SLIDES: U.S. Shale Gas: Resources, Reserves and $$$

John B. Curtis
U.S. Shale Gas Resources, Reserves and $$$

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Potential Gas Agency
Colorado School of Mines
Oil Shale Gas Hydrates

Tight Gas Sands; CBM; Gas Shales

Tight Oil; Heavy Oil; Bituminous Sands

Oil Gas

Conventional Reservoirs: Small Volumes, Easy to Develop

Unconventional Reservoirs: Large Volumes, Hard to Develop

Huge Volumes, Difficult to Develop

The Resource Pyramid
(S. Sonnenberg, CSM)

Increasing Product Price

Improving Technology

Province Resource Size
Shale Gas Annual Production and Energy Information Administration (EIA) Forecast

Annual Production, Bcf

- CUM
- EIA Projection

EnCana
Targeted Research – $150 Million
Acquisitions – >$50 Billion

Source: Trollart.com – Ray Troll
Resource Development – >$15 Billion
Growth in Barnett Shale - Ft. Worth Basin

- Gas Production
- Well Count

Annual Production, Bcf

- 1980
- 1982
- 1984
- 1986
- 1988
- 1990
- 1992
- 1994
- 1996
- 1998
- 2000
- 2002
- 2004

Producing Wells

- 0
- 500
- 1,000
- 1,500
- 2,000
- 2,500
- 3,000
- 3,500
- 4,000
- 4,500
- 5,000
Exploration Considerations

- Natural fractures - Friend or Foe?
- Facies changes - greater permeability
- Kerogen type - I, II, IIS, III
- Microbial or thermogenic gas?
- Thermal maturation history
- MWD - especially w/ gas isotopes
Some Elements of a Successful Shale Gas Play

- Organic Richness
- Maturation
- Gas-In-Place
- Permeability
- Pore Pressure
- Brittleness
- Mineralogy
- Thickness
- Productivity
Potential Supply of Natural Gas in the United States

Report of the Potential Gas Committee
(December 31, 2008)
Regional Resource Assessment

Data source: Potential Gas Committee (2009)

Total U.S. 1,836.4 Tcf
- Traditional 1,673.4 Tcf
- Coalbed 163.0 Tcf

Regional Resources:
- Rocky Mountain: 374.4 Tcf, 51.9%
- Mid-Continent: 274.9 Tcf, 16.6%
- Gulf Coast: 455.2 Tcf, 3.4%
- Atlantic: 353.5 Tcf, 17.3%
- Pacific: 51.3 Tcf, 2.6%
- Alaska: 193.8 Tcf, 57.0%
PGC Resource Assessments, 1990-2008

Total Potential Gas Resources (mean values)

Data source: Potential Gas Committee (2009)
Possible Constraints on Future Gas Supply

- Resource Base
- Environmental Concerns
- Skilled Workforce
- Technology
- Pipeline Capacity
- Gas Price
- Regulatory & Land Issues
- Rig Availability

Sufficient Supply to Meet Demand