

# **Natural Gas Costs Update:** ***Facts and Opinion— Connecting Some Dots***

**RESNET Conference**

**March 1, 2004  
Steve Andrews**

ONE POSSIBLE REASON  
WHY THINGS  
AREN'T GOING  
ACCORDING  
TO PLAN



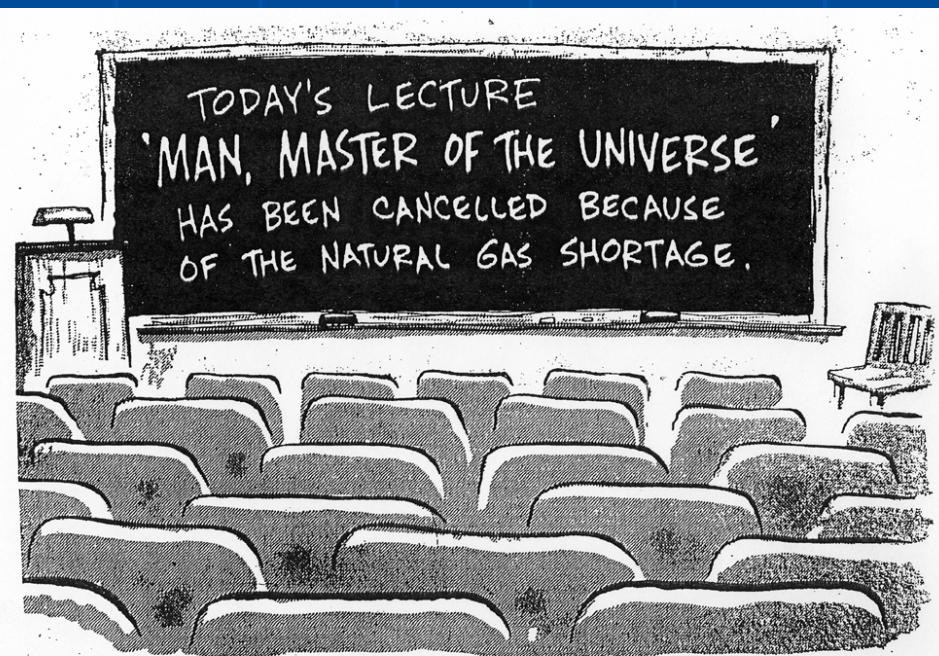
IS THAT  
THERE NEVER  
WAS A PLAN.

FOY-SHOTS NO. 571

*Ashleigh  
Brilliant*



The political season and  
the world of energy...

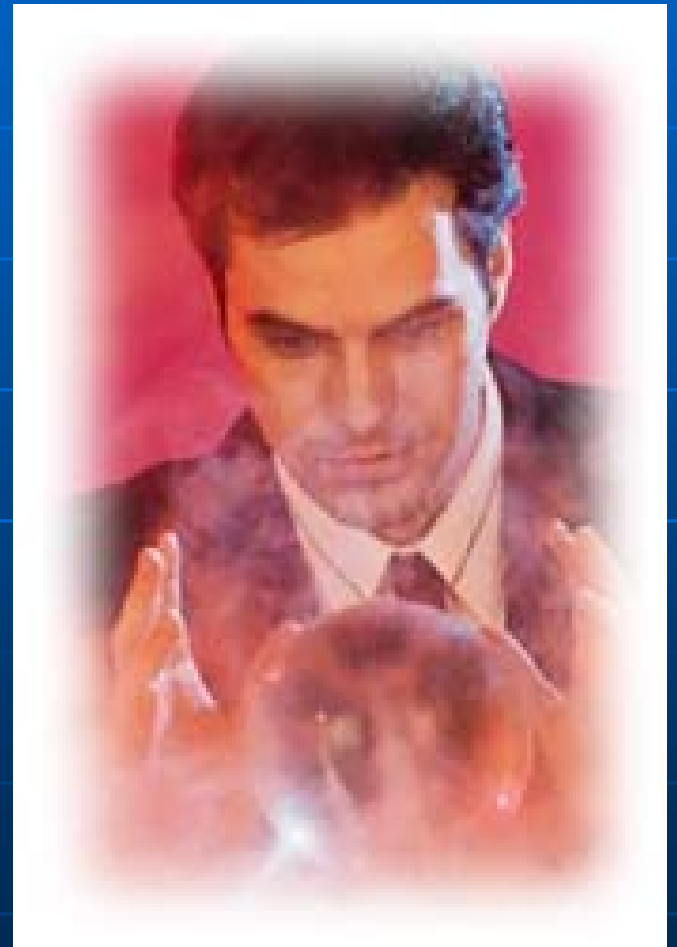


# Overview

- Price: The Vision Thing
- Demand
  - Who uses it, for what
- Supply
  - Trends, including The Cavalry
- An imbalance that leads to a bind
- Vision wrap

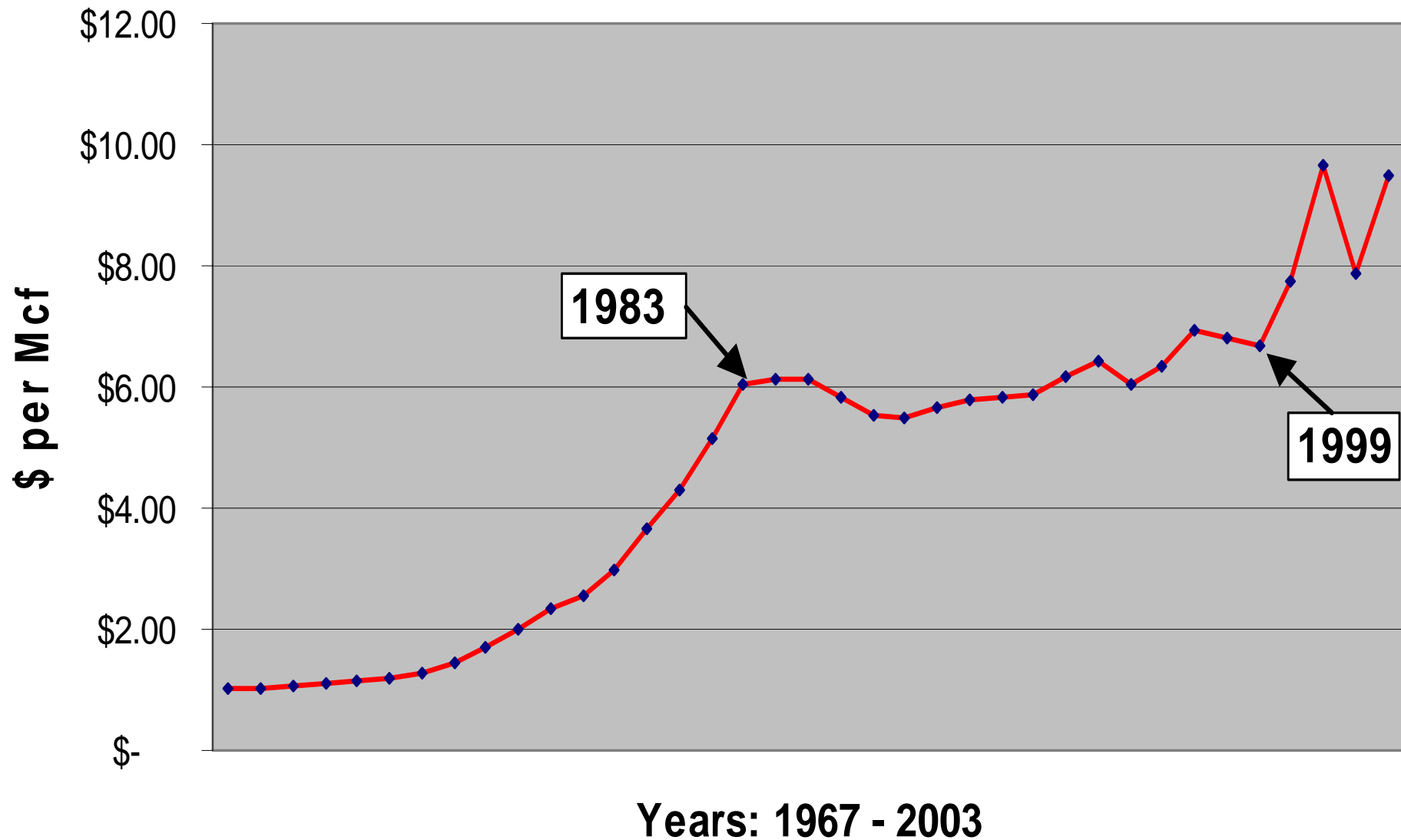
# Cloudy Vision

- President GHWB
- "Some reporters say I don't have any vision."
- "I don't see that..."
- Your call as to who of the following has clear vs. cloudy vision...



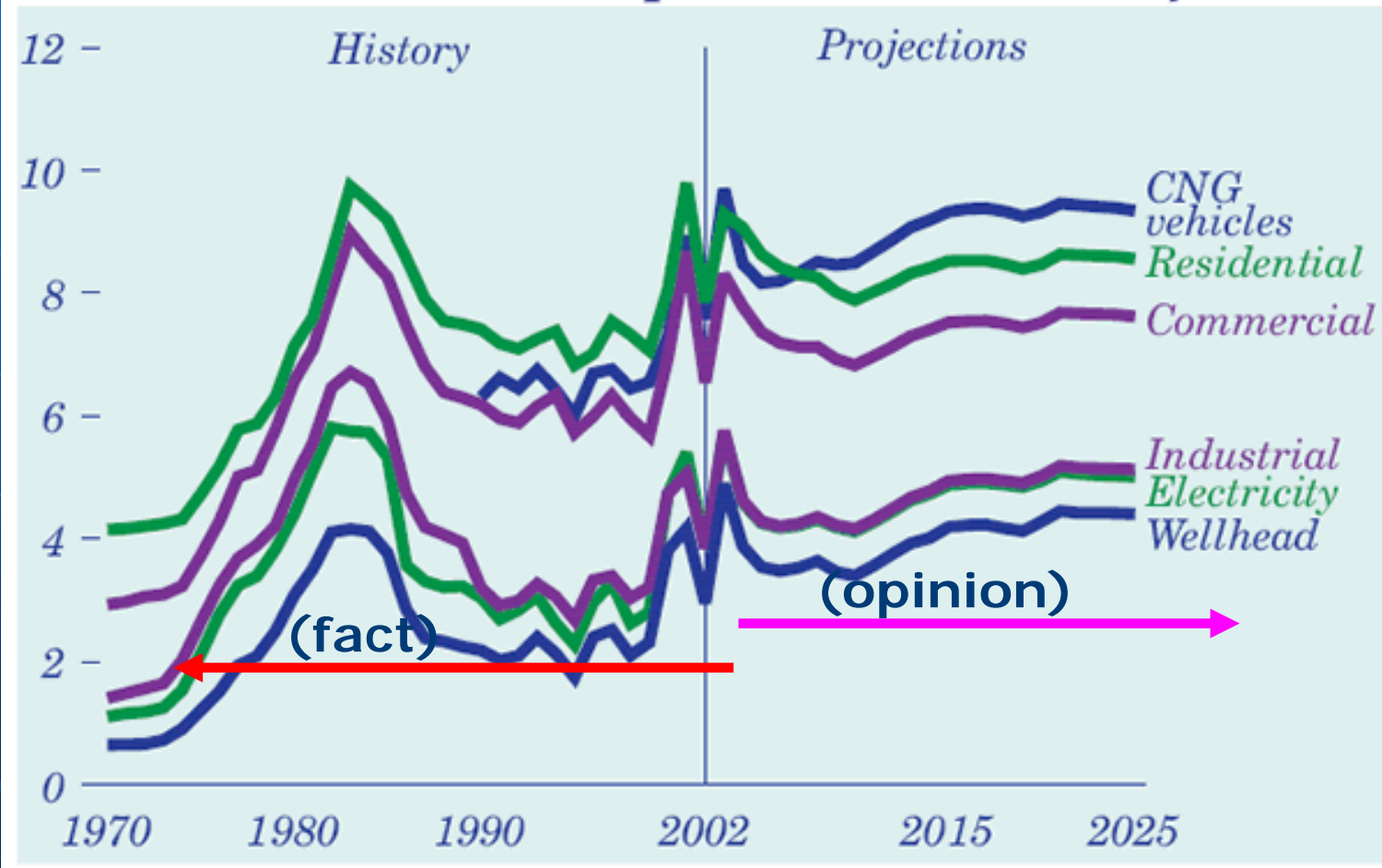


# US Price for Residential Natural Gas



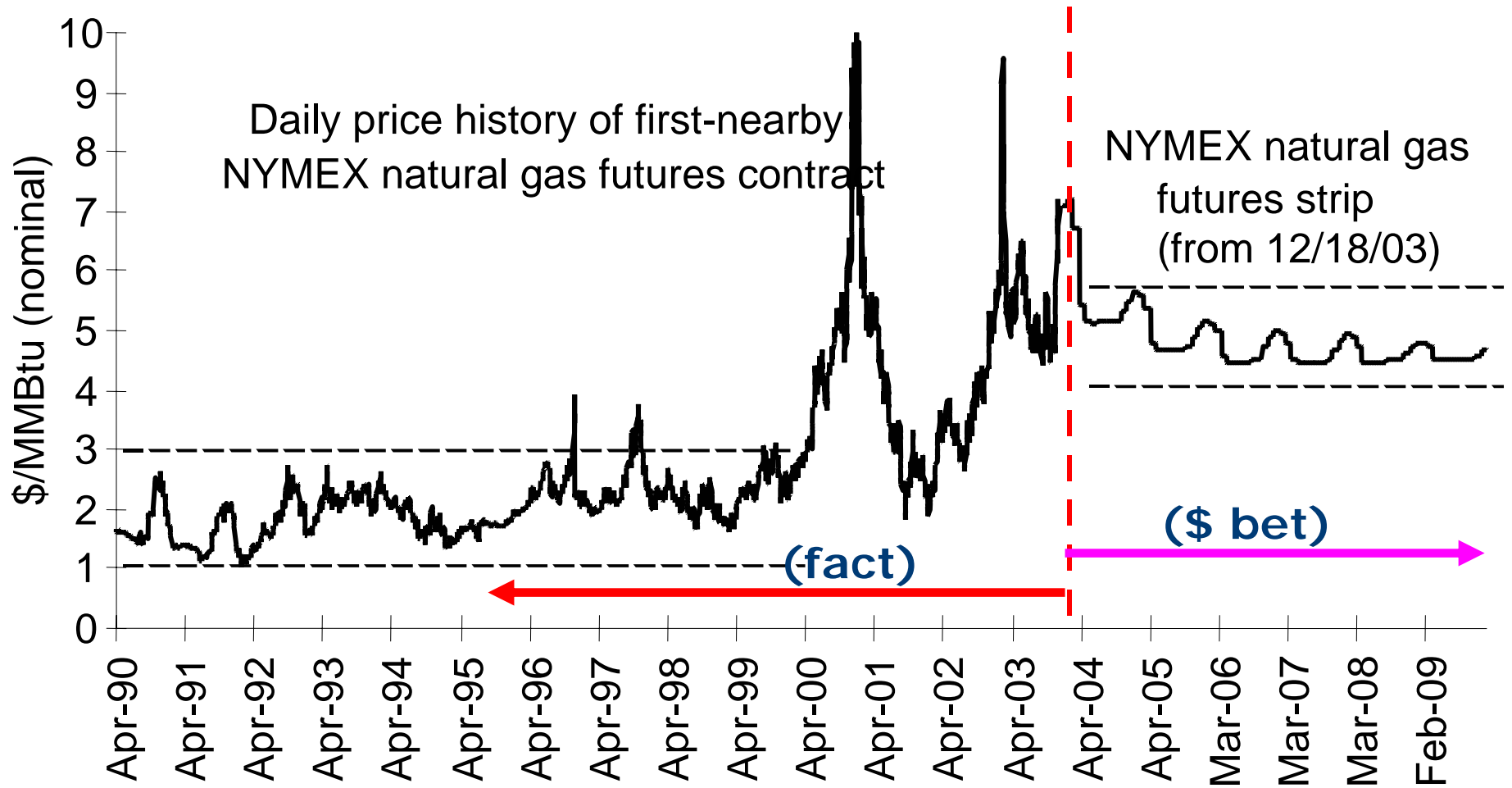
# Lucky us: prices to decline for 7 years

*Figure 86. Natural gas prices by end-use sector, 1970-2025 (2002 dollars per thousand cubic feet)*



Source: US EIA, 2004 Annual Energy Overview

# NYMEX Natural Gas Futures Market: 1990 - 2009



Source: NYMEX, LBNL

# Prices: Driving Forces

## DEMAND SIDE

- *Weather roulette*
- New gas-fired power plants
- Economic growth
- Demand destruction (outsourcing)
- Investment in efficiency

## SUPPLY SIDE

- Amt/depth of drilling
  - Bigger tools; smaller and deeper pools
- Crew/rig availability
- Access to land
- LNG
- New Arctic pipelines
- Fuzzy math...

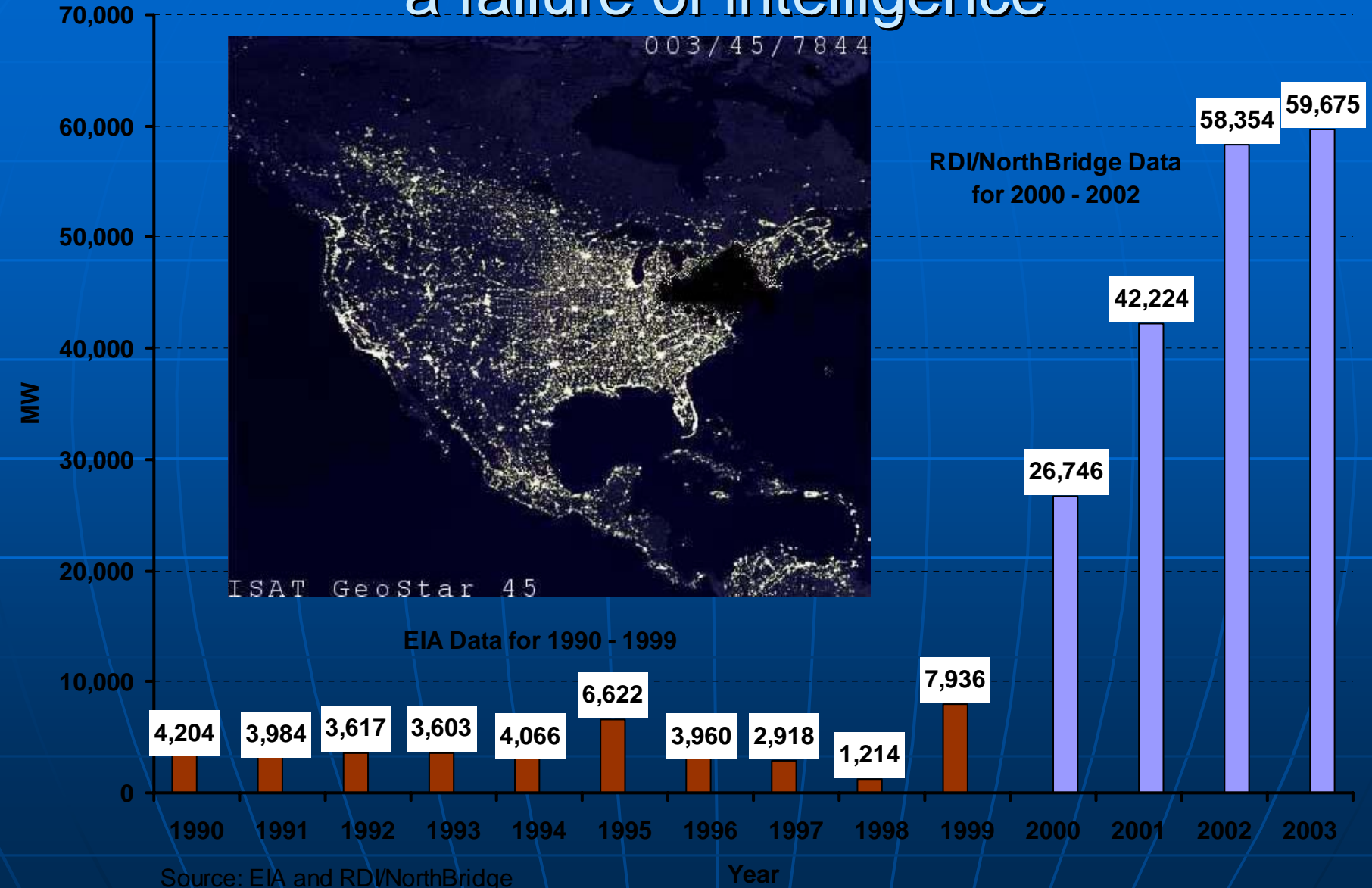


# *Weather roulette*

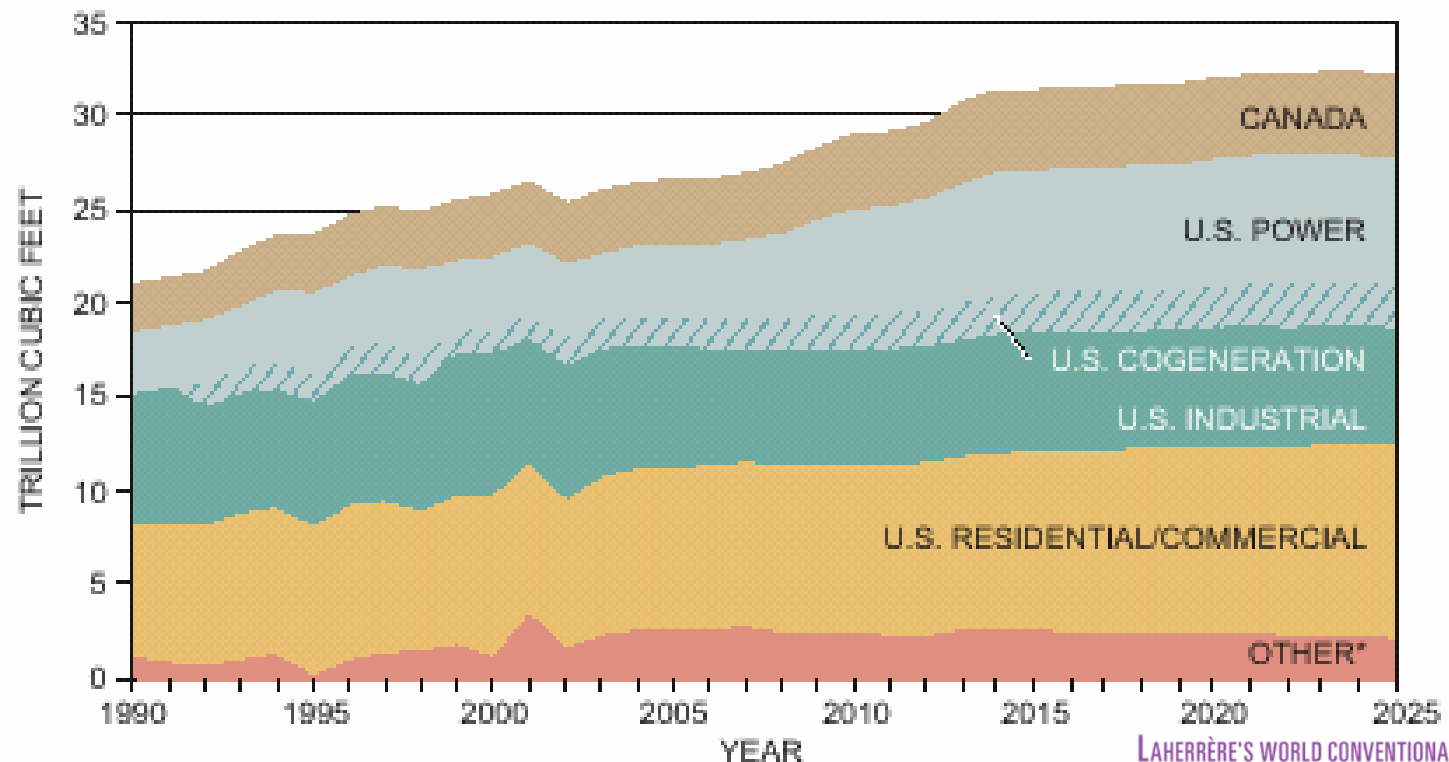
- Cold winters
- Hot summers
- Hurricanes



# New Capacity Added -1990-2002: a failure of intelligence



# NPC assumes some growth and demand destruction



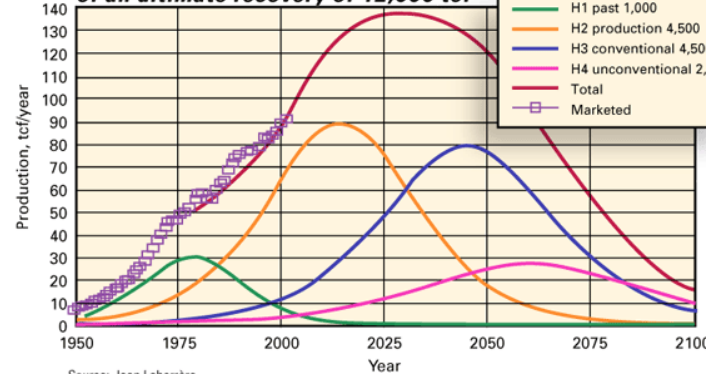
\*Includes net Mexico exports, lease/plant/pipeline fuel, and net storage.

- Natural gas demand for power generation increases, reflecting future utilization and additions of natural gas-fired generation.
- Natural gas use in the industrial sector erodes, illustrating projected losses in income in the most gas-intensive industries.

FIGURE 1  
U.S. AND CANADIAN NATURAL GAS DEMAND

## LAHERRÈRE'S WORLD CONVENTIONAL GAS PRODUCTION PEAK

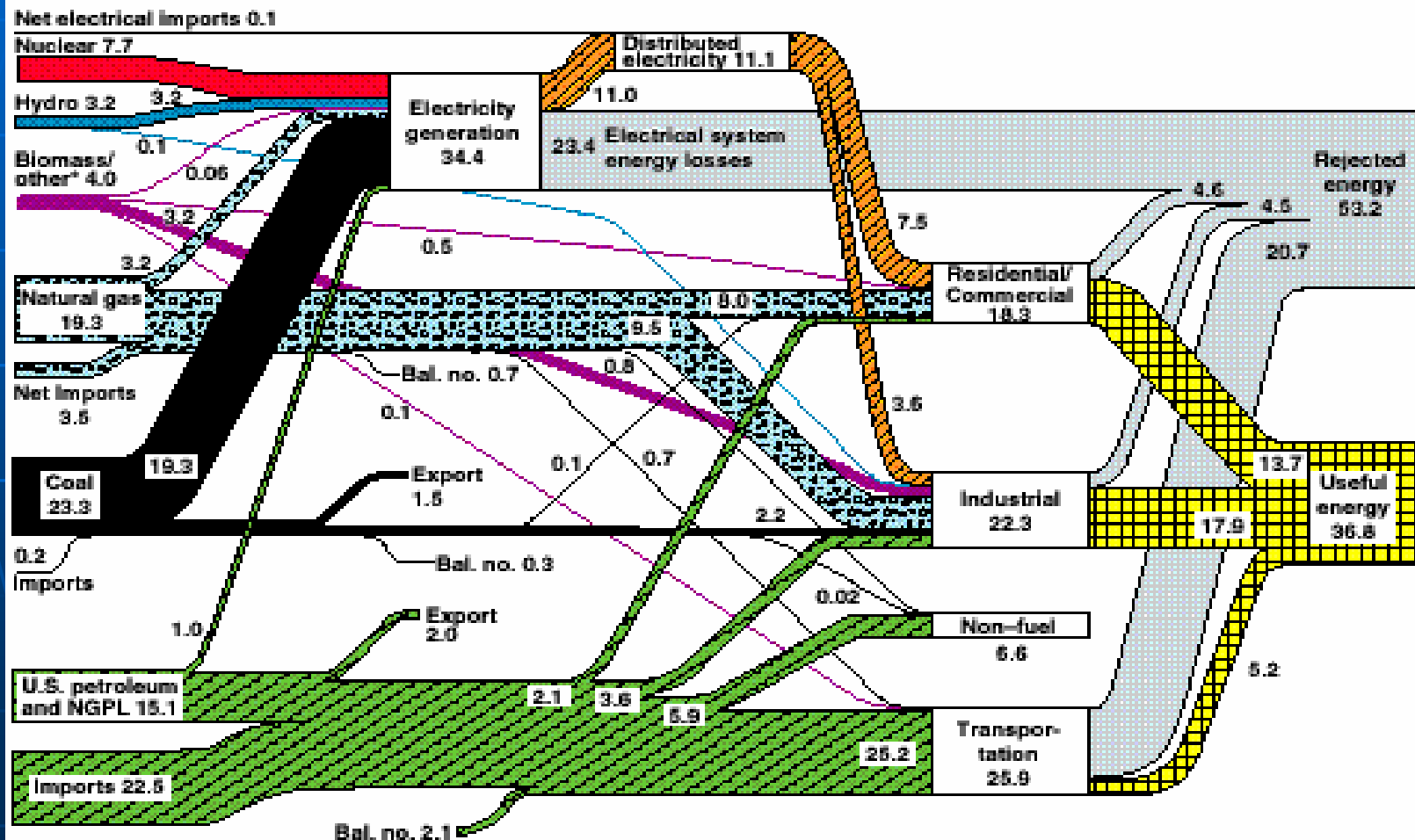
**World marketed gas production and forecast of an ultimate recovery of 12,000 tcf**



# Efficiency investment opportunities

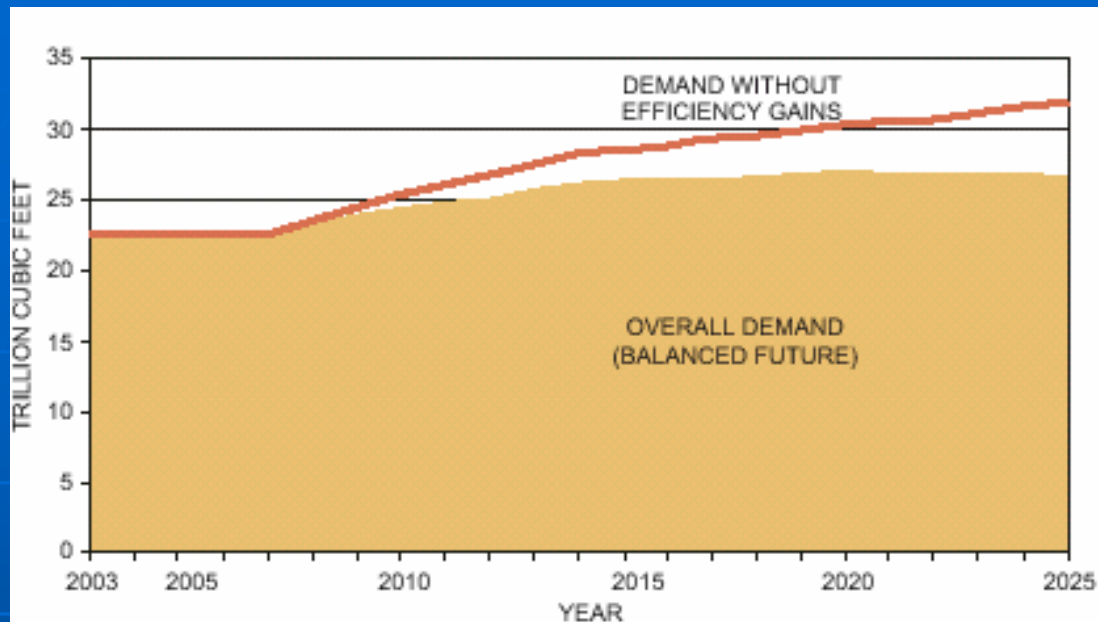
## U.S. Energy Flow – 1999

## Net Primary Resource Consumption 97 Quads



\*Biomass/other includes wood and waste, geothermal, solar, and wind.

March 2001  
Lawrence Livermore  
National Laboratory



\* Energy efficiency gains in NPC modeling of future gas demand are principally from: decreased electric power demand intensity; increased efficiency in gas-fired power generation, industrial boilers, and industrial process heat; and efficiency gains in commercial and residential gas consumption.

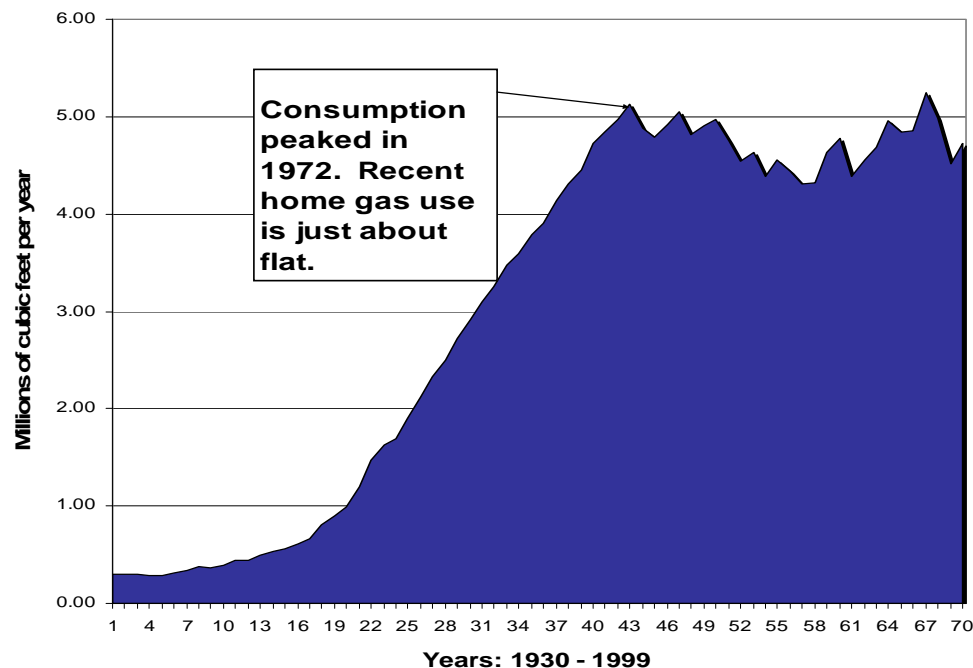
FIGURE 3  
ENERGY EFFICIENCY EFFECT ON GAS CONSUMPTION\*

Source: NPC September 2003 Report

Gas used in  
residential  
sector:

1972: 35 million

2003: 58 million





## *Consumption:*

- Where we use it
- What we use it for

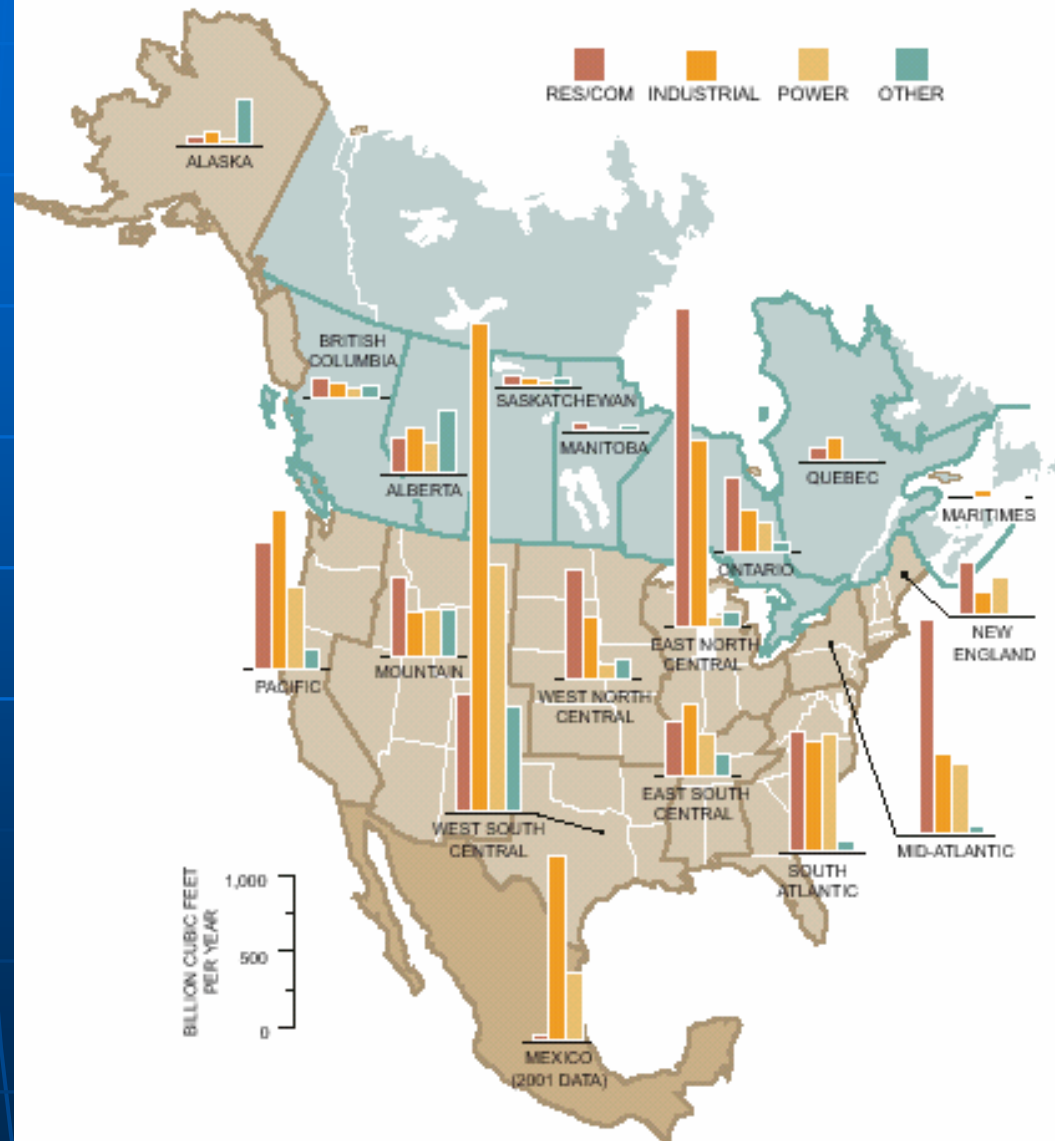


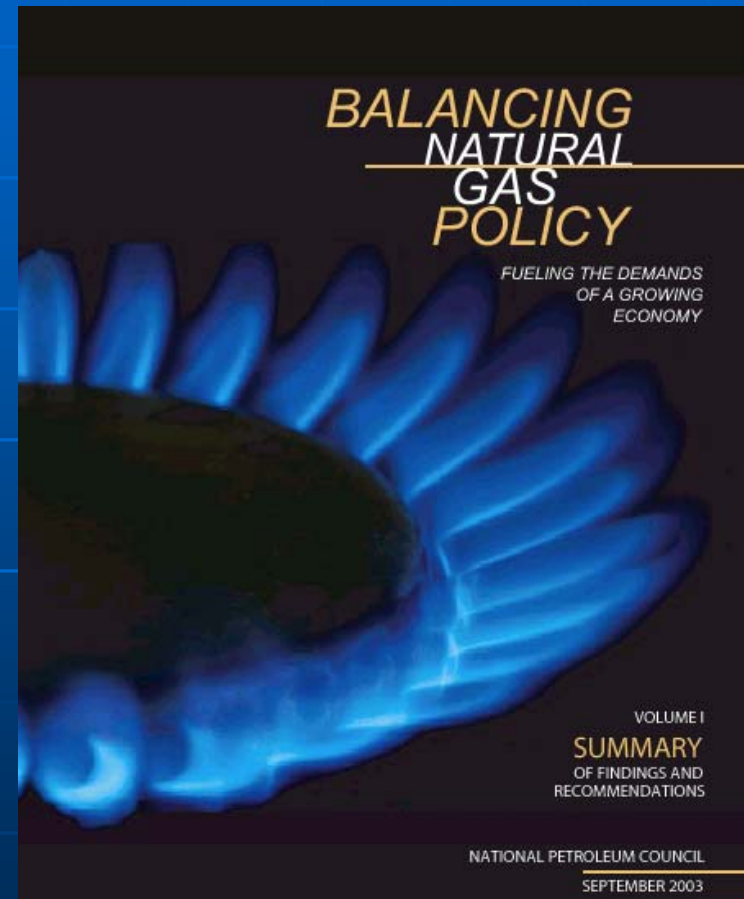
FIGURE 4  
U.S. AND CANADIAN NATURAL GAS DEMAND BY SECTOR, 2002

# Supply--Harsh Reality (9/04 NPC Report)

“Recent fundamental shifts in North American natural gas markets have led to the current market conditions of higher gas prices and increased price volatility. *This situation will likely persist...*”

“Production from traditional US and Canadian basins has plateaued.

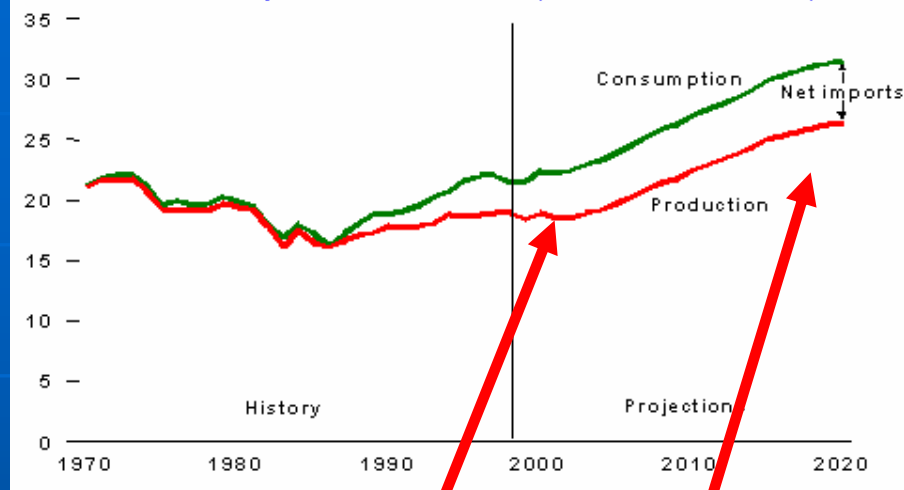
“The 1999 NPC study assumed 144 gigawatts of new capacity through 2015, while the actual new capacity is expected to exceed 200 gigawatts by 2005.”



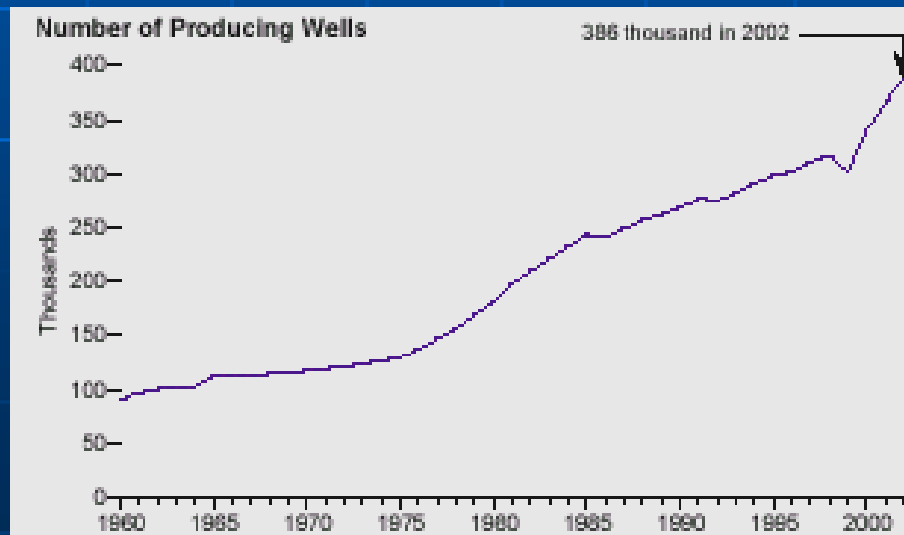
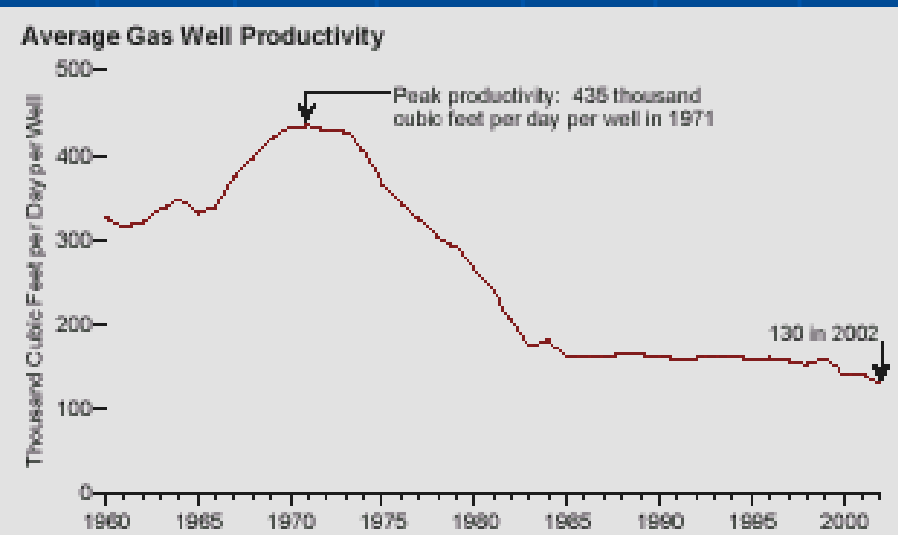
# Three key facts here:

1. Production peaked in 1972
2. Amount per well way down since production peaked
3. So we need more wells, LOTS more wells (treadmill), just to keep production flat...

Figure 6. Natural Gas Production, Consumption, and Net Imports, 1970-2020 (trillion cubic feet)

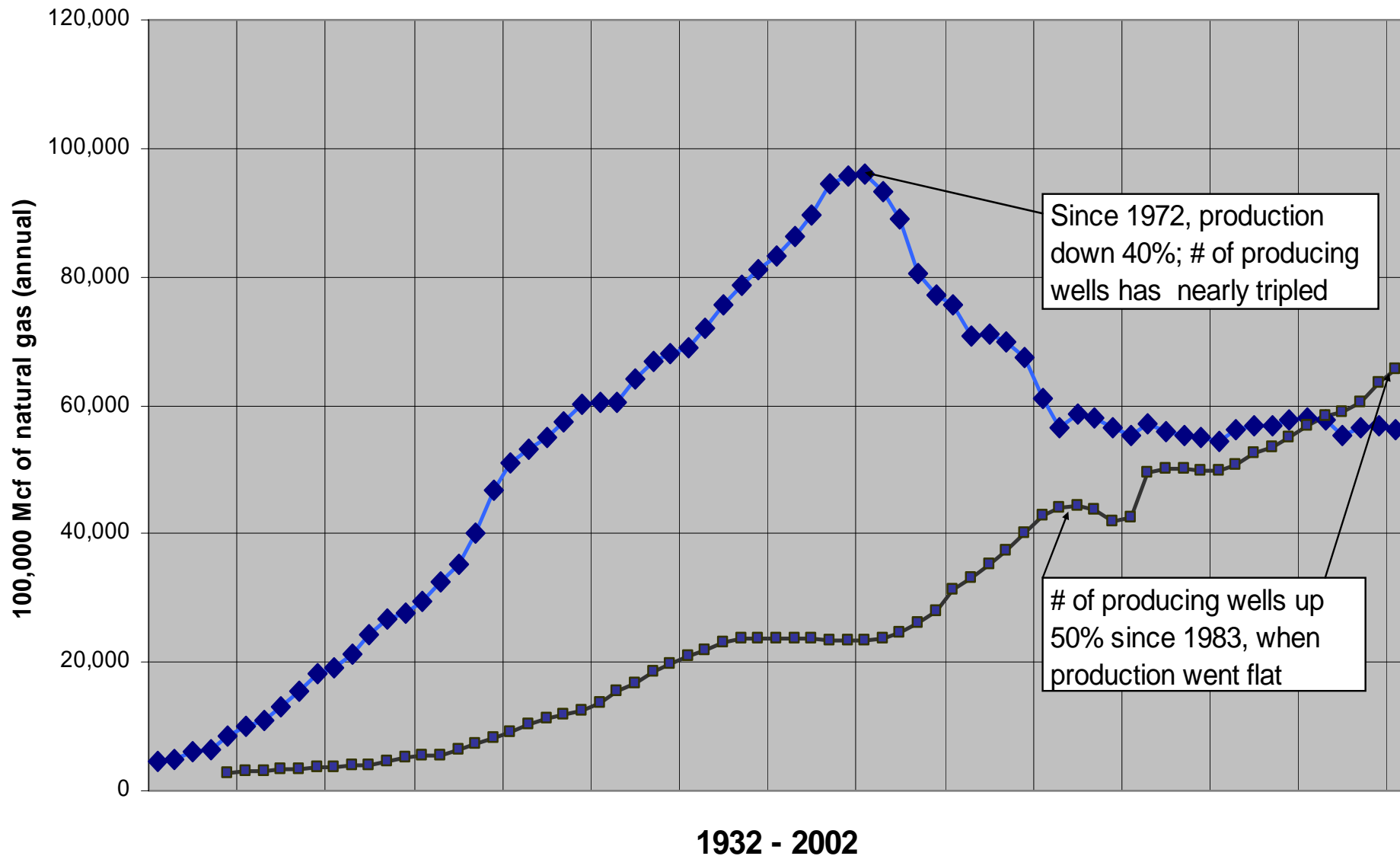


**Opinion**

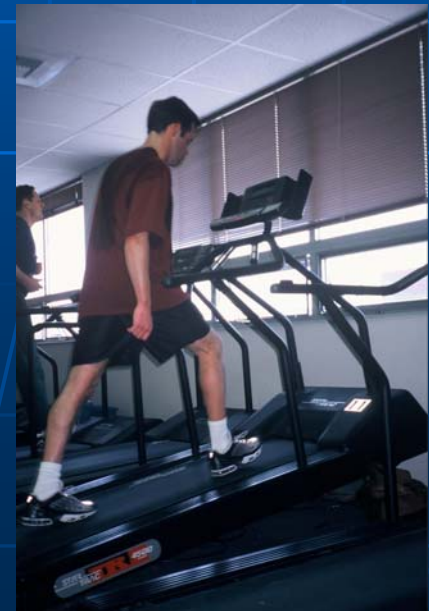
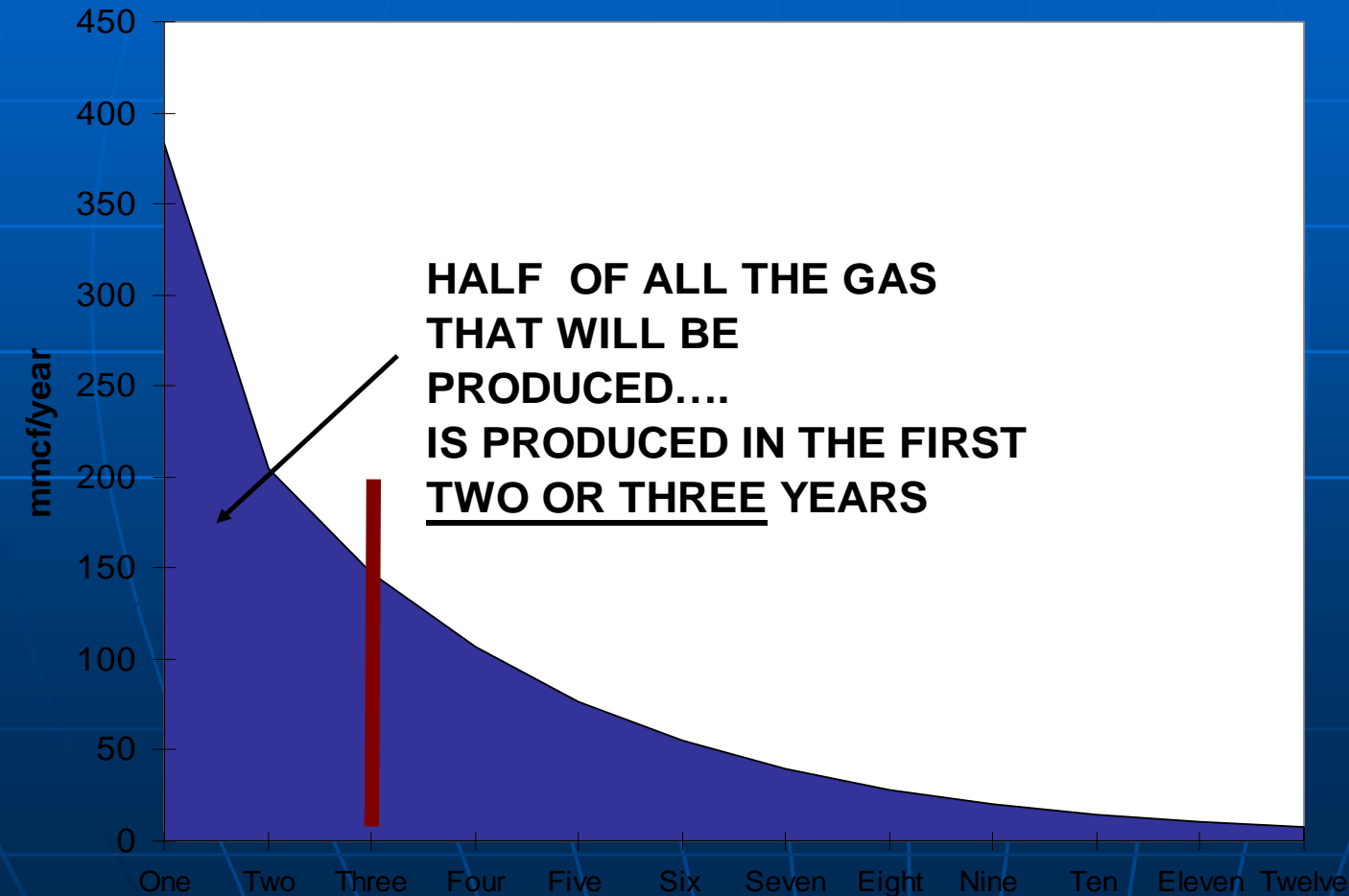


*EIA: Annual Energy Review 2004*

# History of Texas Natural Gas Production vs. Number of Producing Gas Wells

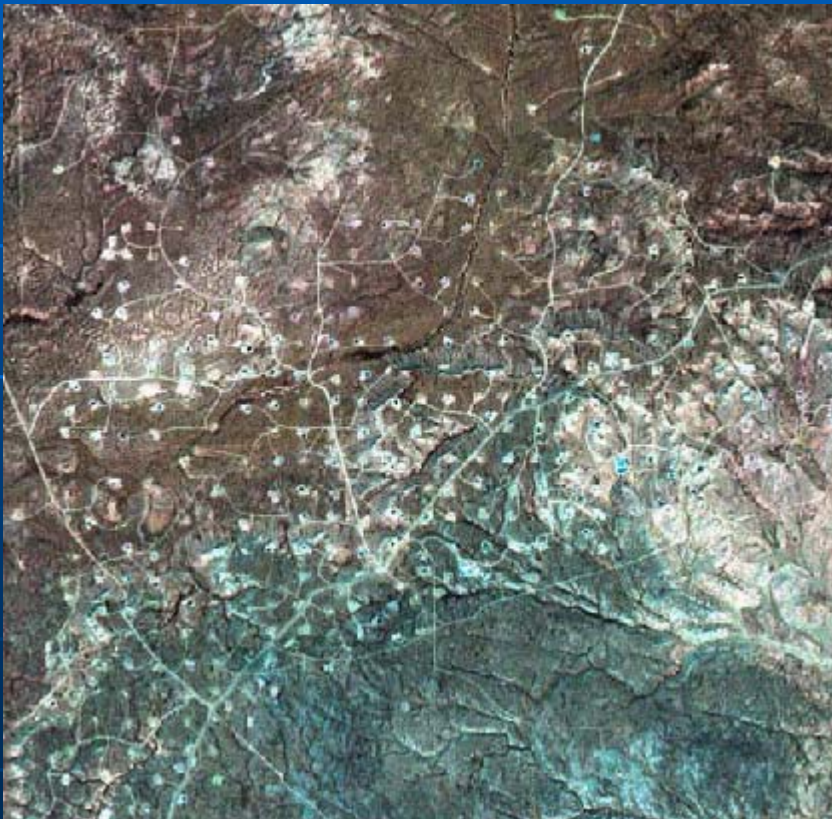


# Depletion treadmill at work: typical new Texas gas well, with a technology twist





Part of Jonah Field (WYO,  
2002), with 400 wells drilled



Shallow well  
rig for  
drilling  
Power River  
Basin coalbed  
methane



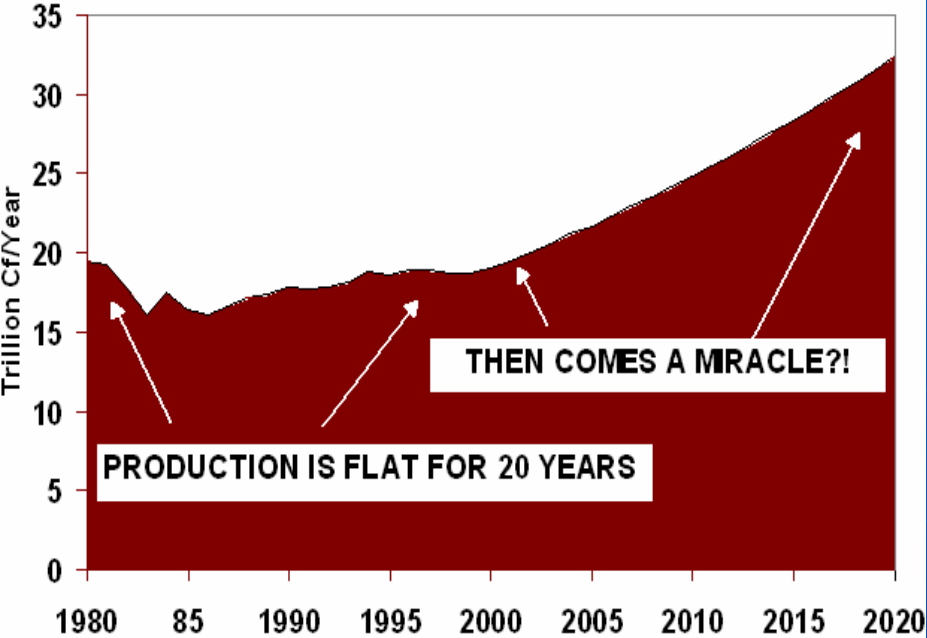
Typical deep-well drilling pad



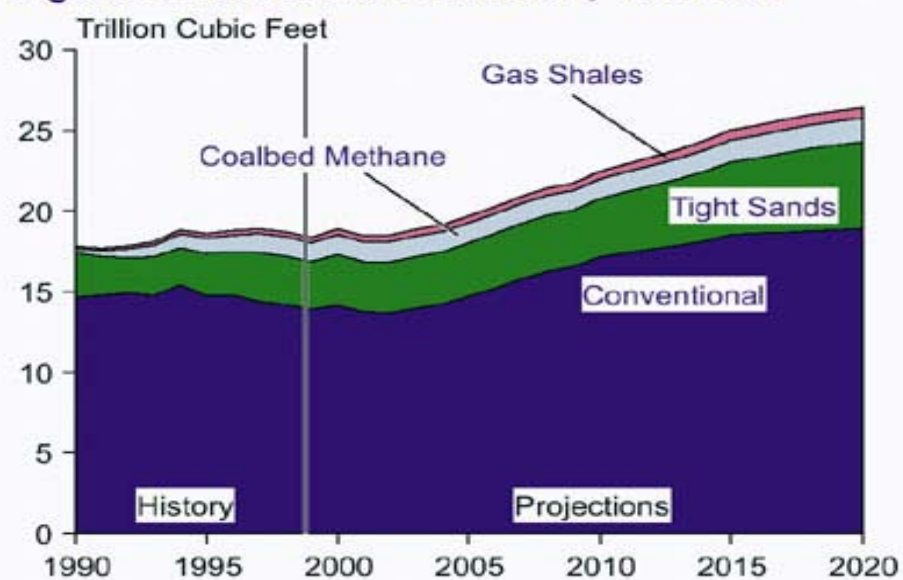


# A Longer Term North American Gas Supply Solution



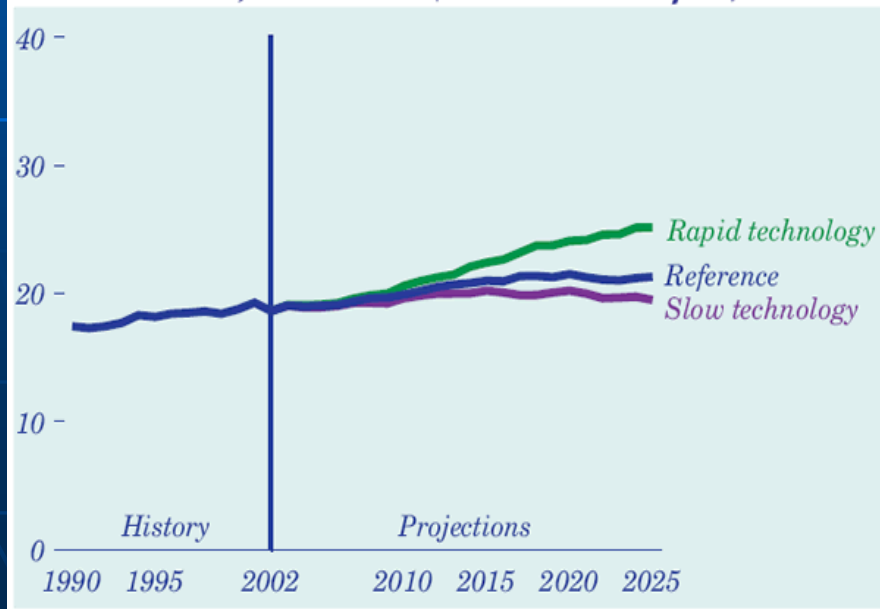


**Figure 1. Natural Gas Production, 1990-2020**



Sources: **History:** Advanced Resources International, Inc. (ARI). **Projections:** Energy Information Administration, *Annual Energy Outlook 2000*, DOE/EIA-0383(2000) (Washington, DC, December 1999), reference case.

**Figure 91. Lower 48 natural gas production in three cases, 1970-2025 (trillion cubic feet)**



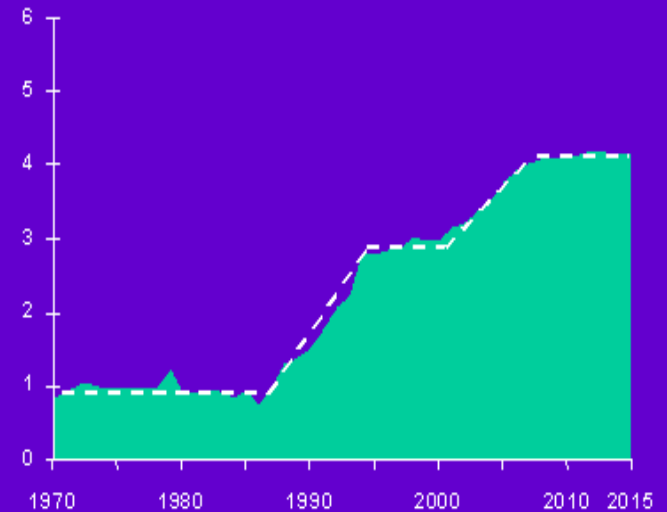
EIA's super optimistic projections supported "dash to gas," lower energy code thresholds, etc. (wdtkawdtki)

# Canadian exports to *increase*???

- Production declining this year (imports down 12%)
- Tar sands gas usage up
- Delta pipeline to be high-jacked?



## CANADIAN PIPELINE IMPORTS (TCF)



gri.

GRI BASELINE CENTER-2000 Edition of the GRI Baseline Projection

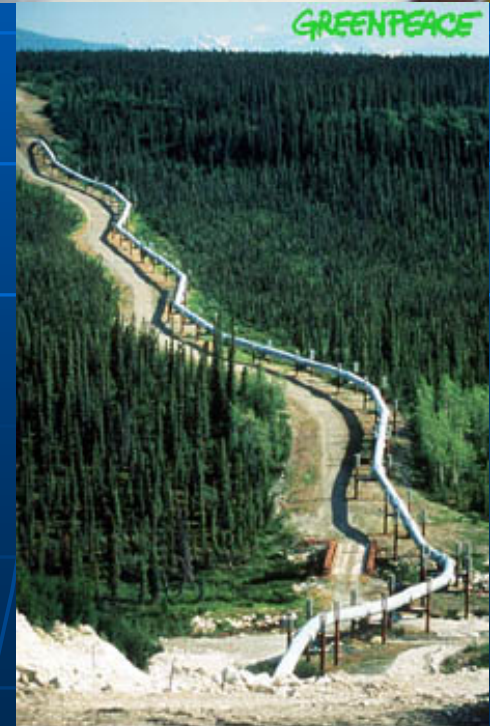


*Conventional wisdom:* Build pipelines (The Cavalry) to bring proven gas down from Alaska and the Mackenzie Delta



*The reality:* Pipelines will be slow and expensive to build. [Daniel Yergin quote] “We’re on a steepening treadmill. We can’t just drill and pipe our way out of this.” Balance....





Pipeline crossing Spring Creek, south of Huffman's Alaska  
©Greenpeace/Visser Alaska - Jul 1993

# *He's concerned*

**Testimony of Federal Reserve  
Chairman Alan Greenspan:  
June 10 (and May 9, and July 10...)**

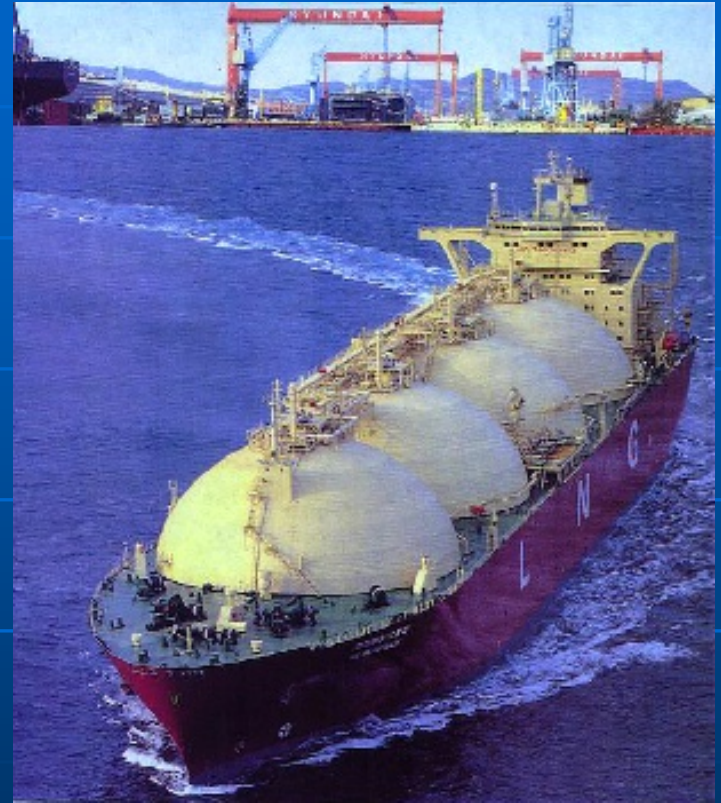
- “Futures prices suggest that we are not apt to return to earlier periods of relative abundance and low prices anytime soon.
- “Canada has little capacity to... expand its exports.”





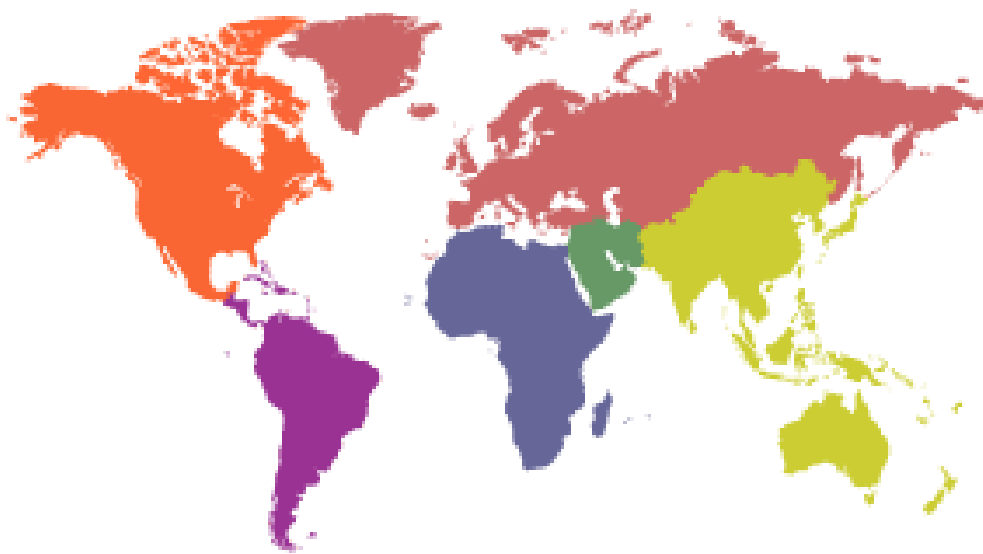
# Greenspan on LNG

- “Access to world natural gas supplies will require a major expansion of LNG terminal import capacity. Without the flexibility such facilities will impart, imbalances in supply and demand must inevitably engender price volatility.
- “...a major expansion of U.S. import capability appears to be under way.”

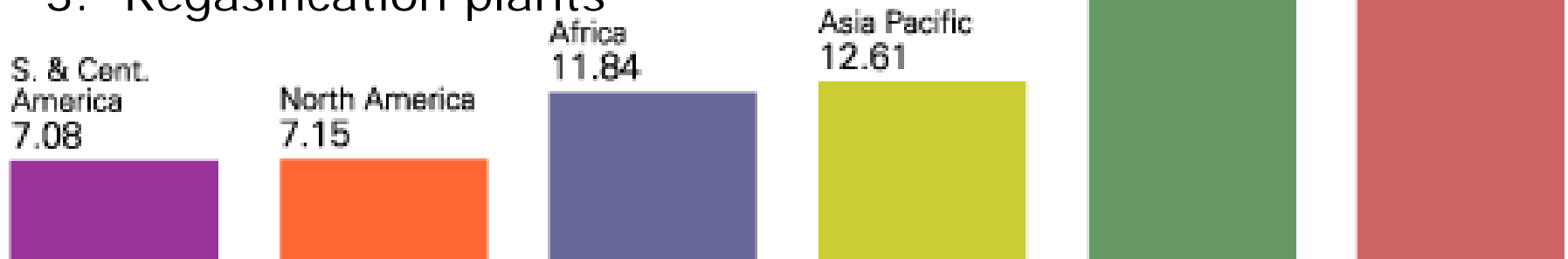


## Proved natural gas reserves at end 2002

Trillion cubic metres



1. Liquifaction plants
2. Tankers
3. Regasification plants



*Source: BP Statistical Review of World Energy 2003*



Kidding ourselves...



# Iran taps 'Persian' of natural gas' in West

By Mike Soraghan  
Denver Post Washington Bureau

WASHINGTON — The Bush administration has singled out the Rocky Mountain West for a pilot project to speed up energy development.

The White House has charged a group of top administration officials with finding ways to streamline environmental approvals and accelerate pipeline construction and natural-gas drilling on public lands.

The group, called the Rocky Mountain Energy Council, is to hold its first meeting Tuesday at the Denver Federal Center, where it may set up permanent offices.

The Bush administration and industry are eager to tap into what's been called a "Persian Gulf of natural gas" in the West, and the move comes after dire warnings from the U.S. economy.

The council's goal is to get federal and state officials talking to prevent unnecessary production of oil and gas in the West, New Mexico, Utah and Wyoming.

"The Rocky Mountains are 'energy central' in the West," said Jim Sims, who worked for Vice President Dick Cheney in developing the National Energy Plan and runs the Golden-based and now Business Roundtable, an association of energy companies, from a business perspective, "we would rather have a fast 'no' than a slow 'maybe.'"

Ideas the council may consider include working on several environmental permits at once rather than reviewing them in sequence, and highlighting problems early in the process.

D Post

8/6/03

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DANGER

To our  
Communities

*(Efforts may slow imports = higher prices)*



*...Fuzzy math, reported by CNN/Money*

## **El Paso tumbles on reserve cut**

**No. 1 gas pipeline operator cuts proven reserves by 41 percent, sets \$1B charge; stock tumbles.**

**February 18, 2004: 6:44 AM EST**

**HOUSTON (Reuters) - Energy company El Paso Corp. has cut its estimate of its proven natural gas reserves by 41 percent and said it would take a \$1 billion pretax charge in the fourth quarter.**

# The drill-our-brains-out approach







...and/or drill  
our houses



# The Gas Take-Home Here

- North American gas production flat
- Much more LNG (but timely?)
- More “demand destruction” to come
- Arctic gas longer than a decade out
- Energy efficiency best short-term balancing factor
- Wholesale gas prices at higher (stepped up) level--\$4 – \$8, still very volatile
- Higher and wilder residential gas prices
- You’re in the right biz at the right time!



■ Thanks

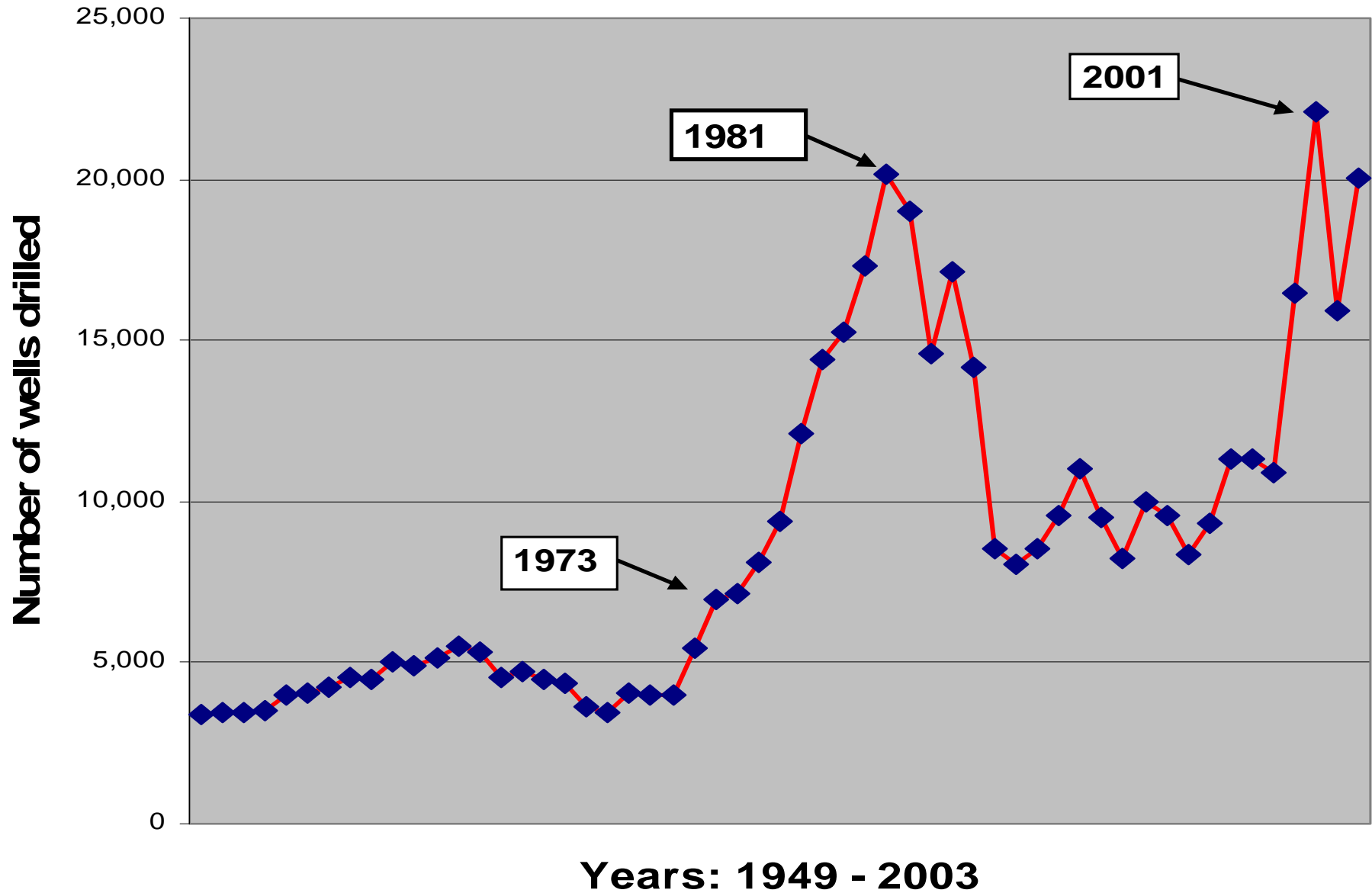




# North America Natural Gas Peak

- Optimists: DOE/EIA, GTI, a few analysts
- Harsh realists: NPC, Canadian Gas Potential Committee, Simmons & Company International, CERA, Walter Youngquist, even the USGS
- *Geologists* provide estimates of proven, probable & possible reserves
- *Engineers* who develop it, bring it to market
- *Economists* interpret estimates: prices, technological improvements, econometric models

# Natural Gas Wells Drilled: 1949 - 2003



# The Canadian Viewpoint

**“The Canadian Government interprets the NAFTA as not requiring any Canadian to export a given level or proportion of any energy resource to another NAFTA Party. The Canadian Government has stated that it will take any measures that it deems necessary for the future energy security of Canadians.”**

**<http://www.sice.oas.org/cp061096/english/04010200.asp>**