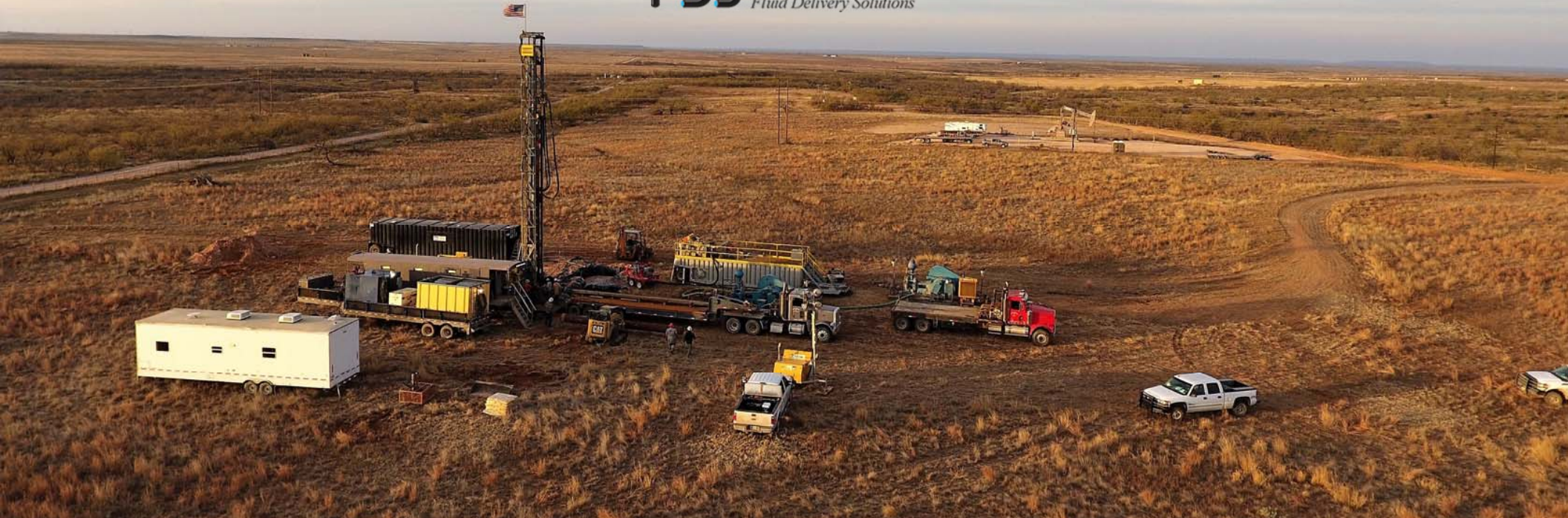


# Challenges and Evolution of Energy Water Consumption in the Permian

**FDS** Fluid Delivery Solutions



# Goal of the Next 15 Minutes

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- Discuss water sourcing evolution in the Permian with respect to unique differences between Texas and New Mexico areas of operation
- Discuss impacts of permanent infrastructure and emergence of water midstream operations
- Debate market share of reuse vs. groundwater in the near-term and throughout duration of shale development
- Summarize industry concerns and headwinds

# State of the Industry

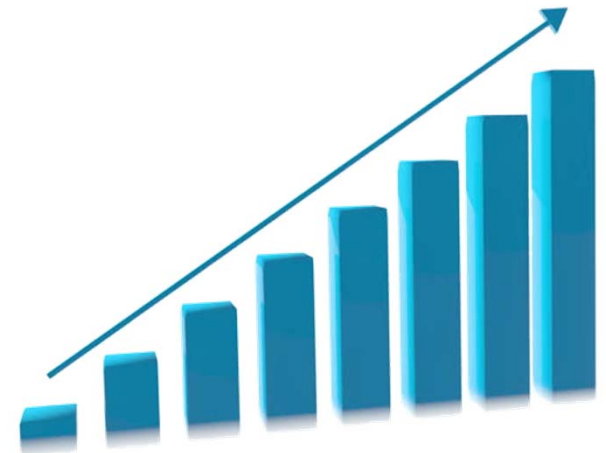
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## “Permania”

- Cost of rock = Absolute necessity to drill at break even prices or better
- Cause & Effect

## Water Consumption Trends – Our Market

- Longer laterals = Larger Demand
- 2012 – Average horizontal consumed ~250k BBLs
- 2017 – Average horizontal consumed ~450k BBLs +



# What are the Core Water Source Challenges?

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- **Water Security:** Access to sufficient and sustainable water source to secure investment in long-term production
- **Capacity:** Availability of reservoir storage to meet high volume and timely demand
- **Margin:** Economical right of way
- **Diversification:** Management of water returns after completions

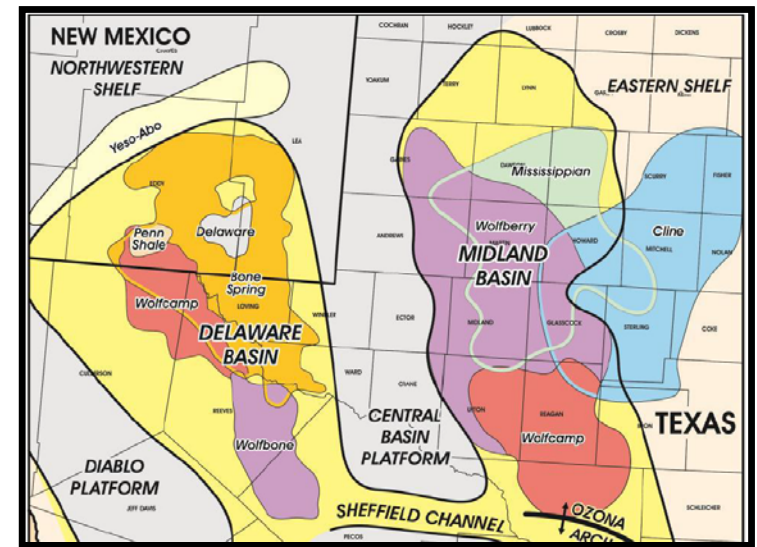
# A Tale of Two States

## Texas

- Groundwater Permit style – minimal restrictions
- Unique access to several sustainable aquifers
- Groundwater production is currently unlimited
- Water cost variant from low to high
- Bureaucratic involvement rating: **Limited**

## New Mexico

- Groundwater Permit style – complicated
- Limited access to sustainable aquifers
- Groundwater production is very limited
- Bureaucratic involvement rating: **High**
- Water cost significantly more





# Groundwater Quality: Consumption Trends

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## What is the best practice for the marathon race in the Permian?

### Midland Basin

- Ogallala Aquifer (Fresh)
- Santa Rosa Aquifer (Brackish/Saline)
- Reuse / Affluent

### Delaware Basin

- Rustler Aquifer
- Santa Rosa Aquifer
- Pecos Alluvium

# Reuse vs. Groundwater: Future Market Share

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**The ultimate benchmark will be the future price of a fresh/brackish BBL of water**

## Short Term Impact

- Emergence of first generation water midstream infrastructure
  - Fresh Infrastructure
  - Disposal Infrastructure
- Limited impact but growing (capital markets financing)
- Augmentation not replacement
- Significant increase in reuse pits across both basins

## Long Term Impact

- Significant impact on groundwater consumption
- Replacement in specific regions and augmentation in others
- NOTE: Never will be scenario of replacement over 80% of consumption average
- Mature Water Midstream
  - Fresh Infrastructure obsolete
  - Disposal infrastructure / COOP Sharing

# Significant Headwinds

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- Landowner ROW – What happens when Ranchers begin losing water revenue?
- Sustained downturn in oil price
- Economics of water midstream





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