Looking for Growth in the Chemicals Industry

T. Kevin Swift
American Chemistry Council

Recovery has stalled in developed nations. Debt, unemployment, and the emerging recession in Europe will encumber U.S. growth prospects in the years ahead. One bright spot, however, is the shale gas story.

The global economy, which entered the third year of recovery in June 2011, has reached a critical state. The pace of improvement has slowed, due to such factors as higher energy prices, the disasters in Japan, the financial crisis in Europe, and the slowdown in China, among others. While dynamic growth has materialized in China and other emerging markets, where recovery evolved into business cycle expansion during 2010, the U.S. and other developed nations have yet to see the emergence of a typical business cycle recovery.

The consensus forecast (the American Chemistry Council's base-case scenario, developed by surveying industry-oriented economists) is for continued but anemic growth in U.S. gross domestic product (GDP) — well below the U.S. economy's long-term potential to grow — through 2012. The current soft patch could very well be a typical mid-cycle slowdown, in which case, a rebound of spending activity would emerge. The most likely scenario is that the U.S. will avoid a recession but economic growth will not reach long-term trend levels until 2013. The recovery is fragile and multiple risks remain — and the likelihood of another recession (emanating from Europe) is still high. The wrong trade, tax, or other policy initiative could derail recovery.

The European debt crisis continues to present one of the greatest risks to the world economy, as does uncertainty about U.S. debt levels, policy, and long-term economic prospects. Concerns about the stability of the banking system in China have been raised in light of massive credit inflation and exposure to real estate and local government loans. Any of these factors could combine to trigger another recession.

Prospects going forward are for a two-speed world — in which the developed nations, constrained by debt, adverse demographic factors, and tighter fiscal policies, grow slowly, while the emerging markets grow rapidly as a result of industrialization and rising consumer-driven economies. Asia will continue to outpace the rest of the world, and growth in other emerging markets will be strong as well. In general, with slow growth in the developed nations, inflation will diminish across much of the world.

Forward momentum in the major end-use markets for chemistry depends on demand for consumer goods, which ultimately drives factory output. But weakening foreign demand (chemicals are in the early part of the supply chain, and exports to Europe have evaporated) presents challenges for the manufacturing sectors. Balance sheets are strong, and lower input costs have benefited manufacturers. Nonetheless, an uncertain business and regulatory environment is constraining business optimism (and hiring).

U.S. chemistry outlook

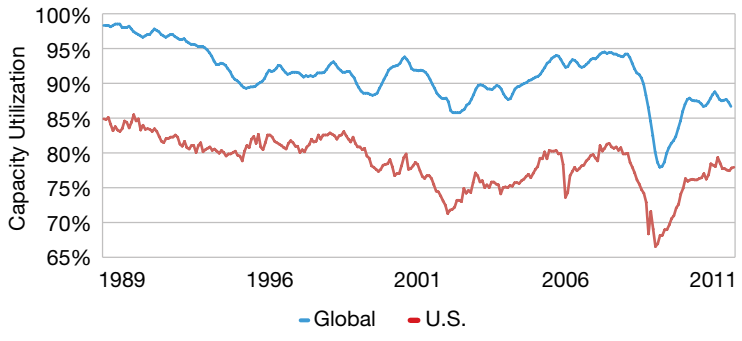
A bright spot during the past two years has been U.S. chemical exports, which have been favored due to overseas growth, a weak dollar, and a favorable oil-to-gas price ratio. Even so, the slowdown in global manufacturing is clearly affecting U.S. chemistry, and third- and fourth-quarter production volumes have slowed. Production of chemicals has eased as demand from key end-use markets has also slowed.

Capacity utilization, on the other hand, continues to tighten (Figure 1). Inventories can mean the difference between a slowdown and a recession, and in general, lean inventories along the supply chain support future gains in production. Chemical inventories in the U.S. have become slightly imbalanced and, barring a major recession, a large correction is not expected. With an improvement in consumer industries, such as paper, plastic products, and electronics, and in emerging markets, low feedstock costs should support U.S. production.

The consensus is that U.S. chemical output will improve during 2012 and continue to improve further in 2013. Strong growth is expected first in synthetic rubber; later, as export markets revive, growth in petrochemicals and organic derivatives, and in plastic resins, will follow. Strong gains are expected in agricultural chemicals and consumer products, and pharmaceuticals will eventually emerge as a growth segment as well. In the long-term, U.S. chemistry growth is expected to expand at a pace exceeding that of the overall U.S. economy.

Factors affecting capital spending

Several factors drive the magnitude and composition of investment in new plant and equipment — *i.e.*, capital investment or capital spending. One of the major determinants is the level of profits, which have improved in 2011. With a slow recovery of chemical industry production volumes, overall operating rates rose to an average of 77.4% in 2011. Further modest gains in production and stable capacity hint at improved operating rates in 2012. With further reduction of capacity and strengthening production volumes, capacity utilization could improve even more in 2013 and beyond.



▲ **Figure 1.** Capacity utilization measures the extent to which the capital stock of an industry (or nation) is being employed in the production of goods.

> Sustaining capital will support investment in the U.S. chemicals industry, with the largest proportion of capital spending allocated toward the replacement of worn-out plant and equipment.

In addition to profits and capacity utilization, other factors that influence the level of capital spending include the business cycle, long-term business expectations, taxation policies, the cost of capital, the burden of debt, the supply of credit, and mandated expenditures. These have generally been favorable in the U.S.

Capital spending and global chemistry

The global business of chemistry invested close to $511 billion in new plant and equipment (P&E) during 2011. With several announced projects going forward and with stronger growth in emerging markets, the prospects for capital spending over the next few years are good. Global capital spending by the business of chemistry is expected to increase by an average of nearly 10% in both 2011 and 2012, to $511 billion and $557 billion, respectively. Emerging markets will account for the bulk of the incremental investment gain, about 90%, during the period through 2016. China and other emerging markets in Asia-Pacific and Africa, and the Middle East, will experience noteworthy gains. By 2016, capital spending by global chemistry will exceed $800 billion.

Capital spending and U.S. chemistry

The worst business conditions since the 1930s combined with a credit crisis and lower profits to create a difficult environment for capital spending in the wake of the Great Recession. With narrowing margins, austere market conditions, lower operating rates, and a high level of uncertainty, several projects were extended or delayed. Furthermore, capital spending budgets were slashed to conserve cash flow. As a result, U.S. capital investment in chemistry fell by more than 9.2% to $25.3 billion in 2009. This followed a 9.3% drop in 2008, which came off a peak level in 2007. Despite lower-than-average operating rates and lingering uncertainty concerning future demand, the recovery in economic activity during 2010 and the need to enhance competitiveness pushed up capital spending by

Table 1. After reaching a peak level in 2007, U.S. capital spending by the chemicals industry declined by nearly 10% in 2008 and 2009. The industry investment cycle has likely re-engaged, with U.S. spending rising 7.3% in 2012.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United States											
Growth in Capacity, %	1.8	2.8	1.2	–5.4	–4.6	–0.3	0.0	0.8	1.8	2.5	2.8
Capacity Utilization, %	78.0%	79.7%	72.8%	69.7%	75.7%	77.4%	78.3%	79.5%	80.4%	80.9%	81.2%
Capital Spending, U.S.$ billions	$23.17	$30.73	$27.87	$25.32	$27.45	$29.38	$31.53	$34.05	$37.20	$40.85	$44.95
Change, %	1.3	32.6	–9.3	–9.2	8.4	7.0	7.3	8.0	9.3	9.8	10.0
Global											
Growth in Capacity, %	7.1	6.4	6.0	6.5	1.7	3.5	3.8	4.0	4.3	4.8	5.0
Capacity Utilization, %	92.0%	93.2%	88.9%	80.1%	87.1%	87.1%	86.9%	87.5%	87.7%	87.3%	86.7%
Capital Spending, U.S.$ billions	$251.6	$304.9	$383.8	$407.2	$464.3	$510.6	$556.7	$603.4	$658.8	$729.8	$803.2
Change, %	13.1	21.2	25.9	6.1	14.0	10.0	9.0	8.4	9.2	10.8	10.1

8.4% in 2010 and 7.0% in 2011. Capital spending in 2011 was on the order of $29.4 billion (Table 1).

Capital spending cycles generally lag cycles of industry activity, with profits and operating rates the leading determinants of spending. In general, improving production and utilization rates, cost containment from earlier cost-reduction efforts, low feedstock and other raw material costs (compared to Europe and Northeast Asia), and higher selling prices resulted in a strong recovery of profits during 2010 and into 2011. Given the new dynamics created by shale gas, there is a possibility that the current rise in profits will last longer than recent cyclical upswings. In addition, utilization rates have improved, although they are still below the levels of several years ago and are below the long-term average. Other factors influencing capital spending include business cycle, which saw a recovery in 2010 and 2011, and interest rates, which are low and make for a low cost of capital.

With improving operating rates and profit margins, increases in new P&E investment in the U.S. are forthcoming. The need to replace existing capital is apparent and will drive the investment increase. The chemical industry's investment cycle has likely re-engaged, with U.S. spending rising 7.3% in 2012. Capital spending of $31 billion in 2012 will exceed the most recent peak.

Sustaining capital will support investment in the U.S., with the largest proportion of capital spending allocated toward the replacement of worn-out plant and equipment. Furthermore, the majority of the production capacity expansion is for existing products, and thus largely incremental. As a recovery unfolds and strengthens into an expansion, this will change, and increased spending is expected in future years.

The improved competitiveness resulting from developments in shale gas is leading to a re-evaluation of the U.S. as a favorable location for investment. Indeed, several petrochemical projects have been discussed, and the dynamics for sustained capital investment are in place. Strong gains in capital spending by American chemistry are thus expected during the next several years, as a result of new investments in petrochemicals and derivatives arising from shale gas developments. The need to add capacity and improve operating efficiencies will play a role as well.

Shale gas: a game changer

Access to vast, new supplies of natural gas from previously untapped shale deposits is one of the most exciting domestic energy developments of the past 50 years (*CEP*, Sept. 2010, p. 16). After years of high, volatile natural gas prices, the new economics of shale gas are a game changer, reducing the cost of natural gas and thus creating a competitive advantage for U.S. manufacturers — which will lead to increased investment and industry growth.

American manufacturers use natural gas to fuel and power a wide variety of processes to produce an extensive range of manufactured goods. Growth in domestic shale gas production is helping to reduce U.S. natural gas prices and creating a more stable supply of natural gas for fuel and power. As economic theory teaches and history shows, a reduction in the cost of an input such as natural gas leads to renewed competitiveness and a positive supply response. This, in turn, leads to new private sector investment, which fosters job creation.

For the chemical industry, the stakes are even higher, because in addition to using natural gas for fuel and power, the industry also uses it as a raw material (*CEP*, Dec. 2011, p. 11). In the U.S., it has historically been cheaper to crack ethane, propane, and other natural gas liquids (derived from natural gas) than to crack naphtha (derived from oil refining), the primary petrochemical

▲ **Figure 2.** Shale gas and its impact on the price of natural gas in the U.S. is positively affecting the U.S. chemicals industry, and will continue to do so.

feedstock in Western Europe and Northeast Asia. The steam-cracking process using ethane is simpler and the hardware is less expensive. Nearly 90% of North American ethylene is now derived from natural gas liquids. U.S. ethane prices are correlated (0.82) with Henry Hub natural gas prices (the price point for natural gas futures on the New York Mercantile Exchange), and Western European naphtha prices are highly correlated (0.97) with Brent oil prices (the price point for oil from the North Sea). So, feedstock costs (and competitiveness) are relatively dependent on relative oil and gas prices.

Less than a decade ago, many industry observers were writing off the U.S. Gulf Coast (USGC) petrochemicals industry, which was close to the top of the cost curve and was in a worse position than Western Europe and Northeast Asia. A pending wave of capacity in the Middle East only added to the dour outlook.

With the revolution in shale gas, however, this has changed radically, and for the better. By 2010, the USGC petrochemicals' cost position had so improved that the region is now second only to the Middle East. Moreover, ethane supplies are tightening in the Middle East and are constrained; the era of low-cost feedstock in that region may soon be over.

As a rough rule of thumb, when the ratio of the Brent oil price to the Henry Hub price for natural gas is higher than about six or seven to one, the competitiveness of Gulf Coast-based petrochemicals and derivatives such as plastic resins, relative to other major producing regions, is improved. Other factors, such as co-product prices, exchange rates, and capacity utilization play a role in competitiveness as well.

With shale gas in the picture, this ratio has been above 7:1 for several years. The ratio of oil prices to natural gas prices has recently been over 25:1, which is very favorable for U.S. competitiveness and exports of petrochemicals, plastics, and other derivatives. This has led to strong gains in U.S. plastic exports. The only reason for a stabilization of thermoplastics exports has been the financial crisis in Europe and weakness in that region's economy, which has dampened U.S. exports. In addition, capacity constraints have occurred and rising domestic demand for plastic resins in North America has meant that some overseas customers needed to source elsewhere, as their ability to import from the U.S. has been hindered somewhat.

Shale gas and new investment in chemistry

The benefits of shale gas do not end with the improved competitiveness of the U.S. petrochemical sector and increased exports. The benefits are being felt beyond petrochemicals, in the fertilizers and downstream products sectors.

Capital investment in North America is being reconsidered and a slew of projects have been announced. Over $16 billion in new petrochemical investments will likely occur. With an eventual recovery in Europe's economy, the start-up of some of these projects, and sustained competitiveness, the outlook for North American exports is quite good in the medium- and long-term.

In turn, this will generate new business and — importantly — jobs. By mid-decade, capital spending by the American chemistry business will accelerate, reaching $45 billion in 2016. With the U.S. seen as a more attractive venue for investment, by 2016, U.S. capital spending will be on par with that in the rest of the world.

Looking ahead

The outlook for chemicals points to modest growth over the next several years and depends on strengthening domestic demand and an improvement in exports. A strong recovery in profits and the shale gas revolution will lead to further investment in innovation and plants and equipment. The outlook will thus be more favorable for chemical engineers involved in process design. CEP

T. KEVIN SWIFT is the chief economist at the American Chemistry Council (ACC; Phone: (202) 249-6180; E-mail: kevin_swift@americanchemistry.com), where he is responsible for economic and other analyses dealing with markets, raw materials, trade, tax, energy, and competition and innovation, as well as monitoring business conditions and identifying emerging trends for the domestic and global chemical sector. Previously, he held senior and executive positions at several business information/database companies, directing business research, forecasting, and consulting efforts, as well as domestic and international business forecasting services and related online databases. He started his career at Dow Chemical USA. He is a member of the National Association for Business Economics, the Harvard Discussion Group of Industrial Economics, the National Economists Club, the Strategic Management Society, and the Société de Chimie Industrielle. He received his BA from Ashland Univ. and his MA from Case Western Reserve Univ., both in economics. He also received a doctorate in business administration from Anglia Polytechnic Univ.