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Trash or Treasure: How is Produced Water's Economic Value Evolving in the Permian Basin?

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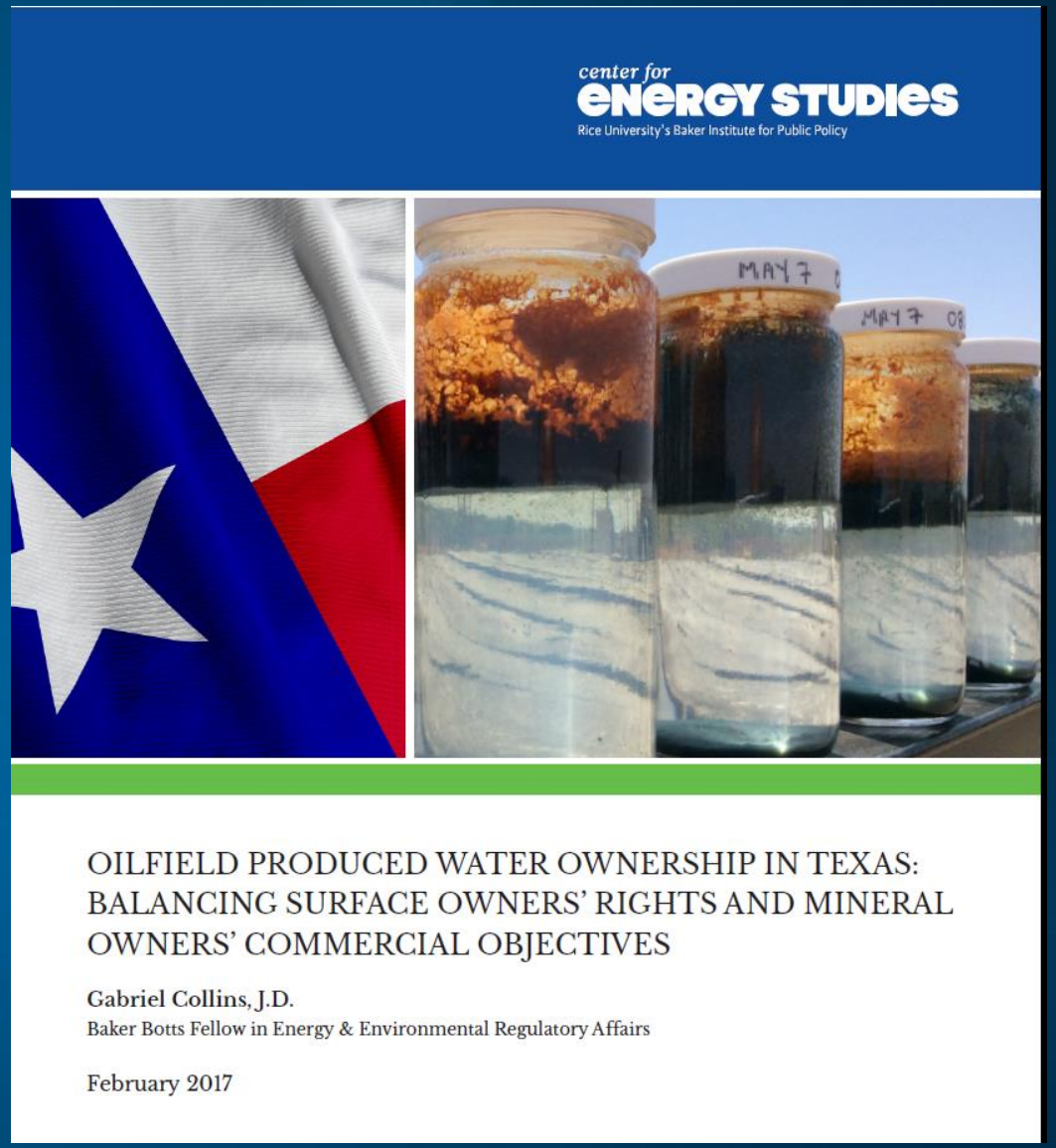
Produced Water Is Evolving From a Liability Into an Asset

Source: http://grouches.wikia.com/wiki/File:Oscar_the_Grouch_old_banana_peels.jpg



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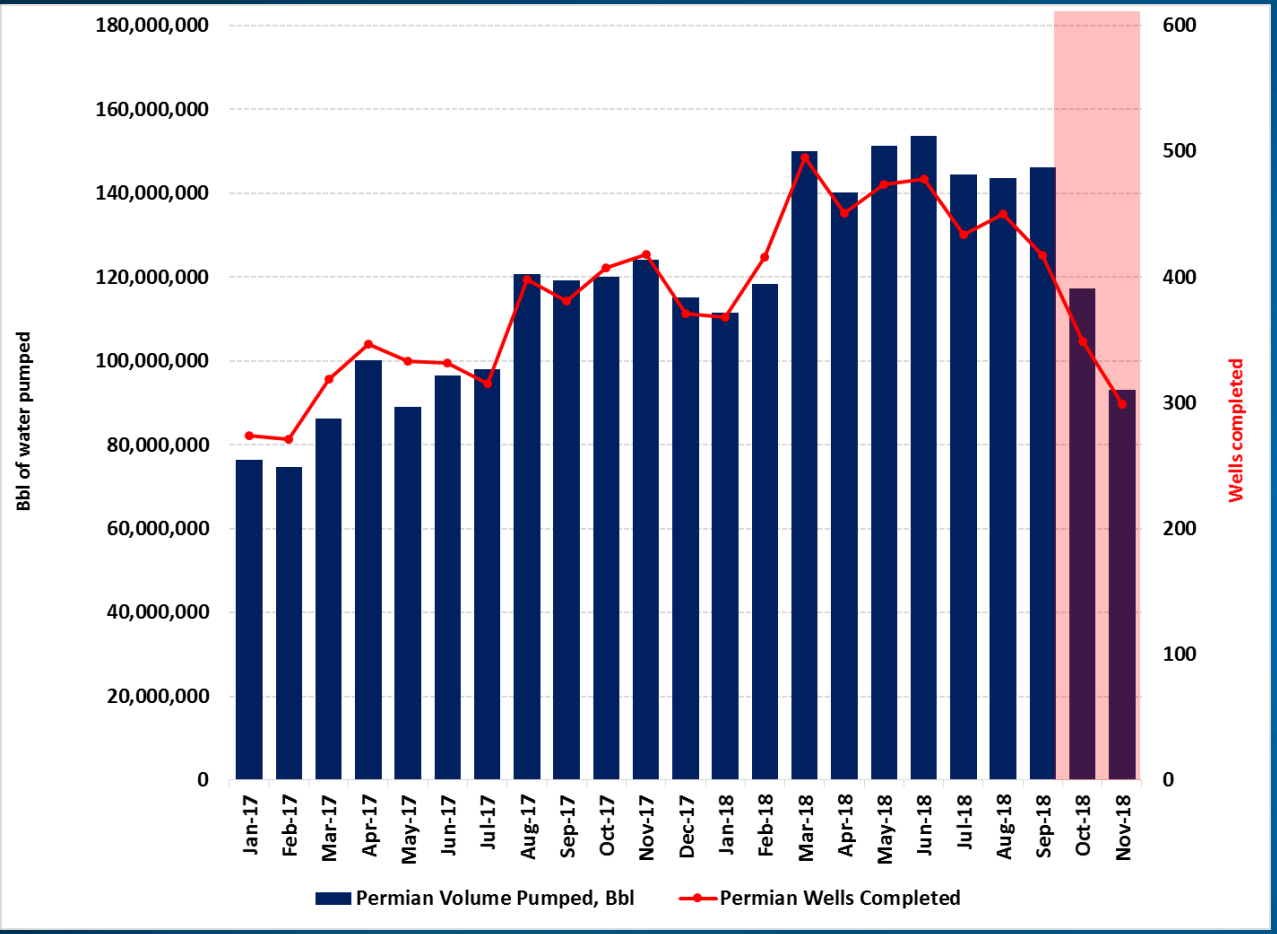
OILFIELD PRODUCED WATER OWNERSHIP IN TEXAS: BALANCING SURFACE OWNERS' RIGHTS AND MINERAL OWNERS' COMMERCIAL OBJECTIVES

Gabriel Collins, J.D.
Baker Botts Fellow in Energy & Environmental Regulatory Affairs

February 2017

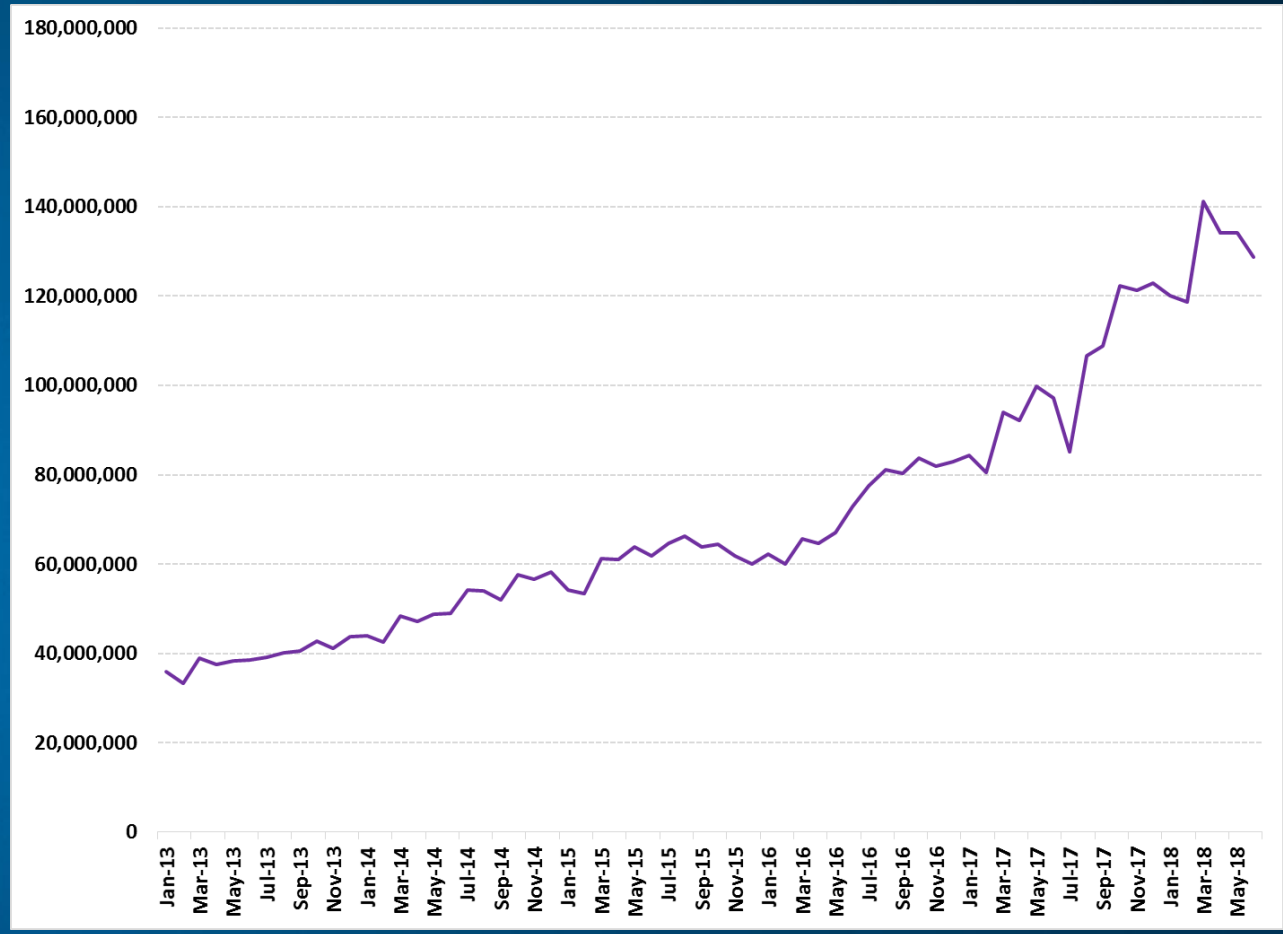
Permian Basin Oilfield Water Supply & Demand

Frac Water Volumes Pumped



Source: FracFocus

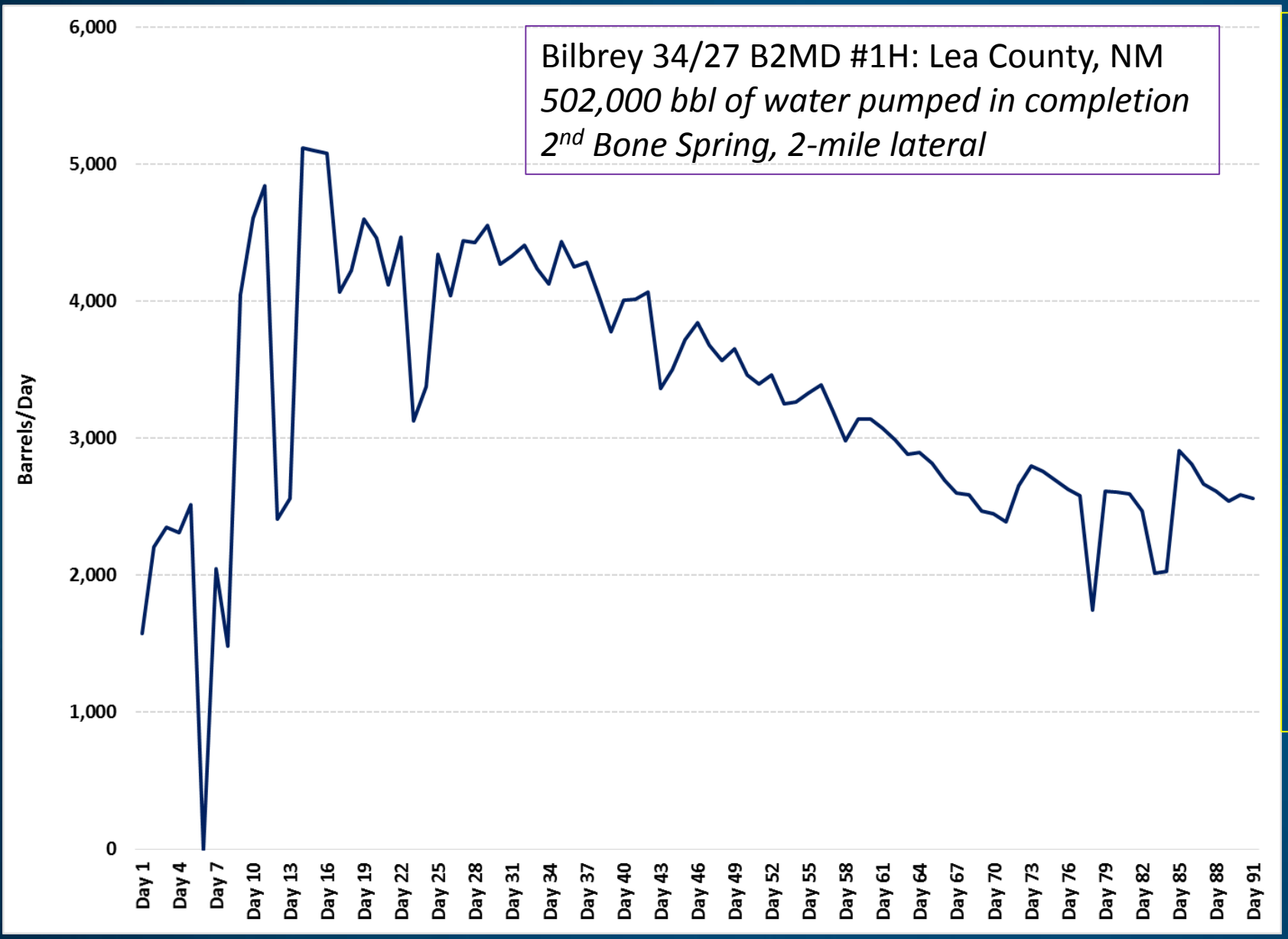
TX RRC District 08 P-18 Disposal Water Received (**Partial**)



Source: Texas RRC

Permian daily average frac water use equal to roughly what the City of San Antonio uses. Or, roughly 12 times the average daily water consumption of the City of Midland (CAFR, FY2017).

Putting Oilfield Water Flows in Perspective: Frac Flowback



Perspective:

- This well's cumulative 90 day flowback volume could fill about 19 Olympic-size swimming pools (660k gallon pool size)
- Now scale this out for a pad drill project with 5, 7, or even 30 wells, with many of them flowing back simultaneously post-completion.
- The resulting water management challenges—from both the perspective of managing peak flow and that of just managing the sheer volume—are substantial.

Source: Well Report Data

Per Well

Long-Lateral Permian Oil Well Inputs and Outputs Weigh ~405,000 metric tons

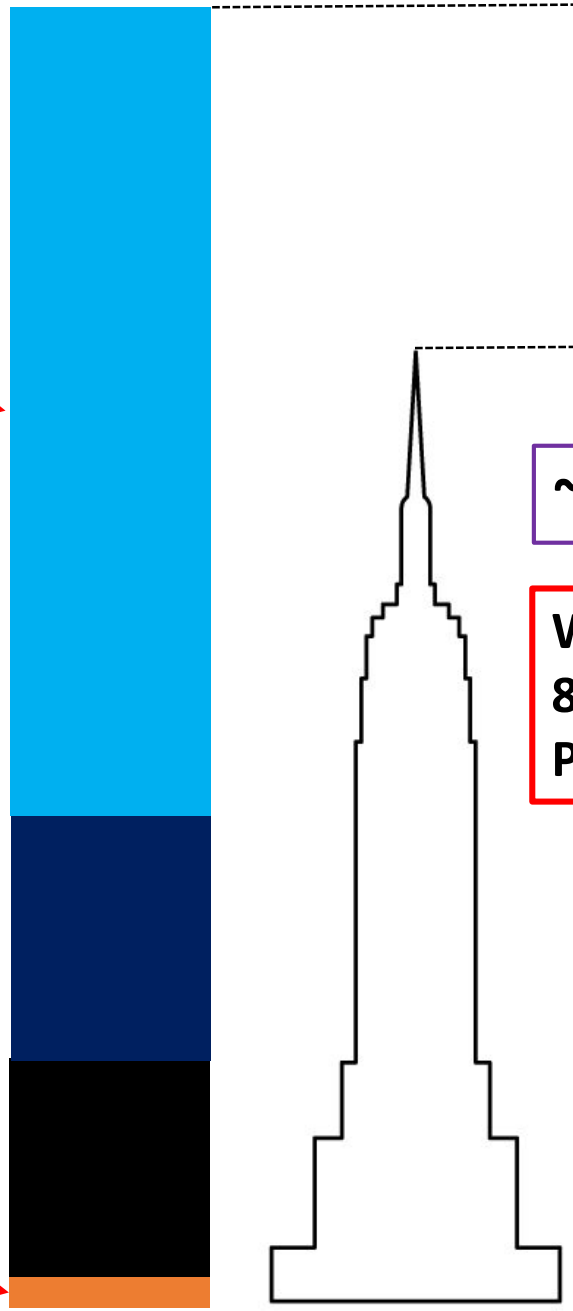
Empire State Building Weighs ~340,000 metric tons

Produced water:
Over 250,000 metric tons

Frac source water:
76,000 metric tons

Crude oil and liquids:
68,000 metric tons

Pipe, sand, misc. consumables:
Approx. 10,000 metric tons



~400-450 wells completed/month

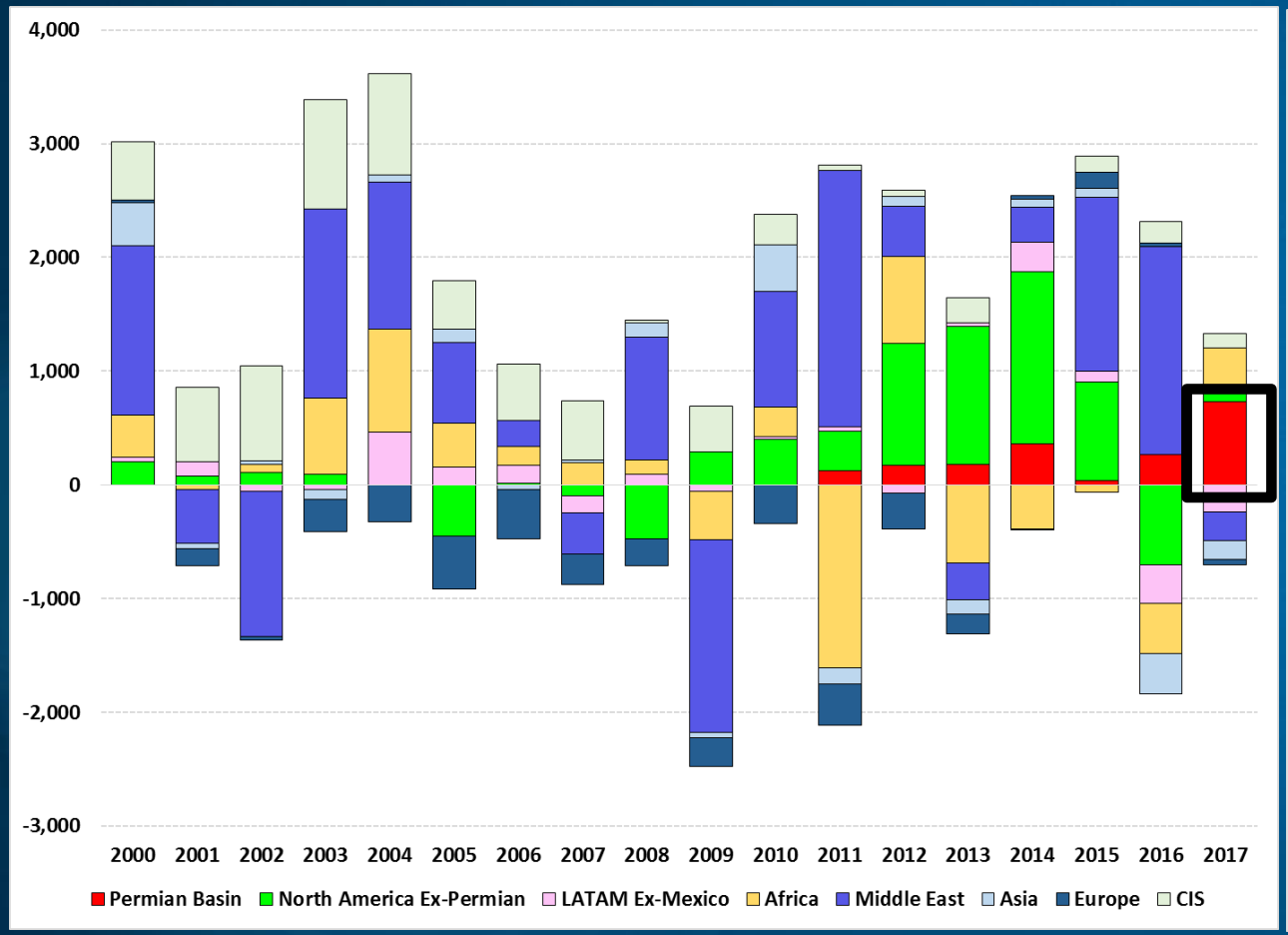
Water will likely account for approximately 80% of lifetime "mass moved" for many Permian Basin wells.

Source: CME Group, Empire State Realty Trust, FracFocus, TexasBrine.com

This analysis assumes 500,000 barrels of oil produced, with a water-to-oil ratio of 3:1. In many cases, wells will ultimately produce more oil and at a higher water cut.

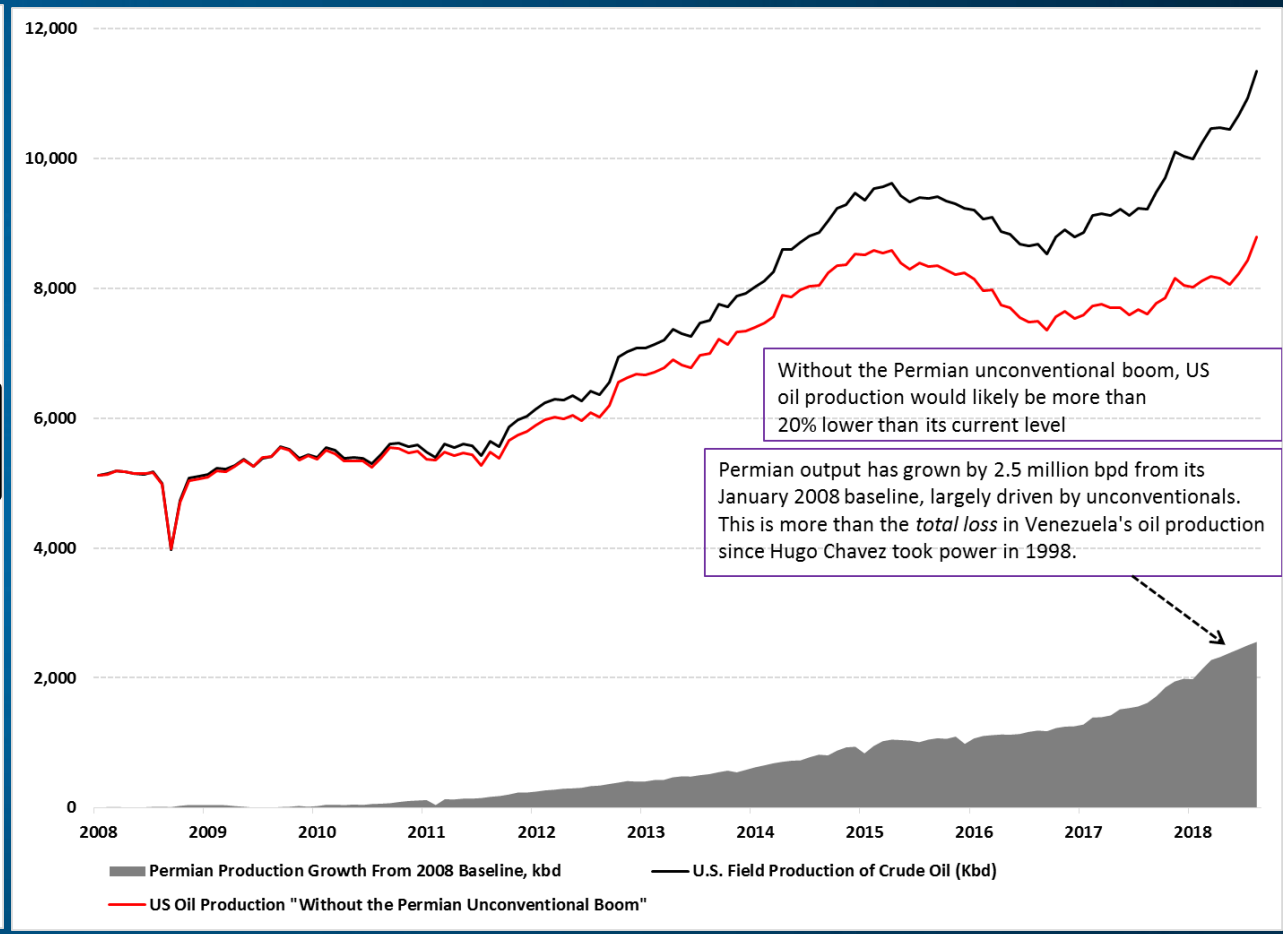
Permian Oil Production Growth Has Been a Major Global Shock Absorber

The Permian Basin Has Become the World's Premier Non-OPEC, Non-Middle East Source of Oil Supply Growth



Source: BP Statistical Review of World Energy 2018, EIA

Thought Exercise: What if the Permian Unconventional Space *Hadn't* Taken Off?

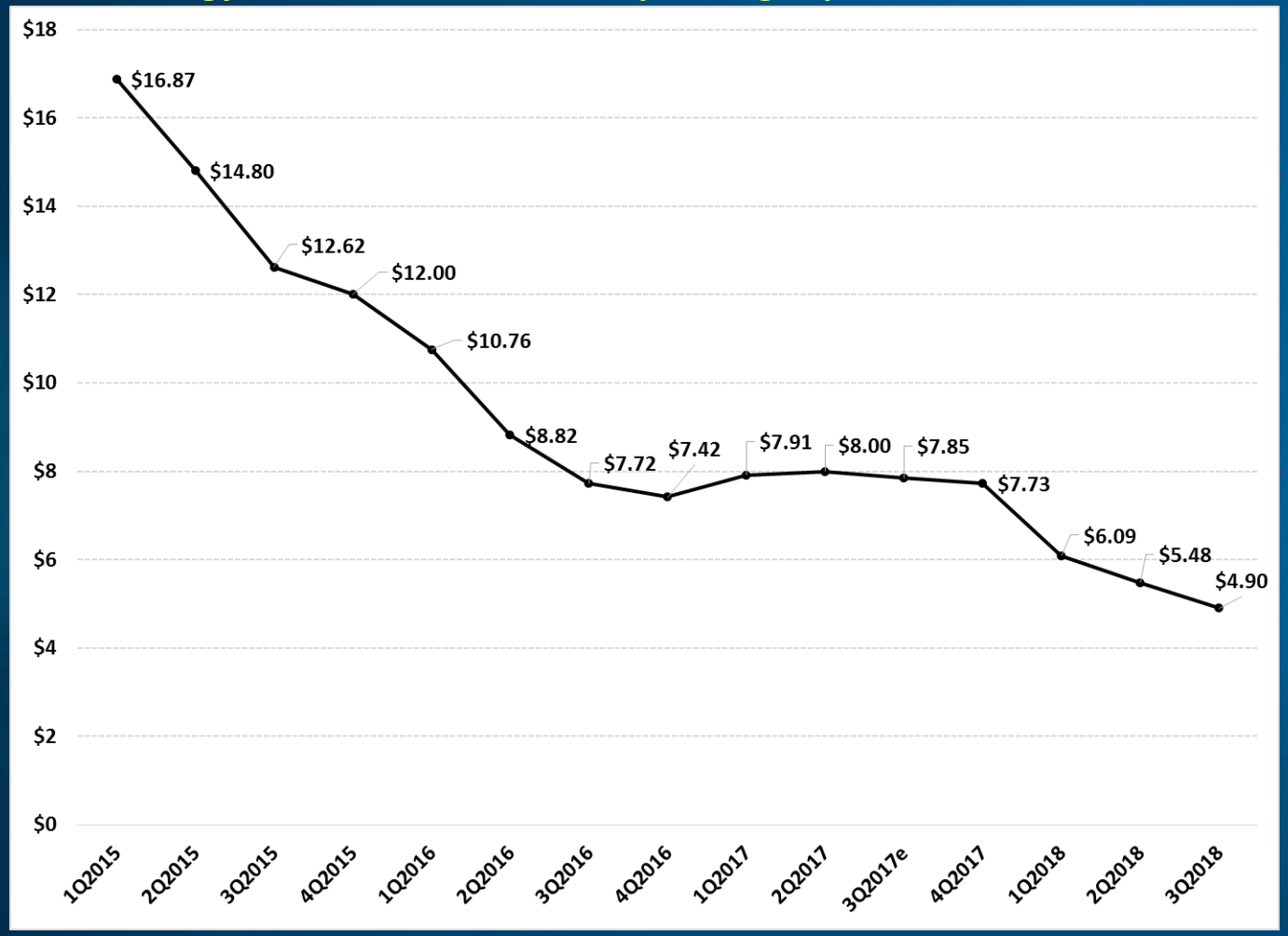


Source: EIA, OPEC Monthly Oil Market Report

Permian Profitability Is an Infrastructure and Integration Game—Water is Key

- The molecular endowment of a given block of acreage is geologically fixed, but the other elements of the unconventional oil & gas development equation are highly dynamic. These include drilling and completion costs, materials sourcing, and midstream services to evacuate oil, gas, and produced water. All are subject to cost reduction via technological improvements--and most of all--solutions delivered through more deeply integrated infrastructure and when feasible, economies of scale.

Devon Energy Delaware Basin Lease Operating Expenses, $/BOE



Source: Company Reports, Author's Estimate

What Management Said Almost 2 Years Ago:
"The majority of these cost savings are expected to be sustainable due to significant enhancements in the power and water-handling infrastructure over the past few years."
—Devon Q4 2016 Operations Report

What is Happening Now:
The company's investments in fixed infrastructure like power and pipelines, as well as sand, dedicated rigs, and frac crews appear to be delivering lower operating expenses even as activity heats back up and service cost inflation looms Basin-wide.

Cost savings ultimately accrue to the bottom line, as Devon reported $66 million in free cashflow on $322 million of revenue in 2Q2018 for its Delaware Basin assets.

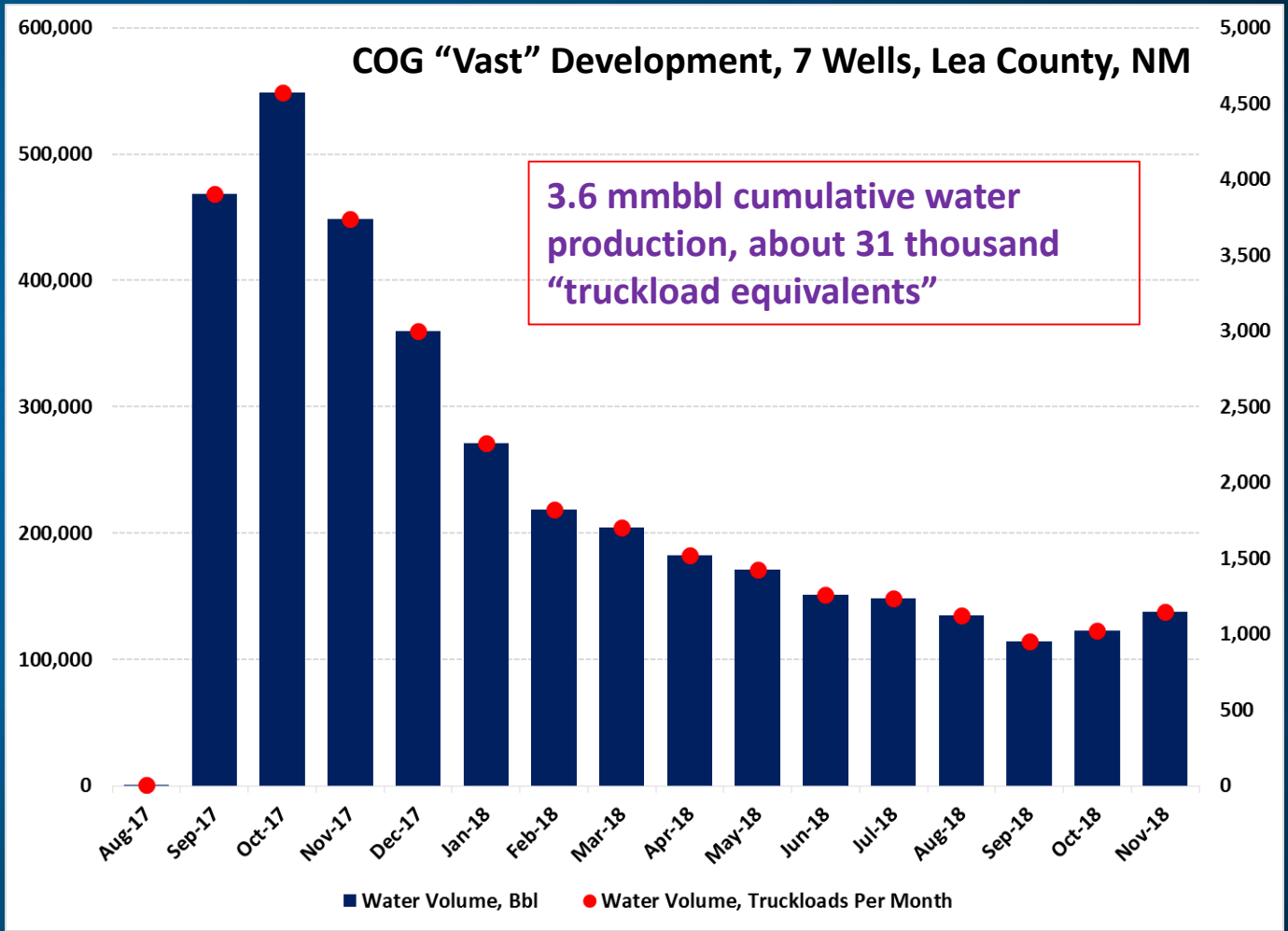
Integrated Water Services: Scale Drives Value and is Operationally Necessary

Demand Side

Frac water demand, '000 bpd	
3-Rig Program	39
5-Rig Program	66
7-Rig Program	92
10-Rig Program	132

- These projections assume 8.0 wells completed per year per rig (based on 9+ wells completed per rig per year implied from annualizing COG's data fro the first 3 quarters of 2018) and an average volume of 600 thousand barrels of water per frac. Increasing productivity from pad drilling and/or larger frac sizes could significantly increase the water volume demanded per active rig.

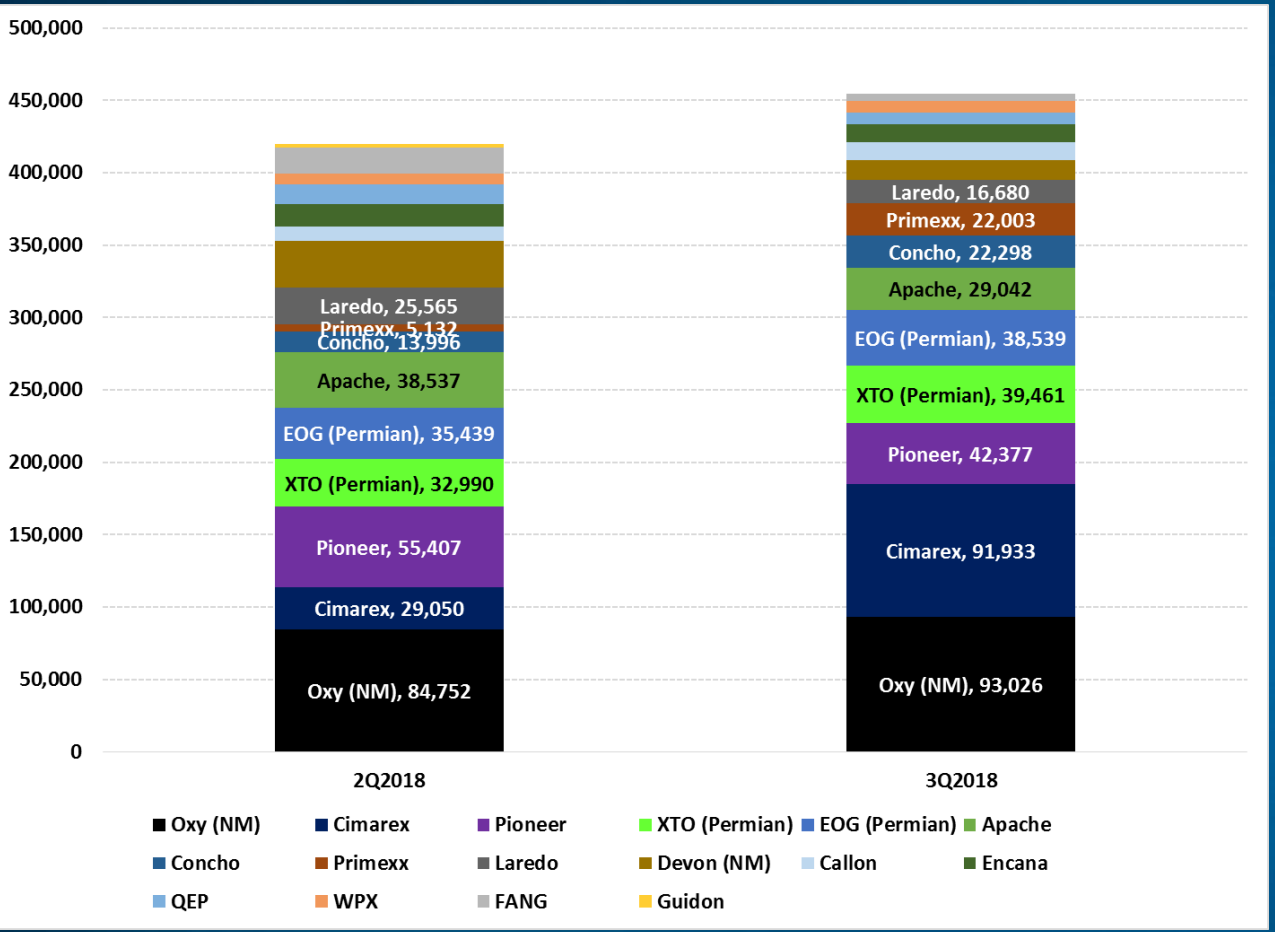
Supply Side—For SWDs, Recycling, and in the Future, Re-Purposing



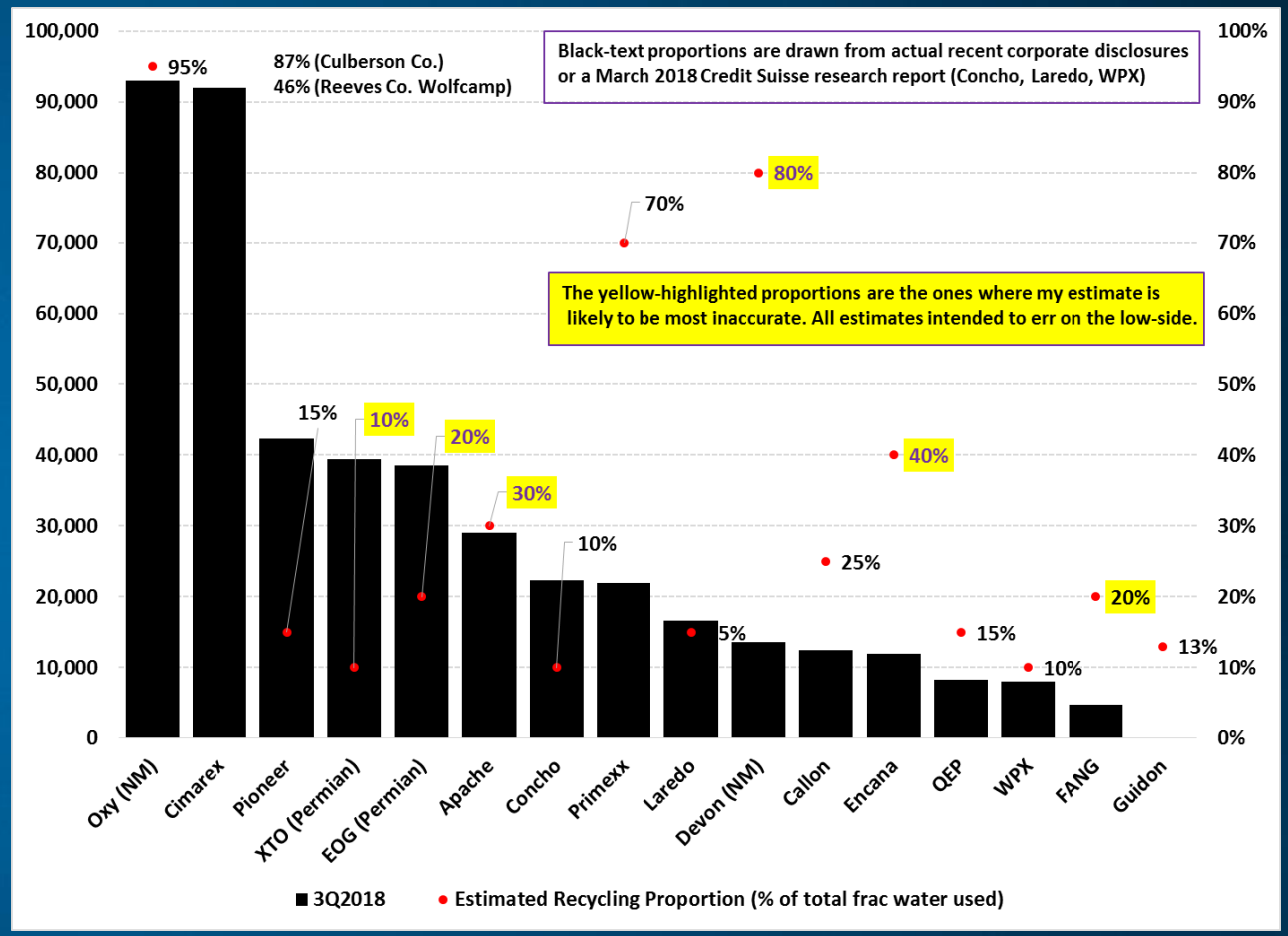
Source: NM OCD, Author's Analysis

Recycled Water Could Now Account for Close to 10% of Permian Frac Sourcewater Supplies

Estimated Daily Average Recycled Water Volumes by Selected Permian Operators, Bpd



Estimated Proportion of Recycled Water as % of Total Frac Fluid Stream, 3Q2018

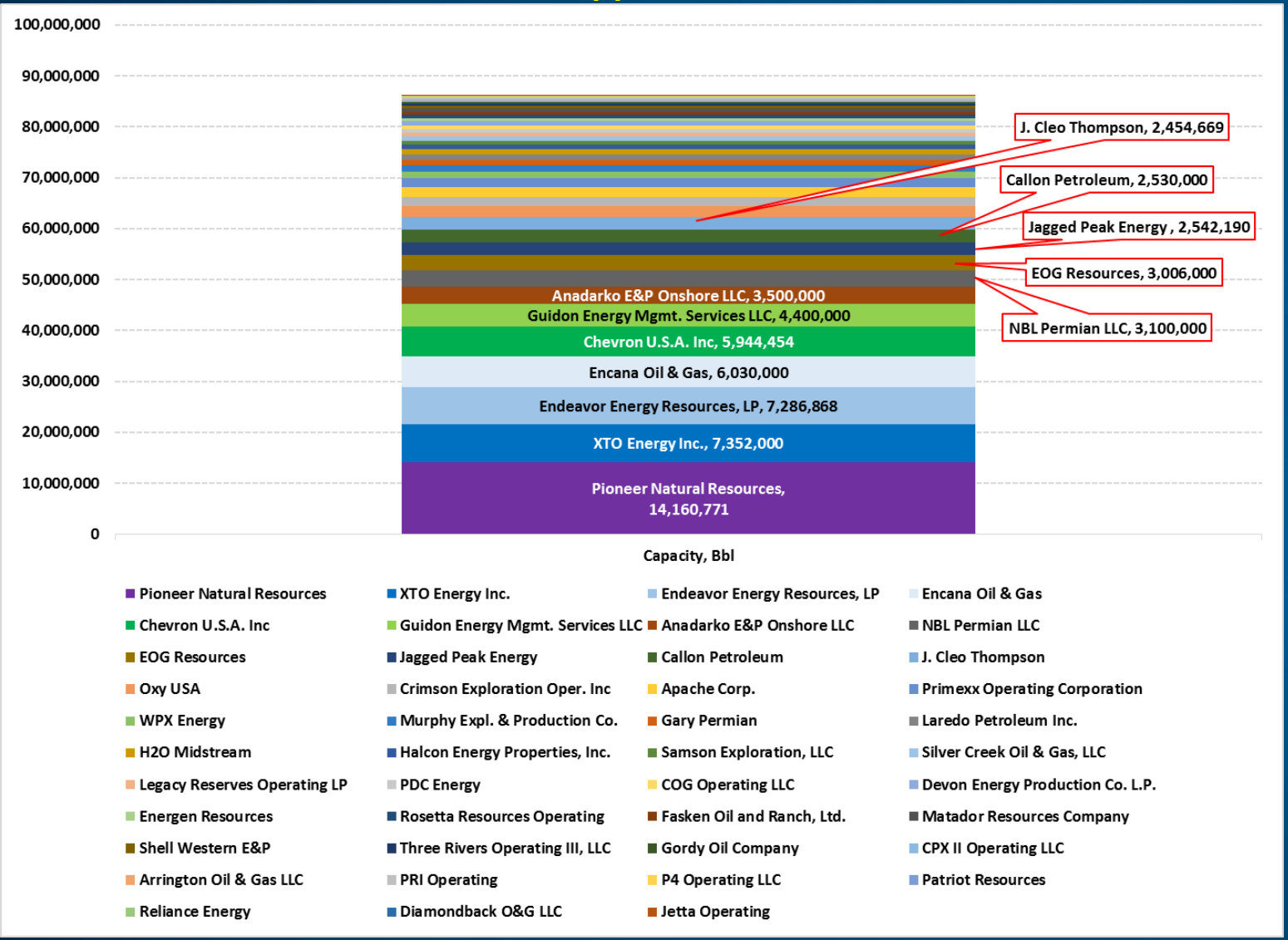


Source: Company Reports, Credit Suisse, Author's Estimates

- Methodology: Take management statements to investors, any other corporate communications I could locate detailing produced water re-use intentions or actual volumes/proportions, and a Credit Suisse research report on the same topic, apply these numbers to frac water usage data each operator reported to FracFocus and estimate recycling volumes for 2Q2018 and 3Q2018.

Companies Are Gearing Up to Recycle More Produced Water

Non-Commercial Fluid Recycling Pit Capacity Companies Have Sought Texas RRC Approval For, Bbl



Source: Texas RRC

Company-level Permian Recycling Plans

- **Apache**—"…by year-end, we feel like we'll be able to utilize about 80% of recycled water for our fracs [*at Alpine High*]." (2Q2018 Earnings Call)
- **Devon**— "~80% of total water used in operations is recycled" [*NM Delaware Basin*] (EnergyPlex Presentation, 2018)
- **Encana**—"We expect average 40% recycled water use in the basin with some cubes as high as 80%..." (2Q2018 Earnings Call)
- **Guidon Energy**—"Once infrastructure was built, we began using 13/87 produced/fresh mix for all fracs." (May 2018 Presentation)
- **Noble**—"And by the end of the year [2018], I'd expect over 30% of the water used in our fracs to be recycled produced water." (2Q2018 Earnings Call)
- **Pioneer Natural Resources**—"Right now, we're increasing our reuse volumes of our produced water to the point where it's going to represent 15% to 20% of our water volumes in the fourth quarter this year." (2Q2018 Earnings Call)

Integrated Water Services: Recycling Economics

Recycle & Re-Sell: "Wellhead to Wellhead" Costs and Value

	Low Case	Base Case	High Case
Cost of moving PW to recycle center	($0.05)	($0.05)	($0.05)
Skim oil credit	$0.20	$0.20	$0.20
Cost of treating PW	($0.30)	($0.30)	($0.30)
Moving clean brine to customer's frac pit	($0.05)	($0.05)	($0.05)
Solids disposal	($0.05)	($0.03)	($0.03)
Freshwater for blending	($0.02)	($0.02)	($0.02)
Price charged to E&P	$0.40	$0.55	$0.75
Net value to Recycler	**$0.13**	**$0.30**	**$0.50**

Economics of Avoiding Disposal Costs

Each million barrels recycled can potentially reduce water-related costs by $250,000 in the most intense phases of an asset's development cycle

	Water Sourcing (Cost Delivered into Central Pit)	Flowback Services (spread over first 90 days' est. water volume)	Gathering and Disposal Cost, Commercial SWD (on Pipe)	Gathering and Disposal Cost, Commercial SWD (trucked)	Gathering and Disposal Cost, Proprietary SWD	E&P's Total Lifecycle Cost Per Bbl of Water
"Status Quo" Full-Cycle Permian Water Cost, Trucked Disposal	$0.50	$0.17	X	$2.00	X	$2.67
"Status Quo" Full-Cycle Permian Water Cost, Pipe Disposal	$0.50	$0.17	$0.75	X	X	$1.42
"Status Quo" Full-Cycle Permian Water Cost, Pipe Disposal via Proprietary SWD	$0.50	$0.17	X	X	$0.30	$0.97
Total Cost to E&P, Recycled Water	$0.55	$0.17	X	X	X	$0.72

Can Greater Recycling Help Optimize the Oilfield Water Investment Cycle?

CAPEX to Dispose of 50 kbd of Produced Water

Option 1: Delaware Sands SWD

2 wells @ 25 kbd per well
X
$5 million-to-$6.5 million per well
$10 million-to-$13 million

Option 2: Devonian/Ellenburger SWD

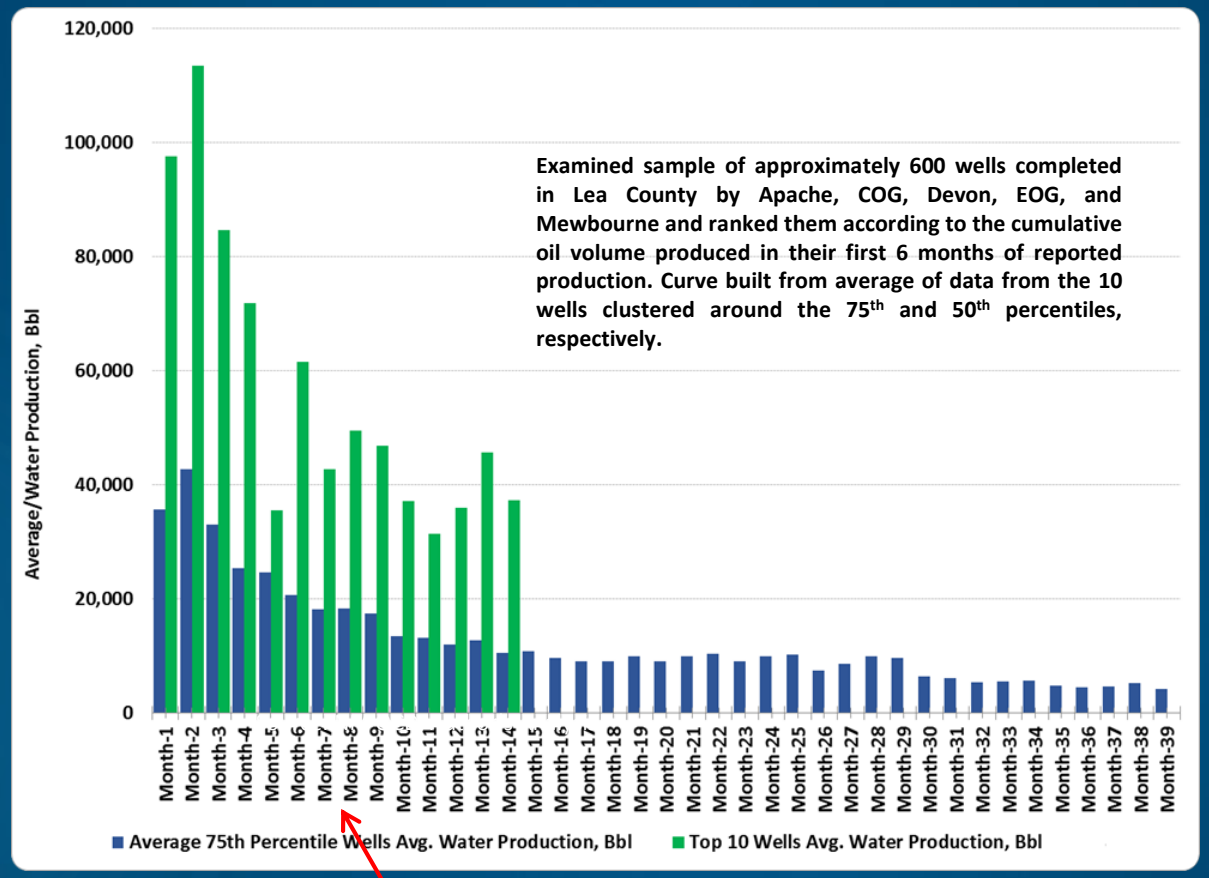
2 wells @ 25 kbd per well
X
$8 million-to-$12 million per well
$16 million-to-$24 million

Option 3: Recycling

1000 kb pond capacity @ $1.25/bbl of built storage
+
$1,000k for process units
$2.25 million

These impacts would become especially strong in an injection-constrained environment.

Water Production Profile of Top-Tier Wells in Lea County, NM



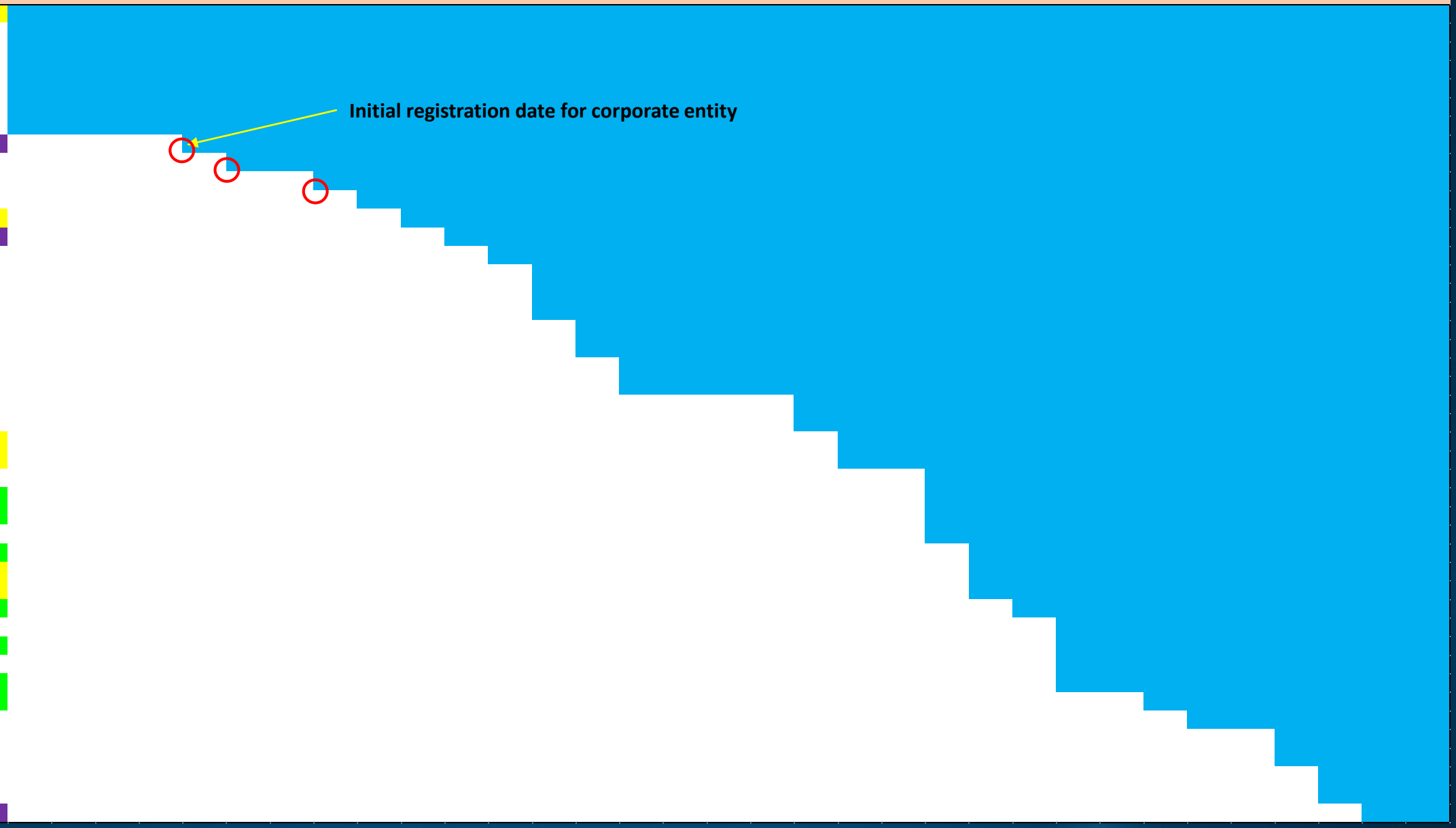
Peaky, front-loaded flows.

- CAPEX differences favor recycling. OPEX parameters will vary depending on scale and quality of incoming water, as well as E&P customer needs.
- The core question is: do recycling investments early in a play's development when frac'ing is most intense and the demand for feedstock water is highest help defer SWD investments that can then be made later when PW flows are more predictable and capital and capacity optimization are easier to do?

Valuation From The Investor Perspective

Permian Basin Oilfield Water Space Increasingly Popular

	1Q11	2Q11	3Q11	4Q11	1Q12	2Q12	3Q12	4Q12	1Q13	2Q13	3Q13	4Q13	1Q14	2Q14	3Q14	4Q14	1Q15	2Q15	3Q15	4Q15	1Q16	2Q16	3Q16	4Q16	1Q17	2Q17	3Q17	4Q17	1Q18	2Q18	3Q18	4Q18	1Q19
Permian Crude Output, Kbd	992	1,001	1,041	1,095	1,139	1,167	1,202	1,265	1,290	1,342	1,408	1,444	1,545	1,590	1,670	1,807	1,886	1,897	1,935	1,847	1,983	1,997	2,042	2,121	2,270	2,414	2,592	2,859	3,161	3,377	3,643	3,800	



Source: Company Reports, Corporation Wiki, EIA (Permian crude data)

Valuing Produced Water Assets: Developers' Seeking Liquidity Events

Announced Date	Basin	Acquirer	Asset	Seller	Price (Million USD)	EV/EBITDA Multiple	Contract Length
September 2015	Appalachia	Antero Midstream Partners, L.P.	integrated water services system, dropdown	Antero Resources	$1,050	8.5-9.0X	20 yrs + MVC+ ROFR on future drilling areas
June 2017	DJ, Permian	NBLX/affiliated DevCos	multiple asset dropdown	NBL	$270	8.2-9.2X	15-yr fee-based
July 2017	Multiple	Select Energy	Rockwater	SCF Partners	$516	7.2X	-
February 2018	Permian	TETRA Technologies	SwiftWater Energy Services	SwiftWater	**$85** (including $15 million in potential earnout payments)	**4.3-5.3X** (based on NTM expected EBITDA)	-
October 2018	Permian	Waterbridge	Halcón Delaware water infrastructure	Halcón	**$200 million** (not counting potential $125 million of incentive payments)	~9X	-

Gabriel Collins, "*What Does it Take to Create a Billion Dollar Oilfield Water Midstream Company?*," PWS Permian Basin 2018 Symposium, 9 August 2018, Midland County Horseshoe Arena & Pavilion, https://www.bakerinstitute.org/media/files/files/6268339d/collins-oilfieldwatercompany.pdf

Which developer will be the first to test the IPO market?

Simple rule of thumb:
at $0.75/bbl, an enterprise handling 500 kbd of produced water could potentially justify a billion dollar valuation.

Another Valuation Variable: The Role of Investor Expectations

- Private equity funds generally target a 2.5 times multiple of invested capital ("MOIC") when they sell a business.

HARVARD | BUSINESS | SCHOOL

2015 HBS Study

What Do Private Equity Firms Say They Do?

Paul Gompers
Steven N. Kaplan
Vladimir Mukharlyamov

Working Paper 15-081

Sample data from a real-world, big name PE fund
Carlyle Group investor slides, June 2018

Key Points

- **Superior, diversified track record**
  - **2.5X MOIC on realized and partially realized investments**
  - **13 significant fund families**
  - **Experience across multiple deployment and exit cycles**

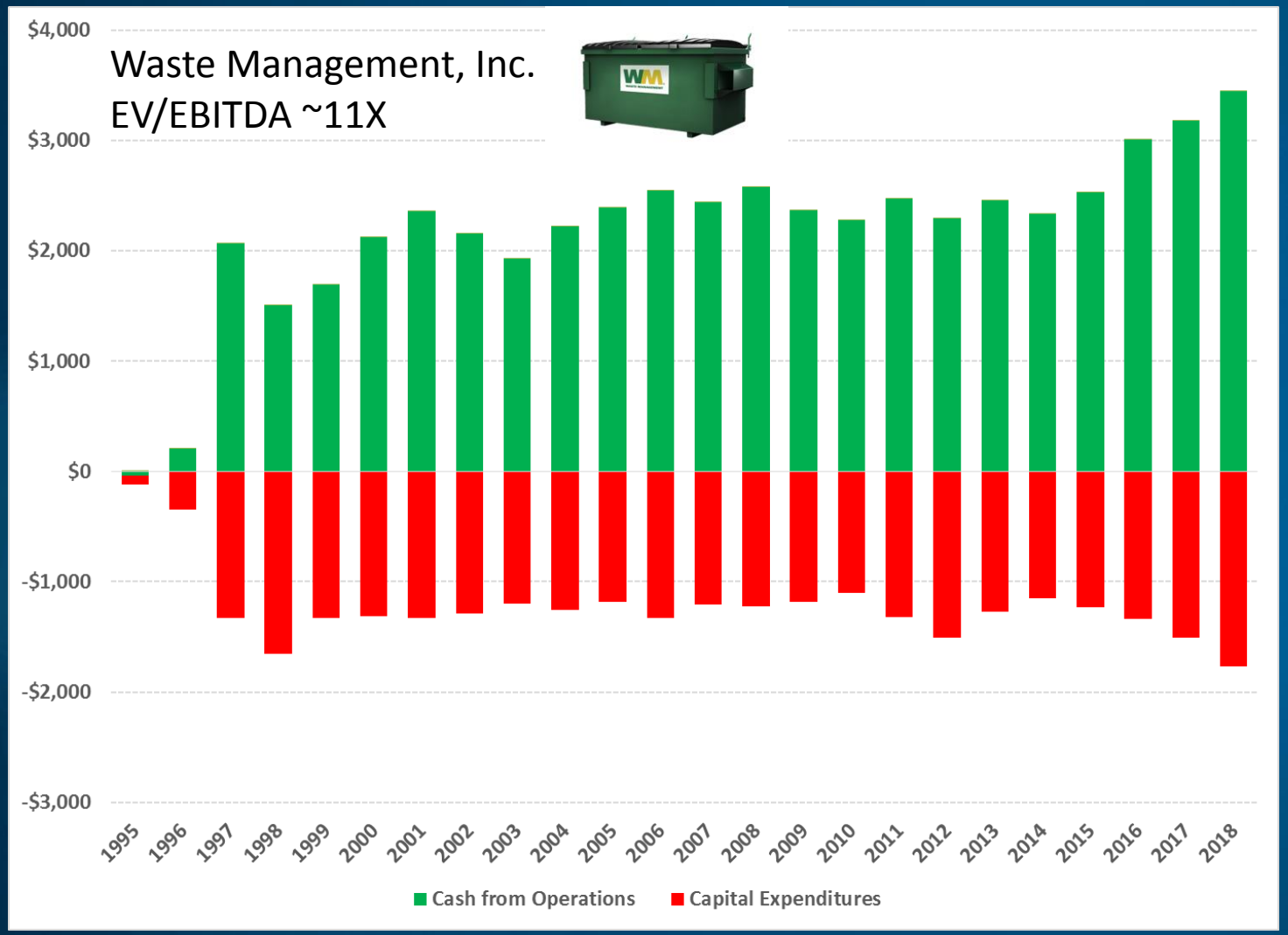
Table 9: MOIC
The target value of gross MOIC used by PE investors.

			AUM			IRR			Age			Offices	
	Mean	Median	Low	High		Low	High		Old	Young		Local	Global
Multiple	2.85	2.50	3.16	2.54	**	2.51	2.56		2.50	3.14	**	2.98	2.67
Number of responses	62	62	31	31		24	21		28	34		36	26

This matters because… ~$200 million/system X 2 systems = $400 million invested. A 2.5X MOIC thus equals approx. $1 billion—roughly the enterprise valuation of our hypothetical system at a 7.0X EBITDA multiple.

Valuing Produced Water Assets: A Possible Public Market Analogue

Where might the financial profile of integrated water services eventually head?



Source: Bloomberg, Waste Management

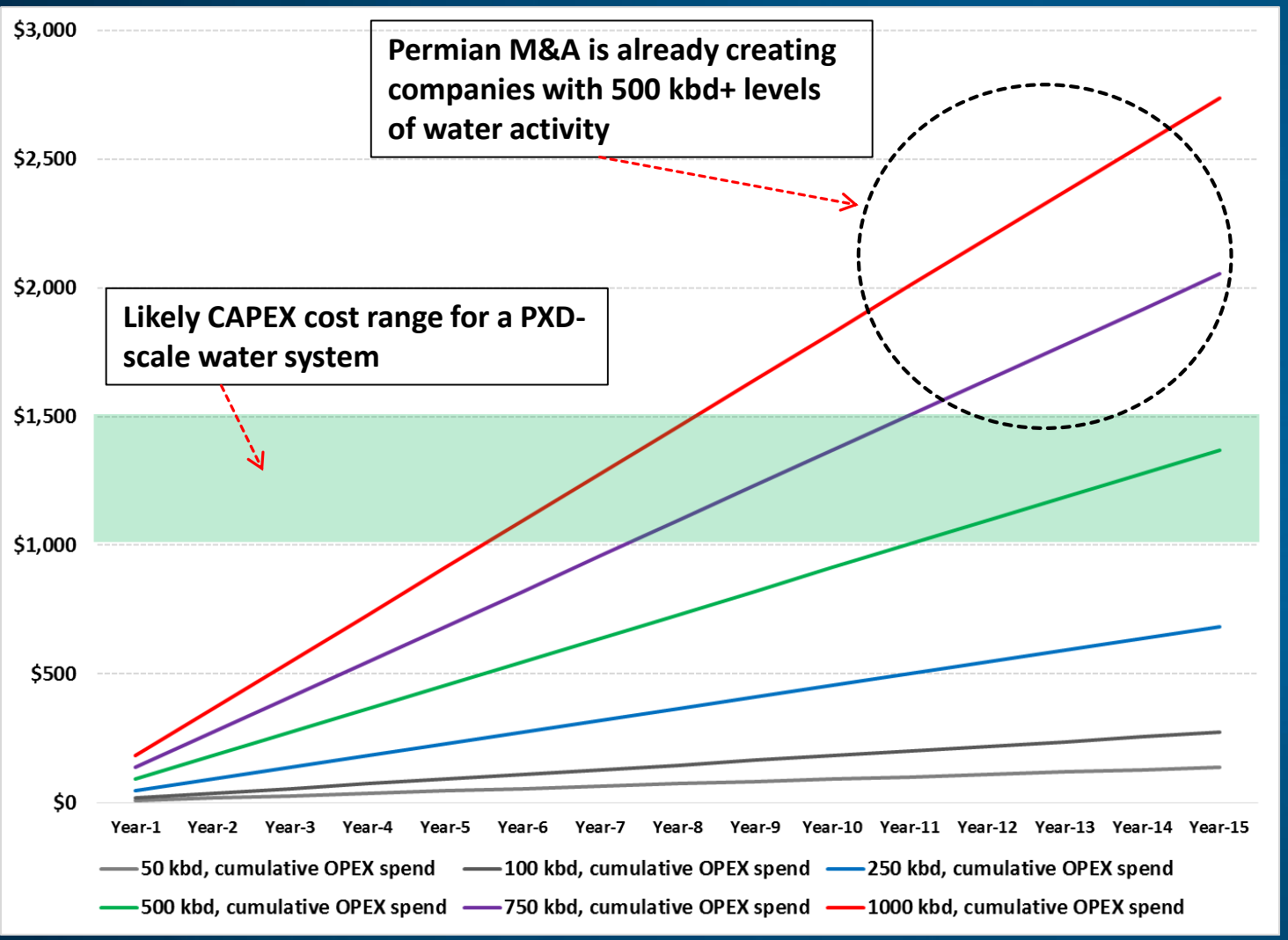
Important Adjustment Factors to Consider

1. Strength of contracts
2. Diversity of customer base
3. Hydrogeological trends in market area
4. Potential for tie-ins with other pipeline operators' systems
5. Infrastructure integrity
   a. In particular, what are the SWDs' downhole conditions like?
   b. Potential buyers of water midstream firms would be wise to conduct full downhole and engineering diligence to make sure they aren't buying a set of components intended for 5 years of use that are now in their 4th year of operation.

Valuation From The E&P a/k/a "Customer" Perspective

Valuing Produced Water Assets: Cost-Avoidance Perspective

Cumulative OPEX at $0.50/bbl Disposal Cost



For Big, Blocky Acreage Firms, In-House Water Systems May Offer Market Optionality As Well

As filed with the Securities and Exchange Commission on August 7, 2018

Registration No. 333-

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

RATTLER MIDSTREAM PARTNERS LP
(Exact Name of Registrant as Specified in Its Charter)

Delaware	4922	83-1404608
(State or Other Jurisdiction of Incorporation or Organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

500 West Texas Avenue
Suite 1200
Midland, Texas 79701
(432) 221-7400
(Address, including Zip Code, and Telephone Number, including Area Code, of Registrant's Principal Executive Offices)

Teresa L. Dick
Chief Financial Officer
9400 N. Broadway
Suite 700
Oklahoma City, Oklahoma 73114
(405) 463-6900
(Name, address, including zip code and telephone number, including area code, of agent for service)

DIAMONDBACK Energy

Transformational Combination with Energen

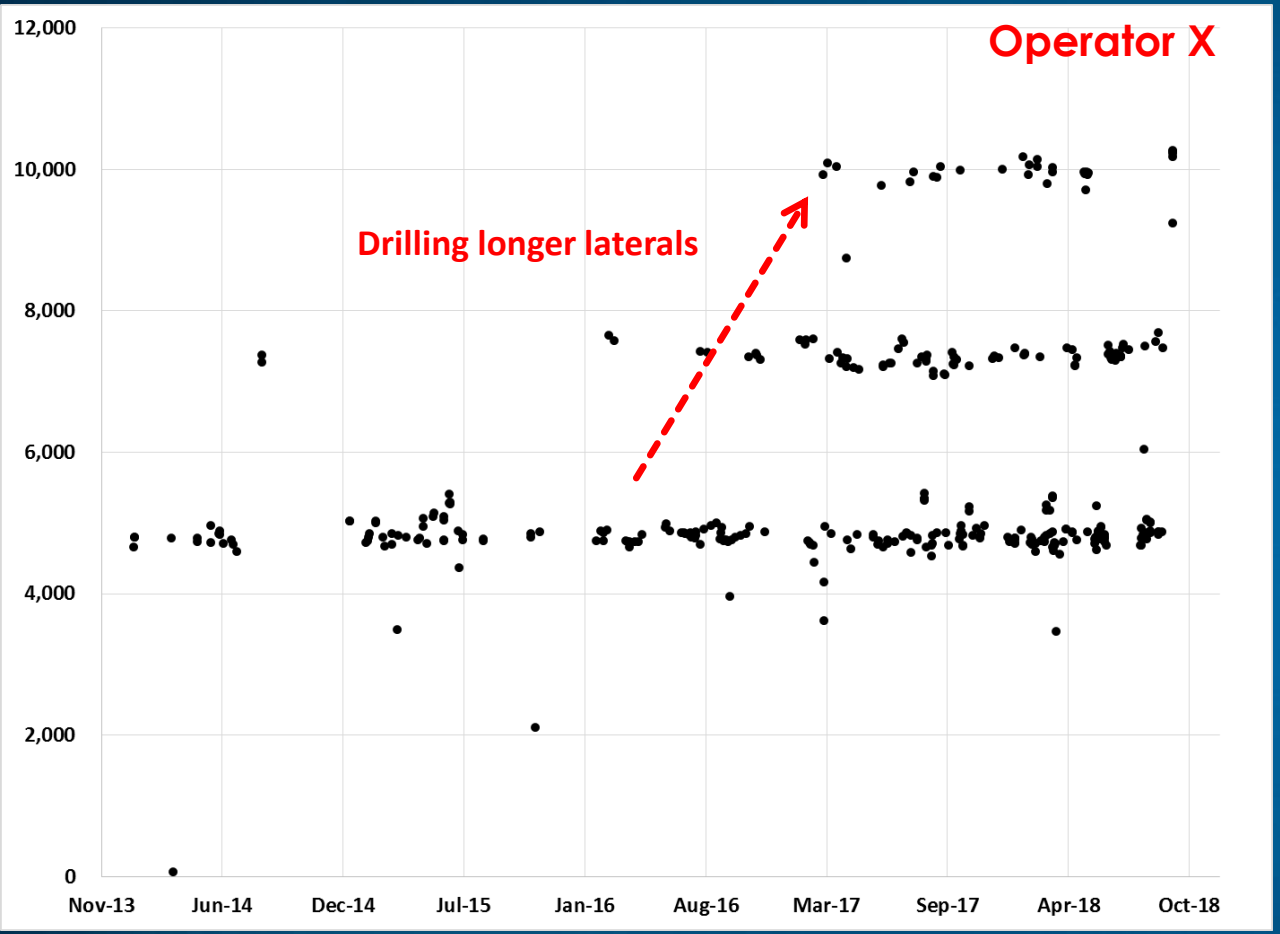
August 14, 2018

Important Decision for E&Ps: Is Water Better Handled as a CAPEX Item or an OPEX Item?

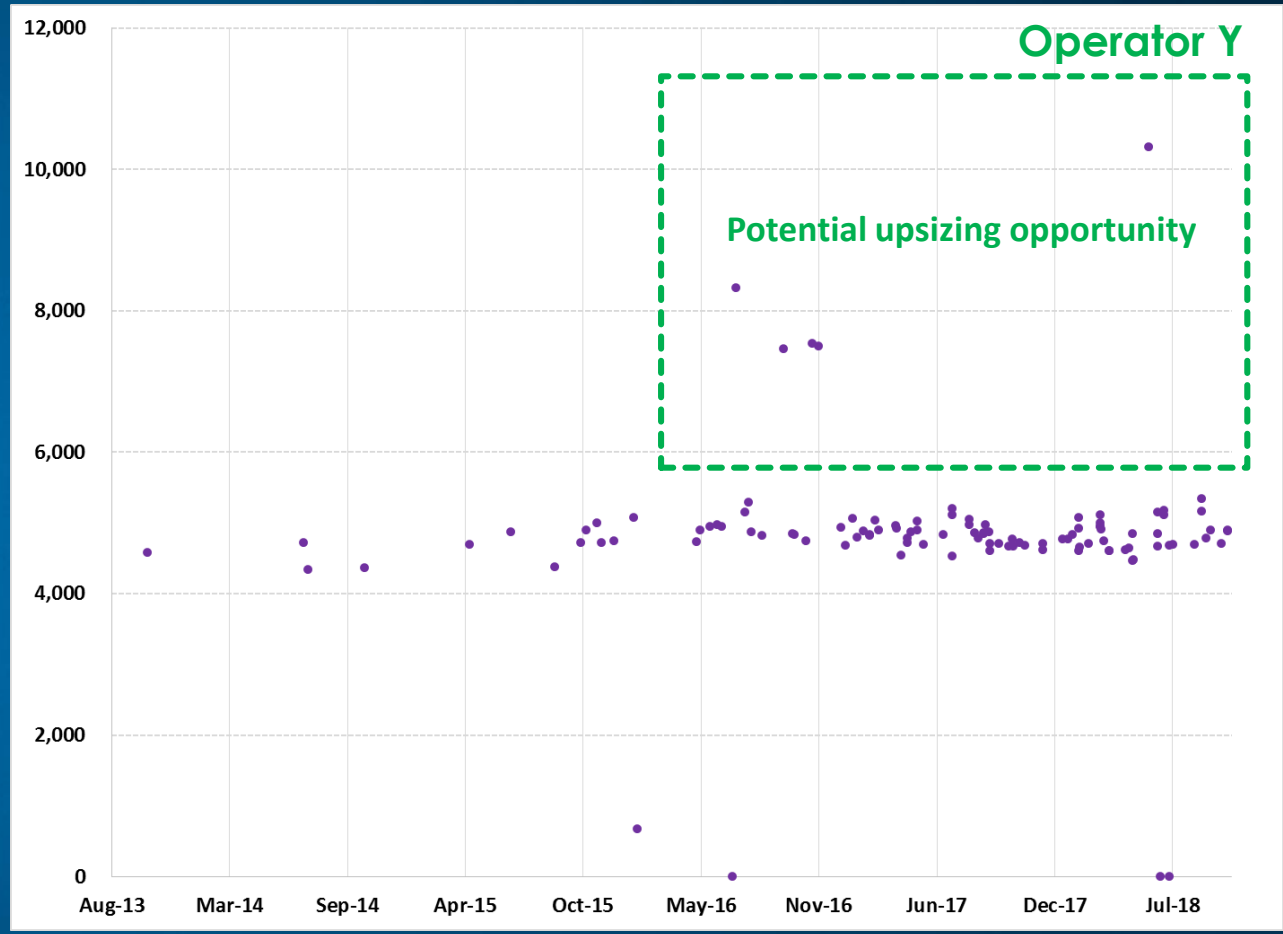
Takeover Logic Hypothetical Example: Capturing Scale Up Opportunities

1. Potential Acquirer is Scaling Up

Lateral Length, ft



2. Potential Acquiree (Ideally Adjacent) Has Proven Acreage But Not Yet Scaled Up



Source: NM OCD, Author's Analysis (*Research assistance provided by Nosa James)*

IDEA TIME

“Imagination is not to be divorced from the facts: it is a way of illuminating the facts.”

—Alfred North Whitehead, 1927

Tradable Produced Water: The New "WTS?"

At least one Texas-focused operator has already contemplated a world in which produced water carries a commercial price tag.

Halcón Resources Investor Presentation

February 28, 2018

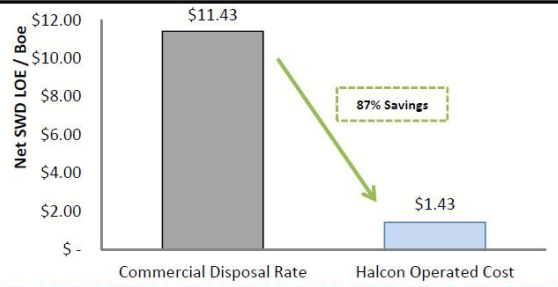
Halcón Field Services

Water Management Advantages

Key Infrastructure for Cost Control

- Operational Advantages
  - Eliminates dependence on 3rd party sources for water disposal and completions
  - Simplifies operations to handle and source all water within our own field
  - Critical to control own destiny with regards to infrastructure, especially water infrastructure
- Value of these assets growing rapidly as production and expansion of capacity continues

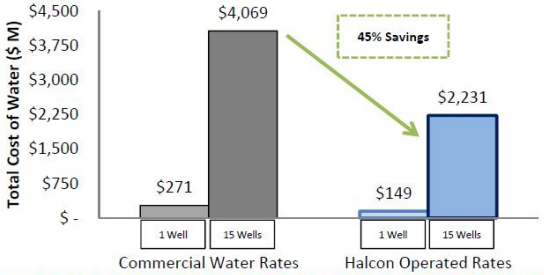
Hackberry Draw SWD LOE Cost Control Example (1,2,6)



Estimated savings of ~$1.7 MM /well during first year of production

Hackberry Draw Water Recycling Facility

Water for Completions Cost Control (3,4,5,6)



Estimated savings of ~$1.8 MM /rig/year (2)

(1) [illegible]
(2) Assumes Halcon Field Services handles produced water for $0.25 / bbl of water.
(3) Assumes blended water use of 75% recycled produced water and 25% fresh water.
(4) Assumes 1 rig drills and ROI's 15 wells per year.
(5) Assumes commercial water sourcing costs of $0.35 / bbl for produced water and $0.50 / bbl for fresh water.
(6) Assumes 100% WI and 75% [illegible]

22

Significant chemical, legal, and physical barriers to tradability remain, but the proper set of financial and legislative incentives would greatly facilitate produced water trading.

(5) Assumes commercial water sourcing costs of $0.35 / bbl for produced water and $0.50 / bbl for fresh water.

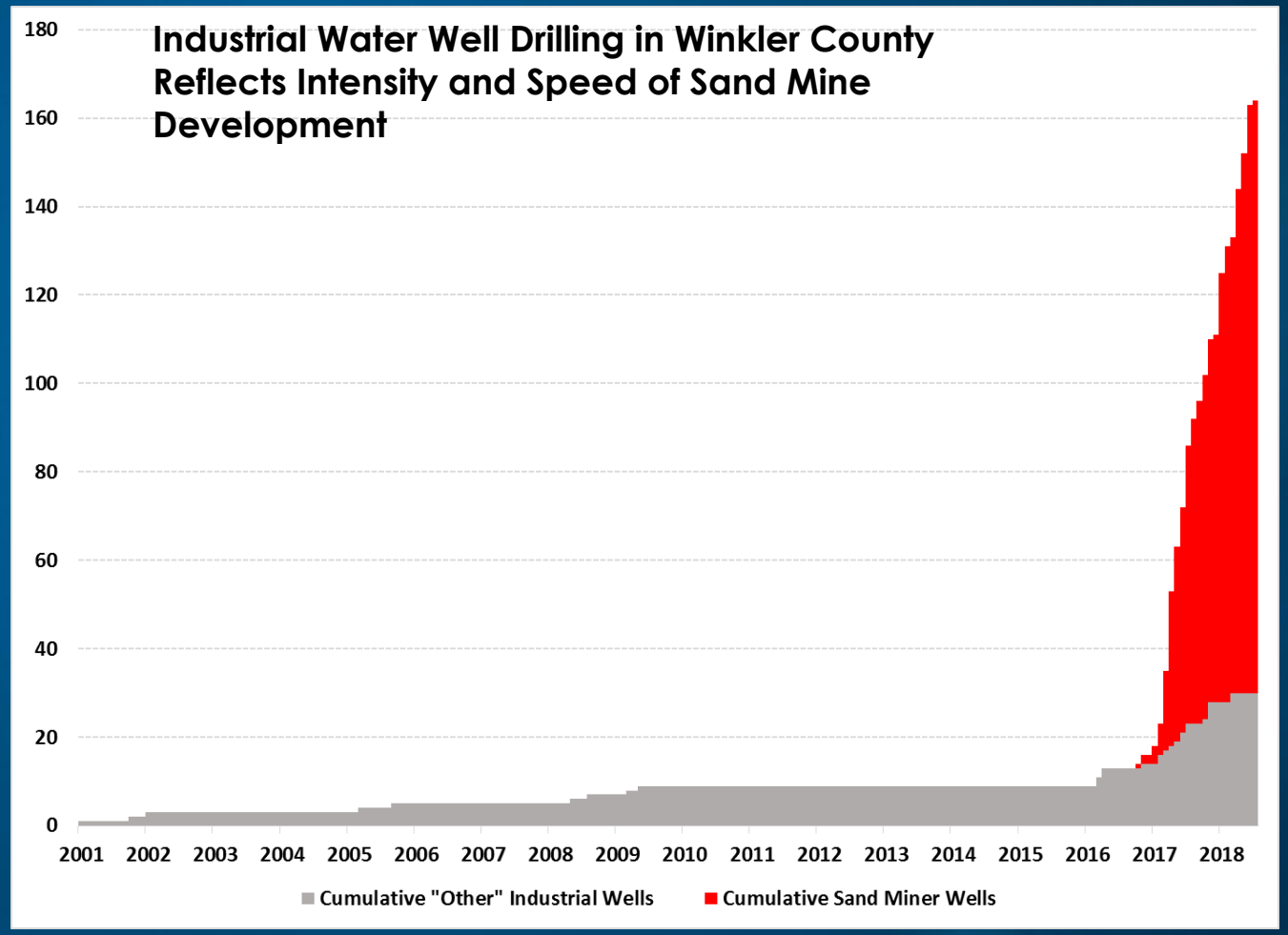
Oilfield Input Transitions Can Happen *Fast*

- Consider the velocity at which E&Ps are adopting In-Basin frac sand.
- It took a while for the transition to reach a tipping point, but now sand suppliers are scaling up at warp speed to meet demand.

The Dunes at Kermit: March 2015

The Dunes at Kermit: September 2017

Source: YouTube, Midland Reporter Telegram



Source: TWDB, Author's Analysis

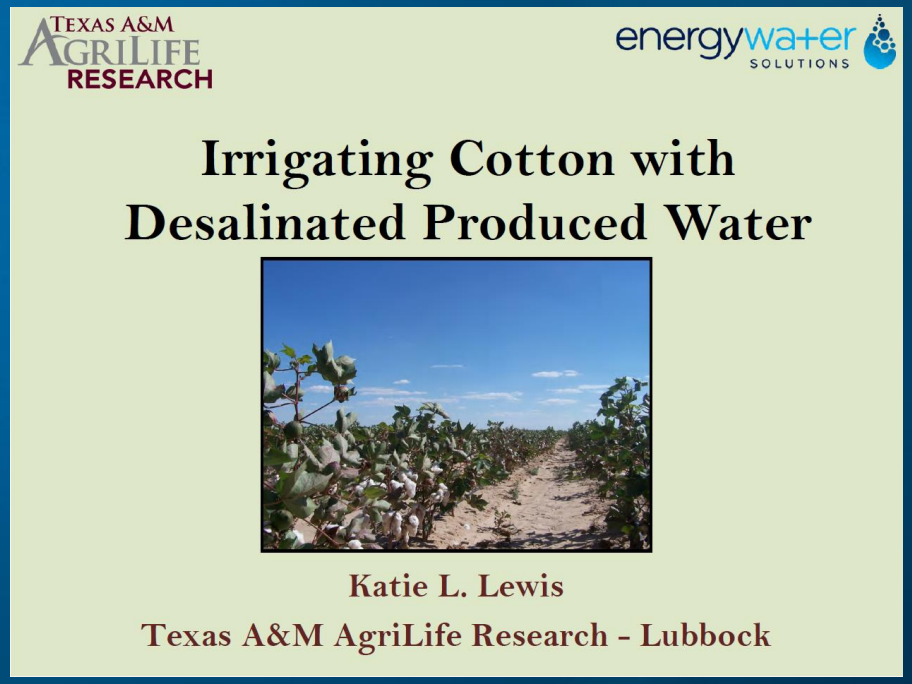
Produced Water Repurposing: Thinking Beyond the Oilfield

Large-scale midstream infrastructure has the potential to enable creative new uses of water that go beyond disposal and recycling alone. Here we are talking utility-scale systems with pipelines that could be 36” diameter or larger. These ideas also presuppose two other developments: (1) a higher degree of interconnection between oilfield water handling footprints, which at this point in time are highly fragmented and (2) lower-cost treatments that can provide “upgraded” produced water at scale.

It is also important to start thinking intensively now about re-purposing part of the produced water stream, so that the practices and technologies have a better chance of being in place when oilfield recycling demand begins to slow several years down the road as many parts of the Delaware and Midland Basins begin to mature.

A Few Potential Applications

- Non-food crops
- Pipeline to Gulf of Mexico
- Power plant cooling/industrial use
- Fuel algae



Source: https://vpr.colostate.edu/few/wp-content/uploads/sites/14/2016/07/Lewis-TAMU-AGL-NSF-FEW-workshop-12-2015.pdf

At What Price Would Treated Produced Water Become Practically Useful to Farmers?

For Biofuel Crops

Probably $0.10/bbl or less, assuming a 75% freshwater/25% treated PW irrigation blend

Alamo switchgrass grows well in TX climates and can be a feedstock for cellulosic ethanol production.

Source: USDA

For the Highest Value "Non-Food" Crops

Approximately $0.40/bbl, assuming a 75% freshwater/25% treated PW irrigation blend

Opium cultivation assuming that farmer sells morphine base instead of raw opium, such as that being harvested below by a farmer in southern Afghanistan.

Source: NPR

Disclaimer: The opium example is for illustrative purposes only.

At What Price Would Treated Produced Water Become Practically Useful to Farmers? Data Breakdown

Revenue		Quantity	Units	$/Unit	Total per Acre	Enterprise Total
Switchgrass		**5.668016**	**ton**	**$140.00**	**$793.52**	**$396,761.13**
Variable Costs						
Fertilizer						
	N-32 in water	20	lb	$0.39	$7.80	$3,900.00
	Urea, Solid (46% N)	45	lb	$0.20	$8.89	$4,443.75
Herbicide						
	2-4-D Amine 4	40	ounce	$0.14	$5.60	$2,800.00
Other Labor						
	Hand labor	0.14	hr	$15.00	$2.10	$1,050.00
Irrigation						
	ac-in	22				
	bbl/ac, freshwater	10,668	$	$0.018	$186.69	$93,342.73
	bbl/ac, treated PW	3,556	$	**$0.075**	$266.69	$133,346.76
	Irrigation Labor	0.03	hr	$15.00	$0.45	$225.00
Machinery Labor						
	Tractors	3	hr	$12.00	$36.00	$18,000.00
Diesel Fuel						
	Tractors	16	gal	$3.00	$48.00	$272.06
Repairs & Maintenance						
	Irrigation Equipment	1	acre	$12.02	$12.02	$6,010.00
	Tractors	1	acre	$20.06	$20.06	$10,030.00
	Implements	1	acre	$1.73	$1.73	$865.00
Interest on Credit Line				6.5%	$3.46	$1,730.00
Total Variable Costs, Ex-irrigation					$599.49	$299,743.25
Planned Returns Above Variable Costs						
Breakeven price to cover variable costs				$105.77	ton	
Fixed Costs						
Machinery Depreciation						
	Irrigation Equipment	1	acre	$48.64	$48.64	$24,320.00
	Tractors	1	acre	$24.68	$24.68	$12,340.00
	Implements	1	acre	$3.87	$3.87	$1,935.00
Equipment Investment						
	Irrigation Equipment	$364.78	Dollars	6.50%	$23.71	$11,855.35
	Tractors	$182.60	Dollars	6.50%	$11.87	$5,934.50
	Implements	$30.54	Dollars	6.50%	$1.99	$992.55
Allocated Establishment Cost		1	acre	$41.84	$41.84	$20,920.00
Trans-Pecos Irrigated Land		1	acre	$40.00	$40.00	$20,000.00
Total Fixed Costs					$196.59	$98,297.40
Total Specified Costs					$796.08	$398,040.65
Returns Above Specified Costs					-$2.56	-$1,279.51
Breakeven Price to Cover Total Costs				$140.45	ton	

Source: TAMU Ag Extension, M.A. Sanderson et.al., "Switchgrass cultivars and germplasm for biomass feedstock production in Texas," Bioresource Technology 67 (1999) 209-219

Opium poppy cultivation

Crop Acres 500

Revenue	Quantity	Units	$/Unit	Total	Enterprise Total
Morphine	5.80	Pound	$1,125.23	$6,526.32	$3,263,157.89

Production Costs	$/Acre	$/bbl	Est. Irrigation Water		Enterprise Total
Seed	$4.05		22.28	ac-inches	
Sowing	$23.76		14,404	bbl/ac	
Fertilizer	$207.92				
Weeding +	$99.34				
Water	$5,689.59	**$0.40**			
Labor	$200.00				
Farm Services	$187.47				
Local Taxes	$101.21				
Total Costs	$6,513.33				
Net Income	$12.98				

Source: Mahdavi-Damghani et.al., Water stress effects on growth, development and yield of opium poppy (Papaver somniferum L.), Agricultural Wa Management, Volume 97, Issue 10, 2010, Pages 1582-1590, ISSN 0378-3774, https://doi.org/10.1016/j.agwat.2010.05.011; Katharine Sanderson, "Opiates for the Masses," Nature 449, 268-269 (2007), doi:10.1038/449268a; Rainer Gonzalez Palau, "The Decision to Plant Poppies: Irrigation, Profits & Alternatives Crops in Afghanistan," Civil-Military Fusion Centre, August 2012, https://reliefweb.int/sites/reliefweb.int/files/resources/Full_Report_4263.pdf; Chris Murray, "An Overview Of The Tasmanian Poppy Industry," GRD July 2014, https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2014/07/an-overview-of-the-tasmanian-poppy-industry

Accommodating Future PW Volumes Might Require Unorthodox Solutions

Example: ***What might the economics of piping produced water down to the Gulf Coast and discharging treated PW into the ocean or disposing of it in depleted offshore fields look like?***

Initial model based on Vista Ridge water pipeline to San Antonio.

- 142 miles
- $930 million project cost
- 54-inch steel line
- Projected to move ~1 million bwpd.

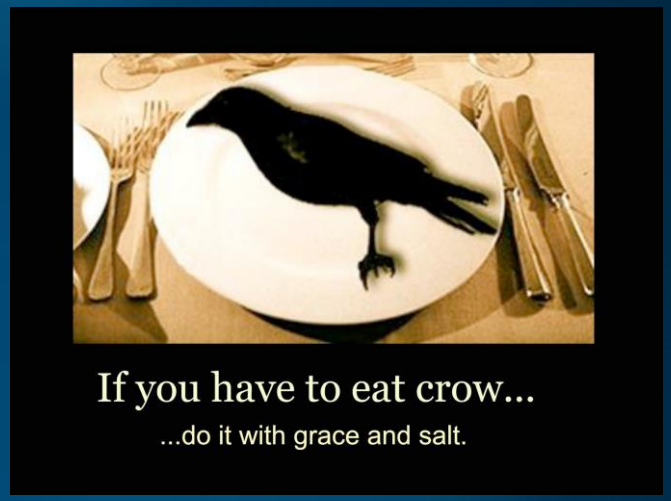
Using Vista Ridge's economics as a baseline, installing 5 X 54-Inch, 650-mile long water pipelines between Orla and Corpus Christi would cost about $16 billion and financed at a 4.5% interest rate over 20-years, would yield an estimated CAPEX cost of $0.66/bbl and OPEX cost of $0.23/bbl, for a delivered cost to the Gulf Coast of $0.89/bbl.

Permian Oilfield Water Predictions

A. **Within 12 months from today (start date August 2018)**
   - A major Permian-focused water midstream firm goes public or has a similarly large liquidity event
   - At least 3 additional large private equity companies enter the space
   - At least 3 sizeable (80 kbd+ avg. actual volume handled) water midstream firms in the Permian will be acquired by a larger player
   - Treated co-mingled produced water will began to be re-sold at a commercial price

B. **Within the next 24 months (by August 2020)**
   - There will have been a billion-dollar oilfield water transaction in the Permian
   - At least five Permian-focused entities other than Pioneer Water Management will be transporting and injecting 500 kbd or more of produced water

C. **Within the next 36 months (i.e. by August 2021)**
   - At least 4 million bpd of incremental produced water (relative to August 2018) must be handled



Source: Pinterest

Cutting-Edge Texas Groundwater and Oilfield Water Research

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- Gabriel Collins, *"Economic Valuation of Groundwater in Texas,"* Texas Water Journal, Vol. 9, No.1, 2018 (50-68), https://twj.media/economic-valuation-of-groundwater/, (peer reviewed)
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- Gabriel Collins, "*Blue Gold: Commoditize Groundwater and Use Correlative Management to Balance City, Farm, and Frac Water Use in Texas*," 55 Nat. Resources J. 441 (2015). (peer reviewed)

Appendix

Monetizing Oilfield Water

- Sell fresh water
- Sell brackish water
- Sell the groundwater rights
  - New Mexico: NGL Beckham and McCloy Ranch purchase in September 2018 (122 thousand acres for $93 million)
- Sell the groundwater estate (Texas)
- Charge royalties for saltwater disposal
- Sell a broader package of disposal rights
- Charge “trespass fees”
- Charge for pipeline transport of water and subsequent injection services
- Sell water gathering and handling dedications (E&Ps)
- Recycle and sell produced water
  - In practice, likely to be a blend of produced water and fresh/brackish groundwater or treated municipal effluent.
- Provide an integrated water services package that does all this and also includes transfer and chemical expertise