

## CHANGING LANDSCAPE

Despite a recent stream of encouraging economic figures, leading chemical companies continue to evaluate their operations and make tough decisions that are reshuffling the industry. Many will lead to a stronger, leaner industry, some, however, could have serious consequences for the adhesives industry.

Throughout the downturn, chemical companies reacted quickly to ratchet down capacity and utilization rates in response to dwindling demand. In many markets, this has kept supply in-line with demand and stopped prices from freefalling. However, many industry insiders are now worried that the reductions have gone too far. If demand should come back on-stream faster than expected, demand could easily outstrip supply, which could cause shortages and price escalation. This provides a backdrop for a troubling new development: companies are selling businesses and exiting markets.

As major chemical companies reported Q2 2009 earnings, it was clear that sales are down and margins are pinched. Dow Chemical reported a 31% drop in sales. Celanese, a 33% decline. BASF, a 23% decrease. Now, the price of oil and other feedstocks are on the rise. With margins under siege, even small rises in feedstock costs exert intense pressure on businesses.

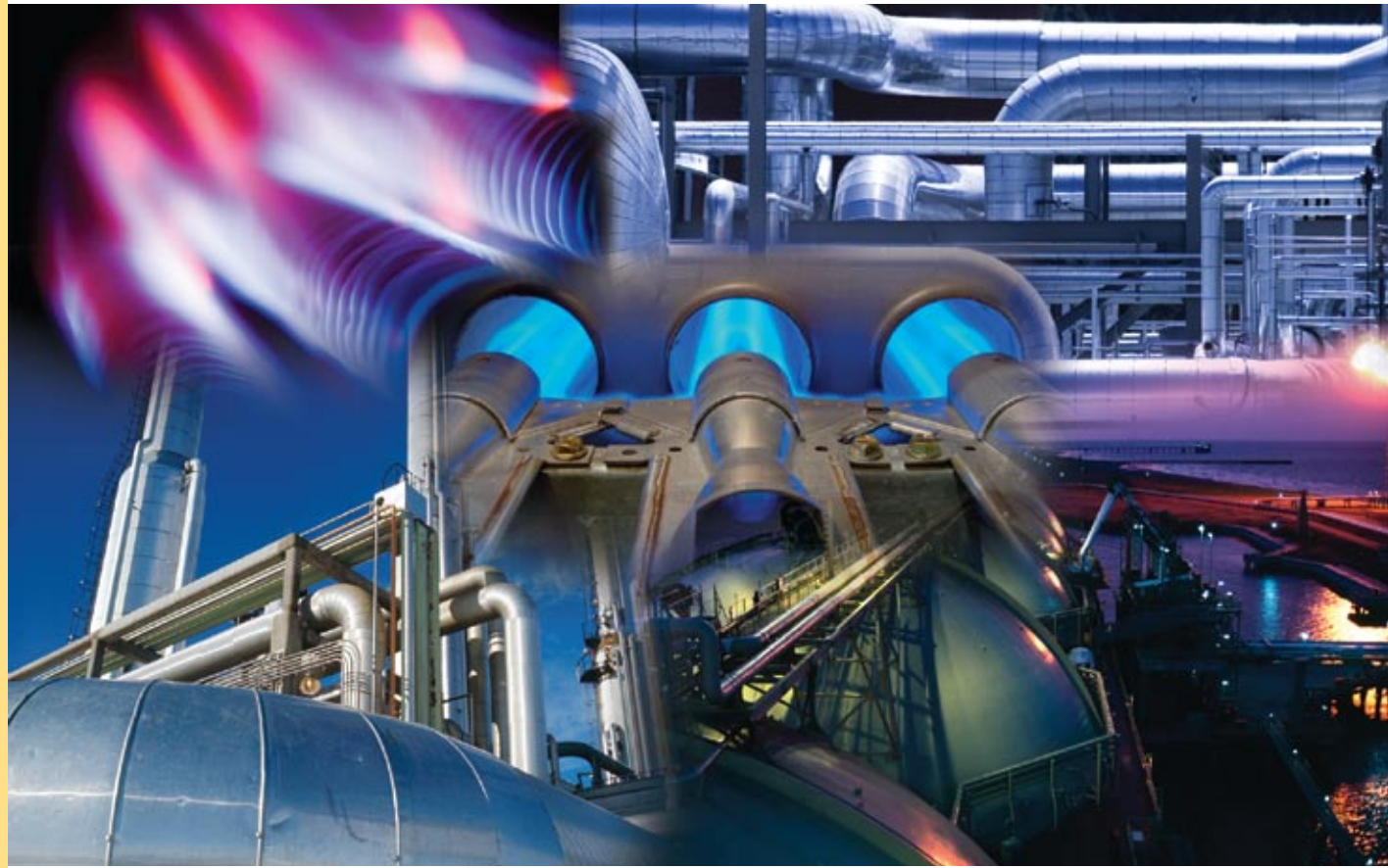
Credit markets are still tight. Businesses are underperforming. And companies are taking a hard look at their portfolios. As part of its restructuring plan following the acquisition of Rohm & Haas, Dow Chemical decided to sell its acrylates business in the U.S. Meanwhile, DuPont Performance Elastomers announced it was exiting the Hypalon market. This set off a chain reaction of product discontinuations throughout the supply chain as customers decided that it would be too expensive to try and replace the synthetic rubber in their formulations.

These decisions are reverberating down the supply chain. The repercussions can be serious, especially when an important supplier decides to discontinue the production of key raw materials used in the formulation of adhesives.

This often means that products must be reformulated to accommodate raw materials from other suppliers, which is costly and time consuming. More importantly, in light of reduced capacities, there often is not a lot of extra supply in the market. As a result, securing a new supplier is not trivial. This is especially true in the case of specialty raw materials produced by a limited number of global suppliers.

The only insurance is to continue to partner with a global supplier who has demonstrated a track record of ensuring supply during the most challenging market conditions. Now more than ever customers must maintain vigilance on the financial health of suppliers and the changing landscape of supplier relationships. ■

## THE DOWNSIDE OF CHEAPER NATURAL GAS



A dramatic shift in the domestic natural gas market is providing relief, in the form of ample supply and falling prices, to many chemical industry participants — but not to all. For companies that require feeds like C4, C5 and C9 (and to a lesser extent C3) to formulate the raw materials used in adhesives, the natural gas boom is a bust.

Improved extraction technologies — like horizontal drilling, which enhances gas exploration companies' ability to extract gas from shale formations — have led to a resurgence in U.S. gas production. This has contributed to an 11% rise in natural gas production in the past two years.

As demand dropped in response to the economic crisis, exploration companies cut back production and reduced the number of operating wells. Baker Hughes, an oil fields services company, reports a 56% decline in active drill rigs in the U.S. compared to July 2008. Still, demand dropped faster than the decrease in production and gas was diverted to underground storage. This has led to "an inordinately high amount of natural gas in storage for this time of year," the Energy Information Administration (EIA) said in a recent report. Stored natural gas levels are now 19% higher than the five-year average.

Increased production, lower demand and growing inventories have deflated prices. Natural gas prices have retreated 78% since highs last July and are at historically low levels.

These low prices are enticing refiners to shift their cracking slates to favor the cheaper feed. Equistar Chemicals, a subsidiary of LyondellBasell, recently announced that it would be transitioning its Corpus Christi olefins plant in Texas to lighter feeds from natural gas. The switch will provide a cost advantage for several years, the company said in a statement.

But the switch will also result in the idling of the plant's butadiene unit. Lighter feeds severely limit the production of heavier molecules like C4, C5 and C9 from the cracking stream. These molecules come from cracking naphtha-based feeds and are the feedstocks for many of the building blocks used

in hot melt adhesives, including butadiene used in styrene-butadiene rubber (SBR; from C4), isoprene used in styrene-isoprene-styrene (SIS; from C5) and C9 tackifiers. Equistar Chemicals' decision to retool its olefins plant is a sign of a more widespread move to lighter cracking slates. This shift will have serious consequences for all users of downstream derivatives of C4, C5 and C9.

Butadiene markets around the world are currently bearing the brunt of this shift. Global supply has tightened and, even though downstream demand for many products that require butadiene remains depressed, prices are rising. Prices in Europe are now six times what they were in January 2009. The North American market has seen a doubling of prices this year, and more increases are expected.

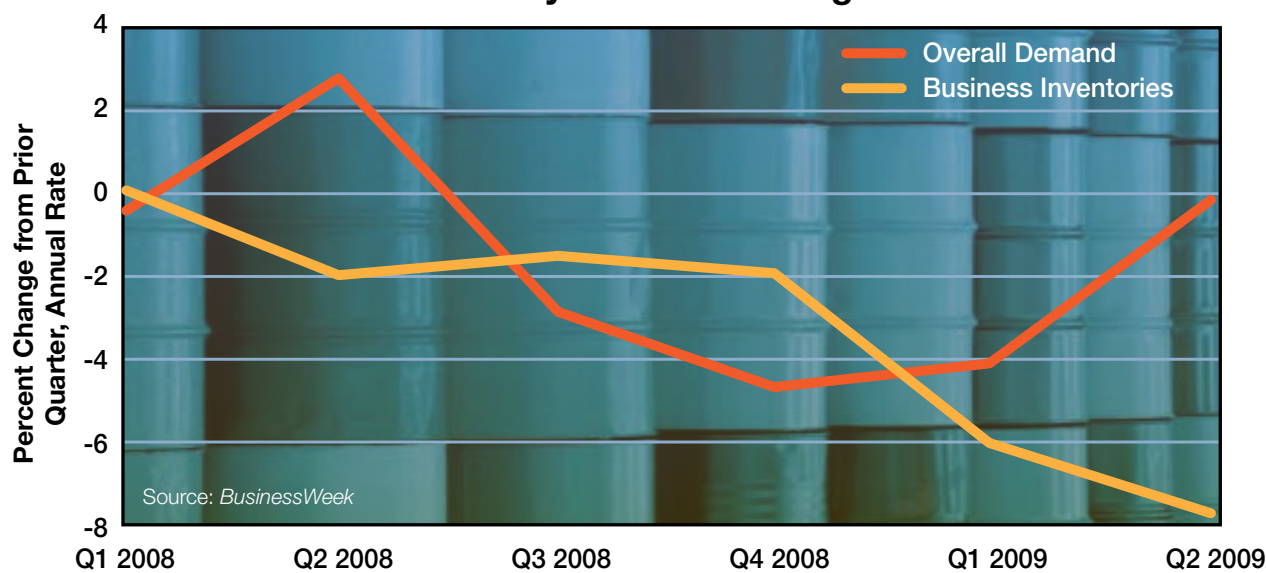
ICIS reports that the butadiene price surge in Asia has been "relentless." Prices are up almost 250% in 2009. This is putting butadiene users in an untenable position. "Some SBR producers were already forced to revise their offers on a weekly basis since early-August to keep up with the sizzling pace of butadiene price spikes," ICIS says. Some SBR producers are choosing to close plants rather than allow margins to be further eroded by the high feedstock costs.

The supply of butadiene in the U.S. is also tight. Inventories are low. Several producers have put customers on sales allocations. Crude prices, which influence the price of naphtha used to produce C4s, are on the rise and analysts are now talking about \$80-a-barrel oil again. And the U.S. refining industry is entering cracker turnaround season, when typically 10-to-12% of capacity comes off-line for several months for maintenance.

Butadiene prices have climbed sharply already this year. In the current environment, it wouldn't take much — a cracker that is delayed coming back on-line, a hurricane or a slight ramp up in demand — to move prices even higher. And with supply as tight as it is, butadiene suppliers have the upper hand in price negotiations. They have all the leverage they need, even in the absence of strong demand, to push through price increases. ■

# INSIGHT: INVENTORIES

Inventory/Demand Divergence



Demand is accelerating and inventory levels continue to drop. This could set the stage for a supply crunch in coming months.

Inventory levels have garnered a lot of attention throughout the downturn. Now, they're in the spotlight again as signs of recovery are growing.

As the economy quickly spiraled into the recession in 2008, demand dropped and many companies were caught with high inventory levels and few buyers. In the case of chemicals, much of the inventory had been produced when raw materials were at peak levels. As a result, companies were forced to take large write-downs.

Across the board, companies quickly scaled back on production and supplied what demand remained from inventory. The American Institute for Economic Research (AIER) reported that companies were reducing inventories faster than in previous recessions. By reducing the overhang in inventories, businesses were making the necessary adjustments to the difficult economic conditions and setting the stage for a recovery, AIER said.

Companies were still destocking in 2009. Inventories declined \$114 billion in Q1 and \$141 billion in Q2. During Q2 financial results season, many chemical industry executives called the bottom of inventory destocking in the industry.

Now inventories may drive growth. The inventory liquidation has been "unusually severe," said Janet Yellen, president of the Federal Reserve Bank of San Francisco in a talk earlier this year. "All it would take is a reduction in the pace of liquidation — not outright inventory building — to raise the GDP growth rate." This growth would create a positive feedback loop — growth leads to positive sentiment leads to buying leads to growth — which could quickly drive up demand.

Some in the industry worry that the destocking has gone too far and that inventories are now

dangerously low. In the August survey by the Institute of Supply Management (ISM), 34% of companies surveyed said their customers' inventories were "too low."

"Coming at a time when overall demand shows every sign of stabilizing, [inventory liquidation] has pushed down stockpiles too far, and businesses now have to ramp up production as customers reorder," economist James Cooper wrote in the August 17 issue of *BusinessWeek*.

New orders reported in the ISM monthly surveys have improved steadily since bottoming in December 2008. The July New Orders Index registered 64.9%, up 9.6% from the previous month. While these and other economic indicators may signal an upturn in demand and production, many chemical industry executives still warn of a "lack of visibility" around demand going forward.

That makes building inventories a gamble. On the one hand, many industry insiders are concerned that inventories are too low. If demand were to resume unexpectedly, suppliers would be caught with inadequate supply, competition would intensify, and prices could quickly rise.

On the other hand, there's a cost associated with building inventories. Company earnings are low, credit markets are still tight and companies continue to preserve cash. Given their experience in 2008, suppliers are understandably reluctant to take on the additional cost of building inventories without a clear signal that sales have gathered enough strength to support the investment.

No one can tell when consumers will start buying again, and when demand for chemicals will grow. In the meantime, the trends in inventory levels and demand are clearly heading in opposite directions. ■

# UPDATE: POLYURETHANE RAW MATERIALS

Escalating feedstock costs, the switch to lighter cracking slates and capacity reductions are setting the stage for tightness in the supply of raw materials used in polyurethane adhesives. This led some suppliers of polyurethane raw materials to announce price increases for Q3; more announcements are likely entering Q4. Adipic acid prices increased sharply beginning in Q2 and appear to be leading the way.

## Isocyanates

MDI is an isocyanate derived from benzene and is used in polyurethane-based hot melt adhesives. TDI, from toluene, is an important raw material used in polyurethane-based flexible packaging adhesives. The industry's move to lighter feedstocks has reduced the output of aromatics, like benzene and toluene.

Benzene prices have climbed significantly since January and toluene has followed suit. Despite the rise in feedstock prices, depressed end markets have curtailed demand and kept a lid on prices of MDI and TDI this year. CMAI now reports that downstream demand, while not robust, is improving. In a recent report, the consultancy said that TDI demand "looks healthier for September than we have seen in some months." CMAI does not expect much downside to aromatics pricing in the next 18 months. Now isocyanate producers are starting to implement price increases.

As the economic downturn took hold, poor demand from key end markets, including automotive and construction, motivated isocyanate producers to reduce capacity. BASF shut TDI plants in Louisiana and Texas late last year. In March, Bayer Material Science idled one of its TDI plants in Baytown, Texas. The shutdowns put stress on the supply chain, especially when customers have fixed formulations, which do not allow for an easy switch between suppliers.

## Adipic Acid

Reduced capacity and strengthening demand have tightened global adipic acid markets. The tight supply and rising feedstock costs are contributing to higher prices.

A series of shutdowns and plant closures have restricted adipic acid supply in the past twelve months. INVISTA's Orange, Texas plant has been offline since September 2008 when Hurricane Ike swept through the Gulf Coast. More recently, the company announced the closure of facilities in Wilton, UK and Maitland, Canada.

Supply is being further constrained by tightness in the upstream cyclohexane market. In August, CITGO declared *force majeure* on cyclohexane produced at its Corpus Christi, Texas plant. Prices of cyclohexane, which is produced from benzene, have climbed over 160% since January.

The majority of global adipic acid production is consumed in the manufacture of nylon 66 fiber. Recently, demand for nylon has picked up. This has put pressure on adipic acid supply and led producers to raise prices. According to CMAI, adipic acid prices have increased by 40% since January.

Industry insiders are concerned about the limitations placed on isocyanates and adipic acid production during the economic slowdown. There is no guarantee that capacity will return once it has come out of the marketplace. This could lead to potential supply disruptions when demand resumes.

Price increase announcements are already in the market and adipic acid prices have increased sharply, driven by escalating feedstock costs. If demand picks up faster than expected, or more capacity is removed from the marketplace, prices of the raw materials used in polyurethane adhesives could move sharply higher, taking the price of adhesives along for the ride. ■

# UPDATE: HURRICANE SEASON

In early August, the National Oceanic and Atmospheric Administration (NOAA) reduced its forecast for the 2009 hurricane season. The organization now predicts a 50% chance of a normal season.

This year, a developing El Niño weather pattern may calm the Atlantic storms. "El Niño may mean fewer storms compared to recent seasons, but it doesn't mean you can let your guard down," says Jack Hayre, director of NOAA's National Weather Service. "History shows that hurricanes can strike during an El Niño."

The 2009 season has been slow to start but by mid-August named storms were starting to roll

across the Atlantic. So far none have threatened critical infrastructure for the chemicals industry, but September is traditionally the most active storm month.

The Gulf of Mexico hosts 32% of domestic crude production and 15% of natural gas production. Numerous chemical refineries are also located in the region. When a hurricane trajectory threatens the Gulf, facilities shut down operations as a security measure. The disruptions to the supply chain are further exacerbated when a storm damages local infrastructure, like roads and electricity generation. Then supply can become constrained — and prices can climb. ■