Year-End 2013 Chemical Industry Situation and Outlook

American Chemistry is Back in the Game

December 2013

American® Chemistry Council

American chemistry expanded in 2013 despite weakness in key export markets, cuts to government spending from the federal sequester, and periods of tense uncertainty. In the U.S., strong gains in light vehicles and housing, two important markets for chemistry producers, drove modest economic growth. Looking ahead to 2014, we anticipate a sustained global expansion that will result in growing trade. We also anticipate positive supply chain impacts from unconventional oil and gas development in the U.S., through increased demand for equipment, chemicals, and services required for energy production in addition to lower fuel prices for all consumers.

While there were only moderate gains in chemistry production volumes in 2013, inventories remain balanced, so growing demand in 2014 will require new production. During the past year, output gains were led by consumer chemistry and specialties. Advances in manufacturing and exports during 2014 will drive demand for basic chemicals, especially those segments in which the U.S. enjoys renewed competitive advantage.

Soft performance in 2013 came against the backdrop of a wave of announcements to build new chemical capacity. These investments will capitalize on the profound and sustainable competitive advantage enabled by shale gas development. The business of chemistry in the U.S. may be experiencing its own tipping point. ***Following a decade of lost competitiveness, American chemistry is reemerging as a growth industry.*** The trade balance in chemistry has reversed from a deficit position to one of surplus. In addition, the industry is adding high-paying American jobs after years of trimming payrolls. Chemistry companies in the U.S. continue to innovate, focusing on improving efficiencies as well as on new leading-edge product development.

Globally, growth fundamentals in Europe and many emerging markets will be stronger in 2014 and the fragile recovery will gain traction. World GDP growth and trade, which are closely linked, will accelerate. Chemical production will continue to outpace global GDP growth to enable higher living standards for the world's growing population.

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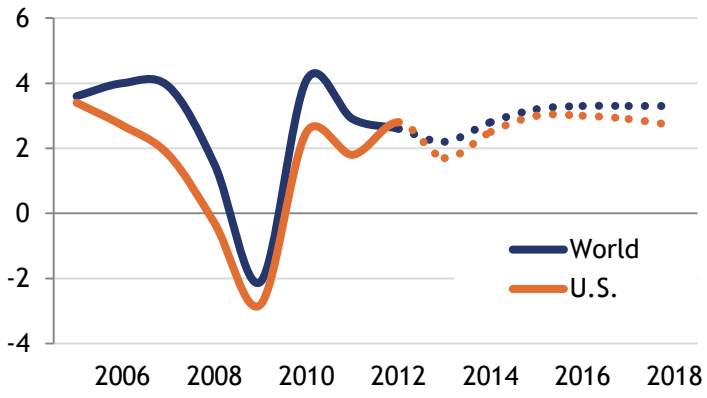
U.S. and World Macroeconomic Situation & Outlook

Strengthening fundamentals and the unconventional oil and gas advantage improve growth prospects in the U.S.

World GDP (market exchange basis), Real U.S. GDP % change Y/Y



ACC's CAB signals slow, tentative growth in the U.S. through 2014.

U.S. GDP growth will be well below trend in 2014, about 2.5%. Growth is expected to accelerate to a 3.0% pace in 2015. Long-term growth in the economy is expected to be more muted due to demographic, policy and other factors. *The U.S. chemical industry* will provide a bright light on this outlook as improvement in its customer industries and in emerging markets occurs and as the effects of enhanced feedstock competitiveness bolster growth.

For many, 2012 and 2013 may be two years to forget as austerity in developed nations, recession in Europe, the China slowdown, and uncertainty all combined to hinder growth. The BRIC (Brazil, Russia, India, China) economies have been weighed down (much like a brick) but it appears that China is now improving. The European economies appear to be emerging out of a secondary recession but recovery is tentative at best. Inflationary pressures have eased and monetary policy around the world is accommodative.

The manufacturing sector, which represents the primary customer base for chemistry, entered a soft period in 2012 with particular weakness in Europe and East Asia. The global industrial cycle, however, is beginning to turn upwards, led by the U.S., the United Kingdom and other nations.

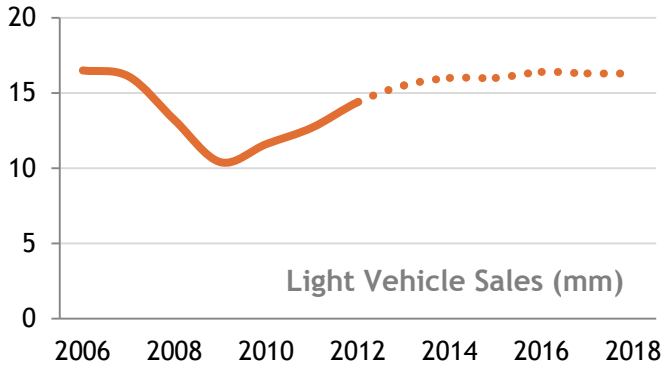
In the U.S., the economy is stuck in a slow growth mode as higher taxes, debt and regulatory burdens combined with political uncertainty to take a toll on both business and consumer confidence. As a result, businesses have been cautious and cut-back capital spending in 2013. Furthermore, overseas weakness and a higher dollar dampened U.S. exports. Contractionary fiscal policy and these other burdens, however, are being partially offset by a loose monetary stance. With household deleveraging largely over, gradual improvements in the employment situation, a pick-up in the housing market and asset prices moving higher, consumers are starting to spend again. Americans are shunning credit card debt but increasing other kinds of debt (e.g., automobile loans, educational loans) and debt levels remain historically high.

Overall, growth in the U.S. economy will persist – albeit slowly and tentatively – into 2014 and we can see this by examining the trends in **ACC's Chemical Activity Barometer (CAB)**. The CAB is a composite index of economic indicators that track the activity of the chemical industry. Due to its early position in the supply chain, chemical industry activity leads that in the overall economy and thus, the CAB can be used to anticipate potential turning points in the overall economy. The CAB is currently signaling slow economic growth into 2014. Indeed, the consensus forecast for U.S. GDP is for continued but modest growth, well below trend in 2014, about 2.5%. This will likely improve to 3.0% in 2015 and beyond. Furthermore, the U.S. is in the midst of an unconventional oil and gas boom which is supportive of economic growth and industrial activity. Long-term growth in the economy, however, will be more muted due to demographic, policy and other factors.

End-Use Markets

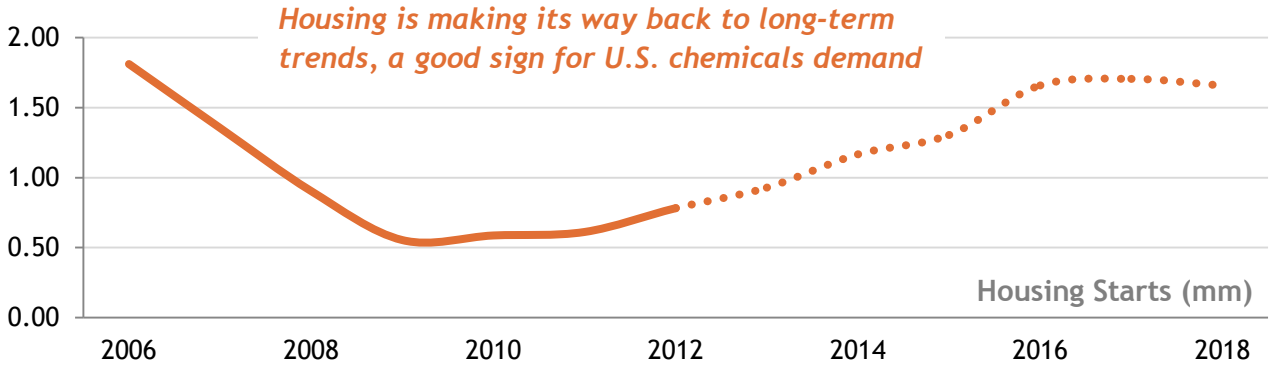
Gains in key end-use markets driven by vehicles and housing. The outlook is buoyed by improvements in export markets and supply chain impacts from unconventional oil and gas development.

Many key end-use markets for chemistry have recovered; however, several segments remain below their pre-recession peaks. During 2013, manufacturing growth slowed significantly largely due to the sequester and to weakness in major export markets. This followed a strong post-recession rebound. Leaders included light vehicles, aircraft, construction materials, and some industries involved with business investment. Elsewhere, however, several manufacturing industries have yet to regain traction (appliances, textiles, paper, printing, etc.). Forward momentum for these segments depends upon demand for consumer goods, which ultimately drives factory output. In addition, the surge in unconventional oil and gas development is creating both demand side (e.g., pipe mills, oilfield machinery) and supply-side (e.g., chemicals, fertilizers, direct iron reduction) opportunities.



Light vehicles represent an important market for chemistry (nearly $3,550 in chemistry per vehicle) and production continues to improve. U.S. light vehicle sales are expected to rise in 2014 as pent-up demand, improving employment (and income) prospects, and better availability of credit foster growth.

Housing is the other large consumer of chemistry (about $15,000 in chemistry per start) and the outlook is bright. Housing prices have begun to appreciate, credit conditions are easing, and favorable demographic factors are reemerging as a driving force. A gain in housing starts is expected in 2014 and 2015. Activity will remain well below the previous peak of 2.07 million units in 2005 but by the second half of the decade, activity will approach the long-term underlying demand of 1.5 million units per year as suggested by demographics and replacement needs.



U.S. and World Chemistry Situation & Outlook

The U.S. is back in the game

The slowdown in global manufacturing clearly affected U.S. chemistry, and volume gains have moderated. With an improvement in customer industries and in emerging markets, however, the effects of an enhanced competitive position with regard to feedstock costs will support U.S. chemical industry production going forward.

Basic chemicals (inorganic chemicals, petrochemicals, plastic resins, synthetic rubber, and man-made fibers) were the hardest hit from the recession in Europe and manufacturing slowdown, despite improving demand from important customer markets such as light vehicles and housing. Downstream customers remain cautious about building inventories and improvements in final demand could necessitate replenishing.

The consensus is that U.S. chemical output will improve during 2014 and into 2015. As a result, for chemistry, following the 0.1% gain in volumes during in 2012 and 1.6% gain in 2013, expectations are for a 2.5% production gain in 2014 before improving to a 3.5% gain in 2015. Strong growth is expected in plastic resins and organic chemistry as export markets revive. Production of specialty chemicals will be driven by strong demand from end-use markets; most notably light vehicles and housing. Strong 2013 gains are expected in consumer products as well, but these gains will moderate in 2014 and 2015. Demand for agricultural chemicals (and their supply from the U.S.) will revive. During the second half of the decade, U.S. chemistry growth is expected to expand at a pace (over 4% per year on average) exceeding that of the overall U.S. economy. Pharmaceuticals will eventually emerge as a growth segment in 2015.

Although projected year-on-year growth rates for most segments appear good over the next few years, they must be considered in the context of the exceptionally sharp declines seen in 2008 that continued into 2009. Moreover, it may take years for activity to recover from these steep declines and broach past peaks.

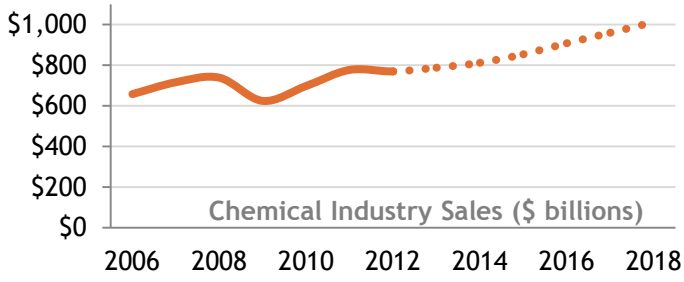
Looking forward, the expected modest gains in chemical industry production volumes and stable capacity suggests improving operating rates in 2013, and with strengthening production volumes, capacity utilization could improve even further in 2014 and beyond.

U.S. chemical output is expected to rise 2.5% in 2014 and 3.5% in 2015.

IN THE LONG-TERM, the U.S. chemical industry will grow faster than the overall U.S. economy.

In the U.S., growth improved across all regions during 2013. The highest growth was seen in the Ohio Valley region, reflecting gains in specialties and consumer chemistry produced in that region. Production in 2014 will be even higher in nearly all regions. Looking ahead to 2015 and beyond, significant shale-driven chemical capacity will start to come online and generate faster growth, especially along the Gulf Coast. By 2018, American chemistry revenues will exceed $1.0 trillion.

American Chemistry revenues projected to accelerate



$1 TRILLION

In U.S. chemical industry sales by 2018

After more than a decade of falling employment levels, the U.S. chemical industry is adding jobs.

Chemical industry adding good jobs

The industry's expansion is also reversing a falling trend in employment. Employment in the chemical industry is expected to have grown by 1.3% in 2013 with continued additions through 2018. This is in contrast to a continuous decline in employment from 1999-2011. Because chemical industry workers are among the highest paid in the manufacturing sector, growing payrolls will strengthen local economies.

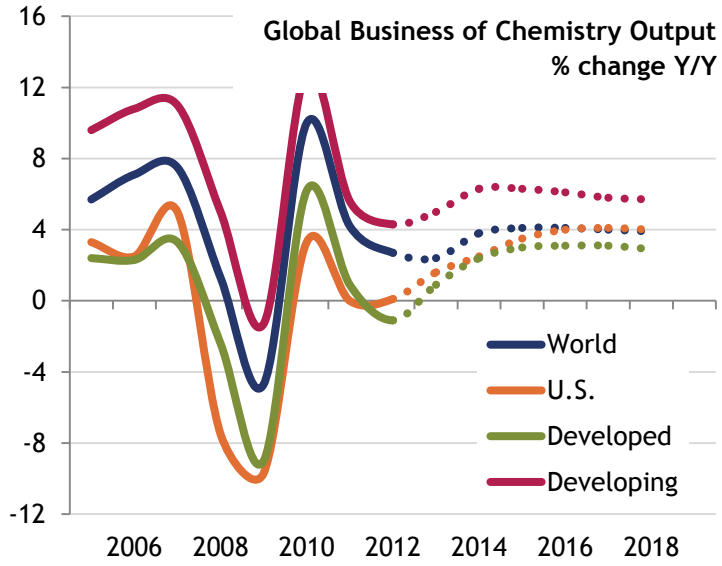
Inventories are well-balanced

Effective inventory management since the end of the Great Recession has resulted in fairly well-balanced inventories relative to shipments. For chemical manufacturers, inventories-to-shipments have ranged between 0.98 and 1.05. In recent months, the ratio has been at the upper end of this range, still within historical norms.

Along the value chain downstream, businesses have been reluctant to add to inventories and, as a result, levels are low. Downstream customers have been drawing down inventories and in some cases a lack of inventories may be slowing economic recovery and expansion. Inventories among chemical wholesalers have moderated in recent months and at fairly lean levels portend increased needs for product once orders accelerate.

Global chemistry set to expand – largest gains in developing nations

In global chemistry, the recession in Europe and the slowdown in China and other East Asian nations clearly affected global chemistry volumes. Overall global production likely advanced only 2.4% in 2013, down from 2.7% in 2012 and 4.2% in 2011. With improving economic prospects headline growth will improve to 3.8% in 2014 and 4.1% in 2015. The most dynamic achievements will be found in the developing nations of Asia-Pacific, Africa & the Middle East, and Latin America. Due to competitive advantages from shale gas, growth will be strong in North America as well. Western Europe and Japan will lag. With strengthening production volumes, global capacity utilization will improve in the years to come.



Strong Y/Y gains in chemicals output growth in the developing nations of Asia-Pacific, Africa & the Middle East, and Latin America.

Capital/Infrastructure

The U.S. is the venue for chemical investment

We need tax policies that will drive innovation, increase productivity and promote manufacturing competitiveness in the U.S.

A new capital spending cycle began in 2010 as chemical manufacturers recovered from the Great Recession. Initially in this cycle, it was sustaining capital that drove investment in the U.S. with expenditures allocated towards equipment upgrades and other efficiency investments. However, access to vast, new supplies of natural gas has created an enormous competitive advantage for American chemistry - petrochemical manufacturers in particular – and the trend in capital investment has rapidly accelerated and changed as significant expansion of existing petrochemical capacity has become the driver. As a result, capital spending surged 14.9% and 16.9% in 2011 and 2012 and will have grown another 10.0% in in 2013 to $42.4 billion. Despite the hindrance of slow global growth, uncertainty and U.S. tax policies that discourage business investment, these strong gains in capital spending for American chemistry are expected to continue. Capital spending is expected to increase more than 8% per year on average through 2016 with only a minor slowdown in growth after that. Expansions will continue and investments to improve operating efficiencies will play a role as well. By 2018, U.S. capital spending by the chemical industry will reach $61.2 billion - more than double the level of spending at the start of this prolonged cycle in 2010.

Over 135 new chemical production projects (valued at over $90 billion altogether) have been announced and the dynamics for sustained capital investment are in place.

With high profit margins, a low cost of capital and the opportunities afforded by shale gas, prodigious increases in new plant and equipment investment in the U.S. are forthcoming. The United States is being favorably re-evaluated as an investment location and petrochemical producers are announcing significant expansions of capacity in the U.S., reversing a decade-long decline. It's estimated that the gains to basic olefins capacity range from 35% to 40%. Indeed, over 135 new chemical production projects (valued at over $90 billion altogether) have been announced through early-December and the dynamics for sustained capital investment are in place. It's projected that cumulative investments arising from renewed industry competitiveness could reach $115 billion by 2025.

Average annual gains of over 8% per year in capital spending are expected through 2016 with only a minor slowdown in growth after that.

Access to plentiful and affordable natural gas supplies has allowed the U.S. to capture an increasing share of global chemical industry investment since 2011. This trend will continue as **the United States has become the location for investment.** By 2018, global chemical industry capital investment will reach $618 billion, a level nearly two times higher than it was in 2010.

$61 BILLION

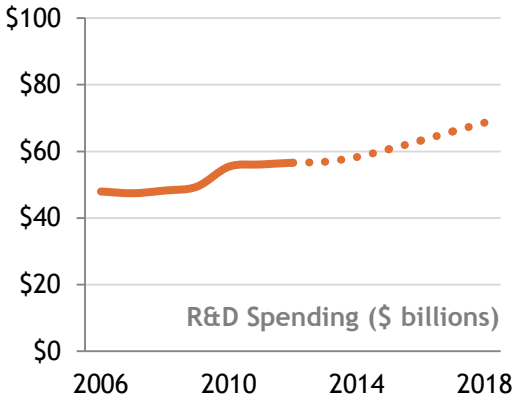
In U.S. Chemical Industry Capital Spending by 2018

$618 BILLION

In Global Chemical Industry Capital Spending by 2018

Innovation

The chemical industry is one of the top private investors in R&D



Chemistry is a science and technology, knowledge-based endeavor. In 2012, the business of chemistry invested $56.6 billion in research and development (R&D). With improved margins and prospects it is likely that R&D spending increased 0.5% to $56.9 billion in 2013.

Companies continue to focus on improving efficiencies as well as on new leading-edge product innovations and are strengthening R&D activities. Looking forward, R&D spending is expected to increase 2.5% to $58.3 billion in 2014. Improving gains are expected thereafter and by 2018, R&D spending will reach $68.7 billion.

Pharmaceutical R&D spending gains will continue to outpace non-pharmaceutical segments although the latter will enjoy new buoyancy. Computational advances and other innovations are resulting in improved R&D effectiveness.

Trade

Renewed competitiveness from shale gas will boost U.S. chemicals exports

For the business of chemistry in the United States, the softening of the manufacturing recovery dampened domestic chemical demand and the recession in Europe and weakness elsewhere, hindered export sales normally aided by a favorable oil-to-gas price ratio. The trade surplus in chemicals is expected to grow for the second straight year in 2013, rising to $2.7 billion. During 2014 and 2015, trade in chemicals will expand as global manufacturing activity improves. Exports of chemicals will grow 6.6% in 2014 and 7.6% in 2015. The chemical industry will continue to post a trade surplus overall as deficits in pharmaceuticals and agricultural chemicals are offset by large (and growing) surpluses in basic and specialty chemicals.

Renewed competitiveness from shale gas (and the resulting disconnect between U.S. natural gas prices and global oil prices) will boost U.S. exports in the years ahead. New investments to take advantage of this competitive position will begin to supply export markets in the coming years. The large surplus in basic chemicals trade will continue to expand as will the surplus in specialties and consumer chemistry. **Excluding pharmaceuticals, the surplus in chemicals trade will grow to $67.5 billion by 2018.**

Conclusion

As 2013 comes to a close, the business of chemistry is on an upswing. Continued recovery in end-use markets, a growing global economy, and a shift in competitiveness will lift demand for American chemistry over the next several years. Inventories remain balanced, so increasing demand for chemistry will come from new production rather than stock drawdowns. ACC expects to see above-trend growth in basic chemicals over the forecast horizon, in addition to solid demand in other segments.

Innovation will also continue to drive American chemistry, with growing investments in research and development in new molecules, new applications, and new more efficient processing techniques. Research into the safety of chemical products also continues to be a significant part of companies' research programs.

With the development of shale gas and the surge in natural gas liquids supply, the U.S. has moved from being a high-cost producer of key petrochemicals and resins to among the lowest-cost producers globally. This shift in competitiveness is boosting export demand and driving significant flows of new capital investment toward the U.S. We anticipate that recently announced new capacity for chemicals will significantly expand production when those investments come online beginning in 2015. As a result, the recent pattern of trade deficits and smaller payrolls is shifting course. By 2018, American chemistry will post record trade surpluses. In addition, the industry is expected to add high-paying jobs through the end of the decade. In a stark reversal to the trends of a decade ago, American chemistry is back in the game and poised for growth.

TABLE 1
Macroeconomic Outlook

% Change Year-over-Year unless otherwise noted	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average 2019-23
Global Macroeconomic Indicators										
GDP (Market Exchange Rate basis)	4.1	2.9	2.6	2.2	2.8	3.2	3.3	3.3	3.3	3.3
GDP (PPP basis)	5.2	3.9	3.2	3.0	3.6	3.8	4.0	4.0	4.0	4.3
World Trade	12.8	6.1	2.7	2.8	4.8	5.5	5.6	5.6	5.9	6.5
Industrial Production	10.0	5.4	3.4	2.1	4.1	4.4	4.0	3.9	3.7	3.4
Consumer Prices	3.6	4.8	4.0	3.2	3.5	3.5	3.3	3.2	3.1	3.0
U.S. Macroeconomic Indicators										
GDP	2.5	1.8	2.8	1.7	2.5	3.0	3.0	2.9	2.7	2.5
Consumer Spending	2.0	2.5	2.2	1.9	2.5	2.6	2.6	2.6	2.6	2.4
Business Investment	2.5	7.6	7.3	2.5	4.6	6.0	5.9	5.6	4.1	3.4
Industrial Production	5.7	3.3	3.6	2.3	2.7	3.8	3.4	3.3	2.8	2.5
Light Vehicle Sales (mm)	11.6	12.7	14.4	15.5	16.0	16.0	16.4	16.3	16.3	16.1
Housing Starts (mm)	0.59	0.61	0.78	0.93	1.17	1.31	1.66	1.71	1.66	1.59
Consumer Prices	1.7	3.1	2.1	1.5	1.8	2.1	2.2	2.2	2.1	2.1
10-Year Treasury Notes (%)	3.21	2.79	1.80	2.59	3.23	3.45	4.02	4.64	4.76	4.94
Unemployment Rate (%)	9.6	9.0	8.1	7.5	7.0	6.8	6.3	5.9	5.4	5.3
Exchange Rate ($U.S./euro)	1.33	1.39	1.29	1.31	1.28	1.24	1.26	1.28	1.29	1.32
U.S. End-Use Market Output										
Construction	3.9	5.5	5.2	3.5	7.4	7.8	6.4	4.1	3.6	3.2
Food, Beverages & Tobacco	-0.1	1.7	2.9	1.2	1.2	1.1	1.1	0.7	0.6	0.3
Textile Mill Products	4.0	0.1	0.5	-1.8	-1.3	-0.7	-1.8	-2.5	-2.6	-2.5
Apparel	-0.2	-2.4	-3.5	1.0	-2.6	-3.6	-3.6	-3.7	-4.1	-4.1
Structural Panels	2.2	0.4	4.3	6.7	12.3	12.1	4.4	0.6	1.6	1.4
Paper	2.1	-1.4	-2.4	0.3	1.1	1.5	1.7	0.9	0.8	0.7
Printing	0.1	-4.3	-1.4	-2.6	-1.7	-0.9	-0.7	-0.5	-0.3	0.3
Petroleum Refining	-2.3	3.7	0.0	1.7	1.5	2.6	2.3	1.9	1.7	0.8
Rubber & Plastic Products	8.9	8.4	3.2	4.3	2.9	3.3	3.4	4.1	3.5	2.5
Iron & Steel	30.0	9.1	3.6	-1.3	5.0	5.5	5.2	3.4	2.8	2.2
Fabricated Metal Products	6.9	10.0	7.2	3.7	3.6	5.2	4.2	3.3	2.5	2.4
Computers	10.9	7.9	6.3	3.3	3.9	6.1	6.2	4.6	4.5	4.2
Semiconductors & Electronic Components	32.7	12.0	5.3	5.0	9.6	9.3	8.9	8.6	8.3	8.3
Appliances	-0.2	-1.7	-0.8	5.9	4.3	4.2	3.2	2.1	1.8	2.1
Motor Vehicles & Parts	32.5	11.8	17.4	6.0	3.0	4.1	4.2	2.6	2.3	2.0
Aerospace	-2.3	8.9	6.9	0.9	9.2	11.9	8.9	7.4	6.0	4.4
Furniture	-1.8	5.0	4.7	2.7	3.7	2.6	1.3	0.7	0.3	1.6

TABLE 2
U.S. Chemistry Outlook: Production Volumes

% Change Year-over-Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average 2019-23
Total Chemicals Production Volume	3.3	0.0	0.1	1.6	2.5	3.5	4.0	4.1	4.0	3.4
Production Volume by Segment										
Pharmaceuticals	-6.9	1.6	-3.2	-0.7	2.3	3.5	4.3	4.4	4.6	4.2
Chemicals, excl. Pharmaceuticals	10.0	-0.9	2.1	3.2	2.6	3.5	3.8	4.0	3.6	2.9
Consumer Products	1.5	5.1	5.2	5.5	2.0	2.2	2.3	2.3	2.2	2.3
Agricultural Chemicals	4.3	-5.9	-3.2	2.3	1.4	1.9	3.7	4.8	3.0	1.3
Fertilizers	12.2	-12.0	-9.5	2.0	1.4	2.2	4.9	5.9	3.8	1.8
Crop Protection	-4.9	6.1	11.5	2.5	1.4	1.7	2.9	3.9	2.4	1.0
Specialties	10.4	-1.3	6.9	4.8	3.2	3.6	3.5	3.0	2.9	2.7
Coatings	9.9	0.4	9.0	7.2	3.3	3.3	3.6	3.2	3.2	3.3
Other Specialties	10.6	-1.9	6.0	3.8	3.2	3.7	3.4	3.0	2.7	2.5
Basic Chemicals	16.2	-2.3	0.6	1.2	2.4	4.2	4.5	4.4	3.9	3.1
Inorganic Chemicals	11.7	-3.0	4.7	-0.8	1.2	4.2	4.5	3.3	2.3	2.0
Bulk Petrochemicals & Organics	18.8	-1.2	-1.6	1.6	2.9	4.5	4.6	5.0	4.9	3.6
Plastic Resins	14.3	-6.1	1.6	2.5	2.7	4.2	4.7	4.8	4.0	3.4
Synthetic Rubber	14.5	4.6	7.1	1.3	2.6	4.2	4.2	3.6	3.4	2.7
Man-Made Fibers	33.6	5.2	4.3	0.7	0.1	0.4	0.1	0.9	1.6	0.0
Production Volume by Region										
Gulf Coast	13.5	-2.1	0.7	1.4	2.3	4.0	4.3	4.2	3.9	2.9
Midwest	2.0	0.1	-0.2	1.4	2.4	3.5	4.0	4.0	3.9	3.4
Ohio Valley	9.8	-0.9	2.3	3.0	2.3	3.4	3.7	3.7	3.8	2.8
Mid-Atlantic	-1.1	0.9	-0.9	1.0	2.3	3.4	4.0	4.0	4.1	3.6
Southeast	2.4	-0.2	-0.1	1.6	2.2	3.3	3.9	4.0	3.7	3.1
Northeast	-1.9	1.4	0.0	1.4	2.4	3.3	3.8	3.8	3.8	3.4
West Coast	-2.2	1.0	-1.2	1.0	2.3	3.4	4.0	4.0	4.0	3.6

TABLE 3
U.S. Chemistry Outlook: Trade

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Exports (billions)	$171.2	$187.3	$188.3	$192.7	$205.4	$220.9	$238.8	$258.2	$279.4
Imports (billions)	$166.6	$191.1	$187.5	$190.0	$197.6	$208.0	$221.4	$234.9	$249.5
Trade Balance (billions)	$4.6	-$3.7	$0.8	$2.7	$7.7	$12.9	$17.4	$23.3	$29.8
Pharmaceuticals	-$40.1	-$47.2	-$40.4	-$39.1	-$38.4	-$38.3	-$39.1	-$39.6	-$40.2
Chemicals, excluding Pharma.	$44.6	$43.5	$41.2	$42.7	$46.6	$51.1	$55.4	$60.9	$67.5
Consumer Products	$2.8	$2.4	$2.3	$2.1	$2.1	$2.1	$1.8	$1.6	$1.3
Agricultural Chemicals	-$3.2	-$5.0	-$5.0	-$4.8	-$4.2	-$3.9	-$3.7	-$3.6	-$3.5
Specialties	$11.8	$11.4	$10.3	$9.7	$10.2	$10.9	$11.7	$12.6	$13.8
Basic Chemicals	$33.2	$34.7	$33.5	$34.8	$38.0	$42.1	$46.6	$52.2	$58.4

TABLE 4
U.S. Chemistry Outlook: Other Indicators

	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average 2019-23
Capacity	-5.6	-2.7	1.2	1.7	2.3	3.3	4.0	4.3	4.0	3.3
Capacity Utilization (%)	74.1%	76.1%	75.3%	75.2%	75.3%	75.4%	75.4%	75.3%	75.3%	75.6%
Shipments (billions)	$697.8	$776.8	$769.4	$787.8	$812.0	$853.8	$908.2	$959.7	$1,011.7	n/a
% Change Year-over-Year	14.5	11.3	-1.0	2.4	3.1	5.1	6.4	5.7	5.4	n/a
R&D Spending (billions)	$55.41	$56.07	$56.59	$56.88	$58.30	$60.65	$63.25	$66.00	$68.65	n/a
% Change Year-over-Year	12.1	1.2	0.9	0.5	2.5	4.0	4.3	4.3	4.0	n/a
Capital Spending (billions)	$28.69	$32.96	$38.53	$42.40	$46.20	$50.28	$54.28	$57.80	$61.15	n/a
% Change Year-over-Year	8.4	14.9	16.9	10.0	9.0	8.8	8.0	6.5	5.8	n/a
Employment (thousands)	786.5	783.6	783.6	793.8	794.8	795.9	800.1	803.5	805.6	n/a
% Change Year-over-Year	-2.2	-0.4	0.0	1.3	0.1	0.1	0.5	0.4	0.3	n/a
Hourly Wages ($/hour)	$21.07	$21.45	$21.45	$21.42	$21.65	$21.90	$22.17	$22.46	$22.75	n/a
% Change Year-over-Year	3.8	1.8	0.0	-0.1	1.1	1.1	1.3	1.3	1.3	n/a

TABLE 5
Global Business of Chemistry Production Outlook by Country and Region

% Change Year-over-Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average 2019-23
United States	3.3	0.0	0.1	1.6	2.5	3.5	4.0	4.1	4.0	3.4
Canada	4.5	0.8	0.8	4.7	3.3	2.6	2.6	2.5	2.6	2.7
Mexico	0.2	-0.1	-0.5	1.3	4.9	4.7	4.3	3.9	3.8	3.5
North America	**3.2**	**0.2**	**0.0**	**1.7**	**2.6**	**3.5**	**3.9**	**4.0**	**3.9**	**3.4**
Brazil	8.1	-4.1	5.4	0.3	3.5	3.7	3.7	3.5	3.3	3.2
Other Latin America	5.4	3.4	-0.6	0.5	3.1	3.9	3.9	3.6	3.3	3.1
Latin America	**6.8**	**-0.4**	**1.9**	**0.4**	**3.3**	**3.8**	**3.8**	**3.6**	**3.3**	**3.1**
France	4.8	2.3	1.7	-0.2	1.3	1.8	2.1	2.4	2.0	1.8
Germany	10.8	2.5	-2.9	0.7	1.6	1.4	1.4	1.5	1.5	1.6
Italy	4.5	-0.9	-3.0	-1.2	0.2	1.1	1.4	1.2	0.9	0.7
United Kingdom	-4.4	-3.8	-6.1	-3.2	1.0	1.6	1.8	1.8	1.5	1.3
Belgium	20.5	10.6	-4.9	7.7	1.9	2.5	3.0	2.8	2.7	2.5
Ireland	16.6	6.0	-1.7	0.5	3.5	2.6	3.4	3.6	3.8	4.0
Netherlands	12.3	0.3	3.7	-1.5	0.8	1.7	2.1	2.1	2.0	1.9
Spain	7.2	0.8	0.0	-3.3	-0.2	1.0	2.4	2.6	2.1	1.6
Sweden	4.4	11.7	2.9	1.8	3.0	3.2	3.4	3.1	3.0	2.8
Switzerland	10.3	-0.8	4.8	1.4	3.8	3.9	3.3	3.1	3.4	3.4
Other	8.7	3.9	-1.0	1.0	2.4	2.6	2.6	2.5	2.4	2.3
Western Europe	**7.7**	**1.9**	**-1.4**	**-0.1**	**1.4**	**1.8**	**2.1**	**2.1**	**1.9**	**1.8**
Russia	16.9	5.6	-9.3	1.9	4.5	4.3	4.2	4.2	4.4	4.5
Other Central/Eastern Europe	10.4	2.9	3.0	1.3	3.7	4.5	4.6	4.7	4.5	4.2
Central/Eastern Europe	**13.6**	**4.3**	**-3.4**	**1.6**	**4.1**	**4.4**	**4.4**	**4.5**	**4.5**	**4.4**
Africa & Middle East	**11.5**	**2.2**	**3.6**	**3.6**	**4.8**	**4.9**	**4.9**	**4.8**	**5.0**	**4.6**
Japan	7.4	-0.2	-3.2	0.8	4.0	4.3	2.8	2.3	2.0	1.8
Asia-Pacific excluding Japan	14.3	7.7	6.4	6.6	7.3	7.2	7.0	6.6	6.5	6.5
China	17.7	10.7	9.3	8.5	8.8	8.5	8.2	7.8	7.8	8.0
India	1.3	2.5	1.4	5.8	6.7	8.1	8.7	8.9	8.1	7.4
Australia	4.2	0.1	-0.7	1.8	1.8	1.9	2.0	2.0	1.8	1.7
South Korea	10.6	3.3	3.7	4.4	5.5	5.6	4.8	3.9	3.9	3.8
Singapore	13.3	7.4	-3.3	2.3	5.5	2.8	2.7	3.0	2.9	3.3
Taiwan	21.9	-0.9	-3.1	2.0	4.5	4.3	4.3	4.0	3.9	3.7
Other Asia/Pacific	8.8	8.1	5.8	6.9	6.7	6.5	5.9	5.5	5.4	5.2
Asia/Pacific	**15.7**	**8.7**	**7.2**	**5.3**	**6.5**	**6.5**	**6.0**	**5.6**	**5.4**	**5.4**
Total World	**10.0**	**4.2**	**2.7**	**2.4**	**3.8**	**4.1**	**4.1**	**4.0**	**3.9**	**3.7**
Developed	6.2	0.9	-1.1	0.9	2.4	3.0	3.1	3.1	2.9	2.6
Developing	13.0	5.6	4.3	5.0	6.3	6.3	6.1	5.8	5.7	5.7

TABLE 6
Global Business of Chemistry Production Outlook by Segment

% Change Year-over-Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average 2019-23
Total Chemicals	**10.0**	**4.2**	**2.7**	**2.4**	**3.8**	**4.1**	**4.1**	**4.0**	**3.9**	**3.7**
Pharmaceuticals	3.3	4.2	2.0	1.7	3.8	3.9	4.1	4.1	4.3	4.1
Total, excluding Pharmaceuticals	12.4	4.2	3.0	2.6	3.8	4.2	4.2	4.0	3.8	3.6
Consumer Products	10.1	4.0	6.7	2.7	3.5	3.6	4.1	3.8	3.3	3.5
Agricultural Chemicals	5.5	5.9	3.1	3.8	3.1	3.0	3.2	3.2	3.3	3.1
Specialties	14.8	4.0	2.4	2.6	4.2	4.7	4.5	4.1	3.3	3.6
Coatings	12.5	4.6	3.2	2.5	3.2	3.5	3.7	3.4	3.3	3.0
Other Specialties	15.2	3.7	0.7	2.7	4.6	5.1	4.8	4.3	3.3	3.8
Basic Chemicals	15.0	2.7	3.1	2.3	3.8	4.3	4.2	4.1	4.1	3.6
Inorganics	20.7	9.0	6.8	1.7	3.7	4.5	4.3	4.0	3.8	3.2
Bulk Petrochemicals & Organics	13.6	8.0	7.4	2.1	4.1	4.5	4.3	4.3	4.3	3.9
Plastic Resins	9.9	3.9	3.2	3.2	4.0	4.7	4.7	4.6	4.5	4.0
Synthetic Rubber	8.2	4.0	3.0	3.3	3.8	4.3	4.3	4.1	4.1	3.7
Man-Made Fibers	10.5	3.9	3.3	4.7	4.1	4.3	4.4	4.1	4.1	3.7

TABLE 7
Global Chemical Capital Spending

% Change Year-over-Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average 2019-23
Global Capacity	1.8	3.6	3.3	3.3	3.5	3.8	4.0	4.3	4.3	4.0
Global Capacity Utilization	86.7%	87.2%	86.7%	85.9%	86.2%	86.5%	86.6%	86.3%	86.0%	86.3%
Capital Spending (billion US$)	$325.9	$385.3	$413.8	$438.8	$467.7	$504.3	$542.7	$580.4	$617.5	n/a
% Change	14.1	18.2	7.4	6.0	6.6	7.8	7.6	6.9	6.4	n/a

TABLE 8
Global Economic Environment: Real GDP

% Change Year-over-Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average 2019-23
Real GDP										
United States	2.5	1.8	2.8	1.7	2.5	3.0	3.0	2.9	2.7	2.5
Canada	3.4	2.5	1.7	1.7	2.4	2.6	2.6	2.5	2.4	2.4
Mexico	5.1	4.0	3.6	1.6	3.5	3.8	4.0	3.8	3.8	3.6
Brazil	7.5	2.7	0.9	2.4	2.8	3.2	3.7	3.6	3.6	3.8
United Kingdom	1.7	1.1	0.2	1.4	2.2	2.3	2.2	2.2	2.2	2.3
Eurozone	2.0	1.5	-0.6	-0.3	0.9	1.5	1.6	1.7	1.7	1.7
France	1.7	2.0	0.0	0.1	0.8	1.3	1.5	1.7	1.5	1.8
Germany	3.9	3.4	0.9	0.6	1.6	1.7	1.5	1.5	1.4	1.5
Italy	1.7	0.4	-2.4	-1.8	0.3	0.9	1.3	1.1	1.0	1.1
Spain	-0.2	0.1	-1.6	-1.4	0.2	0.7	1.1	1.6	1.7	1.9
Russia	4.5	4.3	3.4	1.8	2.9	3.6	3.8	3.7	3.5	3.4
Japan	4.7	-0.6	2.0	1.9	1.7	1.4	1.0	1.3	1.2	1.1
China	10.4	9.3	7.7	7.4	7.5	7.6	7.5	7.1	6.8	6.3
India	10.5	6.3	3.2	4.4	5.2	6.4	6.9	7.0	7.1	7.2
South Korea	6.3	3.7	2.0	2.6	3.4	3.9	3.9	3.8	3.6	3.2
World GDP (Market Exchange)	4.1	2.9	2.6	2.2	2.8	3.2	3.3	3.3	3.3	3.3
World GDP (PPP)	5.2	3.9	3.2	3.0	3.6	3.8	4.0	4.0	4.0	4.3
World Trade	12.8	6.1	2.7	2.8	4.8	5.5	5.6	5.6	5.9	6.5

TABLE 9
Global Economic Environment: Industrial Production

% Change Year-over-Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average 2019-23
Industrial Production										
United States	5.7	3.3	3.6	2.3	2.7	3.8	3.4	3.3	2.8	2.5
Canada	4.9	3.8	1.0	1.2	2.4	2.7	2.8	2.8	2.6	2.4
Mexico	6.0	4.0	3.6	1.6	4.6	4.9	4.2	4.2	4.1	3.6
Brazil	10.5	0.3	-2.6	2.2	3.4	3.6	3.2	3.6	3.6	3.6
United Kingdom	2.1	-0.7	-2.3	-0.3	1.9	2.0	1.6	1.5	1.5	1.5
Eurozone	7.3	3.1	-2.3	-0.5	1.8	2.1	2.1	2.0	1.8	1.6
France	4.8	2.1	-2.8	-0.8	1.6	2.1	3.0	3.9	2.3	1.7
Germany	11.7	8.1	-0.6	0.2	3.2	2.0	1.5	1.6	1.5	1.8
Italy	7.0	-0.7	-6.2	-2.9	0.5	1.8	1.8	1.7	1.6	1.4
Spain	0.8	-1.4	-6.1	-2.0	0.3	1.6	2.3	2.6	2.3	1.9
Russia	8.3	4.7	2.5	2.0	3.8	4.4	4.0	3.8	3.7	3.6
Japan	16.0	-2.5	-0.3	-0.7	4.5	3.9	2.8	2.1	1.7	1.2
China	12.7	9.6	10.1	8.7	8.5	9.7	9.3	9.1	8.7	8.5
India	9.8	4.8	0.8	0.6	4.4	6.4	7.0	6.7	6.7	7.5
South Korea	16.3	5.9	0.9	0.0	5.7	6.9	5.9	5.1	4.5	4.1
World Industrial Production	10.0	5.4	3.4	2.1	4.1	4.4	4.0	3.9	3.7	3.4

TABLE 10
Global Economic Environment: Inflation (Consumer)

% Change Year-over-Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average 2019-23
Inflation (Consumer)										
United States	1.7	3.1	2.1	1.5	1.8	2.1	2.2	2.2	2.1	2.1
Canada	1.8	2.9	1.5	1.1	1.8	2.0	2.0	2.0	2.0	2.0
Mexico	4.2	3.4	4.1	3.9	3.5	3.5	3.0	3.4	3.4	3.4
Brazil	5.0	6.6	5.4	6.0	5.5	5.4	4.9	4.7	4.6	4.1
United Kingdom	3.3	4.5	2.8	2.6	2.3	2.3	2.2	2.2	2.3	2.2
Eurozone	1.6	2.7	2.5	1.4	1.4	1.7	1.8	1.9	1.8	1.8
France	1.7	2.3	2.2	1.1	1.5	1.6	1.8	1.9	1.7	1.9
Germany	1.2	2.5	2.1	1.6	1.7	1.9	1.9	1.8	1.7	1.7
Italy	1.6	2.9	3.3	1.4	1.4	1.5	1.6	1.8	1.6	2.0
Spain	2.0	3.1	2.4	1.6	1.2	1.4	1.7	1.6	1.7	2.1
Russia	6.9	8.4	5.1	6.5	5.5	5.2	4.9	4.7	4.4	3.9
Japan	-0.7	-0.3	0.0	0.3	2.1	1.7	1.9	1.6	1.7	1.4
China	3.3	5.4	2.7	2.6	3.1	3.1	3.2	3.3	3.0	3.0
India	10.4	8.4	10.4	10.3	8.3	7.7	6.9	6.6	6.4	5.7
South Korea	2.9	4.0	2.2	1.3	2.5	3.0	3.0	2.8	2.8	2.6
World Inflation	3.6	4.8	4.0	3.2	3.5	3.5	3.3	3.2	3.1	3.0

Methodology

This report presents an assessment of current conditions and expectations for the global business of chemistry, with particular emphasis on the U.S. The analysis uses economic data and publicly available information through mid-November 2013.

In looking ahead, several models of global output, trade, etc. for the business of chemistry are employed. Also taken into account are the forecasts made by economists at the national chemical associations in Europe (whose expertise ACC gratefully acknowledges) and from economic forecasting consultants and other institutions. Also gratefully acknowledged is the macroeconomic and chemical industry expertise of IHS Global Insight and Oxford Economics, leading providers of economic advice and consultancy services. The macroeconomic forecasts of the Economist Intelligence Unit (EIU) were also important to our thinking as was the U.S. Industrial Outlook of the Manufacturers Alliance/MAPI. These were supplemented by forecasts provided by the Asian Development Bank, IMF, OECD, the WTO, and various banks.

For More Information

More details, historical data (back to 1994) and annual projections (to 2018 and beyond) for the tables in the report are available in spreadsheet format. For more information or to access the detailed data, contact ACC's Economics Department: ACC_EconomicsDepartment@americanchemistry.com

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