Natural Gas Abundance:
The Development of Shale Resource in North America

EBA Brown Bag Luncheon

Bracewell & Giuliani
Washington, D.C.
February 6, 2013

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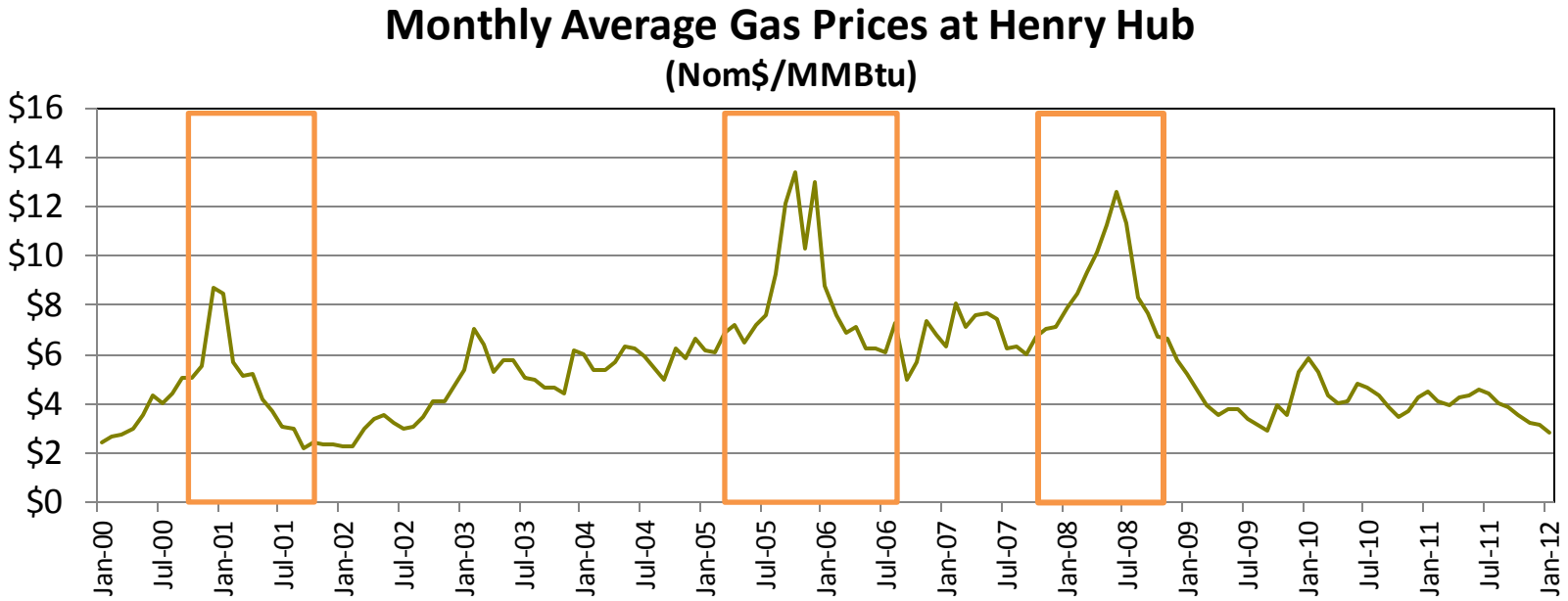
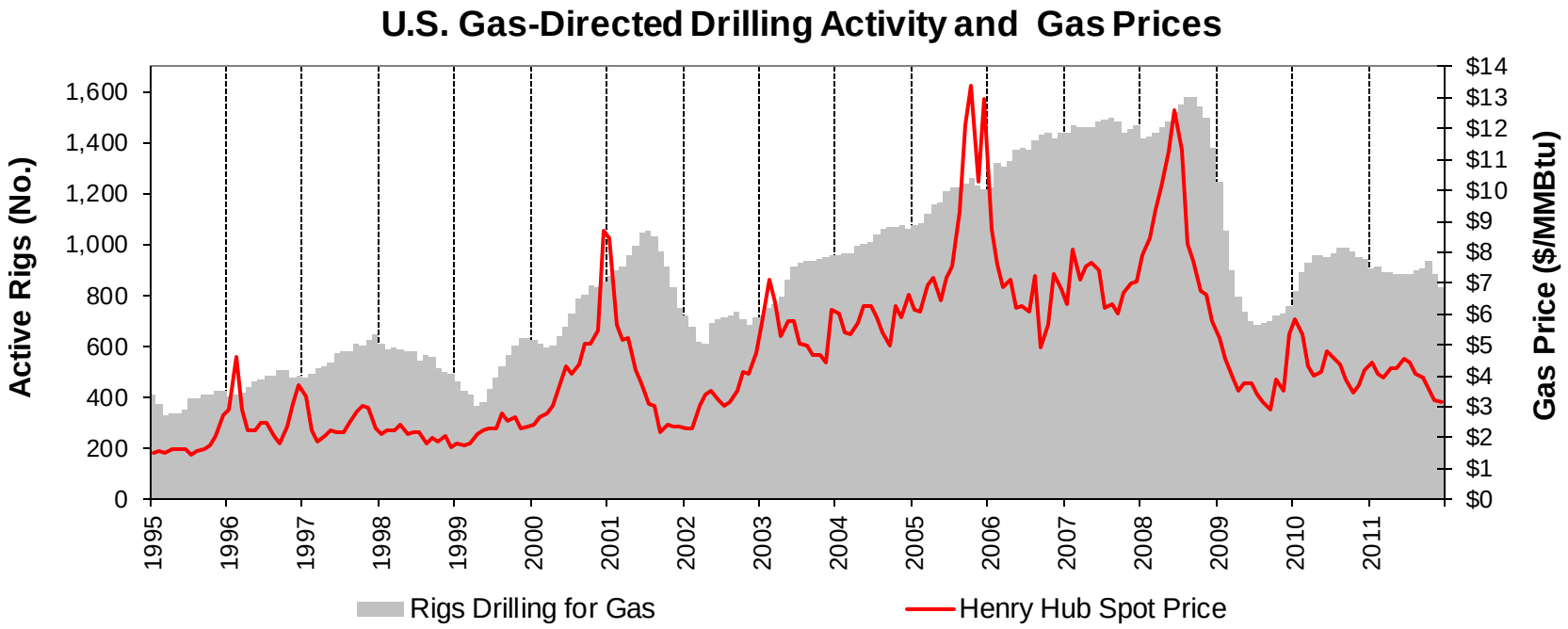
Historical Natural Gas Prices



Source: Platts

- In the last decade, there have been three periods where natural gas prices have spiked.
- Each of these periods had a different driver for the increase in prices.
- Recently, prices have collapsed.

Gas Drilling Response to Price Movements



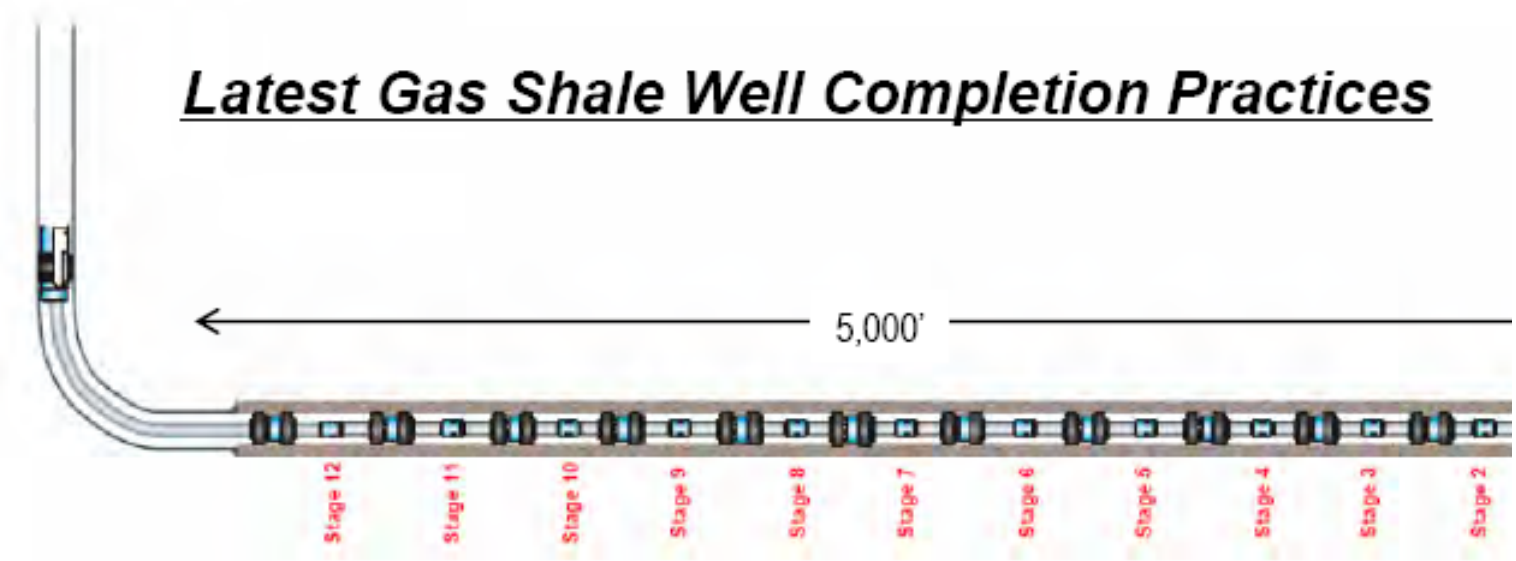
- In response to each of the three previous price spikes, drilling levels increased. The resulting increase in supply moderated prices.
- In the most recent period, gas supplies have been increasing significantly even though rig activity is nowhere near peak levels.

The Opportunity!

Shale and Other Unconventional Gas

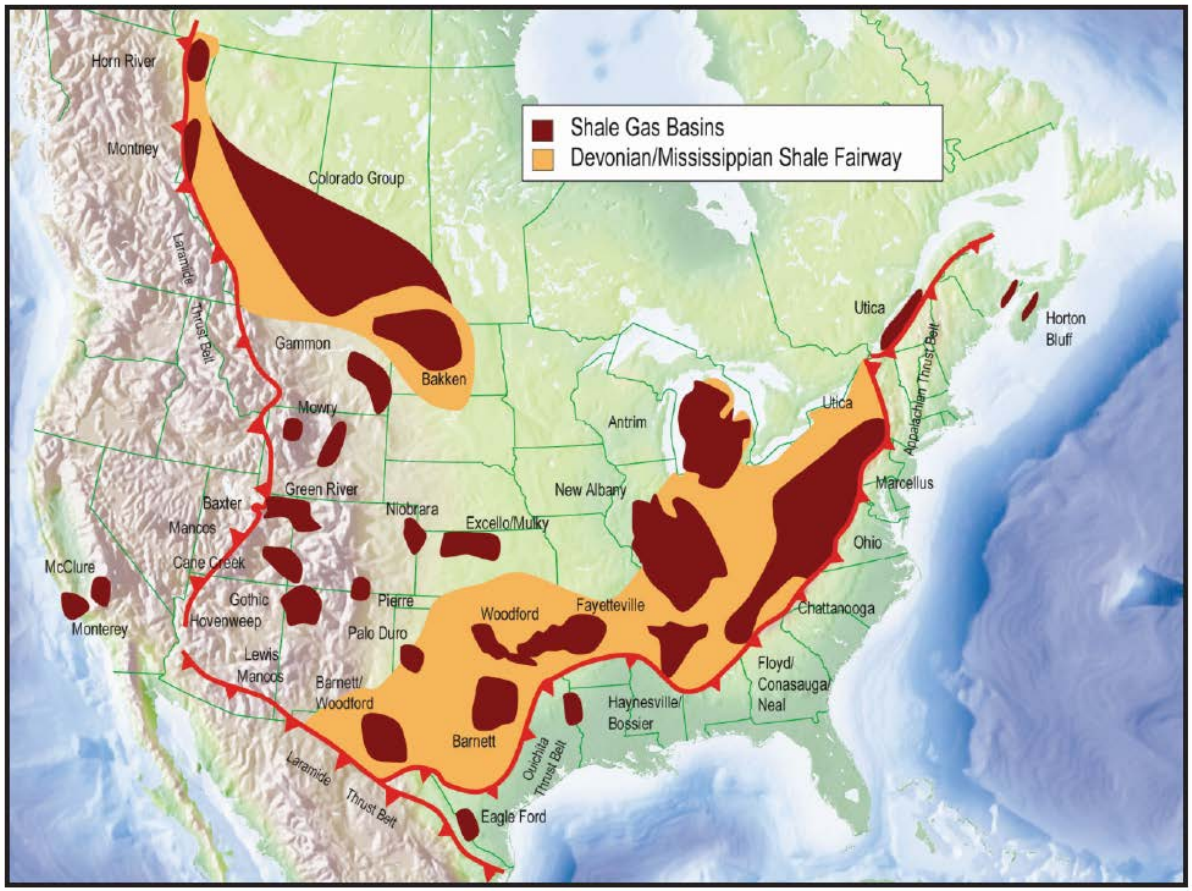
Evolution of D&C Technologies and Practices

- Horizontal drilling and steering
- Multi-stage hydraulic fracturing
- Fracturing fluids and techniques
- Seismic and other geophysical analyses of drilling locations
- Reductions in environmental impacts (multi-well pads, water conservation and recycling, reformulation of additives, RECs, etc.)



Shale Formations of the U.S. and Canada

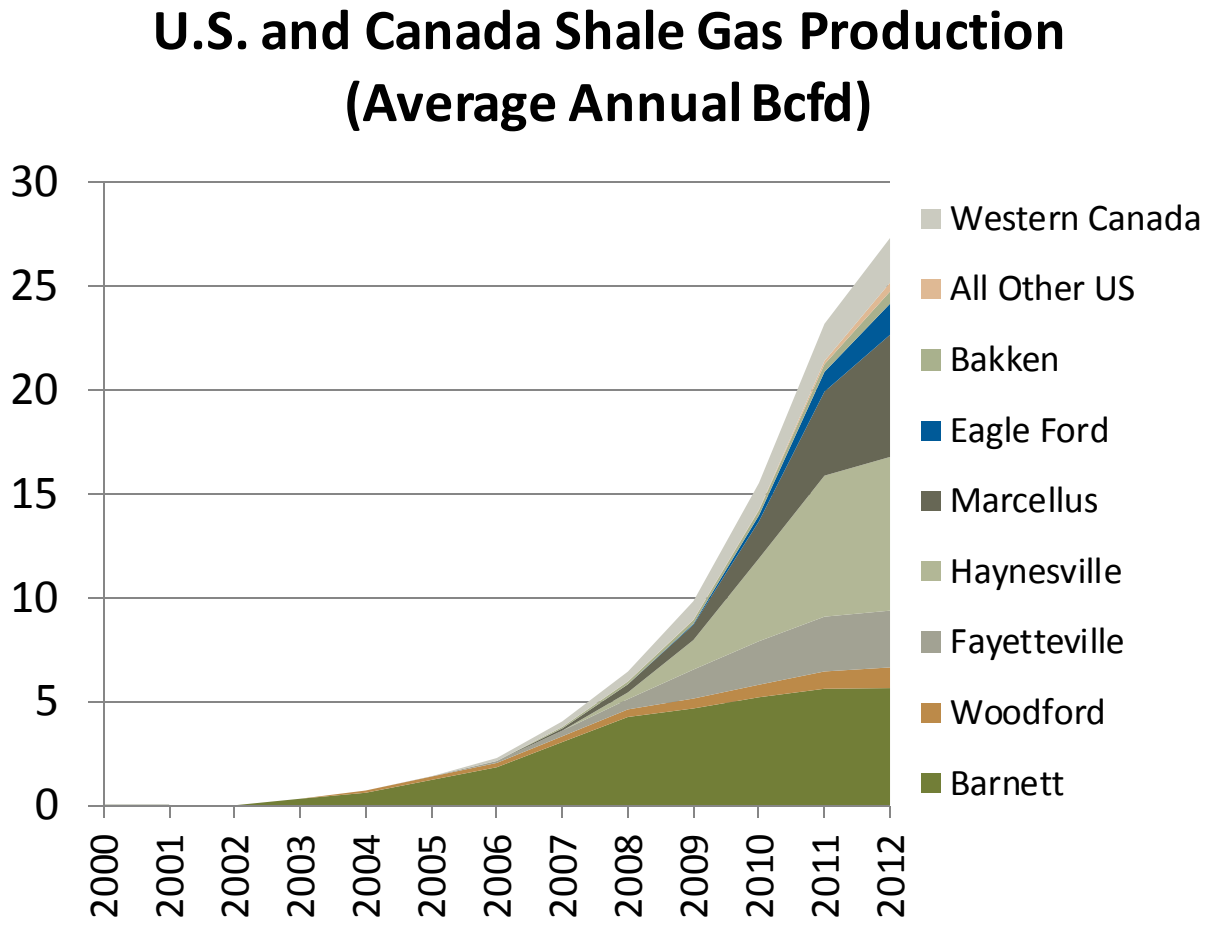
- Shale formations are widely distributed.
- Liquids content vary by location, which affects the economics of development.



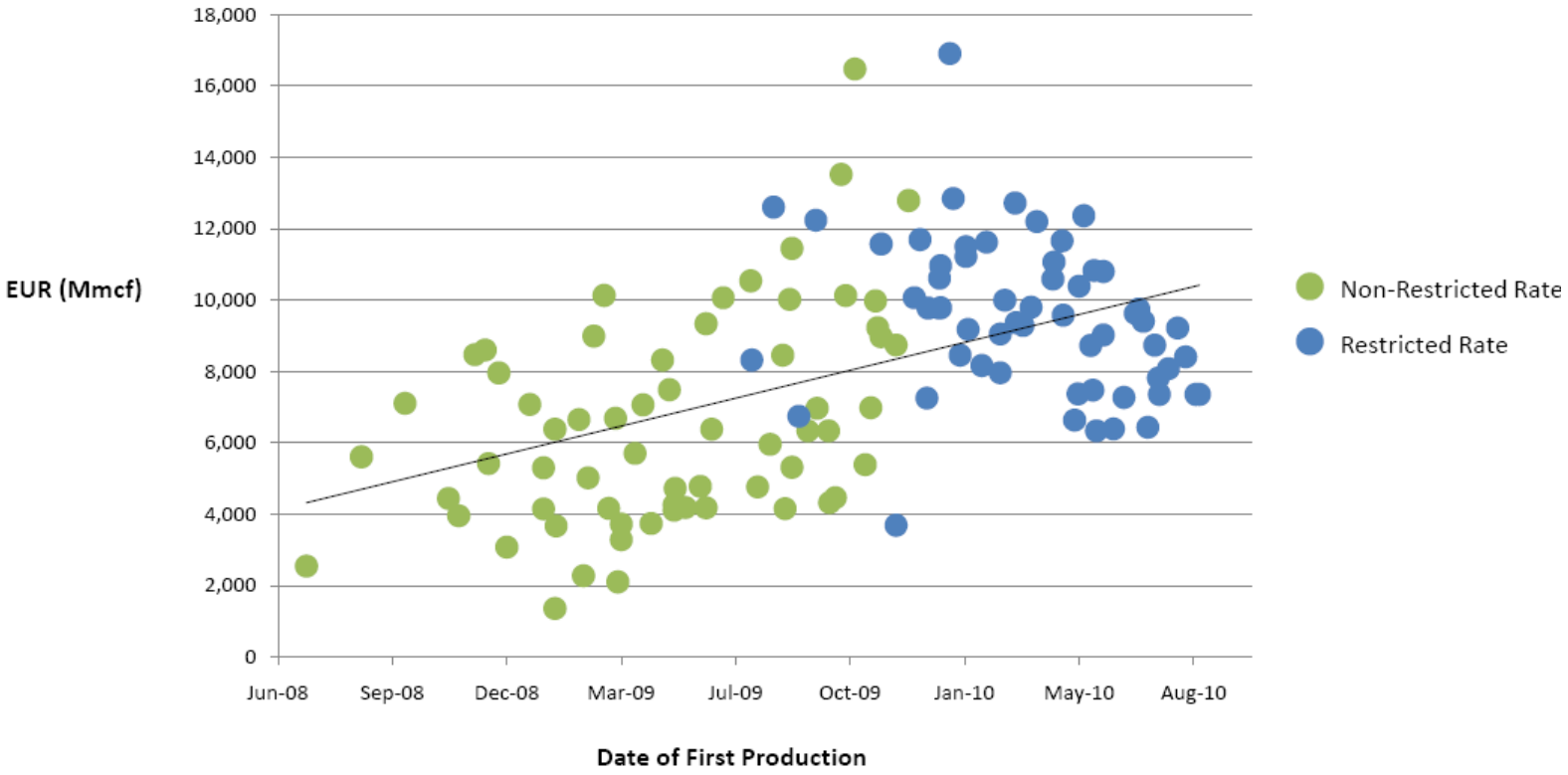
Source: NEB, "Understanding Canadian Shale Gas," 2009

Slower Gas Production Growth Expected in 2013 as Drilling Declines Impact Many Shale Plays

- Since 2005, shale gas production has increased roughly 40% per year, while 2012 is projected to grow by a more modest 20%, relative to 2011 levels.
- Liquids-rich plays, like Eagle Ford, are expected to grow at a faster pace, while growth in dry gas plays is slowing (except for in the Marcellus).



Impact of Improved Completion Techniques Increase in Haynesville on the Estimated Ultimate Recovery per Well



Source: Petrohawk August 2010

The North American Natural Gas Resource Base Could Support Current Levels of Gas Use for about 150 Years

- In total, the U.S. and Canada have almost 4,000 Tcf of resource that can be economically recovered using current exploration and production (E&P) technologies.
  - At current levels of consumption, this is enough resource for about 150 years.
  - As technologies improve and new discoveries are made, the total gas resource is likely to grow.
- Over 50% of the assumed resource is shale gas.

U.S. and Canada Natural Gas Resource Base

(Tcf of Economically Recoverable Resource, Assuming Current E&P Technologies)

	Proven Reserves	Unproved Plus Discovered Undeveloped	Total Remaining Resource	Shale Resource[1]
Alaska	7.7	153.6	161.3	0.0
West Coast Onshore	2.3	24.6	27.0	0.3
Rockies & Great Basin	66.7	388.3	454.9	37.9
West Texas	27.6	47.7	75.3	17.5
Gulf Coast Onshore	70.1	684.7	754.8	476.9
Mid-continent	37.0	205.0	241.9	133.9
Eastern Interior [2,3]	18.6	1053.7	1072.3	986.1
Gulf of Mexico	14.0	238.6	252.5	0.0
U.S. Atlantic Offshore	0.0	32.8	32.8	0.0
U.S. Pacific Offshore	0.8	31.7	32.5	0.0
WCSB	60.4	664.0	724.4	508.8
Arctic Canada	0.4	45.0	45.4	0.0
Eastern Canada Onshore	0.4	15.9	16.3	10.3
Eastern Canada Offshore	0.5	71.8	72.3	0.0
Western British Columbia	0.0	10.9	10.9	0.0
US Total	**244.7**	**2,860.6**	**3,105.3**	**1,652.5**
Canada Total	**61.3**	**807.6**	**868.8**	**519.1**
US and Canada Total	**306.0**	**3,668.1**	**3,974.1**	**2,171.6**

1. Shale Resource is a subset of Total Remaining Resource
2. Eastern Interior includes Marcellus, Huron, Utica, and Antrim shale.
3. Reference case assumes drilling levels are constant at today's level over time, reflecting restricted access to the full resource development.

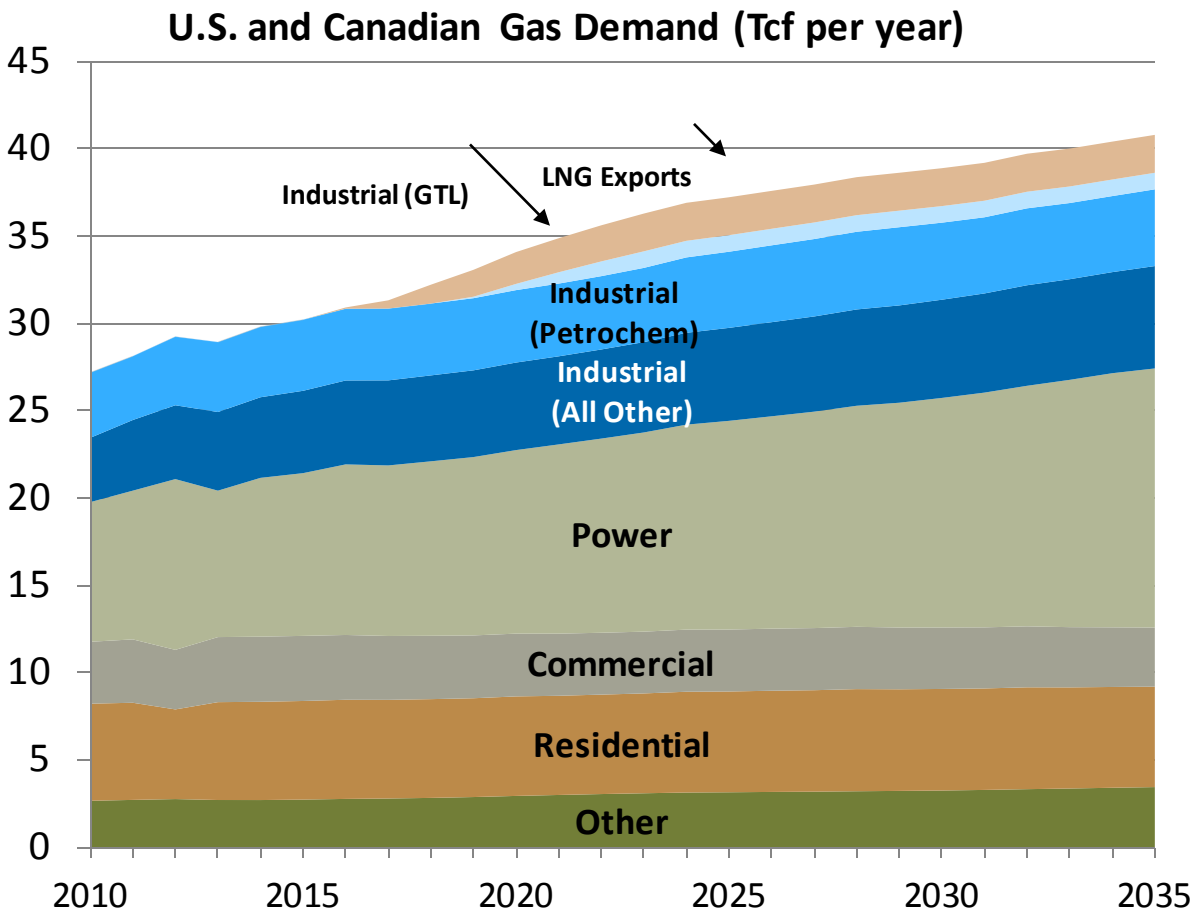
ICF North America Technically Recoverable Gas and Liquids Resources

Lower 48	Total Gas Tcf	Crude and Cond. Bn Bbls
Proved reserves	263	19
Reserve appreciation and low Btu	219	23
Enhanced oil recov.	0	42
New fields	488	68
Shale gas and condensate	1,964	31
Tight oil	88	25
Tight gas	438	4
Coalbed methane	66	0
Lower 48 Total	**3,526**	**212**
Canada		
Proved reserves	61	4.3
Reserve appreciation	29	3.0
Stranded frontier	39	0.0
Enhanced oil recov.	0	3.0
New fields	219	12.0
Shale gas and condensate	601	0.3
Tight oil	108	12.1
Tight gas (with conv.)	0	0.0
Coalbed methane	76	0.0
Canada Total	**1,133**	**35**
North America Total	**4,659**	**247**

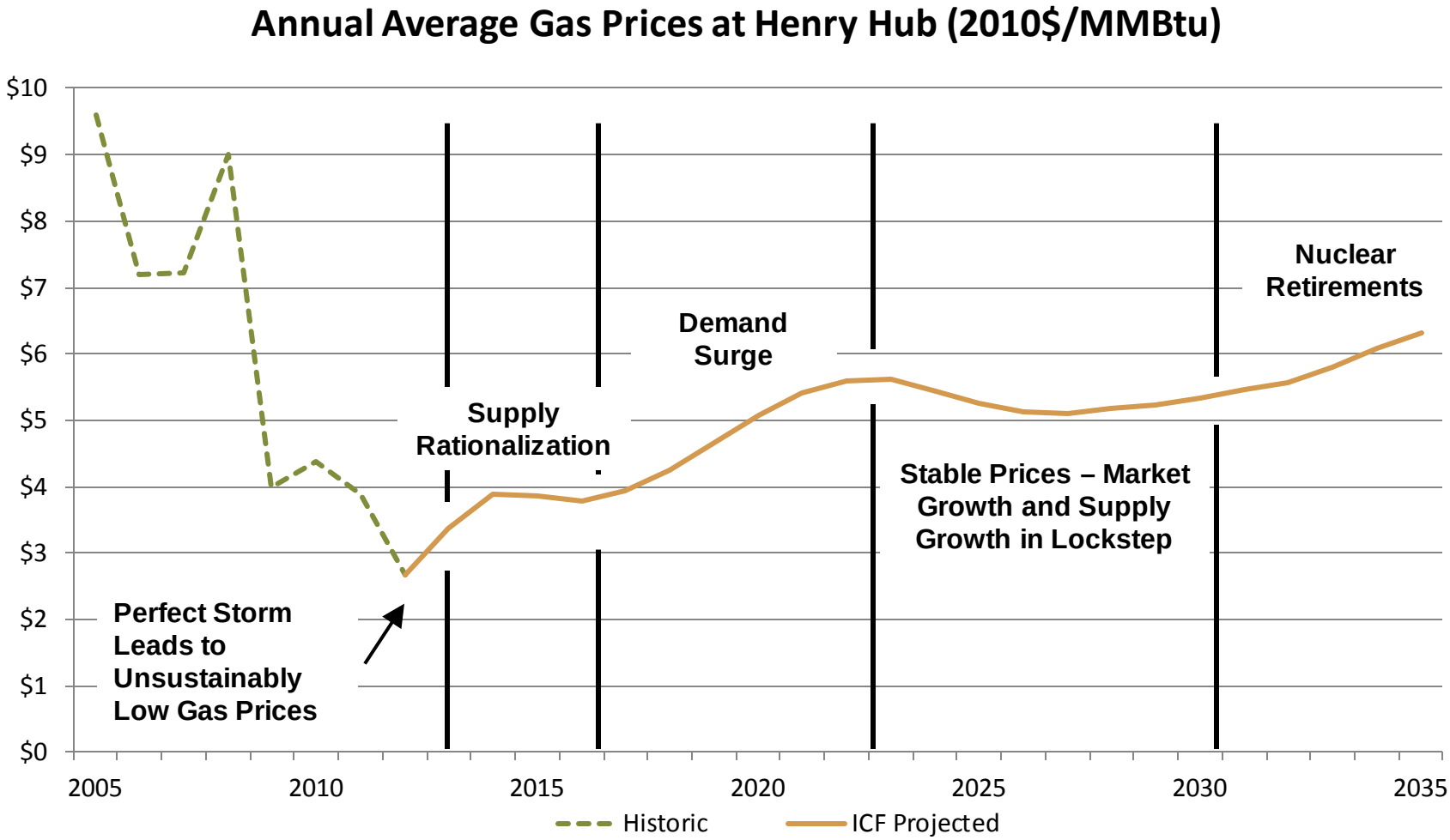
- Conventional and unconventional gas and liquids
- 45 unconventional plays; 436,000 square miles evaluated for gas and liquids.
- 36 square mile unit of analysis for most plays, larger areas for tight oil plays
- Cost of supply evaluated as function of spacing

Gas-Fired Power Generation Growth will Continue to Drive Gas Consumption Growth

- Total gas demand is projected to increase at a rate of 1.5% per year.
  - Power sector gas use will continue to grow.
  - New gas-to-liquids (GTL) plants are expected to add nearly 1 Tcf of demand.
  - LNG exports expected to total 6 Bcfd (2 Bcfd from Canada and 4 Bcfd from the Gulf Coast).
- Not much growth in the residential and commercial sectors, but oil-to-gas conversions are likely to spur some regional growth.

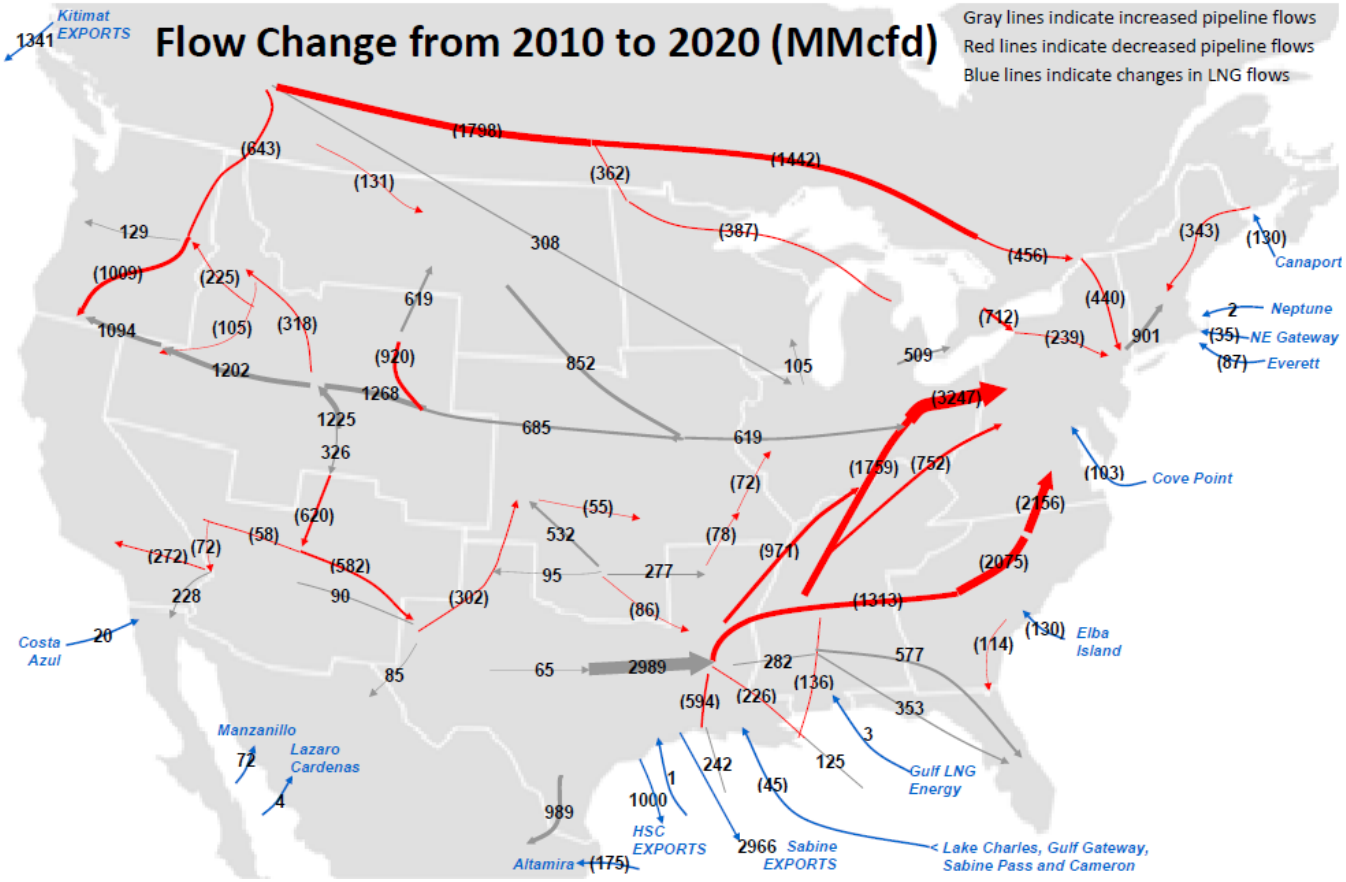


Gas Prices Remain Relatively Low in the Near Term, but then Increase as the Market Grows



Supply and Demand Changes will Significantly Change Pipeline Flows Over the Next 10 Years

- Increases in flows from the Gulf Coast to the east are due to increases in Mid-continent shale gas production.
- Modest increases in the Rockies both east and west.
- Marcellus gas production growth displaces gas flows into the U.S. Northeast (shifts within the Northeast are not depicted on this interregional flow map).
- Declining conventional production in Alberta and increasing gas consumption for oil sands development causes flows from western Canada to decline.



Source: ICF International

Conclusion

- Abundant supply is a real benefit to the gas consumers and the industry.
  - Gas supply will likely remain sufficient for 150 years.
  - But that does not mean that prices will not fluctuate from year to year.
- Shifting locations in gas supply are causing "basis compression" in many regions.
  - New pipeline capacity adds to basis compression
- Developing pipeline infrastructure projects is difficult, in part due to basis compression.

Who will sign up for new firm capacity?