

It's Happening Again: Market Psychology vs. Natural Gas Fundamentals

Robert S. Linden

25th Annual USAEE/IAEE North American Conference

September 19, 2005

Denver, Colorado

Today's topics

Preamble

Then

Now

Tomorrow

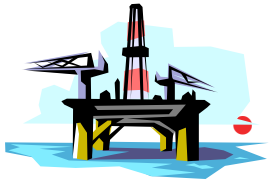
Welcome, Hurricane Katrina (not)!

At last year's annual meeting in Washington, I opened my presentation with the following statement:

Heresy for this morning:

The pervasive belief among observers and participants in North American gas markets today that we have tripped over a major discontinuity in natural gas resource availability and price is, at best, overstated.

That '70s Show was about more than adolescent angst and aspiration



- **1970:** U.S. oil production peaks, begins steady decline



- **1973:** U.S. natural gas production peaks, begins steady decline; Arab oil embargo



- **1974:** OPEC oil price increases, doubling U.S. gasoline prices



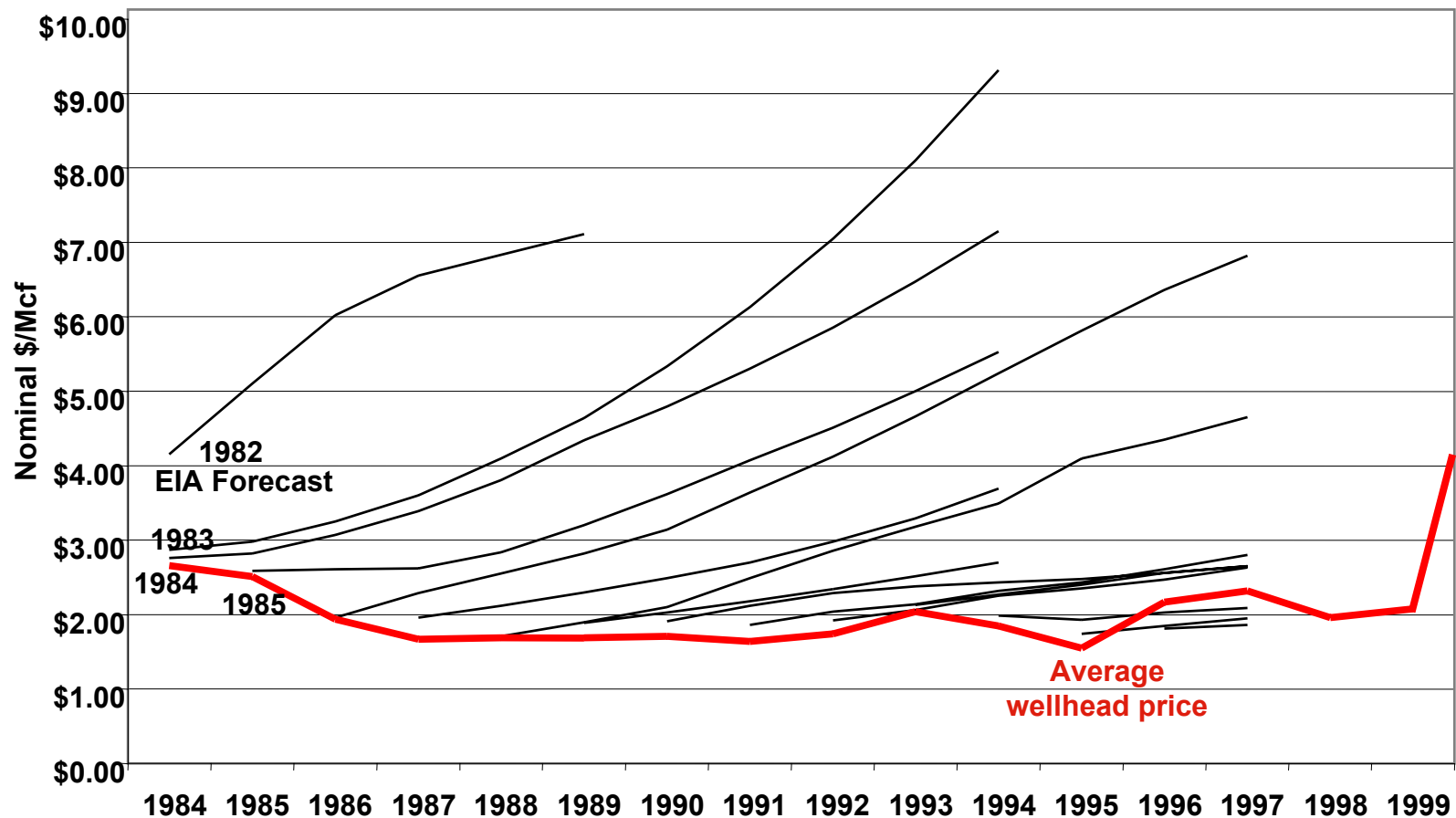
- **Winter 1975-76:** Schools and factories in the Northeast are closed due to inadequate natural gas supplies

- **1979-80:** Iranian revolution, second Arab oil embargo, MEOW



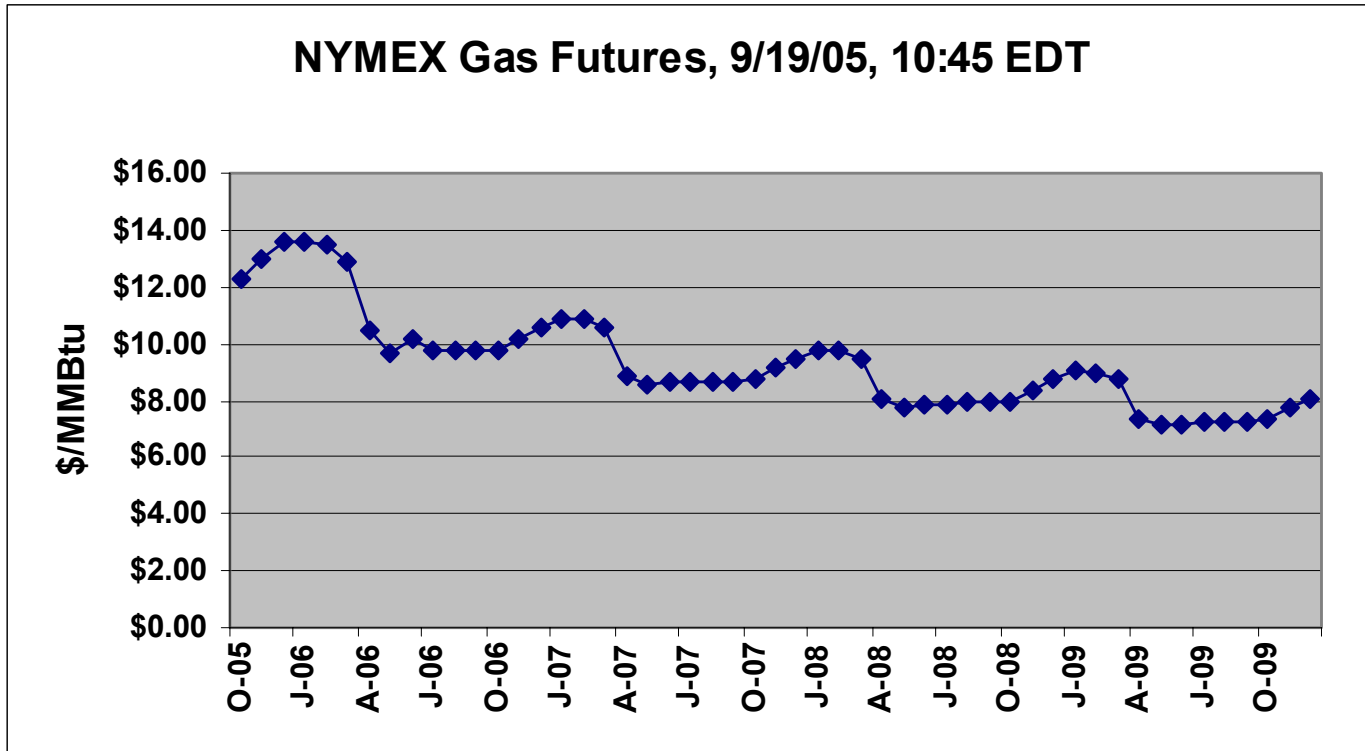
We didn't get over it for at least another decade

The EIA, along with most institutional forecasters, couldn't get over the deeply-ingrained belief that gas prices would resume their inexorable rise once we got by the "gas bubble" and back to the increasing cost of producing a dwindling natural resource.



...which brings us to now

Are there any similarities in the larger scheme of things?



On top of all the bullish sentiment, Katrina

Katrina caps a long string of anxiety-building events both in the market and the public at large. The general perception of a society losing control of its own destiny may be the most lasting factor.

9/16/05 Statistics (source: MMS):

- **56% of GOM oil production remains shut-in (1/3 due to onshore problems)**
- **34% of GOM gas production remains shut-in (onshore problem not disclosed)**
- **Cumulative lost production: 4% (22.2 MMbbl) of annual GOM oil production, 3% (106 Bcf) of annual GOM gas production**
- **Forty-six mostly low-producing structures were destroyed. Some of these were single-well caissons.**
- **Twenty producing structures had extensive damage.**
- **Four drilling rigs were destroyed. One was a jack-up rig. The other three were platform rigs.**
- **Nine drilling rigs have extensive damage. Four of these are from broken anchor patterns.**
- **Six rigs are adrift, but they have been located and remanned, and they are currently being repowered.**

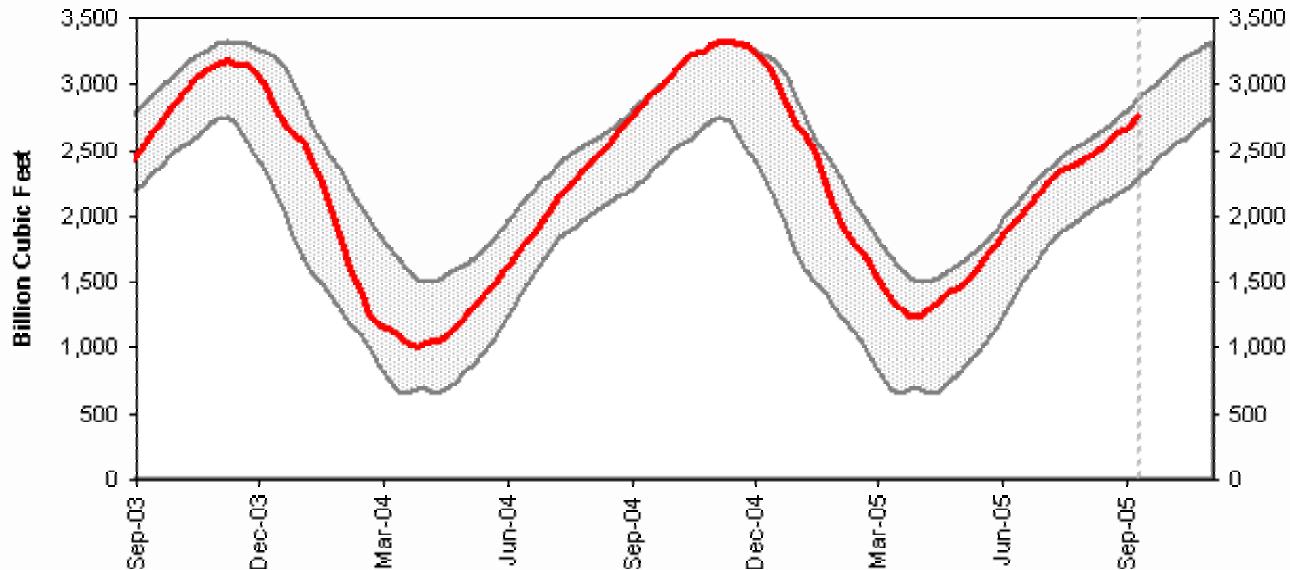
Meanwhile, it appears supply and demand are in balance, despite Katrina...

NORTH AMERICAN WEEKLY GAS STORAGE
(Billion Cubic Feet)

Region	Sep. 9 Week	Sep. 2 Week	Weekly Change	Year Ago	Yr. Ago Change	5-year Average	5-year Change
US							
East	1601	1543	58	1644	-43	1571	30
West	390	381	9	372	18	350	40
Producing	767	745	22	844	-77	739	28
Total Lower 48	2758	2669	89	2860	-102	2660	98
Canada							
East	211	204	7	258	-47	—	—
West	235	228	7	208	26	—	—
Total Canada	446	432	14	466	-20	—	—
Total North American	3204	3101	103	3326	-122	—	—

Sources: Energy Information Administration; Canadian Enerdata

NATURAL GAS WEEK • September 19, 2005



...and current netbacks at US terminals are certainly favorable

LNG NETBACKS TO US & EUROPEAN TERMINALS

September 2005

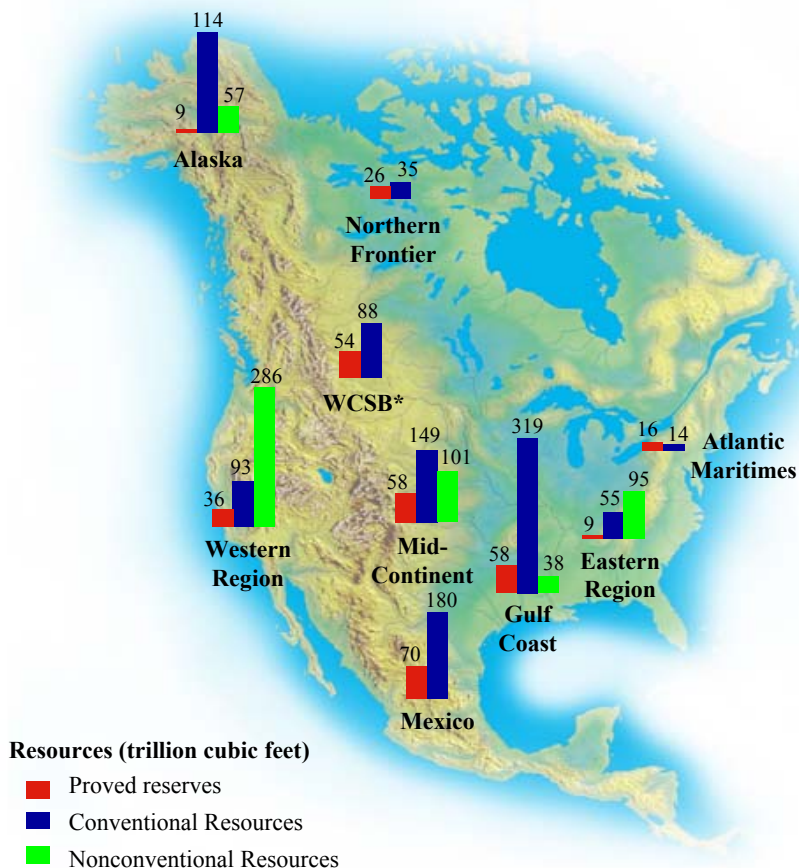
US\$/MMBtu

	Trinidad	Algeria	Qatar	Nigeria	Oman
US					
Lake Charles	7.78	7.51	6.83	7.36	6.93
Elba Island	8.72	8.51	7.82	8.32	7.91
Cove Point	8.72	8.55	7.85	8.36	7.95
Everett	8.58	8.46	7.77	8.25	7.87
EUROPE					
Belgium/Zeebrugge	5.32	5.51	4.86	5.23	4.95
Spain/Huelva	6.99	7.37	6.50	6.93	6.61

Source: World Gas Intelligence. Base price used in calculating US netbacks is three-day average of front-month Nymex Henry Hub closing price. Location adjustments based on Natural Gas Week spot price assessments for Trunkline West Louisiana (Lake Charles); Transco Zone 6-Non-NY (Cove Point); Transco Zone 5 (Elba Island); and Boston City Gate (Everett). Regas charged as 10% of base price in US. Zeebrugge includes regas charge of 1 eurocent/cubic meter applied to base price, calculated as first or second month IFE price for the UK National Balancing Point, adjusted for historic differentials. Spanish prices are based on ex-ship price estimates.

North American gas resources did not disappear

North American Natural Gas Resource Estimates by Supply Region



Cheap and abundant gas reserves are getting harder to find. However, there remain plenty of recoverable reserves to be developed and produced if the price is right.

- The regional estimates at left indicate 293 Tcf of proven reserves and about 2,000 Tcf of technically recoverable resources
- Recent updates of technically recoverable reserves for the U.S. Rocky Mountain states alone range from 225 to 383 Tcf (below)
- Last week's release of the PGC's 2005 update reported a 2.4 Tcf/2% decline in US reserves net of 38 Tcf of production

Assessment Agency	Technically Recoverable Resources	Proved Reserves	Additional Technically Recoverable Resources		
			New Fields/ Reserve Growth	Tight Gas/ Shales	Coalbed Natural Gas
PGC (2002)**	288	50	175	N/A	63
NPC (1999)*	382	36	155	137	54
EIA (2003)	383	50	52	225	56
USGS (2002)**	226	43	13	127	43

* Assumes advanced technology as of year 2010; coalbed natural gas resources include low Btu gas resources.
 ** Combines tight gas, gas shales, and conventional gas.
 *** Includes only five gas basins in the Rocky Mountain States (Paradox-San Juan, Uinta-Piceance, Greater Green River, Powder River, and Montana Thrust Belt).

Source: U.S. Department of Energy Office of Fossil Energy, Rocky Mountain States Natural Gas, September 2003.



Even these numbers could be conservative

We hear of unconventional gas resources, but there are conventional targets previously beyond our grasp due to technological constraints and the resulting risk/reward balance.

- Deep (>15,000 ft) and abiogenic gas

WoodMac: Ultra-Deep Shelf Gulf Gas Play Potentially World-Class

The Gulf of Mexico's ultra-deep shelf gas play has world-class potential in terms of prospect sizes and profitability, but it is still in the very early phases of being tested, research and consulting firm Wood Mackenzie concludes in an upcoming study.

WoodMac says prospects probably range from 500 Bcf to 4 Tcf and may average 1 Tcf (about 170 MMboe), although industry talk suggests prospects as large as 8 Tcf may have been mapped.

If the play pans out and results in discoveries of 4 Tcf, their profitability would likely exceed giant deepwater oil finds such

The play's potential has been recognized by the industry's heavy hitters. Exxon Mobil, BP, Royal Dutch/Shell and ChevronTexaco are all seeking a piece of the action.

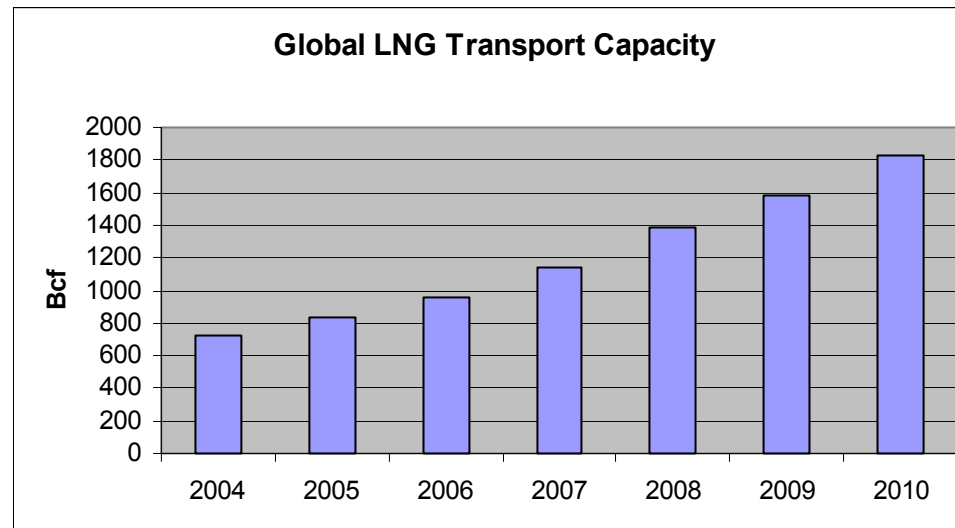
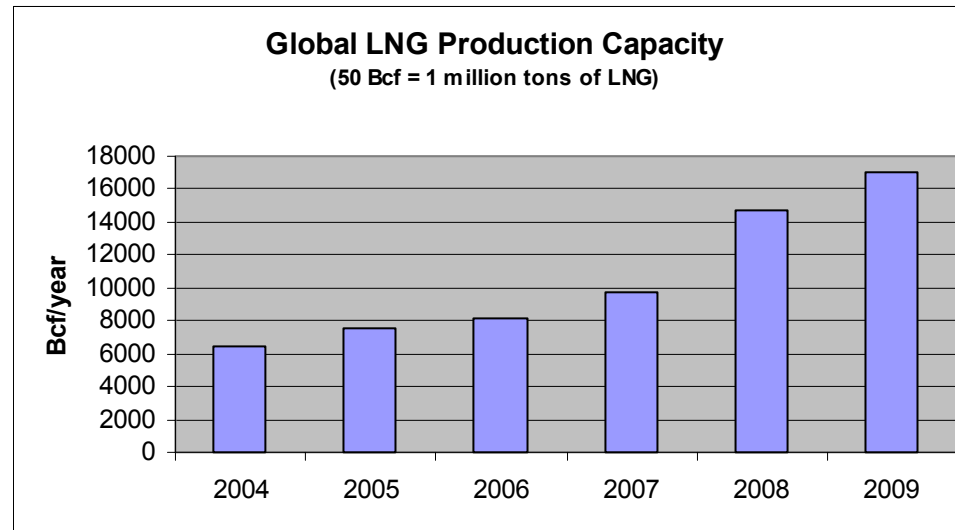
NATURAL GAS WEEK • April 11, 2005

Even these numbers could be conservative, cont.

- Methane hydrates - by far the largest undeveloped natural gas resources
 - **Estimated global/US P3 remaining technically recoverable reserves = 20,000/2300 Tcf**
 - **Estimated global/US methane hydrate resource = 700,000/112,000 Tcf**
 - **Most promising methane hydrate prospect: Blake Ridge, 250 mi. east of Charleston, SC**
 - **6500-16,000 ft. water depth, 310 mi. long, 30-35 mi. wide**
 - **Total gas content ~2000 Tcf, 34% free gas, 66% hydrated gas**

***Technology is the critical disruptive factor
in any long-term projection of resource availability***

Meanwhile, LNG production and transportation capacity is building rapidly...



...and the gridlock on new North American terminal construction is finally easing

Current North American LNG import capacity of 3.7 Bcf/d (~6% of average daily US consumption) is starved for adequate supply due to tight offshore production capability. With the huge increase in production capacity now in the pipeline and regulatory leadership by the FERC, new capital has just begun flowing into new and expanded import facilities, with more to come.

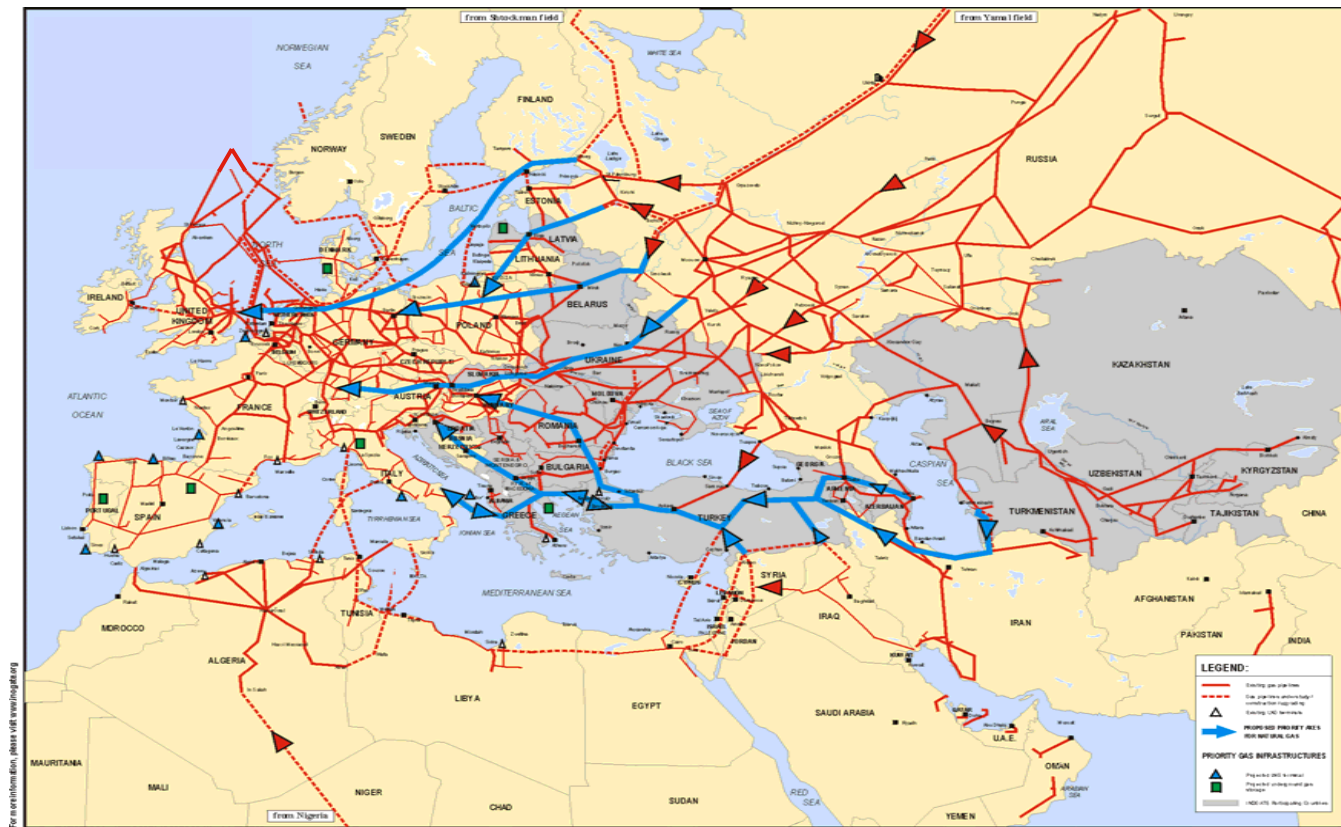
Facilities Under Construction	US Market Access Point	New Capacity	Estimated Completion Date
Elba Island Expansion	Savannah, GA	0.54 Bcf/d	2006-07
Lake Charles Expansion	LA Gulf Coast	1.1 Bcf/d	2005-06
Energy Bridge	LA Gulf Coast	0.5 Bcf/d	2005
Freeport	TX Gulf Coast	1.5 Bcf/d	2008-09
Sabine Pass	LA Gulf Coast	2.6 Bcf/d	2008-09
Altamira	Displaced US exports	0.7 Bcf/d	2006
Energia Costa Azul	Southern CA	1.0 Bcf/d	2008
	TOTAL:	7.74 Bcf/d	

...but will Europe have “first dibs”?

Gas-hungry European markets face a different set of options and associated costs.

Blessings: proximate and diverse resource alternatives and existing delivery systems

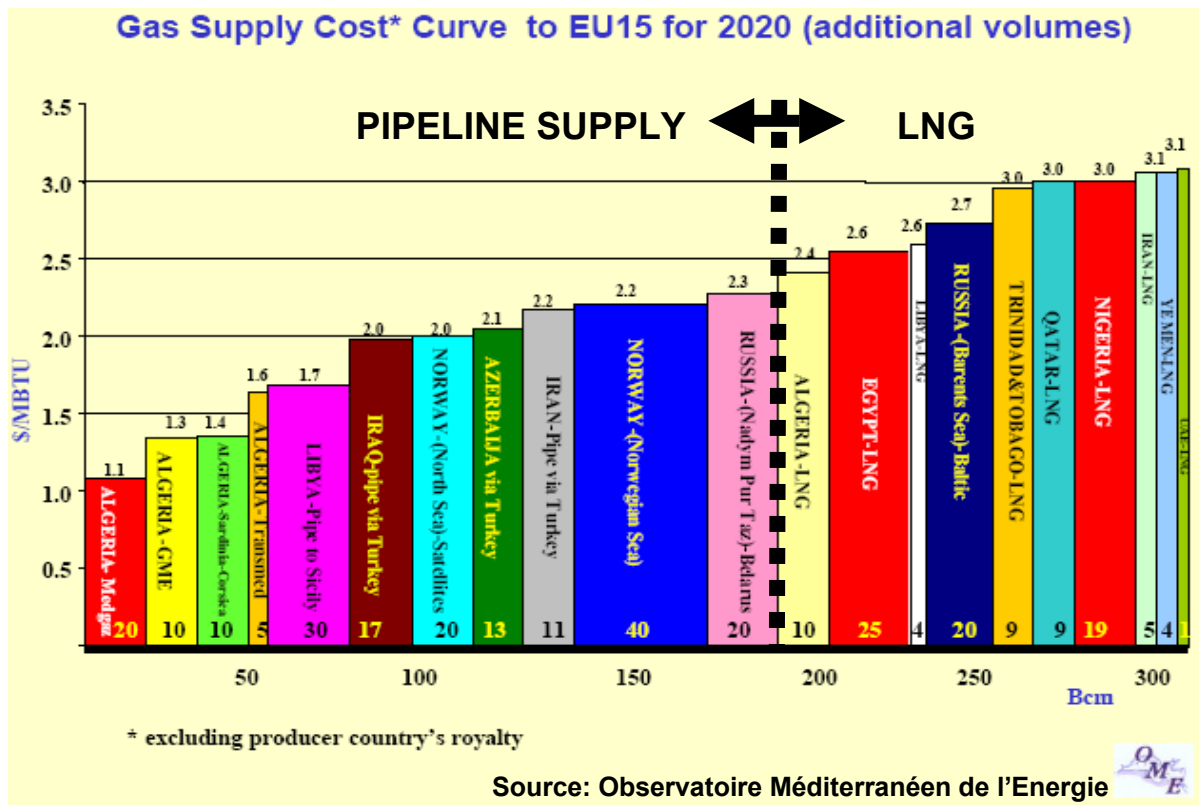
Curses: history, memory and political instability



This publication is produced with the assistance of the European Union. The contents of this publication are the sole responsibility of the contractor, EIRI/HILL/CSP/PL and can in no way be taken to reflect the views of the European Union.

European gas markets: future features

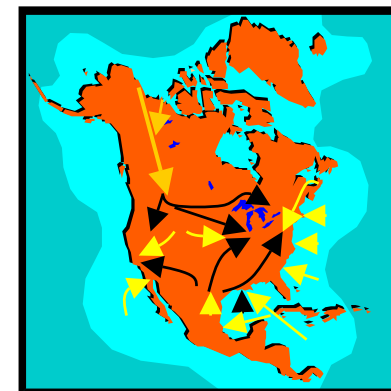
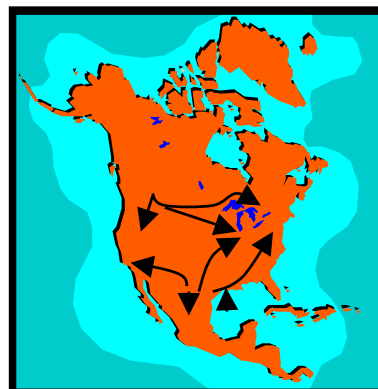
- Incremental Norwegian, Russian pipeline supply
- The Turkish Gas Hub
- North African LNG in southern Europe
- Supplemental LNG into UK, northern Europe for supply risk diversification and load-tracking flexibility
- EU 15 indigenous gas supply response?



The ongoing shift in North American gas supply

Although the North American gas crisis is overstated and self-correcting through normal price-motivated industry mobilization, some things have changed.

- We have left the world of \$2.00 gas – adequate reserve replacement will require:
 - deeper wells
 - more remote drilling objectives
 - supplemental LNG resources
 - new pipeline and storage infrastructure
 - more cost per unit for new flowing supplies



\$3.50–\$4.00/MMBtu should elicit an adequate and sustained supply response, but the market will need to recognize the pace and magnitude of the secular change now underway for these prices to be realized.

So one of these days....

Every price increase builds pressure for a price collapse once the underlying sources of anxiety and perceived opportunity are sufficiently challenged by new and contradictory information and expectations.

- **Such contradictory information will become increasingly frequent in 2006 and beyond**
- **By 2008, with US LNG terminals running near capacity and new Rocky Mountain and Gulf of Mexico production coming on-stream, the evidence should be impossible to ignore.**
- **However, should the general aura of pessimism about the future of the planet and US society prevail, denial could add 1-3 years to market recognition that the gas supply problem, for the time being, has been solved**