Where Are We in the Chemical Cycle?
Macro factors and outlook

Joseph Chang, Global Editor

October 3, 2011

Titanium 2011 – San Diego
Agenda

- The chemical cycle
- Chemical price trends
- Macroeconomic factors
- Capital spending
- Shale gas dynamics
Boom and Bust

Trough:
Capital investment slows and stops

Peak:
Markets tighten, companies ramp up spending

Mid-cycle:
Spending picks up, capacity added

Trough:
Capacity buildup takes its toll

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The Case for a “Supercycle”

- **Supply: Capacity constraints**
  - Middle East running out of gas supplies, leading to a “capacity vacuum” after 2011

- **Demand: Strong economic growth, led by emerging markets in China and India**
  - Annual demand for ethylene & derivatives in China and India within 5 years will equal total current consumption in the US – the world’s largest consumer
Petrochemical Prices Remain Elevated

ICIS Petrochemical Index (IPEX)

September 2011: 366.06

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Macro View: Hitting a “Soft Patch”

- Global economy hitting a “soft patch” with slowing growth in the US and China
- Japan earthquake impact still being felt
- Monetary tightening and fiscal austerity
  - China and India hiking interest rates
  - More and more of Europe on “Austeria Lane,” with US headed on the path
Global Manufacturing Growth Slows

JPMorgan Global Manufacturing PMI
Diffusion Index, sa

Source: JPMorgan - produced by JPMorgan and Markit in association with ISM and IFPSM
China Polyethylene Slowdown

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US Polypropylene (PP) vs. Propylene

- (Bulk Del USA) Polypropylene (Homopolymer US Gulf Domestic Injection)
- Propylene (F Grade) US Gulf Spot Pipeline

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US Butadiene (BD)
Titanium Dioxide (TiO2)
Capital Spending Patterns

CAPX as % of Depreciation

Dow Chemical
DuPont
Huntsman
Eastman
Solutia
Celanese
LyondellBasell

Source: Compiled by ICIS
Shale Gas – The Game Changer

ICIS Chemical Business
ANALYSIS OF CHEMICAL MARKETS

WANTED

US FEEDSTOCK ADVANTAGE
More cheap gas liquids are coming. What about a new cracker?

SHALE GAS!
LIQUID-RICH PREFERRED

www.icis.com
US Natural Gas Volatility

Daily Natural Gas Futures Contract 1

Source: U.S. Energy Information Administration
US Ethane Advantage

Long Term - Cracker Variable Margins, US ethane vs naphtha feed

Source: ICIS Weekly Margin Report

2011 = Year-to-date as of 2 Sep 2011
US Quarterly Ethylene Production - Feedstock source (proportion of total)

Source: NPRA Ethylene Production data
US IPEX tracks WTI crude oil

US IPEX v WTI v Henry Hub

IPEX and oil – R2 = .881
IPEX and gas – R2 = .594

Source: ICIS, EIA
Crude oil price divided by EIA’s factor 5.8 to give equivalent energy value
Taking Advantage of Shale

- Shell to build a new worldscale (1m tonnes+/year) cracker in the Appalachian region – the 1st in proximity of the Marcellus Shale
- Dow to build new cracker on US Gulf Coast by 2017, restart 1 idled plant, expand 2 existing plants, build new on-purpose propylene plant by 2015
- Chevron Phillips explores plan to build new cracker on US Gulf – study complete by end of 2011, cracker start-up by 2017
- Formosa evaluates building new cracker at Point Comfort, Texas by 2015
- LyondellBasell studies new cracker, plus 2 debottleneckings
- Brazil’s Braskem explores building a new cracker in the US
- Westlake undertaking 2 debottleneckings, exploring 3rd
- INEOS explores debottlenecking 2 facilities
- Bayer trying to attracting new cracker to West Virginia
Outlook Summary

Supply Side

- Scant planned capacity additions in the Middle East support the case for continued supply-driven tightness. BUT the huge planned capacity increases in the US is throwing some water on the Supercycle theory.

Demand Side

- China’s economic growth slows, with US and Eurozone economies on the brink of recession.

Conclusion – CAUTION

- Demand side could quash the upcycle, but it won’t be 2008 all over again. Supply constraints to put upward pressure on select petrochemical prices through 2013-2014. Beyond that, huge potential for supply-driven downturn.