

World Petroleum Markets

What the Past Tells Us About the Future

June 23, 2008

Senate Staff Briefing

Capitol Hill

Washington, DC

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Introduction

Energy Policy Research Foundation Inc. (EPRINC), *formerly the Petroleum Industry Research Foundation Inc. (PIRINC)*

Founded in NY in 1944

- Moved to Washington from NYC in Feb 2007
- EPRINC brings policy analysis and industry economics to bear on current energy issues

Note: All data in this presentation are from EIA unless otherwise noted. Summary conclusions, comments, etc, are the sole responsibility of EPRINC.

Topics for Today

- EPRINC's Perspective on Structure and Pricing in the Upstream Crude Market (some history is useful)
- Why Are Crude Prices So High Today?
- What Does History and the Structure of the Crude Oil Market Tell Us About Policy Choices (and what is the problem we are trying to fix?)
- Assessments of Trends in US and World Petroleum Product Markets

1973-74 Arab Oil Embargo

NOT AN EMBARGO, but instead a

- Structural Shift in Ownership and Control of the Resources of the Middle East
- Fundamental Change in Expectations on Production from Middle East Producers

As an Embargo it was a failure, market was integrated (lesson not yet learned by Chavez)

1979 Price “Shock”

OIL MARKET WAS NOT FRAGILE, but instead there was a shift in:

- Expectations regarding regional risk; i.e. more risky
- Prospects for future output from Iran and Iraq were reduced substantially, i.e., access to those reserves would now be delayed

1986 Price Collapse

- Saudi Arabia abandons role as swing producer at low levels of net demand for SA crude
- Shift in expectations on Saudi decision making within OPEC and as regulator of world oil market
- Sustained reduction in oil use as a percentage of GNP in major Western countries

1998 Price Collapse: Six Central Issues

Asian economic crisis brings a collapse in net demand

- OPEC misreads the oil market
- Warm 1997-98 summers in N. America, Europe, Asia
- Increase in Russian oil exports as Ruble collapses
- Chinese authorities decrease imports in Q4 of 1998
- UN authorizes increase in Iraqi exportation in 1998
- Asian economic crisis brings a collapse in net demand

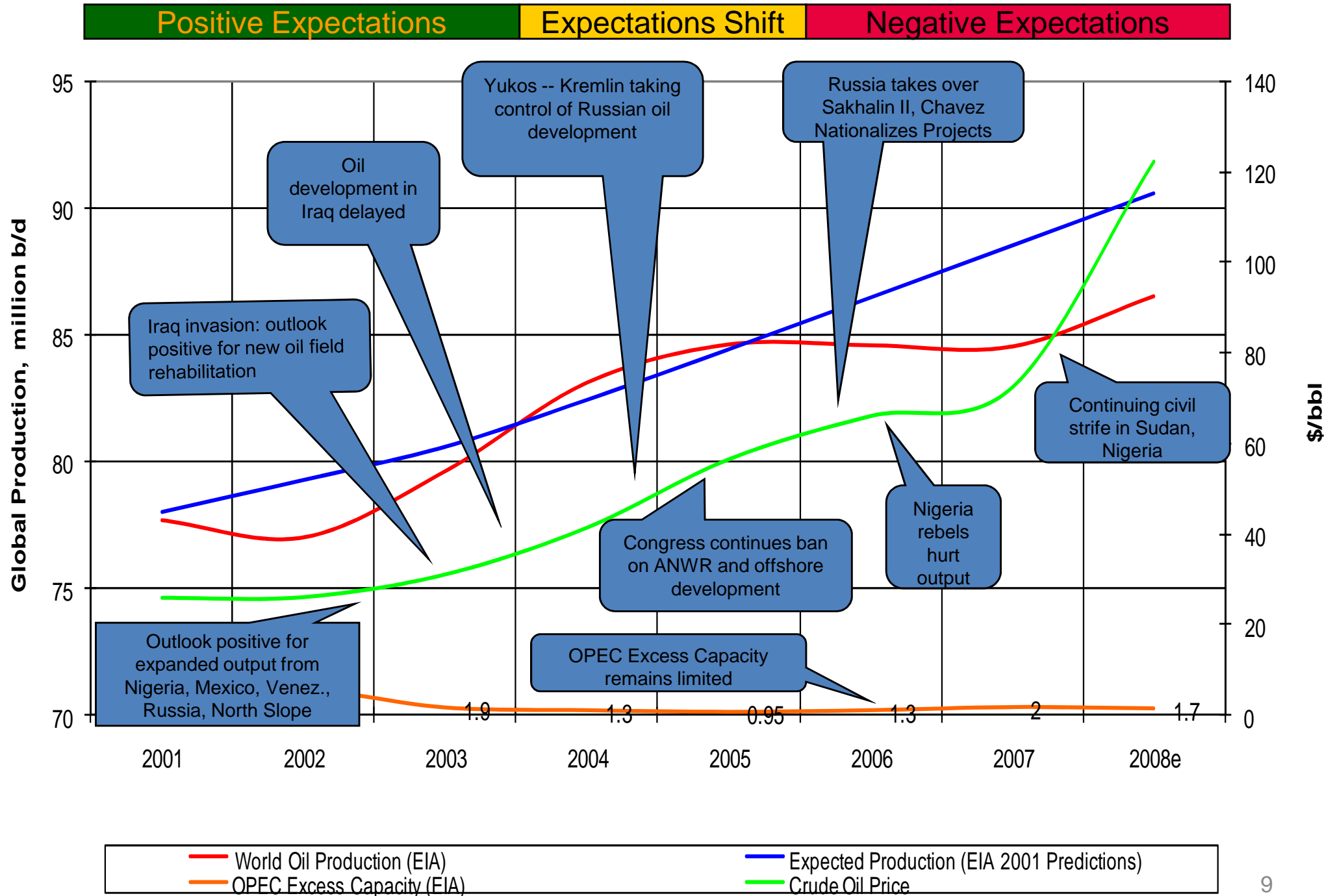
The Peak Oil Problem: New Supplies Will Be More Expensive, but We Are Not Running Out of Oil



"One thing is clear: the era of easy oil is over. What we all do next will determine how well we meet the energy needs of the entire world in this century and beyond."

- David J O'Reilly, Chairman & CEO, Chevron Corporation, July 2005

A Series of Unfortunate Events Leading to New Expectations



San Joaquin Valley

Testing Hubbert-Method Predictions for Reserves and Production (Billions of Barrels)

1964

1982

2000

Cumulative Discoveries	7.7	11.8	16.1
Percent Attributable to 1915	49%	69%	76%
Cumulative production as of	8.0-9.5	11.9-12.1	16.1-16.2
Year 2000 production projected in: (mb/d)	44-112	189	597(actual)

Source: EPRINC, October 2006. *Does the Hubbert Method Provide a Reliable Means for Predicting Future Oil Production*, Richard Nehring, October 2006,

Permian Basin

Testing Hubbert-Method Predictions for Reserves and Production (Billions of Barrels)

1964

1982

2000

Cumulative Discoveries	17.6	27.9	35.2
Percent Attributable to 1950	85%	86%	84%
Cumulative production as of	19-27.5	28.5-30.5	35.8-37.5
Year 2000 production projected in: (mb/d)	162-479	326-479	910(actual)

Source: EPRINC, October 2006. *Does the Hubbert Method Provide a Reliable Means for Predicting Future Oil Production*, Richard Nehring, October 2006,

What Does the Permian and San Joaquin Tell Us About the Hubbert Predictions?

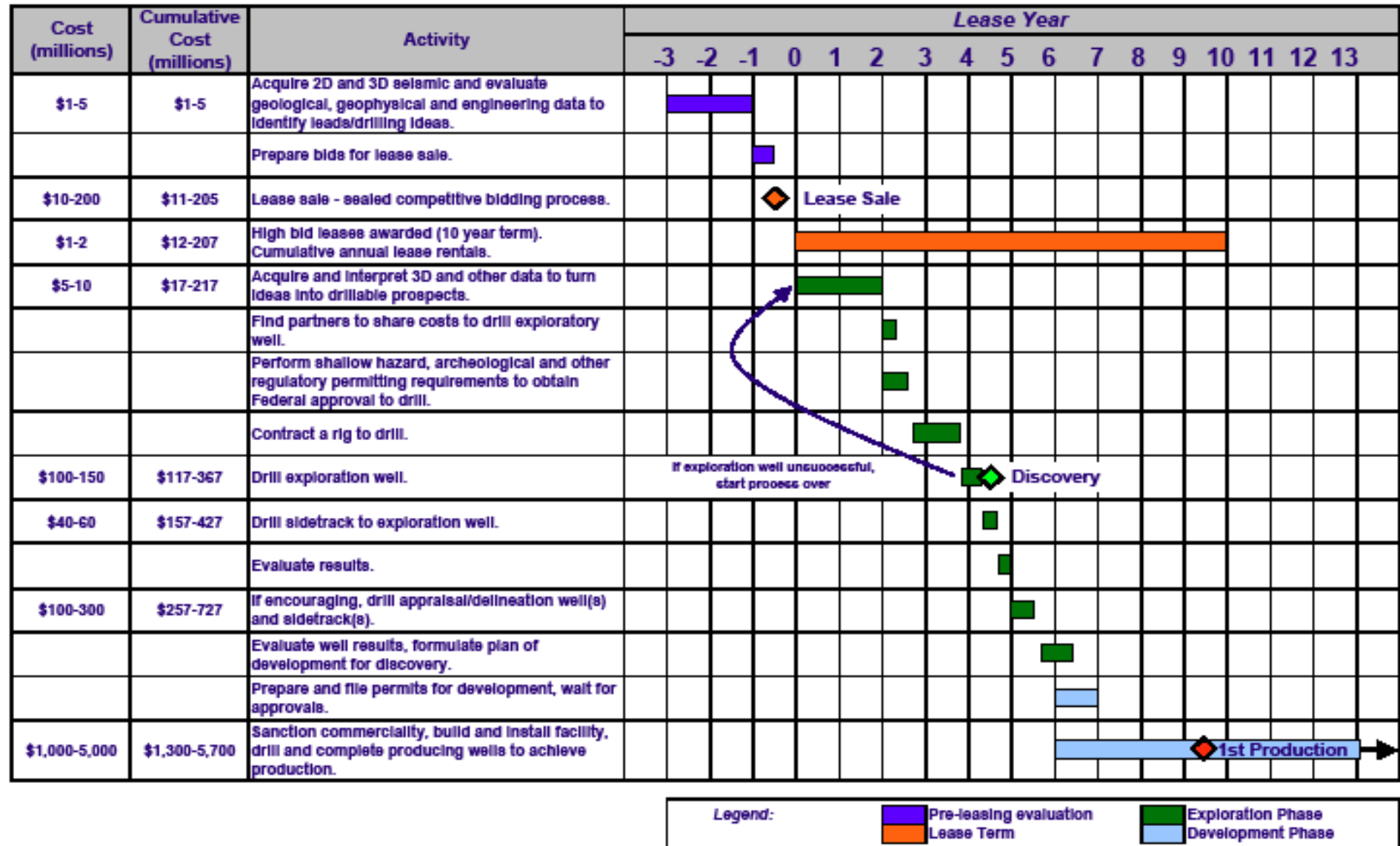
- Knowledge and technology grow over time
- Big payoff to long term access to both existing and new oil provinces
- More importantly Hubbert Method does not reveal.....
 - The Backstop Price
 - Total Recovery

What Does This Analysis Tell Us About the Energy Security Problem?

- Current Market Price Probably Tied to a “Perfect Storm” of Unfortunate Events – More Than Declining Reserves (Peak Oil)
- Longer Term Energy Security Problem Remains “A Concentration of Low Cost Reserves Among Relatively Few Players.”
- This Concentration of Low Cost Reserves Poses Risks to the US (wealth transfers, price spikes)
- Focus on Import Dependence Not Likely to Fundamentally Address Energy Security Problem and Can Be Costly. Policy Focus Should be On Reducing Vulnerability.
- What Would be the Elements of an Effective Strategy Given This Analysis?

Gulf of Mexico Deepwater Frontier Exploration and Production Timeline

Individual Prospect: 5,000' Water Depth, 30,000' Drilling Depth



Some Questions on Expanding Domestic Leasing

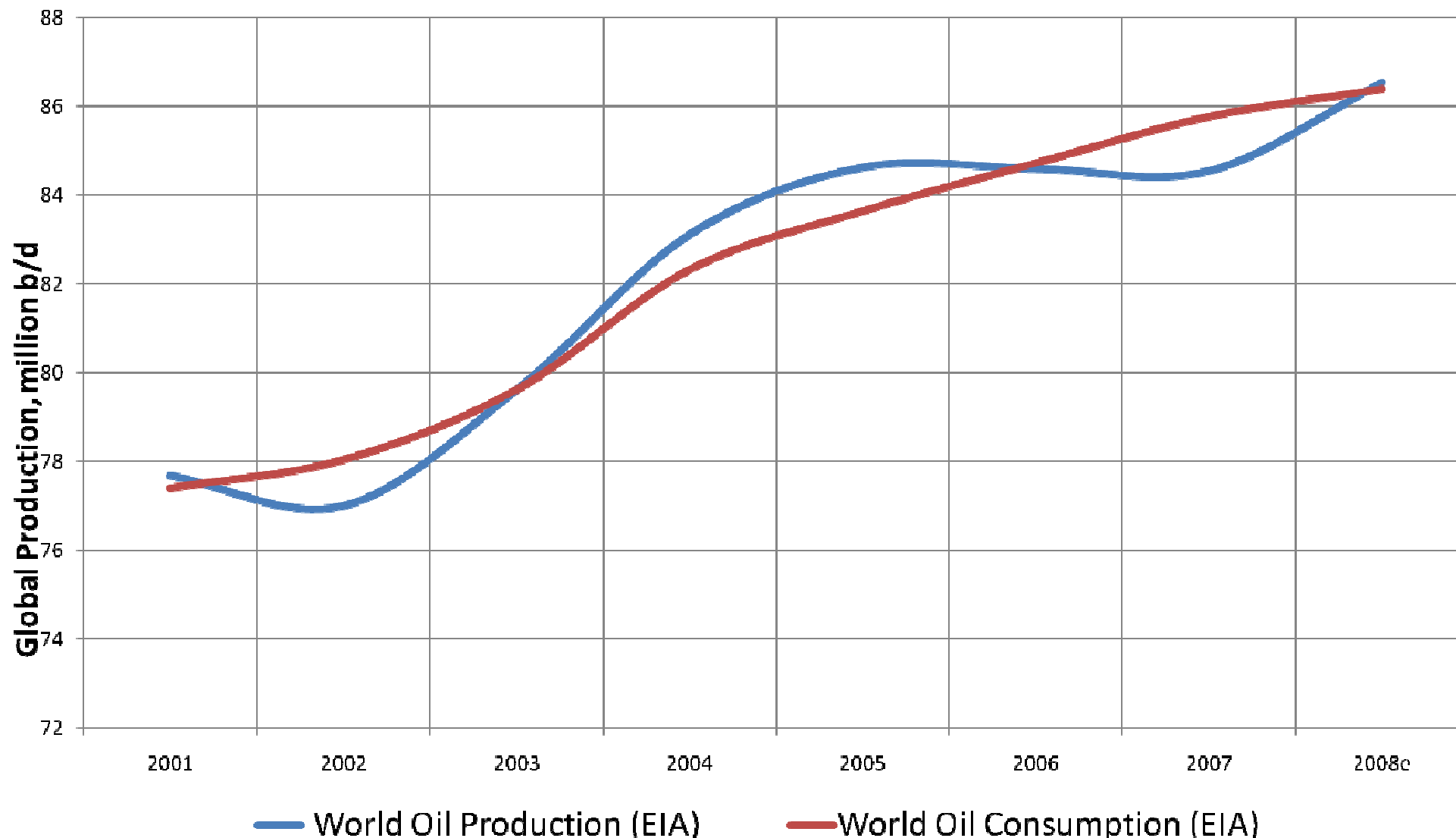
- What is the nature of the E&P Process?
- Should we provide more leasing opportunities when so much land is already under lease?
- What are the environmental risks?
- Can production in the future effect prices today?
- How does more domestic oil fit in with efforts to transition to the fuels of the future?

Refined Oil Products, etc.

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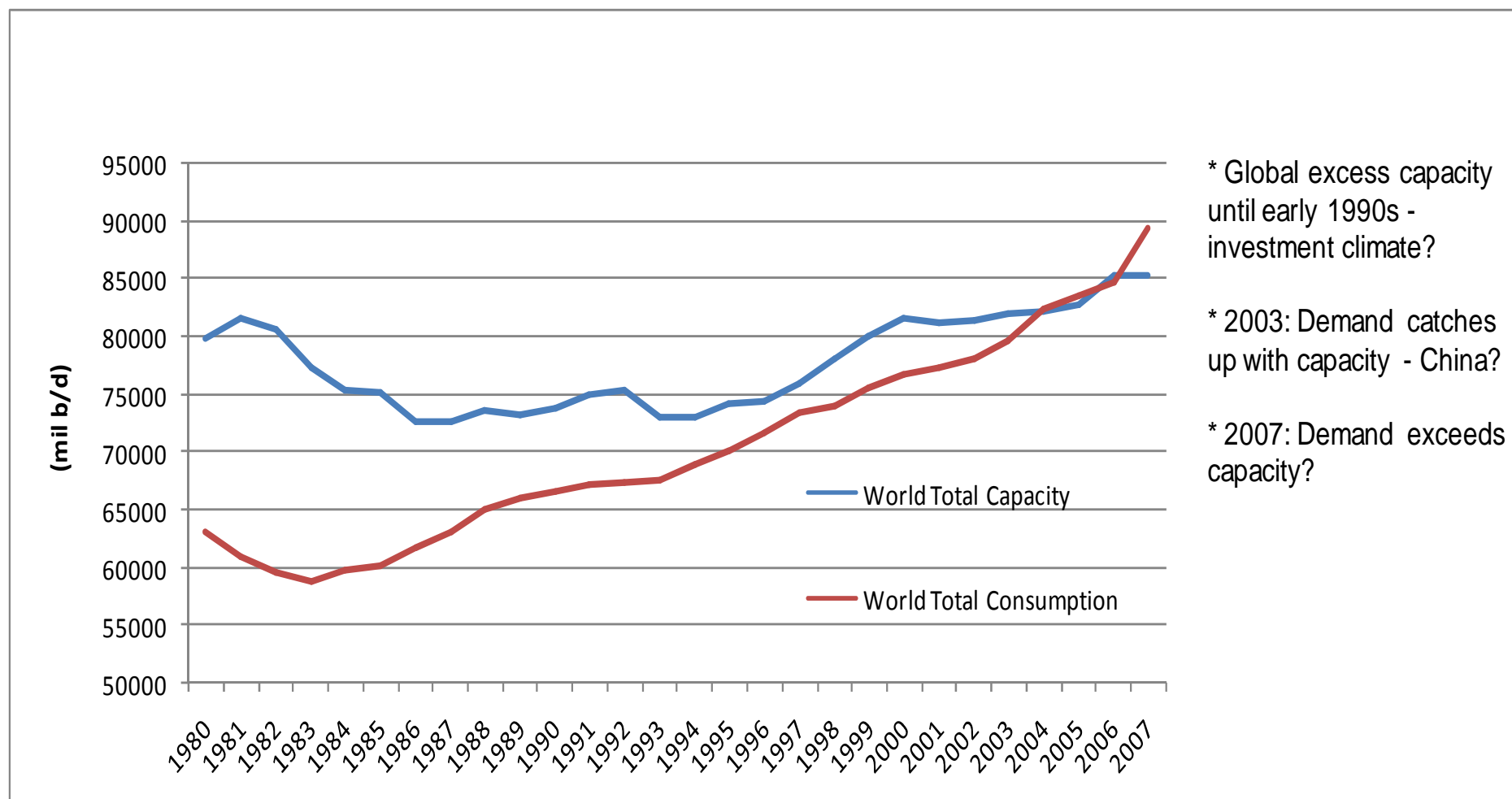
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World Oil Production and Consumption, 2001-2008

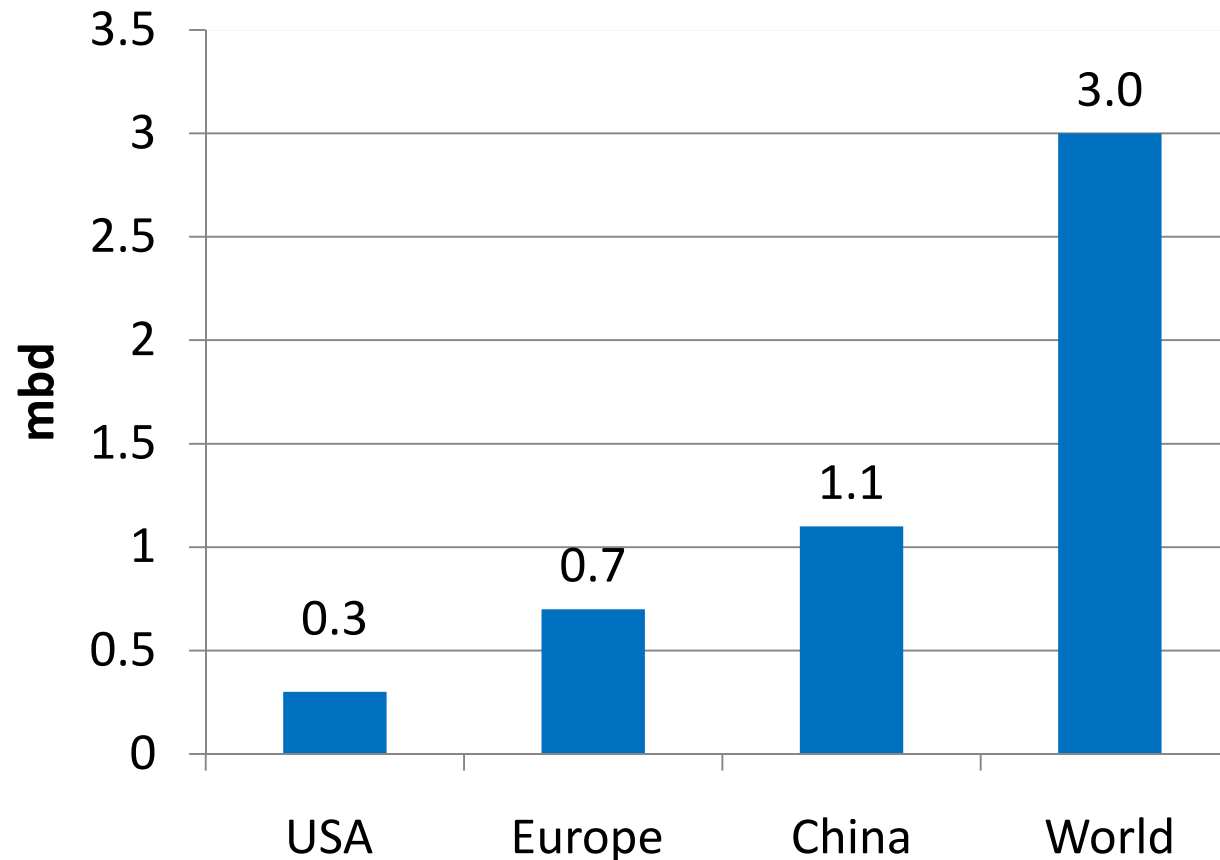


Source: U.S. Energy Information Agency

World Petroleum Consumption and Refining Capacity: 1980 - 2007

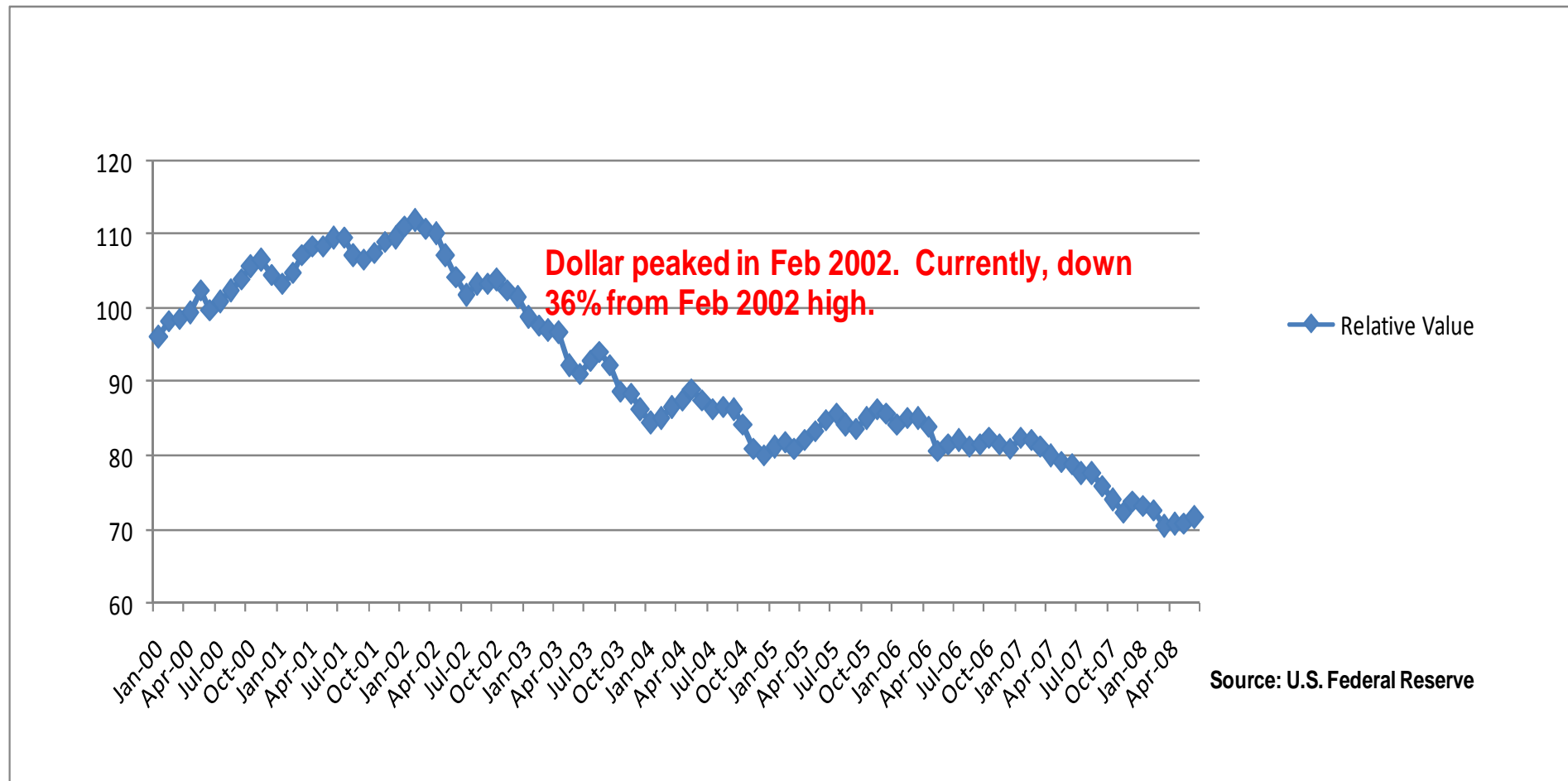


Global Distillate Consumption Growth: 2003 - 2007



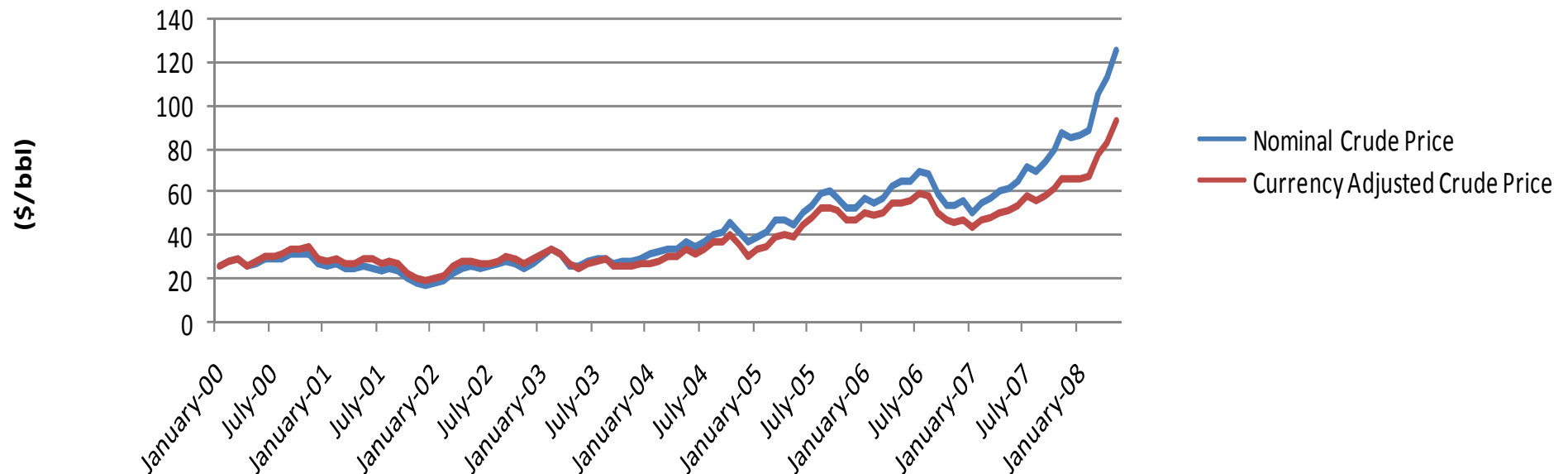
Source: BP Statistical
Review of World Energy -
2007

Declining Dollar Value Relative to Foreign Currency Basket



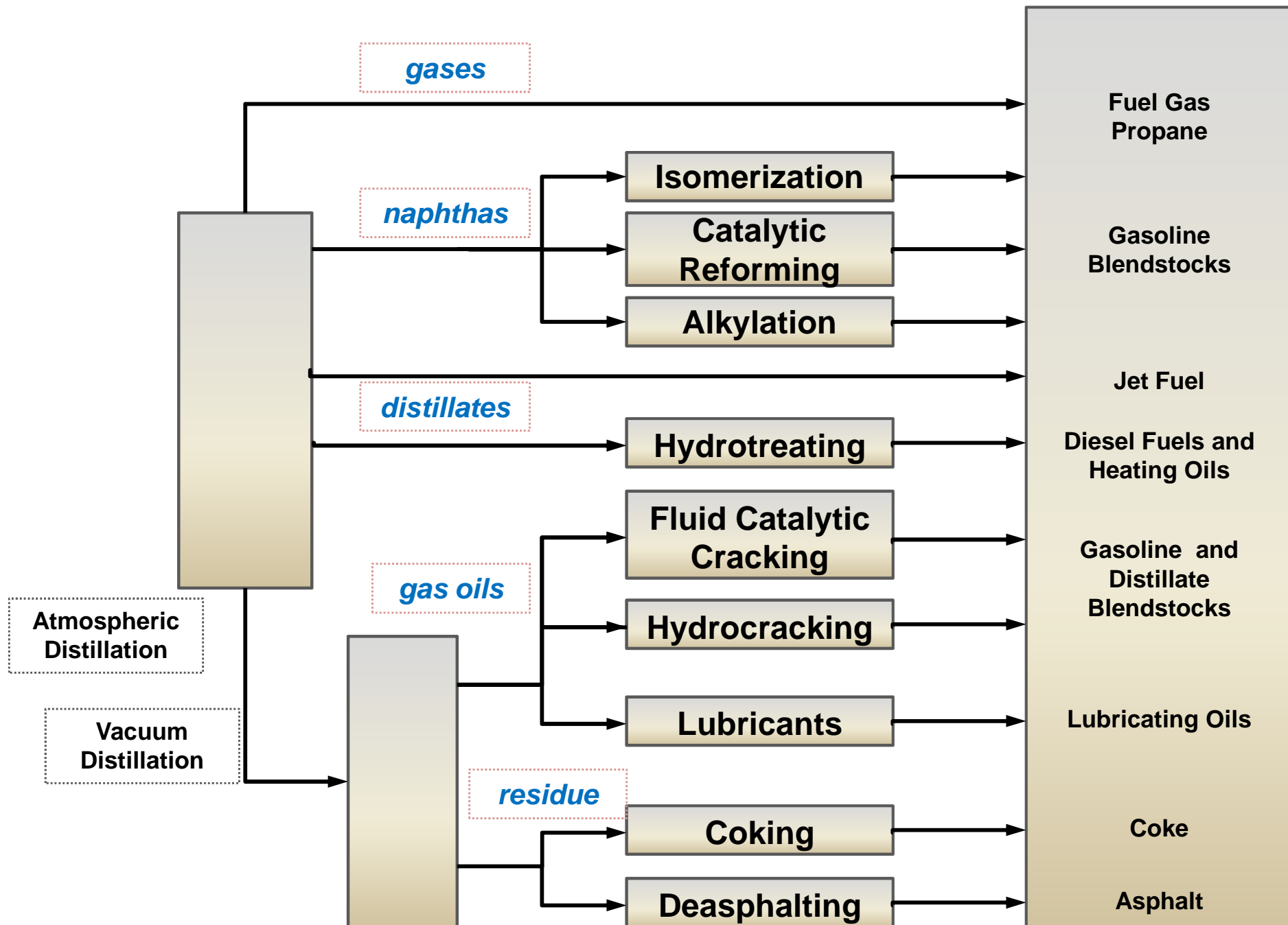
Nominal and Dollar- Adjusted Crude Prices

\$135 today would be \$93 if the \$ value didn't change

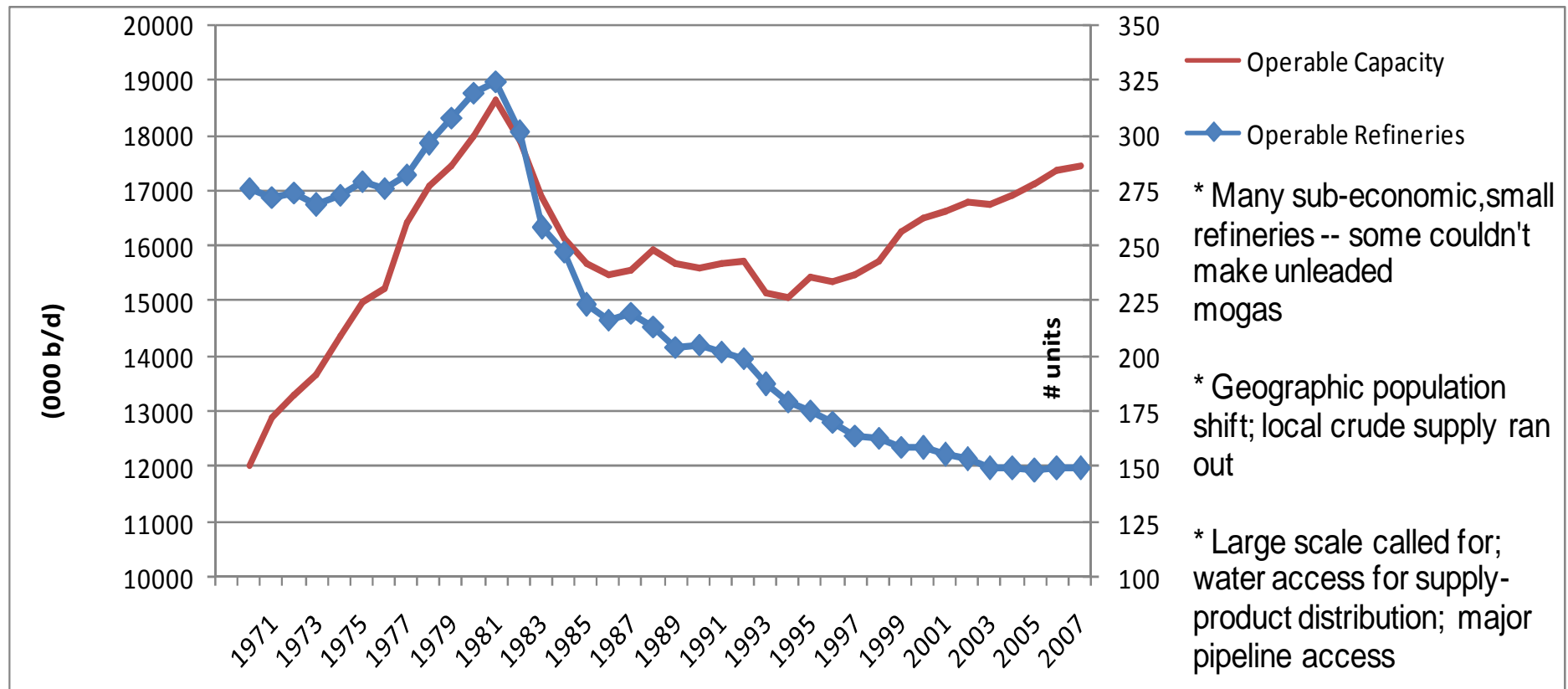


Source: EPRINC calculations : U.S. Energy Information Agency,
U.S. Federal Reserve

What's a Refinery?



U.S. Oil Refineries History: 1970 - Present



U.S. Oil Refineries History: 1970 - Present

- 1970s: The Small Refiner Bias in the 1973 price control program encouraged the building of excess small refineries.
- 1979: Price controls end.
- 1980-1990: Rationalization of refining.
 - Closure of small, uneconomic units - adversely impacted by population and crude supply shifts.
 - Capacity at existing, better-located facilities expanded.
 - Remaining refinery campuses become bigger, more efficient.
- Mid-1990s: Capacity grows; demand grows faster.
- 2000s: More investment needed to expand existing refineries.
 - Regulatory issues
 - Capital requirements and investment decisions

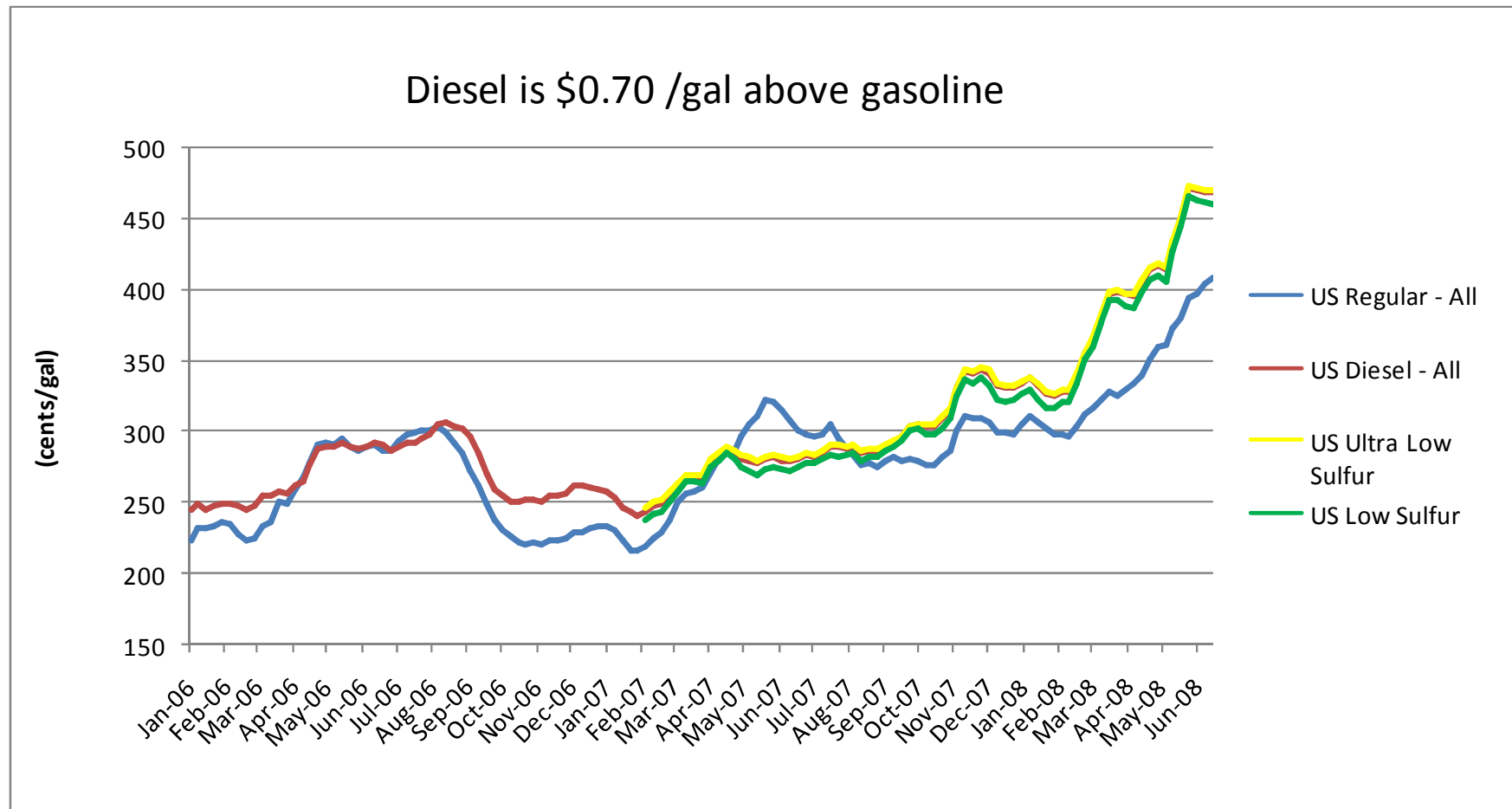
What happened to “Refining’s Golden Age?”

Modular Investment in Refinery Upgrades

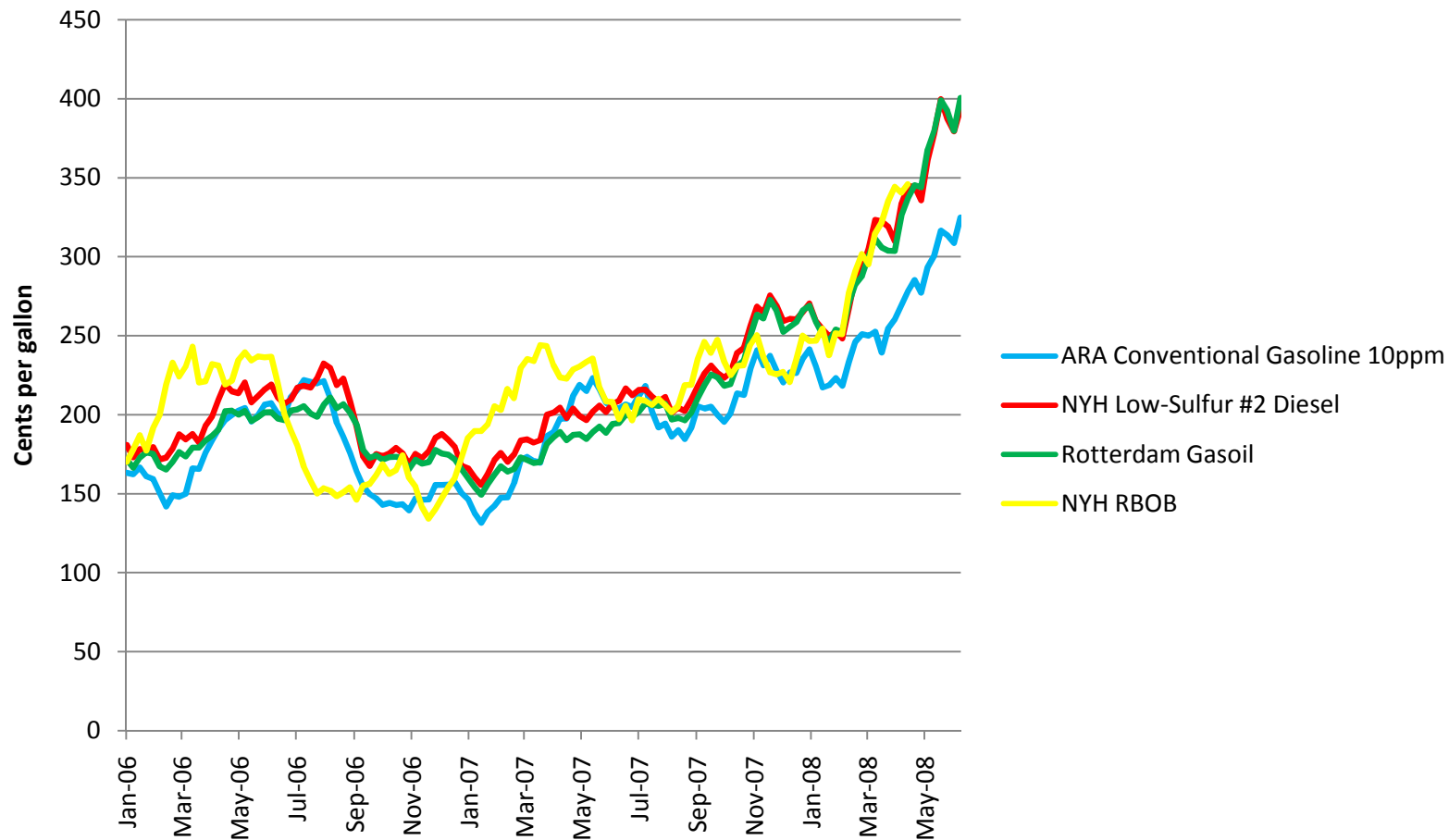
Need to:

1. Make high specification products
2. Make cleaner gasoline
3. Make gasoline for ethanol blending
4. Make ultra-low sulfur diesel (ULSD)
5. Make across-the-board sulfur reduction
6. Adjust to declining crude quality
7. Reduce refinery site emissions

U.S. Retail Prices: Gasoline vs. Diesel 2006 - 2008



Gasoline and Distillate Prices: NYH vs. Rotterdam - 2006 - 2008

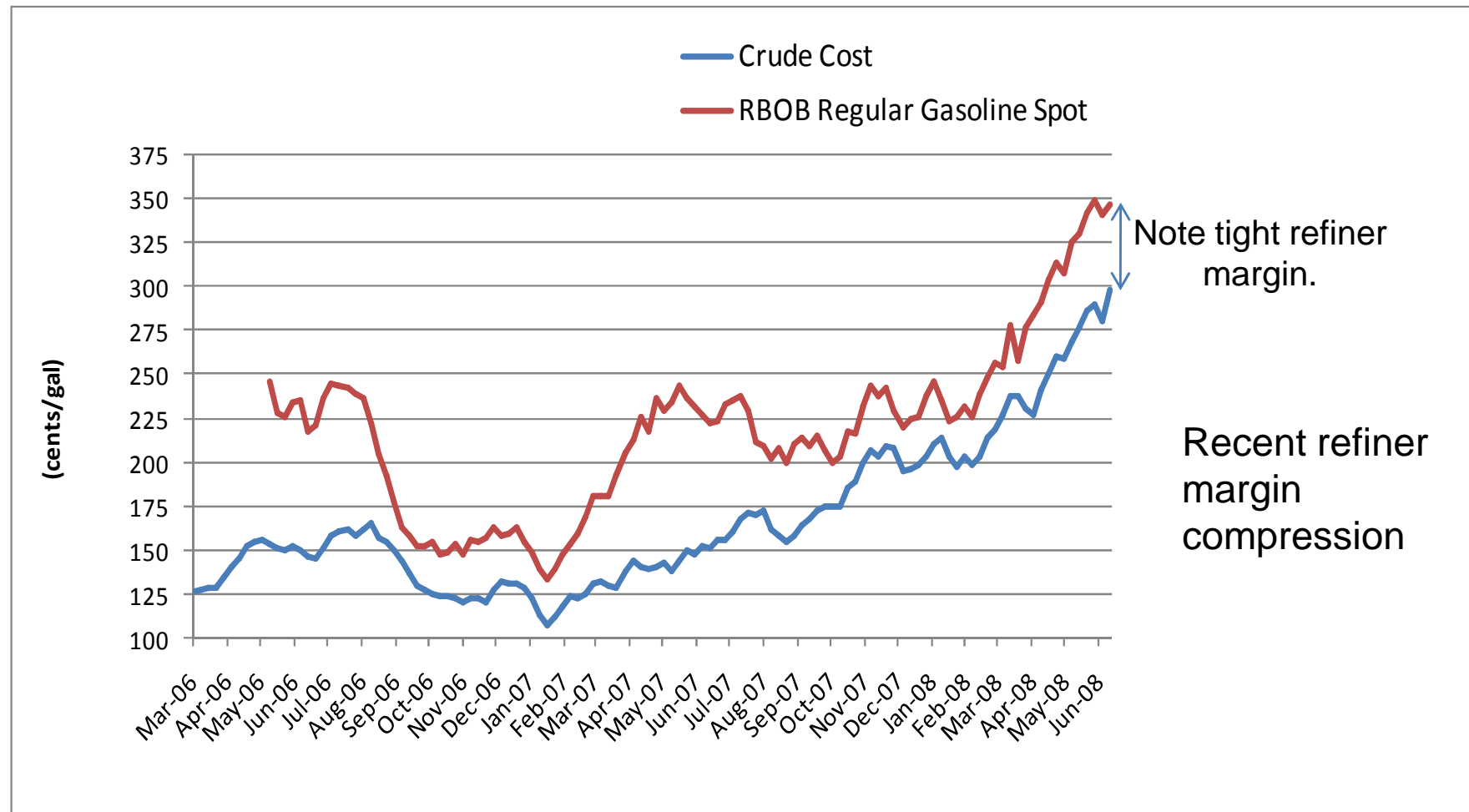


- 2006/7: Gaso & distillate prices track. NYH gaso has summer spike.

- 2007/8: World distillate prices exceed gasoline.

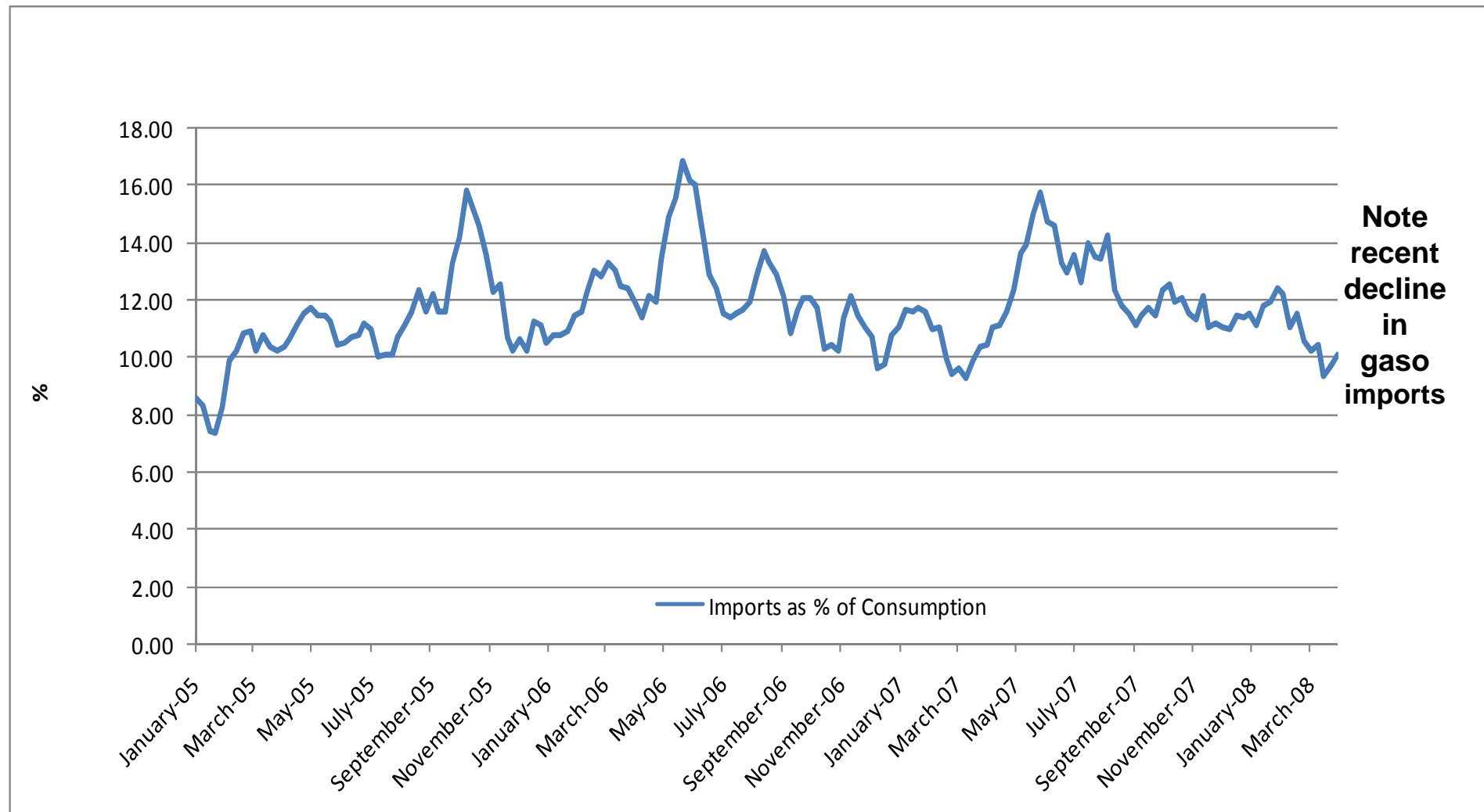
Source: U.S. Energy Information Agency

U.S. Wholesale Gasoline Price and Crude Cost: 2006 - 2008



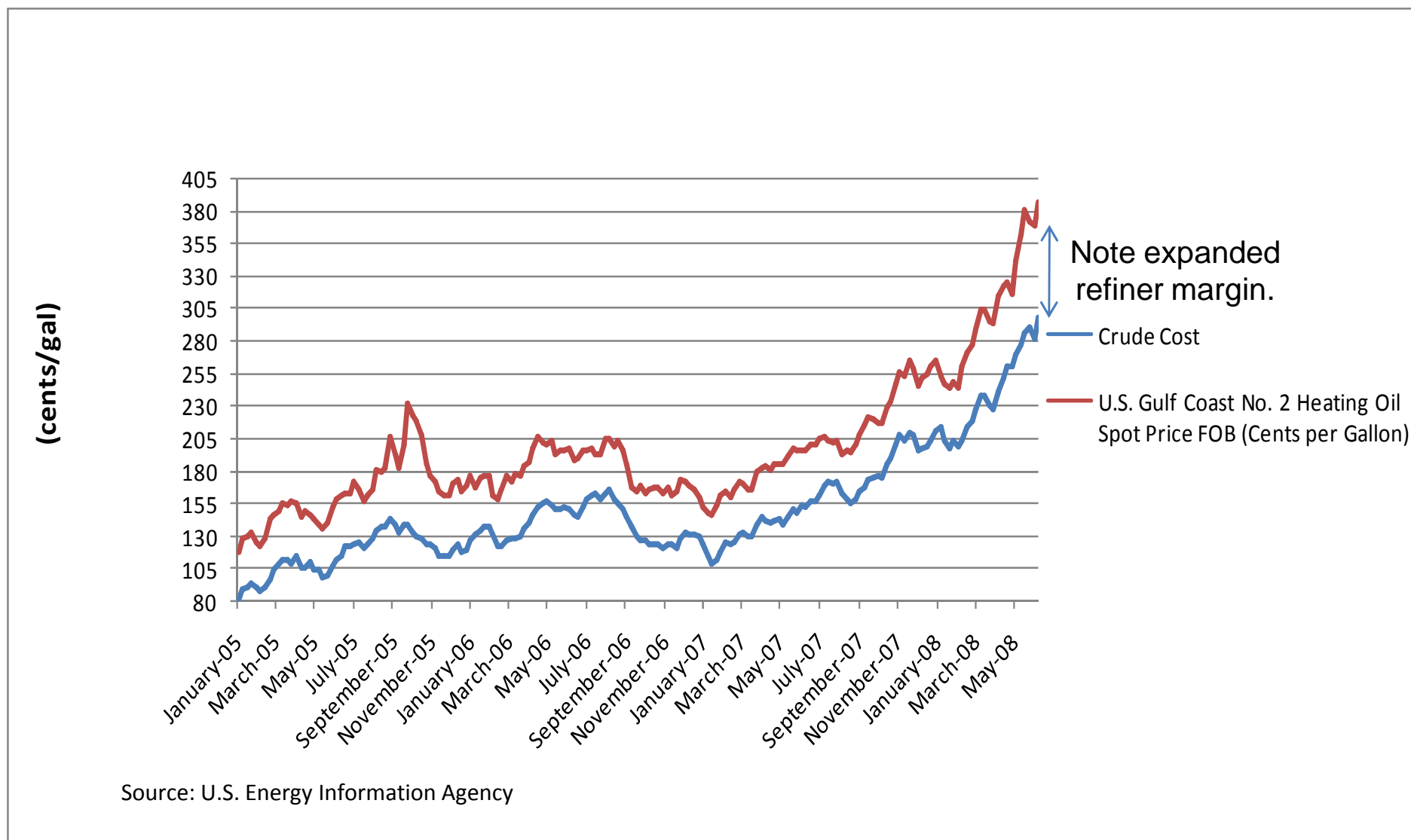
Source: U.S. Energy Information Agency

Gasoline Imports as Percentage of Consumption: 2005 - 2008

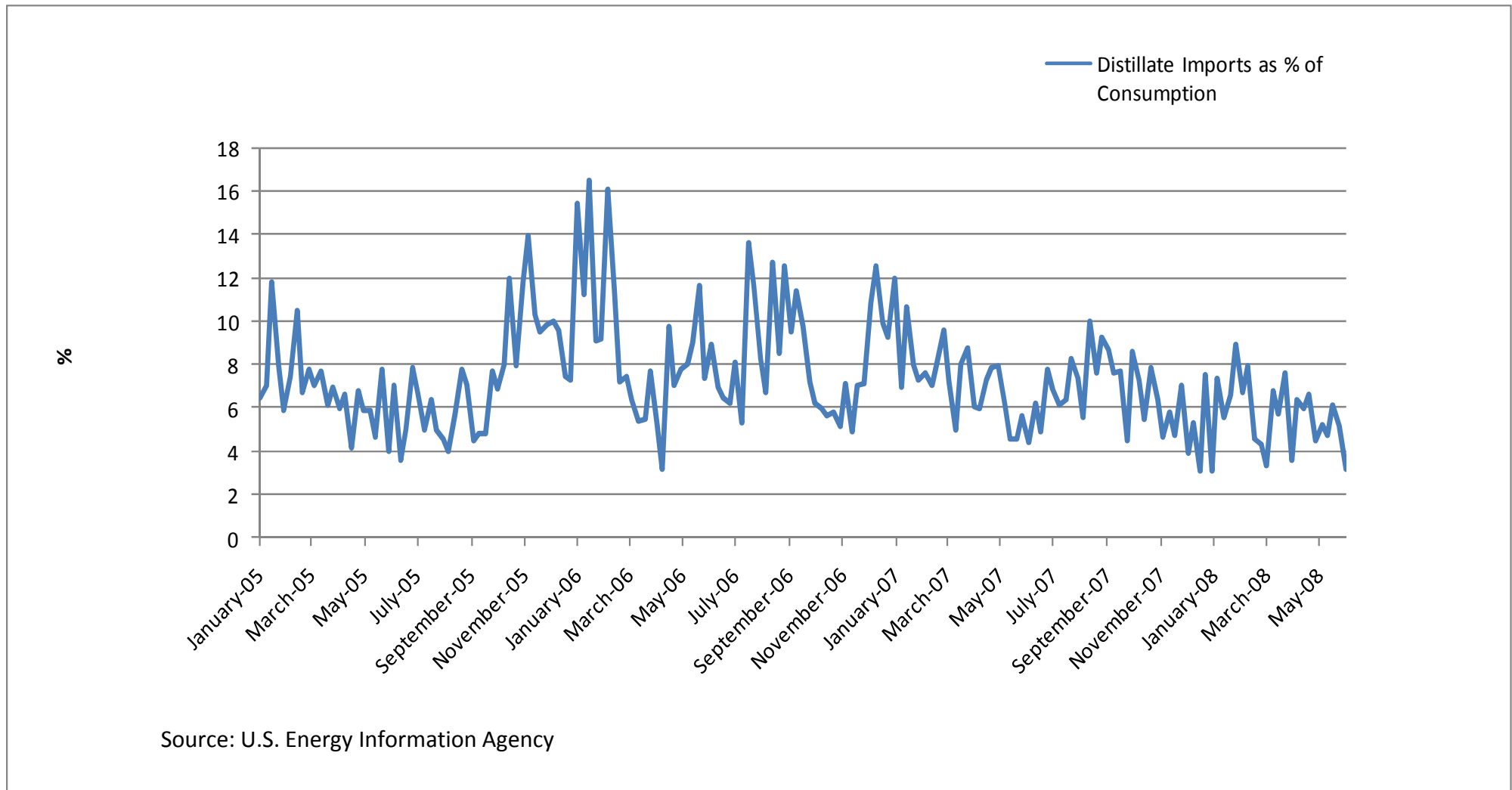


Source: U.S. Energy Information Agency

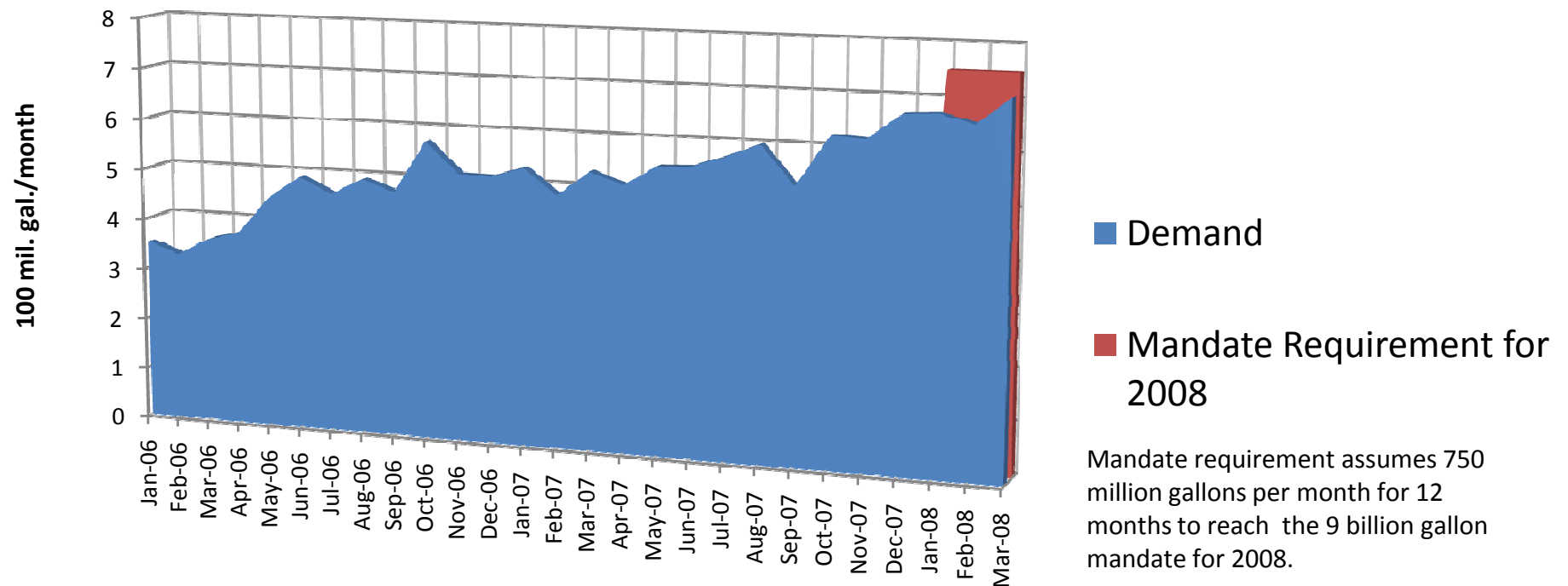
U.S. Wholesale Distillate Price and Crude Cost: 2005 - 2008



Imports Share of U.S. Distillate Supply: 2005 - 2008



US Ethanol Consumption: 2006 - Present



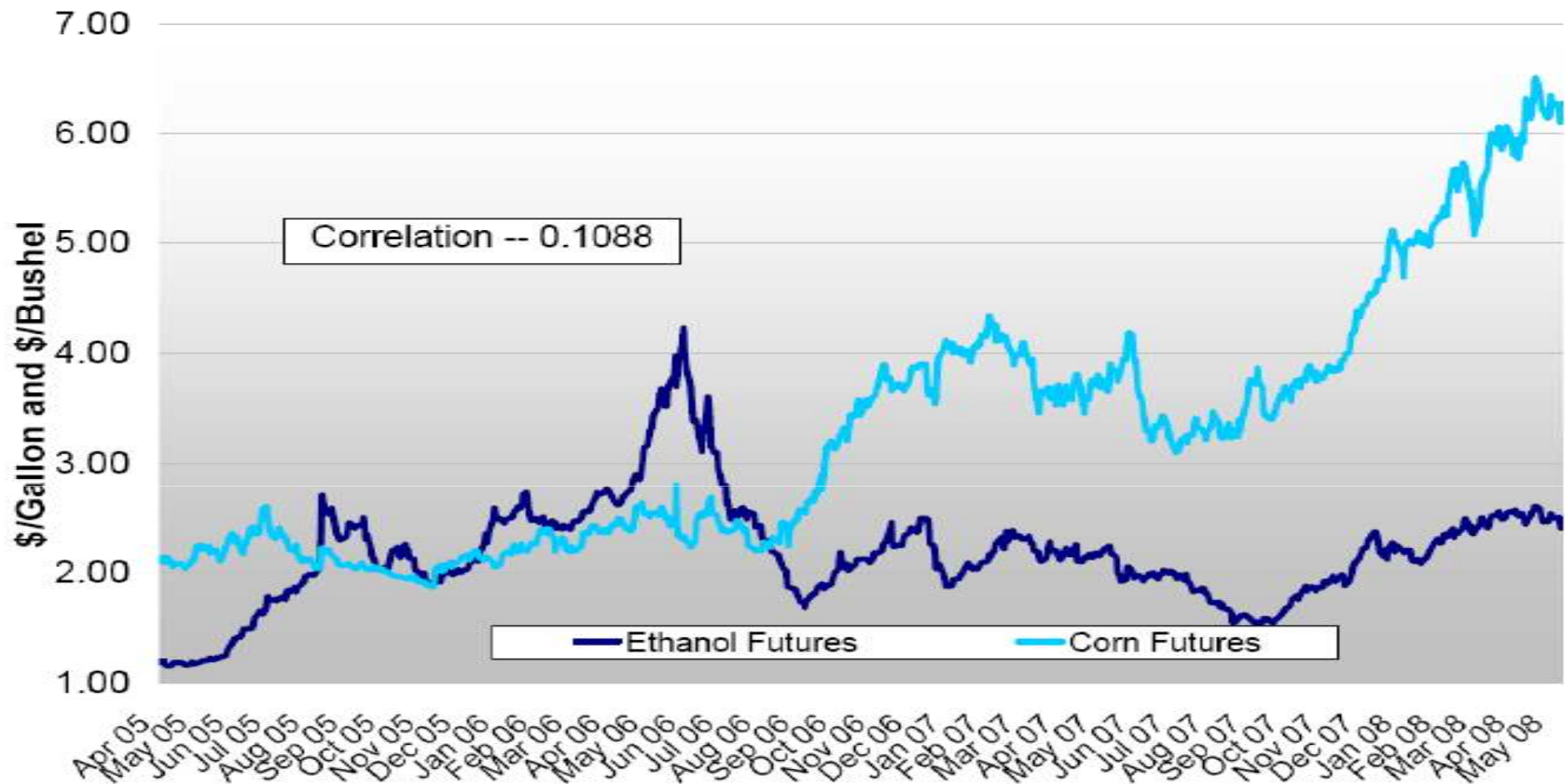
Source: Renewable Fuels Association

US Ethanol Consumption: 2006 - Present

- Quick ramp-up made it look easy—but really was **displacement of MTBE**
- Ethanol does not displace much foreign oil. 6 bil gallons per year of ethanol saves approx 100 million bbls of oil.
- Corn prices have risen from \$1.60 to \$7.00. How much attributable to ethanol driven demand? \$1.00? \$2.00?
- At \$1.00/bu, oil saved cost \$130/bbl; at \$2.00/bu, the figure is \$230 per bbl.
- Current Ethanol Economics Looks Dickey—With high corn prices, low fuel ethanol prices, existing plants earn losses.
- Existing plants have 7 bil gal capacity; mandate calls for 2 bil more
- Plants under construction and planned may not be completed/brought on line
- If corn prices remain stable at current levels, ethanol prices must rise by at least \$0.50 per gallon in order for ethanol to be sufficiently profitable to attract investment.
- More capacity needed to meet 9 bil gal mandate for 2008

CBOT Ethanol Futures versus CBOT Corn Futures

Corn and Ethanol prices go wrong way



Ethanol Production Cost

Ethanol Production Cost (\$/gal.)

Cost	Wet Mill	Dry Mill
Natural Gas	0.30	0.30
Miscellaneous Inputs	0.56	0.52
Corn (\$6/bu)	2.31	2.14
Co-product credit	-1.03	-0.41
Subtotal	2.14	2.55
Remaining To Cover Fixed Costs/Profit	0.36	-0.05

Sources: Simmons & Company International; EPRINC Calculations