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SBS/Butadiene Past, Present & Future

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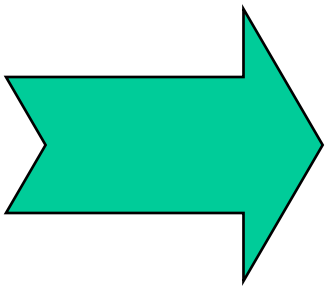
Today

- Refresher on Butadiene/SBS in 2008
- Where are we Today
- Fundamentals that will affect the future

Where Do Raw Materials Come From ?

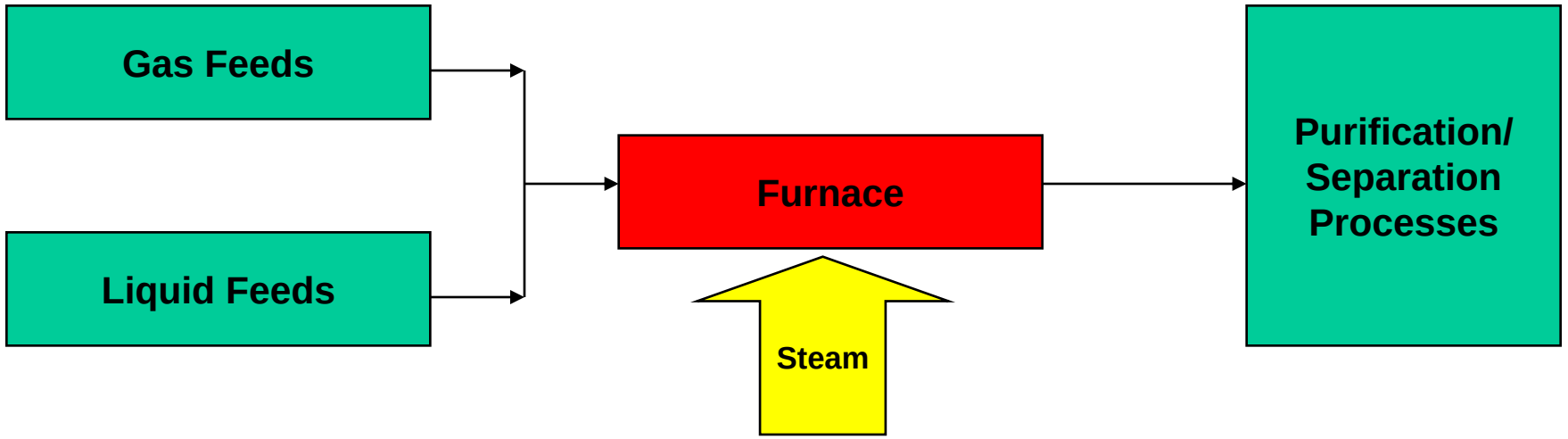
Ethylene



Chemicals Are A Byproduct of Ethylene Production

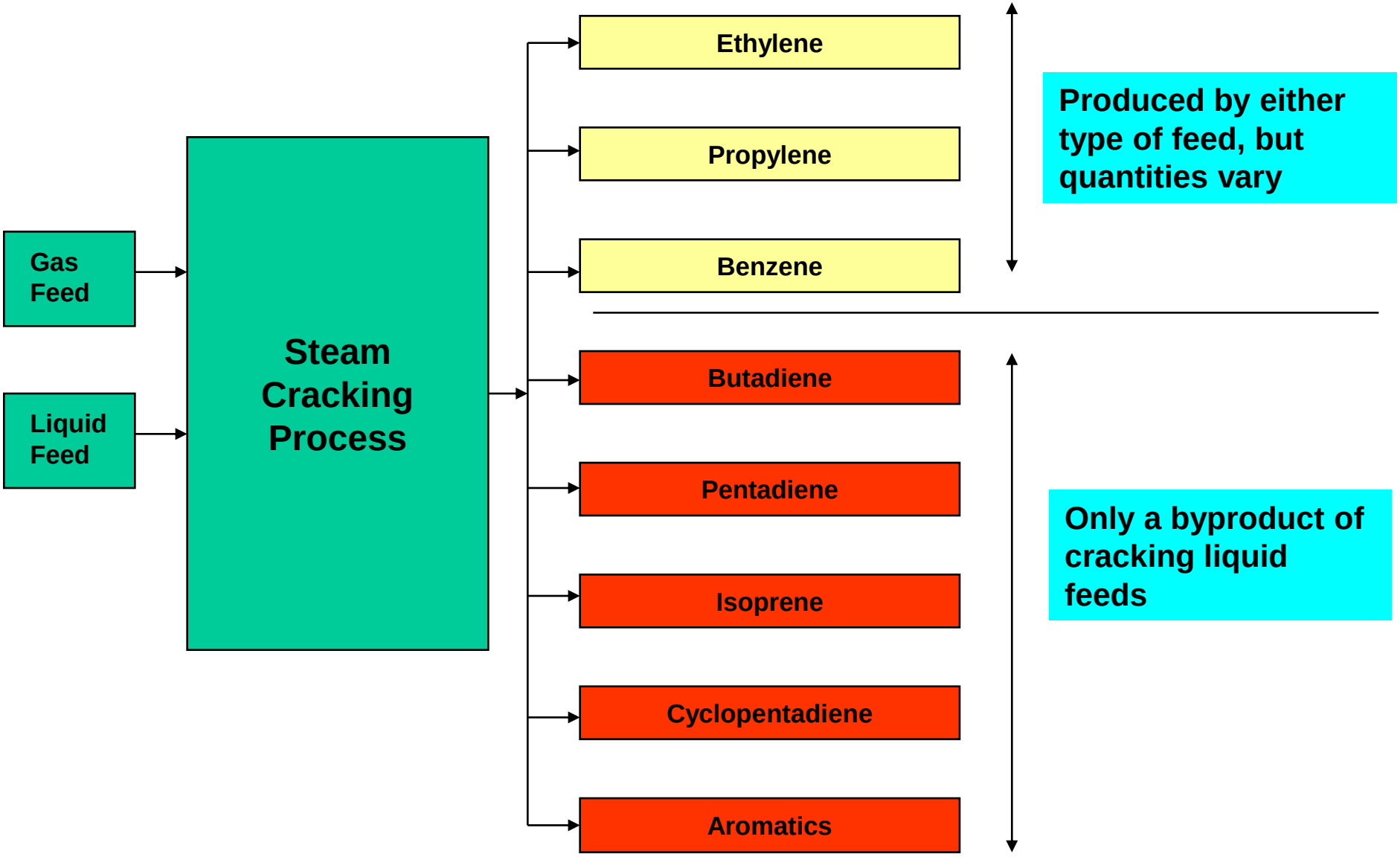
- Styrene
- Ethylene
- Propylene
- **Butadiene**
- Isoprene
- Pentadiene
- Cyclopentadienes
- Aromatic Resin Formers
- Isobutylene
- Amylenes
- Hydrogen
- Benzene

How Do You Make Ethylene

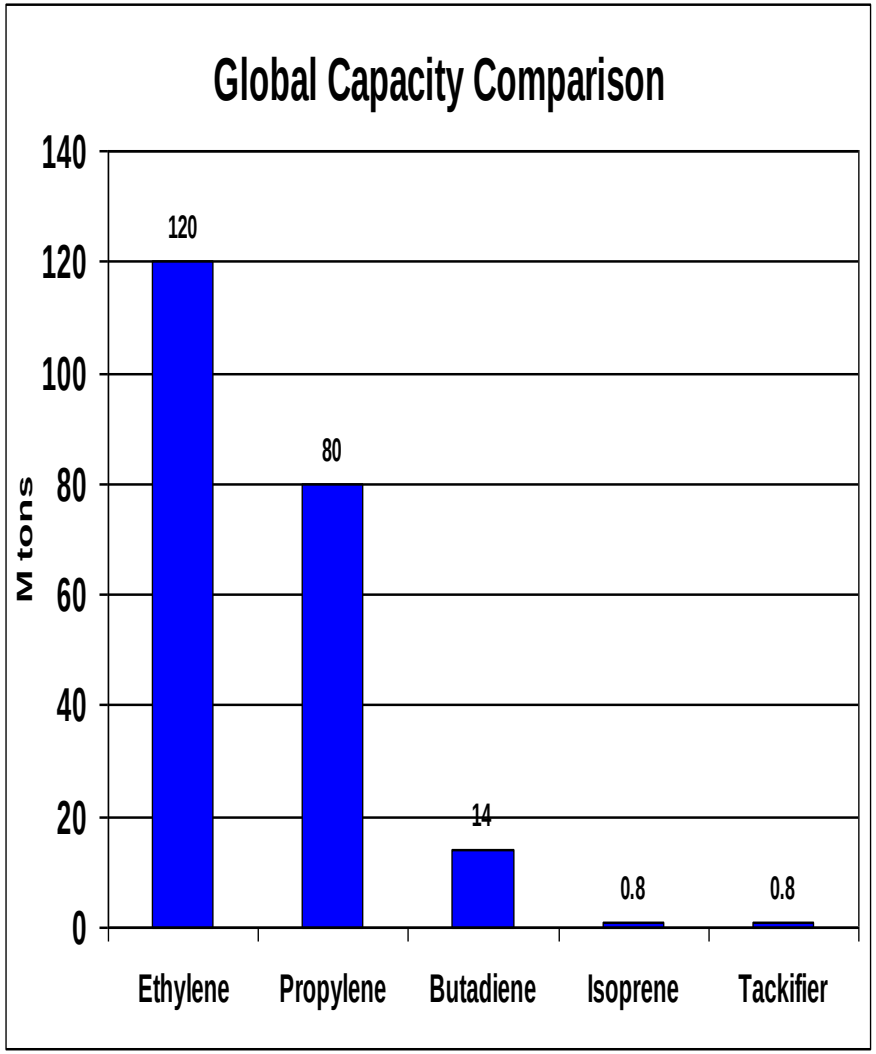


- Basic ethylene technology is called a steam cracking process - Often referred to as “Cracker” as it cracks molecules
- Basic process heats feed up to 1700 degrees, then injects steam that cracks the molecules
- Choice between gas feeds like ethane, propane and butane and liquid feeds like naphtha and gas oils.
- Output is a mixture of ethylene to heavy products like tar
- Requires a downstream purification processes to separate products

What's Important to Know About Ethylene

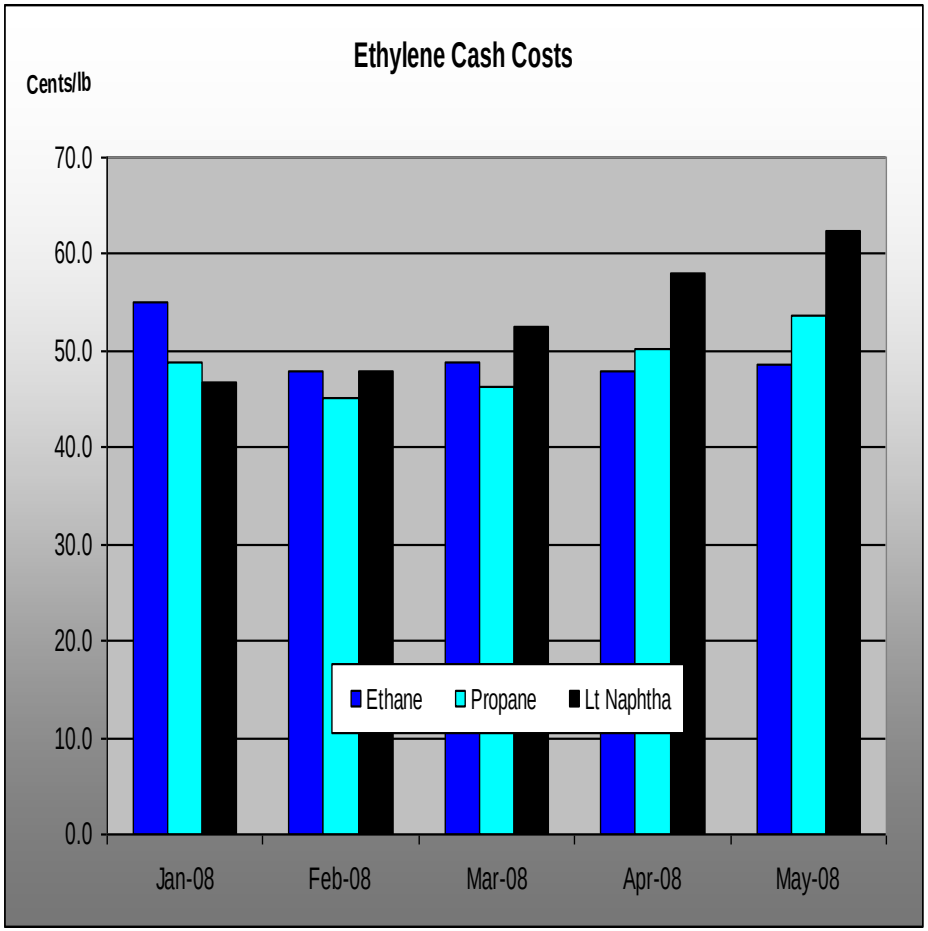


Scale Of The Chemical Industry



- Prime drivers for chemical production are ethylene and propylene
- Strategic interest by most chemical producers are ethylene and propylene
- Butadiene historically has been a disposal issue
- Businesses were built around these low valued byproducts of ethylene production
- Byproduct streams are capturing more value now, but strategic interest remains low

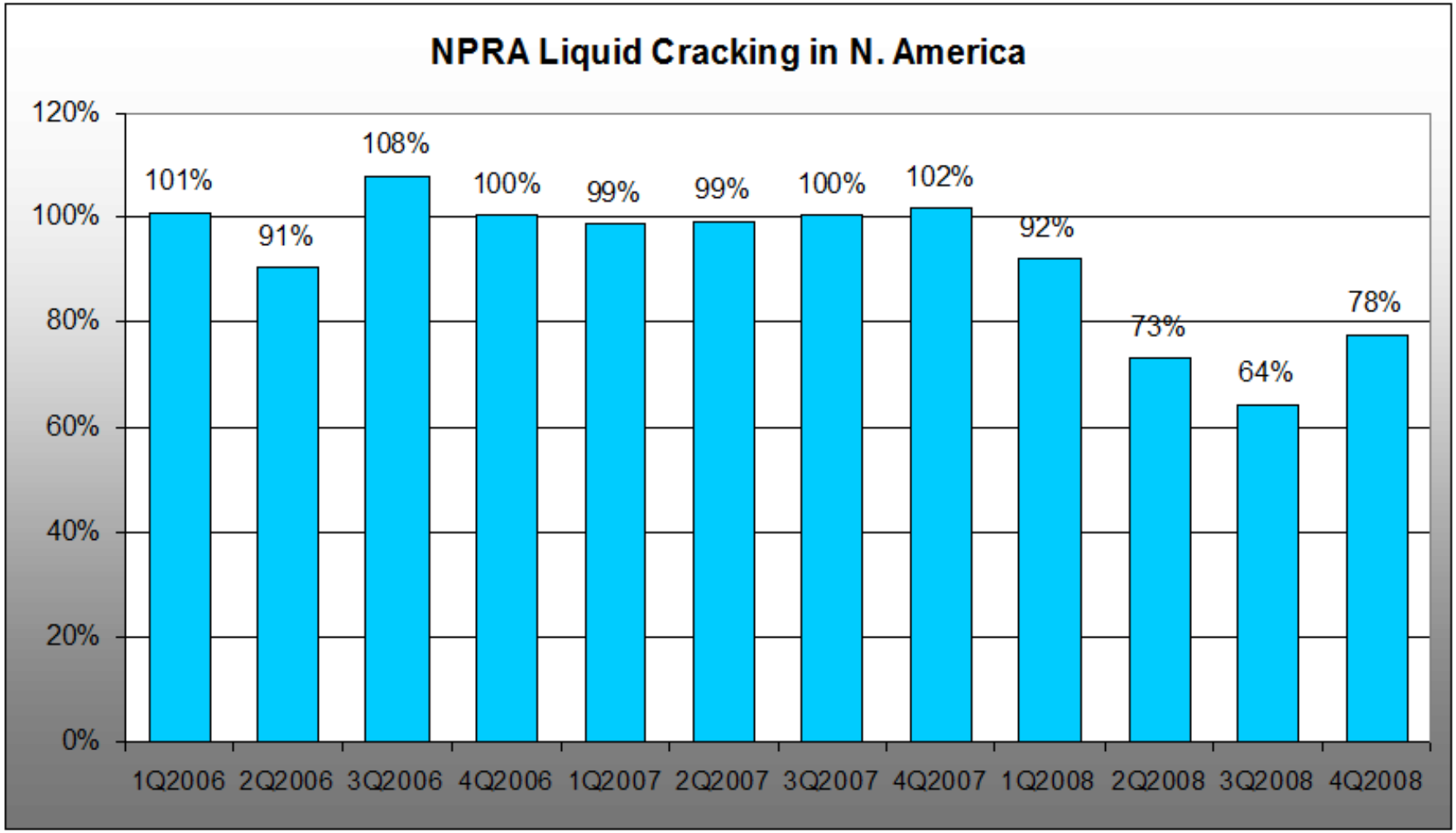
How Do They Chose A Feed To Make Ethylene



- Decisions on ethylene feed slate are based on cost of ethylene economics
- Cost of ethylene economics attempts to model the cost of ethylene by netting back all the credits for the byproduct streams
- The graph shows January to May 2008 cost of ethylene for N. America

Major Change in the Cracker Feeds Started Mid-February & Continued Through the Summer

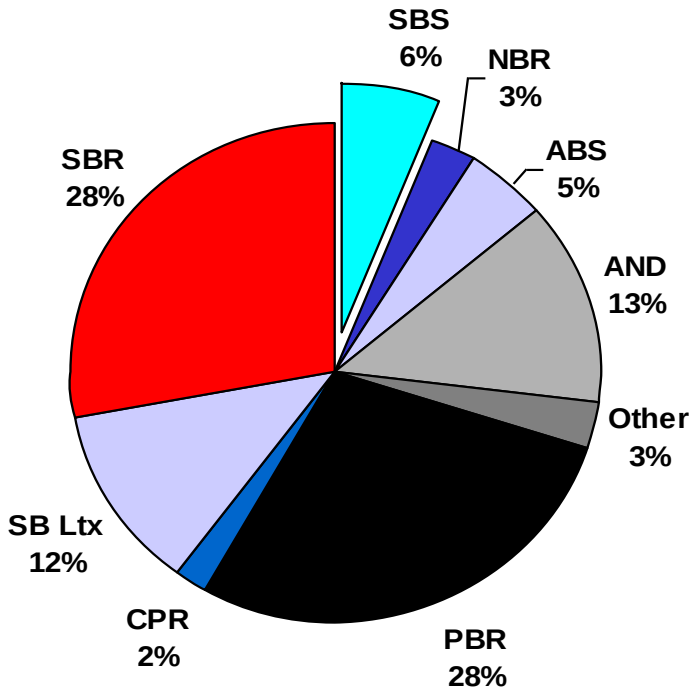
How Did Feed Slate Change in 2008



2008 Liquid Cracking Down 23% vs. 2007/6

Butadiene Consumption

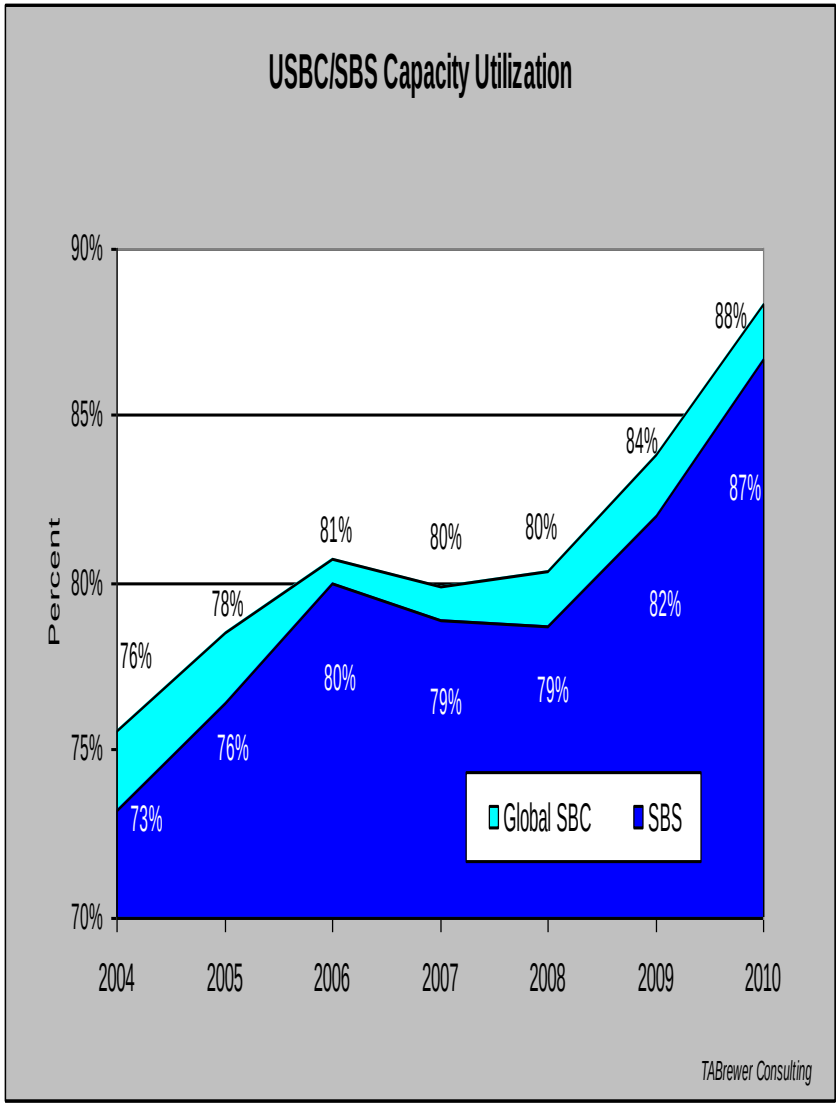
N. American Butadiene Consumption



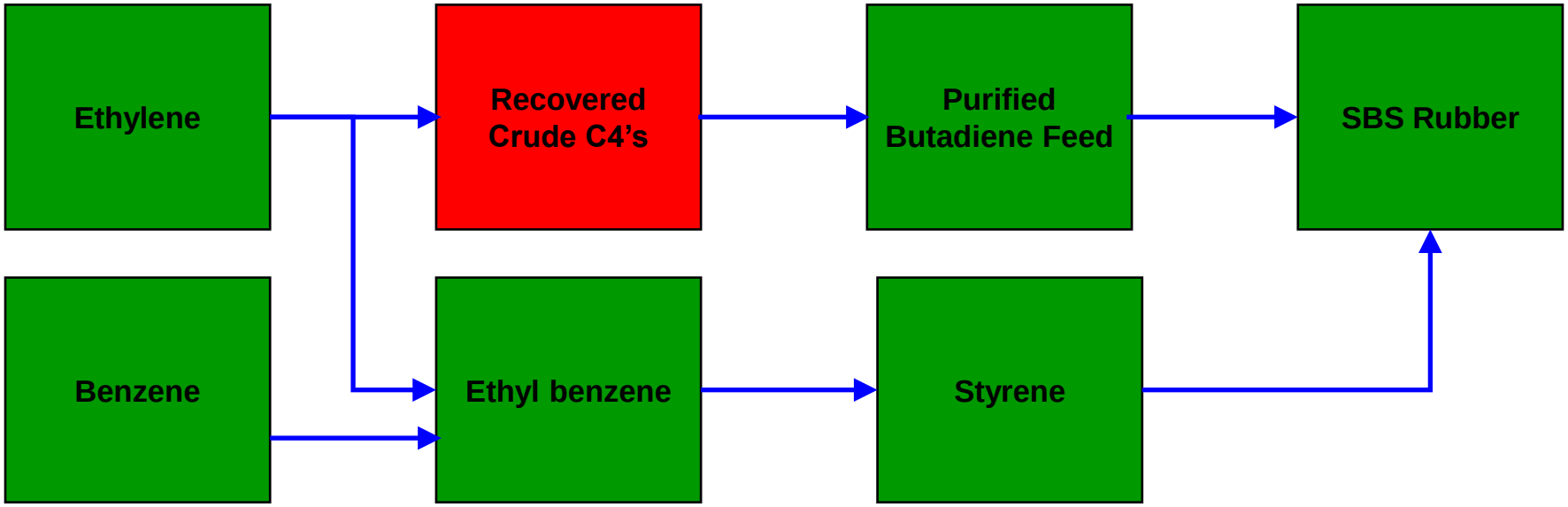
- SBS represents only 6% of the total demand
- SBS into asphalt is the majority of this demand
- Asphalt demand is small versus the total

SBS/SIS Supply

- Graph shows SBS capacity utilization and total USBC (SIS plus SBS)
- Overall capacity is adequate through 2010
- Western world capacity utilizations will rise in the high 90% range
- Asia capacity utilizations will be lower in the 70% range



Polymer Examples – SBS

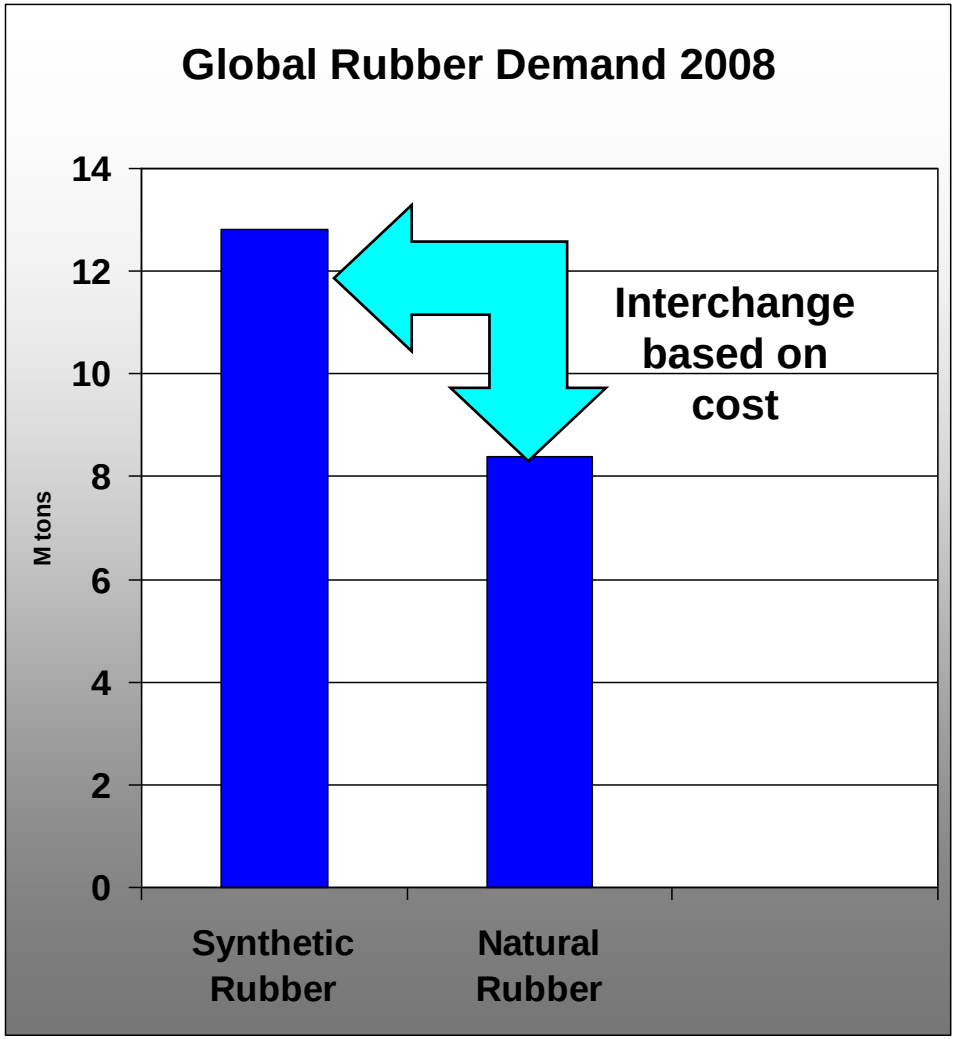


- 2008 SBS supply problem was a cracking slate issue or crude C4 availability issue
- No shortage of any other capacity
- Another key point is that U.S. has more purification capacity than available crude streams, so typically US is a net importer from Europe to meet demand

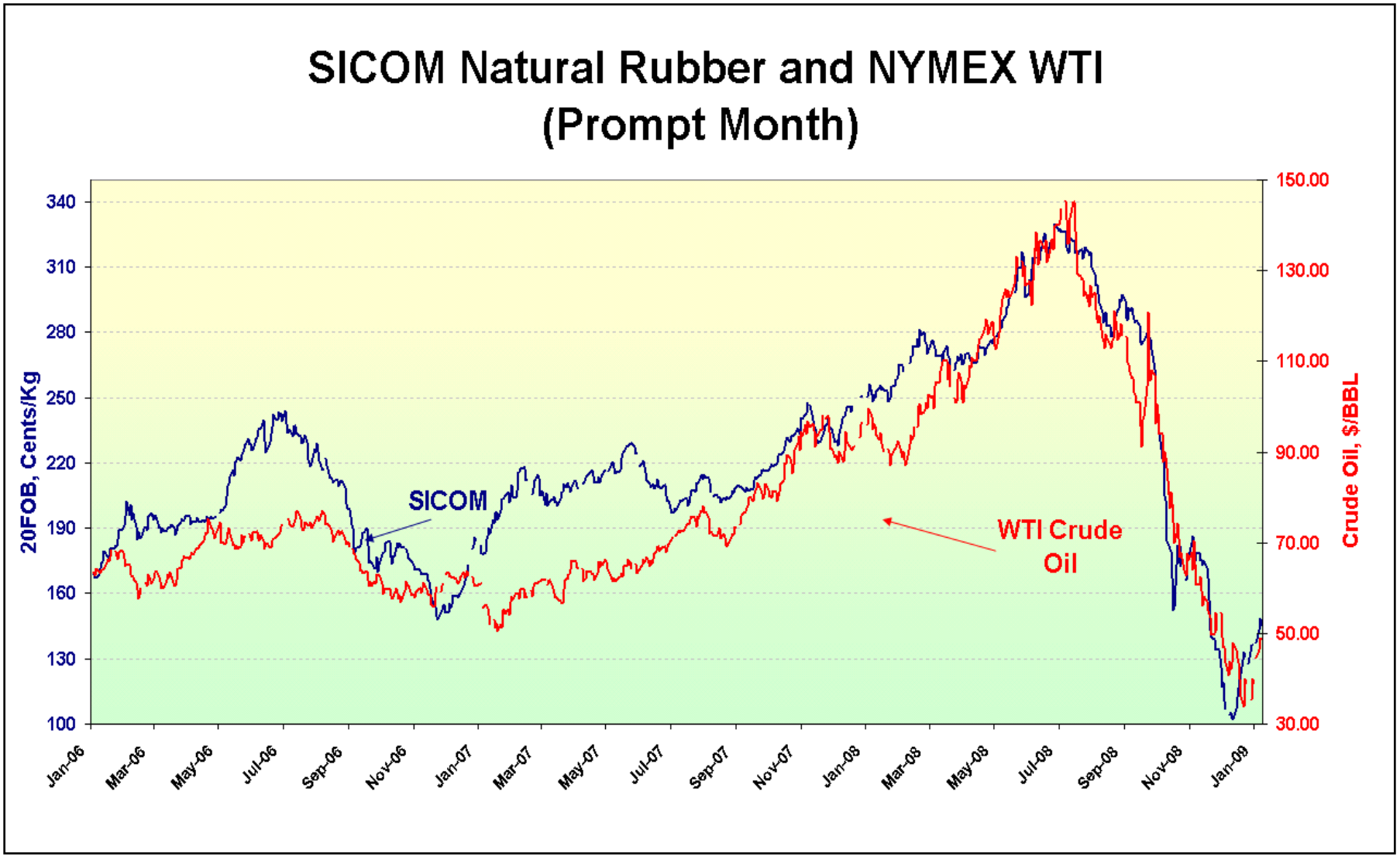
Where Are We Today

Global Rubber Perspective

- Global rubber demand in 2008 is 21.4 M tons, or 47 billion pounds
- Tires are the major consumer of synthetic and natural rubber
- Butadiene is a major component in most synthetic rubber: SBR, PBR, SBS, etc
- Decreased tire demand will significantly improve butadiene supply

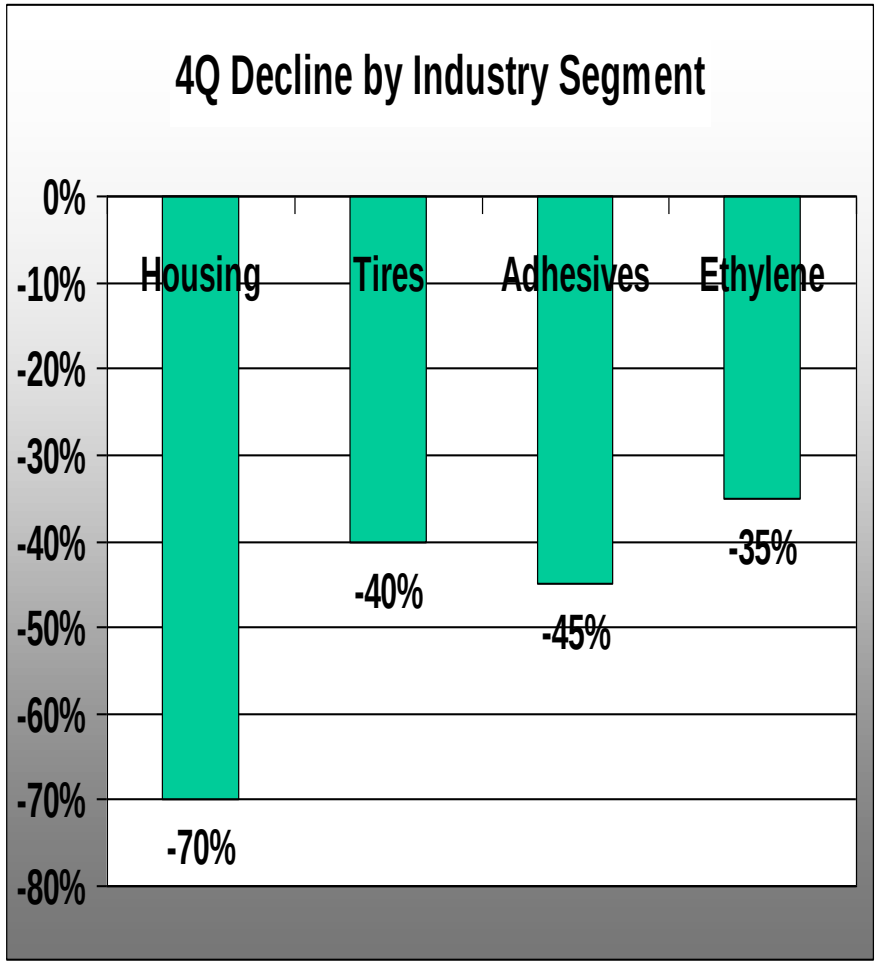


Low Natural Rubber Prices Push Out Synthetic

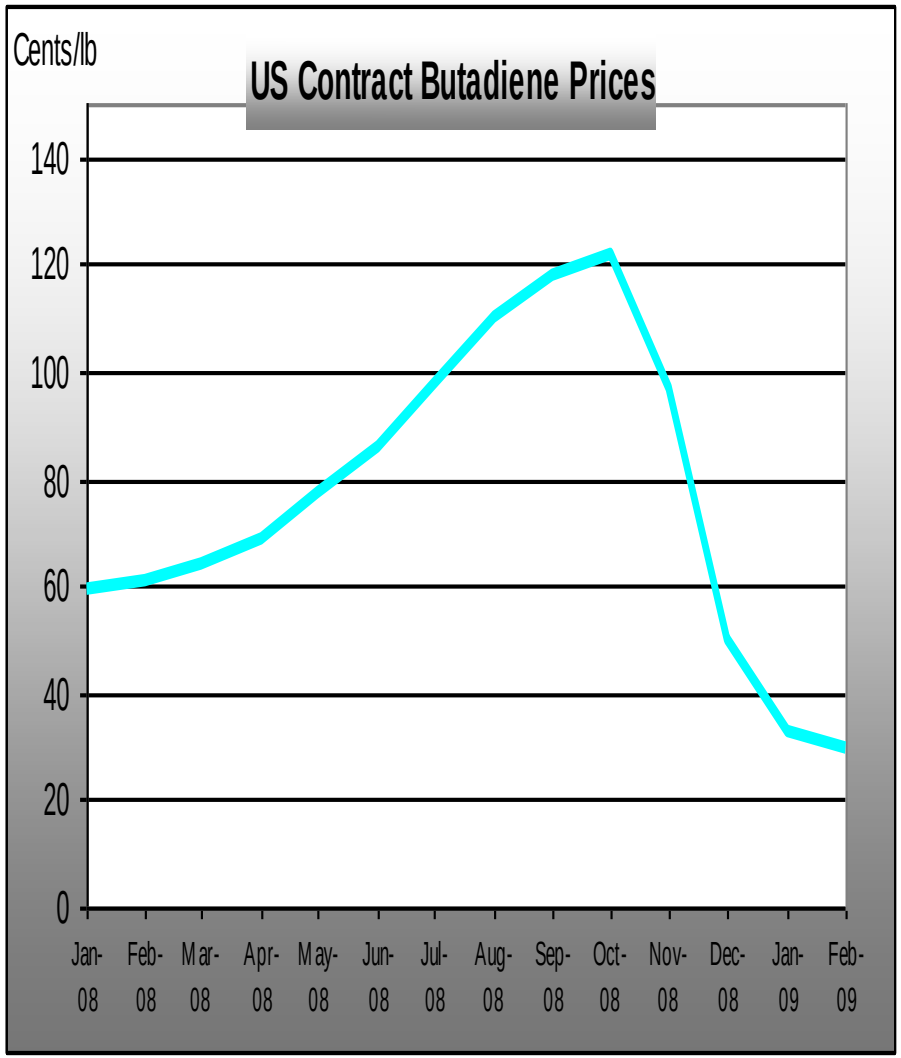


4Q Economic Decline – Makes Bd Supply Longer

- Economy progressively shut down during the fourth quarter
- Housing industry started years before
- Tire industry was the first 4Q casualty
- Adhesive industry followed quickly behind tires
- Followed by general chemicals/Ethylene
- The sequence helped increase Bd supply



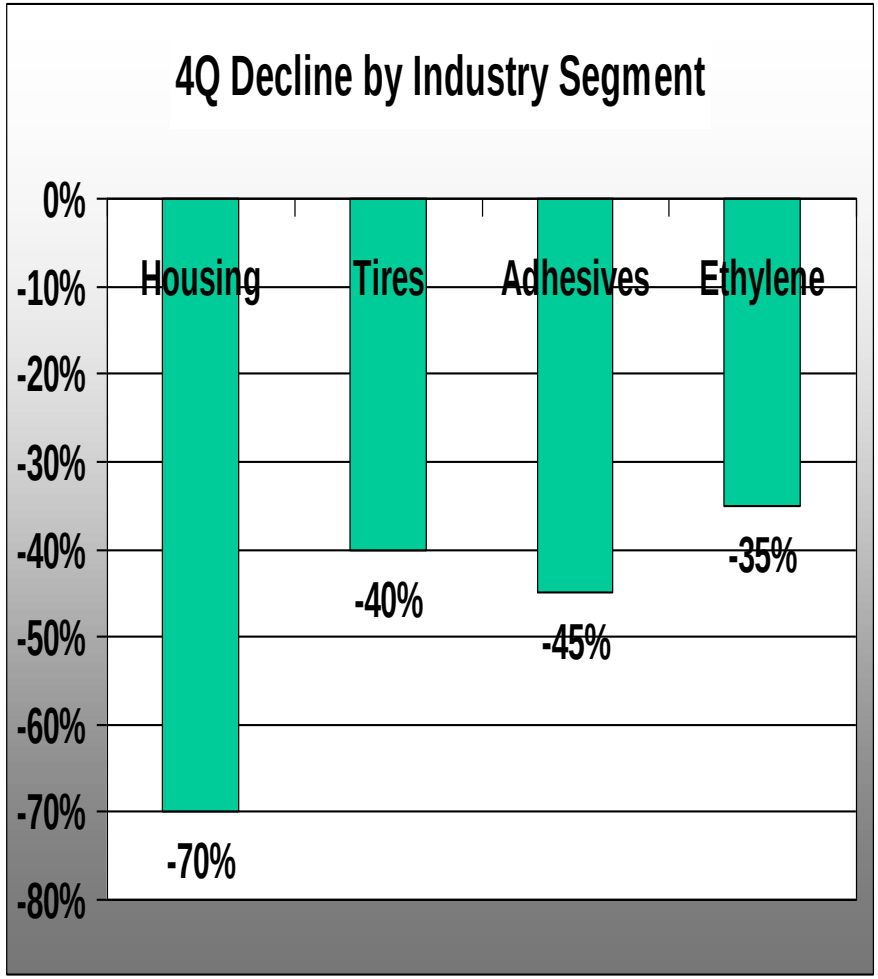
Price Decline - Not All Crude Oil Related



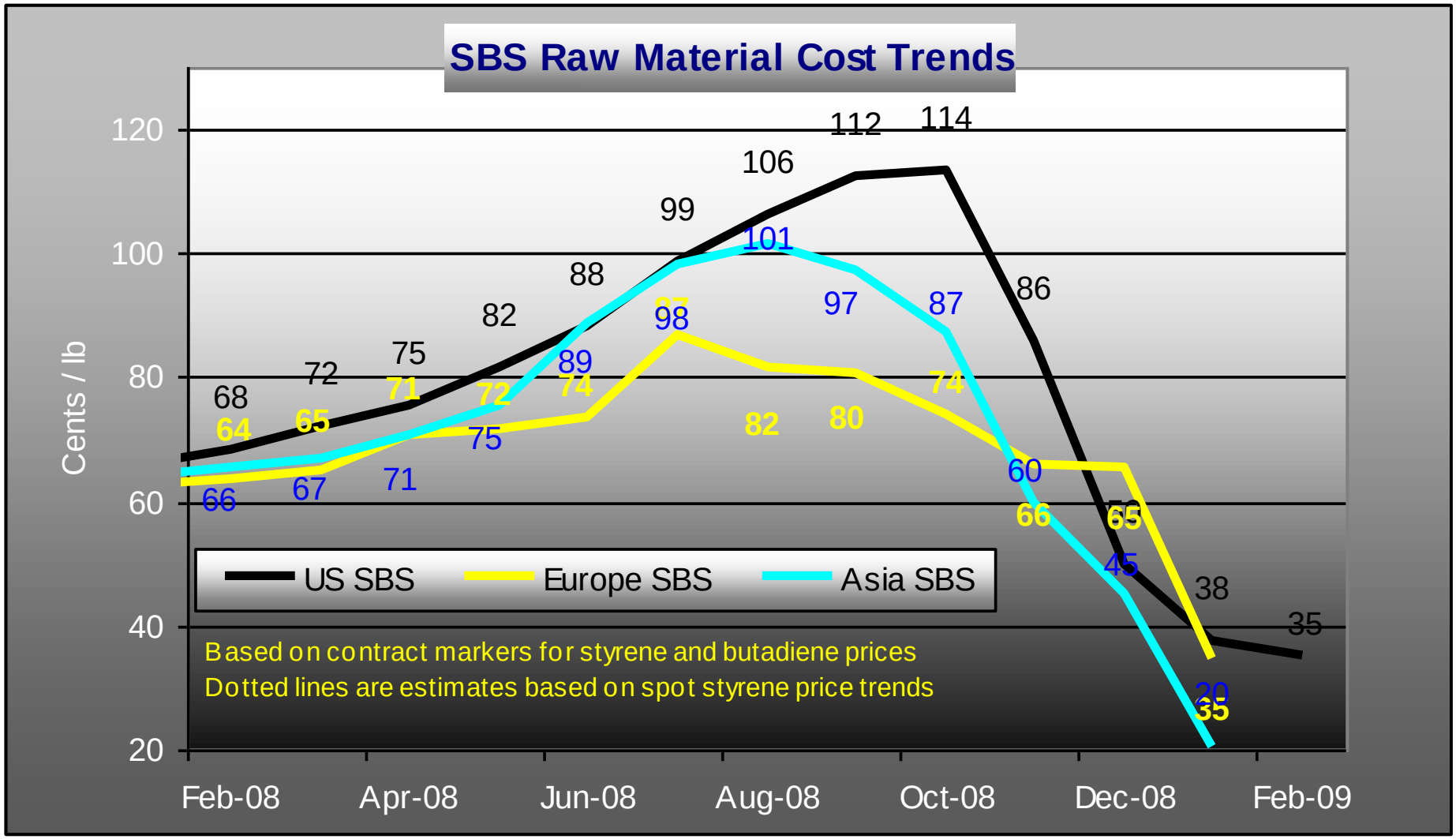
- Prices peaked at $1.20 per pound
- Dropped 92 cents/lb in four months
- Why did it drop during 4Q when cracking slate didn't?
- Crude oil decline is part of reason
- Markets and products is the other part
  - Tire decline started early 4Q
  - Ethylene end-use markets started later
- Ethylene demand forced more production of Bd that wasn't needed
- Disposal of Bd became an issue
- Going forward this is going to be important

1Q Demand Uncertain

- Some increase in demand over disastrous December, but different by products/market segments
- Many feel it's just restocking at lower prices
- Concern that real demand won't return until late 1Q/early 2Q
- Some ethylene capacity restarts, but biased to light feed
- Butadiene remains long due to tire industry



SBS Raw Material Cost Trends

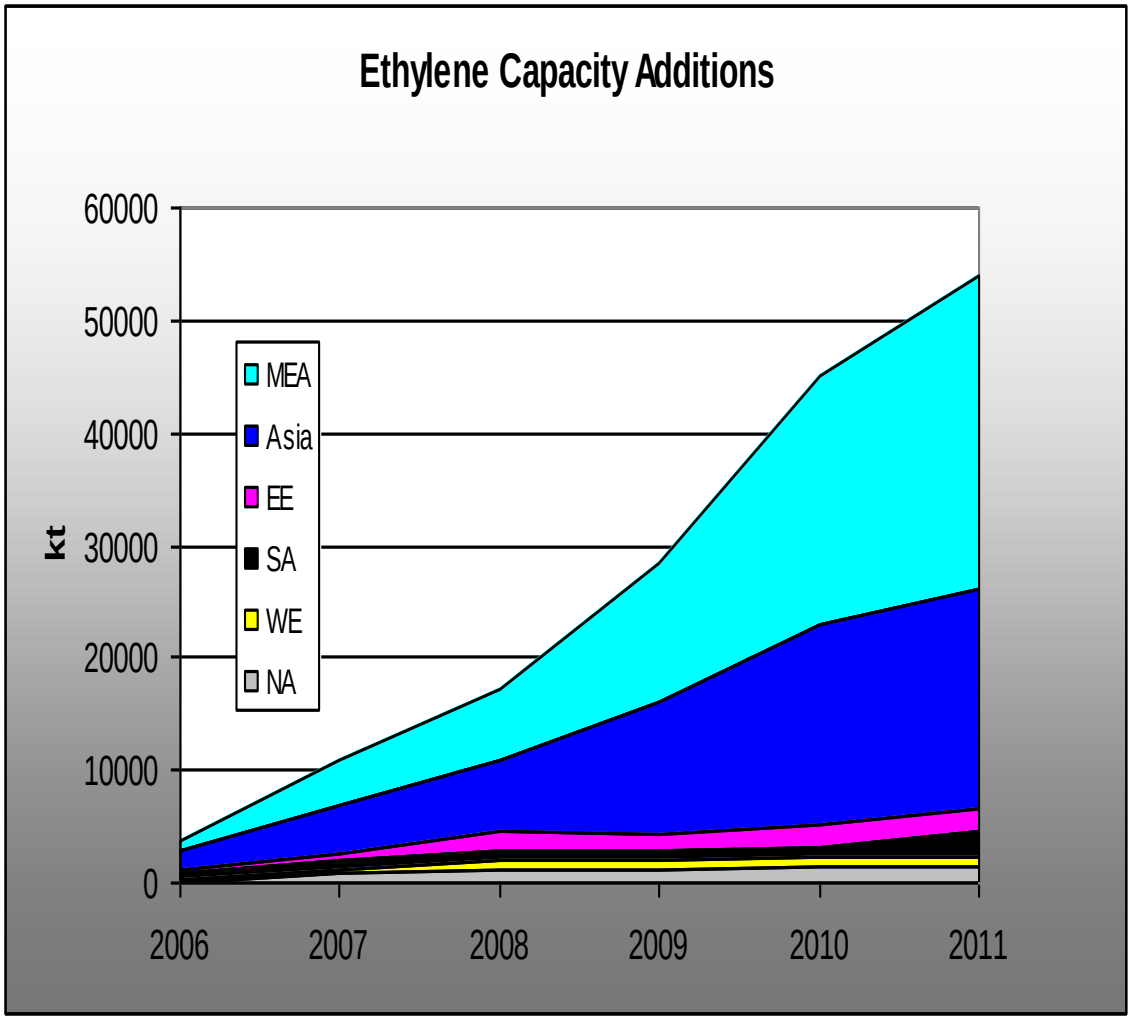


Outlook For 2009

- Expect demand to be lower than 2008 across all market segments, the question is how much
- Ethylene is expected to be 10-20% lower than 2008; key trends
  - Less demand
  - Lighter cracking
  - Less exports
  - More imports….more on this latter
- Tire demand expected to be 20% lower than 2008
- Butadiene supply should be adequate.
  - Need to stay close to ethylene demand/feed slate and tire demand
- Other Chemical markets may create new supply issues; especially since they can move independently in volatile market

What Does The Future Look Like

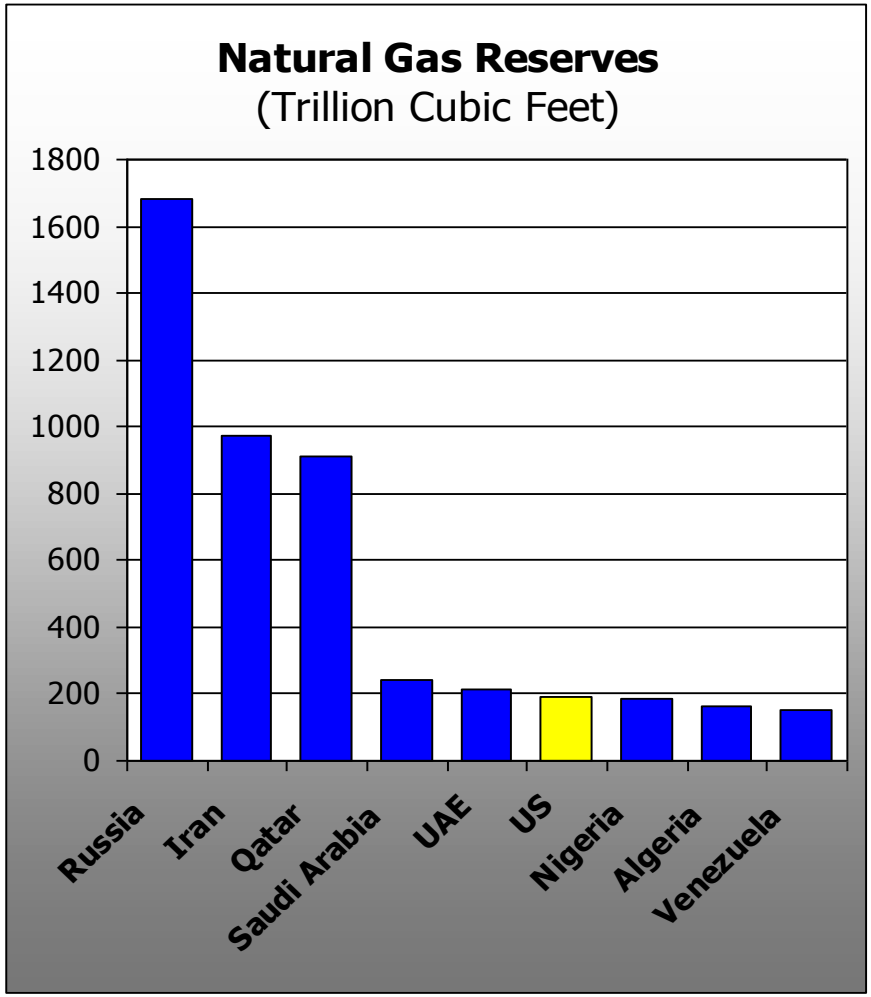
Global Ethylene Capacity Additions



- 90 % of Expansions in Asia & Middle East Africa
- Majority of Middle East capacity is based on gas feed
- S. America & E. Europe 8% of new capacity
- Essential no capacity growth in western world

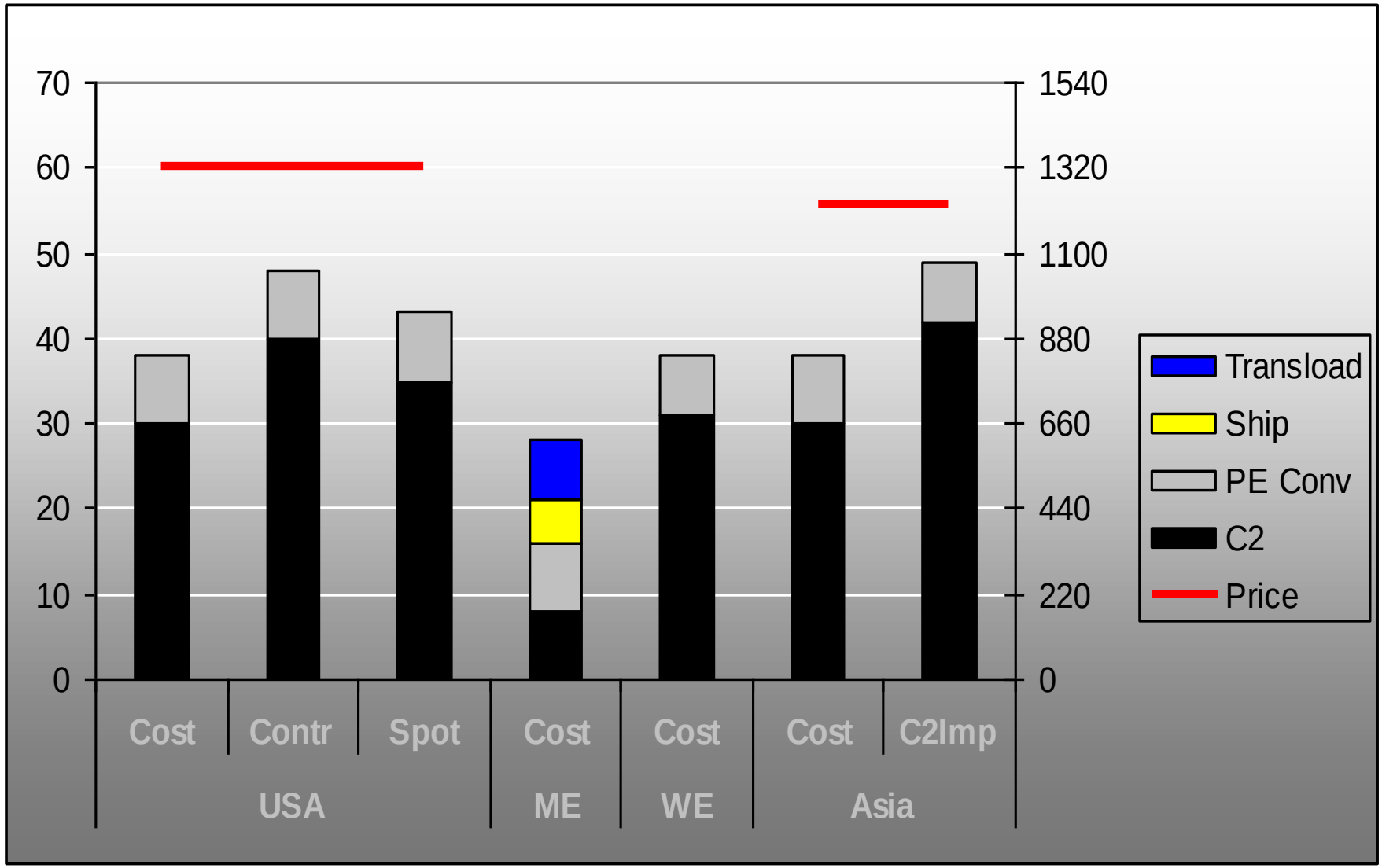
Some Slowdown Due To Resources

Global Natural Gas

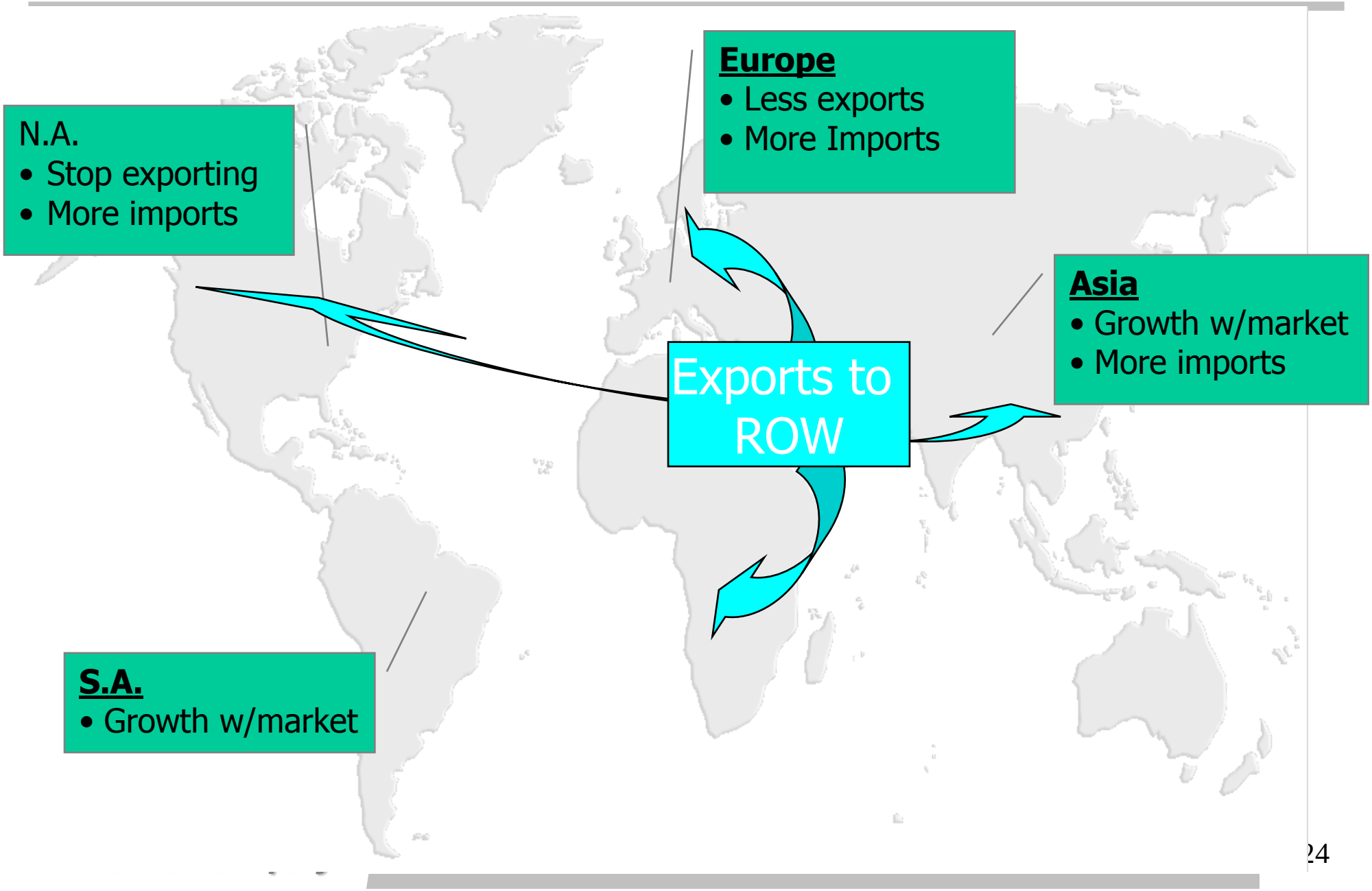


- Excess natural gas in the world
- Terms often used
  - Stranded gas
  - Waste gas
- Most of which is in the Middle East and almost valued at zero costs
- Countries trying to exploit free gas by developing
  - Ethylene business
  - LNG exports

Ethylene Competitive Factors as Polyethylene



Ethylene Derivative Trade Flow Changes

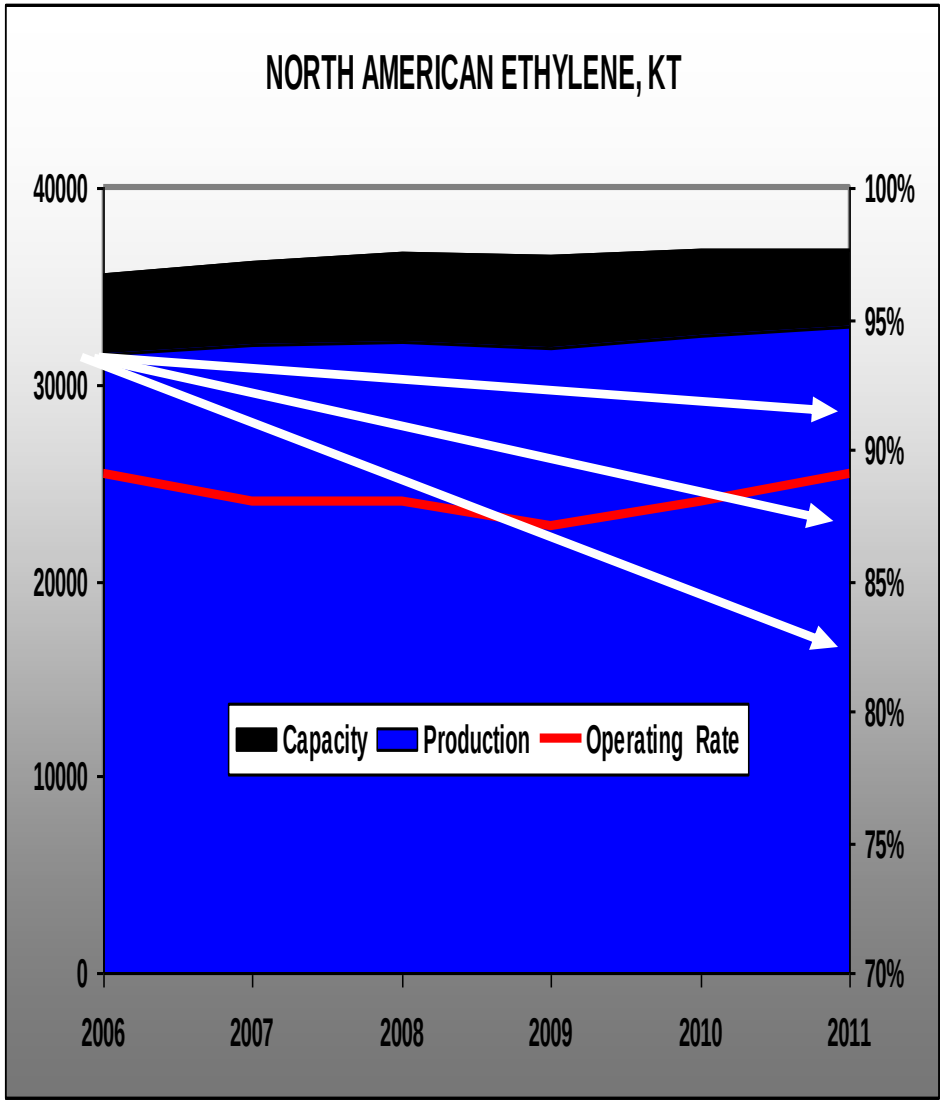


Key Trends On Ethylene

- Worldwide cracker feed flexing towards gas due to:
  - Naphtha supply tightness and higher prices
  - Mogas reformulation kicking out light components - butane
- Rationalization of uncompetitive ethylene capacity
  - Eastman
  - Total
  - Dow
- Fortification
  - Petrochemical integration
    - Shell
    - ExxonMobil
    - Reliance

Most All These Trends Negatively Affect Butadiene Supply

N. American Ethylene Picture With Future Overlay



- Global growth slows to less than 3-4% for next 2-3 years
- Global expansions going ahead as planned, but some slippage in start-ups
- Impact on butadiene producing regions
  - Less exports
  - More imports
- Risks for lower ethylene/byproduct production
  - Lighter cracking slate
  - Capacity rationalization

Positives and Negatives Going Forward

Positives

- Tire demand for butadiene likely to fall with less domestic ethylene production
- NR prices could be lower against a low growth market backing out butadiene containing synthetic rubber
- New offshore SBS and butadiene capacity - Asia

Negatives

- Less ethylene production
- Lighter cracking slate
- US short Crude C4's against butadiene purification capacity