



Gas Supply and Demand in an Uncertain Environment

**U.S. and Canada Gas Market Overview
(Based on EEA/ICF January 2007 Base Case)**

**Presented at:
2007 EIA NEMS Conference
Varying Views on the Future of the Natural Gas Market
Washington, DC
March 28, 2007**

**Presented by:
Kevin R. Petak
Vice President, Gas Market Modeling
ICF International**

ICF International. Passion. Expertise. Results.



Disclaimer

This presentation represents the views of Energy and Environmental Analysis, Inc. (EEA), an ICF International Company. The presentation includes forward-looking statements and projections. EEA has made every reasonable effort to ensure that the information and assumptions on which these statements and projections are based are current, reasonable, and complete. However, a variety of factors could cause actual market results to differ materially from the projections, anticipated results or other expectations expressed in this presentation, including, but not limited to, general economic and weather conditions in geographic regions or markets that may generally affect natural gas markets.

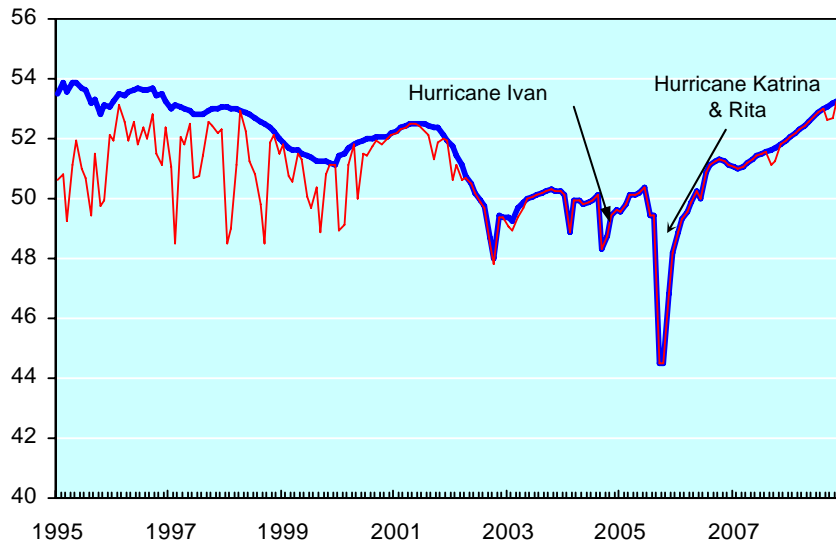
Contents

- The Changing Gas Balance
- Long-Term Outlook for U.S and Canada Gas Market
 - Key Assumptions
 - Gas Demand
 - Gas Supply
 - Gas Price
 - Price Volatility
 - Key Findings

Note: Unless otherwise referenced, all conclusions and results are based on EEA's gas market fundamentals analysis.

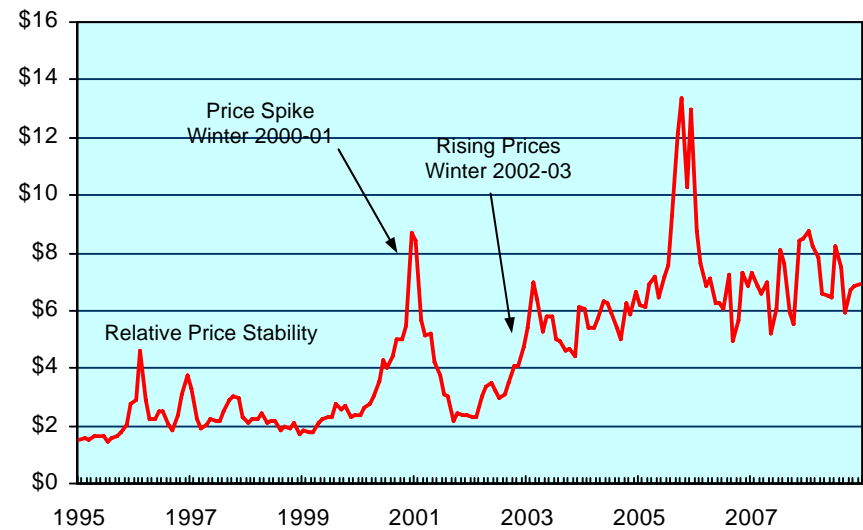
The Changing Gas Balance

Lower-48 Dry Gas Production Vs. Dry Gas Capacity (BCFD)



Source: Energy and Environmental Analysis, Inc.

Historical Gas Price at Henry Hub (\$ per MMBtu)



Source: Platts Gas Daily & Energy and Environmental Analysis, Inc.

Divergent trends in gas supply and demand have led to a tight balance between supply and demand, higher gas prices, and increased price volatility.

TIGHT BALANCE EXPECTED TO CONTINUE

ICF International. Passion. Expertise. Results.

Key Assumptions

- U.S. and Canadian economic growth of between 2.5% and 3% per year.
- Assumed oil prices of \$45 to \$50 per barrel, in real terms.

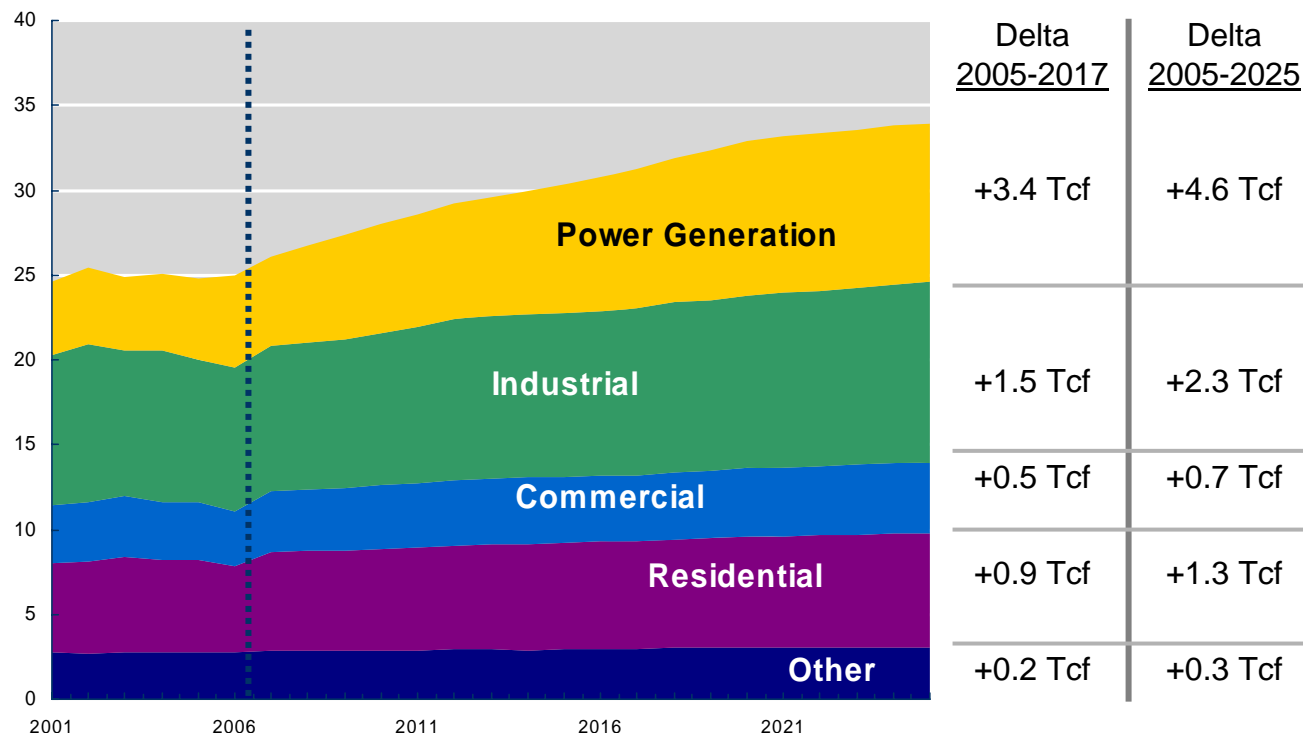
Gas Demand Outlook

The North American gas market may be best characterized as a “demand leads supply market” for the foreseeable future.

- Gas consumption in the power sector will grow substantially.
 - Over 200 GW’s of new gas-based generating capacity in the U.S. will be used to satisfy increasing electric load.
- Modest growth in R/C gas consumption.
- Industrial gas consumption will rise modestly
- When necessary, price-induced demand reductions will balance the market.

U.S. and Canada Gas Consumption

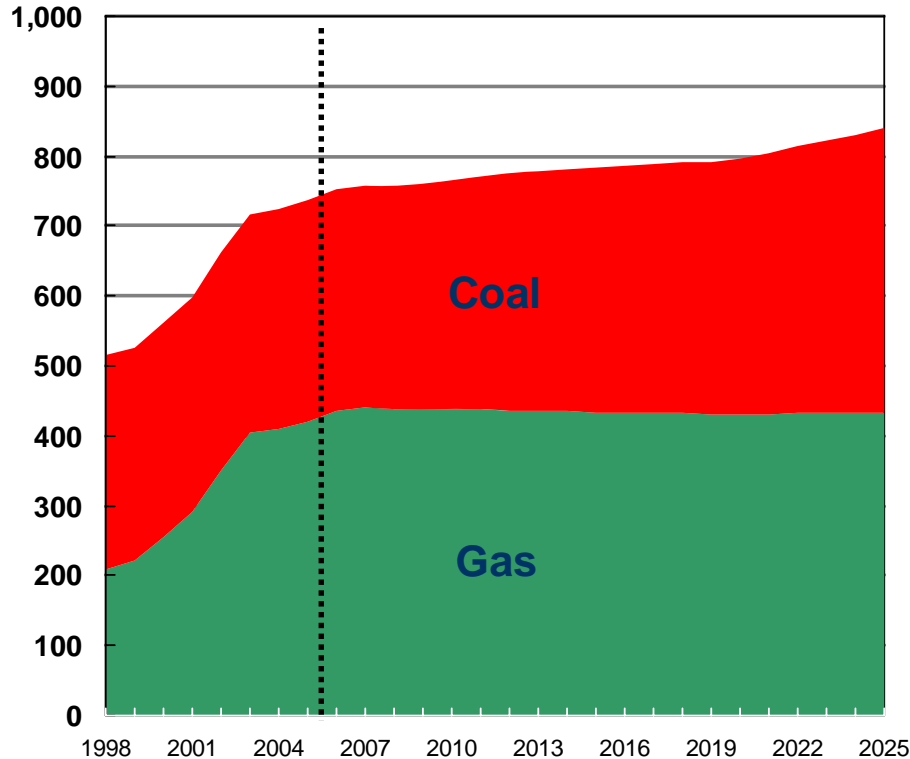
(Trillion Cubic Feet, Tcf)



ICF International. Passion. Expertise. Results.

U.S. Coal and Gas-Fired Capacity

Gas and Coal Capacity
(Gigawatts)



Sources: Historical data from EIA, Projection by Energy and Environmental Analysis, Inc.

- Over 200 GW of new gas-fired combined cycle and combustion turbine capacity has been added since 1997.
- The expansion pace has recently slowed and will continue at a slower rate, as existing capacity can meet most incremental electricity load growth during the next decade.
- Most of the future growth is in coal capacity.

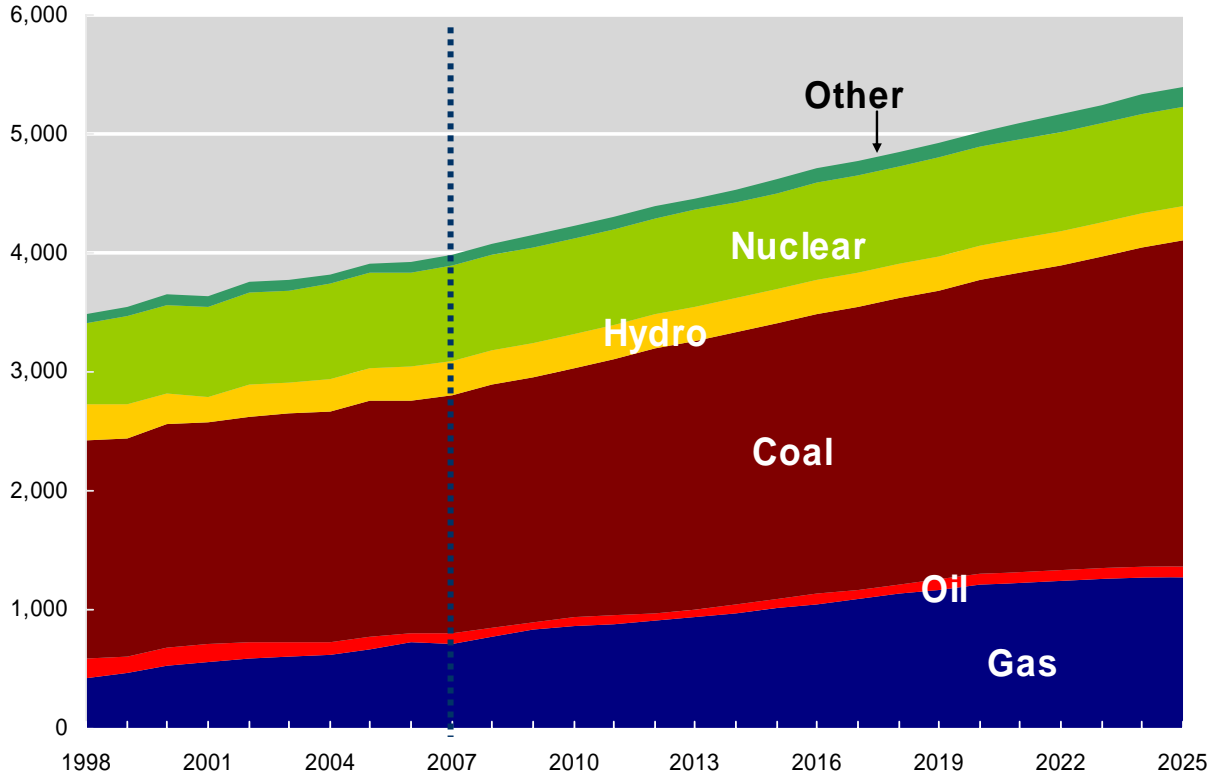
ICF International. Passion. Expertise. Results.

Gas-Based Generation

Powering The Future, Along with Coal ...

- Gas-based power generation will grow significantly.
- Penetration of gas-based generation will slow after 2017 as new coal units enter the market.

Power Generation (Billion kilowatthours)



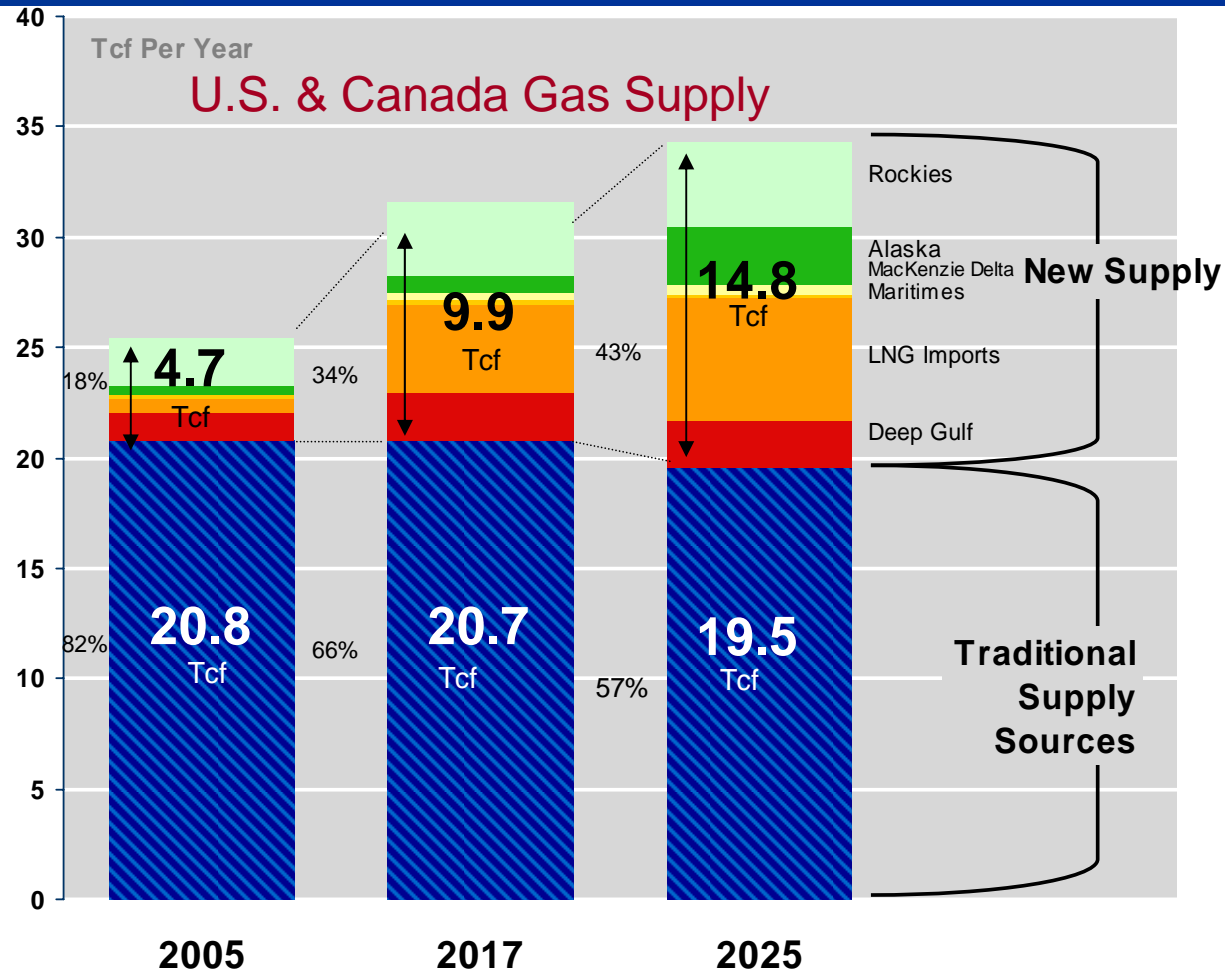
Gas Generation as Percent of U.S. Total Generation

2005: 15% 2017: 21% 2025: 22%

Natural Gas Supply

Relying On New Frontiers

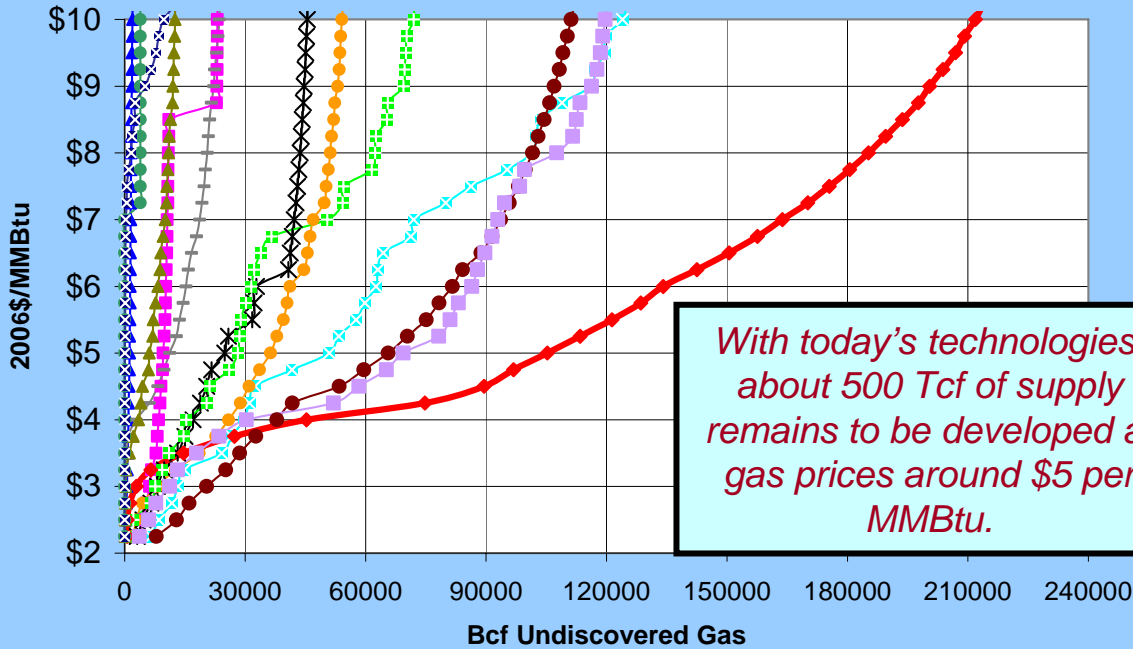
- Production from mature producing areas will decline slightly.
- New frontier supplies will account for 34% and 43% of total U.S. and Canada gas supply in 2017 and 2025, respectively, versus only 18% today.



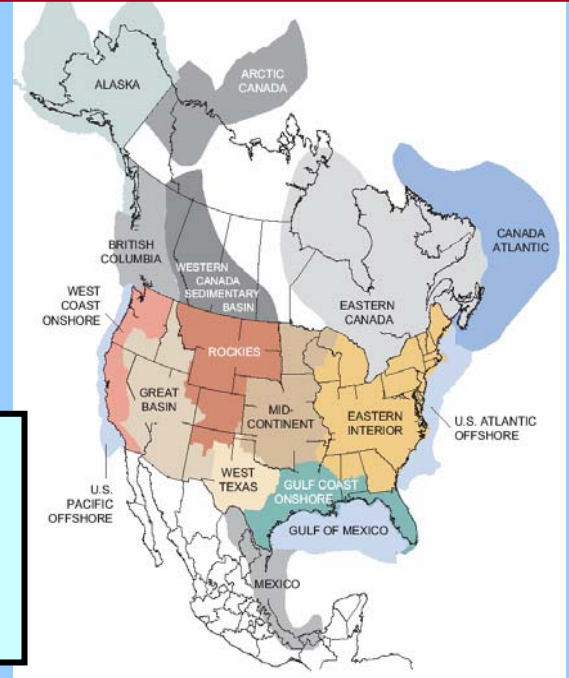
U.S. and Canada Gas Supply

*“Abundant...
But Potentially Costly”*

Regional Gas Supply Curves
Current Technology



*With today's technologies,
about 500 Tcf of supply
remains to be developed at
gas prices around \$5 per
MMBtu.*



*Curves very elastic
at \$4, yielding a
“floor” on gas
prices.*

- West Coast Onshore Gas Supply Curve
- Rockies Gas Supply Curve
- Gulf Coast Onshore Gas Supply Curve
- Eastern Interior Gas Supply Curve
- US Atlantic Offshore Gas Supply Curve
- WCSB Gas Supply Curve
- Eastern Canada Offshore Gas Supply Curve

- Great Basin Gas Supply Curve
- West Texas Gas Supply Curve
- Midcontinent Gas Supply Curve
- Gulf of Mexico Gas Supply Curve
- US Pacific Offshore Gas Supply Curve
- Eastern Canada Onshore Gas Supply Curve

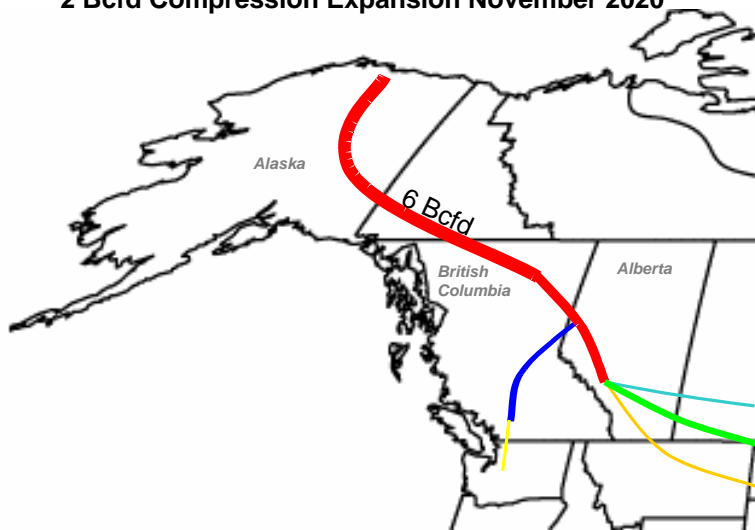
Alaska Gas and LNG Imports

Playing a Major Role

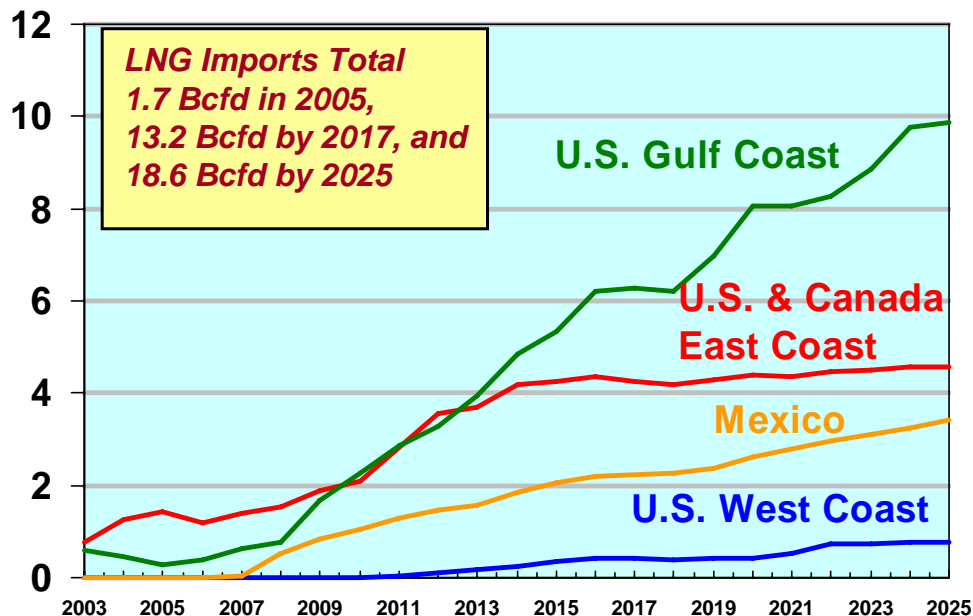
Alaska Gas Pipeline

4 Bcfd Pipeline Added November 2017

2 Bcfd Compression Expansion November 2020



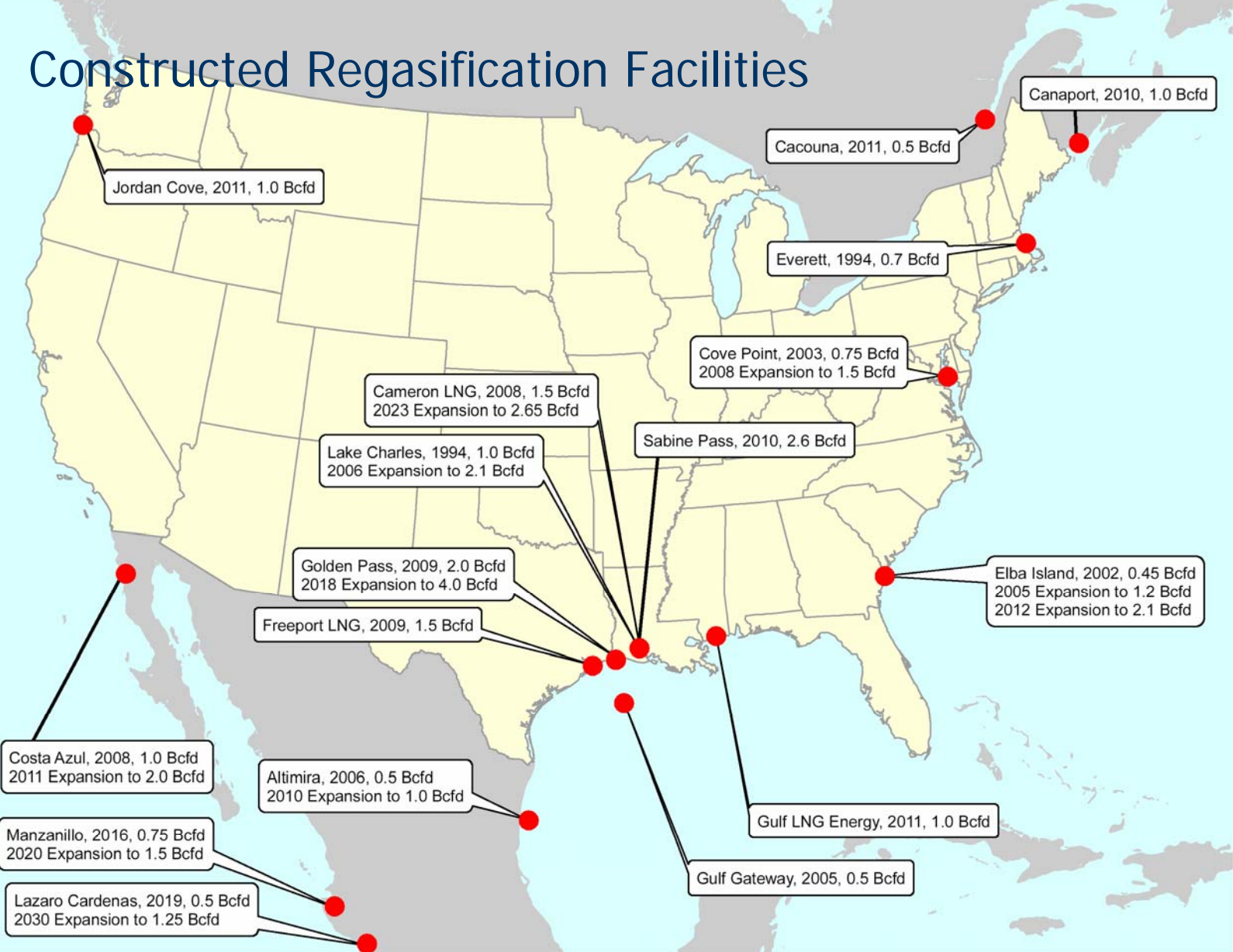
North American LNG Imports, Bcfd



LNG Imports and Alaska gas will provide over 20% of North America's total gas supply by 2025. There would be little growth in supply without these new sources of supply.

ICF International. Passion. Expertise. Results.

Constructed Regasification Facilities

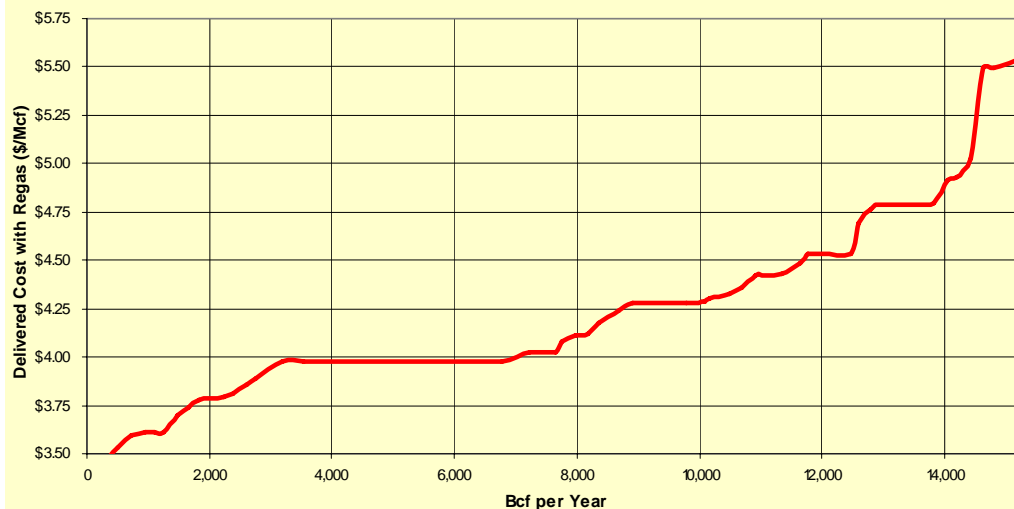


World LNG Supply

LNG Trains and Liquefaction Capability

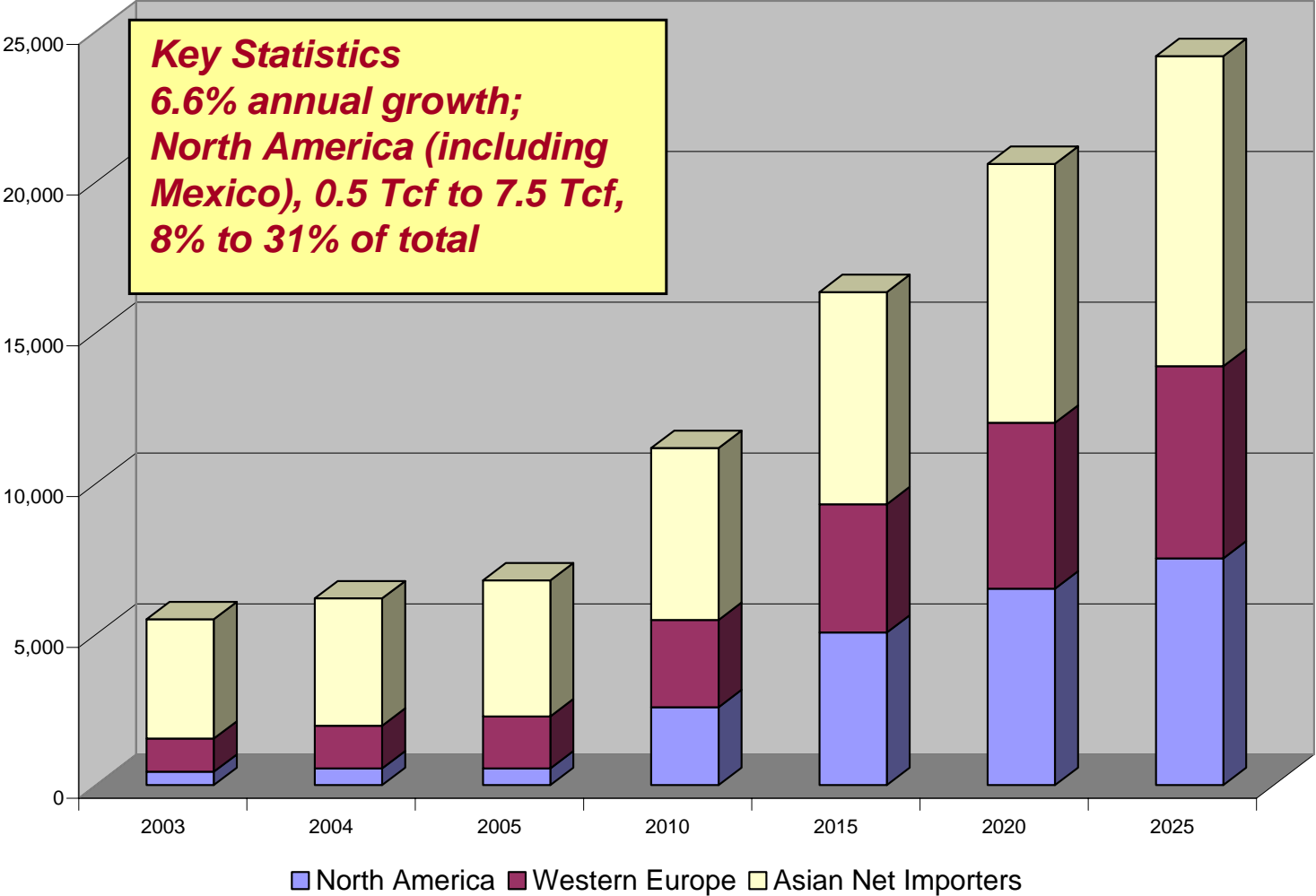
	Existing Capacity			Under Construction			Planned			Total Capacity		
	Trains	MMcfd	Bcf/year	Trains	MMcfd	Bcf/year	Trains	MMcfd	Bcf/year	Trains	MMcfd	Bcf/year
Africa	29	6,914	2,524	2	1,007	368	14	9,451	3,450	45	17,372	6,341
Middle East	13	5,571	2,034	3	2,725	995	16	10,128	3,697	32	18,424	6,725
Pacific Rim/Southeast Asia/Australia	27	10,264	3,747	4	2,027	740	14	7,290	2,661	45	19,581	7,147
Russia/Norway	0	0	0	3	1,853	676	5	3,786	1,382	8	5,638	2,058
Trinidad and Tobago	4	2,027	740	0	0	0	2	1,396	510	6	3,423	1,250
All Other	1	188	69	0	0	0	6	2,551	931	7	2,739	1,000
Total Capacity All Regions	74	24,964	9,112	12	7,612	2,778	57	34,601	12,629	143	67,177	24,520

Supply Curve for All Projects Currently Under Construction or Planned



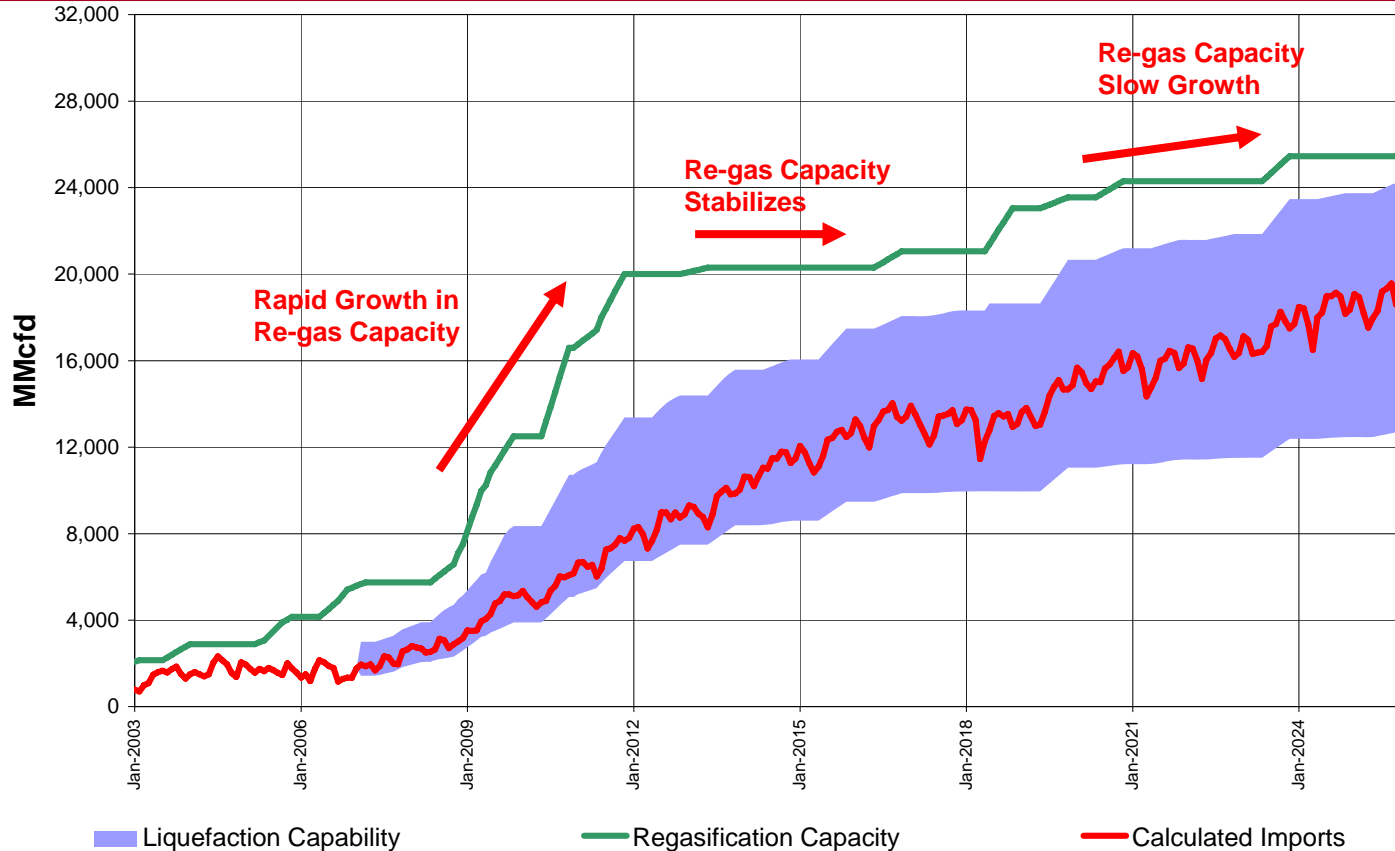
There are over 60 different liquefaction trains either under construction or planned, with total export capability of over 15 Tcf per year. All trains are economic at delivered gas prices under \$6 per MMBtu.

Projected LNG Imports, Bcf per year



Regasification Capacity Versus Liquefaction Capability

Regasification capacity is not the constraint on North American deliveries – liquefaction capability is!



ICF International. Passion. Expertise. Results.

Obstacles for Supply Development

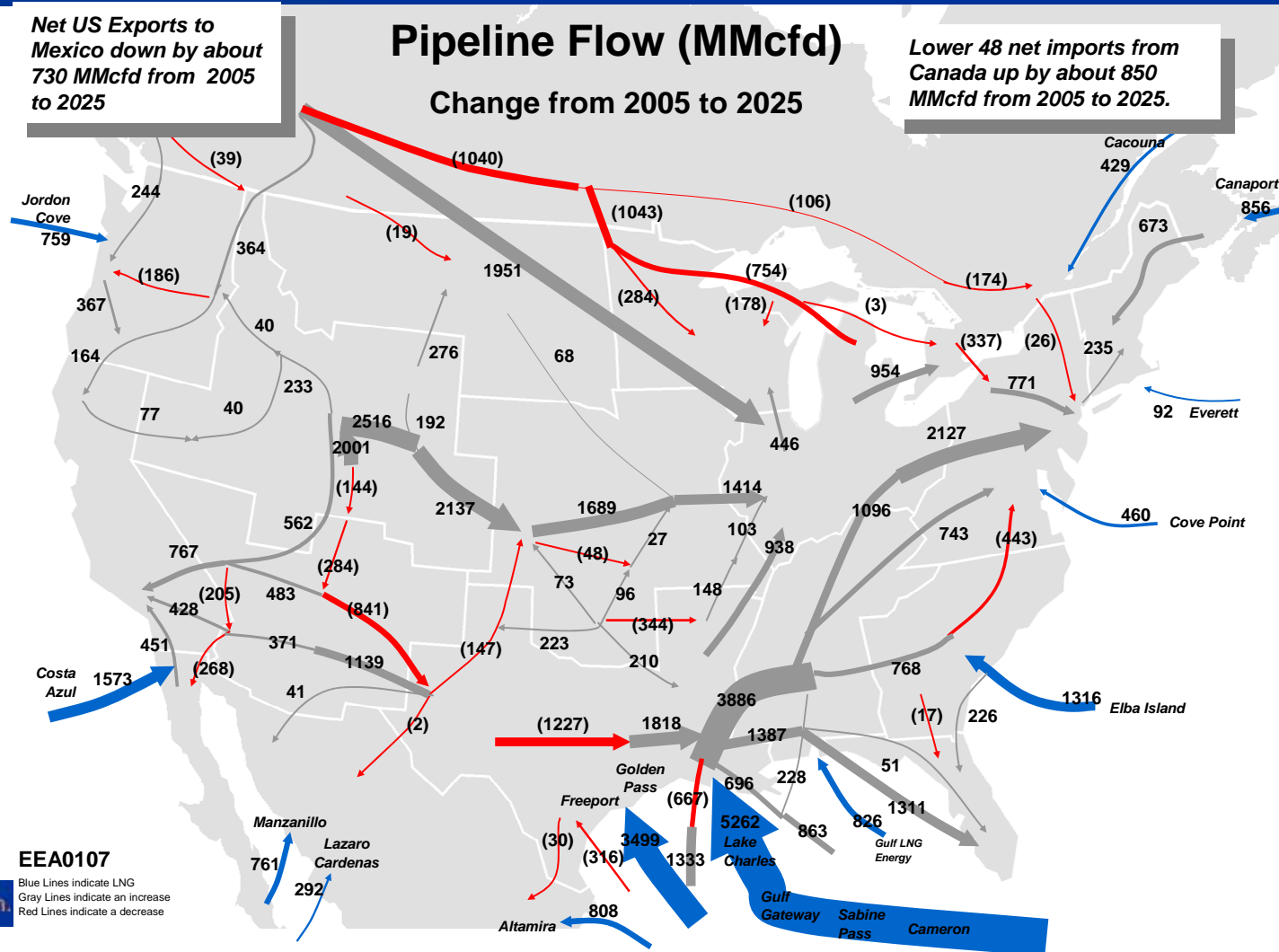
- Large Capital Requirements
- Investor Recognition of Opportunities
- Price Volatility Creates Uncertainty
- Uncertainty About Future Gas Demand
- Siting Issues
- Contracting Issues
- Political Uncertainties

There is much uncertainty about future gas supply development.

New Gas Supplies Affect Regional Flow Patterns

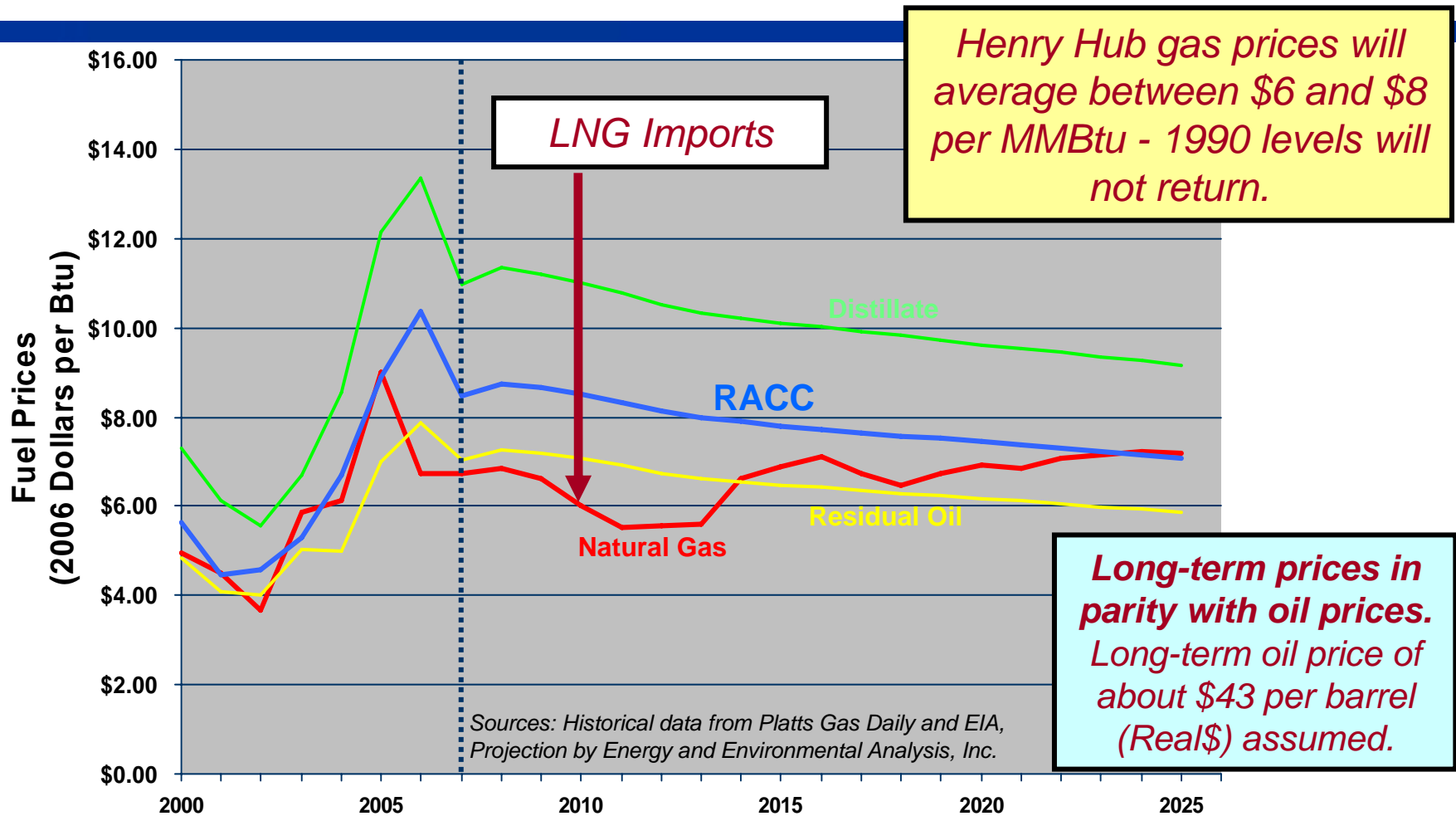
2005-2025

- Greatest increases in supply are from LNG Imports, the Rockies, and Texas production.
- Net exports from Western Canada are about 1 Bcfd greater with 7 Bcfd of Alaskan and Canadian Arctic gas development.
- Eastern Canada flow increase attributed to LNG imports.
- U.S and Canada LNG imports increase to over 15 Bcfd by 2025.
- Location of LNG terminals will affect flow patterns.



ICF International. Passion.

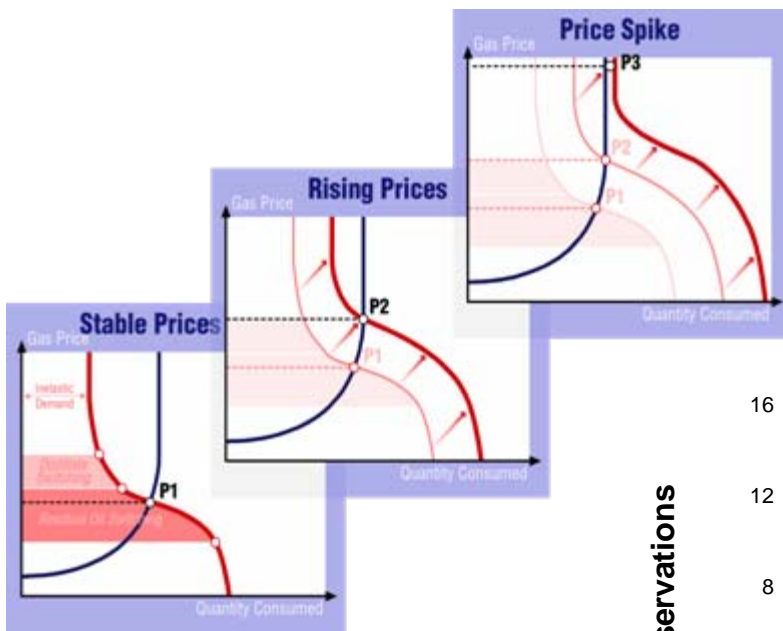
Projected Annual Average Henry Hub Gas Price



ICF International. Passion. Expertise. Results.

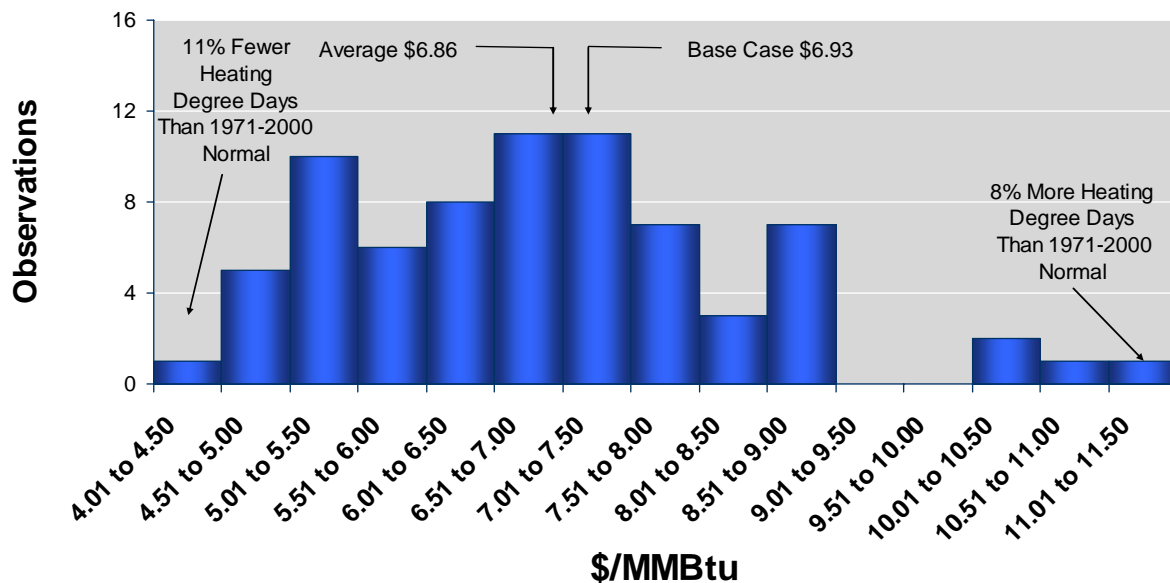
Gas Prices

Expect Significant Price Volatility



Changes in weather shift daily demand, causing wide swings in gas prices.

Henry Hub Price Distribution for Jan. 2007 – Dec. 2007



Significant price volatility creates uncertainties for buyers and sellers alike.

Key Findings

- Gas supply/demand balance will remain tight.
 - Gas consumption will grow, mostly as a result of growth in gas-based power generation.
 - Alaska gas and LNG imports will provide over 20 percent of North America's total gas supply by 2025.
 - Regasification capacity is not likely to constrain North American LNG imports – liquefaction capability will likely be the constraining factor.
 - Supply development is likely to face many obstacles.
- Henry Hub gas prices likely to average between \$6 and \$8 per MMBtu in real terms.
 - Oil prices are a driver.
 - High levels of gas price volatility likely to continue.
 - Weather alone can significantly swing gas prices.

Bottom Line: Supply can satisfy demand, but there are many uncertainties.



Energy and Environmental Analysis, Inc.

an ICF International Company



Gas Supply and Demand in an Uncertain Environment

**U.S. and Canada Gas Market Overview
(Based on EEA/ICF January 2007 Base Case)**

**Presented at:
2007 EIA NEMS Conference
Varying Views on the Future of the Natural Gas Market
Washington, DC
March 28, 2007**

**Presented by:
Kevin R. Petak
Vice President, Gas Market Modeling
ICF International**

ICF International. Passion. Expertise. Results.

