



# Texas Railroad Commission NGV & NG For E&P Operations

Charlie Riedl  
Director of Transportation  
February 26, 2014



# ANGA Members

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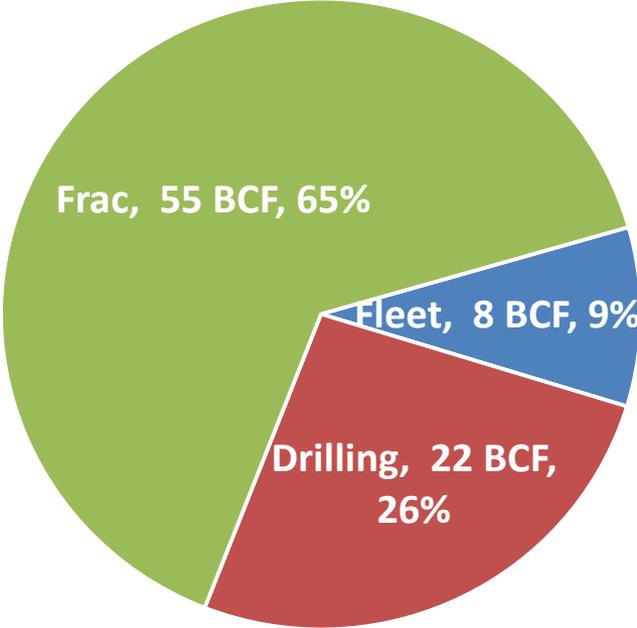


# Survey Overview and Inventory Information

# ANGA Supply Chain Annual NG Potential (BCF)

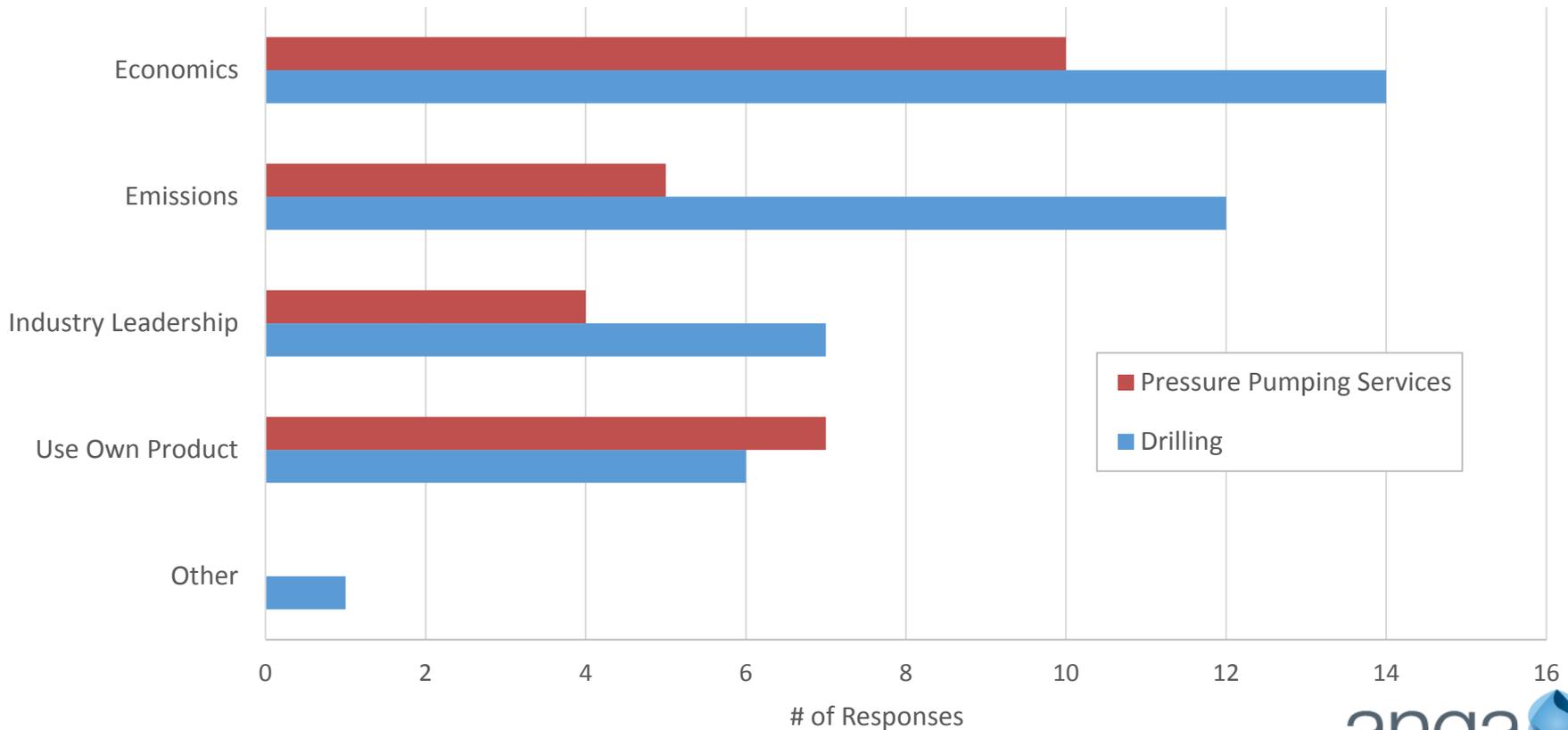
If the entire ANGA member supply chain (fleet, drill rig and pressure pumping equipment) were converted to NG, it would use 86 BCF per year

**ANGA Supply Chain Annual Potential NG Use**



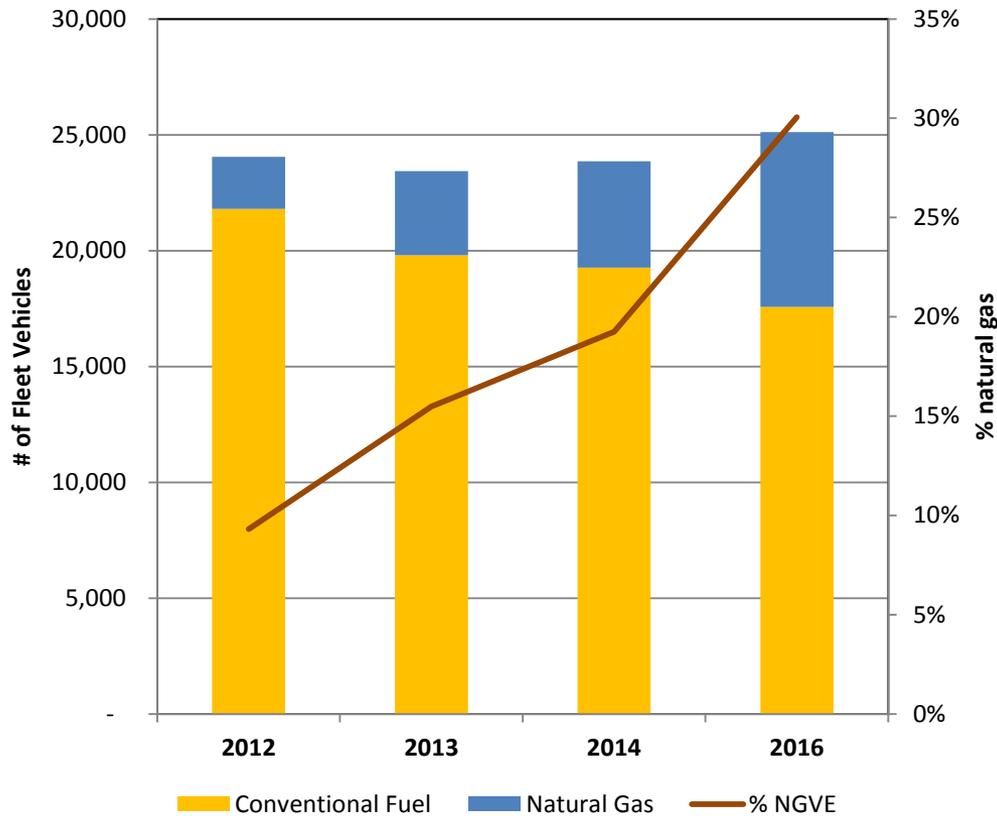
# Natural Gas Project Motivations

What are the primary motivations behind using natural gas in your operations?

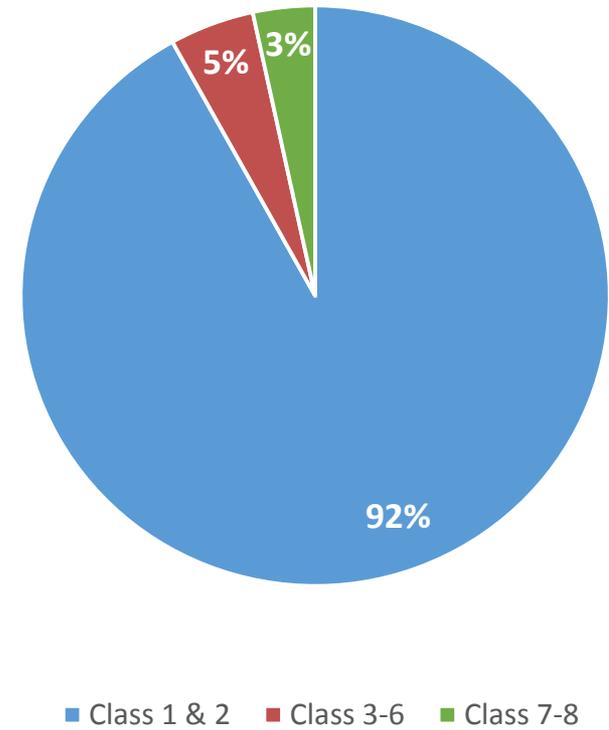


# ANGA Member On-Road NGV Fleet Trends

## 30% Natural Gas Fleet by 2016

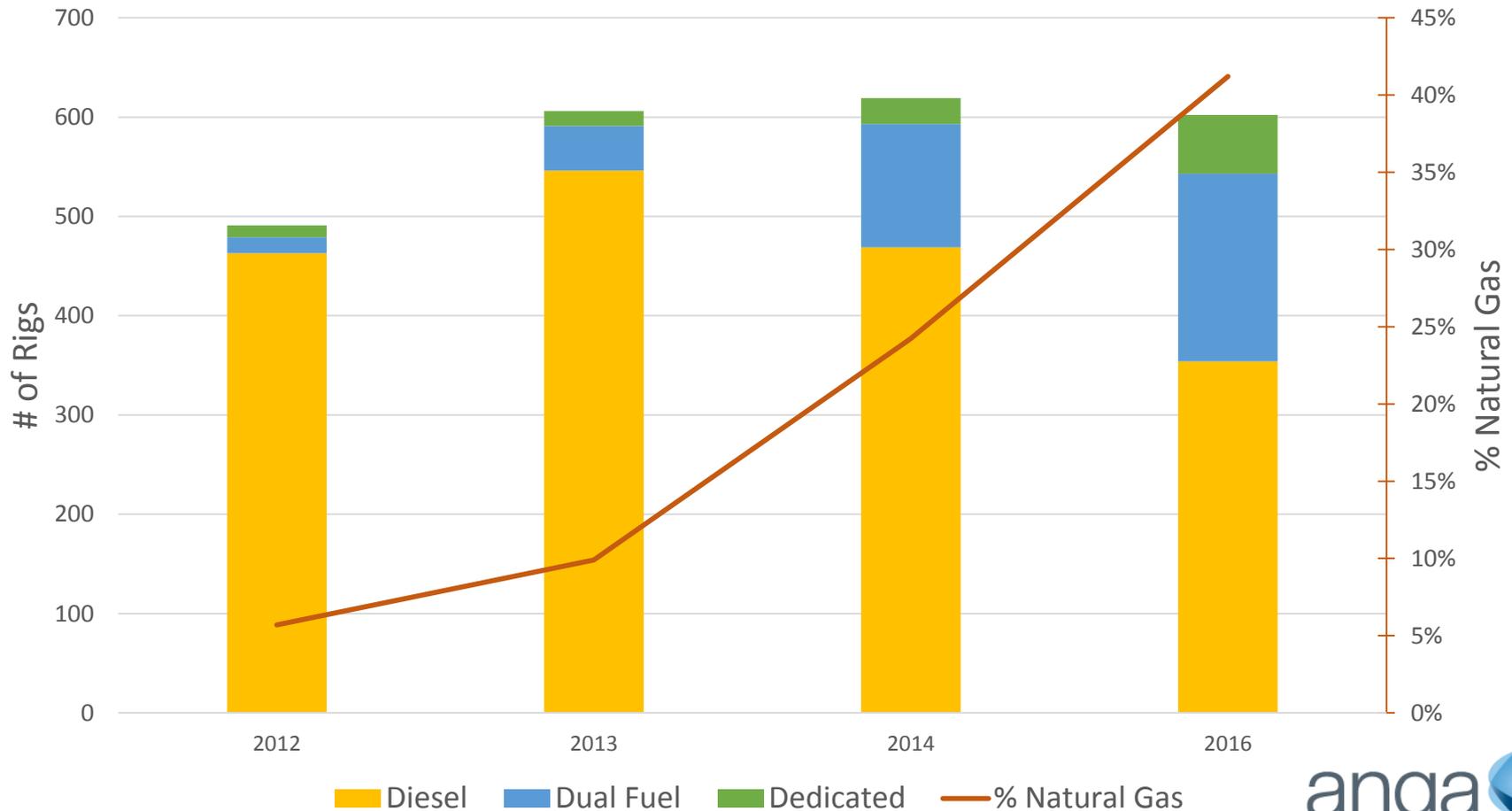


## 2016 NGV Fleet Makeup



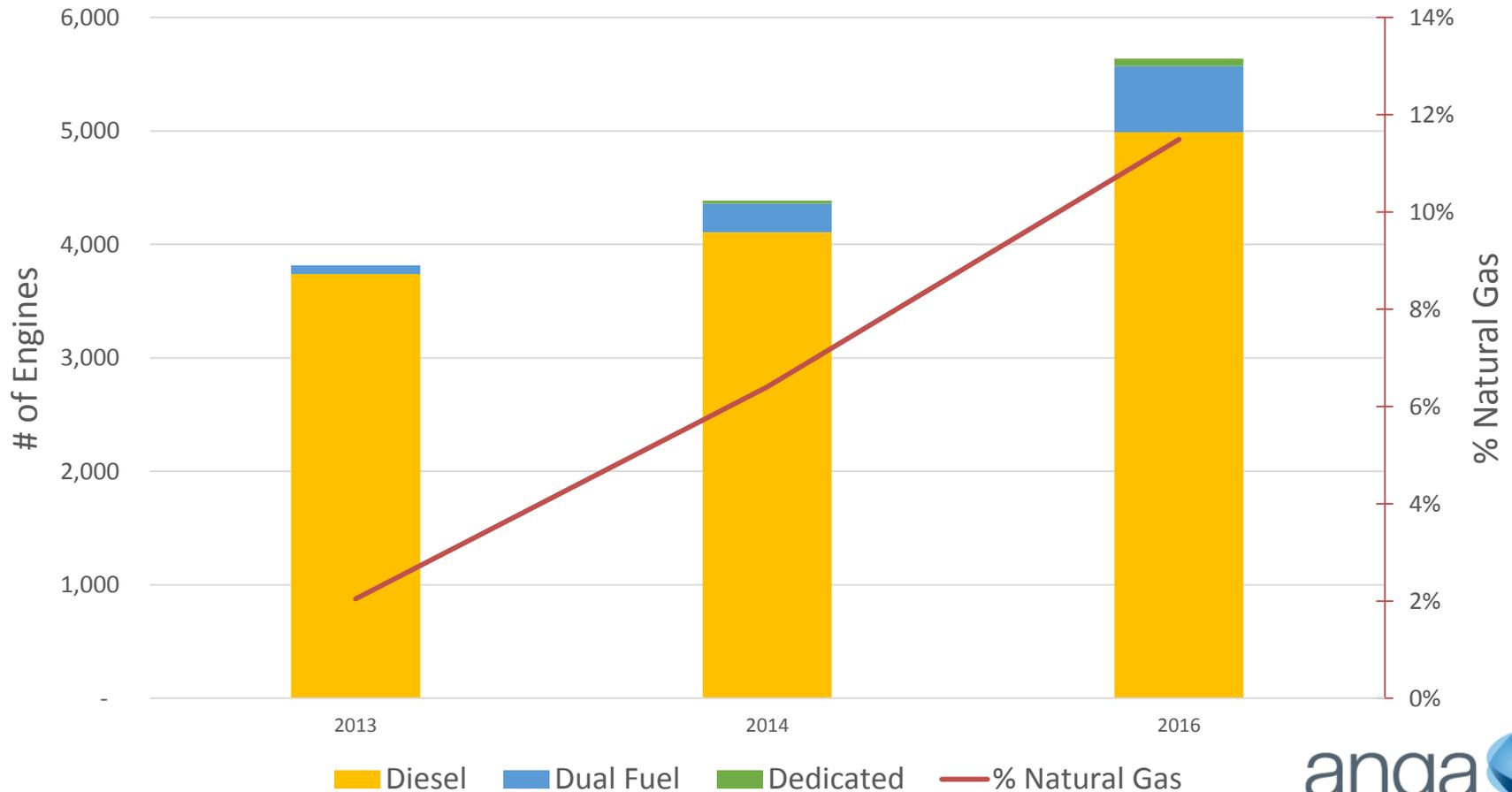
# ANGA Member NG Drill Rig Trends

41% Natural Gas Rigs by 2016



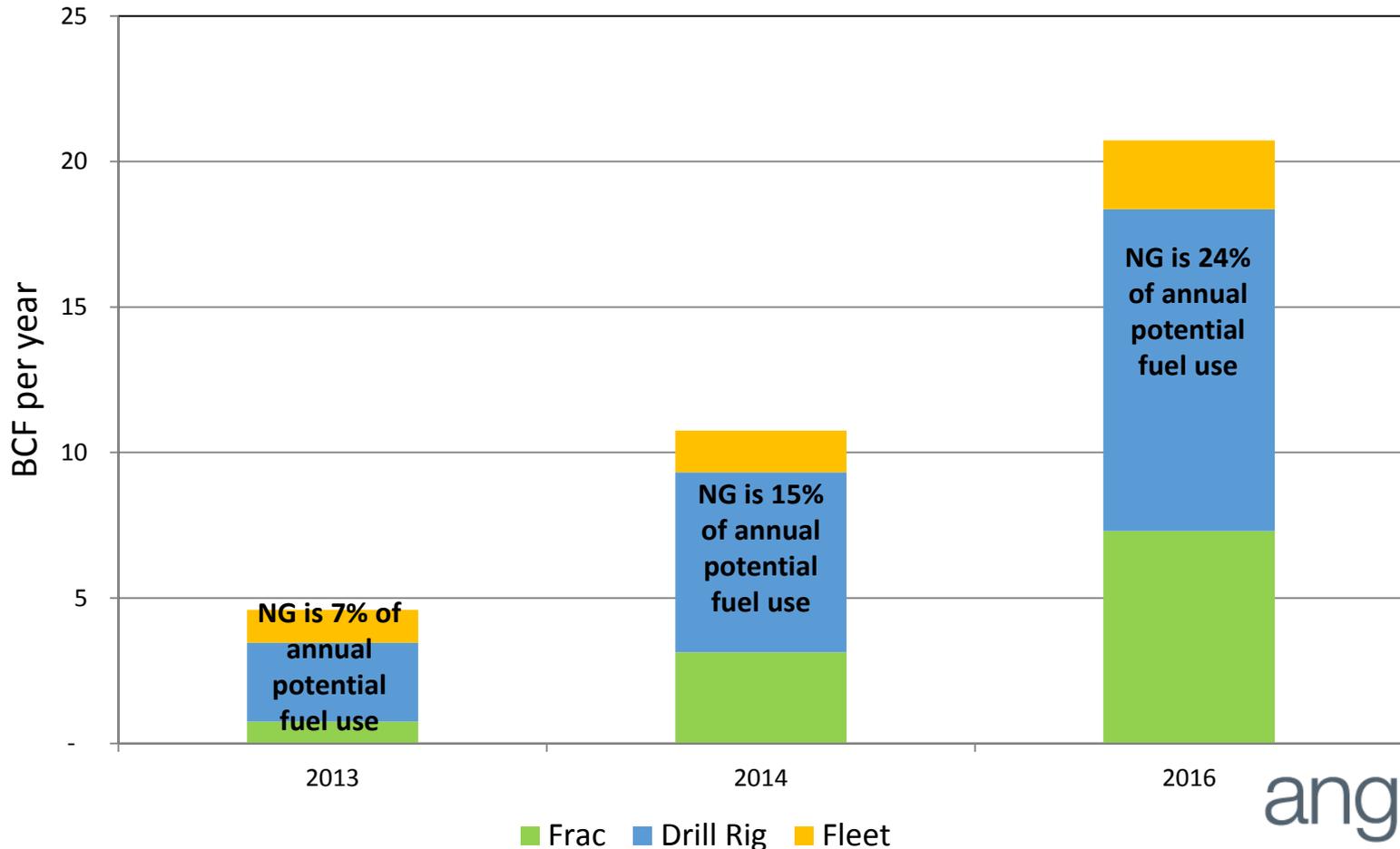
# ANGA Member NG Pressure Pumping Trends

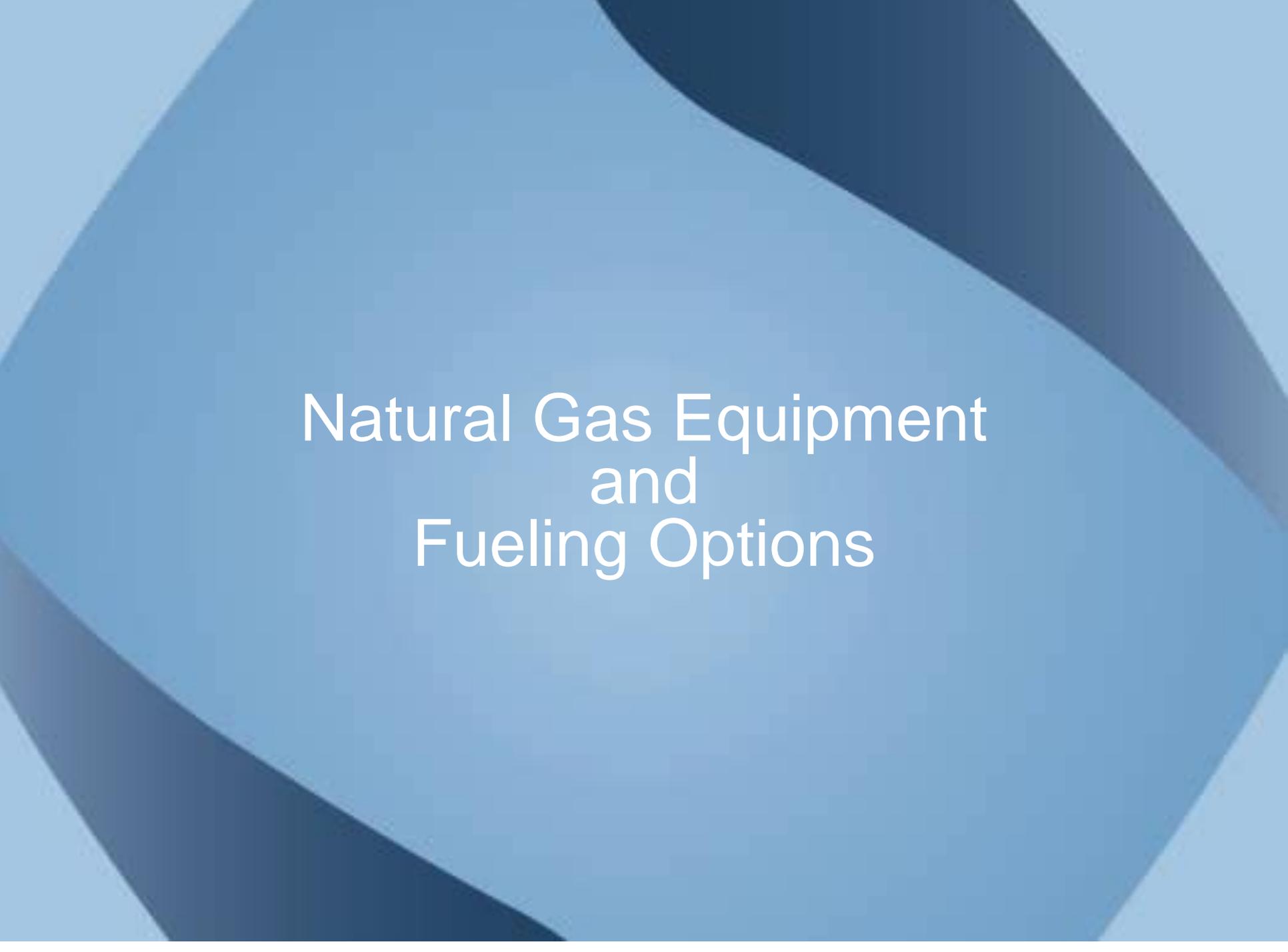
## 11% Natural Gas Pressure Pumping by 2016



# ANGA Member Natural Gas Vehicle and Equipment Use (Owned and Supply Chain)

## ANGA Supply Chain Natural Gas Use

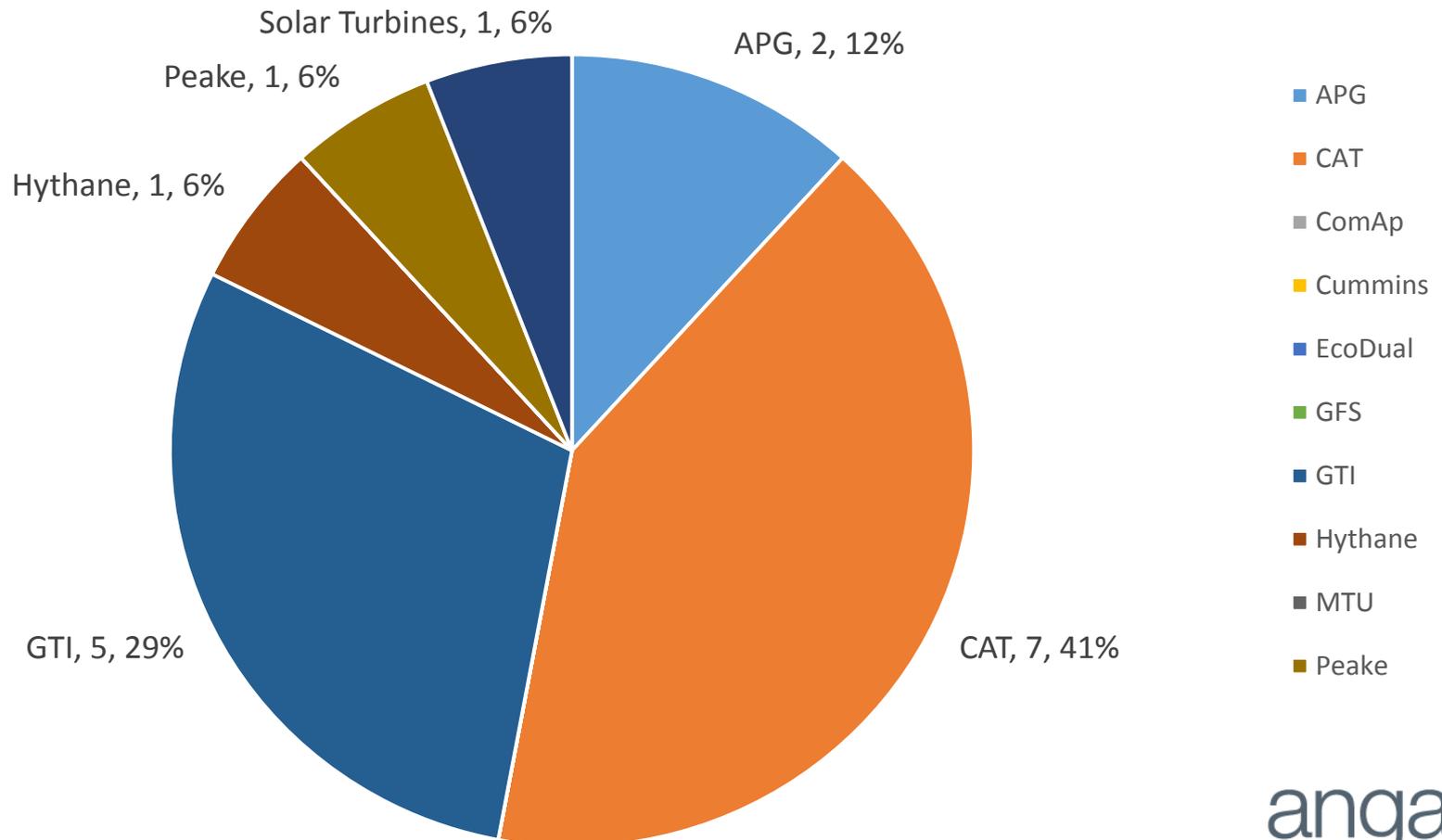


The background consists of several overlapping, curved, light blue shapes that create a sense of depth and movement. The shapes are layered, with some appearing in front of others, and they all share a common light blue color. The overall effect is a modern, clean, and professional aesthetic.

# Natural Gas Equipment and Fueling Options

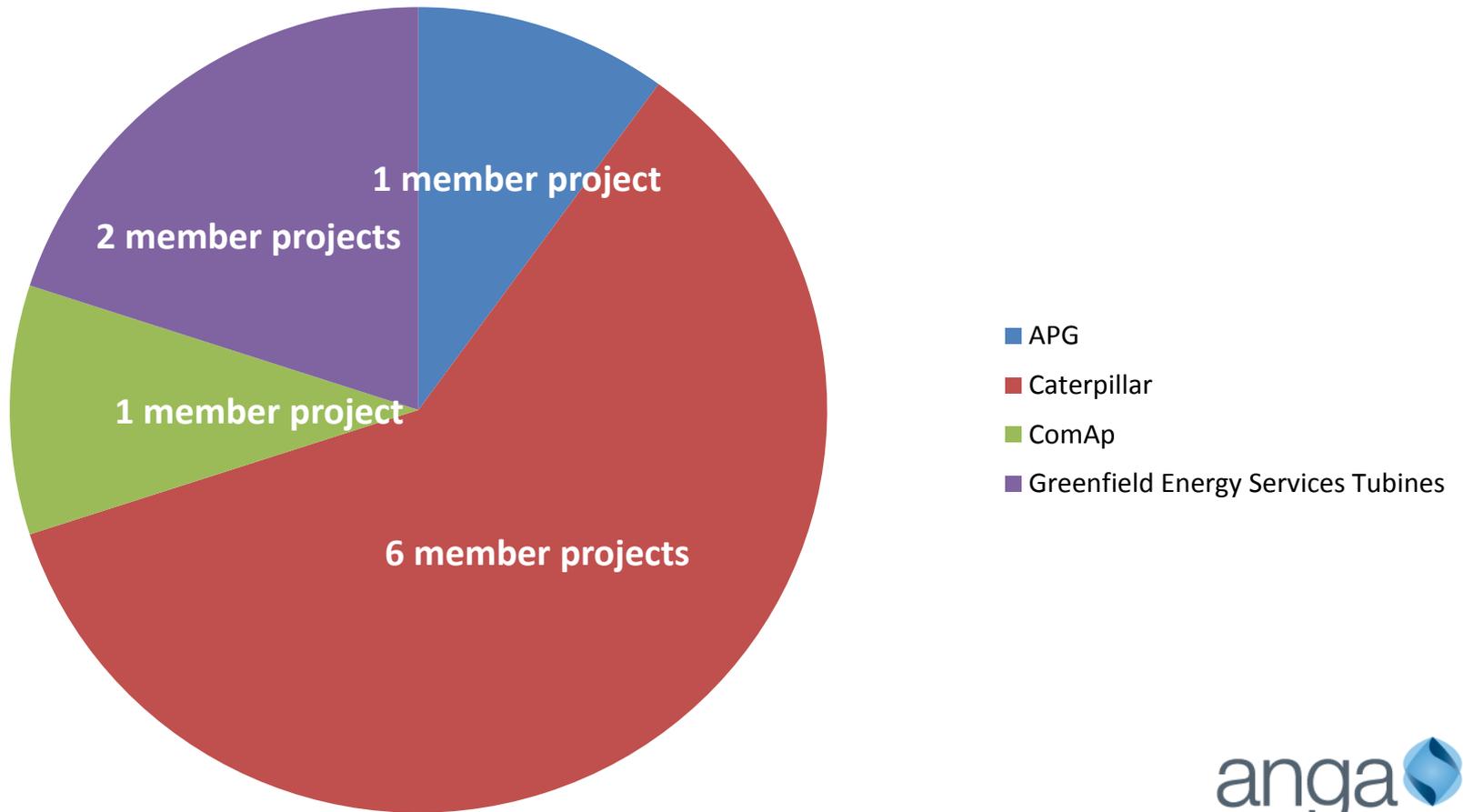
# ANGA Member Drill Equipment Use

What natural gas equipment have you worked with/are you considering?



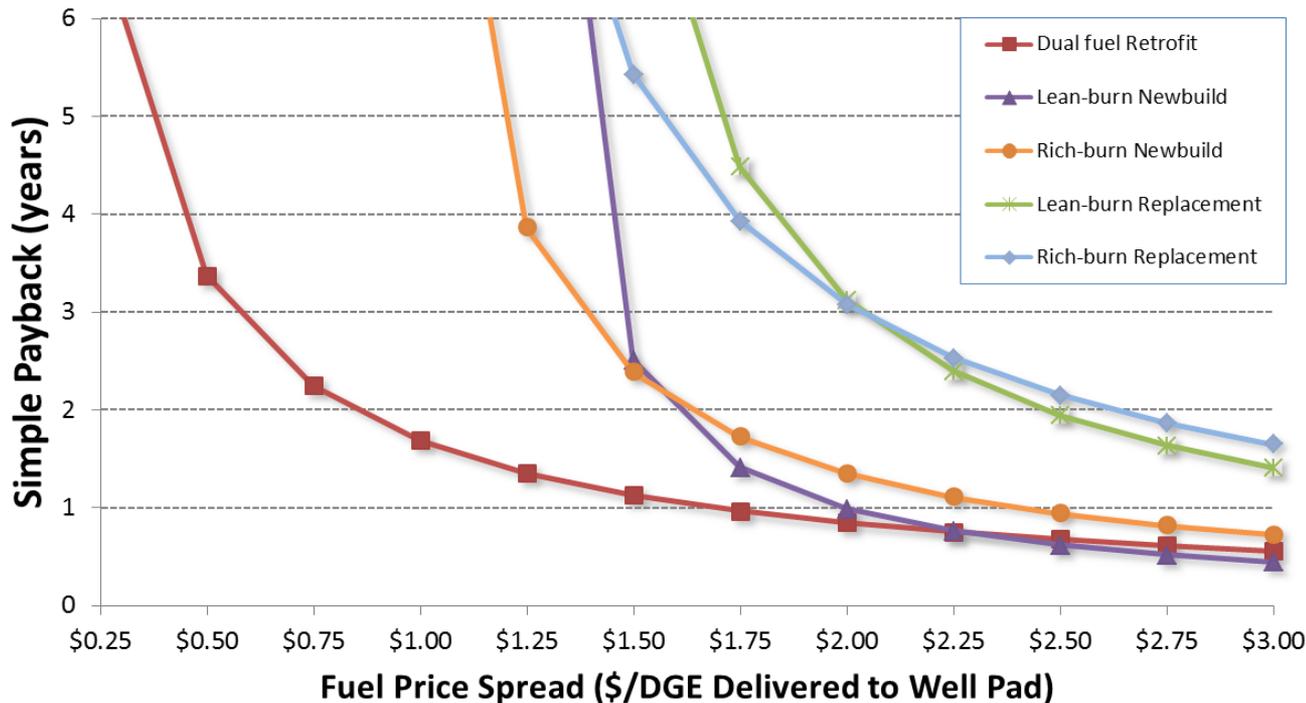
# ANGA Member PPS Equipment Use

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# Payback Analysis

# Simple Payback Analysis – Drill Rigs

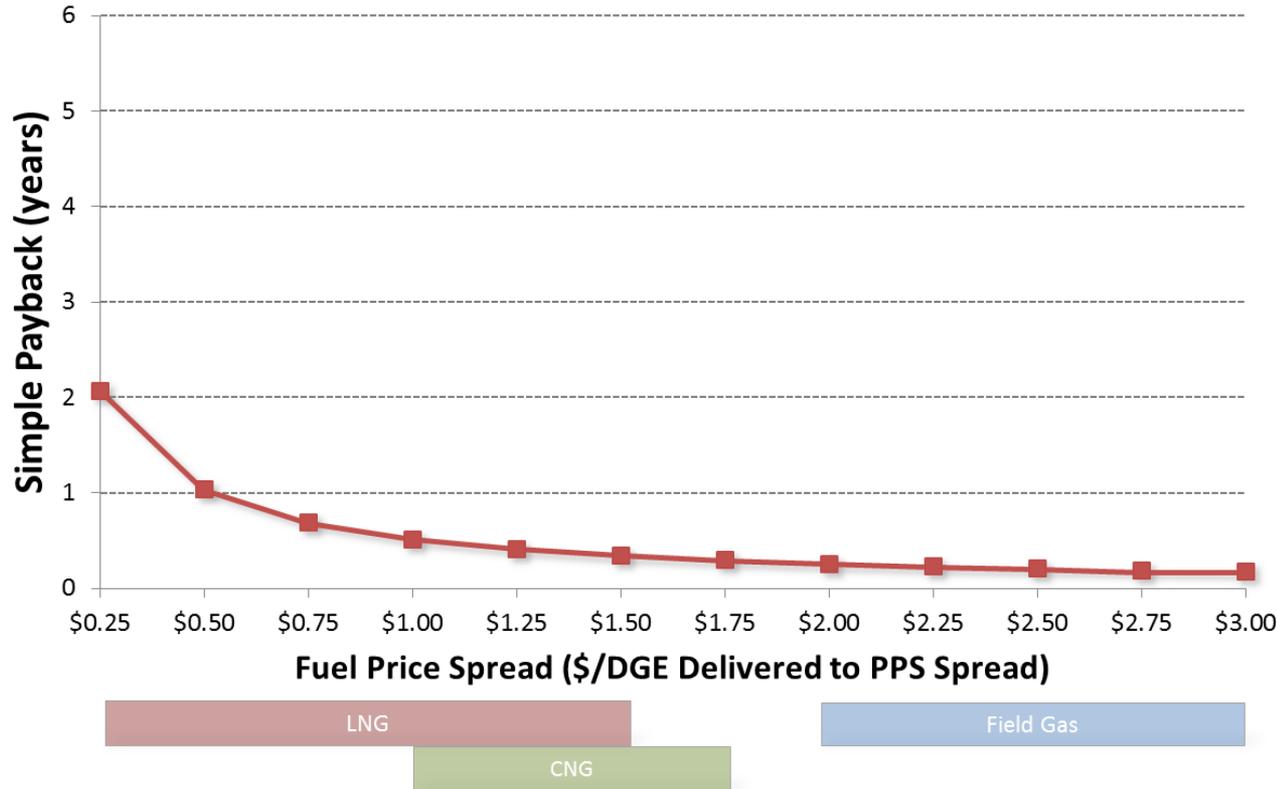


- Dual fuel retrofits offer the fastest payback, except at very large fuel price spreads.
- As fuel price spread decreases, the fuel efficiency of rich-burn engines improves payback over lean-burn engines.



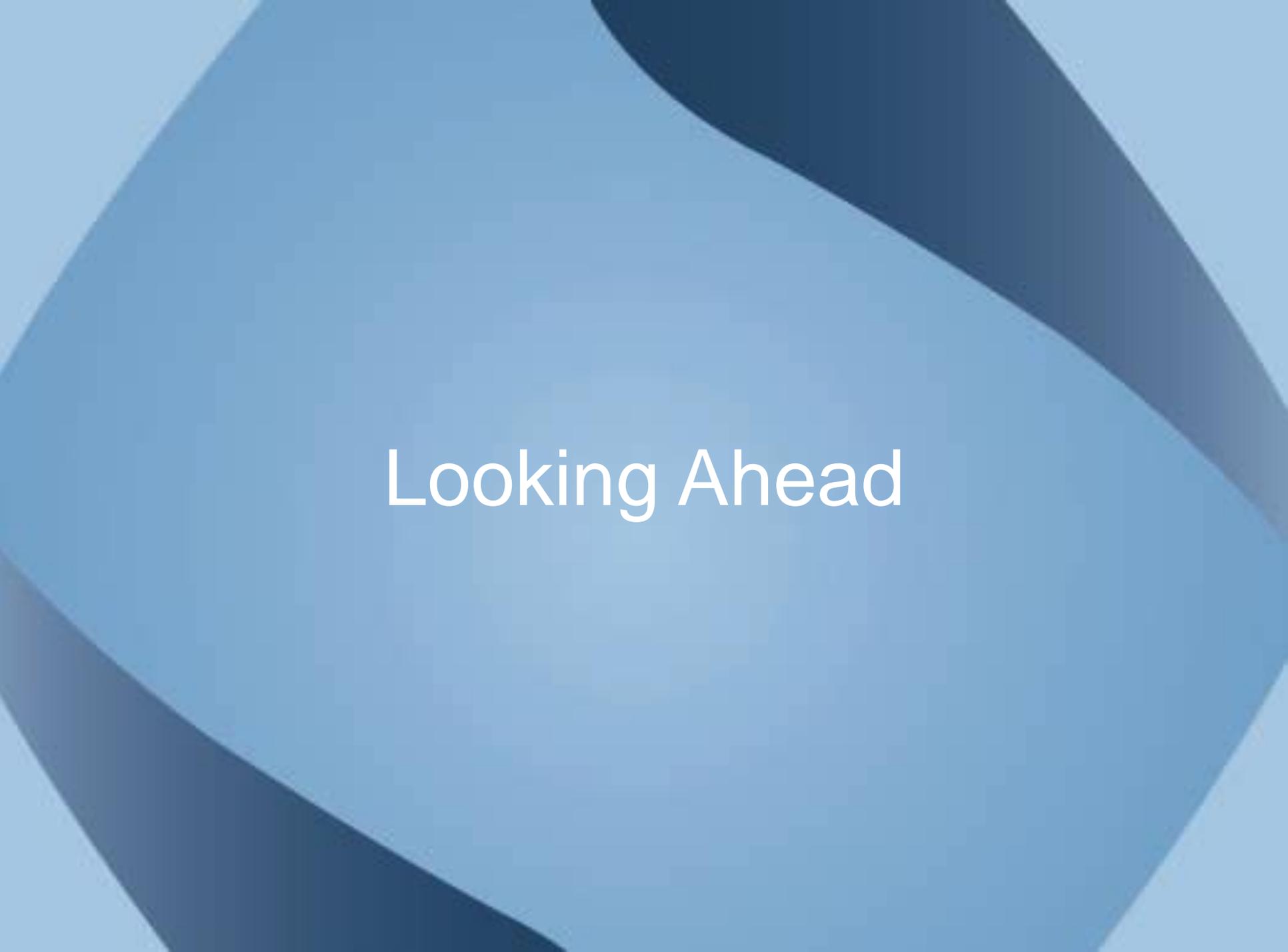
Based on:  
 1,800 DGE per day baseline diesel fuel consumption  
 \$3.75 per gallon diesel fuel cost  
 1,500 HP drill rig with three engines  
 All three engines converted to natural gas  
 330 operating days per year

# Simple Payback Analysis – PPS



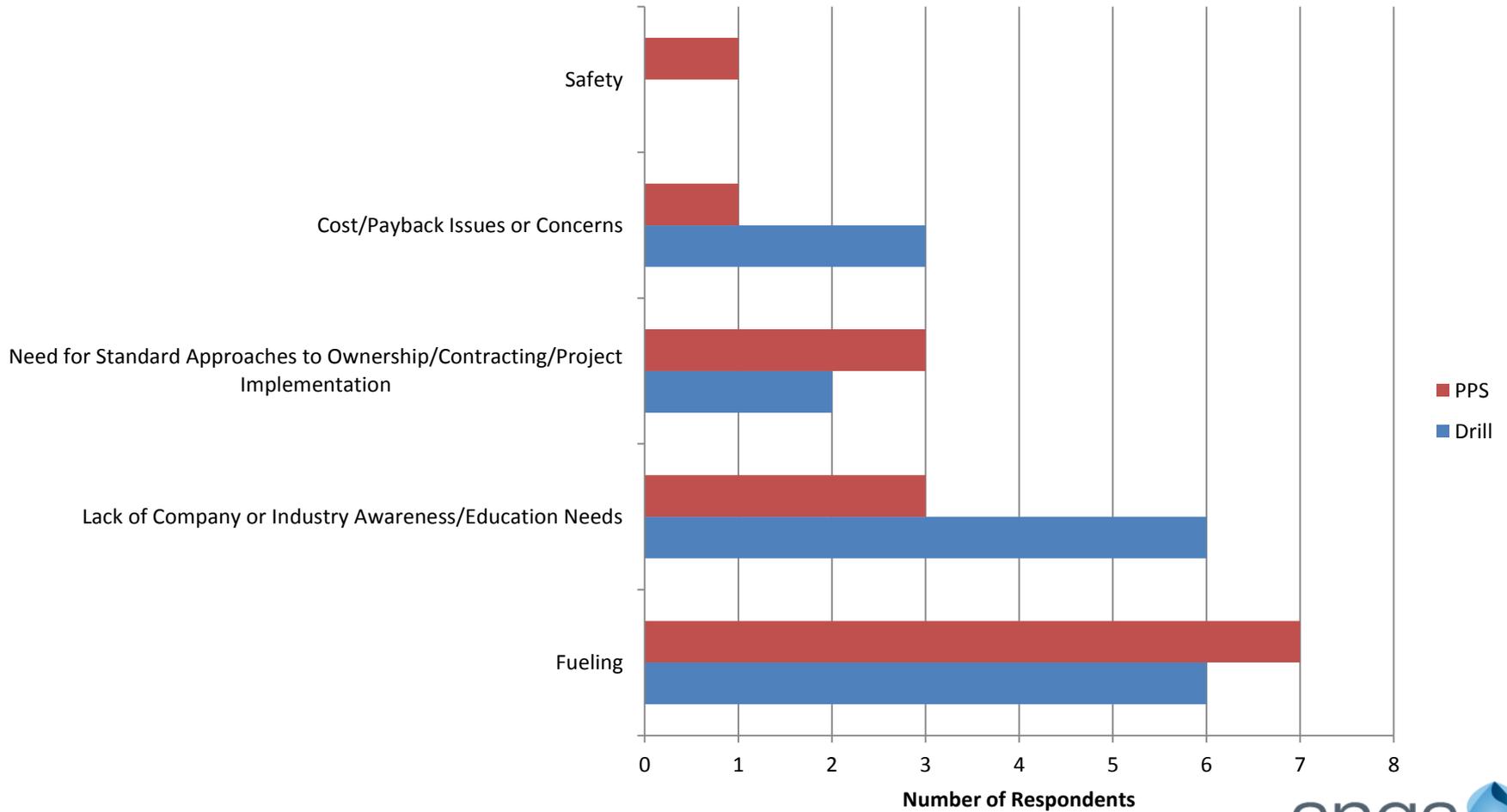
- The high daily fuel use in PPS engines and relatively low cost of the conversion provides rapid payback.
- Field gas can be difficult to implement in PPS because of peak fuel demands from large spreads, limiting the fuel price spread.

Based on:  
 1,600 DGE per day baseline diesel fuel consumption  
 \$3.75 per gallon diesel fuel cost  
 2,500 HP engine driving a hydraulic fracturing pump  
 330 operating days per year

The background consists of several overlapping, curved shapes in various shades of blue, ranging from a light sky blue to a dark navy blue. The shapes are smooth and organic, creating a sense of movement and depth. The text is centered in the middle of the composition.

Looking Ahead

# Challenges and Impediments to NG Growth





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