



Bureau of Economic Geology, The University of Texas at Austin



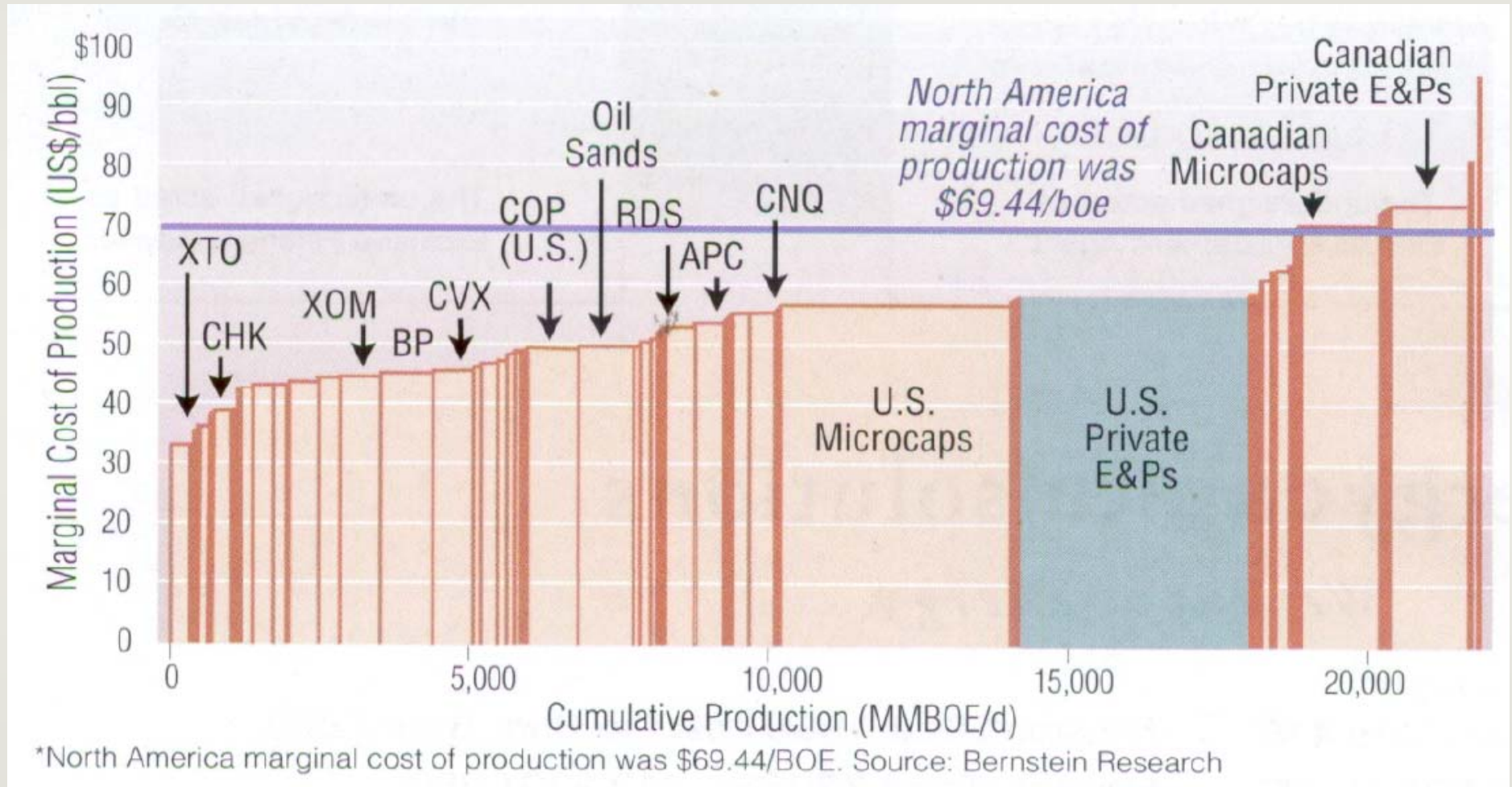
# Oil & Gas Investment

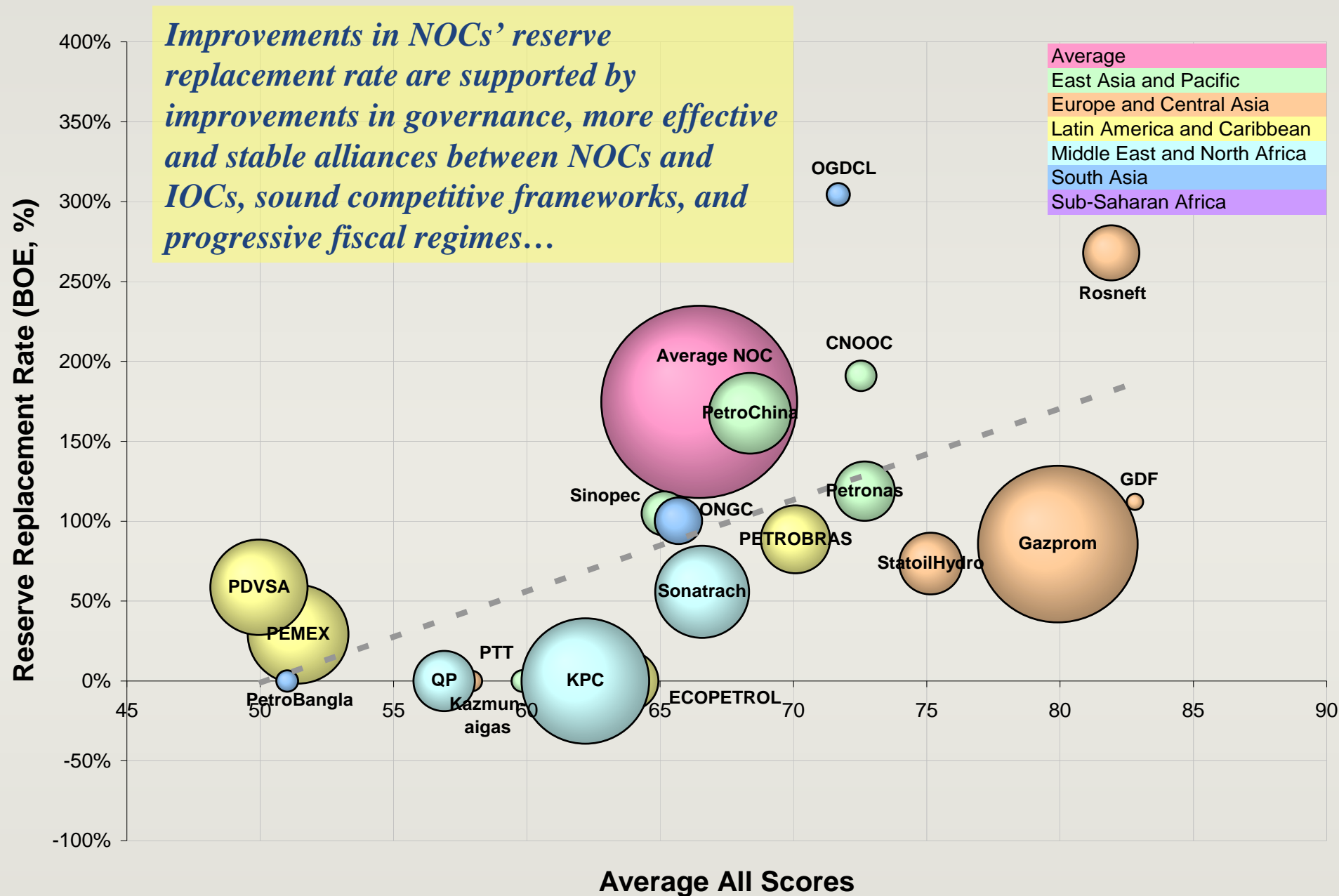
*USEIA, April 7-8, 2009*

# Trends Drivers

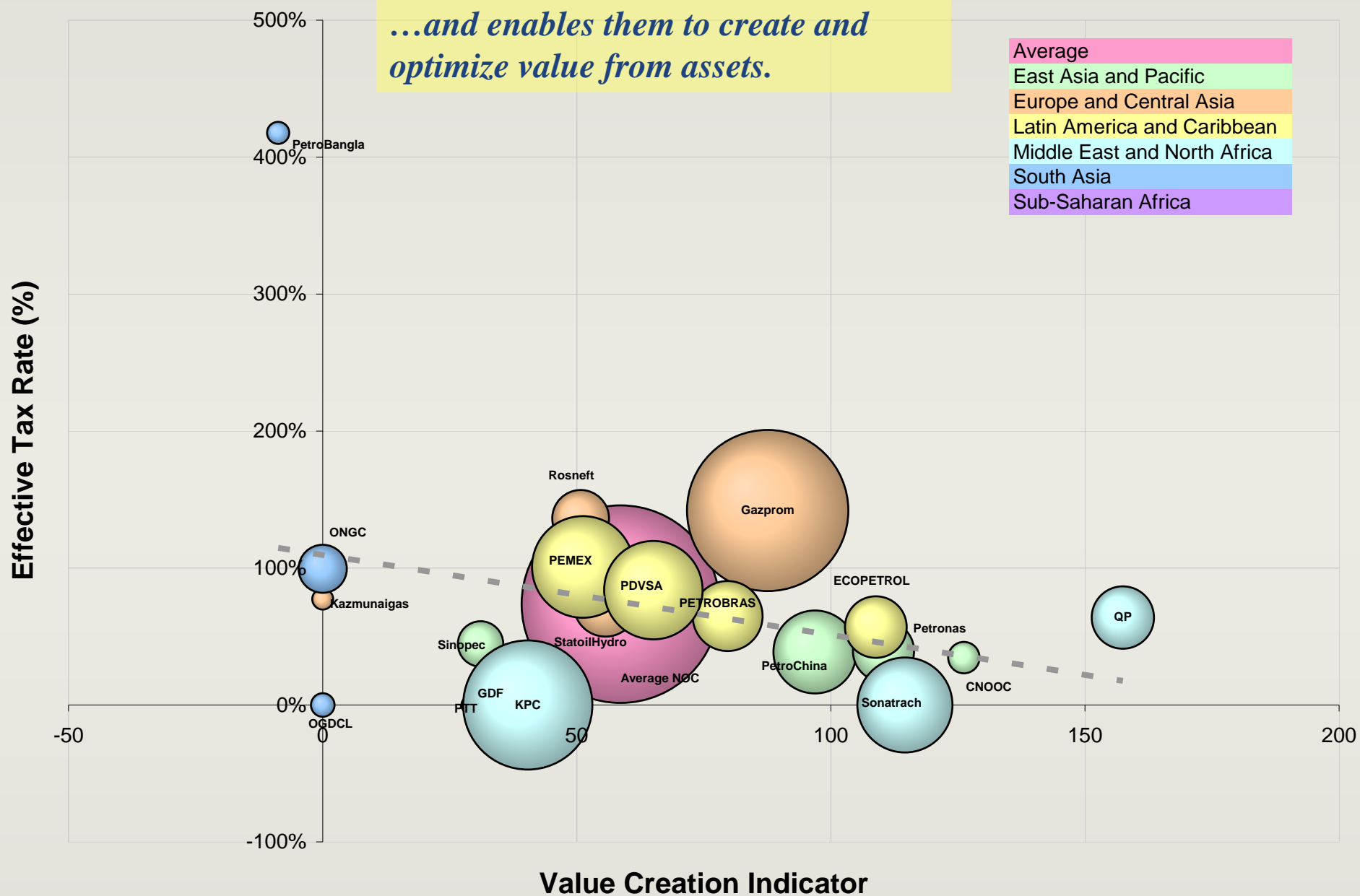
- Upstream cost structures and margins relative to financing
- Demand-side pricing policies by governments (oil)
- Impact of financial markets
- Resources and opportunities – “frontier” oil
- “Frontier” natural gas
- Cross-commodity pricing (fuel competition) – the challenge of building value for nat gas
- Climate
- Investment trends – invest in what you know

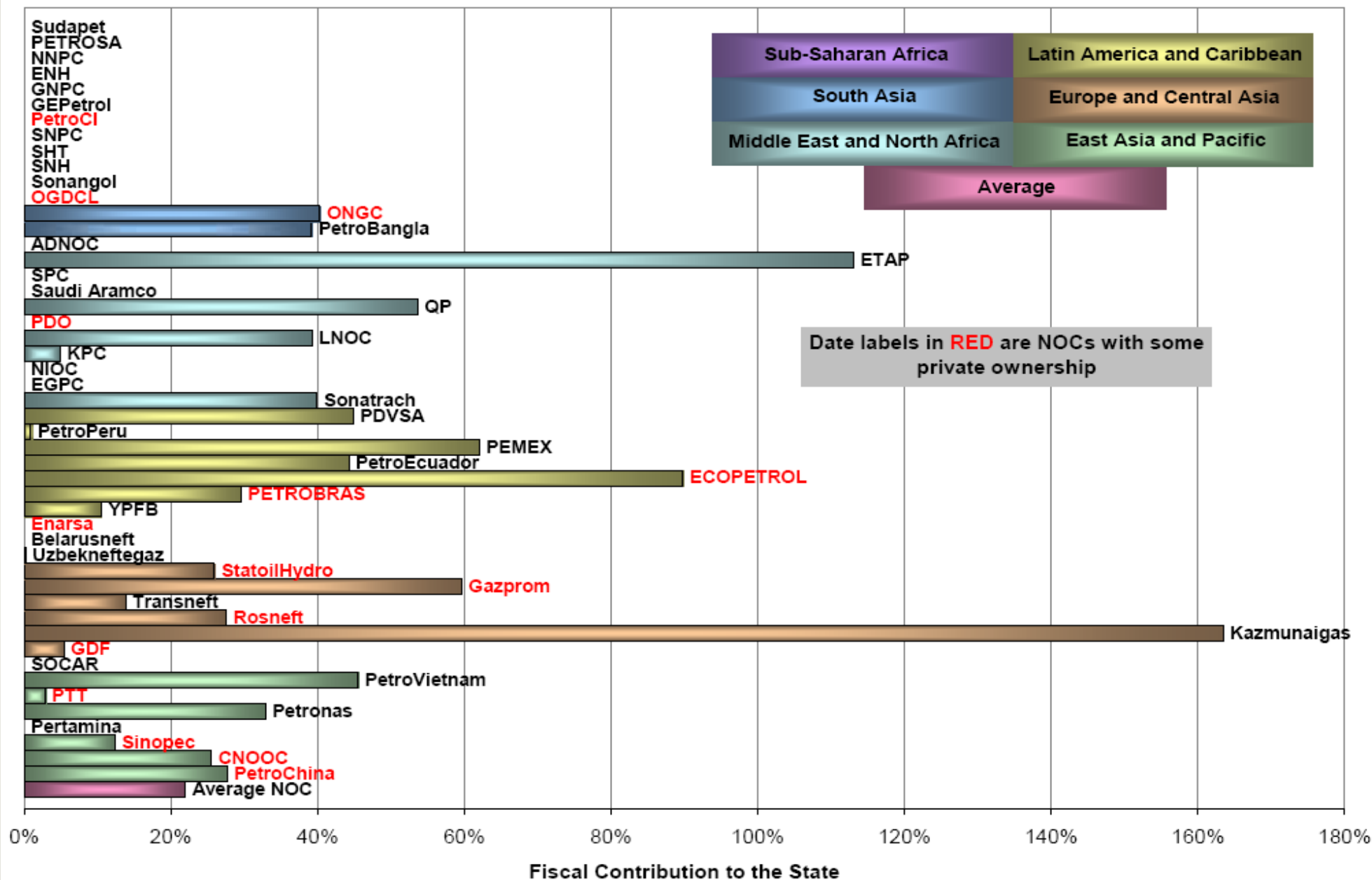
# Players and Cost Structures



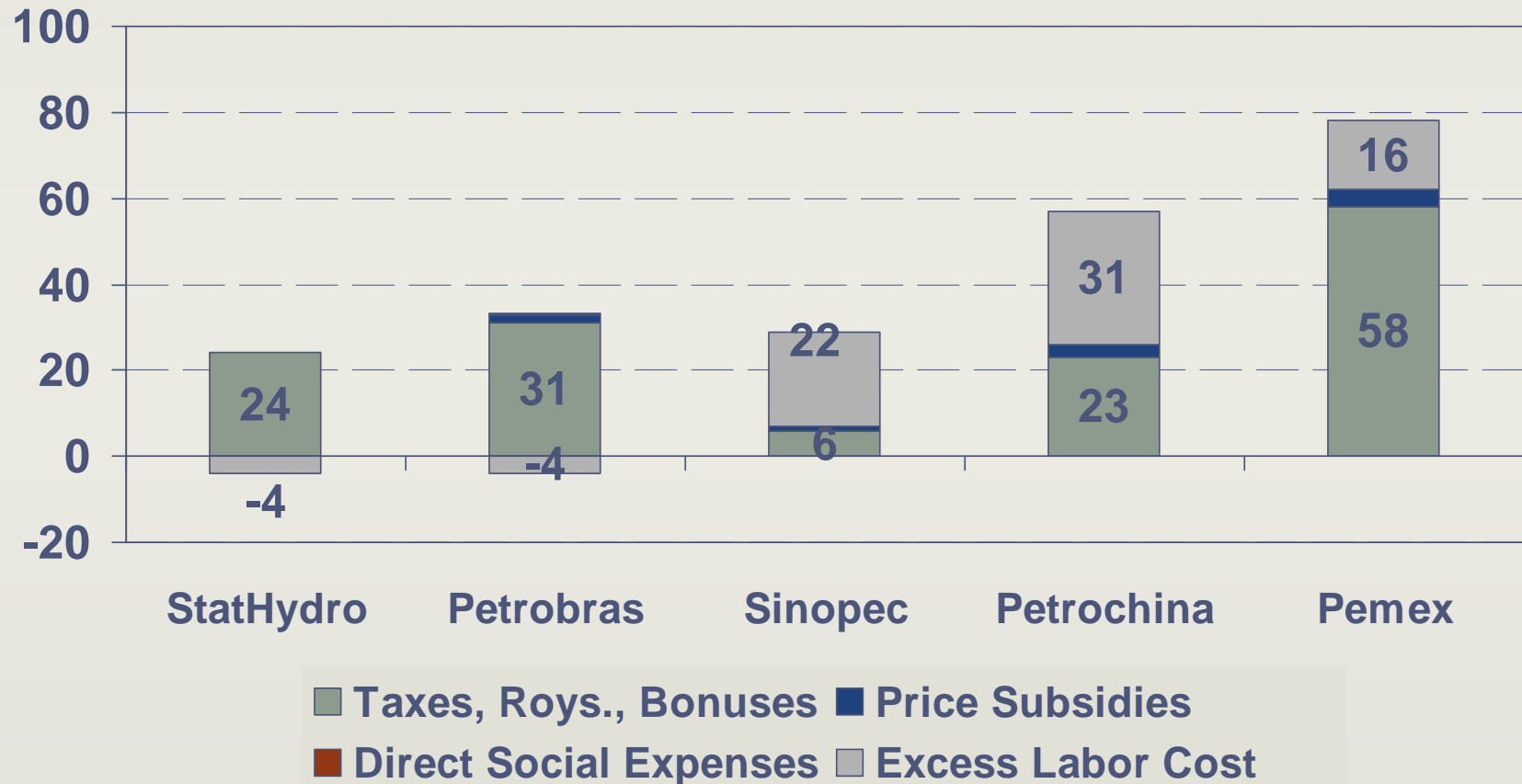




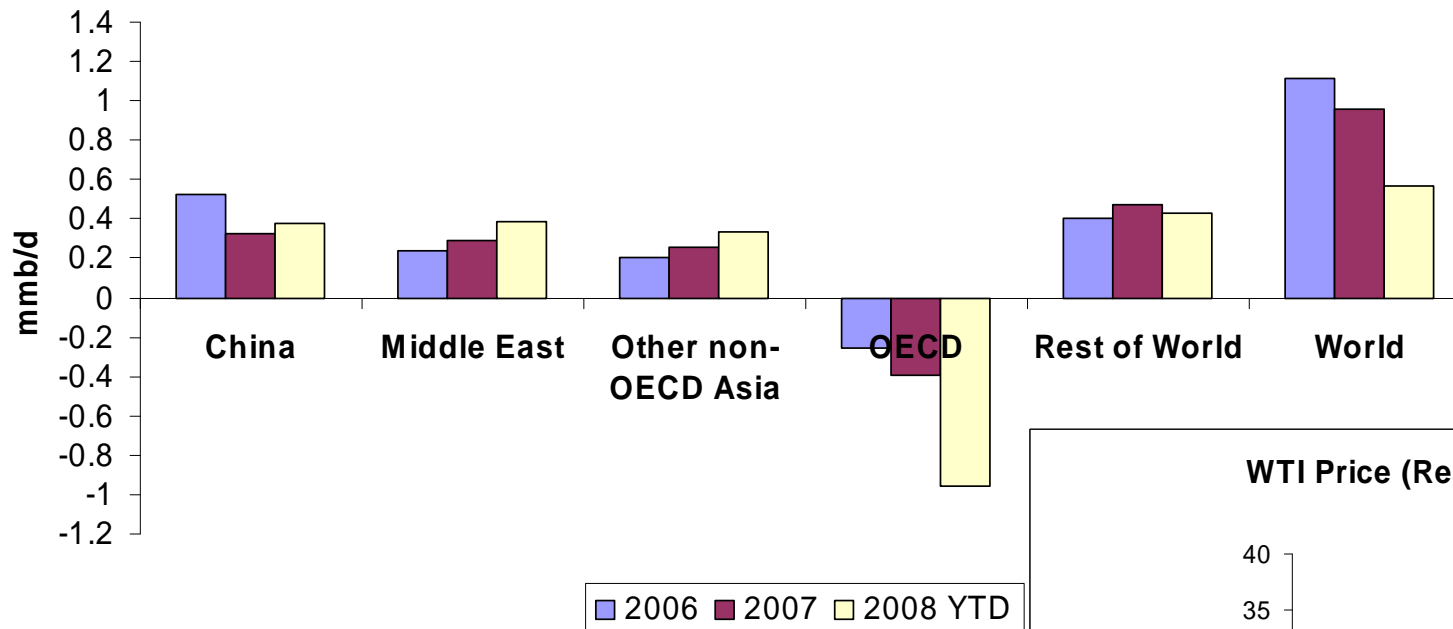




# Non-Commercial Performance Contributions by Type/Revenue (%)

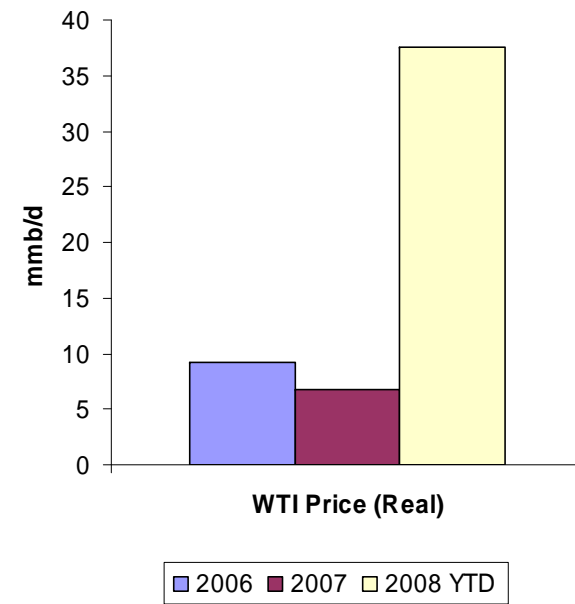


Oil Demand Growth by Region, 2006-2008 (YTD)



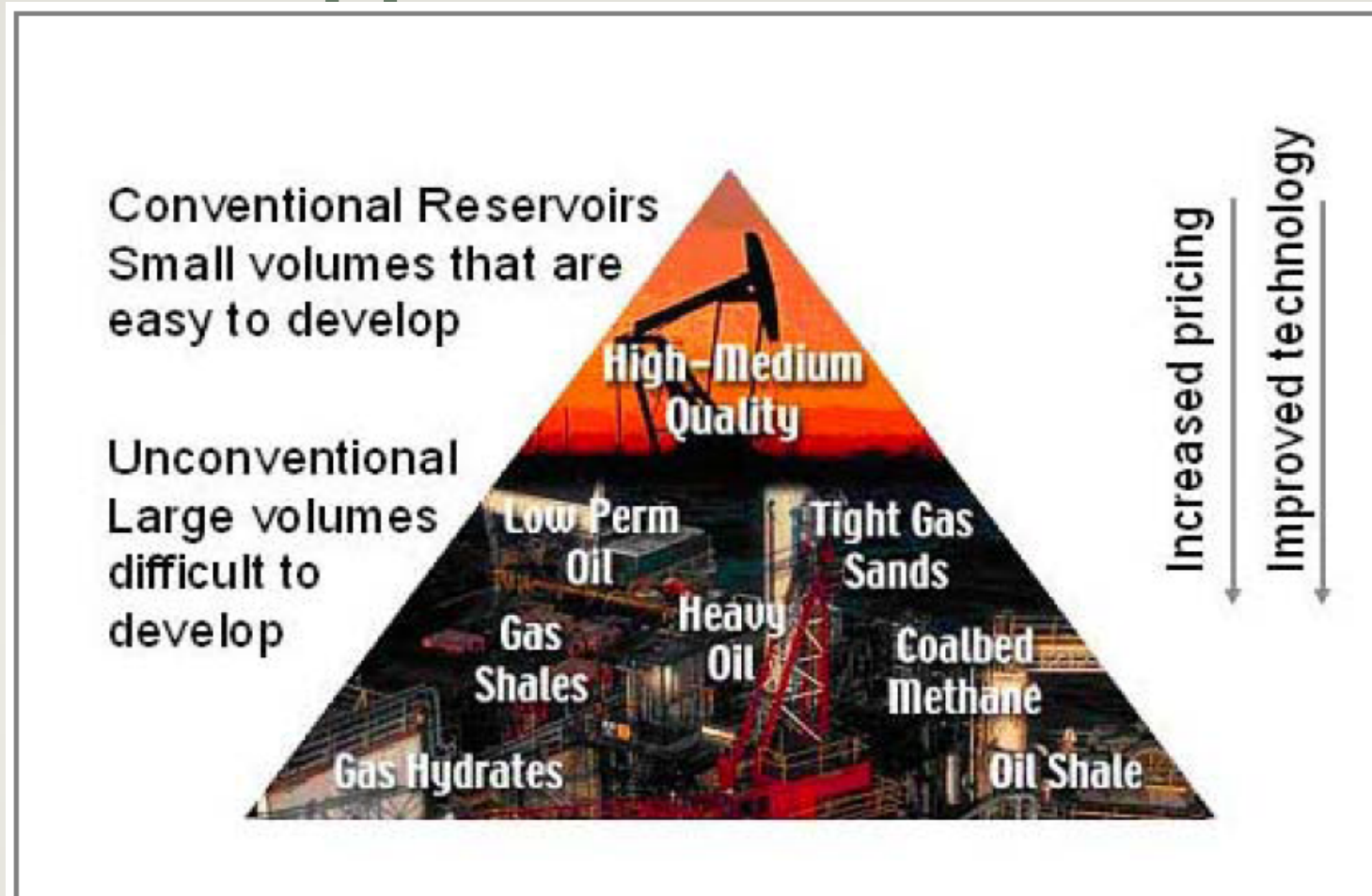
# Subsidies and Demand

WTI Price (Real), 2006-2008 (YTD)





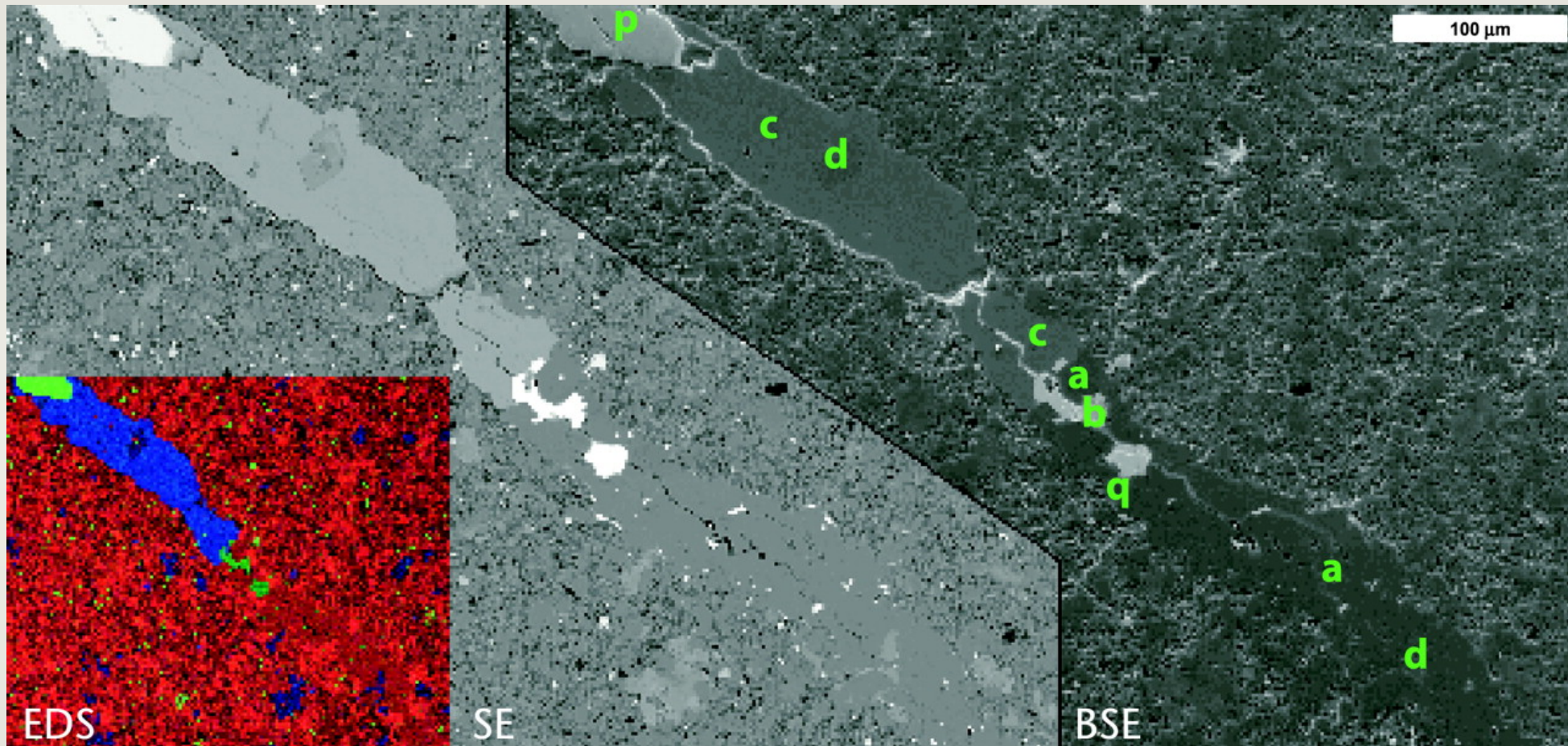
# Not All Opportunities are the Same



From Holditch, 2005, “Statistical Correlations in Tight Gas Sands”, American Association of Petroleum Geologists (AAPG) Hedberg Conference Proceedings.

[http://www.searchanddiscovery.net/documents/abstracts/2005hedberg\\_vail/abstracts/extended/holditch01/holditch01.htm](http://www.searchanddiscovery.net/documents/abstracts/2005hedberg_vail/abstracts/extended/holditch01/holditch01.htm)

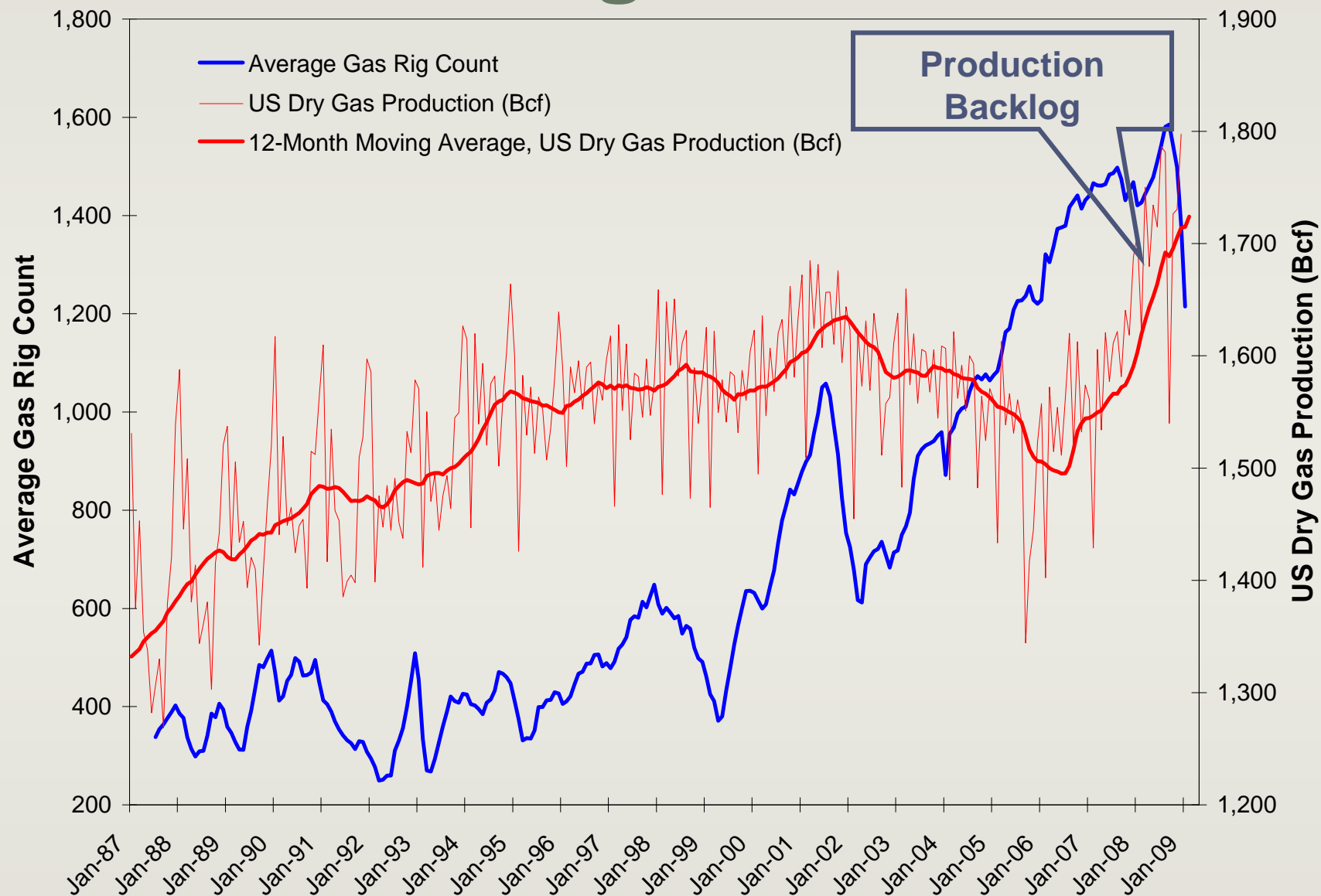
# Electron Imagery of Barnett Fractures



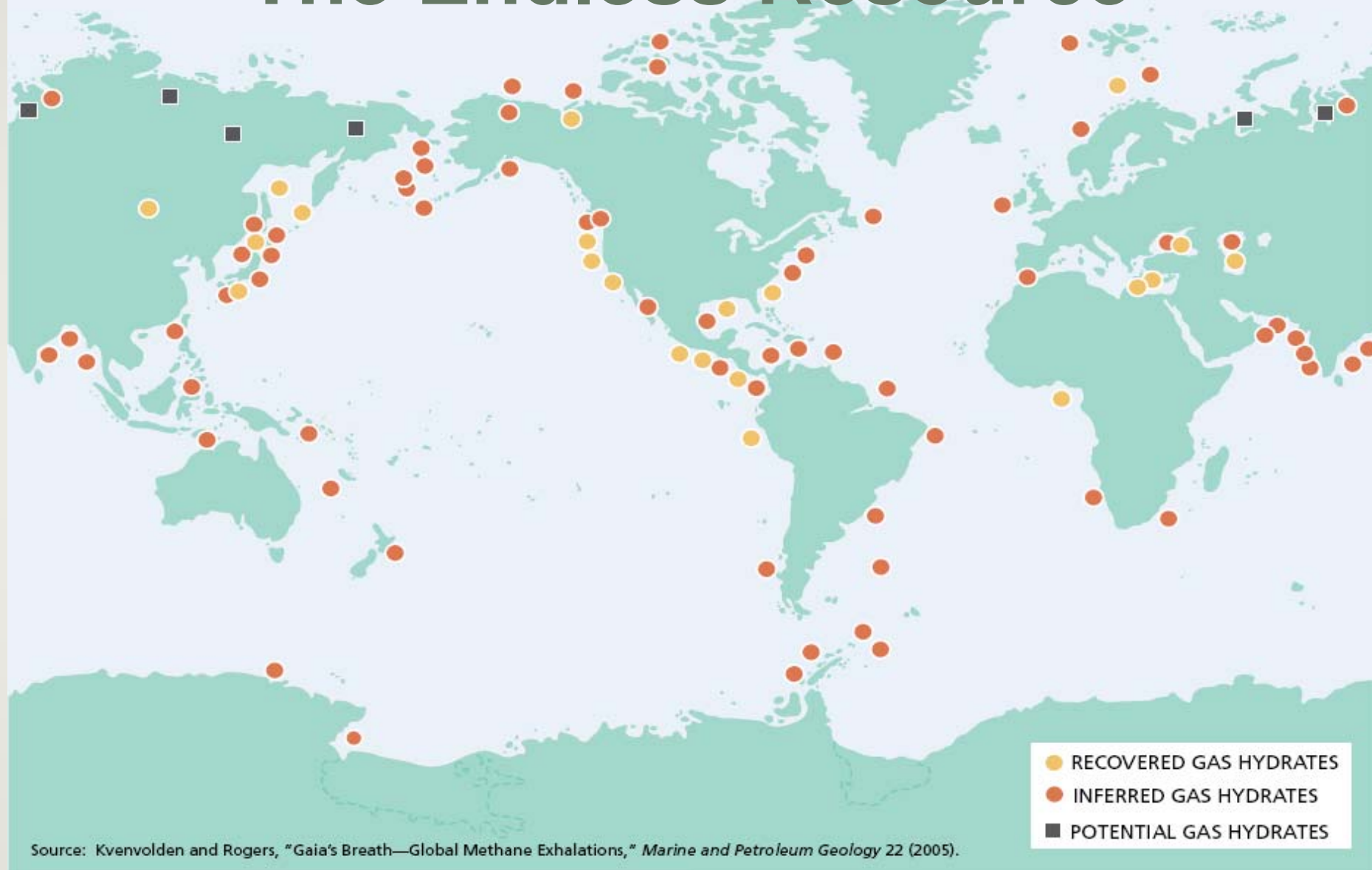
*Gale, J. F. W., Reed, R. M., and Holder, Jon, 2007, Natural fractures in the Barnett Shale and their importance for hydraulic fracture treatments: AAPG Bulletin, v. 91, no. 4, p. 603–622.*



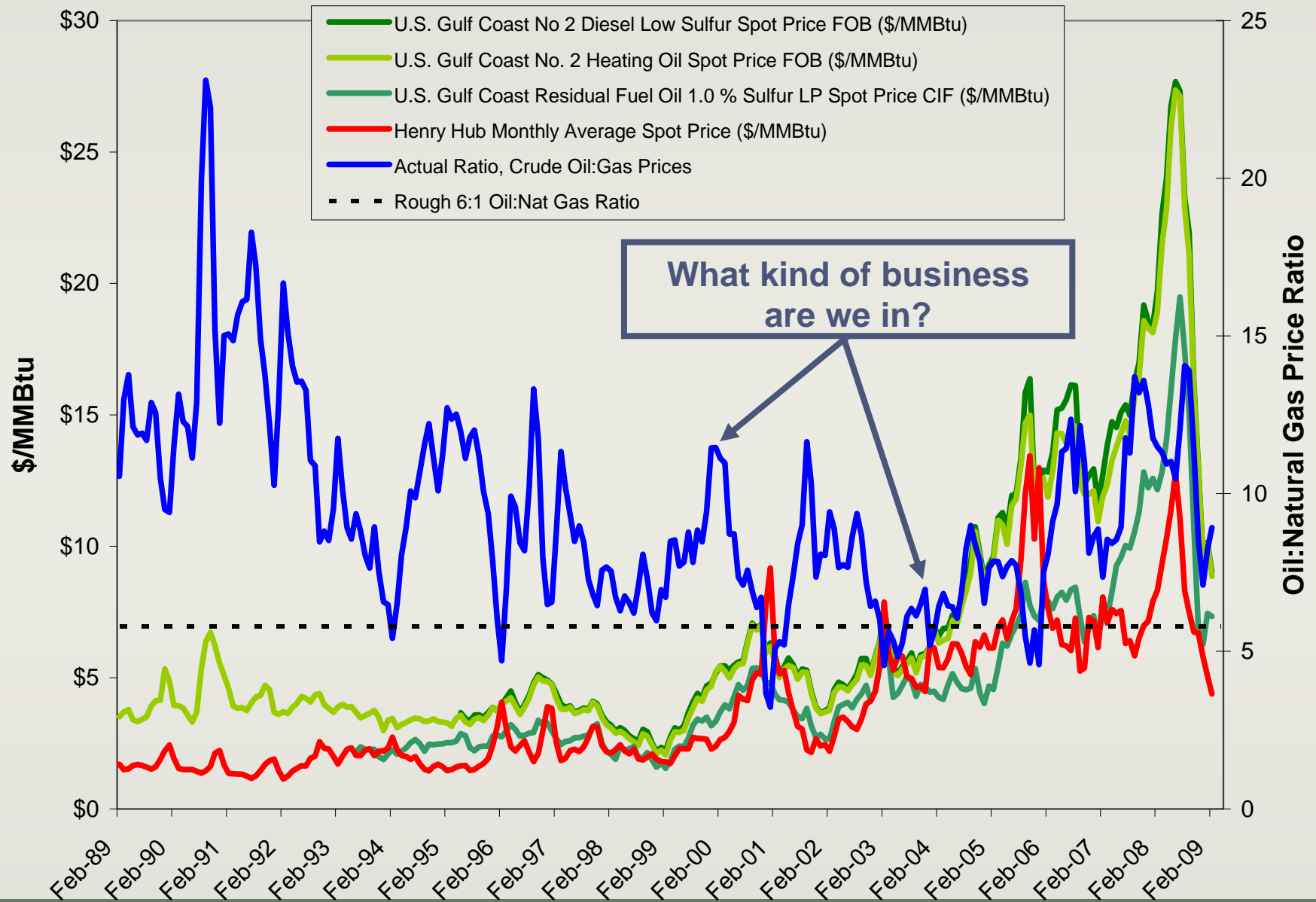
# US Gas Rigs, Production



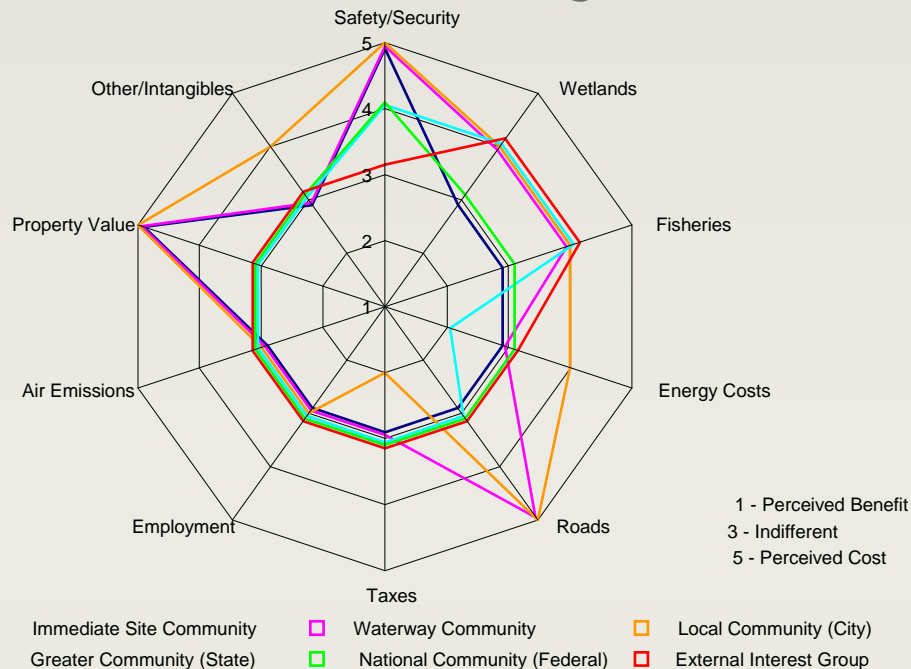
# The Endless Resource



# Natural Gas vs. Petroleum Prices

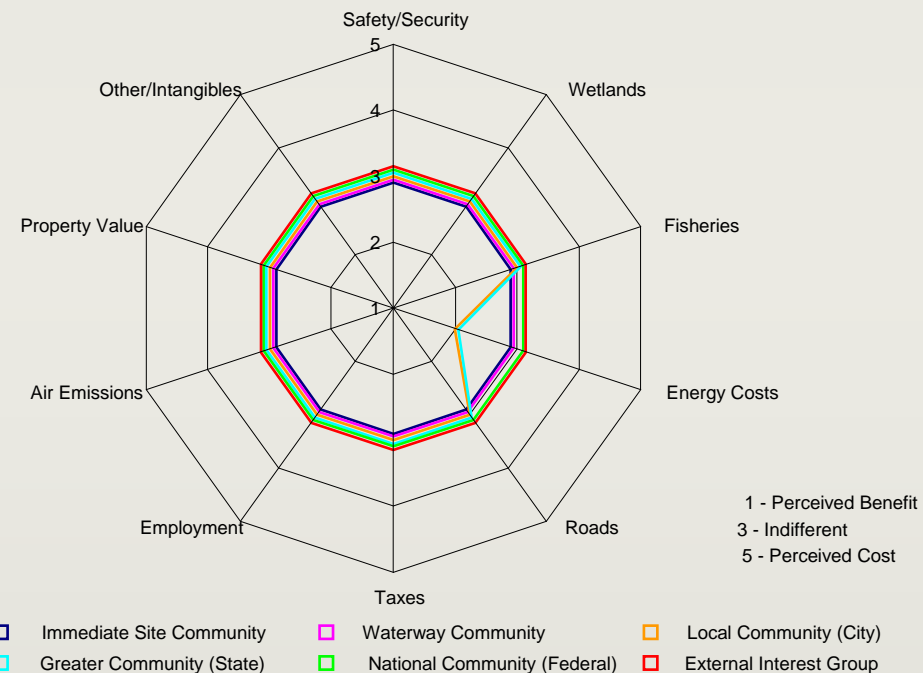


# Public Acceptance: Sample LNG Projects in Same Region



## Unlicensed Onshore Project

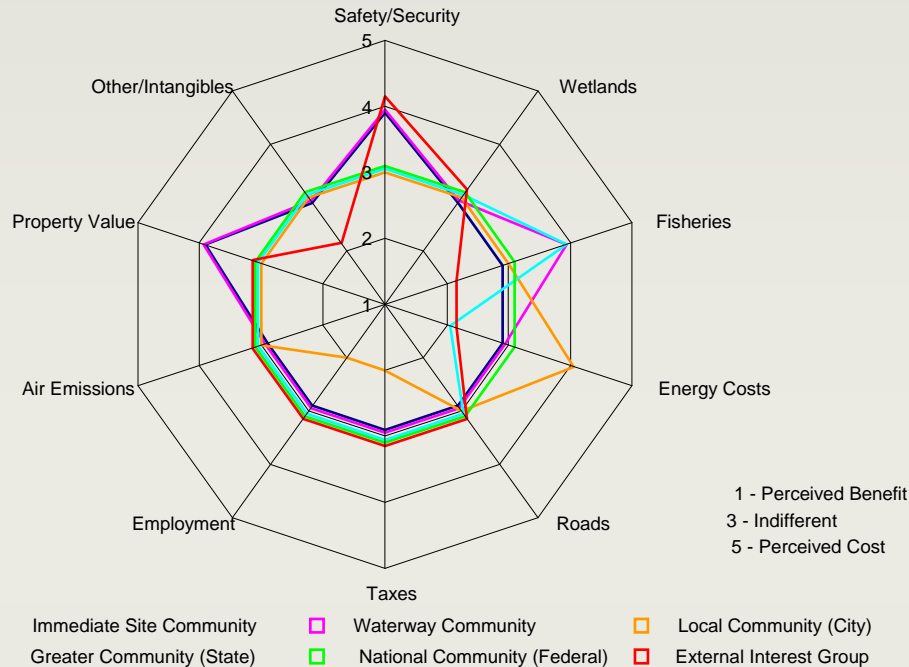
What caused the differences?  
Onshore vs. Offshore?  
Developer posture?  
Early dialogue?



## Licensed Offshore Project

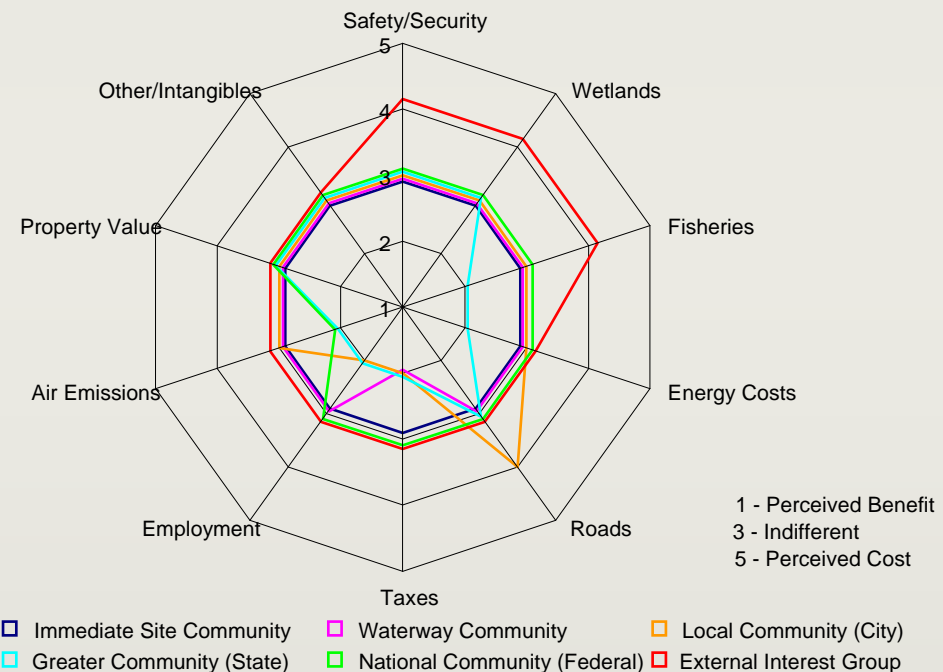


# Sample Projects in Different Regions



## Unlicensed Onshore Project

What caused the differences?  
Onshore vs. Offshore?  
Developer posture?  
Early dialogue?

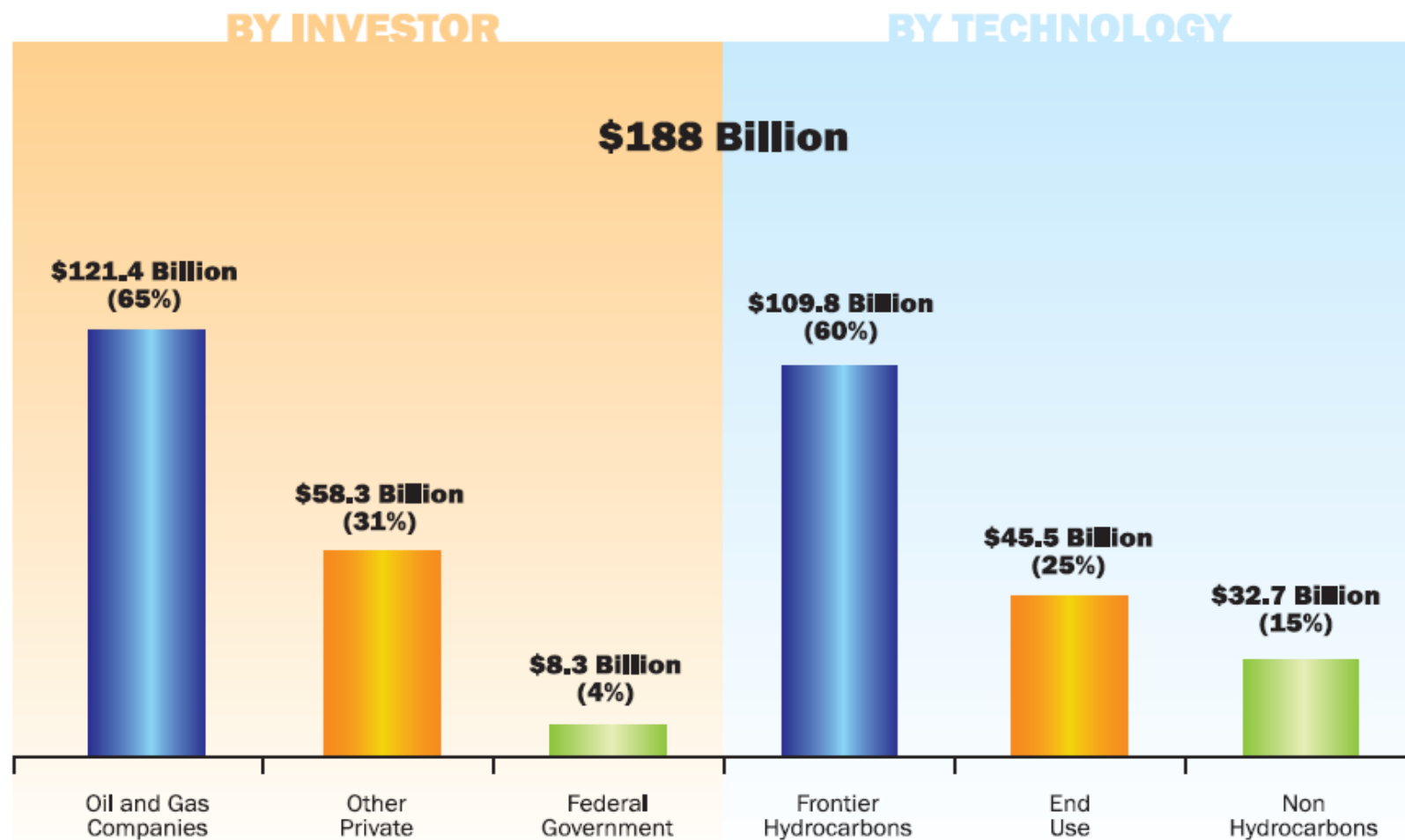


## Licensed Onshore Project

# Math Whiz

- Total annual CO<sub>2</sub> emitted is 188 bn ton
- 8bn is derived from human activity
  - US produces 2 bn
- Net generation from US coal plants is ~170mm MWh
  - CO<sub>2</sub> production is ~2,250 lbs/MWh, or 191mm tons
- **The total atmosphere is 5 quadrillion tons**
  - **We would be removing 0.00000382% if all CO<sub>2</sub> from US coal-fired power gen was captured**
  - **We would be removing 0.00016% if all CO<sub>2</sub> attributed with human activity were captured or eliminated**

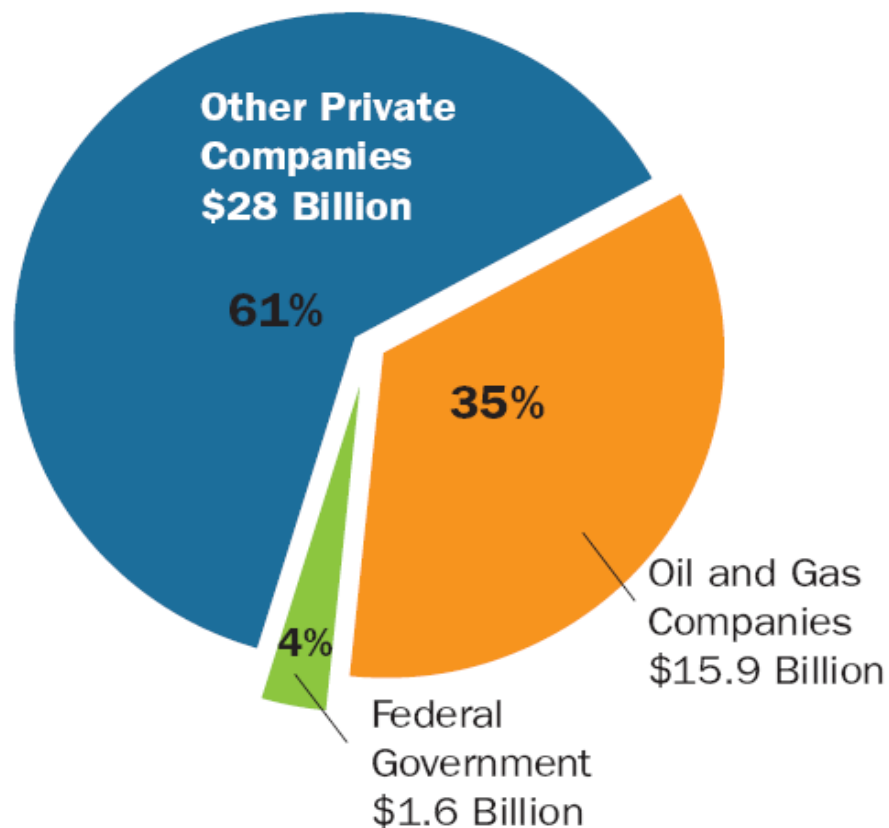
## Technology – Our Industry's Investments (2000-2007)



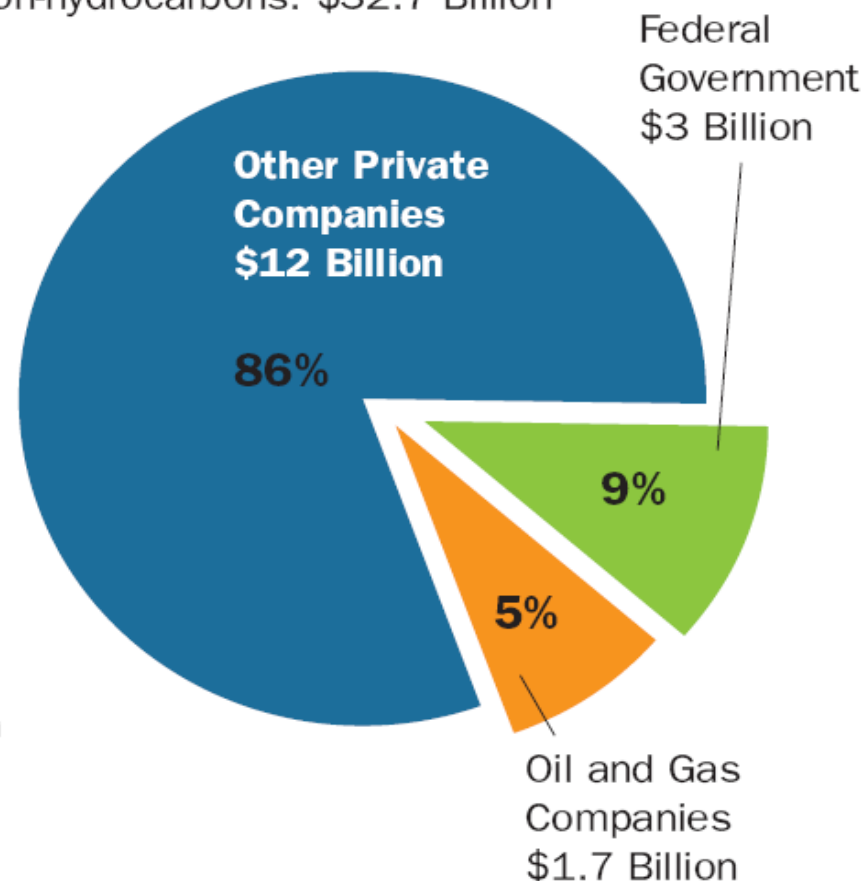
Source: T<sup>2</sup> and Associates and CEE

## Leading Emerging Energy Investments by U.S. Firms (2000-2007)

End Use: \$45.5 Billion

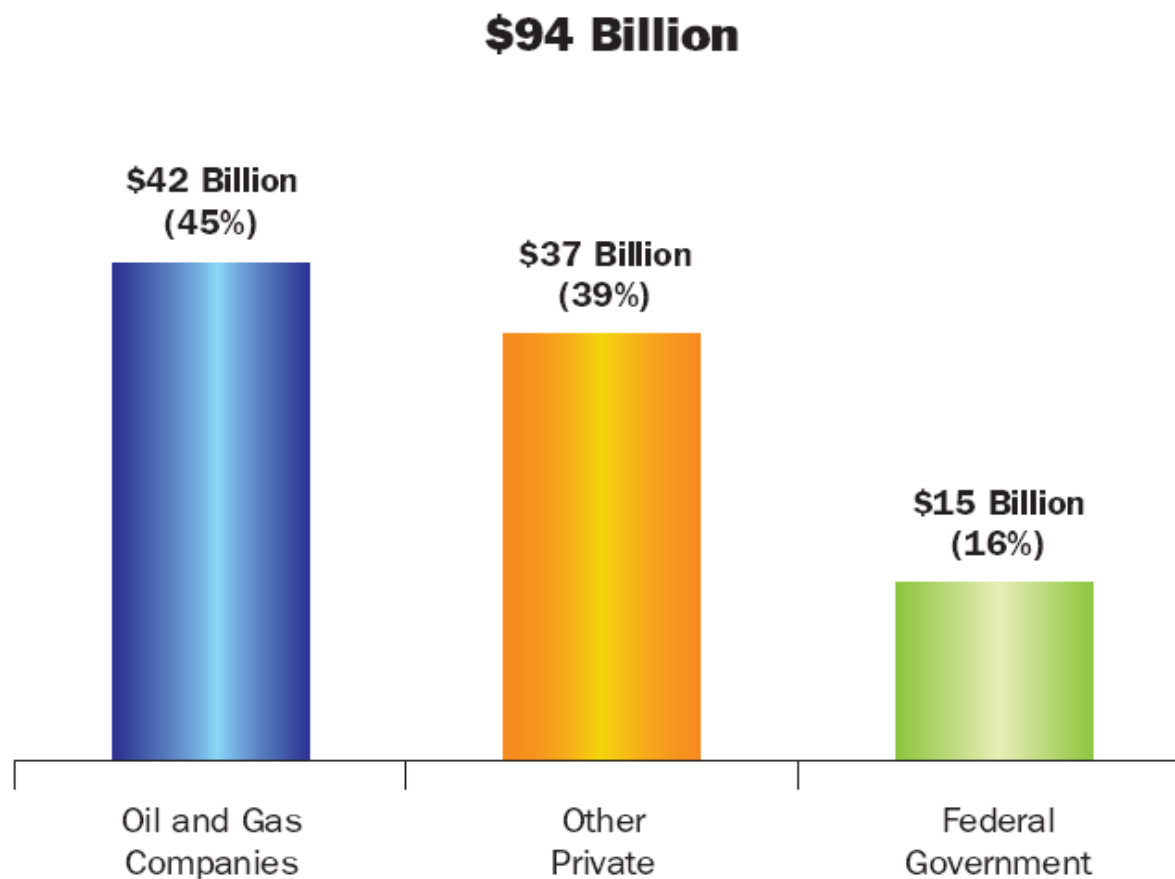


Non-hydrocarbons: \$32.7 Billion



Source: IER and CEE

## Carbon Mitigation (2000-2006)



Source: T2 & Associates and CEE

# Impact of Technology – Deferring Declines

## Oil & Gas Technology Pathway



- Arctic?
- Hydrates
- Offshore below **10,000ft**
- 4-d seismic, offshore below **5,000ft**

- 3-d seismic, horizontal drilling, measurement while drilling, offshore below **1,000ft**

- Pipeline trenching and welding, compression, pressure control, metering; national grid develops

- Directional drilling, offshore below **250ft** water

- Long-line pipeline transmission

- Advances in drilling, early seismic, shallow offshore E&P

- Oil discovered at Spindletop (Texas), 1901

- Oil discovered in Titusville, Pennsylvania, 1859; natural gas replaces town gas, 1870s

Conventional porosity/permeability

Unconventional

Nano

IT Pathway:

Mainframes

Minis

Micros

Work Stations





# Center for Energy Economics

[www.beg.utexas.edu/energyecon](http://www.beg.utexas.edu/energyecon)

[Michelle.Foss@beg.utexas.edu](mailto:Michelle.Foss@beg.utexas.edu)