

North American Energy Standards Board Meeting

James Slutz
Global Energy Strategies LLC

September 24, 2009



[HOME](#) [WEBINARS](#) [EXPERTS](#) [OUR PARTNERS](#) [CONTACT](#) [LINKS](#) [SPONSORSHIPS](#) [Q&A](#)

Understand Carbon and the Latest Related Global Developments from the World's Leading Experts

Climate Change – The Issue of Our Time.

As the world gets ready for the UN Climate Change Conference in Copenhagen in December, understanding the complexity in policies, technology development, and investment challenges will be the key to developing business strategies that chart the course for success in a carbon constrained world. Policies to address climate change will have far-reaching impact on energy and economic systems.

[Sign Up Now](#)

Use Hart's Energy and Climate Series: Global Carbon to navigate the policy divisions and establish a path through technology heights to determine a winning investment path.

A global initiative aimed at educating policymakers and industry leaders ensures we all share the relevant information available on carbon, energy and climate change.

To learn more or partner with Hart on the Energy & Carbon Series please contact:

Carbon Webinar Series A weekly e-newsletter and 12 webinars

[Sign Up Now](#)

Learn from and meet with experts on specific energy & carbon-related topics via the Internet. Selected Tuesdays at 10:00 AM EST ([convert](#)) or pre-recorded via the Internet.



[Dr. Donald L. Paul](#) [Joseph \(Tom\) Stricker, Jr.](#) [James L. Connaughton](#) [James A. Slutz](#)



[Belinda Robinson](#) [Sandrine Dixon-Declève](#) [Liz Bossley](#) [Jeet Bindra](#)



FEATURED WEBINAR

Aug. 25 - [Technology Today and to Come](#)

[More Information](#) | [Sign up for this webinar](#)

Audio Sample: James Slutz from the Webinar: Adapting to New Policies - July 28th



Hart Carbon Partners



The Carbon Challenge Webinar Schedule

Select Tuesdays, 10:00AM EST ([convert](#))

- July 28 - [Adapting to New Policies](#)
- Aug 25 - [Technology Today and to Come](#)
- Sept. 1 - [Cap-and-Trade: Creating more Trading...](#)
- Sept. 8 - [Impact on Oil Producers](#)
- Sept. 15 - [Impact on Natural Gas Sector](#)
- Sept. 22 - [Impact on Utilities](#)

The Carbon Challenge

Tuesday's at 10:00 Eastern Time, 16:00 Belgium and 23:00 Singapore

July 28

Adapting to New Policies

August 25

Technology Today and To Come

September 1

Creating More Trading Profit

September 8

Impact on Oil Producers

September 15

Impact on the Natural Gas Sector

September 22

Impact on the Utilities

September 29

Impact on the Refining Industry

October 6

Impact on Automotive Transportation Industry

October 13

Impact on the Renewable Industry

October 20

Carbon Capture Sequestration (CCS)

Tuesday October 27

Bring it Back Together

November 3rd

**Energy, Environment & Excellence Conference
in Houston, www.energysolutionsconf.com**

North American Natural Gas Major Themes

- **Henry Hub cash price will struggle to exceed \$4 for the balance of 2009**
 - Diminished hurricane threat
 - Storage nearing containment levels in U.S. and Canada
 - Long awaited new LNG supplies hitting market in Q4
- **Calendar year 2010 has mixed outlook; bulls are afraid of economy and LNG; bears afraid of production declines**
 - Most economists calling for growth (slow) in 2010
 - Second wave of new LNG hits market across summer and fall of 2010
 - Outlook is for production to be down 4 Bcfd, but high grade drilling prospects, deferred completions, and autumn shut-in production and could respond quickly and soften rates of decline
- **Growth in North American gas production is real, sustainable, and ill defined on price elasticity**
 - USA has the most compressed energy investment cycle globally
 - *Drill decision to production ranges from 7 weeks to 1 year*
 - *North America **could be** self sufficient in natural gas for several years (including ~ 1 Bcfd of embedded LNG imports in Boston and Altamira), **but it likely will not be***
- **Demand outlook has become less certain**
 - Long-term balance between carbon rules, gas/coal pricing, and energy efficiency impacts
- **Infrastructure buildup will shift basis weakness to new, and in some cases, unexpected areas**

Gassy Consequences

- **Over the next 2-4 years, North American gas prices are likely to oscillate between cash cost and marginal play's life cycle investment cost [$< \$2.50$ up to $\$8.00$]**
- **No room for LNG sloshing from other markets, so incremental LNG pushes price hard towards “coal floor” then producer shut-in economics**
 - Likely outcome for last half of 2009 and first half of 2010
 - Expect each month to churn between low $\$3$ to $\$4.50$ with few excursions under $\$3$ cash Henry Hub if storage containment emerges generally and in LA/TX specifically
- **Pipeline and Storage capacity value likely to be very volatile**
 - More flowing production reduces value of seasonal storage
 - Less flowing supply and episodic LNG imports will increase value
 - Some pipe assets may experience periods of low utilization for segments of their system as supply sources move around
- **Lower gas price outlooks will impact new power generation decisions and carbon technology and market decisions**

Current Bullish and Bearish Factors - Natural Gas

Near Term

- Actual LNG import Level
- Price compared to UK/EU
- Headline drop in rig counts
- Coal to gas switch economics

Longer Term

- Power demand
- New build economics
- CO2 potential
- Oil price relationship
- Global demand for LNG
- Embedded project costs
- LNG investment cycle lead-time
- U.S. E&P investment cycle requirements
- Asia gas demand growth potential
- EU to diversify supply away from Russia

Longer Term

- Shale gas and other unconventional plays
- Power technology
- Renewable power
- Meaningful carbon capture and sequestration capability
- Economic growth outlook

Near Term

- US production resilience
- US recession
- Global recession
- Global demand for existing LNG
- LNG supply growth threat
- Emerging outlook for El Nino winter warmth
- Cuts in hurricane activity outlook



Macro Issues Facing US E&P Companies

- **Legislation on hydraulic fracturing**
 - Proposes to eliminate exemption from Safe Drinking Water Act for injection of fluids or propping agents
 - Consequences range from only reporting of fluids used to actual regulation on which fluids can be used. API study suggests either of these would adversely impact gas production
- **Tax issues on E&P activity; current administration proposes to repeal:**
 - Manufacturing tax credit
 - Marginal well tax credit
 - Expensing of intangible drilling costs
 - Passive loss exception for WI owners in producing properties
 - Percentage depletion deduction
- **Greenhouse gas legislation (cap and trade)**
 - What is the balance of positive and negative impact upon natural gas
- **Financing Issues**
 - Credit access
 - Market appetite for equity issuances

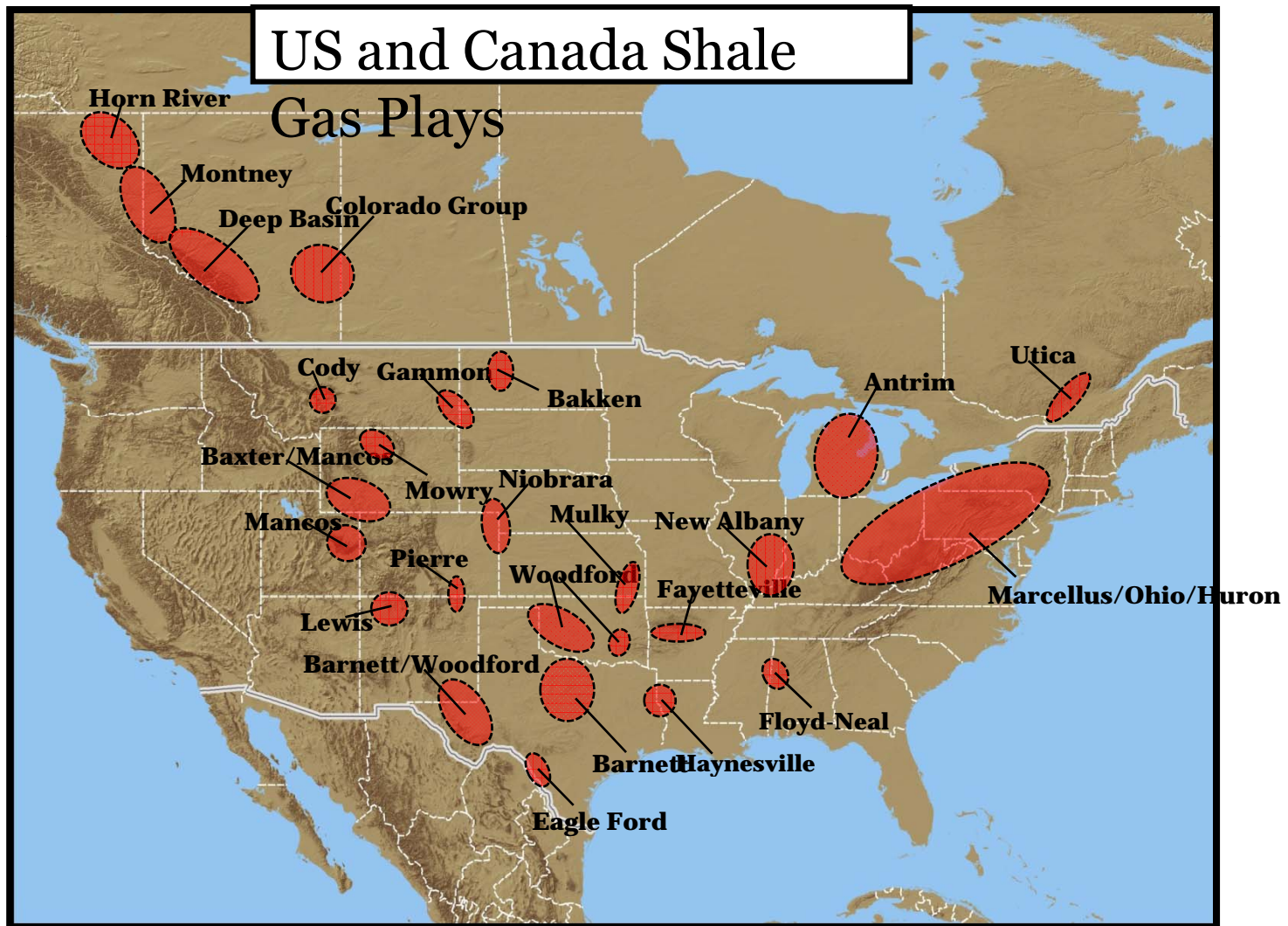
Shale Drilling Inventories

<u>Shale Location</u>	<u>Acres¹</u>	<u>Spacing</u>	<u>% Utilization</u>	<u>Potential Wells</u>	<u>Wells</u>
Barnett (TX)	2.9 mm	80 acres	50%	18,300	10,359
Fayetteville (AR)	2.0 mm	80 acres	50%	12,500	1,392
Woodford (OK)	0.7 mm	60 acres	50%	5,500	900
Haynesville (N. LA & E. TX)	3.1 mm	80 acres	50%	19,500	100
Marcellus (Eastern)	5 mm	160 acres	50%	15,600	500
Canada - BC	1.4 mm	80 acres	50%	8,600	10
<u>Total of 6 Shales</u>	13.7 mm			80,000	13,261

1 – Sum of public companies net land position; Sources are public filings with the SEC

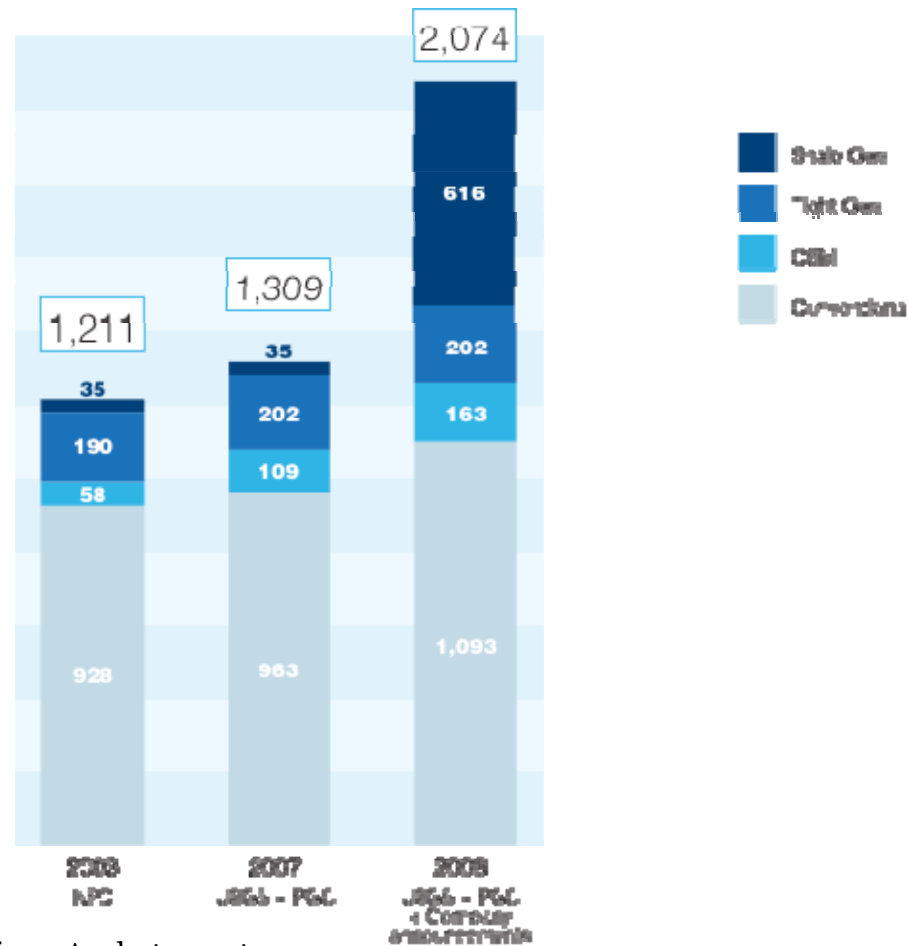
Source: Hart Carbon Webinar Merrill Lynch presentation

Shale has Changed Everything



U.S. Gas Resources

(Tcf)



Source: EIA; HPDI; PGC 2009; Investor presentations, Analyst reports 2006-2008; 2006 Oil and Gas Investor presentation

Natural Gas is Cleaner

Typical Emissions for Coal-Fired, Oil-Fired, and Natural Gas Generating Plants
(Pounds per Megawatt-Hour)

Generating Plant Configuration	Carbon Dioxide	Carbon Monoxide	Nitrogen Oxides	Sulfur Oxides	Particulate Matter	Mercury
Coal-fired/Steam	2,028	2.03	4.45	25.26	26.75	0.00016
Oil-Fired/Steam	1,600	0.32	4.37	10.93	0.82	0.00007
Natural Gas Combined Cycle	760	0.26	0.60	0.01	0.05	0.0000
Natural Gas Simple Cycle	1,140	0.39	0.90	0.01	0.07	0.0000

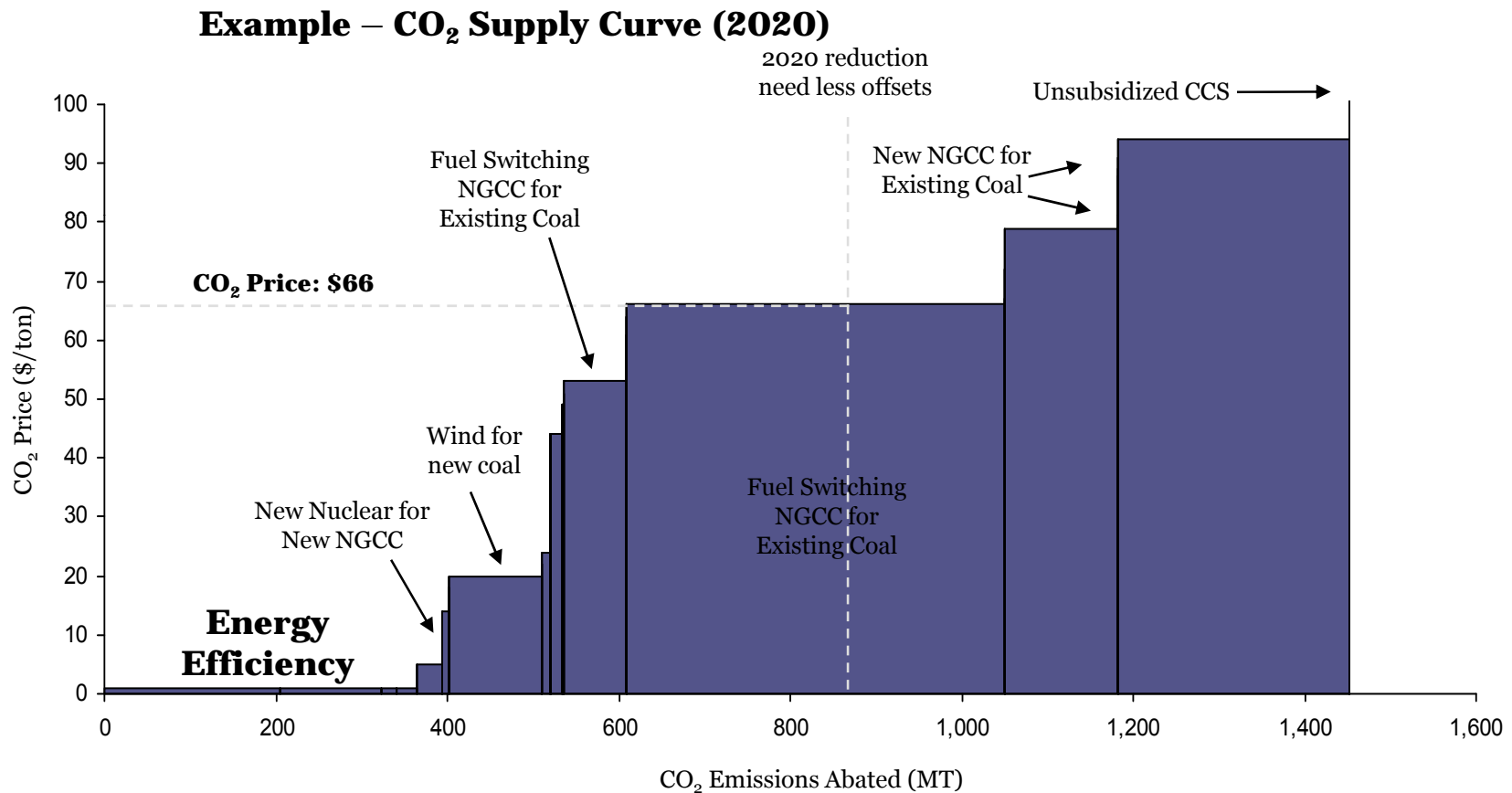
Source: US Energy Information Administration, "Natural Gas Issues and Trends," 1998

Computed using EIA data based on the following conditions:

A. Combined Cycle (gas/steam turbine plant) heat rate of 6,500 Btu/KW-hour (Thermal Efficiency=52.5%)

B. Simple Cycle (gas turbine plant) heat rate of 9,750 Btu/KW-hour (Thermal Efficiency=35.0%)

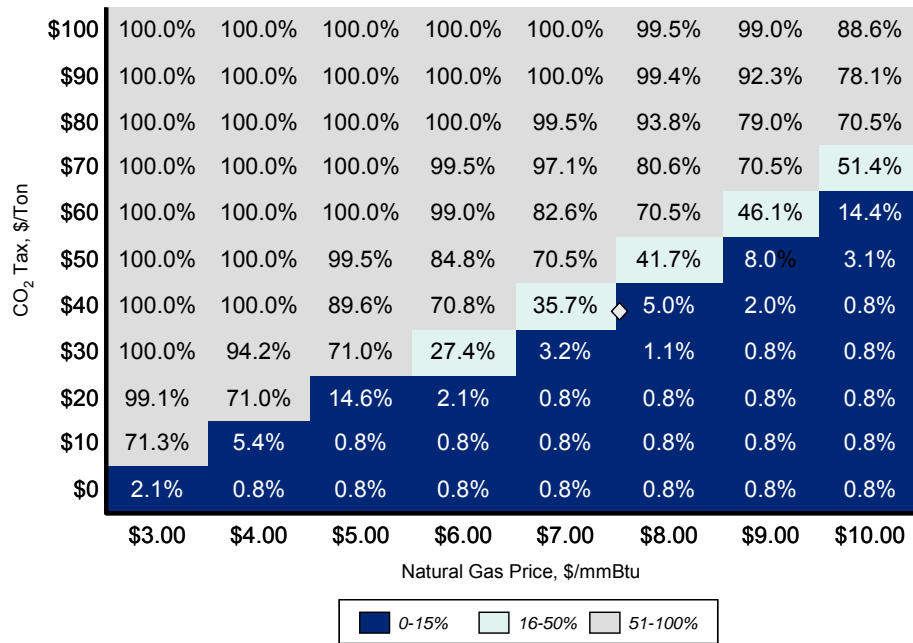
The nature of the US electricity emissions abatement costs makes coal fired generation the prime source of near term reductions



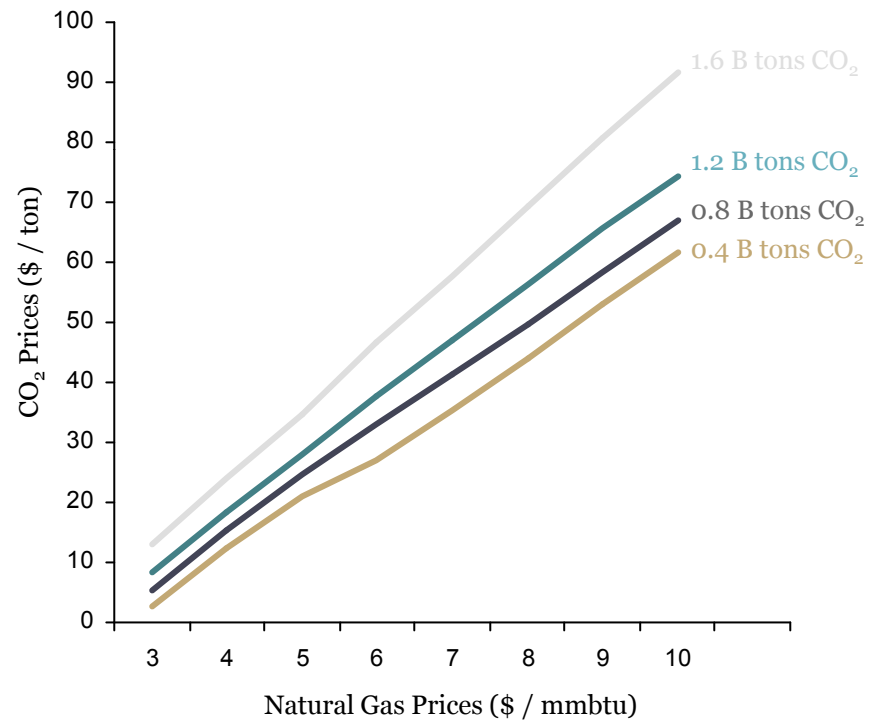
Source: Booz & Company analysis

Thus CO₂ price will be highly sensitive to natural gas

**Percentage of Coal Capacity Forced Out
(Based on 2006 Existing Capacity)**

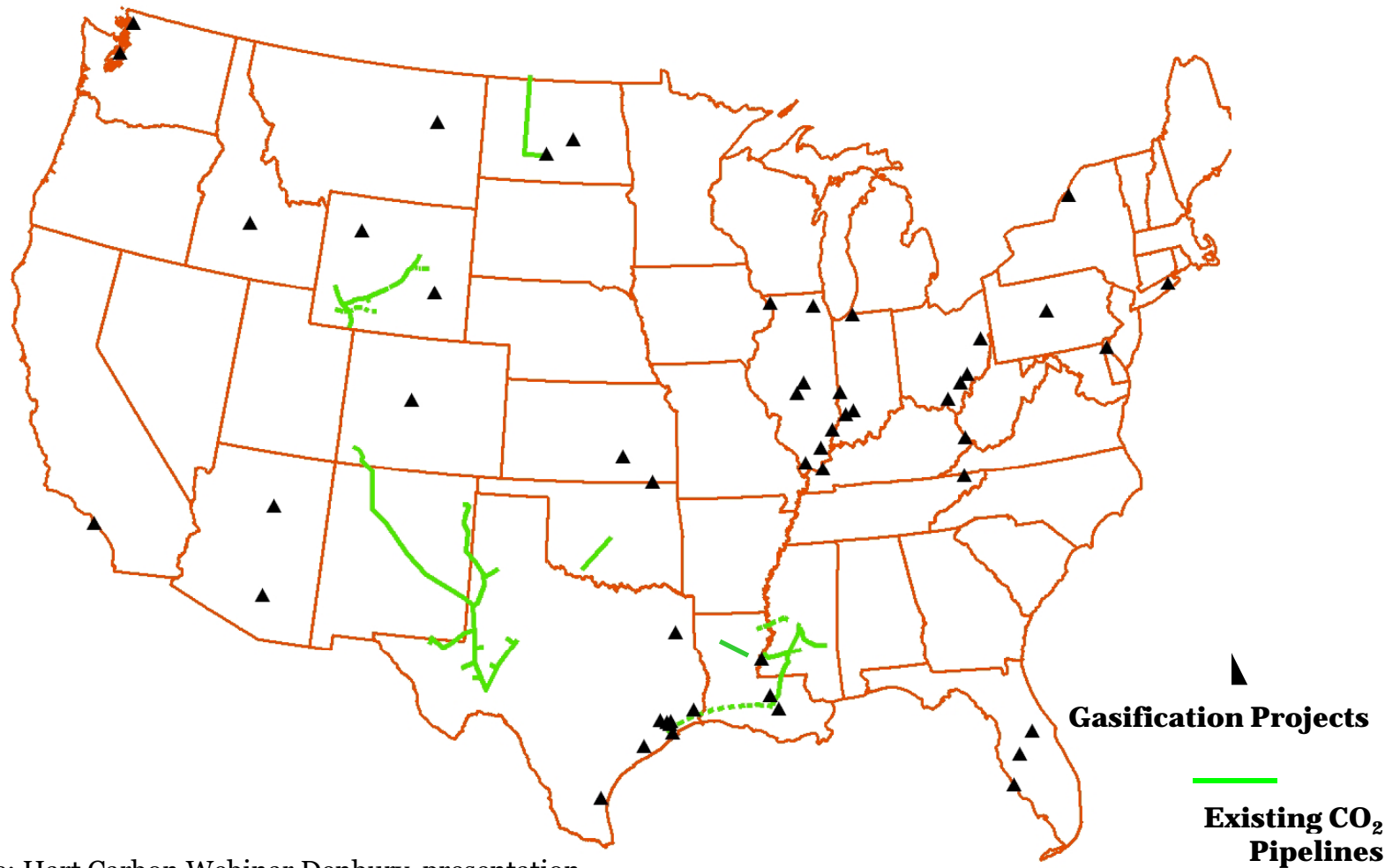


**Reductions due to Forced Capacity
based on Natural Gas Price and CO₂
Price**



Source: Booz & Company

US CO₂ Pipelines vs Proposed Gasification Projects



Source: Hart Carbon Webinar Denbury presentation

CO₂ EOR Potential

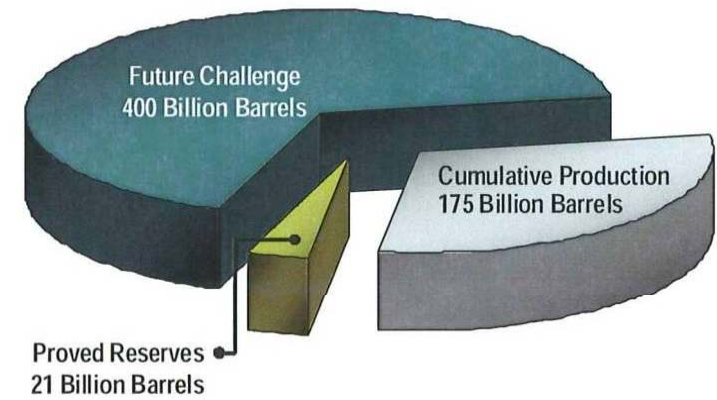
Large Volumes of Domestic Oil Remain “Stranded” After Traditional Primary/Secondary Oil Recovery

U.S. Original Oil In-Place: 596 Billion Barrels*

U.S. “Stranded” Oil In-Place: 400 Billion Barrels*

***Excludes deep-water GOM**

**Source: American Resources International
(2008)**



- **In Most U.S. Oilfields, About 33% of the Original Oil In-Place is Recoverable Through Primary and Secondary Methods, Increasing to 50-60% with Tertiary (CO₂) Recovery**
- **The Gulf Coast (TX, MS, LA)** Has an Estimated 3.4 to 7.5 Billion Barrels Recoverable with CO₂ EOR (DOE 2005 and 2006 reports)**
- **“CO₂ Enhanced Oil Recovery (CO₂ EOR) Offers the Potential for Storing Significant Volumes of Carbon Dioxide Emissions While Increasing Domestic Oil Production.” (2008 DOE/NETL Report)**

****Does not include offshore basins**

Source: Hart Carbon Webinar Denbury presentation



Observations

- NG long-term price will be driven by marginal cost of supply; unconventional gas and LNG will be in same range
- NG supply is not constrained
- CCS development will remain a challenge and the key question is commercialization timeline
- Models that project impact of greenhouse gas regulation contain optimistic CCS adoption