



Refining Outlook 2006 Western Hemisphere

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Turner, Mason & Company

- **Engineering/management consultant to petroleum refining industry since 1971.**
- **Highly qualified staff of licensed chemical engineers with extensive experience with multiple operating companies.**
- **Wide range of clients involved in petroleum refining, including both major and independent operating companies, financial institutions, industry associations, suppliers to the industry, government agencies, and various other parties.**

Presentation Overview

- **Where have we come from?**
- **Where are we now?**
- **Where are we going?**
- **Conclusions**

Where Have We Come From?

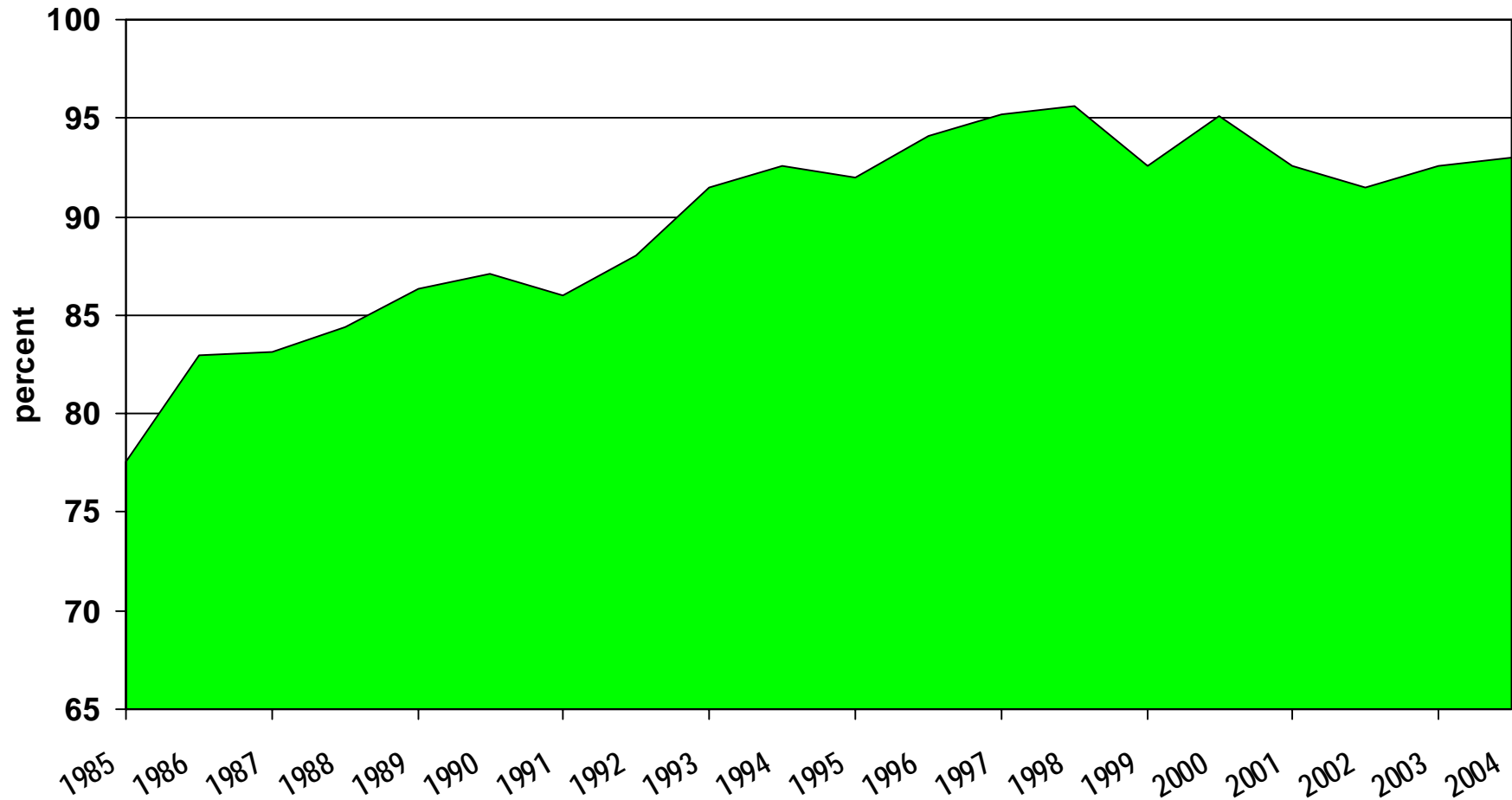
Refining Industry in 1980s

- **Dominated by integrated majors in U.S./government-owned entities in Latin America**
- **Refining treated as cost center**
- **Excess refining capacity throughout region, resulting in low utilizations and margins**
- **Capex primarily for defensive purposes (regulatory and maintenance)**

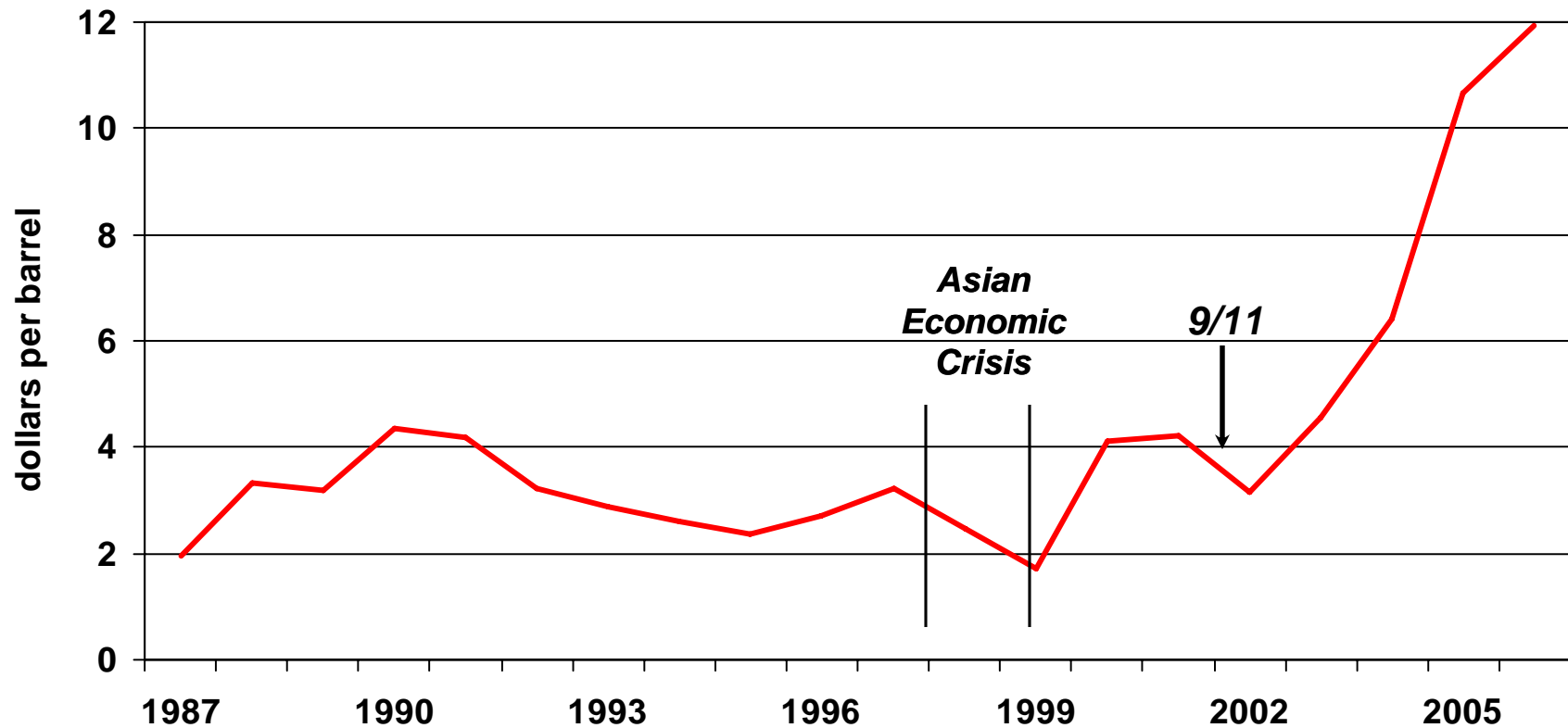
Movement into “Golden Age” 1997 to Present

- **Low product prices and strong overall macro-economic performance have resulted in healthy product demand growth since 1997**
 - U.S. and Canada – 3.6 MMBPD, or over 1.8% per year
 - Latin America – 0.7 MMBPD, or about 1.3% per year
- **As excess refining capacity has been soaked up, refining margins have improved.**
- **Crude slates in the U.S. have gotten progressively heavier and higher sulfur, allowing refiners to process lower cost crude and further increase profitability.**

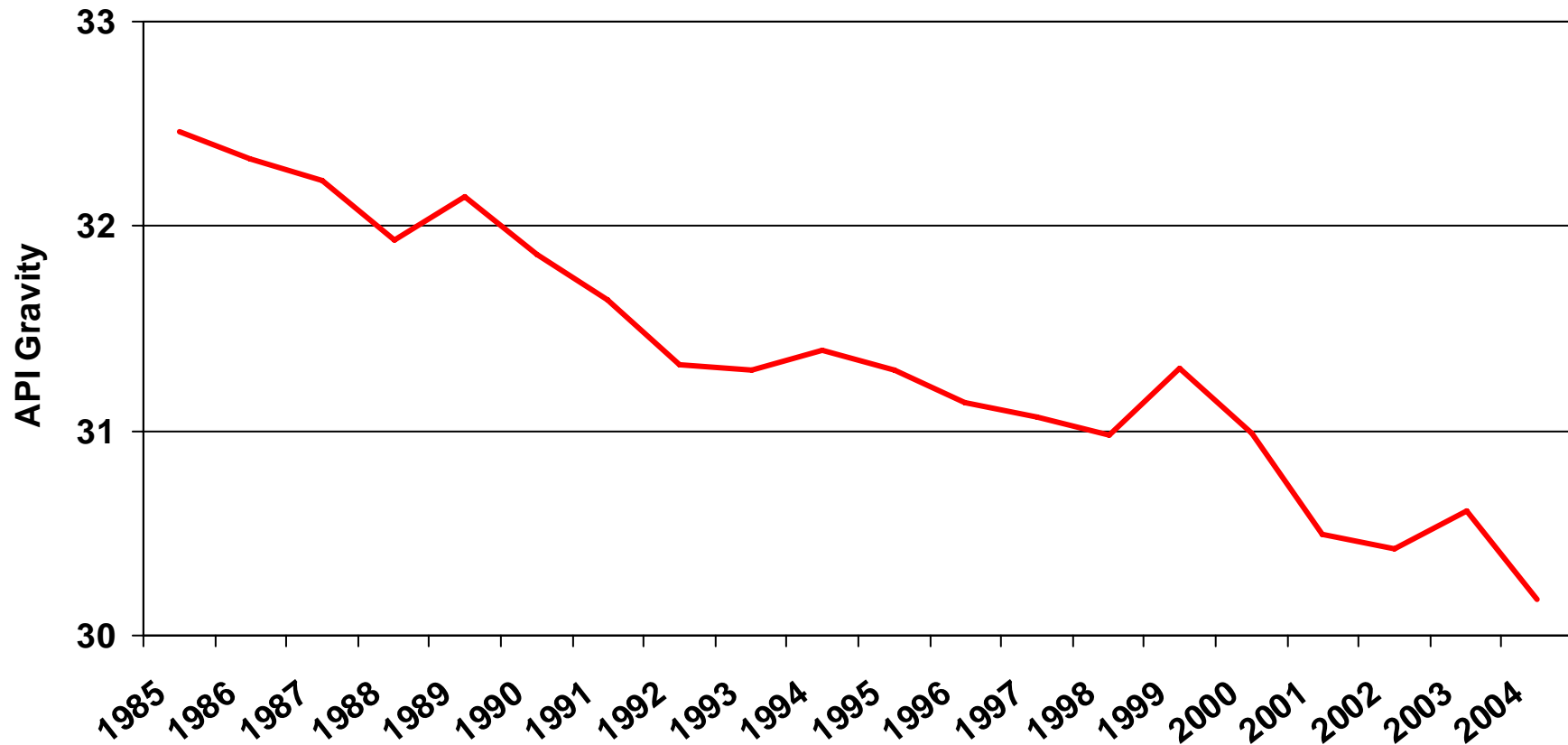
U.S. Refining Capacity Utilization



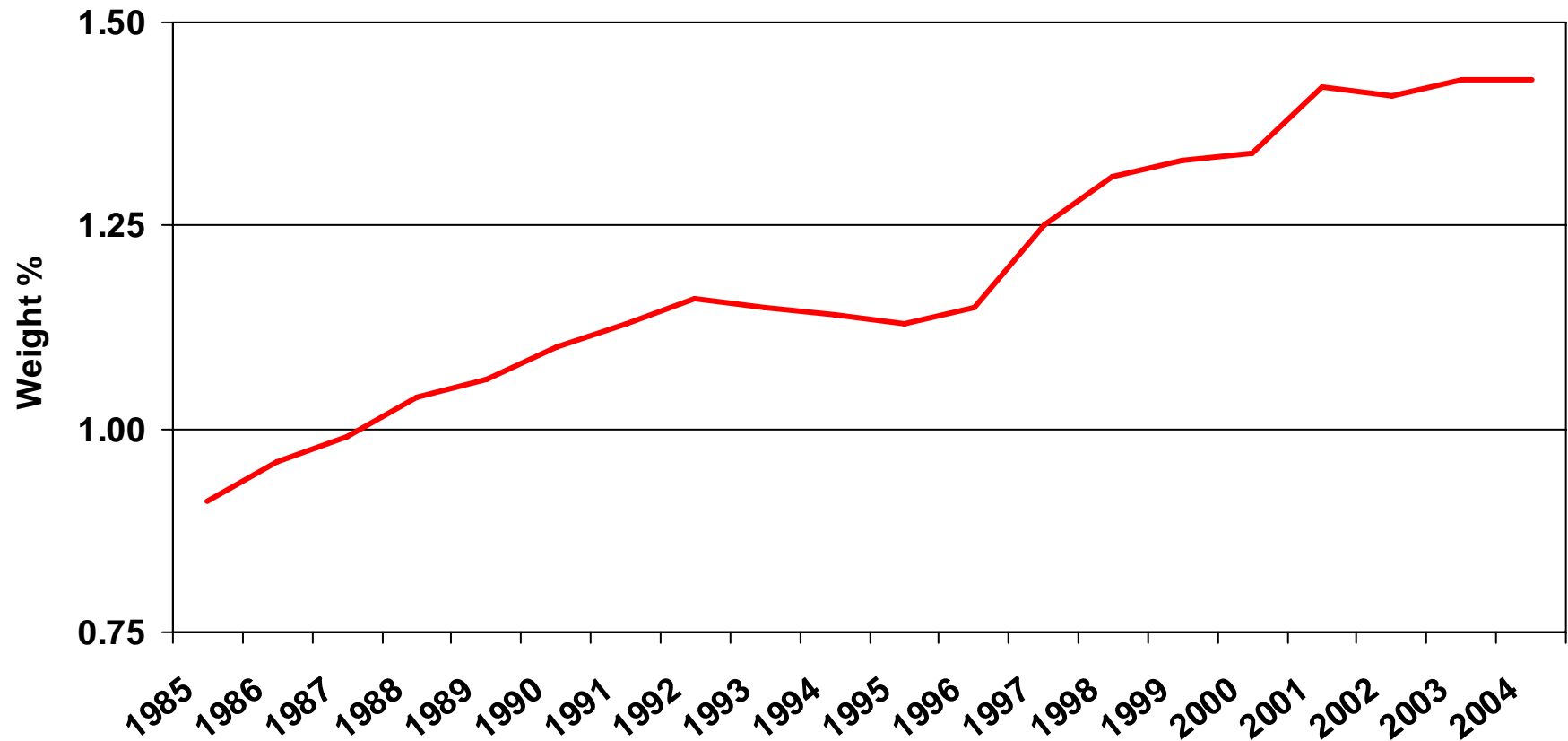
3:2:1 Gulf Coast Crack Spreads - Annual Averages



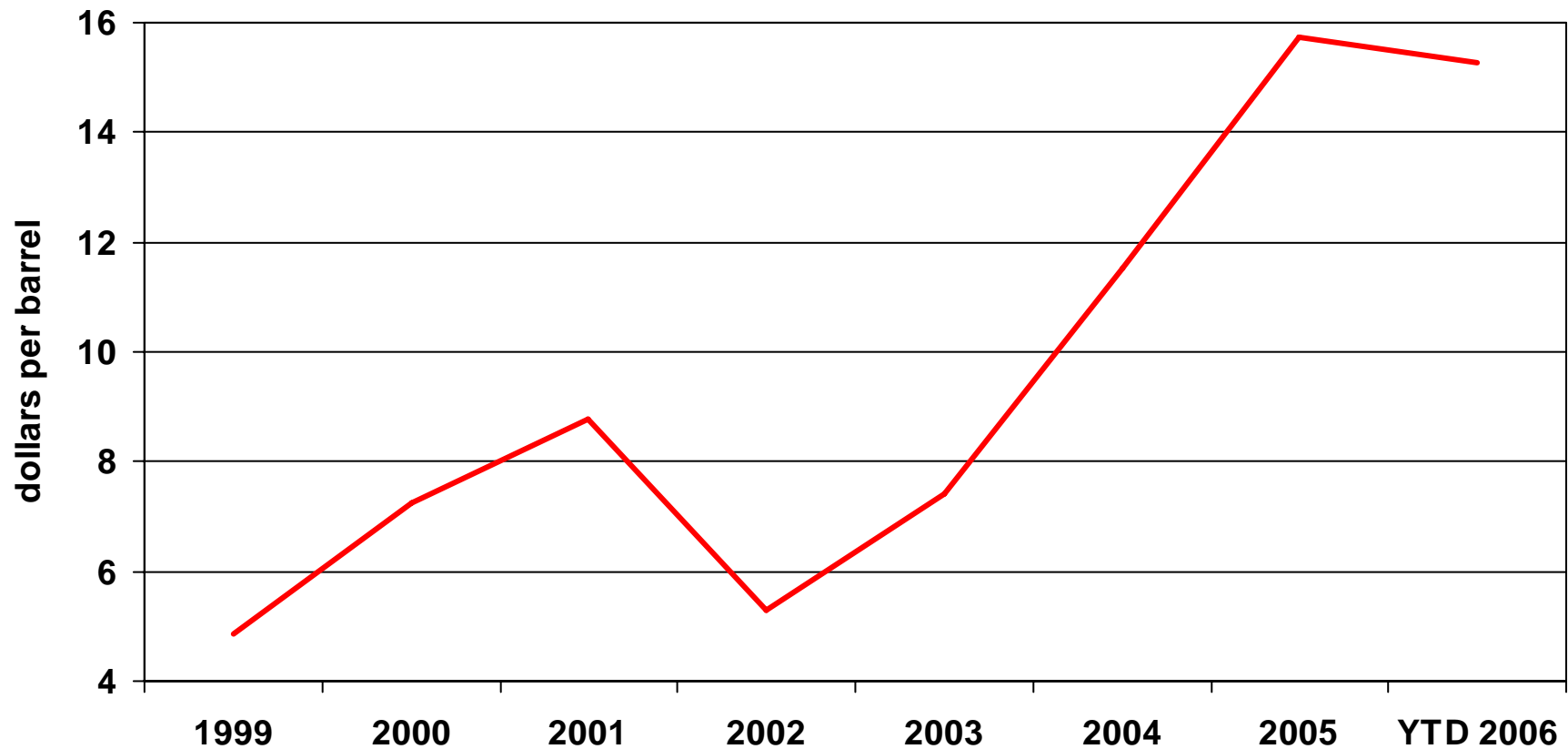
U.S. Refinery Crude Oil Input API Gravity



U.S. Refinery Crude Oil Input Sulfur



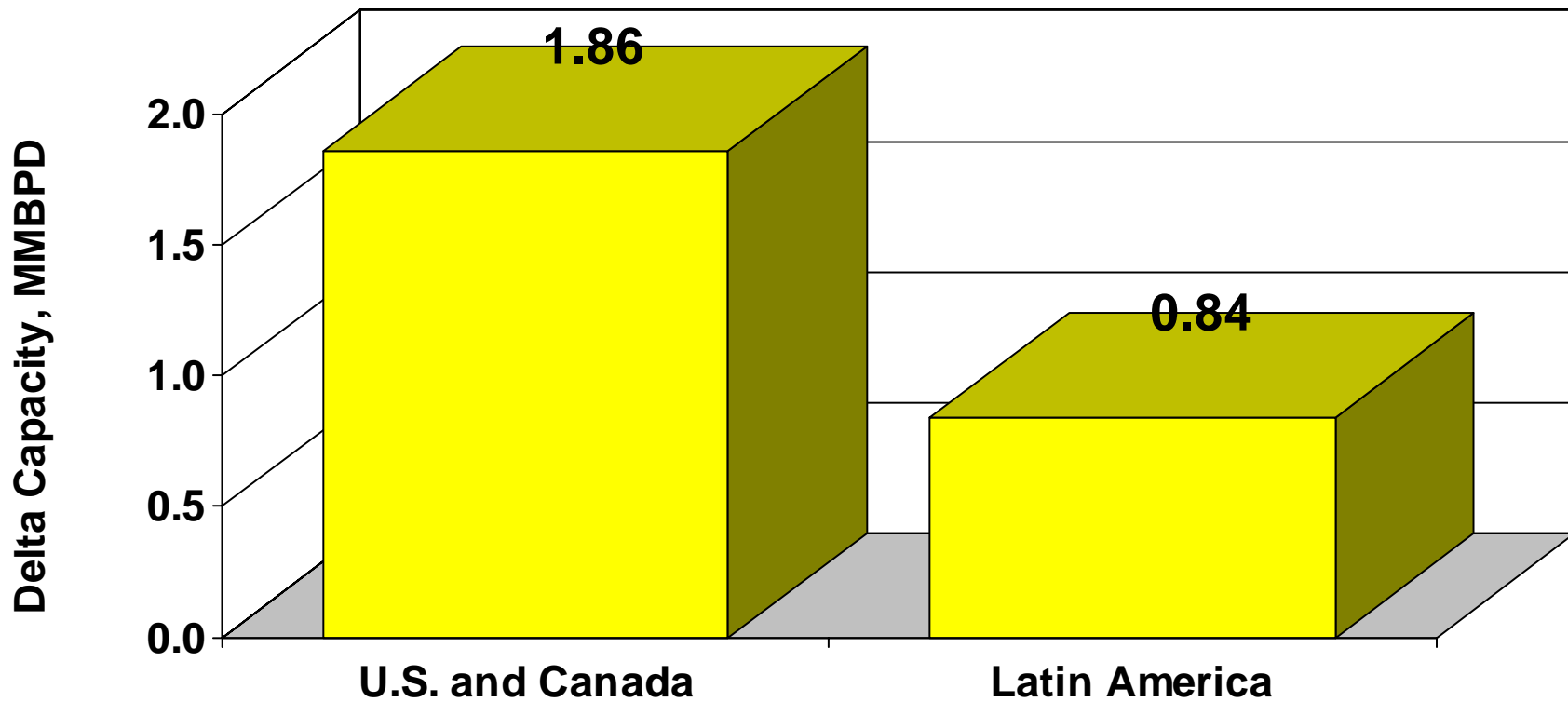
WTI - Maya: Annual Averages



Refinery Capacity Changes 1997 ➔ 2006

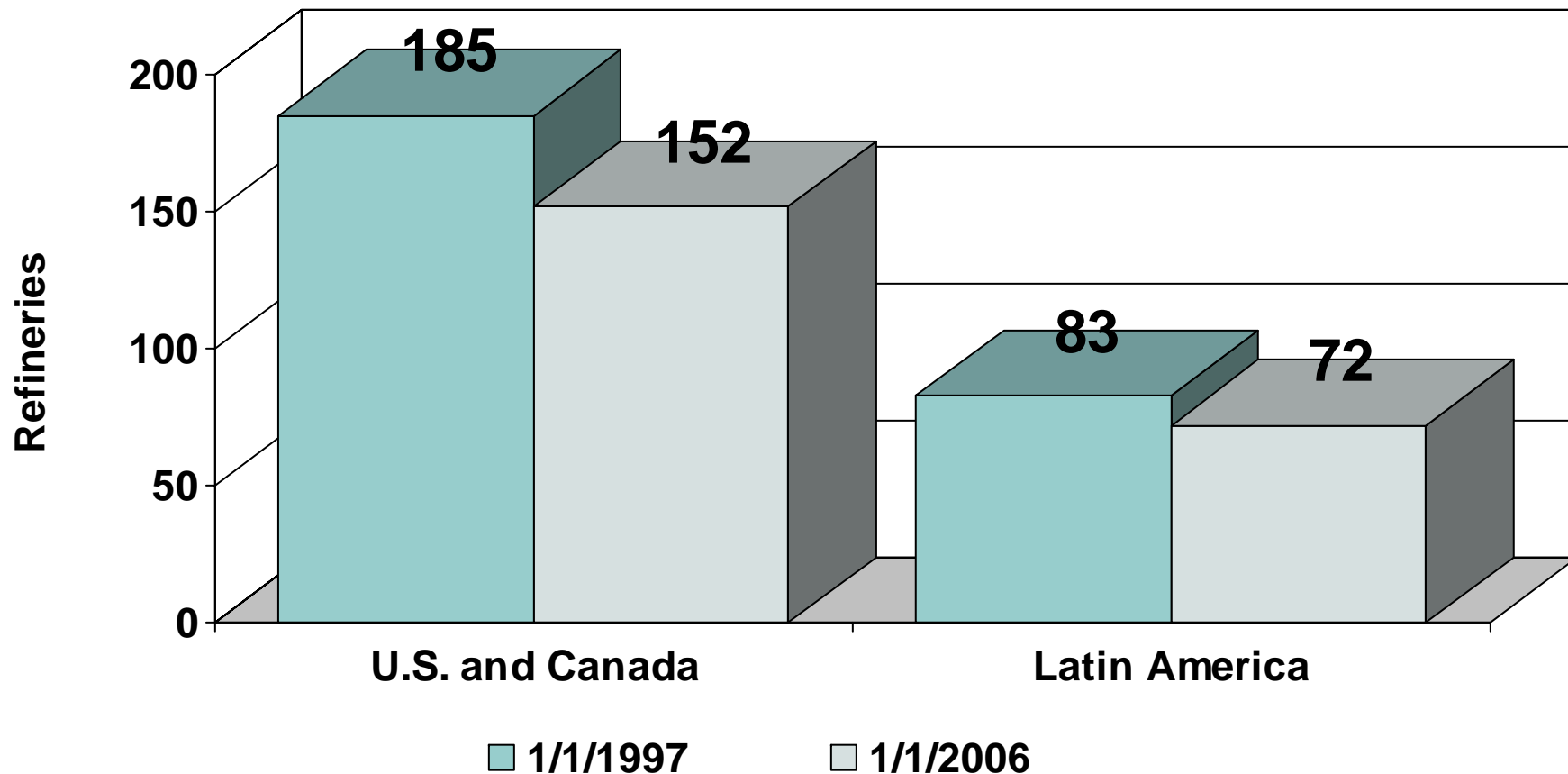
Crude Capacity \uparrow 2.7 MMBPD

2006 vs. 1997



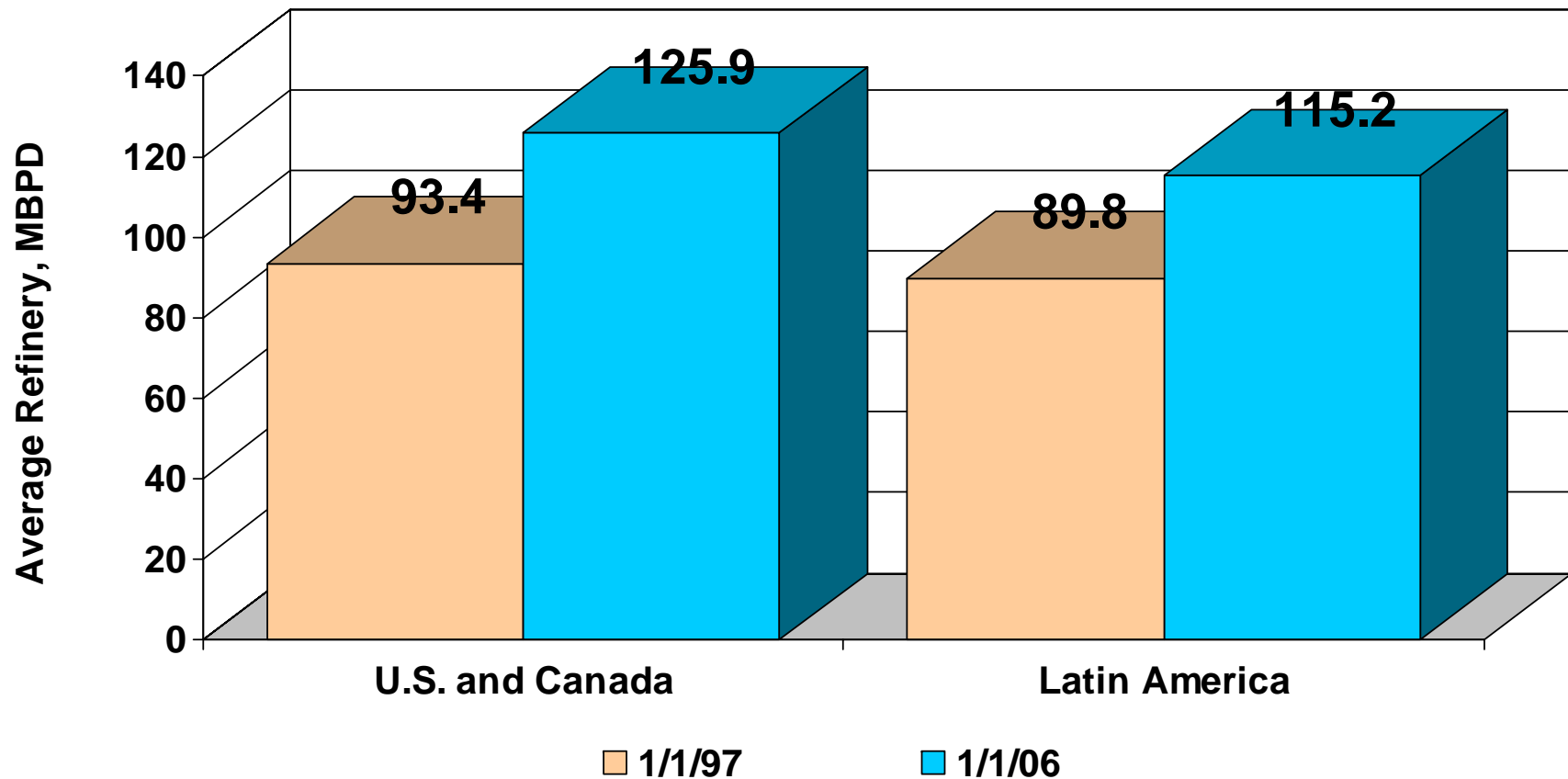
Number of Refineries ↓ 44

2006 vs. 1997



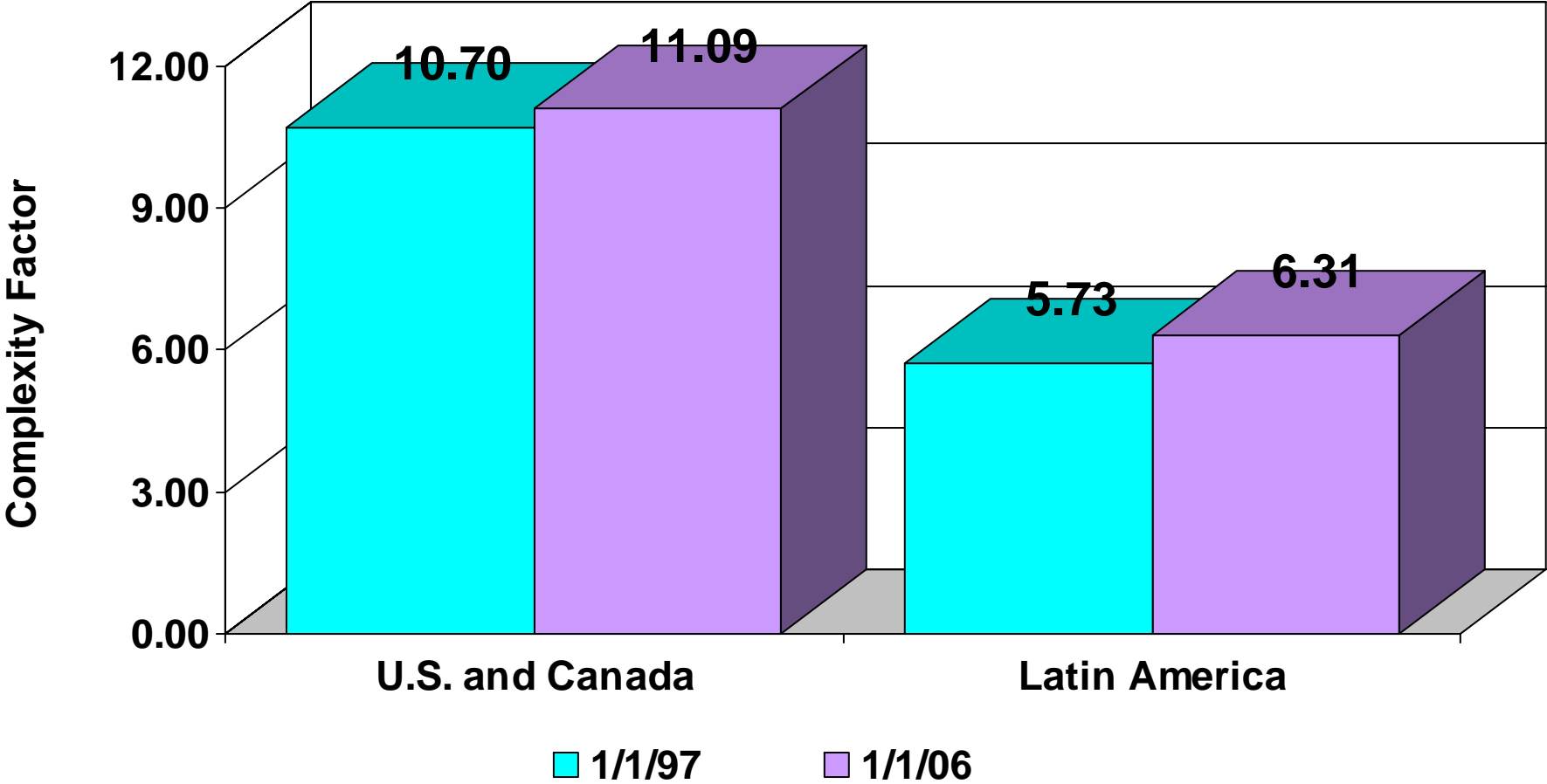
Average Refinery Size ↑

2006 vs. 1997



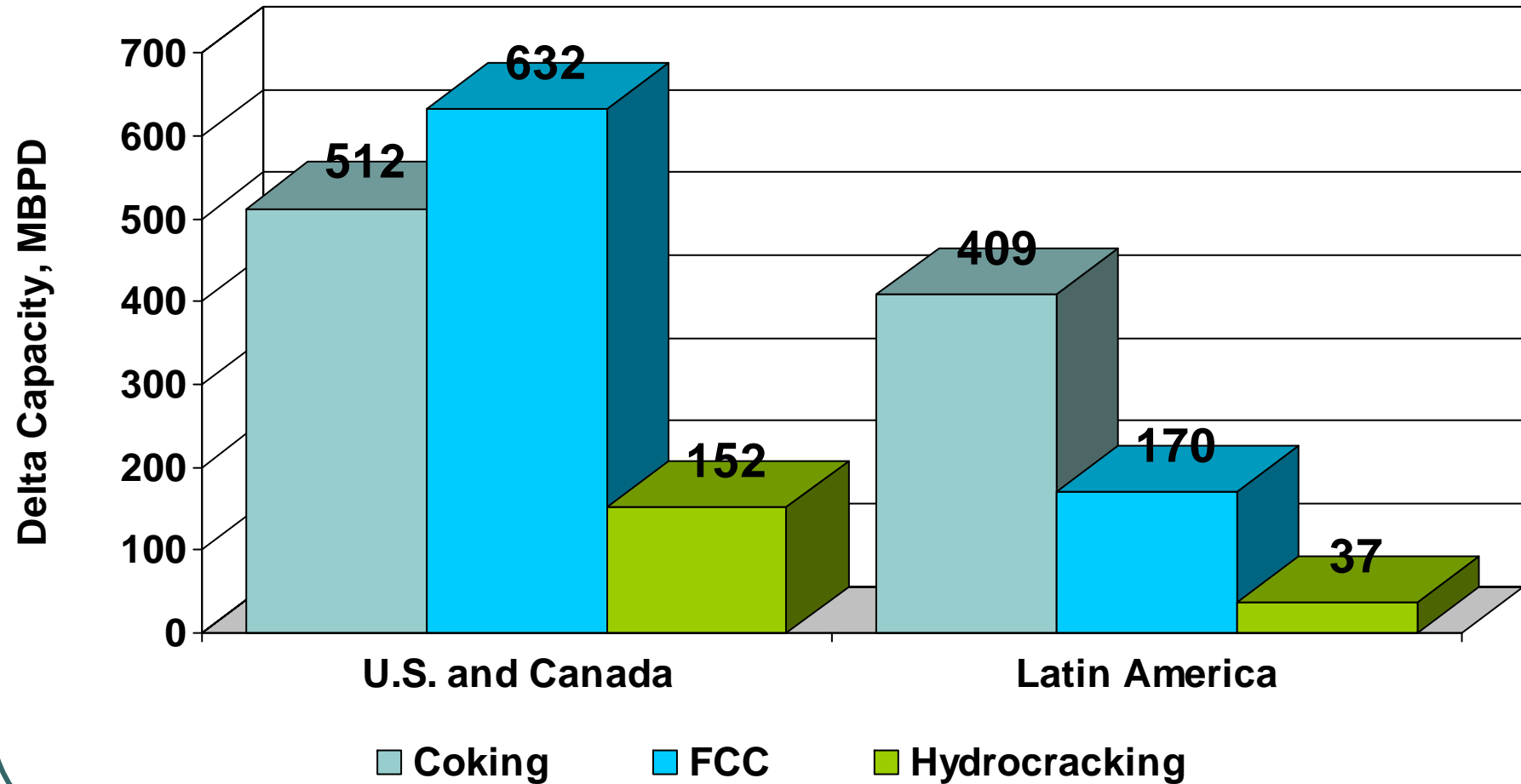
Complexity ↑

2006 vs. 1997



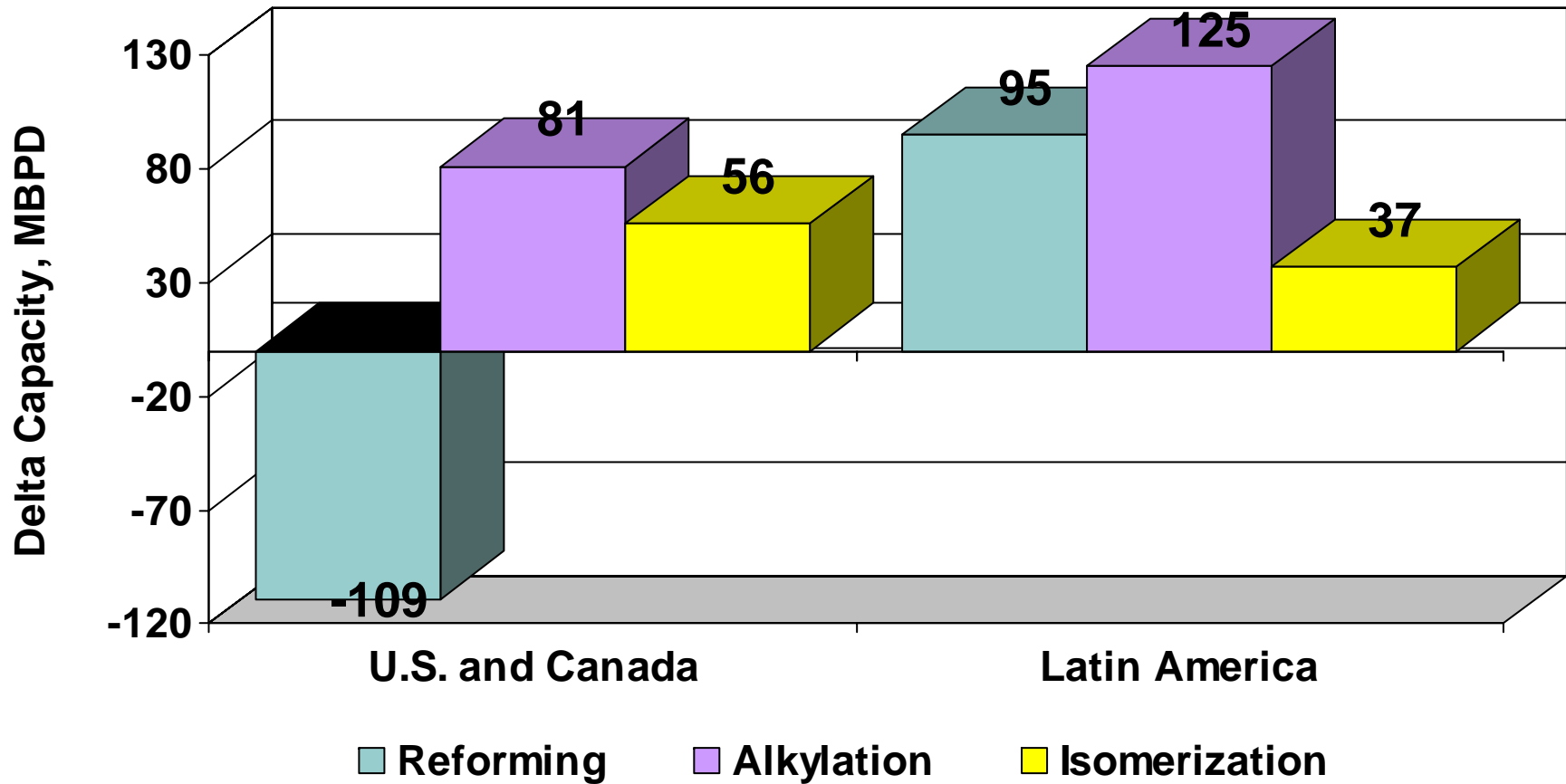
Conversion Units \uparrow 1.9 MMBPD

2006 vs. 1997



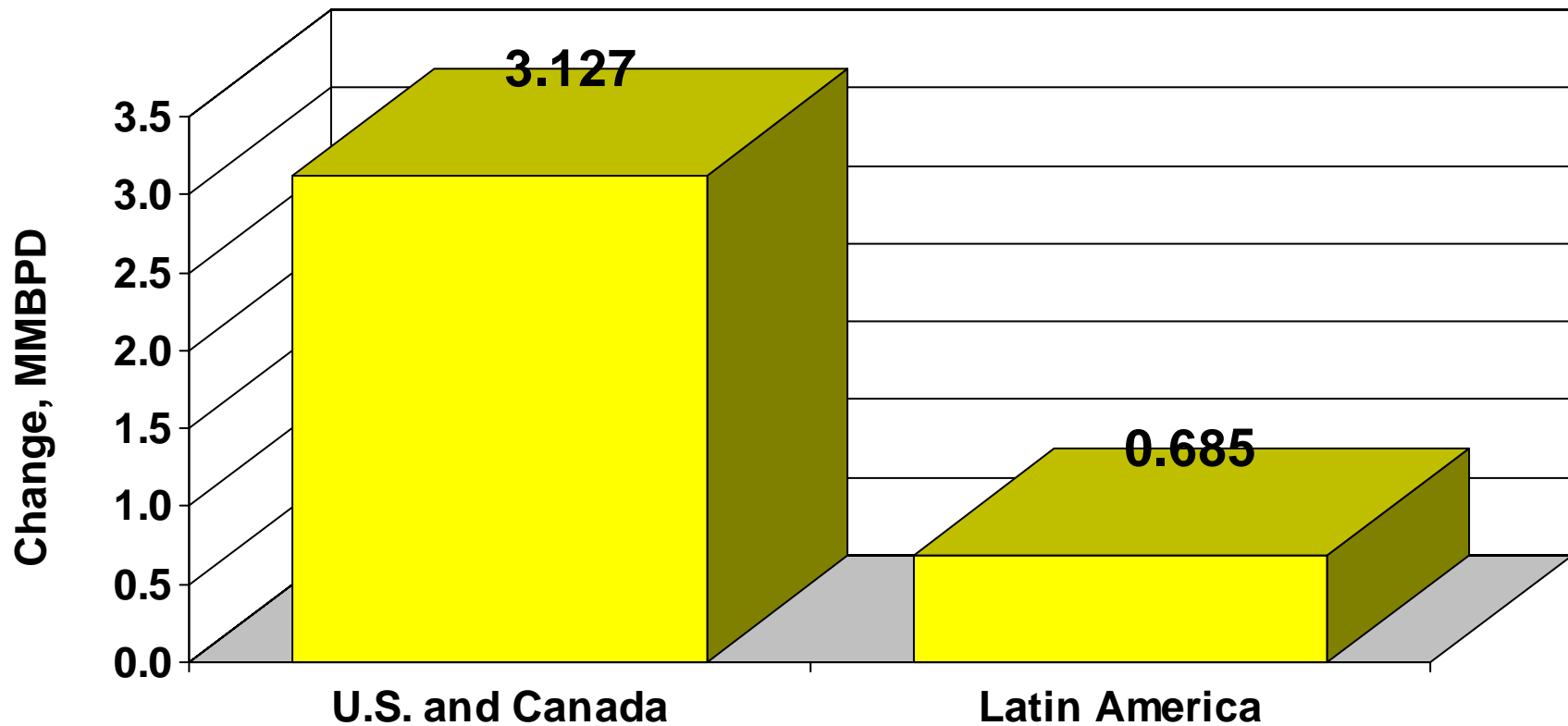
Octane Units \uparrow 250 MBPD

2006 vs. 1997

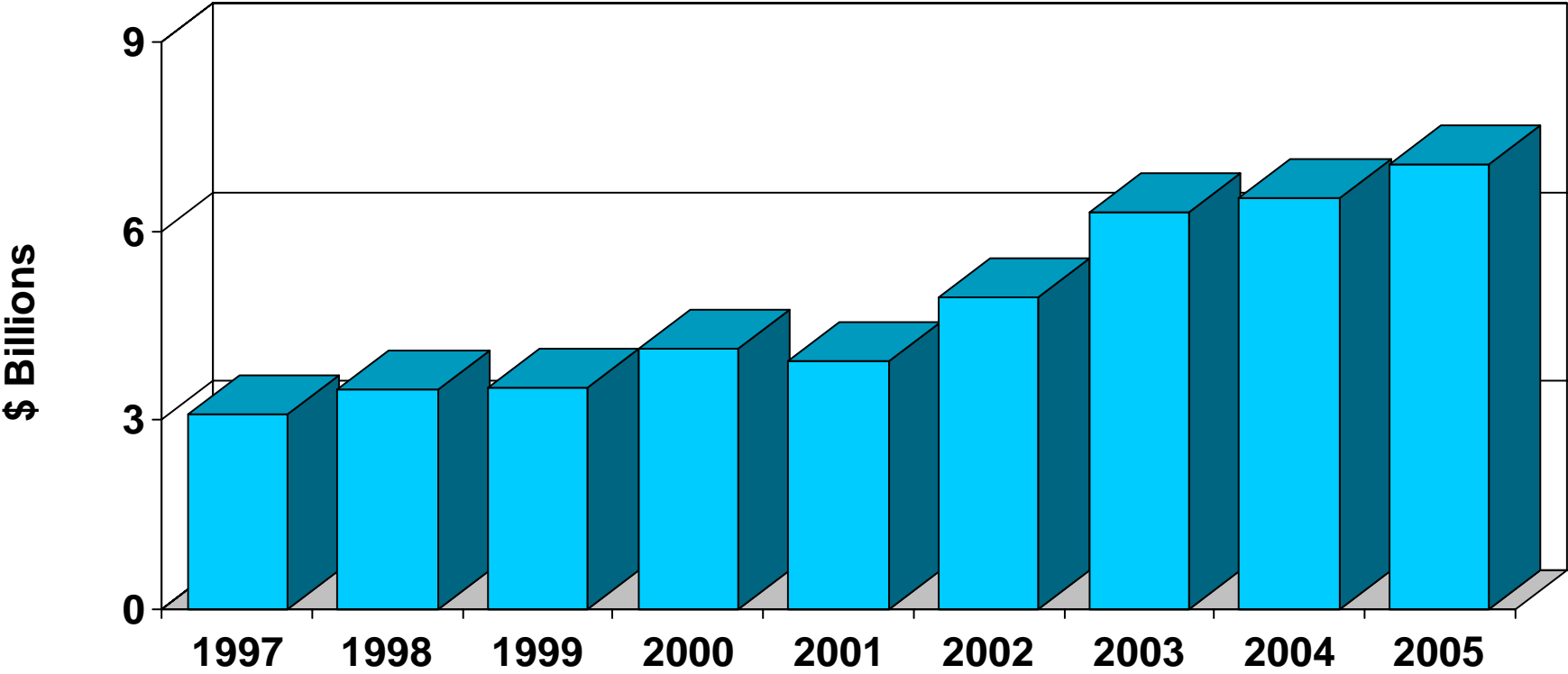


HDS Capacity \uparrow 3.8 MMBPD

2006 vs. 1997



U.S. Refining Capex



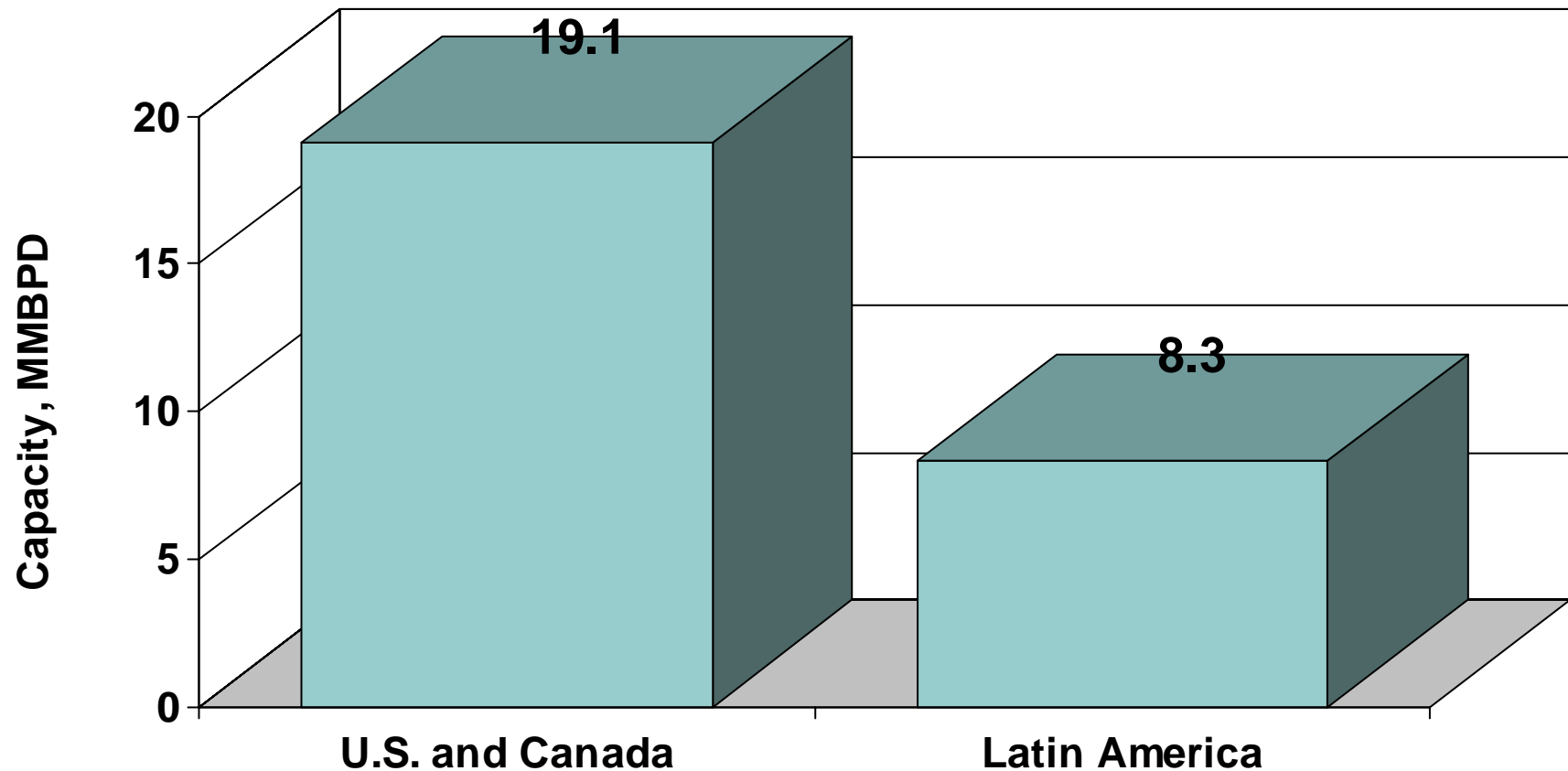
Hidden Capacity Creep

- **Over the last decade, U.S. refining process gain has increased 1.3%.**
- **Equivalent to a 200+ MBPD refinery.**

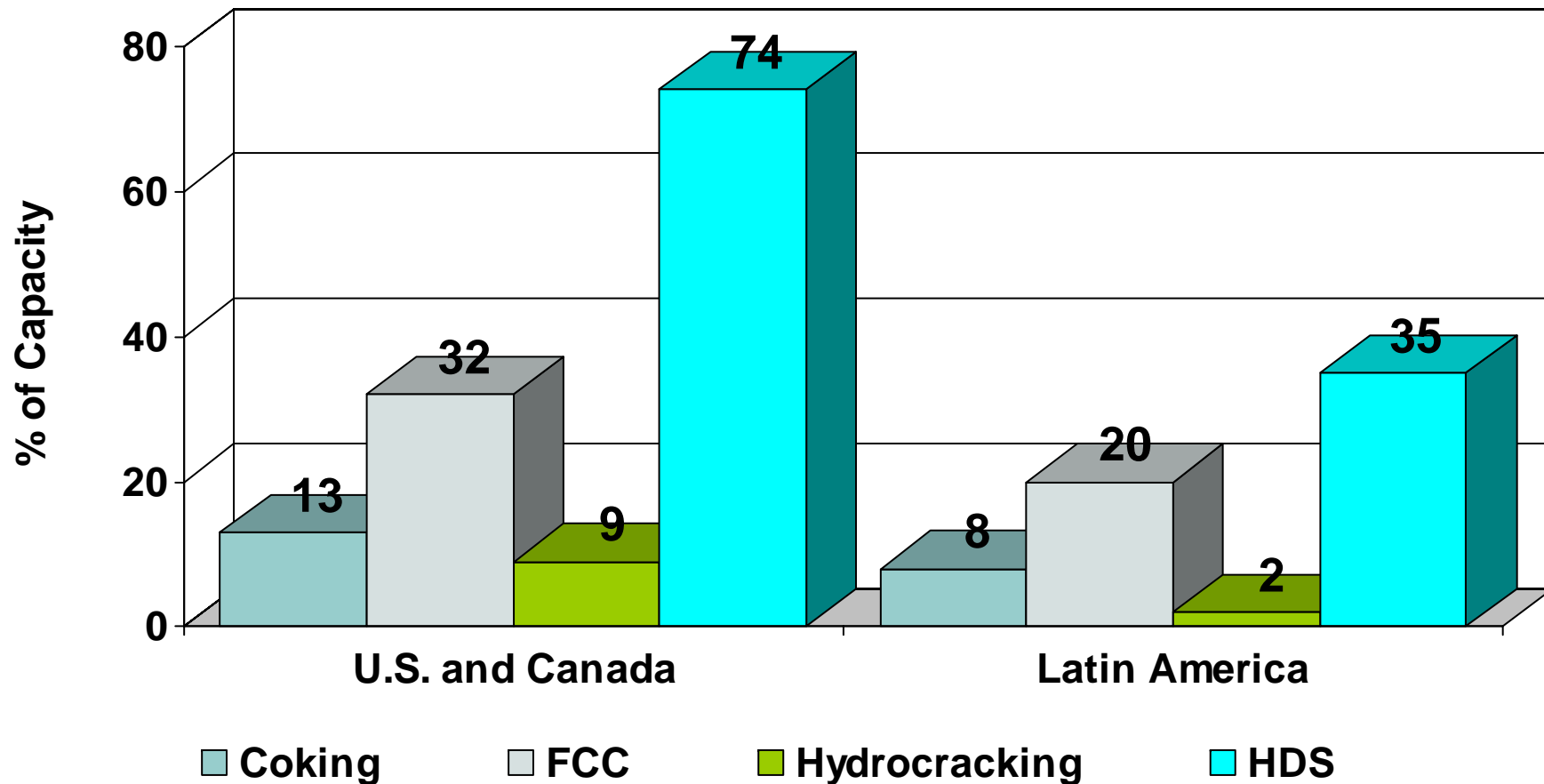
Where Are We Now?

2006 Western Hemisphere Capacity

27.4 MMBPD



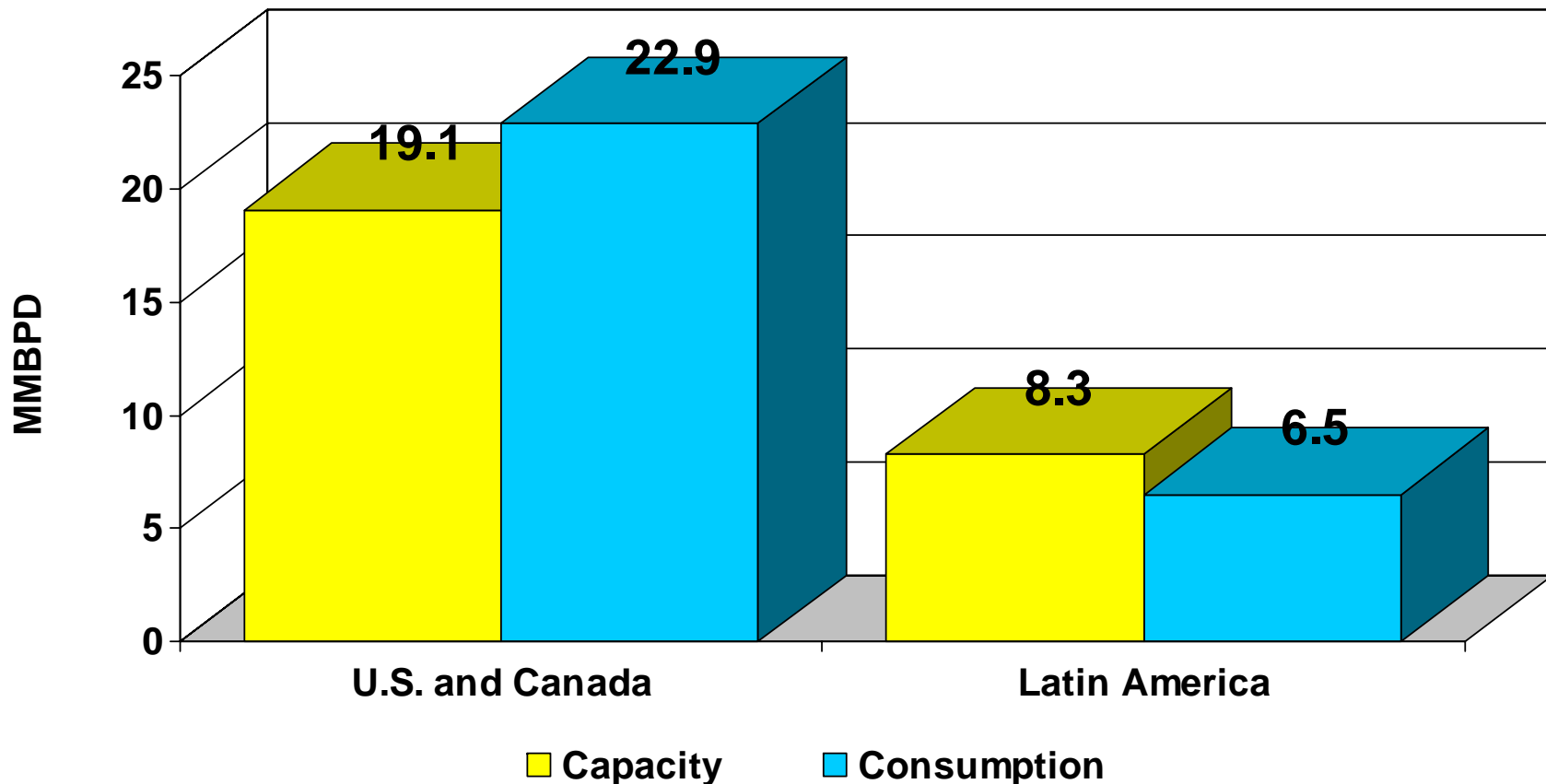
2006 Western Hemisphere Refinery Configuration



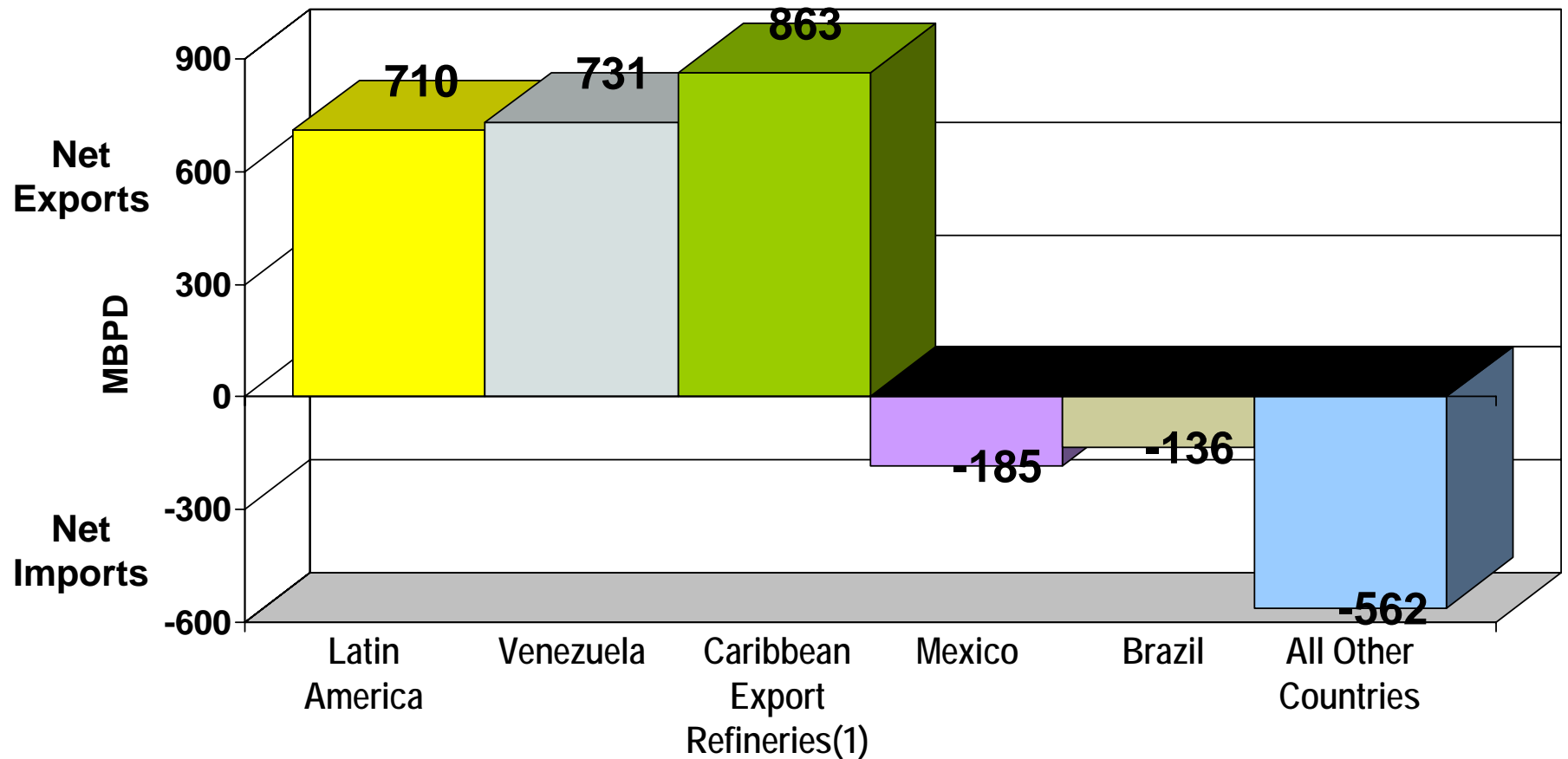
Refined Product Supply and Demand

- **U.S./Canada product demand has surpassed the supply capacity of U.S. refiners and traditional offshore import sources.**
- **Although Latin America as a whole is still long on refining capacity, most countries are net importers.**
 - **The largest economies, Mexico and Brazil, have growing need for additional refined products, particularly transportation fuels.**
 - **Product demand growth in Latin America is projected by IEA to grow by 3-3.5%.**

Western Hemisphere Refinery Capacity vs. Consumption in 2006



Latin America Refined Product Balance - 2002



(1) U.S. Virgin Islands, Aruba, Netherlands Antilles, Trinidad and Tobago.

Clean Fuels Status – U.S.

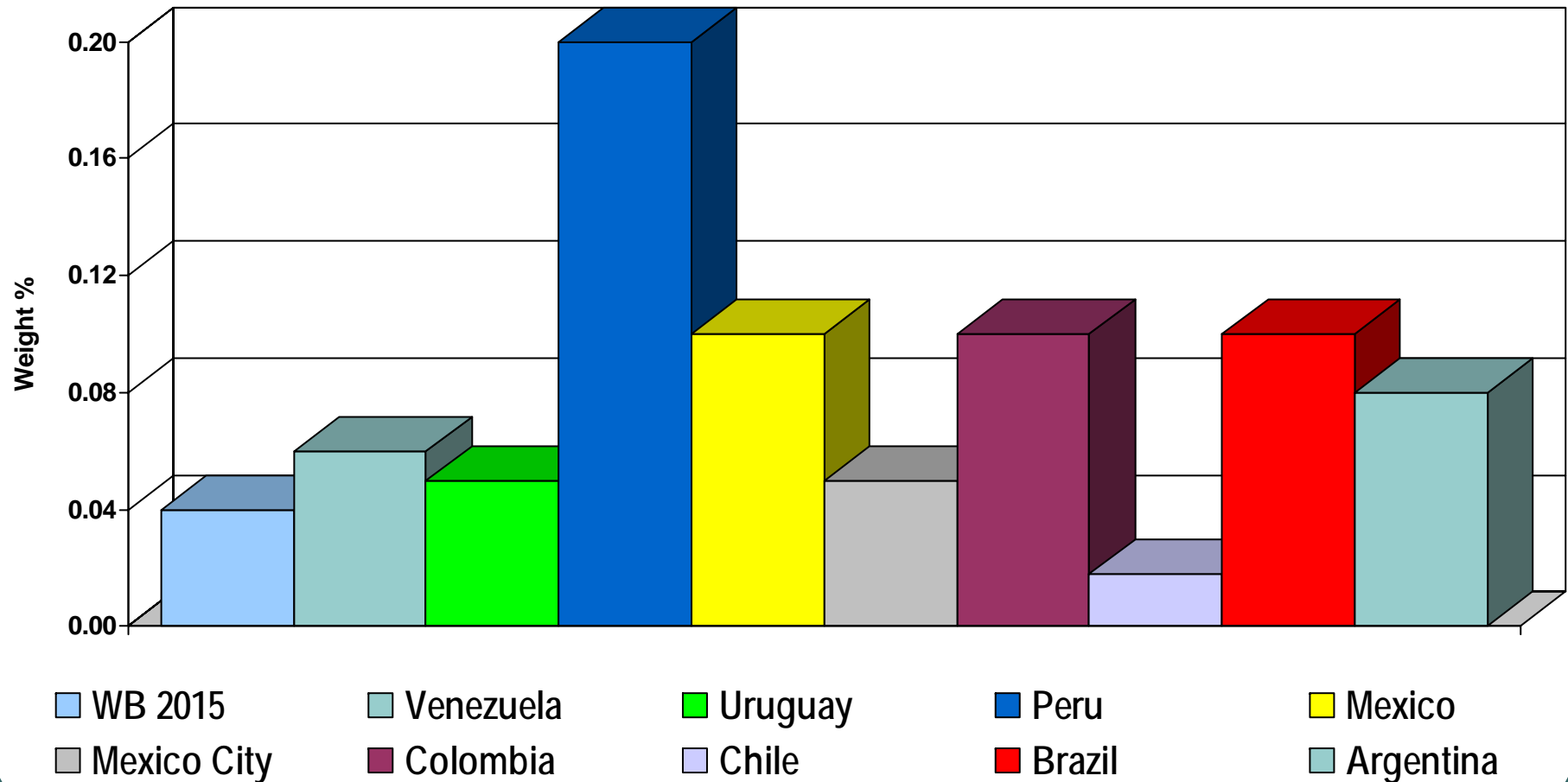
- **The U.S. refining industry has completed the bulk of the capital spending required for clean fuels**
 - **ULS gasoline program was implemented in 2004**
 - **Planned ULSD diesel capacity by June 2006 is >2.5 MMBPD. LSD demand in 2004 was 2.4 MMBPD**
 - **More than one-third of refineries we surveyed which plan to produce ULSD are pre-investing in capacity for ULS off-road diesel**

Clean Fuels Status – Latin America

- **Most Latin American countries have not finalized clean fuels regulations.**
- **Sulfur in gasoline and diesel exceeds World Bank-issued future targets in all but a few countries.**
- **As a result, the potential exists for significant spending on hydrotreating facilities in the region.**

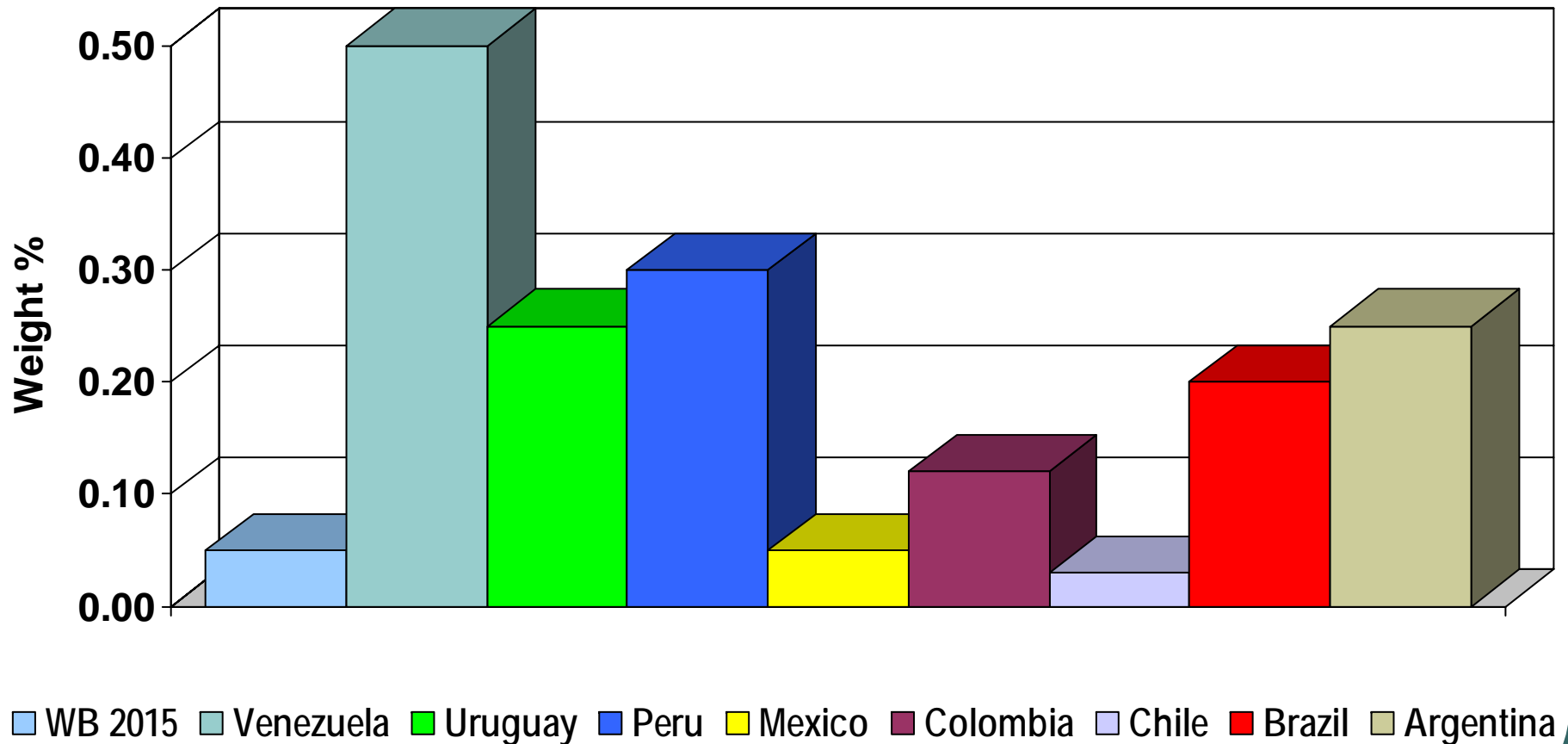
Sulfur in Gasoline

2003 Average vs. World Bank 2015 Target



Sulfur in Diesel

2003 Average vs. World Bank 2015 Target

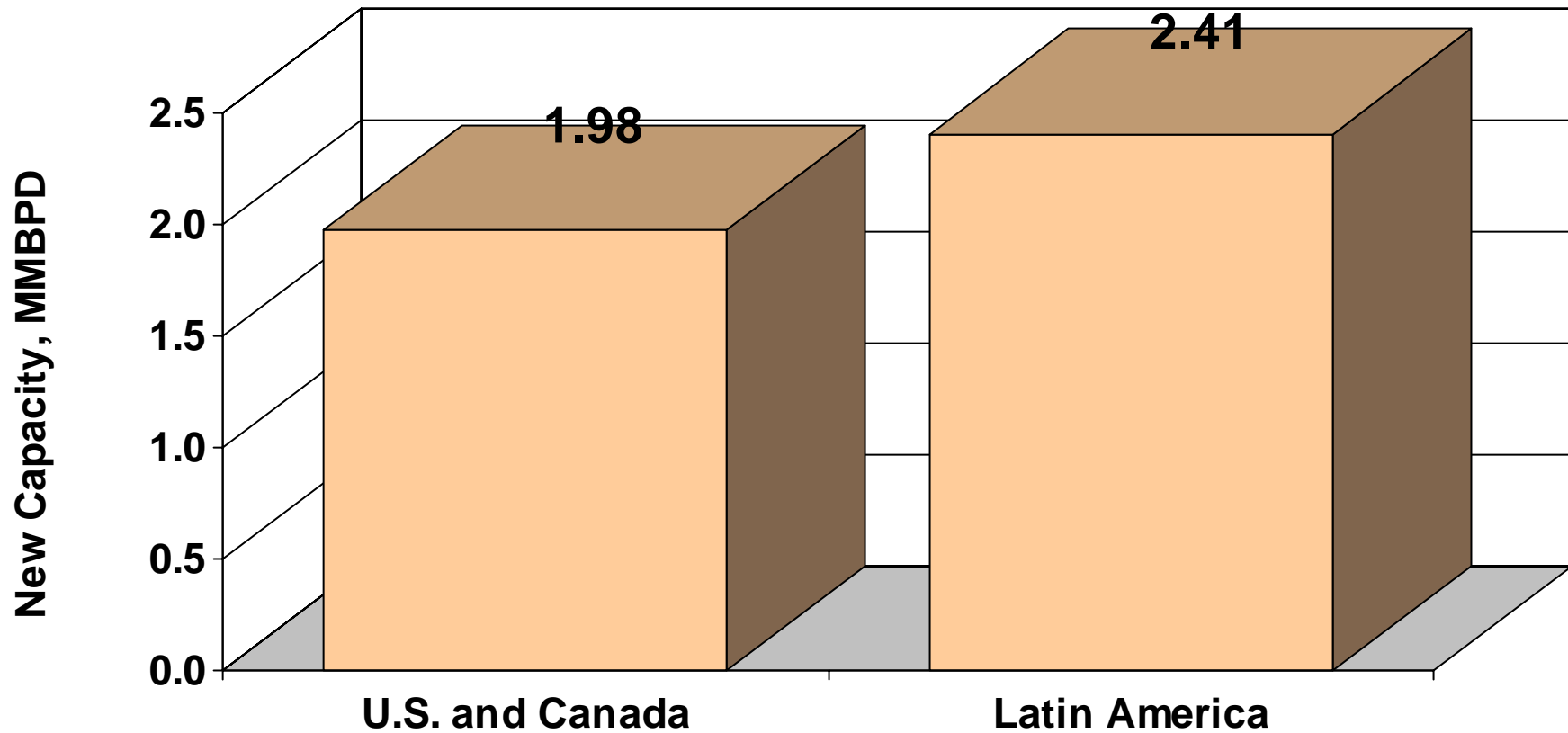


Where Are We Going?

**Western Hemisphere
Construction Plans
Through 2012**

By 2012: Crude Capacity

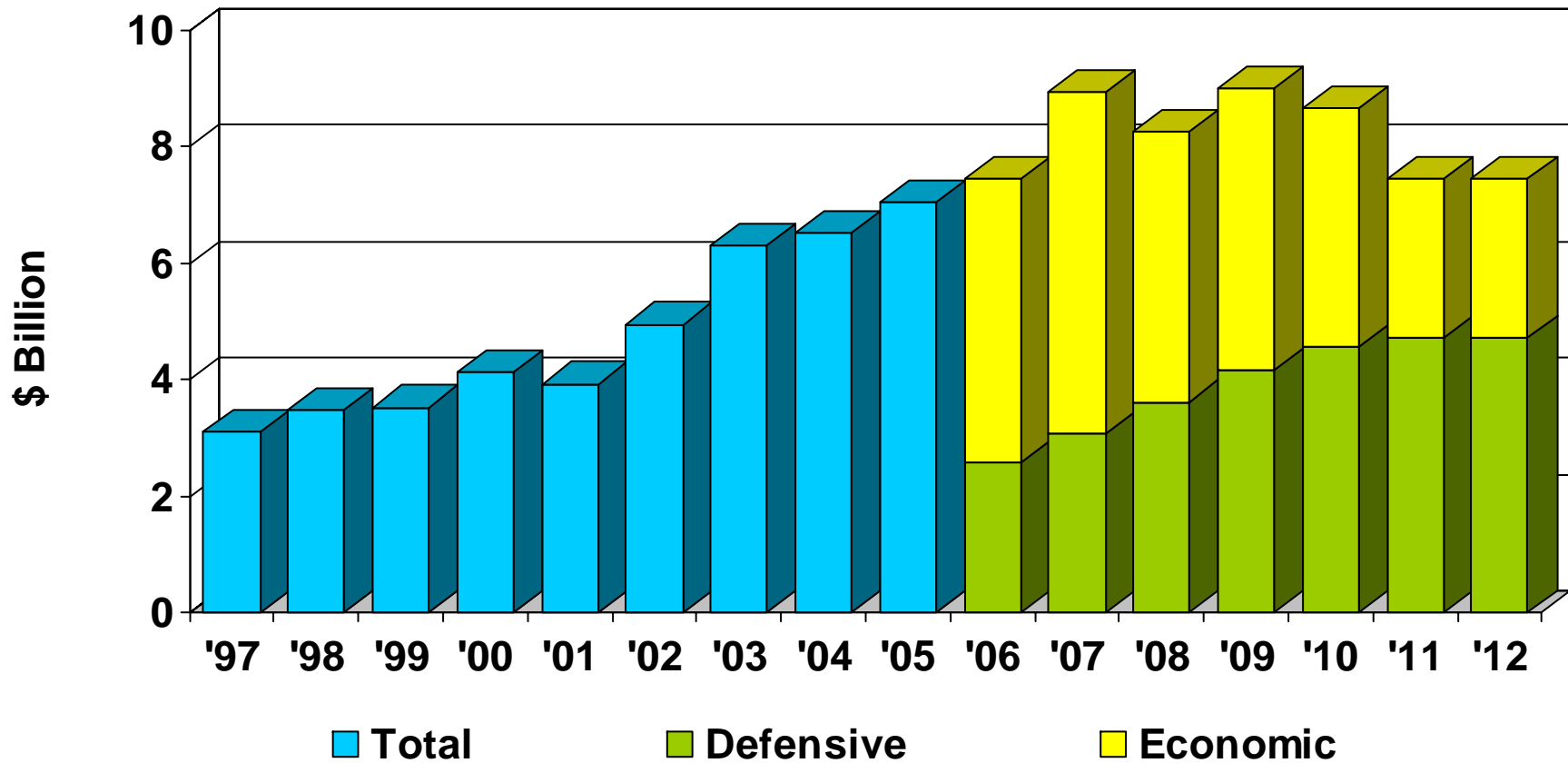
4.4 MMBPD



North American Crude Capacity Increases, MBPD

ConocoPhillips	230
Marathon	626
Motiva	325
Sunoco	100
Valero	406
Others <100 MB/D	138
Arizona (Grass Roots)	<u>150</u>
Total	1,975

U.S. Refining Capex ↑

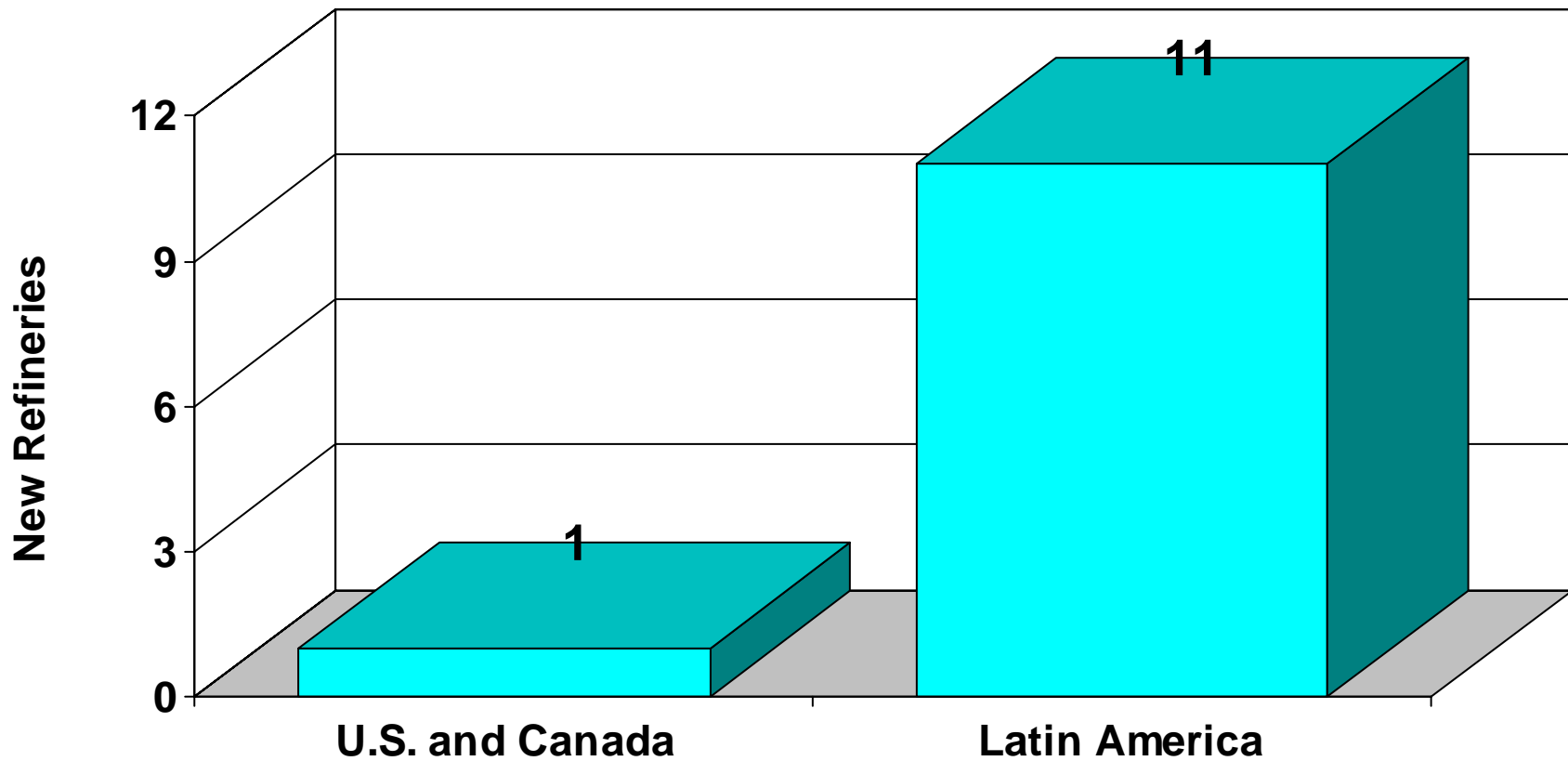


Latin American Crude Capacity Increases, MB/D

● Brazil (2)	450*
● Dominican Republic	300*
● Jamaica	250*
● Colombia	65
● Cuba	65*
● Peru	28
● Ecuador	300*
● Mexico	150*
● Venezuela (3)	650*
● Central America	150*
Total	2,408

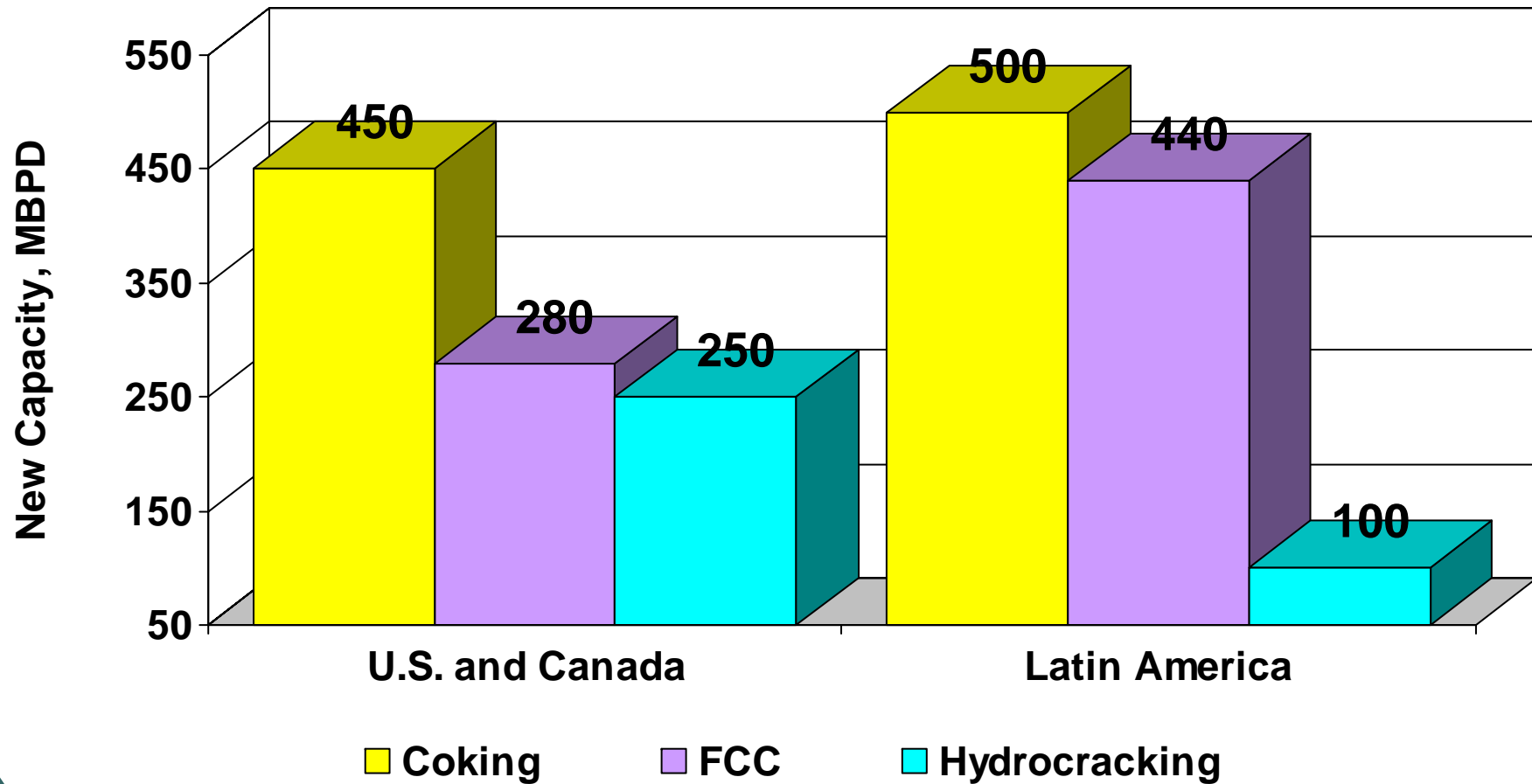
* New refineries.

By 2012: 12 New Refineries

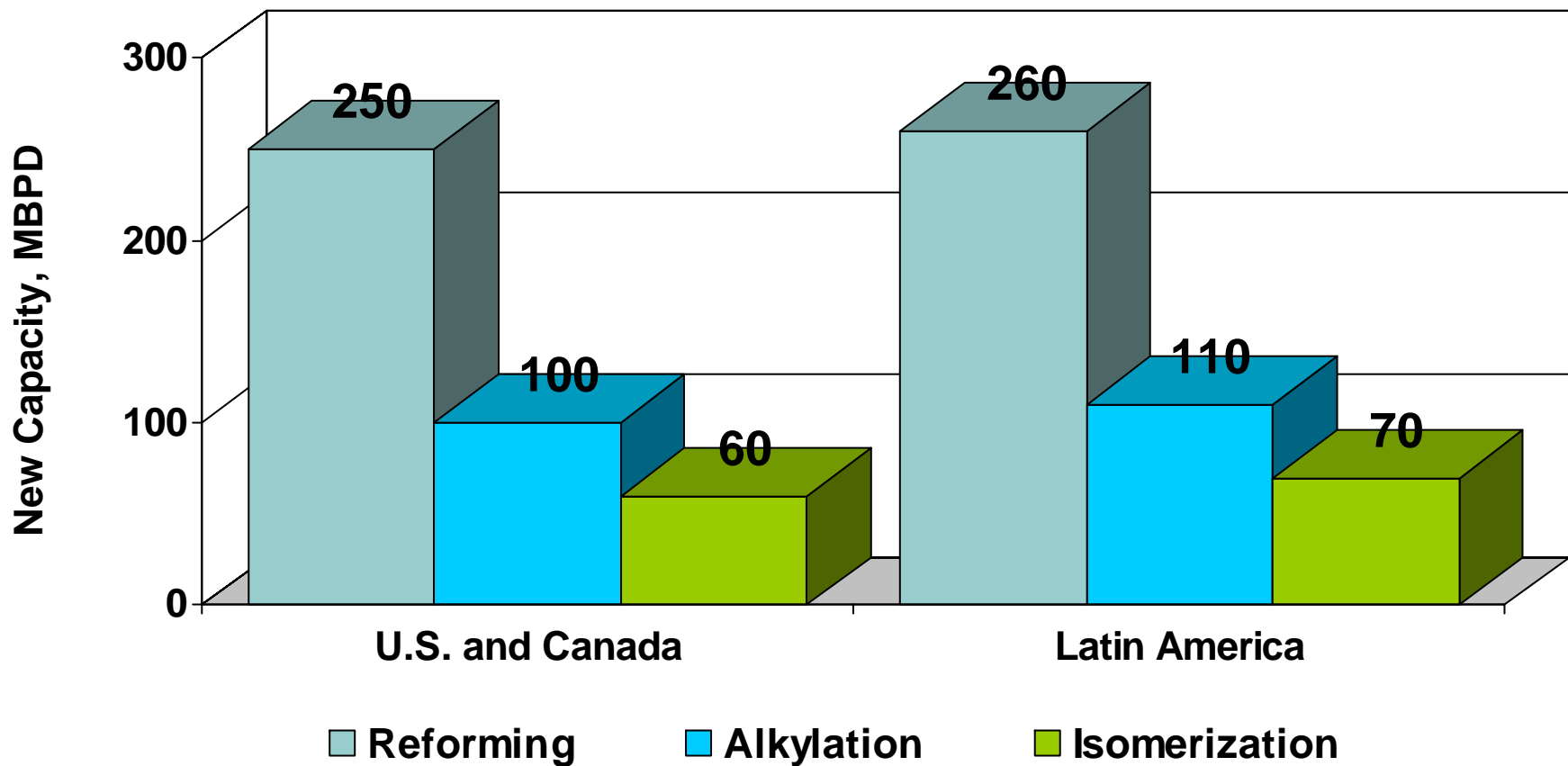


By 2012: Conversion Units

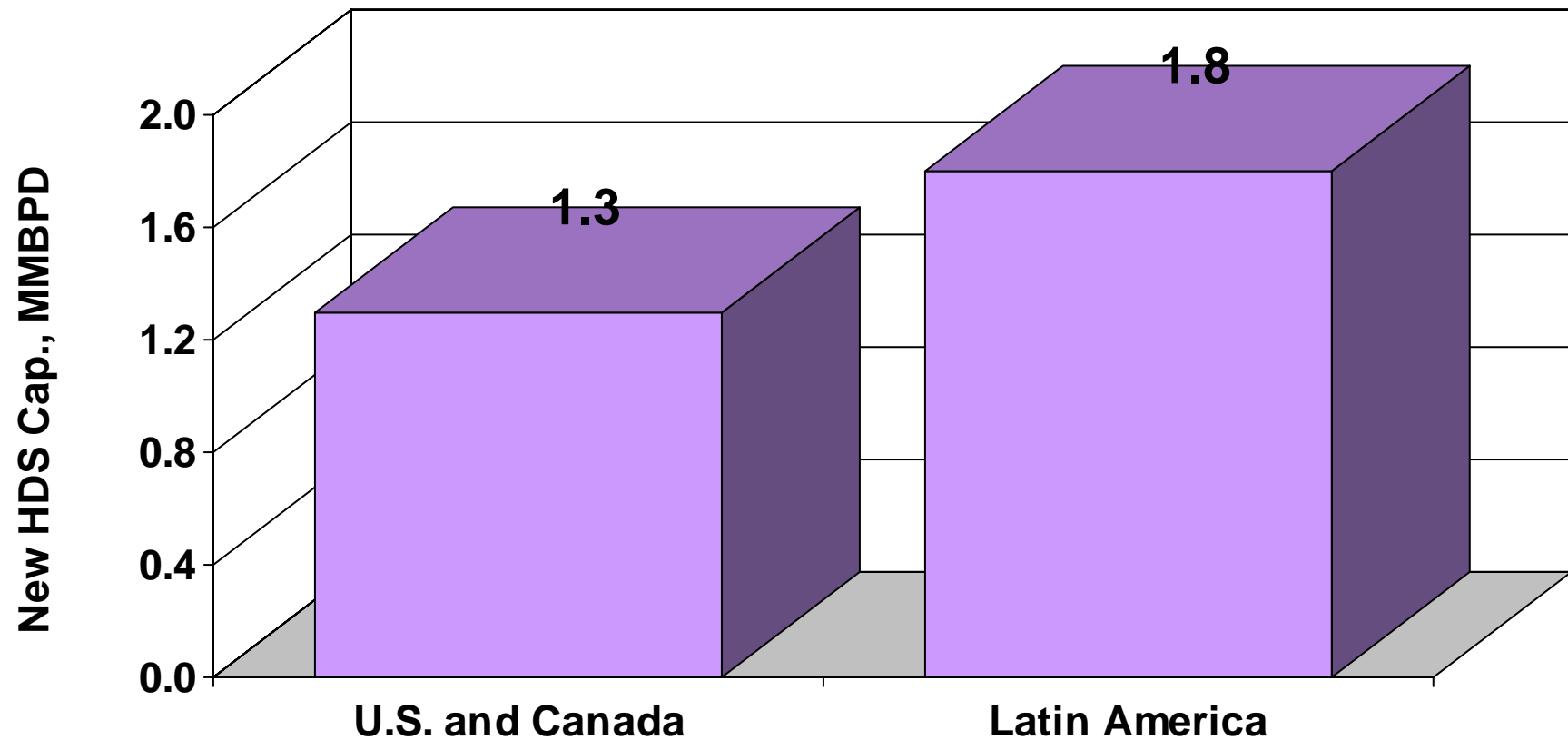
↑ 2.0 MMBPD



By 2012: Octane Units ↑ 0.85 MMBPD



By 2012: HDS ↑ 3.1 MMBPD



U.S. Expansions Target Heavy Crude and Distillate

	<u>Current Avg.</u>	<u>Expansion</u>
Crude, MBPD	131	150+
Coking, % Crude	13.7	25+
Cracking	FCC	HC
Complexity	11	15+

Grass Roots Refinery Economics

	<u>150 MBPD USGC Refinery</u>	
	<u>Sweet Cracking</u>	<u>Sour Coking</u>
Capex, \$ Billion	1.7	2.8
Complexity	10.6	15.7
<u>2004-05 Pricing⁽¹⁾</u>		
Refinery Net Margin	206	547
IRR⁽²⁾	8-10%	14-22%
<u>2005 Average⁽¹⁾</u>		
Refinery Net Margin	239	677
IRR⁽²⁾	10-12%	17-30%

(1) Excluding August-October 2005 hurricane effects.

(2) Range reflects 100% cash to typical project financing terms.

Possible Threats to Expansion Plans

- **Economic slowdown in region or in other parts of the world**
- **Over-expansion of refining capacity**
- **Government policies**
 - Incentives/disincentives for investment in refining
 - Regulatory impediments to new refinery construction
- **Turmoil in Latin America**
 - “Bolivarization” of South/Central America
 - Potential new government in Mexico

Conclusions

- **Worldwide investment in refining will likely exceed \$200 billion over the next decade.**
- **Current investment plans will not keep up with demand if growth exceeds 1.5% per year.**
- **U.S. refining investment will likely exceed \$80 billion during the next ten years.**

Conclusions (cont.)

- **Even at this investment level, U.S. dependence on refined product imports will continue at current levels.**
- **Economic incentives for U.S. grass roots expansion exist at recent prices.**
- **Large U.S. projects will likely come in the form of complete new processing trains at existing refinery sites.**

Conclusions (cont.)

- **U.S. projects will favor bottom-of-the-barrel upgrading and hydrocracking.**
- **Some projects will include gasification to capitalize on low cost feeds for utilities and hydrogen generation.**
- **Latin American projects will face more difficulty but some will be built.**

Conclusions (cont.)

- **Favorable government policies will be necessary at many locations to make new refinery projects viable.**
- **Significant hydrotreating capacity additions are possible dependent on imposition of more stringent product specifications.**

Presenter

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