

Western States Land Commissioners Association

2020 Winter Conference



Austin, Texas
January 15, 2020



WATER SOLVED

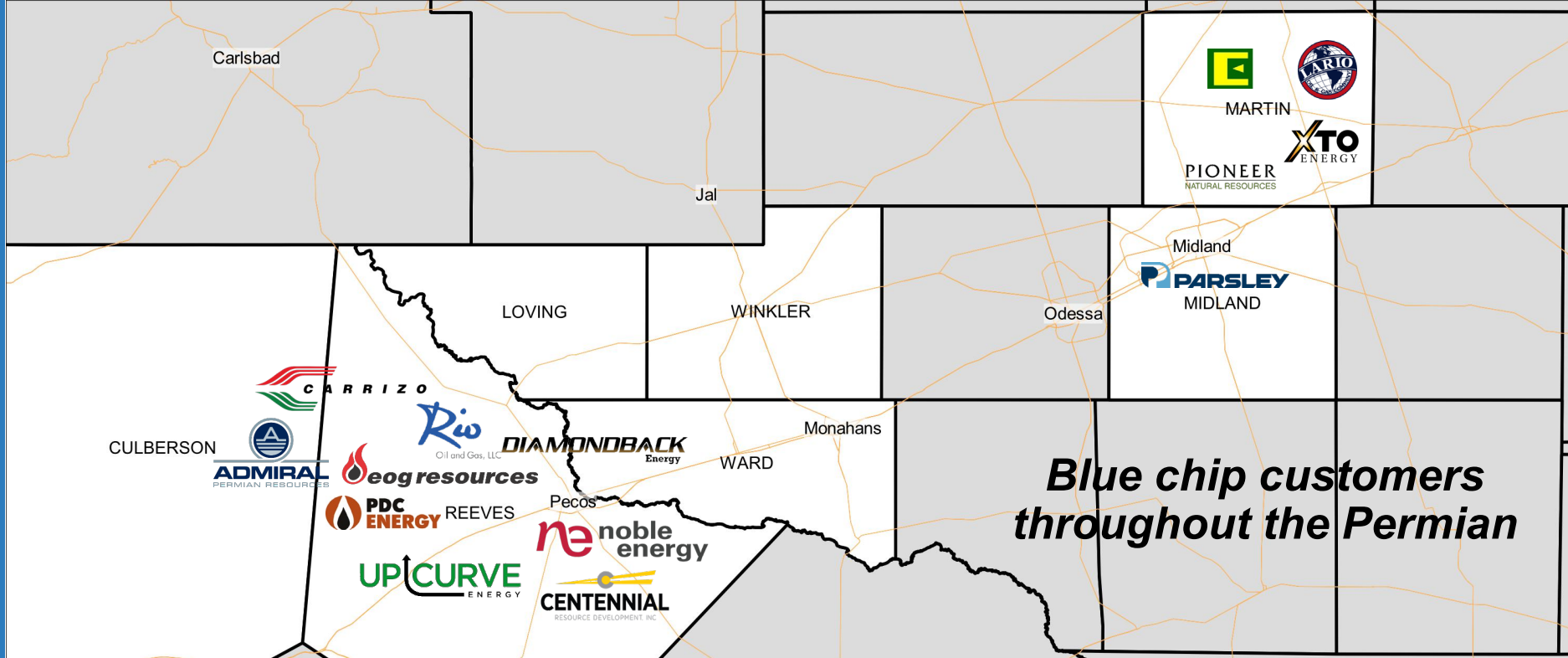
Speaker Introduction

J. Michael Anderson
Chief Executive Officer



- Over 25 years of finance, water and energy experience
- Founded Layne Water Midstream in 2016
- Led two IPOs of energy infrastructure companies as CFO
- Served as CFO and as CEO of Azurix, a water infrastructure company
- Former investment banker specializing in M&A with JPMorgan Chase
- MBA from The Wharton School of the University of Pennsylvania
- BBA from Texas Tech University





Layne Water Midstream Overview

- Full-cycle water midstream company in the Permian Basin
- Water sourcing, transportation, recycling and disposal services
- Long-term partnerships with Texas GLO and University Lands
- Founded in 2016 at Layne Christensen, a 135-year old water company
- Investors include Post Oak Energy Capital, Genesis Park and UTIMCO

Today's Agenda

- **What are the global water trends today?**
- **How does the energy sector use water?**
- **What is Water Midstream?**
- **Risks, issues and opportunities in Water Midstream**
- **Opportunities for land and water partnerships**
- **What does the future look like?**

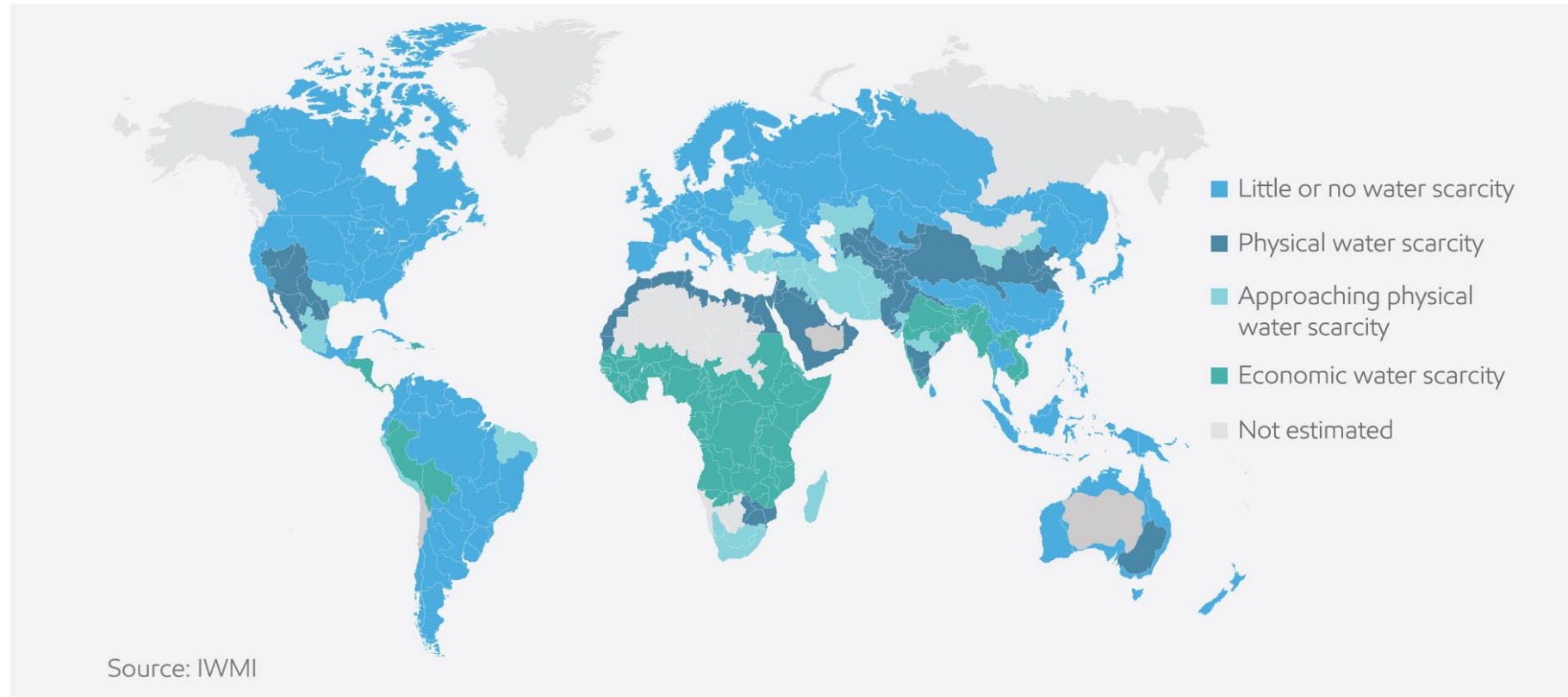
Recent Water Headlines

25% percent of the world's population live in regions with severe water scarcity

Water scarcity affects 2.8 billion people around the world at least once per year

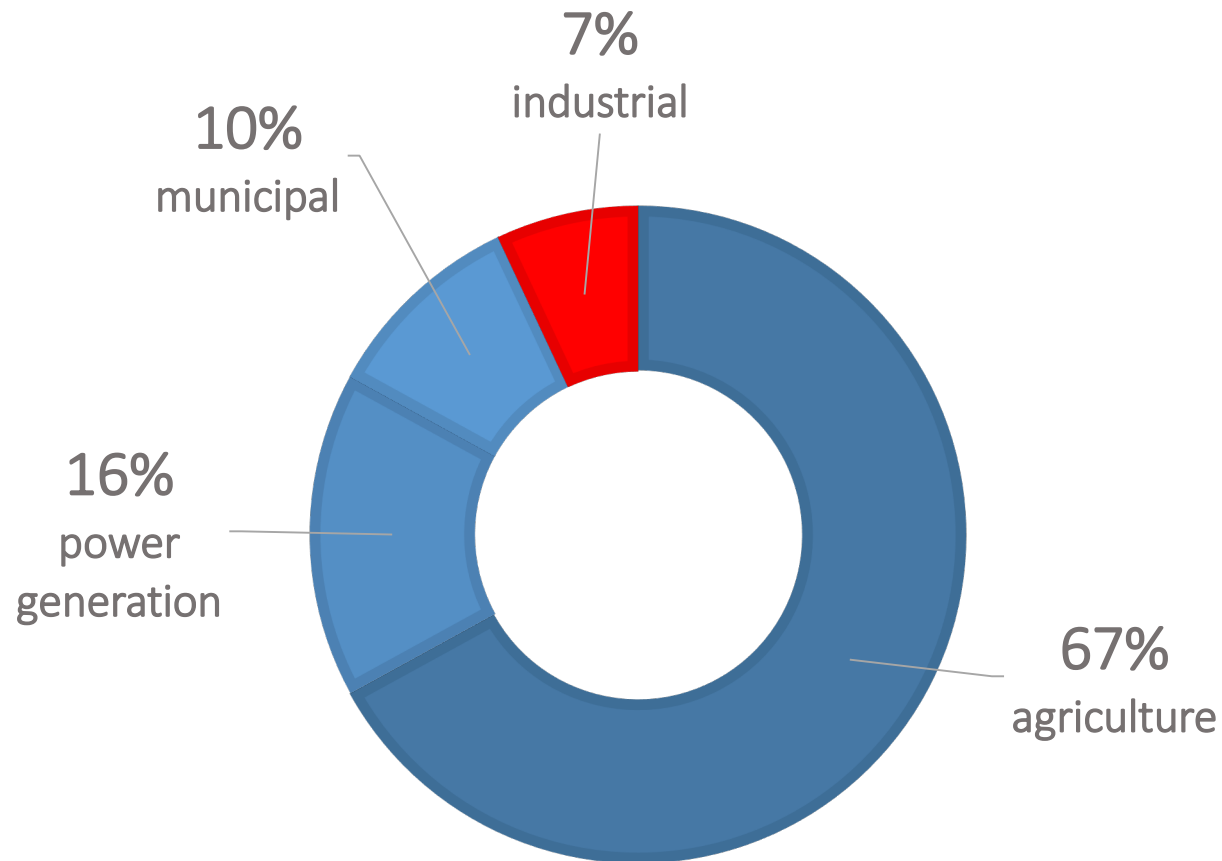
Nearly 1 billion people may not have access to water by 2025

Water Scarcity Across the Globe



Agriculture is Largest User of Water

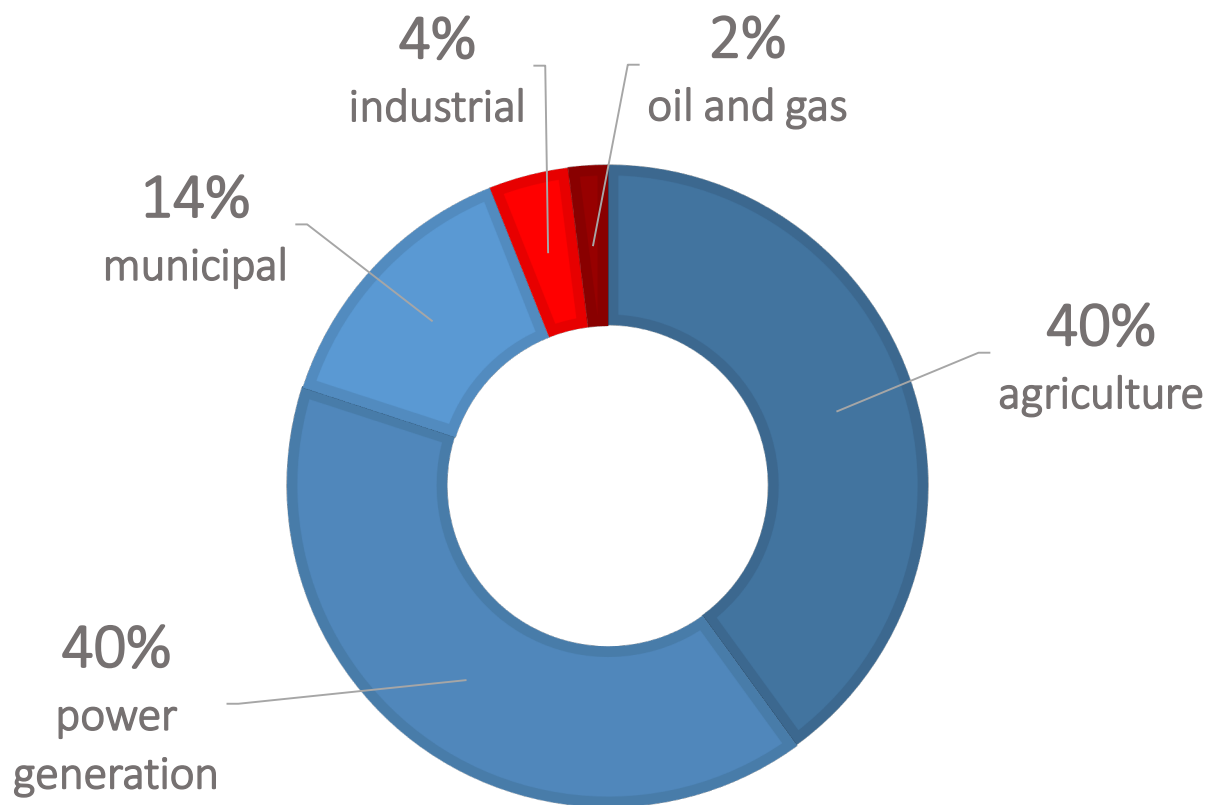
Global water usage estimates



ExxonMobil website

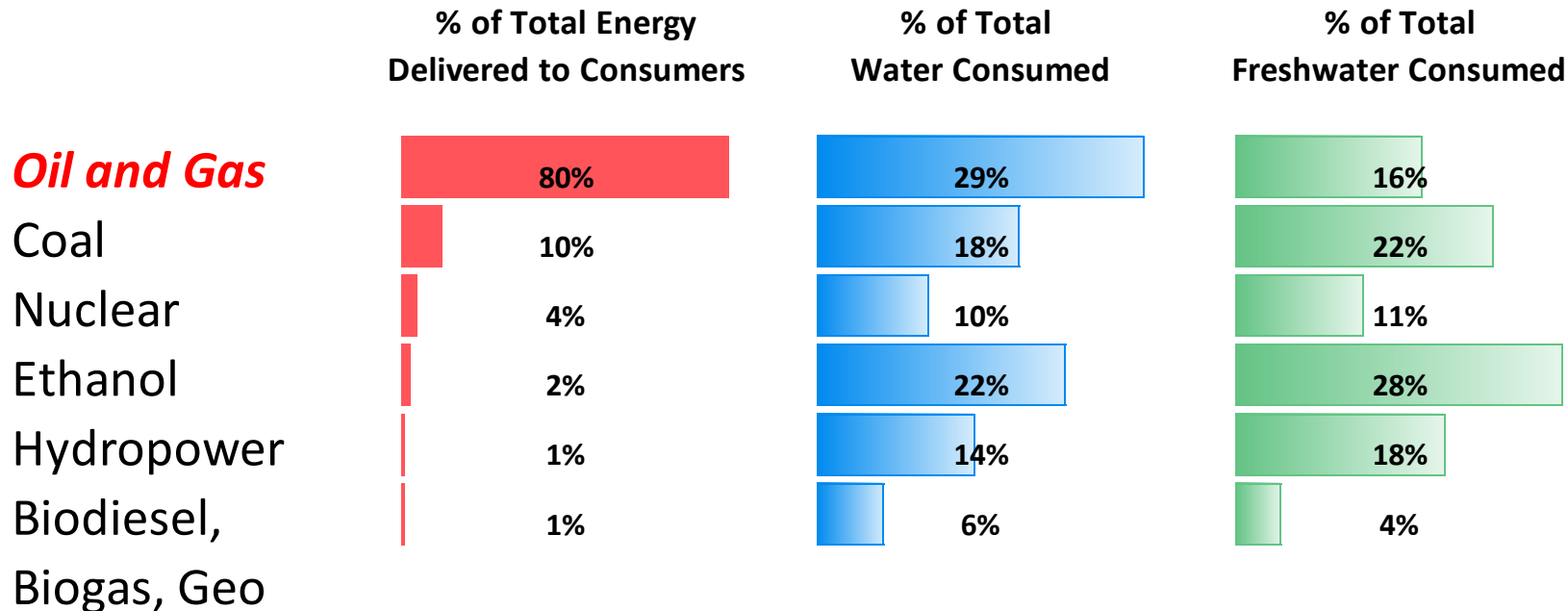
Oil & Gas Uses 2% of Water in the US

Water usage estimates in the United States



Oil & Gas is an Efficient Water User

More Energy Generated per Water Volume



Energy Information Association

Responsibility within Energy Sector

Globally agriculture is the largest user of fresh water, accounting for 70% of all withdrawals.

Although the oil and gas industry uses far less water (industrial use is about 5%), it has an **important role to play in protecting the quality of water** in the areas where it operates.

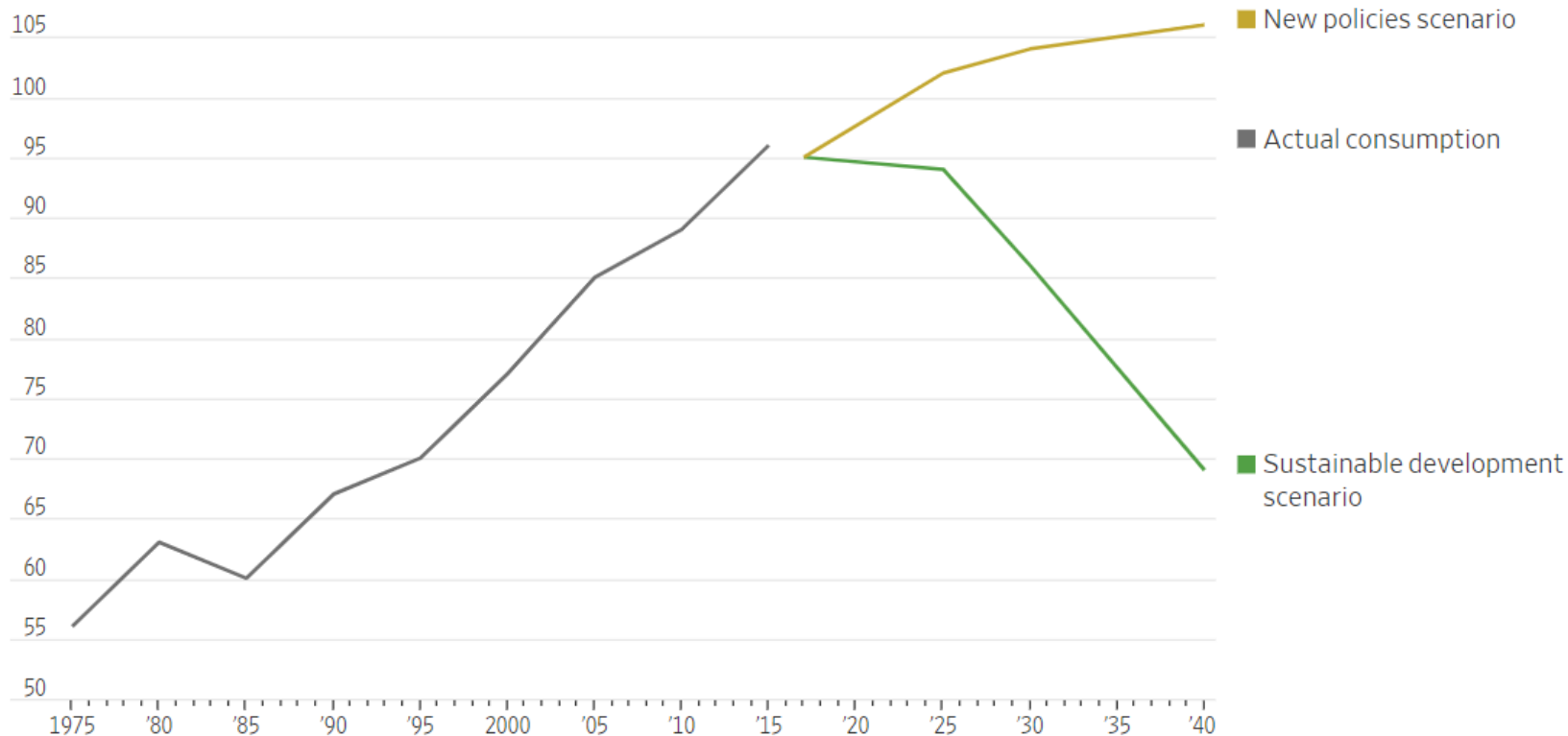
Source: ExxonMobil web site

Is Oil the New Tobacco?

Investors aren't yet rewarding big oil companies that are preparing for a greener future, but that could change

Oil consumption

110 million barrels/day

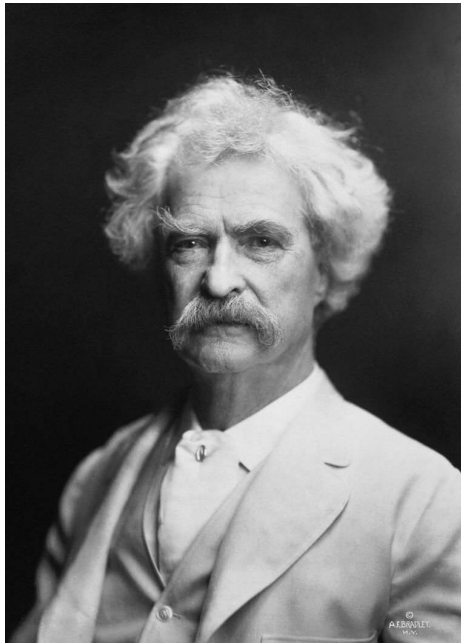


Sources: U.S. Energy Information Administration (actual consumption), International Energy Agency (scenarios)

Wall Street Journal - 1/2/20

Where are we today?

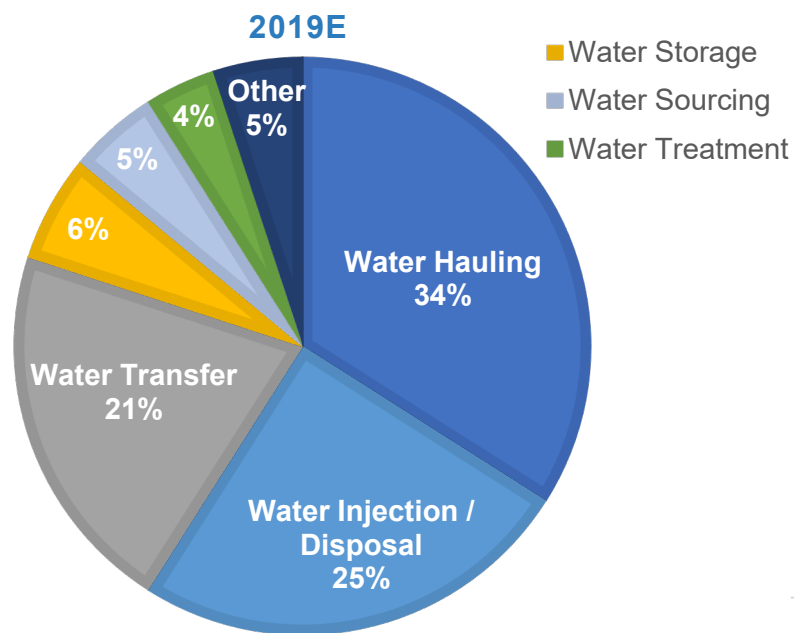
***Whiskey is for drinking,
water is for fighting***



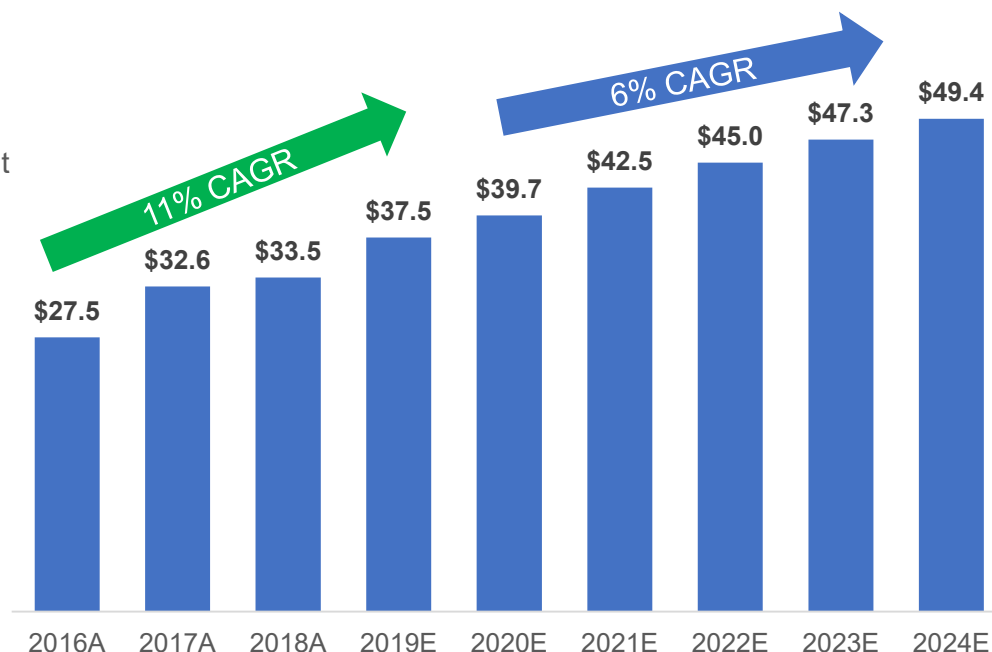
Mark Twain

Water Market is Large and Growing

U.S. Land Oilfield Water Market Size by Segment



Historical & Projected U.S. Land Water Market Size (\$B)





Bob Gilman
WWW.FRAMEITART.COM







ROBERT D. FLAHERTY | ENERGYLANDSCAPES.NET

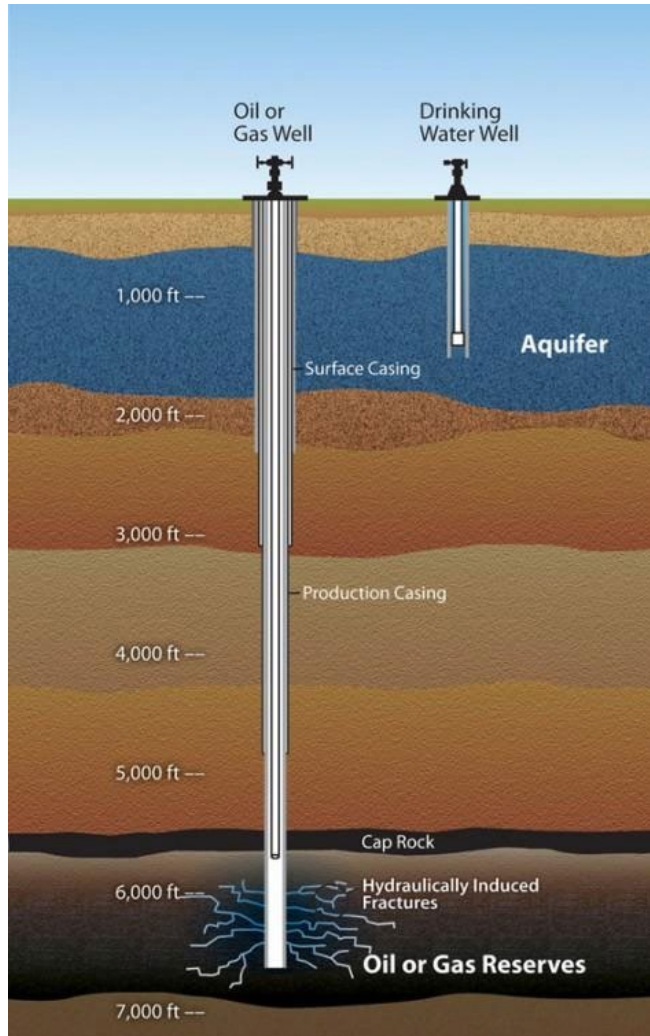
Rapid Growth in Water and Infrastructure

Water transformed by shale, horizontal drilling and fracturing technology

- **Drilling and completion** water volumes have increased exponentially in the past 10 years
- **Unconventional wells** can generate 15x produced water amounts versus conventional wells
- Large scale **water infrastructure needed** to manage massive water volumes
- Water management is increasingly being **outsourced** to midstream companies

Water in energy has changed dramatically

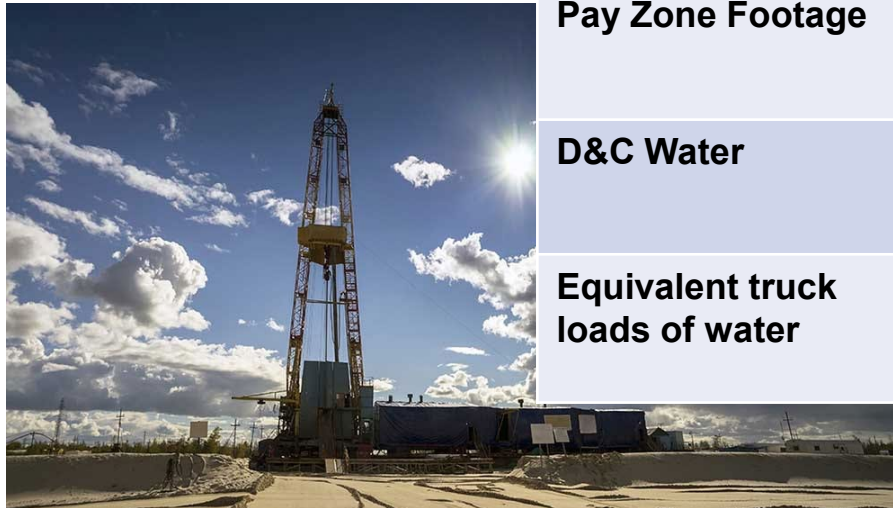
Basic Water Terms in Energy



Term	Use
Source Water	Hydraulic Fracturing
Flowback Water	During first few weeks of oil and gas production
Produced Water	During life of oil and gas well

Water for D&C has Grown Exponentially

Longer drilling laterals and more water per foot



	Vertical Well	Horizontal Well
Year	~2000	2020
Pay Zone Footage	100-500	5,000 – 10,000
D&C Water	10k – 50k Barrels	500k – 1MM Barrels
Equivalent truck loads of water	50-400	4,000 – 8,000

Drilling and completion water volumes have increased nearly 100x since 2000

Produced Water Growth

Water moving from on-site disposal to pipeline network

	Conventional Wells	Unconventional Wells
Initial Flowback Water Volume	5k-25k	250k-500k
Daily Produced Water Volume	Relatively Low	Up to 10,000 bpd per well
Wells per Pad	Typically 1	Often 2-12
Disposal	Sometimes reinjected on site	Disposed off-site

Produced Water Drivers

- ☐ Flowback volume
- ☐ More productive areas from each oil well
- ☐ Multi-well pads
- ☐ High WOR
- ☐ Desire to move water away from production

Multiple factors are dramatically increasing the amount of produced water at each site

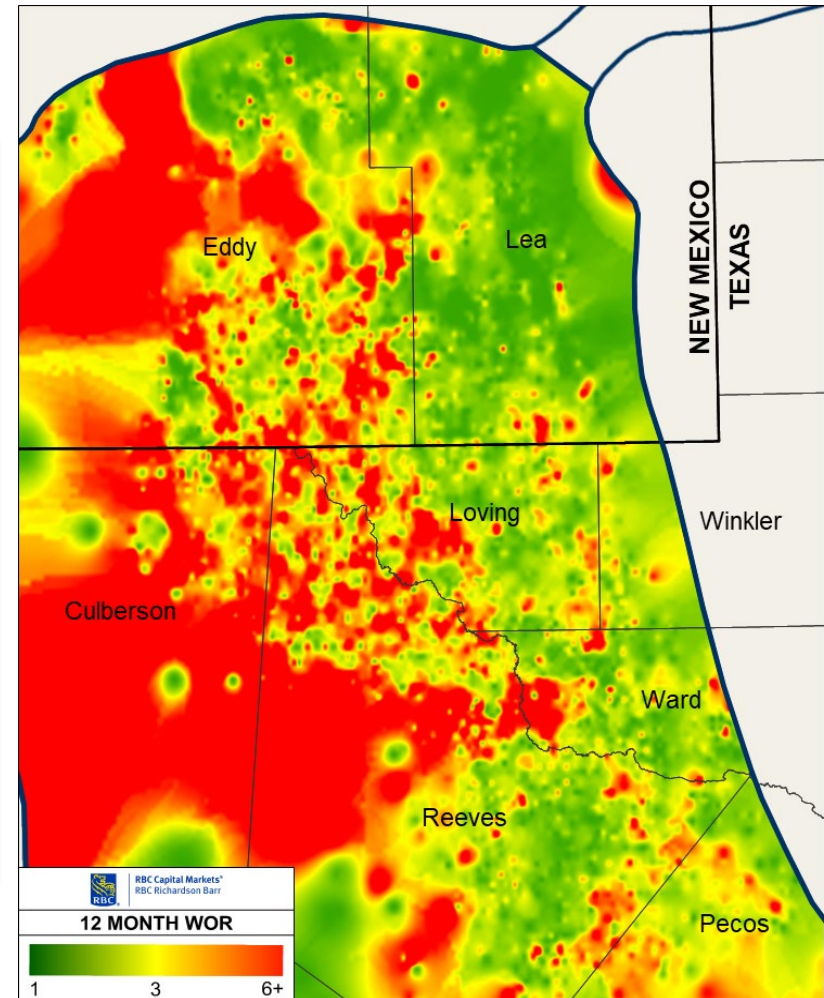
WORs are Large and Growing

“New wells in the Delaware Basin are coming online with **WORs as high as 10-to-1...**

WORs of 4 or even 6-to-1 are ... normal”

Raymond James Equity Research – July 2019

Delaware Basin Water to Oil Ratio Heat Map



Cost Also Drives Water Changes

Pipeline transportation costs are a fraction of trucking costs

\$1.50 to \$10.00



Trucking

\$0.05 to \$0.20



Pipeline



Per Barrel Cost Comparison

***Pipeline networks improve cost,
operating efficiency and safety***

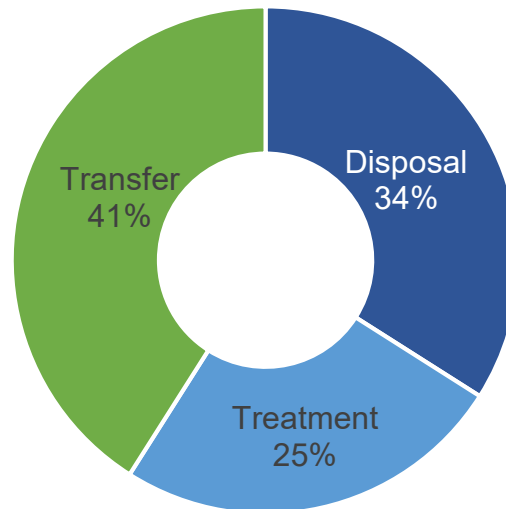
Water Infrastructure is Stretched

“While U.S. oil production has reached record levels ..., **much of the supporting infrastructure has failed to keep up**, including how to transport the large quantities of water ...”

David French, President & CEO, Rosehill Resources – *March 2019*

Water Infrastructure Needs are Driving New Investment

US Onshore Water Infrastructure Capex Requirement
2018-2023E

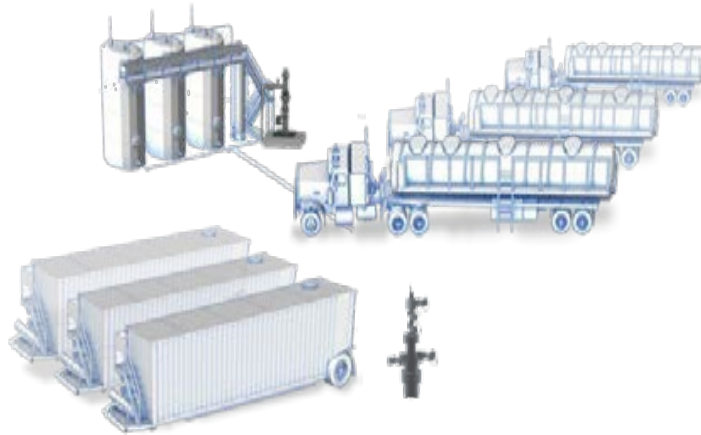


Over \$11 billion in water infrastructure needed over the next 5 years in the Permian Basin

Water Business Model Evolution

Past

Well-by-Well Systems



- Trucks and tanks
- Water reinjection or short haul transportation
- O&G producers own and operate

Expensive and large environmental footprint

Present

Field Wide Water Networks



- Pipelines and storage facilities
- Large scale water infrastructure
- Growth of shared infrastructure and midstream

Lower costs, improved productivity, smaller environmental impact

Low Water Intensity

High Water Intensity

Full Cycle Water Infrastructure

Water Midstream Operations

Source Water



- Water wells
- Ground water

Source Water Distribution / Storage



- Large scale storage ponds
- Interconnected facilities
- Permanent and temporary pipelines

Produced Water Injection and Disposal



- Salt Water Disposal wells
- Reinjection largely into old oil and gas production zones

Produced Water Gathering



- Buried, high capacity pipelines
- Gathering and long distance pipelines
- Interconnected facilities



Water Treatment and Re-use as needed

E&P Operations

Completions



Produced and Flowback Water



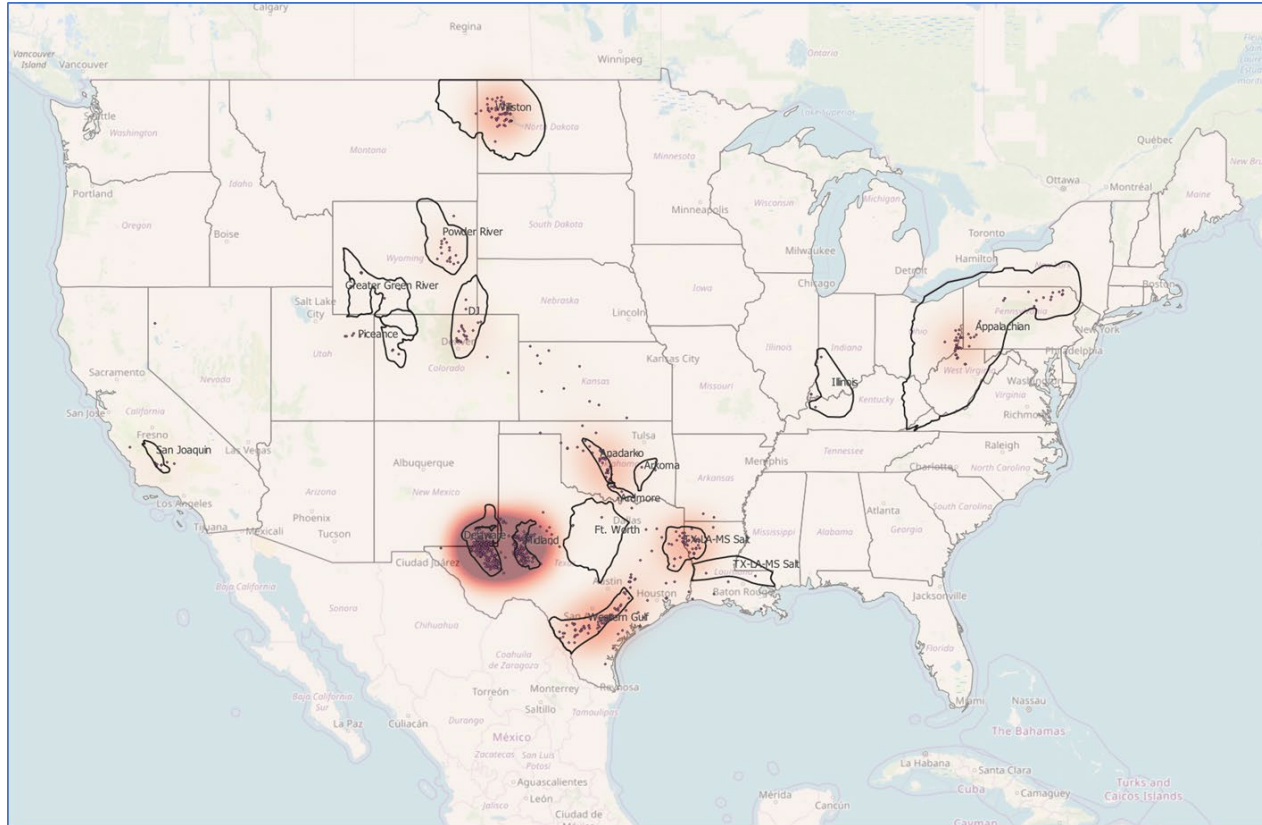
Water Midstream Growth Drivers

O&G producers are increasingly outsourcing water operations

- Growing importance of **water costs** in oil production
- **Capital investment** demands for water is expanding
- Water management is **increasingly complex**
- Cost savings, operating efficiencies and enhanced reliability are available through **shared infrastructure**
- Water Midstream companies are growing and proving capable of high-quality service delivery to O&G producers

Growing need for water infrastructure is rapidly expanding the water midstream industry

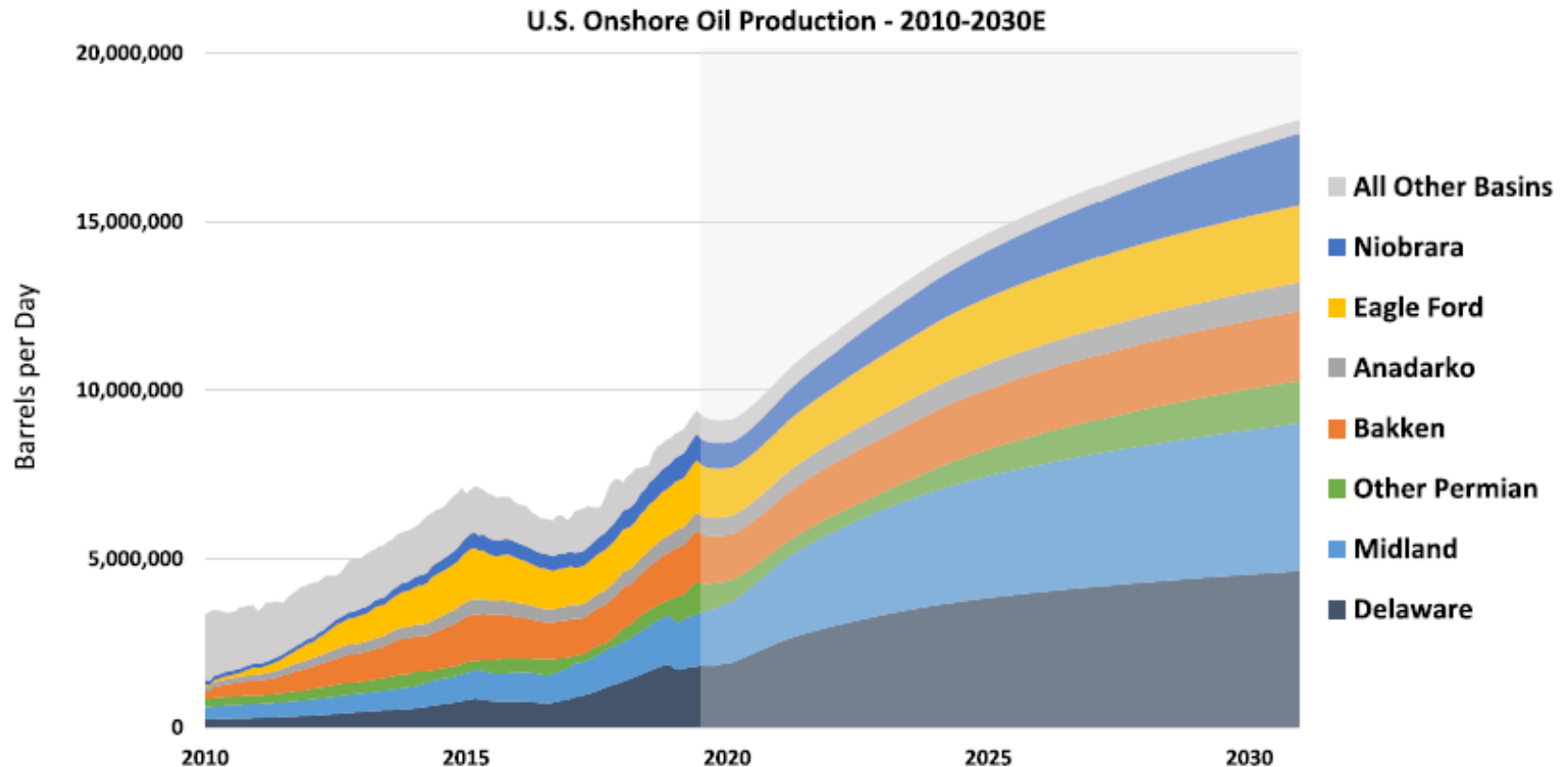
Permian is Hub of O&G Production



Over 50% of the 773 land-based operating oil and gas rigs in the US are in the Permian Basin

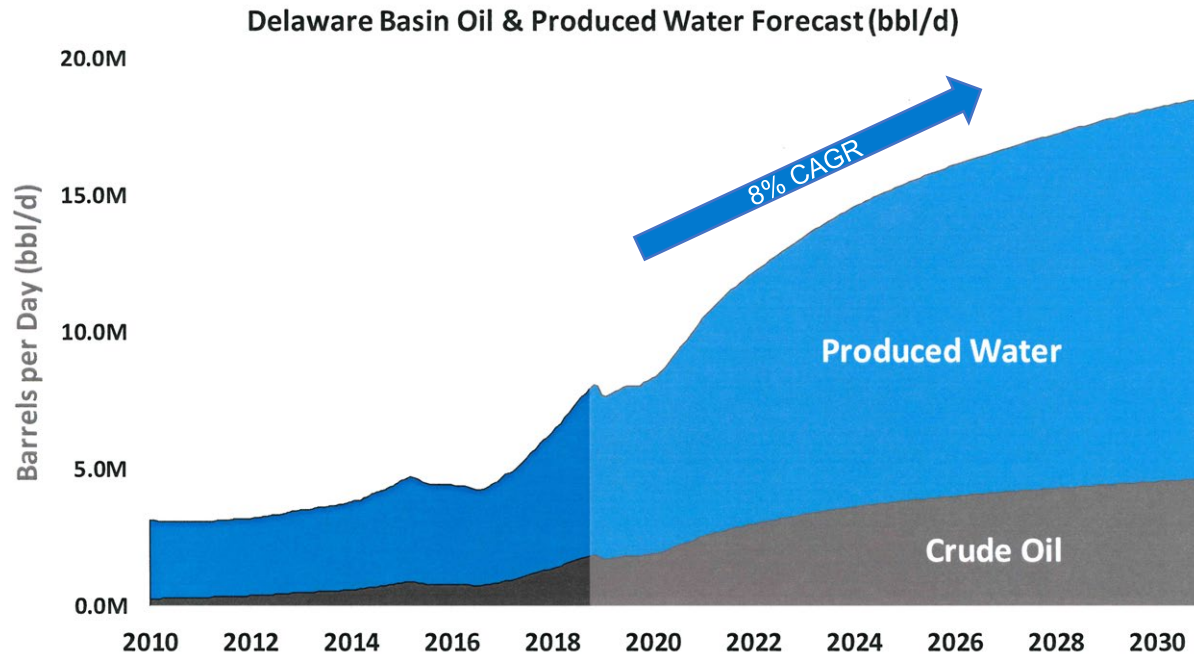
Permian Basin Growth

Permian will be about 50% of US oil production



Source: EIA, Drilling Info, Baker Hughes, Raymond James Research

Permian Basin is Center of Water Change

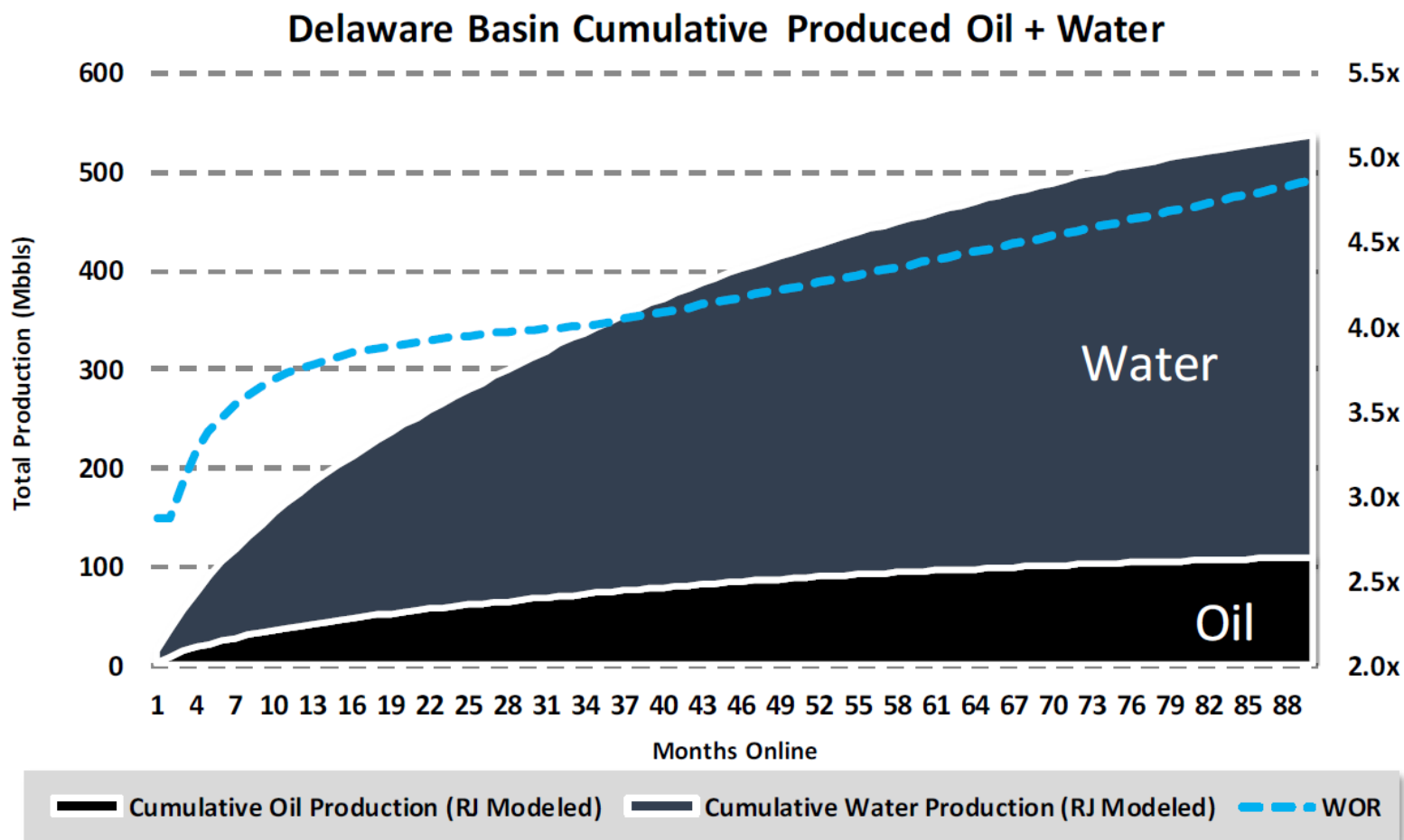


“A Wall Of Water Is Coming. The Permian is bracing for a tidal wave of as much as 10mmb/d+ of incremental produced water over the next five years.”

Gabriel Collins, Rice University Baker Botts Fellow in Energy and Environmental Regulatory Affairs – March 2019

Water Production Growth

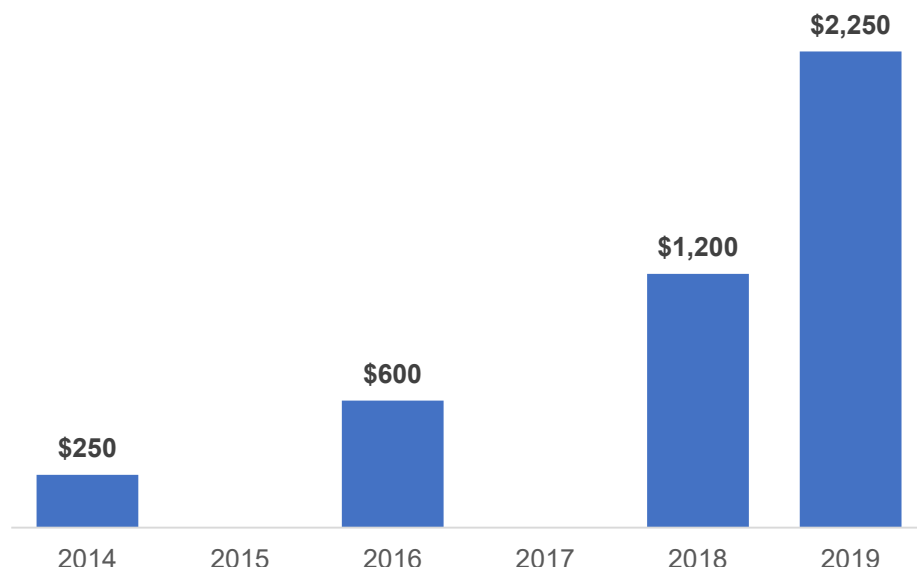
Water to Oil Ratios Typically Increase Over Time



Source: *DrillingInfo, Raymond James Research*

Private Equity Investing in Water

Growing Private Equity Interest (\$MM)



“...this space will become ripe for M&A and IPOs over the next 3 to 5 years – there are **big opportunities for integration, strategic combinations, and roll-ups.**”

March 2019

Water Midstream Evolution

Industry will likely evolve like oil and gas midstream industry

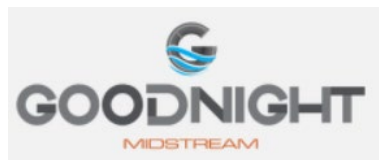
	Introduction	Rapid Growth	Sophistication	Maturity
Growth Drivers	Change creates a new market need	High rate of market growth	Good but slowing growth	Flatter growth around GDP rates
Company Type	Entrepreneurial	New private companies are rapidly formed	IPOs with public market acceptance; some M&A	M&A activity and consolidation
Financing Sources	Individuals and angel investors	Private Equity	Public and capital markets	Public and capital markets
Profitability Focus	Opportunities for strong financial returns & profit	Strong returns for well-run companies	Focus on scale and efficiencies; returns compress with growth focus	Strive for cost reductions, scale and efficient costs of capital

2010 Water Midstream

1980 Oil and Gas Midstream

Growth of Water Midstream

Many new companies created in the past several years

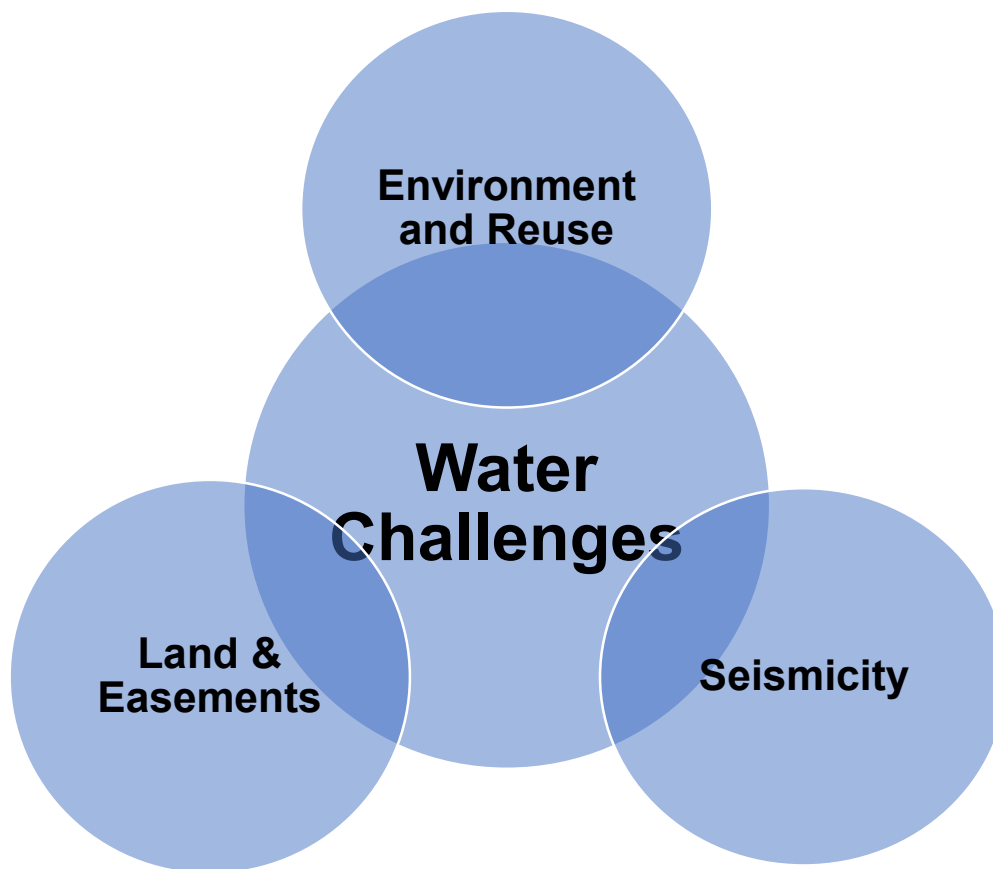


Traditional
O&G Midstream

Traditional
Water Co

Water Challenges

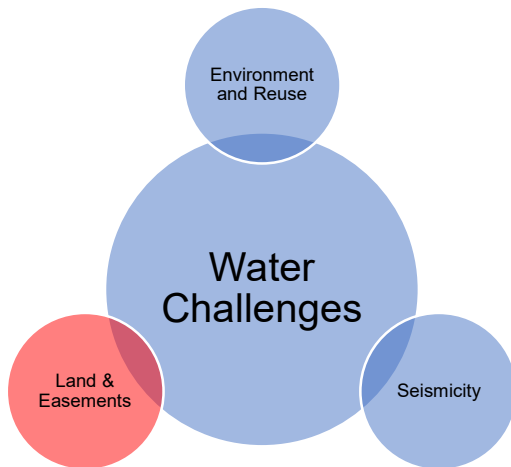
The industry faces significant challenges and opportunities



Water must be managed professionally to avoid pitfalls

Land and Easement Challenges

Water pipelines do not typically have eminent domain rights

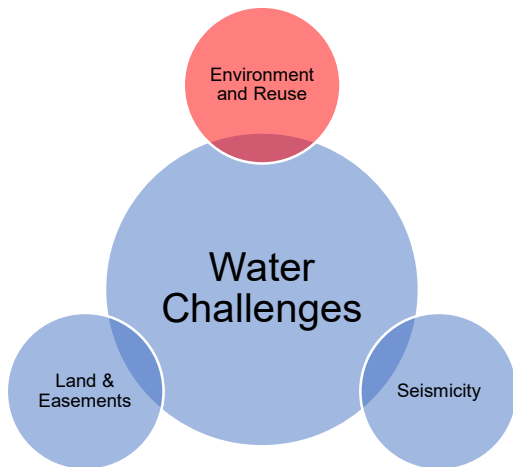


- Navigating pipelines across landowners is increasingly complex
- Pipeline crossings can be impossible if a landowner is also a competitor
- Easement costs vary widely
- Landowners in the Permian are becoming more aggressive in driving easement costs higher and/or generating water revenues

Landowners with large, contiguous acreage positions have significant leverage with O&G producers and water midstream companies

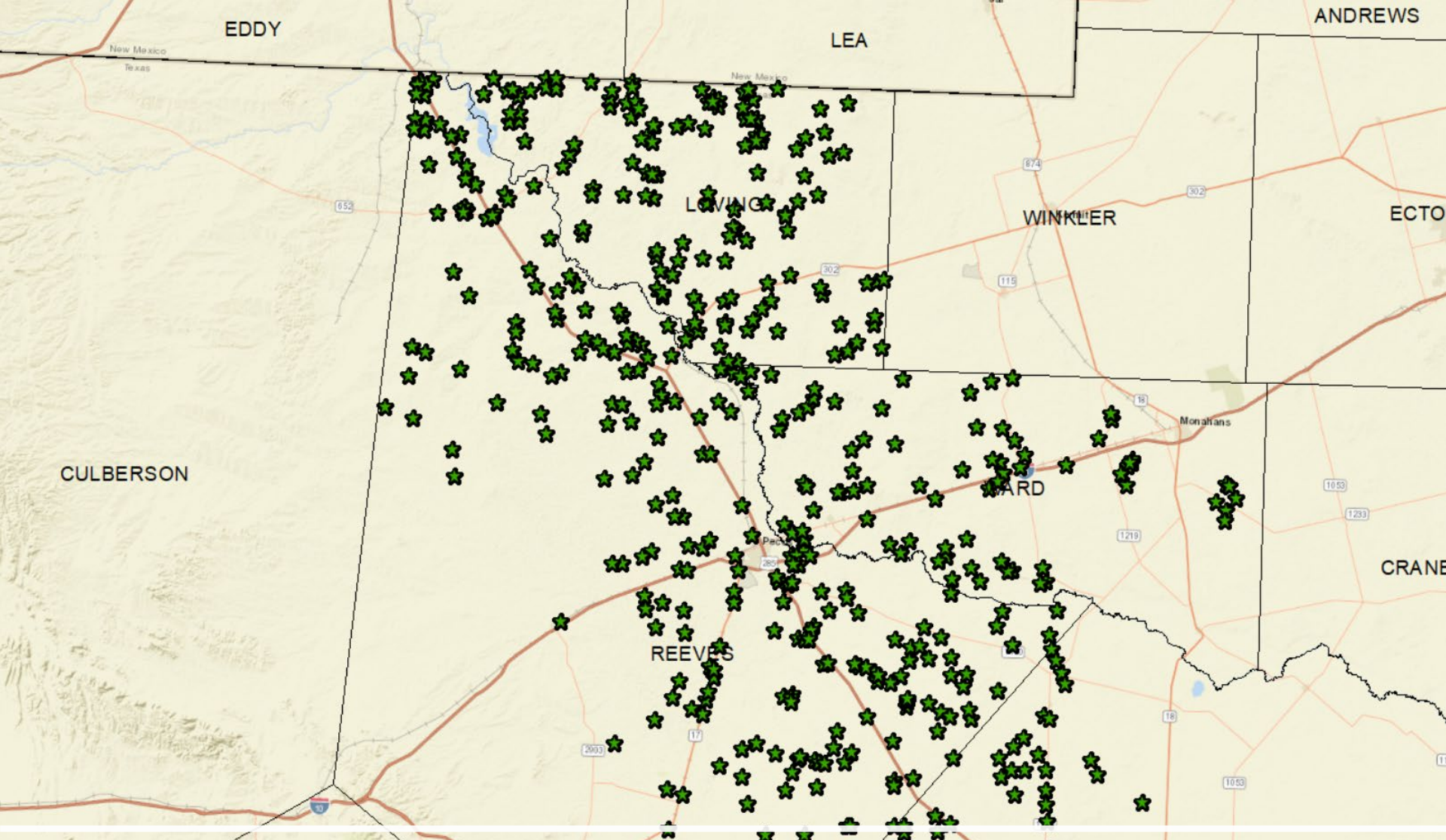
Environmental Challenges

Freshwater use and produced water disposal are getting more scrutiny

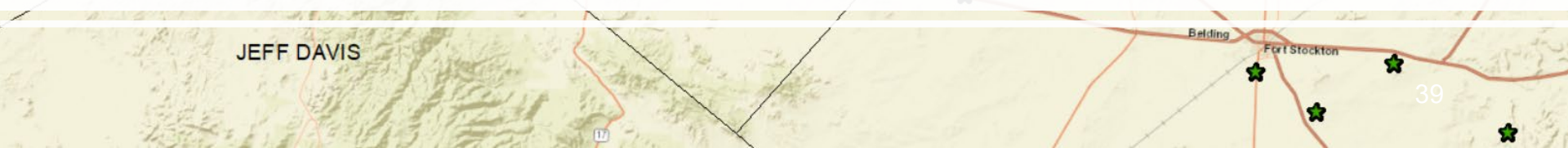


- Frack water is increasingly non-potable and brackish water
- Water quality demands are easing
- Recycling of produced water is an attractive option and treatment costs are declining
- Disposal will almost certainly always exist as one of the water management options
- Beneficial reuse challenges include both treatment costs and logistical challenge of transporting water to areas of need

Energy companies are increasingly sensitive to water conservation

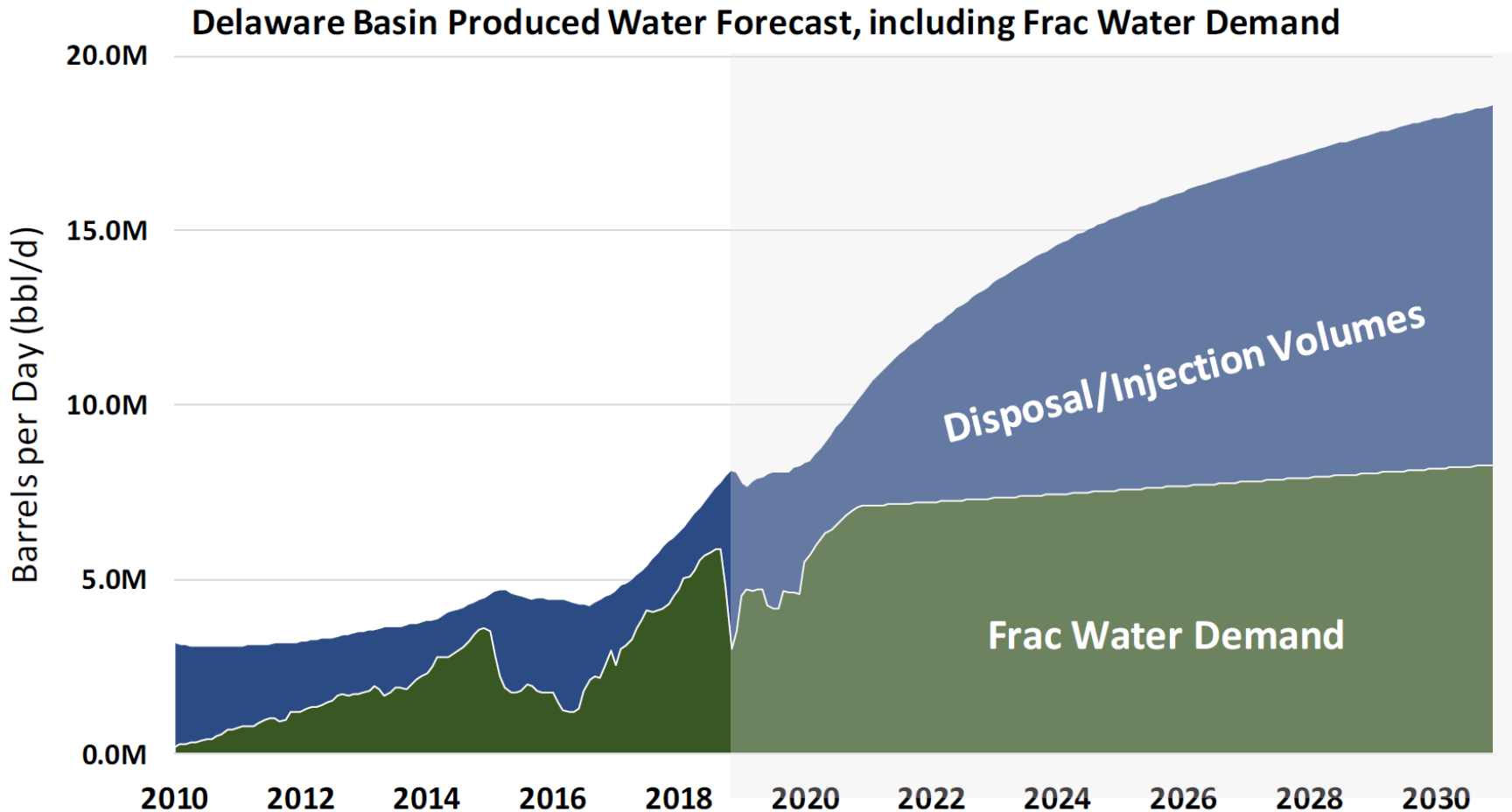


SWDs in Southern Delaware Basin



Recycling can only be a Partial Solution

Logistically impossible to match fracking and disposal volumes



Source: EIA, Drilling Info, Baker Hughes, Raymond James Research

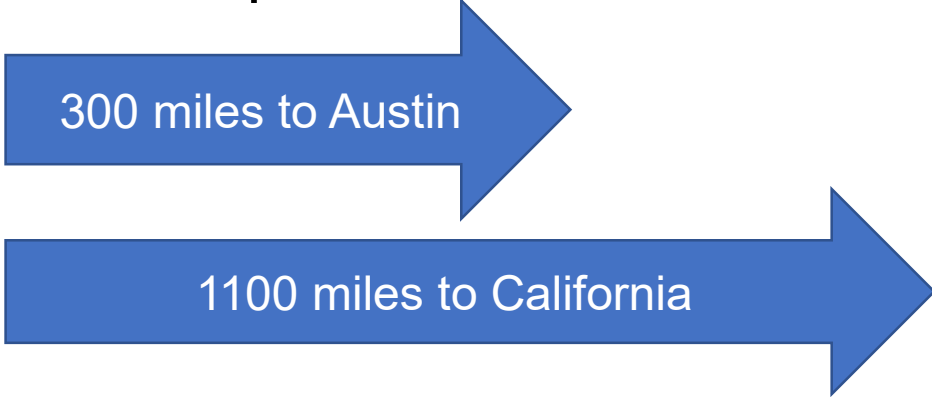
Treatment and Recycling Trends

- **Treatment requirements are declining for fracks**
 - Energy companies can use a wider variety of formulas
- **Treatment technologies are improving**
 - Costs are declining
 - Speed is quickening
 - On-the-fly treatment is available
- **Evaporation is increasing as a disposal trend**
- **Recycling is still a relatively small portion of the market and is used most often when...**
 - Driven by environmental or sustainability initiative
 - Source water is expensive or difficult to find
 - Disposal capacity is expensive or difficult to find

Beneficial Use Issues

- Uncertainties around liability, especially for agricultural production
- Energy production areas and large cities are not typically correlated
- Expensive transportation costs

**PERMIAN
BASIN**



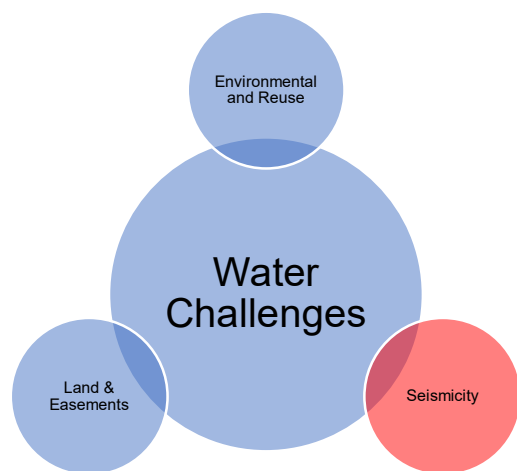
300 miles to Austin

1100 miles to California

- Must be cost competitive compared to water recycling and desalination

Seismicity Challenges

Disposal has been linked to growing seismicity in some areas



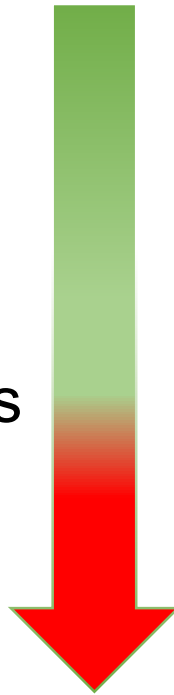
- **Strong linkage in Oklahoma with seismicity and disposal zones at bedrock formations**
- **Continuing uncertainty on causes in Texas and elsewhere**
- **Increasing scrutiny and regulations in Texas related to new disposal permits and reviews**
- **Enhanced seismicity monitoring is being put into place, often in public/private cooperation**
- **Additional monitoring is leading to extensive studies and understanding of seismicity**

Water Midstream companies, O&G producers and public entities are working together to proactively minimize seismicity issues

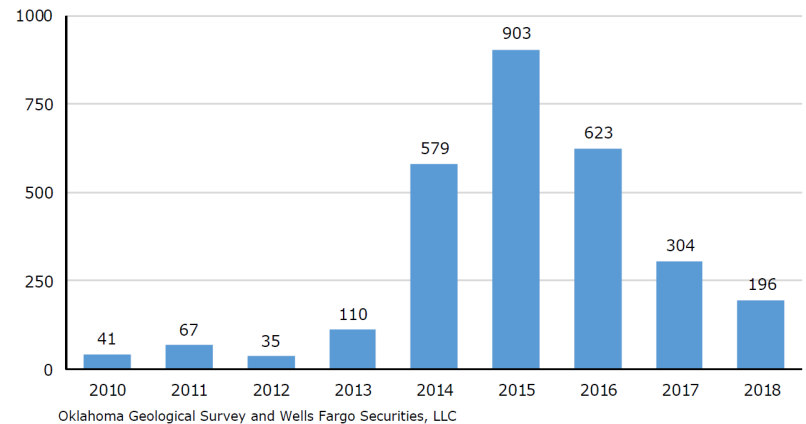
Seismicity Concerns

Seismicity Management

- Careful study of permits with seismicity reviews
- Flow and fault modeling
- Seismicity monitoring
- Reductions & shutdowns in response to events
- Prohibition of fracking



Number of Oklahoma Seismic Events



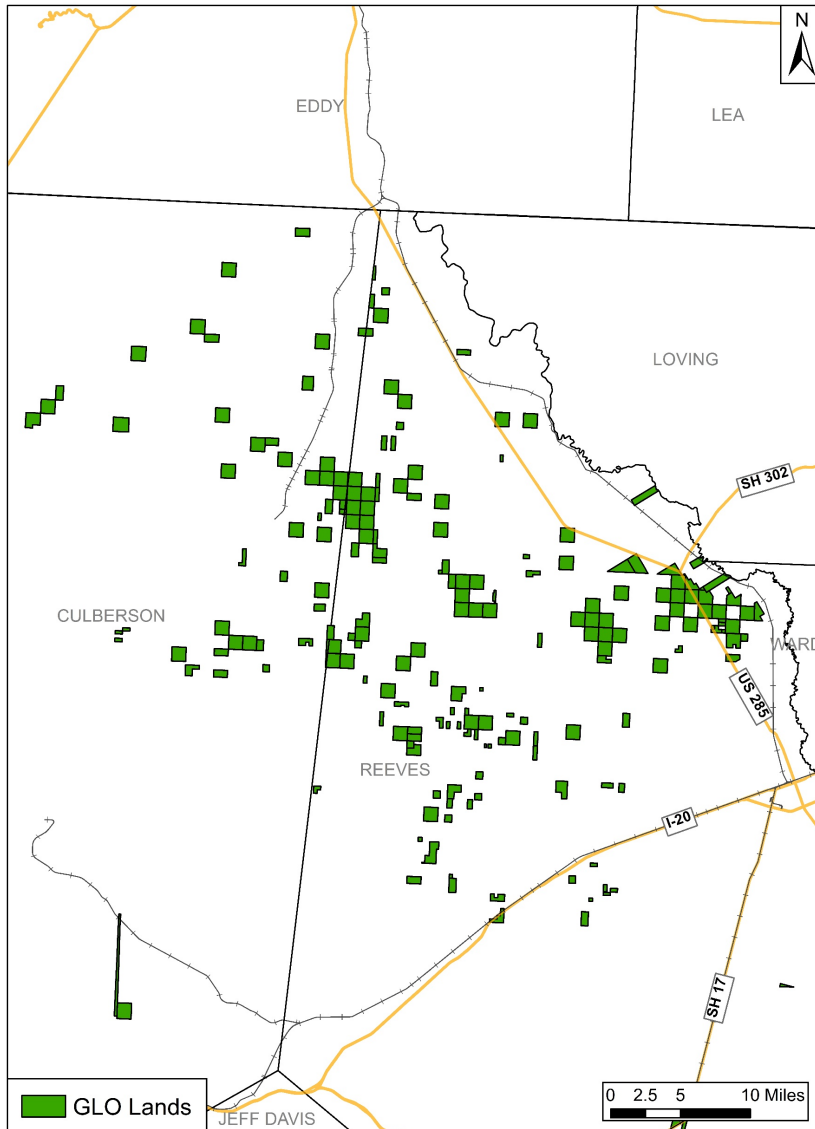
Land Partnership Opportunities

Landowners have significant opportunities to enhance energy revenues

- **Landowners control large and valuable energy producing acreage**
- **Private landowners have been aggressively pursuing water and other ancillary revenue streams**
 - Public and passive landowners may be left only with easement income
- **Partnering with water and other service providers can accomplish multiple goals for landowners:**
 - Diversifying and enhancing revenue streams
 - Making it easier and cheaper for producers to drill on acreage
 - Controlling quality and quantity of support infrastructure

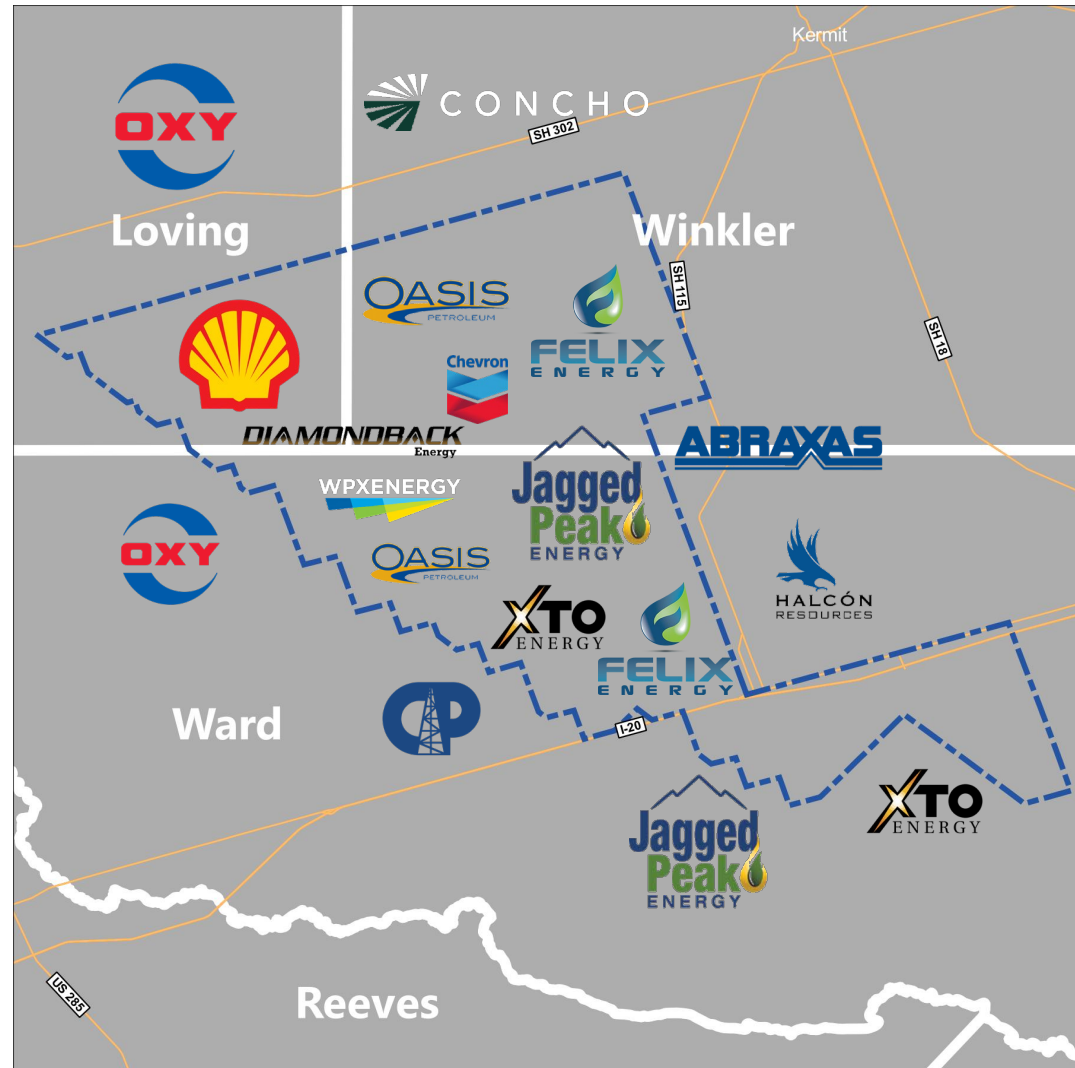
Private landowners are paving the way as examples for public/private partnerships on public lands

Texas General Land Office



- Groundwater agreement executed in November 2017 covering non-potable water for use in energy applications
- Exclusive 20-year right to develop and market non-potable groundwater on acreage for energy use
- Covers 88,000 acres throughout Culberson and Reeves Counties
- LWM invests all capital
- Revenue shared between LWM & GLO
- Contract expanded in January 2020 to include recycling and disposal

- Founded in 2019 with equity owners LWM & H2O Midstream
- Long term contract as Preferred Water Services Provider for University Lands' 167k acres in the Delaware
- Preferred rate structure
- Created to provide full-cycle water midstream solutions to E&P operators on and adjacent to University Lands:
 - ***Support an increase in oil and gas production on UL***
 - ***Decrease operator costs***
 - ***Minimize the industry's environmental footprint***



Forecasting the Future

Water will be a growth business in energy for many years

- **Water volumes and water management will grow**
- **O&G producers will continue to outsource water operations**
 - Producers will also continue to monetize water assets
- **Water regulations will expand and change with increased use**
- **Basins outside the Permian will see water infrastructure growth**
- **Water Midstream companies will grow, combine and IPO**
- **Proactive landowners will create profitable businesses that expand their revenue streams and enhance minerals production**
 - The larger the land position, the better the business model
 - Public/private models can be highly attractive models

Landowners have unique opportunities to partner with Water Midstream companies to create long-term sustainable revenue streams