ASPHALT SUPPLY IN A VOLATILE OIL WORLD

Bill Haverland
ConocoPhillips Company
Issues to be Discussed

- Crude Oil Supply
- Crude Oil Pricing
- Refining Capacity
- Products Supply
- Products Pricing
- Future of the Industry
CRUDE OIL SUPPLY

A WORLD LOOK
Crude Oil Supply (2006)

World Crude Oil Production
Millions of Barrels Per Day

- Total: 85MMB/D

- FSU/E. Europe: 26.0
- W. Europe: 11.3
- US/Canada: 8.4
- Asia/Pacific: 9.8
- Africa: 12.6
- Latin America: 10.6

World Proven Crude Oil Reserves
Billions of Barrels

- Total: 1,292 BB

- FSU/E. Europe: 79
- W. Europe: 116
- Latin America: 36
- US/Canada: 201
- Asia/Pacific: 743
- Africa: 102
- Middle East: 743
Crude Oil Demand

- Demand has risen by 7 MMBD (9%) since 2002.
- Demand at 85 MMBD or 98% of world daily delivery capacity.
- Vulnerable to supply disruptions caused by storms, accidents, breakdowns, political unrest.
- 65% of proven reserves within national oil companies and 16% held by Russia.
- Traditional companies have full access to 7% of reserves and 12% through partners (if allowed).
WTI Price by Year

The graph shows the WTI price over the years from 1996 to 2006. The price starts around $20 in 1996 and gradually increases over the years, reaching approximately $70 by 2006.
WTI Price by Quarter
REFINING CAPACITY
Topping Refinery

CRUDE OIL

DU

650-
GASES

NAPHTHA
AND
GASOIL
FEEDSTOCKS

650+

“Tea Pot”
Not A Refinery
Really Just A
Crude
Distiller

6OIL or ASPHALT
(if heavy crude)
**Simple Refinery**

- **CRUDE OIL**
  - 650-
    - **GASES**
      - **NHT**
      - **CRU**
        - **JET/KER O**
        - **TO NO.2**
  - 650+ → **6OIL or ASPHALT** *(if heavy crude)*
  - **DU**

“Hydroskimming” Refinery, many exist all over the world
CCU - “Complex” Refinery

CRUDE OIL

DU

GASES

NHT → CRU → TO MOGAS
NHT → TO MOGAS
KHT → JET/KER
DHT → TO 2OIL

650-

ALKY

TO MOGAS
GASOLINE
GASOIL
TO 2OIL

650-

VAC

CCU → TO MOGAS
CCU → TO MOGAS

1050

6OIL

ASPHALT

650+

1050+
Refinery Yield (% of Crude Intake)
U. S. Refining Capacity

Last New U. S. Refinery Built in 1976

Source: Oil & Gas Journal
U. S. Asphalt Refining Capacity

Production Range: 600 B/D to 60,000 B/D

Source: Oil & Gas Journal
U. S. Refining Coking Capacity

- **# Refineries w/Cokers**: 50, 81, 138
- **Coke Production, MT/D**: 56, 120, 58
U.S. Coker Construction Projects
2005 - 2011

- **Engineering, Procurement & Const. Phase**
  - Total Refineries: 245 MB per day
  - Asphalt Refineries: 135 MB per day

- **Planning or Early Engineering Phase**
  - Total Refineries: 176 MB per day
  - Asphalt Refineries: 121 MB per day

*Source: Argus Asphalt Report*
PRODUCTS
SUPPLY/DEMAND
Supply Source for U. S. Demand

- Domestic Crude Production
- Imported Crude
- Imported Products

MMB/D

- '95
- '96
- '97
- '98
- '99
- '00
- '01
- '02
- '03
- '04
- '05
U. S. Product Demand, MB/D

- Gasoline
- Diesel
- Jet
- Resid
- Asphalt

Historical Asphalt Supply/Demand
Millions Tons - Liquid

Source: Oil & Gas Journal
PRODUCTS PRICING
Prices by Quarter
Prices by Quarter
Asphalt vs Coker Feed Value

WTI
P&P MC Avg
gulf coast coker value
## Economic Analysis – 2005 YE

<table>
<thead>
<tr>
<th>Gasoline/Diesel Pricing</th>
<th>Kansas Asphalt Pricing</th>
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</thead>
<tbody>
<tr>
<td>Jan., 06 Price: $70.00/BBL</td>
<td>12/05 YTD: $32.94/BBL*</td>
</tr>
<tr>
<td>Less Distribution: 6.00/BBL</td>
<td>($35/Ton): 6.25/BBL</td>
</tr>
<tr>
<td>Net to Refinery: $64.00/BBL</td>
<td>$26.69/BBL</td>
</tr>
<tr>
<td>Lost Value: $37.31/BBL</td>
<td></td>
</tr>
</tbody>
</table>

* Source – Poten & Partners
Coking Economics – 2005 YE

- 30,000 BBLs/Day Asphalt Production
- X 70% Gasoil Production
- 21,000 BBLs Gasoil for Gasoline/Diesel
- X $37.31/BBL Gasoline/Diesel diff. To Asphalt
- $783,510 per day added margin
- $1 Billion / $783,510 = 1,276 days (3.5 years payoff)
Economic Analysis – Recent Update

**Gasoline/Diesel Pricing**
- Jan., 07 Price: $62.75/BBL
- Less Distribution: 6.00/BBL
- Net to Refinery: $56.75/BBL

**Kansas Asphalt Pricing**
- 12/06 MTD: $49.11/BBL*
- ($35/Ton): 6.25/BBL
- $42.86/BBL
- Lost Value: $13.89/BBL

*Source – Poten & Partners*
Coking Economics – Recent Update

- 30,000 BBLS/Day Asphalt Production
- $\times$ 70% Gasoil Production
- 21,000 BBLS Gasoil for Gasoline/Diesel
- $\times$ $13.89/BBL$ Gasoline/Diesel diff. To Asphalt

- $291,690$ per day added margin

- $1$ Billion / $291,690 = 3,428$ days (9.4 years payoff)
FUTURE OF THE INDUSTRY
Current Realities

- Crude production at maximum rates based on exiting infrastructure
- U.S. refining running at maximum capacity
- No new refineries in the near term
- Existing refinery expansions must fill gap
- Increase crude capacity and conversion capabilities to meet light product demand
- Asphalt must keep pace with conversion feed values to encourage production
- Asphalt not as politically charged as fuels
Factors Influencing Asphalt Price

- Absolute price of crude (WTI benchmark)
- Light/Heavy crude price differential
- Light product “crack spread”
- Coking economics
- Impact of clean fuels (sweet crudes)
- Heavy crude availability (Venezuela)
- Transportation costs
- Supply/Demand
Future For Asphalt

- More heavy crude being run (availability and price)
- Clean fuels capital behind refiners, up-graders next?
- Asphalt is more expensive in a $60.00+ crude world
- Asphalt has to trend faster with crude oil prices
- Asphalt has to be more competitive with light products
- Transportation costs rising – Rail, Barge, Terminalling
- Refiners less willing to shoulder price risk
- State asphalt price indexes reduce supplier/contractor risk
QUESTIONS
Worldwide Coker Additions

- Refinery Coker Additions – 1,570M Barrels
- Crude Upgraders - 1,214M
- Total Resid Destruction - 2,784M*

*Reduces world asphalt and #6 oil supply

Source – Argus Asphalt Report
Light-Heavy Product Price Spread Drives Refinery Investment Cycle

1995-2000
Six New Cokers
Total U.S. Capacity Utilization

History
- Demand growth has outpaced capacity expansion
- Investment focused on clean fuels
- Insufficient global capacity to process more difficult crudes

Forecast (DOE)

90%

Source: U.S. Department of Energy

1 Percent utilization defined as: gross input to refineries / operable capacity.