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INSIGHTS ON STRATEGY AND MARKET DYNAMICS

# BARBARIANS AT THE GATE

THE UNAVOIDABLE TRANSITION IN THE GLOBAL POTASH  
FERTILIZER MARKET



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*Recent developments in the global potash fertilizer market, driven primarily by the skyrocketing prices in the financial crisis, have led to irreversible changes in the potash game and will ruin potash suppliers' profitability for the next decade at least. Uralkali's recent exit from the export alliance, Belarusian Potash Company (BPC), is nothing but the consistent starting point of this game-changing development, which is driven by announced enormous overcapacities. Similar to the potash market, other basic materials may also face this kind of development in the next years. Due to significant investments in capacity by both new and established suppliers, the global potash industry's historically stable market is currently facing a transition from high margins to more competition, as our analysis shows; this unavoidable change will be permanent.*

*Large suppliers, like Germany's DAX 30 company K+S (formerly "Kali und Salz AG"), basically have a choice between Scylla and Charybdis: they can try to slow down the avalanche of price cuts by artificially reducing the market, selling less volume and losing market share. Or they can adjust fast to the new domain and secure their volumes at significantly lower prices. Both choices will significantly harm the global potash industry's profitability permanently. From the perspective of economic theory, this is nothing but the transition from a narrow to a wide oligopoly, which shows rules close to those of perfect competition.*

## THE MARKET HAS BEEN HUGE FOR DECADES, WITH A STEADY ANNUAL GROWTH

### THE HISTORY UNTIL SUMMER 2013

#### Potash fertilizer is crucial for everyday life

While big parts of the world are plagued by economic uncertainty, some things remain the same: the world population is growing, people in developing countries desire better nutrition, and the per capita arable land and available water resources are shrinking. Increased demand for food exerts unprecedented pressure on the global supply and supports high prices for a wide range of crops. In order to keep pace, farmers need to produce more and better crops. Especially potash as a fertilizer can help them to achieve significantly higher yields. As a key substance for the food industry, potash has enormous importance as a fertilizer in everyday life: potash is crucial not only for the production of cereals, rice, and corn in the agricultural sector, but also for fruit and vegetables, and indirectly for the production of animal feed, as well as for energy and biofuels production. This is reflected in the fact that over 60 million tons of potash were sold in 2011, which is enough fertilizer to produce crops that would cover 1 million soccer fields for 1,000 years.

Hence, the market has been huge for decades, with a steady annual growth of about 3% from 2001 to 2011. This is in line with the combined annual growth of the world population and global wealth level, which are the two main drivers of global potash demand.

**LARGE SUPPLIERS EXERT MARKET POWER BY UNDERUTILIZING THEIR CAPACITIES**

**Historically, few suppliers have dominated the market**

For a long time, a few large suppliers who gained immense profits through their pricing power have dominated this highly profitable market. In this oligopoly, two large export alliances, BPC and Canpotex, control the market with a combined share of ~64% (2011), and they have kept an enormous price discipline.

Our analysis shows a clear ability to take advantage of the market on the supplier side: The large suppliers exert market power by consciously underutilizing their capacities for the sake of higher prices and higher profitability for the volume they still sell. Naturally, one would expect the two export alliances, Canpotex and BPC, to drive this behavior. However, as depicted in figure 1, K+S seems to follow this logic of underutilization in order to keep prices high, which has secured attractive margins for all suppliers.

At the same time, all smaller suppliers had a combined capacity of about 25%, which they are utilizing to a large extent, wisely denying responsibility for the overall market price, which they cannot influence individually anyway.



**FIGURE 1: GLOBAL POTASH SALES VOLUMES AND PRODUCTION CAPACITIES BY SUPPLIER (2011)**

## THE CURRENT TRANSITION

### A transition on the supply side

The former market mechanism has paid off for all suppliers as long as only a minor share of global capacity belonged to smaller suppliers. For a long time, barriers to entry into the potash market have been high enough to protect all suppliers' profitability due to capital intensity and long lead times for developing new mines. But when prices skyrocketed in 2008–09 to almost USD 1,000 per ton (cf. figure 2), profitability gains on suppliers' investments in capacity seemed too tempting to resist. Even in the following years, the large suppliers managed to keep prices at around USD 400 per ton, still highly profitable compared to many other basic material industries.

### BHP BILLITON DECIDED TO ENTER THE GLOBAL POTASH GAME

Consequently, BHP Billiton, the world's largest raw materials company, with traditionally deep pockets, decided to enter the global potash game, and is currently building the world's biggest potash mine. As an immediate reaction, the large established players have publicly announced several expansion projects in order to scare off new entrants. However, these announcements have not really stopped the new entrants' plans, especially as numerous delays have made the announcements seem less credible. Hence, numerous new players have started to sink investments into market entry or expansion, putting unparalleled pressure on the export alliances in the oligopoly.

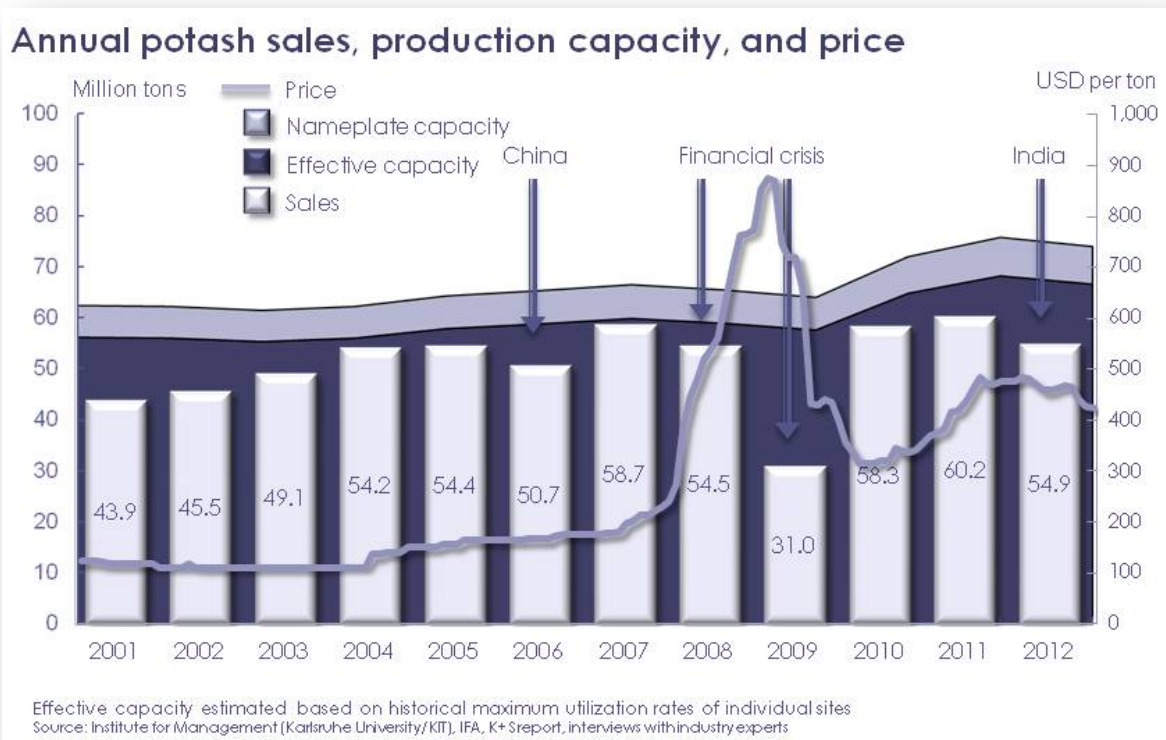


FIGURE 2: GLOBAL POTASH SALES, PRODUCTION CAPACITY, AND PRICE 2001–2012

**THE POTASH MARKET WILL CHANGE AND BECOME A WIDE OLIGOPOLY**

As a consequence, the potash market will change and in the long run become a wide oligopoly, where new rules that are much closer to those in perfect competition will apply. In the well-understood domain, valid after this transition, prices will be determined by the production cost of the marginal capacity: economic theory predicts that price will equal the production cost (including transport) of the most expensive mine that ultimately satisfies demand. In the words of economic theory: in recent years, all suppliers could profit from a typically uncoordinated, narrow oligopoly and from the pricing power of large suppliers. This has led to excess returns. Soon, the rules in this conduct will be replaced by new rules much closer to those of perfect competition.

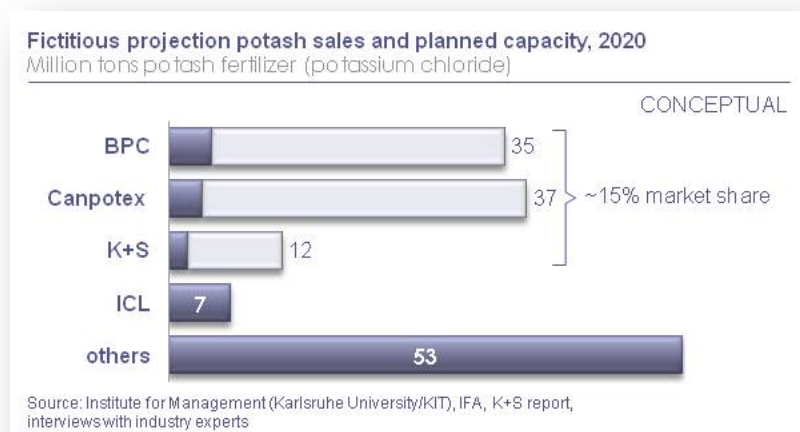
It is not possible to clearly say when this will happen, but with a high degree of certainty, it will indeed happen, whereas intermediate states of this transition are not stable.

**STICKING TO CURRENT PRICING BEHAVIOR IS NOT VIABLE FOR THE LARGE PLAYERS**

**The large suppliers face considerable risk in the transition**

How should the large players respond? What strategies will lead to the most success under the new market rules? A natural answer seems to be sticking to the current pricing behavior. But a closer look at current investments that are to a large degree already sunk shows that this option is not viable for the large players.

Instead, the global potash market is really at a crossroads: if the three large players continue their previous conduct until 2020, an extreme loss of market share can be expected, from 73% to as low as 15% in 2020, as depicted in figure 3 – the share of their capacity required to satisfy global demand. In that extremely unlikely case, new entrants and smaller players might take over market control.



**FIGURE 3:** FICTITIOUS 2020 PROJECTION OF POTASH SALES AND PRODUCTION CAPACITIES, IF LARGE PLAYERS CONTINUE CURRENT CONDUCT BY KEEPING PRICES HIGH

### **A strong and sustainable price decline is imminent**

Firms in oligopolistic industries traditionally do not directly influence their fate themselves - it is rather the actions of all market players that will ultimately determine industry profitability and thus the fortune of each individual player. In the extreme, it only takes a single firm to cause serious disruptions. Current developments support this assumption for the potash market. In July 2013, Uralkali exited its export alliance, BPC, and announced a fall in prices to USD 300 per ton.

### **URALKALI LEFT BPC BECAUSE THE EXPORT ALLIANCE WAS BECOMING UNSTABLE ANYWAY**

We believe that this is not, as is frequently reported and interpreted, any form of disciplining other suppliers. Instead, more probably, Uralkali left BPC because it realized that the export alliance was becoming unstable anyway, and leaving early gave Uralkali an advantage in managing its remaining profitability at the other suppliers' expense.

### **THE BURDEN OF UNDERUTILIZATION IS SHARED BY FEWER SUPPLIERS**

This is one of the seeming paradoxes in narrow oligopolies: if one anticipates that peaceful conduct will become unstable and vanish anyway, it is smart to be one of the first to give up sacrificing volume for value. By the same token though, this strategy implies that change will come faster, since the burden of underutilization is shared by fewer and fewer suppliers.

In the case of potash, we believe a strong and sustainable price decline cannot be avoided, leaving the suppliers with the choice of sacrificing either margin first and volume second, or vice versa.

## **THE FUTURE**

### **Our Global potash model allows analysis of future supplier strategies based on game theory**

It is hard to predict how the large suppliers will react in the short run and how industry conduct will change within the next two to four years, because the enterprises' choices and short to medium term trends do depend on individual management decisions to a large extent. However, we are confident that the current transition will ultimately lead to new market dynamics that can be anticipated already today.

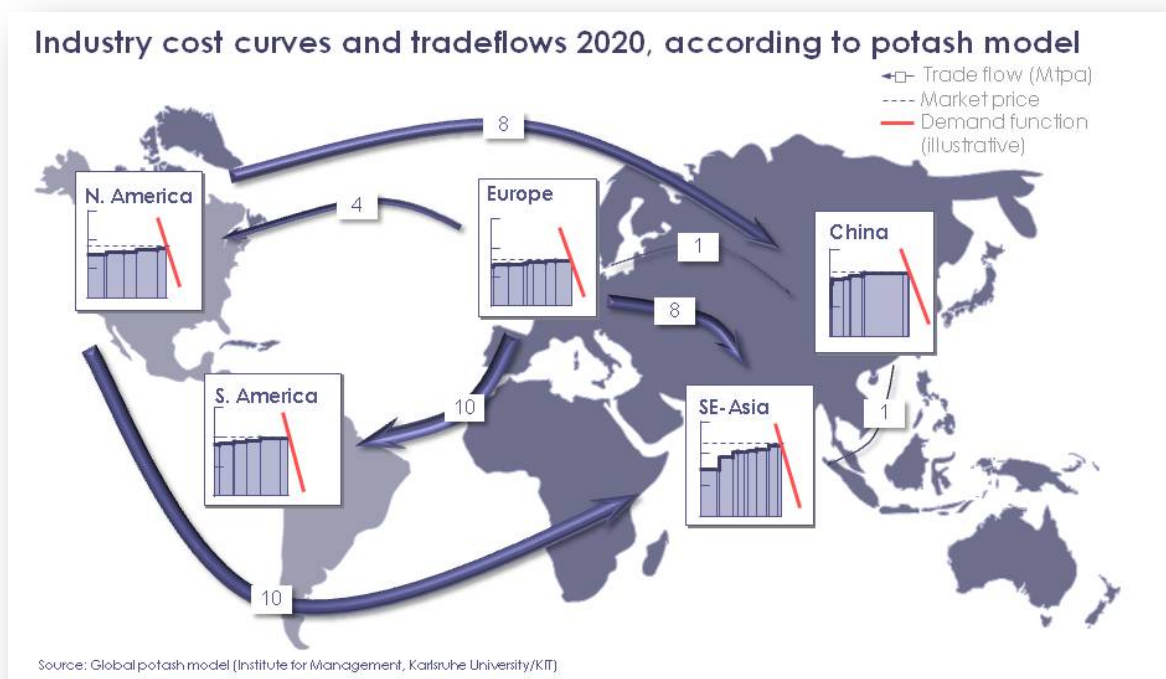
To investigate the market dynamics after the transition, we have developed a comprehensive supply and demand model for the global potash industry. While models naturally have to be regarded as simplified maps of the real world, there is no doubt that they are useful for deriving early insights into potential developments and consequences and for guiding one in a specific direction. This is precisely what we strive for.

**WE HAVE DEVELOPED A SPATIAL DYNAMIC MARKET EQUILIBRIUM MODEL**

We have developed a spatial dynamic market equilibrium model with a level of detail of five regions on an annual basis under the assumption of new domain pricing close to perfect competition. In this model, all suppliers are price takers and adjust to a common market price in each region, while strategic decisions are focused on investments in future capacity.

The model is based on capacities, production volumes, and costs of more than 80 individual mines, as well as brownfield and greenfield expansion projects currently in the pipeline and estimation of future demand and price elasticity. As a result, we get production volumes, regional market prices, and interregional trade flows in the domain of the large suppliers' new market conduct. Strategic interaction among suppliers' investment decisions is based on game theory for the most important scenarios. We have put a special focus on the interaction between investment strategies, interregional trade, and price elasticity of demand, which characterizes the potash market. The model is realized as numerous market simulations, which have been calculated in parallel on several servers, using complex iterative approximation algorithms.

Figure 4 shows the resulting system of demand and supply functions (industry cost curves) and the resulting trade flows in the most likely base scenario.



**FIGURE 4:** REGIONAL POTASH SUPPLY, DEMAND, AND PRICES (2020 BASE CASE)

## A SKETCH OF THE MOST IMPORTANT OUTCOMES

In the new domain of a wide oligopoly with competitive behavior and pricing similar to perfect competition, our 2020 projection for the base case scenario leads to the following outcomes:

### ONLY A FEW SELECTED INVESTMENTS WILL LEAD TO BEST RESULTS

- **The market has limited room for new mines in the near future.** Old strategies of massive capacity expansions, which some experts currently suggest, are predicted to no longer be successful. This shows that only a few selected small investments will lead to the best results for the large players in the long run. This is especially the case when capacity expansion is a) performed in a cost-efficient manner in terms of expected variable production cost and b) focused on projects that are already close to realization.
- **In particular, the best investment strategies with the highest total payoff are found in a Nash equilibrium between BPC and Canpotex.** (This is when the best answers of both players coincide.) Canpotex should keep their capacity at the current level, and BPC may choose to invest about USD 500 million more in their current best projects until 2016. Above this amount, investments are likely not to pay off anymore. While at least some new mines at BPC have a positive net present value (NPV), additional capacity for Canpotex will likely not pay off.

### PRICE CUTS OF 50% OR MORE UNTIL 2020

- **Price cuts of 50% or more until 2020.** The simulation results in the following prices for 2020 under these investment scenarios after the complete market transition (percentages in parentheses: difference to average 2012 actuals):
  - Europe USD 156 (-66%)
  - North America USD 169 (-63%)
  - South America USD 195 (-64%)
  - China USD 219 (-50%)
  - South East Asia USD 225 (-56%).
- **Main changes in trade flows compared to today.** Anticipated 2020 trade flows will still focus on the routes from North America and Europe to SE-Asia and China. In addition, we expect the route from Europe/CIS to South America to gain much more importance and replace export from North to South America.



**MARKET CONDUCT IS FACING AN UN-AVOIDABLE AND PERMANENT CHANGE**

**SUPPLIERS SHOULD NOT TRY TO STOP THE PRICE AVALANCHE ONCE IT IS UNDERWAY**

## SUMMARY AND OUTLOOK

The global potash fertilizer market is currently in a transition driven by the supply side. Due to significant investments in capacity and market entries, the historically stable market conduct is currently facing an unavoidable change that will be permanent.

If large suppliers try to keep prices at current levels, they will severely reduce their combined market share from more than 70% to less than 20% until 2020. To avoid this ruinous development, suppliers may opt for price reductions that will severely lower their margins. In consequence, the global potash industry's profitability will be harmed permanently, leading to a new equilibrium at significantly lower prices. This whole process reflects the transition from a narrow to a wide oligopoly.

Since there is not much suppliers can do to change this logic fundamentally, given the current paths in supply and demand, they should reduce investments, concentrate on cost efficiency and prepare for a future that is already everyday life in many other markets and industries, especially in basic materials — and they; doing this will most likely destroy value without leading to the desired results.



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