



# **DIESEL vs GASOLINE PRODUCTION**

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**MICHAEL LEISTER  
FUELS TECHNOLOGY MANAGER**

**Marathon** 

# Gasoline vs Diesel Price



- ◆ **Gasoline and Diesel prices are controlled by the law of supply and demand**
- ◆ **However they can be affected by:**
  - **Fundamental energy content**
  - **The cost of crude oil**
  - **Refinery configurations**
  - **Industry capacity utilization**

# Refinery Production Decisions



- ◆ Typically based on LP modeling
  - Input mix and characteristics
  - Output product mix and volume
  - Expected costs and realizations
  - Refinery technical limitations
- ◆ Technical variables are unique by refinery
- ◆ Price, mix and volume of inputs, outputs, are unique by company
- ◆ Highly proprietary; competitively sensitive

# Historical Refinery Operations



- ◆ **Historically US refiners would seek to maximize gasoline production relative to diesel in spring and summer and maximize heating/diesel in fall and winter because seasonal changes in demand**
- ◆ **Refinery upgrades and expansions favored conversion units to make more gasoline**
- ◆ **At full utilization, the last refinery barrel processed produced more distillate than gasoline**
- ◆ **Spring and Summer were when refineries became profitable**
- ◆ **A refiner would seek to maximize light product volume over heavy product production because of better expected sales value.**

# Refinery “Swing” Capability



- ◆ Most US refineries have the capability to “swing” a limited volume of heavier gasoline components into diesel fuel.
- ◆ This capability varies by refinery and is believed to be in the 6-8% range
- ◆ High refinery utilization may reduce this capability
- ◆ The swing decision is based on relative gasoline to diesel economics

# Recent Refining Conditions



- ◆ **Since the fall of 2004, the market has signaled for refiners to be in maximum distillate operations almost continuously**
- ◆ **Refinery operations were at very high utilizations throughout the year.**
  - Turnarounds and new Environmental units kept utilizations tight in fall and winter
- ◆ **Fall and Winter operations were profitable.**
- ◆ **Seasonal effects have become smaller**
  - Heating oil portion of distillate production has been dropping.

# Current Refinery Operations



- ◆ **High crude prices and biofuels mandates have resulted in negative hydrocarbon gasoline demand growth**
  - Reducing Refinery capacity utilization year round
- ◆ **Most new Environmental projects have been completed**
- ◆ **Highway diesel demand has continued to grow reflecting strong worldwide diesel demand**
- ◆ **Residual products, such as asphalt, bunker fuel, etc. have been unable to pass along the increase in crude prices**



# Refinery Diesel Options After Maximizing “Swing Stream”



- ◆ **Short term (1-3 years)**
  - Improved distillation cuts into diesel component pool
  - Debottleneck existing hydrotreaters
  - Investigate changing Gasoline, Kerosene, Jet and Diesel cut points
  - Change FCCU operations/catalyst
  
- ◆ **Long term**
  - Build hydrocrackers
  - Modify hydrotreaters to handle more difficult feed streams
  - Build units to convert current residual products to diesel fuel.



# Other Coming US Diesel Requirements



- ◆ **2010**
  - Remaining 20% of US highway diesel goes to ULSD
  - US Off road diesel goes to ULSD
- ◆ **2012 – Railroad and Marine diesel goes to ULSD**
- ◆ **Worldwide Marine fuel changes**
  - 2015 SECA's require 0.1% sulfur distillate
  - 2020 All bunker fuel could become 0.5% sulfur distillate (ships will compete with trucks)
- ◆ **Biofuels mandates (US and worldwide)**
- ◆ **Low carbon fuels requirements**
- ◆ **Other GHG legislation/regulation**

# Future Trends



- ◆ Diesel fuel is projected to grow faster than gasoline for the next 20 years
- ◆ Public and Congressional fascination with CAFÉ tightening will continue with limited interest in current diesel fueled vehicles. This may further reduce gasoline demand relative to diesel fuel.
- ◆ The US economy will continue to be more dependent on diesel fuel than gasoline. Diesel demand will continue to be more inelastic than gasoline demand.

# Conclusions



- ◆ **Physical and technical constraints will limit the amount of diesel fuel that can be obtained from a barrel of crude oil.**
- ◆ **US Refineries do not yet appear to be physically nor technically constrained in terms of diesel fuel production.**
- ◆ **Incremental diesel production decisions will be influenced by the expected margins derived from the other products that will be produced.**