrated further south in the SCOOP/STACK. “So there was this spatial disconnect between disposal and the frac’ing, so they could state pretty conclusively that it was disposal related,” she said. In the Barnett, seismic activity is also SWD related.

But in the Delaware, “You’ve got disposal and frac’ing very closely connected, spatially, and the earthquakes are deeper than most of the disposal, because most of the disposal is shallow.”

Her study found that Oklahoma is among the few basins where disposal is deeper than the production—elsewhere, including the Delaware, disposal is shallower than the producing wells.

Seismicity in the Delaware came from formations deeper than the disposal wells, and the tremors were “spatially connected in time with the frac’ing.”

The good news is that all facets of the industry are looking closely at how to better manage water use. “We’re at the early stages of development in the Permian, considering the resources,” Scanlon said. She noted the rise of water midstream companies in recent years, tasked with handling the rising tides of produced and fresh water.

And while there is no reporting function that allows experts to accurately figure percentages of recycling for produced water, the Texas Department of Licensing and Regulation does track new water wells—and “We’re still drilling a lot of wells.

“We’re fortunate in Texas that we have the State Water Planning, who manage available groundwater, that manage depletions and how much water they’re willing to use over the next 50 years, so we have a lot of data.”

Managing this rising flood of waters is requiring a host of decisions as the production sector and the service sector tread untested waters—balancing economic and energy interests with environmental issues. However, these decisions are not limited to the oil and gas industry itself.

Wilson Farms CEO Cody Wilson said he decides whether to sell groundwater to oil and gas companies or to grow cotton, figuring his water table can’t handle both in the same year.

He makes more from selling water to the oil industry.

### **“Mining for Water”**

Wilson had been told by a banking friend that ranchers don’t breed cattle, they grow grass—and that made him think about the real business of cotton farmers like himself. Then it hit him: “Our M.O. is more like, in West Texas, at least, farmers don’t grow cotton, we mine for water.”

For years, he added, farmers around his family land near Midkiff have believed, “Basically, you pump all the water out from under one piece of ground, you move over and clear off another piece of ground drill more wells and grow more cotton. It’s a very thirsty industry.”

“Ours [farming] is an industry that uses more water than oil and gas,” at least in arid regions like the Permian Basin, he said.

On his own land, the water availability is diminishing, which is why Wilson is looking to recycle produced water for agriculture, as reported in the February edition of this publication.

Scanlon feels these decisions are important because it’s part of decisions regarding the total use of water. Referring to Wilson’s oil-or-cotton decisions, she said, “That’s an excellent example of, ‘What should we use the water for?’ Maybe oil and gas, maybe he gets a lot more money for the oil and gas [sales] than he would for the cotton.”

She added that in regards to water use, “Irrigation is the elephant [in the room]. But that’s okay because we all eat.” Of course, everyone drives, too, so singling out oil and gas as the bad guy in water use is ironic if not disingenuous.

There are questions about the numbers floated about regarding the amount of water use. She pointed out that tracking irrigation use is difficult because there is no reporting mechanism as there is for oil and gas.

But even where water production is recorded, there is confusion about how agencies like the U.S. Geological Survey categorize various water sources.

Scanlon attended a water conference in New Mexico early in 2020, where a consortium to manage produced water is being formed. “You’ve got two sides of the coin—you have the water used for hydraulic fracturing and then you have the produced water. And one of the questions that came up at this meeting was, ‘What number are we talking about?’ Because USGS includes produced water in their water use numbers. So people are totally confused.”

With options for reuse of produced water increasing, Scanlon sees both opportunities and challenges in every direction. Treating for uses—spanning fracturing on one end of the scale and agricultural or even municipal use on the other end—all have challenges, including questions of what to do with removed impurities. Some, like lithium and iodine, might be sold to defray some processing costs. “We should should run the numbers for a lot of different scenarios because somebody else might get something out of it that we might be missing.”

## **Palisade Pipeline**

The big opportunities in recycling definitely revolve around treating produced water, but municipalities provide another significant alternative to fresh water. In 2016, Pioneer Natural Resources reached an agreement with the City of Midland that involved the company making certain improvements in the treatment system in return for access to the wastewater for use in fracturing.

In that vein, Palisade Pipeline LLC plans to do something similar with City of Lubbock wastewater, moving 150,000-200,000 barrels of that per day, by pipeline, into the Midland and Delaware Basins in Lea and Eddy counties of New Mexico for fracturing and other use.

Now in the design phase, Palisade Founder and President Phillip Laughlin said Palisade has received capital and planning assistance from partner Macquarie Capital, with design input from others as well.

Due to Lubbock’s advanced treatment facility, Palisade will not need to do anything further to the water before delivering it to clients. “The City of Lubbock has a premier wastewater treatment facility,” Laughlin said, “and we take transfer of the water as a finished product from them.”

The expectation is for Lubbock to be the company's only water supplier. "Our focus is the ESG push, so we're not interested in sourcing potable groundwater and selling that as part of the Palisades Pipeline product. We're selling a recycled municipal reclaimed water source as an alternative to using potable groundwater."

### **Customers Will Vary**

"There's a number of different areas we're looking at for selling water," Laughlin noted. "Obviously, the major focus is hydraulic fracturing, as a way to conserve groundwater. Outside of that industry, there is the opportunity for supporting farming and agriculture; there could be some municipality uses up and down our route [of the trunkline]; this water could be used for a golf course or various uses."

On the oil and gas side, said Palisade's EVP of Operations Reagan Kneese, water buyers are coming in all shapes and sizes. "We have a pretty diverse client base at this point—all sizes of operators—and the ability to facilitate other industrial uses as well makes it a unique project in that sense."

As interest in the water sector grows, the understanding of its breadth also matures. Most life forms are made up largely of this substance, so the fact that it pervades everything we do is to be expected. Water treatment and reuse also spreads a wide net, reaching beyond oil and gas to agriculture, municipalities, and earthquakes, and to the handling of removed solids.

As per the words of Bridget Scanlon, spreadsheets and calculators should crank out numbers voluminously with the goal of achieving that balance. Because the opportunities are there.

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*By: Paul Wiseman*