# Fertilizer Outlook

## Is History Repeating Itself?

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RaboResearch Food & Agribusiness
Global Farm Inputs Team

Lead Author
Bruno Fonseca
Senior Analyst – Farm Inputs

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# Executive Summary

**When geopolitics meets fertilizer markets**, things tend to get bumpy for fertilizers. Over the past couple of years, that is exactly what has happened, with tensions peaking after the invasion of Ukraine. But how did we get here?

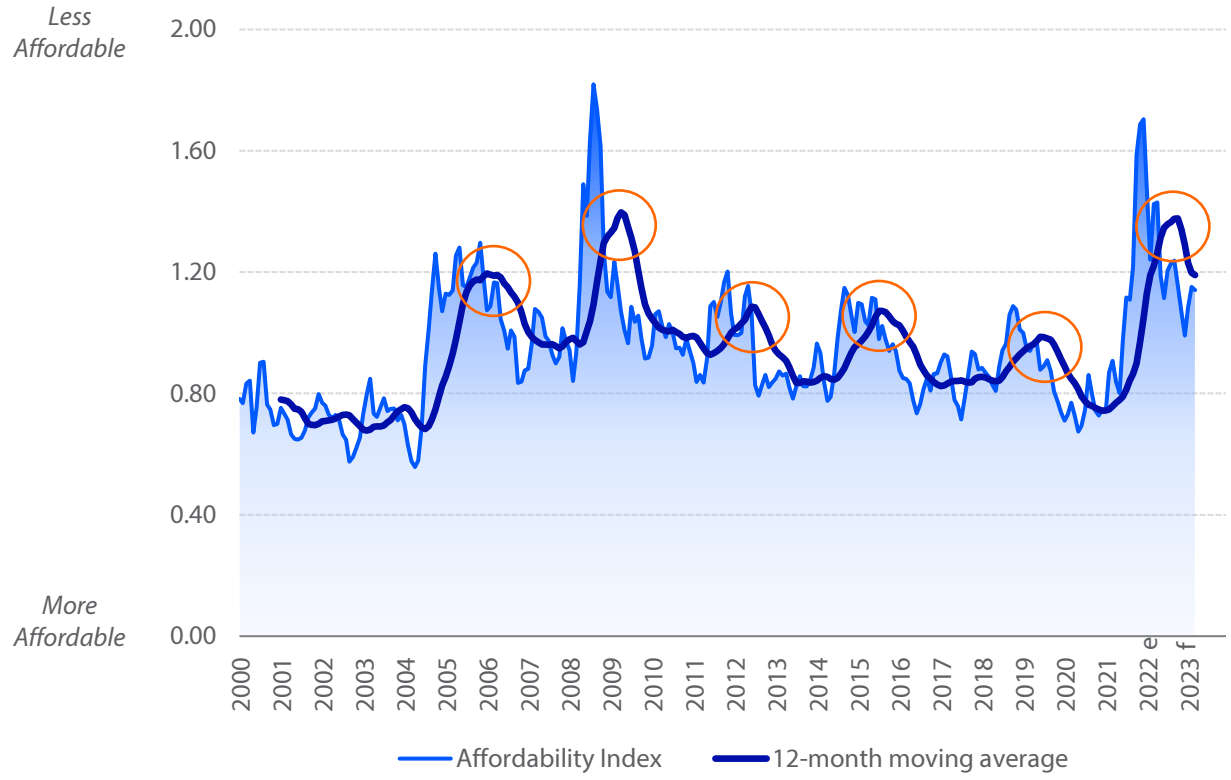
By August 2020, the Covid outbreak had paralyzed supply chains throughout the world, while consumption maintained its normal pace. That situation led to record-high commodity prices in some cases. Later in November, farmers around the world decided to invest more in their fields, which resulted in higher fertilizer utilization rates and an increase in global demand. By December 2021, higher fertilizer demand and production problems (and consequently poor supply) teamed up to create a perfect storm that pushed fertilizer prices much higher, to levels not seen in quite some time. After reaching record-high prices, fertilizer markets started to calm down until Russian troops invaded Ukraine in February 2022. With Russia being one of the top fertilizer suppliers globally, uncertainties took over, and fertilizer prices set new record highs. Subsequently, the EU had to shut down most of its nitrogen production capacity as a consequence of rising natural gas prices, leading to a strong restriction of European supply as well as an increase in nitrogen production costs.

Price movements during these past months have borne a resemblance to those of certain periods in the past. So, **history repeats itself, or history rhymes.** That becomes more evident when we explore historical trends in the affordability index over time. Although fertilizer consumption has suffered in 2022, a look back at the past reveals that a recovery in fertilizer consumption is possible in some regions in 2023, with prices lowering and commodity prices at historically good levels.

# Affordability Index

## More difficulties ahead?

*Figure 1: The affordability index reveals a slight downward trend over the next three months*




2022 has added layers of complexity to an already complex agricultural market. Farmers suffered as fertilizer prices soared as a consequence of the war in Ukraine. In some cases, buying 1 metric ton of fertilizer became 50% more expensive in a matter of weeks. It's here where the affordability index offers insights.

The affordability index shows the relative price of a basket of commodities in comparison to a basket of fertilizer. The more expensive it becomes to buy the same ton of fertilizer, the higher the index rises.

When we explore the index's 12-month moving average, analysis reveals an interesting trend: a three-year cycle in which purchasing power decreases as the moving average reaches its peak.

Looking back over the past two decades, we see the moving average first peaked in 2006, but the highest value occurred in 2009, as a consequence of the economic crisis. (It is interesting to note that, between 2009 and 2022, the height of peaks was trending lower.)

As the conflict in Ukraine evolved, commodity and fertilize prices soared. And even though the prices of most commodities rose this year, the affordability index reached its second highest devaluation period, as all fertilizer prices set new record highs. The key difference from 2009 is the extension of this period of high devaluation.

However, our analysis shows that the index's moving average is trending lower, as fertilizer prices are returning to pre-war levels. For November, the index is expected to end around 1.07, down from 1.23 in October. For the next three months, the index will continue to trend downward but remain above normal. The key point of attention is on nitrogen products, as the natural gas crisis in Europe has the potential to make urea and ammonia more expensive and, therefore, to keep the index at a high level.



*Source: Rabobank 2022*

# Commodities

## Are good price levels here to stay?

Grain and oilseed markets have had a two-year run of historically high prices, and projections estimate that the current elevated price environment will continue for at least another one to two years. The same factors that created this situation – global production shortfalls, unfavorable weather, robust demand, supply chain challenges, and declining stock levels – remain in place. It will take several years before these factors are rectified and prices decrease from their current levels.

The Russian invasion of Ukraine added another supportive price factor to the mix, as both Russia and Ukraine were major exporters of corn, wheat, barley, and sunflower oil. Consequently, the global supply situation has become much tighter, particularly for corn and wheat, as exports from the region have diminished. Buyers across the world are diversifying their supplier base to assure supply, putting additional strain on global stocks, particularly among the remaining exporters. As result, the already declining stocks of the world's major exporters of corn, soybeans, and wheat are decreasing further. In addition, total global grain and oilseed stock levels are at the top 10% of all time, but much of that is unavailable to the global market. For example, China holds over 50% of the world's wheat stocks. Without Black Sea region exports, prices will remain well supported.

Consequently, Brazil's corn and soybean crops this year have taken on added importance. Last year's La Niña-reduced crop only contributed to the tightness among major exporters' stocks. Early season growing conditions in Brazil have been favorable for crops. In addition, the soybean crop was planted on time, making way for timely planting of the all-important safrinha corn crop next year. However, a third season of La Niña is already creating dryness in Argentina. The market is depending on good Brazilian crops to ease the upward price pressure, but much of the growing season is still ahead.

The high commodity prices of the past two years have given producers outstanding returns and strong working capital positions. But higher commodity prices encourage higher input costs. Analysis shows that producers' margins will be lower in the 2023 growing season than in the past two years, but margins will still be positive. With strong working capital and positive margins, producers will make minimum, if any, cuts to inputs. Their objective is to maximize yields, and that is not accomplished by cutting back inputs, particularly fertilizers.

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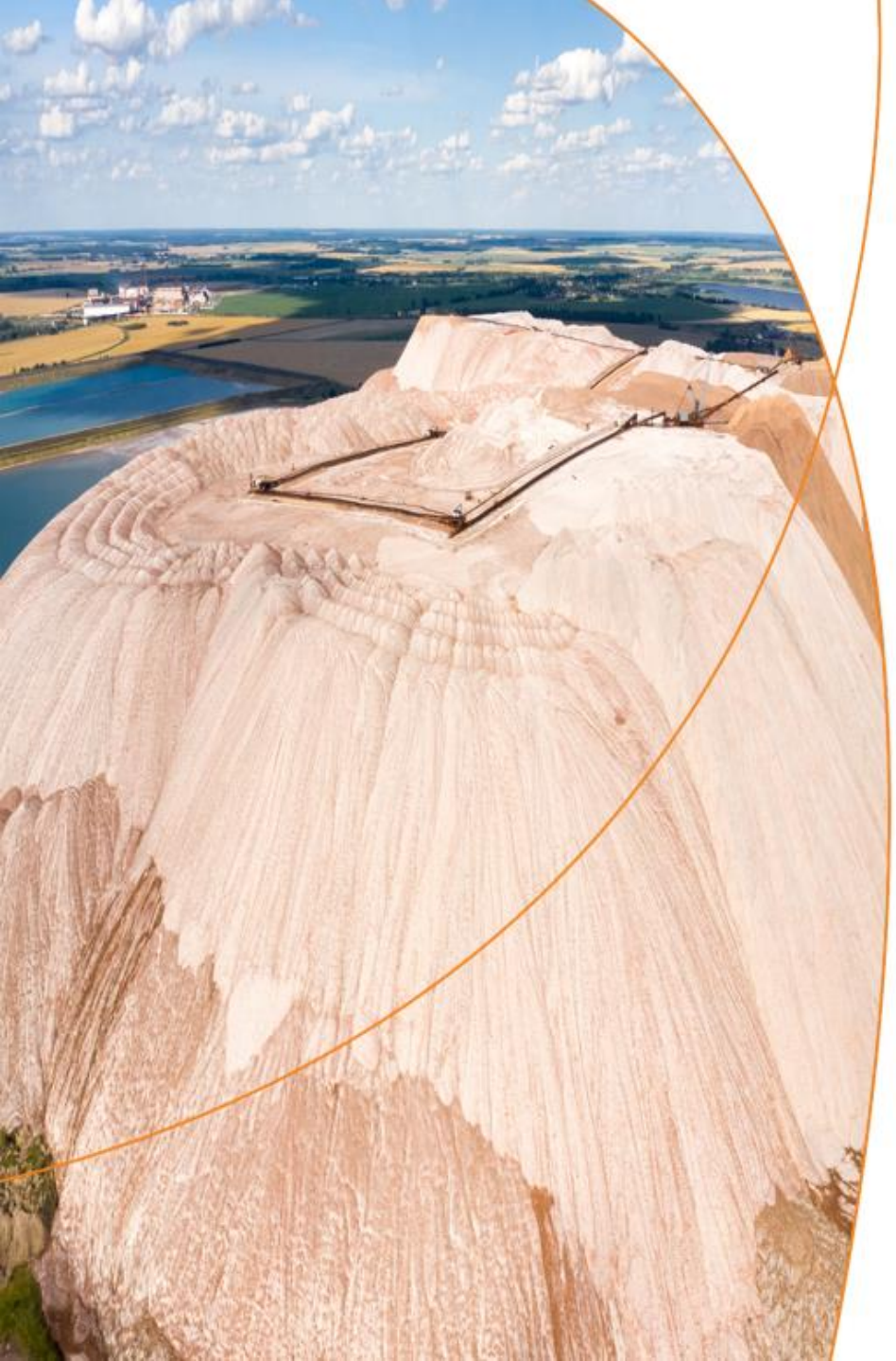


# Nitrogen

## On a rollercoaster with oil and natural gas

The nitrogen-based fertilizer market is the most volatile among all fertilizers due to its intrinsic connection with oil and natural gas markets. Thus, as those commodities become more volatile, urea and ammonia prices are expected to go with the tide. And that is exactly what we saw happen in the weeks that followed the invasion of Ukraine. Oil and natural gas prices soared, as did the prices of urea and ammonia. Since then, prices have decreased, but they remain very volatile. The 2022 annualized volatility of urea prices up to mid-October was above 60% – three times more than the five-year average.

Given the current scenario, we should not expect volatility to decrease anytime soon. Europe's ongoing natural gas crisis is affecting the region's economy, as well as factories' operations, including fertilizer factories. Some numbers in the market indicate that nearly 50% of ammonia factories have shut down or reduced their production rates, and the curtailment of urea production is even more aggressive.

Deep diving into Europe's figures – more specifically, EU-27 figures – we see the region consumes more than 12m metric tons of urea annually, representing 7% of global consumption. Europe's share of the ammonia market is very similar, around 8.5%. Key to understanding the possible impacts is the fact that the region is a net importer of urea, importing nearly 25% of its annual consumption. Hence, it is an important player, ranked among the top importers.

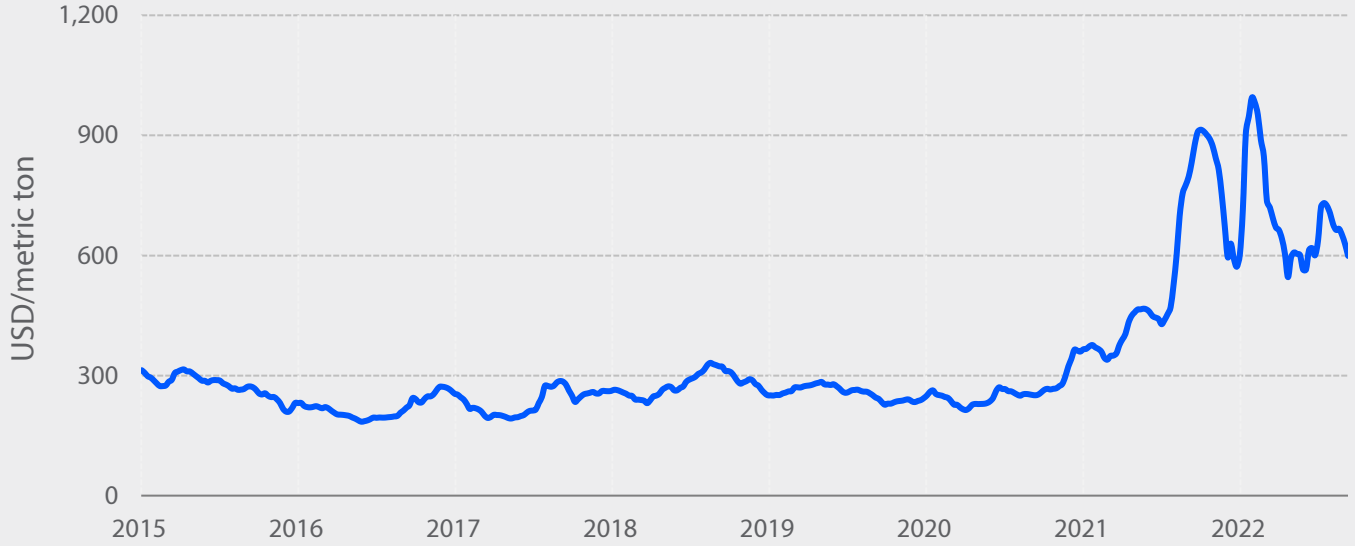
But currently, natural gas prices are falling, and the Dutch TTF reference has declined 60% from the EUR 330/MWh observed in August this year. As prices declined, production started to resume, albeit at a slow pace. Thus, Europe's annual production will decline this year, even if the reduction isn't sizable. This lower production of urea and ammonia in Europe will force the region to raise the amount of product acquired in the global market, which could add pressure to already volatile prices. Yet farmers are currently quite resistant to buying at such high prices.

As long as the natural gas crisis lasts, volatility in the nitrogen-based fertilizer market will persist, with weeks of stronger demand pushing prices higher and weaker weeks pushing prices lower.

# Nitrogen

## Nitrogen fertilizer prices will continue to oscillate in the coming months

*Figure 2: Nitrogen fertilizer prices, 2015-2022*



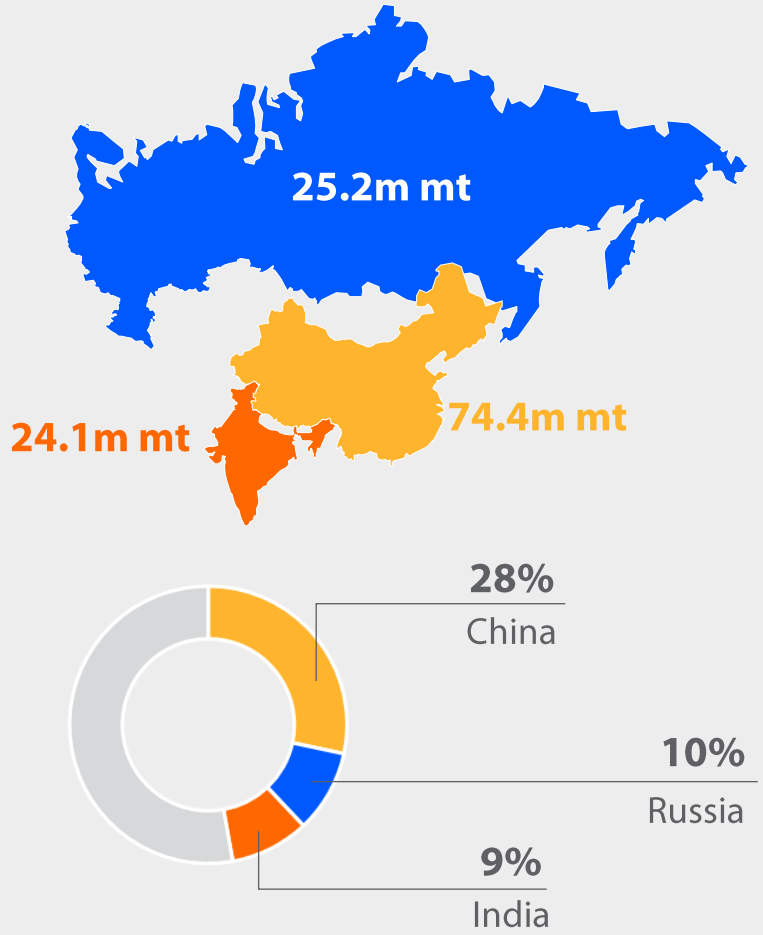

### Price evolution

We expect nitrogen fertilizer prices to continue oscillating in the coming months. Europe's natural gas risks are unlikely to be resolved in the next six months, and they present a volatile variable over the coming period.

### What to watch?

Natural gas in Europe
Russian export duties
Yuzhny ammonia pipeline

**Top 3 producers, 2020**




*Source: CRU, Rabobank 2022*



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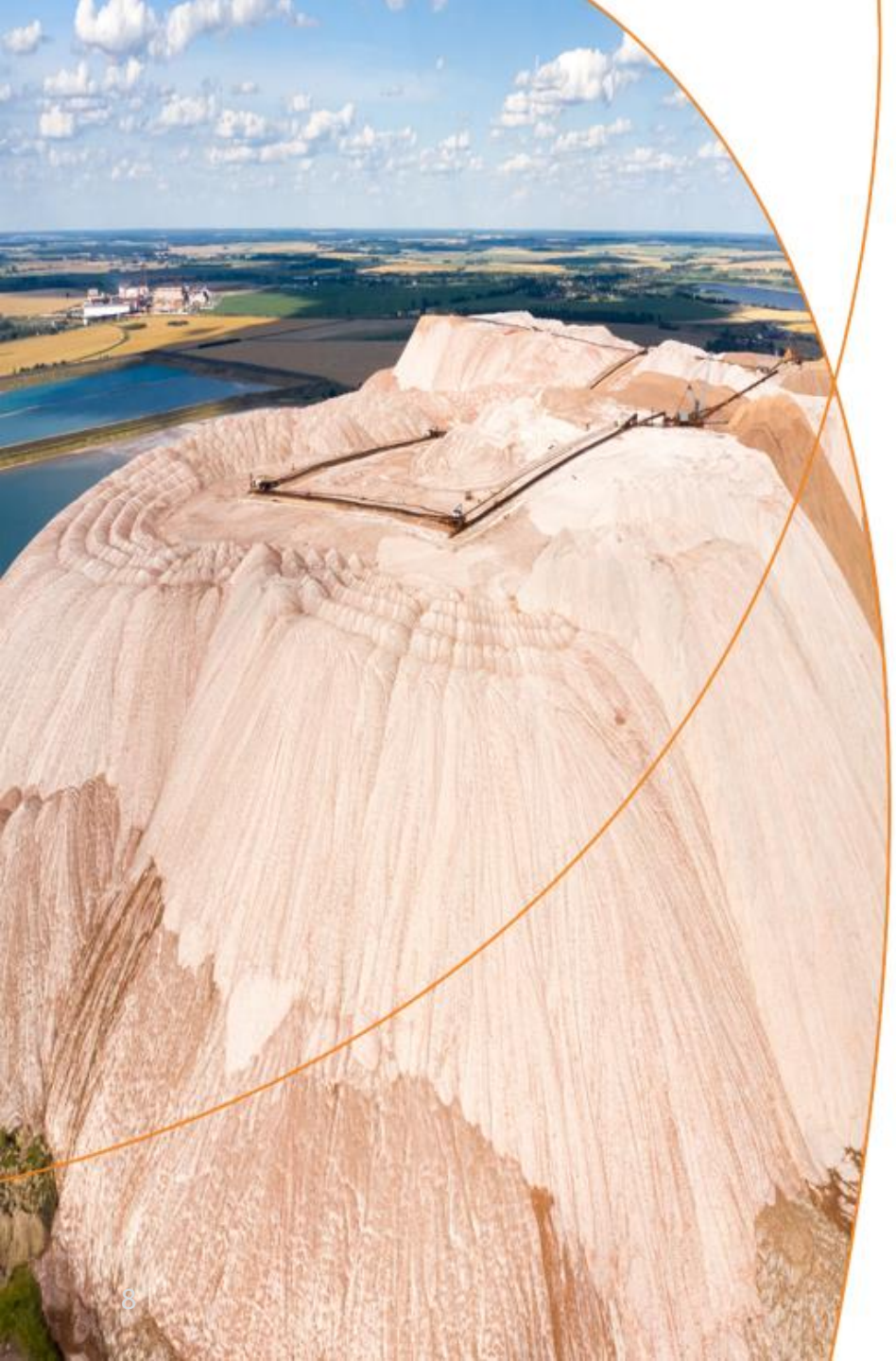


# Phosphate

## A muted market, but still vulnerable to volatility

Phosphate-based fertilizers have, of late, served as the 'middle sibling' of macronutrients. That is to say, phosphates avoid both the scale of potash's visceral physical exposure to Russia and Belarus, and the scale of nitrogen production's direct exposure to natural gas markets. Given this, and phosphate's relative agronomic flexibility, prices in the coming six months may be more indicative of fundamental supply and demand, with (hopefully) less volatility than nitrogen or potash markets.

Directionally, prices seem likely to trend downward over the coming six months. Demand destruction, driven by affordability concerns, seems to have exceeded even the most bearish sentiments through the second half of the calendar year. As the affordability index suggests, we have recently emerged from a decade-plus high in unaffordability, most clearly resembling 2008. At that time, regional demand destruction of 25% was not uncommon. However, this year many countries and regions have seen growers reduce application by more than 30%.

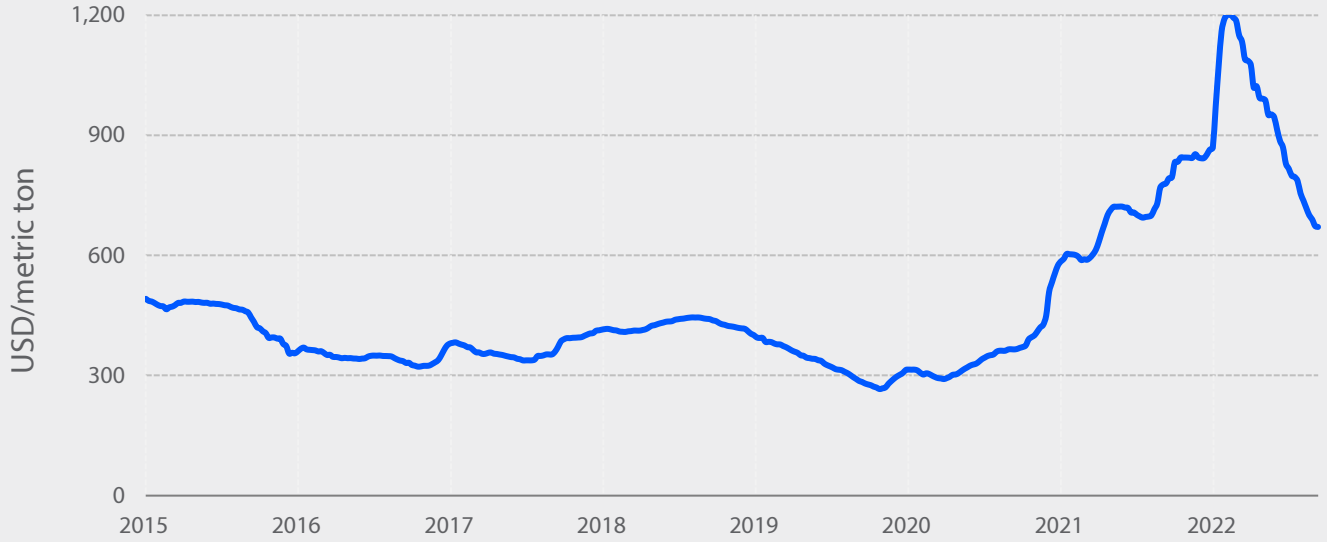
Production costs for phosphate producers may be tamped by the greater near-term availability of natural gas in Europe and by mild weather abating worst-case scenarios for ammonia prices. Sulphur prices, having fallen materially from their summer peaks (more than 50% in many geographies), are forecast to remain at depressed levels. This, combined with the magnitude of demand destruction seen through the second half of the year, could lead to a more favorable environment for growers. Adjusting for seasonality, the sentiment for prices will likely drift downward over the coming months.

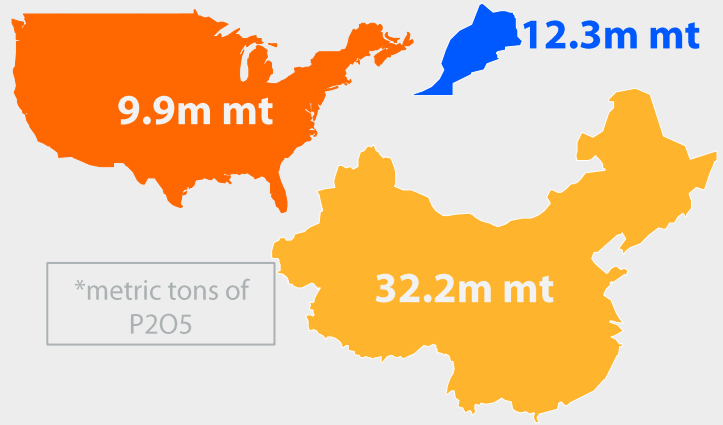
However, some of the most dynamic price moves have been driven by specific needs for product at specific times. Logistics remains a prevailing risk – consider the current malaise on the Mississippi River. Additionally, demand is likely to re-emerge in many regions as fertilizer prices adjust lower. Soft commodity prices are likely to stay at elevated levels through the coming period, stimulating demand from growers. Compressed application windows, resulting from weather, could deliver material volatility in the otherwise muted market.

# Phosphate

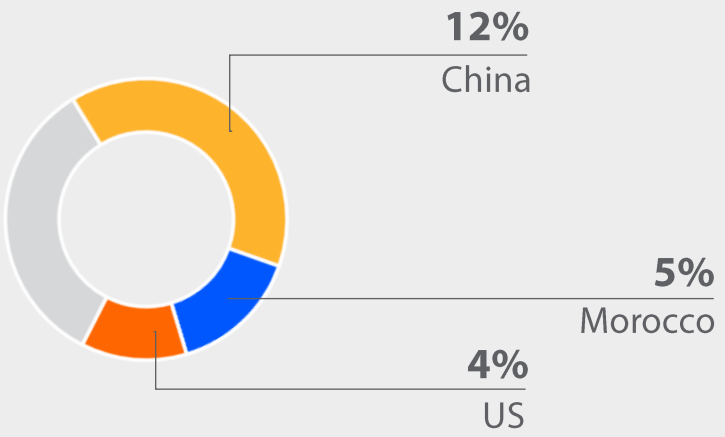
## Prices are trending lower, after earlier highs destroyed demand

*Figure 3: Phosphate fertilizer prices, 2015-2022*




**Top 3 producers, 2020***




### Price evolution

Directionally, prices are trending lower, as demand was destroyed by the high prices observed this year. Still, high production costs should prevent big decreases in prices.

### What to watch?

Sulphur prices
Ammonia prices
Evolution of the natural gas crisis

*Source: CRU, Rabobank 2022*



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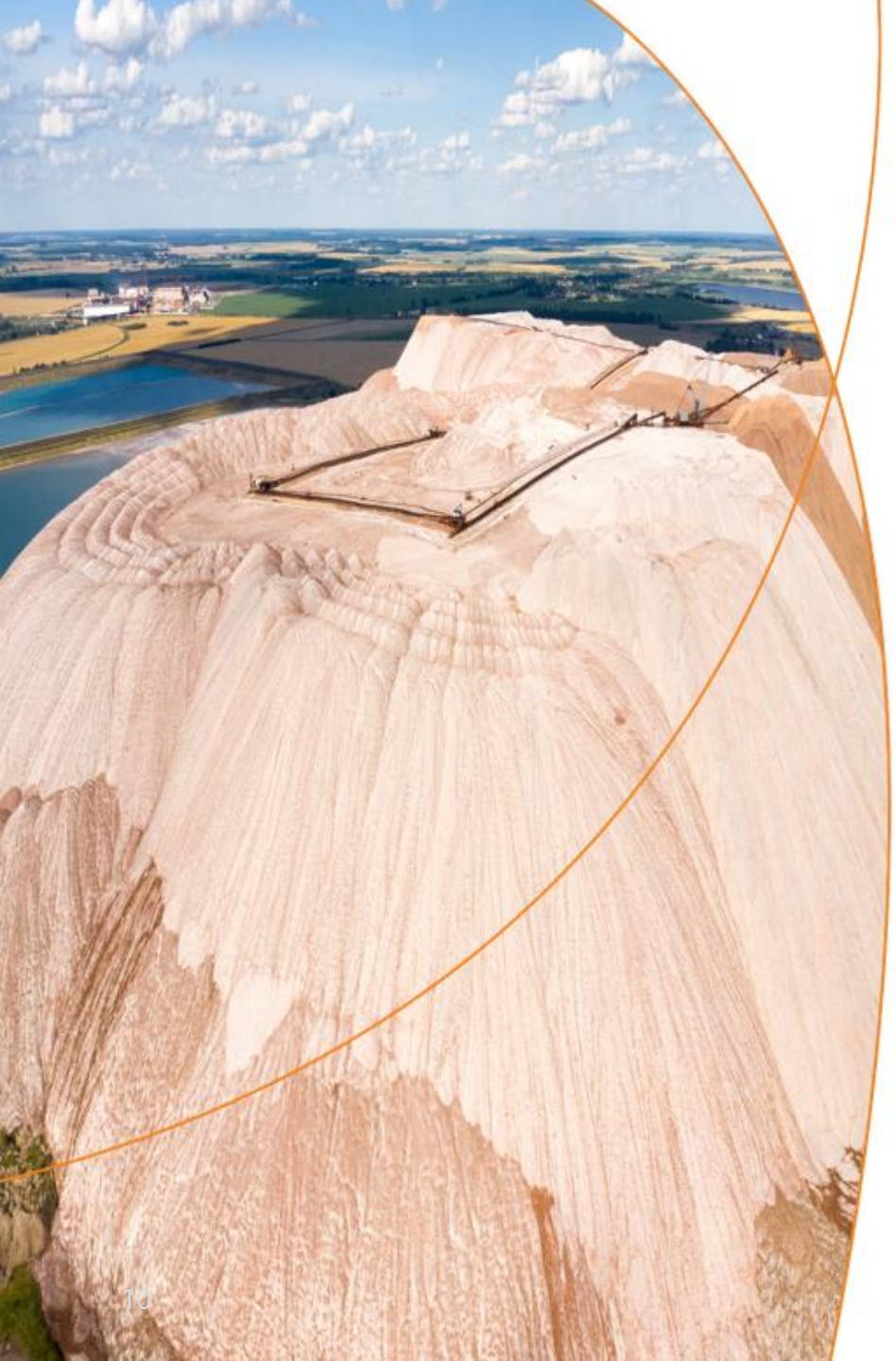


# Potash

## Have we been here before?

To a certain extent, the current scenario in the potash market somewhat resembles 2008/09, but there are important differences. In 2008, we saw soaring potash prices and collapsing commodity prices in the middle of a global economic crisis. In the case of soybeans, CBOT prices dropped more than 30% from the average observed in the three months before the crisis began and remained at that level for quite a long period. Lower demand in the global potash market pushed big players to partially reduce their operations, leading to a major decline in global supply. According to International Fertilizer Association data, production in 2009 dropped around 40% compared to 2008. The diminished supply extended the period of elevated potash prices.

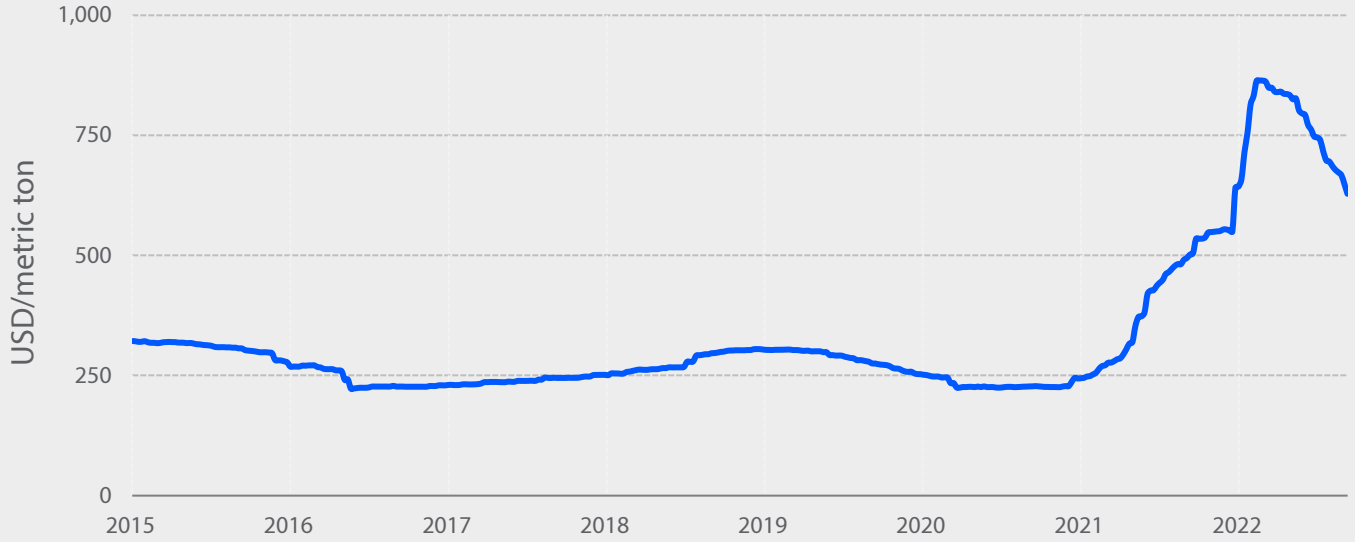
Now, back to 2022. One main difference is clear: commodities prices. Using soybeans as an example, one can see that, even though prices fell from their April peak, CBOT prices remain at a very good level compared to historical prices. As in 2008, potash prices have become so expensive for farmers, it has partially destroyed demand. The sluggish demand has pressured suppliers to keep lowering prices. In Brazil, one of the main destinations, prices soared and reached a new record of USD 1,200/metric ton CFR. Since then, prices have entered a downward trend, in some cases declining more than 50%. Although potash has arrived at Brazilian ports below USD 600/metric ton CFR, the price reduction is still not enough to revive demand. This is happening in other places too.

So, what can we conclude? Even though potash price movements this year are very similar to those of 2008, prices will ultimately spend a lot less time at a very high level in 2022 than they did in 2008. And this makes a big difference, especially when combined with good commodity prices. Once prices get closer to 1H 2021 levels, we will see demand pick up and return to trend. On the supply side, despite all the sanctions imposed on Russia and Belarus, they continue to export to 'friendly' countries, which means that global supply was not affected.

# Potash

## Potash prices move lower to regain demand

*Figure 4: Potash fertilizer prices, 2015-2022*

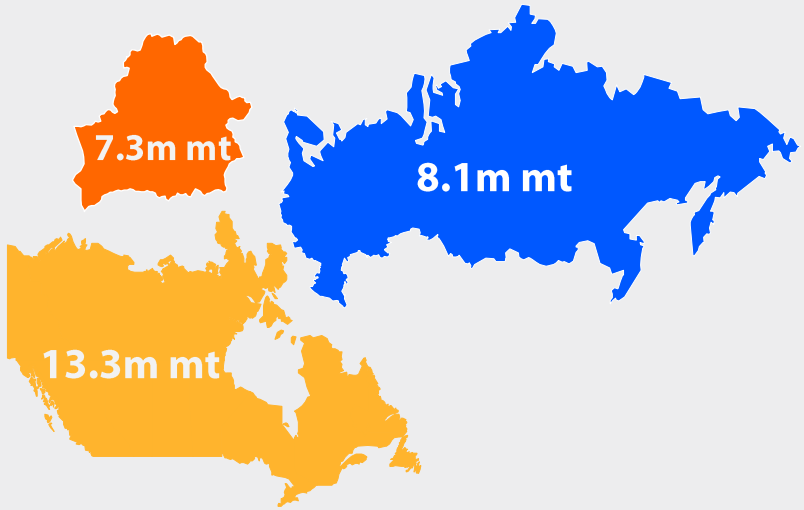



### Price evolution

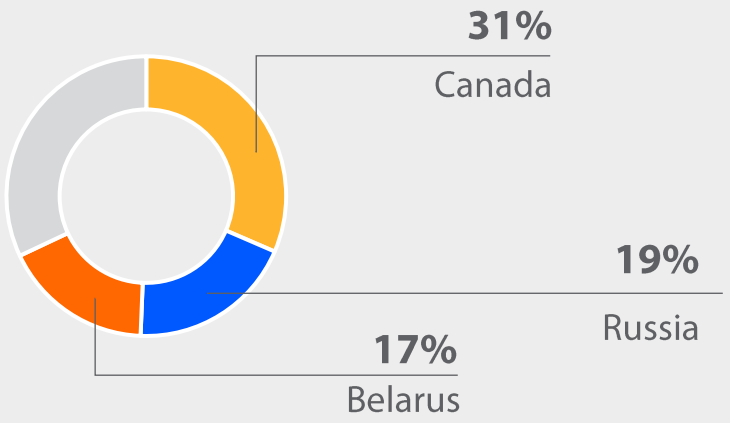
The spike in the potash market destroyed demand. Now, prices are moving lower to regain that demand. The continuation of exports from Belarus and Russia is resulting in a rearrangement of global supply, further pressuring prices.

### What to watch?

Exports from Russia and Belarus
Chinese contract negotiations
Russian export duties




**Top 3 producers, 2020**




*Source: CRU, Rabobank 2022*



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# Regional Outlooks



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Vitor Pistóia, Analyst – Farm Inputs
Vitor.Cacula.Pistoia@rabobank.com


Australia's heavy reliance on imported fertilizers, especially urea, potash, and monoammonium phosphate, means global turmoil and market volatility will continue to factor heavily into the local fertilizer market. Import factors, including still volatile bulk freight rates, the Australian dollar's ongoing weakness, and Australia's smaller market size, mean we expect local fertilizer pricing to remain less competitive into 2023 regardless of the underlying global market price movements. In addition to this, domestic freight and logistics constraints are unlikely to be unwound in 2023, meaning that farmers will again be facing a well-above-average cost for crop nutrients in 2023.

Australia is on track to harvest its third consecutive year of well-above-average crop production in the coming months. This will shape the country's fertilizer demand for the balance of 2022 and 2023. It also means that, as farmers determine their fertilizer needs for 2023, the majority should have favorable cash flow from above-average margins and that, given strategies to manage high fertilizer costs this past year, they will need to replenish soil nutrients. This strong demand picture will, however, be dampened by caution in expectation of what would be an unprecedented fourth year of superior seasonal conditions in 2023/24.

These factors, on balance, support a reasonably buoyant market outlook and a continuation of early purchasing for planting needs as a whole, but also (potentially) a skewing of urea volumes toward in-crop application. Uncertainty regarding access to global supplies across the nutrient complex, specifically in relation to monoammonium phosphate given China's export constraints, further supports earlier purchasing and upside risk in pricing.

Bruno Fonseca, Senior Analyst – Farm Inputs
Bruno.Fonseca@rabobank.com


During 2022, the main question on Brazilian farmers' minds was: Is it better to pay more for fertilizer than not have enough? In the weeks following the invasion of Ukraine, fertilizer prices soared, with some prices setting new record highs. The fear of tightened supplies and the obligation to assure fertilizer for the season forced many producers in Brazil to purchase fertilizer despite soaring costs. But attractive soybean prices at that time eased the situation. Anticipating high domestic demand for 2022, Brazil managed to import 19.2m metric tons of fertilizer during the first six months of the year, 20% more than in 2021. But the import pace slowed in July/August, and the difference in accumulated imports decreased to 10% above 2021 volumes. In this high-stock scenario, some companies began discounting their prices to clear warehouses for new volumes. Some places even began offering volumes at prices below the international parity.
However, fertilizer volumes delivered to final consumers by the end of August showed that not all farmers were able or willing to pay. Based on reports published by the Brazilian National Fertilizer Association, volumes distributed up to the end of August were 10% below the same period in 2021. The reported lag appears in regions that plant soybeans late in the window. This delay can be recovered, but it already provides a good hint about what could happen to yearly consumption figures. Though distribution lags 2021, the forecast for an even greater planted area in 2022 suggests total consumption will not see a sizable reduction. A large decrease in the usage rate per hectare could produce such a reduction, but that would negatively impact potential yields, which, in a year with good prices, would hurt farmer revenues.

Lief Chiang – Senior Industry Analyst
Lief.Chiang@rabobank.com


The Chinese government has maintained tight control of fertilizer exports for the purposes of prioritizing local use, limiting export quantities, weighing down domestic prices, and reducing exposure to volatility in international markets. Markets expect that the restrictions will last until April 30, 2023. Consequently, Chinese fertilizer exports will remain low for the next six months.

In the domestic market, rising coal prices are adding cost pressures for Chinese nitrogen fertilizer companies. Margins of local anthracite-based urea companies are close to or even below breakeven points. Nitrogen fertilizer prices will continue to rebound in the coming months.

Lower raw material costs triggered sizable price declines of phosphate fertilizers from previous highs. Prices of sulphur, a key feedstock in the manufacture of DAP/MAP, plummeted by over 70% in July, but registered modest rebounds in recent months. By contrast, prices of synthetic ammonia and phosphate rock are more resilient. Looking ahead, further downside potential for domestic phosphate fertilizer prices will be limited.

Unlike nitrogen and phosphate stocks, China's potash supply is highly dependent on foreign markets, with 50% coming from imports. Previously, high potash prices led to demand rationing, as farmers and compound fertilizer companies lowered the adoption rate of potash. China's 2023 potash import contract price is likely to be signed in Q1 or Q2 next year. It is widely projected that the new contract price will fall by at least 20% from 2022's USD 590/metric ton CFR.

Chia-Kai Kang, Analyst – Farm Inputs
Chia-Kai.Kang@rabobank.com


The fertilizer outlook for the EU in the coming months is a mixed story of availability, affordability, and sustainability. The EU is facing high natural gas prices, as Russia cut off supply due to the war in Ukraine. As a result, ammonia and downstream nitrogen production costs are uneconomical, and the gap between cost and prices is significant. Around 50% of ammonia production facilities are currently shut down, and more capacity is likely to be shuttered if prices remain elevated. With capacity unlikely to restart unless the economics or governments incentivize production, these closures will lead to a reduction in nitrogen fertilizer production. To fill the gap, the EU has to import from other regions, which increases its carbon footprint and conflicts with environmental policies.

In 2022, summer crop yields were heavily reduced by unusually hot and dry weather conditions, with corn (-20.1%), sunflowers (-1.67%), and soybeans (-4.24%) all falling below their five-year averages. However, the hot and dry conditions benefited winter crops, which saw a slight improvement in harvested volumes. Reduced yields and higher crop prices will influence fertilizer demand in the coming six months.

To ensure the availability and affordability of fertilizers in Europe, the European Commission has encouraged member states to provide targeted financial support to farmers and fertilizer producers. Under the reformed common agricultural policy, EUR 450m will be reserved in 2023 for exceptional measures to aid farmers affected by high input costs. Nevertheless, in general, we expect less affordability. With increasing fertilizer prices plus national and EU environmental regulations, consumption of fertilizers (N, P, and K) is forecast to decline about 2% to 3% in the EU.

Samuel Taylor, Senior Analyst – Farm Inputs
Samuel.Taylor@rabobank.com


Fertilizer purchasers have likely aged significantly in the last year given the slew of factors driving markets. In the latest development, low water levels in the Mississippi River are hampering barge transport upriver and widening the spread between New Orleans coastal and in-market prices. This may spark concerns around supply shortages heading into 2023. However, we do not believe that supply shortages will prove to be the case. After peaking immediately following the Russian invasion of Ukraine, a North American fertilizer price index fell ~30% as markets adjusted to seasonality and supply. We expect this trend downward to persist over the coming months.

High prices in global P and K markets have been met with significant demand destruction, easing the shortfalls in global supply and trade resulting from the conflict. Prices have reverted from the highs observed in the early days of the war, and we expect this momentum in global markets to help pull down inland pricing over the coming months, potentially to the tune of 15% and 25% on P and K respectively. (This deflation could be tamped down by any worsening of river/rail logistics or the conflict.)

Nitrogen pricing risk remains to the upside, given the global energy complex. However, with European natural gas prices 'abating,' global demand for industrial products falling, and better supply anticipated, pricing of nitrogen over the coming six months could become weaker, with in-market pricing playing out flatter than previously feared. On the other hand, weather, logistics, and energy prices could yet form a vortex to adulterate this view.

# *RaboResearch Food & Agribusiness*

## Global Farm Inputs Team


South America
**Bruno Fonseca** (Lead Author)
Senior Analyst
Bruno.Fonseca@rabobank.com

**Stephen Nicholson**
Global Strategist
Stephen.Nicholson@raboag.com

**Cindy van Rijswick**
Global Strategist
Cindy.Rijswick@rabobank.com

North America
**Samuel Taylor**
Senior Analyst
Samuel.Taylor@rabobank.com

China
**Lief Chiang**
Senior Analyst
Lief.Chiang@rabobank.com

Europe
**Chia-Kai Kang**
Analyst
Chia-Kai.Kang@rabobank.com

Australia
**Vitor Pistóia**
Analyst
Vitor.Cacula.Pistoia@rabobank.com

Europe
**Doriana Milenkova**
Analyst
Doriana.Milenkova@rabobank.com