

# THE OUTLOOK FOR THE U.S. SHALE INDUSTRY

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# THE BOOK IS FINALLY HERE! (JULY 2016)

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Primary lesson is that much knowledge is superficial, and incorrect. In-depth understanding usually trumps clichés.

# CAUTIONS

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## HIGH LEVEL VIEW

- ANY GIVEN COMPANY MIGHT BE DIFFERENT
- GEOGRAPHY AS WELL AS GEOLOGY

## ACCOUNTING ALWAYS TRICKY

- NO EFFORT TO CORRECT
- AGGREGATION

## TOO MUCH SUPERFICIAL THINKING

- STATIC NOT DYNAMIC

# PRIMARY TOPICS

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DECLINE RATES

CAPITAL DISCIPLINE

PERMIAN TAKEAWAY

OUTLOOK FOR LNG

# HISTORY OF CONTROVERSY

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## GEOLOGISTS: HUGE RESOURCE!

- ENGINEERS: IMPOSSIBLE TO EXTRACT

## COMPANIES: GREAT GEOLOGY!

- AS GOOD AS/BETTER THAN THE EAGLE FORD/BAKKEN
- ANALYSTS: TOO EXPENSIVE

## PESSIMISTS:

- ONLY BARNETT
- OIL WON'T WORK
- BAKKEN UNIQUE
- HIGH DECLINE RATES
- CASH-FLOW IS NEGATIVE
- SWEET SPOTS INSUFFICIENT

E PUR SI MUOVE!

# CAPITAL DISCIPLINE: BANKERS VS. DRILLERS

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## SHOW US YOUR CAPITAL DISCIPLINE!

- “Please for the love of God, don’t do it!”

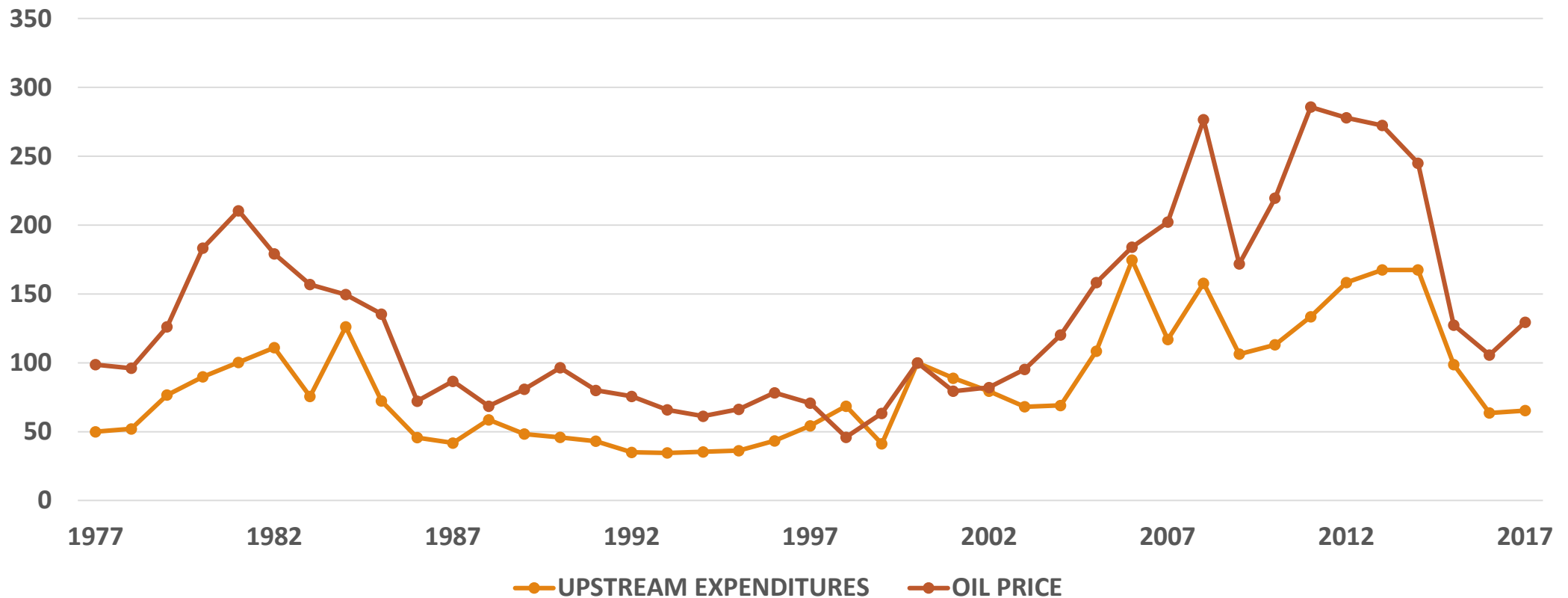
## SURPLUS WEIGHING ON PRICES

- PERMIAN TAKEAWAY
- NEGATIVE GAS PRICES, DISCOUNTED CRUDE

## GROWING DUCS

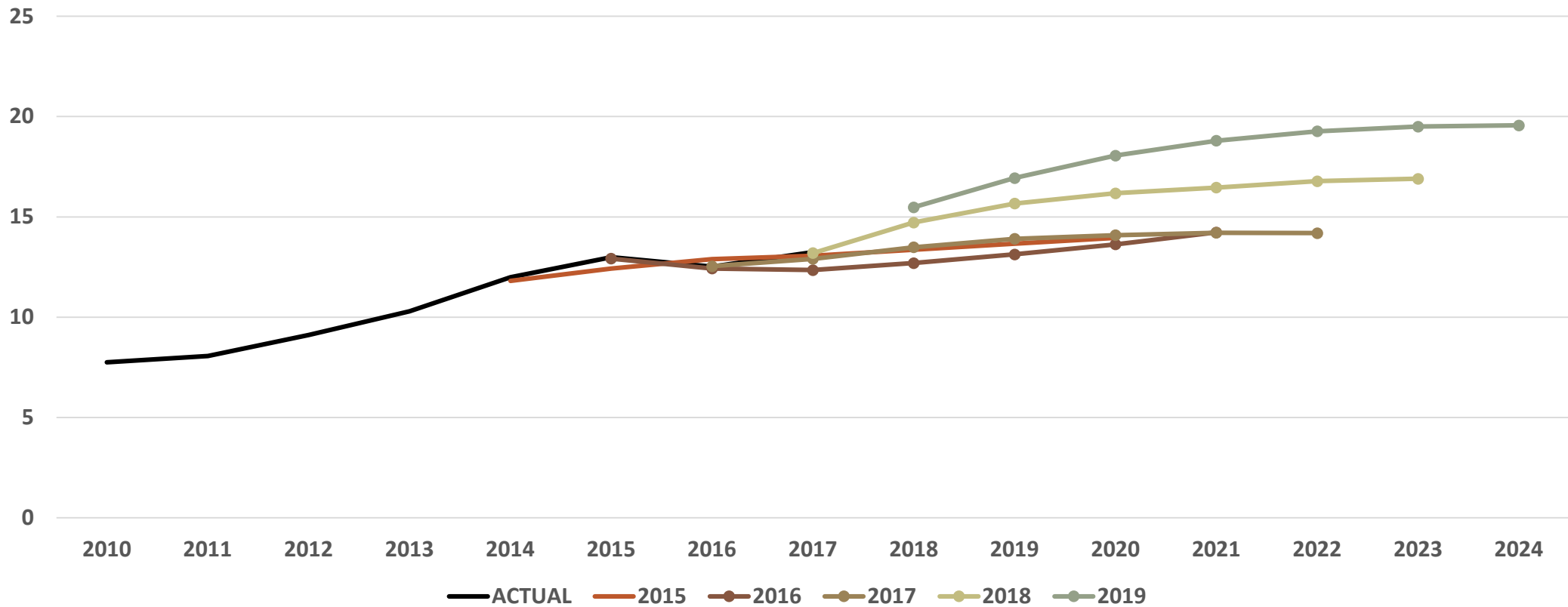
## ANIMAL SPIRITS VS. IRRATIONAL EXUBERANCE

# WHAT DRIVES SPENDING?



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION.

# PESSIMISM IN SHORT-TERM IEA FORECAST OF US SUPPLY

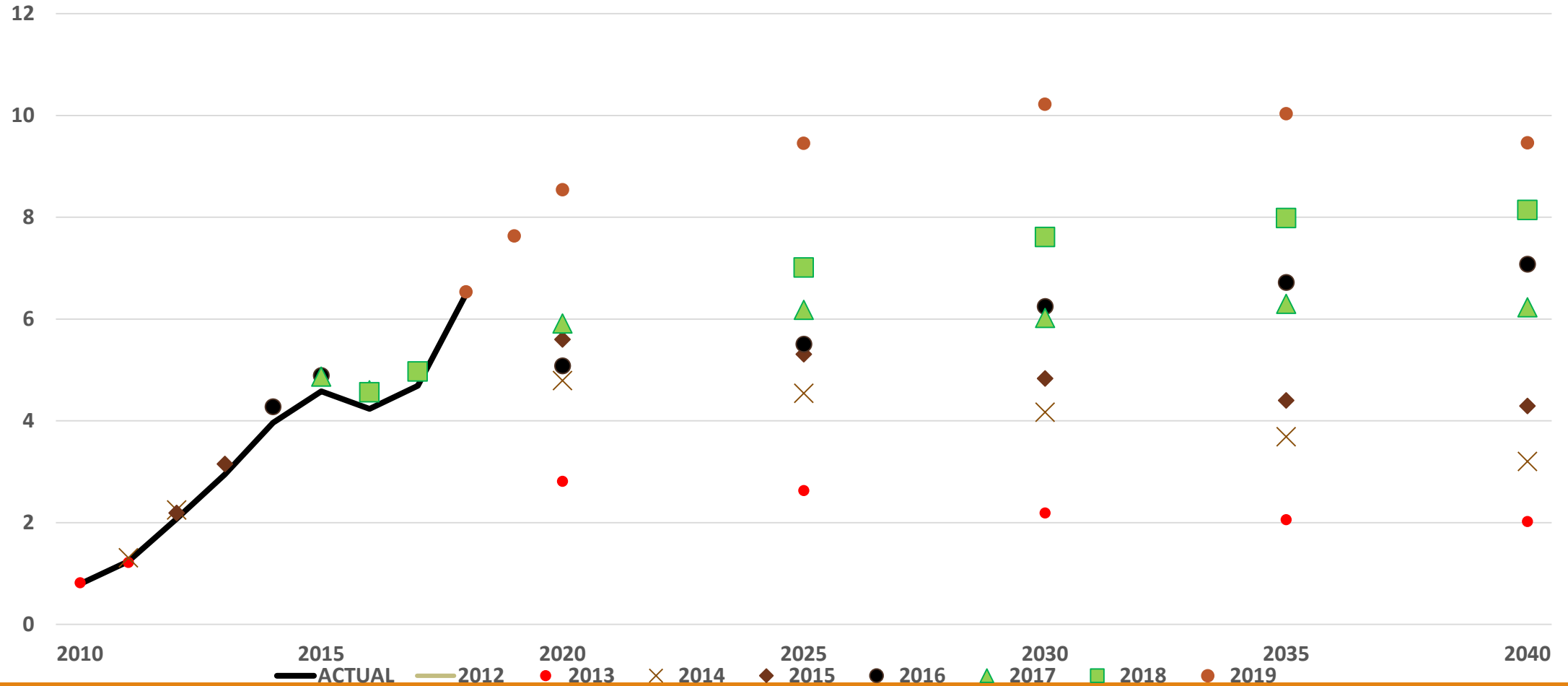


SOURCE: INTERNATIONAL ENERGY AGENCY *OIL MARKET REPORT*.



# CONTINUING PESSIMISM IN SHALE OIL

(EIA FORECASTS)



# BREAKEVEN CONTROVERSY

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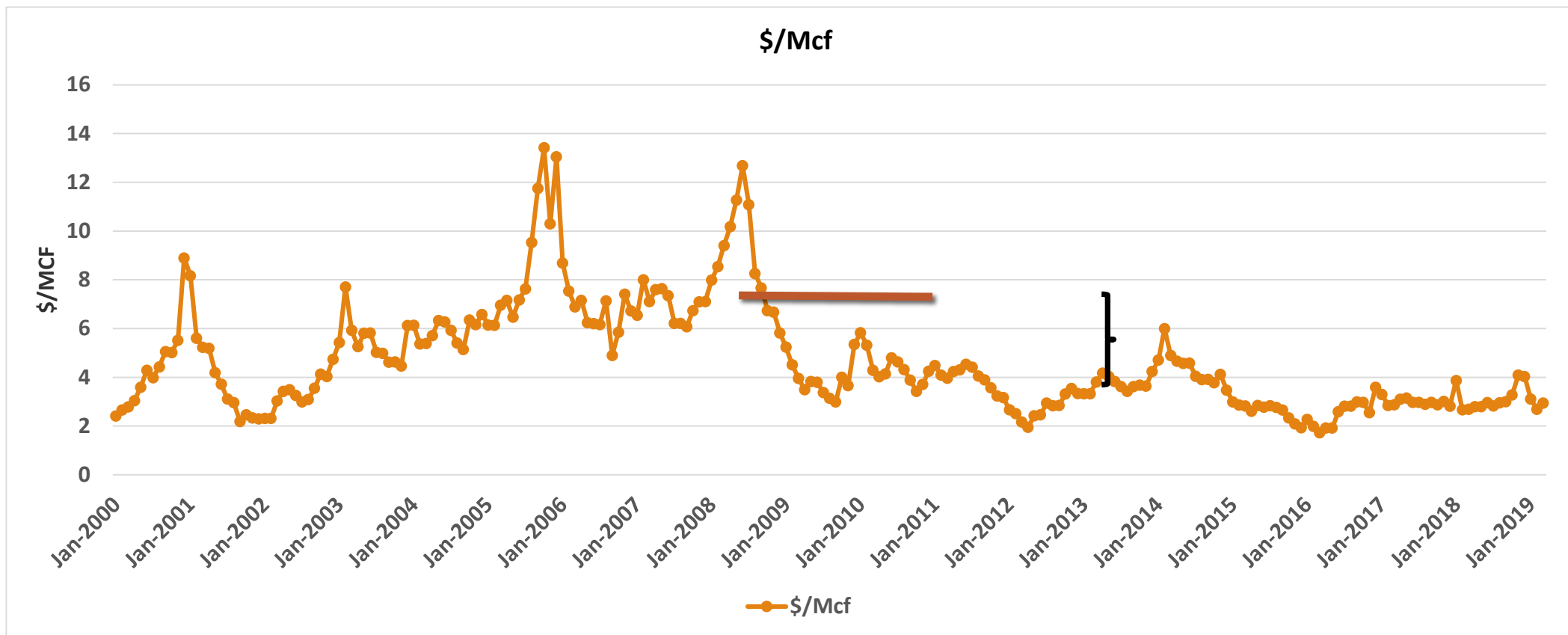
“NO WELL IS PROFITABLE”

- “ALL OUR WELLS ARE PROFITABLE”

BREAKEVEN ESTIMATES UNRELIABLE

- SHORT-RUN NOT LONG-RUN COSTS
  - EXCLUDING G&A, INTEREST?
- REALITY BITES
  - MARGINAL COSTS \$7.50/MCF (2010)
  - MARGINAL COSTS \$3.81-7/MCF (2013)

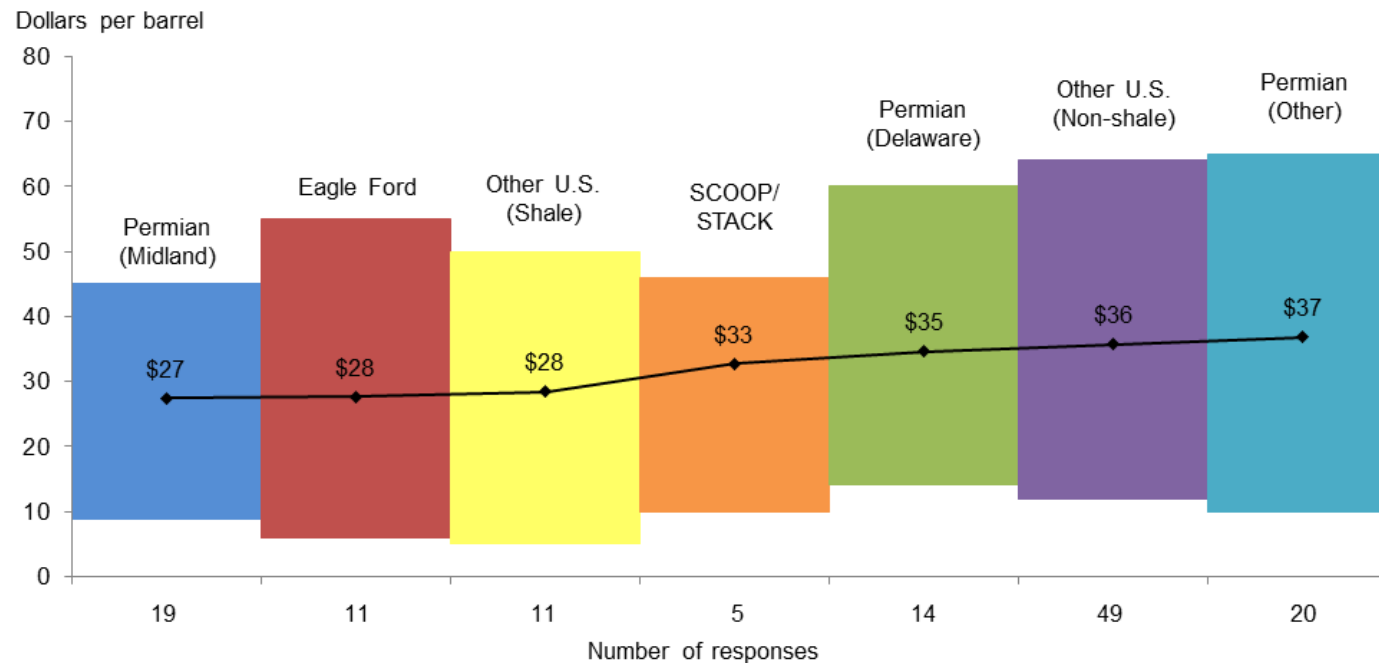
# GAS BREAK-EVEN AND PRICE



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION AND THE AUTHOR.

# MARGINAL COSTS (SHORT-RUN)

In the top two areas in which your firm is active:  
What WTI oil price does your firm need to cover operating expenses for existing wells?

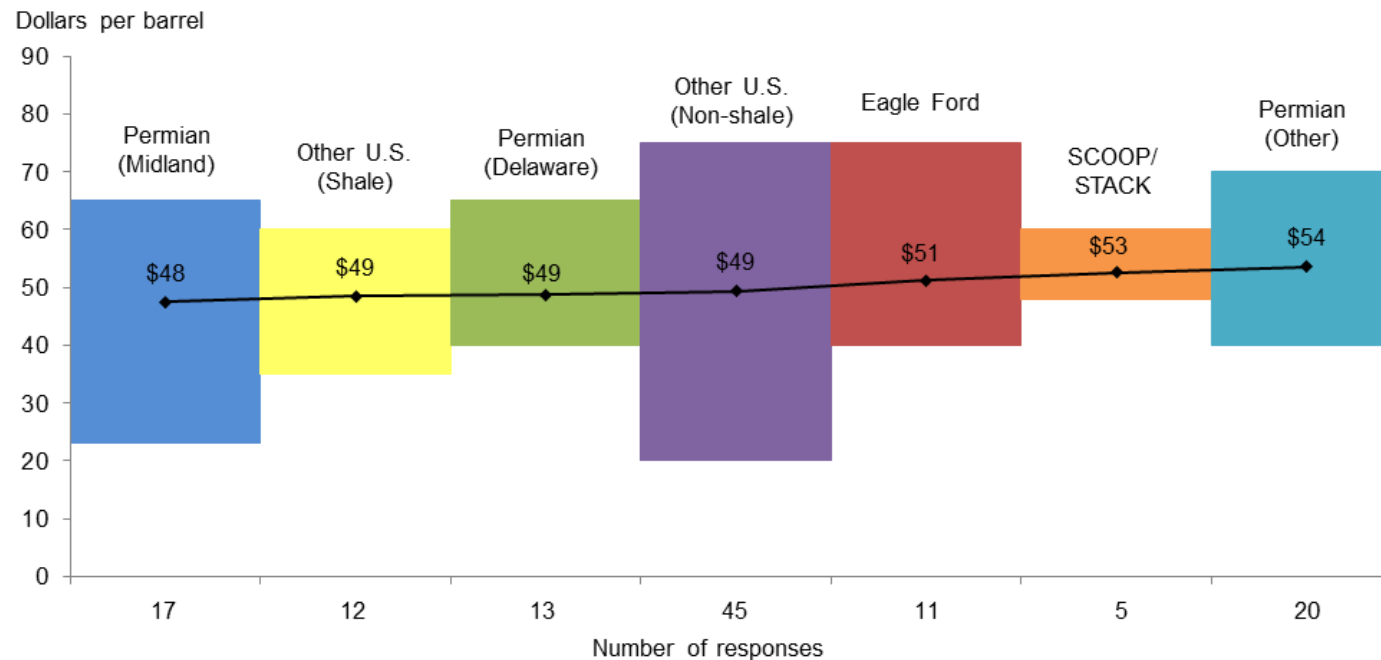


NOTES: Lines show the mean, and bars show the range of responses. Executives from 87 exploration and production firms answered this question during the survey collection period, March 13–21, 2019.

SOURCE: Federal Reserve Bank of Dallas.

# MARGINAL COSTS (LONG-RUN)

In the top two areas in which your firm is active:  
What WTI oil price does your firm need to profitably drill a new well?



NOTES: Lines show the mean, and bars show the range of responses. Executives from 82 exploration and production firms answered this question during the survey collection period, March 13–21, 2019.

SOURCE: Federal Reserve Bank of Dallas.

# DECLINE RATES

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PRODUCTION DROPS OFF SHARPLY

MUCH FASTER THAN CONVENTIONAL OIL

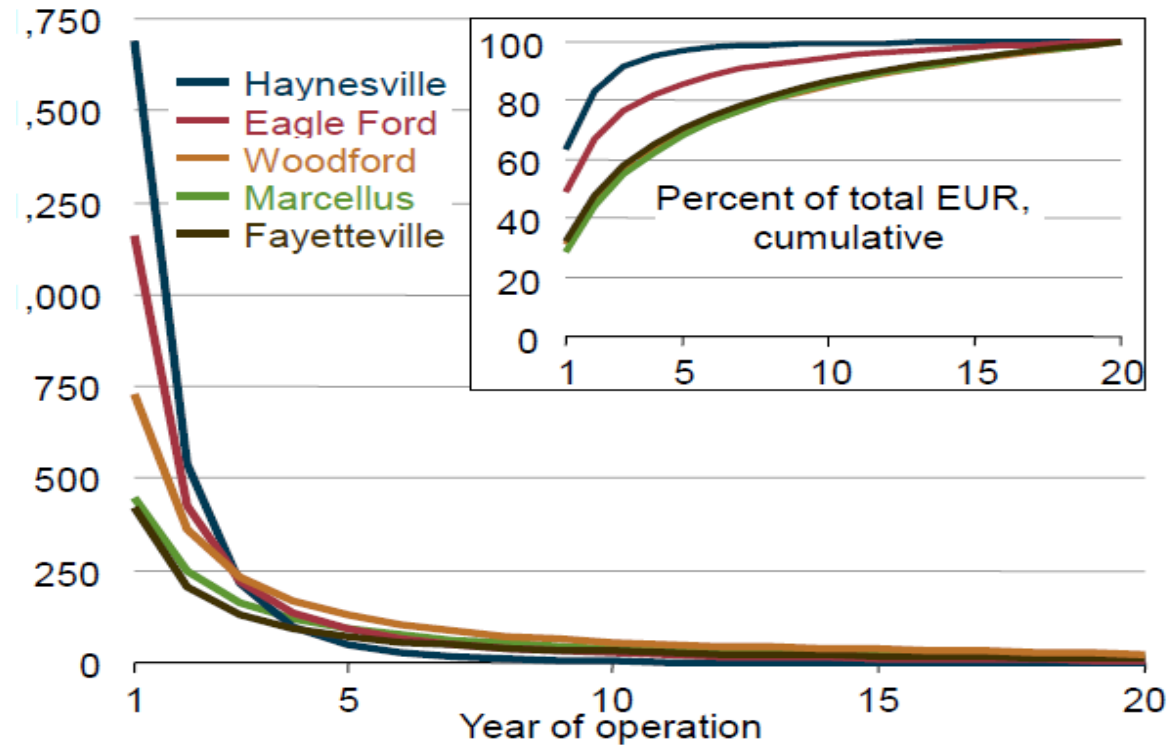
FOCUS IS ON THE WELL LEVEL

IMPACT ON OUTPUT MIXED

DRILLING LEVELS NEED TO BE MONITORED CLOSELY

# SHALE GAS DECLINE CURVES

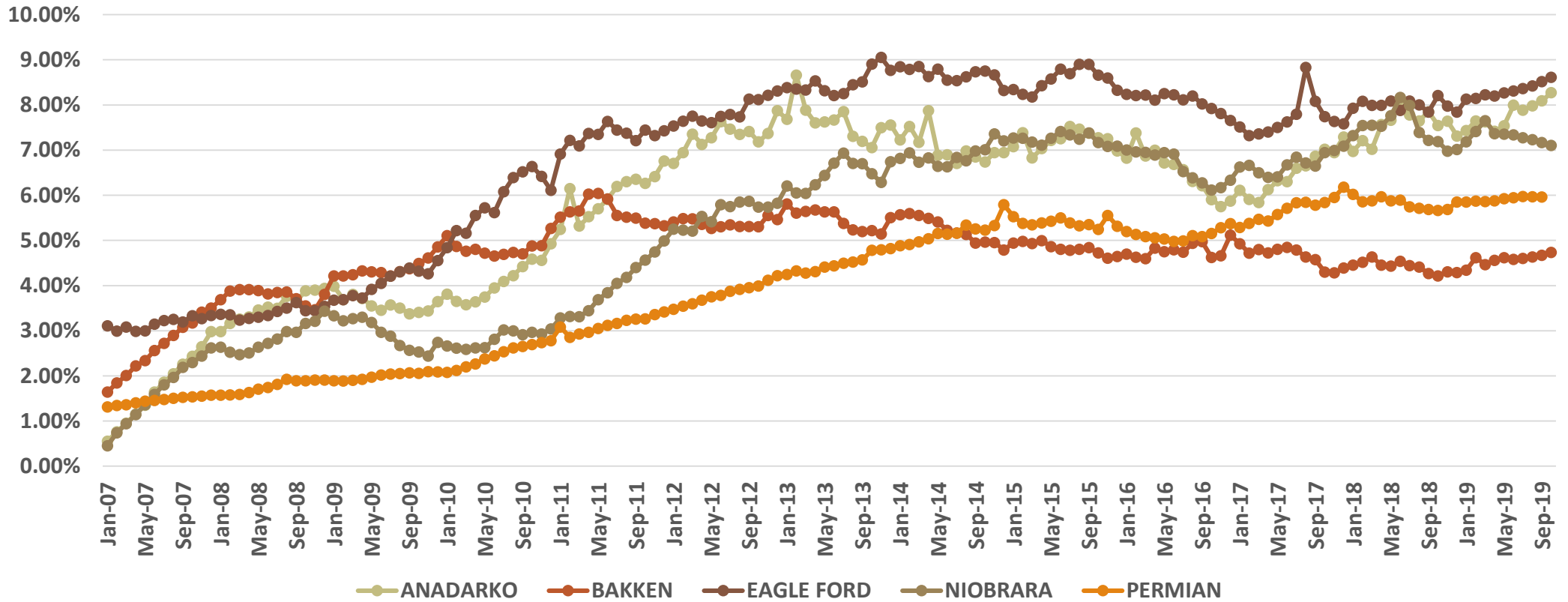
**Figure 54. Average production profiles for shale gas wells in major U.S. shale plays by years of operation (million cubic feet per year)**



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION

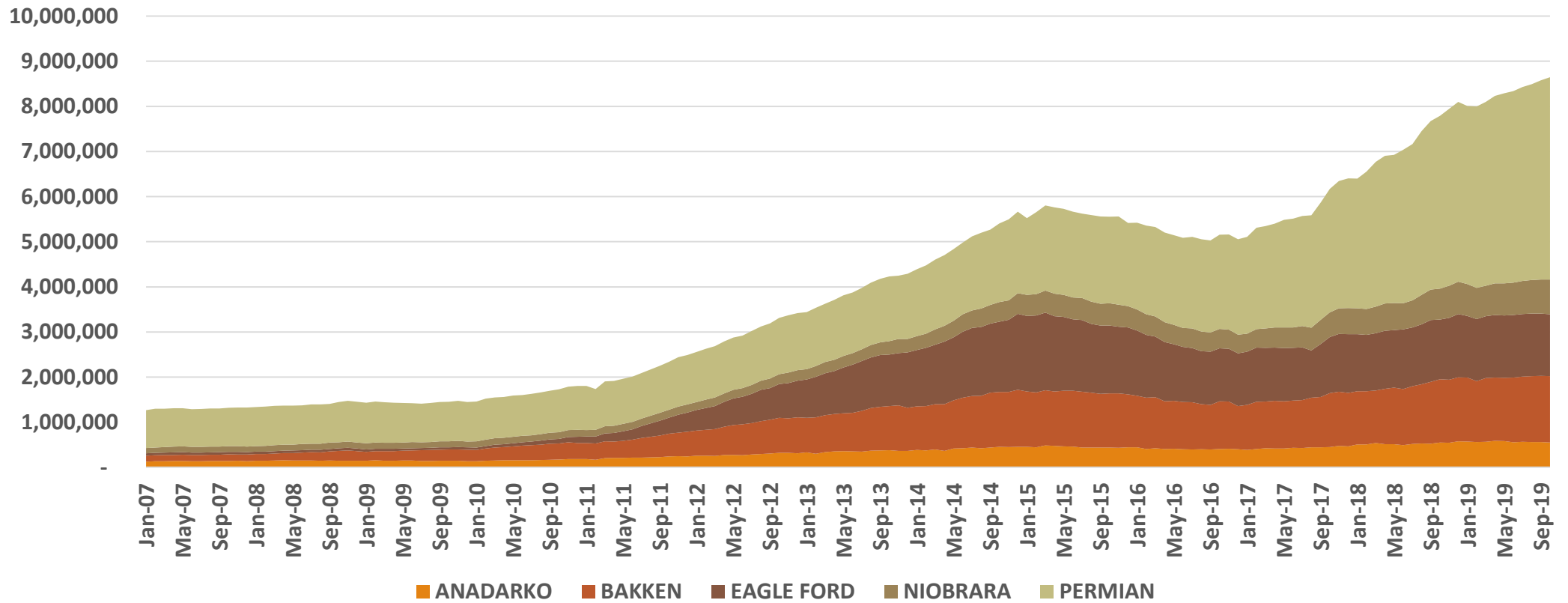
# SHALE OIL DEPLETION RATES

## (LEGACY / PRODUCTION)



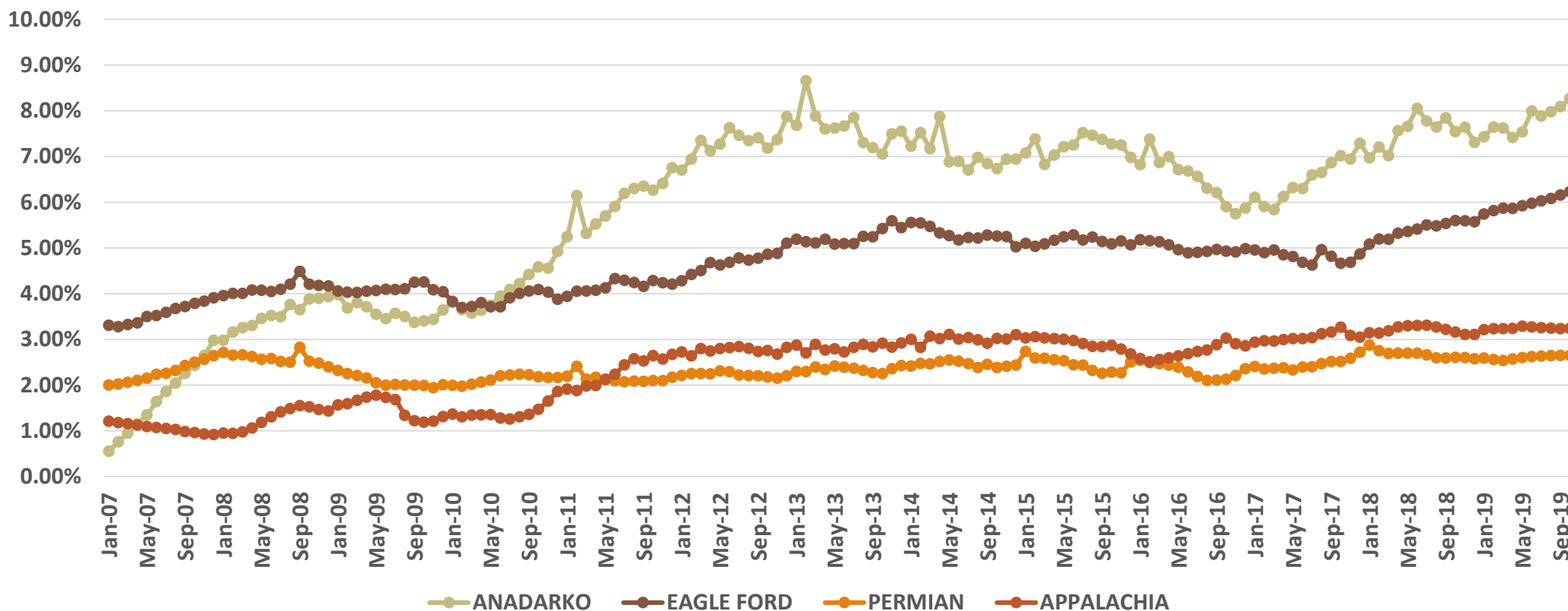


# SHALE OIL PRODUCTION



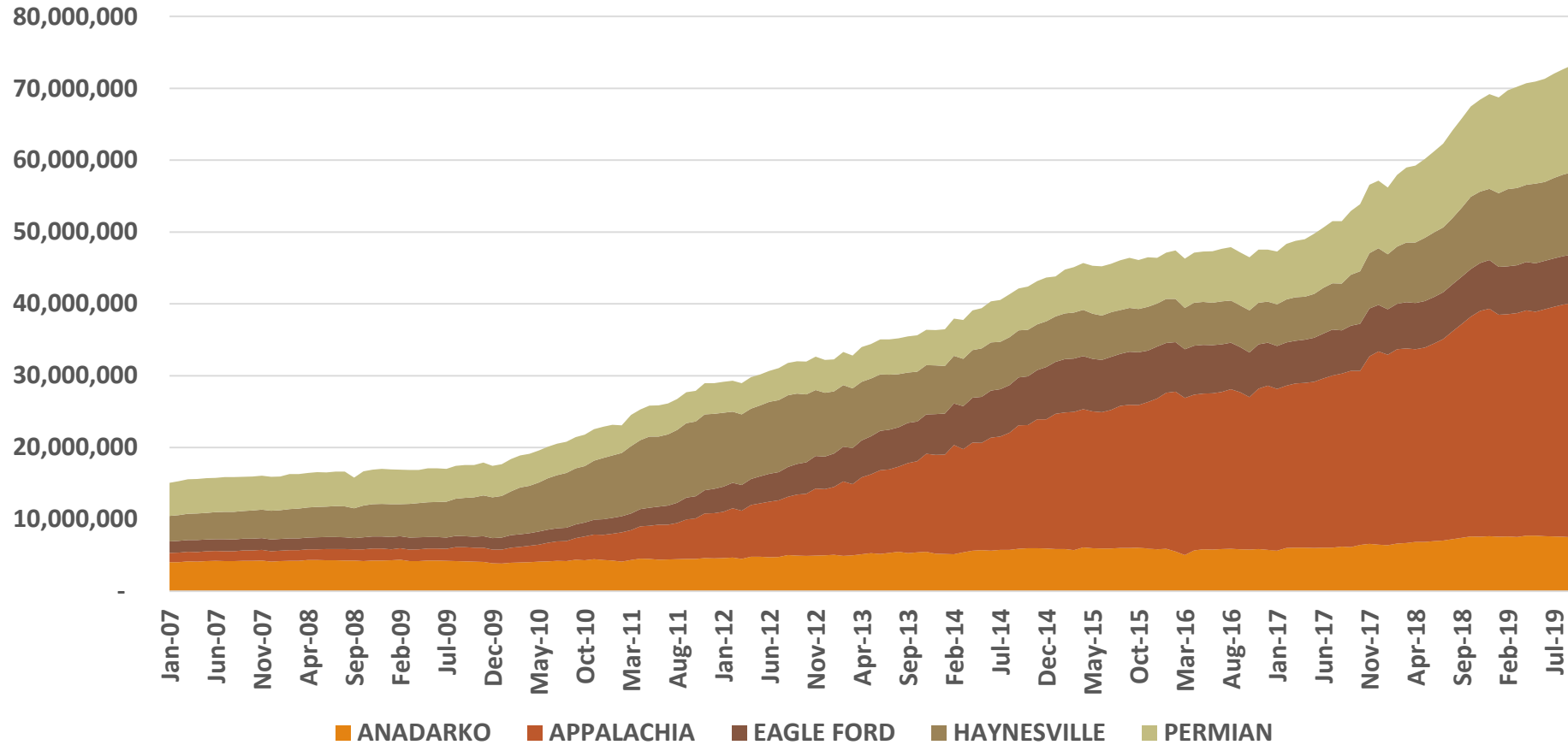
# SHALE GAS DECLINE RATE

(LEGACY / PRODUCTION)



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION AND THE AUTHOR.

# SHALE GAS PRODUCTION



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION

# CAPITAL DISCIPLINE (OR NOT)

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EARLY BOOM YEARS

CASH FLOW NEGATIVE/NO PROFITS

IRRATIONAL EXUBERANCE

- WALL STREET THE ENABLER
- LOTS OF DUMB MONEY

# WINNER'S CURSE

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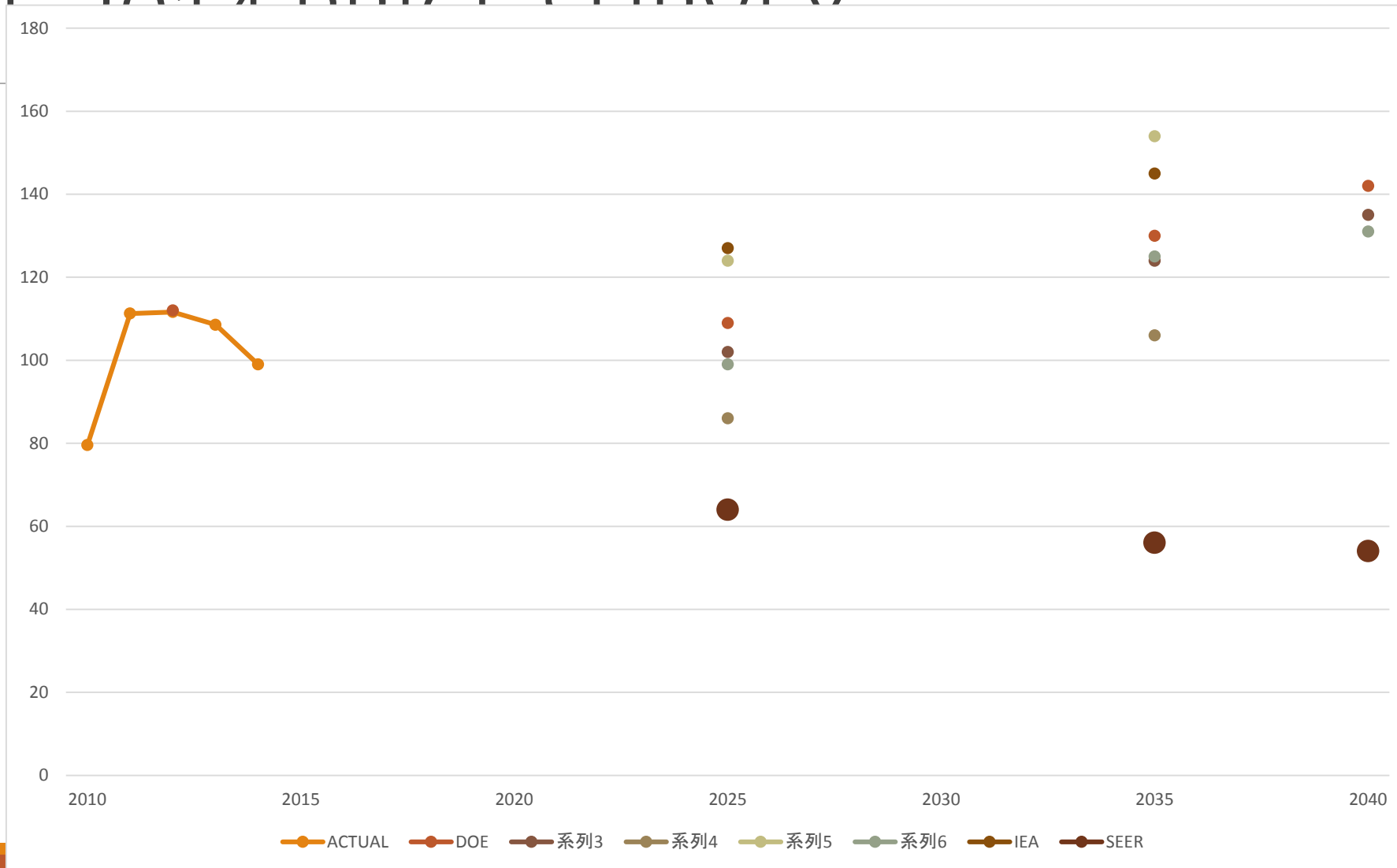
## APPLIED TO UNCERTAINTY

- GEOLOGICAL
- PRICE

## FORMER A MAJOR FACTOR IN EARLY SHALE DAYS

- LATTER THE ENTIRE INDUSTRY
  - PHILOSOPHER BjM: "THIS TIME FOR SURE!"

# DOE 2014 PRICE SURVEY



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION, *ANNUAL ENERGY OUTLOOK 2014*.

# BIG FAILS

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SAMSON: HAYNESVILLE EMPHASIS

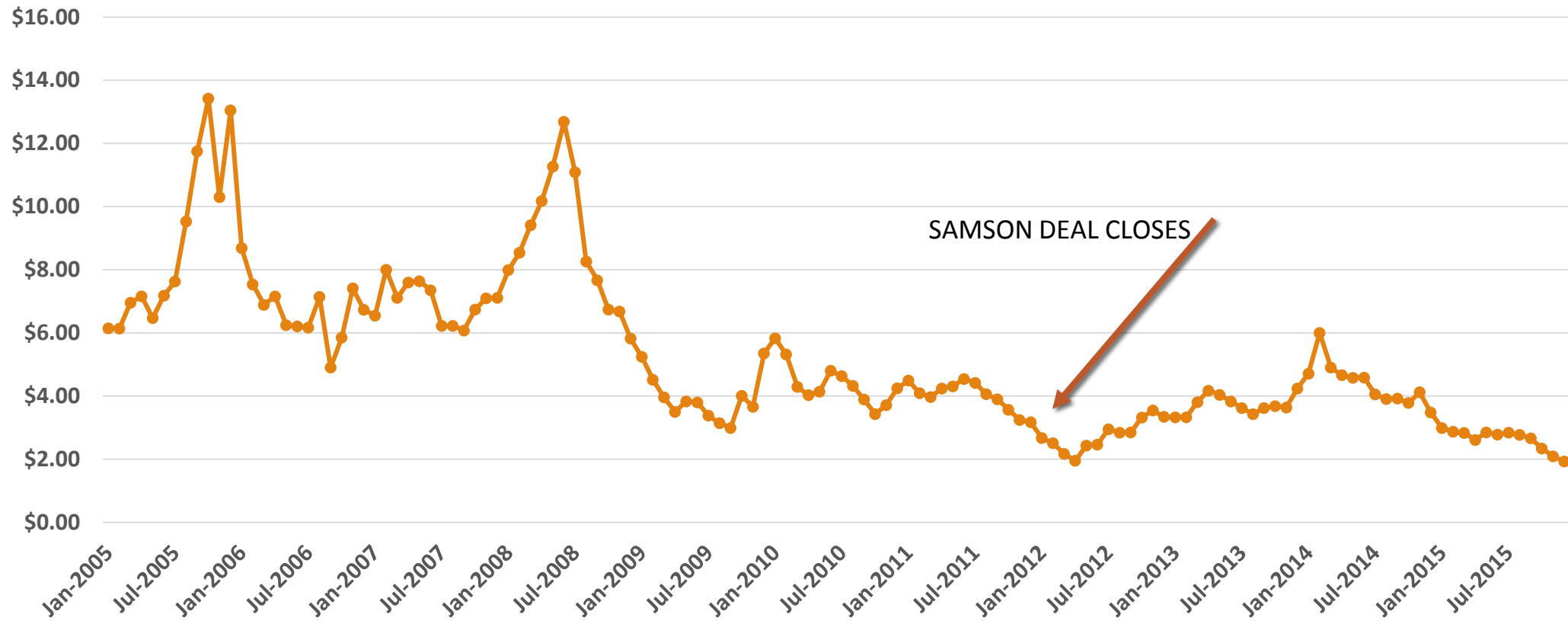
CHESAPEAKE: AGGRESSIVE LEASE ACQUISITION

MANY OTHERS

COMMON ELEMENTS

- NATURAL GAS HEAVY
- UNEXPECTED PRICE DROP
- HEAVY DEBT/EQUITY

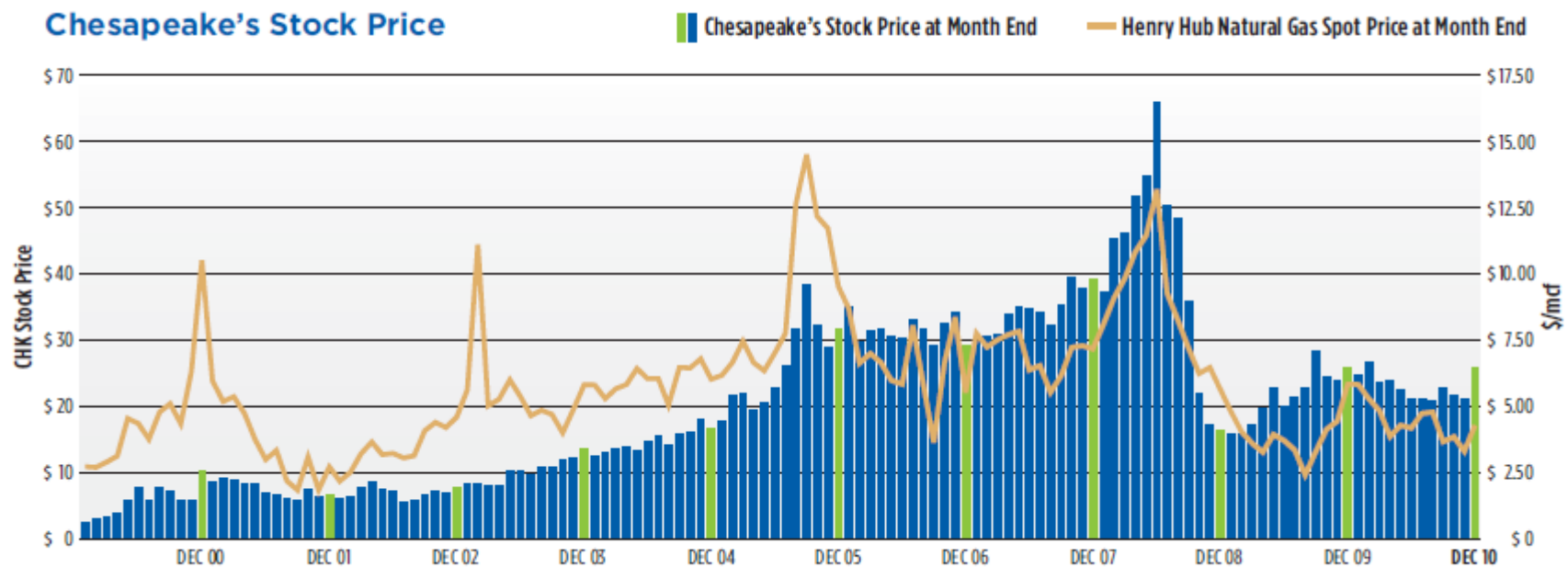
# GAS PRICES



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION

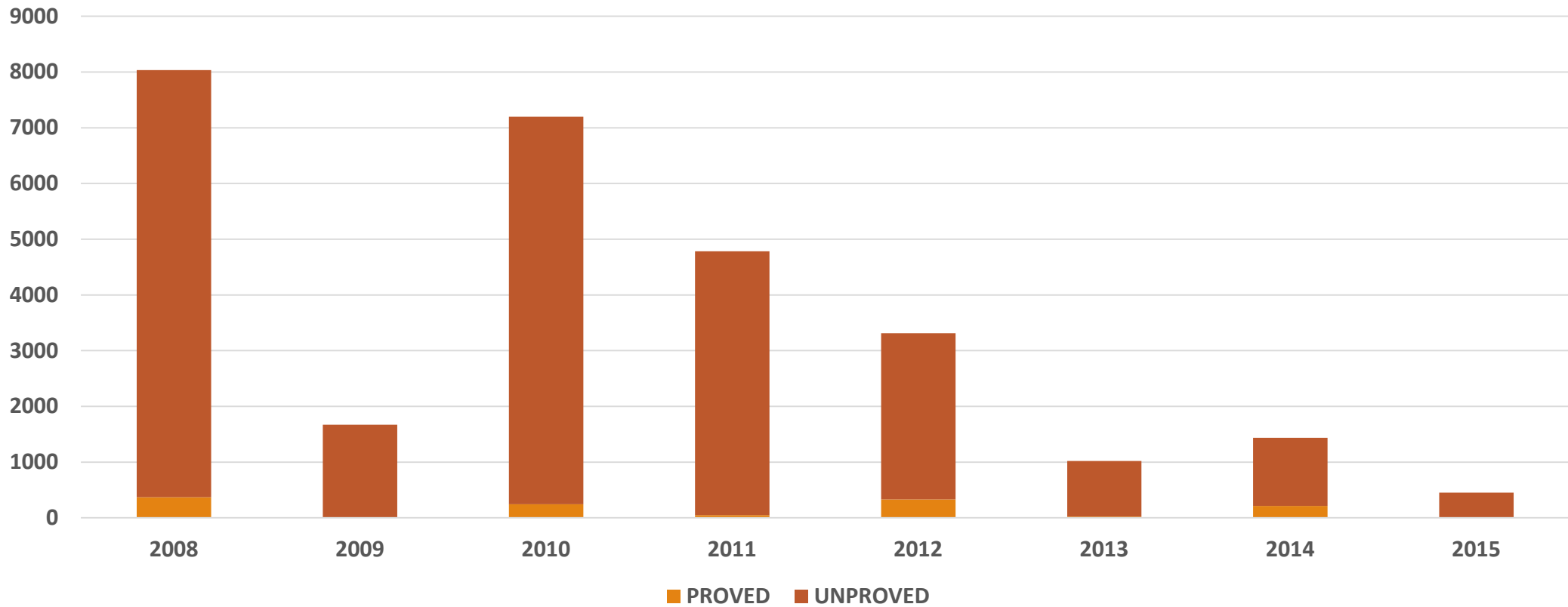


# ...SORT OF OBVIOUS



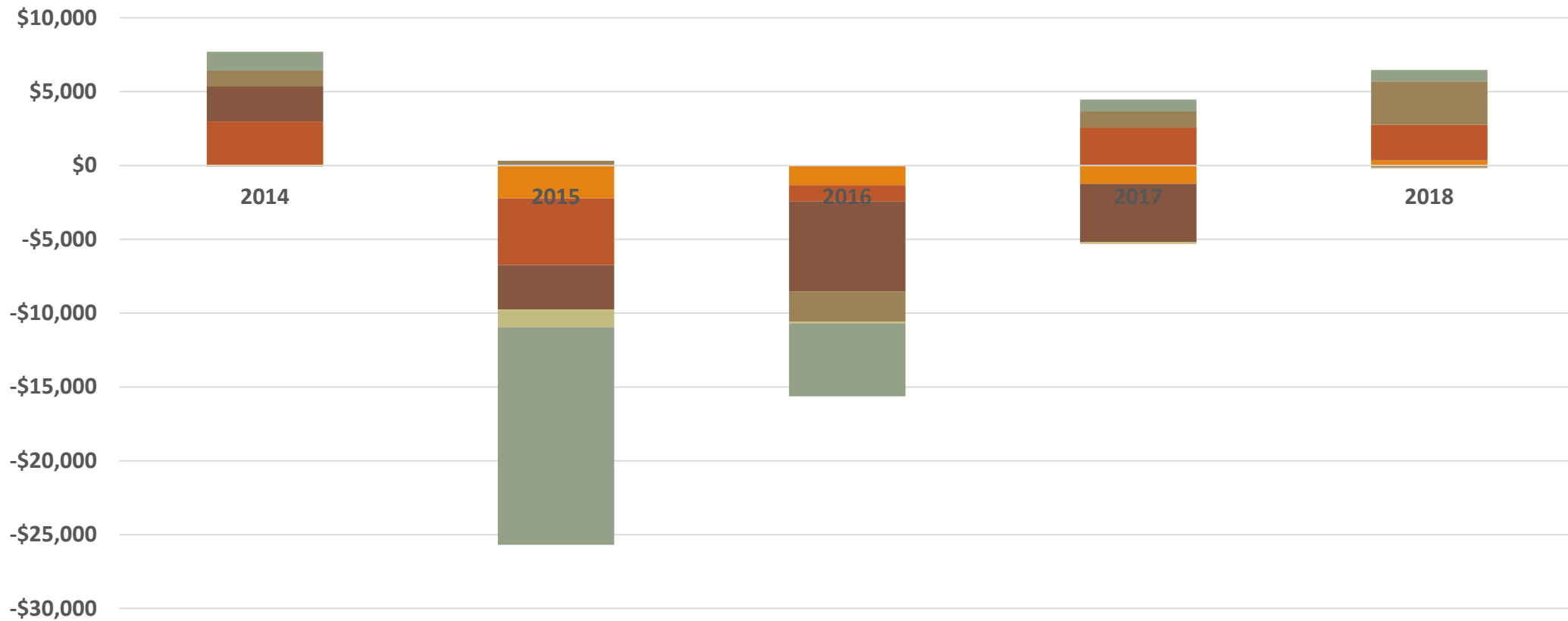
SOURCE: CHESAPEAKE ENERGY ANNUAL REPORT 2011.

# EMPHASIS ON FUTURE REVENUE



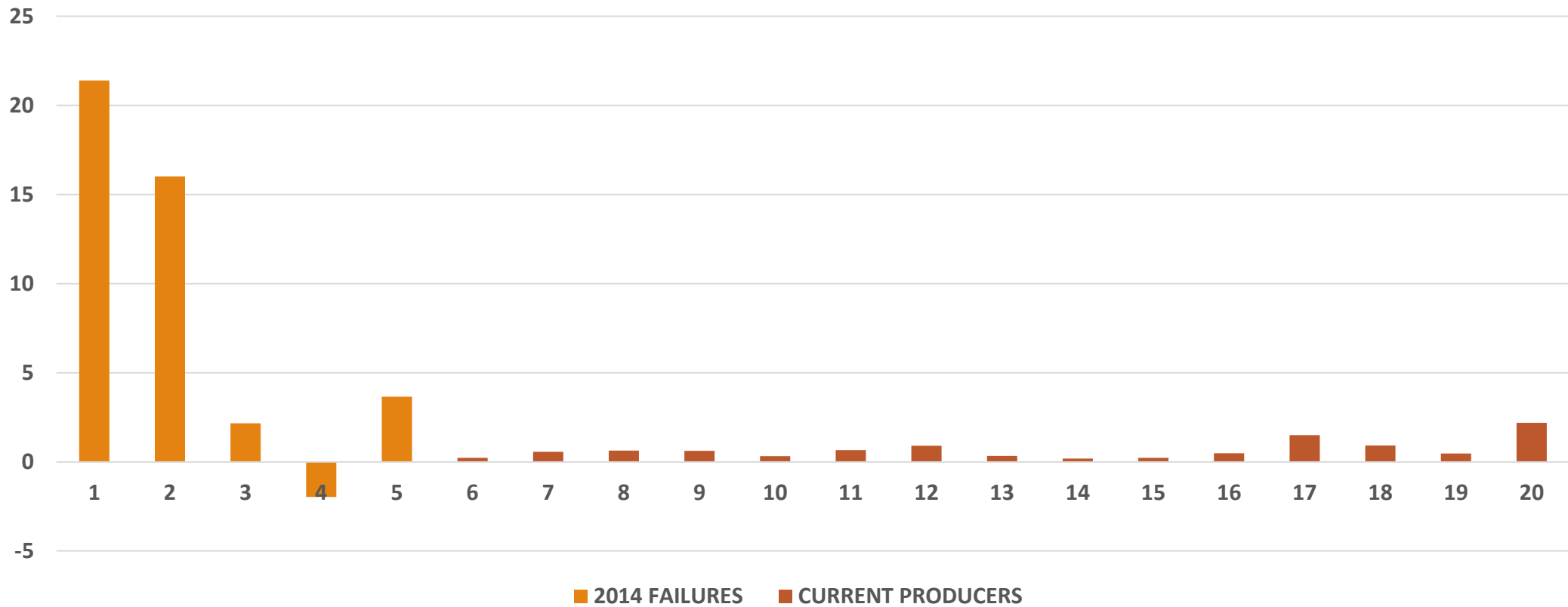
SOURCE: CHESAPEAKE ENERGY ANNUAL REPORTS.

# LOSSES CONCENTRATED IN 2015/2016



SOURCE: VARIOUS COMPANY ANNUAL REPORTS

# DEBT/EQUITY RATIOS IMPROVED



SOURCE: COMPANY ANNUAL REPORTS

# COULD IT REPEAT?

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## REPEATING THE 2008 COLLAPSE WOULD MEAN:

- DROP OF 60% IN GAS: TO \$1.20/\$1.50?
- DROP OF 40% IN OIL: TO \$35?

## REPEATING THE 2015 COLLAPSE WOULD MEAN:

- DROP OF 45% IN GAS: TO \$1.60?
- DROP OF 48% IN OIL: TO \$32?

## OTHER CONCERNS

- SHARP INTEREST RATE RISE
- FLARING BAN

# SHARP RISE IN PERMIAN TAKEAWAY

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TRANSPORT COSTS SHOULD DROP

MORE REVENUE FOR PRODUCERS

SHOULD MEAN MORE DRILLING

WILL DUCS BE COMPLETED RAPIDLY?

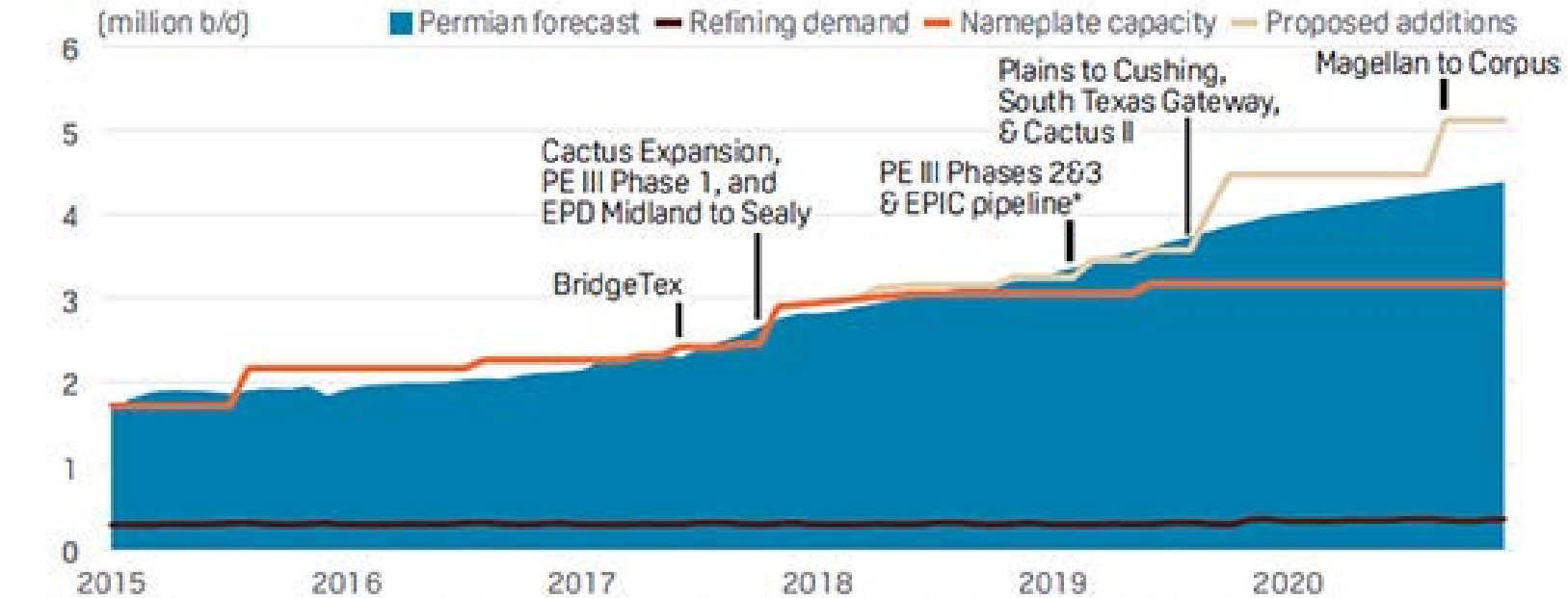
COULD BRENT/WTI DIFFERENTIAL DROP?

MORE NATURAL GAS TO BE FLARED?

- OR LARGER PRICE DISCOUNT
- GOOD FOR LNG EXPORTS

# PERMIAN TAKEAWAY GROWS

**ADDITIONAL PIPELINE CAPACITY WILL BE SUFFICIENT, BUT MAY HAVE PERIODS OF TIGHTNESS**



\*Only takes into account original 200Mb/d EPIC capacity. Has proposed increasing to 440Mb/d.  
Source: Platts

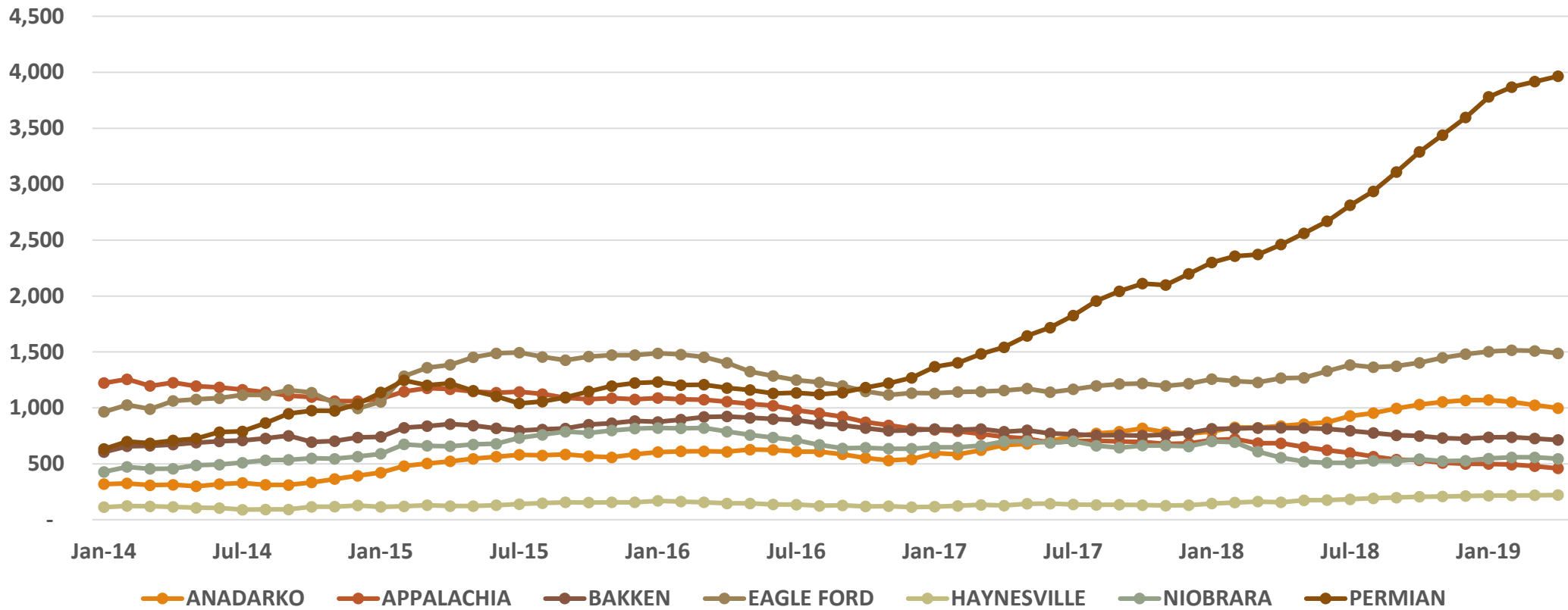
# WTI DISCOUNT

(API 40+MINUS 20-)



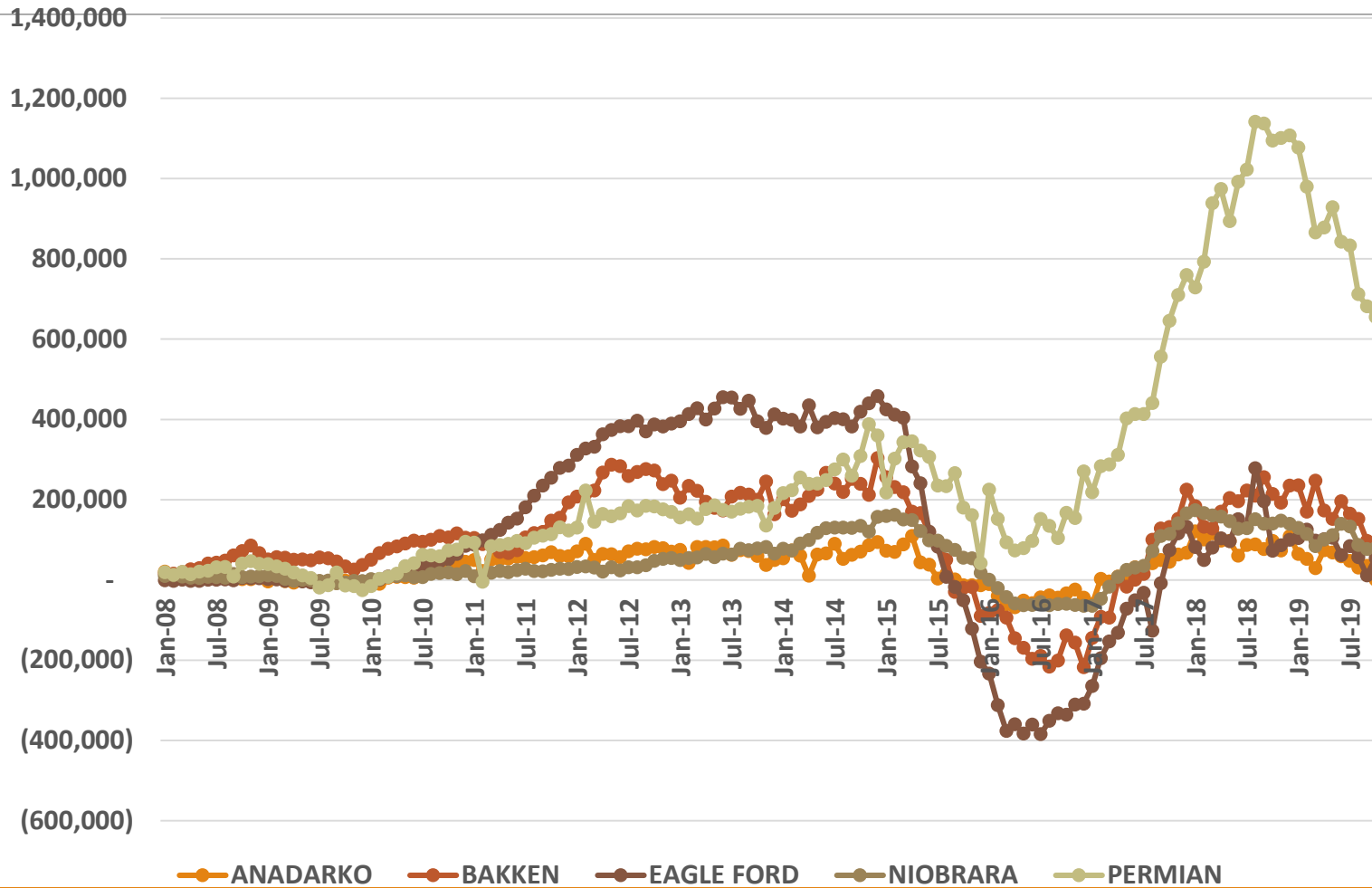


# DUCS BY BASIN



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION

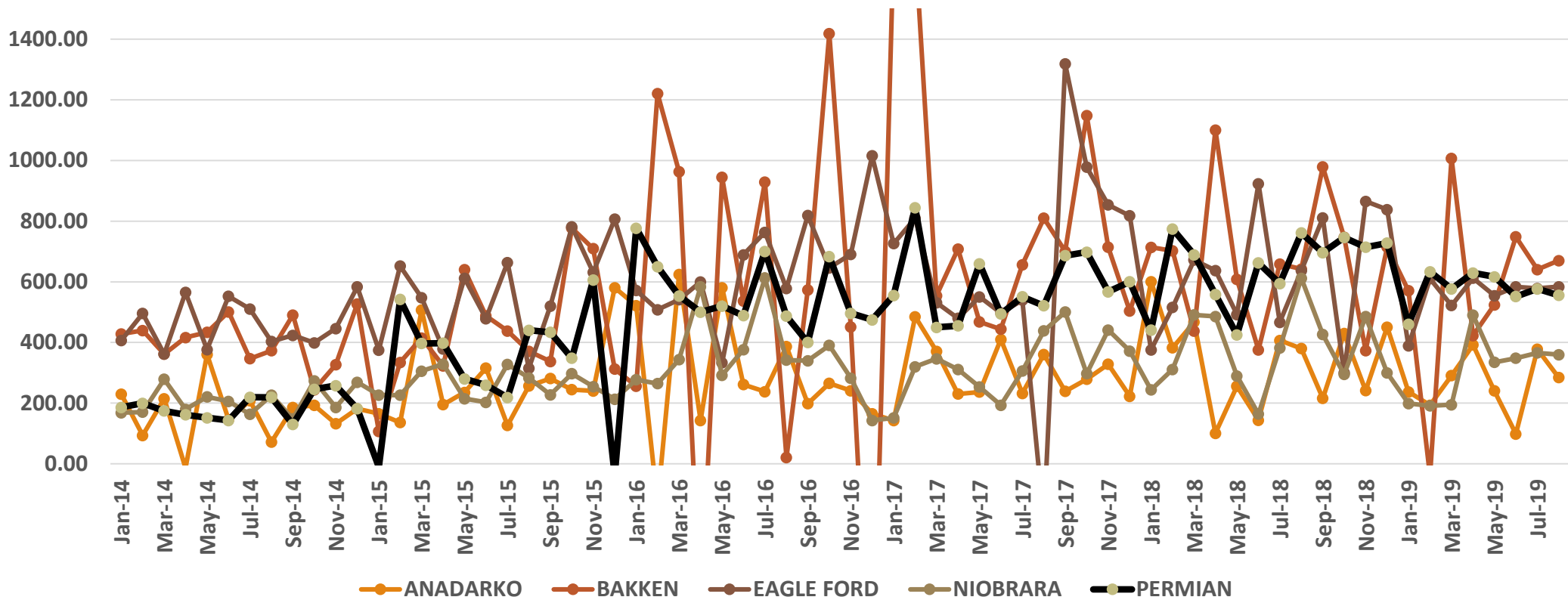
# TIGHT OIL YEAR ON YEAR CHANGE



Source: DOE.

# BASIN PRODUCTIVITY

(B/D/WELL ADDED)



# WHY IS SHALE DIFFERENT?

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## GEOLOGICAL AND POLITICAL RISKS SMALL

- OUTSIDE OF NEW YORK (COLORADO)

## PRICE RISKS HIGH

- TAXES AS SHARE OF PRICE SMALLER

## QUICK MONEY

- CASH IN ON PRICE SPIKES? MOSTLY OIL.

# SHALE REVOLUTION AND LNG MARKET

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## TWO BIG DIFFERENCES

- HIGH COST FEED GAS
- ANIMAL SPIRITS

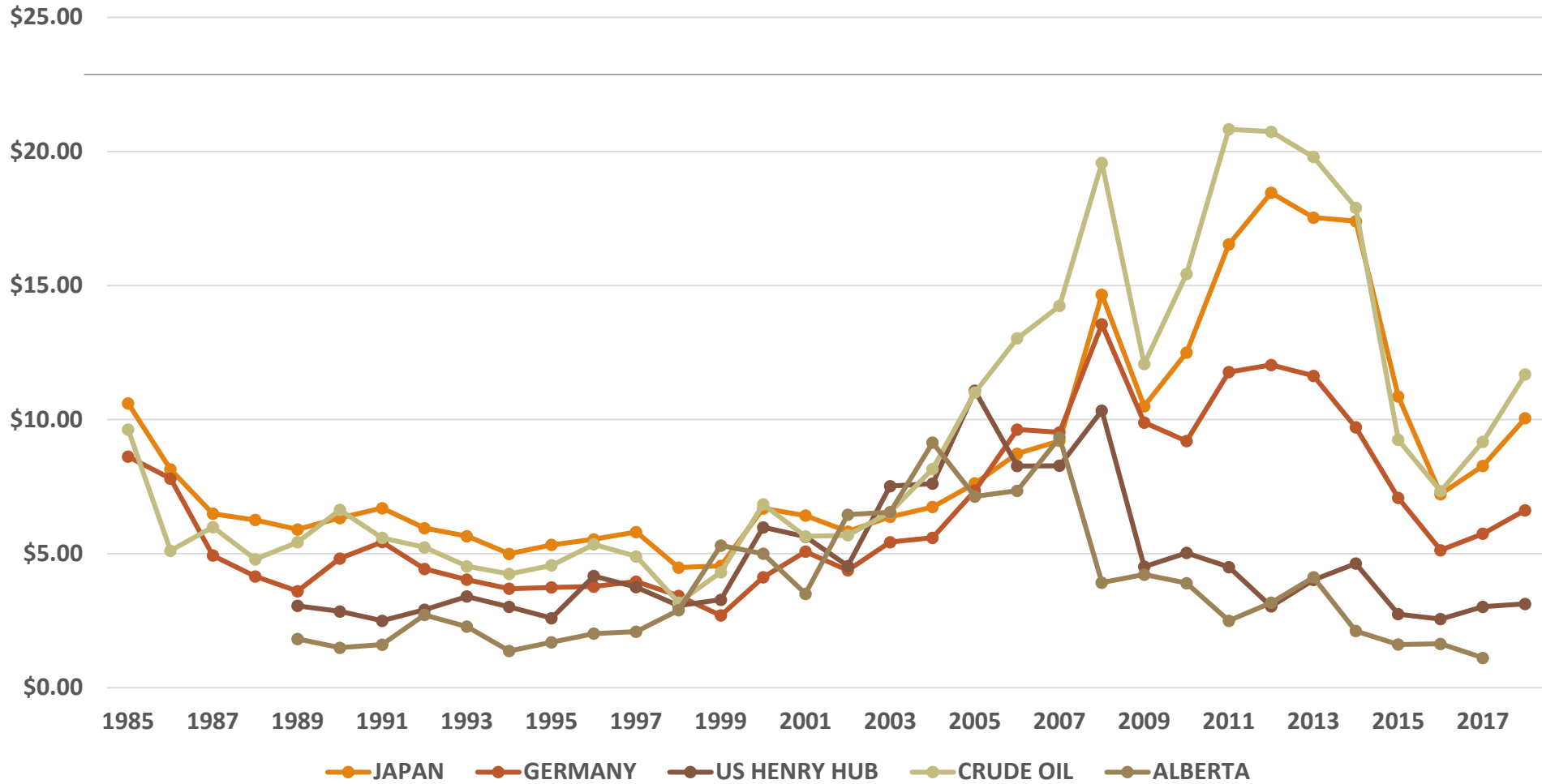
## WILLINGNESS TO BE FLEXIBLE

- BUILD WITHOUT COMMITTED PURCHASES
- NEW CONTRACT STRUCTURES
  - NO OIL PRICE INDEXING
  - DESTINATION RESTRICTIONS

RESULT: LOWER PRICES, LESS UPSTREAM PROFITS

BUT MAYBE IRRATIONAL EXUBERANCE?

# GLOBAL GAS PRICES 2018\$/MMBTU



See: "Uncertainties Threaten Natgas Development," *Oil & Gas Journal*, 3/4/13.

# EXPECTATIONS

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## SHALE PRODUCTION TO BE ROBUST

- INCREASINGLY DOMINATED BY LARGER PLAYERS
- 2020 SURGE COULD PRESSURE MARKETS

## BOOM AND BUST CONTINUE

- SMALLEST AND MOST VULNERABLE DISAPPEAR

## UNCERTAINTY REIGNS

- NEW BASINS TOUTED AND DECRIED
- RATE OF TECHNOLOGICAL PROGRESS UNCLEAR