The information and statistics set out in this section and other sections of this document were extracted from the report prepared by Frost & Sullivan, which was commissioned by us, and from various official government publications and other publicly available publications. We engaged Frost & Sullivan to prepare the Frost & Sullivan Report, an independent industry report, in connection with the [**REDACTED**]. *The information from official government sources has not been independently verified by us, the Sole Sponsor, the* [**REDACTED**]*, the* [**REDACTED**]*, the* [**REDACTED**]*, the* [**REDACTED**]*, the* [**REDACTED**]*, the* [**REDACTED**]*, any of their respective directors and advisers, or any other persons or parties involved in the* [**REDACTED**]*, and no representation is given as to its accuracy.*

SOURCE OF INFORMATION

We have commissioned Frost & Sullivan, an independent market research and consulting company, to conduct an analysis of, and to prepare a report on the Global and China potash fertiliser industry. The report prepared by Frost & Sullivan for us is referred to in the document as the Frost & Sullivan Report. A total fee of RMB1,130,000 was paid to Frost & Sullivan for the preparation of the report, which we believe reflects market rates for reports of this type.

Frost & Sullivan is a global consulting company founded in 1961 in New York and has over 40 global offices with more than 2,000 industry consultants, market research analysts, technology analysts and economists.

RESEARCH METHODOLOGY

The Frost & Sullivan Report was prepared through both primary and secondary research obtained from various sources using intelligence collection methodologies. Primary research involved discussing the status of the industry with certain leading industry participants across the industry value chain and conducting interviews with relevant parties to obtain objective and factual data and prospective predictions. Secondary research involved information integration of data and publication from publicly available sources, including official data and announcements from government agencies, company reports, independent research reports and data based on Frost & Sullivan's own data base.

Basis and assumptions

In compiling and preparing the Frost & Sullivan Report, Frost & Sullivan has adopted the following assumptions: (i) the social, economic and political environment in the world and China are likely to remain stable in the forecast period; and (ii) industry key drivers are likely to drive the growth of the Global and China potash fertiliser industry in the forecast period. All statistics are based on the information available as at the date of the Frost & Sullivan Report, with the potential impact of the COVID-19 pandemic taken into account.

GLOBAL AND CHINA POTASH FERTILISER INDUSTRY OVERVIEW

Introduction of Potash Fertiliser

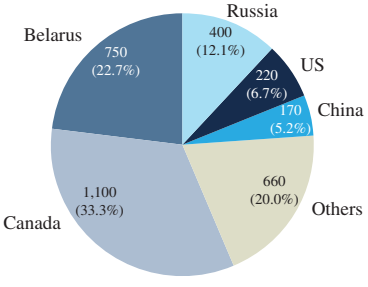
Potassium is one of the three basic plant nutrients along with nitrogen and phosphorus. Potassium, also known as potash, is essential for carbohydrate and starch synthesis, and it also helps plants resist wilting. Up to 98% of potassium in the soil is unavailable to plants in its existing form, making potash fertiliser essential for crop production. Potash fertiliser is defined as a fertiliser made by chemical or physical processes with potassium as the main nutrient. There are three major types of potash fertilisers, potassium chloride (KCL), potassium sulfate (SOP) and potassium nitrate (NOP).

Overview of Global Potash Reserve

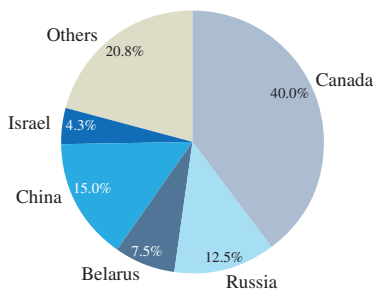
The global potash reserve is relatively unevenly distributed, and the recoverable reserves are concentrated in a few countries. Among them, Canada, Belarus and Russia are the three countries with the highest reserves in the world. According to the USGS (US Geological Survey), in 2022, the potash reserves of these three countries accounted for more than 60% of the global potash reserves. China has approximately 170 million metric tons of potash reserves (K_2O equivalent), ranking the fourth in the world. However, most of the potash reserves are low-grade potassium and hard-to-reach deep brine deposits, which is difficult to support long-term mining and the increasing downstream demands in the future.

The production volume (K_2O equivalent) of global potash fertilisers reached 50.2 million tonnes in 2022 and is expected to increase from 51.3 million tonnes in 2023 to 54.7 million tonnes in 2027. According to the USGS (US Geological Survey), in 2022, Canada accounted for 40% of the global potash mine production in 2022, followed by China (15%), Russia (13%) and Belarus (8%). Affected by the uncertainty brought about by the conflict between Russia and Ukraine as well as the international sanctions targeting the Belarus Producer, the share of Russia and Belarus' potash mine production in the world declined in 2022. In order to maintain a stable supply, the share of China's potash mine production in the world increased in 2022. However, in the long run, due to the scarcity of potash reserves, the growth of China's domestic potash mine production is limited.

Global Potash Reserves by Countries, 2022



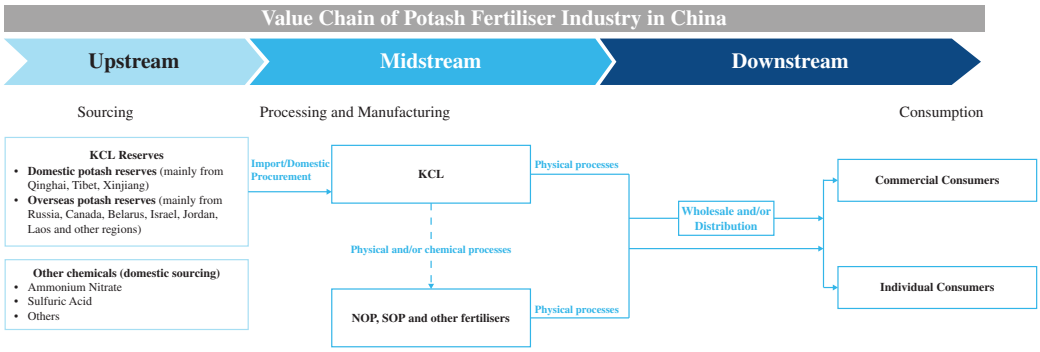
Global Potash Mine Production by Countries, 2022



Notes: Data in million metric tons of K_2O equivalent

Source: USGS, Frost & Sullivan Report

Value Chain Analysis in China



Source: Frost & Sullivan Report

The upstream of China potash fertiliser industry includes KCL reserves and other chemicals. KCL supplied in China is mainly extracted from international and domestic potash reserves. Most KCL is imported from Russia, Canada, Belarus, Israel, Jordan, Laos, etc. Potash reserves in China are primarily located in Qinghai, Xinjiang, Tibet and other regions.

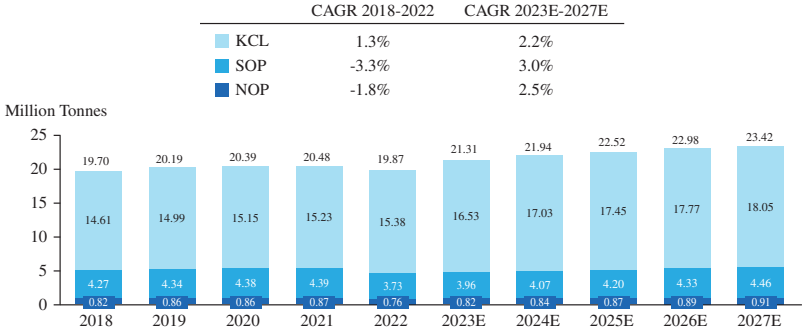
The midstream consists of the processing and manufacturing of potash fertilisers. In some cases, the imported KCL can be sold directly to end customers without further processing. In other cases, imported KCL may go through some physical processes and be sold to end customers. In addition to the direct application, KCL can be used for the manufacturing of SOP, NOP and other fertilisers such as compound fertilisers. The production of SOP, NOP and other compound fertilisers require physical and/or chemical processes under specific environments and related equipment. It is commonly seen that potash fertiliser manufacturers customise their products according to their downstream clients' particular demands such as product forms and shapes.

The downstream activities of the industry involve wholesale, distribution and end consumption. Particularly, the transportation of fertilisers containing NOP needs to strictly abide by relevant standards such as Regulation on the Safety Management of Hazardous Chemicals (危險化學品安全管理條例). Generally, potash fertilisers are transported to wholesalers, then distributed and sold to the end customers through various distribution channels. In addition, some potash fertilisers are sold directly to consumers without distribution, especially for SOE and large clients. Downstream customers are mainly classified into commercial and individual consumers. Furthermore, some companies in the industry may have overlapping customers/suppliers, for example, potash fertiliser companies may produce compound fertilisers with the raw materials (e.g., KCL) supplied by the downstream customers.

Overview of China Potash Fertiliser Industry

The recent years saw a booming development in China's agriculture and hence an ever-growing demand for potash fertilisers. KCL (potassium chloride) is the most commonly-used potash fertiliser in China and could be used to farm a variety of crops. Due to the limited potassium resources in China, a great proportion of the annual demand for KCL is made up by overseas import. The market size by sales volume of KCL in China reached 15.38 million tonnes in 2022, accounting for 77.4% of the total potash fertiliser sales volume. The sales volume of SOP (potassium sulfate) and NOP (potassium nitrate) reached 3.73 million tonnes and 0.76 million tonnes in 2022. Looking forward, the market size by sales volume of potash fertilisers is forecasted to be further enlarged with sales volume of KCL starting from 16.53 million tonnes in 2023 to 18.05 million tonnes in 2027, showing a CAGR of 2.2%. The application of SOP demonstrates beneficial effects on soil structure, and improves crop resistance to drought, disease and insects. SOP is also a preferred potash fertiliser for chloride sensitive crops such as tobacco and fruit trees. SOP and NOP are also more water soluble which provides the option of applying either to the soil, through irrigation systems, or as a foliage spray. The sales volume of SOP and NOP is expected to reach 4.46 million tonnes and 0.91 million tonnes by 2027, representing CAGRs of 3.0% and 2.5%, from 2023 to 2027.

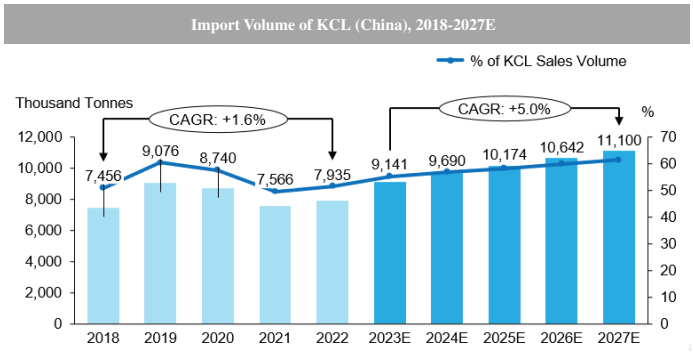
Market Size by Sales Volumes of Potash Fertiliser (China), 2018-2027E

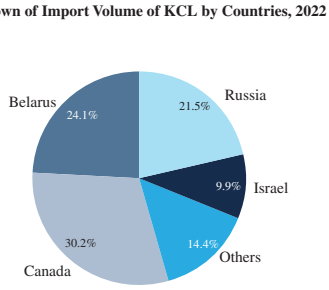


Source: Frost & Sullivan Report

Import Analysis of KCL

The imported KCL is of significance to the potash fertiliser market in China due to the limited supply from domestic potash reserves. In 2022, approximately 50% of the total KCL sales volume in China is sourced from foreign countries. According to the data released by General Administration of Customs, PRC (中華人民共和國海關總署), the import volume of KCL increased from 7,456 thousand tonnes in 2018 to 7,935 thousand tonnes in 2022 with a few fluctuations. Canada, Belarus and Russia were the largest three countries exporting KCL to China in 2022, accounting for approximately 30.2%, 24.1% and 21.5% of the overall China KCL import volume, respectively. Negatively affected by the COVID-19 pandemic, the international trading activities were adversely impacted, causing the decreasing imports of KCL in 2020 and 2021. It is expected that the import volume of KCL in China will keep a steady increase in the coming years and reach approximately 11,100 thousand tonnes by 2027.





Source: General Administration of Customs, PRC, Frost & Sullivan Report

Entry Barriers

(i) Manufacturing Safety and Compliance

- With the increasing attention on environmental sustainability and safety, potash fertiliser manufacturing enterprises have to comply with laws involving environmental protection and government compliance. As special raw materials such as sulfuric acid are used for potash fertiliser manufacturing, regulation requirements are relatively strict. Companies have to obtain licenses such as Safety Production Licence for Hazardous Chemicals (危險化學品安全生產許可證), Registration Certificate of Hazardous Chemicals (危險化學品登記證) and The Safety Production Permit (安全生產許可證), etc. Moreover, manufacturers have to comply with government and industrial standards governing the potash fertiliser industry. Therefore, new entrants need to spend long-term investments to implement the manufacturing safety rules and obtain relevant license.

(ii) Solid Business Networks

- Due to the decentralised sales and distribution, potash fertiliser companies are required to establish a strong distribution network to cover customers from all areas. Leading potash fertiliser companies usually have substantial expertise and logistical resources. Upstream raw material suppliers are more willing to cooperate with large companies with distribution expertise in the market. Major potash fertiliser companies have established close cooperation with upstream suppliers to speed up transaction circulation and reduce the internal friction in the supply chain. It is difficult for new entrants in the industry to establish a solid business network in a short period.

(iii) Procurement Barrier

- Since fertiliser was listed in the "Catalogue of Automatic Import License Management Goods" (自動進口許可管理貨物目錄), importing such commodities should acquire relevant license issued by the Ministry of Commerce. Only companies that hold import license are allowed to proceed customs clearance. Therefore, potash companies that rely on procuring imported potash fertilisers need to obtain the license or maintain close relationships with companies that hold the licenses such as the state-owned enterprises and some cross-border trading companies. It is difficult for new entrants to establish stable business relationships with different types of suppliers in a short term. Furthermore, changes in diplomatic and trade relationships of different countries may have impacts on the international potash fertiliser supply. New entrants might do not have the capability of adopting timely measures to cope with changing situation.

Market Drivers and Trends

(i) Sustained food demand stimulated by population growth

The continuous growth of the global population and economic development, global and China's cereal production and demand will continue to maintain a steady growing trend, which drives the demand for potash fertiliser. Potash fertiliser is an important component of the fertiliser industry, and its demand is closely linked to the production and demand for cereals. Cereals are the most widely grown crops globally, and they play a vital role in feeding the world's population. Potash is an essential nutrient for plant growth and is required for the development of strong roots and stems, as well as for improving the quality and yield of crops. Global and China's cereal production volumes have maintained steady growth over the past few years, with a gradual increase from 2,647.2 million and 610.0 million tonnes in 2018 to 2,786.5 million and 633.2 million tonnes respectively in 2022, at CAGRs of 1.3% and 0.9%, respectively, from 2018 to 2022. The steady growth in global and Chinese cereal production over the past few years has driven the demand for potash fertilisers. Meanwhile, the area of arable land worldwide has continued to decline and is expected to decrease further. Population growth and higher levels of productivity have strong effect on cereals demand, leading to a corresponding increase in demand for potash fertilisers. Furthermore, emerging countries generally have underdeveloped agricultural level and their fertiliser consumption will be much higher than that of developed countries. Therefore, the potash fertiliser industry and manufacturers must continue to innovate and invest in the production and distribution of potash fertilisers to meet the growing demand from the global agriculture sector.

(ii) Improvement in dietary structure brought by consumption upgrades

With the increase in food diversity and the promotion healthy diet concept, the dietary structure has improved. From 2018 to 2022, the global fruit and vegetable production volume have maintained CAGRs of 1.2% and 0.7%, while China has maintained relatively higher CAGRs of 5.1% and 3.3%. Fruits, vegetables and other industrial crops have higher demand for potash fertilisers compared with other agricultural products, the growing production and consumption of these products will continue to drive the demand of potash fertilisers. In addition, the increasing demand for meat products of the emerging countries has greatly promoted the consumption of feed crop as well as fertilisers. Therefore, changes in people's eating habits and improvement in dietary structure will promote the growth of agricultural products with higher demand for potash fertilisers.

(iii) Low potash application rate with large potential market

From 2018 to 2022, the ratio in terms of sales volume of nitrogen, phosphate and potash fertilisers in the world has gradually evolved from 1:0.43:0.35 to 1:0.44:0.36, and the ratio in China reached 1:0.43:0.31 in 2022. The consumption and application level of potash fertilisers in China is still lower than that of many developed countries. Comparing with nitrogen and phosphate fertilisers, potash fertiliser is less harmful to the environment and human health, and has demonstrated advantages in water retention, extreme weather resistance and improvements on crop yield quality. In addition, a series of polices have been issued to encourage the continuous development of potash fertilisers in China. For example, high-concentration potash fertilisers has been listed in the "Catalogue of Industries Encouraging Foreign Investment" 《鼓勵外商投資產業目錄》 by the National Development and Reform Commission and the Ministry of Commerce in 2020. In 2022, the "Notice on a Package of Policies and Measures to Stabilize the Economy" 《紮實穩住經濟一攬子政策措施的通知》 issued by the State Council pointed out that it is necessary to ensure food security and actively support the import of potash fertilisers. As the advantages of potash fertilisers are further recognised by the market, potash fertiliser will become one of the fastest growing and most promising types of fertilisers in China.

(iv) Supporting government policies

The Chinese government has issued strategic supports to the development of the potash fertiliser industry and actively encouraged the construction of overseas potash production base. In addition, the government established the joint negotiation mechanism for potash fertiliser imports to control the import price and promote potash consumption. Moreover, potash fertilisers have been included in the national chemical fertiliser commercial reserves since 2020, and the official notice was issued in the "National Chemical Fertiliser Commercial Reserve Management Measures" 《國家化肥商業儲備管理辦法》. The inclusion of potash fertilisers in the national chemical fertiliser commercial reserves is an important measure to ensure the stable supply of agricultural inputs and promote the sustainable development of agriculture in China. In addition, the government has listed innovative and environmental-friendly fertiliser production technologies for high-quality, high-efficiency and safe production in the "Catalogue of Supported High-tech Fields" (國家重點支持的高新技術領域目錄), According to the "Guiding Opinions on Promoting the Transformation and Development of

Fertiliser Industry" (關於推進化肥行業轉型發展的指導意見), the government will promote fertiliser producers to improve their technological innovation capabilities through special funds. In September 2023, the National Development and Reform Commission promulgated the revised "Measures for the Supervision of Grain Quality and Safety" (糧食質量安全監管辦法). This law has come into effect in October 2023. The promulgation of this law will strengthen the government's supervision of grain quality and safety, increase society's awareness of grain quality and safety, thus promoting the steady improvement of grain quality, and driving the market demand for high-quality potash fertilisers.

(v) Advanced production technology

In order to enhance market competitiveness, potash fertiliser producers have attached great importance on the improvement of production methods and equipment. Irregular granulation technology and round granulation technology are two major fertiliser granulation techniques used to produce potash fertiliser and can significantly improve production efficiency, which have made major breakthroughs.

The advantage of irregular granulation technology is that it can produce fertiliser particles of different particle sizes and shapes, which can meet the needs of different soils and crops. In addition, irregular particles can increase the contact surface area between the fertiliser and the soil during fertilisation, increasing the utilisation efficiency of the fertiliser and thereby improving production efficiency. The advantage of round granulation technology is that it can produce uniform-sized particles with a smooth surface that are not easily caked or layered during transportation and storage, reducing fertiliser loss and improving fertiliser utilisation and production efficiency.

The choice of which technology to use should depend on specific conditions, including soil conditions, crop requirements, fertilisation methods, etc. The related phenol granulation method has been localised, which helps to produce potash fertiliser products with high utilisation rate and absorption rate. With the improvement and progress of various related technologies, the varieties of potash fertiliser products will be more diversified. The concentration of nutrients and physical properties is also expected to gradually increase, and the production method will be more intelligent and environmental-friendly, hence driving the upgrade and development of the industry.

COMPETITIVE LANDSCAPE ANALYSIS

The top five potash fertiliser companies in terms of sales volume in China had a total share of 58.1% in 2022. Our Company, with the sales volume of 1,417.4 thousand tonnes, showed a market share of 7.1% which ranked the third. We offer comprehensive fertiliser products including KCL, SOP, NOP as well as compound fertilisers. The potash fertiliser companies can be classified into resource-based companies and non reserve-based companies. Non reserve-based potash fertiliser companies are companies which do not have potash mineral resources. Our Company is the second largest non potash reserve-based potash fertiliser company in China in terms of sales volume in 2022. In terms of sales revenue, our Company, with the sales revenue of RMB5,362.0 million, showed a market share of 6.0%, which ranked the third.

Top 5 Companies by Sales Volume and Sales Revenue of Potash Fertiliser (China), 2022

Ranking	Company	Sales Volume (Thousand Tonnes)	Market Share	Sales Revenue (RMB Million)	Market Share	Potash reserve-based/ Non potash reserve-based
1	Company A	4,941.1	24.9%	17,300.6	19.5%	Potash reserve-based
2	Company B	2,700.0	13.6%	7,155.0	8.1%	Non potash reserve-based
3	Our Company	1,417.4	7.1%	5,362.0	6.0%	Non potash reserve-based
4	Company E	1,350.0	6.8%	5,130.0	5.8%	Potash reserve-based
5	Company C	1,135.0	5.7%	4,027.9	4.5%	Non potash reserve-based

Note: The sales volume and sales revenue is calculated on the calendar year basis.

The market shares of sales volume are calculated based on the physical quantity of potash fertiliser (KCL)

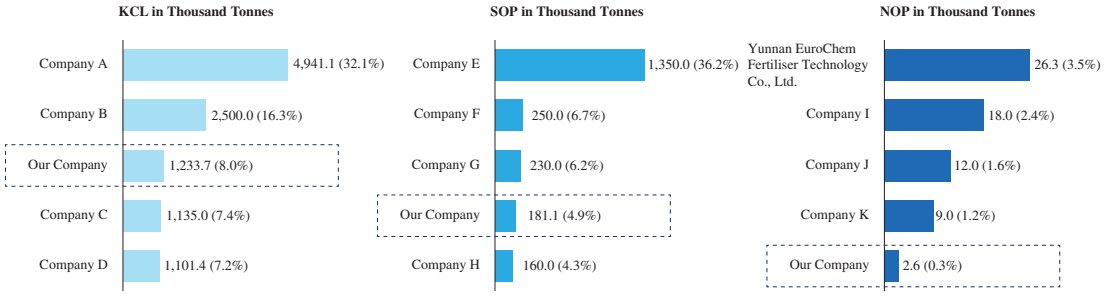
Although Company C has phosphate reserve, it is classified as a non potash reserve-based potash fertiliser company because it has no potash reserve.

Source: Frost & Sullivan Report

The top five companies of KCL in terms of sales volume had a total share of 71.0% in 2022. Our Company with the sales volume of 1,233.7 thousand tonnes showed a market share of 8.0% which ranked the third.

The top five companies of SOP in terms of sales volume had a total share of 58.2% in 2022. Our Company with the sales volume of 181.1 thousand tonnes showed a market share of 4.9%, which ranked the fourth. In 2022, the top five companies of NOP in terms of sales volume had a total share of 8.9%. Our Company with the sales volume of 2.6 thousand tonnes showed a market share of 0.3%, which ranked the fifth.

Top 5 Companies by Sales Volume of Major Potash Fertiliser Manufacturers (China), 2022



Note: The sales volume is calculated on the calendar year basis.

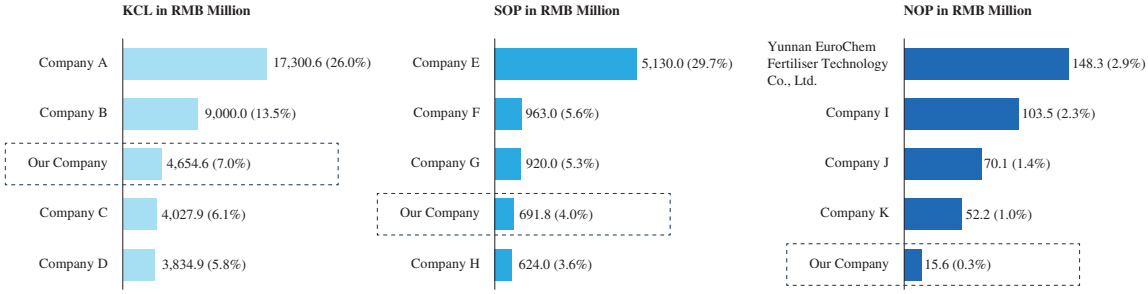
Source: Frost & Sullivan Report

The top five companies of KCL in terms of sales revenue had a total market share of 58.4% in 2022. Our Company with the sales revenue of RMB4,654.6 million accounted for a market share of 7.0%, which ranked the third.

The top five companies of SOP in terms of sales revenue had a total market share of 48.2% in 2022. Our Company with the sales revenue of RMB691.8 million accounted for a market share of 4.0%, which ranked the fourth.

The top five companies of NOP in terms of sales revenue had a total market share of 7.7%. Our Company with the sales revenue of RMB15.6 million accounted for a market share of 0.3%, which ranked the fifth.

Top 5 Companies by Sales Revenue of Major Potash Fertiliser Manufacturers (China), 2022



Note: The sales revenue is calculated on the calendar year basis.

Source: Frost & Sullivan Report

Competitor profiles

(1) Enterprise A is a listed SOE company founded in 1997 and is headquartered in Qinghai. It is mainly engaged in the production and sales of KCL, lithium compounds and utilisation of salt lake resources.

(2) Enterprise B is an unlisted SOE company founded in 2010 and is headquartered in Beijing. It is an international agricultural supplier and agribusiness provider.

(3) Enterprise C is a listed SOE company founded in 1993 and is headquartered in Beijing. It is engaged in the production, import, export, distribution and retail of raw materials and finished products of fertilisers.

(4) Enterprise D is a listed private company founded in 1996 and is headquartered in Qinghai. It is mainly engaged in the production and sales of KCL.

(5) Enterprise E is an unlisted SOE company founded in 2000 and is headquartered in Xinjiang. Its business mainly covers the production and sales of SOP and NOP based on the natural potash reserves.

(6) Enterprise F is an unlisted SOE company founded in 2003 and is headquartered in Qinghai. It is engaged in the development, production and sales of potassium, lithium, boron, magnesium, etc.

(7) Enterprise G is an unlisted private company founded in 1993 and is headquartered in Shandong. It is mainly engaged in the R&D, production, sales and distribution of SOP, hydrochloric acid and other products.

(8) Enterprise H is an unlisted private company founded in 2004 and is headquartered in Qinghai. It is mainly engaged in the development, production and sales of KCL, SOP and potassium sulfate magnesium fertiliser.

(9) Enterprise I is an unlisted private company founded in 2010 and is headquartered in Shanxi. It is mainly engaged in the production of NOP, sodium nitrate, barium chloride, calcium nitrate, lithium nitrate, etc.

(10) Enterprise J is an unlisted private company founded in 1999 and is headquartered in Jiangxi. It is mainly engaged in the R&D, production and sales of NOP, sodium nitrate, compound fertiliser, etc.

(11) Enterprise K is an unlisted private company founded in 2001 and is headquartered in Zhejiang. It is mainly engaged in the R&D, production and sales of NOP, compound fertiliser and other chemical products.

Key Success Factors of Potash Fertiliser Industry

Key success factors of potash fertiliser industry mainly consist of: 1) sufficient and stable sources of supply, 2) innovative, diversified and customized products, and 3) extensive sales lay-out. Firstly, maintaining business relationships with both domestic potash companies and oversea potash fertiliser suppliers are essential to ensure a stable KCL supply. Leading potash companies in China has established close business cooperation with overseas KCL suppliers as well as cross-border trading companies to obtain a stable supply of KCL. In addition, the procurement of KCL through domestic companies (e.g., the state-owned enterprises) with import qualifications is also a major channel for the sourcing of KCL, and maintaining a stable relationship with these companies is also of great importance for the industry players. Secondly, driven by the diversification of fertiliser demands and higher regulatory standards on fertiliser utilisation in China, fertiliser products should adjust ingredients proportion to satisfy the various consumption scenarios and the increasingly stringent environmental requirements. Leading companies, equipped with advanced automatic processing techniques, competitive manufacturing equipment, and experienced industry professionals, have attached great importance on the promotion of high value-added products, such as innovative compound fertiliser and water-soluble fertiliser products, to continuously enrich their product portfolios. Thirdly, establishing factories in areas based on the downstream market and setting up an extensive sales network is another effective strategy to outcompete in the market, which is conducive to saving transportation costs and avoiding transportation risks. On the other hand, building factories near customers can enable fertiliser companies to establish a tighter relationship with customers, better understand their requirements and market demands, thus providing fertiliser products suitable for the local growing conditions.

RAW MATERIAL PRICE ANALYSIS OF MAJOR POTASH FERTILISER

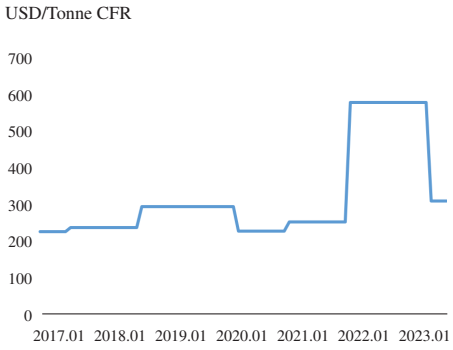
The sea import master contract price ("**Sea Import Master Contract Price**") is negotiated and determined by a consortium of PRC state-owned enterprises with overseas KCL producers and suppliers usually each year in an annual master contract which specifies the price term. The Sea Import Master Contract Price is primarily determined by reference to the PRC domestic demand and the international market price of KCL (which reflects the global supply and demand), both around the time of negotiation, and generally follows the trend of the international market price of KCL. The PRC benchmark import price of KCL imported by ground transportation (the "**Land Import Price**") is negotiated by a group of licenced cross-border trading companies organised by China Chamber of Commerce of Metal, Minerals & Chemicals Importers & Exporters (中國五礦化工進出口商會) ("**China Importers & Exporters**") with major KCL producers and suppliers in Russia and Belarus. The Sea Import Master Contract Price forms the basis of the Land Import Price; however, unlike the Sea Import Master Contract Price, the Land Import Price is subject to more frequent adjustments taking into account of the trend of the prevailing international market price of KCL (which reflects the global supply and demand) at the time of adjustment. As the Land Import Price is privately negotiated and not published, there is no publicly available source on historical Land Import Price. The Sea Import Master Contract Price plays an important guiding role in the determination of the overall price of imported KCL to the PRC (by sea and by land).

On 15 February 2022, the Chinese negotiation team reached an agreement on the 2022 Sea Import Master Contract Price of KCL with and a Canadian potash fertiliser company, and the contract price was US$590/tonne CFR (cost and freight), increasing significantly from US$247/tonne CFR in 2021. On the one hand, it is attributed to the rising price of agricultural products after the recovery of the global economy, which has further driven up the demand for fertilisers. On the other hand, due to the lasting impact of COVID-19 such as shipping disruption, the recovery of each link along the supply chain is different, resulting in a relatively insufficient supply of potash fertilisers.

Economic sanctions as well as regional conflicts are another two factors affecting global KCL price. In 2021, US, UK and EU successively introduced sanctions against Belarus, involving some potash fertiliser export products, which might impact the global supply balance of potash fertilisers. Some companies that rely on Belarus to import KCL may shift their targets to KCL suppliers in other countries. In 2022, as tensions escalate in the Russian-Ukrainian conflict, the Ukrainian government decided to temporarily ban the export of all types of fertilisers on 12 March 2022. Meanwhile, in order to retaliate against the economic sanctions imposed by Western countries, Russia's government has announced on 10 March 2022 to temporarily suspend the export of fertilisers to the "unfriendly" countries. It is expected that the Russian-Ukrainian conflict will still bring certain uncertainty to the global supply of KCL. Subsequently, as the the U.S. Department of Treasury has clarified on 14 July 2022 that agricultural commodities (including fertilisers) are not targets of the sanctions imposed by the U.S. on Russia and the U.S. has not imposed sanctions on the exportation of fertiliser from, to, transiting, or involving Russia, the uncertainties on the global supply of potash fertiliser decreased. Starting from the third quarter of 2022, due to factors such as the entry of the potash fertiliser market into the off-season, which in turn drove the price of potash fertilisers to fall from a high level.

During the first half of 2023, the price of potash fertiliser continued its downward trend. On 6 June 2023, the Chinese negotiation team reached an agreement on the 2023 Sea Import Master Contract Price of KCL with a Canadian potash company. The 2023 Sea Import Master Contract Price is USD307/tonne CFR, with a decrease of USD283/tonne from the previous year. The newly signed 2023 Sea Import Master Contract Price is valid until the end of 2023. After the Sea Import Master Contract Price expires, the potash fertiliser industry will generally continue to follow the old Sea Import Master Contract Price until the new Sea Import Master Contract Price is announced.

Sea Import Master Contract Price of KCL (China), 2017-2023



Date	Price (USD/tonne CFR)
2016.7	219
2017.7	230
2018.9	290
2020.4	220
2021.2	247
2022.2	590
2023.6	307

Note: The big contract negotiation of potash fertiliser was not held in 2019.

Source: Frost & Sullivan Report

Sulfuric acid, ammonium nitrate are two essential raw materials for the production of potash fertilisers. The average selling price of sulfuric acid increased from RMB261.9 per tonne in 2017 to RMB375.4 per tonne in 2018. Since 2018, the average selling price kept decreasing which was mainly caused by overcapacity and insufficient downstream demand. The average selling price has demonstrated an upward trend in 2021 recovering from 2020, increasing rapidly to approximately RMB642.0 per tonne in 2021. Affected by the decline in downstream demand, the average selling price of sulfuric acid started to decrease in the second half of 2022. The average selling price of sulfuric acid reached RMB564.2 per tonne in 2022 in China. The average selling price of ammonium nitrate has demonstrated a steady growth in the past few years. In 2020, the shrinking demand after the outbreak of COVID-19 led to the decrease of ammonium nitrate price. The average selling price of ammonium nitrate has also demonstrated an increasing trend since 2021 and reached RMB3,126.6 per tonne in 2022.

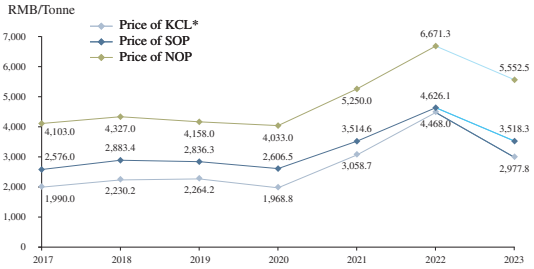
The production and sales of different fertilisers were negatively affected after the outbreak of COVID-19 in 2020 due to the decreasing planting activities during the lockdown period. As the demand for fertilisers dropped off in the spring ploughing season, the market price of different fertilisers and their raw materials also witnessed a decrease in the first quarter of 2020. Meanwhile, the Chinese government has put forward a series of powerful measures and policies (e.g., "Notice of the Central Leading Group against COVID-19 on Printing and Distributing the Current Spring Ploughing Production Guidelines" (中央應對新型冠狀病毒感染肺炎疫情工作領導小組關於印發當前春耕生產工作指南的通知), "Notice on Effectively Supporting the Stable Production and Supply of Agricultural Products During the Prevention and Control of the New Coronary Pneumonia Epidemic" (關於切實支持做好新冠肺炎疫情防控期間農產品穩產保供工作的通知) and "Notice on Doing a Good Job in the Production, Supply and Price Stabilisation of Fertilisers for Spring Ploughing in 2021" (關於做好2021年春耕化肥生產供應和價格穩定工作的通知)) to control the spread of virus as well as to guarantee stable agricultural activities and the stable supply of agricultural products. With the gradual recovery of economy, the demand for fertilisers has gradually recovered since the second quarter of 2020. In 2021, driven by the active spring ploughing and other planting activities, the downstream demand for fertilisers has obviously increased and the price of fertilisers and their raw materials started to increase.

PRICE ANALYSIS OF FERTILISERS

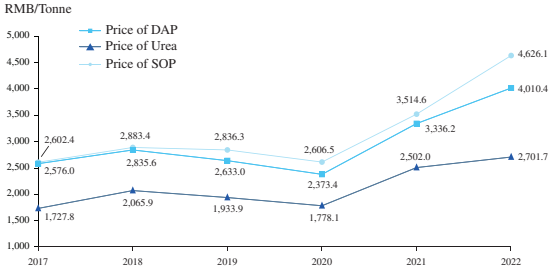
Compared to potash fertilisers, the prices of nitrogen fertilisers, represented by urea, and phosphorus fertilisers, represented by DAP, were generally lower than that of potash fertilisers and experienced a similar trend during the past five years. In 2021, the average selling price of urea and DAP reached RMB2,502.0 per tonne and RMB3,336.2 per tonne, respectively. In 2022, the average selling price of urea and DAP reached RMB2,701.7 per tonne and RMB4,010.4 per tonne, respectively.

The price of KCL experienced an overall growth from 2017 to 2020 despite some fluctuations. From 2017 to 2019, the average selling price of KCL maintained at around RMB2,000 per tonnes. After the outbreak of COVID-19, the price of KCL experienced a decrease due to the shrinking fertiliser demand during the lockdown period. Since 2021, the recovering downstream demand and the tight supply has pushed the price of KCL to an unprecedent level. Similarly, the average selling price of SOP decreased to RMB2,606.5 per tonne in 2020. Affected by the rising price of KCL and other raw materials, the average selling price of SOP also surged since 2021, reaching RMB4,626.1 per tonne in 2022. The price of NOP is higher than that of KCL and SOP due to the complex manufacturing technique and higher production cost. Again, the slump of global prude oil prices and the lockdown in 2020 lowered the price of NOP, while it rebounded significantly since 2021 due to the increasing raw material prices and demands. In 2022, as the global supply shortage of potash fertilisers intensified, the average selling price of KCL, NOP and SOP in China rose significantly, peaked in the second quarter, and slowly declined, although still maintained at historical high in 2022. In 2023, the average selling price of KCL, NOP and SOP in China gradually recovered compared to 2022, but remained at a relatively high level in recent years.

Average Price of KCL, NOP and SOP, (China) 2017-2023



Average Price of Nitrogen Fertiliser (Urea), Phosphorus Fertiliser (DAP) and Potash Fertiliser (SOP), (China), 2017-2022



Note:* The price of KCL refers to the selling price of imported KCL in the finished goods form in China.

Source: Frost & Sullivan Report

PRICE ELASTICITY OF DEMAND FOR POTASH FERTILISERS ANALYSIS

Potash fertiliser is indispensable in agricultural applications, playing a critical role in ensuring the development of agriculture and the national food supply, and is therefore considered as a commodity with relatively low price elasticity of demand in China. Among potash fertilisers, KCL is the most widely used potash fertiliser and also serves as the key raw material for other potash fertilisers, making KCL the most representative potash fertiliser. The price elasticity of demand for KCL is calculated by dividing the percentage change in annual domestic KCL sales volume in China by the percentage change in average domestic selling prices in China and it is found that such elasticity value averaged 0.15 from 2020 to 2023, indicating that demand for KCL in China's domestic market is generally insensitive to price changes on an annual basis.

However, the price elasticity of demand for KCL can vary among specific customer segments over shorter time frames. Although an increase in potash fertilisers price will generally make agricultural activities less economical, the level of impact differs by different customer segments, leading some customers to postpone purchases, control usage, or seek temporary alternatives. The key factors affecting demand responsiveness to price changes in potash fertilisers mainly include the following:

- **Crop varieties**

  Different crops exhibit different requirements for potash fertilisers, leading to varied levels of price elasticity for potash fertilisers across crops types. For example, stable food crops such as wheat and corn are usually cultivated on a large scale with focus on stringent cost control, and consequently those agricultural product producers tend to be more sensitive to fluctuation in the prices of agricultural inputs including potash fertilisers. On the other hand, those agricultural product producers of high-value agricultural crops, such as vegetables, fruits, flowers and tobacco, may be more inclined to invest in agricultural inputs (such as potash fertilisers) to achieve superior yields and quality, which can potentially sell for higher prices. As a result, these customers show a relatively lower price elasticity of demand for potash fertilisers.

- **Planting conditions**

  Planting conditions, including climate and soil composition, significantly influence the requirements for potash fertilisers of crops, thereby impacting the price elasticity for potash fertilisers. Variations in soil nutrients content across different regions necessitate the use of specific types and quantities of fertilisers tailored to the local soil's nutrient profile. Moreover, the disparity in soil types affects their capacities to absorb and retain fertilisers, leading to different utilisation rate of potash fertilisers. For instance, sandy soils, which tend to leach potash more readily, may require more frequent or increased fertiliser applications to sustain adequate potassium levels. Consequently, regions with planting conditions demanding higher potash fertilisers inputs exhibit lower price elasticity for potash fertilisers, meaning demand for potash fertilisers is less sensitive to price changes, as sufficient application of potash fertilisers is essential for ensuring optimal growth and productivity of crops in these areas.

- **Planting scale**

  Since agricultural product producers with different planting scale have different procurement scales, bargaining power and cost control capabilities, they also exhibit different price elasticity for potash fertilisers. For example, customers with large planting scale usually have larger procurement scale and bargaining power, and can take more effective measures to mitigate price fluctuation, such as signing long-term contracts and developing diversified procurement channels, thereby reducing its price elasticity for potash fertilisers. In addition, customers with large planting scale usually have better cost control capabilities, thereby reducing comprehensive costs and ensuring profitability through internal adjustments and optimisation of production processes when prices of potash fertilisers rise. However, small-scale agricultural product producers lack sufficient purchasing scale, bargaining power and cost control capabilities, so they exhibit a higher price elasticity for potash fertilisers than those with large planting scale.

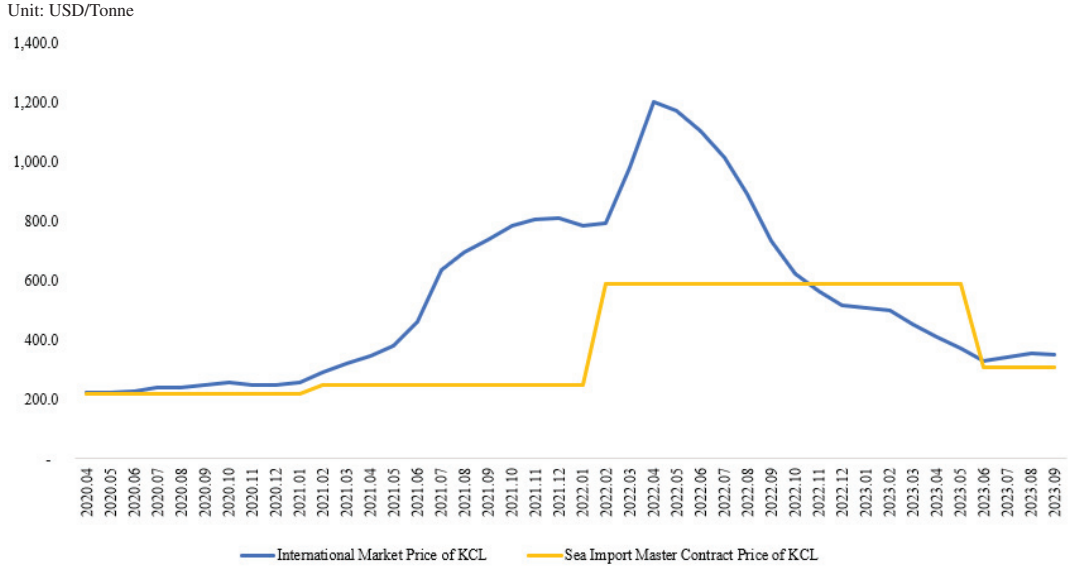
- **Seasonality**

  Since the demand for potash fertilisers is seasonal due to natural cycle of planting activities, the timing of fluctuations in potash fertiliser prices will also affect the price elasticity for potash fertilisers. For example, when prices of potash fertilisers rise during the non-peak season, agricultural product producers often temporarily postpone their purchase plans of potash fertilisers until the prices recover or stabilise to a certain reasonable level, as they do not have urgent demand for potash fertilisers. On the contrary, when prices rise during the peak season, agricultural product producers that do not have enough potash fertilisers inventory have to accept higher prices to meet their planting needs and exhibit less price elasticity for potash fertilisers.

SHORT-TERM EXPECTATION OF THE SEA IMPORT MASTER CONTRACT PRICE AND MARKET DEMAND OF KCL IN THE PRC

Imported KCL is of significance to the potash fertiliser market in China due to the limited supply from domestic potash reserves. In 2022, over 50% of the total KCL sales volume in China was sourced from foreign countries. However, as the negotiation groups of China have significant bargaining power in its negotiation of the Sea Import Master Contract Price and the Land Import Price, considering China's large domestic demand and approximately 50% of its KCL consumption is sourced from overseas, the Sea Import Master Contract Price and the Land Import Price therefore generally follow the trend of, but are not necessarily the same as, the international market price of KCL at the relevant points in time. As illustrated from the chart below, the Sea Import Master Contract Price was usually lower than the prevailing international market price of KCL at the time of the relevant sea import master contract from April 2020 to September 2023. Only importers with the automatic import license have the ability to import KCL based on the Sea Import Master Contract Price. The following chart shows the Sea Import Master Contract Price and the international market price of KCL in US$ from April 2020 to September 2023.

Sea Import Master Contract Price of KCL and International Market Price of KCL, 2020.4-2023.9



Source: World Bank, Frost & Sullivan

Note: The international market price of KCL sets out in the above chart is published monthly by the World Bank. As there is no published information on the market price of KCL of all the countries in the world, the market price of KCL above is not an average of the market price of KCL of all the countries in the world. The data above only uses KCL price in various representative potash fertiliser markets as reference, including but not limited to the current Brazil CFR (cost and freight) price, Vancouver FOB (free on board) price, etc.

As the Sea Import Master Contract Price is renegotiated generally on an annual basis, the change in the Sea Import Master Contract Price may tend to lag behind the fluctuation in the international market price of KCL; while the international market price of KCL may change month to month in response to dynamic changes in global market demand and supply. The Sea Import Master Contract Price generally followed the trend of the international market price of KCL. The Sea Import Master Contract Price determined in June 2023 has reflected its previous time lag to the international market price of KCL and bringing it back in line with the international market price of KCL in June 2023.

Based on the factors to be discussed below, it is expected that the international market price of KCL will recover steadily in the foreseeable future, and it is not expected there will be further decrease in the Sea Import Master Contract Price in the near future as the international market price of KCL has been recovering from its low level in June 2023.

International market price of KCL will recover steadily in the foreseeable future

Demand side factors

(a) The non-renewal of the Black Sea Grain Initiative

On 17 July 2023, Russia announced the non-renewal of the Black Sea Grain Initiative, an agreement negotiated in July 2022 between Turkey, the UN and Russia as a way of ensuring that Ukraine, one of the breadbaskets of the world, could export its grain through its southern ports via the Bosphorus. The agreement expired in July 2023. With the non-renewal of the Black Sea Grain Initiative, global cereal supply suffered uncertainties and global cereal prices have begun to rise. With the increase in global cereal prices, this will stimulate agricultural planting as farmers will be able to sell their cereal at higher prices. Given that potash fertiliser is an important agricultural product necessary for cereal production, the increase in cereal prices will therefore also expect to stimulate the global potash fertiliser demand and price.

(b) Continuous growth of global population and cereal production

Cereal production continues to maintain a steady growing trend, which drives the demand for potash fertiliser as its demand is closely linked to the production and demand for cereals. Population growth and higher levels of productivity have strong effect on cereals demand, leading to a corresponding increase in demand for potash fertilisers. For further information, please refer to the section headed "Industry Overview – Global and China Potash Fertiliser Industry Overview – Market Drivers and Trends – (i) Sustained food demand stimulated by population growth" in this document.

(c) Improving dietary structure

From 2018 to 2022, the global fruit and vegetable production volume have maintained CAGRs of 1.2% and 0.7%. Fruits, vegetables and other industrial crops have higher demand for potash fertilisers compared with other agricultural products, and the growing production and consumption of these products will continue to drive the demand of potash fertilisers. For

further information, please refer to the section headed "Industry Overview – Global and China Potash Fertiliser Industry Overview – Market Drivers and Trends – (ii) Improvement in dietary structure brought by consumption upgrades" in this document.

Supply side factors

(a) The slowdown in global potash fertiliser production capacity expansion

On 2 August 2023, Nutrien, a Canadian company and one of the largest global potash fertiliser manufacturers, decided to indefinitely suspend its plans to increase potash fertiliser production capacity. In addition, there is no apparent large scale new production base of potash fertilisers which is expected to commence operation in the near future. Therefore, the growth of global potash fertiliser production capacity is limited, which is expected to stimulate the steady recovery of potash fertiliser prices.

(b) The continuation of sanctions against Belarus

Although there is a reduced global supply uncertainties caused by the imposition of sanctions on Belarus, which had gradually become a norm, the prolonged continuation of sanctions against Belarus will, nonetheless, negatively impact the global potash fertiliser supply and is a supporting factor on the international market price of KCL.

Market demand of KCL in the PRC in the near future

As the Sea Import Master Contract Price returned from its peak of US$590/tonne to US$307/tonne, the demand of KCL in the PRC previously suppressed when the price of KCL experienced an unusual increase to US$590/tonne would be released. For example, the import volume of KCL to the PRC has increased from approximately 3.2 million tonnes during June to October 2022 to approximately 5.0 million tonnes during June to October 2023. Therefore, it is expected that there will be an overall increase in demand in 2023 compared to 2022.

Further, in view of the magnitude of the decrease in domestic market price of imported KCL during the first half of 2023 and the market's expectation of a lower Sea Import Master Contract Price would be announced, a considerable number of customers in China took a more conservative approach in their purchases of KCL in the first half of 2023 until the announcement of the Sea Import Master Contract Price in June 2023. During the first half of 2023, many customers in China only purchased less than 40% of their total planned purchases of KCL for the year. As the Sea Import Master Contract Price has been determined in June 2023 and the further decrease in domestic market price of imported KCL has eased and the domestic market price of imported KCL has been recovering in the second half of 2023, it is expected that customers will purchase their remaining planned purchase volume in the second half of 2023 and there will be an increase in purchase of KCL domestically in the second half of 2023.

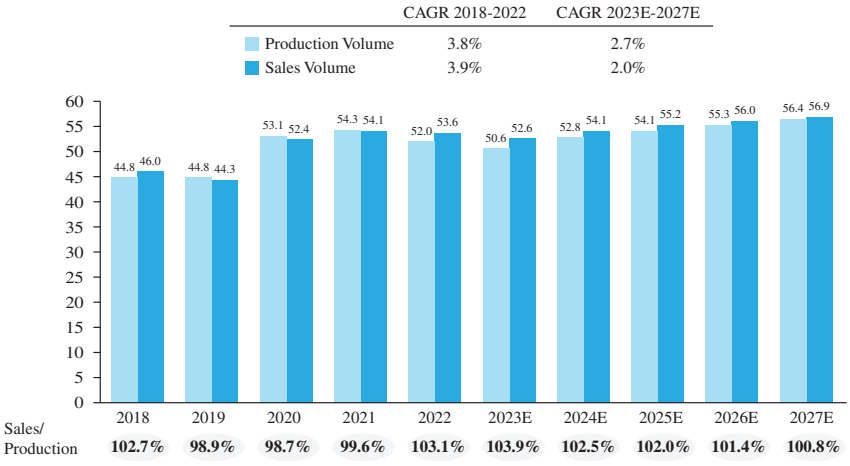
CHINA COMPOUND FERTILISER INDUSTRY OVERVIEW

Production and Sales Volume of Compound Fertiliser

Compound fertiliser is a kind of fertiliser with three-components, providing nitrogen, phosphorus and potassium. Compound fertiliser can be used for balanced fertilisation and can increase the utilisation rate of fertilisers. They can be applied to the soil, or directly on the plant to maintain or increase fertility to produce crops with good quality. They supplement naturally available nutrients in the soil and also provide additional nutrients that are required for specific types of crops.

The production volume of compound fertilisers increased from 44.8 million tonnes in 2018 to 52.0 million tonnes in 2022, representing a CAGR of 3.8%. And the sales volume presented a similar trend, rising from 46.0 million tonnes in 2018 to 53.6 million tonnes in 2022, representing a CAGR of 3.9%. Looking forward, driven by the increasing planting area of different crops, the production volume and sales volume are expected to increase to 56.4 million tonnes and 56.9 million tonnes in 2027.

Market Size by Production and Sales Volume of Compound Fertiliser Industry (China), 2018-2027E



Source: Frost & Sullivan Report