*The information and statistics set out in this section and other sections of this document were extracted from different official government publications, available sources from public market research and other sources from independent suppliers, and from the independent industry report prepared by Frost & Sullivan (the "**Frost & Sullivan Report**"). 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,* **[REDACTED]**, **[REDACTED]**, **[REDACTED]**, **[REDACTED]**, **[REDACTED]**, *any of 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 researcher and consultant, to analyse and report on China's cement admixtures market and concrete admixtures market. Frost & Sullivan is an independent global consulting firm founded in 1961 in New York. Frost & Sullivan provides market research on a variety of industries, among other things. The information from Frost & Sullivan disclosed in this document is extracted from the Frost & Sullivan Report, a report commissioned by us for a fee of RMB260,000, and is disclosed with the consent of Frost & Sullivan.

Our Company has included certain information from the Frost & Sullivan Report in this document because our Directors believe that such information facilitates an understanding of the relevant market for potential **[REDACTED]**. The market research process for the Frost & Sullivan Report has been undertaken through detailed primary research which involves discussing the status of cement admixtures market and concrete admixtures market with leading industry participants and industry experts. Secondary research involved reviewing company reports, independent research reports and data based on Frost & Sullivan's own research database.

Analysis and forecasts contained in the Frost & Sullivan Report are based on the following major assumptions at the time of compiling such reports: (i) China's economy is likely to maintain steady growth in the next decade; (ii) China's social, economic, and political environment is likely to remain stable in the forecast period; (iii) COVID-19 pandemic will affect the market stability in the short term; and (iv) market drivers such as increasing urbanisation, favourable policies and growing downstream demands will drive the development of cement admixtures market and concrete admixtures market. Our Directors confirm that after taking reasonable care, there has no material adverse change in the overall market information since the date of the Frost & Sullivan Report that would materially qualify, contradict or have an impact on such information.

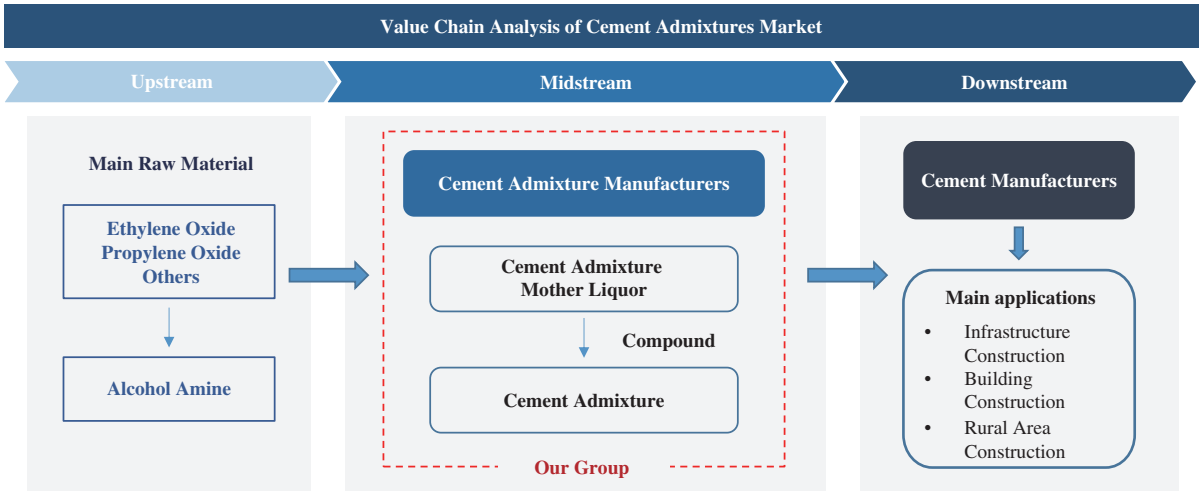
ANALYSIS OF CHINA'S CEMENT ADMIXTURES MARKET

Definition and Classification of Cement Admixtures Market

Cement admixtures, which primarily refer to the admixtures that are added to cement during the production process of cement, mainly include cement grinding aids, flu gas desulphurisation admixtures, denitration admixtures, coal-saving admixtures, raw meal sulphur fixation admixtures, etc. Cement admixtures are indispensable components in the process of cement production and application, and cement grinding aids are the most widely used cement admixture. As regular cement cannot meet the evolving requirements for cement performance and energy conservation during the cement production and application, the usage of cement admixtures is necessary for downstream cement manufacturers to (i) improve cement performance and (ii) reduce production costs and energy consumption. In general, the usage of cement admixture in cement production can reduce the usage amount of cement clinker (which is a major raw material of cement products) by approximately 8%, reduce the energy consumption of cement production process by approximately 15%, and improve the cement strength by approximately 10%. Due to the significant role of cement admixtures in cement production, almost all of production of cement applies cement admixtures. Therefore, cement admixtures are important materials that promote the energy conservation and emission reduction and the green and high-quality development of cement industry, and play an important role in promoting the development strategy of carbon peak and carbon neutrality in cement industry. According to the National Standard GB/T 26748-2011, cement grinding aids refer to the admixtures added during cement grinding process to enhance the grinding effect without affecting human health and performance of cement and concrete. Cement grinding aids can not only reduce energy consumption of cement grinding, reduce production costs, increase production volume of cement, and improve cement qualities and performances, but also improve the economic benefits of cement manufacturers.

Value Chain Analysis of Cement Admixtures Market

The value chain of China's cement admixtures market is set out below:



Source: Frost & Sullivan Analysis

The upstream raw materials of cement admixtures are different depending on the type of cement admixture and production process applied. For cement grinding aids, the main raw materials are alcohol amines, including trolamine and processed alcohol amine, which are produced from ethylene oxide and propylene oxide, respectively. In the midstream, most of the cement admixture companies produce cement admixtures by purchasing alcohol amines as raw materials. Due to the lack of mature production technologies such as the synthesis technology of alcohol amines and the formula of cement admixture mother liquor, a few small-sized cement admixture manufacturers with weak profitability choose to purchase cement admixture mother liquor to produce cement admixtures by simple compounding. A small number of leading market participants, such as our Group, have possessed the production technology to produce cement admixtures from ethylene oxide and propylene oxide as raw materials. Due to their capabilities to effectively control raw material costs, they have obtained strong competitive advantages. In addition to supplying cement admixtures to cement manufacturers, they can also provide processed alcohol amines to cement admixture manufacturers. It is an industry norm for large-scale cement manufacturers to procure cement admixtures from related parties.

Production Process Analysis of Cement Admixtures Market

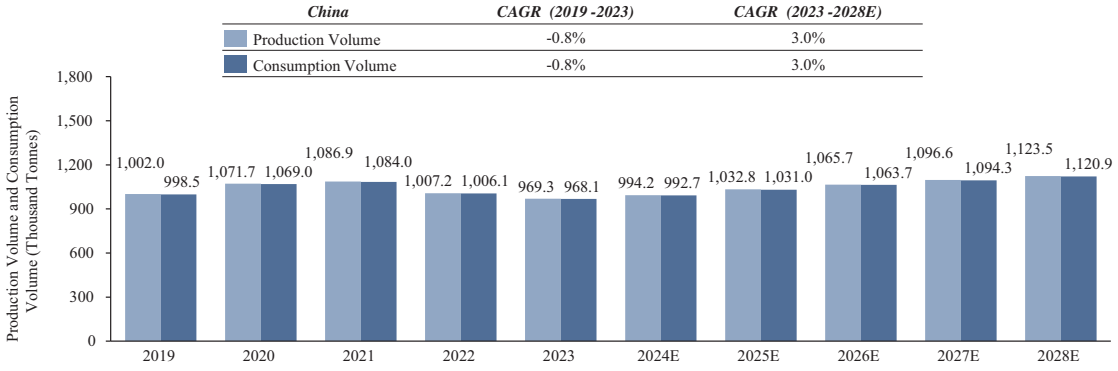
There are primarily two production methods to produce cement grinding aids, which is the principal type of cement admixtures, including processed alcohol amine production method and trolamine production method. The major production process of cement grinding aids includes a chemical reaction by mixing raw materials in the reaction kettle, and then a physical process of compounding. The processed alcohol amine production method is to produce processed alcohol amine by adding diethanolamine and propylene oxide under catalytic reaction and then produce cement grinding aid after compounding. The trolamine production method is to produce cement grinding aid by trolamine, which can be produced from ethylene oxide and ammonia water as raw materials.

Market Size of China's Cement Admixtures Market

Production Volume and Consumption Volume of Cement Admixtures in China

From 2019 to 2023, the production volume of cement admixtures in China decreased from 1,002.0 thousand tonnes to 969.3 thousand tonnes, with a CAGR of negative 0.8%. In 2022 and 2023, the production volume decreased mainly due to the decline in demand from downstream cement market affected by the regulation policies in real estate industry. In the future, as Chinese government increases infrastructure investment, the growth in the cement market is expected to further drive the demand for cement admixtures. The production volume of cement admixtures in China is anticipated to maintain a stable growth and reach 1,123.5 thousand tonnes in 2028, with a CAGR of 3.0% from 2023 to 2028. China's cement admixture manufacturers usually choose to invest in overseas production facilities to serve overseas markets instead of exporting cement admixtures, as it is conducive to producing customised cement admixtures according to cement characteristics of local markets. In addition, due to the sufficient supply of cement admixtures in the domestic market, there is basically no import of cement admixtures in China. Therefore, the consumption volume of cement admixtures in China is equivalent to the sales volume of cement admixtures in China.

Production Volume and Consumption Volume of Cement Admixtures (China), 2019 – 2028E

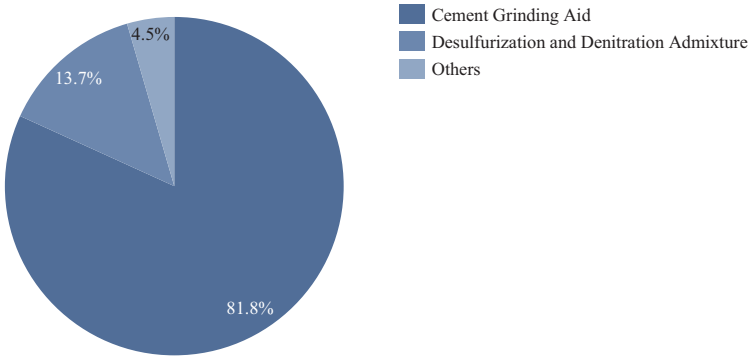


Source: Frost & Sullivan Analysis

Segmentation of China's Cement Admixtures Market by Product Categories

Cement grinding aid is the most widely used cement admixture as it can reduce energy consumption of cement grinding, decrease production costs and improve cement qualities. In terms of production volume by product categories, cement grinding aids accounted for approximately 81.8% in 2023. The demand for cement grinding aids is expected to grow steadily as the production scale of cement in China further increases, with the proportion of cement grinding aids remaining at approximately 80%. Desulphurisation and denitration admixtures accounted for the second largest market share of approximately 13.7% in China's cement admixtures market. Other cement admixtures primarily include coal-saving admixtures, raw meal sulphur fixation admixtures, etc., accounting for approximately 4.5% of the total production volume of cement admixtures in China.

Segmentation of Cement Admixtures Market by Product Categories (China), 2023



Source: Frost & Sullivan Analysis

Market Drivers of China's Cement Admixtures Market

Favourable Policies: A series of policies and measures, including urban infrastructure, government-subsidised housing projects, agricultural facilities and new rural construction, as well as the implementation of major projects such as nuclear power, water conservancy and high-speed rail, and the Belt and Road Initiative ("一帶一路"倡議) that has involved over 150 countries as at 31 December 2023 to cooperate in the fields including policy, infrastructure, trading, finance, among others, and has provided abundant development opportunities for domestic construction enterprises to participate in the infrastructure construction such as highways and railroads in these countries, have driven the development of infrastructure construction, building construction and rural area construction, which stimulated the increasing demand for cement admixtures. In addition, the National Development and Reform Commission updated the "Guiding Catalogue for Industrial Structure Adjustment" (《產業結構調整指導目錄》) in 2019, which added the "development and application of cement admixtures" in the encouraged catalogue, promoting the development of China's cement admixtures market.

Growing Awareness on Energy Conservation and Emission Reduction: As an industry with high energy consumption, the cement market has placed greater emphasis on energy efficiency, emission reduction and environmental protection. Cement admixtures can be applied to improve cement grinding efficiency, reduce clinker usage, and reduce energy consumption in cement production, which can contribute to achieving the targets of energy conservation and emission reduction. Therefore, as cement manufacturers pay more attention to energy conservation and emission reduction, their demand for cement admixtures will continue to increase.

Market Consolidation: With the industrial transformation and upgrading, and fierce market competition, small-sized cement admixture manufacturers are gradually withdrawing from the market due to lower product qualities and profitability. Leading cement admixture manufacturers have sufficient funds to expand production scale to achieve economies of scale, possess strong R&D capabilities to meet the growing requirements for product performances and qualities, and effectively control costs and enhance profitability with business layout in the entire value chain and supplier management. Therefore, the leading manufacturers can continuously increase their market shares, thereby promoting the industrial consolidation in China's cement admixtures market.

Future Opportunities of China's Cement Admixtures Market

Value Chain Extension: To effectively control production costs, the leading cement admixture manufacturers are committed to expanding their operations to upstream raw material production, such as alcohol amines, to reduce the impact of raw material price fluctuations on cement admixture prices and improve the profit margins. In addition, cement admixture manufacturers with business layout in the entire value chain can not only supply cement admixtures to cement manufacturers, but also provide alcohol amines to other cement admixture manufacturers, further enriching their revenue sources.

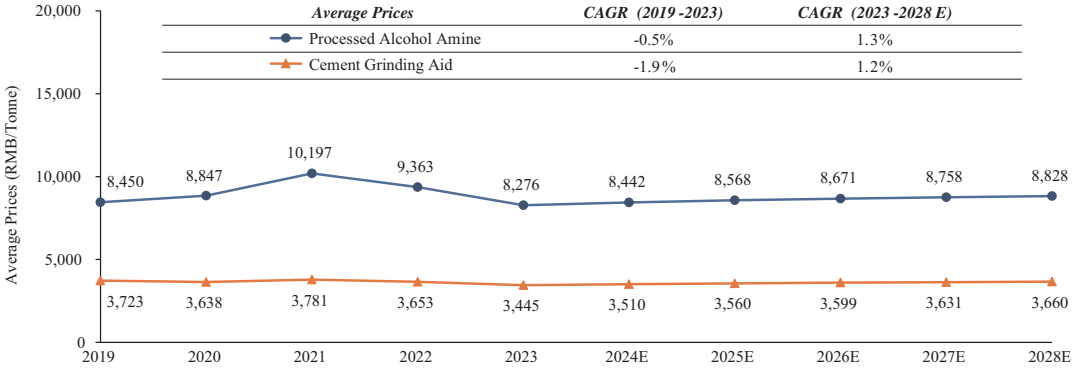
Expanding Nationwide Presence: Affected by limited transportation radius, transportation costs, and regional differences in cement properties, cement admixture manufacturers tend to locate their production and supply close to downstream cement manufacturers. In order to cover more target markets and enhance market influence, the leading cement admixture manufacturers continue to expand their nationwide presence to better and faster meet the requirements from cement manufacturers in various regions, thus obtaining more market shares.

Strategic Cooperation with Cement Manufacturers: In addition to expanding nationwide presence, leading cement admixture manufacturers also expand business by establishing joint ventures with large cement manufacturers or establishing strategic direct supply partnerships, which requires them to have competitive advantages in production scale, product quality, production technology and supply channels. Achieving strategic cooperation is beneficial for cement admixture manufacturers to enhance their competitiveness.

Average Product Price and Average Raw Material Price of China's Cement Admixtures Market

The price of cement admixture is primarily affected by the relationship of market supply and demand and the fluctuation in raw material prices. Processed alcohol amine is the major raw material for cement grinding aids, and its average price is mainly affected by raw material prices, the relationship between market supply and demand, and the pricing strategies of major market participants.

Average Product Price and Average Raw Material Price (China), 2019-2028E



Source: Frost & Sullivan Analysis

In 2021, the price of processed alcohol amine increased due to the significant increase in the price of its raw material propylene oxide. In 2022, the price of propylene oxide fell and the demand for processed alcohol amine from downstream cement admixtures market declined, resulting in a decline in the price of processed alcohol amine. In 2023, the price of processed alcohol amine further declined as the price of propylene oxide decreased.

Competitive Landscape of China's Cement Admixtures Market

Cement grinding aid is the most widely used cement admixture. In recent years, with continuous industrial consolidation, the number of market participants in China's cement admixtures market gradually decreased, with market concentration continuously increasing. As at 31 December 2023, there were approximately 200 cement grinding aid manufacturers in China. In 2023, the sales volume of cement grinding aids in China reached 792 thousand tonnes. In terms of sales volume of cement grinding aids in 2023, the top five market participants in China accounted for approximately 49.6%, and our Group ranked first with a market share of approximately 34.6%. In terms of sales revenue of cement grinding aids in 2023, our Group ranked first in China, with a market share of approximately 34.1%. In addition, in terms of sales volume of cement admixtures in 2023, the top five market participants in China accounted for approximately 41.2%, and our Group ranked first in China, with a market share of approximately 28.3%.

Top Five Market Participants in China's Cement Admixture Market by Sales Volume, 2023

Ranking	Company Name	[REDACTED] Status	Market Share (%)
1	**The Group**	**-**	**28.3%**
2	Zhejiang Hongshi Building Materials Science and Technology Co., Ltd.	Not listed	5.3%
3	Huaxin Cement Co., Ltd. Building Materials Admixture Branch	Not listed	2.3%
4	Tangshan Jidong Cement Admixture Co., Ltd.	Not listed	2.9%
5	Zhuzhou Hongxin Technology Development Co., Ltd.	Not listed	2.4%
Top 5			41.2%

Top Five Market Participants in China's Cement Grinding Aids Market by Sales Volume, 2023

Ranking	Company Name	[REDACTED] Status	Market Share (%)
1	**The Group**	**-**	**34.6%**
2	Zhejiang Hongshi Building Materials Science and Technology Co., Ltd.	Not listed	6.2%
3	Huaxin Cement Co., Ltd. Building Materials Admixture Branch	Not listed	3.3%
4	Tangshan Jidong Cement Admixture Co., Ltd.	Not listed	2.8%
5	Zhuzhou Hongxin Technology Development Co., Ltd.	Not listed	2.7%
Top 5			49.6%

Source: Frost & Sullivan Analysis

Entry Barriers of China's Cement Admixtures Market

Capital Barrier: Cement admixtures industry is typically a capital-intensive industry. A large amount of initial capital is required for constructing or leasing factories, investing in equipment, procuring raw materials and recruiting R&D teams. In addition, with business expansion, the exploration of new markets also requires sufficient funds to establish production facilities and sales networks. For new entrants, strong financial strength is one of major entry barriers.

Technical Barrier: The cement admixtures market involves many critical technologies, including the formula of cement admixtures and the synthesis of raw materials such as alcohol amines, which require significant investment in R&D. Due to the differences in cement properties, cement admixture manufacturers need to provide customised products, which requires strong capabilities in R&D, production and testing. Additionally, leading cement admixture manufacturers collaborate with professional institutions such as universities and research institutes to innovate and upgrade their products and technologies, and expand their technological advantages. It is rather difficult for new entrants to master core technologies and possess strong production technology in a short time.

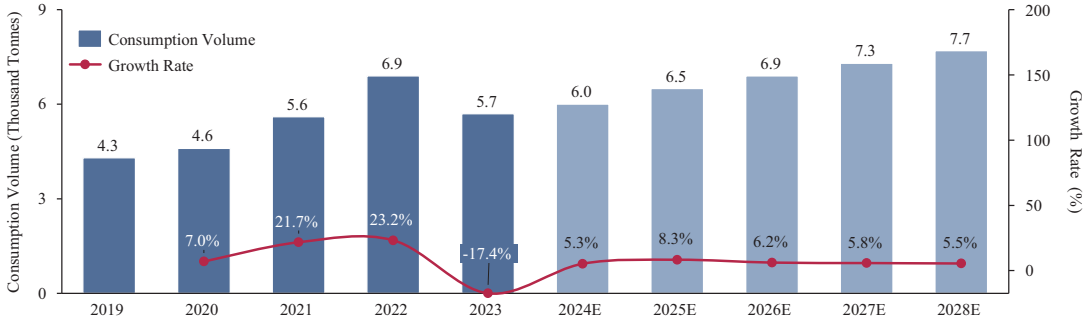
Talent Reserve: To enhance the performance and quality of cement admixtures, cement admixture manufacturers need to continuously optimise and upgrade product formulas. Therefore, sufficient talent reserves, especially technical personnel reserve, is one of competitive advantages for cement admixture manufacturers. New entrants may face challenges to establish own talent reserves in a short time.

Overview of Uzbekistan's Cement Admixtures Market

The consumption volume of cement admixtures in Uzbekistan increased from 4.3 thousand tonnes in 2019 to 5.7 thousand tonnes in 2023, with a CAGR of approximately 7.3%. The consumption volume in 2023 declined mainly due to the decrease in downstream demand from building construction affected by large-scale power outages and shortage in energy supply. The Uzbek government has issued a series of measures to facilitate infrastructure construction. For instance, in 2022, the Uzbek government issued the "Further Improvement of the Management System of Apartment Buildings", which proposed plans for the renovation of more than 6,000 apartment buildings, and the construction and maintenance of 1,800 playgrounds. The promulgation and implementation of these policies will promote the rapid growth of the demand for cement and other building materials, thereby driving the continuous increase in the sales volume of the cement admixture market in Uzbekistan. With the further growth of the infrastructure construction and construction industry in Uzbekistan, the production volume of building materials such as cement will continue to grow, driving the development of the cement admixtures market. By 2028, the consumption volume of cement admixtures is expected to reach 7.7 thousand tonnes, with a CAGR of approximately 6.2% from 2023 to 2028.

Consumption Volume of Cement Admixtures (Uzbekistan), 2019 – 2028E

Consumption Volume	*CAGR (2019 - 2023)*	*CAGR (2023 - 2028E)*
Uzbekistan	7.3%	6.2%



Source: Frost & Sullivan Analysis

In Uzbekistan, the number of domestic cement admixture manufacturers was limited, and demand for cement admixtures is mainly satisfied by imports from neighbouring countries, such as Kazakhstan and Turkey. The cement admixtures market in Uzbekistan is relatively concentrated, with the top five cement admixture manufacturers occupying a market share of approximately 58.0% in terms of sales volume of cement admixtures in Uzbekistan in 2023. Manufacturers like our Group, with a large scale of capital, mature technology, steady supply of raw materials and more competitive prices are likely to be able to enter into the market.

Top Five Market Participants in Cement Admixtures Market In Uzbekistan by Sales Volume, 2023

Ranking	Company Name	[REDACTED] Status	Market Share (%)
1	GCP Applied Technologies, Inc.	Not listed	15.2%
2	Sika Group	Listed	13.2%
3	BASF Group	Listed	11.1%
4	Mapei Group	Not listed	9.8%
5	Fosroc International Ltd.	Not listed	8.7%
Top 5			58.0%

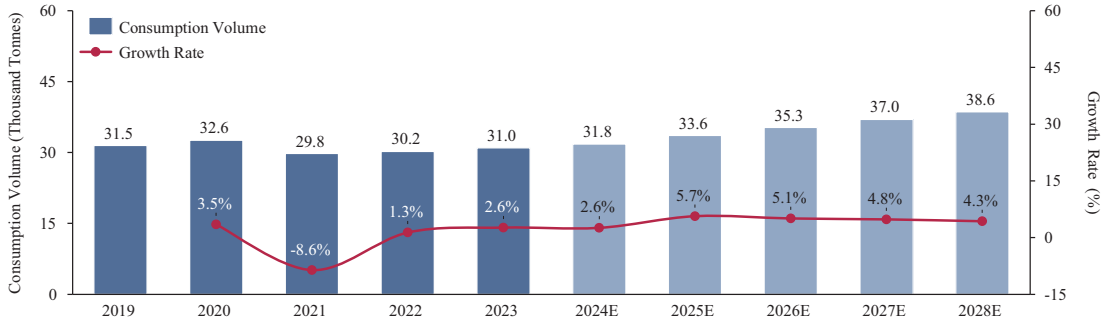
Source: Frost & Sullivan Analysis

Overview of Indonesia's Cement Admixtures Market

Indonesia is a cement exporter. Since 2019, in order to promote the sustainable and healthy development of the cement industry, the Indonesian government has issued a number of policies to promote domestic infrastructure construction, such as strengthening the construction of the railway network, increasing investment in power construction, and promoting the development of the construction industry, with the aim of expanding market demand for cement applications. In addition, the Indonesian government has concluded cement export cooperation agreements with countries such as China and Australia. The consumption volume of cement admixtures in Indonesia has slightly decreased from 31.5 thousand tonnes to 31.0 thousand tonnes, with a CAGR of approximately negative 0.4% from 2019 to 2023. With the continuous increase in the export volume of cement, the consumption volume of cement admixtures in Indonesia is expected to reach 38.6 thousand tonnes in 2028, with a CAGR of approximately 4.5% from 2023 to 2028.

Consumption Volume of Cement Admixtures (Indonesia), 2019 – 2028E

Consumption Volume	*CAGR (2019 - 2023)*	*CAGR (2023 - 2028E)*
Indonesia	-0.4%	4.5%



Source: Frost & Sullivan Analysis

The cement admixtures market in Indonesia is relatively concentrated, with the top five cement admixture manufacturers occupying a market share of approximately 57.1% in terms of sales volume of cement admixtures in Indonesia in 2023. Manufacturers like our Group, with a large scale of capital, mature technology, steady supply of raw materials and more competitive prices are likely to be able to enter into the market.

Top Five Market Participants in Cement Admixtures Market In Indonesia by Sales Volume, 2023

Ranking	Company Name	[REDACTED] Status	Market Share (%)
1	BASF Group	Listed	17.6%
2	Mapei Group	Listed	15.7%
3	Sika Group	Listed	14.1%
4	Fosroc International Ltd.	Not listed	5.5%
5	PT. Nexco Indonesia	Not listed	4.2%
Top 5			57.1%

Source: Frost & Sullivan Analysis

ANALYSIS OF CHINA'S CONCRETE ADMIXTURES MARKET

Definition and Classification of Concrete Admixtures Market

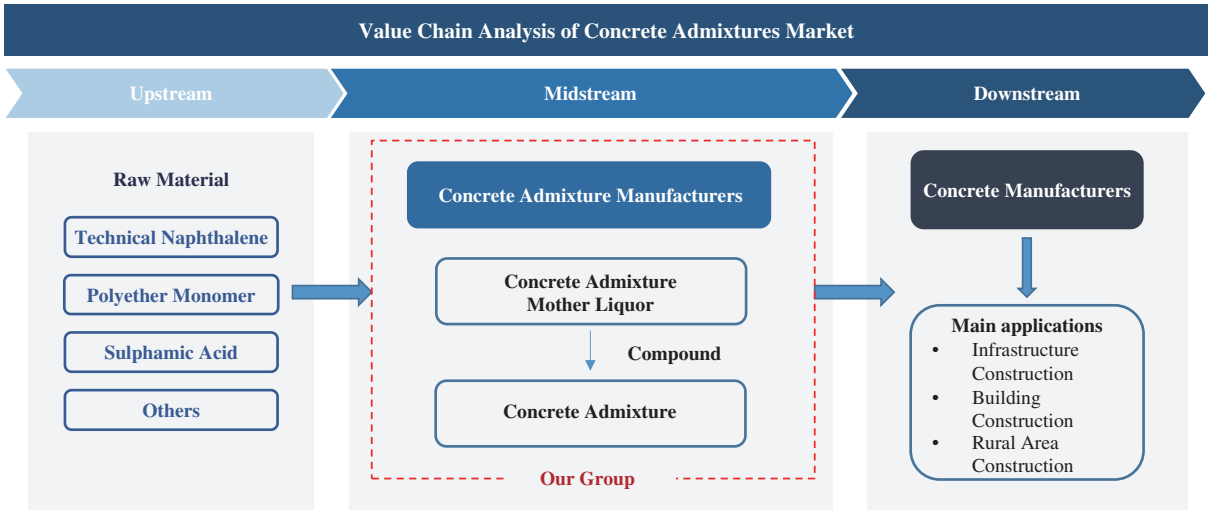
According to the National Standard GB/T 8075-2017, concrete admixtures refer to materials added to concrete before or during the mixing process, in addition to cementitious materials, aggregates, water, and fibre components, to improve the performance of newly mixed concrete and/or hardened

concrete and have no harmful effects on humans, organisms, and the environment. Based on different functions, concrete admixtures can be divided into (i) admixtures that improve the rheological properties of concrete mixtures, such as water reducing admixtures, pumping admixtures, etc.; (ii) admixtures that regulate setting time and hardening process of concrete, such as set retarding admixtures, hardening accelerating admixtures, set accelerating admixtures, flash setting admixture, etc.; (iii) admixtures that improve the durability of concrete, such as air entraining admixtures, water-repellent admixtures, anti-corrosion admixtures, etc.; and (iv) admixtures that improve other properties of concrete, such as expanding admixtures, anti-freezing admixtures, colouring admixtures, etc. Concrete admixtures can enhance concrete performance, improve construction workability, and reduce production costs of concrete manufacturing, and improve the durability of the concrete/building to which it is applied, which can contribute to achieving the targets of energy conservation and emission reduction.

Water reducing admixtures are the most widely used concrete admixtures. Based on different water reducing performances, water reducing admixtures can be divided into high-performing water reducing admixtures, high-range water reducing admixtures and ordinary water reducing admixtures. Under the same slump condition of concrete, the water reducing rate of each type is not less than 25%, 14% and 8%, respectively. High-performing water reducing admixture, also known as polycarboxylic acid water reducing admixture, is produced from polyether monomers as raw material, enabling concrete to have excellent performances in water reduction, slump retention, plasticisation, shrinkage reduction, and environmental protection. It is the best-performing and most widely used water reducing admixture.

Value Chain Analysis of Concrete Admixtures Market

The value chain of concrete admixtures market is set out below:



Source: Frost & Sullivan Analysis

The upstream raw materials are different depending on the type of concrete admixture and production process applied. Due to different production processes of concrete water reducing admixtures, the upstream raw materials mainly include technical naphthalene, polyether monomer and sulfamic acid. The synthesis of polycarboxylic acid mother liquor (聚羧酸母液), the principal type of concrete admixture mother liquor produced from polyether monomer, involves polymerisation technology, which requires mature production technologies. Due to insufficient funds and weak production technology, small and medium-sized concrete admixture manufacturers usually choose to purchase polycarboxylic acid mother liquor as raw material to produce concrete admixtures. Due to strong financial and technological strength, large concrete admixture manufacturers tend to extend the value chain and produce polycarboxylic acid mother liquor and even its raw materials, such as polyether monomer, which can effectively control the impact of raw material price fluctuations and improve the profitability. In addition to supplying concrete admixtures to concrete manufacturers, they can also provide polyether monomers and polycarboxylic acid mother liquor to concrete admixture manufacturers. It is an industry norm for large concrete manufacturers to procure concrete admixtures from related parties.

Production Process Analysis of Concrete Admixtures Market

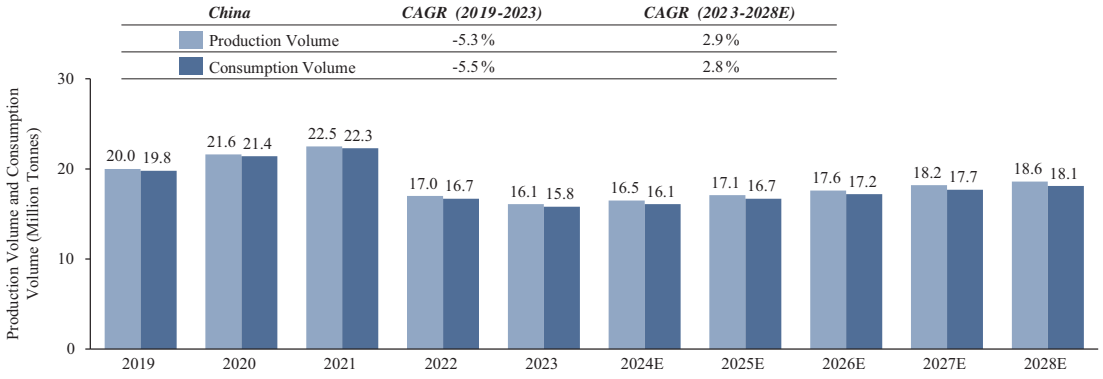
Concrete water reducing admixture is the most widely used concrete admixture. In recent years, polycarboxylic acid water reducing admixture has gradually become the best-performing and most widely used concrete water reducing admixture, which is mainly produced from polyether monomers as raw materials. The major production process of concrete water reducing admixture includes a chemical reaction by mixing raw materials, such as polyether monomers and acrylic acid, in the reaction kettle, and then a physical process of compounding.

Market Size of China's Concrete Admixtures Market

Production Volume and Consumption Volume of Concrete Admixtures in China

At present, the supply and demand in China's concrete admixtures market remained stable, and concrete admixture manufacturers usually formulate production plans based on market demands. From 2019 to 2023, the production volume of concrete admixtures in China decreased from 20.0 million tonnes to 16.1 million tonnes, with a CAGR of negative 5.3%. During the same period, the consumption volume of concrete admixtures in China decreased from 19.8 million tonnes to 15.8 million tonnes, with a CAGR of negative 5.5%. In 2022, affected by the economic downturn, the production volume of concrete experienced a significant decline, resulting in a decrease in production volume and consumption volume of concrete admixtures. With the recovery of macro economy and the increase in infrastructure investment, the production volume of concrete admixtures in China is expected to grow to 18.6 million tonnes in 2028, with a CAGR of 2.9% from 2023 to 2028. Meanwhile, the consumption volume of concrete admixtures in China will reach 18.1 million tonnes in 2028, with a CAGR of 2.8% from 2023 to 2028.

Production Volume and Consumption Volume of Concrete Admixtures (China), 2019-2028E

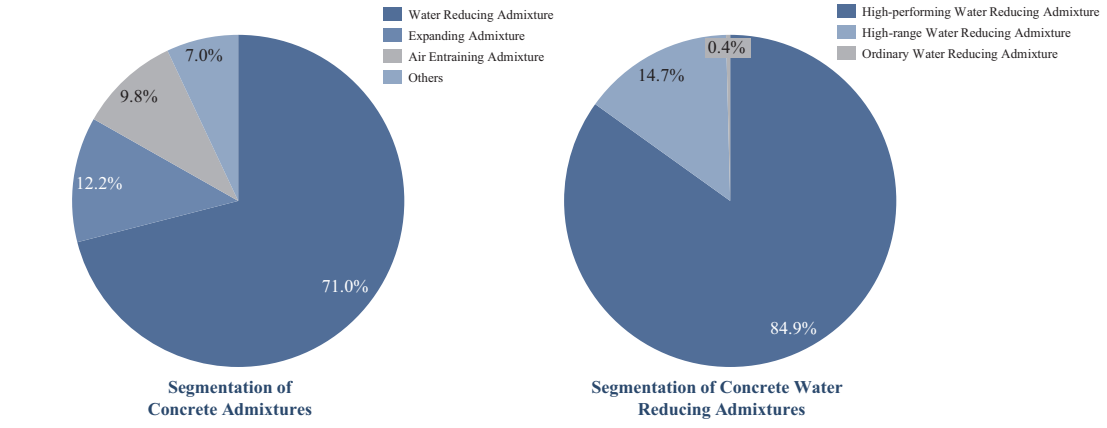


Source: Frost & Sullivan Analysis

Segmentation of China's Concrete Admixtures Market by Product Categories

Concrete water reducing admixture is the most widely used concrete admixture. In terms of production volume by product categories, concrete water reducing admixture accounted for approximately 71.0%. In recent years, the market share of polycarboxylic acid water reducing admixtures has experienced a continuous increase due to excellent performances. In terms of production volume, polycarboxylic acid water reducing admixtures accounted for approximately 84.9% of the total production volume of concrete water reducing admixtures in 2023, whilst the proportion of high-range water reducing admixtures and ordinary water reducing admixtures reached approximately 14.7% and 0.4%, respectively. In the future, the proportion of polycarboxylic acid water reducing admixtures is expected to continue to increase, while ordinary water reducers will be gradually eliminated.

Segmentation of China's Concrete Admixtures Market by Product Categories (China), 2023



Source: Frost & Sullivan Analysis

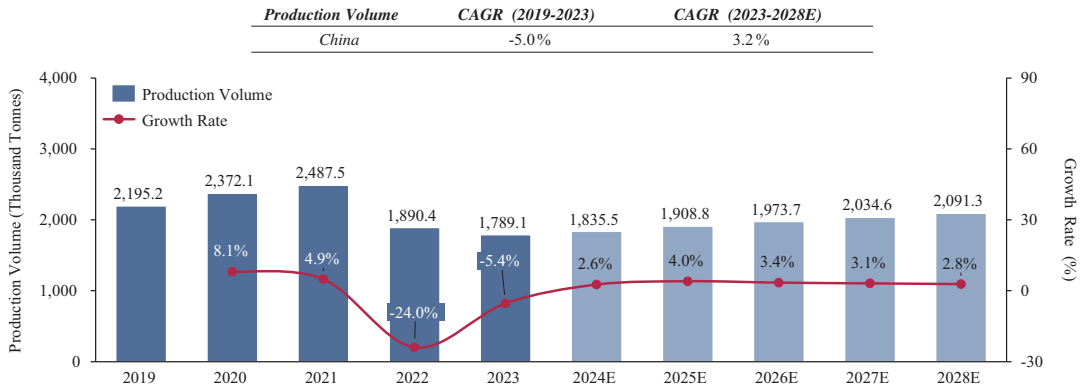
Import Volume and Export Volume of Concrete Admixtures in China

China is a net exporter of concrete admixtures. Due to sufficient domestic supply, the import volume of concrete admixtures is rather low. From 2019 to 2023, the export volume of concrete admixtures in China increased from 275.6 thousand tonnes to 347.2 thousand tonnes, with a CAGR of 5.9%. Meanwhile, the import volume of concrete admixtures in China decreased from 2.3 thousand tonnes in 2019 to 1.3 thousand tonnes in 2023, with a CAGR of negative 13.3%. By 2028, the export volume of concrete admixtures is expected to reach 477.4 thousand tonnes, with a CAGR of 6.6% from 2023 to 2028. With the steady growth in the domestic supply of concrete admixtures, the import volume of concrete admixtures in China is likely to further decrease to 1.0 thousand tonnes in 2028, with a CAGR of negative 5.1% from 2023 to 2028.

Overview of China's Polycarboxylic Acid Mother Liquors Market

Due to the lack of production technology, some small and medium-sized concrete admixture manufacturers choose to purchase polycarboxylic acid mother liquors to produce concrete admixtures. From 2019 to 2023, the production volume of polycarboxylic acid mother liquors in China dropped from 2,195.2 thousand tonnes to 1,789.1 thousand tonnes, with a CAGR of negative 5.0%. By 2028, the production volume of polycarboxylic acid mother liquors in China is expected to grow steadily to 2,091.3 thousand tonnes, with a CAGR of 3.2% from 2023 to 2028.

Production Volume of Polycarboxylic Acid Mother Liquors (China), 2019–2028E



Source: Frost & Sullivan Analysis

The polycarboxylic acid mother liquors market in China is relatively concentrated. In terms of sales volume of polycarboxylic acid mother liquors in 2023, our Group accounted for approximately 1.7% of the total sales volume of polycarboxylic acid mother liquors in China.

Market Drivers of China's Concrete Admixtures Market

Growing Downstream Demand: The development of the concrete admixtures market is mainly affected by downstream demands. In recent years, the infrastructure investment in China increased from RMB15.1 trillion in 2019 to RMB17.6 trillion in 2023, with a CAGR of 3.9%. In 2022, the National Development and Reform Commission and the Ministry of Housing and Urban-Rural Development issued the "14th Five-Year Plan for National Urban Infrastructure Construction" (《"十四五"全國城市基礎設施建設規劃》), proposing the development goal of building high-quality urban infrastructure systems during the 14th Five-Year Plan period. The infrastructure investment in China is expected to reach RMB20.9 trillion in 2028, with a CAGR of 3.5% from 2023 to 2028. The continuous promotion of infrastructure construction will promote the stable development of concrete market, thereby stimulating the steady growth of demand for concrete admixtures.

Increasing Proportion of Manufactured Sand and Gravel: Due to the shortage of natural sand and gravel resources caused by excessive and disorderly exploitation, the usage of manufactured sand and gravel has been rising in recent years. Compared to natural sand and gravel, the surface of manufactured sand and gravel particles is rough and multi-angular. When mixing concrete with the same slump, the water demand per cubic metre of manufactured sand and gravel increases by 10 to 20 kilogrammes. Therefore, concrete produced with manufactured sand and gravel has a greater demand for water reducing admixtures. In addition, manufactured sand and gravel have higher requirements for water reducing rate and air-entraining capacity of water reducing admixtures. Therefore, the increase in the usage of manufactured sand and gravel will promote the rapid growth of demand for concrete water reducing admixtures, especially high-performing water reducing admixtures.

Improvement in Ready-mixed Rate of Concrete: At present, the ready-mix rate of concrete in China reached approximately 50%, while in developed countries it is generally above 70%. There are significant potentials for ready-mixed rate of concrete in China to improve. In order to maintain the performances of ready-mixed concrete during transportation, higher dosage of concrete admixtures is required. Therefore, with the improvement of ready-mixed rate of concrete in China, the demand for concrete admixtures is expected to further increase.

Future Opportunities of China's Concrete Admixtures Market

Increasing Industry Concentration: With the implementation of environmental protection policies and the "Relocation of Industries from City Urban Area to Industrial Parks" policy, the development of small and medium-sized concrete admixture manufacturers has been restricted, and some are forced to shut down and withdraw from the market. In addition, large concrete manufacturers tend to establish long-term strategic cooperation with concrete admixture manufacturers with large-scale production capacity, thus leading concrete admixture manufacturers will continue to increase their market shares. In the future, with the continuous business expansion of leading players, and the withdrawal of small and medium-sized manufacturers, the concentration rate of China's concrete admixtures market will further increase.

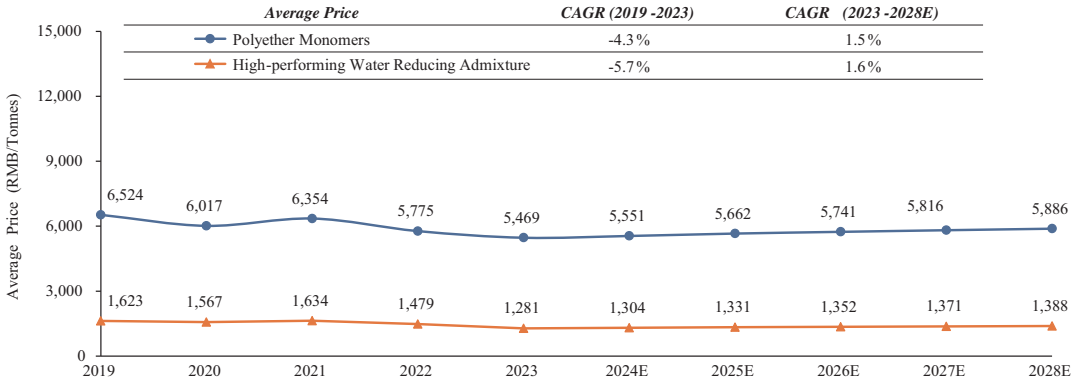
Growing Demand for High-performing Water Reducing Admixtures: Compared to high-range water reducing admixture and ordinary water reducing admixture, high-performing water reducing admixtures, with excellent performances in higher water reducing rate and concrete fluidity retention ability, can produce high-strength and durable concrete, suitable for various construction environments and special project requirements. In addition, the synthesis process of high-performing water reducing admixture does not generate waste liquid, exhaust gas and waste residue, which is more environmentally friendly than other water reducing admixtures. Therefore, with the growing demand for high-performing water reducing admixtures, the market share of high-performing water reducing admixtures will be further improved.

Technological Advancement: The variety of cement in China is complex, and the physical properties of sand and gravel and mineral admixtures are also highly different. To ensure the stability of concrete performance, concrete admixture manufacturers need to adjust the formula of concrete admixtures based on the proportion of other components in concrete, or produce concrete admixtures through customised compounding from mother liquors according to customers' requirements. Therefore, with the increasing demand for customisation and the growing requirements for product performances, the technical level of concrete admixture manufacturers will be rapidly improved.

Average Product Price and Average Raw Material Price of China's Concrete Admixtures Market

The average price of high-performing water reducing admixture is primarily affected by the relationship of market supply and demand and the fluctuation in raw material prices. Polyether monomer is the major raw material for high-performing water reducing admixtures, and its average price fluctuation is mainly affected by raw material prices, the relationship between market supply and demand, and the pricing strategies of major market participants.

Average Product Price and Average Raw Material Price (China), 2019–2028E



Source: Frost & Sullivan Analysis

In 2021, the price of polyether monomer increased mainly as the price of its raw material ethylene oxide increased. In 2022, the price of ethylene oxide decreased, and the downstream demand for polyether monomer declined, resulting in a decrease in the price of polyether monomer. In 2023, the average price of polyether monomer further declined as the price of ethylene oxide decreased.

Competitive Landscape of China's Concrete Admixtures Market

China's concrete admixtures market is rather fragmented. As at 31 December 2023, there are approximately 4,000 concrete admixture manufacturers in China. In terms of sales volume of high-performing water reducing admixtures in 2023, the top five market participants in China accounted for approximately 38.7%. In terms of sales volume of high-performing water reducing admixtures in 2023, our Group accounted for approximately 1.3% of the total sales volume of high-performing water reducing admixtures in China. In terms of sales volume of concrete admixtures in 2023, our Group accounted for approximately 0.8% of the total sales volume of concrete admixtures in China.

Top Five Market Participants in China's Concrete Admixture Market by Sales Volume, 2023

Ranking	Company Name	[REDACTED] Status	Market Share (%)
1	Lets Holding Group Co., Ltd.	Listed	8.4%
2	Sobute New MATERIALS Co., Ltd.	Listed	8.3%
3	Anhui Engineering Material Technology Co., Ltd.	Not listed	4.7%
4	Guangdong Redwall New Materials Co., Ltd.	Listed	3.9%
5	Shijiazhuang Chang An Yucai Building Material Co., Ltd.	Not listed	3.1%
Top 5			28.4%

Top Five Market Participants in China's High-performing Water Reducing Admixtures Market by Sales Volume, 2023

Ranking	Company Name	[REDACTED] Status	Market Share (%)
1	Lets Holding Group Co., Ltd.	Listed	11.2%
2	Sobute New MATERIALS Co., Ltd.	Listed	10.6%
3	Anhui Engineering Material Technology Co., Ltd.	Not listed	6.3%
4	Guangdong Redwall New Materials Co., Ltd.	Listed	6.3%
5	China West Construction Group New Material Technology Co., Ltd.	Not listed	4.3%
Top 5			38.7%

Source: Annual Reports, Chinaconcretes.com, Frost & Sullivan Analysis

Entry Barriers of China's Concrete Admixtures Market

Qualifications and Certificates: Concrete admixtures industry belongs to chemical industry and are subject to compulsory production qualification management. Concrete admixture manufacturers have to obtain corresponding qualifications or certificates, such as the qualifications required for safety production, environmental protection and fire protection. It is necessary to obtain certificates for safety use of hazardous chemicals for production processes that use hazardous raw materials. In addition, concrete admixture manufacturers need to obtain corresponding pollution discharge permits. It is rather difficult for new entrants to acquire such qualifications and certificates in a short time. Compared to the cement admixtures market, the concrete admixtures market is subject to stricter industry regulation. For instance, affected by policies such as the "Relocation of Industries from City Urban Area to Industrial Parks", it is more difficult for new entrants to build new production facilities, resulting in higher entry barriers to China's concrete admixtures market.

Technology Capabilities: Concrete admixture manufacturers need to customise technical solutions based on customers' differentiated requirements to provide high-quality products and possess strong R&D capabilities to quickly respond to customers' urgent needs and ensure their production.

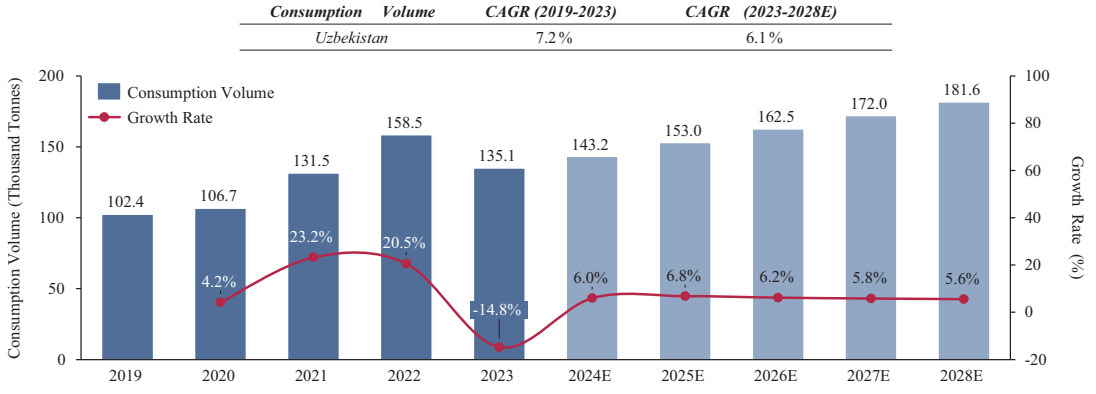
Existing concrete admixture manufacturers generally have mature production processes, strong technology capabilities, and a considerable number of technical personnel reserves. It is difficult for new entrants without strong technology capabilities to cope with customised needs from customers.

Customer Relationships: Concrete manufacturers usually establish long-term cooperative relationships with concrete admixture suppliers, mainly as they need to conduct multiple tests together with their suppliers to choose appropriate concrete admixtures. Moreover, concrete manufacturers generally choose concrete admixture manufacturers that are located close to them due to convenient product supply and timely response to their requirements. Therefore, it is not common for concrete manufacturers to replace their concrete admixture suppliers after the admixture supplier has already gained familiarity and experience with the customers' technical requirements due to high costs of replacement. Therefore, it is difficult for new entrants to establish own customer base in a short time.

Overview of Uzbekistan's Concrete Admixtures Market

The consumption volume of concrete admixtures in Uzbekistan increased from 102.4 thousand tonnes in 2019 to 135.1 thousand tonnes in 2023, with a CAGR of approximately 7.2%. Driven by a series of favourable policies for infrastructure construction, the production volume of concrete in Uzbekistan increased steadily, which drives the market demand for concrete admixtures. By 2028, the consumption volume of concrete admixtures in Uzbekistan is expected to reach 181.6 thousand tonnes, with a CAGR of approximately 6.1% from 2023 to 2028.

Consumption Volume of Concrete Admixtures (Uzbekistan), 2019-2028E



Source: Frost & Sullivan Analysis

The concrete admixtures market in Uzbekistan is relatively concentrated, with the top five concrete admixture manufacturers accounting for approximately 36.7% of the total sales volume of concrete admixtures in 2023.

Top Five Market Participants in Concrete Admixtures Market in Uzbekistan by Sales Volume, 2023

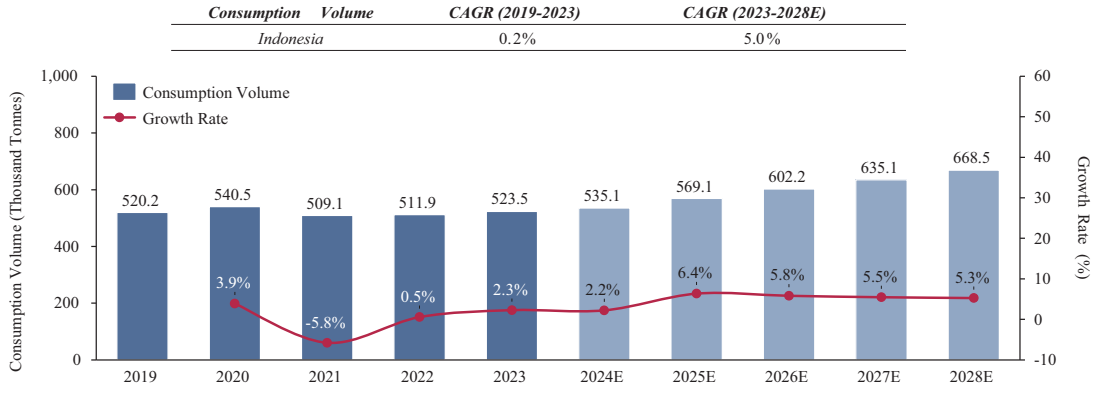
Ranking	Company Name	[REDACTED] Status	Market Share (%)
1	BASF Group	Listed	10.4%
2	Sika Group	Listed	8.8%
3	Mapei Group	Listed	7.7%
4	RPM International Inc.	Listed	5.3%
5	Fosroc International Ltd.	Not listed	4.5%
Top 5			36.7%

Source: Frost & Sullivan Analysis

Overview of Indonesia's Concrete Admixtures Market

The consumption volume of concrete admixtures in Indonesia increased slightly from 520.2 thousand tonnes in 2019 to 523.5 thousand tonnes in 2023, with a CAGR of approximately 0.2%. In 2028, the consumption volume of concrete admixtures in Indonesia is expected to reach 668.5 thousand tonnes, with a CAGR of approximately 5.0% from 2023 to 2028.

Consumption Volume of Concrete Admixtures (Indonesia), 2019-2028E



Source: Frost & Sullivan Analysis

The concrete admixtures market in Indonesia is relatively concentrated, with the top five concrete admixture manufacturers occupying a market share of approximately 52.4% in 2023.

Top Five Market Participants in Concrete Admixtures Market in Indonesia by Sales Volume, 2023

Ranking	Company Name	[REDACTED] Status	Market Share (%)
1	Sika Group	Listed	11.8%
2	BASF Group	Listed	11.0%
3	RPM International Inc.	Listed	10.4%
4	Fosroc International Ltd.	Not listed	9.7%
5	Mapei Group	Listed	9.5%
Top 5			52.4%

Source: Frost & Sullivan Analysis

COMPARISON OF CEMENT ADMIXTURE AND CONCRETE ADMIXTURE

Comparison of Growth Between Cement Admixtures and Concrete Admixtures

Different Types of Admixtures. Cement admixtures are applied in the production of cement whilst concrete admixtures are applied in the production of concrete. The types and functions of cement admixtures and concrete admixtures are different. Depending on different functions, cement admixtures primarily include cement grinding aids, desulphurization and denitration admixtures, coal-saving admixtures, among others, whilst concrete admixtures primarily include water reducing admixtures, expanding admixtures, air entraining admixtures, among others. Different growth rates of different types of cement admixtures and concrete admixtures result in different growth in admixture markets.

Different Amounts of Admixtures in Production. The usage amounts of cement admixtures in the production of cement are different from the usage amounts of concrete admixtures in the production of concrete. Specifically, for every 1,000 tonnes of cement produced, approximately 0.3 to 1.5 tonnes of cement admixtures are used, while for every 1,000 cubic metres of commercial concrete produced, approximately 5 to 8 tonnes of concrete admixtures are used. Different trends of usage amounts of cement admixtures and concrete admixtures in the production of cement and concrete result in different growth in admixture markets.

Different Growth in Downstream Industries. In addition to concrete production, cement can be also used in mortar, bricks, among others. Moreover, different types of concrete products use different amount of cement as raw materials. In recent years, the demand from downstream applications for cement such as mortar, bricks and concrete recorded different growth rates. Therefore, the growth rates of cement industry and concrete industry in China are different. From 2019 to 2023, the production volume of cement and commercial concrete in China grew at a CAGR of negative 3.5% and 1.4%, respectively. Further, different growth rates in downstream industries result in different growth in admixture markets.

Comparison of Market Concentration Between Cement Admixtures and Concrete Admixtures

Different Number of Market Participants. As the production processes, production technologies and raw materials of cement admixtures and concrete admixtures are different, participants in these markets and their business scale are different. As at 31 December 2023, there were approximately 200 cement admixture manufacturers and approximately 4,000 concrete admixture manufacturers in China. Different number of market participants results in different market concentration in admixture markets.

Different Types of Market Participants. The leading participants in cement admixture market are primarily cement admixture manufacturers that are affiliated to large cement manufacturers, whilst the leading participants in concrete admixture market are mainly chemical companies that are specialised in the production of concrete admixtures. Based on the stable product supply to cement manufacturers, the affiliated cement admixture manufacturers can expand their production scale and business layout more easily. Therefore, the concentration rate in China's cement admixture market is higher than that in China's concrete admixture market. For instance, in terms of sales volume in 2023, the market shares of top five cement grinding aid manufacturers in China reached approximately 49.6%, which was higher than the market shares of top five high-performing concrete water reducing admixture manufacturers in China of approximately 38.7%. Different types of market participants result in different competitive landscape and market concentration in admixture markets.

Different Competitive Landscape of Downstream Industries. The competitive landscape between cement industry and concrete industry is different. The concrete industry is much more fragmented than cement industry mainly as the transportation radius of concrete is limited and there is a large number of small-sized concrete mixing plants in China. In terms of production volume in 2023, the top five cement manufacturers in China accounted for approximately 34% while the top five concrete manufacturers in China only accounted for approximately 8%. To ensure timely and stable supply of concrete admixtures to these small-sized concrete mixing plants, there are also a large number of small-sized concrete admixture manufacturers. However, due to higher concentration rate in cement industry, large-scale cement manufacturers can procure cement admixtures from related parties. Therefore, the large-scale cement admixture manufacturers are normally affiliated to cement manufacturers, which resulted in higher concentration rate in China's cement admixture market.

Analysis of Forecast Growth of Cement Admixture and Concrete Admixture Markets

Reasons for Negative Historical Growth. The market size of cement admixture and concrete admixture experienced a slowdown in growth and decline mainly as (i) due to the outbreak of COVID-19, the delay in work resumption, the restriction in transportation and the declining downstream demands have hindered the development of admixture market; (ii) a series of policies on purchase restriction of housing issued by the Chinese government have resulted in a downturn in China's real estate industry, which led to a decreasing demand for cement and concrete admixtures; and (iii) the elimination of backward production facilities that can not meet the requirements of environmental protection has resulted in the decreasing production volume.

Expectations for Growth in Forecast Period. The market size of cement admixture and concrete admixture is expected to have a stable increase in the forecast period mainly due to (i) continuous development of infrastructure construction promoted by the investment in infrastructure construction in China increasing at a CAGR of 3.9% from 2019 to 2023 and favourable policies such as the "National Urban Infrastructure Construction Plan During 14th Five Year Plan Period" (《"十四五"全國城市基礎設施建設規劃》) issued in 2022, which proposed to build and renovate approximately 118 thousand kilometers of roads, construct and renovate approximately 15 thousand urban bridges, and basically completed the renovation task of 219 thousand old urban communities that need to be renovated during the 14th Five Year Plan period; (ii) recovery of China's real estate industry as the Chinese government has started to relax purchase restrictions of housing; (iii) industry consolidation by large-scale market participants that possess strong capabilities in capital, technology and sales channels, and can expand their business scale more easily; (iv) development of new types of admixtures which can enlarge product categories and provide development potentials for admixture manufacturers; and (v) increase in export volume along with the business expansion and the increasing brand awareness of China's cement admixture and concrete admixture manufacturers in overseas markets.

ANALYSIS OF CHINA'S ALCOHOL AMINE MARKET AND POLYETHER MONOMER MARKET

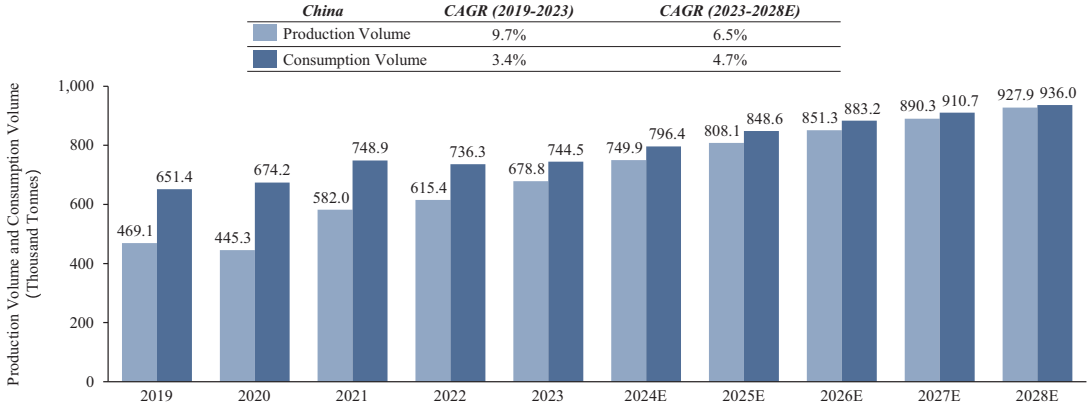
Overview of Alcohol Amine Market

Alcohol amines refer to substances that contain an N atom and an -OH group within the molecule of organic compounds, and possess the chemical properties of both amines and alcohols. Alcohol amines primarily include (i) ethanolamine and (ii) isopropanolamine (isopropanolamine being our Company's processed alcohol amine), and are widely applied in cement admixtures, surfactants, coatings, etc. Cement grinding aids produced from alcohol amines as raw materials can effectively reduce the particle size of cement grinding, reduce the power consumption of cement grinding, and increase the strength of cement.

Market Size of China's Alcohol Amine Market

In recent years, with the growing downstream demands, the production volume of alcohol amines in China maintained a stable growth, increasing from 469.1 thousand tonnes in 2019 to 678.8 thousand tonnes in 2023, with a CAGR of 9.7%. With the recovery of construction industry and the continuous development of downstream industries such as coatings industry and pharmaceutical industry, the production volume of alcohol amines in China is expected to further increase to 927.9 thousand tonnes in 2028, with a CAGR of 6.5% from 2023 to 2028. Meanwhile, the consumption volume of alcohol amines in China maintained a steady growth, increasing from 651.4 thousand tonnes in 2019 to 744.5 thousand tonnes in 2023, with a CAGR of 3.4%. In 2022, the consumption volume of alcohol amines in China experienced a slight decline due to the decreasing demand from major downstream applications such as cement grinding aids. In the future, the accelerated urbanisation and new infrastructure construction will promote the gradual recovery of China's cement market, which will stimulate the increasing demand for alcohol amines. The consumption volume of alcohol amines in China is expected to reach 936.0 thousand tonnes in 2028, with a CAGR of 4.7% from 2023 to 2028.

Production Volume and Consumption Volume of Alcohol Amines (China), 2019 – 2028E



Source: Frost & Sullivan Analysis

As important organic chemical raw materials, alcohol amines have a wide range of applications in various industries. In terms of production volume by downstream applications in 2023, cement admixture represents the largest downstream application in China's alcohol amine market, accounting for approximately 50.3%. With the accelerated urbanisation and infrastructure construction, the market share of alcohol amines applied in cement admixtures is expected to increase in the future. Surfactants and coatings were the second and third largest applications in China's alcohol amine market, accounting for approximately 12.8% and 10.6%, respectively.

Market Drivers of China's Alcohol Amines Market

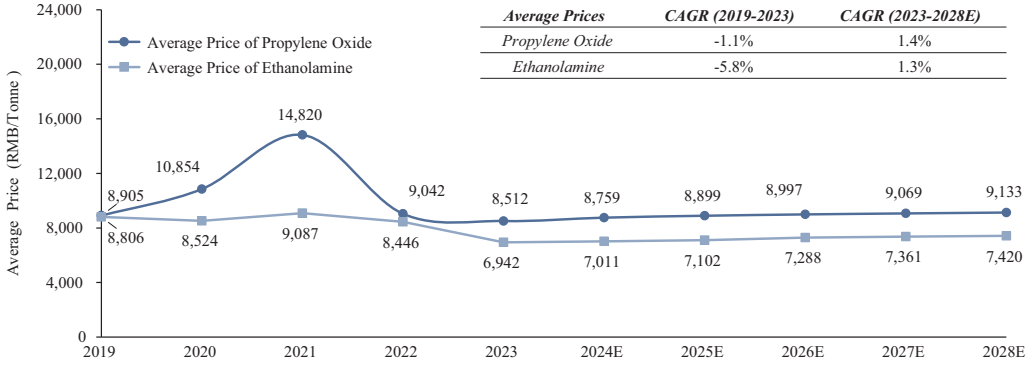
Stable Development of Downstream Industries: Alcohol amines are primarily used in the production of cement admixtures, coatings, adhesives, etc., with the major applications in building and infrastructure construction. With the economic growth, the demand for building and infrastructure construction experienced a stable increase, thereby promoting the growth in demand for alcohol amines. In addition, as important intermediates for drug synthesis and pesticide production, the development of pharmaceutical industry and agricultural industry stimulated the growing demand for alcohol amines. Therefore, the stable development of downstream industries has driven the sustained growth of demand in China's alcohol amine market.

Improving Production Process and Technologies: Alcohol amine manufacturers have been dedicated to improving production processes and technologies, such as using new catalytic systems to effectively reduce production costs and improve production efficiency. Meanwhile, the development and application of new technologies can also improve product qualities, reduce the generation of by-products and wastes, increase the purity of alcohol amine products, and satisfy the stringent requirements of environmental protection.

Average Raw Material Prices of Processed Alcohol Amines in China

The main raw materials of processed alcohol amines are propylene oxide and ethanolamine. As propylene is the main raw material of propylene oxide, the average price of propylene oxide has a certain correlation with the price of propylene. As ethanolamine is produced by ethylene oxide, the average price of ethanolamine is correlated with the average price of ethylene oxide. Meanwhile, mainly as propylene oxide and ethanolamine are important organic compound raw materials with wide applications, their average prices are closely related to downstream demands. The average price of propylene oxide in China decreased from RMB8,905 per tonne in 2019 to RMB8,512 per tonne in 2023, with a CAGR of negative 1.1%. In 2021, the average price of propylene rose and the demand for propylene oxide from downstream processed alcohol amines market saw a significant increase, leading to a substantial increase in the average price of propylene oxide. In 2022, the average price of propylene fell, and the increase in production capacity of propylene oxide led to an increase in market supply and a drop in the average price of propylene oxide. In 2023, the average price of propylene fell, leading to a further decline in the average price of propylene oxide. The average price of ethanolamine decreased from RMB8,806 per tonne in 2019 to RMB6,942 per tonne in 2023, with a CAGR of negative 5.8%. In 2021, due to the rise in prices of ethylene oxide, the average price of ethanolamine increased accordingly. In 2022, the average price of ethylene oxide fell, and the decline in downstream demand led to a drop in the average price of ethanolamine. With the further decline in the average price of ethylene oxide, the average price of ethanolamine decreased in 2023. The average price of propylene oxide and ethanolamine for the first half of 2024 amounted to RMB8,350 per tonne and RMB6,748 per tonne, respectively. With the steady development of downstream applications such as processed alcohol amines, and the stable supply of propylene oxide, the average price of propylene oxide in China is expected to remain stable in the future. In 2028, the average price of propylene oxide in China is anticipated to reach RMB9,133 per tonne, with a CAGR of 1.4% from 2023 to 2028.

Average Raw Material Price of Processed Alcohol Amines (China), 2019 –2028E



Average Prices	*CAGR (2019-2023)*	*CAGR (2023-2028E)*
Propylene Oxide	-1.1%	1.4%
Ethanolamine	-5.8%	1.3%

Source: Frost & Sullivan Analysis

Competitive Landscape of China's Alcohol Amine Market

The production of alcohol amines requires the corresponding production qualifications of chemical products. Meanwhile, the technical barrier and capital barrier in the alcohol amine market are relatively high, therefore China's alcohol amine market is relatively concentrated. In terms of sales volume of alcohol amines in 2023, our Group accounted for approximately 2.5% of the total sales volume of alcohol amines in China. In terms of sales revenue of alcohol amines in 2023, our Group accounted for approximately 1.9% of the total sales revenue of alcohol amines in China. Among the major categories of alcohol amines, processed alcohol amine (isopropanolamine) has excellent performances and is environmentally friendly. Only a limited number of manufacturers in China have the capability of scale production for processed alcohol amine. In terms of sales volume of processed alcohol amines in 2023, our Group accounted for approximately 4.7% of the total sales volume of processed alcohol amines in China. In terms of sales revenue of processed alcohol amines in 2023, our Group accounted for approximately 3.9% of the total sales revenue of processed alcohol amines in China.

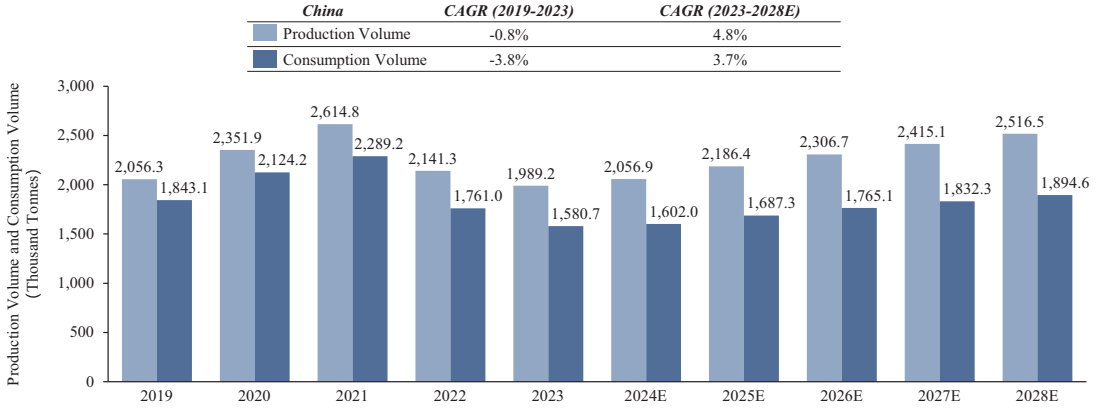
Overview of Polyether Monomer Market

Polyether monomer is a commonly used polymer material, primarily applied in downstream applications such as concrete admixtures, coatings and surfactants. Polycarboxylic acid water reducing admixtures produced from polyether monomers possess functions such as large water reduction, high slump retention and high strength improvement.

Market Size of China's Polyether Monomer Market

The production volume of polyether monomers in China decreased from 2,056.3 thousand tonnes in 2019 to 1,989.2 thousand tonnes in 2023, with a CAGR of negative 0.8%. In 2022 and 2023, the production volume declined mainly due to the decreasing demand from downstream concrete admixture market. In the future, with the recovery of real estate industry and the continuous promotion of infrastructure construction, the growing demand from concrete admixture market is expected to drive the development of China's polyether monomer market. In 2028, the production volume of polyether monomers in China is anticipated to increase to 2,516.5 thousand tonnes, with a CAGR of 4.8% from 2023 to 2028. The consumption volume of polyether monomers in China decreased from 1,843.1 thousand tonnes in 2019 to 1,580.7 thousand tonnes in 2023, with a CAGR of negative 3.8%. In line with the trend of production volume, the demand for polyether monomers in China is expected to grow with the recovery of real estate industry and the continuous promotion of infrastructure construction. In 2028, the consumption volume of polyether monomers in China is expected to reach 1,894.6 thousand tonnes, with a CAGR of 3.7% from 2023 to 2028.

Production Volume and Consumption Volume of Polyether Monomers (China), 2019 – 2028E



Source: Frost & Sullivan Analysis

Polyether monomers are primarily applied in the synthesis of polycarboxylic acid water reducing admixtures. In terms of production volume by downstream applications in 2023, concrete admixture is the largest downstream application of polyether monomers, accounting for approximately 90.2%. With the steady recovery of real estate industry and the continuous development of infrastructure construction, the proportion of polyether monomers applied in concrete admixtures is expected to remain stable. Coating and surfactant are the second and third largest downstream applications for polyether monomers, accounting for approximately 4.2% and 3.9%, respectively.

Market Drivers of China's Polyether Monomer Market

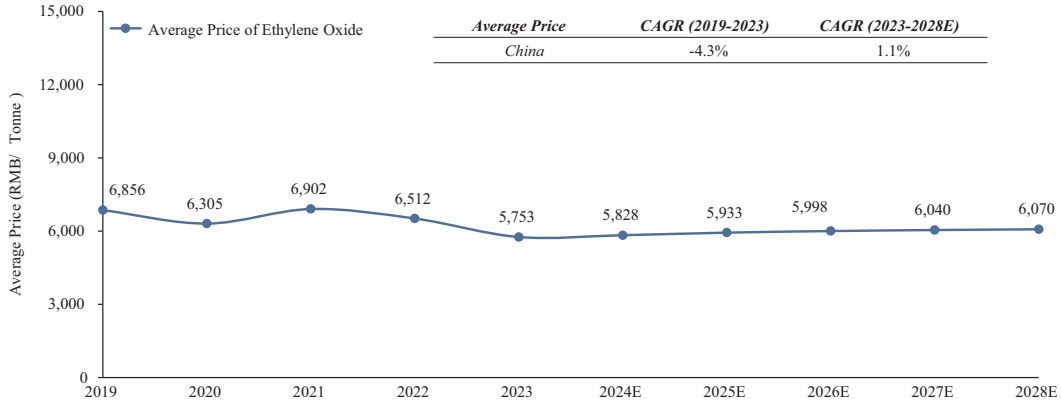
Increasing Downstream Demand: With the development of downstream industries such as concrete admixtures, coatings and surfactants, China's polyether monomer market has experienced a stable growth in recent years. The demand for polycarboxylic acid water reducing admixtures, which is one of the key materials to improve concrete performances, has experienced a stable increase with the development of building industry and infrastructure construction industry. Meanwhile, the popularisation of sustainable building standards has driven the demand for higher-performance concrete. Polycarboxylic acid water reducing admixtures produced from polyether monomers can reduce the unit cement consumption of concrete, improve energy efficiency, and meet the requirements of sustainable building. Therefore, as the main raw material for polycarboxylic acid water reducing admixtures, polyether monomers play a crucial role in building and infrastructure construction.

Technological Innovation: The production technologies and product qualities of polyether monomers are constantly improving, providing broad development potentials for China's polyether monomer market. For instance, the synthesis process of six-carbon polyether monomers can effectively improve production efficiency and reduce energy consumption, and the polycarboxylic acid water reducing admixtures produced from it have a significant effect on improving the workability of concrete. Such technological innovations provide new development opportunities for business expansion of polyether monomer manufacturers.

Average Raw Material Prices of Polyether Monomer in China

The main raw material of polyether monomers is ethylene oxide. Ethylene oxide is produced by ethylene, therefore, the price of ethylene oxide has a certain correlation with the price of ethylene. Additionally, as an important chemical raw material with wide applications, the average price of ethylene oxide is closely related to the relationship between market supply and demand. The average price of ethylene oxide in China decreased from RMB6,856 per tonne in 2019 to RMB5,753 per tonne in 2023, with a CAGR of negative 4.3%. In 2021, the average price of ethylene rose, leading to an increase in the average price of ethylene oxide. In 2022, due to the fall in the average price of ethylene and the decreasing demand for ethylene oxide from downstream applications such as polyether monomer, the average price of ethylene oxide decreased accordingly. In 2023, due to a further decline in the average price of ethylene, the average price of ethylene oxide continued to decrease. The average price of ethylene oxide for the first half of 2024 amounted to RMB5,972 per tonne. Mainly as the supply and demand of ethylene oxide maintain stable, the average price of ethylene oxide is expected to remain stable in the future. In 2028, the average price of ethylene oxide is likely to slightly increase to RMB6,070 per tonne, with a CAGR of 1.1% from 2023 to 2028.

Average Raw Material Price of Polyether Monomers (China), 2019 –2028E



Source: Frost & Sullivan Analysis

Competitive Landscape of China's Polyether Monomer Market

China's polyether monomer market is relatively concentrated. As at 31 December 2023, there were approximately 50 polyether monomer manufacturers in China. In terms of sales volume of polyether monomers in 2023, our Group accounted for approximately 0.9% of the total sales volume of polyether monomers in China. In terms of revenue of polyether monomers in 2023, our Group accounted for approximately 1.0% of the total revenue of polyether monomers in China.

Entry Barriers in China's Alcohol Amine Market and Polyether Monomer Market

Qualification Barrier: Alcohol amines and polyether monomers are fine chemical materials, and their production requires corresponding production certificates and pollution discharge permits. In particular, the raw materials for the synthesis of alcohol amines and polyether monomers are propylene oxide and ethylene oxide, which are hazardous chemicals. Therefore, the manufacturers have to obtain safety production certificates and certificates for safety use of hazardous chemicals. For new entrants, it is rather difficult to obtain various qualifications and certificates with the approval from industry regulations in a short time.

Capital Barrier: The construction and operation of production facilities of alcohol amines and polyether monomers require a large amount of capital investment. Existing manufacturers usually have established a solid financial foundation, which is easier to expand production scale. In contrast, it is difficult for new entrants to obtain sufficient investment to acquire production sites, purchase equipment, procure raw materials, and meet operation costs in the initial stage.

Technical Barrier: The production process of alcohol amines and polyether monomers involves complex chemical reactions and precise process control, requiring the manufacturers to possess strong production technology and equipment operation capabilities. Product performances directly affect the application effect, which requires the manufacturers to possess strong R&D capabilities. Therefore, the production of alcohol amines and polyether monomers requires sufficient technical reserves, which is one of major obstacles for new entrants.

Raw Material Supply Barrier: Ethylene oxide and propylene oxide are hazardous chemicals and inconvenient to transport over long distances. There are primarily two transportation methods for ethylene oxide and propylene oxide, including land transportation and pipeline transportation. Small-sized companies mainly choose land transportation due to small procurement volume. According to the "Opinions on Comprehensively Strengthening Safe Production of Hazardous Chemicals" (《關於全面加強危險化學品安全生產工作的意見》) issued by the CPC Central Committee and the State Council in 2020, stricter supervision on the transportation of hazardous chemicals has been implemented, and pipeline transportation has become the main trend for the transportation of ethylene oxide and propylene oxide. It is rather difficult for new entrants to absolutely ensure the safety in the transportation of raw materials if they cannot sign a long-term pipeline transportation agreement with upstream suppliers.

ANALYSIS OF CHINA'S CEMENT MARKET AND CONCRETE MARKET

Market Size of China's Cement Market

From 2019 to 2023, the production volume of cement in China decreased from 2,344.3 million tonnes to 2,033.1 million tonnes, with a CAGR of negative 3.5%. From 2019 to 2020, mainly as Chinese government increased the amount of special government bonds and promoted the construction of major projects, China's cement market maintained a stable growth. Since 2020, affected by the outbreak of COVID-19 and the continuous recession in real estate market, the demand for cement

experienced a decline, resulting in a decrease in the production volume of cement from 2020 to 2023. The "National Urban Infrastructure Construction Plan During 14th Five Year Plan Period" (《"十四五"全國城市基礎設施建設規劃》) issued by the Ministry of Housing and Urban Rural Development and the National Development and Reform Commission in 2022, proposed to build and renovate approximately 118 thousand kilometres of roads, construct and renovate approximately 15 thousand urban bridges, and basically completed the renovation task of 219 thousand old urban communities that need to be renovated during the 14th Five Year Plan period. In the future, mainly due to the continuous growth of infrastructure investment, the demand for cement is expected to maintain a steady increase. The production volume of cement in China is likely to grow to 2,302.4 million tonnes in 2028, with a CAGR of 2.5% from 2023 to 2028. Consistent with the trend of production volume, mainly affected by demands from downstream industries such as infrastructure construction, building construction and rural area construction, the consumption volume of cement in China decreased from 2,341.2 million tonnes in 2019 to 2,030.3 million tonnes in 2023, with a CAGR of negative 3.5%. With the recovery of downstream demands, the consumption volume of cement in China is expected to reach 2,293.8 million tonnes in 2028, with a CAGR of 2.5% from 2023 to 2028.

Market Size of China's Concrete Market

With the stable development of downstream industries such as infrastructure construction and building construction, the production volume of commercial concrete in China increased from 2,553.9 million cubic metres in 2019 to 2,696.1 million cubic metres in 2023, with a CAGR of 1.4%. In 2022, mainly due to the downturn in real estate industry, the demand for commercial concrete decreased, resulting in a decline in production volume by 13.4%. With the stable economic development, the further advancement of infrastructure construction and the continuous growth of construction industry, the production volume of commercial concrete in China is expected to maintain a steady growth and reach 3,101.2 million cubic metres in 2028, with a CAGR of 2.8% from 2023 to 2028. Due to the regional characteristics and relatively short sales radius, commercial concrete manufacturers generally formulate production and sales plans based on demands from their customers. Therefore, the consumption volume and production volume of commercial concrete in China remain consistent. The consumption volume of commercial concrete in China reached 2,696.1 million cubic metres in 2023, and is expected to reach 3,101.2 million cubic metres in 2028, with a CAGR of 2.8% from 2023 to 2028.

Market Drivers of China's Cement Market and Concrete Market

Supportive Policies and Stable Growth in Downstream Demands: The Chinese government has issued a series of favourable policies to promote the transformation, upgrading and sustainable development of China's cement and concrete market, such as the "Implementation Plan for Carbon Peak in Building Material Industry" (《建材行業碳達峰實施方案》) and the "National Urban Infrastructure Construction Plan During 14th Five Year Plan Period" (《"十四五"全國城市基礎設施建設規劃》). In addition, the stable growth in demand from downstream industries such as infrastructure construction, building construction and rural area construction has promoted the continuous development of China's cement market and concrete market. Specifically, the infrastructure investment in China increased from

RMB15.1 trillion in 2019 to RMB17.6 trillion in 2023, with a CAGR of 3.9%. The gross output value of construction engineering industry in China grew from RMB21.9 trillion in 2019 to RMB27.8 trillion in 2023, with a CAGR of 6.1%.

Impact of Carbon Emission Related Polices

Release of Carbon Emission Related Policies Strengthens Control over Greenhouse Gas Emissions in Specific Industries. The "Interim Regulations for the Management of Carbon Emission Trading" (《碳排放權交易管理暫行條例》), which was implemented on 1 May, 2024, aims to regulate carbon emission trading and related activities, strengthen control over greenhouse gas emissions, and actively and prudently promote the strategy of carbon peak and carbon neutrality. This policy specifically targets producers and manufacturers that generate significant carbon emissions during their production process, such as cement clinker producers, power generators, and steel manufacturers, which are typically involved in carbon emission trading and related activities due to the nature of their industries. In general, such producers and manufacturers are required to obtain annual carbon emission quotas for their production activities from competent authorities each year, and to procure carbon emission quotas from other entities through the carbon emission trading system run by competent authorities to compensate for any excess of carbon emissions in their production activities to ensure the compliance with such policy. The "Consultation Paper on the Accounting Verification and Report Compiling of GHG Emissions of Cement Clinker Manufacturers" (《企業溫室氣體排放核算與報告指南水泥熟料生產(徵求意見稿)》), which was released in March 2024, sets out guiding principles relating to the accounting and reporting of greenhouse gas emissions of cement clinker manufacturers, and aims to further improve the quality of carbon emission data for carbon emission trading and related activities.

Carbon Emission Related Policies Have Direct Impact on Downstream Cement and Concrete Market. Cement clinker, being the major raw material for cement products, is one of the industries which are regulated by these aforementioned policies, and is involved in carbon emission trading and related activities in the PRC. Such policies require cement clinker producers to manage and control carbon emissions in their production process either by obtaining sufficient carbon emissions quotas from competent authorities or procuring carbon emission quotas from other entities. Therefore, these requirements including the management and control of carbon emission quotas may limit the reckless expansion of cement production capacity, and accelerate the transformation of cement industry towards energy conservation and carbon emission reduction such as the replacement of equipment with high energy consumption in the production, which may lead to the elimination of small-sized industry players that cannot fulfill technical transformation of their production facilities. In response to carbon emission related policies, cement producers can (i) purchase carbon emission quotas to compensate for any excess of carbon emissions in their production, (ii) adopt low-carbon production technologies such as installing more efficient production equipment in their production and (iii) apply raw materials that can reduce the energy consumption of production including cement and concrete admixture products in their production, among which cement producers may mainly choose to apply raw materials that can reduce energy consumption as this method has lower costs. Additionally, as cement is the major raw material for concrete manufacturing, the control of carbon emission quotas in cement industry may increase the purchase costs of raw materials for concrete manufacturers. Although these policies may

affect the cost structure of cement and concrete production, they are unlikely to affect the overall demand for cement and concrete products, as the demand for cement and concrete products is mainly dictated by market needs arising from construction industry.

Carbon Emission Related Policies Do Not Have Material Impact on Cement and Concrete Admixtures Manufacturers. The implementation or issuance of the aforementioned policies does not have any material impact on cement and concrete admixtures manufacturers as the cement admixtures industry, the concrete admixtures industry, the alcohol amine industry and the polyether monomer industry were not listed as one of the regulated industries in the aforementioned regulations and consultation paper. Although the implementation of carbon emission related policies will have to some extent, an impact on the cement and concrete industries which are the downstream industries of cement and concrete admixtures, the downstream demands for cement and concrete admixtures will not be affected by these policies as cement manufacturers can purchase carbon emission quotas to ensure their production scale, and the demand from those small cement manufacturers that are phased out can shift to other large cement manufacturers.

ANALYSIS OF CHINA'S ETHYLENE CARBONATE MARKET

Overview of Ethylene Carbonate Market

Ethylene carbonate (EC) is a chemical substance with excellent performances such as high dielectric constant, high thermal stability, low viscosity and low volatility. EC can be used as organic solvents and active intermediates. The main downstream applications include lithium battery electrolyte, high water absorbing resins and active intermediates, among which lithium battery electrolyte is the most common downstream application of EC.

Market Size of China's Ethylene Carbonate Market

In recent years, due to the development of downstream industries of lithium battery electrolytes such as new energy vehicles, energy storage and consumer electronics, the market size of EC has experienced a rapid growth. From 2019 to 2023, the production volume of EC in China increased from 69.0 thousand tonnes to 304.2 thousand tonnes, with a CAGR of 44.9%. The production volume of EC in China is expected to reach 1,026.7 thousand tonnes in 2028, with a CAGR of 27.5% from 2023 to 2028. With the continuous development of lithium battery industry, the production volume of lithium battery electrolyte in China continues to increase, which drives the rapid growth of demand for EC. From 2019 to 2023, the consumption volume of EC in China increased from 64.3 thousand tonnes to 296.7 thousand tonnes, with a CAGR of 46.6%. In the future, with the further improvement of emphasis on new energy and the continuous extension of downstream applications of EC, the demand for EC is expected to maintain a rapid growth. The consumption volume of EC in China is anticipated to reach 1,005.9 thousand tonnes in 2028, with a CAGR of 27.7% from 2023 to 2028.

EC can be primarily divided into electronic grade EC and industrial grade EC, among which electronic grade EC is almost entirely used in electrolyte solvents, whilst industrial grade EC is mainly applied in electrolyte additives, high water absorbing resins and active intermediates. In terms of

production volume by downstream applications in 2023, electrolyte solvent is the largest downstream application of EC, accounting for approximately 80.9%. The proportion of EC applied in electrolyte additives and high water absorbing resins is approximately 12.8% and 4.3%, respectively.

Market Drivers of China's Ethylene Carbonate Market

Favourable Policies Promoted Rapid Development of Downstream Industries: EC is one of the important components of lithium battery electrolyte solvents, directly benefiting from the favourable policies on China's new energy vehicle industry and energy storage industry, such as the "Guiding Opinions on Further Establishing a High-Quality Charging Infrastructure System" (《關於進一步構建高質量充電基礎設施體系的指導意見》) and the "Implementation Plan for Development of New Energy Storage During 14th Five-Year Plan" (《"十四五"新型儲能發展實施方案》). In recent years, the sales volume of electric vehicles in China experienced a significant growth from 1.2 million in 2019 to 9.5 million in 2023, with a CAGR of 67.7%. Meanwhile, the cumulative installed capacity of new energy storage in China's electrical energy storage market increased from 1.7 GW in 2019 to 31.4 GW in 2023, with a CAGR of 107.3%. Therefore, the rapid development of downstream industries will drive the sustained growth of China's EC market.

Competitive Landscape of China's Ethylene Carbonate Market

Due to relatively high entry barriers such as capital investment, production technology and raw material supply, China's EC market is relatively concentrated. In 2023, the total production volume of EC in China reached 304.2 thousand tonnes, with the top five market participants in China accounting for approximately 76.2%. Nevertheless, manufacturers like our Group, with large scale of capital, mature technology and steady supply of raw materials is likely to be able to enter into the market and benefit from the rapidly growing market prospects.

ANALYSIS OF OUR GROUP'S KEY SUCCESS FACTORS

Industrial Consolidation in China's Cement Admixtures Market Promoted the Steady Growth of our Company's Business: (i) With the industrial transformation and upgrading, increasingly stringent environmental requirements and intensified market competition, some small and medium-sized cement admixture manufacturers have gradually withdrawn from industry competition due to low product qualities, weak profitability, and outdated production facilities that cannot meet environmental requirements. In recent years, the number of cement admixture manufacturers in China showed a downward trend. As at 31 December 2018, there were approximately 300 cement admixture manufacturers in China, while the number of cement admixture manufacturers in China decreased to approximately 200 as at 31 December 2023; and (ii) In addition to the elimination of some small and medium-sized cement admixture manufacturers, some leading cement admixture manufacturers are also seeking strategic mergers to exit business operation, which further accelerated the industrial consolidation and promoted the continuous growth of leading manufacturers. In 2018, our Company have successively consolidated various assets and entities relating to the cement admixture business from Linyi Haihong, the then largest company in the cement admixture industry of PRC, and Hubei Xintongling, the then third largest company in the cement admixture industry of PRC.

Growing Demand and Technological Upgrading in China's Concrete Admixtures Market Helped to Improve our Company's Business Performance: (i) The promotion of new infrastructure construction, the increasing proportion of manufactured sand and gravel, and the improvement in the ready-mixed rate of concrete have driven a stable growth in demand for concrete admixtures in China. In 2028, the consumption volume of concrete admixtures in China is expected to reach 18.1 million tonnes, with a CAGR of 2.8% from 2023 to 2028. The stable growth of market demand contributed to the continuous improvement of our Company's business performance; and (ii) our Company has sufficient funds to expand production scale of concrete admixtures to achieve economies of scale, and possesses R&D capabilities to meet the growing requirements for product performances and qualities. Among the participants in China's concrete admixtures market, our Company is one of the only three companies with total assets exceeding RMB2 billion in 2022. At present, our Company has mastered the synthesis technology of six-carbon polyether monomer, which can be used to produce concrete admixtures as raw materials. The Company is the only concrete admixture manufacturers in China that mastered such synthesis technology. The high-performing water reducing admixtures produced from six-carbon polyether monomers has a remarkable effect on improving the workability of concrete, thereby enhancing the competitiveness of our Company's concrete admixtures.

Growing Demand and Stable Cooperation with Upstream and Downstream Companies Drove the Continuous Development of our Company's Processed Alcohol Amine Business: (i) The accelerated urbanisation and new infrastructure construction will promote the gradual 2023 to 2028 recovery of China's cement market, which will stimulate the increasing demand for alcohol amines. The consumption volume of alcohol amines in China is expected to reach 936.0 thousand tonnes in 2028, with a CAGR of 4.7% from 2023 to 2028. Stable growth in market demand is conducive to the steady development of our Company's processed alcohol amine business; and (ii) our Company has a stable supply of upstream raw materials and downstream customer demand. Regarding the supply of raw materials, our Company has signed a pipeline agreement with a leading company in the petrochemical industry. The pipeline is currently the longest bi-directional circulating long-distance epoxy pipeline in China, capable of transporting 210 thousand tonnes of epoxy products per year. Pipeline transportation can ensure a stable supply of raw materials, whilst the average cost of pipeline transportation is about 1/4 of that of land transportation and the lower cost of pipeline transportation can enhance our Company's product competitiveness and profitability. In addition, as the leading company in China's cement admixtures market and a company that provides cement admixture, concrete admixture and their respective in-process intermediaries, our Company has established stable cooperative relationships with leading companies in downstream industries to ensure continuous downstream demands.

Stable Growth in Market Demand and Upgrading of Synthesis Process are Beneficial for our Company to Obtain Higher Market Shares: (i) Polyether monomers are significant raw materials of polycarboxylic acid water reducing admixtures. With the recovery of real estate industry and the continuous promotion of infrastructure construction, the growing demand from concrete admixtures market is expected to drive the development of China's polyether monomer market. In 2028, the consumption volume of polyether monomers in China is expected to reach 1,894.6 thousand tonnes, with a CAGR of 3.7% from 2023 to 2028. The market where our Company's polyether monomer business is located has stable growth potentials, which helps to continuously improve the company's business performance; and (ii) The Company has mastered the synthesis process of six-carbon polyether

monomers, which is possessed by only a limited number of companies. Six-carbon polyether monomer has the characteristics of high activity and good adaptability. Its synthesis process shortens the reaction time by over 50% compared to other polyether monomers, which can effectively improve production efficiency. Meanwhile, the reaction temperature of six-carbon polyether monomers is about 50% lower than that of other polyether monomers and can be carried out at room temperature, which can reduce energy consumption and save costs. The synthesis of six-carbon polyether monomers will become one of the main development trends in the future. Therefore, our Company's leading technological level greatly enhances its competitiveness in the polyether monomer market.