Natural Gas Issues and Emerging Trends for the Upcoming Winter and Beyond

2013 NASEO WINTER ENERGY OUTLOOK CONFERENCE

November 1, 2013

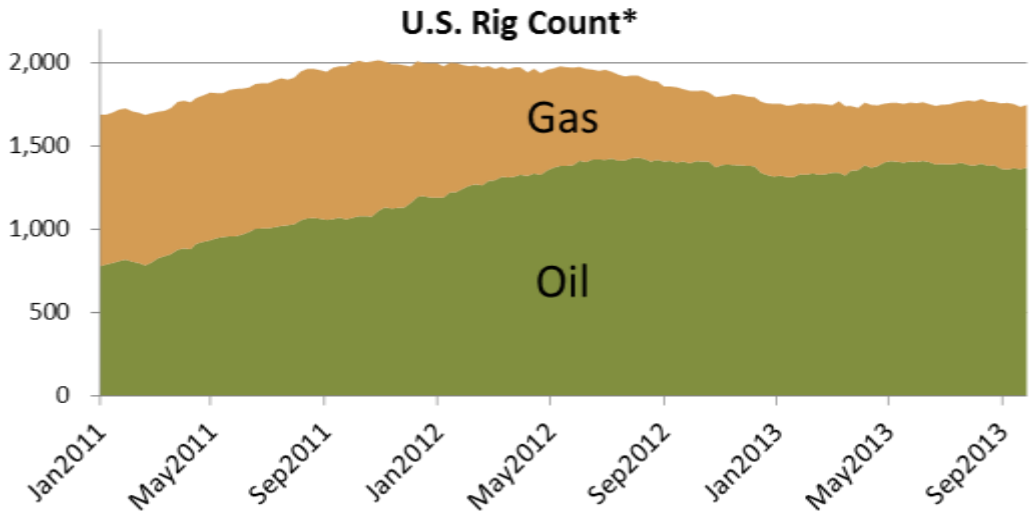
Kevin Petak
Vice President, ICF International
Kevin.Petak@icfi.com
703-218-2753

Contents

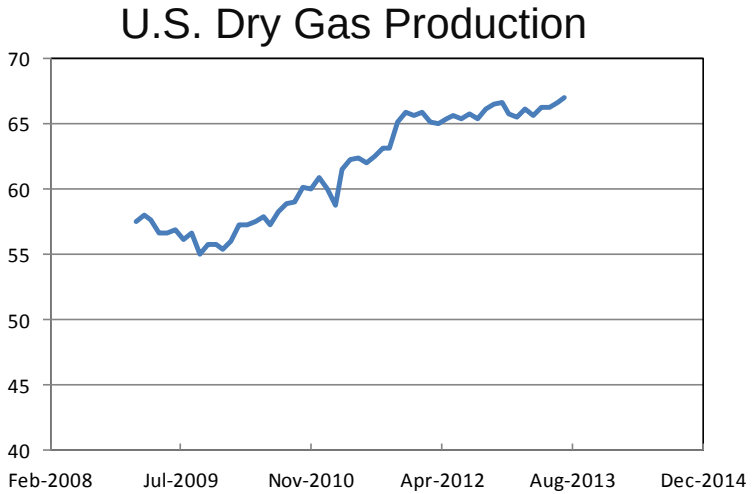
- Review of Recent Trends and ICF's Near Term Outlook
- Thinking Longer Term

Gas Production Continues to Grow Despite Relatively Low Gas Rig Count

- Gas Rigs Currently Under 400, with a noticeable shift toward oil drilling during the past two years
- Gas Production Still Up by 1 Bcfd Over the Past 12 Months
  - Lower activity leading to slower growth, but drilling has become more efficient



Source: Baker Hughes



Source: US DOE-EIA

Power Gas Use Down This Winter Versus Last Winter, but Other Factors are Offsetting the Impact

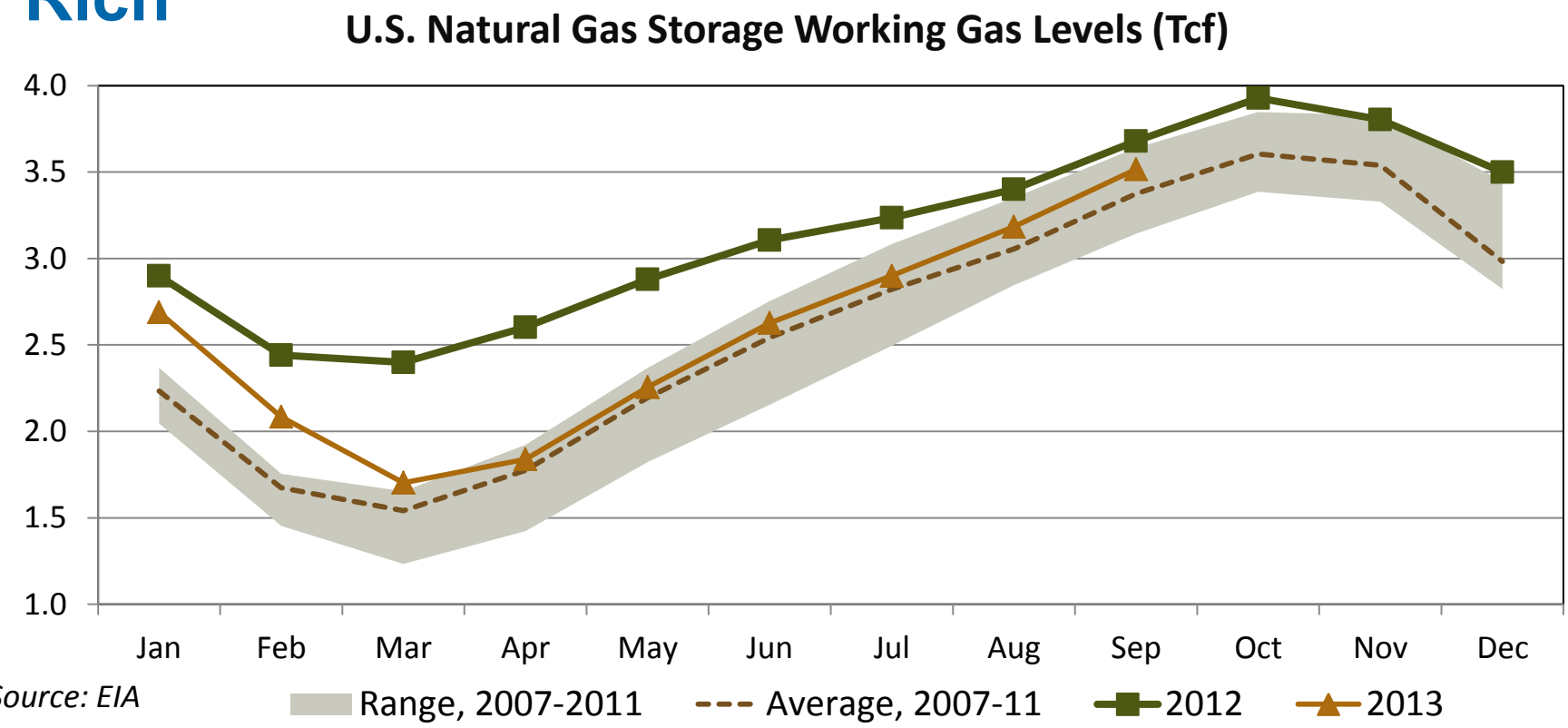
- Power Gas Use Down by 22% From Last Winter
- R/C/I gas use up
  - Winter weather
  - Petrochem load
- Net Imports Down
  - Mexican exports up
  - Canada imports down
  - LNG imports down

U.S. Natural Gas Supply/Demand Balance

Average Billion Cubic Feet per Day

	Withdrawal Season			Injection Season		
	2011/12	2012/13	2013/14	2012	2013	2014
Gas Demand						
R/C/I Gas Use	50.2	56.0	57.0	28.7	30.5	31.0
Power Gas Use	22.2	22.1	17.1	27.9	23.2	24.9
Other Gas Use	6.1	6.2	6.0	6.0	5.8	5.7
Net Exports to Mexico	1.4	1.5	1.8	1.4	1.8	2.2
Net Injections	0.0	0.0	0.0	7.3	9.8	8.0
Demand Total	**79.9**	**85.8**	**82.0**	**71.4**	**71.2**	**71.8**
Gas Supply						
US Production	65.5	66.8	67.7	65.5	66.6	67.9
Net Imports from Canada	4.9	4.9	4.7	6.1	5.0	4.3
Net US LNG Imports	0.6	0.4	0.4	0.4	0.5	0.4
Net Withdrawals	9.7	15.0	10.7	0.0	0.0	0.0
Supply Total	**80.7**	**87.0**	**83.5**	**72.0**	**72.1**	**72.6**
Balancing Item (S-D)	**0.8**	**1.2**	**1.5**	**0.6**	**0.9**	**0.8**

Gas Storage Fill Much Closer to the 5-Year Average, but the Market is Still "Supply-Rich"



Source: EIA

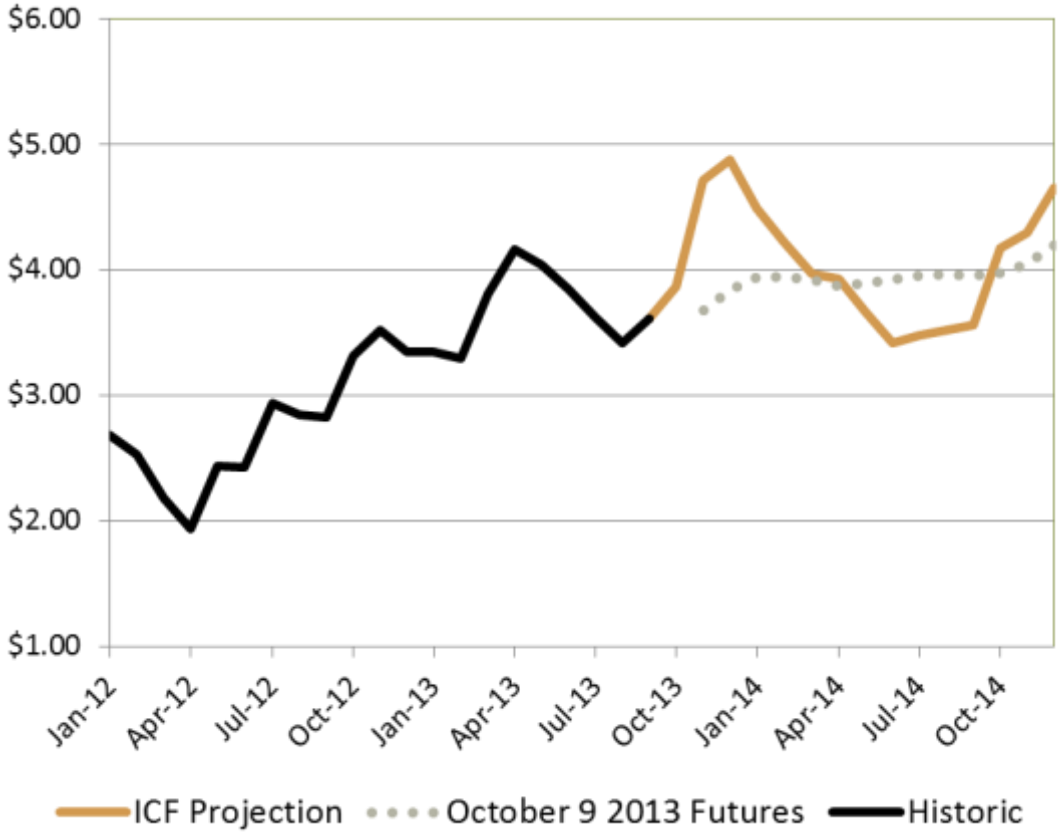
- The higher rate of withdrawals this past winter brought current working gas levels closer to the five-year average.
- As gas production continues to grow ahead of demand, the current market perception is that gas storage has relatively low value.

ICF Projects Near-Term Gas Prices that Fluctuate Around $4 per MMBtu

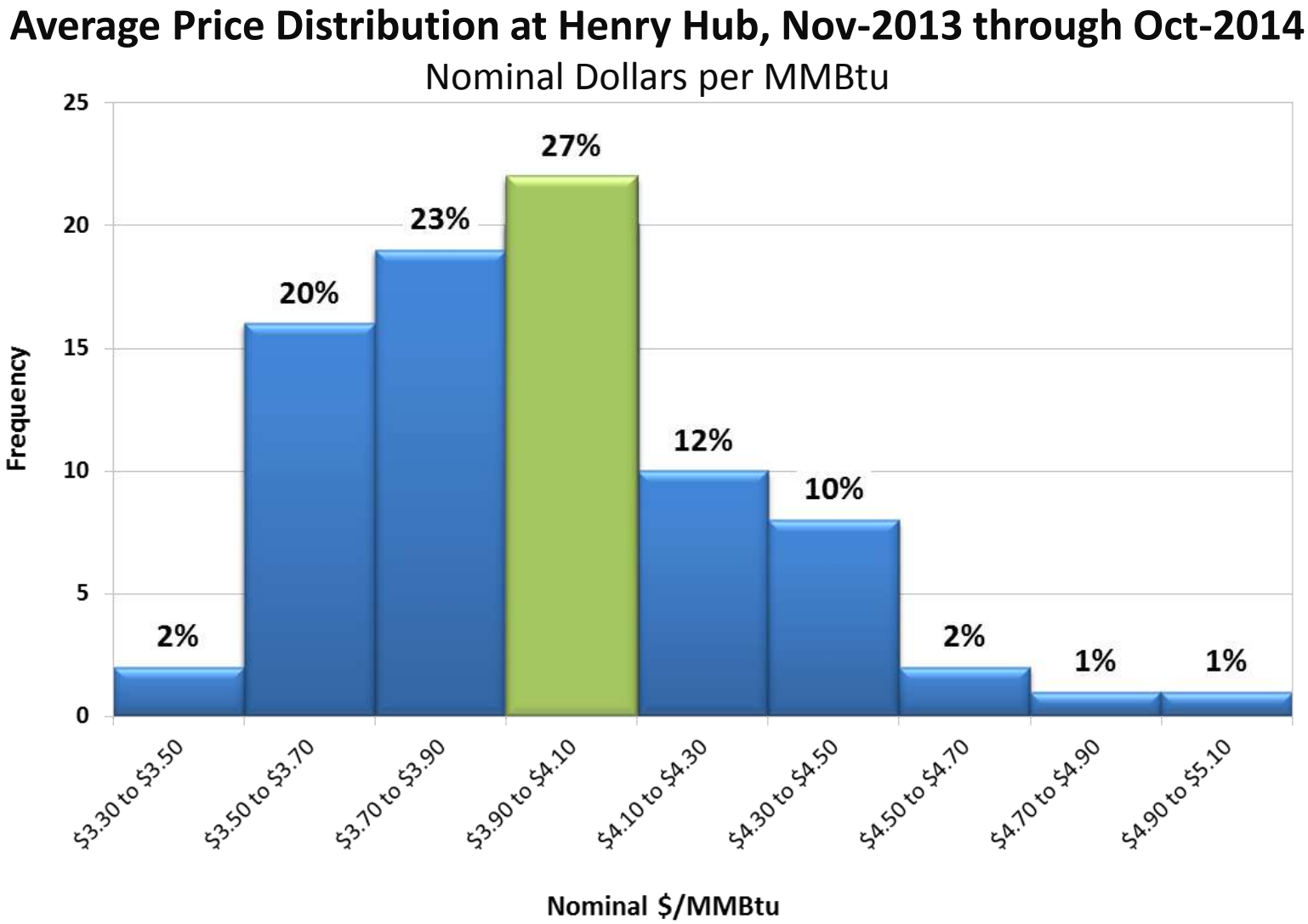
- ICF's projection is fairly consistent with the average price levels observed in futures market over the next 24 months
  - However, ICF projects a greater seasonal price spread
- Gas bills this winter likely to be a little above last winter's bills, assuming "normal" winter weather

Historic and Projected Henry Hub Gas Prices

Nominal Dollars per MMBtu



Price Distribution for the Next Year

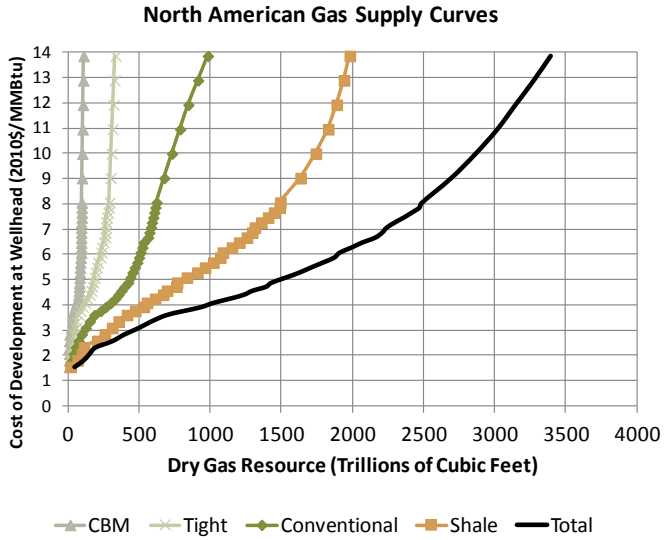


Thinking Longer Term, Gas Supply is Abundant and Cost Effective

U.S. and Canada Natural Gas Resource Base

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

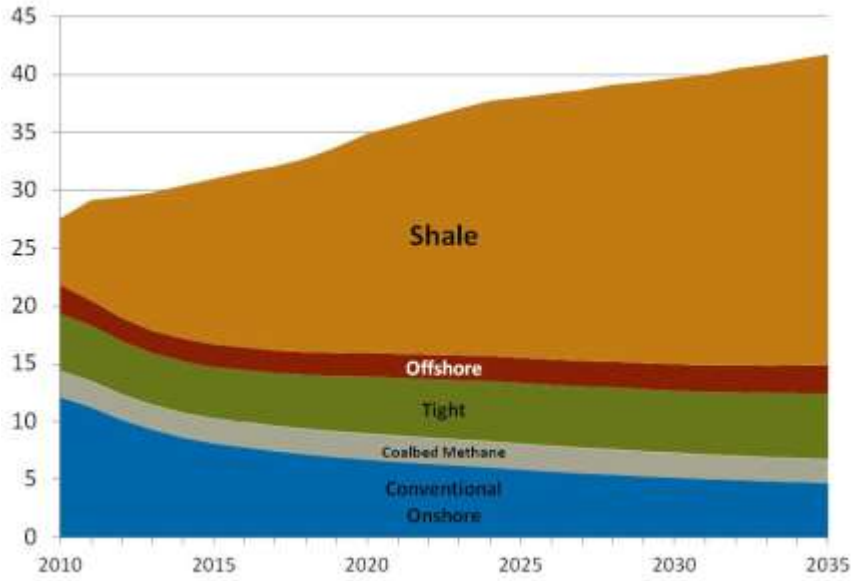
	Proven Reserves	Unproved Plus Discovered Undeveloped	Total Remaining Resource	Shale Resource[2]
Alaska	9.4	153.6	163.0	0.0
West Coast Onshore	2.9	24.6	27.5	0.3
Rockies & Great Basin	81.8	388.3	470.1	37.9
West Texas	20.4	47.7	68.1	17.5
Gulf Coast Onshore	97.6	684.7	782.3	476.9
Mid-continent	65.3	205.0	270.3	133.9
Eastern Interior [3,4]	45.2	1,053.7	1,098.9	986.1
Gulf of Mexico	10.7	238.6	249.3	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	68.8	664.0	732.8	508.8
Arctic Canada	0.0	45.0	45.0	0.0
Eastern Canada Onshore	0.8	15.9	16.7	10.3
Eastern Canada Offshore	0.3	71.8	72.1	0.0
Western British Columbia	0.5	10.9	11.4	0.0
US Total	**334.1**	**2,860.6**	**3,194.7**	**1,652.5**
Canada Total	**70.4**	**807.6**	**878.0**	**519.1**
US and Canada Total	**404.5**	**3,668.1**	**4,072.6**	**2,171.6**



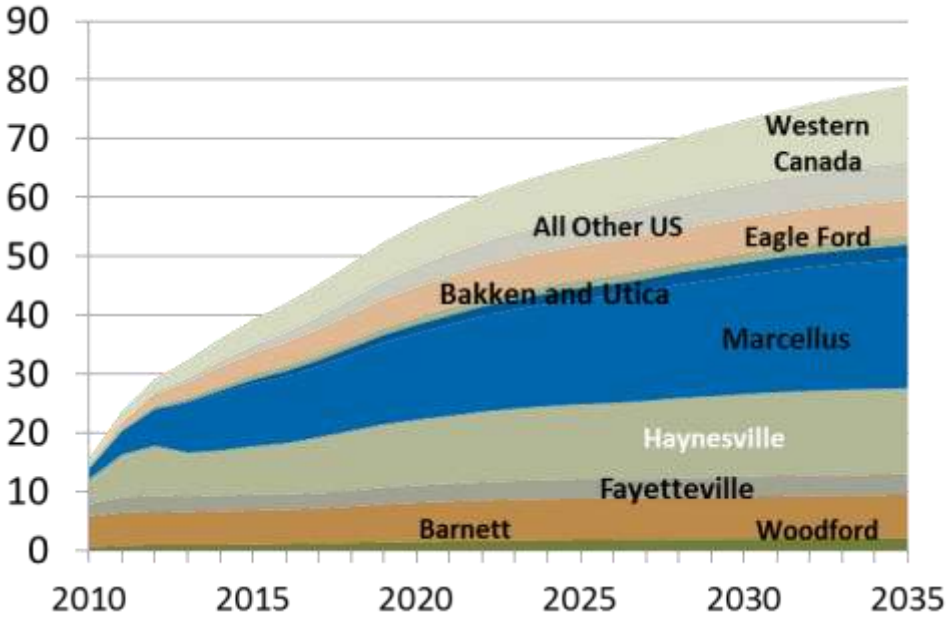
- **Over 4,000 Tcf of economically recoverable gas resource with current technologies – roughly 140 years of production at current consumption levels**
- **Roughly 1,500 Tcf recoverable at less than $5 per MMBtu – roughly 50 years of production at current consumption levels**

Gas Supply will Continue to Grow, Fueled by Production from Shale Resources

U.S. and Canadian Gas Production (Average Bcfd)



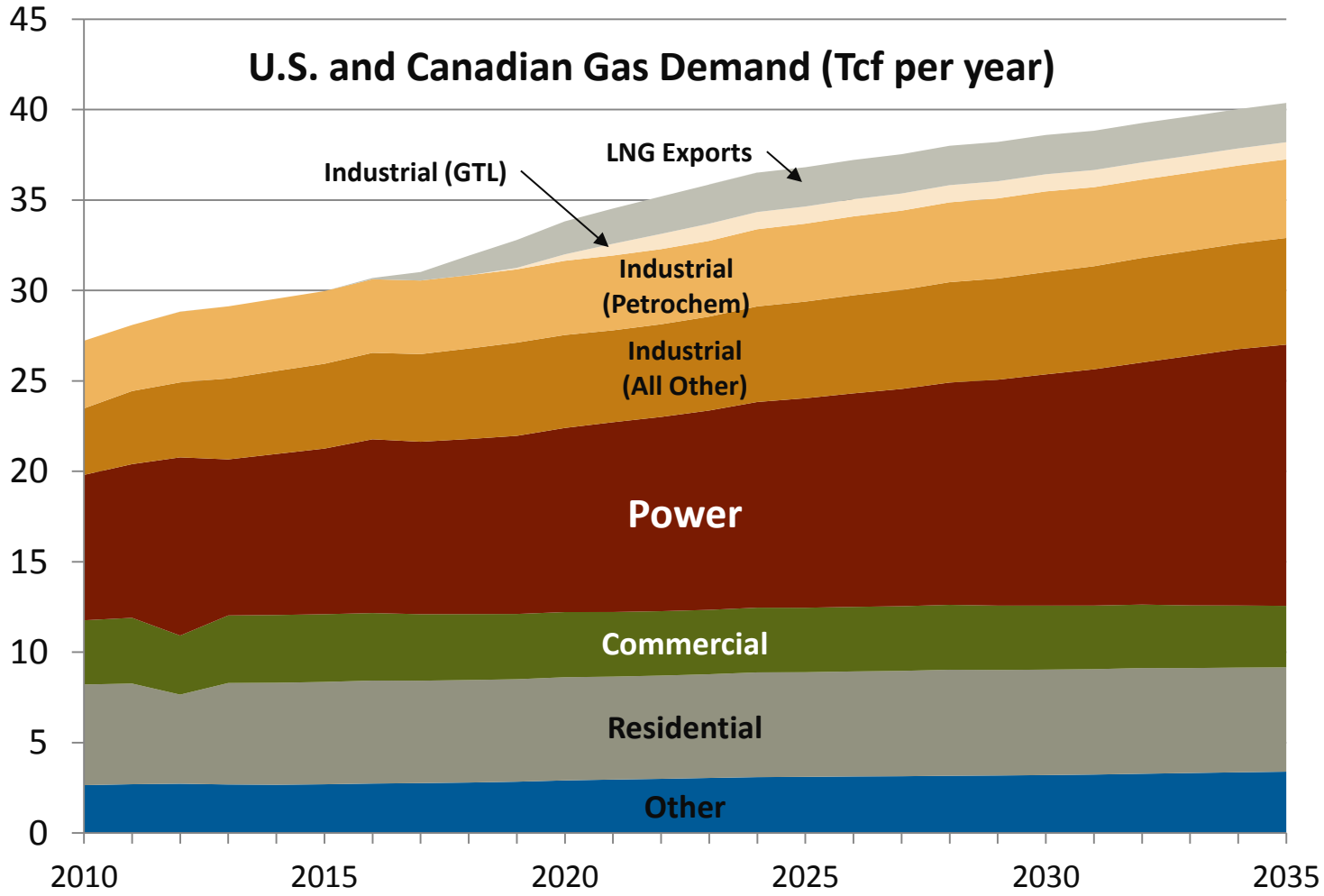
U.S. and Canadian Shale Gas Production (Average Bcfd)



So, Where is the Market?

- Gas market currently soft, with supply ahead of demand.
- Widely held expectation for growth in gas-fired generation.
  - Significant number of coal plants expected to retire.
  - Nuclear generation aging and experiencing problems.
  - Low gas prices make economics for renewables challenging.
- Petrochemical gas use improving due to abundant gas and liquid supplies.
- Gas use for vehicles economically attractive at wide gas-oil price spread, but there is still a "chicken and egg" issue.
  - GTLs look attractive, but with significant risk.
- LNG exports widely expected, but not without challenges.
- Mexican exports likely to continue to grow due to growth in gas-fired power generation.

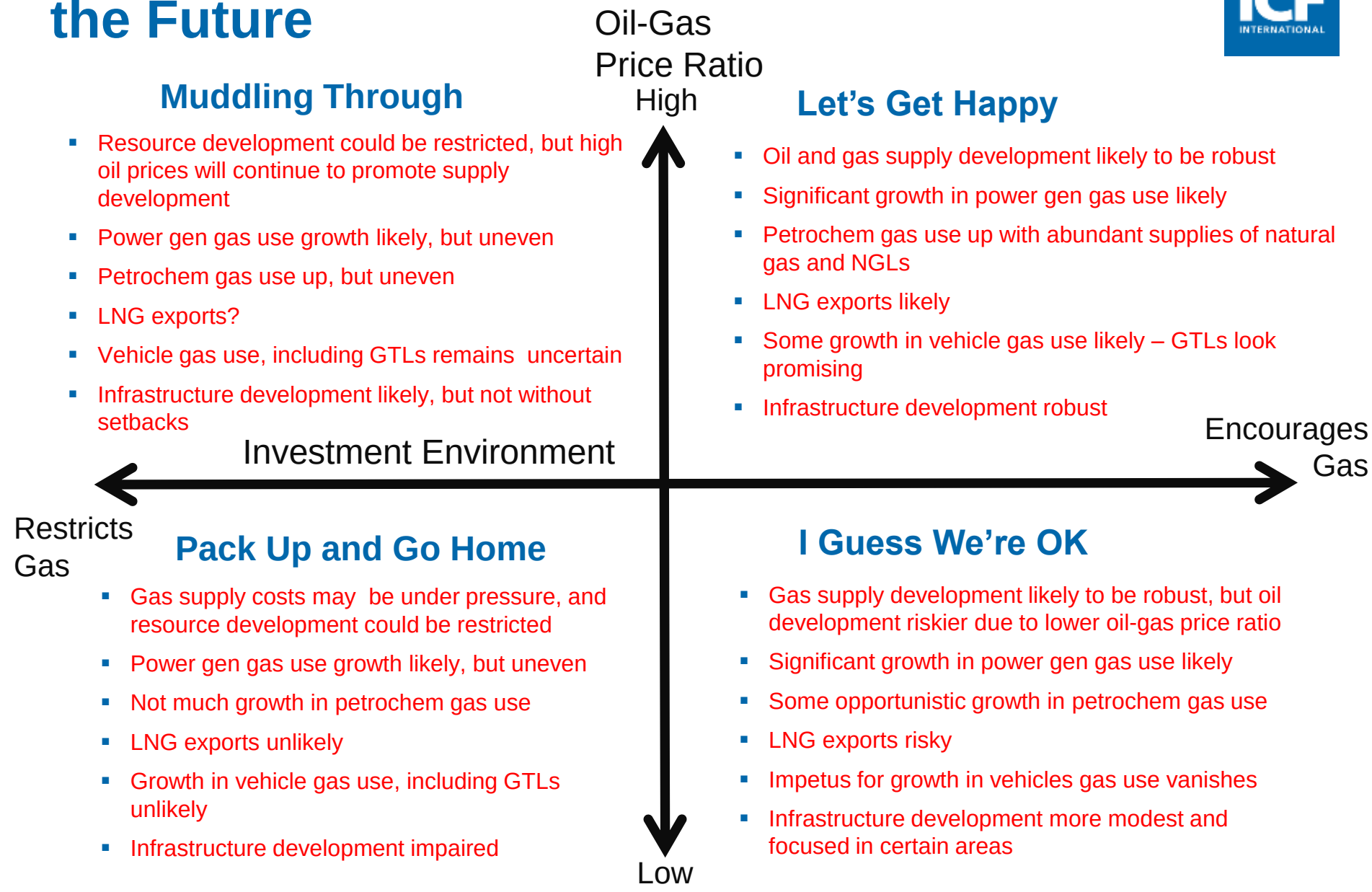
Market Growth is Likely in the Current Price Environment



Don’t Overlook the Need of New Midstream Infrastructure

- Natural Gas
  - Supply shifts will continue to pose challenges
  - Shorter haul transport needed to move gas away from growing supply areas
  - Flows on “traditional” pipeline corridors displaced by growth of new supplies
  - Opportunities to re-purpose gas pipelines with declining flows (line reversals and conversion to oil or NGL transport)
  - Replacement of aging coal fleet and electric load growth leads to growth in power sector gas demand and transport needs
  - LNG export terminals will need some new pipeline capability to make delivery of gas possible to the facilities
- Natural Gas Liquids
  - Much new processing capability needed, especially in liquids-rich areas like the Eagle Ford and portions of Marcellus/Utica
  - New transport lines needed to transport liquids to locations where they can be used or exported
  - New ethylene and propylene production facilities and incremental export capacity is needed – lack of markets for liquids could inhibit gas market growth
- Gathering Systems
  - New gas, oil, and NGL plays need extensive investment in gathering infrastructure
  - Producers likely to continue to divest midstream assets in challenging commodity price environment
- Petroleum
  - Significant new transport capability needed to debottleneck growing supplies
  - Refinery upgrades may be needed to accommodate new mix of crude supplies
  - Incremental exports of products could necessitate additional handling capability
- Alberta Oil Sands
  - Transport capacity need to move bitumen to U.S. and to BC coast for export
  - More gas use to process oil sands means incremental gas pipeline capacity is needed
  - Additional NGL pipeline is likely needed to move diluent to facilitate bitumen transport

There is Plenty of Uncertainty Regarding the Future



Muddling Through

- Resource development could be restricted, but high oil prices will continue to promote supply development
- Power gen gas use growth likely, but uneven
- Petrochem gas use up, but uneven
- LNG exports?
- Vehicle gas use, including GTLs remains uncertain
- Infrastructure development likely, but not without setbacks

Let's Get Happy

- Oil and gas supply development likely to be robust
- Significant growth in power gen gas use likely
- Petrochem gas use up with abundant supplies of natural gas and NGLs
- LNG exports likely
- Some growth in vehicle gas use likely – GTLs look promising
- Infrastructure development robust

Pack Up and Go Home

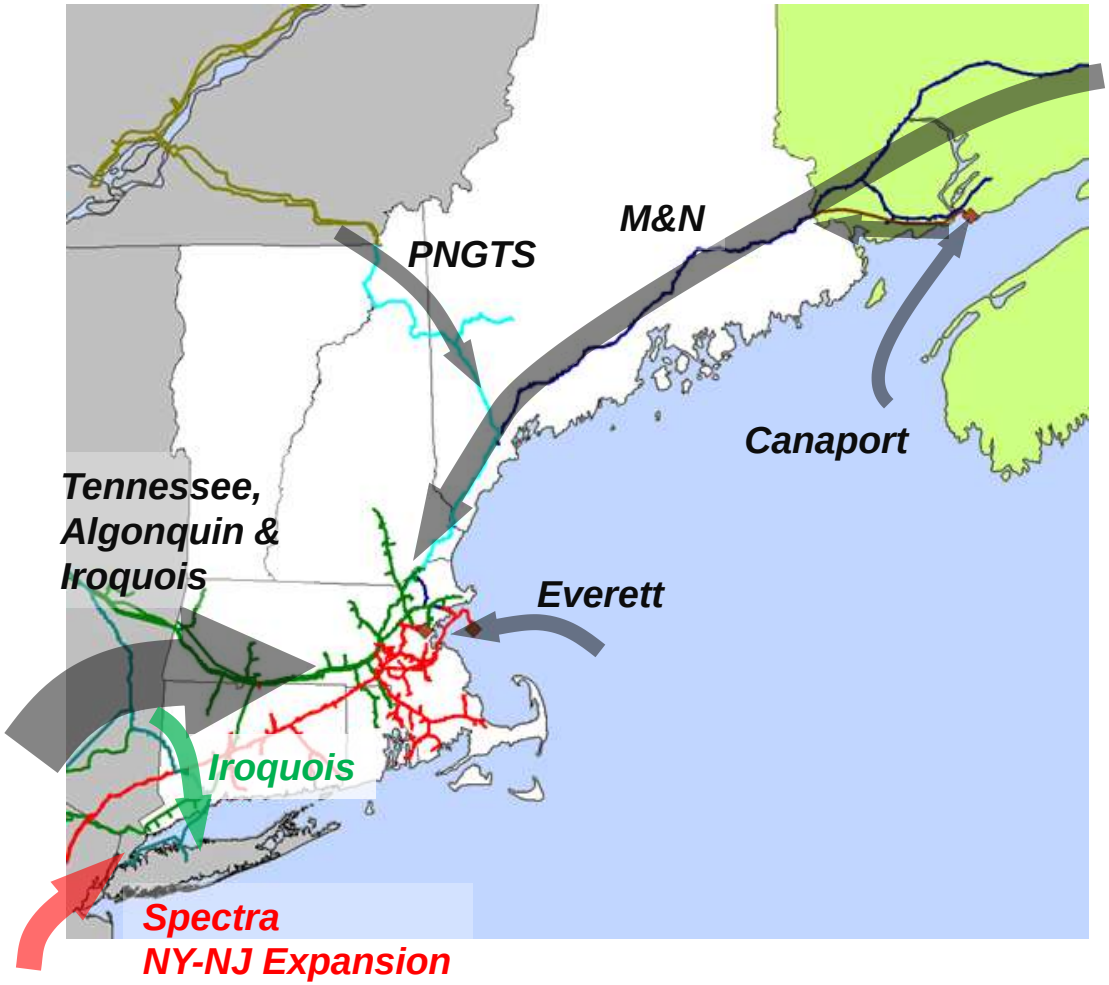
- Gas supply costs may be under pressure, and resource development could be restricted
- Power gen gas use growth likely, but uneven
- Not much growth in petrochem gas use
- LNG exports unlikely
- Growth in vehicle gas use, including GTLs unlikely
- Infrastructure development impaired

I Guess We're OK

- Gas supply development likely to be robust, but oil development riskier due to lower oil-gas price ratio
- Significant growth in power gen gas use likely
- Some opportunistic growth in petrochem gas use
- LNG exports risky
- Impetus for growth in vehicles gas use vanishes
- Infrastructure development more modest and focused in certain areas

Even though Prices are Likely to be Relatively Low Nationally, Regional Market Conditions are Important to Consider (take New England, as an Example)

- Growth in power sector gas use has led to noticeable constraints on peak winter days.
- LNG imports are the swing supply.
- Production from Deep Panuke and Spectra's NY expansion provide some indirect relief for New England, but the market is likely to tighten back up with future demand growth.




ICF
INTERNATIONAL