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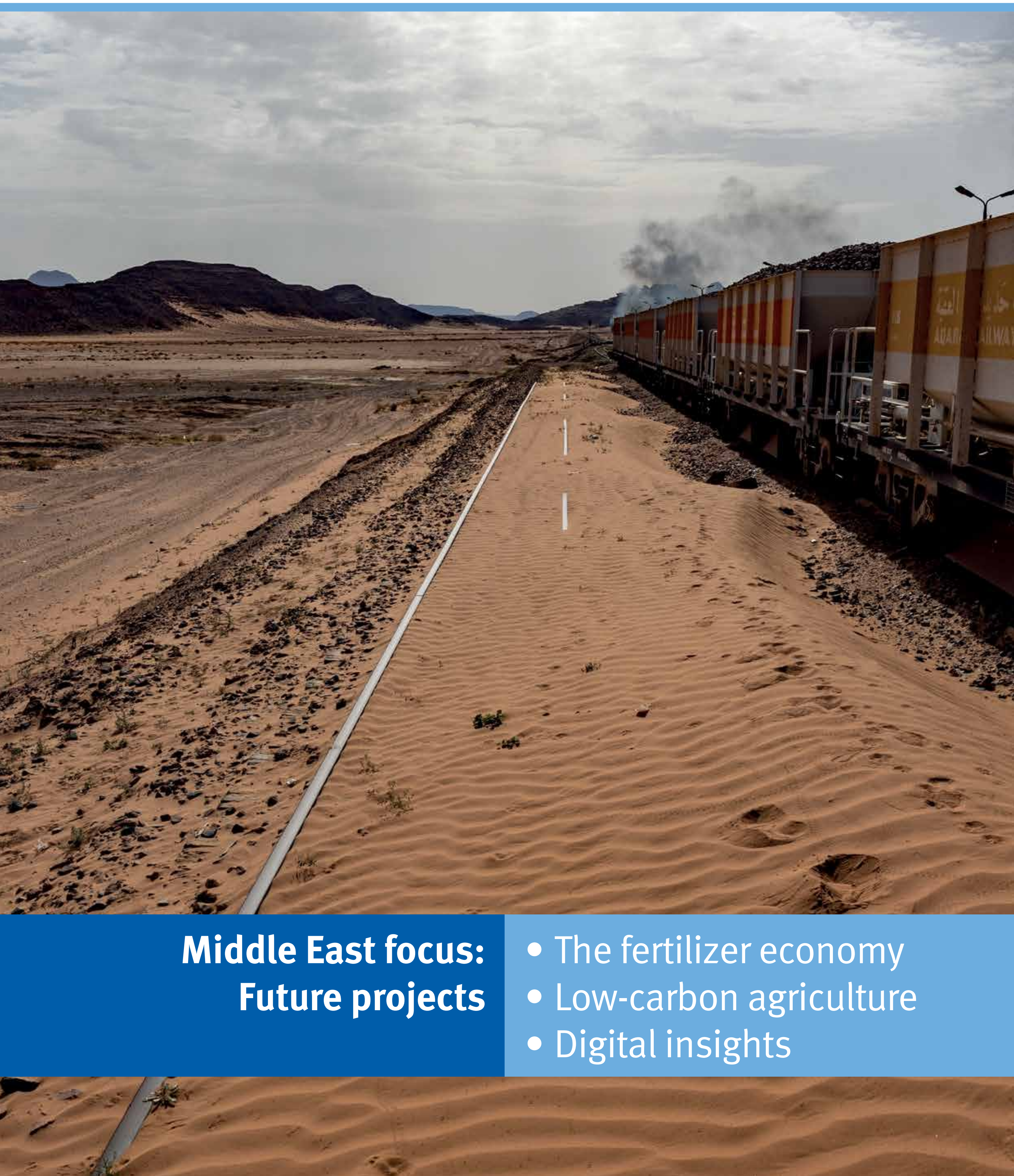
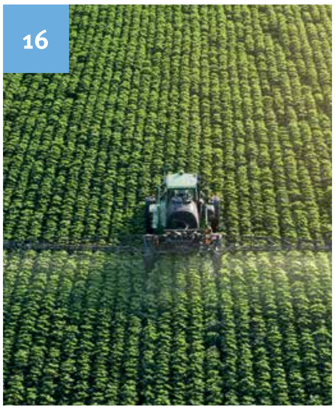
Fertilizer Focus



Middle East focus:
Future projects

- The fertilizer economy
- Low-carbon agriculture
- Digital insights



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Investment in knowledge

Written by
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Welcome to the July/August 2024 edition of Fertilizer Focus! In this issue, Stamicarbon offers an insight into digital technologies for enhancing plant efficiency. With the ability to use complex models that account for various processes, physics, and thermodynamic conditions, plant owners can employ a sophisticated tool for transforming data into knowledge. As the global demand for fertilizers continues to grow, these technological innovations are crucial in helping the industry reduce its environmental impact while improving productivity.

We have a special focus section on the "fertilizer economy". Firstly, Rabobank tackles the expansive subject of fertilizer market opportunities for investors. He suggests there are plenty - particularly those in private equity with the appetite for greater risk.

The Brazilian investment sector is also discussed by EMBRAPA and the Brazilian Ministry of Agriculture and Livestock. The fertilizer sector in Brazil faces complex challenges and opportunities, emphasizing the need to prioritize sustainability and autonomy in input production. They say that to ensure the effectiveness of Brazil's National Fertilizer Plan, strategic investments in sustainable infrastructure and policies are essential.

There is also a supplement focus on the Middle East. The GPCA takes a look at the evolving patterns in GCC nitrogen investment strategies. There are significant opportunities for the nitrogen industry to expand into new markets and applications. The evolving market dynamics, regulatory landscapes, and the emphasis on sustainability are reportedly driving transformative shifts in investment strategies.

The Phoenix Vision Consultant Group then discuss the future prospects in the Middle East, which plays a significant role in the global agricultural sector. With its abundant natural resources, strategic location, and ongoing investments in technology and infrastructure, the region is well-equipped to meet the growing global demand for nitrogen- based fertilizers. While challenges exist, the future looks promising for the Middle East's role in this critical market.

Please also take time to read through the event preview for the Argus Fertilizer Europe 2024 conference, which always proves to be a success every year. The conference returns for its 36th year and will be held in Athens, Greece, renowned for being Europe's shipping capital which links eastern and western markets.

We are also featuring the final chapter of Michael Freeman's second volume on the "*History of the modern mineral fertilizer industry*". Look out for volume 3 in the forthcoming editions!

I hope you enjoy the issue. ■

History of the modern mineral fertilizer industry
Volume 2: 1900-1950 (Part 6)

Consolidation in the UK and advancements in Japan

In this final instalment of a six part series, Michael Freeman discusses market developments in the UK and the progression of the industry in Japan. (Please refer to all editions of Fertilizer Focus in 2022 for volume 1 covering the origins of the fertilizer industry)

United Kingdom/Great Britain

In the second half of the 19th century, Britain was in the vanguard of the introduction of mineral fertilizers for use in farming. Industrial-scale production of single superphosphate (SSP) was started in the 1840s by John Lawes, who went on to found an agricultural research station on his Rothamsted estate, initiating long-term trials to demonstrate the impact of mineral fertilizers and publishing the results. Funds from the London capital market played a key role in the development of the South American trade in guano and nitrates. Recognition of the value of certain industrial by-products resulted in the introduction of ammonium sulphate and of basic slag as fertilizers. However, when Sir William Crookes spoke about the need to develop an industrial fixation process for nitrogen, the challenge was taken up in Germany, resulting in the Frank-Caro process for calcium cyanamide and the Haber-Bosch process for ammonia.

At the start of the new century the UK was producing some 500,000-600,000 t/y single superphosphate and was the world's fourth largest producer after the USA, France and Germany. There are no annual statistics for SSP until 1905, when the UK's share of world SSP production was 12%. UK production of basic slag for sale was around 250,000 t/y, of which more than one half was exported, mainly to Germany. The by-product, ammonium sulphate (AS), was around 200,000 t/y of which 85% was exported, as British farmers preferred Chile nitrate.

Annual production of SSP peaked at around 900,000t in the years leading up to WWI and exports amounted to 150,000 t/y. In the two decades after the end of the war, SSP production fell back to 500,000-600,000 t/y and producers in the UK faced the challenge of surging imports that peaked at 205,000 t in 1927. There was already a supply surplus and this was aggravated by the impact of the economic recession on fertilizer demand in the early 1930s. One result was a move to consolidation, in which Fisons was a major player, having merged with Packard and Prentice in 1929 it went on to acquire forty smaller companies, closing down old, inefficient factories and replacing them with large plants with capacity to make granular SSP - for example at Ipswich (80,000 t/y) in 1934 and Avonmouth (60,000 t/y) in 1935. Imperial Chemical Industries (ICI) had been active in Scotland in 1928, buying several small fertilizer operations to form Scottish Agricultural Industries.

Consolidation

ICI had been founded in 1926 by the merger of four UK chemical companies, following the creation of IG Farben in the previous year, but on a smaller scale. The merged companies included Brunner, Mond & Co. which had taken over the Ministry of Munitions' wartime project to build a synthetic ammonia plant at Billingham. The first viable plant was commissioned in 1924 with capacity for 8,000 t/y ammonia, using technology based on the Haber-Bosch process that had been obtained indirectly as BASF had not wanted to provide unconditional assistance to a potential competitor. When the initial plant was running successfully, it was expanded in stages so that by the mid-1930s its capacity had reached 300,000 t/y, which was used to make ammonium sulphate, calcium ammonium nitrate (Nitrochalk) and ammonium phosphate, as well as ammonium nitrate for explosives.

The threat of another world war caused the UK government to negotiate with ICI to build four more ammonia units

The rush across Europe, North America and Japan to build ammonia using the new processes led to an oversupply situation that IG Farben proposed to resolve by forming a nitrogen (N) fertilizer cartel. Initially in 1929, this took the form of the DEN group, of which ICI was a member, together with German and Norwegian producers. This was expanded in the following year to include a number of other countries so that the cartel represented more than two thirds of world nitrogen supply. This relationship, which remained in place until the end of the 1930s, gave ICI rights to sell its N fertilizers in certain markets. As the uptake of synthetic AS by British farmers had been low, ICI made a big effort to promote N fertilizer use in the countries of the British Empire, but had limited success.

The threat of another world war caused the UK government to negotiate with ICI in 1936 to build four more ammonia units to support munitions manufacture at locations that would be safer than Billingham from enemy attack. This resulted in plants being established at Mossend (1939), Dowlais (1940), Heysham (1942) and Prudhoe (1943) that almost doubled the national capacity for ammonia.

The ammonium phosphate produced by ICI at Billingham from ammonia and phosphoric acid was the basis for a new range of Concentrated Compound Fertilizers (CCFs) containing higher levels of nutrients than the NPK mixtures that were the conventional products in the UK market. The average nutrient content of ICI's 1931 range of CCFs was 30% which was, however, less than the average 54% nutrient content of BASF's Nitrophoska range that had been advertised a few years earlier. Fisons in 1937 invested in an Eirich mixer to make granular NPKs, but not having access at that time to ammonia or phosphoric acid it could not make high-grade formulations.

Market dominance

ICI and Fisons were the dominant companies in UK fertilizer supply and their positions became stronger after WWII. This led to concerns about possible abuses of their market power and led to a reference to the UK Monopolies Commission in 1955. The resulting report identified the market

Table 1. Market shares of principal UK sertilizer suppliers in 1957/58

Imperial Chemical Industries Ltd	74% of nitrogen fertilizers
Fisons Ltd	43% of superphosphates
	40% of basic slag
	43% of compound fertilizers
British Basic Slag Ltd	37% of basic slag
Potash Ltd	76% of potash fertilizers

Source: Monopolies Commission Report on the Supply of Chemical Fertilizers, 1959

After the war, the Soil Association was founded in 1946 to promote organic farming

shares of the main suppliers (see table 1), but concluded that neither ICI nor Fisons had operated against the public interest.

In 1951 Fisons expanded its phosphoric acid capacity at Immingham as the basis for making TSP and higher-grade NPKs. Later in the decade it secured an ammonia deal with Shell and then persuaded ICI to build a 200,000 t/y ammonia plant at the Immingham site to meet its needs there.

In view of the UK's important role at the start of the 19th century, it is perhaps not surprising that it should also have been a contributor to the reaction against mineral fertilizers a century later. The concepts of fertilizer-free farming were developed in the 1920s by, among others, Albert Howard in India, and separately by Rudolf Steiner in central Europe. Howard, an agricultural scientist, was employed as a researcher in India, where he developed the 'Indore Method' for making compost for use by Indian farmers unable to afford the new chemical fertilizers. This became a basis for maintaining the humus content of soils, hence the term "humus farming".

Steiner, the Austrian polymath, formulated the concept of biodynamic farming in a series of lectures given in 1924 to a group of Silesian farmers who were concerned about the negative impact of N fertilizers on soil quality. In the UK, a book on biodynamic farming was published in 1940 by Lord Northbourne in which he introduced the term "organic farming". Around the same time, Lady Eve Balfour started the Haughley Experiment on her farm in eastern England that compared organic farming favourably with conventional methods, but her trials lacked the scientific rigour that characterised Gilbert's work at Rothamsted. Despite this appearance of interest in farming without modern fertilizers, the exigencies of the war years dictated the use of any available fertilizers to maximise yields. After the war, the Soil Association was founded in 1946 to promote organic farming and to set standards for it, but another thirty years passed before it began to be taken up more widely in the UK, across continental Europe and North America, but even after some growth it still accounts for a small proportion of the land under cultivation in these regions.

Japan

In the mid-19th century night soil was used to maintain soil fertility in Japan, as in the rest of East Asia, where the general absence of meat and other animal products from diets meant that farmyard manure and abattoir wastes were not available for this purpose. Over the following decades, as Japan opened up to Western influences, there was considerable interest in the use of mineral fertilizers and in the way they were supplied.

The Ministry of Agriculture tried to promote the use of mineral fertilizers by Japanese farmers, but the conservative and poorly-educated peasants were mostly unwilling to try new products. At the start of the new century, just 10-15% of all of the commercial fertilizers being consumed were in the form of mineral fertilizer products, i.e. single superphosphate (SSP) from domestic production, ammonium sulphate that was mostly imported, as well as some imports of Chile nitrate. The majority of commercial fertilizer consumption was organic products such as fish meal, soya bean meal and oil-seed rape cake.

The first superphosphate plant in Japan was brought on stream in 1886 by Ryusan Seiojo at Osaka, and was soon followed by Toyo Jinzo Hiryo (later Dai Nihon Jinzo Hiryo, and then

Noguchi, Shitagau (1873-1944)

Educated as an electrical engineer, Shitagau Noguchi became heavily involved in setting up the nitrogen fertilizer industry in Japan. Initially this involved adopting the German Frank-Caro process in a factory linked to his hydroelectric power plant at Minamata. Nihon Chisso Hiryo (Nichitsu) was founded in 1908 by Noguchi to run his fertilizer operations, and a second larger plant was brought on stream at Kagame in 1915.

When Noguchi became aware of the developments in ammonia techonology that were happening in Europe, he moved quickly to secure rights to the Casale process, which he used for an ammonia plant at Nobeoka that was completed in1923 as the basis for ammonium sulphate production, maintaining Nichetsu's position as Japan's biggest producer of N fertilizers. This was followed a few years later by a project in Korea, then a Japanese colony, where Noguchi built Asia's largest ammonia plant as part of a fertilizer and chemical complex at Konan (Hungnam). Completed in 1930, the Chōsen Chisso plant began to deliver N fertilizers to Korea and Japan, as well as to other markets.

Noguchi died in 1944 and his company was broken up after the war. The fertilizer side later became Chisso Corp., and today is JNC Corp.

Japanese thatched roof building of Ainu on the island Hokkaido, Japan, circa 1890-1900

Nissan), and many others. There are no statistics for these early years and the first estimates of SSP production were done for 1905 when ISMA calculated that 150,000 t SSP were produced in Japan; this total rose rapidly to exceed 500,000 t in the period before the outbreak of WWI. The number of SSP producers in Japan expanded from 11 in 1898 to 159 in 1907. Dai Nihon bought up many of the smaller operators, becoming Japan's biggest producer with a 60% share of the market, retaining this position with more acquisitions after the war

Ammonium sulphate emerged as the other important mineral fertilizer in Japan, as Chile nitrate was unsuitable for use on paddy rice. By-product AS recovery was started by a couple of producers of town gas around 1900, and was followed by a few others, but the total level of national AS output remained below 10,000 t/y until the start of synthetic AS production, which developed in Japan in an unusual way. Shitagau Noguchi, an entrepreneur, travelled to Germany in 1907 to purchase rights to the Frank-Caro calcium cyanamide (CCN) process, having obtained financial support from Mitsubishi. His Nihon Chisso Hiryo company (Nichitsu) started producing CCN fertilizer at Minamata in 1908. However, CCN proved to be unpopular with farmers, and Noguchi modified his plant to convert CCN into AS, which was more acceptable. He then built a second bigger CCN/AS plant at Kagami which came on stream in 1915. Another small company, Denki Kagaku (Denka) commissioned a similar plant in 1915, and these two dominated Japanese AS production until the late 1920s.

Ammonia technology

The next stage of development for Japanese AS production was after WWI when Japanese industrialists started to investigate the feasibility of using the new ammonia technology developed in Europe as the basis for building more AS capacity. A consortium that included representatives from the three big zaibatsu companies studied a project based on the Haber-Bosch process, to which they had access, but concluded that the high capital cost made it too great a risk. Meanwhile, two smaller companies – Suzuki and Nichitsu – took chances on different ammonia processes that were still being proved. Suzuki Shoten built an ammonia plant at Hikoshima using the Claude process which came on stream in 1925 with capacity to make 15,000 t/y AS. The

Table 1. Japan: Production of chemical fertilizers ('000 tonnes)

	1912	1920	1930	1940	1950
AS	7	80	265	1,111	1,501
CCN	5	87	228	224	426
SSP	443	509	957	1,639	1,389
Compounds	-	-	82	172	43
others	3	5	5	9	73
TOTAL	**458**	**681**	**1,538**	**3,155**	**3,432**
- N content	3	34	107	286	404
- P_2O_5 content	80	92	179	309	264

Sources: Ministry of Agriculture & Forestry, author's calculations (nutrient contents)

The first superphosphate plant in Japan was brought on stream in 1886 by Ryusan Seiojo at Osaka

company went bankrupt in 1928, giving Mitsui the opportunity to buy it and become a producer of fertilizer nitrogen. However, Japan's first producer of synthetic ammonia was Nichitsu, which bought rights to Casale technology in 1921 and used it for an ammonia plant at Nabeoka that came on stream in 1923 with capacity for 12,500 t/y AS that it immediately decided to double, following it with a 60,000 t/y AS plant based on ammonia in Minamata. In a remarkable move, Noguchi set up a fertilizer company in Korea, then a Japanese colony, to build capacity for ammonia and 400,000 t/y AS at Konan (Hungnam) that would supply fertilizers to Korea and Japan, as well as having AS available for export. This Chōsen Chisso plant, which was completed in 1930, was one of the biggest AS plants at the time, added to Japanese concerns about over-supply, because there were more projects in the pipeline and the demand for fertilizers was depressed. Negotiations between representatives of the Japanese zaibatsu and the European cartel in 1930 resulted in a draft agreement to control AS supply and prices in Japan, but fierce opposition from Japanese farmers prevented its implementation, leading the government to recommend that Japan's farm cooperatives should take a bigger role in purchasing and distributing fertilizers. The producers set up the Ammonium Sulphate Distribution Agency in 1932 and continued to expand, supplying the strong growth in domestic demand for AS and building up exports.

Food shortage

In the course of the 1930s the annual production of SSP and AS, the two main fertilizers consumed in Japan at that period, grew rapidly to exceed 2 mn t and 1 mn t respectively by the end of the decade. Japan's involvement in WWII brought negative changes for industries, especially those dependent on imported raw materials. In the pre-war period SSP producers obtained 45-50% of their phosphate rock needs from Pacific island sources and 30-40% from long-haul sources, mostly the US and Egypt. The latter stopped delivering in 1942 and shipments from the islands were impeded by the war, with the result that SSP production fell back, eventually to a few thousand tonnes in 1945. AS production was impacted by the war economy and declined by 1945 to one quarter of its pre-war level.

When SCAP, the allied powers administration, took over after the surrender, it had to consider how to deal with the food shortage and the threat of famine in Japan. One of SCAP's priorities was to maximise fertilizer production and to arrange for imports of fertilizers to supplement the local supply, which had also been depleted by the loss of deliveries from Korea, now no longer a colony. Japanese fertilizer production levels reached pre-war levels at the end of the 1940s with SSP and AS still the main products, joined in 1948 by urea which Toyo Koatsu began producing in a new factory at its Sunagawa site. In the following decade, Japan appeared to be the world's biggest producer and consumer of urea fertilizer, but the amounts were very small by today's standards. ■

Digital insights for enhancing plant efficiency

Written by

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Digital technologies have revolutionized the performance and efficiency of industrial operations, opening new possibilities for more cost-effective and sustainable operations in the chemical industry. With the ability to use complex models that account for various processes, physics, and thermodynamic conditions, plant owners can employ a sophisticated tool for transforming data into knowledge. These capabilities can enable them to discover actionable insights and further improve their operations.

Fertilizer producers increasingly recognize the substantial value of plants' digital twins in obtaining extensive process knowledge. The digital process monitor that connects the plant's model and the operator is a cornerstone tool in the digital transformation of fertilizer production. This model-based tool integrates real-time process monitoring with predictive analytics to optimize plant performance. By using a complex mathematical model that includes over 5,000 equations, the system provides insights into key performance indicators (KPIs) and other variables of interest, enabling operators to make informed decisions that enhance productivity while reducing energy usage.

This article explores digital innovations that transform fertilizer production, focusing on Stamicarbon's process monitor solution, which contributes to plant operations optimization and enhances energy efficiency.

The knowledge-driven model

Different classes of models can be developed based on the level of a priori knowledge, such as knowledge-driven models, data-driven models, and grey-box models. Knowledge-driven models, also called first-principle models, are developed based on the underlying physics and chemistry of the process. This requires full phenomenological knowledge about the underlying processes. In contrast, data-driven models, also called black-box models, are proposed for situations in which a physical understanding of the urea process is absent or irrelevant. These models are based on experimental data fitted to (typically) simple correlations. There are many possible combinations of knowledge-driven and data-driven models between the two extremes. The prior knowledge offered by the simplified first principles analysis forms the core of a so-called grey-box model, while data-driven methods can compensate for fractions that cannot be modelled efficiently in terms of phenomenological models.

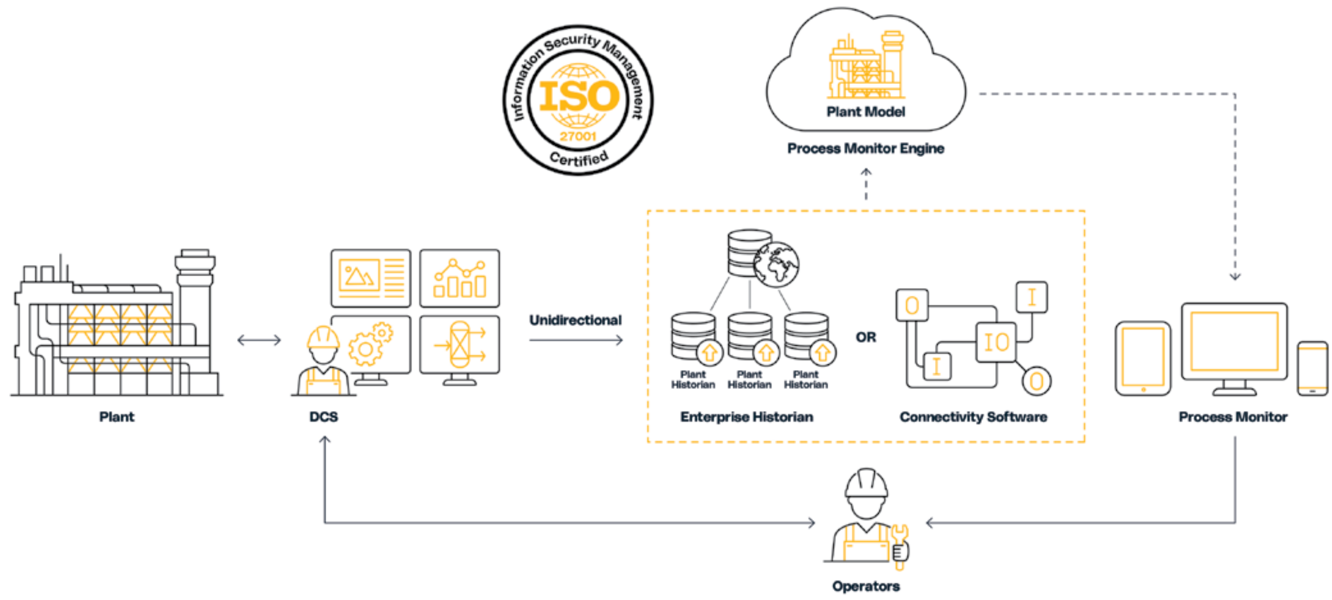
A process model of the urea plant, serving as the engine of Stami Digital Process Monitor, is purely knowledge-driven, with superior prediction quality. The mathematical model developed includes mass and heat transfer equations, reaction kinetics, vapour-liquid equilibria, and hydrodynamic aspects, covering the entire plant. In total, the plant model consists of more than 5,000 linear and non-linear equations. An in-house developed equation-oriented flow sheeting programme ensures fast, complex, steady-state calculations that provide insights into the plant operation.

Process monitor architecture

The Stami Digital Process Monitor feeds real-time data of a urea plant to a rigorous plant model, which calculates Key Performance Indicators (KPI), such as plant load, energy consumption and emissions, as well as a variety of soft sensor key variables such as equipment efficiency, equipment load and reactor load and shows them on a dashboard.

As illustrated in figure 1, the real-time plant data is unidirectionally communicated to the process monitor engine, which runs in a secured cloud environment. The plant data is processed by the plant model, which calculates the KPI and soft sensor key variables and is made available to the plant operators and all other stakeholders. This approach adheres to the highest information security standards, in compliance with ISO 27001, the global standard for information security management.

Figure 1. Stami Digital Process Monitor architecture



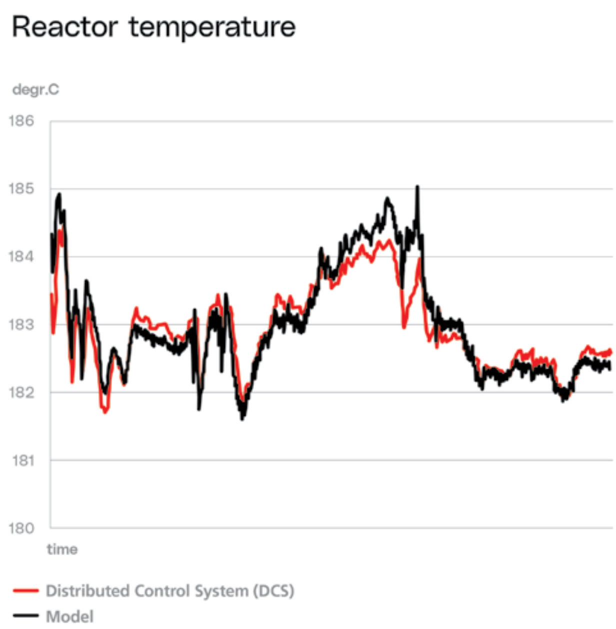
Designing the digital twin

The creation of the plant model for Stami Digital Process Monitor consists of two steps: the consulting phase and the data reconciliation phase.

The project starts by conducting interviews with plant experts and operators as they play a key role in fully exploiting historical data. The experiences and expertise of those involved in day-to-day operations provide valuable insight into relevant process changes and the performance of measuring devices. An in-depth analysis of the plant operation can be made with a validated plant model and historical plant data. The report will generally provide information on several aspects, including the evaluation of plant sensors, identification of plant constraints along with proposed solutions, assessment of achieved operation in relation to key variables, analysis of low-frequency oscillations and disturbance rejection (such as day and night rhythm), as well as recommendations for improvements.

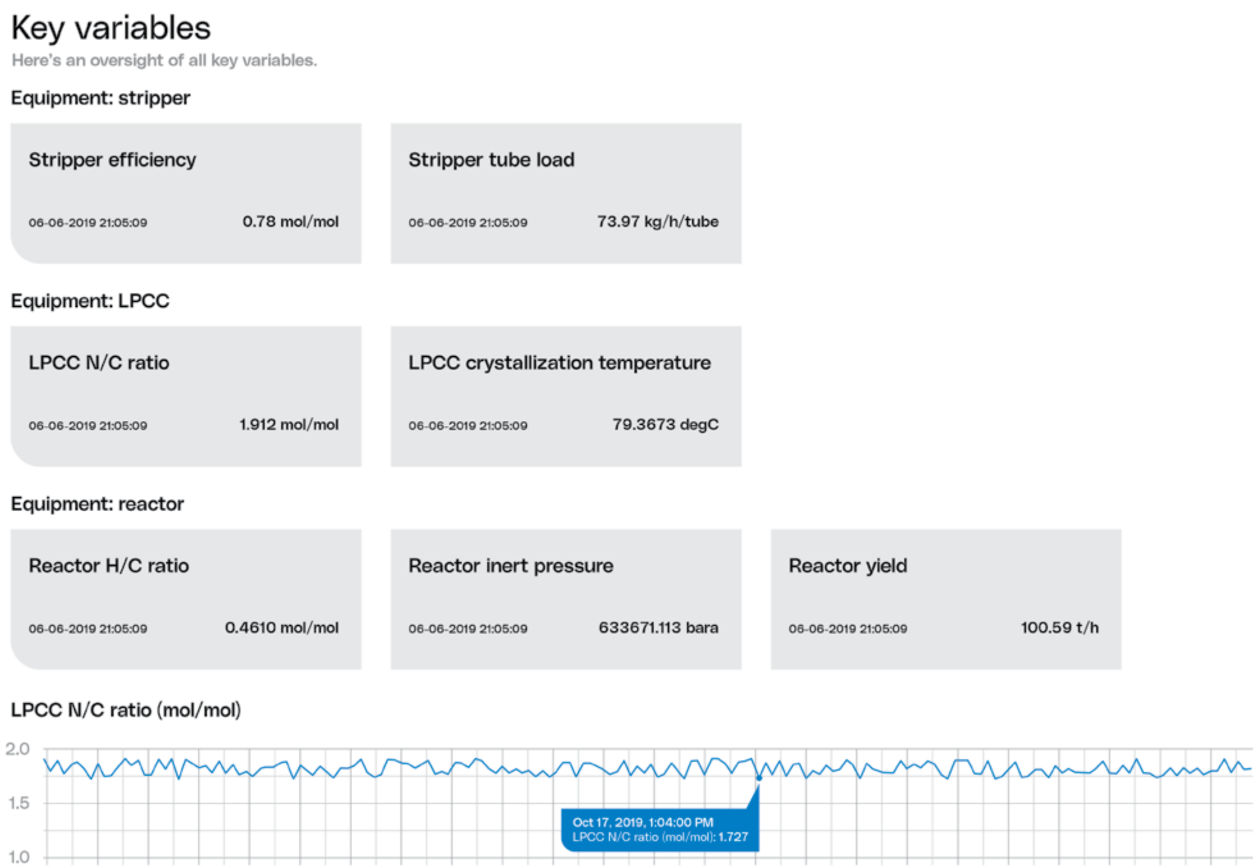
At the data reconciliation stage, historical Distributed Control System (DCS) information is collected from the operation and subsequently used to validate the model to ensure that the model represents the process accurately. The measured data typically contain random errors and, less frequently, may also contain systematic errors. The role of data reconciliation is to identify and correct deviations and, therefore, provide reliable information for updating the model parameters or to conclude systematic sensor errors.

Figure 2. Reactor temperature validation



For process control engineers, data reconciliation is a feedback process aiming to bring the model predictions on target to the process measurements. This is similar to how feedback is used in a control application to bring measured values to requested target values or within ranges. A validation example is illustrated in figure 2.

Figure 3. Soft Sensor Key Variables



The urea reactor outlet temperature is typically a critical variable in urea synthesis. To some extent, it represents urea conversion in the reactor, assuming other interacting variables are constant. The plot in figure 2 shows the model-predicted temperature compared with the DCS reading over a period of two weeks. Accuracy is the level of agreement between the predicted and DCS values, while reliability is the degree to which the prediction errors vary.

The accuracy of identification and reliability of validation are sensitive to the size of the corresponding datasets. For historical data analysis, hourly averages typically from one to two months are required.

Once the consult and reconciliation phases have been completed, Stami Digital Process Monitor is ready to provide real-time KPI, soft sensor key variables information, and automatic reports that will help maximize efficiency and increase production.

Soft sensor key variables

The Key Variables (KV's) characterize the technical and economic performance of the urea process. Once the KV's are fixed, the operating points are fixed. The KV's are normally determined by offline sample analysis in a laboratory. One of the drivers of process modelling is to give operators and process engineers a reliable and accurate estimation of the KV's. This would allow them to arrive at the optimum operating point and assist them in troubleshooting activities. For example, the urea yield in a reactor is fully characterized by its key variables N/C, H/C, retention time, and system pressure. Only N/C can be measured in real-time, whereas H/C and system pressure are determined by offline sample analysis in a laboratory. Calculation of retention time would require a total mass balance calculation over the reactor.

Stami Digital Process Monitor produces these real-time soft sensor key variables (see figure 3), enabling advanced process monitoring and optimized control of urea plants.

Once the Stami Digital Process Monitor is implemented, Stamicarbon regularly hold meetings with the customer to review and evaluate data from the previous period. This data will be analyzed with the help of operational specialists. As part of the 'ADVANCE CONSULT' process, these sessions are designed to help the customer understand the significance of the key variables (KVs) and how to utilize them to optimize

Figure 4. Troubleshooting - Feed stream

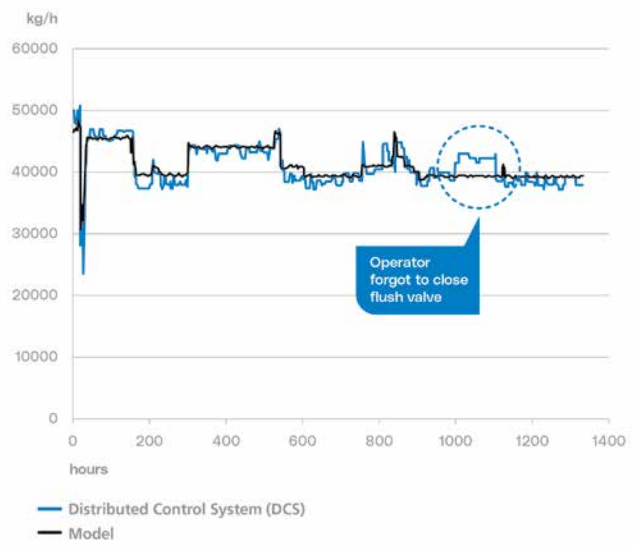
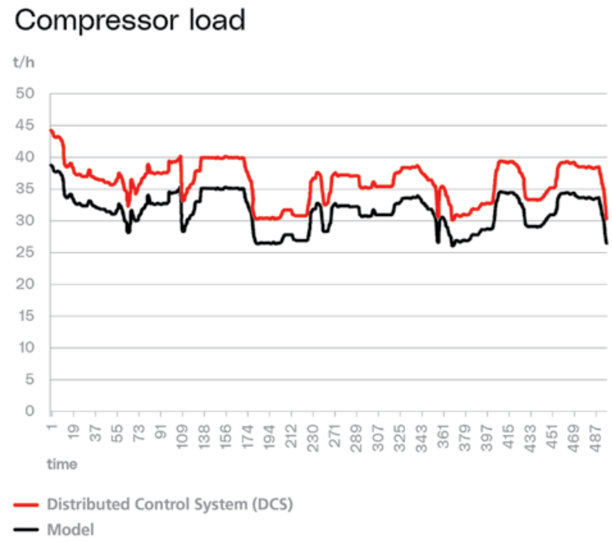


Figure 5. Troubleshooting - Compressor load offset



plant performance. During these discussions, Stamicarbon experts provide suggestions for improving operations, including increasing capacity, reducing emissions, or enhancing energy efficiency. These sessions help to identify measurement errors, equipment bottlenecks, and inefficiencies. Operating strategies developed using the model data often prove to be highly efficient.

Troubleshooting with knowledge

The Stami Digital Process Monitor is a prominent tool for troubleshooting in plant operations. It is especially useful for comparing the values from the plant's distributed control system with those calculated by the plant model, as illustrated in figure 4.

In figure 4, the distributed control system data is shown in blue, and the values calculated by the model are shown in black. In this case, it was found that a flush valve unintendedly remained open, which explained the relatively large difference shown in the highlighted area. Stami Digital Process Monitor will immediately show such a difference, which will trigger the plant operator for corrective actions and prevent unnecessary loss of production.

Another troubleshooting example is shown in Figure 5. In this case, the trend shows a constant offset between the compressor load as per the distributed control system value shown in red and the value calculated by the process model. The root cause of this particular offset was found in a wrongly configured density compensation of the orifice. As a result, the compressor can be pushed to a higher capacity, leading to a higher plant load.

Technology is helping the industry to reduce its environmental impact

Your digital aid for sustainable operations

As the global demand for fertilizers continues to grow, these technological innovations are crucial in helping the industry reduce its environmental impact while improving productivity.

The integration of digital technologies also contributes to environmental protection. Advanced digital monitoring tools track emissions in real time, ensuring compliance with environmental regulations and helping plants minimize their carbon footprint. This is particularly important as the industry moves towards more sustainable production practices to meet global environmental standards.

Depending on plant's requirements, Stamicarbon, the nitrogen technology licensor of MAIRE Group, can enable various functionalities of digital process monitor's architecture, including real-time optimization, predictive control, data reconciliation, virtual (soft) sensors, process performance monitoring, and comprehensive plant monitoring systems.

Note: ADVANCE CONSULT™ is a trademark of Stamicarbon ■

Case Study: FertigHy's revolution in low-carbon agriculture

Written by

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FertigHy is aiming to produce affordable, low-carbon fertilizers, with the goal of cutting emissions by up to 1 mn t of CO_2 per plant per year. By focusing on innovative and sustainable solutions, the company is poised to accelerate the decarbonization of the agriculture sector, making a substantial contribution to the EU's climate goals and fostering a more sustainable future for the region.

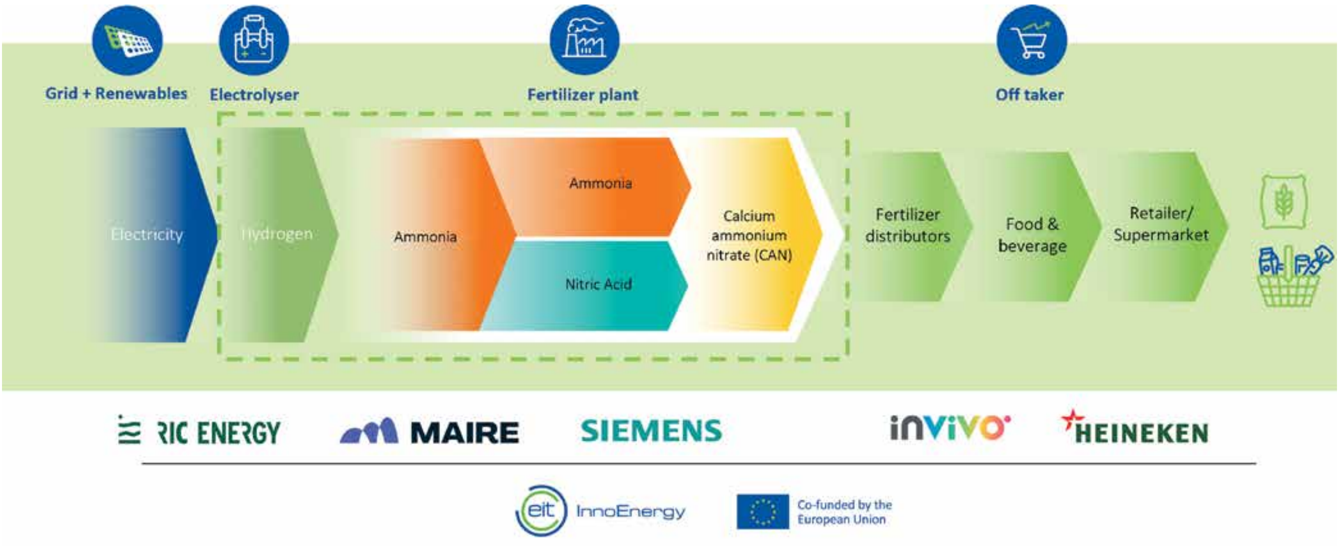
The aim is to employ fully integrated low-carbon fertilizers produced from electricity which will offer an opportunity for re-industrialization, supply security, and stable long-term prices, while also contributing to the decarbonization of the challenging agricultural sector.

Decarbonization: A key objective

The European agriculture sector significantly contributes to greenhouse gas emissions, accounting for 10% of the EU's total emissions. European farmers apply over 11 mn t of nitrogen fertilizers annually, leading to substantial environmental impacts. The production of nitrogen fertilizers is a major source of CO_2 emissions, with the European fertilizer industry emitting millions of tonnes of CO_2 each year.

Efforts to decarbonize this sector include adopting renewable and lower carbon hydrogen and ammonia, which can drastically reduce the carbon footprint of fertilizer production. The importance of producing low carbon fertilizers for the decarbonization of the food value chain cannot be overstated. Mineral fertilizers play a critical role in addressing Scope 3 emissions, which are the indirect emissions from a company's value

Figure 1. FertigHy's scheme



(left) Europe's reliance on nitrogen fertilizers, particularly from natural gas producers, underscores the sector's vulnerability

chain, often representing 80-90% of total emissions for food and beverage companies. Many leading food and beverage companies have committed to ambitious decarbonization goals, aiming to significantly reduce their house gas emissions in line with global climate targets. By producing low-carbon fertilizers, FertigHy can significantly support the reduction of greenhouse gas emissions of these companies, contributing to their sustainability goals and the broader plight of mitigating climate change.

Addressing Europe's dependency on imported fertilizers

Europe's reliance on nitrogen fertilizers, particularly from natural gas producers, underscores the sector's vulnerability. Recent geopolitical events, such as the conflict in Ukraine, have amplified concerns regarding supply chain disruptions. FertigHy's initiative to establish local production plants reduces this dependency, enhancing Europe's agricultural resilience and ensuring security in the value chain. Utilizing water electrolysis powered by renewable and low-carbon electricity to produce hydrogen not only eliminates direct CO_2 emissions, but also reduces dependency on fossil fuels. This approach aims to increase the resilience of Europe's agricultural sector against future events, ensuring a more stable and sustainable supply chain.

Ensuring sustainability and competitiveness

Becoming self-sufficient in fertilizer production means less price volatility. Natural gas prices and the scarcity of fertilizer supplies have driven costs higher, significantly contributing to food inflation. Ensuring a stable supply of fertilizers at predictable prices is of strategic importance. While

The European industry relies too heavily on nitrogen fertilizers

low-carbon fertilizers might initially be more expensive, upcoming carbon taxes on traditional natural-gas-based fertilizers, starting from 2026 with 100% application in 2034 under the EU's Carbon Border Adjustment Mechanism (CBAM), will level the playing field. The new taxes that fertilizer importers will have to pay under the CBAM highlight the importance of transitioning to more sustainable alternatives. Moreover, the reduction of free allowances under the EU Emissions Trading System (ETS) will lead to increased costs for fertilizers in Europe. This pressure, both from the CBAM and reduced ETS allowances, will make it even more crucial to have alternatives such as low-carbon fertilizers within Europe, fostering greater market competitiveness.

Becoming self-sufficient in fertilizer production means less price volatility

From grey to low carbon: the role of hydrogen in the production of fertilizers

Fertilizers rely on ammonia (NH_3) as a key ingredient, traditionally produced using natural gas through the Haber-Bosch process. In the aforementioned method, the Haber-Bosch process will remain, but the key difference lies in the way hydrogen is produced. FertigHy will use electrolyzers instead of Steam Methane Reforming (SMR). The conventional method releases significant amounts of CO_2 due to the fossil fuels used to produce hydrogen. By using renewable and low-carbon electricity instead of natural gas, ammonia can be synthesized in a manner that virtually eliminates CO_2 emissions, leading to the production of decarbonized ammonia. This shift in hydrogen production replaces the use of natural gas with lower carbon electricity sources, significantly reducing the carbon footprint.

The project overview

FertigHy plans to build and operate several large-scale low-carbon fertilizer plants, with the first plants earmarked for France and Spain, and then subsequent replications in other European countries. Each plant will produce 500,000 t of low-carbon nitrogen-based fertilizers per year. Construction is expected to begin in 2027, with an estimated energy demand of 2 TWh/year. The carbon footprint of these plants is expected to be 80-90% lower compared with conventional gas-based synthetic fertilizers, resulting in a reduction of up to 1 million tonnes of CO_2 per year. The company is on the brink of initiating feasibility, environmental, and safety studies, and have already secured the first contracts for these efforts, ensuring that the plants meet the highest standards of sustainability and safety.

Benefits of CAN-27

FertigHy's focus on producing calcium ammonium nitrate (CAN-27) highlights its advantages over other nitrogen-based fertilizers such as urea and ammonium phosphates. CAN-27 was chosen due to its numerous benefits, including lower volatilization risk, neutral soil impact and rapid nutrient uptake. These advantages, coupled with its potential for 100% decarbonization and better efficiency of use in cultivation, align perfectly with the commitment to fostering more sustainable agricultural practices. Given these superior conditions, CAN-27 is set to become the predominant fertilizer in the future.

France as the Launchpad

FertigHy's decision to establish its first manufacturing plant in Northern France showcases strategic foresight and careful consideration. The region boasts a long-standing agricultural base, making it a prime location for fertilizer production. Furthermore, France's position as the biggest consumer of nitrogen fertilizers in Europe, consuming around 5 mn t annually, underscores the market potential. Moreover, France's attractiveness for investment in clean hydrogen is noteworthy, with the government implementing supportive policies and subsidies. The ongoing efforts to develop a support mechanism for low-carbon and renewable hydrogen production further solidifies France's appeal as a business destination. Additionally, the country's robust agricultural sector, coupled with a national roadmap to safeguard agricultural and food sovereignty, provides a conducive environment for the planned operations.

Strategically located in Northern France, the chosen site offers proximity to key European markets and access to low-carbon baseload electricity.

Strategic collaboration and innovation

FertigHy's founding consortium brings together expertise from various sectors:

- EIT InnoEnergy offers robust business acceleration and innovation support
- RIC Energy provides deep insights into renewable energy and electricity markets
- MAIRE contributes significantly to project development, engineering and technology expertise
- Siemens Financial Services bring its experience in financing large-scale industrial projects focused on sustainability and facilitates the alignment with the entire Siemens ecosystem
- InVivo's extensive network aids in fertilizer distribution to farmers
- HEINEKEN's commitment to low carbon fertilizers drives demand and supports a shared goal of reducing carbon footprints across supply chains

The shareholders are key actors in the company's value chain and their investment and commitment provide the necessary expertise, strategic direction, and governance for the company's success. Through shared commitment and innovative solutions, FertigHy is aiming to pave the way for a more sustainable agricultural future. It is crucial for stakeholders to support these endeavours for a more sustainable tomorrow in agriculture. ■

News in brief

EUROPE

Yara International and Kongsberg Digital enter collaboration on digital twin technology

Kongsberg Digital, a leading provider of industrial software, and Yara International, a global fertilizer company and the world's largest distributor of ammonia, have entered into a two-year agreement under which Kongsberg Digital will develop digital twin technology for Yara's factories in Herøya in Norway and Sluiskil in the Netherlands.

The agreement includes an operational twin for Yara's production facilities at Herøya in Porsgrunn and a project twin for the carbon capture project in Sluiskil in the Netherlands. The ambition is to deploy the solution to Yara's production facilities worldwide.

The operational twin for the production facility at Herøya will utilise industrial data from the factory in combination with technical data and equipment documentation. Based on this, a contextualised work surface with detailed 3D models of the plant and the various units will be created, along with associated maintenance, operational, and facility information gathered from the factory's sensors and data sources. The work surface will assist users in making the right decision at the right time by providing relevant information.

"Yara is collaborating with several partners for our digitalisation programme. We chose Kongsberg Digital because of its technical solutions and flexible user interface. Yara is the first wholly Norwegian industrial company to use Kognitwin – Kongsberg Digital's twin technology. With this technology, a significant improvement in the work process is expected, thereby leading to a more efficient workday for engineering, maintenance, and operations," says Merete Østby, Digital Manager at Yara Porsgrunn.

"It is a fantastic recognition for Kongsberg Digital to develop and deliver twin technology to Yara. We will build on the already close cooperation between Kongsberg Gruppen and Yara and deliver technology that provides Yara with improved insights and new opportunities to optimise the operation of their facilities. For Kongsberg Digital, this marks a significant milestone as this agreement demonstrates our use of digital twin technology and how we are solving common challenges across the process and chemical industry," says Shane McArdle, CEO of Kongsberg Digital.

Twin technology will also be implemented into the carbon capture project at Yara's facility in Sluiskil, Netherlands, where a new carbon capture unit is being built to convert CO_2 gas into liquid before transporting it by ship for injection and storage in reservoirs in the North Sea. The twin technology will play an essential role in this project by contributing to efficient collaboration and preparations for data transfer from project to operation before the plant is operational. The digital twin will establish a "digital thread" through all project phases and into the operation and maintenance phase.

"With digital twin technology, Yara takes another great stride forward in digitalising our production. This technology has the potential to optimise operations by gathering and visualising large amounts of data and information on a simple and user-friendly platform. Together with Yara's Digital Production Platform – our industrial IoT platform – this opens up entirely new possibilities for data-driven insights," says Roar Nilsen, Programme Manager Yara International ASA.

MOL and thyssenkrupp Uhde celebrate opening of Polyol Plant in Tiszaújváros, Hungary

The EUR1.3 bn polyol complex, engineered and built by thyssenkrupp Uhde, is a milestone in MOL Group's history, as it represents the culmination of its largest organic investment ever. The plant uses state-of-the-art technology from Germany's thyssenkrupp Uhde, making it one of the most modern and efficient facilities of its kind in the world. MOL and thyssenkrupp signed the license agreement in summer 2017, and the foundation stone of the complex was laid in September 2019.

“With this new MOL polyol complex we establish new standards in terms of efficiency, environmental friendliness and automation by combining proven technologies with innovative solutions”, said Nadja Håkansson, CEO of thyssenkrupp Uhde. “We are grateful for the deep and trustful partnership with MOL. This polyol plant is a true landmark project and a great demonstration of how we at thyssenkrupp Uhde enable the industrial green transformation. With fully integrated and highly automated plant units, the valuable polyol chemicals will be produced in a highly efficient and sustainable way.”

“I am proud that we have completed the polyol complex. It was a true international team effort, a great collaboration involving thousands of people over the past six years that enabled us to deliver MOL Group's largest investment ever, perhaps the biggest development in modern Hungarian history. We have come a long way, but the road ahead is even longer, as the polyol complex will significantly strengthen our company's position and competitiveness, with the entire value chain from petroleum processing to polyol production,” said Zsolt Hernádi, Chairman and CEO of MOL Group.

The project involved an international team of thousands of experts, with engineering design work carried out in

Germany, Thailand, India and Hungary. The plant equipment came from 24 countries. The construction of the complex involved 75 000 cubic metres of concrete, 13 000 tonnes of steel, 2 500 kilometres of cable and 700 kilometres of pipelines laid in more than 18 mn working-hours.

thyssenkrupp Uhde and Johnson Matthey join forces to offer an integrated solution for blue ammonia technology

thyssenkrupp Uhde, a leading provider for engineering, construction and service of chemical plants, and Johnson Matthey (JM), a global leader in sustainable technologies, haveannounced they have signed a Memorandum of Understanding to jointly offer a fully integrated low carbon (blue) ammonia solution, building on a nearly 25-year ammonia relationship between the companies.

In the drive to reduce CO_2 emissions, the role of ammonia has expanded from a vital ingredient used to produce fertilizer for the agricultural sector, to a decarbonized carrier and supplier of hydrogen energy that's easier to store and transport than pure hydrogen. The movement of low carbon ammonia can utilize existing infrastructure making it a leading energy transition solution that's ready to capture, store, and ship vast quantities of hydrogen for use in the power and shipping sector, and industrial value chains globally.

NORTH AMERICA

USDA to invest USD83 mn in fertilizer projects

The US Department of Agriculture (USDA) plans to invest USD83 mn to build out fertilizer production plants, modernize equipment and adopt new technologies in 12 states.

The grants are part of the USDA's Fertilizer Production Expansion Program (FPEP) aimed at boosting domestic fertilizer production, increasing competition and lowering costs for farmers.

Around USD25 mn will be granted to a food waste upcycling facility in Jurupa Valley, California, to produce organic fertilizer. Nearly 90 market participants in the area will be supplied by the 11,400 t of fertilizer produced annually at this facility.

Cog Marketers, in partnership with AgroLiquid, is expected to produce 2 mn USG of fertilizer a year at its Lake City facility in Florida with a USD4 mn grant from the USDA. Around 200 fertilizer retailers in the Mid-South region would receive product from this facility.

Return will receive USD4 mn to expand production at its Northwood facility in Iowa.

Other grants were awarded to projects in California, Florida, Hawaii, Iowa, Illinois, Kansas, Kentucky, Minnesota, North Carolina, North Dakota, Oregon and Washington.

So far, FPEP has supplied 29 states with USD251 mn for increased domestic fertilizer production, with the last round of awards announced in March and January.

About USD649 mn are left from the USD900 mn the administration of President Joe Biden committed to domestic fertilizer funding through FPEP in 2022. The FPEF was started in response to rising fertilizer prices caused by a variety of factors including the war in Ukraine.

Hanwha and INEOS agree Heads of Terms to study a low-carbon ammonia facility in the USA

Hanwha Corporation and INEOS Nitriles have announced their intention to collaborate in a study for a low-carbon ammonia facility with carbon sequestration in the USA, with a capacity of more than 1 mn t per annum. The location of the plant is yet to be determined.

The two companies agreed Heads of Terms, under which Hanwha and INEOS will together explore the feasibility of a facility to meet the growing global demand for ammonia with low-carbon emissions. The final investment decision is planned for 2026 with planned commercial operation in 2030.

"Our collaboration with INEOS Nitrites is aimed at strengthening our strategic foothold in the global ammonia market and addressing the growing worldwide demand for clean ammonia solutions," said Kiwon Yang, CEO of Hanwha Corporation. He further stated, "The production of industrial materials using clean ammonia aligns well with our commitment to key sustainability principles. This technological advancement will be a pivotal turning point in realizing Hanwha's vision for a sustainable future."

“This project is a potentially important contributor to INEOS Nitriles’ carbon emission reduction targets in 2030 and its net zero ambitions by 2050. This project would be a significant step towards a leadership position in low-carbon Acrylonitrile supply of which ammonia with low-carbon emissions is a key raw material. INEOS positions itself to find solutions to the challenges the world is facing and is looking forward to achieving a net zero economy whilst both continuing to deliver products that are essential to society and remaining competitive”, said Hans Casier, CEO of INEOS Nitriles.

SOUTH AMERICA

Syensqo partners with Agtech Innovation in Brazil to drive open innovation in agricultural technologies

Syensqo has teamed up with Agtech Innovation located in the Piracicaba Technology Park, São Paulo, Brazil to boost Syensqo's agribusiness capabilities and strengthen connections within the South American agribusiness ecosystem.

“Demonstrating Syensqo's keen interest in innovation within the South American agricultural landscape, our partnership with Agtech Innovation positions us to establish robust connections with both major corporations and burgeoning startups,” says Ana Paula Bodemeier, Research & Innovation Agro Lab manager for LATAM at Syensqo.

Agtech Innovation, is recognized as a leading center for agricultural innovation. It is dedicated to fostering initiatives that bring together startups, producers, investors, academics, scientists, and various stakeholders to develop technological solutions that enhance sustainability, competitiveness, and social inclusivity across the entire agribusiness value chain. Supported by industry leaders, Agtech Innovation cultivates an ecosystem characterized by openness, connectivity, collaboration, and agility.

Syensqo’s close ties to Agtech Innovation's extensive partner network provide invaluable opportunities to help accelerate the group’s innovation agenda for the agriculture market, including formulation solutions for biologicals. This partnership embodies the essence of open innovation and underscores our commitment to being a catalyst of responsible agriculture.

ATOME announces completion of FEED study for Green Fertilizer Villeta Project

ATOME PLC has announced the completion of its Front End Engineering Design (FEED) study for its 145MW green fertilizer facility at Villeta, Paraguay.

This represents the first known announced completion of FEED for a large-scale green dedicated fertilizer project worldwide, a result of approximately 100,000 hours of engineering and comprising of 619 individual documents and reports.

This marks a major milestone in the delivery of the project and offtake, engineering, procurement and construction negotiations are now at an advanced stage. Construction is expected to start by the end of the year.

One of the biggest challenges the food industry is facing is the ability to meet production demand in a sustainable way. The Villeta Project has grown to be one of the most advanced of its kind in the world, targeting green fertilizer production with 445MW of projects in Paraguay and a further pipeline of potential projects.

MIDDLE EAST

More Egyptian urea plants go off line

Abu Qir has become the latest Egyptian company to stop urea production because of gas cutbacks.

Its granular and prilled urea plants, which have a capacity of 650,000 t/yr and 580,000 t/yr, respectively, were closed on 24 June.

Alexfert, NCIC and Helwan had already halted production on 23 June. Fellow producer Kima's plant has been closed since 4 June. Mopco and EFC's production status has yet to be confirmed. The combined capacity of the five shuttered plants is about 3.2 mn t/yr.

Egyptian urea producers have been grappling with tighter gas supplies since 20 May, leading to plant closures and output reductions.

There is no indication on how long the gas supply restrictions will last, but urea availability for export could fall to less than 200,000t in July, Argus Media estimates. This compares with exports of about 415,000t in July 2023, according to data from GTT.

Ma’aden and Mosaic enter share purchase and subscription agreement

The Saudi Arabian Mining Company, Ma’aden, the Middle East’s largest mining and metals company, and The Mosaic Company, one of the world’s leading producers and marketers of concentrated phosphate and potash crop nutrients, have announced that they have entered into a Share Purchase and Subscription Agreement. The agreement provides for the sale by Mosaic of all its shares in Ma'aden Wa'ad Al Shamal Phosphate Company (MWSPC), a joint venture investment among Ma'aden, Mosaic and Saudi Basic Industries Corporation (SABIC) to Ma'aden in exchange for newly issued shares in Ma'aden. Upon completion, this transaction will increase Ma'aden's shareholding in MWSPC to 85%, while Mosaic will exchange its 25% shareholding in MWSPC for approximately 111 mn shares in Ma'aden.

The acquisition of Mosaic's stake in MWSPC, an asset that is currently producing over 3 mn t of phosphate fertilizers per year and has been a focal point for the global phosphates industry since 2018, is expected to provide greater integration across Ma'aden's phosphate operations. It will streamline its operating model, shareholdings, logistics and marketing. As a result of the transaction, Ma'aden will acquire the marketing rights of Mosaic within the MWSPC joint venture, increasing its volume of Ma'aden marketed phosphates by more than 750k t annually (circa. 20% of additional volumes). The transaction delivers on Ma'aden's growth agenda while preserving its balance sheet.

The transaction is expected to continue to enhance Ma'aden's commercial excellence in phosphates fertilizers marketing and distribution, which includes a network of operations to supply key fertilizer markets and sales offices globally. As part of the transaction, Ma'aden and Mosaic have agreed to an ongoing partnership to continue to drive operational excellence across a more integrated phosphate business unit.

The transaction is subject to regulatory approvals, and then approval by the shareholders of Ma'aden, in addition to the completion of other closing conditions that are customary for this type of transaction. The transaction is expected to be completed during the third calendar quarter of 2024.

HSBC Saudi Arabia served as financial advisor to Ma'aden and AS&H Clifford Chance acted as legal counsel. Bank of America Securities served as lead financial advisor to Mosaic in conjunction with Lazard. Simpson Thacher & Bartlett LLP served as legal counsel to Mosaic.

Yara signs deal for renewable NH_3 from Egypt

Norwegian fertilizer producer Yara's low-carbon arm, Yara Clean Ammonia, has signed a non-binding partnership agreement with Norway's Scatec and Egyptian firms Echem and Mopco for a renewable ammonia offtake arrangement from Egypt.

Renewables developer Scatec, along with Echem and Mopco, entered a joint development and shareholder agreement in 2023 to produce renewable ammonia. They will develop and build up to 480MW of renewable energy, and an up to 240MW electrolyser facility to produce renewable hydrogen. The renewable hydrogen will be used as feedstock for renewable ammonia output at Mopco's existing ammonia production facility at Damietta, Egypt. Total targeted renewable ammonia production capacity would be around 150,000 t/yr.

Mopco has three existing urea-ammonia plants at Damietta, which have production capacity of around 1.2 mn t/yr of ammonia and 2 mn t/yr of urea.

Scatec also signed a letter of intent with the European Investment Bank (EIB) for long-term financing of the project.

"This project will further strengthen our sourcing portfolio of renewable ammonia and is a testimony to Yara Clean Ammonia as the most preferred offtaker, as the world's largest trader and distributor of ammonia," Yara Clean Ammonia chief executive Hans Olav Raen said.

ASIA

Thai cabinet allocates THB29.9bn for fertilizer scheme

The Thai cabinet has approved a central budget of nearly THB30 bn to assist farmers with fertilizer costs, which is expected to increase rice production by 10% in this harvest season, says the Bangkok Post.

According to government spokesman Chai Wacharonke, the cabinet agreed on a central emergency budget of THB29.9 bn to support a co-payment fertilizer scheme to reduce farmers' costs to purchase fertilizer.

Under the scheme, the government will subsidise fertilizer costs for farmers at a rate of THB500 per rai, up to a maximum of 20 rai per person, for the 2024/25 planting season. The scheme is scheduled to run from 15 July 2024 to 31 May 2025.

Farmers can buy fertilizer from stores registered with state agencies, according to 15 state-determined fertilizer formulas, and the sales prices must be lower than market prices. The purchases must be made using the Bank for Agriculture and Agricultural Cooperatives' application.

Farmers wishing to participate must register with the Agriculture and Cooperatives Ministry. Roughly 4.68 mn farmers are estimated to benefit from this scheme.

According to Mr Chai, last year the government spent THB56 bn to provide financial assistance to farmers, reducing their expenses by THB1,000 per person for up to 20 rai. However, most of this financial aid went to landowners, while tenant farmers did not benefit. This year the approach changed to directly subsidise fertilizer costs for farmers, ensuring the benefits reach planters, he said.

In a related development, the cabinet approved a central budget of THB4.7 bn for water management and storage, which is an additional project beyond the usual operations of relevant agencies. This decision follows the prime minister's statement that rainfall is forecast to be 10% higher this year than in 2023, requiring an updated plan to accommodate the expanded volume of water.

Some 125,000 rai of land is expected to benefit from the policy, with water storage capacity increased by 115 mn cubic metres, helping 67,000 people.

Yara Clean Ammonia and AM Green (earlier Greenko ZeroC) sign term sheet for sale of renewable ammonia from India to Yara Clean Ammonia's global market

Yara Clean Ammonia, the world's largest trader and distributor of ammonia, and Greenko ZeroC, the green ammonia production arm of the India-based AM Green, signed a term sheet for supply of renewable ammonia from Phase 1 of AM Green's ammonia production facility in Kakinada, India.

This term sheet and the subsequent offtake agreement covers the long-term supply of up to 50% of renewable ammonia from Phase 1 of AM Green's ammonia production facility in Kakinada. The plant will produce, and export renewable ammonia derived from round-the-clock carbon free energy by 2027.

Renewable ammonia and other sustainable fuels from AM Green's platform, will be compliant with EU RFNBO and Renewable Energy Directive requirements. For Yara Clean Ammonia, the renewable ammonia supply will contribute to produce low-emission fertilizer and for de-carbonizing other industries like shipping, power, and energy intensive industries.

Mr. Mahesh Kolli, President of AM Green said, "We are delighted to partner with Yara Clean Ammonia to propel the transformation of various industries and several OECD economies. Continuous focus on innovation combined with execution reinforces AM Green's leadership position as a global clean energy transition solutions platform for low-cost green molecules such as hydrogen, ammonia, fuels, and other chemicals."

Mr. Hans Olav Raen, CEO of Yara Clean Ammonia said, "The AM Green Kakinada project expands our portfolio of ammonia produced with renewable energy and consolidates Yara Clean Ammonia's position as a reliable supplier of low-emission ammonia to established and emerging markets like fertilizer production, cracking of clean ammonia to hydrogen, shipping fuel, power generation, and other industrial applications." ■

MARKET ANALYSIS ›

Commodity updates • Shipping news • Price watch

Soft commodities: Russian wheat offers decline

Information from **Agritel** – ***An Argus Media company***

Wheat summary

Sellers of Russian milling wheat have lowered their offers in a bid to compete with alternative Black Sea and EU origins in both fob and destination markets.

Offers for EU-origin wheat delivered to Morocco rose in premium terms as sellers corrected price ideas higher after recent trading activity below equivalent fob levels. Romanian, Bulgarian and French origin wheat was offered at premiums between EUR8/t and EUR12/t to Paris-listed futures, compared with offers heard at EUR6/t above Euronext's September contract.

With the futures contracts also trending higher and buyers in Morocco will likely take a step back from the market, market participants said.

And an expected lower rebate level for buyers in Morocco in July – now pegged at 20.5 dirhams/100kg (USD20.60/t), compared with the 25 dirhams/100kg previously expected when Morocco last booked EU cargoes – could further deter buying.

That said, offers of Russian 11.5% wheat, in contrast, fell by USD5/t cif Morocco boosting the origin's competitiveness against EU product.

Russian 12.5% milling wheat fob Novorossiysk offers shed value as sellers vied to compete with alternative Black Sea sellers. But looking ahead, Russian prices may get a boost from lower availability of higher-protein wheat. Early indications from the wheat harvest in Russia's Krasnodar region show a below-average wheat quality, according to local market participants. Harvested wheat shows 10.5-11.0% protein content, compared with the 12.5% or higher typically produced in the region. That said, Krasnodar's harvest is still in its initial stages, meaning wider quality trends are not yet clear.

Elsewhere, offers for spot shipments of 13.5% Canadian Western Red Spring (CWRS) wheat rose as a sustained lack of farmer selling tightened supply available for export in July and August. But an uptick in Minneapolis-listed September futures could encourage farmers to sell stock, with producers awaiting a futures rebound before letting go of product, according to market participants.

Lower farmer selling has also supported the local market in France. On a cpt Rouen basis, exporters increased their bids in premium terms, but producers maintained a wait-and-see approach on quality concerns for French wheat.

Corn summary

Competition has ramped up for corn shipments to Spain. Sellers of Argentinian corn offered volumes into the east coast of Spain, some USD1-2/t below equivalent offers of Ukrainian product cif Spanish Mediterranean, while Ukrainian sellers held firm.

Although buyers in the EU are unlikely to book offered Argentinian volumes at the moment on concerns over potential phytosanitary issues, Argentinian offer levels could set the market for Brazilian corn cif EU prices, market participants said, which accounted for around 30% of Spain's corn imports across the previous five marketing years, according to

Figure 1. Wheat price (USD/t)

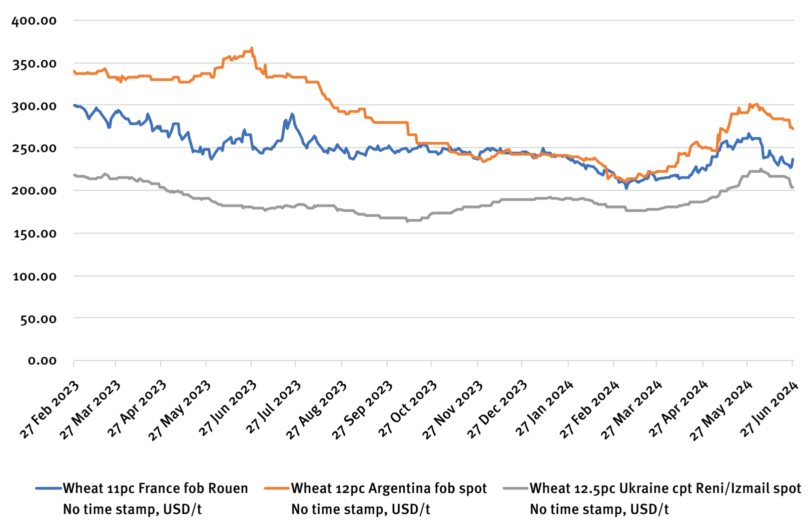


Figure 2. Corn price (USD/t)

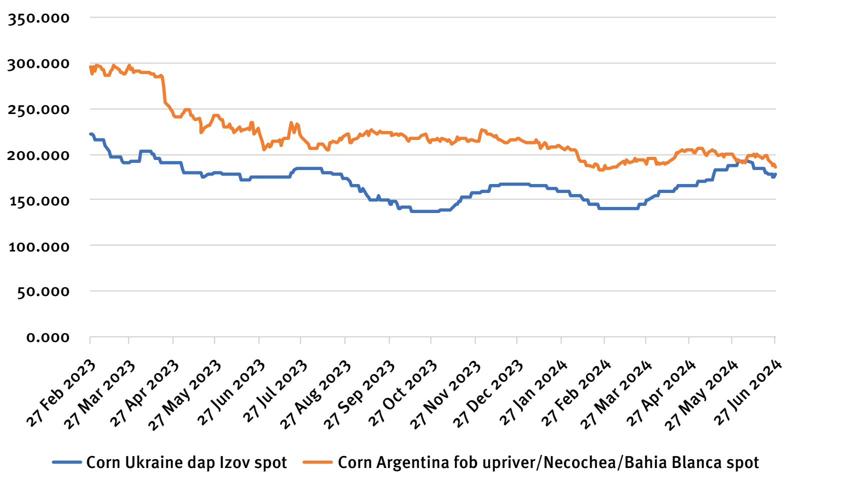
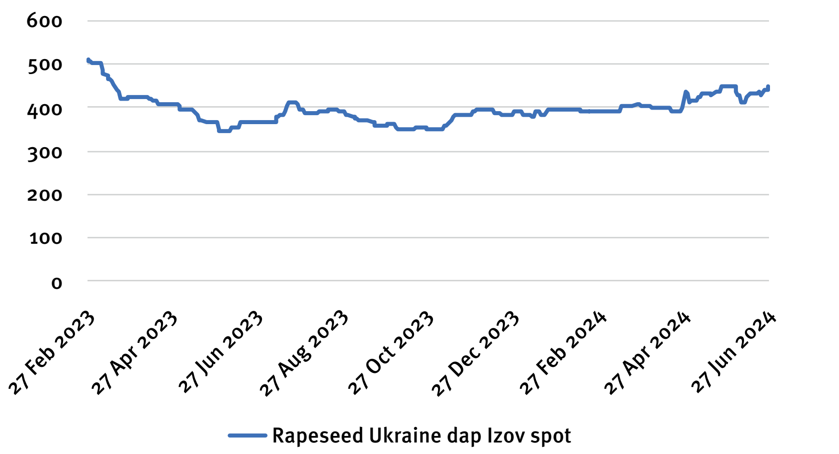


Figure 3. Rapeseed price (USD/t)



customs data. Buyers responded in turn, lowering bids by around USD2/t. Fob and delivered corn prices may continue to come under pressure as South American new crop volumes hit the market. And looking ahead, European demand for South American corn could grow in 2024-25, as hot and dry weather in the Black Sea could hamper crop development and increase importers' reliance on alternative suppliers.

But in the shorter term, waning Ukrainian corn availability could counterbalance South American harvest pressure to some extent, with sellers holding cif Spanish Mediterranean offers flat at USD216/t.

And Ukrainian corn prices fob deep-sea Pivdennyi/Odesa/ Chornomosrk (POC) ports closed flat for a fourth consecutive trading session. Trading interest was concentrated on smaller, coaster-sized vessels, with traders struggling to find enough remaining crop to fill larger vessels, market participants said.

Elsewhere, corn prices at China's northern ports rose by around 10 RMB/t (roughly USD1.40/t) on low stock levels and higher Dalian-listed futures. But demand in southern consuming regions was limited, as feed producers currently have enough corn stored for two to three weeks of processing, according to market participants.

Oilseeds summary

Bids rose in the Paranagua soybean paper market as buyers attempt to attract more offers and CBOT futures continue to fall. The outlook of favourable weather and expected expansions in acreage for the 2024-25 crop are pressuring prices. That led most sellers to retreat from negotiations, while also discouraging the farmer selling pace despite the weakening trend of the Brazilian real. Most sales took place in the barter modality — which consists of the exchange of 1 metric tonne of inputs for a portion of production — for the 2024-25 crop.

Part of the remaining sellers available in the soybean paper and cargo markets are in a haste to trade, fearing further prices decreases.

The range of offers and bids for August ended the day at a premium of 50-47¢/bu to the CBOT, from a premium 6540¢/bu on 26 June.

Chinese soybean premiums continued to weaken for near-curve shipments from Brazil, boosting China-bound purchases, while buying interest for March-April loadings rose as well owing to rebounding crushing margins.

Differentials to the Chicago Board of Trade (CBOT) contract weakened by 4.5¢/bu on the day for August shipment from Brazil on lower offers. Exporters were keen to attract sales to reduce positions secured previously. Additionally, extra loading capacity coming from a faster pace of operations at ports allows traders to sell and deliver more volumes.

China secured a fresh cargo at 142¢/bu cfr premiums over the August CBOT contract for shipment in late-July to early-August.

Bulk soybean arrivals in the next 7-8 weeks might exceed overall demand for the upcoming 3-4 months. Thus Chinese crushers expressed less interest in September shipment. Meanwhile, crushers need to sell out soybean meal before booking beans because of storage shortage for both soybeans and meal. ■

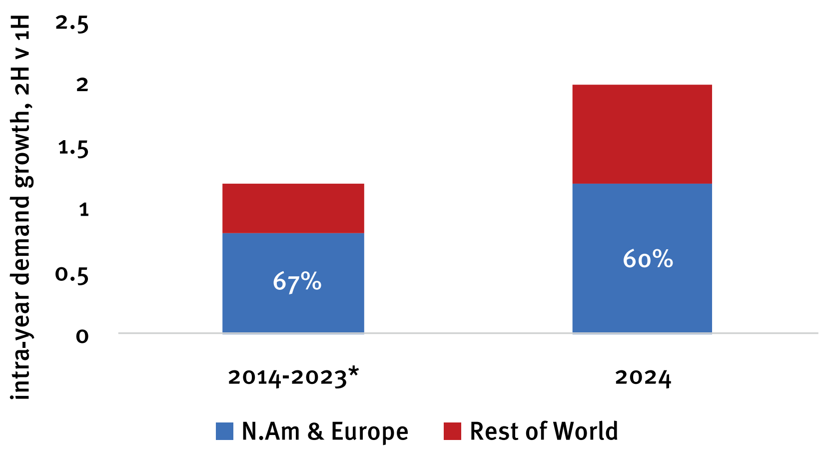
Hard commodities: Tighter oil market fundamentals ahead

Written by

David Fyfe, *Chief Economist,* ***Argus Media, UK***

By the second week of June, crude oil futures had reversed over 70% of a USD5 price decline seen in the immediate aftermath of the recent OPEC+ Ministers' meeting. Heading in to the meeting oil producers had doubtless hoped that extending two-thirds of their total 5.8 mb/d of production cuts through until to December 2025 would be sufficient to keep markets tight in the second half of 2024 by ensuring sufficient price backwardation to avoid a build-up of surplus inventory.

Figure 1. Oil demand growth 2H vs. 1H, mb/d



Source: Argus Consulting **excludes pandemic*

Indeed the prevailing Argus Consulting view is that the market needs the incremental flow of barrels that will result when the 2.2 mb/d tranche of voluntary cuts start to be unwound from October this year. However, producers' hopes for a strengthening in prompt prices has been thwarted so far by a diminishing Middle East risk premium, enduring macro-economic uncertainty and weak early-2024 oil demand growth.

However, forward-looking, sequential market dynamics from the first half of the year to the second can sometimes be more instructive than a holistic annual view. Crucially, Argus forecasts that global oil demand in the second half of 2024 averages around +2 mb/d versus an admittedly weak first half of the year. And while the Developing Economies increasingly account for the bulk of annual oil demand growth, the greater underlying seasonality of demand in North America and Europe traditionally sees these regions combined account for over 65% of sequential 2H vs. 1H demand growth. Add in an anticipated hiatus in non-OPEC oil supply growth expected until spring 2025, and the scene is set for a fairly tight crude oil market through until mid-2025, with a likely strengthening in prices as a consequence.

Of course any such outlook is beset by risks on both sides of the ledger. Recent political uncertainty following elections in Mexico, South Africa and India has raised concern over economic policy and commodity demand prospects in those countries. Nonetheless, India's economy still looks likely to grow by 6-7% in 2024, despite the Central Bank sustaining interest rates at 6.5% in early-June. Heatwaves and policy moves designed to prevent power blackouts at the time of India's elections culminating in June also saw April and May gas-fired power generation double from year-ago levels.

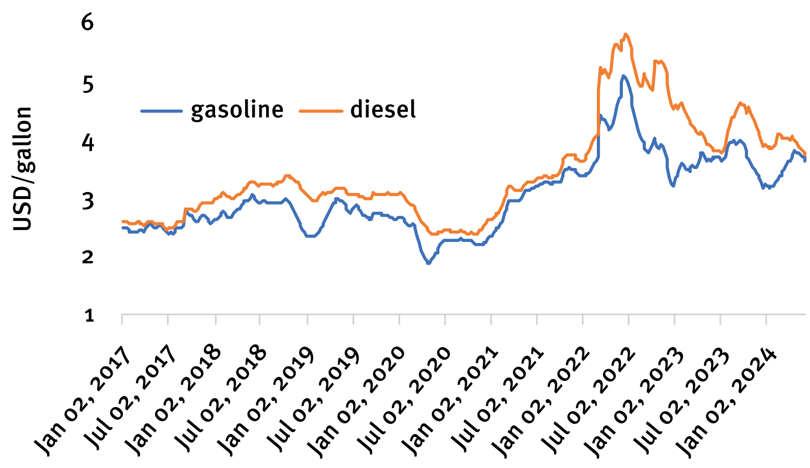
Policy uncertainties

Arguably though, as noted above, China, the US and Europe hold greater potential to bolster sequential oil demand during the next six months or so, and although policy uncertainties in all three persist, nonetheless macroeconomic and oil demand upside is starting to look more credible.

Apparent oil demand in China for January-April stands only 100-200 kb/d above year-ago levels, much

China, the US and Europe could bolster sequential oil demand

Figure 2. US retail motor fuel prices*



Source: Argus Media, US EIA, AAA **average all grades*

weaker than the half million b/d-plus of growth we assume for the year as a whole. Indeed January-May crude imports are down by an aggregate -300 kb/d YoY, with a backdrop of stubborn decline in the real estate sector and low consumer confidence. Nor is oil the only point of relative weakness in China's January to May commodity imports, with industrial metals import growth languishing at low single-digit levels and agricultural commodity imports in decline. Year-on-year growth in coal (+12%) and natural gas (+17%) imports has however proven stronger.

China's May manufacturing PMIs were also mixed, with the official gauge showing renewed contraction at 49.5, while private sector readings showed an expansionary 51.7. However, with fiscal and monetary stimulus beginning to trickle down through the economy, and two months of oil de-stocking now drawing to a close, oil demand prospects should pick up heading towards autumn's seasonal construction peak and the Golden Week holidays.

European manufacturing decline slowed in May, with Germany's PMI nudging up to 45.4, still in contractionary territory but an improvement on April's 42.5. Crucially however, the European Central Bank cut interest rates by 25 basis points in the first week of June, the first cut since 2019, thereby ending a phase of monetary tightening in place since mid-2022. Post-meeting commentary revealed ECB leaders being rather non-committal as regards future policy moves, though a further one or two rate cuts are seen possible by end-2024.

The Eurozone tentatively nudged out of recession in the first quarter of 2024, although mild weather crimped heating demand, weighing particularly on European gas and power prices. While the regional gas market remains well supplied for now, upside demand surprises in Asia nonetheless hold the potential to draw LNG cargoes away from Europe and to raise regional gas prices accordingly. More generally, with European business confidence reported in June to be at a 27-month high, an anticipated seasonal uptick in travel demand, further progress in curtailing inflation and gradual monetary policy loosening should help oil and energy demand recovery continue from the low point reached in 1Q24.

Price recovery

Which brings us finally to the US, where the trajectory of summer driving season demand and the scale and timing of widely-anticipated autumn Federal Reserve interest rate cuts will be critical. The US economy remains resilient, albeit a sustained period of interest rates above 5% saw GDP growth in 1Q24 slow to only 1.3%. A recent Reuters poll of economists suggests an initial September rate cut followed by perhaps one more cut before year-end. That said, fiscal policy is expected to remain expansionary in the run-up to November's Presidential election, while retail gasoline prices well below USD4/gallon for now look unlikely to significantly crimp summer driving demand. The US jobs market remains strong, notwithstanding the May unemployment rate ticking marginally higher to 4%.

Argus Consulting projections envisage North Sea Dated crude prices recovering from USD78/barrel in June closer to USD85/barrel by end-year and similar levels through 2025. The price recovery hinges on tightening oil market fundamentals brought about by a sequential rise in second-half 2024 oil demand in conjunction with a temporary levelling-off in non-OPEC supply growth. OPEC+ Ministers would likely be satisfied to see prices supported near these levels. However, between now and end-2024 they will be closely watching the evolution of inflation and monetary policy in the Atlantic Basin on one hand, and a still-stuttering Chinese economic recovery on the other for any signs of downside oil demand risks. Their latest agreement allows for production reinstatement to be paused if market conditions warrant. ■

Shipping and trade news

Vancouver port union rejects revised offer

Port of Vancouver unionized workers voted Saturday to reject a revised four-year agreement, increasing the risk of a strike or lockout at the Canadian port.

The International Longshore and Warehouse Union's (ILWU) Ship and Dock Foremen Local 514 voted to reject the British Columbia Maritime Employers Association's (BCMEA) revised agreement. The two sides were looking to renew an agreement that expired on 1 April 2023.

The BCMEA last month escalated the matter to the Canada Industrial Relations Board (CIRB), with a hearing scheduled to adjudicate the BCMEA'S 10 May complaint on 2 July.

Neither party has yet to issue a 72-hour notice of a strike or lockout. Regular cargo and passenger operations within the province's ports remain uninterrupted.

Vancouver's port is the country's largest — about the same size as the next five combined — and describes itself as able to handle the most diversified range of cargo in North America. There are 29 terminals belonging to the Port of Vancouver.

The Trans Mountain-operated Westridge Marine Terminal responsible for crude oil exports on Canada's west coast is unaffected as its employees are not unionized.

AW Shipping's VLACs join newbuild order book

AW Shipping, a joint venture between Abu Dhabi's state-owned Adnoc and Chinese petrochemical producer Wanhua Chemical, has ordered up to four Very Large Ammonia Carrier (VLAC) newbuilds.

AW Shipping ordered up to four 93,000m³ VLACs from China's Jiangnan Shipyard in Shanghai. The deal was for two firm and two optional VLACs, with prices estimated at around USD120mn each, according to sales and purchase and newbuild vessel sources. AW Shipping has yet to respond to Argus to confirm the prices.

It added five very large gas carriers to its fleet at the end of last year. The

FREIGHT RATES

POTASH	Price type	Units	Timing	Low	High	Date
Dry potash Vancouver - China 60-65kt	outright	USD/t	prompt	28	30	27-Jun-24
Dry potash Red Sea - WC India 25-30kt	outright	USD/t	prompt	24	28	27-Jun-24
Dry potash Baltic Sea - Brazil 30-40kt	outright	USD/t	prompt	35	45	27-Jun-24
Dry potash Baltic Sea - SE Asia 25-30kt	outright	USD/t	prompt	80	100	27-Jun-24
Dry potash Vancouver - SE Asia 25-30kt	outright	USD/t	prompt	63	65	27-Jun-24
Dry potash Baltic Sea - China 60-65kt	outright	USD/t	prompt	54	81	27-Jun-24
Dry potash Baltic Sea - US Nola 50-55kt	outright	USD/t	prompt	32	40	27-Jun-24
Dry potash Vancouver - Brazil 30-35kt	outright	USD/t	prompt	54	56	27-Jun-24
Dry potash Hamburg - Brazil 30-35kt	outright	USD/t	prompt	20	22	27-Jun-24

SULPHUR	Units	Low	High	Date
50-60kt – Vancouver-China	USD/t	29	34	27-Jun-24
Below all 30-35kt				
Mid East – EC India	USD/t	24	26	27-Jun-24
Mid east – North/River China	USD/t	29	31	27-Jun-24
Mid East – South China	USD/t	25	27	27-Jun-24
Mid East – Brazil	USD/t	27	30	27-Jun-24
Mid East – North Africa	USD/t	34	36	27-Jun-24
Mid East – South Africa	USD/t	23	25	27-Jun-24
Black Sea – North Africa	USD/t	45	65	27-Jun-24
Black Sea – Brazil	USD/t	65	70	27-Jun-24
Baltic – Brazil	USD/t	65	80	27-Jun-24
Baltic – North Africa	USD/t	45	56	27-Jun-24
35-40kt – US Gulf - Brazil	USD/t	23	24	27-Jun-24

86,000m³ newbuilds — Al Ain, Zakher, Rabdan, Al Salam and Baynounah — were built by Jiangnan and are equipped with dual-fuel engines that can run on LPG, which will be used as the primary fuel, as well as standard bunker fuels, the company said.

Ammonia carrier demand is increasing as it gains traction in the energy and agricultural sectors and plays a part in decarbonisation efforts. It is becoming more popular because of its low-carbon qualities, which make it a desirable option for use in power plants and as an alternative fuel in the maritime sector. Ammonia is also extensively used in the production of fertilizer.

But development of a VLAC market could be delayed by a lack of terminal infrastructure to allow discharge of 40,000-60,000t cargoes, said Steem1960 ammonia shipbroker Lisa Maria Assmann at the Argus Clean Ammonia conference in Tokyo in May. Around 40 VLACs are scheduled to hit the water between 2026-28, when an uptake in clean ammonia trade is likely to be pushed by public tenders from South Korea and Japan.

"VLACs cannot discharge these large volumes using the existing infrastructure," Assmann said. "We have storages that are much smaller than that, terminals with draft issues, LOA (length overall) issues. With all these problems, I do not see these large volumes being discharged in a speedy manner in the short term, not before 2035-40 at least."

NITROGEN/UREA		Units	Low	High	Date
Middle East - US Gulf	45kt	USD/t	32	34	27-Jun-24
Middle East - Thailand	30kt	USD/t	29	32	27-Jun-24
Middle East - Brazil	40kt	USD/t	22	24	27-Jun-24
Baltic - Brazil	30kt	USD/t	34	39	27-Jun-24
China - India	60kt	USD/t	17	20	27-Jun-24
Algeria - Brazil	30kt	USD/t	19	23	27-Jun-24
Algeria - French bay	12kt	USD/t	18	20	27-Jun-24
Baltic - EC Mexico	30kt	USD/t	35	41	27-Jun-24
Baltic - WC Mexico	25kt	USD/t	62	66	27-Jun-24

PHOSPHATES		Units	Low	High	Date
Morocco – Brazil	30kt	USD/t	21	23	27-Jun-24
Tampa – Brazil	30kt	USD/t	27	29	27-Jun-24
Saudi Arabia – EC India	30kt	USD/t	23	25	27-Jun-24

AMMONIA	Units	Latest	Date
Ras al Khair - Ulsan, 23kt	USD/t	79	27-Jun-24
Ras al Khair - Kakinda, 23kt	USD/t	44	27-Jun-24
Ras al Khair - Kandla, 23kt	USD/t	22	27-Jun-24
Point Lisas - Ulsan, 23kt	USD/t	127	27-Jun-24
Point Lisas - Houston, 23kt	USD/t	34	27-Jun-24
Point Lisas - NW Europe, 23kt	USD/t	55	27-Jun-24
Bontang - Ulsan, 23kt	USD/t	35	27-Jun-24

Moroccan fertilizer output untroubled by ship fire

Moroccan fertilizer major OCP's operations have suffered minimal disruption from a fatal explosion and fire on a vessel anchored off the firm's Atlantic hub at the port of Jorf Lasfar.

An explosion in the Toro Rosso's engine room on 30 May resulted in several fatalities and injuries to other crew members. OCP has a production capacity at its Jorf Lasfar facility of 12mn-13mn t/yr of DAP, MAP, TSP, NP, NPS and NPK products. The firm is assessing the extent of the damage caused by the incident, but it is unlikely to impact OCP's production, although port loadings may be affected slightly.

Argus understands that the 91,384dwt Toro Rosso was to be loaded with NPS. The product was likely to be shipped to Djibouti for Ethiopia's EABC.

OCP was awarded the full volume of just below 1.36mn t in EABC's latest tender to buy NPS, which was issued in mid-August. OCP was also awarded the full volume in each of the four previous EABC annual tenders for complex fertilizers.

South Korea to expand ammonia infrastructure

South Korea is building up its ammonia infrastructure, with fertilizer producer Lotte Fine Chemicals (LFC) and chemicals firm Namhae Chemical proposing expansions.

Namhae is building a new 25,000t ammonia tank at Yeosu, expected to be completed in June with commercial operations to begin in September. This will bring the total tank capacity at Yeosu to 80,000t. Domestic conglomerate Hanwha Corporation currently uses a 15,000t ammonia tank at Incheon.

LFC plans to expand its storage tank capacity at Ulsan and its existing ammonia vessel fleet to prepare for future clean ammonia purchases, said its general manager John Kwon at the Argus Clean Ammonia Conference in Tokyo earlier this month. LFC is looking to increase its ammonia tank storage capacity from the current 90,000t by an additional 100,000t to cater to future clean ammonia demand.

LFC purchased a new 25,000t medium gas carrier Manta Salacak in March this year, with it to join LFC's fleet in September as it increases its flexibility for future shipments. LFC is also looking at long-term chartering options for a 60,000t very large gas carrier for eventual transportation of clean ammonia. The company is currently chartering a 40,000t large gas carrier Polar for its existing ammonia shipments.

Clean ammonia and hydrogen demand as a new energy source in South Korea is expected to increase significantly in the coming years, supported by government policies and demand from power plants. At least 2.1pc of South Korea's electricity will be produced by hydrogen and ammonia by 2030, said Kwon, which would require around 5mn t of ammonia. South Korea currently imports around 1.3mn t of ammonia each year. Namhae and LFC buy around 700,000 t/yr and 500,000 t/yr of ammonia respectively, mostly through contractual arrangements from the Middle East or southeast Asia.

LFC also aims to eventually buy clean ammonia from different regions to diversify and ensure supply stability. It will receive future clean ammonia shipments from Ulsan port and is also working with port authorities on plans for ammonia bunkering opportunities. Ulsan port will be equipped with a re-export facility, targeting to achieve ship-to-ship ammonia bunkering in South Korea by 2028. ■

Price watch

*These market insights are provided by **Argus Fertilizer Analytics team***

AMMONIA

Tightness continues to build in the Middle East and Asia

Price sentiment diverged as expected in the east and west-of-Suez markets, given differences in regional balances and the near impossibility of ammonia shipments resuming through the Suez Canal. Tightness in the east-of-Suez market was driven by a scheduled outage at Saudi Arabian state-controlled Ma'aden's 1.1mn t/yr MWS% plant, and India's demand starting to pick up ahead of the kharif crop season. Meanwhile, fertilizer demand seasons wrapped up in major northern hemisphere markets and pre-existing production outages were resolved, allowing US Gulf producers to switch to prioritise exports instead of serving the local market.

This dynamic in the west prompted a greater-than-expected fall in the Tampa contract price for June. The contract fell by USD50/t to USD400/t cfr, despite recent news that Trinidad's gas supply to ammonia producers would be cut by 37% for 25 days in June, resulting in an expected production loss of 125,000t for the month. This would have promoted a bullish price reaction if it was during a period of strong demand, but the outage is aligned with a low-demand period in both the US and Europe, so the reaction has been negligible so far. We are expecting softer sentiment to remain until the start of the autumn fertilizer demand period, although the dynamic in Europe could change on the back of gas price volatility.

The European production cost picture shifted in May as TTF prices firmed on news that a Russian natural gas supply agreement with Austria may be under threat. TTF prices breached USD11/mn Btu, which by our calculations took the average production cost above the import price for the first time this year. The reaction to the gas price increase has been muted so far, with no announcements of major production rate changes. But European import rates are starting to build, and could raise the floor for summer pricing should gas prices remain elevated.

Additional supply from Russian producer Uralchem's Taman Black Sea terminal — due to commence shortly — may provide some relief if the balance in the west does shift, but for now we are expecting Taman exports to be limited. Producer TogliattiAzot has transported 3,300t by rail to the port. When this ships, it will be the producers' first ammonia export cargo since the closure of the Togliatti-Odesa pipeline in February 2022. We are accounting for one 23,000t cargo a month from the terminal from June onwards.

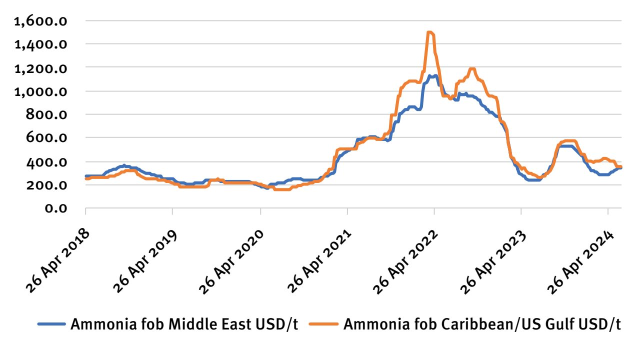
The north Africa cfr benchmark range will diverge further in the next month or two as rising prices on the back of out-ages in the Middle East push up the high end of the price range, while netbacks to the Caribbean soften following the sharp fall in the Tampa contract. Moroccan producer OCP is still buying much of the spot volumes being offered out of west-of-Suez markets, mopping up much of the spare capacity. Less product will be available from Trinidad this month, but the shortfall will be made up for by increased availability out of the US Gulf, allowing prices to keep softening.

In Asia and the Middle East, the tightness will relent once Ma'aden's unit comes back on line, as regional demand is not high enough to provide the support required to keep prices at their forecast level for June. Extra interest from Indian buyers is adding upwards pressure on delivered prices, especially given limited spot cargoes being offered. Indonesian producers have been prioritising domestic fertilizer production over the past two months, but should have some spot availability for July, further easing the market.

A seasonal uptick in fertilizer demand is expected from September, driven by the US and Europe. At this point, all major benchmarks will begin to climb once more and continue to do so until the end of the year. The start-up of the US' Gulf Coast Ammonia project is expected to align with the peak US demand in the fourth quarter, so the additional supply will help limit the extent that prices go up. Our forecast for peak pricing at the end of the year is below the peak in 2023, when the global merchant market was more finely balanced as the demand season began shortly after several major global production outages.

A lower peak price in 2024 means prices have less far to fall at the start of 2025, when fertilizer demand will begin to recede again. The additional supply from Russia and the US will also mean that price volatility should be greatly reduced in 2025, and an event such as a major plant outage will likely have less impact on the market than Ma'aden's outage is expect to have this month.

Ammonia historical pricing



PHOSPHATES

Suppliers push for higher fob prices

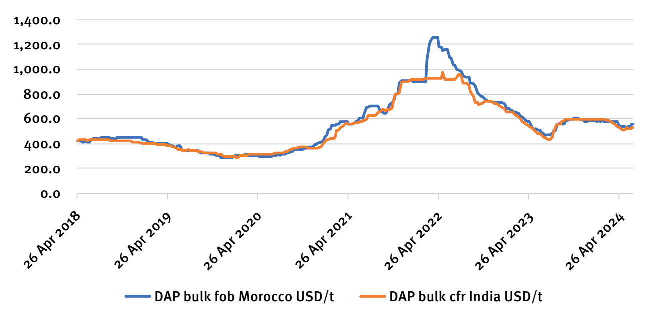
Healthy global phosphate demand and a persistently tight market are encouraging suppliers to push for higher fob prices. East of Suez, Indian buyers are reluctant to accept higher Chinese DAP fob offers, but their position is likely to prove unsustainable. India's current subsidy regime and maximum retail price will temper upward price movements, but alternative outlets in the Chinese domestic market, southeast Asia and Bangladesh will erode any existing leverage for Indian buyers, and we forecast that DAP supplier fob prices will increase further, particularly as more pressure will come from tighter Saudi supply in the near term.

But we expect prices to ease temporarily in July as a result of Chinese exports picking up once domestic demand starts to recede, and this will add to near-term price volatility. By August, competition between the MAP and DAP markets will push the DAP market into deficit and prices will firm. Further upward pressure will come from south Asian buyers seeking to secure product ahead of rabi, especially as India and Pakistan will be making up for delayed buying in the first half of the year, while awards from the imminent Bangladesh tender are likely to have been made and loadings will be under way.

West of Suez, European demand is subdued and regional buyers are expected to remain largely absent until the fourth quarter. But on the supply slide, Lithuania's Lifosa plant is eyeing a restart in June, which would help ease some of the region's supply pressure once a new round of buying begins. Russia has proposed raising its mineral extraction tax (MET) and introducing a tax on ammonia production, which could eat into phosphate producers' margins, but such moves are not yet expected to impact production or traded volumes.

Moroccan producer OCP is continuing to focus most of its attention westward and at the MAP market, where netbacks are more attractive, and this is tightening the market further and supporting firm sentiment in the east. Buyers in the subcontinent will need to increase their price expectations if they are to entice OCP to ship significant volumes to the region, so for now, MAP and other phosphate products will be the focus for this key global supper. Lower Chinese MAP export availability has given OCP another reason to pay more attention to the west than the east.

Phosphates historical pricing



In the US, summer fill purchases are already winding down and we expect DAP barge prices to find some stability over the next month or so, and decline across the rest of the third quarter as a result of weaker demand. There is still concern about MAP supply for the autumn, despite some replenishment at terminals, which has resulted in demand for TSP rising in the US, and this is likely to become a more embedded feature during the autumn, with duties on Russian and Moroccan product limiting the pool of MAP supply options. We expect barge prices to firm again after more material phosphate demand emerges for the autumn, and we anticipate that seasonal price support will be strengthened by continuing concerns over the availability of supply. Larger prices spreads with other regions will return to be part of our forecast narrative for spring next year, as the US will need to attract supply from further afield.

POTASH

Russia and Belarus leading supply growth

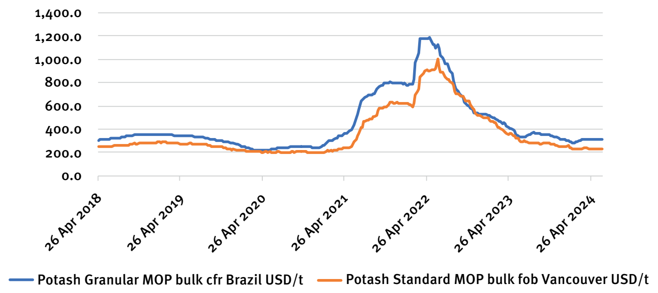
Potash prices look set to continue their recent neutral trajectory through the summer months as demand is healthy but supply is sufficient to cover requirements. Suppliers are reluctant to soften prices further but, with export volumes forecast to rise for Russia, Belarus and Laos, there is plenty of competition in the market. Affordability is good globally, and this is encouraging demand.

Although some cargoes have flowed into India this year, the window for signing a contract that allows meaningful imports in time for the kharif season is narrowing, as the monsoon season has begun. We maintain a contract should be settled imminently, around USD270-285/t, but India has so far confounded expectations, contributing to a softer market for standard grade MOP.

India's delay in signing an import contract for 2024 has caused MOP prices in southeast Asia to drift lower through the year. Southeast Asian buyers continue to push for lower prices, but suppliers will start to withdraw from the region if prices continue to soften. This could finally support prices, as demand is healthy, and fertilizer affordability is supported by strong rice and CPO prices.

China's spring demand caused a significant drawdown in stocks as NPK producers raised output to meet strong domestic demand at comparatively low fertilizer prices. China may settle a contract in the near-term to rebuild stocks but, with product flowing from Laos, and Belarus by rail, China is unlikely to face market tightening, especially as the market moves to the quieter summer period.

Strong imports into Brazil in the year so far have eased concerns around product availability ahead of the peak demand season. Supply to the Brazilian market remains competitive, and this should prevent prices rising substantially through summer. After Brazil global attention will shift to the US and Europe, Potash historical pricing



both of which will import for use after summer. These markets have tracked down towards parity with Brazil, but Europe will likely retain a premium that reflects the continued absence of Belarusian and Russian product in the region.

Russian exports have returned to historical levels, and we forecast that ongoing ramp-up by Eurochem will lead to year-on-year growth of 2.3mn t to 12.5mn t for total Russian exports this year. This is greater growth than anticipated for Belarus, although its railed volumes have risen after a comparatively slow first quarter. We forecast Belarusian exports at 10.1mn t in 2024, 7% above last year's total.

These two producers account for most growth forecast in MOP supply this year. Delays to projects in Laos have limited possible growth there, as Laotian producers were already running assets at high utilisation last year. Other producers are expected to keep production stable from 2023.

Elsewhere there is more downside than upside which could tighten the market. Middle Eastern producers are contending with disruption to shipping through the Red Sea. Although this has yet to impact production, it is likely that Middle Eastern producers will reduce shipment to Asia this year. In Canada both Nutrien and Mosaic have underutilised capacity which could be brought on line in the event of a tightening market, but there is risk that Canadian supply may be disrupted by strikes on Canada's rail network or at Vancouver port.

SOP prices are being supported by a tighter market than for MOP, which is leading to a wider premium for the specialty over MOP than has been typical historically. Export restrictions remain in place for Chinese producers, and even high operating rates for Mannheim producers benefiting from low MOP costs have not been sufficient to ease market tightness. Demand is healthy after two years of lower use at high prices, and this should support values through the next quarter, although buyers are conscious of the abnormal premium and unwilling to accept higher costs, even with limited availability.

Rainfall in Panama is easing drought conditions at the Panama Canal, with increased transits expected to result in falling freight costs. Disruption at the Red Sea looks less likely to clear near-term however, after more attacks on vessels, and this should result in high freight costs for ships using the Suez route or transiting around the Cape of Good Hope in South Africa.

SULPHUR

Middle East export prices to edge up

The global sulphur market has remained somewhat stable to subdued with a lack of spot demand in some key markets and elevated freight costs, as well as third-quarter contract negotiations getting under way in many regions. Sulphur remained under-valued versus DAP, when looking at the Moroccan market, in recent months because sulphur pricing has been driven down amid ample availability. But the gap is now closing, with the sulphur moving towards a more historical range of equilibrium.

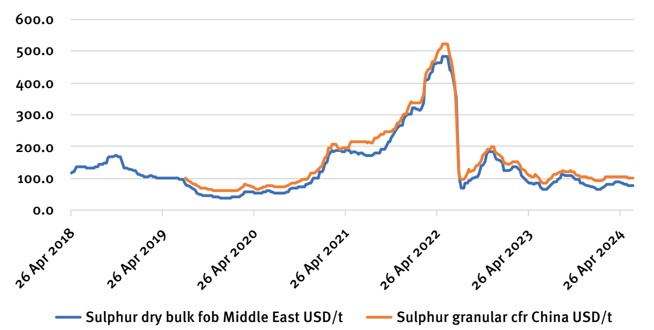
The short-term view for the sulphur market is being supported by the DAP market firming faster than expected, regional tightness in western Europe, the expected increase in Indonesian metals demand and the view for elevated demand in Morocco as sulphur-burning capacity ramps up. At the same time, merchant sulphuric acid prices remain at a premium in most markets compared with sulphur, further adding to potential for swing buyers to consider elemental sulphur.

We expect to see some further soft-to-stable prices before moving to slightly higher prices at the start of the third quarter. But these price ideas are being tempered by a recovery from previous geopolitical price drivers earlier this year, China's high sulphur stocks at ports and an expectation that the DAP market will come back down in the third quarter. These factors will provide a ceiling to the firming for sulphur, preventing a significant run-up in pricing, with a more stable view moving into the first half of 2025.

The recent boost in domestic DAP demand in China has given phosphate exporters an additional outlet alongside the Bangladesh private tender, encouraging producers to push for higher fob levels. The transition into a firmer DAP market is happening earlier than expected, which will support sulphur pricing, albeit at a lag, and the demand boost in the phosphate fertilizer market is expected to limit the decline in sulphur pricing in the latter part of the third quarter.

Meanwhile, tightness in the western European molten sulphur market has kept many consumers running at below capacity rates at burners, constrained by ongoing shortages.

Sulphur historical pricing



Import options are limited because of logistical bottlenecks and a lack of remelting capacity. Molten vessels can come into the region, bringing supply from the US, but this is still not enough to meet demand in the current constrained market. Thus, buyers are being forced into accepting price premiums on spot tonnes just to ensure product, keeping pricing firm. This tight supply situation is not expected to ease in the short term, likely playing a role as negotiations for third-quarter contracts get under way.

Indonesian nickel-based demand is expected to ramp back up after a slowdown in purchasing activity. In southeast Asia, July and August demand is expected to be high, particularly in Indonesia, and swing buyer Lygend is already in the market for 100,000t of sulphur. With more than half of Indonesian sulphur being sourced from Saudi Arabia and the UAE, this will support Middle Eastern fob values across the third and fourth quarters and the first half of 2025.

Moroccan sulphur consumer OCP was active in the merchant sulphuric acid market in the first half of this year. Acid imports totalled more than 500,000t in the first quarter, according to trade data, and 1.1mn t up to July, according to Argus line-up data. Burner capacity is ramping up, with additional capacity set to come on line in early 2025. This supports the view for strong sulphur import demand. From the fourth quarter, we expect north Africa prices to increase to USD106/t cfr on the high end, up from the USD100/t forecast for September.

Firming in global markets will be tempered by rising availability, and contract negotiations for the third quarter will provide more price direction, with some regions expecting decreases. There will also be some softening in the DAP market as prices come off their temporary run-up after demand is met, which will filter through into sulphur pricing and limit prices from a major run-up. High sulphur port stocks in China also contribute to potential price softening in the next quarter, as buyers will not be in a rush to re-enter the spot market and make fresh purchases.

NITROGEN/UREA

Limited supply from Egypt and Nigeria

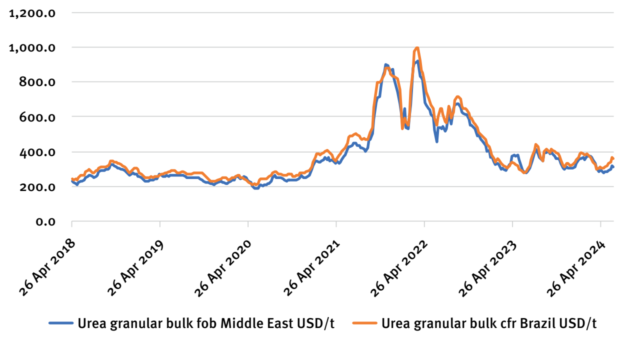
Urea prices have risen by USD30-40/t from their low point at the beginning of May. Several factors lie behind the rally:

China – the policy of restricting exports has continued and looks likely to persist, meaning there will be no bulk cargoes for export from China for another month.

Crop prices – European wheat prices have rallied strongly owing mainly to concerns about crop conditions in Europe and elsewhere, rising by about 30% in the second half of May. Corn prices are also favourable for the new season. This is helpful for farmer demand.

Egypt – rumours that the government would demand a 20% reduction in urea output to conserve gas supplies were confirmed in the second half of May. Combined with short covering for Europe, this prompted a surge in buying.

Urea historical pricing



Europe – Yara set its new season prices for nitrate fertilizers at levels permitting imports of urea up to USD330-340/t fob Egypt.

Nigeria – unplanned outages owing to gas supply issues have reduced availability.

Low prices – urea had fallen to USD285/t fob in north Africa, almost exactly the same level at which prices bottomed out in 2023. Buyers found this level acceptable again and demand picked up in several markets, notably Brazil, as well as Europe.

The question now is whether the rally in price has legs and will continue to run for the coming months. Given the absence of Chinese urea and limited Egyptian supply, pricing should remain firm, with Middle East prices established at USD310-315/t fob, and those producers volumes still to sell should see some further upside in price.

Beyond that, and assuming China does start to export again, the picture is more cloudy. Our trade balance shows the market moving into surplus in July and remaining readily available through August and September. This is based on the assumption that China exports 250,000t in July and increases volumes thereafter.

Given production rates above 170,000 t/day and lower domestic demand from July, it would be surprising if exports do not resume, but China frequently does surprise. On the demand side, India has large urea stocks and can afford to wait before tendering to buy.

The impact from China's stance on exports has been felt most in Asian markets. In the west, US prices have started to ease as the spring season winds down and Nola prices are now at a USD20/t discount to Brazil on a cfr basis. This should prompt more urea to be offered into Brazil and affect price levels there eventually. But demand from other Latin American markets is robust. Argentina is buying more than in 2023, and Mexican imports appear to be running ahead of last year as well, providing alternative outlets.

Looking further ahead, prices in the first quarter of next year could be set for a boost should China repeat its policy of reducing exports again. ■

Special focus

THE FERTILIZER ECONOMY ›

Fertilizer market opportunities for investors

Written by

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'What are the market opportunities for investors?' is quite an expansive question. And, to be candid from the outset (and wanting to tamp expectations), I am not going to attempt to quantify grand opportunities, nor even the faster growing sub-segments of opportunities.

Aligning the myriad of technological opportunities, with the varying profiles of investors across a disparate global market of agricultural practice is simply too hard to form confidence or credibility around a number. Instead, I am going to paraphrase the author of Thinking Fast and Slow, Daniel Kahneman, and suggest that investors should probably less singularly make a decision based on a number and more on the story behind it. And, the story is certainly more compelling and interesting, anyhow.

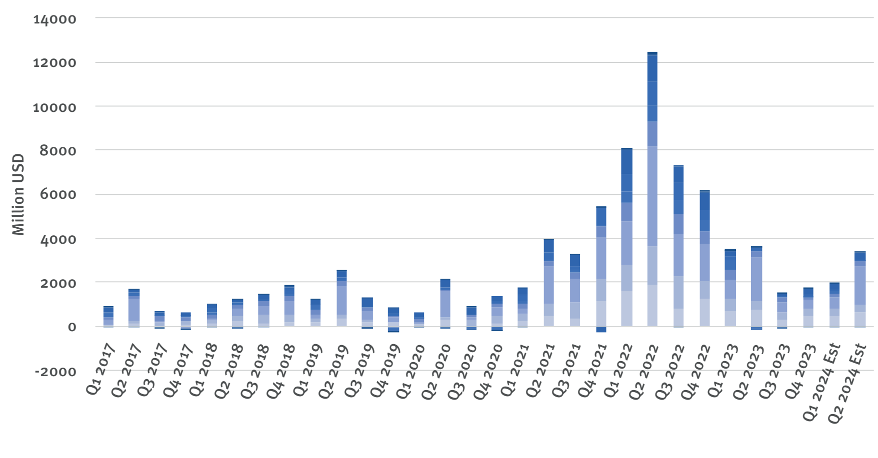
The starting point of the story is the fertilizer markets today, the industry protagonists and the market outlook. And, while we are at pains to highlight that we are only ever one weather event or one geopolitical factor away from change, 'retraction' is an adequate descriptor of global markets today. The retraction relates to a traditionally rich seam of investor returns in statistical arbitrage; mean regression. The mean regression in pricing and earnings of fertilizers and fertilizer companies has been playing out since the peaks in pricing seen after the onset of the Russian invasion of Ukraine.

Declines in investment

The earnings growth that was seen as a result of global factors beginning in 2021 has largely subsided. And, as figure 1 illustrates, the relative capacity of the fertilizer industry to invest much beyond sustaining CAPEX has certainly pulled back from the peaks seen in 2022. And, in some cases this retraction has taken a deeper hold, with some commitments loosening on transition, commentary around curtailment and moth-balling assets and certainly a reluctant appetite for M&A by many of the large incumbents (beyond just the fertilizer space). This is framed more by the commodity price outlook and deteriorating outlook of grower margins than anything else. All in all, while wholesale pessimism for the industry is several steps too far, the halcyon days of 2022 do seem some way off.

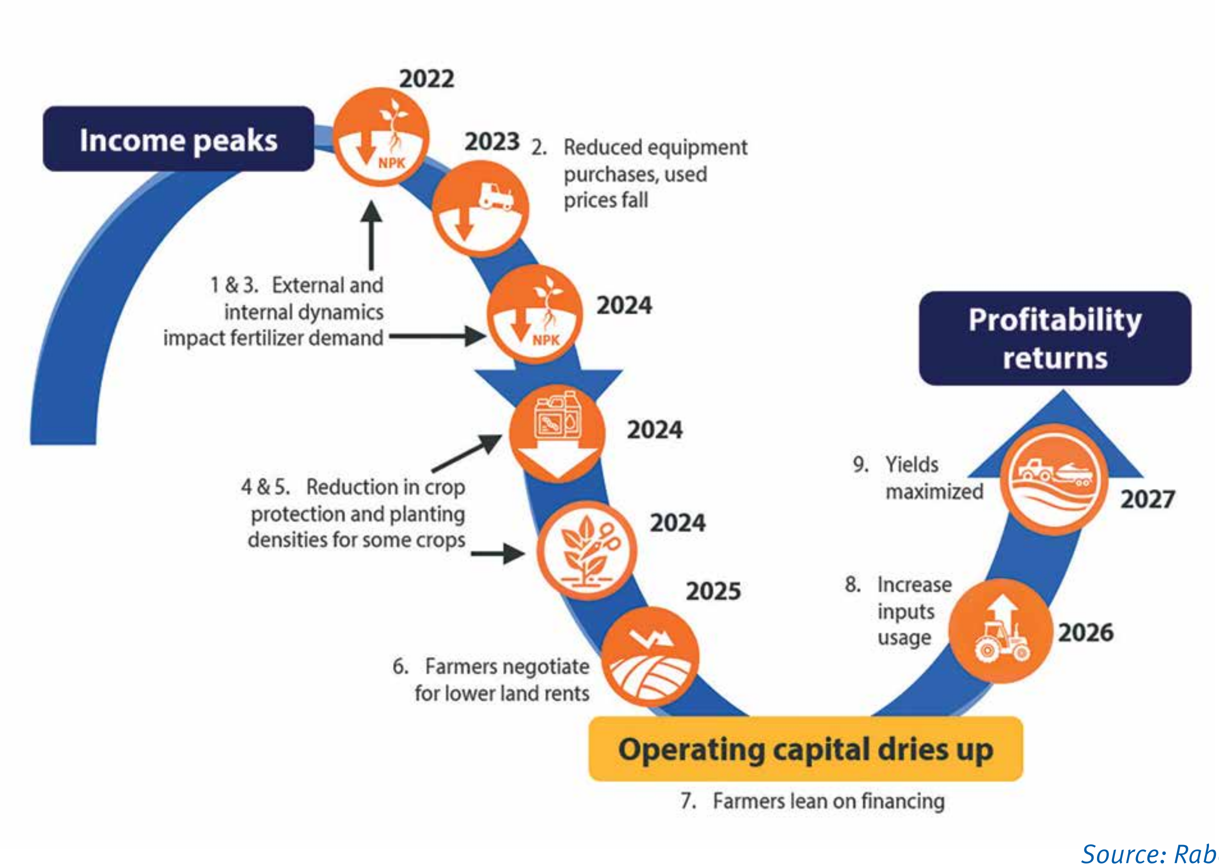
And, so too the view of farmers does seem more stoic. Margins have certainly taken a step back in many key growing regions (particularly the Americas), and in this, precedence certainly exists. The common cyclicality of cause and effect of

Figure 1. Cumulative EBIT of a collection of public fertilizer companies



Source: Bloomberg, Company reports and Rabobank 2024

Figure 2. Stages of behaviour during a "typical" row crop cycle



Source: Rabobank

high commodity prices, leading to high product demand, leading to high input prices, leading to cutbacks, falling commodity prices and compressed margins has begun its downward slope. Slowing product growth or weakening product pricing power are often the predominant realities here. Which, when viewed through the lens of the increasingly blurred portfolios of companies in soil nutrition, seed genetics and control products, it becomes increasingly interesting what exactly is happening beyond just the fertilizer players, and what peer (from the seed and chemistry industry) appetite for investment is. Inventory overhangs in the global agrochemical market, for example, are not irrelevant to the potential competitive sphere one may face in an M&A process for a bio-nutrition platform. At the commodity peak (and quite a long

The earnings growth that was seen as a result of global factors beginning in 2021 has largely subsided

way after) valuations for potentially disruptive and innovative products and platforms swelled. But, by 2023 the market for innovation took a hit. AgFunder suggests that Farm Tech Investment at the VC deal level took a 50% drop in 2023 vs 2022. Macroeconomic factors and deflating commodity prices were two key factors driving this, for sure. Compounding this in 2024 may well be a landscape where the ag majors are less active in potential exits and credible high cash burn and pre-revenue platforms may be running low on cash.

Additional value propositions

This context is step one in understanding the market opportunities for investors. Step two is understanding the more secular trends. IFA give a medium-term global nutrient volume growth rate that ranges from 1.5-2.0% p.a. in the coming five years on - a ceteris paribus scenario. Longer term, very bullish theses have been placed upon the ability of new technologies, products and farm practices to cause significant volume demand

Typically, we overestimate the changes that will occur in the next two years and underestimate those in the next ten

destruction, over the longer-term. So, over time, assets will need to be right-sized.

Beyond this, a few other high-level theses are ubiquitous to the agricultural industry. Agriculture has traditionally focused on yield and productivity gains, and this will persist. But increasingly agriculture will not be just about 'what and how much' of something is produced, it will also be about 'how' things are produced. This not only opens the opportunity for new products and technologies to arbitrage away the farmer's wallet in competition with conventional peers and inputs. And, it creates an additional value proposition that could be tapped into, a second engine of growth, potentially.

In terms of energy transition and future fuel types; from the molecule standpoint, this relates to hydrogen, ammonia and complementary infrastructure and logistics. From a storage standpoint, this has often alluded to phosphate use in battery storage and the related value chain.

These two particular high-level examples (better/measured practice and energy transition) fall at arguably the alternate ends of the investor profile spectrum. Taking synthetic biology product discovery platforms as an example, these are high cash burn, long-term proof platforms, that represent both technological and market risk. These platforms have a very high level of potential to disrupt the agricultural landscape but their time to scale is slower than many may hope and a large amount of the complementary assets (credibility, route to market, distribution) are beyond their control.

Alternative investment partners

These kinds of investor opportunities are likely to be most applicable (at present) to deep tech venture funds. Whereas, the energy transition thesis – often centered around green ammonia transition – may themselves be more suited to the incumbents, the infrastructure funds, special situation private equity funds, asset managers and sovereign welfare funds.

But, 'when you zig, I zag' may be an edict of best practice when looking at investment opportunities for markets over the coming period in the cycle. Very few of the investment theses that were in play at the peak commodity price environment have themselves been debunked. They now just trade at a discount to previous points in the cycle, and there is a chance that a less competitive process abounds, with fewer strategics in play to use the creative functions of 'synergy' to price others out of the market. One of the most interesting investment opportunities may well be a function of finance; greater collaboration between alternative investment partners. Venture Capital (VC) has been a protagonist of change and innovation in many industries, but in the recent analogous past, these have been faster-moving industries than agriculture. The misfortunes of a badly timed raise with a non-compliant macroeconomic environment do not negate the value of platforms with genuine innovative potential. They may however sink them. While collaboration with strategics may be an out route for a number of these companies, so too may be the opportunity of Private Equity (PE) to test their parameters of risk in partnership with well-heeled VCs, to buy time and prove out the concept. The relative quantification of how 'de-risked' these platforms may be, could be open to debate, but there may also be rich pickings here.

Appetite for greater risk

'When you zig, I zag' may also be a function of opportunity cost and value capture. There are undoubtedly public companies that could be better placed private. And, as strategics look to right the proverbial ship by defenestrating lower margin assets and products, opportunities for consolidators by an aggregator may exist. Retraction here may not be exclusively in the poor performing assets however, it may also be in geographies where the cost of sustaining growth is too onerous under current market constraints. And, where there is the most pressure it is often not what you want to sell that sells, but what in fact you can.

Change and opportunity in these conflating farm inputs and energy transition markets may be seen a little as a prisoner's dilemma by the incumbents, but best through the lens of Amara's Law by those looking to play in the future. For those with dry powder, there may be a lot of opportunities in these sectors/industries. Strain in the industry may leave incumbents retracting at a point where valuations have fallen and these remain intact. Those once burned may be viewing through a sense of some disappointment if deep tech innovation bets have yet to yield results. However, as futurist Roy Amara says: "We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten". If this is in fact the case, which I believe it is, there may be plenty of investment opportunities, particularly those in private equity with the appetite for greater risk. ■

Argus Insight:

Laotian MOP supply boom

Key challenges and the need for a new Laos MOP price assessment

Laos is emerging as a major MOP producer in southeast Asia. There are two active mines in the country, operated by Lao Kaiyuan and Asia-Potash, both based in Khammouane province. The producers have combined production capacity of about 3mn t/yr as of early this year, but this is set to grow further.

Lao Kaiyuan and Asia-Potash in the past few years have actively expanded their capacity to cater to Asia's growing demand for MOP.

Lao Kaiyuan in 2022 announced a two-phase expansion project. The first phase, commissioned in May 2023, added 500,000 t/yr to its existing 500,000 t/yr capacity, taking its total MOP capacity to 1mn t/yr. And during a site visit to Lao Kaiyuan's mine, the producer confirmed to Argus that phase 2 has commenced, which involves building a 1mn t/yr unit that would take its production capacity to 2mn t/yr. The second phase is scheduled to be complete by the end of 2025.

Ambitious plans

The company also completed the expansion of its granulation unit in the fourth quarter of 2023, doubling capacity to 400,000 t/yr from 200,000 t/yr.

Asia-Potash, the larger of the two producers, has more ambitious plans. In October 2021, it completed a 750,000 t/ yr capacity expansion and restructured its existing 250,000 t/yr plant to provide a total installed capacity of 1mn t/yr. In March 2022, it managed to ramp up production to operate at full capacity. The producer has aggressive expansion plans and in January 2023 successfully conducted trial production at its second 1mn t/yr project, which achieved full production before the end of that year. It also started trial production at its third 1mn t/yr MOP unit in the first week of April this year.

In the long term, the producer aims to reach total installed capacity of 5mn t/yr by 2025 and an eventual capacity of up to 10mn t/yr.

Beyond these two producers are a number of projects active in their early stages in the north of the country, seeking to develop potassium deposits close to the capital city of Vientiane. These projects, including one that is under development by Chinese MOP producer Zangge, provide further upside potential to

Figure 1. Asia-Potash production ramp-up plans (mn t)

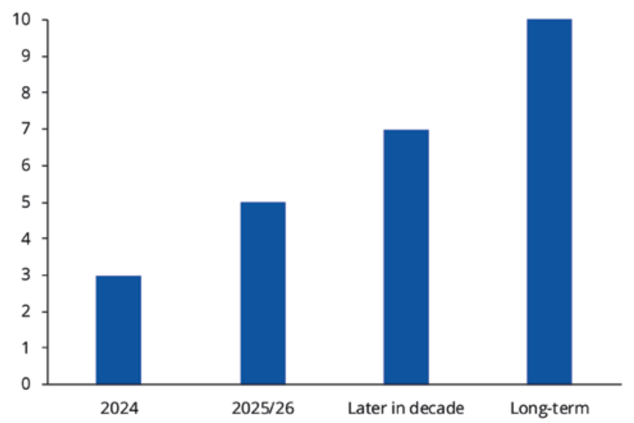
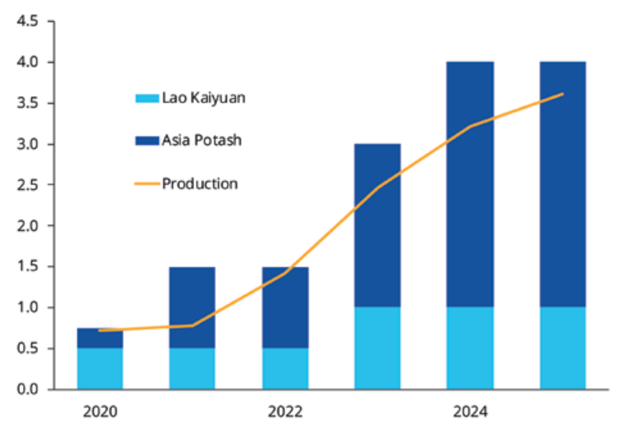


Figure 2. Laos production forecast for 2024 (mn t)



Laos' production in the long term. All these projects are covered in the Argus Potash Analytics mid to long-term outlook service.

Where will all of this MOP go?

Laotian MOP has gained a significant market share in China and southeast Asia in recent years, moving product through various channels, including direct sales and trading firms. Laotian deliveries to China grew to 1.71mn t in 2023, from 127,800t in 2020, rising to 14.6%of total market share in 2023 from 1.4% in 2020, GTT data show. The supply to China has come as no surprise given that the capacity expansions are backed by Chinese investment. As Laotian supply grows, it is expected that supply to China will also increase.

Laotian exports to southeast Asia – including those to Indonesia, Malaysia and Vietnam – totalled 526,000t in 2023, up by 43% from 2020 volumes, GTT data show. Laotian market share in these three markets rose to 11% in 2023 from 7% in 2020.

To ensure continued growth, Asia-Potash signed a 12-month supply agreement with KC Salt International to supply 200,000 t/yr of MOP to KC Salt's subsidiary, HC International, in Thailand. This supply agreement began in July 2023. The producer subsequently signed a 12-month agreement with South Korean trading firm Samsung to supply 200,000t of MOP for Samsung to sell globally. Shortly afterwards, the first Laotian cargo was sold outside of Asia to Europe, as reported in the Argus Potash price reporting service on 27 July 2023. This granular MOP cargo from Laos arrived in Romania in September 2023.

Laos' production can grow alongside regional demand, as MOP consumption in southeast Asia is forecast to increase by 1.5mn t by 2030, with Chinese consumption growing by just less than 1mn t over the same period, as forecast in Argus Potash Analytics.

Figure 3. Map of Laos and key export ports in Vietnam

Disclaimer: Argus depicts geo-political borders as defined by the United Nations Geospatial Information Section. For more information visit https://www.un.org/geospatial/mapsgeo/generalmaps

Challenges for Laotian producers

The majority of Laotian MOP is sent by truck to several Vietnamese ports to be exported on vessels to China and southeast Asia. Producers also send bagged product by truck to Thailand. The China-Laos railway has yet to become a popular distribution route into China for the producers.

Laos' current logistical infrastructure seems unlikely to be capable of supporting the producers' ambitious plans to send up to 10mn t/yr of product by truck and would require significant investment by the producers or government to achieve this aim. ■

Argus launches new price for Laotian standard MOP
It is clear that Laotian MOP in recent years has gained significant market share in southeast Asia and China, and this is likely to grow further as supply increases. Given the lack of pricing transparency for Laotian product in the MOP sector, Argus has launched a weekly bagged Vietnam standard MOP fob price assessment within Argus Potash. This price assessment will accurately and reliably capture the price of Laotian standard MOP being sent by truck to various Vietnamese ports in 1t or 50kg bags. The price will provide more visibility on Laotian MOP prices to better inform business decisions.

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Advancements and challenges in Brazil's agribusiness sector

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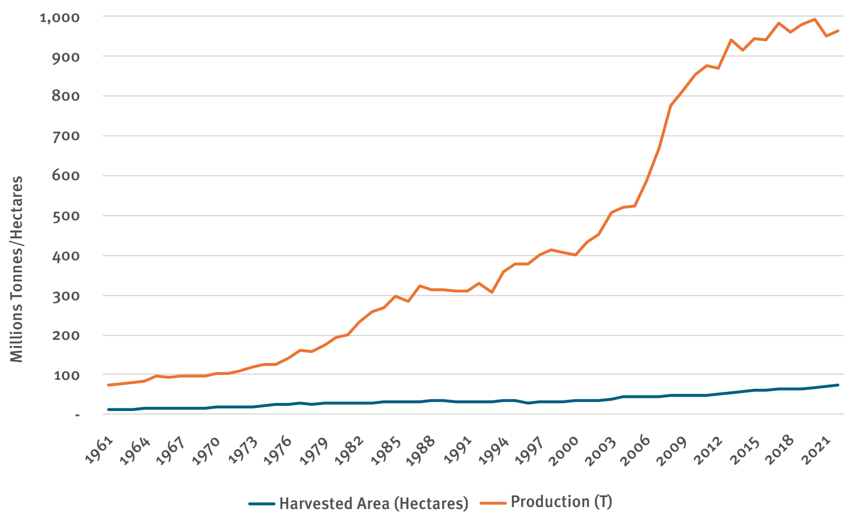
Brazil currently stands out as one of the main protagonists in the global agribusiness landscape, holding the fourth position among the world's largest grain producers, surpassed only by China, the United States, and India. The country accounts for 7.8% of the world's total production and ranks as the second-largest global exporter of grains, commanding a 19% market share.

This prominent status is the outcome of continuous technological advancements, particularly characterized by the collaborative efforts between the public sector, private sector and academia, that have significantly increased production, notably in sugar cane, corn, soybeans, and rice, which collectively rose by 325% from 2000 to 2022, while land utilization expanded by 193% during this period.

Innovative agricultural practices in Brazil have boosted the use of NPK-based fertilizers, with usage surging from 6.6 mn t to 21 mn t between 2000 and 2021 - a 152% increase. However, the country heavily relies on imported fertilizers, with 19 mn t out of 21 mn t used in 2021 being imported. Imports have grown by 190% since 2000, while domestic production has only increased by 24%. Notably, the data considers the nutrient content of fertilizers rather than just their quantity.

Analyzing the top trading partners, there is a heavy reliance on countries such as China, Russia, and Canada, exposing the Brazilian food chain to external vulnerabilities such as financial, health, military, or logistical crises. In response to these uncertainties, the Brazilian government introduced the National Fertilizer Plan 2050 (PNF) in 2022,

Figure 1. Harvested area and production for rice, corn, soybeans and sugar cane

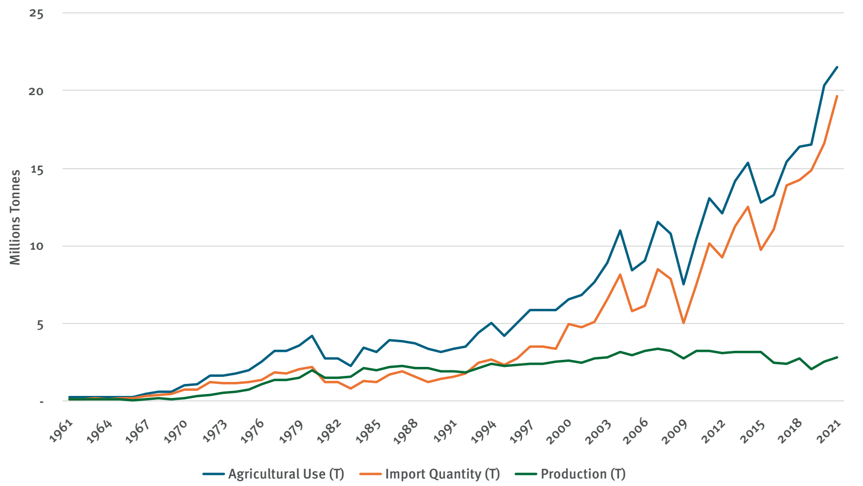


Source: FAOSTAT, 2024

ratified in 2023. This initiative aims to fortify policies that enhance competitiveness in the production and distribution of fertilizers within Brazil in a sustainable manner.

The PNF encompasses collaborative efforts between the public and private sectors. Its overarching goal is to reduce external technological and supply dependencies, thereby mitigating the impacts of international crises. Additionally, the PNF seeks to bolster the competitiveness of Brazilian agribusiness in the global market and promote sustainable development within the sector.

Figure 2. Fertilizers: Agricultural use, import quantity and production



Source: FAOSTAT, 2024

The National Fertilizer Plan

A national plan for fertilizers and plant nutrition should prioritize supply chain elements, benefiting both industry and rural producers. The PNF aims to enhance competitive fertilizer production through:

1. Modernizing, reactivating, and expanding existing industrial plants
2. Improving the business environment to attract investments
3. Promoting competitive advantages in the global fertilizer chain
4. Increasing investments in research and development
5. Upgrading infrastructure for logistics integration

These guidelines, informed by international benchmarking and sectoral analyses, address challenges and opportunities for strategic advancement.

The future of Brazilian agribusiness

To ensure the effectiveness of Brazil's National Fertilizer Plan, strategic investments in sustainable infrastructure and policies are essential. The PNF should align with complementary initiatives such as the Plan for Adaptation and Low Carbon Emission in Agriculture (ABC+), the National Hydrogen Program (PNH2), and the National Program for the Conversion of Degraded Pastures (PNCPD).

ABC+ focuses on expanding sustainable agricultural practices through technology transfer, applied research, and economic diversification to enhance environmental sustainability and economic viability in agriculture.

PNH2 promotes low-carbon hydrogen production to reduce emissions in industries such as transportation and power generation, with specific goals such as establishing pilot plants and low-carbon hydrogen hubs.

The PNCPD targets converting 40 mn hectares of unproductive pastures, aligning with international commitments to expand food production without deforestation, while encouraging financial support for sustainable practices and aligning with environmental recovery policies.

These initiatives collectively strengthen sustainability in Brazilian agriculture while elevating the fertilizer industry. By investing comprehensively in these policies, Brazil aims to meet growing fertilizer demands while promoting resilience, productivity, and greenhouse gas emission control.

Sector analysis and strategies

Nitrogen

Nitrogen benchmarking reveals the intricate interconnectedness of the nitrogen fertilizer production chain, involving multiple stages with interactions extending to other production chains. Its significance also spans the energy and non-energy sectors, encompassing the natural gas, hydrogen, and ammonia chain. In this dynamic context, the nitrogen fertilizer market is subject to influences from various categories, presenting the potential for competition in inputs and generating fluctuations in intermediary prices, among other effects.

Sectoral integration unveils substantial potential to diversify demand for specific products, enabling gains in both scope and scale. The complementarity of demands across sectors facilitates the optimization of cash flow and plant capacity utilization, particularly for those with adaptable production processes that can respond to market conditions.

In Brazil, the nitrogen fertilizer sector primarily relies on natural gas for ammonia and/or urea production. The country hosts four active production units, each contributing to the sector's operations:

1. Unigel Agro BA and Unigel Agro SE

2. Yara Brasil (previously Vale)

3. Araucária Nitrogenados S.A.

In addition, there are nitrogen fertilizer plant projects announced or under construction, such as:

1. Fertilizer Factory in Cuiabá/MT

2. Fertilizer Factory in Três Lagoas/MS

3. Fertilizer Factory in Uberaba/MG

4. Fertilizer Factory in Macaé/RJ

5. Fertilizer Factory in Porto Açú/RJ

6. Fertilizer Factory in Passo Fundo/RS

7. Methanol Plant in Cuiabá/MT

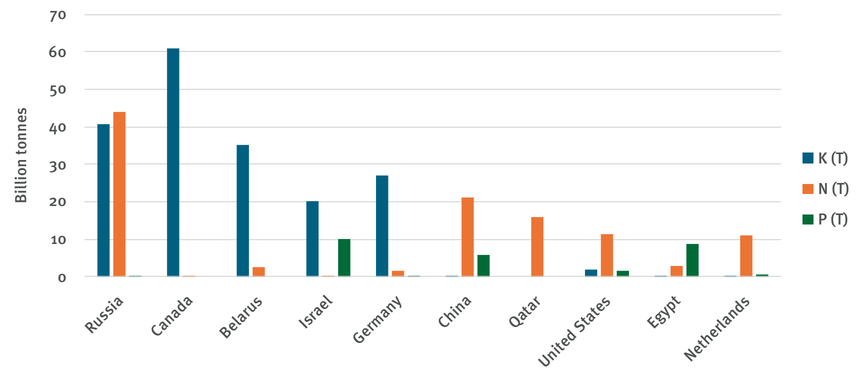
8. Methanol Plant in Macaé/RJ

The competitiveness of nitrogen fertilizers is intricately tied to factors such as investment costs in production plants, operational expenses, raw material costs, and the sales prices of final products. Notably, the divergence in natural gas costs significantly impacts the viability of domestic ammonia and urea production, with Brazil often experiencing prices higher than those observed in the United States.

The New Gas Market Program, launched in 2019, aims to establish a competitive natural gas market in Brazil. Integrating nitrogen fertilizer producers into this programme could empower them to negotiate contracts and tariffs.

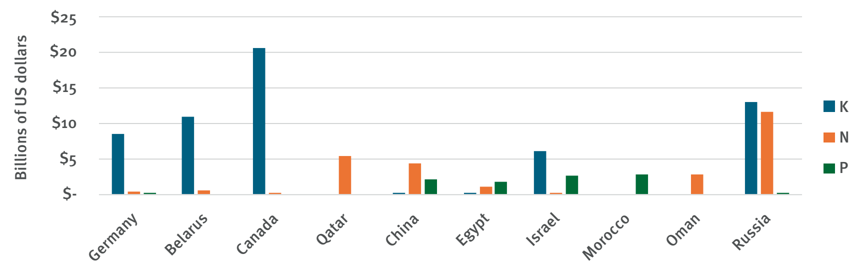
These changes aim to decrease Brazil's reliance on nitrogen fertilizer imports to 50% by 2030, down from 93% in 2023. This shift seeks to enhance domestic production sustainability, reduce external influences, and promote competitiveness in the nitrogen fertilizer industry.

Figure 3. Top trading partners 2023 (volume)



Source: ComexStat, 2024

Figure 4. Top trading partners 2023 (value)



Source: ComexStat, 2024

Phosphorus

Phosphate fertilizers rely on phosphate rock as their primary raw material, with contributions from sulphur and ammonia in their production chain. Global data collection on phosphate resources faces challenges due to reporting disparities among countries. As of 2020, worldwide phosphate reserves totalled approximately 72 bn t, predominantly held by Morocco, China, Egypt, Algeria, and Syria. The top four phosphate rock producers globally are China, Morocco, the US, and Russia. Brazil, with estimated reserves of 5.2 bn t, shows potential for expansion, with national production reaching 5.3 mn t in 2019, and future projects are planned to reduce dependence.

In Brazil, there are ongoing projects for phosphate fertilizer plants, announced or currently under construction, such as:

1. MbAC Factory – Arraias TO

2. Serra Negra Project - Salitre Patrocinio, Tapira, Araxá MG

3. Santana Project – São Félix do Xingu PA

4. Três Estradas Project – Lavras do Sul RS

5. Jauru Project - Mirassol D'Oeste MS

6. Bonfim Factory – Arrais TO

7. Itatiaia Project – Santa Quitéria CE

8. Angico Dias Factory - Campos Alegre de Lourdes BA

9. Bodoquena Mining – Bela Vista MS

10. Beberibe Phosphate Project – Beberibe CE

11. Morro Verde Factory – Pratápolis MG

However, reliance on imported sulphur, crucial for phosphate fertilizer production, underscores vulnerability. Most sulphur production is consumed domestically by producing countries, highlighting Brazil's need to prepare for supply chain disruptions, including from emerging countries.

Despite associated risks, efforts to stimulate national phosphate rock production persist. This entails exploring new reserves, expanding production, and strengthening the entire production chain through collaborative efforts between the public and private sectors. Achieving self-sufficiency requires establishing a secure regulatory framework, efficient public agencies, advanced research initiatives, increased sulphur and sulphuric acid production, diverse financial resources, and a competitive domestic market.

By 2030, Brazil targets reducing its external dependence on phosphate fertilizers to 34%, driven by market reforms and new fertilizer plant establishments. Currently at 72%, ongoing initiatives are crucial for boosting domestic production and reducing reliance on international sources.

Potash

Potassium-bearing minerals, commonly referred to as ‘potash’, are vital in the fertilizer industry due to their widespread distribution in the Earth's crust. However, the quality of these deposits varies greatly in terms of size, content (K_2O or KCl), geographic location, and mining costs.

On a global scale, the potassium chloride (KCl) market is dominated by a few countries. Canada, Belarus, Russia, Germany, and Israel collectively hold 92% of the market share, with Canada leading at 30% and contributing about 33% of global production. Brazil has notable reserves in regions such as Taquari/Vassouras, Santa Rosa de Lima (sylvinite mineral) in Sergipe, and Itacoatiara, Nova Olinda do Norte, Autazes (sylvinite) in Amazonas, representing 3% of the world's reserves.

In Brazil, there are ongoing projects for potassium fertilizer plants, either announced or currently under construction:

1. Carnalite Project – Taquari/ Vassouras SE/CE
2. Autazes Project – Autazes AM
3. Fábrica Kalium – Dores do Indaiá MG
4. KP Fertile factory – Carmo do Paranaíba MG
5. Mina and industrial plant Verde Agritech - São Gotardo MG
6. Curimbaba Factory – Poço de Caldas MG

To reduce its heavy dependence on potassium imports, which accounted for 98% of national consumption in 2023, Brazil aims to decrease this reliance to 62% by 2030. Strategies to achieve this goal include: Exploring sedimentary sources in evaporitic deposits, producing potassium oxide (K_2O) from silicate rocks, encouraging recycling of mineral and organomineral waste, investing in agrogeological research to utilize potassium sources in silicate rocks, as wells as promoting a competitive and diversified domestic market for potassic fertilizers.

Emerging chains

The concept of emerging chains in fertilizer production encompasses new technologies, formulations, and production methods that are currently emerging or in development. This includes organominerals, inoculants, biostimulants and nanotechnology, among others. A patent technology mapping study revealed China's leadership in prospected technological categories, with Brazil ranking 13th, indicating a need for increased investment in research and innovation in this sector.

The global demand for bioinputs, specifically for plant nutrition, is growing, with projections indicating annual growth rates of around 5% in the commercialization of biofertilizers (inoculants in the Brazilian context) until at least 2025. In Brazil, there has been a significant increase in operating companies and the registration of biological products, reflecting a growing trend in the sector.

The market for inoculants, particularly those containing diazotrophic bacteria, serves as a sensitive indicator for the evolution of the bioinputs sector in Brazil. Sales of inoculant doses have more than doubled in the last decade, reaching about 90 mn doses used in approximately 45 mn hectares.

The market for remineralizers, derived from silicate rocks, holds great potential in Brazil, where the country leads in the study and development of these inputs. However, challenges such as the lack of a national inventory and integration between agricultural and waste management policies need to be addressed.

Organomineral fertilizers, which enhance soil quality and reduce dependence on mineral imports, emerge as relevant alternatives. Nanotechnology, producing fertilizers at the nanometer scale, promises to drive a more efficient and sustainable agrotechnological revolution.

Special fertilizers, with a growth rate exceeding 20% per year, are particularly noteworthy, driven by their performance results and the quest for more stable alternatives compared with conventional mineral fertilizers. When these emerging chains are consolidated, they not only enhance the sector's resilience but also significantly contribute to a more sustainable and efficient agricultural model.

Adopting new agricultural technologies and special fertilizers is essential for socioeconomic and environmental benefits, reducing degradation, increasing productivity and profitability, and mitigating environmental impacts. Stimuli such as attractive credit lines and tax incentives are necessary to drive these emerging chains, along with effective policy integration.

The present and the future

The fertilizer sector in Brazil faces complex challenges and opportunities, emphasizing the need to prioritize sustainability and autonomy in input production. This aligns with global demands for more efficient and environmentally friendly agricultural practices. The National Fertilizer Plan plays a crucial role in guiding the development of Brazil's fertilizer industry, providing essential guidelines and foundations. Essentially, the PNF serves as a fundamental tool to foster growth and improvement in the industry, creating an environment conducive to innovation, sustainability, and domestic production. ■

Conference preview:

Argus Fertilizer Europe 2024

22-24 October 2024 • Athens, Greece

Europe's largest fertilizer trading event returns to Athens

The Argus Fertilizer Europe Conference returns for its 36th year. The event will be held in Athens, Greece, renowned for being Europe's shipping capital which links eastern and western markets.

This conference series has cemented itself as the largest gathering for the European fertilizer community, with last year's conference in Lisbon bringing together 704 attendees from 352 companies and 55 countries.

Meet senior decision makers from the world's biggest fertilizer producers, traders, manufacturers, distributors, logistics and solution providers all under one roof. There will be three days of meetings, networking and the opportunity to hear from industry experts on the challenges, market opportunities and future trends within the European fertilizer market.

This year's event is shaping up to be a must-attend, with Dekagro and Indagro confirmed as the host sponsors and over 90% of the exhibition area is sold out.

Event highlights

Expanded exhibition and streamlined networking

Due to popular demand, this year's exhibition has been expanded to feature a larger number of innovative companies, providing a diverse range of product solutions specifically designed for the European fertilizer market.

The exhibition area has also been upgraded, with additional networking lounges, labelled meeting points, a barista café and bar to enhance participants' networking experience and enable them to facilitate multiple meetings throughout the three-day event.

Attendees will also have the chance to sample locally-grown fruit and vegetables, and learn about the sustainable practices used in their production.

The exhibition area is nearly sold out and we are delighted to host the following exhibitors: AGI, Agripower, Arkema,

Best Sign Asia, Bestwin, Bluestone, Cesur, Croxx, EMT, Fertipaq, Goldmann, Haifa, Koeppern, Monband, Nanchang Changmao Chemical, Neelam, Nodral, RS Trading, Sinomagchem, SML and Yunnan Yingfu.

Sustainability and decarbonisation forum: Sustainable products and decarbonising your business

Hear from Yara, Nufarm, Nodral, Gingko Bioworks, YouSustain, Monband and more at the Sustainability and Decarbonization Forum* as they discuss Europe's fertilizer requirements for a sustainable future. Learn about the pioneering products entering the market as well as the future trading prospects for micronutrient, biostimulants, water soluble fertilizer and more.

Participants will also have the opportunity to strengthen their understanding around Europe’s carbon and sustainability regulations to enable them to adapt future business plans around new ESG requirements.

**(Exclusive access only to Main conference pass + Sustainability and decarbonisation forum passholders and All access pass holders)*

Main conference presentations: From tackling food security to sulphur price hikes

This year’s main agenda features senior speakers from the Greek Ministry of Food and Rural Development, c-level executives from OCI, Fertiberia, Arab Potash and experts from Heineken (Athenian Brewery), Agripower, Eyssautier-Verlingue, Helvetia, SPEL and more.

Highlights include:

- Producers and innovators will explore business models which address the balance between food and energy security.
- Fast-moving consumer goods (FMCG) and low carbon fertilizer usage for decarbonising the agri-food sector.
- Examining the rising prices of sulphur and its demand in Europe.
- Reviewing how the current geopolitical instability has impacted shipping costs and created further risks to logistics and transport.

Argus fertilizer fundamentals workshop**

An exclusive workshop series hosted by Argus editorial and consulting experts will provide participants with the foundations of the fertilizer market. It will feature presentations on NPK, sulphur, clean ammonia, phosphates, potash and more.

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People and events

Novaphos appoints James Samuelson chief technology officer

Novaphos has announced that James Samuelson will serve as Chief Technology Officer, a newly created executive leadership position reporting to Andrew "Woody" Lewis, the first leadership announcement since Mr. Lewis was appointed company president in April. This announcement continues the broad leadership expansion of the company as it looks to roll out its paradigm-changing new technology to produce phosphate more efficiently and without environmentally harmful waste. Today's announcement continues a flurry of recent senior leadership additions, including internationally recognized operations leader Evgeny Fedoseev as its Chief Operating Officer, who served in the same capacity for the fertilizer division at EuroChem Group.

Most recently, Mr. Lewis was appointed President of Novaphos after a long and distinguished 36-year military career as a 3-star senior officer serving in the United States Navy, where he served as Commander of the U.S. 2nd Fleet and NATO Joint Force Command in Norfolk, Virginia.

For the last ten years, Novaphos has developed a revolutionary process for producing high-quality phosphates, one of the most valuable resources on the planet and a vital ingredient in manufacturing fertilizers, lithium-ion batteries, and many other essential products. Embodying a series of patents and proprietary technological innovations, Novaphos' innovative process will provide a low-waste, low-cost method to ensure that phosphates remain available and produced sustainably.

The United States Department of Agriculture recently announced its support for Novaphos's new facility in rural Florida through a multi-million dollar grant under its Fertilizer Production Expansion Program (FPEP). The facility will implement Novaphos' proprietary and innovative technologies to revolutionize the production of phosphoric acid.

Before joining Novaphos as Chief Technology Officer, Mr. Samuelson founded the TaySAMM consulting firm, where he first served Novaphos and other companies around the world as an internationally recognized expert in phosphate production and developing new organic phosphate fertilizers. Previously, he served as Director of Engineering for the Simplot AgriBusiness Group, directing engineering for mining and manufacturing operations, technology development, and capital management and planning.

Great Quest Appoints Dr. Andreas Rompel as President and VP Exploration

Great Quest Fertilizer Ltd is pleased to announce the appointment of Dr. Andreas Rompel as President and Vice President of Exploration of the Company. The appointment marks the completion of a transition to gold exploration across Africa, focused on Namibia. Former President Jed Richardson will transition to the role of Executive Chairman.

Dr. Andreas Rompel (Andy), has more than 35 years of management, operating and technical experience in the mining industry. Dr. Rompel was previously the President & CEO of the Cobalt Power Group, a position to which he was appointed in 2016. Dr. Rompel and his team successfully kick-started exploration resulting in a seven-fold return for investors during his tenure. Dr. Rompel has held the position of Corporate Development Manager for Hochschild Mining in Peru, including other functions such as Country Manager and Exploration Manager Mexico.

Dr. Rompel began his mining career in 1988 with Anglo American on the deep level gold mines in South Africa, where he held positions of Shaft Geologist, Senior Geologist, Divisional/Chief Geologist and Head of the Geophysical Service department, in which most of Anglo's geoscientific research was managed. He contemporaneously held other roles in Anglo within the multi-disciplinary Technical Audit Team where he assessed and technically reviewed capital projects for more than 10 years, and as Technical Director of Spectrem Air, a subsidiary company of Anglo American.

Currently, Dr. Rompel holds the position of Vice President Exploration for Trigon Metals, and CEO and Vice President Exploration for Q Gold Resources. Dr. Rompel received his M.Sc. from the Goethe University in Frankfurt, Germany and his Ph.D. in Structural Geology from the University of the Witwatersrand in Johannesburg, South Africa. He also has a diploma in Investments in Mining Projects. He is a registered Professional Natural Scientist (Pr.Sci.Nat.) and a Fellow of the South African Institute for Mining and Metallurgy (FSAIMM). His international experience and proficiency in multiple languages, including German, Afrikaans, and English, make him a valuable addition to the Great Quest team. ■

Supplement

MIDDLE EAST ›

Evolving patterns in GCC nitrogen investment strategies

Written by

Noora Mukhtar, *Research Specialist,* ***The Gulf Petrochemicals and Chemicals Association (GPCA), United Arab Emirates***

As the global population is projected to reach 9.7 bn by 2050, the demand for food and agricultural products is intensifying, necessitating efficient and environmentally conscious nitrogen production. Additionally, the nitrogen industry is being influenced by broader global sustainability goals, including the push for alternative fuels (such as ammonia) by the International Maritime Organization (IMO) targets for reducing greenhouse gas (GHG) emissions from shipping. This presents a significant opportunity for the nitrogen industry to expand into new markets and applications.

These evolving market dynamics, regulatory landscapes, and the emphasis on sustainability are driving transformative shifts in nitrogen investment strategies. They are reshaping the nitrogen industry's regional landscape, with implications for producers, consumers, and policymakers alike.

Shifting centres of production

Traditionally, nitrogen production, which accounts for more than half of the world's fertilizer production, has been concentrated in regions with abundant natural gas reserves. These regions benefit from cost-effective feedstock. However, the industry's focus is gradually moving towards areas with lower production costs, favourable regulatory environments, and proximity to major consumption hubs. This shift aims to enhance operational efficiency, optimize costs, and reduce the environmental footprint.

The industry's focus is moving towards areas with lower production costs

Table 1 and Table 2 illustrate the global and regional trends in nitrogen production capacity from 2017 to 2027. The Gulf Cooperation Council (GCC) region, as a dominant part of West Asia, is expected to experience a positive increase in production capacity, reflecting strategic investments in nitrogen production. Compared to other regions such as Africa, East Europe and Central Asia, the GCC's sustained growth reflects a focus on leveraging natural gas resources, optimizing production efficiency, and solidifying its position in the global nitrogen market.

GCC's strategic expansion and investment in nitrogen production

The Arabian Gulf region, with its vast natural gas reserves and strategic location, is establishing state-of-the-art nitrogen production facilities. For instance, Saudi Arabia, Qatar, and Oman ranked among the top ten leading fertilizer exporters in 2022. The GCC's fertilizer production capacity has grown significantly over the past decade, with a 4.67% Compound Annual Growth Rate (CAGR) between 2010 and 2022, scoring an additional 13 mn t (see figure 1).

The nitrogenous fertilizer segment occupies the larger bulk of the market, where the GCC nitrogen-based fertilizers (mainly urea and ammonia) account for 82.7% of the regions' fertilizer portfolio in 2022. The GCC fertilizer industry remains heavily export-oriented, shipping its products to 63 countries from across the globe. India, the USA and Singapore ranked

Table 1. Urea production capacity share by region and growth forecast

Region	2017	2018	2019	2020	2021	2022	2023F	2024F	2025F	2026F	2027F	CAGR% (2017-2027)	
West Europe	3.2%	3.3%	3.3%	3.3%	3.2%	3.1%	3.1%	3.0%	3.0%	3.0%	2.9%	0.24%	→
Central Europe	2.3%	2.0%	2.0%	2.0%	1.9%	1.9%	1.9%	1.8%	1.8%	1.8%	1.8%	-1.59%	↓
East Europe & Central Asia	7.6%	8.4%	9.1%	9.4%	9.2%	9.2%	10.0%	10.2%	10.7%	10.7%	11.4%	5.24%	↑
North America	7.4%	7.6%	7.8%	7.9%	7.7%	7.5%	7.5%	7.4%	7.4%	7.3%	7.2%	0.82%	→
Latin America	3.7%	3.6%	3.6%	3.2%	3.5%	3.4%	3.4%	3.5%	3.5%	3.5%	3.4%	0.26%	→
Africa	5.8%	5.9%	5.9%	6.2%	6.9%	7.3%	7.4%	7.3%	7.2%	7.8%	7.6%	3.81%	↑
West Asia	11.7%	11.9%	11.5%	12.0%	11.7%	11.3%	11.2%	11.3%	11.1%	11.0%	11.4%	0.75%	→
South Asia	16.0%	16.2%	16.9%	16.9%	17.1%	18.3%	18.1%	18.0%	18.3%	18.2%	17.8%	2.12%	↑
East Asia	42.0%	40.7%	39.5%	38.9%	38.5%	37.7%	37.4%	37.4%	36.9%	36.6%	35.9%	-0.54%	↓
Oceania	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.1%	0.1%	0.1%	0.1%	0.5%	8.39%	↑
TOTAL WORLD (ktp)	**216,028**	**212,841**	**211,560**	**211,916**	**217,399**	**224,734**	**227,175**	**230,793**	**233,843**	**235,173**	**239,585**	**1.04%**	↑

Source: GPCA analysis, IFASTAT, 2024. Ktp = Kilo tonnes per annum

Table 2. Ammonia production capacity share by region and growth forecast

Region	2017	2018	2019	2020	2021	2022	2023F	2024F	2025F	2026F	2027F	CAGR% (2017-2027)	
West Europe	5.2%	5.4%	5.4%	5.4%	5.4%	5.2%	4.9%	4.8%	4.7%	4.7%	4.8%	-0.01%	→
Central Europe	3.7%	3.3%	3.2%	3.2%	3.1%	3.0%	3.0%	3.0%	2.9%	2.9%	2.8%	-1.76%	↓
East Europe & Central Asia	12.9%	13.6%	14.2%	14.5%	14.3%	14.2%	14.3%	14.3%	14.6%	14.5%	14.9%	2.18%	↑
North America	9.6%	10.1%	10.1%	10.2%	10.0%	9.8%	9.8%	10.2%	10.5%	10.5%	10.8%	1.98%	↑
Latin America	5.3%	5.4%	5.4%	4.9%	5.0%	4.9%	4.9%	4.9%	4.8%	4.8%	4.7%	-0.55%	↓
Africa	5.0%	5.1%	5.1%	5.3%	5.6%	5.8%	6.0%	5.9%	5.8%	6.1%	6.0%	2.56%	↑
West Asia	8.8%	9.0%	8.8%	9.2%	9.1%	9.4%	9.4%	9.3%	9.1%	9.1%	9.4%	1.38%	↑
South Asia	9.7%	9.8%	10.2%	10.2%	10.4%	11.1%	11.1%	11.0%	11.2%	11.1%	10.9%	1.98%	↑
East Asia	38.7%	37.4%	36.6%	36.1%	36.0%	35.5%	35.6%	35.9%	35.6%	35.4%	34.7%	-0.33%	↓
Oceania	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.8%	0.8%	0.8%	0.8%	1.0%	1.36%	↑
TOTAL WORLD (ktp)	**227,064**	**223,457**	**222,978**	**221,963**	**225,727**	**231,984**	**231,644**	**235,789**	**239,646**	**240,217**	**245,302**	**0.78%**	↑

Source: GPCA analysis, IFASTAT, 2024. Ktp = Kilo tonnes per annum

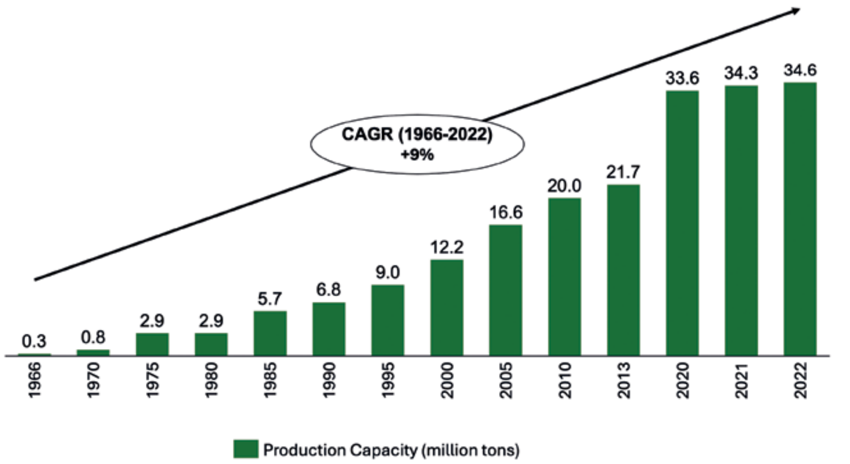
the top three GCC nitrogen export destinations, accounting for 62% of the total nitrogen export value in 2022. Although capacity additions in agri-nutrients have been limited over the past couple of years, they played a pivotal role in boosting revenue within the regional petrochemical industry. Record-high prices for agri-nutrients were driven by a complex combination of various factors such as rising energy costs, supply and demand dynamics, and geopolitical factors.

Market dynamics

With a global focus on ensuring food security for a rapidly growing population, the demand for fertilizers is expected to rise substantially. The global urea and ammonia demand are projected to reach 300 mtpa and 290 mtpa, respectively, by 2030. The surge in demand underscores the urgent need for reliable fertilizer suppliers, enabling GCC producers to meet increasing global demands, particularly in major agricultural markets.

Green ammonia is a critical development for the nitrogen industry

Figure 1. GCC agri-nutrient production capacity (mn t and % growth rate)



Source: GPCA questionnaire and analysis, 2023
Note: GPCA member companies only

Simultaneously, the debate over the use of nitrogen-based products for food security versus fuel is intensifying. The IMO targets net-zero GHG emissions by 2050, spurring interest in ammonia as an alternative maritime fuel. Ammonia's potential as a zero-carbon fuel is compelling, but it competes directly with its role in agriculture.

This dual demand presents a strategic challenge for GCC producers: should they prioritize meeting the urgent needs of global food security, or capitalize on the emerging market for clean maritime fuel? Balancing these priorities will be crucial in shaping the future of the GCC's nitrogen investment strategies, ensuring they meet both environmental goals and food supply needs.

Regulatory drivers

Geopolitical conflicts and the European Union's Carbon Border Adjustment Mechanism (CBAM) are influencing the nitrogen investment landscape. Traditionally, Europe has sourced fertilizers from major producers like Russia, but ongoing geopolitical conflicts have disrupted these supply chains. Additionally, the implementation of the European CBAM could make imports from certain regions more costly due to carbon pricing considerations. These factors, coupled with Europe's chemical industry downturn, may drive the region to diversify its fertilizer import sources further, opening up prospects for GCC producers.

In addition to CBAM, global regulatory frameworks such as Emissions Trading Schemes (ETS) are becoming increasingly relevant. These schemes impose limits on GHG and provide economic incentives for industries in the GCC to adopt cleaner technologies and improve environmental performance. These regulatory shifts are encouraging investments in sustainable practices and resource-efficient production methods within the GCC, aligning with global sustainability goals.

Sustainability imperatives

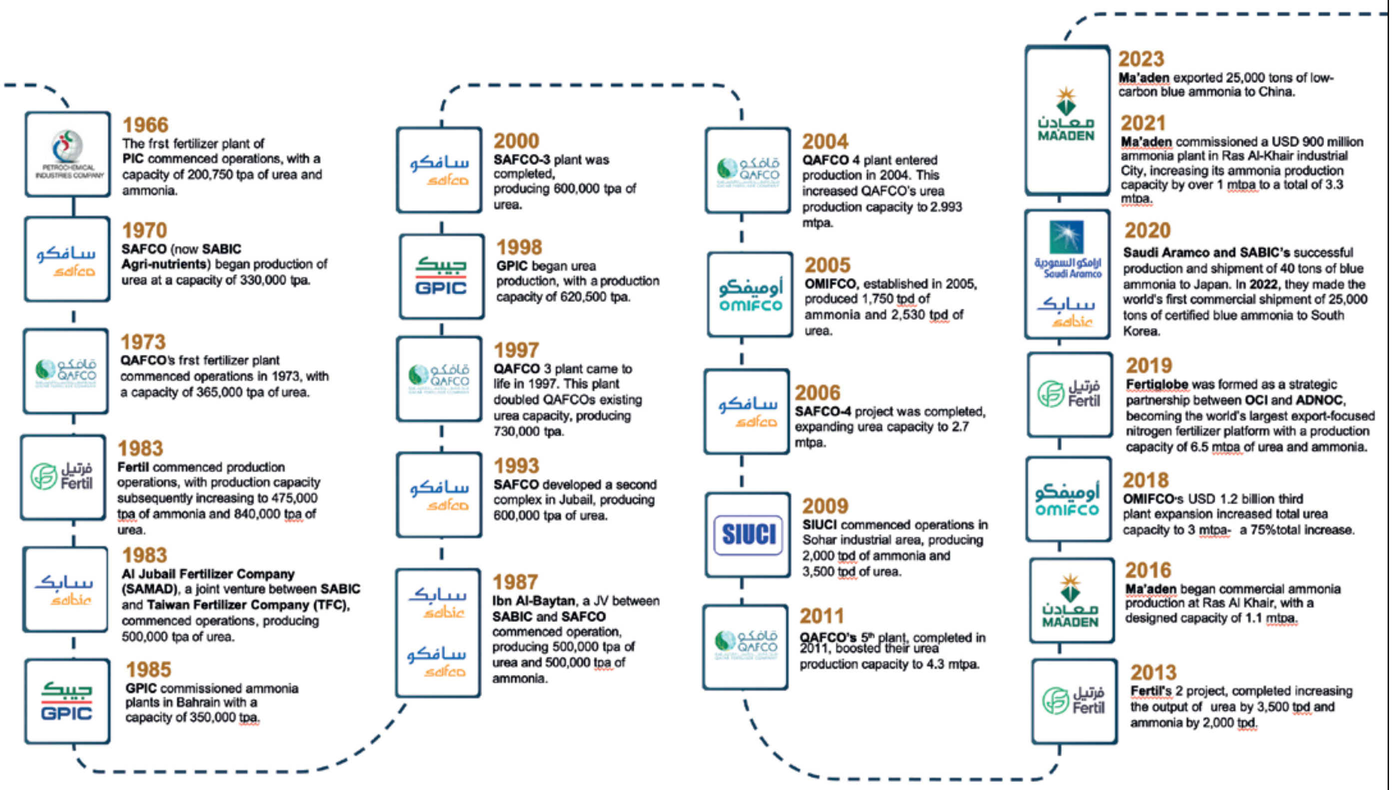
The global push towards sustainability and the race to achieve net-zero emissions are reshaping investment landscapes across industries. Environmental, Social, and Governance (ESG) criteria are increasingly influencing investment decisions, compelling companies to adopt sustainable practices. In the nitrogen industry, this shift is evident as producers strive to align with ESG goals and reduce their carbon footprints. Governments worldwide are implementing stringent environmental regulations and offering incentives to encourage cleaner production technologies and reduce GHG emissions. Investments in carbon capture and storage (CCS) technologies, as well as the utilization of renewable energy sources, are emerging in the region.

Transition to green ammonia

The transition to green ammonia is a critical development in the nitrogen industry. Despite the high capital investments of constructing new ammonia-urea plants, there has been a notable increase in investment in green ammonia projects. Over the past two years, a significant number of green ammonia projects have been announced worldwide, although these projects tend to be on a smaller scale compared with traditional facilities.

This transition is critical because the nitrogen production process is highly energy-intensive, with energy costs accounting for 70-80% of ammonia production expenses. Innovative approaches, such as the integration of CCS technologies and the development of hydrogen-based

Figure 2. Early developments and major milestones of the GCC nitrogen investment projects



Source: GPCA research, 2024

Regions with access to renewable energy sources, such as solar and wind, are gaining traction

ammonia production, are gaining traction reflecting the industry's commitment to sustainability and low-carbon technologies.

Historical achievements

The GCC's journey in nitrogen production began in the 1960s when countries started converting flared gas into valuable agri-nutrient products, marking the birth of the region's petrochemical industry. Since then, the GCC has continuously expanded its nitrogen production capacities, modernizing facilities and increasing efficiency (see figure 2).

Future prospects

Since these early efforts, the GCC countries have continuously expanded their nitrogen production capacities. Major investments have been made to modernize facilities and increase production efficiency. The ample investments in nitrogen capacity in the GCC are part of a broader trend within the GCC countries to enhance their industrial capabilities and economic diversification efforts.

Regions with access to renewable energy sources, such as solar and wind, are gaining traction in attracting nitrogen investments. The integration of renewable energy into nitrogen production processes holds the promise of reducing GHG emissions and aligning with the industry's sustainability goals. For example, countries such as Morocco, with its vast solar potential, and Chile, known for its abundant wind resources, are actively courting investments in green nitrogen production facilities. Morocco has announced plans to invest USD7 bn in a green ammonia production facility, leveraging its renewable energy resources. While Chile, with an estimated investment of

Table 3. Upcoming announced GCC nitrogen-based agri-nutrients projects overview

Project Name	Location	Investment (USD billion)	Completion Year	Capacity (mtpa)
Fertiglobe, blue ammonia project at Ta'ziz industrial complex	Ruwais, UAE	2.0*	2025	1.0
KIZAD, green ammonia facility	Abu Dhabi, UAE	1.0	2026	0.2
QE and QAFCO's world largest blue ammonia project (Ammonia-7 Project)	Mesaieed Industrial City, Qatar	1.0	2026	1.2
OQ and DEME, HYPORT green ammonia plant	Duqm, Oman	NA	2026	0.33
Air Products, ACWA Power, and NEOM green hydrogen and ammonia plant	NEOM, Saudi Arabia	5.0	2026	1.2
Saudi Aramco & Sabic agri-nutrients, blue ammonia production	Saudi Arabia	NA	2030	11
ACME's green ammonia production facility	Duqm, Oman	3.5	NA	1.2
OQ as part of SalalaH2 consortium, renewable ammonia plant	Salalah, Oman	1.0	NA	0.4

Source: GPCA research, 2024
*Note: *Investment includes a chlor-alkali, ethylene dichloride and polyvinyl chloride plant, a blue ammonia plant and a methanol plant.*

USD2.5 bn, the project envisions the construction of a green hydrogen plant capable of producing 600,000 t of green ammonia annually.

Similarly, the GCC countries are proactively pursuing green ammonia projects to diversify their energy mix and reduce their carbon footprint. Several GCC nations have unveiled ambitious plans to establish green ammonia facilities, capitalizing on their renewable energy endowments and commitment to environmental stewardship. Table 3 provides some examples of these upcoming investments.

Emerging opportunities

The nitrogen fertilizer industry stands at a pivotal moment, marked by evolving investment patterns driven by sustainability and resilience. Leveraging its resource advantages and strategic initiatives, the GCC region is poised to play a critical role in the future of nitrogen production. Balancing economic viability with environmental stewardship will be key to the success of these investments.

Regional collaborations and infrastructure development are gaining momentum

To facilitate the transition in nitrogen investments, regional collaborations and infrastructure development are gaining momentum. Investments in research and development are driving market growth, supported by GCC governments through subsidies, financial assistance, and technological advancements. These measures are fostering more favourable conditions for fertilizer adoption across the region.

The convergence of geopolitical shifts, regulatory changes, and sustainability imperatives is creating a dynamic landscape for nitrogen investments. The GCC region, with its strategic initiatives and investments in both traditional and green ammonia projects, is well-positioned to capitalize on these emerging opportunities and contribute to meeting global nitrogen demand while aligning with environmental goals. ■

Future prospects in the Middle East

Written by

Mohammad Ali Vadikheil, *CEO,* ***Phoenix Vision Consultant Group, Iran***

The Middle East (ME) has long been associated with its vast reserves of oil and natural gas, but it is also an important player in the global nitrogen base market. Nitrogen, a key element in the production of fertilizers, is crucial for the agricultural sector, and the Middle East has been investing heavily in nitrogen-based fertilizer production.

The Middle East nitrogen based market is characterized by its large-scale production facilities, which benefit from the region's access to abundant natural gas resources. Natural gas is a primary feedstock in the production of ammonia, which is a building block for various nitrogenous fertilizers, including urea and ammonium nitrate.

For all 'base' products including ammonia, urea and ammonium nitrate (AN), the Middle east region is self-sufficient, and one of the biggest exporters world-wide.

Meanwhile. the more complicated fertilizers are still imported to the region and investment in these nutrient fertilizers would be interesting.

Countries such as Saudi Arabia, Qatar, and Iran have capitalized on their natural gas reserves to build large-scale ammonia and urea production plants. The strategic geographical location of the Middle East allows for easy access to key export markets in Asia, Europe and Africa. Table 1 shows the operating capacity of Middle east countries by 2024.

Local market consumption

Over the last decade local consumption has been increased by an average of 3-5%. In most ME *(left)* The Neom green hydrogen project

countries agricultural production is under the supporting umbrella of governments and is being subsidized. While this has increased the market size, many countries, such as Egypt, Iran and Iraq, it is expected to result in environmental impacts, particularly concerning water sources polluted with nitrate components.

The more complicated fertilizers are still imported to the region

Future prospects

The following topics are the key elements of local market development during the coming years:

Controlled-release and enhanced efficiency fertilizers: The development of controlled-release fertilizers and nitrification inhibitors can significantly improve nitrogen use efficiency, reducing the amount of nitrogen lost to the environment and increasing crop uptake, the main constraint are the upstream producers which these applications will reduce the demand for urea, AN and even ammonia.

Precision agriculture: The integration of advanced technologies such as GPS, IoT, and AI in precision farming can optimize fertilizer application, ensuring that crops receive the right amount of nutrients at the right time, thus enhancing yield and reducing waste. Some of ME governments are promoting and supporting knowledge enterprise companies to create special farms with very new European technologies to control the yield and minimize water application - which is a key factor in ME.

Integrated Nutrient Management (INM): Promoting INM, which combines organic and inorganic fertilizers, can improve soil health and fertility while reducing the dependency on chemical fertilizers, projects in Oman and Saudi Arabia have proven that even with sea water sources there are possibilities to create agriculture products.

Organic farming: Encouraging organic farming practices can diversify the agricultural sector and reduce environmental impacts. However, this might be challenging in arid regions without significant amendments and soil management.

Emission reductions: Implementing stringent regulations to reduce greenhouse gas emissions from fertilizer production plants. Adoption of low-carbon technologies and carbon capture and storage (CCS) can help mitigate environmental impact.

Water-efficient fertilizers: Development and use of fertilizers that require less water, tailored for the arid conditions of the Middle East, can improve efficiency and sustainability, almost all countries are investing in this.

Export opportunities: The Middle East can continue to leverage its strategic location and natural gas reserves to expand its export markets, particularly to Asia and Africa where demand for nitrogen fertilizers is growing. India and Brazil are importing most of the nitrogen base fertilizers from ME and with the new markets for green ammonia, every country is seeking to be part of this future market.

Stability and sanctions: Political stability and the resolution of international sanctions, particularly in countries such as Iran, can unlock significant production and export potential, the new elections in Iran and the US are key political milestones which can make some changes not only to the export capacity of the region, but also in the delivery price.

Table 1. Urea production capacity (mn t per year)

Country	Urea production capacity (mn t per year)
Saudi Arabia	11.2
Iran	7
Egypt	4.6
Oman	3.3
Qatar	3
United Arab Emirates	2.7
Bahrain	1.6
Kuwait	1.5
Jordan	1
Lebanon	0.6
Total	**36.5**

Saudi Arabia projects

Saudi Arabia is a major producer of nitrogen-based fertilizers in the Middle East, leveraging its substantial natural gas reserves to support the production of ammonia and urea. The country has strategically invested in expanding and modernizing its fertilizer industry, aiming to meet both domestic and global demand, the major projects are as follows:

SABIC (SAFCO): SAFCO V is a major expansion project for increasing the capacity by 3250 mtpd is on the way for bid.

MA'ADEN: Feasibility study for new large-scale plant ammonia-urea plant is moving on.

Petrochemical Conversion Company (PCC): Study for new line including diversified products is ongoing.

Advanced Petrochemical Company (APC): APC has announced plans to increase its ammonia and urea production capacity through strategic investments.

Green ammonia initiatives: Saudi Arabia is exploring the potential of producing green ammonia, aligning

Recent expansions in Egypt have increased production capacity significantly and there are ongoing projects to upgrade existing plants

with its Vision 2030 goals for sustainability. This will position Saudi Arabia as a leader in sustainable fertilizer production and contribute to global efforts to reduce carbon emissions. Several projects have been defined and a third-party consultant is studying the prospects, The Neom super project (see figure 1) would be one of the most advanced projects for green ammonia.

Egypt projects

Abu Qir Fertilizers and Chemicals Industries Company (Abu Qir 3 Expansion): Recent expansions have increased production capacity significantly and there are ongoing projects to upgrade existing plants to enhance efficiency and reduce environmental impact as well as diversify products.

Helwan Fertilizer Company: Helwan Fertilizer Company operates a modern plant in Ain Sokhna, producing significant quantities of ammonia and urea for both domestic use and export, a new upgrading project has been earmarked by the company for the coming years.

Alexandria Fertilizers Company (ALEXFERT): The company currently has some revamping projects for increasing the efficiency of production.

Delta Company for Fertilizers and Chemical Industries (ASMEDA): ASMEDA has been focusing on modernizing its facilities to improve efficiency and production output.

KIMA (Egyptian Chemical Industries): After starting up the new KIMA 2, some changes in HP equipment of the old plant is ongoing in a bid for more sustainable production.

Iran projects

Hengam PC: The ammonia plant has already been commissioned and the plan is to commission the urea plant, which will increase the production urea by 1.2 mn t per year.

Kermanshah II: The project will be commissioned in 2025 adding 700,000 t urea per year to the capacity.

Zanajan: A new project is to be commissioned by the end of 2025, adding 1 mn t of production.

Hemmat: The green urea project is starting this year with a plan to commission by 2027.

Golestan: A new bid has been made and the EPCF scheme has been selected for this project with the aim of producing within 36 months.

Other prospects

Iraq: Iraq is on the way to stabilize and secure the country and has announced several international bids for rehabilitation of old plants and building of new plants, but the major issue would be the supply of gas.

UAE: UAE is now focusing now on green ammonia and several projects are going to be defined by FERTIL and ADNOC, the idea is to develop new fertilizers instead of gas based fertilizers.

Adapting for the future

The future prospects for nitrogen-based fertilizers in the Middle East are promising, with significant opportunities for technological innovation, sustainable practices and market expansion. By addressing environmental challenges, enhancing production efficiency, and fostering regional and international collaborations, the Middle East can solidify its position as a key player.

Despite the promising prospects, the Middle East market faces several challenges. Fluctuating natural gas prices can affect production costs and profitability. Political instability in some parts of the region can also impact production and trade.

Moreover, there is a global push towards more sustainable agriculture, which includes reducing the reliance on chemical fertilizers. This trend could lead to changes in the types of nitrogen-based products that are in demand, requiring producers in the Middle East to adapt their offerings.

Furthermore, the development of new nitrogen-based fertilizers that are more environmentally friendly and targeted for specific crops, could open up new markets and opportunities for producers.

The Middle East market plays a significant role in the global agricultural sector. With its abundant natural resources, strategic location, and ongoing investments in technology and infrastructure, the region is well-equipped to meet the growing global demand for nitrogen-based fertilizers. While challenges exist, the future looks promising for the Middle East's role in this critical market.

For EPC companies, licensing entities and equipment manufacturers there are still plenty of opportunities in this area. ■

EBIC fosters collaboration to create more resilient food systems

Written by

Jessica Fitch, *Senior Consultant,* ***Prospero & Partners,*** on behalf of the ***European Biostimulants Industry Council (EBIC), Belgium***

The European Biostimulants Industry Council (EBIC) recently held its 2024 Summit, during which members and invited stakeholders discussed how to create more resilient food systems in the face of volatility. Ongoing turbulence in the agrifood industry threatens both food security and farmer livelihoods, topics examined in detail by attendees including EBIC members, farmer representatives, food chain leaders, policymakers, NGOs, academics and industry.

One of the key takeaways from last years' Summit was the need for collaboration in the food industry. Arne Pingel, EBIC President and Head of Strategic Marketing at RovensaNext, says fostering that collaboration is a key driver for this event. "The EBIC Summit is an opportunity for the key players in food production to focus on our common goals: securing food supply and helping farmers cope with the uncertainty caused by climate change and other geopolitical factors. The 2024 Summit was immensely valuable in improving the understanding of those issues and seeing how working together can help solve them."

Keynote speaker, Christine Tacon CBE, Member Director at the Co-op Group and the UK's first Groceries Code Adjudicator, asked the question: 'How do we break down silos and build bridges to deliver agrifood transformation?' Her vast experience in farming, food industry and retail organisations informed her answer, which focused on "taking farmers with us on the march of progress, communicating and educating the supply chain, and bringing in diversity of thought and regulation when required." Ms Tacon concluded by stressing the need to work together, with trust and shared responsibility, innovation and the right balance between yield and the environment.

> ***Biostimulants can offer a stability that other products simply do not***

Where farmer and food chain interests meet

The session on food security began with an address from Katharine Teague, Group ESG Director, ABF Sugar, and Vice President of the food industry's SAI Platform. Ms Teague believes that conditions have come together for biostimulants to "have their moment," but she noted that users need more data and demonstrations to understate which products are effective and under which circumstances. In an increasingly volatile world, biostimulants can offer a stability and certainty that other products simply do not, but the understanding of them is still not where it needs to be.

A moderated panel discussion followed, featuring Bill Wirtz, Senior Policy Analyst, Consumer Choice Center; Will Surman, Deputy Director General and Director of Strategic Communications, Public Affairs and ESG, FoodDrinkEurope; Antonis Angeletakis, Co-Chair of EBIC's Mid-Term Strategy Steering Group and Director for Biostimulants, Yara International; Patrick Pagani, Deputy Secretary General, COPA-COGECA and Marc Billiet, Senior Adviser for Goods Transport, International Road Transport Union (IRU).

(top left) Keynote speaker Christine Tacon CBE shared her thoughts on how to achieve agrifood transformation; *(top right)* The closing dialogue heard from stakeholders across the agrifood chain; *(bottom left)* Katharine Teague said: "In many ways, I think this could be biostimulants moment."; *(bottom centre)* Jesse Schevel reminded delegates that farmers need access to technologies and finance; *(bottom right)* Kevin Bosc, Co-Chair of EBIC's Farm to Fork project team, launched the new manifesto

The panel considered how to ensure a robust agrifood chain: primarily by supporting the future of farming and empowering farmers to be agile and flexible in times of crisis. Discussions centred around how we attract young people to farming, promote female leaders and offer fair remuneration for those that come to the profession. The panel felt that supply chains need communication, transparency, and collaboration but also regulation and better governance so that value is distributed fairly. In that way we can ensure resilience in the face of increasing volatility.

The delegates split into two groups after lunch to discuss the sub-themes of 'managing risk from climate' and 'working together to enable farmers as agile entrepreneurs.'

The climate discussions featured contributions from Pascal Forrer, President of AIAG (the Crop Insurers' Association) and former CEO of Schweizer Hagel; Ana Rocha, Director of EU's Agri & forestry Related Policies at the European Landowners' Organisation; Moshi Berenstein, European Irrigation Association (EIA), President & Managing Director of Netafim France; César González, Manager Public Affairs at Euroseeds; and Mark Palmer, Co-Leader of EBIC's Agronomy Project Team and Commercial Director of IntraCrop. The panel agreed that farmers show passion, ingenuity, and willingness but their lives are made more difficult by climate change. It was felt that collaboration across the food chain would help make our food systems more resilient in the face of increasing volatility, and all agreed that biostimulants offer new options to help farmers face climate challenges. Preparedness will be vital to secure the future for growers and the wider food chain, as well as the population that relies upon it.

The group discussing farmer agility included Eduardo Cuoco, IFOAM Organics Europe; Louis Gauthier, Doriane; Glauco Bertoldo, Agricultural Attaché at the Mission of Brazil to the European Union; and Deirdre Wall, EBIC Member, Brandon Bioscience. They discussed the importance of attracting talent and skills to the sector and providing competitiveness at farm, European and global level. Healthy soils and the balance between all three pillars of sustainability had a share of the discussion, and there was a debate about how best to incentivise data collection and remunerate farmers for it. The panel agreed that it will be essential to collect data to demonstrate the impact of biostimulants on soil quality, climate resilience and farmer competitiveness.

Choose between eating or being eaten

A highlight of the afternoon was an address from Jesse Schevel, a young dairy farmer from the Netherlands and Head of the Brussels Office of Glastuinbouw, who considered how to help the next generation of farmers thrive despite volatility. His words, "As a farmer, I have the choice between eating or being eaten," and his plea for access to alternative technologies, including biostimulants, as well as sources of energy, crop protection products, finance and land struck a chord with all in attendance. He highlighted the challenges he faces on his own farm, where access to investment and alternative technologies are at the top of his list.

Our closing stakeholder dialogue, “Better cooperation to support farmers in times of turbulence heard from Fabien Santini, Acting Head of Unit, Governance of the agri-food markets and secretariat of the European Food Security

Farmers need to be able to be agile and flexible in times of crisis

Crisis preparedness and response mechanism (EFSCM) at DG AGRI, European Commission; Jelte Wiersma, Secretary General of CEMA (European Agricultural Machinery Association); Marco Rosso, Working Member of EBIC’s Farm-to-Fork Project Team, and Global Head Sustainability and Corporate Affairs Biologicals and Seedcare at Syngenta Biologicals; and Jesse Schevel from Glastuinbouw Nederland. Whilst the panellists agreed relationships built during recent crises have enabled more agile responses, they felt there is still more work to do. EU regulations have taken a big step forward in recent years, but further regulation will be vital to give farmers access to new, safe and effective technologies.

The day ended with closing remarks from the EBIC board, and a CEO fireside chat where members reflected on the day. The clear conclusion was that we need to continue to collaborate to better understand how our technologies, frameworks and tools can work together for the benefit of business, farmers and consumers.

The 2025 EBIC Summit is now being planned. As Arne Pingel reflects, “It is clear that people want to work together and many conversations took place at the EBIC Summit which will help move the industry and food production forward. I look forward to seeing some of the results of this collaboration, which will be so valuable to farmers and the agrifood supply chain.” ■

EBIC launches its manifesto

EBIC took the opportunity at its 2024 Summit to launch its manifesto, putting forward a vision that leverages the power of plant biostimulants to address the challenges we face. The timing is impeccable, with a new EU Parliamentary mandate and Commission Work Programme for 2024-2029 imminent. EBIC is calling for bold and transformative actions to ensure the sustainability, resilience, and competitiveness of our agricultural systems.

Plant biostimulants stimulate natural plant processes to improve nutrient use efficiency, enhance crop quality, and increase tolerance to abiotic stressors such as drought and extreme temperatures. This makes them an essential part of the farmers’ toolbox, but to facilitate the adoption of these new technologies, regulatory barriers must be reduced, allowing more straightforward market entry and farmers must be encouraged to use them.

EBIC is asking the EU to invest in and leverage its agrifood ecosystem to benefit farmer livelihoods and enhance market competitiveness. It has two key requests:

- Facilitate and accelerate the safe market entry of various biostimulant technologies, particularly those derived from animal by-products or containing micro-organisms.
- Incentivise and support the uptake of sustainable technologies such as biostimulants through targeted EU policy tools, including in the CAP.

EBIC believes that this will ensure a sustainable, resilient, and competitive agricultural sector that meets the needs of the present and future generations.

The full manifesto is now available to download at:
https://biostimulants.eu/wp-content/uploads/2024/06/EBIC-Manifesto.pdf

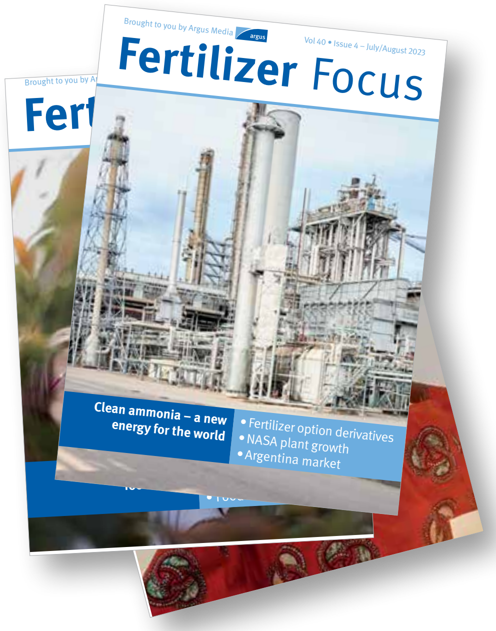
Fertilizer Focus

Media pack 2024

Fertilizer Focus heritage

Argus produces the most comprehensive suite of pricing and market intelligence services available to the fertilizer industry

First published in February 1984 by FMB Consultants, Argus' Fertilizer Focus is the world's leading bi-monthly journal serving the international fertilizer industry. It covers the key developments influencing fertilizer and related markets, such as production economics, technology, plant and project news, and product logistics.



Drawing on Argus's unrivalled expertise and wealth of contacts from our market reporting, consulting and conferences, the editorial content in Fertilizer Focus covers the issues which are top-of-mind for senior executives in the industry. As an advertiser, your message reaches decision makers throughout the world and positions you as a thought-leader on the cutting edge topics which will define the future of the industry. The magazine features a unique blend of news, features, interviews and analysis of all aspects of the fertilizer industry, including:

- Spotlight on hot new trends and growth areas - including clean ammonia and low carbon/ sustainable fertilizers
- New product developments – fertilizer blends, enhanced efficiency ingredients, micronutrients, liquid fertilizers
- Fertilizer production technology across all products
- Port logistics and shipping
- Company strategy, industry developments and emerging markets
- Agronomic analysis and changes in agricultural practice impacting fertilizers

Editorial schedule

January/February issue

Advertising due date - **8 December 2023**

Special Focus - CLEAN AMMONIA

- Key global clean ammonia production hubs
- Market expansion
- Unlocking the hydrogen economy

SUPPLEMENT - LATIN AMERICA

- Infrastructure & logistics in Brazil
- Policies and regulations in Latin America
- The impact of El Nino

March/April issue

Advertising due date - **9 February 2024**

Special Focus - Added Value fertilizers

- Micronutrients as adjusters for plant growth
- Investments in biostimulants
- Adapting strategies to adopt AVFs

SUPPLEMENT - Asia

- Future growth in India
- Phosphate protectionalism policies in Asia
- Laos' emergence as a potash power in southeast Asia.
- What happened to Australia's SOP wave?

May/June issue

Advertising due date - **12 April 2024**

Special Focus - Technological advancements

- Innovations in packing and material handling
- Next generation of plant nutrition
- Digital applications for the fertilizer industry

SUPPLEMENT - AFRICA

- Infrastructure investments
- Copper demand supporting sulphur imports to S Africa
- North Africa: the new price driver for sulphur
- The growth prospects for specialty fertilizers in East Africa

July/August issue

Advertising due date - **7 June 2024**

Special Focus - The fertilizer economy

- Funding new projects
- Hedging tools to de-risk project development
- Fertilizer affordability
- Market opportunities for investors

SUPPLEMENT - Middle-East

- The changing nature of regional nitrogen investment
- Market impact from conflicts
- Rising sulphur production fin the Middle-East

September/October issue

Advertising due date - **9 August 2024**

Special Focus - Fertilizer sustainability

- Decarbonisation progression
- Sustainability investments in Africa
- Revitalizing soil fertility

SUPPLEMENT - Europe

- East Europe capacities
- Importing fertilizers
- European policy update

November/December issue

Advertising due date - **11 October 2024**

Special Focus - FEnhanced efficiency fertilizers

- Advancements for additives and coatings
- NPK processing technology
- New methods for increasing yields

SUPPLEMENT - North America

- Mexico: market overview
- Canada's rail network and the risk of bottlenecks
- Lithium and the increasing in sulphur consumption in North America
- US Inflation Reduction Act impact on nitrogen plant investments

Distribution

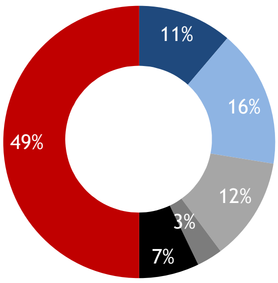
Sector leading digital and hard copy distribution

Published six times a year, the magazine is read by subscribers in over 90 countries. Fertilizer Focus has a unique, best in class distribution, benefiting from Argus' unrivaled presence in the fertilizer sector - **the digital circulation of the magazine in late 2023 was nearly 15,000 - and is growing substantially each month.** Around two thirds of our digital recipients are paying subscribers of Argus fertilizer price reporting and outlook services. This encompasses executives and decision makers in all of the major fertilizer producers, traders, importers and buyers, as well as sector focused financial institutions, shippers, engineering companies, plant contractors, government agencies and trade associations. Our key magazine features are promoted on leading social media platforms (LinkedIn, Twitter, Facebook)

Reader profile

Our unique and unrivaled circulation means your messages reach the industry's most important decision makers.

% of all Fertilizer Focus recipients with the following in their job title



- Executive, President, Director, Vice President
- Manager, Head, Consultant, Advisor
- Sales, Commercial, Marketing, Supply
- Procurement, Buyer, Purchaser, Sourcing, Business Development
- Analyst, Intelligence, Strategy, Accountant, Finance, Investor Relations, Economics
- Other

Unique event distribution

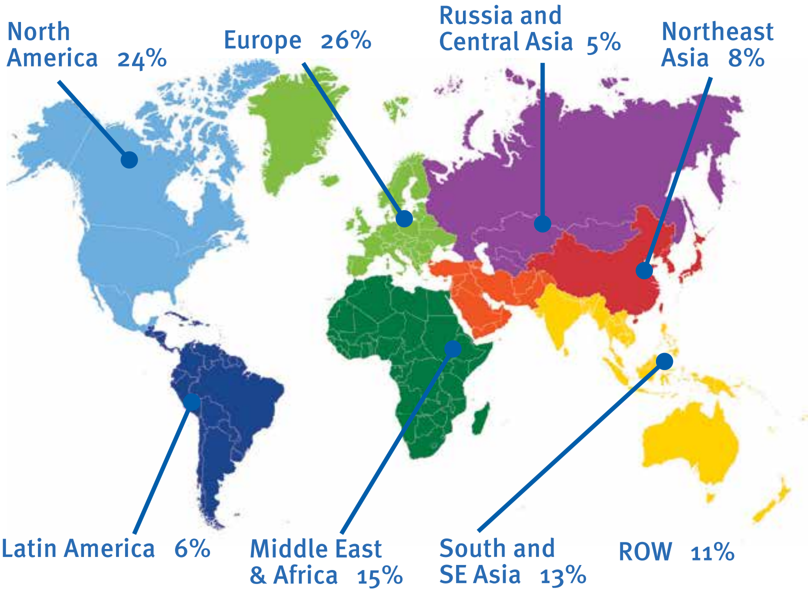
Fertilizer Focus is distributed to every one of the thousands of delegates attending Argus' fertilizer conferences around the world, and available at all of the major global and regional industry events.

Fertilizer Focus will continue to give you unrivaled events positioning. The pandemic temporarily restricted the ability of Argus and other events organizers to deliver physical events, but this is changing. Argus' industry leading conferences are returning in their traditional physical format and our magazine will be delivered to registrants at both physical and digital conferences.

Global distribution breakdown

Our geographic distribution is aligned with the broader Argus fertilizer customer base.

Regional distribution of Fertilizer Focus recipients



Argus events

- Fertilizer Latino Americano (FLA)
- Argus Asia Fertilizer
- Argus East Europe Fertilizer
- Argus Europe Fertilizer
- Argus Clean Ammonia
- Argus Vehicle Emissions and DEF Summit USA
- Argus Paris Grain Conference
- Argus Green Marine Fuels Conference

Global and regional industry events

- AFA Annual Fertilizer Forum & Exhibition, Egypt
- FAI Annual Seminar, India
- IFA Annual Conference
- IFA Crossroads
- Southwest Fertilizer, USA
- TFI Annual Meeting, USA
- TFI World Fertilizer, USA

Advertising rates 2024

Cover rates	
	USD
Outside front package	6,000
Inside front cover	3,740
Inside back cover	3,530
Outside back cover	4,080

Run of press rates	1 Issue	2 Issues (10% discount)	3 -5 Issues (20% discount)	6 Issues (30% discount)
	USD	USD	USD	USD
Double page	6,460	5,748	5,100	4,464
Full page	3,120	2,808	2,496	2,184
Half page	2,640	2,376	2,112	1,848
Third page	1,860	1,674	1,488	1,302
Quarter page	1,740	1,566	1,392	1,218

For more details or to discuss our requirements please contact
Stefan Worsley: stefan.worsley@argusmedia.com

Advertising specifications

Editorial & advertising schedule 2024	
Edition	**Due date**
January/February	8 December
March/April	9 February
May/June	12 April
July/August	7 June
September/October	9 August
November/December	11 October

SIZE & POSITION

Once you have booked your advertisement please ensure you supply the artwork at the correct size, as below. Please note: 'Trim size' is the actual size that the advertisement will appear in the publication. 'Bleed size' is the size your advertisement needs to be supplied to us including the required 3mm bleed (if full page). 'Type area' is the suggested area that any text or important information should sit within to ensure details have some clear space around them for clarity.

TECHNICAL SPECIFICATION

Please ensure your advertisement is produced professionally, and in accordance with the following criteria:

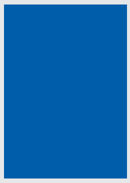
- All artwork should be CMYK colour (No Pantone/Spot colours)
- All fonts should be embedded or outlined
- All images within the artwork must be at least 300dpi resolution and in CMYK colour
- For Full Page adverts please include 3mm bleed and crop marks

FILE FORMAT & SUPPLY

Our preferred file type is a high resolution PDF to the the following specification when exported from Adobe InDesign:

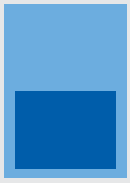
- Adobe PDF Preset: PDF/X-4:2008
- Colour Profile: Coated FOGRA39 (ISO 12647-2:2004)

The above will ensure your advertisement appears in the best possible quality, however if you are unable to supply as a PDF we will accept a 300dpi JPEG or TIFF file in CMYK colour format.



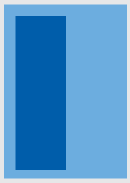
Full page

Trim size:
297mm(h) x 210mm(w)
Bleed size:
303mm(h) x 216mm(w)
Type area:
275mm(h) x 185mm(w)



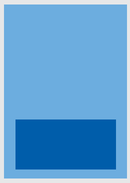
HALF PAGE (Horizontal)

Trim size:
128mm(h) x 180mm(w)
Type area:
118mm(h) x 170mm(w)



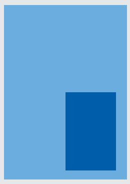
HALF PAGE (Vertical)

Trim size:
250mm(h) x 86mm(w)
Type area:
240mm(h) x 76mm(w)



THIRD PAGE (Horizontal)

Trim size:
62mm(h) x 180mm(w)
Type area:
54mm(h) x 172mm(w)



THIRD PAGE (Vertical)

Trim size:
122mm(h) x 112mm(w)
Type area:
114mm(h) x 104mm(w)

Please note: Bleed is not required for Half Page and Third Page advertisements as these formats sit within the page, however we do recommend your advertisement includes a keyline/border if it has a white background.

If you have any queries regarding our specifications or to send us your files, please contact: **Kate.Shanley@argusmedia.com**

INDEX TO ADVERTISERS

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IN THE NEXT ISSUE...

SPECIAL FOCUS: FERTILIZER SUSTAINABILITY

- Decarbonisation progression
- Sustainability investments in Africa
- Revitalizing soil fertility

SUPPLEMENT: EUROPE

- East Europe capacities
- Importing fertilizers
- European policy update