

CHINA'S CEMENT ADMIXTURES AND CONCRETE ADMIXTURES MARKET

INDEPENDENT MARKET STUDY

Confidential for

Project River Town

Frost & Sullivan
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For and on behalf of
Frost & Sullivan (Beijing) Inc.



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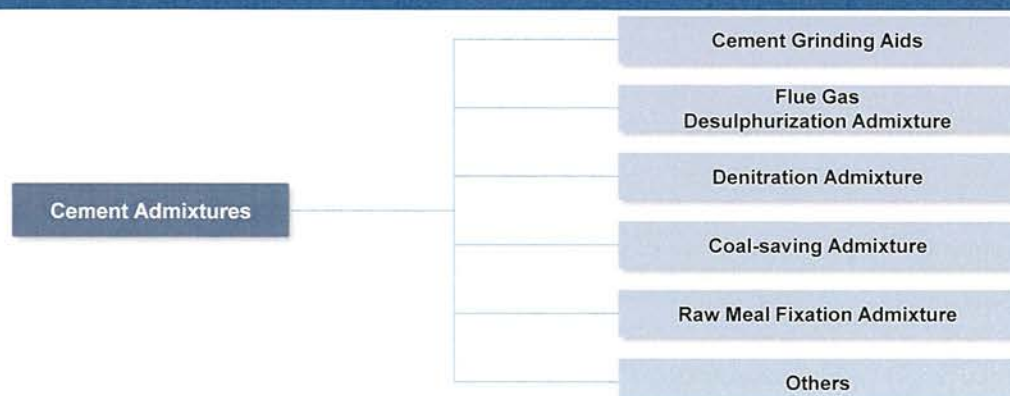
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Analysis of China's Cement Admixtures Market

Definition and Classification

- 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 desulphurization 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.

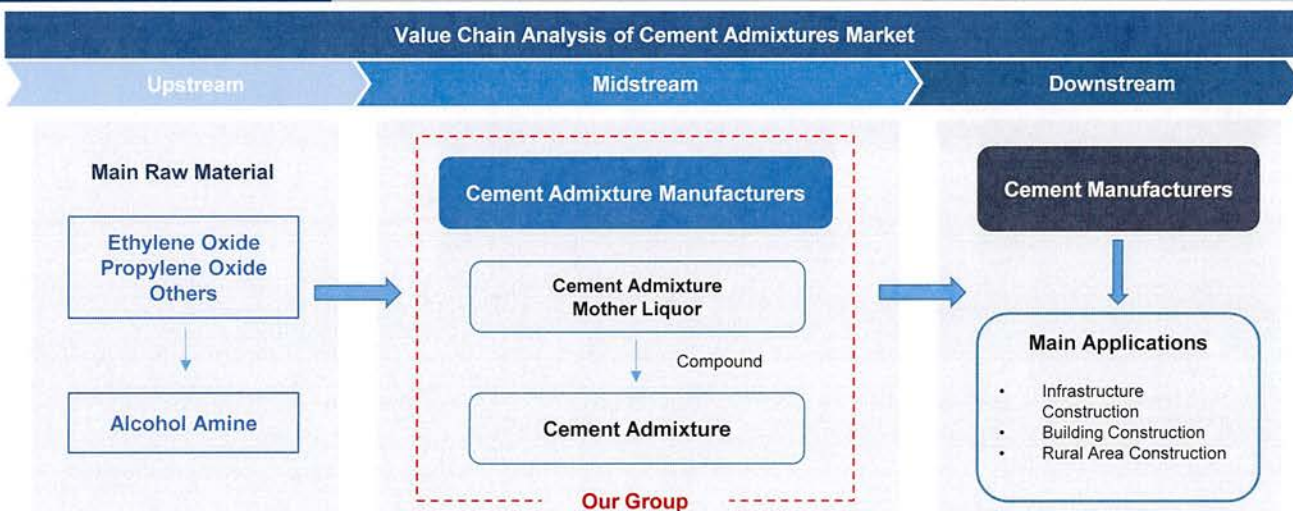
Classification of Cement Admixtures



Source: Frost & Sullivan Analysis

Analysis of China's Cement Admixtures Market

Value Chain 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.

Source: Frost & Sullivan Analysis

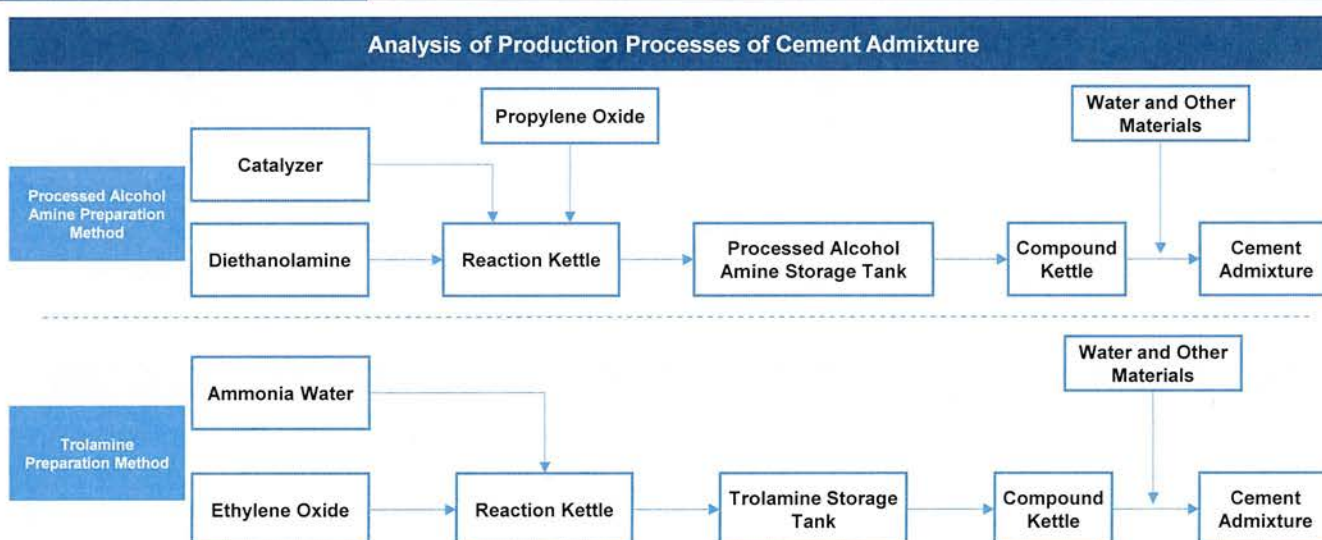
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Analysis of China's Cement Admixtures Market

Analysis of Production Processes of Cement Admixture



- 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.

Source: Frost & Sullivan Analysis

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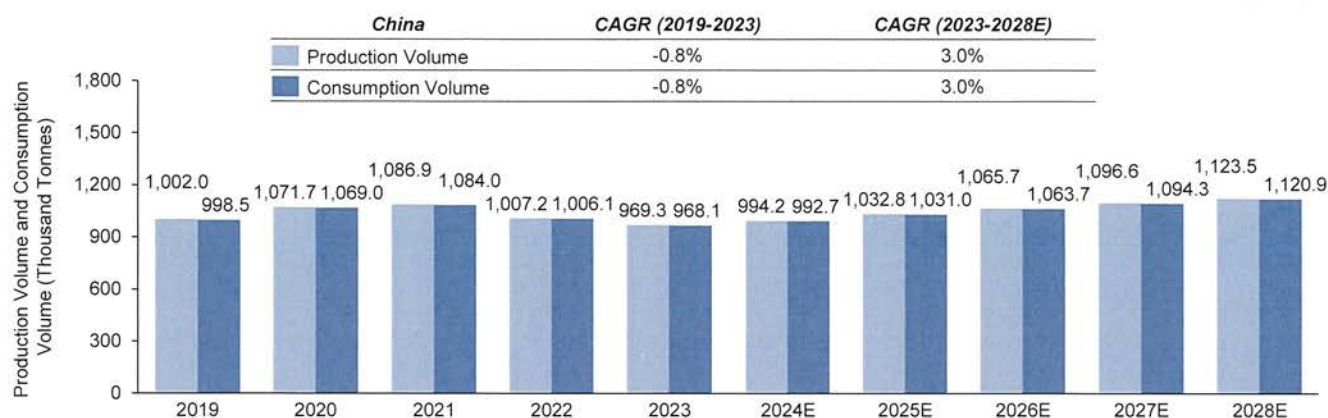
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Analysis of China's Cement Admixtures Market

Production Volume and Consumption Volume of Cement Admixtures in China

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



- 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.

Source: Frost & Sullivan Analysis

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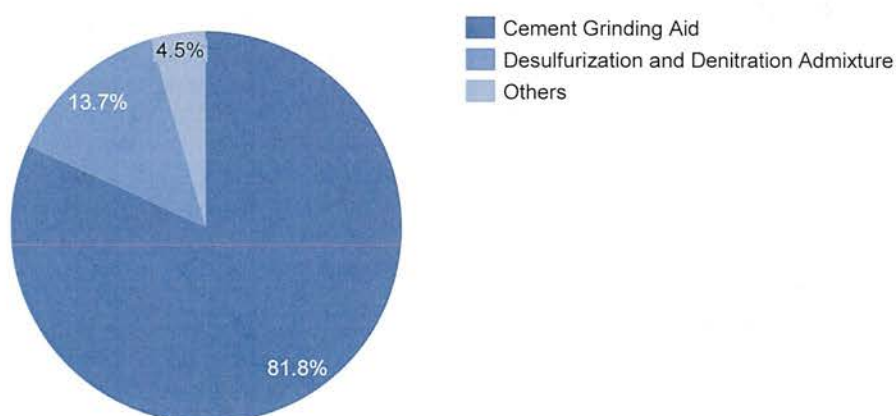
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Analysis of China's Cement Admixtures Market

Segmentation of China's Cement Admixtures Market

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



- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Cement Admixtures Market

Market Drivers

Drivers	Main Content
Favorable Policies	A series of policies and measures, including urban infrastructure, government-subsidized 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 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 catalog; and raw meal grinding aids are also included in the energy-saving product catalog issued by the National Ministry of Industry and Information Technology, 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 industrial consolidation in China's cement admixtures market.

Source: Frost & Sullivan Analysis

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Future Opportunities

Future Opportunities	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.

Source: Frost & Sullivan Analysis

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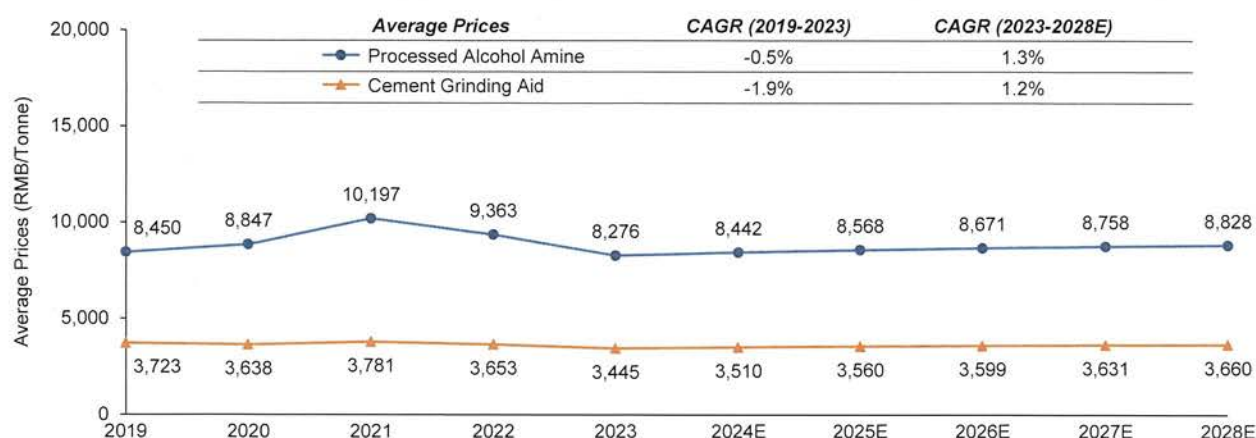
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Analysis of China's Cement Admixtures Market

Average Product Price and Average Raw Material Price

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



- 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.
- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Cement Admixtures Market

Ranking and Market Share

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

Ranking	Company Name	Listing 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.	Not listed	2.3%
4	Building Materials Admixture Branch	Not listed	2.9%
5	Tangshan Jidong Cement Admixture 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	Listing 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.	Not listed	3.3%
4	Building Materials Admixture Branch	Not listed	2.8%
5	Tangshan Jidong Cement Admixture Co., Ltd.	Not listed	2.7%
Top 5			49.6%

- 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%. As at 31 December 2023, the top five PRC cement grinding aids providers accounted for approximately 49.4% of the total production volume of cement grinding aids in the PRC.

Source: Frost & Sullivan Analysis

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Analysis of China's Cement Admixtures Market

Entry Barriers

Entry Barriers

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 customized 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 optimize 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.

Source: Frost & Sullivan Analysis

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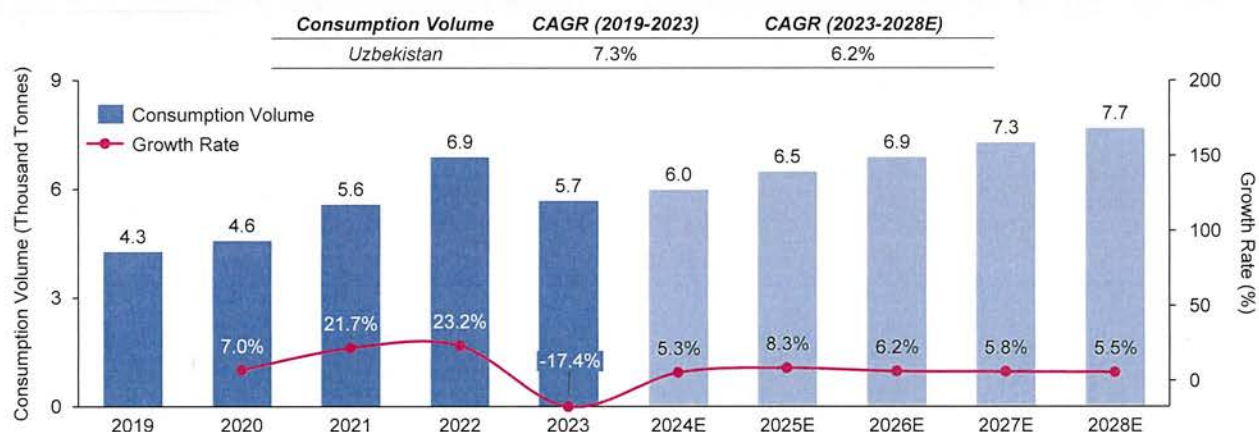
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Analysis of China's Cement Admixtures Market

Market Size of Cement Admixtures in Uzbekistan

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



- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Cement Admixtures Market

Ranking and Market Share of Cement Admixtures Market in Uzbekistan

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

Ranking	Company Name	Listing 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%

- 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.

Source: Frost & Sullivan Analysis

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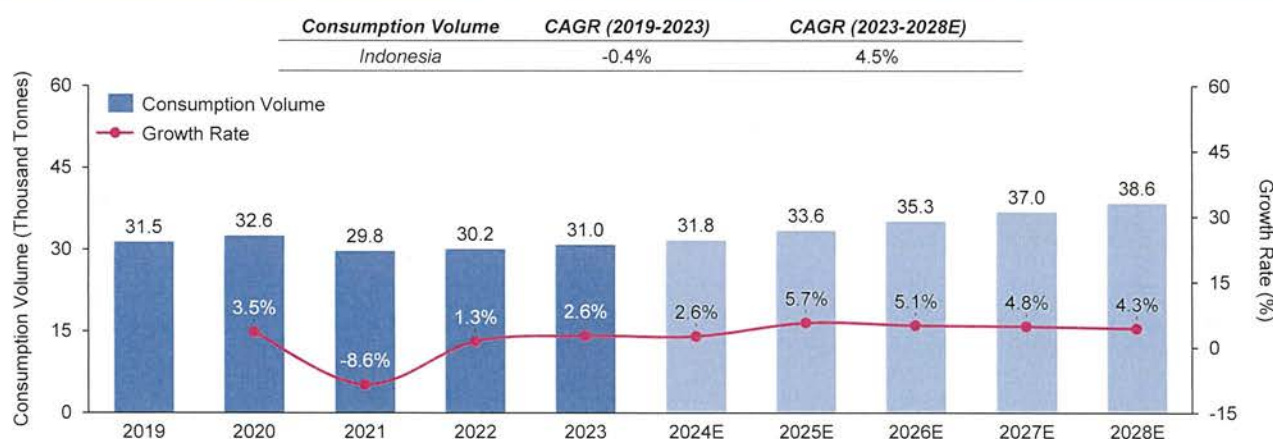
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Analysis of China's Cement Admixtures Market

Market Size of Cement Admixtures in Indonesia

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



- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Cement Admixtures Market

Ranking and Market Share of Cement Admixtures Market in Indonesia

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

Ranking	Company Name	Listing 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%

- 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.

Source: Frost & Sullivan Analysis

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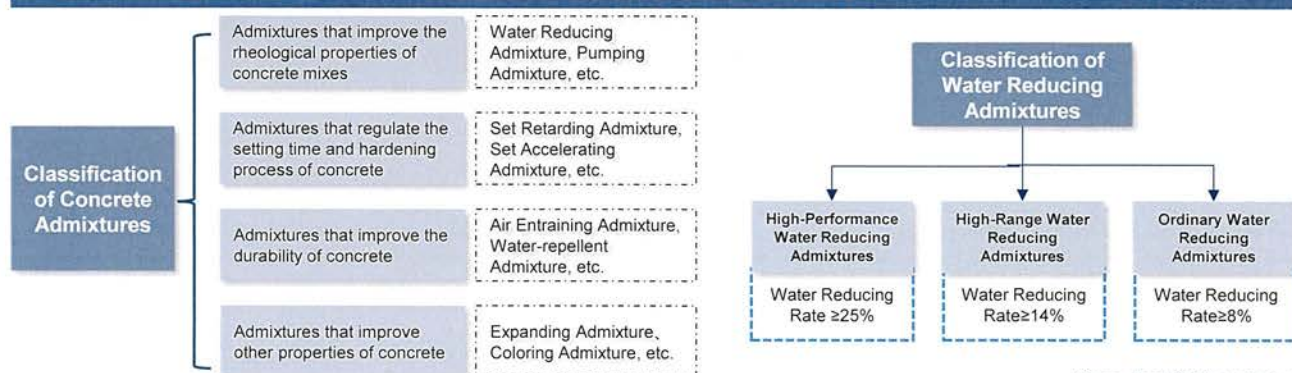
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Analysis of China's Concrete Admixtures Market

Definition and Classification

- 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.

Classification of Concrete Admixtures



Source: Frost & Sullivan Analysis

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Analysis of China's Concrete Admixtures Market

Value Chain Analysis

Value Chain Analysis of Concrete Admixtures Market



- 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 polymerization 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.

Source: Frost & Sullivan Analysis

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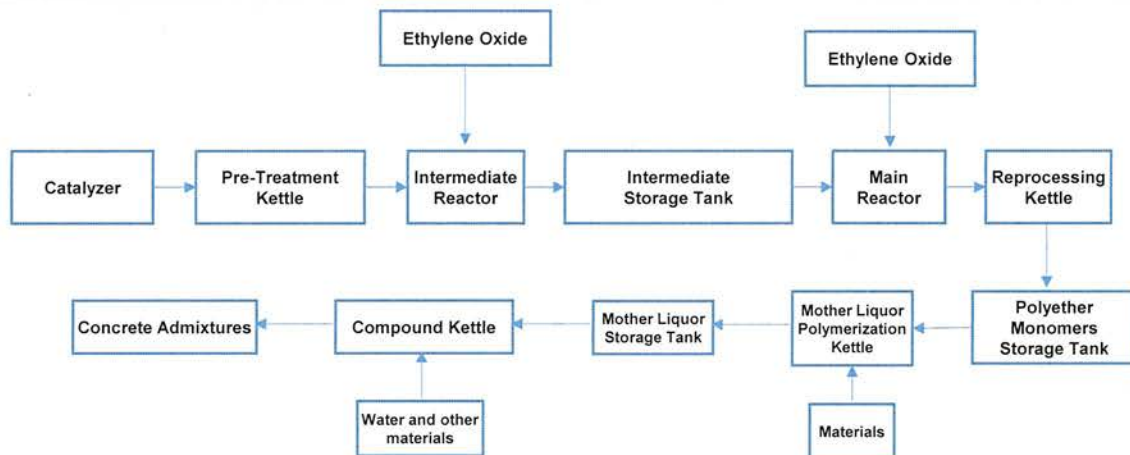
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Analysis of China's Concrete Admixtures Market

Analysis of Production Processes of Concrete Admixture

Analysis of Production Processes of Concrete Admixture



- 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.

Source: Frost & Sullivan Analysis

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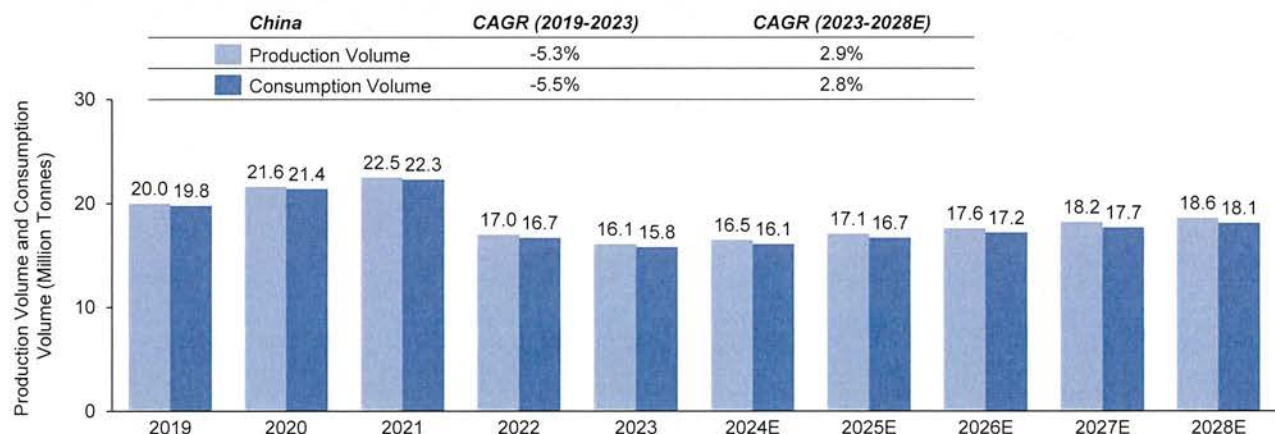
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Analysis of China's Concrete Admixtures Market

Production Volume and Consumption Volume of Concrete Admixtures in China

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



- 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.

Source: Frost & Sullivan Analysis

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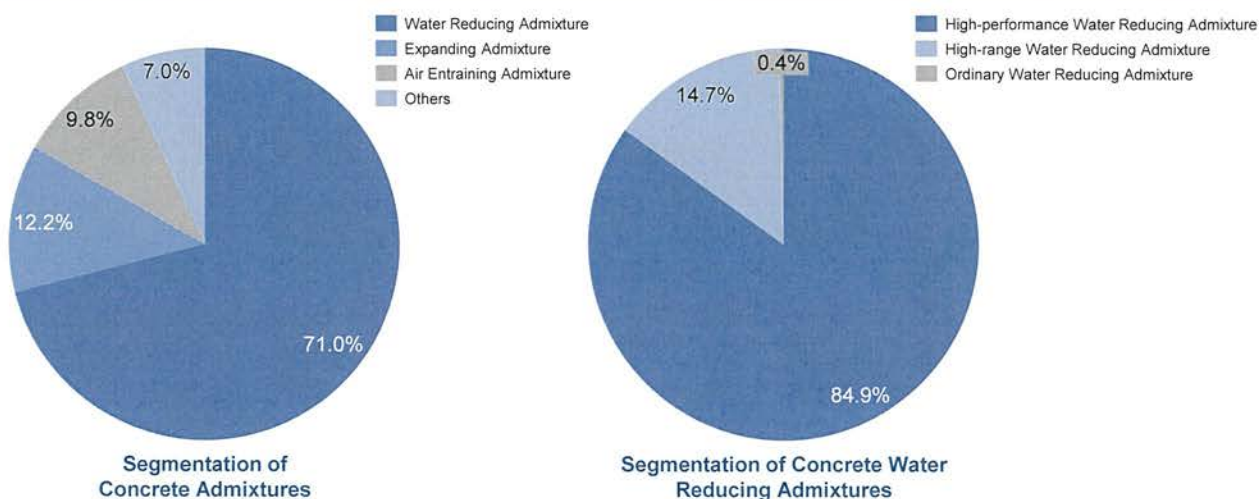
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Analysis of China's Concrete Admixtures Market

Segmentation of China's Concrete Admixtures Market

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



- 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.

Source: Frost & Sullivan Analysis

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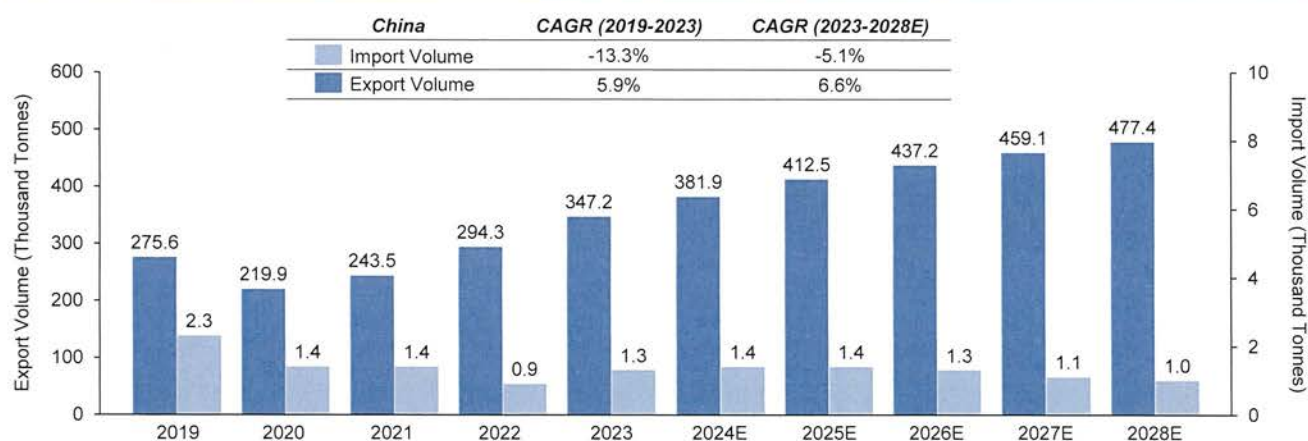
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Analysis of China's Concrete Admixtures Market

Import Volume and Export Volume Concrete Admixtures in China

Import Volume and Export Volume of Concrete Admixtures (China), 2019 – 2028E



- 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.

Source: General Administration of Customs; Frost & Sullivan Analysis

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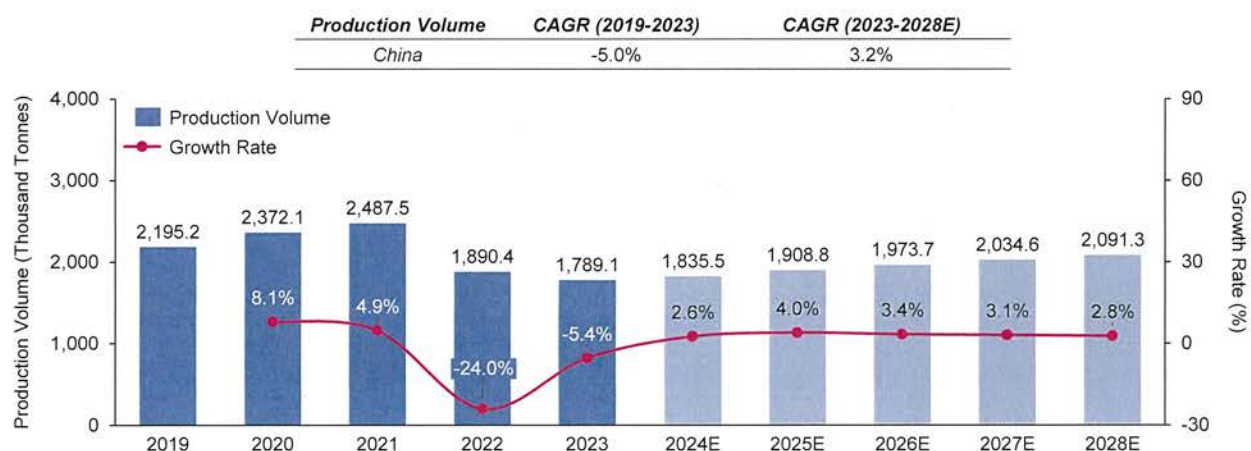
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Analysis of China's Concrete Admixtures Market

Production Volume of Polycarboxylic Acid Mother Liquors in China

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



- 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.
- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Concrete Admixtures Market

Market Drivers

Main Drivers

- 1 Growing Downstream Demand
- 2 Increasing Proportion of Manufactured Sand and Gravel
- 3 Improvement in Ready-mixed Rate of Concrete



Drivers	Main Content
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”全国城市基础设施规划建设规划》), 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 kilograms. 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Concrete Admixtures Market

Future Opportunities and Challenges

Future Opportunities

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.

Technical 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.

Source: Frost & Sullivan Analysis

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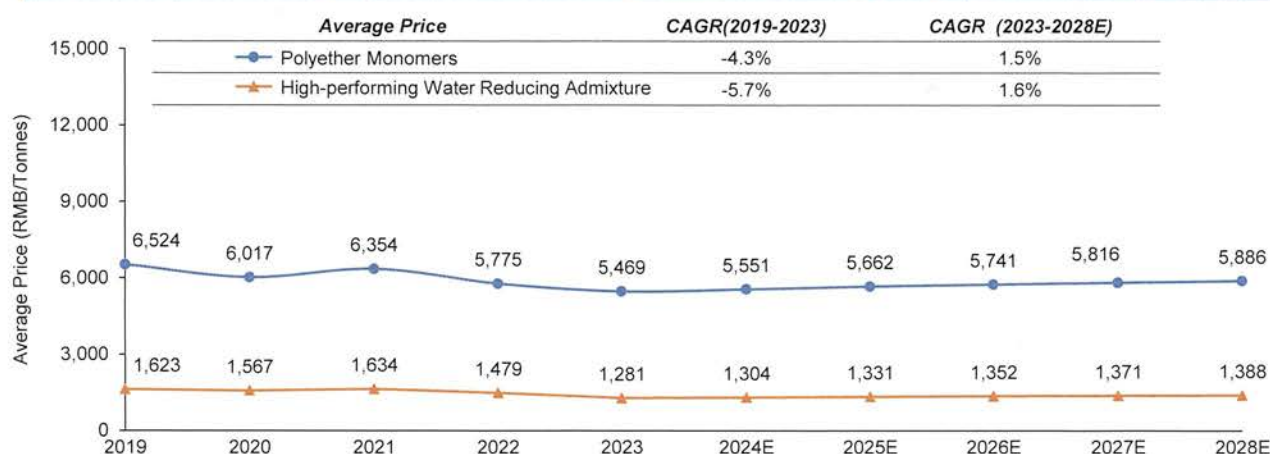
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Analysis of China's Concrete Admixtures Market

Average Product Price and Average Raw Material Price

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



- 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.
- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Concrete Admixtures Market

Ranking and Market Share in China

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

Ranking	Company Name	Listing 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	Listing 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%

- 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.

Source: Annual Reports; Chinaconcrete.com; Frost & Sullivan Analysis

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Analysis of China's Concrete Admixtures Market

Entry Barriers

Entry Barriers

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.

Source: Frost & Sullivan Analysis

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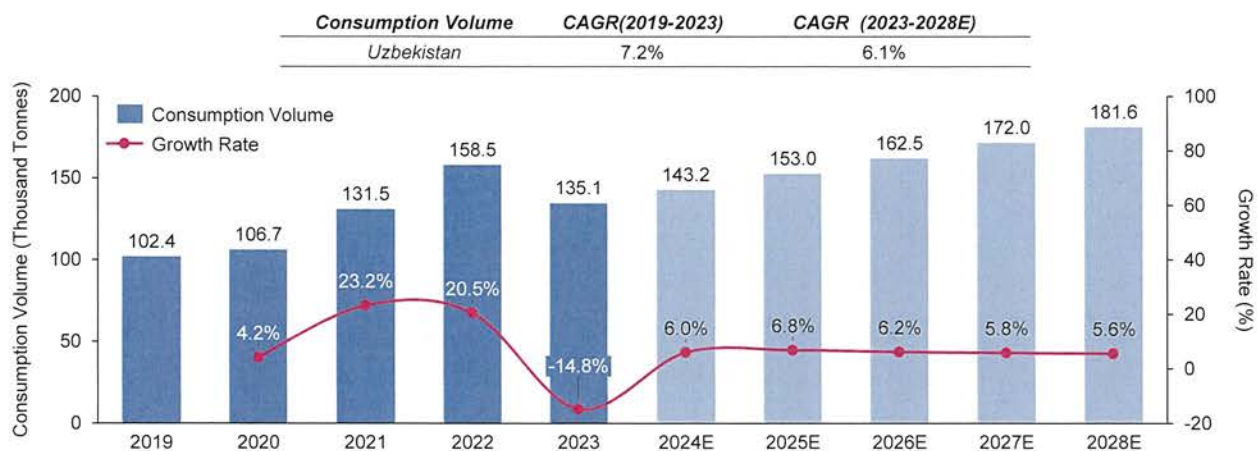
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Analysis of China's Concrete Admixtures Market

Market Size of Concrete Admixtures in Uzbekistan

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



- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Concrete Admixtures Market

Ranking and Market Share in Uzbekistan

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

Ranking	Company Name	Listing 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%

- 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.

Source: Frost & Sullivan Analysis

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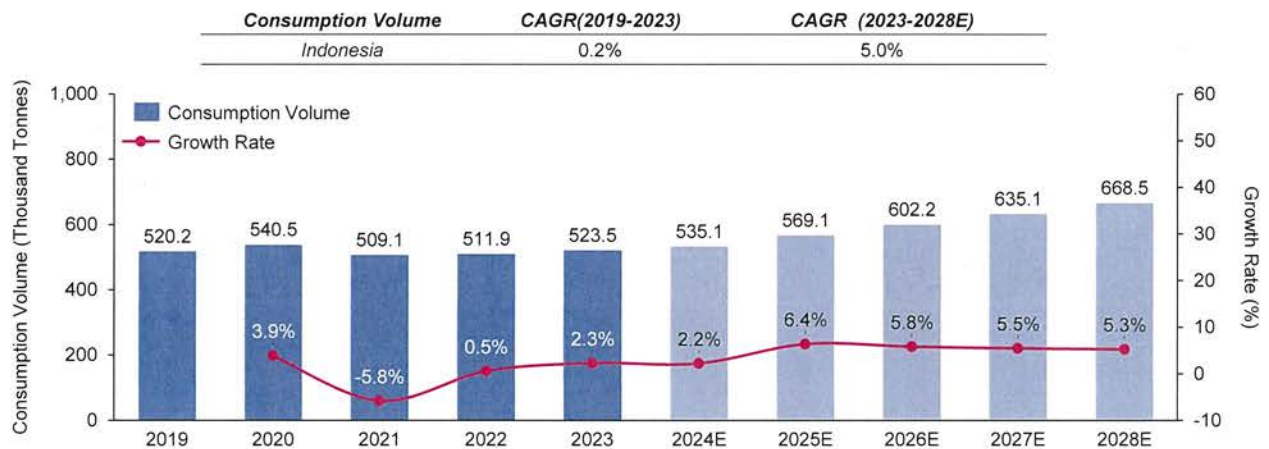
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Analysis of China's Concrete Admixtures Market

Market Size of Concrete Admixtures in Indonesia

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



- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Concrete Admixtures Market

Ranking and Market Share in Indonesia

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

Ranking	Company Name	Listing 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%

- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Concrete Admixtures Market

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.

Source: Frost & Sullivan Analysis

Analysis of China's Concrete Admixtures Market

Comparison of Cement Admixture and Concrete Admixture

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.

Source: Frost & Sullivan Analysis

- 1 Analysis of China's Cement Admixtures Market
- 2 Analysis of China's Concrete Admixtures Market
- 3 **Analysis of China's Alcohol Amine Market and Polyether Monomer Market**
- 4 Analysis of China's Cement Market and Concrete Market
- 5 Analysis of China's Ethylene Carbonate Market
- 6 Analysis of Our Group's Key Success Factors
- 7 Appendix

Analysis of China's Alcohol Amine Market and Polyether Monomer Market

Definition and Classification

- 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.

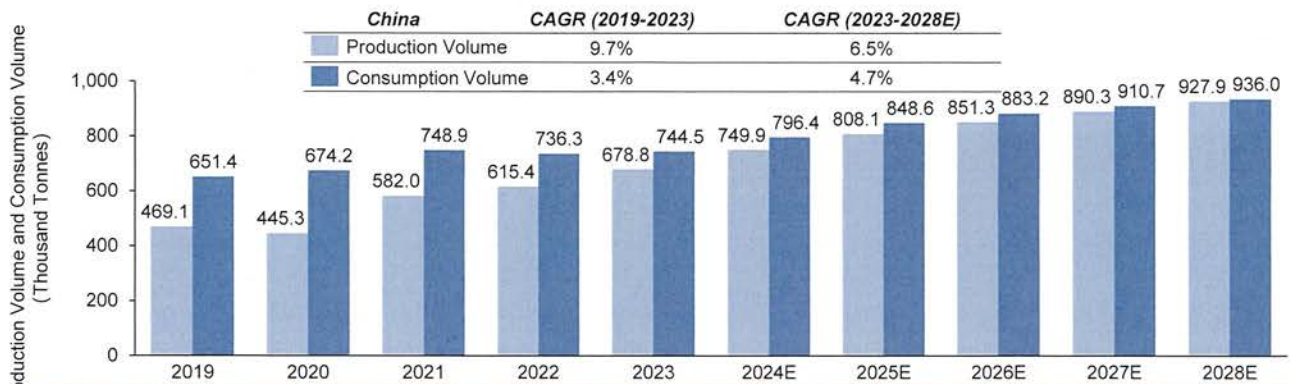
Classification of Alcohol Amines		
Classification		Common Applications
Ethanolamines	Monoethanolamine (MEA)	Used for removing acid gases from natural gas and petroleum gas, producing non-ionic detergents, emulsifiers, etc.
	Diethanolamine (DEA)	Used as a purifying agent for gases, also used as a raw material for synthetic drugs and organic synthesis, often used in the synthesis of isopropanolamine
	Trolamine (TEA)	Used as an organic admixture in the cement clinker grinding process, widely used as a pH balancer in all kinds of detergents and beauty care products (including skin washes, eye gels, moisturisers, shampoos, etc.)
	Methylethanolamine (MMEA)	Used as pharmaceutical and organic synthesis intermediates
	Methyldiethanolamine (MDEA)	Used as emulsifier for desulphurisation and purification of oilfield gas and coal gas, acid gas absorber, acid-base control agent, polyurethane foam catalyst
	Dimethylethanolamine (DMAE)	Used as pharmaceutical raw materials, intermediates in the production of dyes, fibre treatments, anticorrosive additives, etc., and can be used as a base for water-soluble paints, solvents for synthetic resins, etc.
Isopropanolamines	Monoisopropanolamine (MIPA)	Used as raw materials for surfactants, as well as refining agents, antistatic agents, dyeing auxiliaries and fibre wetting agents in the fibre industry, and also used in synthetic detergents, cosmetics, lubricating oils, cutting oils, plasticisers and emulsifiers
	Diisopropanolamine (DIPA)	Used to remove hydrogen sulphide and carbon dioxide from natural gas and refinery gas, and used in fibre additives, tanning agents, pesticides, cutting oils, etc.
	Trisopropanolamine (TIPA)	Used as cement grinding aids to improve the late strength of cement, grinding efficiency, reduce the amount of main materials, can also be used as rubber chain extender, polyurethane adhesive chain agent, antioxidants for metal processing, emulsifiers, dispersants, herbicides, etc.
	Diethanolisopropanolamine (DEIPA)	Used as a new type of green and environmentally friendly grinding aid raw material with obvious grinding effect, and mostly used in cement grinding aids
	Monoethanol diisopropanolamine (EDIPA)	Used as a new type of green and environmentally friendly grinding aid raw material with obvious grinding effect, and can also be applied in surfactants, pigments, pharmaceuticals, building materials, etc.
Other Alcohol Amines	Phenylethanolamine, Phenylpropanolamine, Allylamine, etc.	Applied in medicine, biology, chemical synthesis, etc.

Source: Frost & Sullivan Analysis

Analysis of China's Alcohol Amine Market and Polyether Monomer Market

Production Volume of Alcohol Amines in China

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



- 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.
- 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.

Source: Frost & Sullivan Analysis

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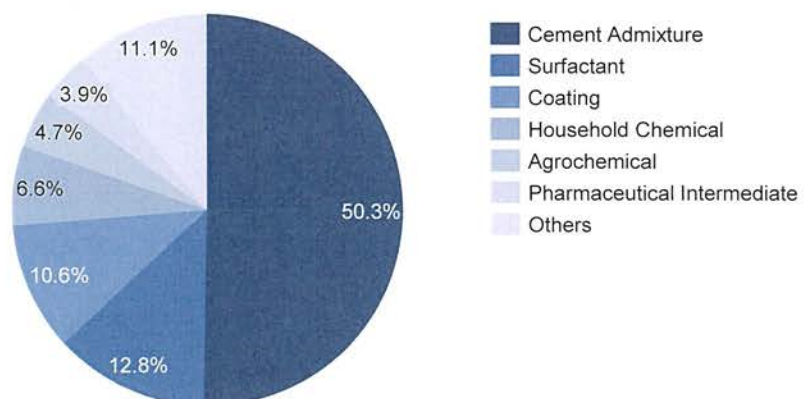
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Analysis of China's Alcohol Amine Market and Polyether Monomer Market

Segmentation of China's Alcohol Amine Market

Segmentation of Alcohol Amine Market by Downstream Applications (China), 2023



- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Alcohol Amine Market and Polyether Monomer Market

Market Drivers

Market Drivers

- 1 Stable Development of Downstream Industries
- 2 Improving Production Process and Technologies



Drivers	Main Content
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.

Source: Frost & Sullivan Analysis

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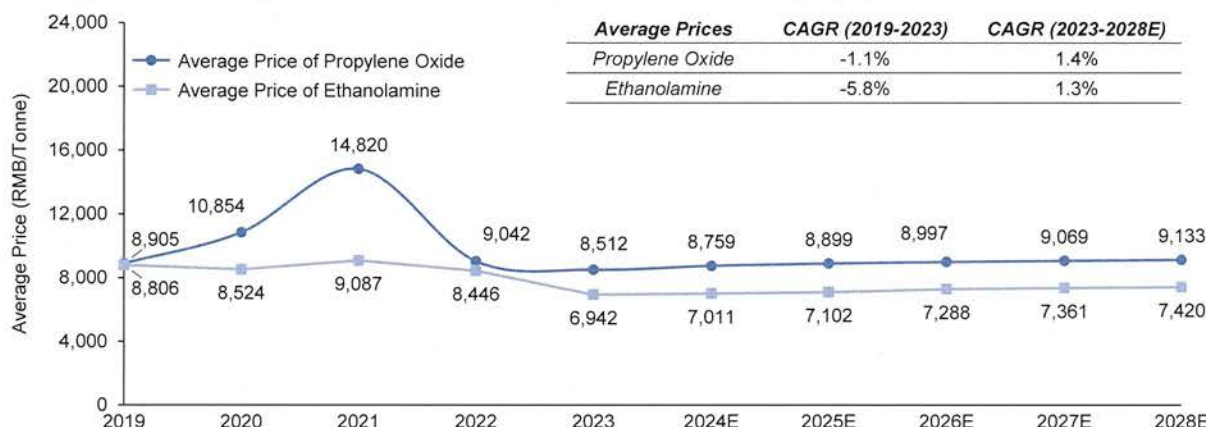
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Analysis of China's Alcohol Amine Market and Polyether Monomer Market

Average Raw Material Prices

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



- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Alcohol Amine Market and Polyether Monomer Market

Definition and Classification

- 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.

Classification of Polyether Monomer

Classification		Common Application
MPEG	Methoxy Polyethylene Glycol	MPEG is used in building materials industry as a raw material for water reducing admixtures and hardening accelerating admixtures. The production of water reducing admixtures generally involves two processes: polymerization and esterification. Since MPEG cannot be completely esterified, the residual MPEG in the products will greatly affect the application performances of the water reducing admixtures, resulting in unstable product qualities.
APEG	Allyloxy Polyethylene Glycol	APEG, a 3-carbon polyether monomer, is an important raw material for synthesizing polycarboxylic acid water reducing admixtures, that can be produced by simply polymerizing it with a monomer solution, making it suitable for on-site mixing and long-distance transportation of high-performing and high-strength concrete. However, APEG has poor polymerization activity and similar residual amounts to MPEG monomers, resulting in unstable performances of water reducing admixtures. Currently, the production volume of APEG is decreasing year by year.
HPEG	Methyl Allyl Polyethenoxy Ether	HPEG, a 4-carbon polyether monomer, is mainly used to synthesizing polycarboxylic acid water reducing admixtures and has become one of the mainstream types in the domestic market. The performances of HPEG is not significantly different from TPEG, but its price is slightly higher.
TPEG	Isopentyl Polyoxyethylene Ether	TPEG, a 5-carbon polyether monomer, is mainly used to synthesizing polycarboxylic acid water reducing admixtures and has become one of the mainstream types in the domestic market. Its polymerization activity is excellent, and it has high water reducing rate. The production technology is rather mature.
EPEG	Ethylene Glycol Monovinyl Polyethylene Glycol Ether	EPEG, a 2+2 carbon polyether monomer, is a non-ionic surfactant with certain hydrophilicity and lubricity. It is widely used in polymer materials, medical materials and food packaging. In recent years, EPEG has been applied to the production of polycarboxylic acid water reducing admixtures to improve their performances.
VPEG	Alkylallylether Polyethylene Glycol	VPEG, a 6-carbon polyether monomer, is mainly used to synthesize polycarboxylic acid water reducing admixtures and is one of the development trends in China's polyether monomer market. It has characteristics including high activity and excellent adaptability. The high monomer activity and short reaction time can effectively improve production efficiency. It can be polymerized at low or room temperature, which can effectively reduce energy consumption and production costs.

Source: Frost & Sullivan Analysis

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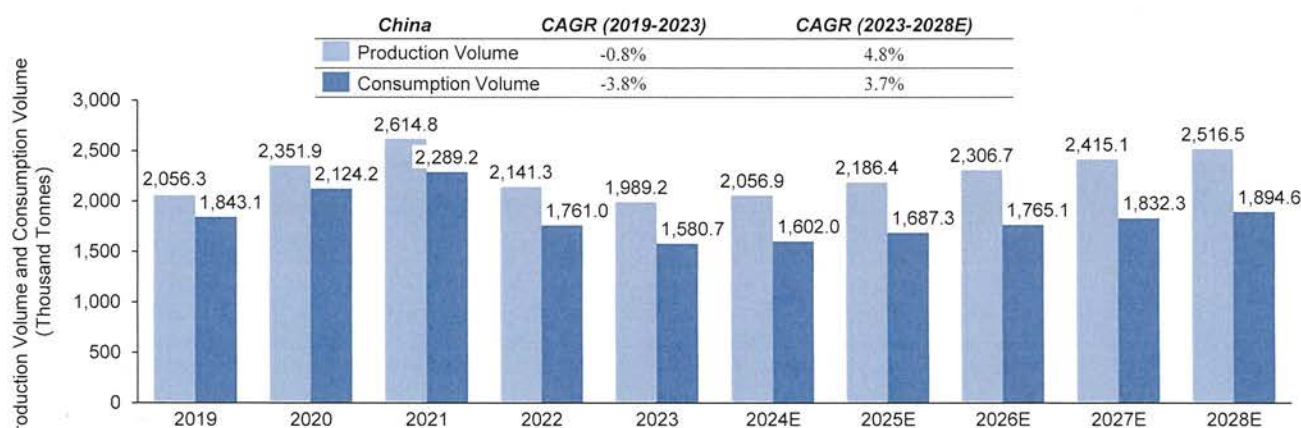
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Analysis of China's Alcohol Amine Market and Polyether Monomer Market

Production Volume of Polyether Monomers

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



- 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.
- 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.

Source: Frost & Sullivan Analysis

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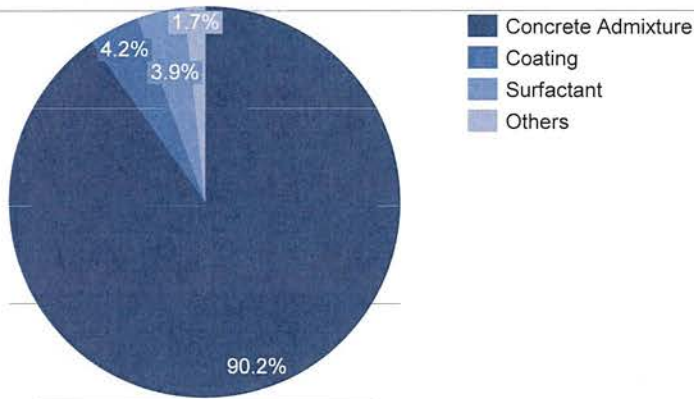
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Analysis of China’s Alcohol Amine Market and Polyether Monomer Market

Segmentation of China’s Polyether Monomer Market

Segmentation of Polyether Monomer Market by Downstream Applications (China), 2023



- 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.

Source: Frost & Sullivan Analysis

Analysis of China’s Alcohol Amine Market and Polyether Monomer Market

Market Drivers

Market Drivers

- 1 Increasing Downstream Demand
- 2 Technological Innovation



Market Drivers	Main Content
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.

Source: Frost & Sullivan Analysis

Analysis of China's Alcohol Amine Market and Polyether Monomer Market

Average Raw Material Price

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



- 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. 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Alcohol Amine Market and Polyether Monomer Market

Entry Barriers

Entry Barriers

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.

Source: Frost & Sullivan Analysis

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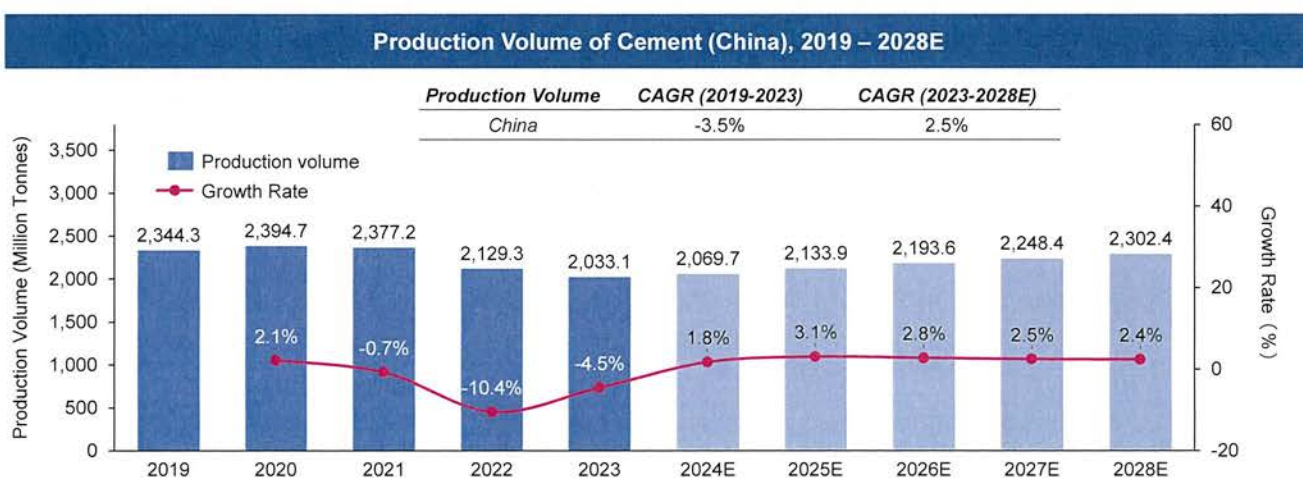
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Analysis of China's Cement Market and Concrete Market

Production Volume of Cement in China



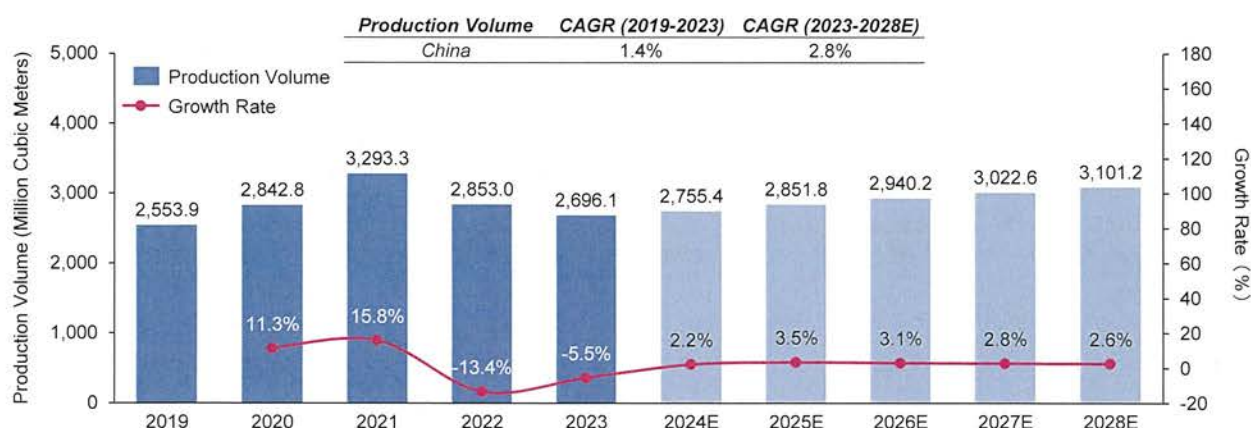
- From 2019 to 2023, the production volume of cement in China decreased from 2,344.3 million tonnes to 2,033.1 million tonnes, with a CAGR of negative 3.5%. From 2019 to 2020, mainly as Chinese government increased the amount of special government bonds and promoted the construction of major projects, 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”全国城市基础设施规划建设规划》) 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.

Source: Frost & Sullivan Analysis

Analysis of China's Cement Market and Concrete Market

Production Volume of Commercial Concrete in China

Production Volume of Commercial Concrete (China), 2019 – 2028E



- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Cement Market and Concrete Market

Market Drivers

Market Drivers

1 Supportive Policies and Stable Growth in Downstream Demands



Market Drivers	Description
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%.

Source: Frost & Sullivan Analysis

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Analysis of China's Cement Market and Concrete Market

Impact of Carbon Emission Related Policies

- **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.

Source: Frost & Sullivan Analysis

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Analysis of China's Ethylene Carbonate Market

Definition and Classification of Ethylene Carbonate

- 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.

Classification of Ethylene Carbonate

Classification	Characteristics	Major Downstream Application
Electronic Grade EC	- Purity above 99.99%, with strict requirements for moisture content - Cyclic carbonate, with high dielectric constant and high ionic conductivity, can form a stable solid electrolyte on negative electrode surface, which is widely used in electrolyte formulations - Solid at room temperature, and poor low-temperature performances requiring mixing with low viscosity and low melting point solvents for application	Electrolyte solvents
Industrial Grade EC	- The purity is 99.9% - Crystalline solid at room temperature, easily soluble in water, and can be miscible with almost all organic solvents such as alcohols, ethers, ketones, etc.	- Electrolyte additives - High water absorbing resins - Active intermediates for the production of lubricants and water-based paints

Source: Frost & Sullivan Analysis

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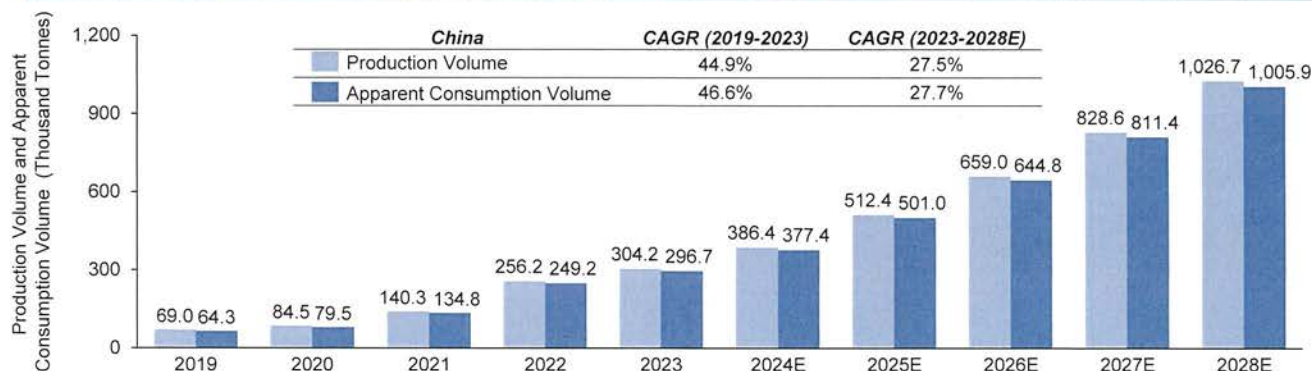
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Analysis of China's Ethylene Carbonate Market

Production Volume and Apparent Consumption Volume of Ethylene Carbonate in China

Production Volume and Apparent Consumption Volume of Ethylene Carbonate (China), 2019 – 2028E



- 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.

Source: Frost & Sullivan Analysis

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Analysis of China's Ethylene Carbonate Market

Market Drivers and Ranking

Market Drivers	Description
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.

Top Five Market Participants in China's Ethylene Carbonate Market by Production Volume, 2023

Ranking	Company Name	Chinese Name	Listing Status	Market Share (%)
1	Shinghwa Advanced Material Group Co., Ltd.	胜华新材料集团股份有限公司	Listed	23.7%
2	Shandong Hi-tech Spring Material Technology Co., Ltd.	山东海科新源材料科技股份有限公司	Listed	20.2%
3	Jiangsu Mingchuan New Material Co., Ltd.	江苏鸣川新材料有限公司	Not listed	14.9%
4	Fushun Dongke Fine Chemical Co., Ltd.	抚顺东科精细化工有限公司	Not listed	11.2%
5	Fujian Zhongke Hongye Chemical Technology Co., Ltd.	福建中科宏业化工科技有限公司	Not listed	6.2%
Top 5				76.2%

- 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.

Source: Annual Reports, Frost & Sullivan Analysis

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Analysis of Our Group's Key Success Factors

Key Success Factors (1/2)

Key Success Factors	Description
Industrial Consolidation in China's Cement Admixtures Market Promoted the Steady Growth of our Company's Business	- 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; - 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	- 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; - 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.

Source: Frost & Sullivan Analysis

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Analysis of Our Group's Key Success Factors

Key Success Factors (2/2)

Key Success Factors	Description
Growing Demand and Stable Cooperation with Upstream and Downstream Companies Drove the Continuous Development of our Company's Processed Alcohol Amine Business	- 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; - 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	- 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; - 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.

Source: Frost & Sullivan Analysis

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Appendix Relating to the Company

- According to Frost & Sullivan, (i) the gross profit margin of our Group to both related party customers and third party customers during the Track Record Period fell within the industry range; and (ii) such variance between the gross profit margin from our related party customers and from our third party customers is commercially justifiable.
- According to Frost & Sullivan, the cement admixture market in the PRC is highly concentrated.
- According to Frost & Sullivan, the concrete admixture market has a large number of participants, with approximately 4,000 concrete admixture providers in the PRC, resulting in a relatively fragmented market.
- Our Group adopted a competitive pricing strategy after taking into account of the requisite scale and product requirements of our existing and potential customers in order to maintain and expand our market share, while the average selling price of our industry peers remained relatively stable or slightly decreased during the Track Record Period, according to Frost & Sullivan.
- While our industry peers have engaged in the industry for a longer period of time with significantly higher production capacity and business scale than that of our Group, thus, they were more susceptible to the economic downturn in real estate industry in FY2023, according to Frost & Sullivan.
- The cement and concrete admixture market in the PRC has demonstrated a trend of market consolidation in recent years. From 2018 to 2023, the number of cement admixture manufacturers decreased from approximately 300 to 200, whilst the number of concrete admixture manufacturers decreased from 4,500 to 4,000. According to Frost & Sullivan, such trend of market consolidation is mainly due to the following reasons:
 - (i) growing preference for cement and concrete admixture manufacturers which have environmentally friendly practices. The production facilities of some small and medium-sized cement and concrete admixture manufacturers that cannot demonstrate their capabilities of meeting the requirements of environmental protection have been gradually eliminated from the market;
 - (ii) the demand for the functionalities and qualities of cement and concrete admixture. Cement and concrete admixture manufacturers need to continuously improve their production technologies to meet market demands. Some small and medium-sized cement and concrete admixture manufacturers that do not possess strong production technologies to catch up with the growing demands from downstream customers have been gradually eliminated from the market. Downstream customers prefer cement and concrete admixture manufacturers with large-scale production and mature technologies as such manufacturers can provide stable product supply and customised product formulation according to their specific requirements; and
 - (iii) decreased profitability of smaller players. Due to the intensified market competition, some small and medium-sized cement and concrete admixture manufacturers without advantages in scale, production technology, product quality, raw material supply and etc., can only compete by offering lower prices, which have reduced their profitability and competitiveness.
- As at the Latest Practicable Date, there was no material change on the cement and concrete admixtures markets, the alcohol amine market and the polyether monomer market, according to Frost & Sullivan.
- According to Frost & Sullivan, the production volume of cement in China decreased from 2021 to 2023 while the production volume of cement admixtures in China also decreased from 2021 to 2023.
- According to Frost & Sullivan, it is in line with market practice as the trading companies can integrate small and medium-sized orders from small and medium-sized companies in the industry.

Appendix Relating to the Company

- According to Frost & Sullivan, the average price of ethylene oxide (環氧乙烷) during 2021 to 2023 amounted to RMB6,902 per tonne, RMB6,512 per tonne and RMB5,753 per tonne, respectively, the average price of propylene oxide (環氧丙烷) during 2021 to 2023 amounted to RMB14,820 per tonne, RMB9,042 per tonne and RMB8,512 per tonne, respectively, and the average price of ethanolamine (乙醇胺) during 2021 to 2023 amounted to RMB9,087 per tonne, RMB8,446 per tonne and RMB6,942 per tonne, respectively. The average price of ethylene oxide (環氧乙烷), propylene oxide (環氧丙烷) and ethanolamine (乙醇胺) for the first half of 2024 amounted to RMB5,972 per tonne, RMB8,350 per tonne and RMB6,748 per tonne, respectively.
- Shandong Hongyi Technology Co., Ltd.* (山東宏藝科技股份有限公司) ("Shandong Hongyi") was the then largest manufacturer of cement admixtures in the PRC, according to Frost & Sullivan.
- We were established by Conch Holdings, a Fortune China 500 company that ranks the 135th in 2024, to explore the fine chemical materials market as a key enterprise with a full industrial spectrum of abilities to achieve energy conservation and efficiency improvement for the cement and concrete industry.
- According to Frost & Sullivan, we are China's largest supplier of cement grinding aids; we ranked first in the PRC in terms of both sales volume and revenue of cement admixtures in FY2023, with a market share of approximately 28.3% and 32.3%, respectively (in particular, we ranked first in the PRC in terms of sales volume and revenue of cement grinding aids in FY2023, with a market share of approximately 34.6% and 34.1%, respectively).
- According to Frost & Sullivan, owing to the fierce competition in the markets that we operate, smaller players will be phased out and the number of cement and concrete admixture manufacturers in the PRC has decreased at a CAGR of approximately -7.8% and -2.3% from 2018 to 2023.
- Our Group adopted a competitive pricing strategy after taking into account of the requisite scale and product requirements of our existing and potential customers in order to maintain and expand our market share, while the average selling price of our industry peers remained relatively stable or slightly decreased during the Track Record Period, according to Frost & Sullivan.
- While our industry peers have engaged in the industry for a longer period of time with significantly higher production capacity and business scale than that of our Group, thus, they were more susceptible to the economic downturn in real estate industry in FY2023, according to Frost & Sullivan.
- In addition, according to Frost & Sullivan, pipeline transportation will be a trend for the transportation of ethylene oxide in the future, which will further enhance our competitive advantage.
- According to Frost & Sullivan, our control level is relatively advanced in comparison with companies similar to us in the cement admixture industry.
- According to Frost & Sullivan, the consumption volume of cement admixtures in Inner Mongolia reached approximately 17.4 thousand tonnes in 2023, and is expected to reach approximately 23.0 thousand tonnes in 2028, representing a CAGR of 5.7% from 2023 to 2028, whilst the consumption volume of concrete admixtures in Inner Mongolia reached approximately 156.1 thousand tonnes in 2023, and is expected to reach approximately 190.5 thousand tonnes in 2028, representing a CAGR of 4.1% from 2023 to 2028.
- According to Frost & Sullivan, our pricing of products compared to the major providers of cement and concrete admixtures in Uzbekistan and Indonesia is relatively competitive.
- According to Frost & Sullivan, the cement and concrete admixture needs of Uzbekistan and Indonesia are dominantly fulfilled by non-domestic suppliers.
- According to Frost & Sullivan, the consumption volume of ethylene carbonate in the PRC is anticipated to reach 1,005.9 thousand tonnes in 2028, with a CAGR of 27.7% from 2023 to 2028 due to (i) the favourable policies in place encouraging the growth of the PRC's new energy vehicle industry and energy storage industry and (ii) the rapid development of electrolyte solvent driven by the development of consumer demand for new energy vehicles, energy storage and electronics in recent years. According to the breakdown of China's ethylene carbonate output by downstream application areas in 2023, electrolyte solvent is the largest downstream application area of ethylene carbonate, accounting for approximately 80.9%.

Appendix Relating to the Company

- While the current market for ethylene carbonate is relatively concentrated, according to Frost & Sullivan, manufacturers like our Group, with a large scale of capital, mature technology and steady supply of raw materials is likely to be able to enter into the market.
- According to Frost & Sullivan, our peers in the polyether monomer market are also undertaking relevant initiatives to break into the ethylene carbonate market in the PRC; such trend is a result of the fact that polyether monomer and ethylene carbonate belong to ethylene oxide derivatives and our peers, like us, wish to take advantage of the stable supply of raw materials of polyether monomer that are similar to that of ethylene carbonate to capture the emerging demand for ethylene carbonate.
- According to the Frost & Sullivan Report, the relationship between cement companies and cement admixture suppliers are generally considered to be mutual, complementary and synergistic.
- According to Frost & Sullivan, in order to secure supply of cement admixture, some large scale cement manufacturers in the PRC will set up their own cement admixture production subsidiaries in order to streamline their business operations.
- According to Frost & Sullivan, the Conch Cement Group, comprising Conch Cement and its subsidiaries, which itself was the second largest cement producer in terms of both production volume and production capacity, in the PRC in 2023.
- According to Frost & Sullivan, as Conch Cement Group has a mature and stable infrastructure in the PRC, it is likely that Conch Cement Group will be successful in capturing the demand for cement or concrete in overseas countries, especially in developing countries.
- The unit price of each type of product supplied to Conch Cement Group is within market price range.
- It is in line with the market practice that cement and concrete admixtures manufacturers commonly correlated with a small registered capital.
- For FY2022, some of the subsidiaries of Related Party A who purchased cement grinding aids (type 1) were export traders and the selling price of such orders was higher as (i) the price of the products included the packaging expenses of intermediate bulk containers; and (ii) the higher product price in overseas market, according to Frost & Sullivan.
- We derived gross loss and gross loss margin of RMB9.0 million and 2.9% for FY2022 from polyether monomers, mainly due to (i) the low production volume as the product was initially launched in June 2022 and we were a new entrant to polyether monomer market, resulting in higher cost per tonne in its initial rollout as a portion of the cost such as depreciation and amortisation of our newly installed production lines and staff cost was of a fixed nature; (ii) the more competitive price offered to our customers in response to the keen competition in the market due to the increase in the number of industry players in 2022; and (iii) the increased market production capacity and relatively weak market demand leading to the low gross profit margin of polyether monomers in the market, according to the Frost & Sullivan Report.
- The target company has a sound financial position and stable profitability. We would prioritise acquisition targets with more than RMB180 million of annual revenue and at least a net profit margin of 5%. As at the Latest Practicable Date, we had yet to identify suitable targets. However, according to F&S, there is over 30 suitable targets available in the market which fit the description of our potential targets as set out above.
- According to Frost & Sullivan, due to a growing downstream demand for cement admixture owing to its energy conservation and emission reduction abilities, the global production volume of cement admixtures has been steadily increasing since 2019 at a CAGR of approximately 2.2%, and is expected to grow at a CAGR of approximately 3.6% from 2023 to 2028. China is the largest producer of cement admixture in the global market, and the production volume of China's cement admixture market has been slightly decreased since 2019 at a CAGR of approximately negative 0.8%, and is expected to grow at a CAGR of approximately 3.0% from 2023 to 2028. While the market size of China's cement production has shrunk from 2019 to 2023, specifically at a CAGR of -3.5%.

Appendix Relating to the Company

- According to Frost & Sullivan, we ranked first in the PRC in terms of both sales volume and revenue of cement admixtures in FY2023, with a market share of approximately 28.3% and 32.3%, respectively (in particular, we ranked first in the PRC in terms of sales volume and revenue of cement grinding aids (水泥助磨剂) in FY2023, with a market share of approximately 34.6% and 34.1%, respectively). Our sales volume of concrete admixtures accounted for approximately 0.8% of the total sales volume of concrete admixtures in the PRC in FY2023, whereas our revenue of concrete admixtures accounted for approximately 0.6% of the total revenue of concrete admixtures in the PRC in FY2023. Our sales volume of processed alcohol amines accounted for approximately 4.7% of the total sales volume of processed alcohol amines in the PRC in FY2023, whereas our revenue of processed alcohol amines accounted for approximately 3.9% of the total revenue of processed alcohol amines in the PRC in FY2023. Our sales volume of polyether monomers accounted for approximately 0.9% of the total sales volume of polyether monomers in the PRC in FY2023, whereas our revenue of polyether monomers accounted for approximately 1.0% of the total revenue of polyether monomers in the PRC in FY2023. We were established by Conch Holdings, a Fortune China 500 company that ranks the 135th in 2024, to explore the fine chemical materials market as a key enterprise with a full industrial spectrum of abilities to achieve energy conservation and efficiency improvement for the cement and concrete industry.
- According to Frost & Sullivan, the global cement admixture market has been steadily growing and its production volume is expected to increase from 1,908.7 thousand tonnes in 2023 to 2,279.5 thousand tonnes in 2028, representing a CAGR of approximately 3.6%. In addition, according to Frost & Sullivan, the global concrete admixture market is significantly larger than the cement admixture market. Due to the recovery of the macro economy and the increase in infrastructure construction investment, the production volume of China's concrete admixture market is expected to increase to 18.6 million tonnes by 2028, representing a CAGR of approximately 2.9% from 2023 to 2028. As China is a main exporter of concrete admixture in the world, it is expected that China's export volume of concrete admixture will increase steadily to 477.4 thousand tonnes by 2028, representing a CAGR of approximately 6.6% from 2023 to 2028.
- According to Frost & Sullivan, the global cement and concrete admixture market experienced and is expected to demonstrate in the future a stable development trend; in particular, developing countries such as Uzbekistan and Indonesia are expected to experience a growth in terms of demand of cement and concrete admixture. Due to the development of infrastructure construction and building construction industry in Uzbekistan and Indonesia, the demand for concrete and other building materials will continue to grow, which will in turn translate to demand for cement admixture products and concrete admixture products. The consumption volume of Uzbekistan's cement admixture market is expected to reach 7.7 thousand tonnes in 2028, representing a CAGR of approximately 6.2% from 2023 to 2028; whereas, the consumption volume of concrete admixture in Uzbekistan is expected to reach 181.6 thousand tonnes in 2028, representing a CAGR of approximately 6.1% from 2023 to 2028. The consumption volume of cement admixtures in Indonesia is expected to reach 38.6 thousand tonnes in 2028, representing a CAGR of approximately 4.5% from 2023 to 2028; whereas, the consumption volume of concrete admixtures in Indonesia is expected to reach 668.5 thousand tonnes in 2028, representing a CAGR of approximately 5.0% from 2023 to 2028.

Abbreviations and Terms

Abbreviations and Terms

- **CAGR:** compound annual growth rate
- **GDP:** gross domestic product
- **R&D:** research & development
- **RMB:** Renminbi, the lawful currency of the PRC

Limitations in Source of Information

- Interviews with end-users, vendors and distributors are conducted to collect information for this report, based on a best-efforts basis.
- Frost & Sullivan will not be responsible for any information gaps where interviewees have refused to divulge confidential data or figures.
- In instances where information is not available, figures based on similar indicators combined with Frost & Sullivan in-house analysis will be deployed to arrive at an estimate.
- Frost & Sullivan will state the information sources at the bottom right-hand corner of each slide for easy reference.

Note to Numeric Calculations

- Value and percentage figures in this report are all rounded. Figures may not add up to the respective totals owing to rounding.
- The base year is 2023. The historic period is from 2019 to 2022. The forecast period is from 2024 to 2028.

Glossary and Definition

Glossary and Definition

- **Cement Admixture:** a type of chemical additive that is used in the production of cement to modify its properties.
- **Cement Grinding Aid:** a type of cement admixture that is used in the production of cement to enhance its grindability and therefore improve its quality.
- **Concrete Admixture:** a type of chemical additive that is used in the production of concrete to modify its properties.
- **Diethanolamine:** a type of chemical compound that is used as a raw material in the production of cement admixtures.
- **Ethanolamine:** a type of chemical compound that is used as a raw material in the production of cement admixtures.
- **Ethylene Oxide:** a type of chemical compound that is used as a raw material in the production of cement and concrete admixtures.
- **Monoethanolamine:** a type of chemical compound that is used as a raw material in the production of cement admixtures.
- **Polycarboxylic Acid Mother Liquid:** a type of chemical concentrated liquid solution that is used in the production of concrete admixture and considered as in-process intermediary.
- **Polyether Monomers:** a type of chemical compound that is used in the production of concrete admixture and considered as in-process intermediary.
- **Processed Alcohol Amine:** a type of chemical compound that is used in the production of cement admixture and considered as in-process intermediary.
- **Propylene Oxide:** a type of chemical compound that is used as a raw material in the production of cement admixtures.
- **Trolamine :** a type of chemical compound that is used as a raw material in the production of cement admixtures.

Methodologies

- Frost & Sullivan is an independent global consulting firm, which was founded in 1961 in New York. It offers industry research and market strategies and provides growth consulting and corporate training. Its industry coverage in the PRC includes automotive and transportation, chemicals, materials and food, commercial aviation, consumer products, energy and power systems, environment and building technologies, healthcare, industrial automation and electronics, industrial and machinery, and technology, media and telecom.
- The Frost & Sullivan's report includes overview of China's macro economy and construction industry, analysis of China's cement admixtures market, analysis of China's concrete admixtures market, analysis of China's cement market and concrete market, analysis of China's alcohol amine market and polyether monomer market, analysis of China's ethylene carbonate market, etc..
- The market research process for this study has been undertaken through detailed primary research which involves discussing the status of the industry 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.
- Projected total market size was obtained from historical data analysis plotted against macroeconomic data as well as specific related industry drivers.
- Frost & Sullivan's report was compiled based on the below assumptions:
 - China's economy is likely to maintain steady growth in the next decade;
 - China's social, economic, and political environment is likely to remain stable in the forecast period;
 - Market drivers like increasing urbanization rate, policy supports from governments, growing downstream demands, etc.;
 - The COVID-19 is likely to affect the stability of China's macro economy in short term.