

U.S. Refiners'

Crude Costs Traps

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OPIS Supply
2002

Fourth Grade Student Suzuki

- **Patrick Henry – 1775**
- **Abraham Lincoln – 1863**
- **Lee Iacocca – 1982**
- **President George Bush – 1991**
- **President Bill Clinton to Monica Lewinsky – 1997**
- **Gary Condit to Chandra Levy – 2001**
- **Arthur Andersen – 2002**

Suzuki Could Have Also Answered

	Losses for Nine Months 2002 <u>(MM\$)</u>
● Tom O'Malley, Premcor CEO	150
● Bruce Smith, Tesoro CEO	80
● Jim Gibbs, Frontier CEO	7

Sales of U.S. Refineries*

1987-2001

Number of Refineries Sold	88
Total Capacity, MBPD	9,209
Average Capacity, MBPD	105
Average Replacement Cost, MM\$	793
Average Sales Price	
MM\$	205
\$/BPD	1,957
% of Replacement Cost	26

* Figures shown are estimates by Turner, Mason & Company based on public information and other sources.

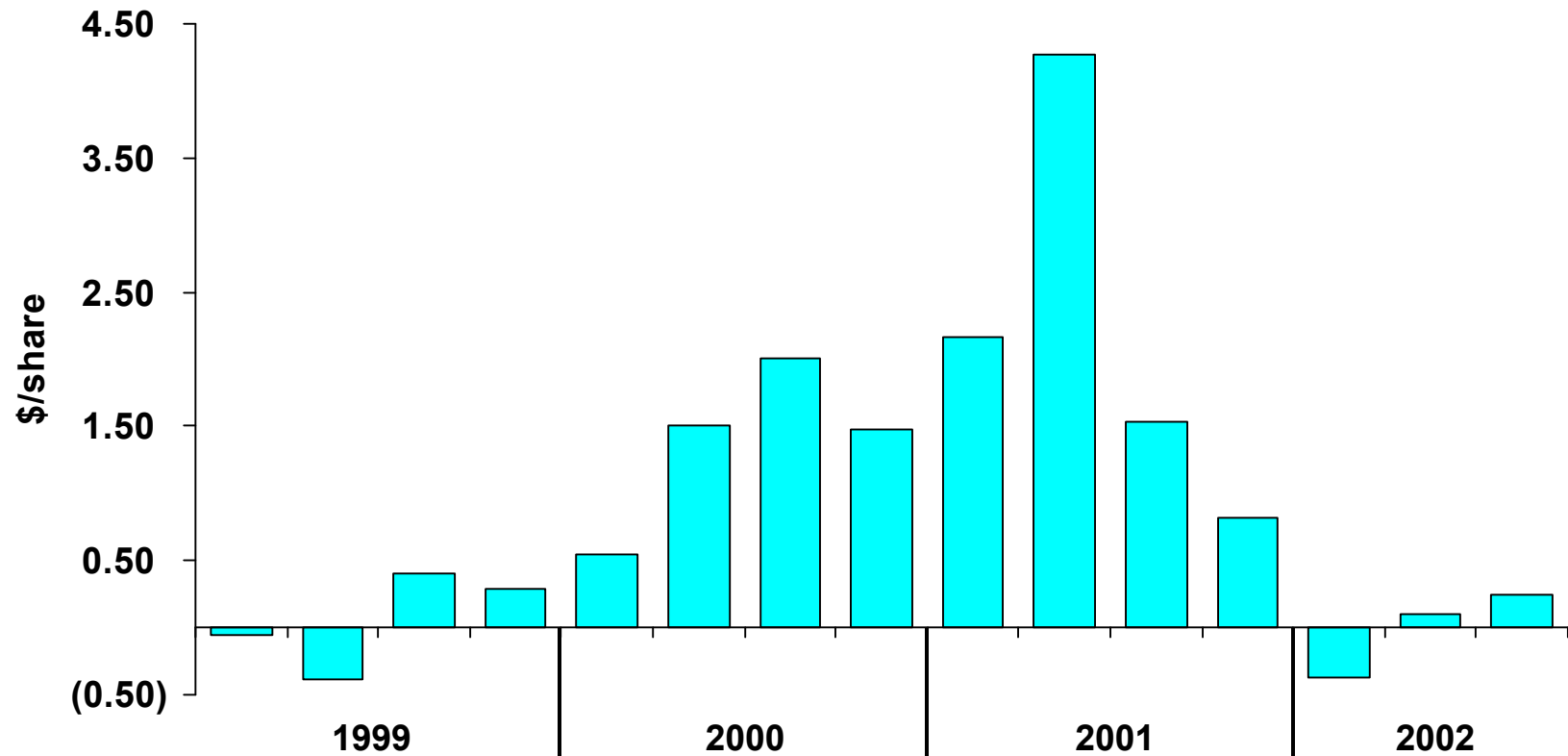
Some Observations

- U.S. refinery values are deeply discounted from replacement costs
- Premcor Port Arthur Refinery Book Value: >\$4,000 per BPD
 - (versus sales average of <\$2,000 per BPD)
- Recent Tesoro Refinery Purchases

	<u>% replacement cost</u>
– 1997: Anacortes	30
– 2000: Mandan and Salt Lake City	53
– 2002: Avon/Golden Eagle	37
- Retail/Convenience Stores
 - Contrast sharply with U.S. refineries
 - Normally sell at or above replacement costs
 - Active new construction

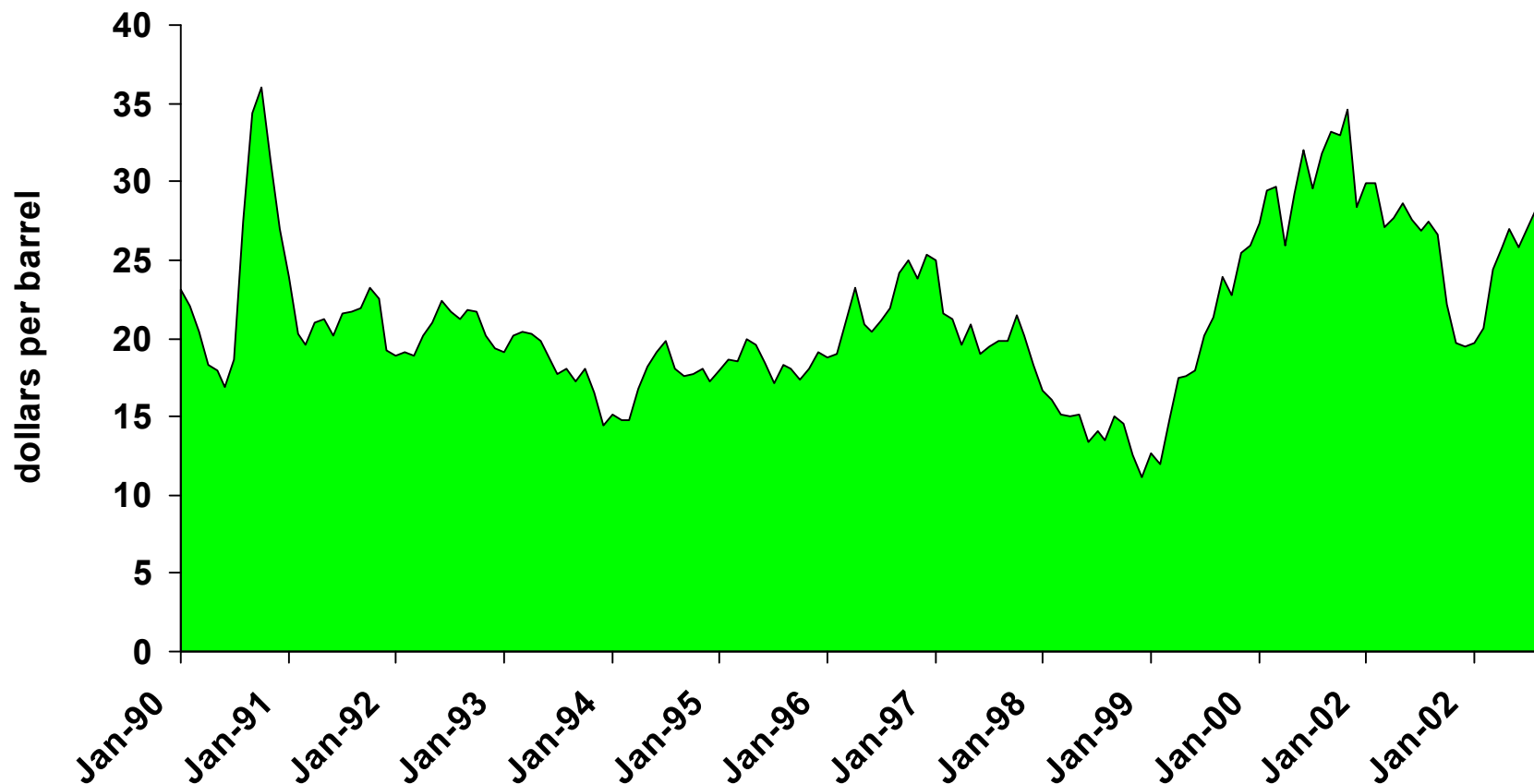
U.S. Refiners Suffer from Exceptional Volatility

Example: Valero Energy Corporation Earnings



Volatility (cont.)

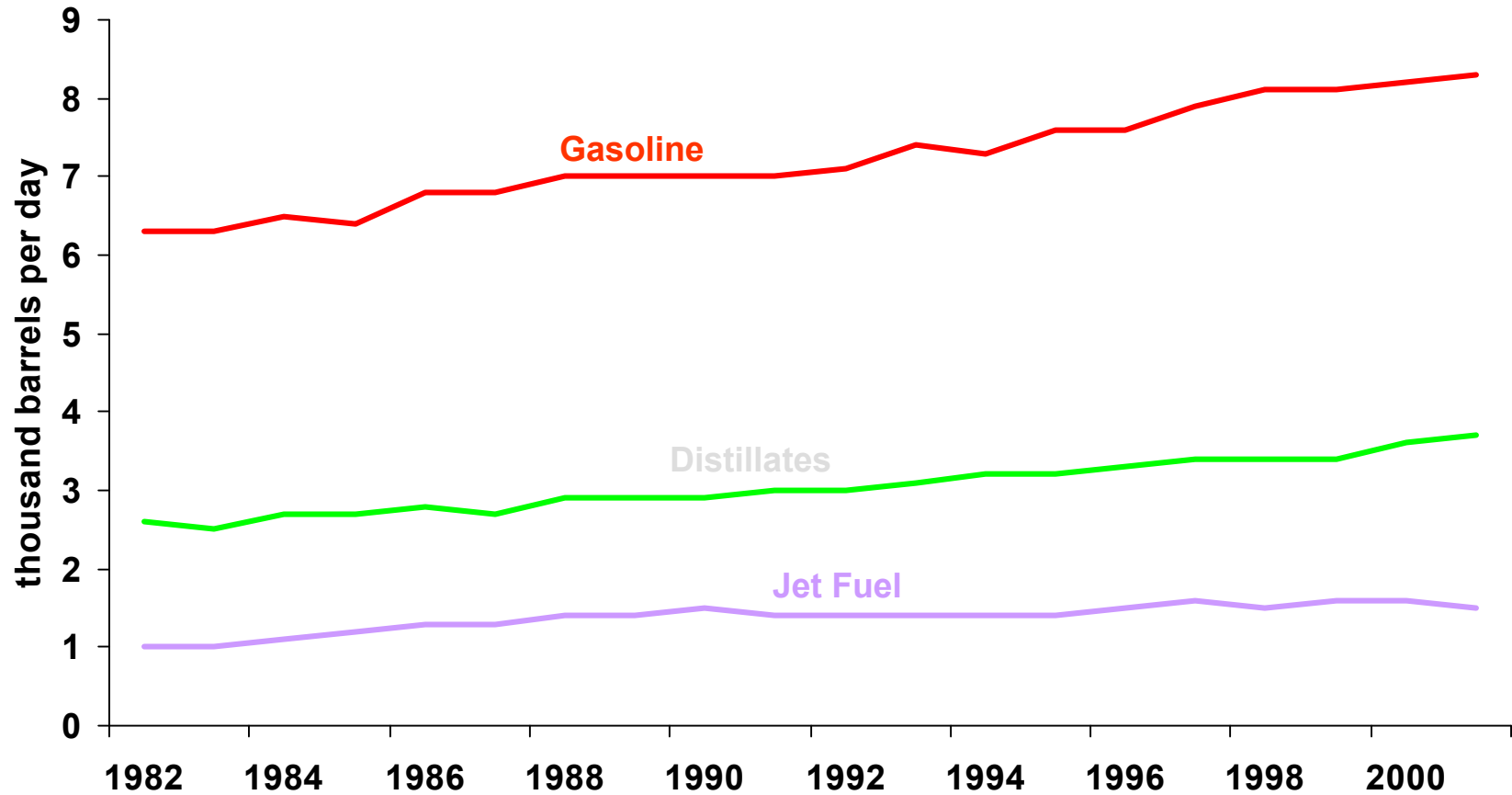
Example: WTI Monthly Average Spot Price



Why Is This True for U.S. Refiners in View of:

- Product demand growth?

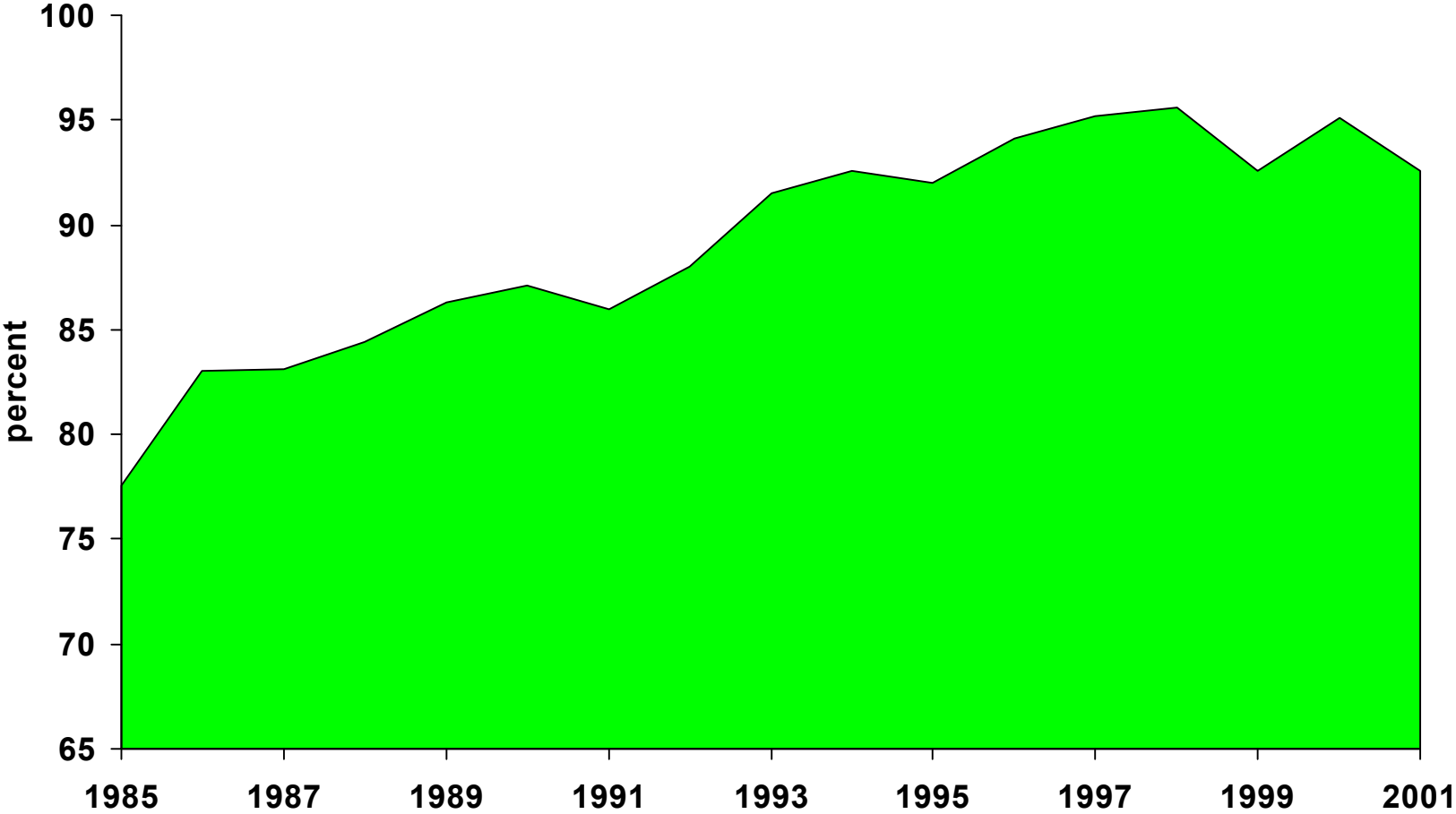
Demand for Gasoline, Distillates and Jet Fuel (MBPD)



Why Is This True for U.S. Refiners in View of:

- **Product demand growth?**
- **Capacity is tight?**

U.S. Refinery Capacity Utilization

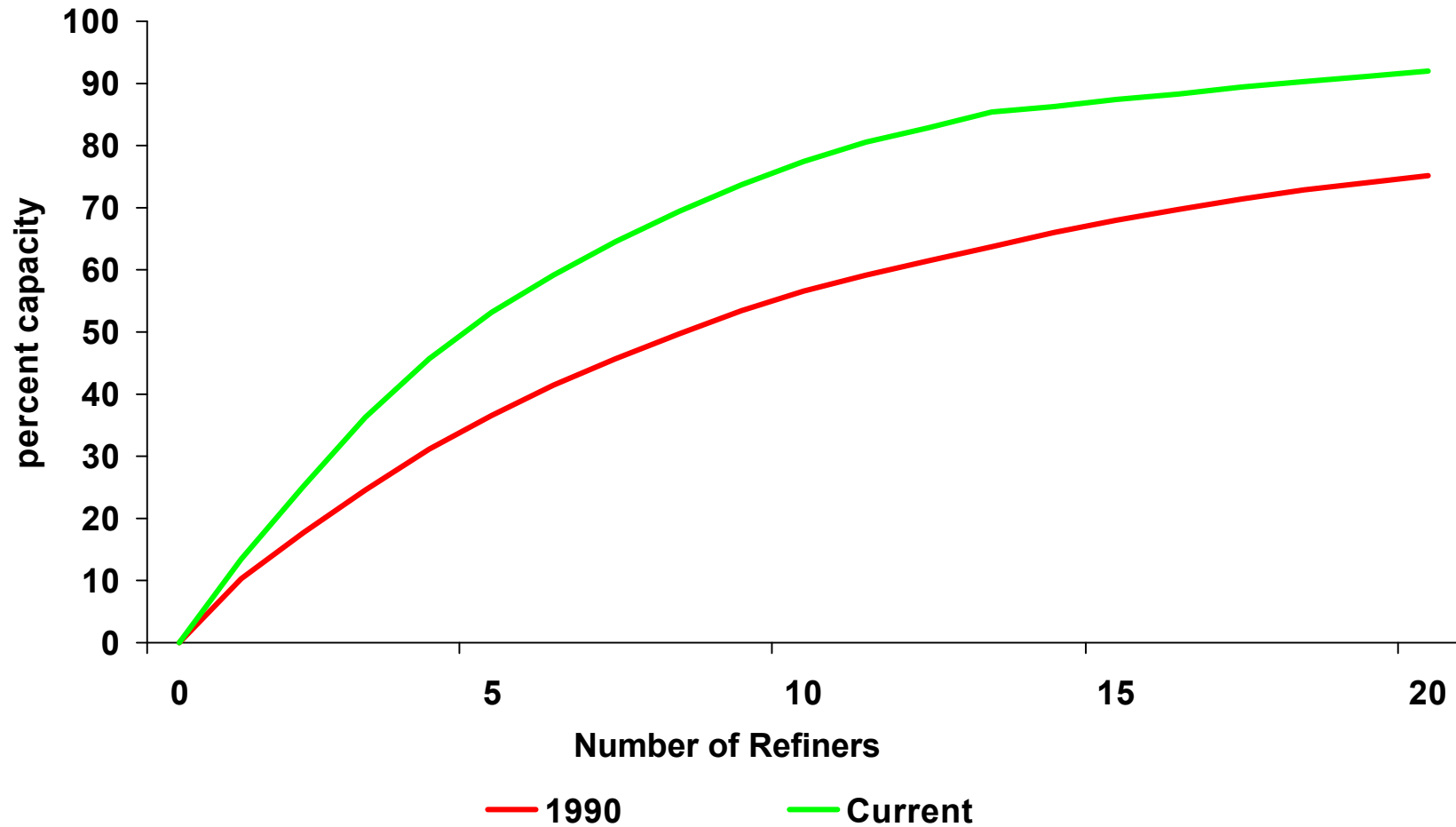


Why Is This True for U.S. Refiners in View of:

- **Product demand growth?**
- **Capacity is tight?**
- **Perceived environmental barriers to new entries?**

**All factors point to strong economic health!
This morning we will look for answers to this
PUZZLEMENT.**

Refinery Concentration Has Increased Dramatically Since 1990



Regional Concentration of U.S. Refinery Capacity

	<u>Operating Refineries</u> <u>Number</u>	<u>% Capacity</u>
East Coast DE, GA, NJ, PA, VA, WV	12	9.5
Gulf Coast AL, LA, MS, TX	50	45.9
Midcontinent AR, IL, IN, KS, KY, MI, MN, OK, TN, WI	29	21.5
Rockies CO, MT, NM, ND, UT, WY	19	4.3
West Coast CA, WA	25	15.7
Other AK, HI	<u>8</u>	<u>3.2</u>
Total U.S.	143	100.0

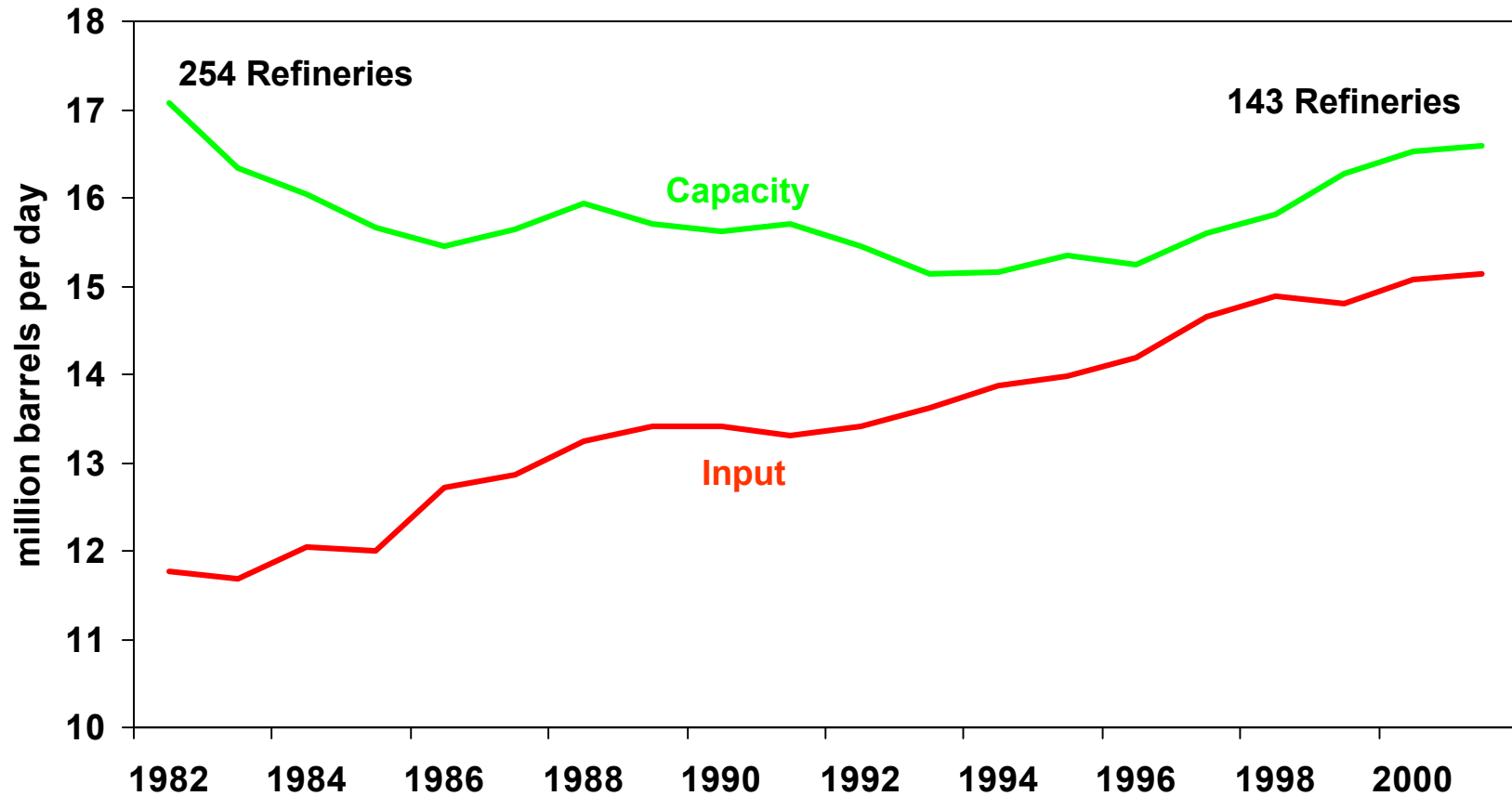
Top 10

<u>Refiner</u>	<u>Crude Capacity MBPD</u>	<u>Cumulative %</u>
Conoco/Phillips	2,191	13.3
ExxonMobil	1,978	25.2
Shell	1,806	36.2
BP	1,570	45.7
Valero	1,244	53.2
ChevronTexaco	969	59.1
Marathon Ashland	935	64.7
Citgo	769	69.4
Sunoco	730	73.8
Koch	587	77.3

The Rest

<u>Refiner</u>	<u>Crude Capacity MBPD</u>	<u>Cumulative %</u>
Tesoro	554	80.7
Premcor	390	83.0
Williams	385	85.4
Atofina	176	86.4
El Paso	170	87.5
Crown	160	88.4
Orion	155	89.4
Sinclair	153	90.3
Frontier	146	91.2
Lyondell	136	92.0
All Others	1,321	100.0

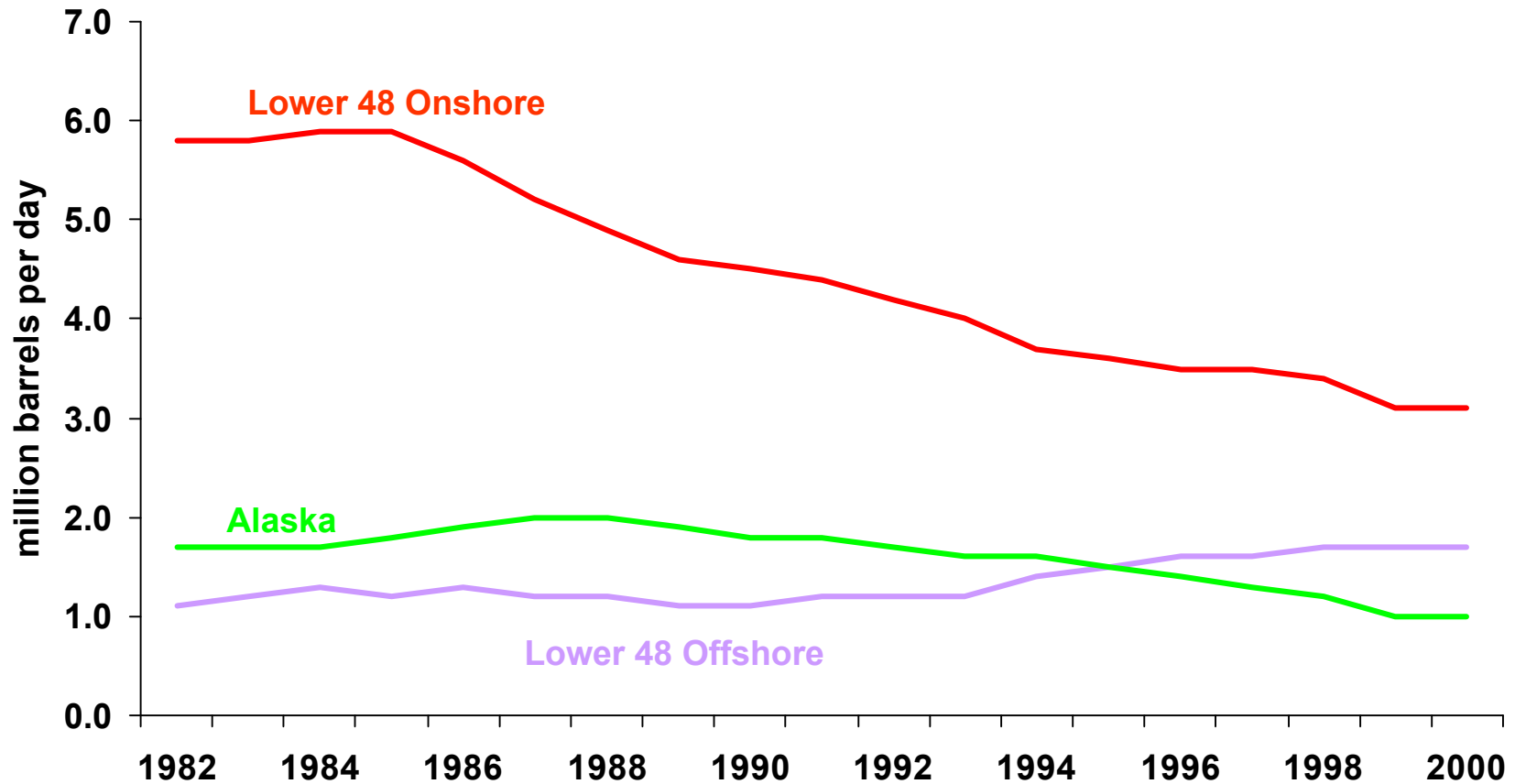
U.S. Crude Oil Refinery Capacity and Input



U.S. Crude Oil Production – 2001

	<u>MBPD</u>	<u>% of Total</u>
Texas	1,162	20
Alaska	963	17
California	714	12
Louisiana	287	5
Oklahoma	188	3
New Mexico	186	3
Wyoming	157	3
Other	<u>2,144</u>	<u>37</u>
Total	5,801	100

U.S. Crude Oil Production



U.S. Gulf Production Will Dominate

Quotes by BP's John Browne

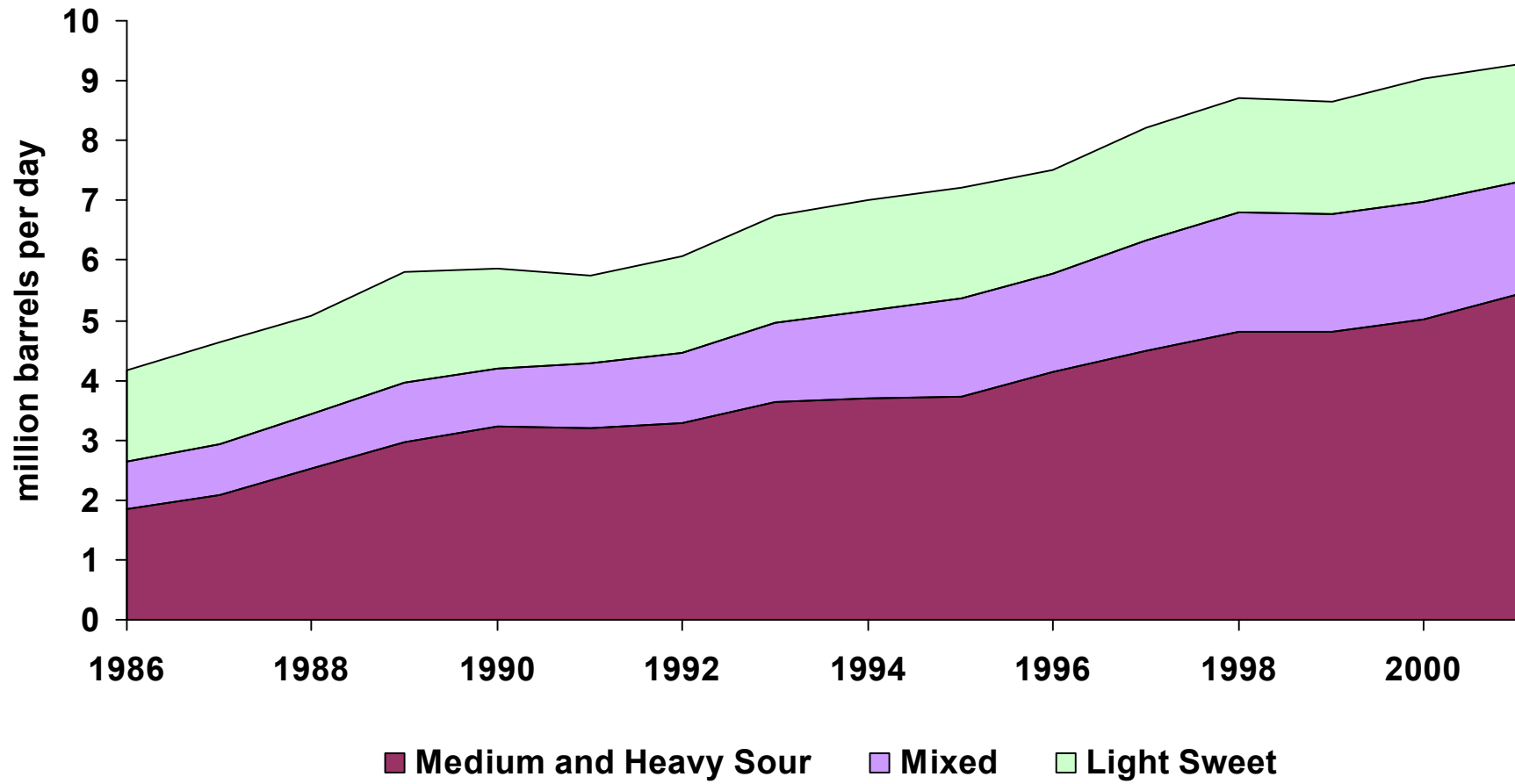
- **“Our current production in the deepwater Gulf alone is 230,000 b/d of oil . . . and 520 mmscf/day of natural gas.**
- **“By 2005 that is set to increase to 400,000 b/d of oil and 580,000 mmscf/day of gas.**
- **“In total the deepwater Gulf should be producing around 1.9 mmbd of oil and 4.4 bcf/day of natural gas.**
- **“And there is more to come beyond that.”**

U.S. Crude Oil Imports – 2001

	<u>MBPD</u>	<u>% of Total</u>
Saudi Arabia	1,611	17
Mexico	1,394	15
Canada	1,356	15
Venezuela	1,391	14
Africa	1,362	15
Other Middle East	1,097	12
North Sea	525	6
Other	<u>692</u>	<u>7</u>
Total	9,328	100

Heavy Crude Oils Accounted for Import Growth

Approximate Quality Mix of U.S. Crude Oil Imports

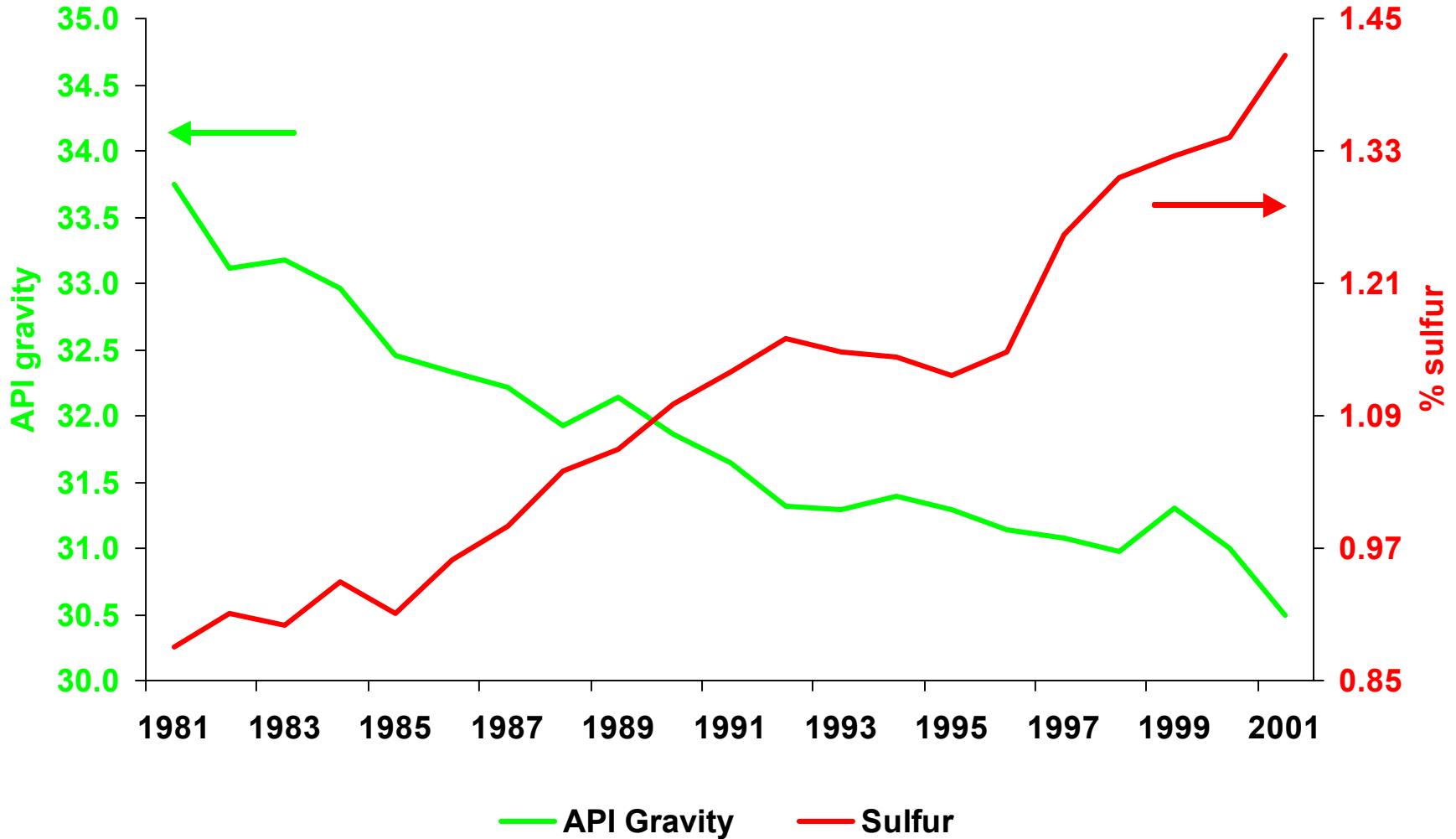


Source: EIA

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U.S. Refinery Input Quality

Gravity Down, Sulfur Up

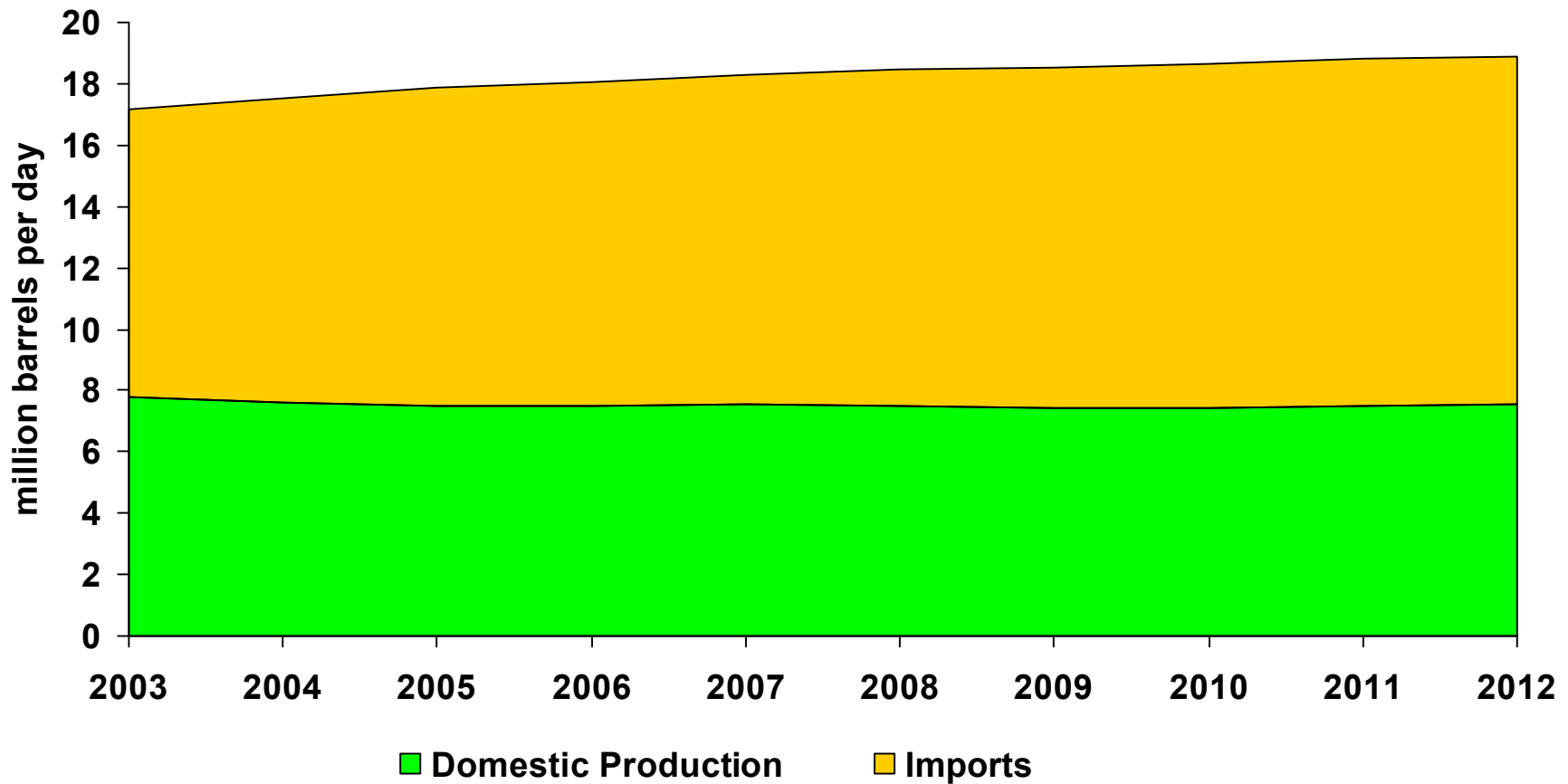


Source: EIA

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U.S. Gulf Will Reduce Domestic Decline

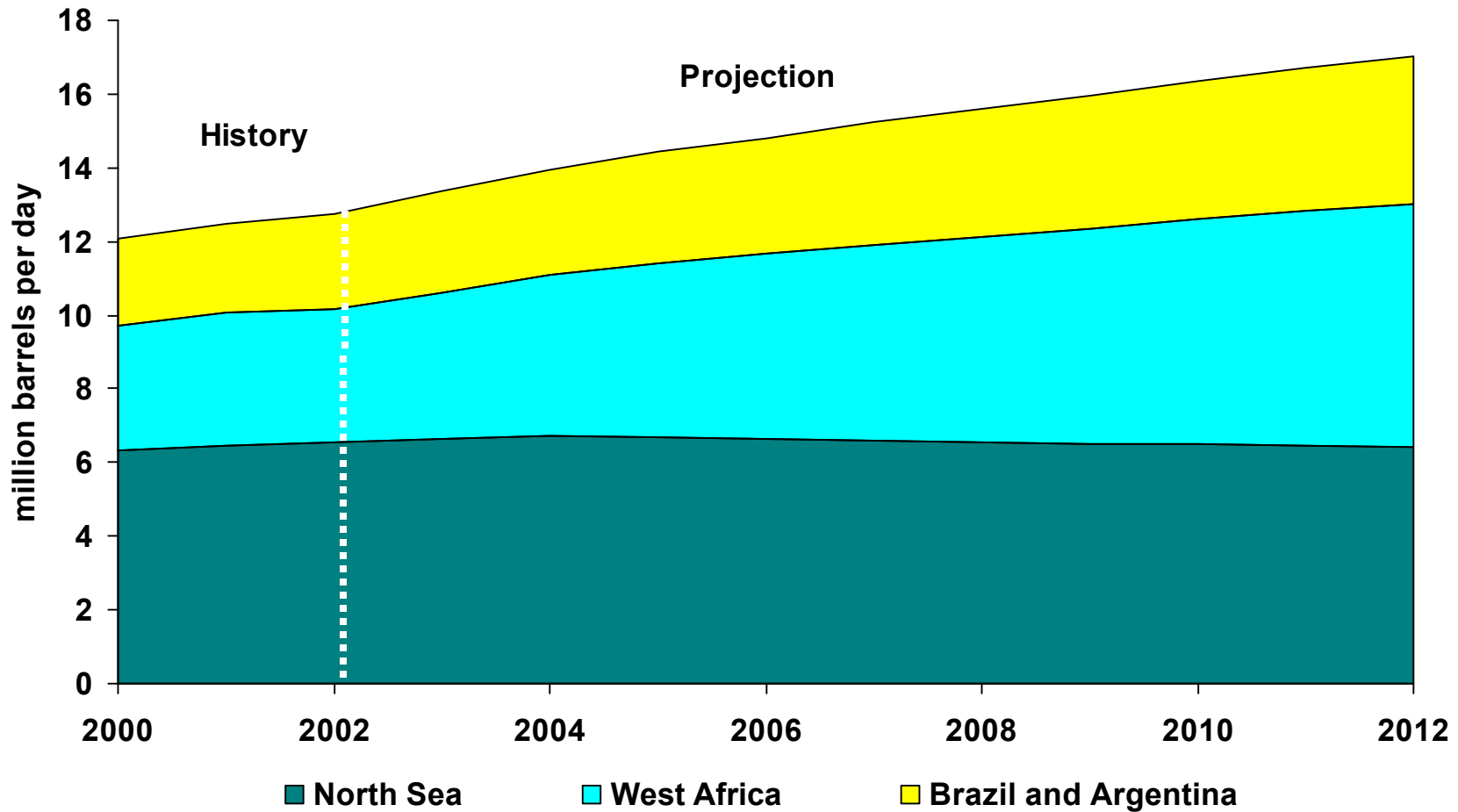
Imports Will Increase



Source: EIA - AEO 2002 Outlook

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Consulting Engineers

Light Sweet Crude Availability Continues to Grow



Source: EIA

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Russia's Crude Capability

- **USSR was world's largest producer from 1974 to 1992**
- **Russia now second behind Saudi Arabia**
- **Accounts for about 10% of world production**
- **Production hit low point in 1998, but increased in 2001 to 7.3 MMBPD**
- **Exports hit low of 3.2 MMBPD in 1994, but have risen to 5.0 MMBPD**

Russia's Crude Exports to U.S.

- **Yukos sent first shipment in July 2002**
- **Tyumen Oil Company sent shipment in September 2002**
- **Exports to U.S. projected to reach 400 MBPD by end of 2003; recent statements by oil executives point to above 1,000 MBPD after 2007**
- **Deep water terminal at Murmansk on Barents Sea being studied; expectations call for high quality sweet crudes**
- **Russian exporters lose money now, but hope to be economically viable in three years**

World Crude Oil Proved Reserves 2001

<u>Country</u>	<u>Billion Barrels</u>	<u>R/P Ratio</u>
Saudi Arabia	259	89
Iraq	113	120
UAE	98	113
Kuwait	94	146
Iran	90	67
Venezuela	78	70
FSU	57	25
Libya	30	57
Mexico	27	24
China	24	20
Nigeria	24	32
United States	22	10
Other	<u>117</u>	13
Total	1,032	42

Crude Oil Prices

- **Through 1970s, posted prices dominated crude oil transactions**
- **Only petroleum refiners can use crude oil; ultimate disposition is limited to relatively few companies**
- **Posted prices for crude oil were, for many years, announced only by refiners or their affiliates**
- **In the U.S., “posted price” means the price a buyer (not seller) is willing to pay for removal of crude oil from an oil field lease**

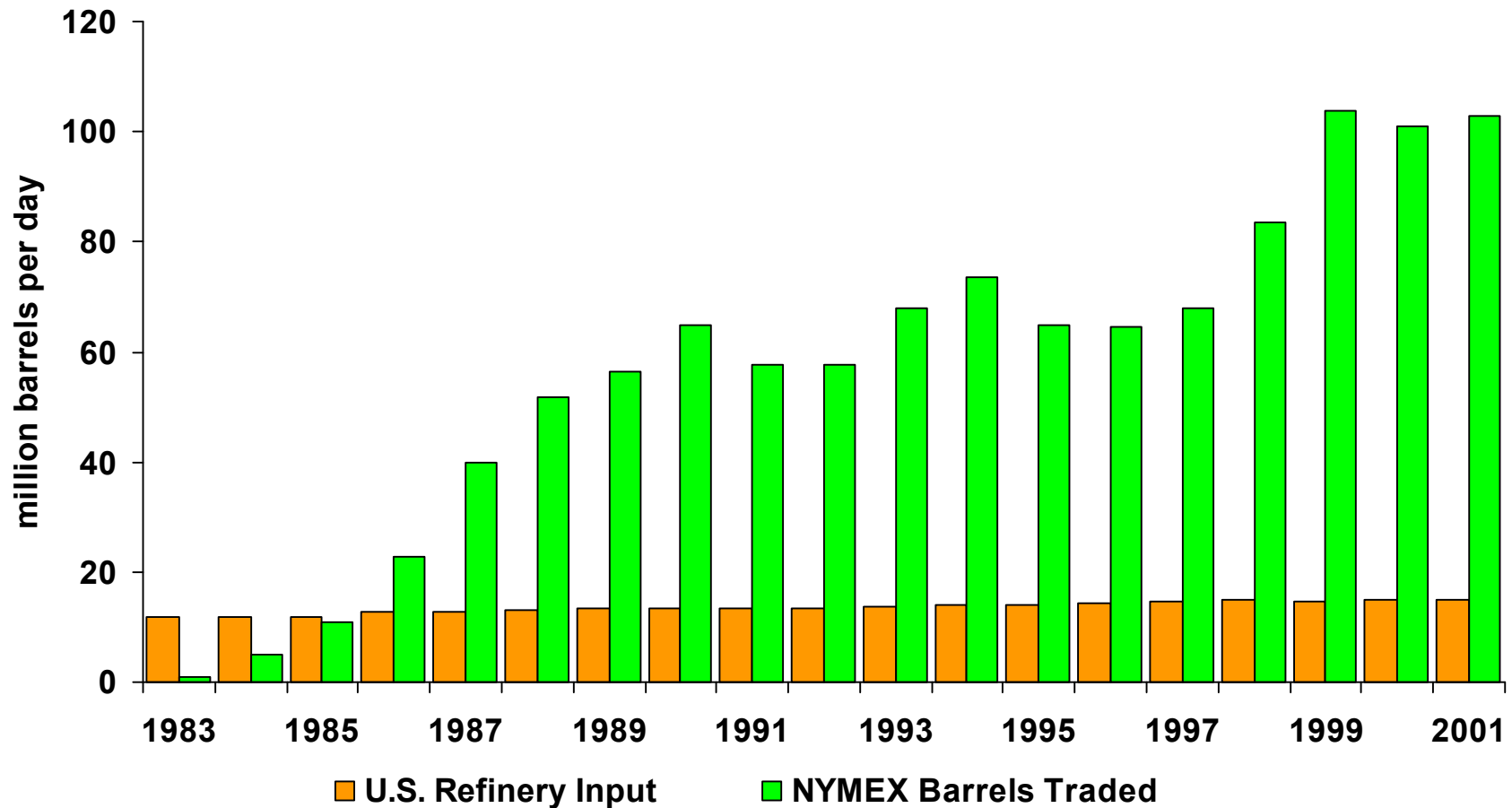
Crude Oil Prices (cont.)

- **Following decontrol by the Reagan Administration in January 1981, free markets brought about drastic changes in petroleum pricing; to the surprise of oil companies and their critics, prices dropped rapidly**
- **Spot prices for crude oil quickly gained importance and dominated physical trading; major oil companies never regained their earlier role as price setters in petroleum markets**
- **By 1986, paper trades on the NYMEX far exceeded physical trades; futures buying and selling led to sophisticated strategies among industry players involving cracks, rolls and swaps**

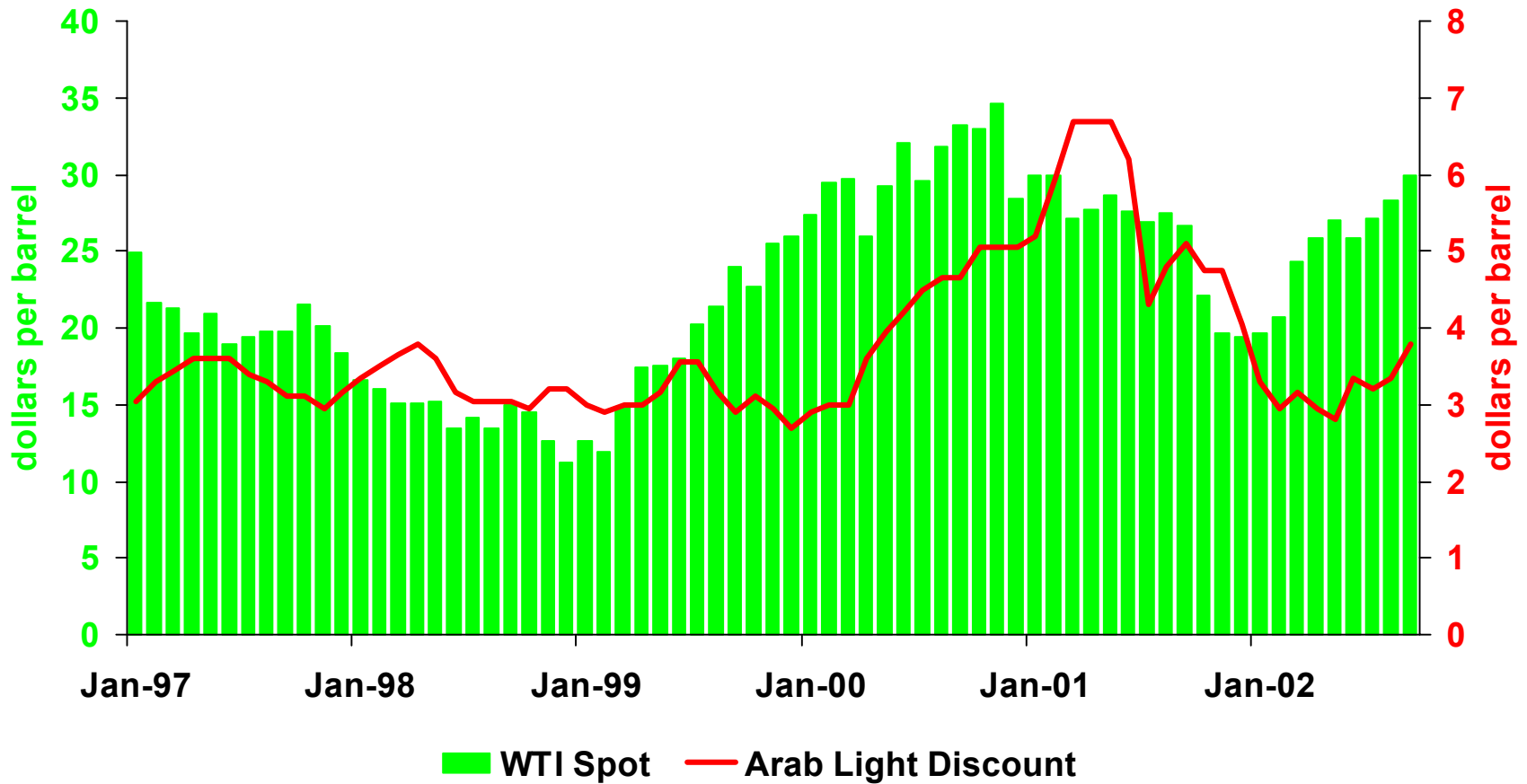
Crude Oil Prices (cont.)

- **Today crude oil prices are established for the most part by commodity traders using reference pricing to the NYMEX and IPE; likewise, petroleum products in most U.S. markets are referenced to the NYMEX**
- **Posted prices for crude oil follow – not lead – the NYMEX, and the major companies have essentially no leadership role in the “games” played among traders using posted prices and monthly NYMEX spreads**
- **In addition to commodity traders, there are two other entities that strongly impact U.S. refiners’ crude costs with their pricing formulae – Saudi Aramco and Pemex**

Crude Oil Traded Daily on NYMEX vs. Actual U.S. Refinery Input of Crude Oil



WTI Spot vs. Arab Light Discount



Pemex Pricing Formula for Maya Crude (\$/B)

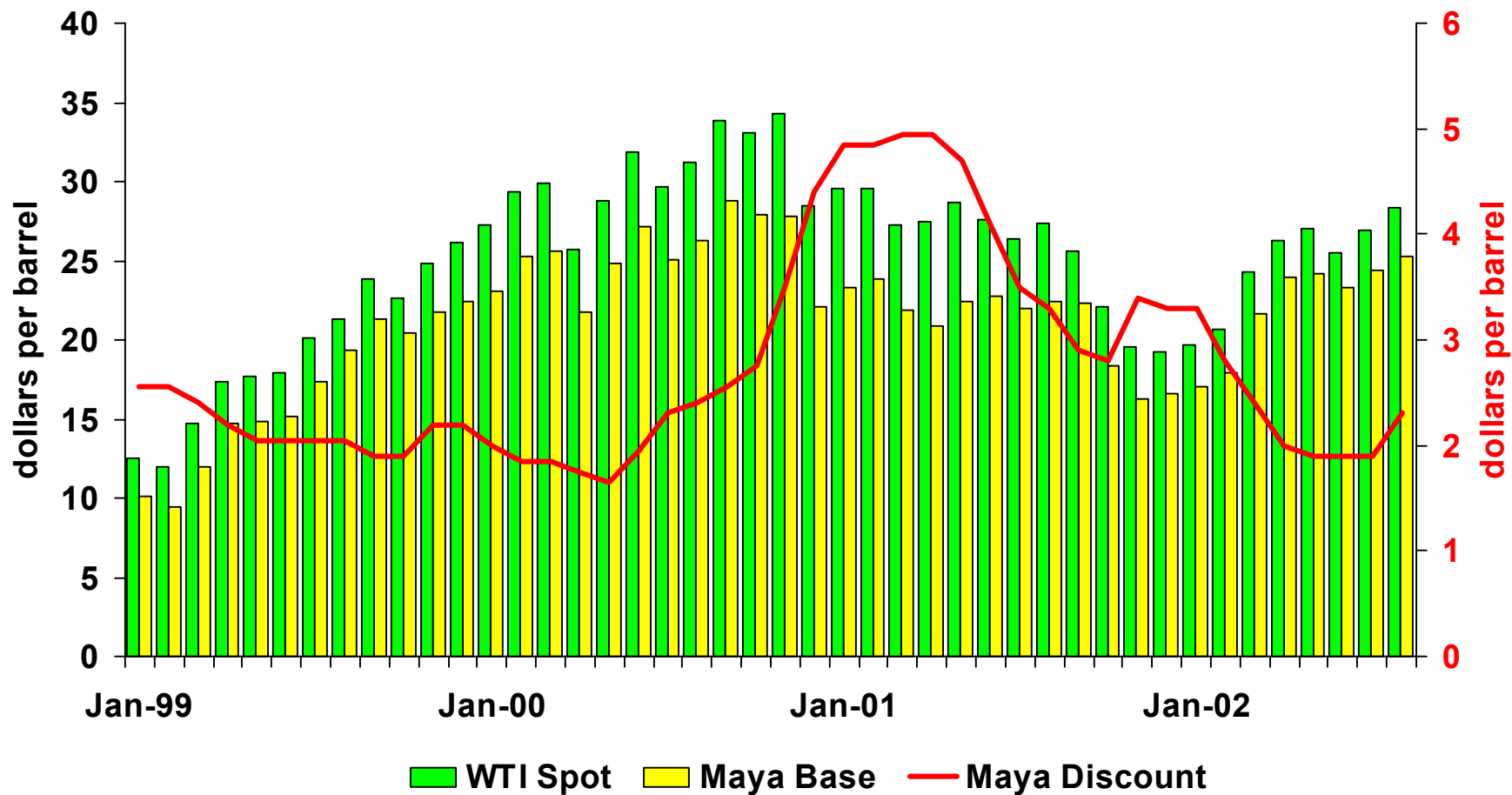
$$\text{Base} = 0.4 \times [\text{WTS} + 3\% \text{ Resid USGC}] \\ + 0.1 \times [\text{LLS} + \text{Brent}]$$

$$\text{Maya (fob)} = \text{Base} - \text{C}$$

where,

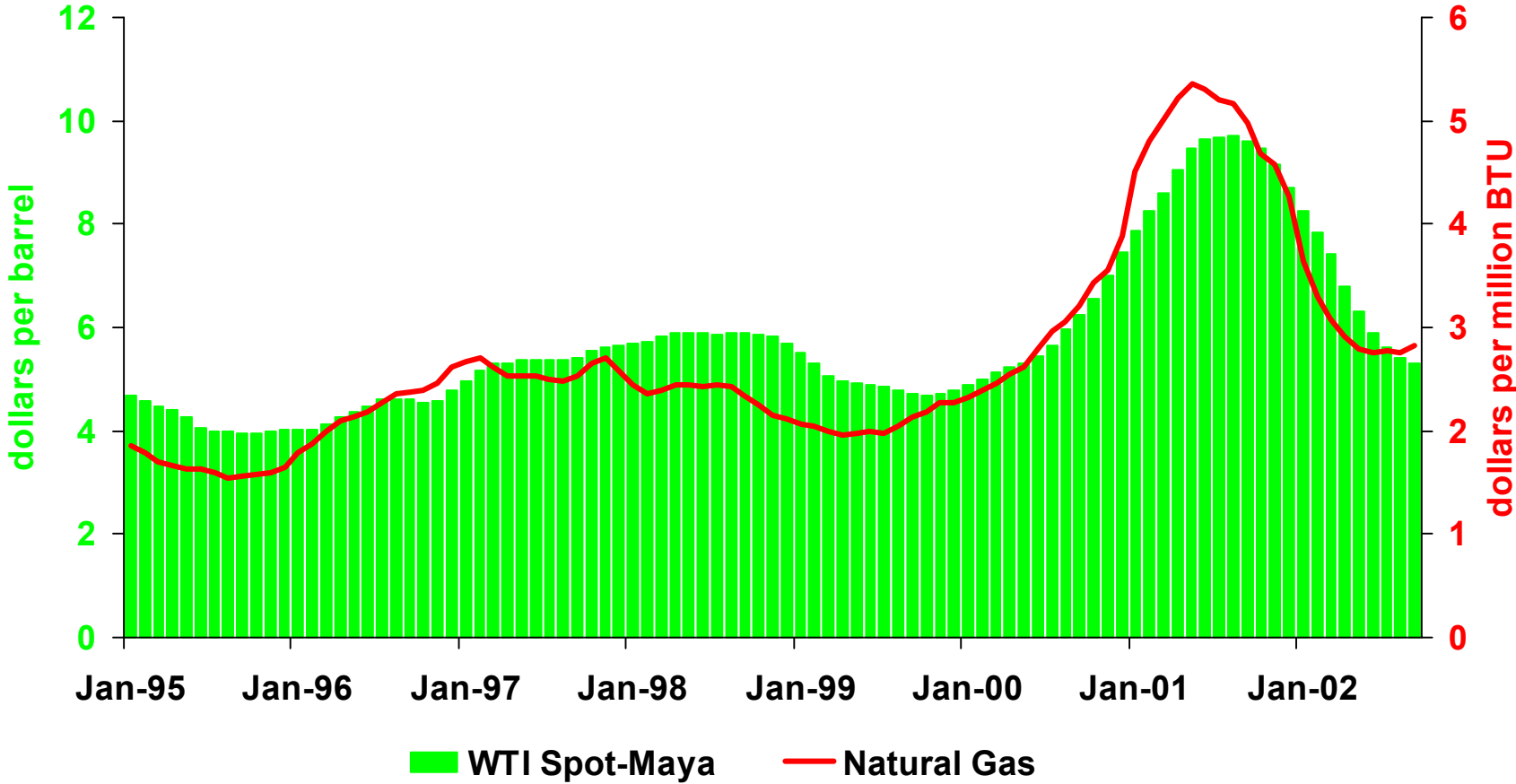
C is Pemex monthly adjustment for U.S.

WTI Spot vs. Maya Discount



WTI-Maya vs. Natural Gas Price

12-Month Rolling Average



Role of U.S. Refiners

- Refiners are the sole “crude oil consumers”; only a few players – top three U.S. refiners process 36% of crude oil; top 10 U.S. refiners process 77%; top 20 process 92%.
- Since mid-1980s, these few “crude oil consumers” have had virtually no voice in the price they pay for their primary raw material!
- For the most part, refiners do competitively determine the *relative prices* paid for various crude oils to reflect quality and location differentials. Yet they have only minor ability to establish *absolute prices*!

Role (cont.)

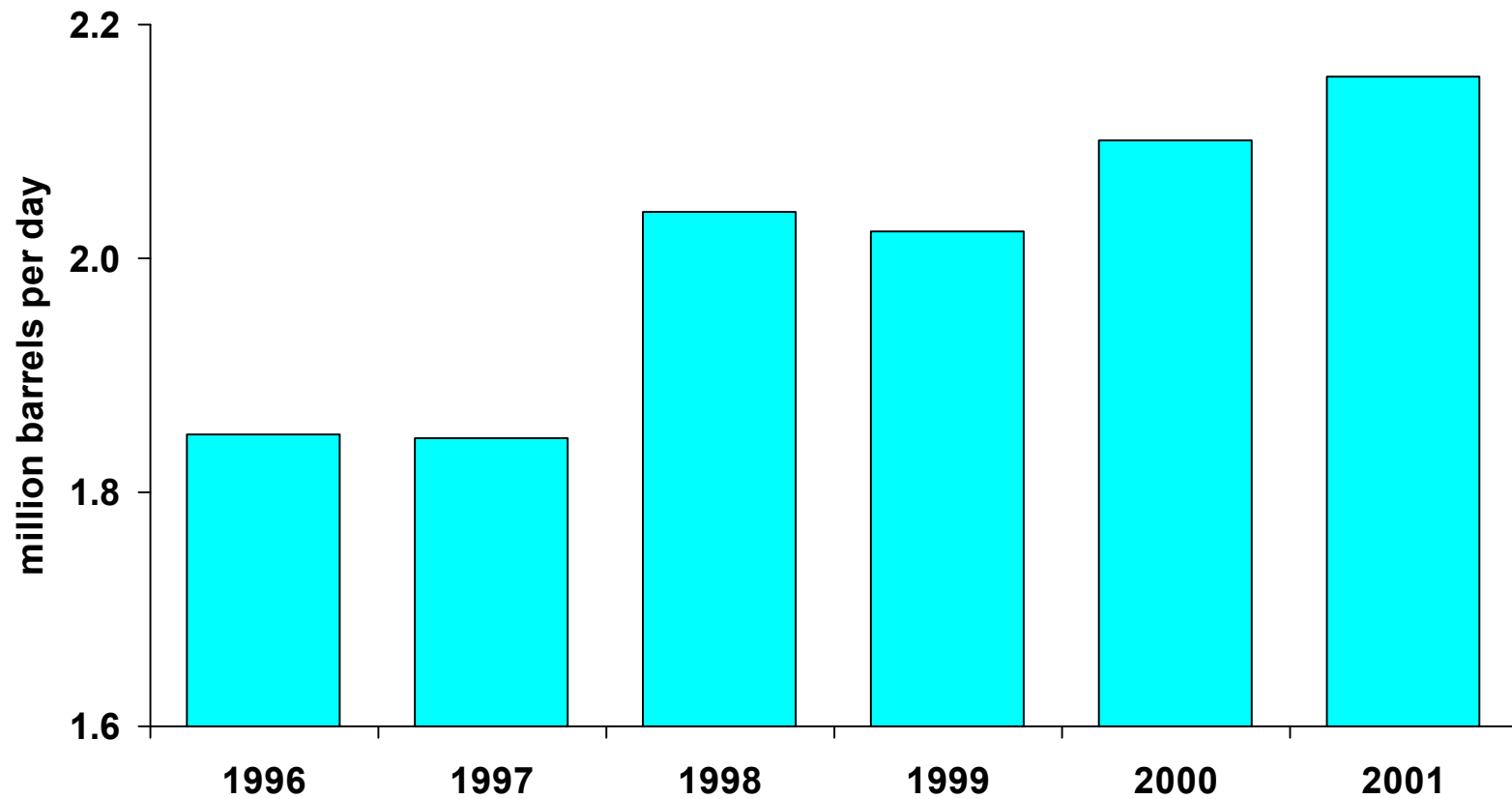
- **Most U.S. refiners use sophisticated LP models to guide their crude oil purchase selections by computing relative refining values and comparing with market availabilities.**
- **Several small U.S. refiners really have no choices for their crude oil supplies. They simply purchase what is available to them and pay prices set by others.**
- **U.S. refiners, especially during the last five years, have exercised stronger control over their crude runs in response to product demands and inventory levels. These actions, almost always led by very large refiners, have had positive economic impacts – but almost entirely on products prices. This has not proved to be an effective tool for U.S. refiners to reduce their crude costs.**

Role (cont.)

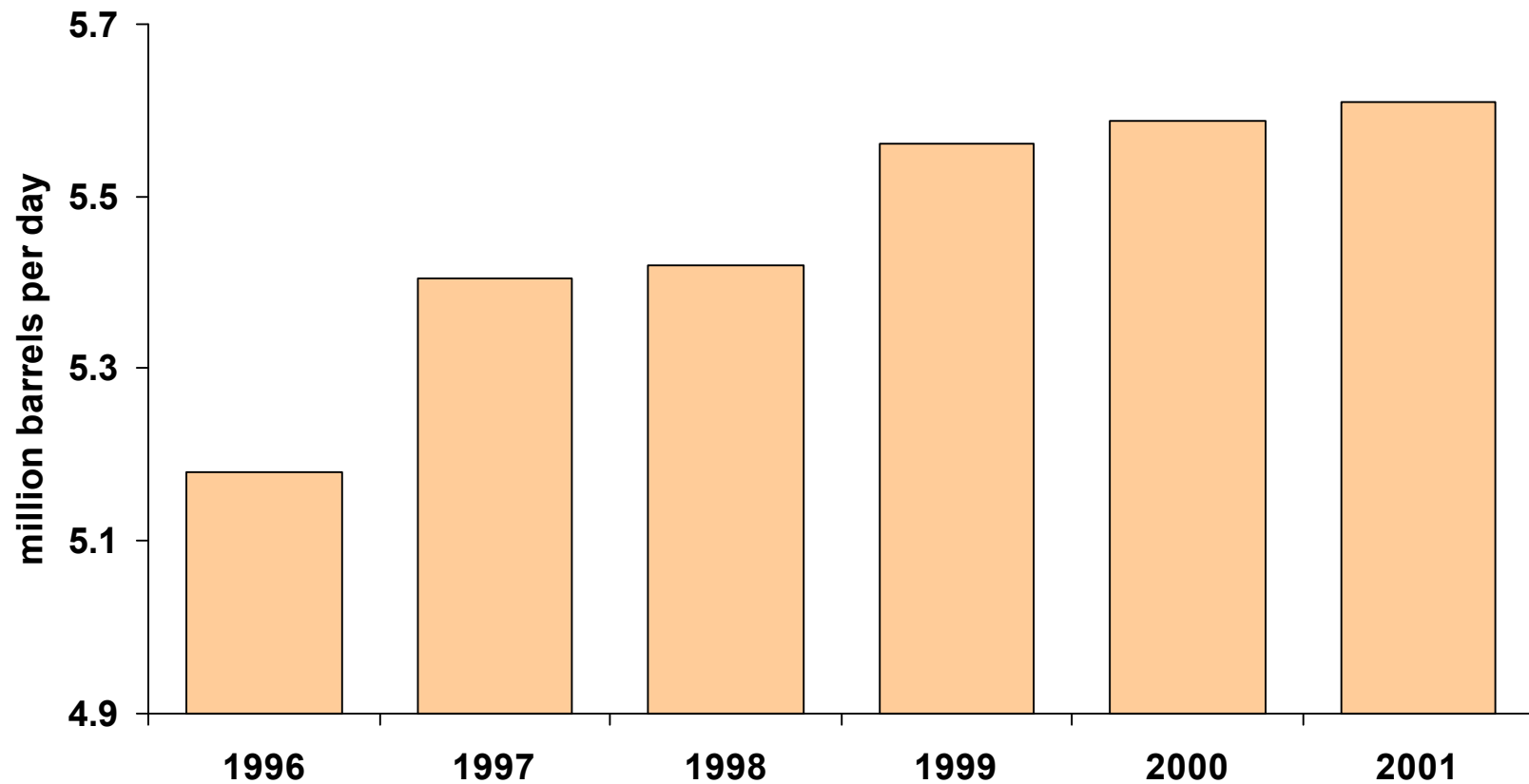
- Refinery configuration is another choice U.S. refiners have available to impact their economics. Many have opted to upgrade hardware to handle medium sour and heavy sour crudes.

<u>Estimated Capacity Increases 1997-2002</u>	<u>MBPD</u>
• New Medium Sour	350
• New Heavy Sour	450
• Conversions to Heavy Sour	450

Capacity Growth for U.S. Cokers



Capacity Growth for U.S. Cat Crackers



U.S. Refiner Myths

- **“I’ll outsmart those crude producers and refinery competitors by building a big coker to run cheap crude.”**
- **“In this business, you’ve got to have 200,000 BPD capacity to compete.”**
- **“You need to be located on the water.”**
- **“You need to be located inland in a niche market.”**
- **“Light sweet crude refiners don’t have a chance.”**

U.S. Refiner Truths

- **Large crude oil producers (Saudi, Pemex, Statoil, PDVSA) have models for U.S. refinery centers and develop sophisticated pricing strategies.**
- **It is virtually impossible for U.S. refiners to “outsmart” crude oil producers and suppliers.**
- **The basic concept that a particular quality and source of crude oil will provide long-term competitive advantages is fundamentally flawed.**
- **For every general rule (see “Myths” on previous slide), there are numerous exceptions. Turner, Mason & Company has observed losers and winners in all shapes, sizes and locations.**

Backcast Economics for Hypothetical 150 MBPD Gulf Coast Refineries (1997-2001)

<u>Refinery Type</u>	<u>Estimated Refinery Margin MM\$/Year</u>	<u>Relative Capital MM\$</u>	<u>Payout Over Base (years)</u>
Sweet Fuels	38	Base	-
Sweet Resid Cracking	55	100	5.9
Medium Sour Coking	89	900	17.7
Heavy Sour Coking	176	1,300	9.4

Hypothetical Grassroots Refineries

U.S. Gulf Coast

<u>Refinery</u>	<u>Description</u>	<u>Total Investment (billions of dollars)</u>
A	150 MBPD Sweet Crude Resid Cracking, Complexity 10.1	1.4
B	150 MBPD Medium Sour Crude Coking, Complexity 13.8	2.1
C	150 MBPD Heavy Sour Crude Coking, Complexity 14.0	2.3

Hypothetical Grassroots Refineries (cont.)

To earn a 15% IRR, the following typical price relationships would be required (\$/B):

	<u>required</u>	<u>last 12 mos.</u>
Gulf Coast Gasoline Crack	10	3.44
Gulf Coast Heating Oil Crack	8	1.24
NYMEX Crude Less Mars	7	2.64
NYMEX Crude Less Maya	10	5.65

Summary

- **For 20 years, U.S. refiners have been plagued by volatile financial results and sharply discounted refinery values averaging about one-fourth of replacement costs.**
- **Since 1982, the number of U.S. refineries has dropped from 254 to 143 today. There are now only about 60 refiners in the U.S., and these companies have met increasing capacity requirements by impressive expansions at fewer locations.**
- **Top three U.S. refiners process 36% of total crude oil; top 10 U.S. refiners process 77%; top 20 process 92%.**
- **Since mid-1980s, even with sharply increased capacity concentration, U.S. refiners, the only “crude oil consumers”, have had virtually no voice in the price they pay for their primary raw material.**

Summary (cont.)

- **Turner, Mason & Company is convinced that U.S. refiners' lack of control over their feedstock costs is the root problem in this industry, and executives do not seem to recognize this reality or have any ideas to find remedies.**
- **The race to build or convert refineries to heavy sour crude feedstocks has produced disappointing financial results to date. Turner, Mason & Company believes that the rosy outlook for ever-growing discounts for heavy sour crude disregards the lack of U.S. refiners' influence on crude pricing and the pricing sophistication of producers.**

Summary (cont.)

- **Plentiful supplies of all types and qualities of crude oil are available for the foreseeable future to U.S. refiners. The diversification of alternative sources is impressive.**
- **The expected dramatic growth of medium sour crude production in the U.S. Gulf, which all must be run in U.S. refineries, is likely to establish much different supply and pricing patterns. In addition, the outlook for Russian crude imports to the U.S. is good for U.S. refiners and should provide increased competition.**
- **Nonetheless, it is Turner, Mason & Company's opinion that "radical surgery" will be necessary to bring about replacement cost economics and earnings stability for U.S. refiners.**

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