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CSIS

Oil Market Group

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Outline



- Refining Industry Basics
- Economics
- Staying in Business

Refining Industry Basics



- 149 Operable Refineries
- Capacity: 16.8 MMBPD of Crude Oil
- Yields (approximate)
 - 8.5 MMBPD Gasoline
 - 4.0 MMBPD Diesel Fuels
 - 1.5 MMBPD Jet Fuel
- Gasoline Imports – approximately 800 KBPD

Refining Industry Basics



- Each Refinery is Unique
- Crude Source
- Product Slate
 - ‘Lubes-only’ Refineries
 - Topping Refineries
 - Gasoline
- Conversion Capacity/Configuration

Refining Industry Basics

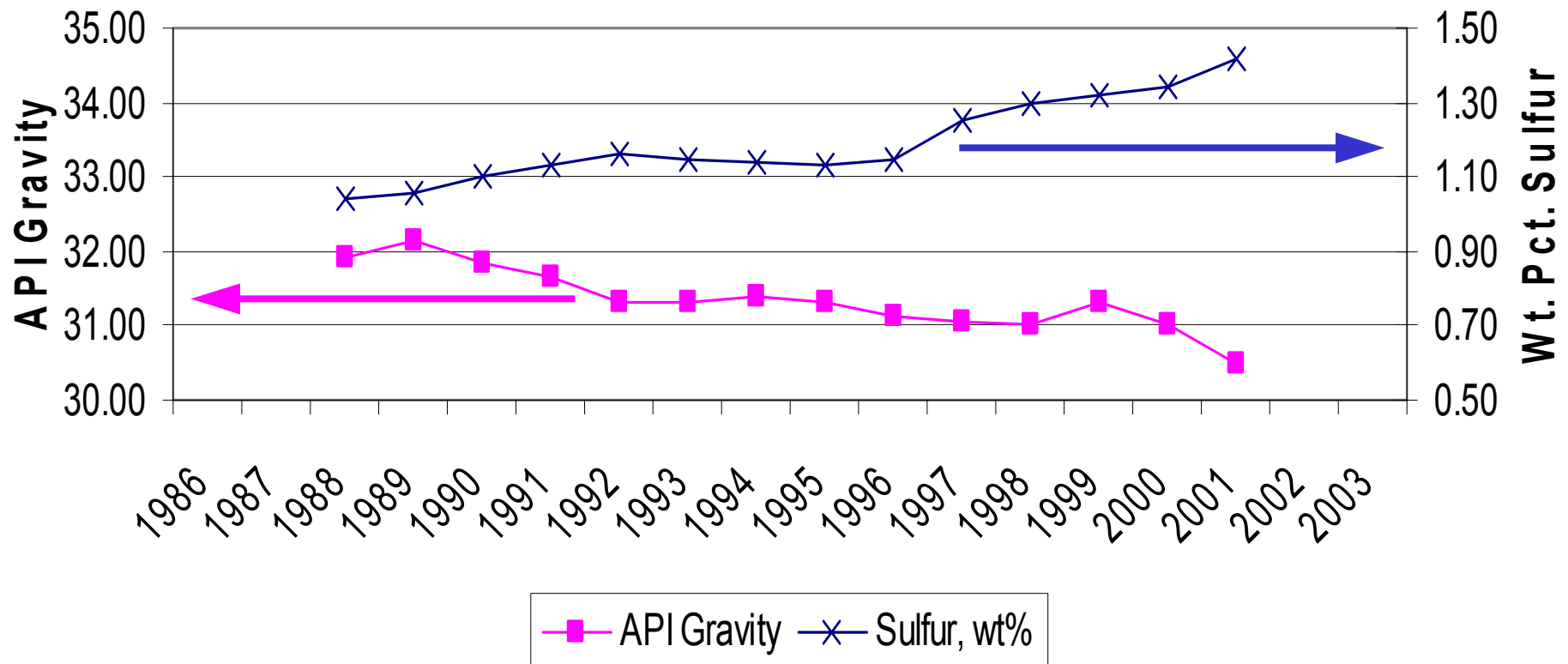


- Refinery Configuration Is Inflexible
- Changes in Crude Qualities Affect Refining Economics



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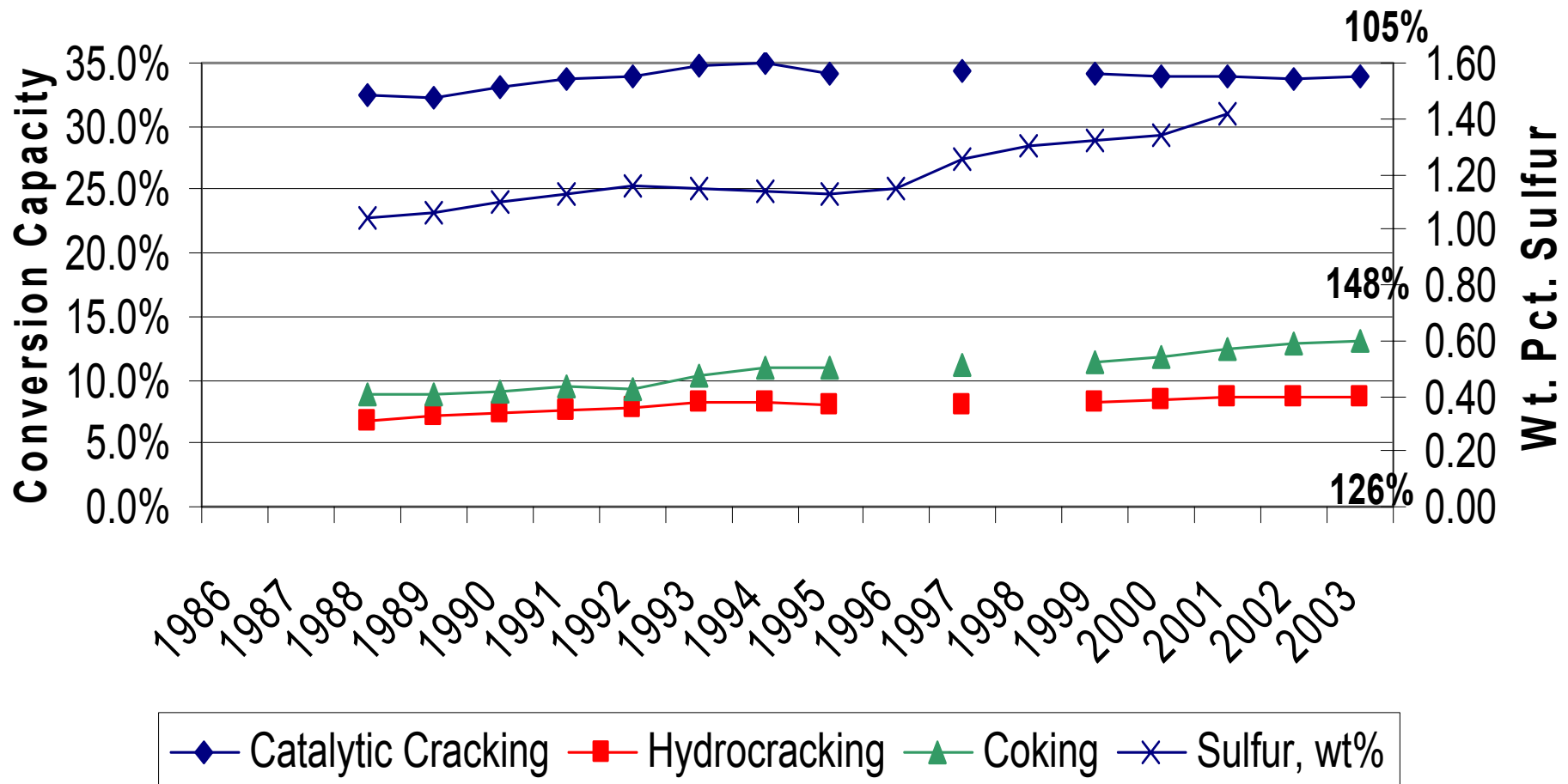
US Crude Oil Trend





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US Refining Capability



Refining Industry Economics

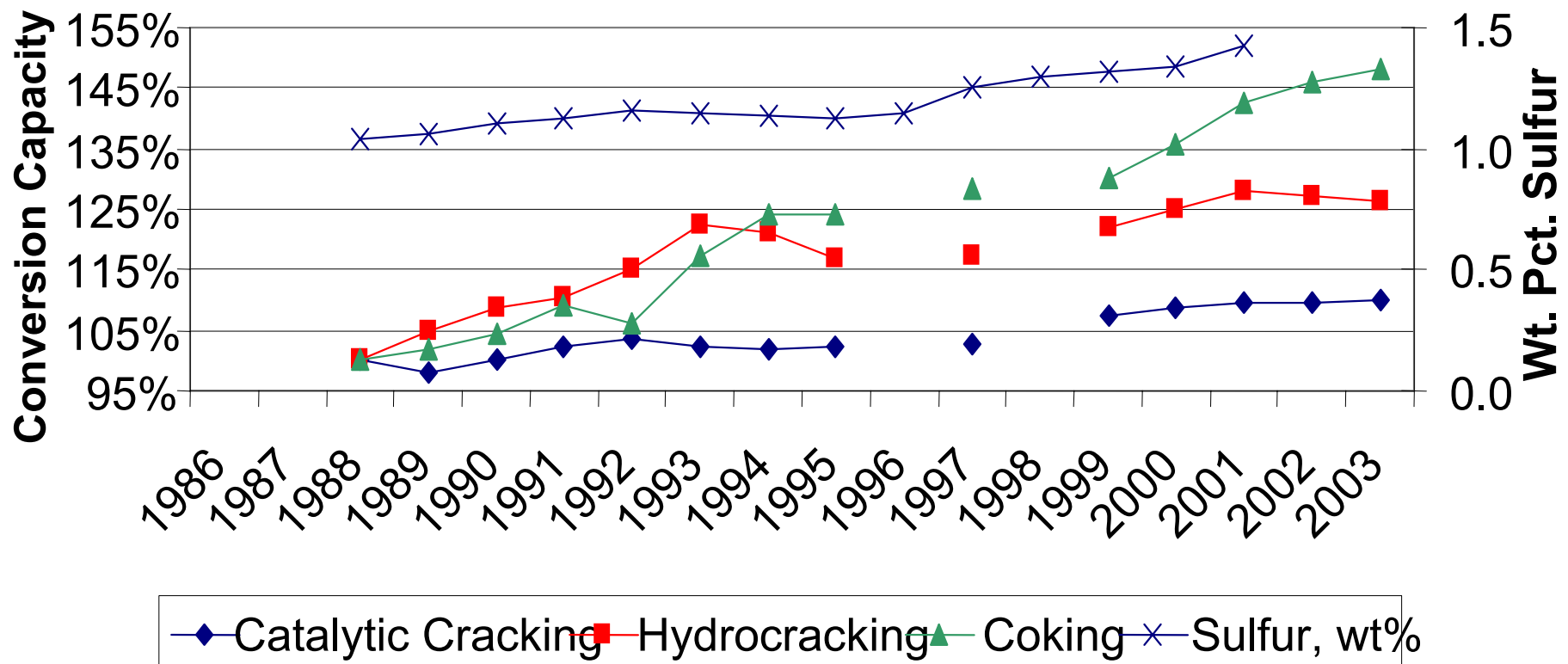


- Crude Slate Changes Beget Refinery Changes
- Product Demand Changes Beget Refinery Changes
- Refiners Have Invested in Conversion Capacity
 - Hydrocrackers
 - Catalytic Crackers (FCCUs)
 - Cokers



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US Refining Conversion Capacity v. Base Year 1988



Refining Industry Economics

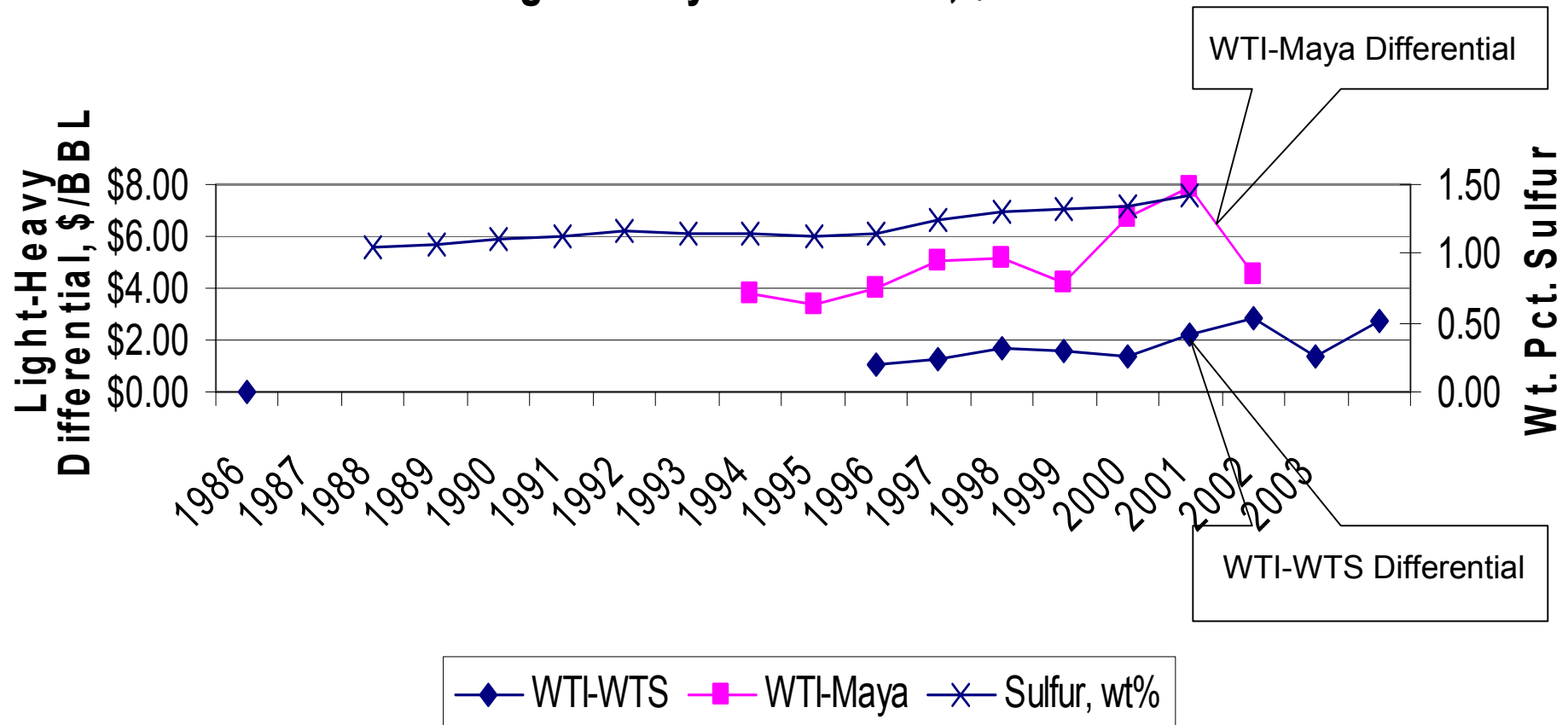


- Lower Cost Crudes Contain
 - More Heavy Material (BP>750°F)
 - More Sulfur
 - More Metals
- Conversion Capacity Enables Refiners to Purchase Cheaper Crudes
 - Ability to Upgrade Heavy Material
 - Ability to Reject Carbon



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Light/Heavy Differentials, \$/BBL



Refining Industry Economics

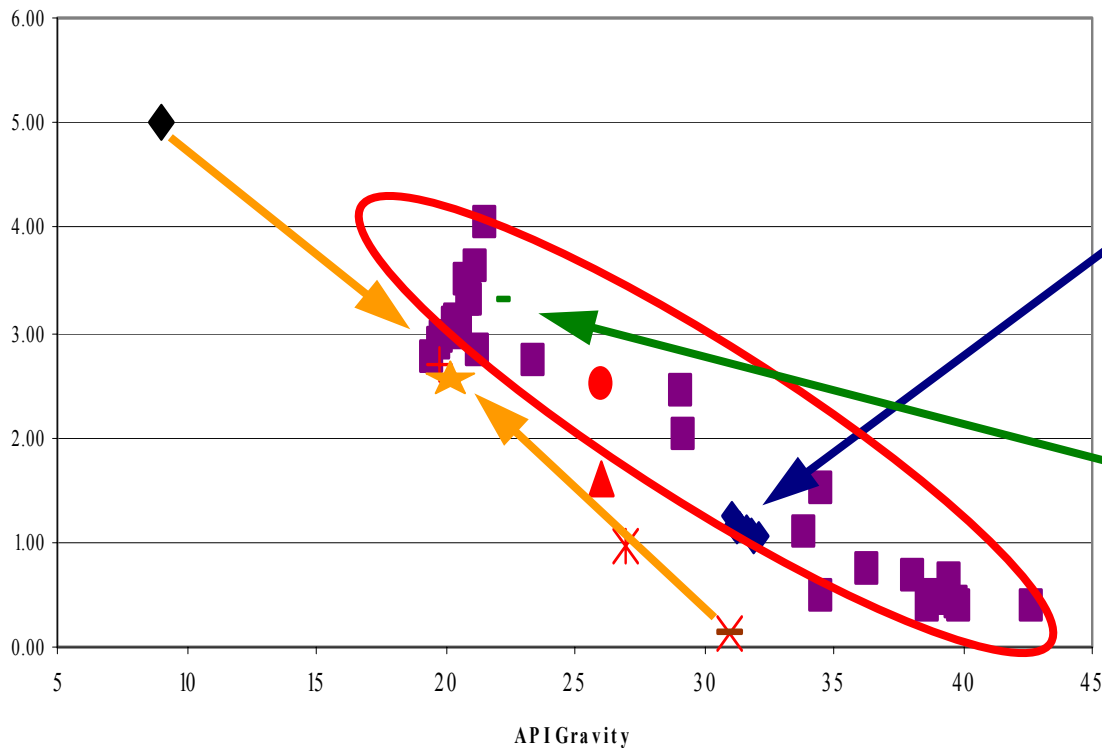


- Additional Conversion Capacity Should Reduce Light/Heavy Differentials
- Cokers in Particular Have Been Built to Process Specific Crudes
 - Maya – Mexico
 - Oriente - Venezuela



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Sulfur v. API Gravity



- Canadian Crudes
- ◆ US Annual Averages
- ▲ Hamaca
- × Zuata Sweet
- × Zuata Medium
- Petrozuata Light
- + Petrozuata Heavy
- Maya
- Canadian Syncrude
- ◆ Canadian Bitumen

Refining Industry Economics



- Synthetic Crudes Will Impact Refining
- Canadian Syncrudes from Tar Sands
 - Presently 900 KBPD
 - Expanding to 1800 KBPD by 2010
- Syncrudes from Venezuela
 - Presently 250 KBPD
 - Expanding to 600 KBPD by end 2005

Refining Industry Staying in Business



- Refining Is Very Competitive
- Industry Emphasis Is on Manufacturing Costs
 - Crude Selection/Optimization Is One Factor
 - Other Factors Are More Urgent

Refining Industry Staying in Business



- Manufacturing Cost Factors
 - Price of Crude Oil
 - Gasoline Sulfur Phase-down
 - MTBE Bans
 - Additional RFG Volume

Refining Industry Staying in Business



- Phase-in of new federal standards began on January 1, 2004
- Most refineries and importers will comply by 2006
- Rocky Mountain-area refineries will comply by 2007
- Small refineries will comply in 2008

Refining Industry Staying in Business



- For refineries, gasoline sulfur phase-down means:
 - Additional processing step(s)
 - Capital investment
 - Downgrade of some blendstocks
- Result: Upward pressure on manufacturing costs

Refining Industry Staying in Business



- For refineries, MTBE ban means:
 - Production of a new blendstock for blending with ethanol;
 - Lower vapor pressure; and
 - Additional segregation and transportation costs.
- Result: Upward pressure on manufacturing costs

Refining Industry Staying in Business



- The following areas will require federal RFG:
 - Baton Rouge: June 23, 2004
 - Atlanta: January 1, 2005
- Summer 2004: Atlanta (45 counties) gasoline will have a 95 ppm sulfur cap at retail

Refining Industry Staying in Business



- For Refineries, additional RFG volume means:
 - More stringent fuel properties;
 - Lower vapor pressure; and
 - Additional segregation and transportation costs.
- Result: Upward pressure on manufacturing cost

Refining Industry Staying in Business



- Summary of Manufacturing Cost Factors:
 - Gasoline sulfur phase-down is gradual and is just starting in 2004
 - MTBE bans have limited geographical implementation
 - New RFG/low-sulfur areas have limited geographical implementation
 - Crude oil price changes predominate

Refining Industry Staying in Business



- Price Volatility – Results from Temporary Supply/Demand Imbalances Due to:
 - Weather
 - Refinery production disruptions
 - Distribution system disruptions
 - International events

Refining Industry Staying in Business



- Prices can be more volatile if an affected area has a unique fuel formulation.
- This is commonly referred to as a 'boutique fuel'.
 - Limited geographical area
 - Not interchangeable with other fuels

Refining Industry Staying in Business



- Boutique fuels are now the root of all evil
 - “300 separate jurisdictions with their own rules” – Senator Kerry
 - “110-plus different fuel types” – Senator Bingaman
 - Must be bad if it needs a word from the French to describe it

Refining Industry Staying in Business



- Actually...
- 'Boutique' fuels
 - Approximately sixteen distinct fuels
 - Each available in three grades
 - Many jurisdictions use the same fuel
- The number of fuels being produced in the US is more like 50.

Refining Industry Staying in Business



Why Do We Have Boutique Fuels?

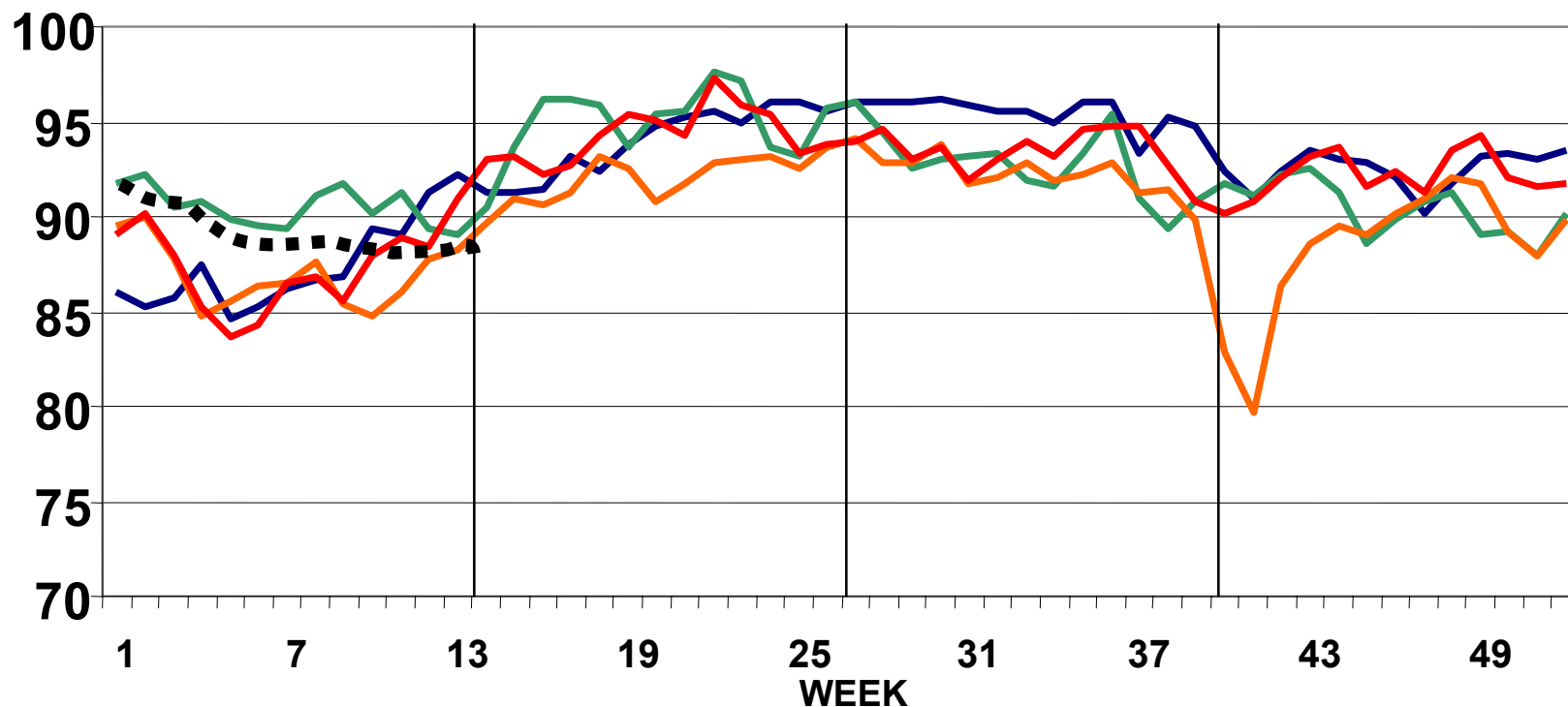
- Local areas have different air quality needs.
- A local fuel is a compromise between environmental and economic considerations.
- Often supported by refiners and other stakeholders
 - Lowers or avoids investment costs for refiners
 - Lower consumer costs ***overall***

Refining Industry Staying in Business



- Refinery Capacity Utilization
 - Refining Industry Operates at High Utilization
 - There Is No Spare Capacity During ‘Gasoline Season’
 - Spare Capacity Would Dampen Price Volatility

REFINERY UTILIZATION (%)



—2000 —2001 —2002 —2003

Refining Industry Conclusions



- The refining industry is operating at maximum capacity.
- Transportation fuel prices will track crude oil costs.
- Except for 'memorable' unpredictable events.

Refining Industry Conclusions



- Boutique fuels are not today's problem, i.e. not the cause of price increases.
- They do add complexity to the refining and distribution system.
- They may contribute to the effects of unpredictable events.

Refining Industry Conclusions



- Future years - The refining industry will continue to cope with significant capital investment requirements to stay in business.



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