

Market Mosaic

August 2016

Administering The Cure



Market Mosaic is a newsletter published for our customers, suppliers and stakeholders by the Market and Strategic Analysis group of The Mosaic Company. Some issues assess the near term outlook for agricultural and plant nutrient markets while others take an in-depth look at a topic of interest to our readers.

There is an old adage in the commodity business that the cure for high prices is high prices and the cure for low prices is low prices. Extraordinarily high prices a few years ago provided the cure for high prices. Buyers of plant nutrients are feeling much better today, witness India recently securing urea at \$180 tonne c&f port or China settling 2016 potash contracts at a net delivered price in the low \$200s tonne.

Now the question is whether current low prices will provide the cure for low prices and make plant nutrient producers feel better any time soon. Lower phosphate (P) and potash (K) prices no doubt are triggering responses on both the supply and demand side of the ledger. This issue of Market Mosaic highlights some of the adjustments underway today and speculates about how the cure may play.

We draw several conclusions from our analysis below. First, P&K markets are administering potent doses of low prices that are causing material supply adjustments. The cure, in fact, is killing a number of higher cost operations and, based on recent earnings reports and guidance, inflicting painful side-effects for most of the rest of the industry. Survivors are cutting costs and optimizing operations knowing that what doesn't kill them will make them stronger lower-cost producers in the long run.

Second, low P&K prices are boosting demand prospects, especially in key countries such as Brazil and India. In addition, declining prices and expectations of continued low prices are causing a destocking throughout the massive global distribution channel. The combination of strong on-farm demand and lower channel inventories underpin positive shipment forecasts, especially in the near term.

Third, positive demand prospects coupled with our estimates of net capacity increases are expected to result in a more balanced supply and demand outlook than most of the forecasts we have seen from consultants and sell-side analysts. We have long maintained that the large drop in P&K prices is more the result of a collapse of costs rather than a gross supply/demand imbalance. By our count, global P&K operating rates look relatively flat during the next five years. We do not see a deep and prolonged cyclical downturn.

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A Potent Dose of Low Prices

On the supply side of the ledger, several adjustments have occurred and more are expected. In the case of potash, low prices have forced the permanent closure of several high cost facilities. For example, all of the North American facilities that were at the right end of every estimate of the industry cost curve have closed. That includes Mosaic's Carlsbad and Hersey mines, Intrepid's Carlsbad East and West operations, and PotashCorp's Penobsquis and Picadilly facilities in New Brunswick. We estimate a net loss of 2.25 million tonnes of capacity from the closure of these six facilities.

Other producers also have announced mine closures or changes. ICL will cease MOP operations and transition to polyhalite production at its Boulby UK mine by 2018. The K+S Sigmundshall facility in Germany and the Vale Taquari operation in Brazil are scheduled to mine out during the next few years. These changes will remove another 2.1 million tonnes of MOP capacity, and low prices potentially could impact closure dates. Furthermore, another 3.0 million tonnes of higher-cost European capacity could be vulnerable if prices remain at or drop from current levels.

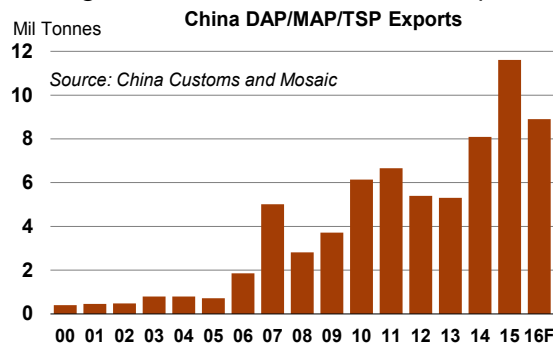
In the case of phosphate, low prices are expected to accelerate the restructuring of China's large phosphate sector. Plans outlined at the National Phosphate and Compound Fertilizer Industry Annual Conference in May called for the permanent closure of "outdated" facilities with capacity of 3.0 million tonnes P_2O_5 or the equivalent of 6.5 million tonnes DAP by the end of this decade. In addition, non-integrated facilities in North America and elsewhere also could be in jeopardy if product prices stay low and rock costs remain at high levels.

Other Producers Optimize Operations

Low prices also are forcing even the most efficient producers to optimize operations in order to compete, especially with exporters who have benefited from a

sharp devaluation of their local currencies. For example, Mosaic has temporarily idled its Colonsay potash operation and is running its large-scale Belle Plaine and Esterhazy facilities at higher rates in order to minimize cost yet still meet customer demand.

Optimization has resulted in a net decline in output. For example, we estimate that Canadian potash production was down 10%, or about 1.1 million tonnes, in the first half of 2016. Uralkali announced that its first-half output was down 11% or 600,000 tonnes from a year earlier. BPC also announced that its exports were down 21% during the first four months of this year.



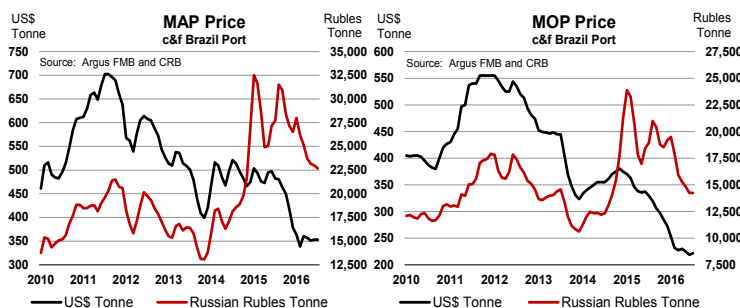
In the case of phosphate, low prices have pressured higher-cost Chinese producers to curtail output rather than cut prices in order to move product to market. The latest customs statistics show that Chinese DAP/MAP/TSP exports declined 31%, or 1.5 million tonnes, during the first half of this year. In addition, we estimate that total U.S. phosphate production in the first half was down 6%, or the equivalent of about 450,000 tonnes of DAP.

Devaluations Neutralize Price Declines

Devaluations of key currencies and the corresponding collapse in the dollar cost of production have offset much of the decline in P&K prices for some producers. The charts illustrate the point by showing dollar and Russian ruble prices of MOP and MAP delivered to Brazil. We have maintained that devaluations of the Belarussian ruble, Russian ruble, and Canadian dollar are the main drivers of the large drop in potash prices during the last couple of years. In economic jargon, it is more of a shift down (from lower costs) rather than a shift out (from capacity additions) of the industry supply or marginal cost curve that has driven prices so low.

"Global P&K operating rates look relatively flat during the next five years. We do not see a deep and prolonged cyclical downturn."

- Dr. Michael R. Rahm



Currency tailwinds, however, are beginning to diminish. Some currencies like the Russian ruble are trending up along with the price of oil. Inflation, as expected, also is accelerating in these countries. These developments are beginning to pinch margins and likely will begin to change pricing strategies at some point

A Demand Boost

On the demand side of the ledger, low P&K prices coupled with moderate crop prices, a few policy changes, and favorable weather are fueling an increasingly strong demand outlook. Our shipment guidance for 2016 has not changed despite volatile crop prices and long delays in settling Chinese and Indian potash contracts. Furthermore, a bunching of shipments is expected in the second half, and our first look at 2017 indicates that demand growth likely will accelerate next year.

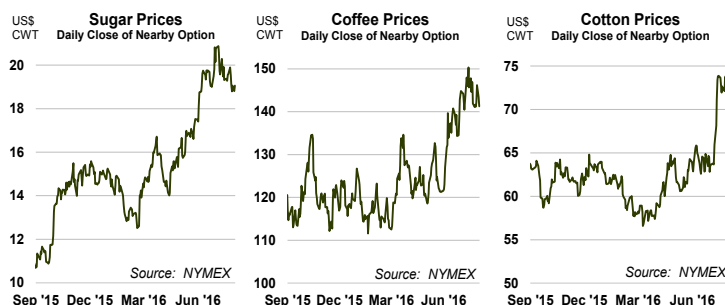
In the case of phosphate, global shipments of the leading products are projected to total 65 to 66 million tonnes this year with a point estimate of a record 65.6 million tonnes. Shipments are forecast to increase to 66 to 68 million tonnes next year. In the case of potash, global MOP shipments are projected to total 59 to 60 million tonnes this year with a point estimate of 59.6 million. Shipments are forecast to climb to 61 to 63 million tonnes next year. The tables on the back page provide a breakdown of our shipment forecasts by region along with brief commentary about fundamental developments in each of these geographies.

Several economic and agronomic factors underpin our constructive outlook. Despite lower and volatile crop prices, plant nutrients remain affordable. In fact, our affordability metric, the ratio of a plant nutrient price index and a crop price index, registered just .47 during the second week of June, the most affordable reading in our data base that dates back to 2005. The reading of .58 at the end of July still is 21% less than the 2010-15 average of .74, even after the sharp break in crop prices.

Our affordability metric is calculated using front month futures prices for corn, soybeans and wheat. However, the P&K we are selling today will feed next year's crop, and

2017 new crop prices for corn, soybeans and hard red winter wheat are somewhat less volatile and exceed front month values. In fact, 2017 new crop corn, soybean and HRW wheat were trading in the \$3.70, \$9.30, and \$4.70 per bushel range, respectively, at the end of July – values far from farm-crisis levels and still constructive for P&K demand. Nevertheless, new crop prices are expected to remain volatile as markets try to figure out the size of this summer's Northern Hemisphere crop and then begin to assess the impact of a potential La Niña event on the Southern Hemisphere harvest in 2016/17. Stay tuned.

Corn, soybeans and wheat, however, account for just 39% of global phosphate use and 30% of global potash use, according to the most recent estimates by the International Fertilizer Association (IFA). Other important agricultural commodity prices continue to trade at relatively high and less volatile levels largely as a result of the impact of the El Niño event this year. For example, rice, palm oil, sugar, cotton and coffee closing prices on July 29 were up 7%, 7%, 56%, 28% and 27%, respectively, from lows earlier this year.



In addition, shipment prospects are bolstered by the pull down of channel inventories so far this year, especially throughout the Americas. Our sales team tells us that many North American retailers bought the "last" truckload of phosphate and potash three or four times last spring and that channel inventories are thin heading into what is expected to be another good fall application season. In Brazil, the most recent ANDA statistics show that phosphate and potash inventories throughout the distribution channel shrunk 600,000 tonnes and 180,000 tonnes, respectively, during the first half of this year. Even high P&K inventories in China and India are getting worked down or are expected to get worked down during the upcoming application season.

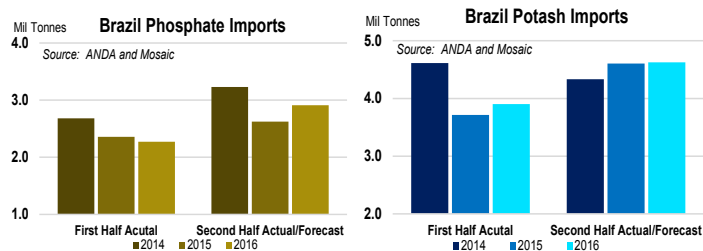
Brazil: Forecasts Keep Moving Up

Low prices are boosting demand in key regions around the globe. Brazil posted record first half shipments despite the chaotic political backdrop, a volatile exchange rate, and tight farm credit. ANDA statistics show that

shipments of all plant nutrient products tallied 13.18 million tonnes during the first half of this year, up 13% from a year ago and up 2% from the previous high-water mark of 12.96 million in 2014. All three major nutrients registered double-digit gains during the first half of this year. Nitrogen, phosphate and potash shipments were up 13%, 12% and 16%, respectively, from a year earlier.

Most analysts are revising up 2016 and 2017 forecasts. That is not a shocker given lower plant nutrient costs and record or near-record local currency prices for soybeans, corn, sugar, cotton and coffee. We now project that total plant nutrient shipments will top 32 million tonnes this year, up 6% from the lower level last year. Shipments this year likely will rival the previous record of 32.2 million in 2014. A first look at 2017 indicates that shipments are expected to climb to more than 33 million tonnes.

Brazilian distributors have big import needs in order to meet projected shipments during the last half of 2016. In the case of phosphate, DAP/MAP/NPS/TSP imports are forecast to total 5.2 million tonnes this year, up 4% or 200,000 tonnes from last year. First-half imports totaled 2.3 million tonnes, down 4% or more than 80,000 tonnes from a year ago. So, second-half imports are projected to total 2.9 million tonnes, an increase of 11% or more than 285,000 tonnes from last year but about 320,000 tonnes less than the 2014 record. Imports in 2017 are forecast to increase 8% to 5.6 million tonnes

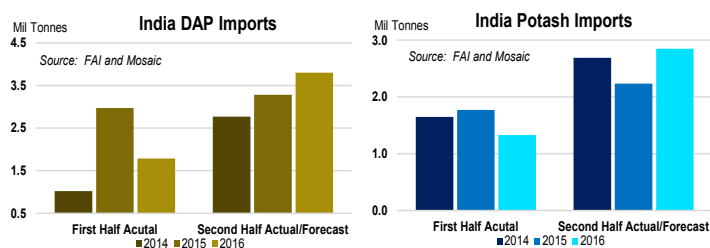


In the case of potash, MOP imports are forecast to rebound to 8.5 million tonnes this year, up 3% or 210,000 tonnes from last year. First-half imports tallied 3.9 million tonnes, a bump of 5% or 190,000 tonnes from a year ago. As a result, second-half imports are projected to total 4.6 million tonnes, equal to last year's record level and up from 4.3 million during the last half of 2014. Imports next year are forecast to grow another 6% to 9.0 million tonnes.

India: All Systems Go

Lower P&K prices, along with several other developments, are putting Indian demand back on a solid growth trajectory. The monsoon is delivering above-average rainfall across nearly all states for the first time in three years. In addition, the combination of lower international P&K prices, modest subsidy cuts and a relatively stable rupee has resulted in large declines in retail DAP and MOP prices and is building expectations for a strong recovery in P&K use. DAP and MOP retail prices have declined roughly 15% and 30%, respectively, to their lowest values in about five years.

India, too, has big import needs during the second half of this year. DAP imports are forecast to total 5.6 million tonnes this calendar year, down from 6.3 million last year (India built large inventories last year due to a poor monsoon and disappointing shipments). First-half imports totaled just 1.8 million tonnes, down 40% or almost 1.2 million tonnes from the lofty level a year earlier. As a result, second-half imports are projected to total 3.8 million tonnes, up 16% or more than 500,000 tonnes from last year and up 1.0 million tonnes from 2014. Imports in 2017 are forecast to increase to 5.8-6.0 million tonnes.

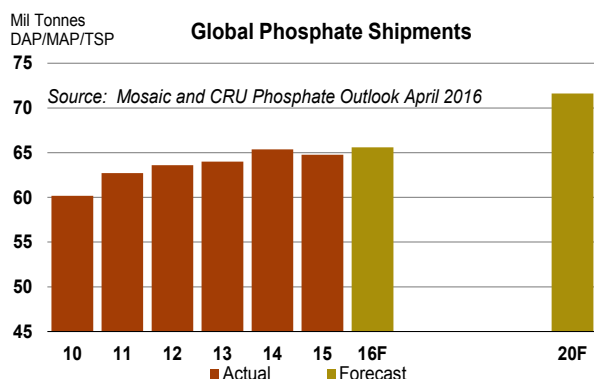


In the case of potash, MOP imports are projected to increase to 4.2 million tonnes this year, up 4% or about 200,000 tonnes from 2015. Delays in settling 2016/17 contracts resulted in first-half imports of just 1.3 million tonnes, a drop of 25% or about 450,000 tonnes from a year ago. So, second-half imports are projected to total almost 2.9 million tonnes, up 600,000 from last year and up more than 150,000 tonnes from the higher level of two years ago. Imports next year are forecast to climb to 4.3-4.5 million tonnes.

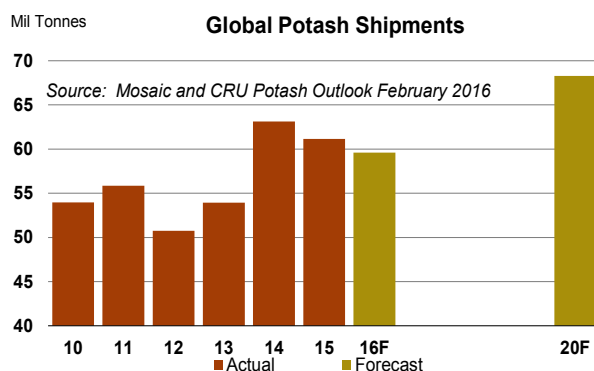
Other Regions Popping Up on Radar Screens

Demand prospects in regions such as Africa, Argentina and the former Soviet Union also have picked up due to lower P&K prices as well as other developments. For example, Argentine phosphate imports are rebounding as a result of the revival of the agricultural sector following the elimination or reduction of grain and oilseed export taxes and a sharp devaluation of the peso. We project that phosphate shipments will climb to 1.1 million tonnes this year and to 1.2 million next year compared to a three-year average of about 850,000 tonnes. In Russia, plant nutrient demand is booming along with agricultural production thanks to the combination of favorable weather and a highly depreciated ruble. Russia this year is expected to grow its largest wheat crop in the post-Soviet era.

Positive Long Term Demand Prospects



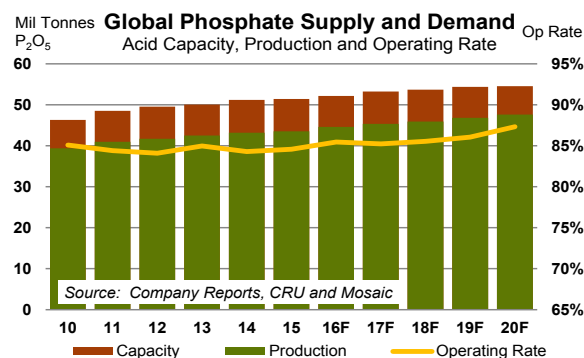
Lower P&K prices also raise the confidence level in our long term demand forecasts. In the case of phosphate, global DAP/MAP/NPS/TSP shipments are forecast to increase 2.0% per year or 6.8 million tonnes from 64.8 million in 2015 to 71.6 million in 2020. More than 55% of the projected gain is from Brazil and India where other factors such as a weak real and workable subsidies are expected to support strong demand growth.



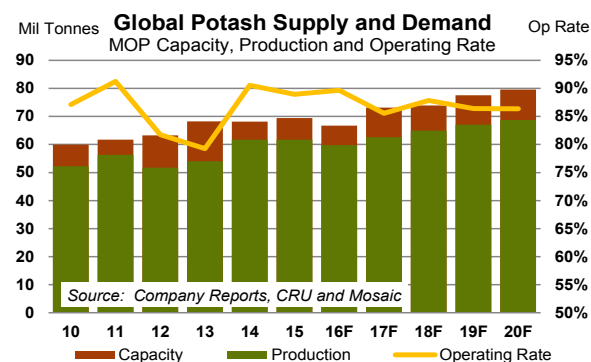
In the case of potash, we forecast that global MOP shipments will increase 2.3% per year or 7.5 million tonnes from 61.2 million in 2015 to 68.6 million in 2020. The "Big Five" importing countries – Brazil, China, India, Indonesia and Malaysia – account for 60% of the projected growth. Continued strong oilseed demand as well as policies to promote more balanced nutrient use underpin our forecasts.

Balanced Supply and Demand Outlook

This demand outlook stacked against our supply estimates produces a balanced five-year outlook for both phosphate and potash. We project that the global phosphoric acid operating rate will trend slightly upwards from about 85% today to 87% in 2020. Morocco and Saudi Arabia account for nearly all of the projected increase in net supply, and we have not assumed a material drop in Chinese capacity during the forecast period.



In the case of potash, we project that the global MOP operating rate will trend slightly downward from about 89% today to 86% in 2020. Our capacity estimates include recently announced and expected closures as well as the start-up of four greenfield projects in Saskatchewan, Russia, and Turkmenistan. Our 2020 capacity estimate is just shy of 80 million tonnes.



The bottom line is that we do not expect a deep and prolonged cyclical downturn in either the phosphate or potash market. Low prices appear to be stabilizing if not curing current low prices.

Global Phosphate Shipment Forecasts by Region (Aug 2, 2016)

| Million Tonnes DAP/MAP/NPS*/TSP | Low 2016F | High 2016F | Low 2017F | High 2017F | Comments | Source: CRU and Mosaic Numbers may not sum to total due to rounding |
|------------------------------------|--------------|---------------|--------------|---------------|---|--|
| China | 18.8 | 19.0 | 19.1 | 19.5 | We have again lowered our 2016 shipment forecast based on a poor spring season as Chinese supply channels were destocked and a slow start to summer stockpiling. We anticipate that inventories will have been worked through in 2016, setting the stage for a rebound next year. | |
| India | 9.3 | 9.5 | 9.4 | 10.0 | Despite starting the year with a large overhang of channel inventories, the above-average monsoon and reservoir levels, workable subsidy (despite the earlier cut and a lowering of retail prices) and strong farm economics have resulted in an upward revision to our 2016 forecast. We believe this strength will carry through to 2017, provided that the rupee remains stable. | |
| Other Asia & Oceania | 8.1 | 8.2 | 8.3 | 8.5 | We revised modestly higher our expectations for 2016 last quarter due to higher crop prices, more moderate P prices, average to below-average channel inventories, improved weather prospects (La Niña), and more stable forex rates. Our 2017 forecast calls for a moderate rebound, as we expect the positive drivers to persist. | |
| Europe and FSU | 5.1 | 5.2 | 5.1 | 5.3 | Our 2016 forecast is unchanged. Big harvests this year imply larger fertilizer replacement requirements, but macroeconomic uncertainties and weaker farm economics in Europe will likely be a drag on growth in 2017. | |
| Brazil | 7.4 | 7.6 | 7.5 | 7.7 | Phosphate shipments through the first half of the year were up 12% from a year ago. Volatility of the real remains an issue, but we anticipate continuation of constructive ag economics in Brazil to drive phosphates consumption. | |
| Other Latin America | 3.4 | 3.5 | 3.6 | 3.7 | Higher local-currency ag commodity prices and more moderate fertilizer prices have boosted demand more than previously anticipated in 2016, leading to an upward revision to our forecast, notably in Argentina. | |
| North America | 9.1 | 9.4 | 9.0 | 9.2 | 2016 shipments were revised up as a result of larger-than expected spring shipments (including a large de-stocking of channel inventories) and prospects for a strong fall season. A small drop is projected next year mainly due to an expected decline in U.S. corn acreage. | |
| Other | 3.7 | 3.8 | 3.8 | 4.0 | Our 2016 forecast is revised slightly higher. Modest growth is expected in the Middle East in 2017, with much stronger (~5% y-o-y) growth anticipated in Africa. | |
| World Total | 64.9 | 66.2 | 65.8 | 67.9 | Our 2016 point estimate of 65.6 million tonnes is unchanged from the May forecast. | |

* NPS products included in this analysis are those with a combined N and P₂O₅ nutrient content of 45 units or greater.

Global Potash Shipment Forecasts by Region (Aug 2, 2016)

| Muriate of Potash Million Tonnes (KCL) | Low 2016F | High 2016F | Low 2017F | High 2017F | Comments |
|---|--------------|---------------|--------------|---------------|--|
| China | 12.8 | 13.0 | 13.7 | 14.1 | Shipments this year are projected to drop more than previously anticipated due to the delayed settlement of 2016 contracts and a drawdown of channel stocks. 1H imports were down 11% from year-ago levels. We do not anticipate that changes to government support policies to discourage corn plantings will have a material adverse impact on demand in 2017, and we expect an ~8% rebound to ~14 mmt. |
| India | 4.4 | 4.6 | 4.4 | 4.7 | Despite high inventories to start the year, we have upped our forecast for 2016 on the basis of the good monsoon underway, lower potash prices, workable subsidy (which was cut only notionally this year) and strong local ag commodity prices. Our forecast for 2017 calls for bullish demand factors to continue, though the stability of the rupee remains a wildcard. |
| Indonesia/Malaysia | 4.5 | 4.7 | 5.0 | 5.2 | The rebound in shipments we were expecting in 2016 has been rather muted, but we believe that fundamentals – better rainfall, lower K prices, and decent rice and palm oil prices – will deliver a more meaningful increase in shipments in 2017. |
| Europe & FSU | 10.3 | 10.5 | 10.6 | 10.8 | Shipments in 2016 have been revised slightly higher and are now expected to be flat y-o-y. Our 2017 forecast calls for a moderate expansion to replace big soil nutrient drawdowns this year and a boost in production of NPKs for export. |
| Brazil | 9.0 | 9.2 | 9.2 | 9.5 | Near-record local currency prices for soybeans, sugar and coffee have led to a big demand pull mid-year (overall June fertilizer shipments set an all-time record). Potash shipments through the first half of the year are up 16% from a year ago. At the same time, imports are running just 3% ahead of last year and domestic production is off slightly, implying a sizable drawdown in channel inventories. We expect these constructive market conditions to carry over into 2017, underpinning our forecast for shipments to surpass the 2014 high of 9.3 mmt. |
| North America | 8.9 | 9.1 | 8.8 | 9.0 | We have trimmed our 2016 forecast slightly due to relatively high channel inventories, though we expect a very solid fall season as a result of large potash withdrawals this year and the low cost of rebuilding soil potassium levels. In 2017, we anticipate a pullback in corn acreage due to lower prices, but that is expected to result in a minor decrease in shipments as acres shift to other crops and the economic incentives to apply potash remain positive. |
| Other | 9.0 | 9.2 | 9.4 | 9.7 | Our 2016 forecast is revised slightly higher, as the reset lower in global benchmark contract prices (i.e. in China and India) provides a floor in spot market pricing that drives demand in the second half of the year. |
| World Total | 58.9 | 60.3 | 61.1 | 63.0 | Our 2016 global shipments point estimate is little-changed at 59.6 million tonnes in an unchanged range of 59-60 mmt. |



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