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Risk and Uncertainty in US Gas

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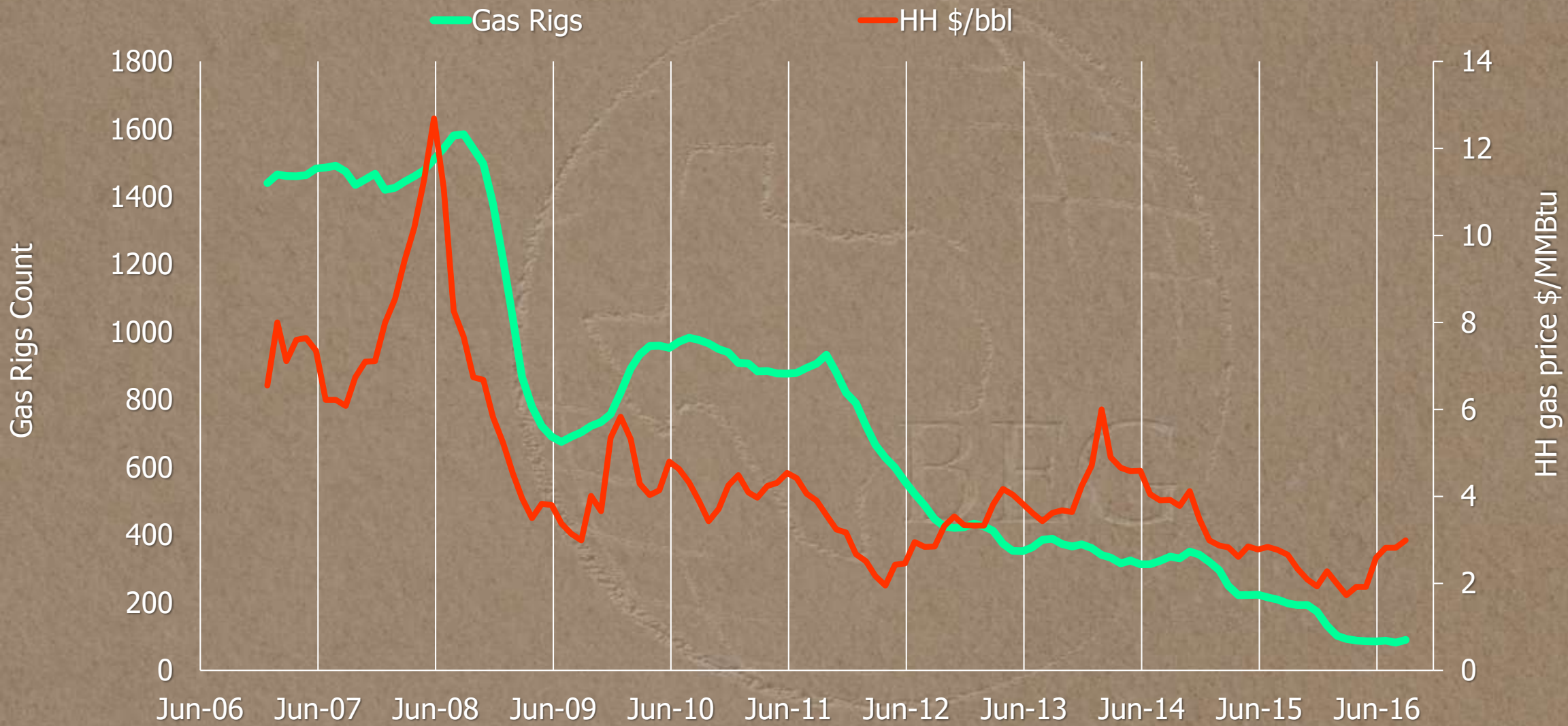
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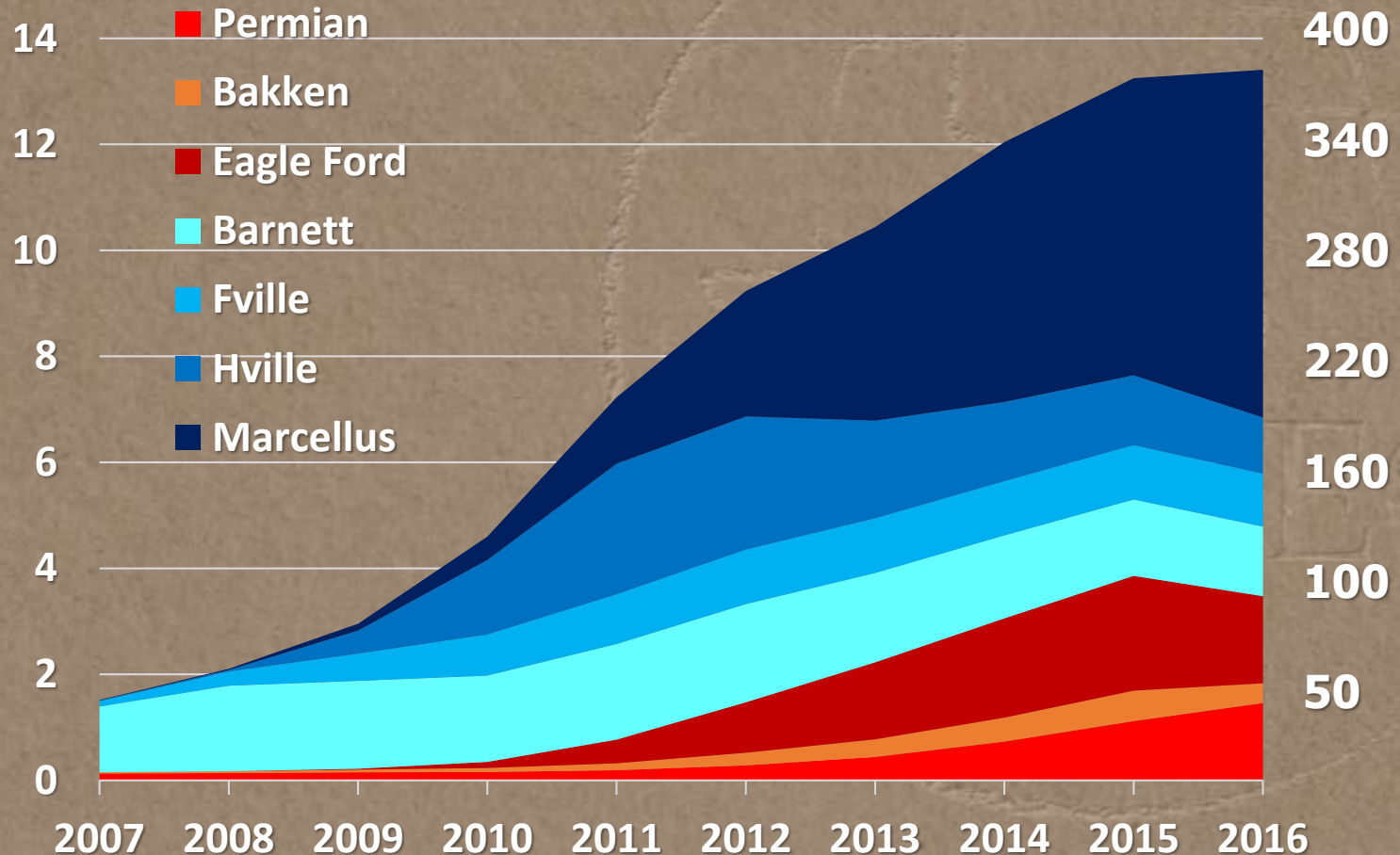
U.S. Natural Gas Turmoil



U.S. Natural Gas Production

Tcf/year

Bcm/year



Despite the low natural gas prices, production continues to grow in many regions

- Technology
- Economies of Scale
- Decreased costs (partly thanks to low oil prices)

BEG: 3DRP Study

Gas-In-Place	3300 Tcf
Recoverable	15-35%
Demand '16	27 Tcf
Demand '06	22 Tcf

Resource-in-Place
Technically Recoverable

HZ Wells drilled 17,815

Bakken
17,844

Marcellus
10,334

Fayetteville
5,834

Haynesville
5,490

Eagle Ford
15,346

Barnett
17,815

Completion Date



N Horizontal Wells

- Potential wells ~ 100,000

Bakken & Three Forks

- Total HZ wells drilled ~ 90,000
- Possible future drilling ~ 500,000
- + >1,000,000 in Permian

Marcellus

~200,000

Barnett

~ 63,000

Fayetteville

~ 13,000

Permian Basin

> 1,000,000

Haynesville

~ 35,000

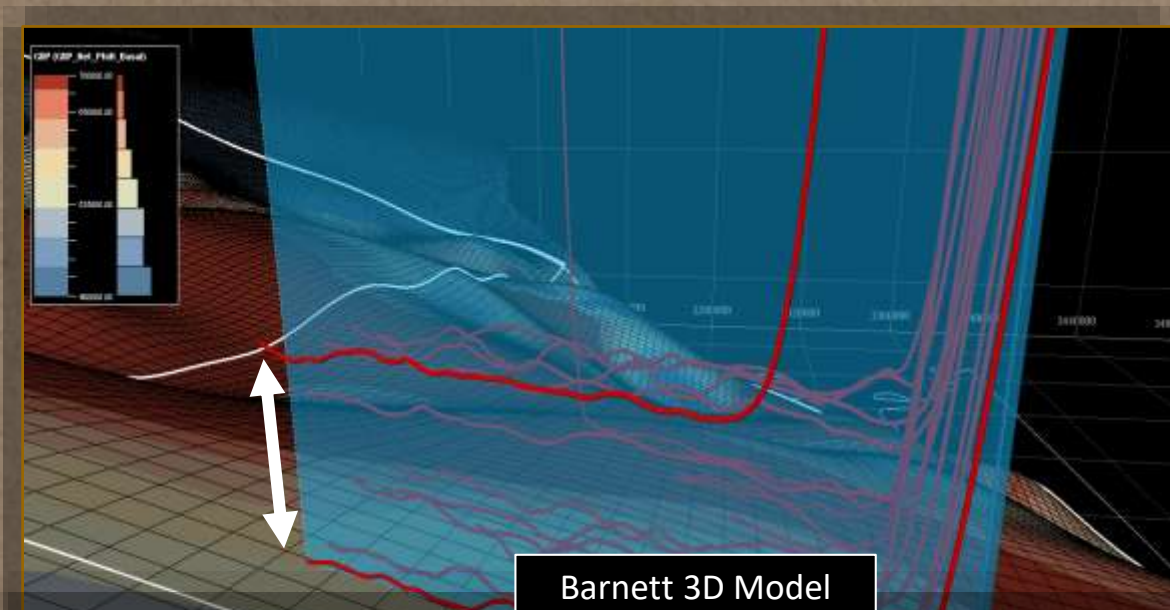
Eagle Ford

~90,000

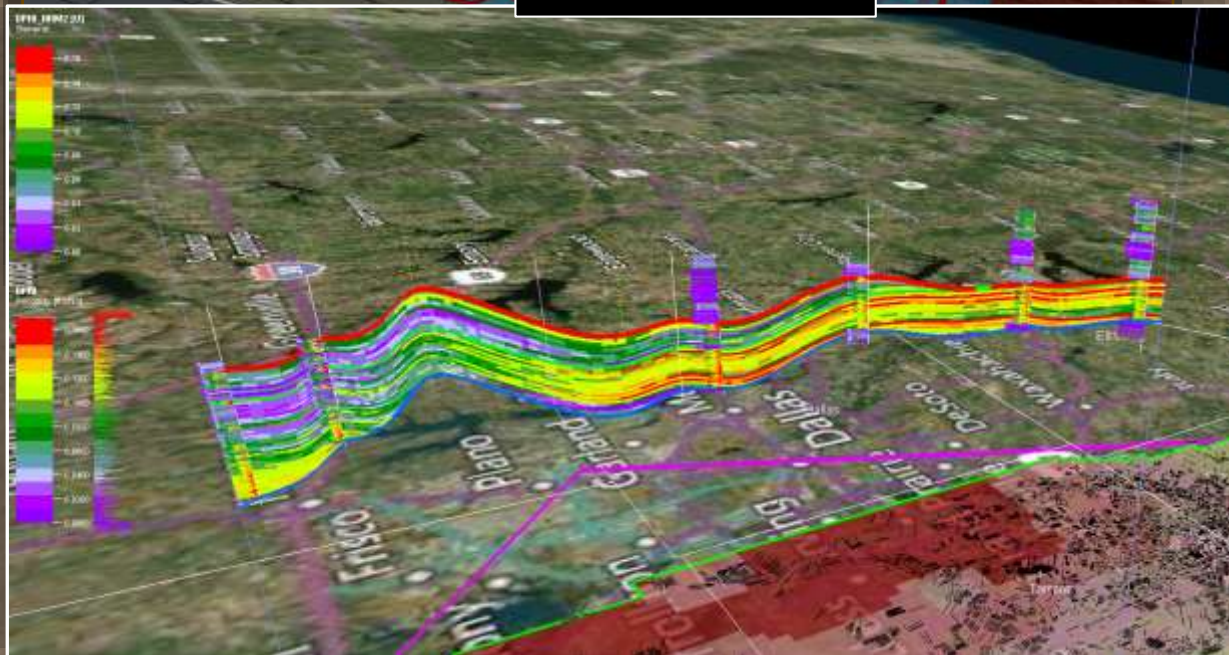
Completion Date



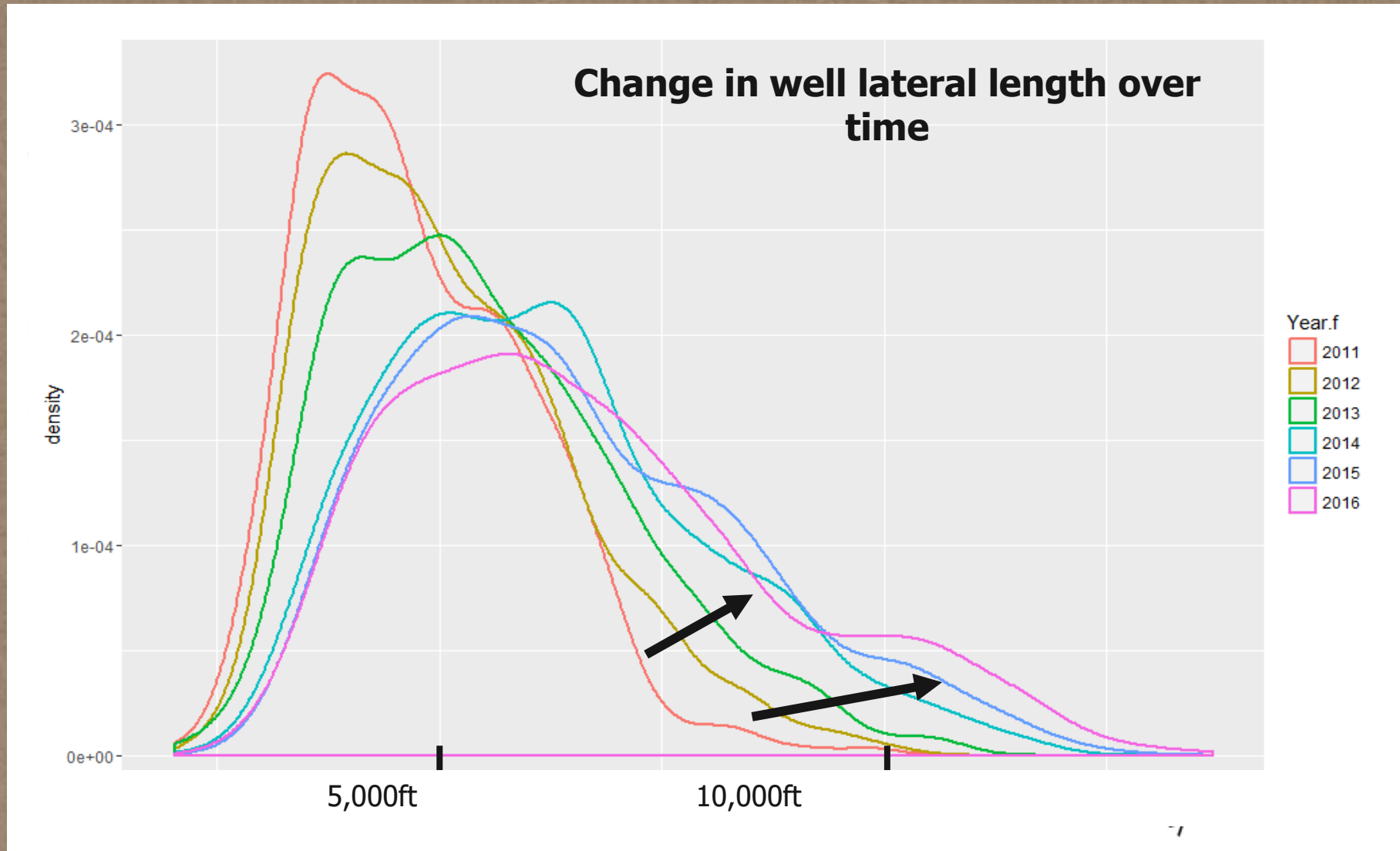
New Completion Strategies



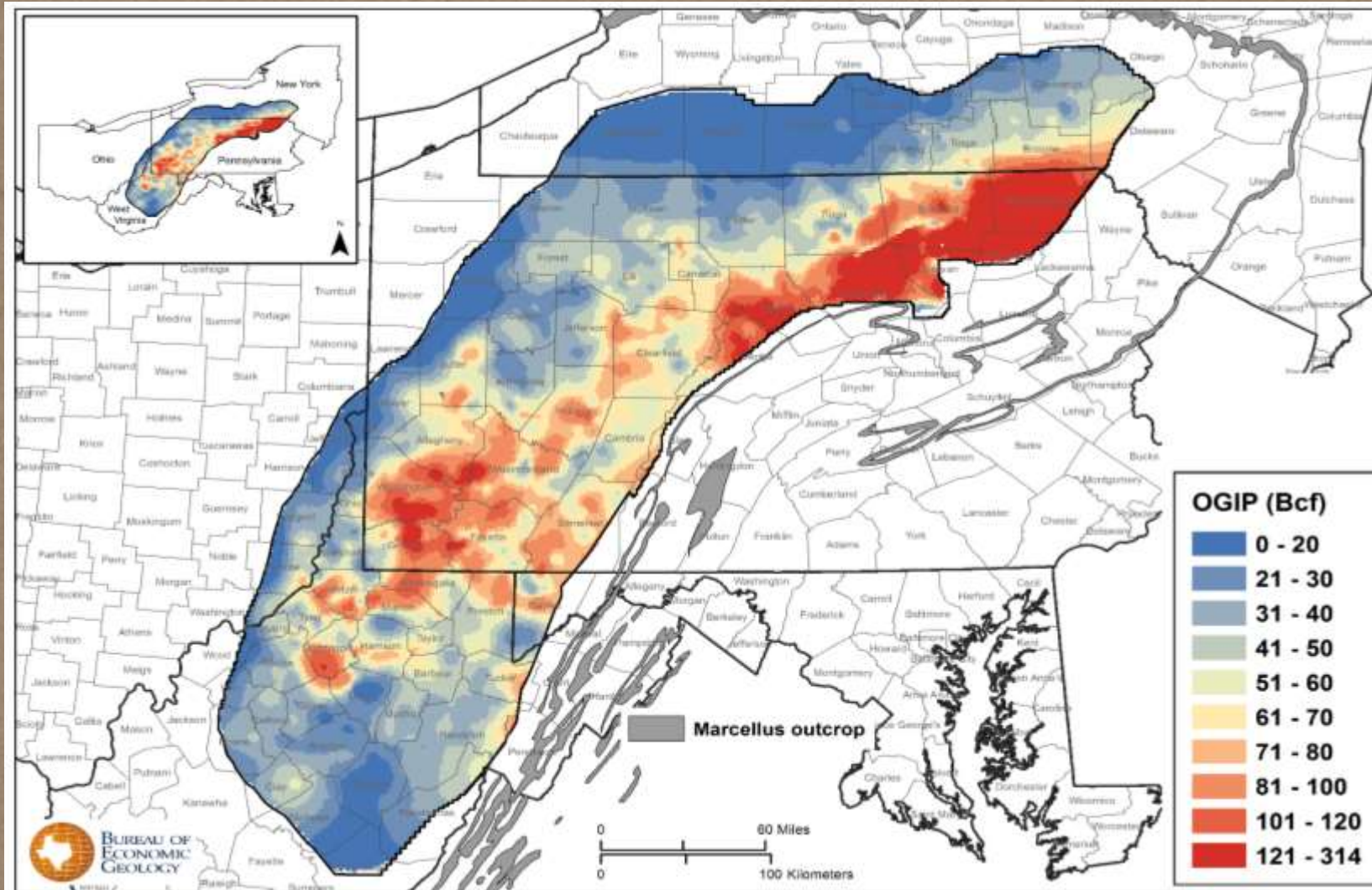
- Established drilling patterns change with technological advances and new economic realm
- New drilling and completion techniques affects the cost and recovery reshaping the supply capabilities *and supply elasticities*



Change in Productivity and Profitability:



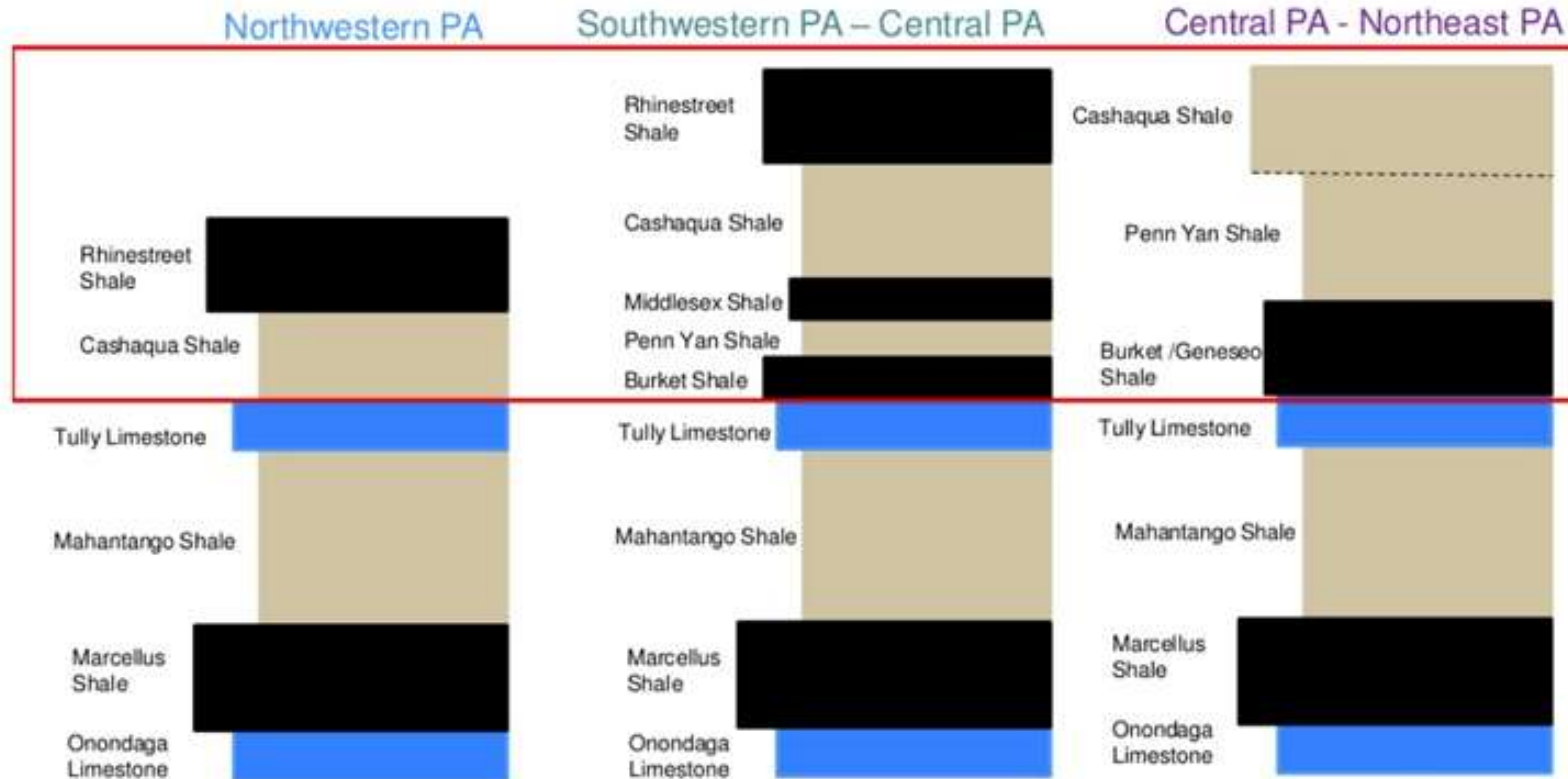
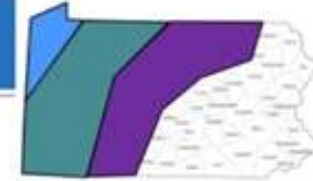
Focus on the Giant: over 2,000 Tcf in-Place, about 45 Tcf to be extracted by existing wells



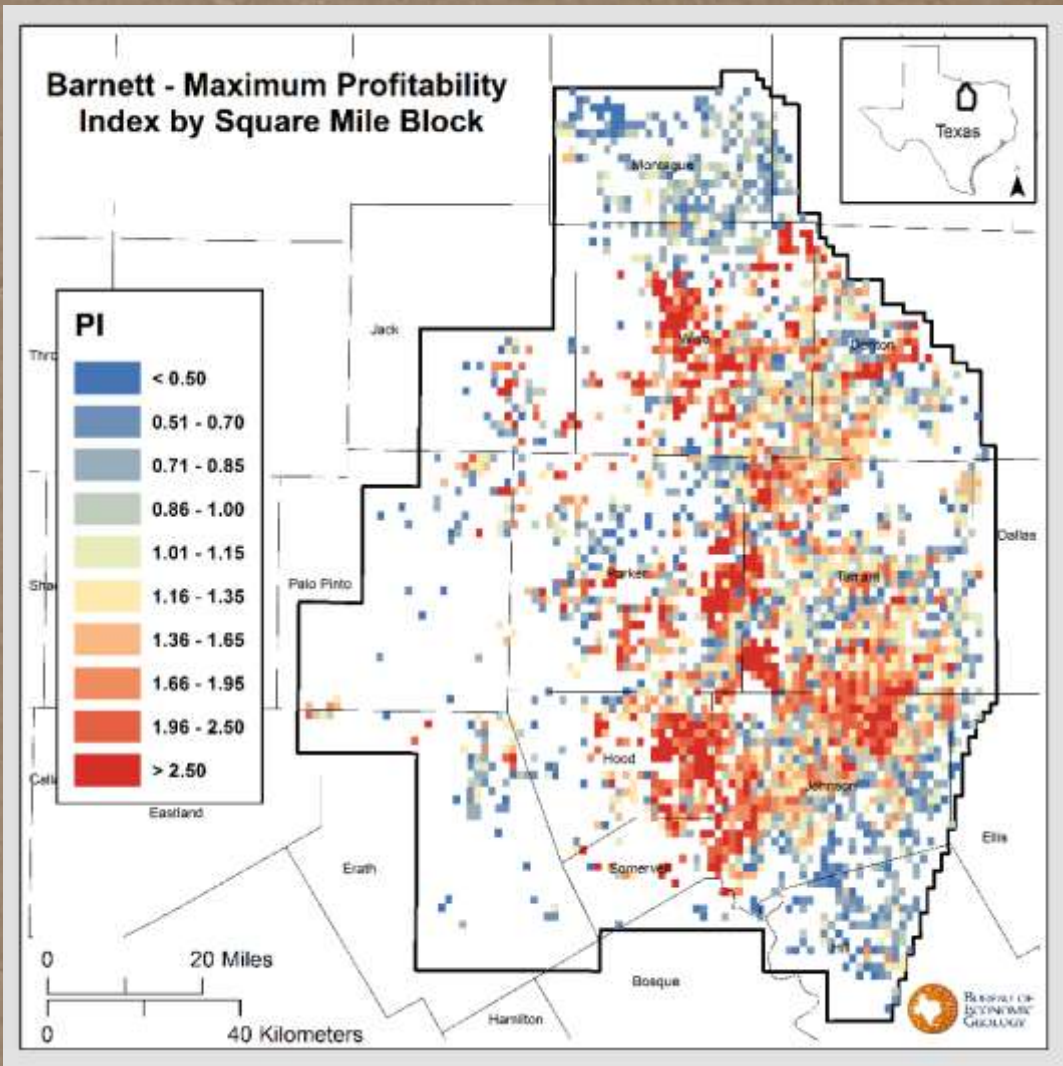
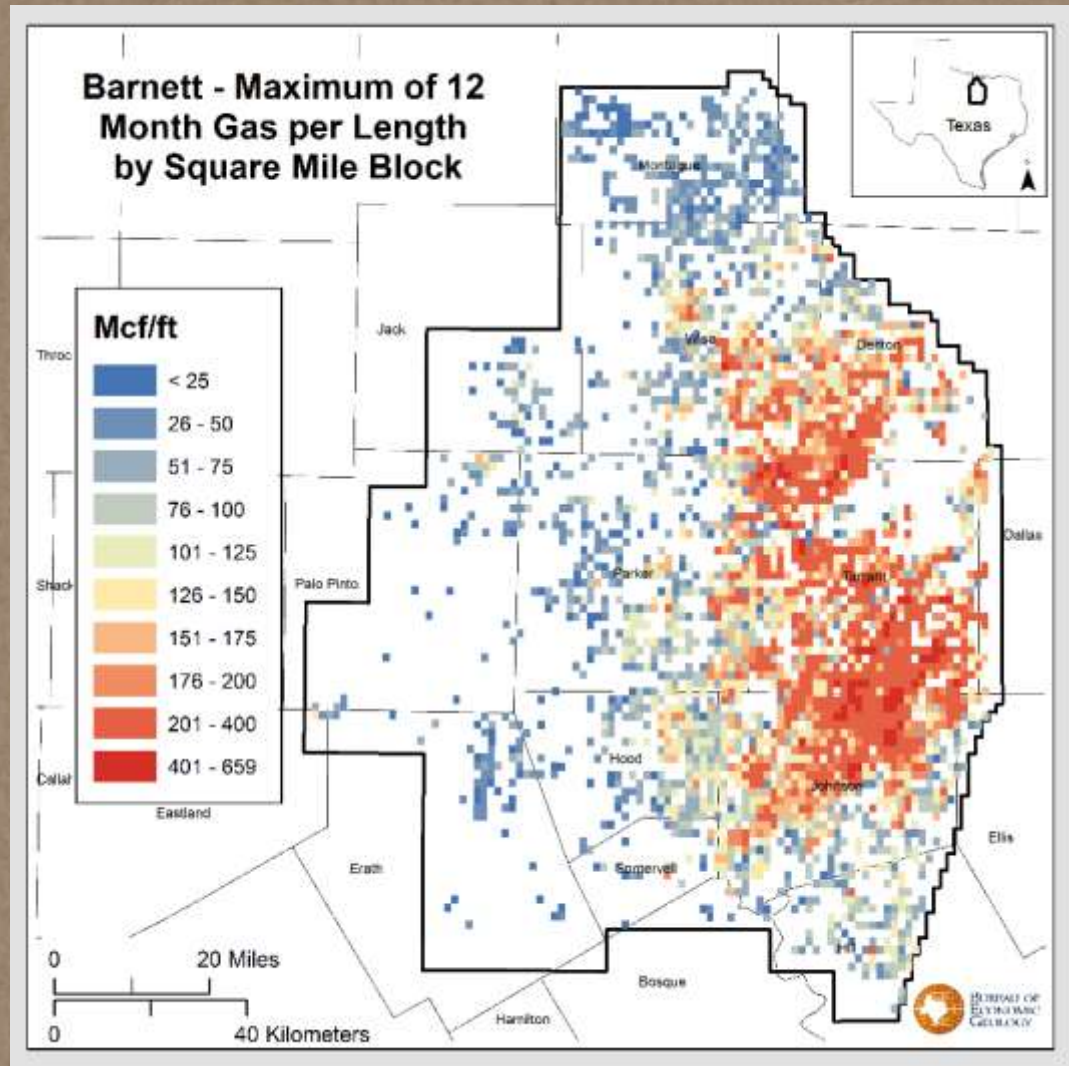
~145,000 locations in PA & VW

Marcellus Shale - Drilled Area

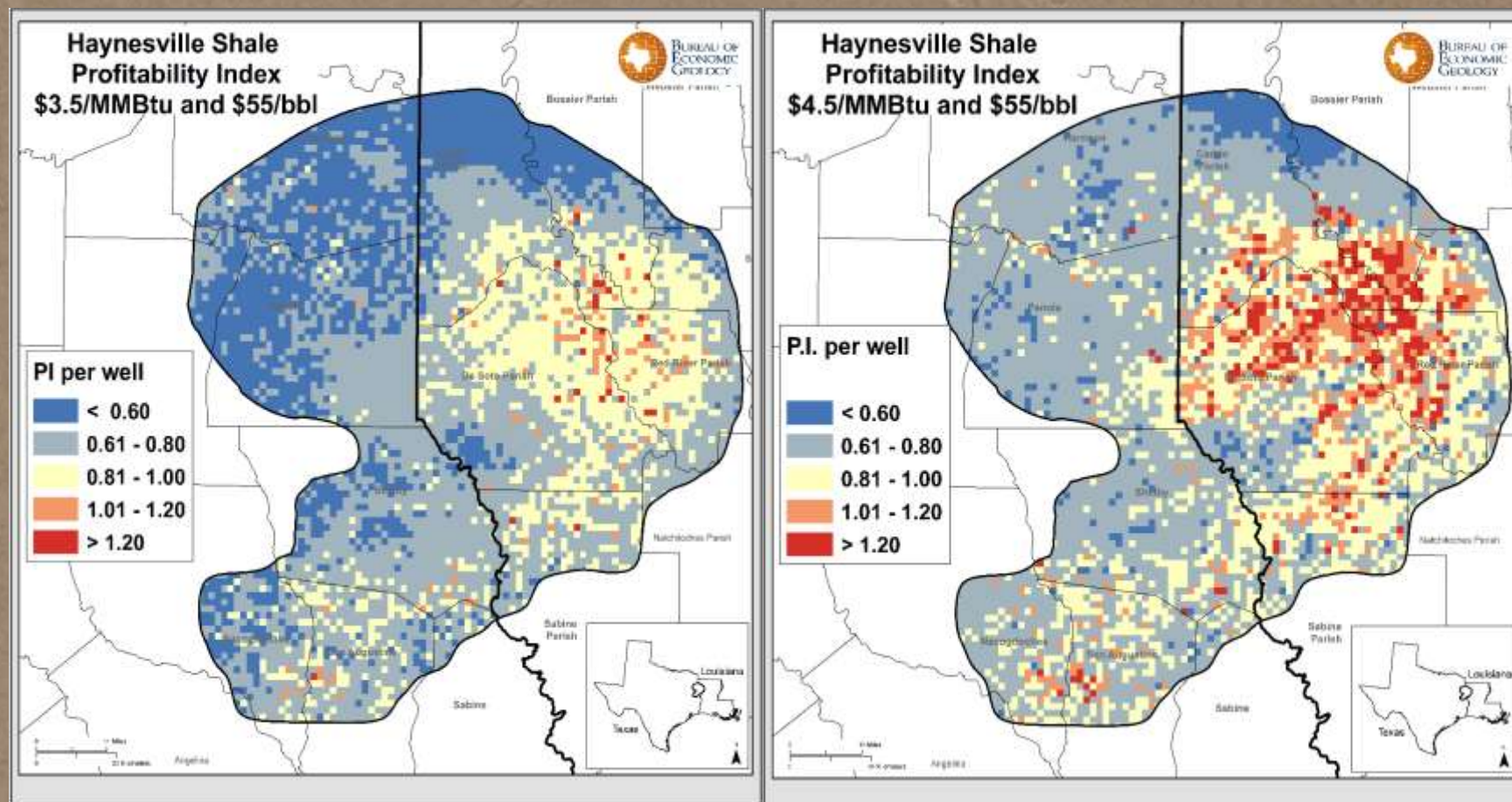
Stratigraphy of Pennsylvania



Historical Maximums



Profitability and Supply Capability Change with *Prices , Costs and Technology*

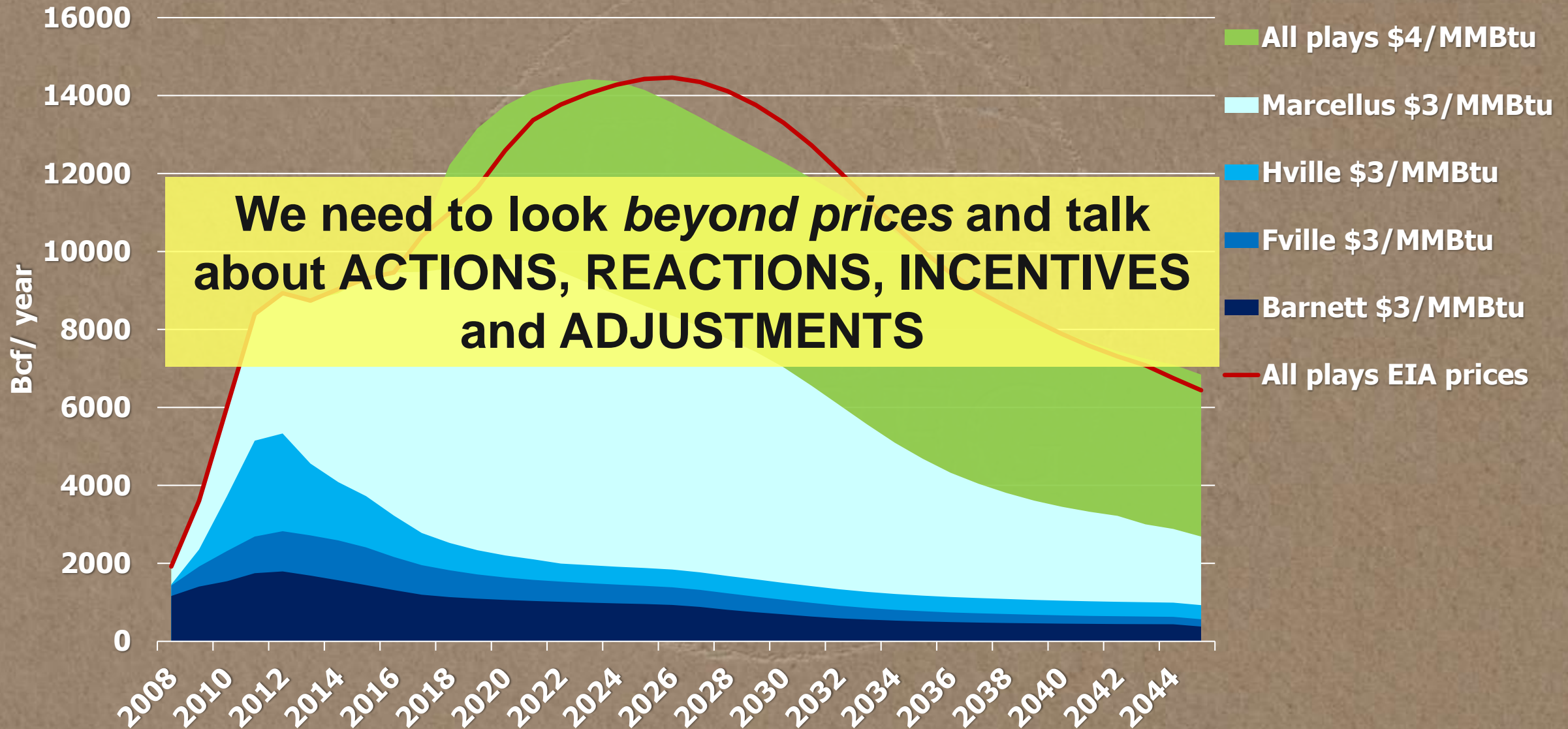


Production Outlook

Drilling and supply depend on:

- Expected profitability of a well
 - Energy prices (natural gas, gas liquids, and oil),
 - Drilling and Completion Cost (change with prices, technology, efficiency),
 - Regulation (fiscal, environmental) and Infrastructure,
 - Expected well production / resource recovery, which changes with technology,
 - **Uncertainty and Expectations**

3DRP Study: Projections for Different Prices



Summary

- The resource is there but geologic and reservoir characteristics vary dramatically: technology and economics help expand production capabilities
- The U.S shale (oil and gas) plays will continue their development even in the low price environment: positive price signals can bring production to a new level if infrastructure is ready
- The BEG production outlook model highlights the importance of resource, technology, prices, operator expectations, financial capacity, infrastructure, and other resources