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Putting Produced Water Management into a Global Perspective

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Thank you for having me here today! It's an honor to share this time with you.

Two quick items: One, the remarks I am about to deliver are my own opinions and do not reflect the views or positions of the Baker Institute for Public Policy or Rice University. Two, I am going to focus on developments in the Permian Basin. The Permian could be producing as much crude oil as Kuwait by year end 2018 and already produces more natural gas than Australia, the world's second-largest LNG exporter.

With disclaimers behind us, let's get right to the big point. Your work—even if you never leave U.S. borders—moves markets and impacts thinking and actions in Baghdad, Caracas, Moscow, Tehran, and other oil & gas exporting capitals. Each cent that your technical skill shaves from full-cycle water management costs makes the molecules your company produces more competitive in the global marketplace. Water management helps U.S.-focused operators drive their economic breakeven oil price below the social breakeven price needed by many producers abroad. The strategic ramifications of this process will likely unfold for years to come. You're each geopolitically relevant—think about that as you drive home tonight.

Water is becoming a source of value

As former Vice President Joe Biden once said: "*Don't tell me what you value, show me your budget, and I'll tell you what you value*."

The numbers strongly suggest that operators value water more highly with each passing year. Capital deployments by E&Ps, water-focused midstream groups, and other parties in the Permian Basin likely exceeds $500 million per year even under a conservative estimate and could approach $1 billion annually of investment directly attributable to oilfield water sourcing, transportation, treatment, and disposal. This includes greenfield infrastructure and consolidation/expansion of existing assets.

Part of the motivation for these significant investments comes from the upfront cost reductions in water procurement, transport, and disposal/recycling. At the Baker Institute, our initial research on the potential savings from integrated water management suggests

going to pipelines and recycling a greater share of produced water could reduce completion operating costs by at least $1 million in a well's first year of economic life. Some operators report even larger savings numbers. For instance, Halcón Resources recently disclosed that at its Hackberry Draw asset, vertically integrated water management saves as much as $1.7 million per well during the first year of production.[1]

As Benjamin Franklin wisely said: "a penny saved is a penny earned." Savings early in a well's life accelerate payback time and reduce capital at risk for a given activity level. Water-driven savings can also increase the stock of total drillable inventory, with economic ripple effects across the Basin, Texas, and globally. Publicly traded firms' disclosures to investors show more than 100,000 yet to be drilled unconventional locations in the Permian. Water management-driven cost reductions could substantially increase the stock of locations economic to drill with WTI at or below $60/bbl.

There are also longer-term motivations for investing in water management. For many unconventional operators, water is often the single largest driver of lease operating expenses. It is also the factor most susceptible to long-term, inflation resistant solutions. Once an operator invests in water midstream infrastructure or signs a multi-year agreement with a water midstream services provider, the economic benefits of reduced water management costs are locked in for years—often for much of the useful economic life of a given acreage block.

Such structural cost reductions either drop to the bottom line or potentially, allow larger drilling programs within existing CAPEX budgets—an important benefit with interest rate increases looming on the horizon and more pressure from investors for operators to focus on capital discipline.

Oilfield water management activities also create additional monetization opportunities. We've seen Permian operators make large midstream asset sales over the past two years in the crude oil space, including stakes in the Alpha Crude Connector and Medallion pipeline system, and water assets could also potentially be monetized this way.

Concentration begets network effects that make infrastructure footprints established by first movers much more valuable in the future. FracFocus data we have analyzed show that for completions reported between January 2013 and May 2017, the 10 largest water users accounted for 54% of total reported frac water use in the Basin. The 25-largest Permian water users accounted for more than 77% of frac water demand during that time. Disposal needs are likely to feature a similarly high level of concentration. The 25 largest users drive a disproportionate share of activity, but the flip side of that coin is that there are 200-plus other operators in the Permian alone who will also need water services and whose business is collectively worth billions.

The water infrastructure footprint in key parts of the Permian Basin is becoming both physically massive and geographically expansive. This helps create commercial critical mass and facilitates making water a marketable commodity. This snowballing is also how the smaller and midsize operators can potentially be tied into the networks the heavyweights are now building.

[1] http://www.halconresources.com/wp-content/uploads/2018/02/Halcon-February-Company-Presentation-Website-020618.pdf

Some operators are now handling as much—or more—water each day than large regional cities. Consider the following: at year end 2016, Pioneer Natural Resources reported that it was sourcing an average of 350 thousand bbl of water per day for fracs.[2] That volume is almost 20% larger than the average daily potable water consumption of the entire City of Midland during FY2016.[3] If one adds Midland's total water sourcing and sewage treatment flows together, the total for FY2016 is about 523 thousand bpd.[4] Depending on which publicly reported numbers you rely on, Pioneer is building out its system to handle from twice, to as much as 4 times that volume, by the mid-2020s.[5] Likewise, Anadarko is building a water disposal system in the Northern Delaware Basin that it states will have 700 thousand bpd of capacity—a daily flow rate 34% larger than Midland's combined municipal water flows in FY2016.[6]

These numbers are big, but they only capture a fraction of the potential market and much more meat remains on the bones—a reality that likely energizes this crowd here today.

Potential Environmental, Legal, and Regulatory Challenges

I've been mostly sunshine so far, so now it's time to put the lawyer hat back on for a few minutes. With oil & gas development, the hardest challenges to solve often aren't the geological ones. It's the things you encounter above ground. Oilfield water management is thus far no different.

Good stewardship requires safe transit of salty water. Pipelines spill far less often, on average, than truck operations, but when they do, the magnitude and impact are often much higher. My analysis of oilfield water spill data from North Dakota, which unlike Texas tracks and reports such incidents, showed that 11 of the 20 largest brine spills between January 2006 and September 2015 involved pipeline leaks. And the largest spill single handedly accounted for approximately 20 percent of the entire brine volume spilled in North Dakota during that 8.5 year timeframe. Pipeline spills can cost millions of dollars to clean up and remediate. Furthermore, produced water spills can contaminate soil and water for years and in a worst-case scenario, lead to major regulatory actions and loss of social license to operate in an area.

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[2] Pioneer Natural Resources 4Q2016 Earnings Call Transcript, Statement by CEO Tim Dove, 8 February 2017, https://seekingalpha.com/article/4043988-pioneer-natural-resources-pxd-ceo-tim-dove-q4-2016-results-earnings-call-transcript?part=single

[3] Midland Texas FY2016 Comprehensive Annual Financial Report, https://www.midlandtexas.gov/ArchiveCenter/ViewFile/Item/203

[4] Ibid.

[5] For 1 million bpd system figure, see statement of PXD CEO Tim Dove on 8 February 2017 during the company's 4Q2016 earnings call. For the 2 million bpd figure, see Brandy Fidler, "Nothing But Water," Midstream Business, Jan/Feb. 2017, https://www.h2omidstream.com/press-releases (Discussing background of H2O Midstream EVP and Chief Development Officer Stephen McNair). See also Mr. McNair's official H2O Midstream bio, available at https://www.h2omidstream.com/management-team#openModal3 (archive copy available upon request)

[6] Anadarko Investor Presentation at Bank of America Merrill Lynch 2017 Global Energy Conference, 16 November 2017. http://investors.anadarko.com/events

I'm a technology optimist and think that with sufficient investment in pipeline surveillance and control measures and a focus on safe operation, water pipelines can be run in a manner that leaves everyone better off. One of the beneficial side effects of making water management a core business priority is that this also boosts incentives to invest in the equipment, people, and operational philosophies that stand the best chance of maximizing safe operations. Along with company level actions, it is also important that the RRC and other relevant regulators take a more focused approach to produced water issues. Data collection—including mandatory spill reporting—and disclosure are a key starting point. More effective analysis and use of data can optimize the deployment of inspections and oversight staff in an area of responsibility about as large as South Dakota (if the TX and NM Permian Basin are both included).[7] This can help catch potential problems early, pinpoint where fixes are needed, and ultimately, bolster the industry's social license to operate.

The second major class of above ground conflicts boils down to dollars and cents. In this realm, expanding produced water re-use is likely to trigger some nasty legal fights with landowners angry at the loss of water sales and disposal revenue. To put the economic impacts of greater produced water recycling into a landowner perspective, consider how much more profitable "frac ranching" is than cattle ranching. A ranch that fills two 500,000 barrel frac pits per month with fresh water and collects a royalty of $0.25/bbl and disposes of a million bbl per month at $0.10/bbl could realistically generate $4.2 million per year in royalty income. That equals the profit it would likely clear selling nearly 11 thousand feeder steers, assuming the average market price over the past five years. Producing that many salable head per year in West Texas would likely require more than half a million acres—larger than any ranch in the region.

Broader Implications

Your technical and commercial skills will remain in high demand. We are in the early innings of the unconventional-focused oilfield water management game. There remains considerable upside for lowering costs, taking trucks off the roads, reducing seismicity risks, and protecting precious freshwater resources.

There is not a technical silver bullet, fancy website, or killer app that will single-handedly transform the oilfield water market. Rather, the process will continue to be driven by advantaged geographic positions, trust relationships, technical competence, and infrastructure that allows water deals to be consummated. As you all keep deploying your capital, energy, and ingenuity to improve efficiency and shave costs, it is going to be exciting to watch how the oilfield water midstream space evolves in coming years. Thank you!

[7] https://www.eia.gov/todayinenergy/detail.php?id=30952