

JLC
International
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Evolution and Forthcoming Changes in China Polyethylene Markets

Content

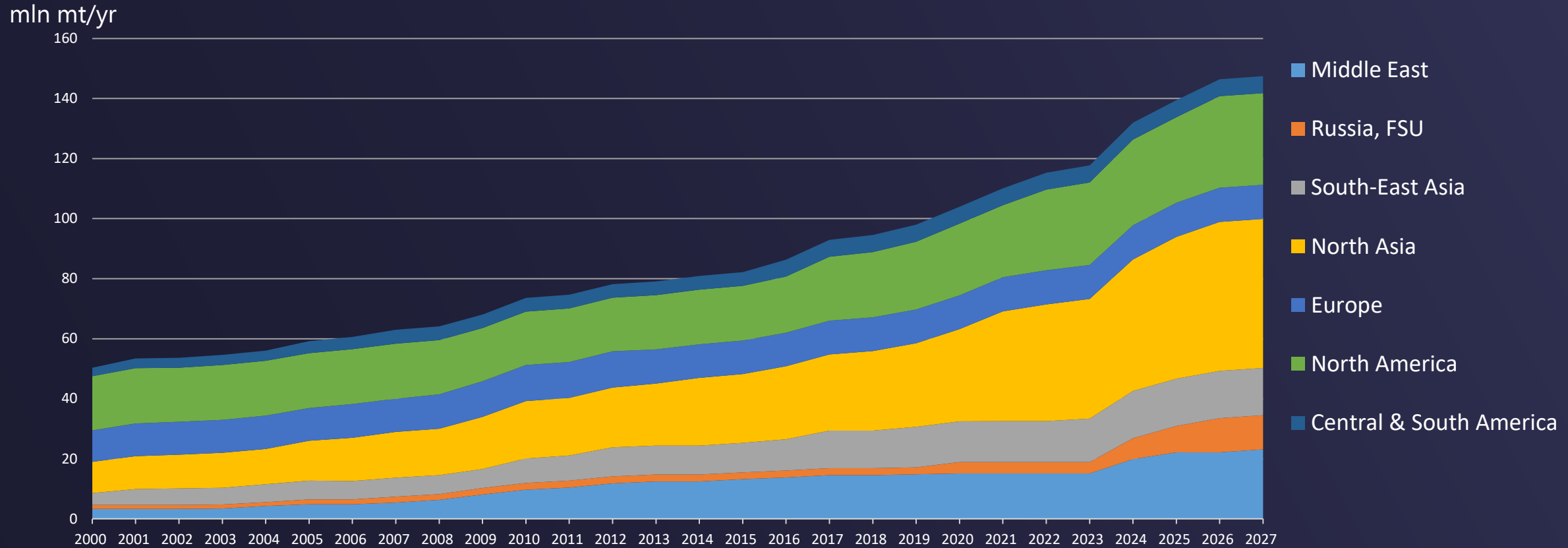
1. Exploring Overcapacity and Production Dynamics in China's Polyethylene Industry
2. China Polyethylene Import and Export Dynamics and End-User Demand Drivers
3. The Emergence of New Polyethylene Materials in China: POE and EVA

1.

Exploring Overcapacity and Production Dynamics in China's Polyethylene Industry

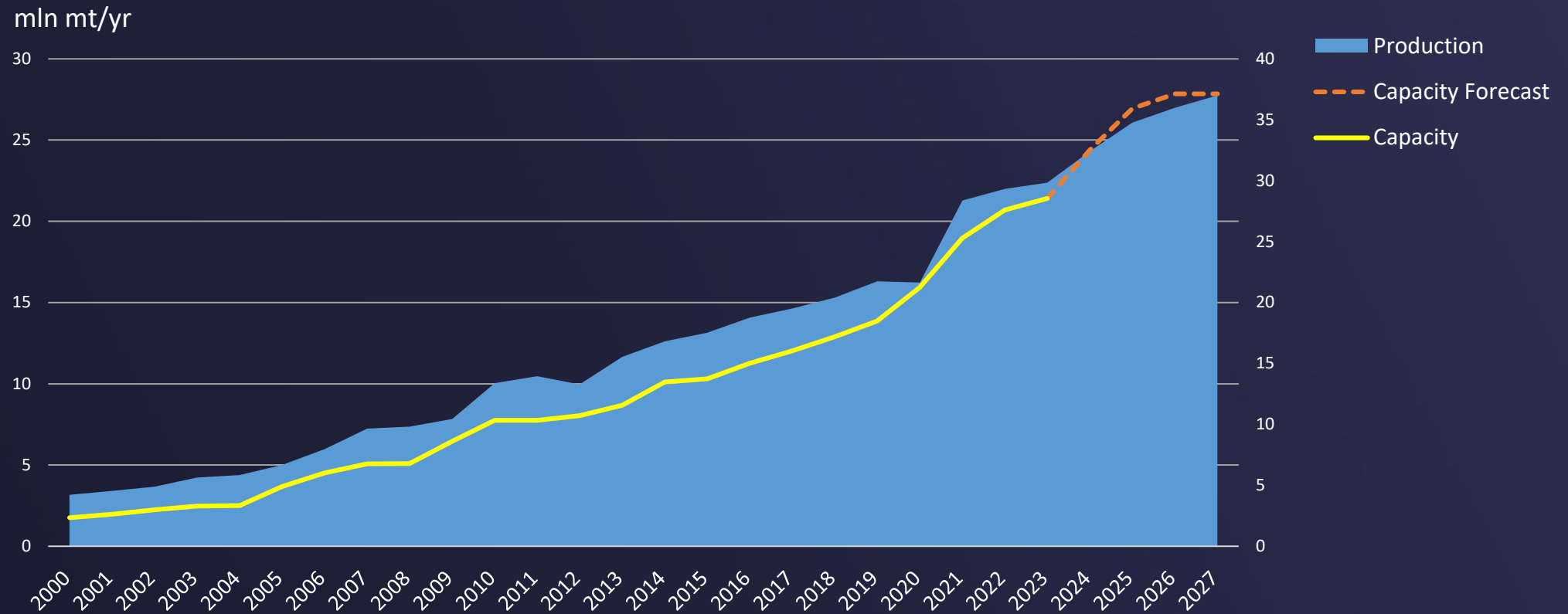
Is China's Polyethylene Production Likely to Face Overcapacity?

POLYETHYLENE GLOBAL CAPACITY



Is China's Polyethylene Production Likely to Face Overcapacity?

CHINA POLYETHYLENE CAPACITY VS PRODUCTION



Is China's Polyethylene Production Likely to Face Overcapacity?

Fundamental Demand

PE is crucial in many applications such as household items, injection-molded barrels, agricultural films, and greenhouse films. This diverse range of basic necessity applications supports continual growth in PE consumption.



Relative Prosperity

Despite overcapacity in many chemical products, PE remains relatively prosperous. Favorable supply and demand dynamics position PE positively compared to other saturated chemical markets.



Strategic Role

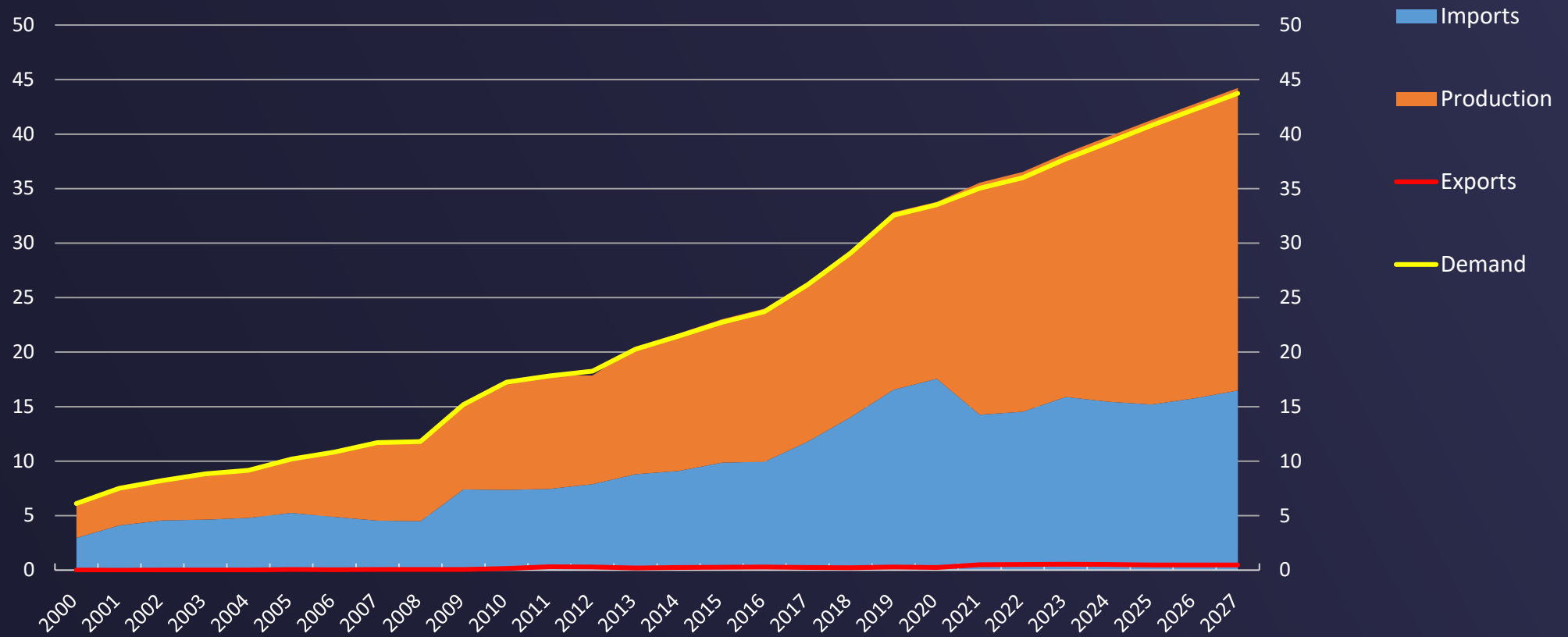
PE is essential for extending the ethylene downstream industry on a large scale. The PE industry chain is shorter and less investment-intensive compared to other large-scale chemical productions. This strategic advantage facilitates substantial growth without immense capital outlays.



Is China's Polyethylene Production Likely to Face Overcapacity?

CHINA POLYETHYLENE DEMAND & SUPPLY

mmt



Expansion of Production Capacity Intensifies Market Surplus

Diversification of Raw Materials

Coal-to-Olefins (CTO) Expansion

The introduction of CTO plants since 2011 has changed the industry structure.



Naphtha Cracking Units (NCUs) Expansion

China's extensive use of naphtha and crude oil for producing polyethylene highlights its ongoing investments and expansions in the petrochemical sector.



Surge in Private Mega-Refining Projects

1

Capacity Growth

From 2020 to 2023, polyolefin capacity expanded by 7.3 million tons annually, more than double the 2010-2019 growth.

2

Demand Growth

Demand growth averaged 3.0 million tons per year from 2020 to 2023, down from 3.4 million tons per year between 2010 and 2019.



Expansion of Production Capacity Intensifies Market Surplus

Market Imbalance and Surplus Pressure

1 Imports Amidst Increased Capacity

Despite increased domestic capacity, the market continues to import around 20 million tons annually, exacerbating oversupply conditions.

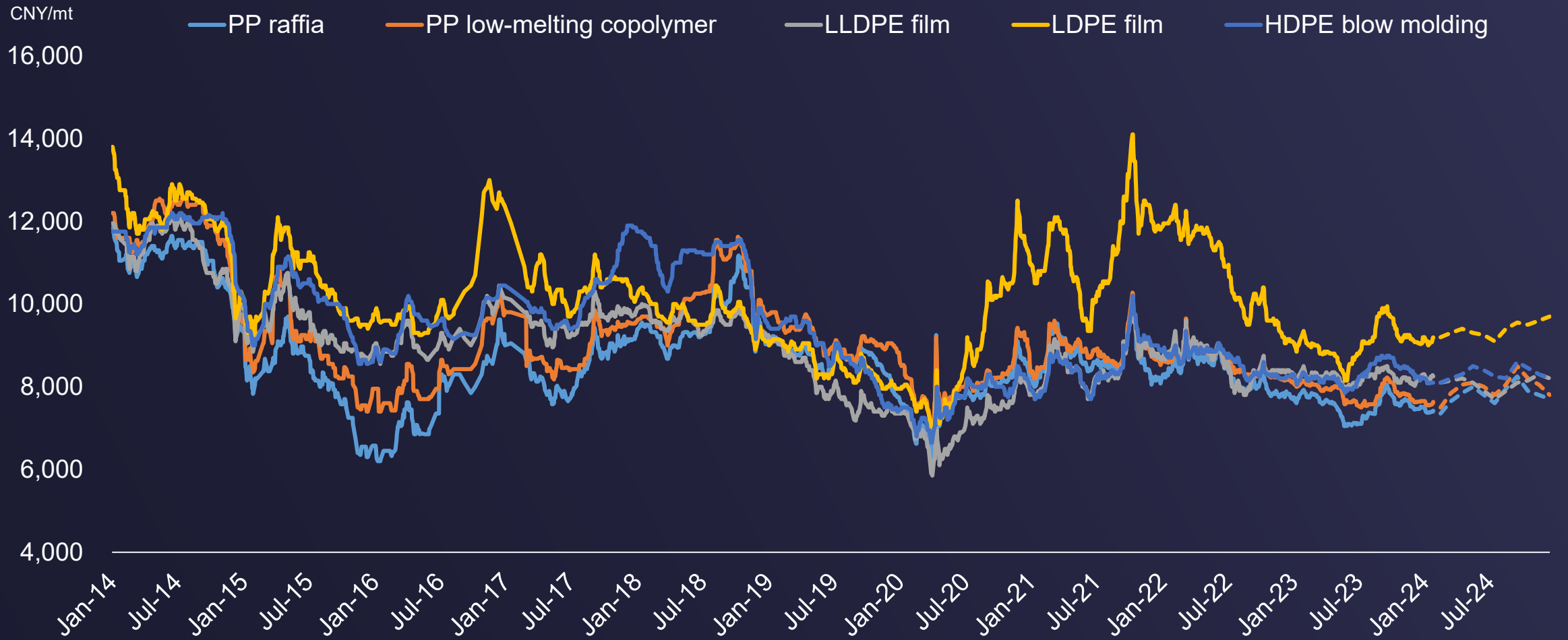
2 Declining Operating Rates

Average operating rates for PE and PP plants have fallen due to overcapacity, dropping to 82% and 80% respectively in 2023.

CHINA POLYETHYLENE PRICE & CAPACITY



China Polyolefin Market Price and Forecast, 2014-2024



Cyclical Fluctuations and Market Forces

2001-2008: Large-Scale Development

During these years, China's PE market primarily focused on large-scale development, driving consistent growth in prices. Investment in infrastructure and industrial expansion led to higher demand for PE, supporting price increases.

2009-2015: Volatile Consolidation

Between 2009 and 2015, the PE market experienced volatile consolidation. Fluctuating economic recovery phases led to unstable demand and supply dynamics, causing price volatility.

1

2

3

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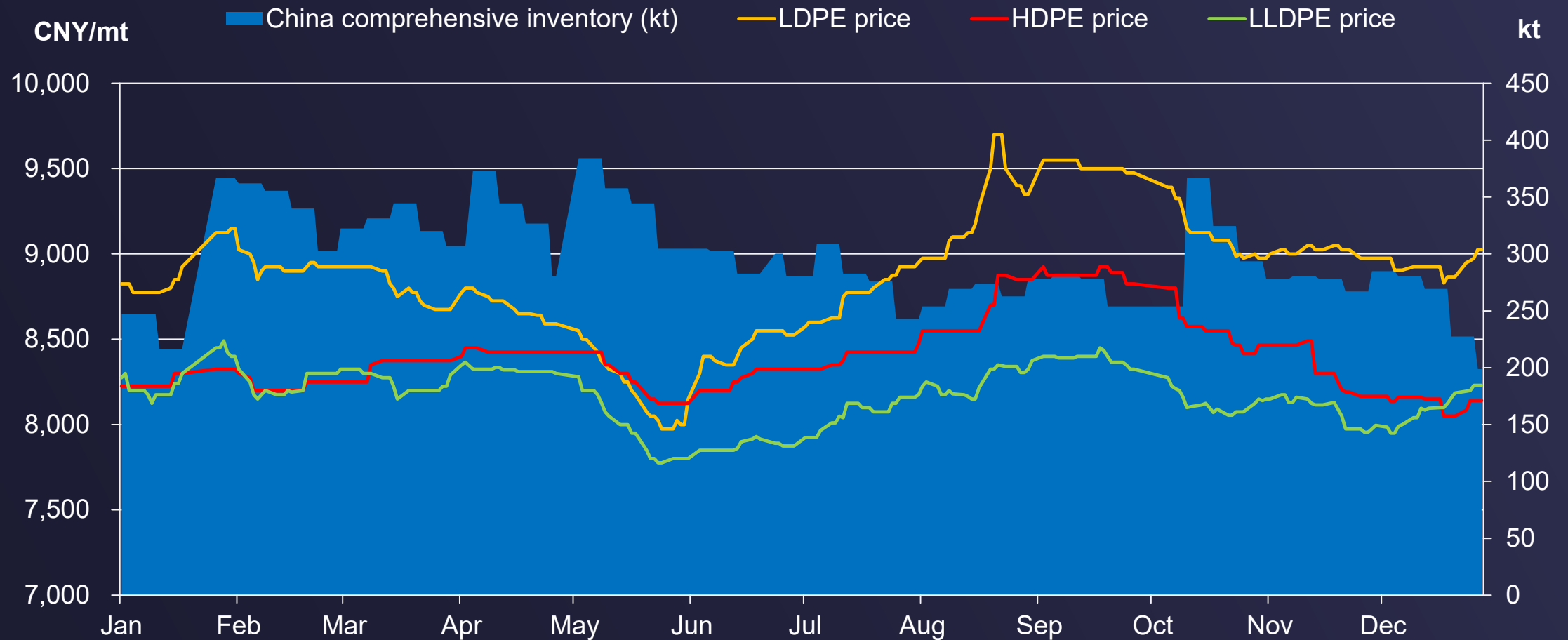
2008: Global Economic Crisis

The global economic crisis in 2008 caused a significant decline in PE prices. The sharp downturn in global markets led to reduced industrial activity and lower demand for PE, resulting in price drops.

2016-Present: Prolonged Downward Trend

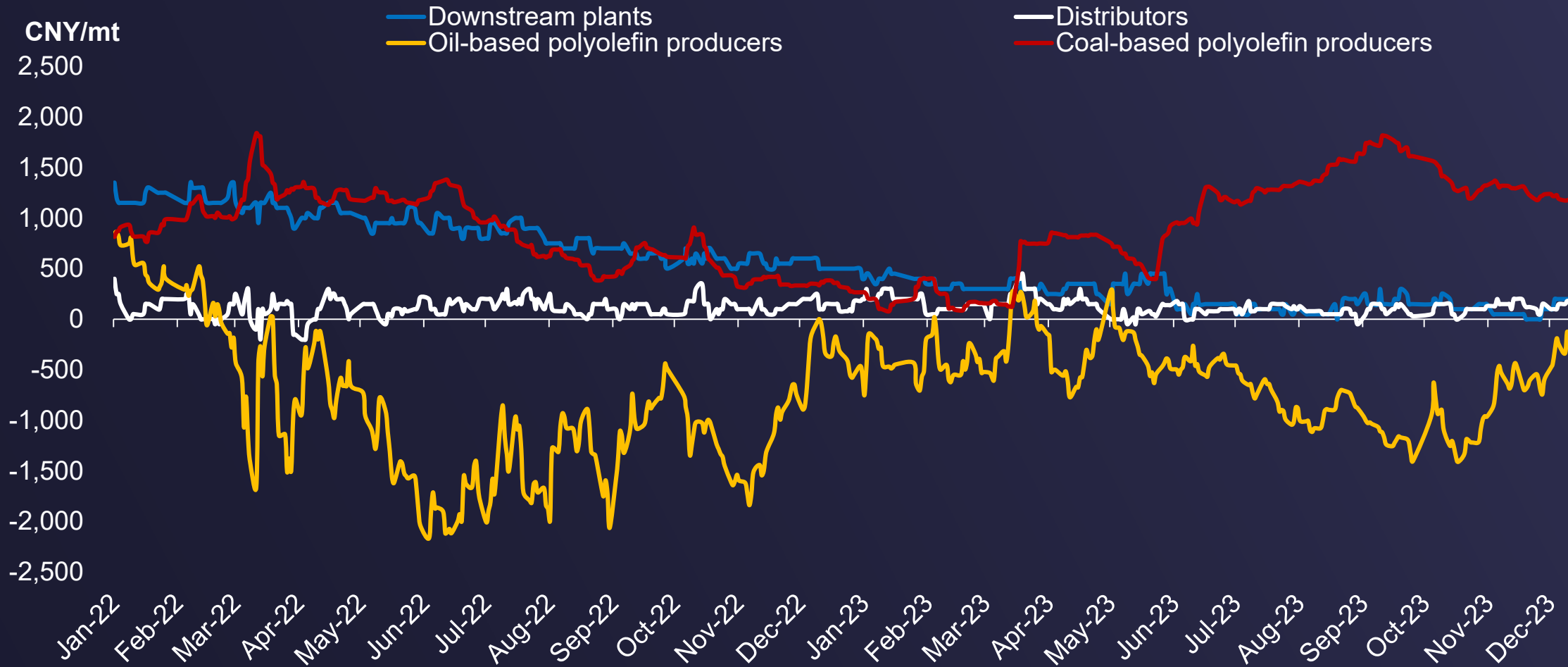
Since 2016, over nearly eight years, PE prices have trended downward, fluctuating between 7,000 CNY/ton and 12,000 CNY/ton. This downward trajectory became especially evident from 2018 to 2023. Increased production capacity and slower demand growth during this period led to a sustained price decline.

China PE Price and Comprehensive Inventory Comparison, 2023



Note: China comprehensive inventory targets the right axis. Comprehensive inventory incl. inventory of Sinopec, PetroChina, distributors, coal chemical plants and port inventory.

Production Margin of Enterprises in Various Links of Polyolefin Industry, 2023





Factors Contributing to Profit Decline

1 Price Divergence

The prices of ethylene and crude oil diverged, leading to severe losses in synthetic resin products like polyolefins.

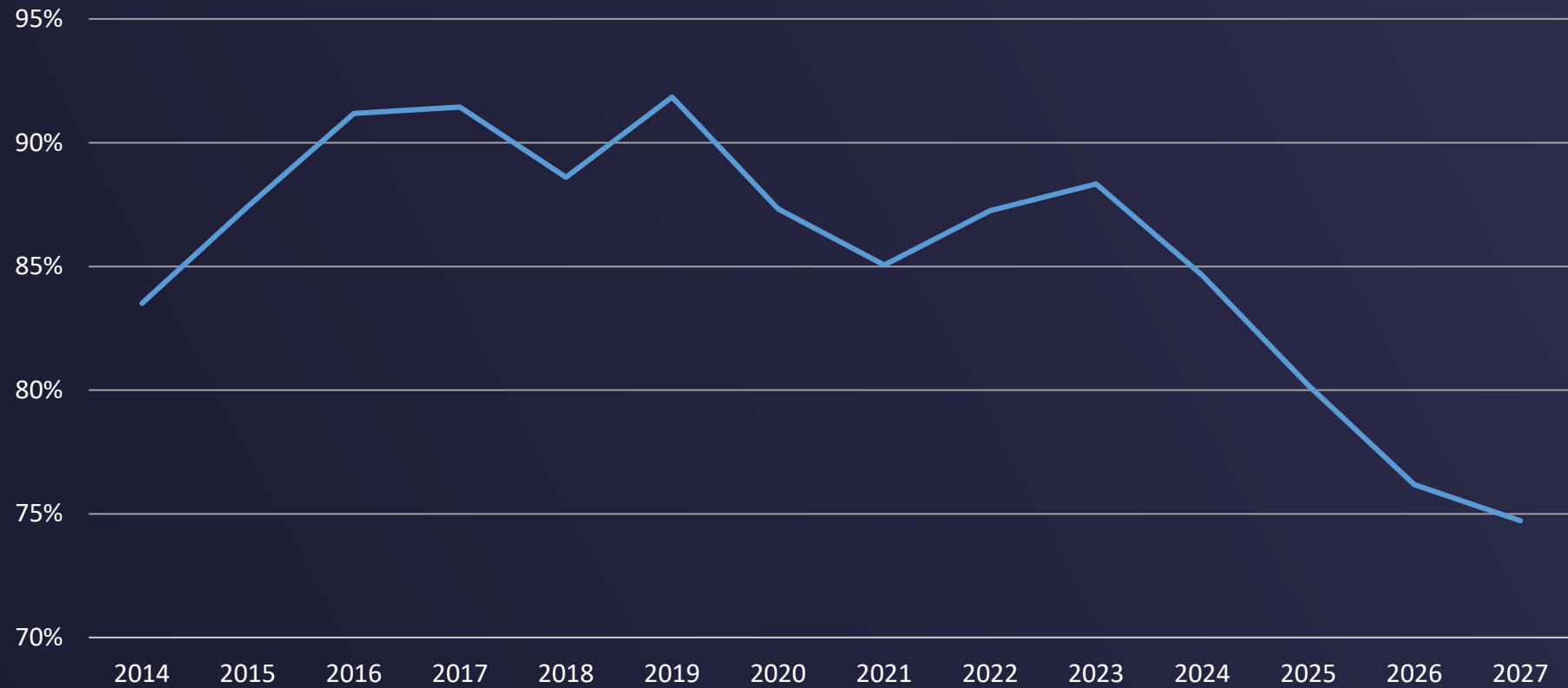
2 Demand Slump

Downstream industries experienced a marked decline in demand, resulting in lower operational loads and reduced production efficiency.

3 Price Sensitivity

Polyolefins, especially polyethylene (PE) and polypropylene (PP), exhibited high sensitivity to raw material price fluctuations.

China Polyethylene Production Operating Rates, 2014-2023



Capacity Surge and Market Imbalance

1

Capacity Growth

From 2020 to 2023, polyolefin production capacity expanded by approximately 7.3 million tons annually, more than double the annual growth rate from 2010 to 2019, significantly impacting market dynamics.

2

Lagging Demand

While capacity surged, demand growth lagged, averaging 3.0 million tons per year from 2020 to 2023, down from 3.4 million tons per year between 2010 and 2019.

3

Imports and Oversupply

Despite increased domestic capacity, the market continues to import around 20 million tons annually, exacerbating oversupply conditions and putting pressure on profit margins.

4

Declining Operating Rates

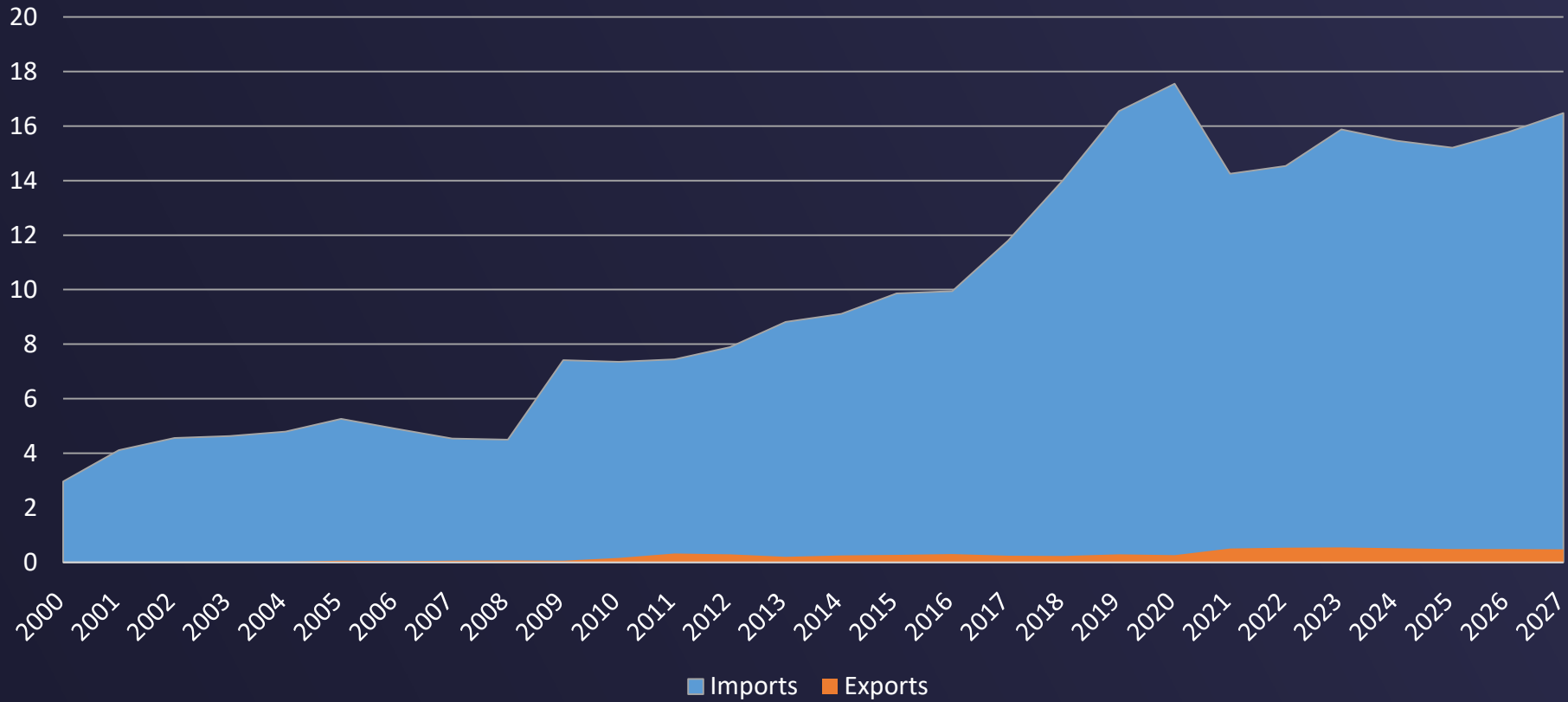
The average operating rates for PE and PP plants have fallen due to overcapacity, dropping from 90% and 85% respectively in 2012-2022 to 82% and 80% in 2023.

2.

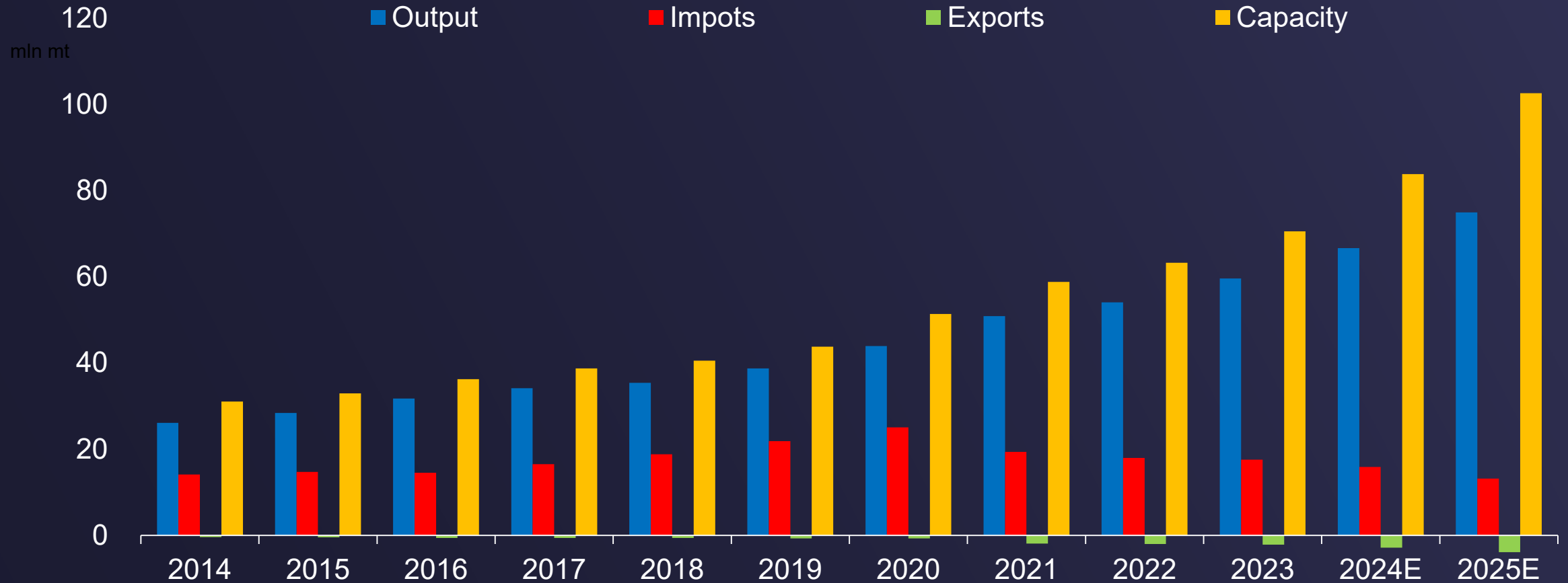
China Polyethylene Import and Export Dynamics and End-User Demand Drivers

CHINA POLYETHYLENE IMPORTS EXPORTS

mln mt/yr

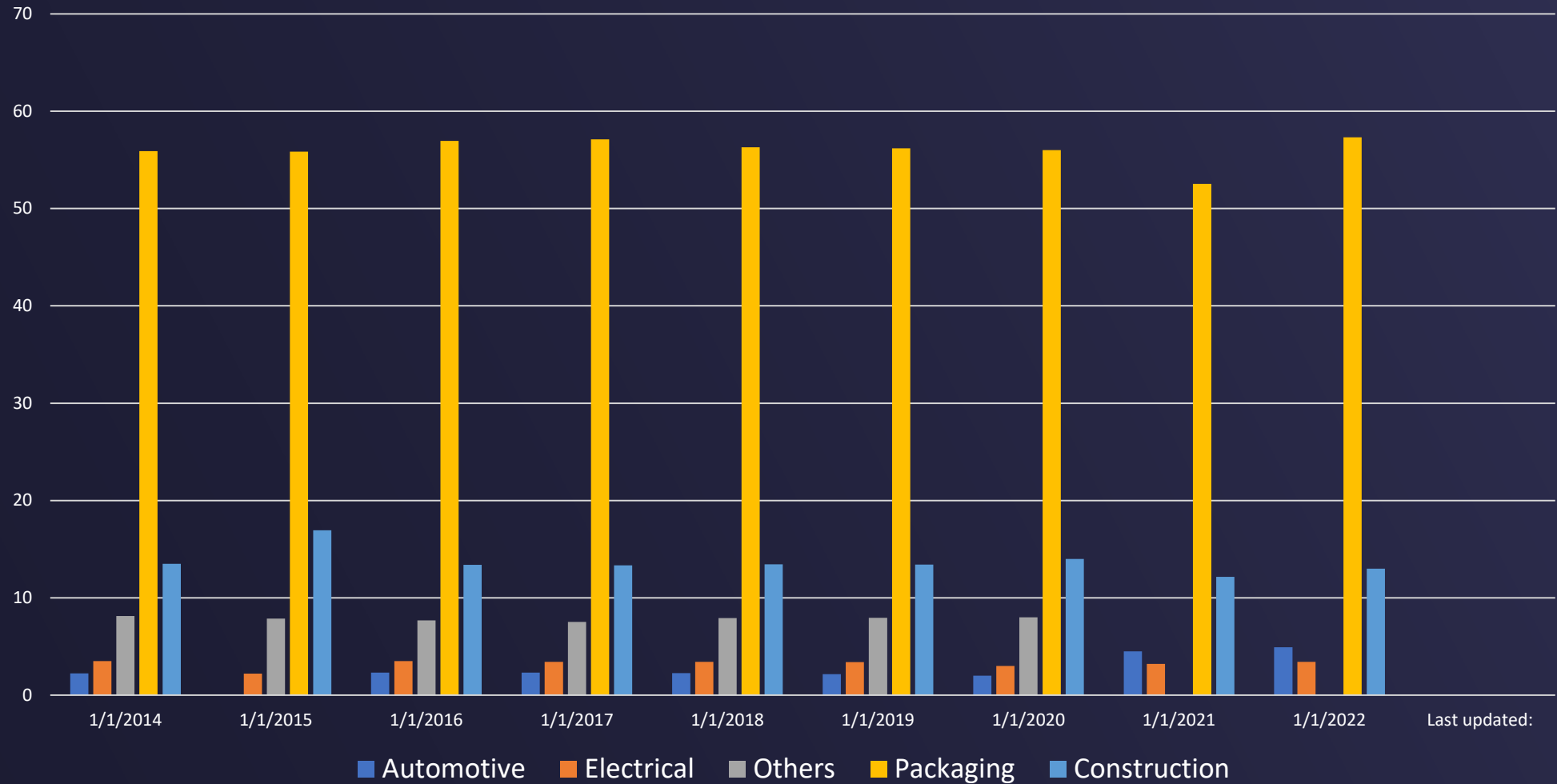


China Polyolefin Supply-Demand Balance, 2014-2025E



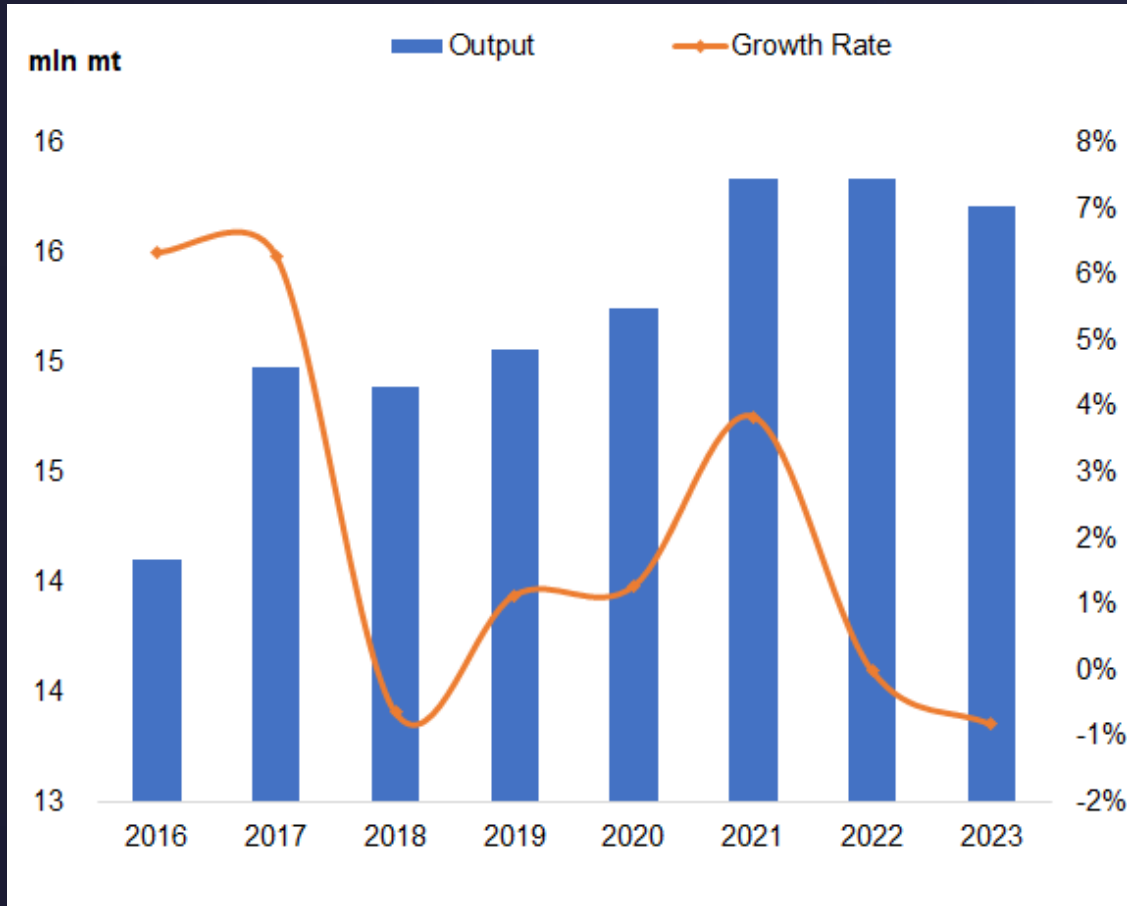
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CHINA POLYETHYLENE DEMAND BY END USE

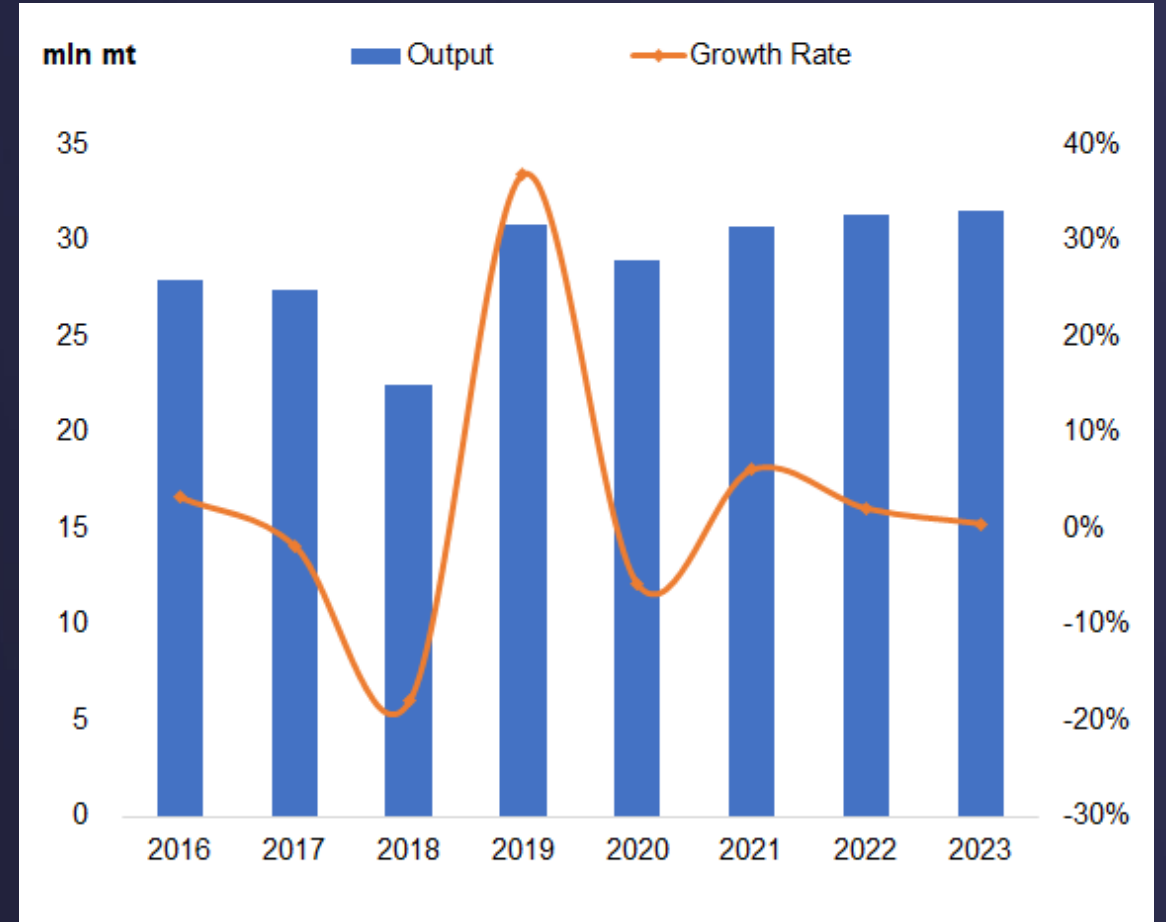


Slow Demand Growth from Traditional Sector

China Plastic Woven Products Output, 2016-2023

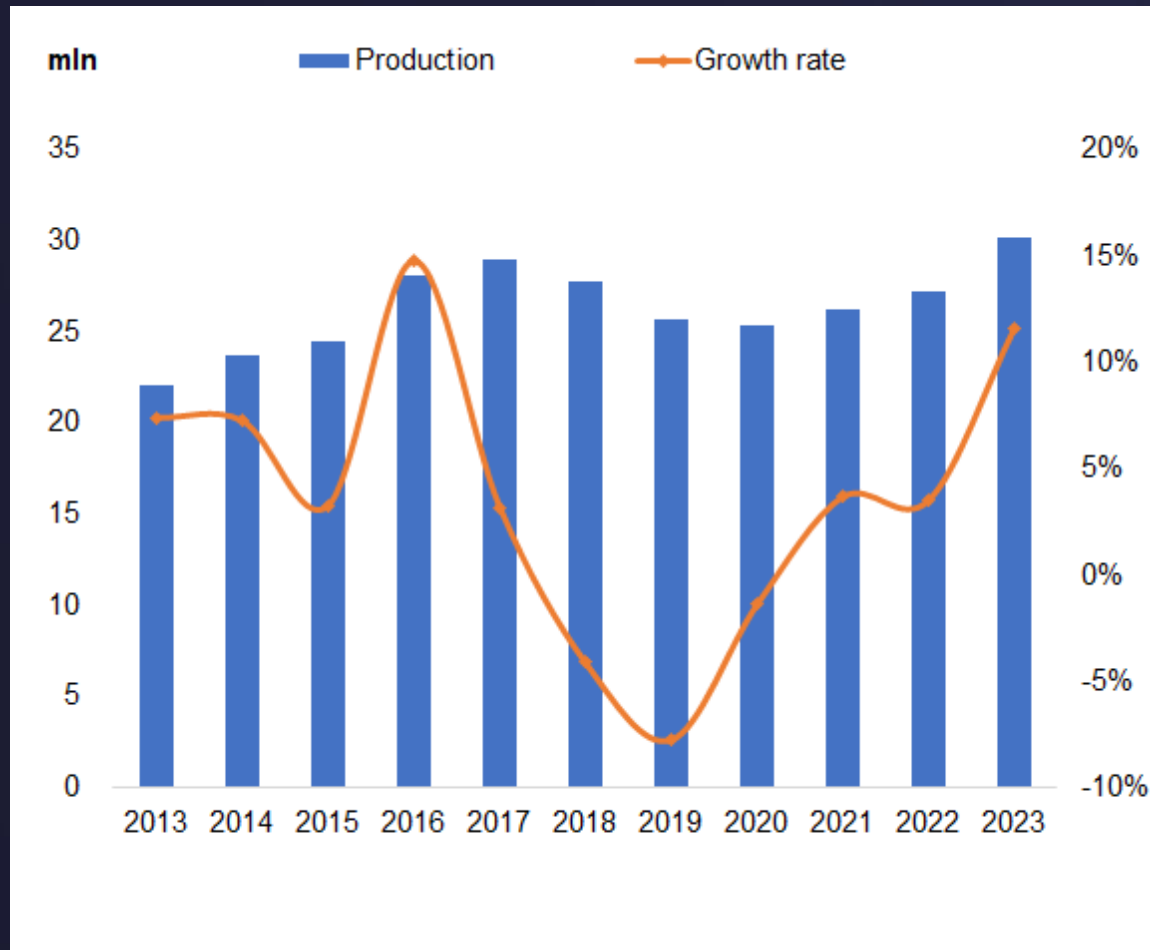


China Injection Products Output, 2016-2023

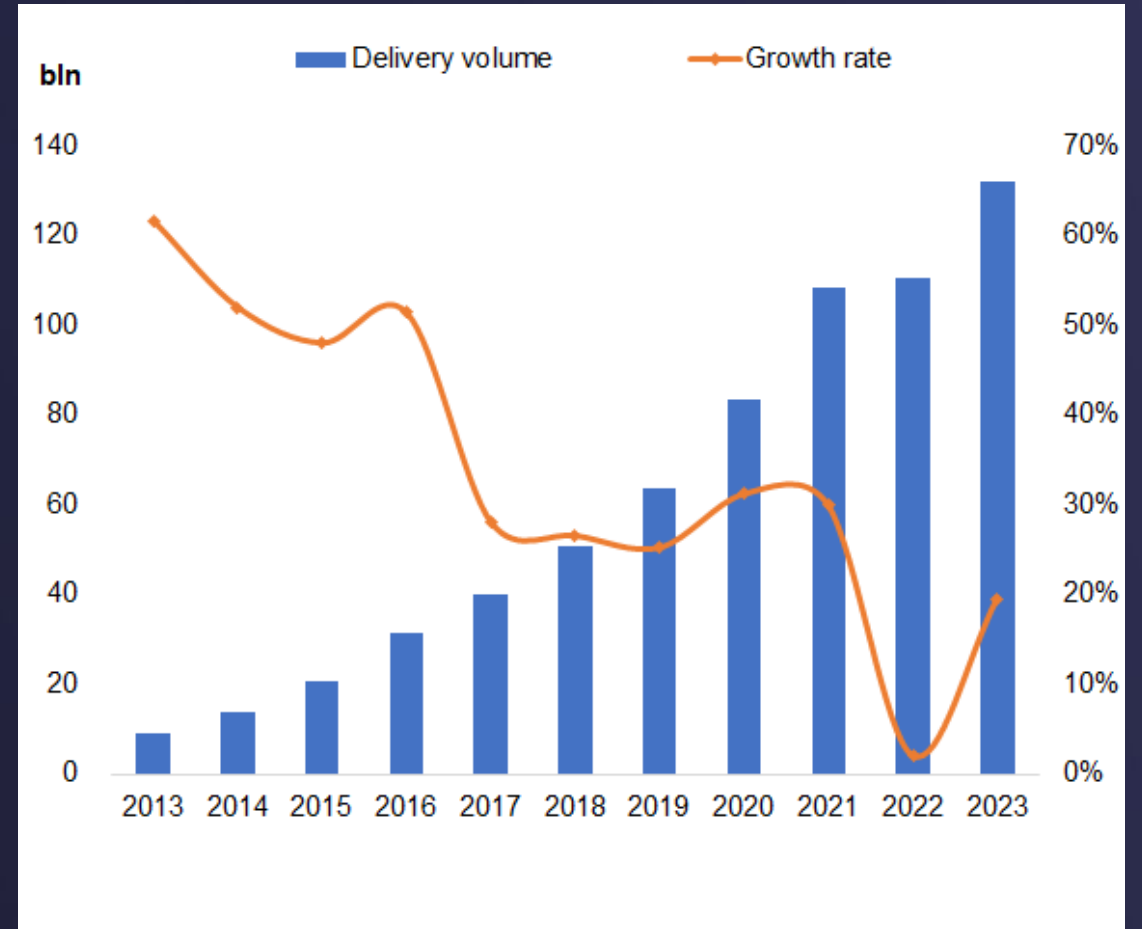


Limited Demand Momentum from New Sectors

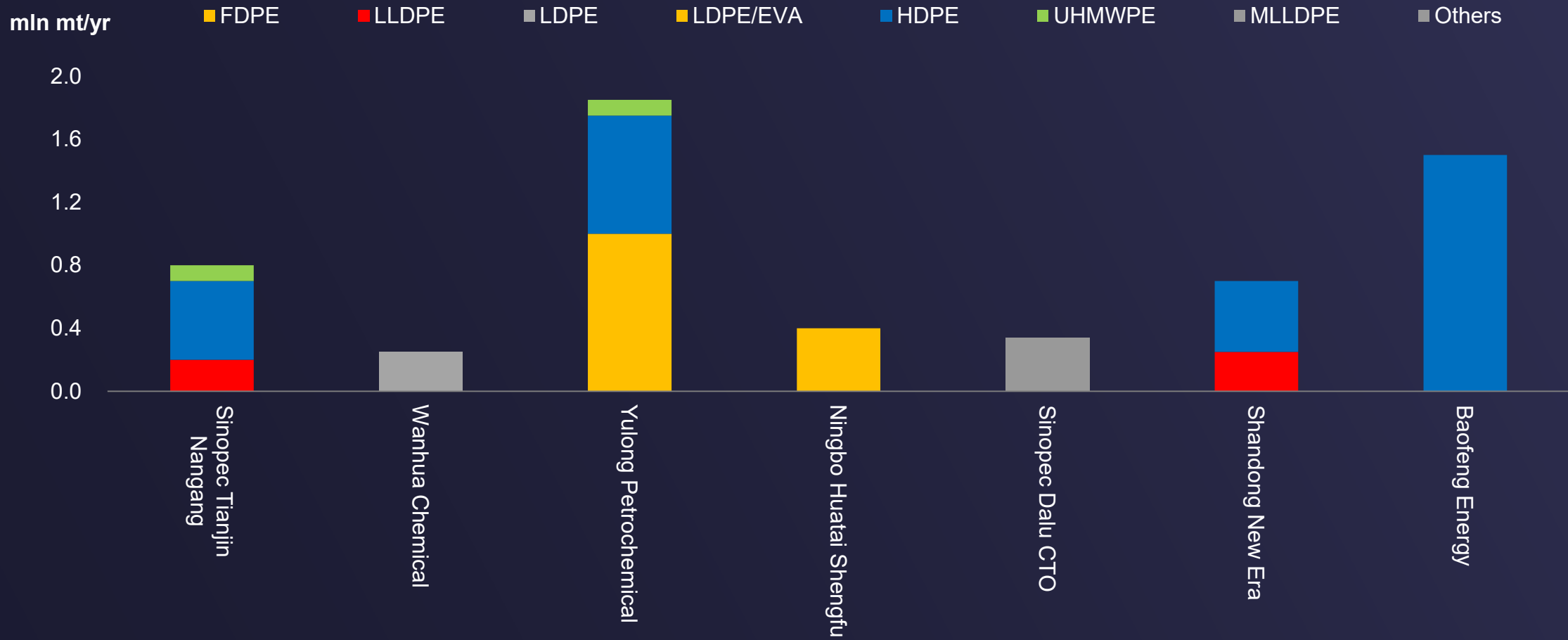
China Automobile Output, 2013-2023



China Parcel Delivery Volume, 2013-2023



New PE Projects by Product Type in 2024



Future PE New Projects, 2024-2028

Company	Location	Type	Capacity (kt/yr)	Startup
A 1.2 mln mt/yr ethylene project in Tianjin Nangang Industrial District	Tianjin	LLDPE	200	May-24
		UHMWPE	100	
		HDPE	500	
Integration of refining & petrochemical project at Yantai Yulong Island	Yantai, Shandong	LDPE/EVA	200	2025
			500	
		FDPE	500	September-24
			500	Late 2024
		HDPE	300	September-24
			450	Late 2024
UHMWPE	100	Late 2024		
A 1.2 mln mt/yr ethylene and downstream high-end polyolefin project at Wanhua Chemical	Yantai, Shandong	LDPE	250	October-24
An extension project of Ningbo Huatai Wealthy Polymer Material	Ningbo, Zhejiang	FDPE	400	Novemver-2024 (or to postpone)
A CTO project at Sinopec Ordos Dalu Industrial Park	Ordos, Inner Mongolia	PE	340	2024 (or to postpone)
A 4.0 mln mt/yr CTO modeling project at Inner Mongolia Baofeng Coal Based New Material	Ordos, Inner Mongolia	LDPE	500	Late 2024
		LDPE	500	
		LDPE	500	
A 0.7 mln mt/yr high-end polyolefin project at Shandong New Era Polymer Material	Zibo, Shandong	HDPE	450	December-24
		LLDPE	250	
PetroChina Jilin Petrochemical	Jilin	HDPE	400	2025
Zhejiang Petroleum & Chemical Phase III	Zhoushan, Zhejiang	LDPE	400	Early 2025
		LDPE/EVA	300	
			300	
ExxonMobil Huizhou Ethylene Project	Huizhou, Guangdong	LDPE	500	Q1 2025

Future PE New Projects, 2024-2028

Company	Location	Type	Capacity (kt/yr)	Startup
PetroChina Guangxi Refining and Petrochemical Complex Project	Qinzhou, Guangxi	FDPE	400	2025
		HDPE	300	
Dongming Shenghai Olefin New Materials Technology Demonstration Project	Heze, Shandong	FDPE	400	2025
		HDPE	400	
Sinopec Luoyang Expansion and Reconstruction Project	Luoyang, Henan	LDPE	250	Dec-25
		m-LLDPE	300	
		HDPE	350	
Sinopec Tahe Refining & Chemical Ethylene Project	Tahe, Xinjiang	HDPE	450	2025
		LLDPE	400	
		LDPE	200	
Zhangzhou Gulei Refining Integration Project's 1.5 mln mt/yr ethylene project	Zhangzhou , Fujian	HDPE	400	2025
		FDPE	600	
Inner Mongolia Rongxin Chemical	Ordos, Inner Mongolia	HDPE	400	2025
Jiangsu Fenghai High-Tech Material	Lianyungang, Jiangsu	HDPE	300	2025
Sinopec Maoming Company	Maoming, Guangdong	FDPE	400	End of 2025
ChinaCoal Yulin Coal Deep Processing Base Project	Yulin, Shaanxi	HDPE	350	2026
Sinopec Zhenhai Refining & Chemical's 1.5 mln mt/yr ethylene expansion project and downstream high-end material integration	Ningbo, Zhejiang	FDPE	400	2026
		LDPE/EVA	400	
Huajin Aramco Petrochemical Company	Panjin, Liaoning	HDPE	300	2026

Future PE New Projects, 2024-2028

Company	Location	Type	Capacity (kt/yr)	Startup
Huajin Aramco Petrochemical Company	Panjin, Liaoning	FDPE	450	2026
PetroChina Dushanzi Petrochemical (phase-II 1.20 mln mt/yr ethylene project in Tarim)	Korla, Xinjiang	FDPE	450	2026
			450	
		LDPE/EVA	300	
PetroChina Lanzhou Petrochemical transformation and upgrading ethylene project	Lanzhou, Gansu	HDPE	450	2026
CHN Energy Ningxia Coal Industry	Yinchuan, Ningxia	LDPE	300	2026
		HDPE	300	
Xinjiang Shanneng Chemical (800,000 mt/yr coal-based olefin project in Wucaiwan, Zhundong economic and technological development zone)	Changji, Xinjiang	PE	450	2026
Xinjiang Dongming Plastic (800,000 mt/yr coal-based olefin project)	Changji, Xinjiang	HDPE	400	H2, 2026
Lianyungang Petrochemical (phase-III)	Lianyungang, Jiangsu	FDPE	500	End-2026
		FDPE	500	
		UHMWPE	50	
Sinopec (1 mln mt/yr ethylene refining and chemical complex project in Yueyang)	Yueyang, Hunan	HDPE	400	Dec-26
		LLDPE	400	
CNOOC and Shell Petrochemicals	Huizhou, Guangdong	MLLDPE	600	2027
Nanjing Yangzi Petrochemical Light Hydrocarbon Comprehensive Utilization Project	Nanjing, Jiangsu	HDPE	350	2028
		LLDPE	300	

3 ■

The Emergence of New Polyethylene Materials in China: POE and EVA



The Polyolefin Elastomer (POE) market in China

The Polyolefin Elastomer (POE) market in China is part of a broader global market which showcases significant growth trends and projections. Globally, the POE market was estimated at USD 1.36 billion in 2023 and is projected to grow at a compound annual growth rate (CAGR) of 7.8% from 2024 to 2030, driven by increasing strategic initiatives such as production expansions, mergers, and acquisitions

The POE Production Process

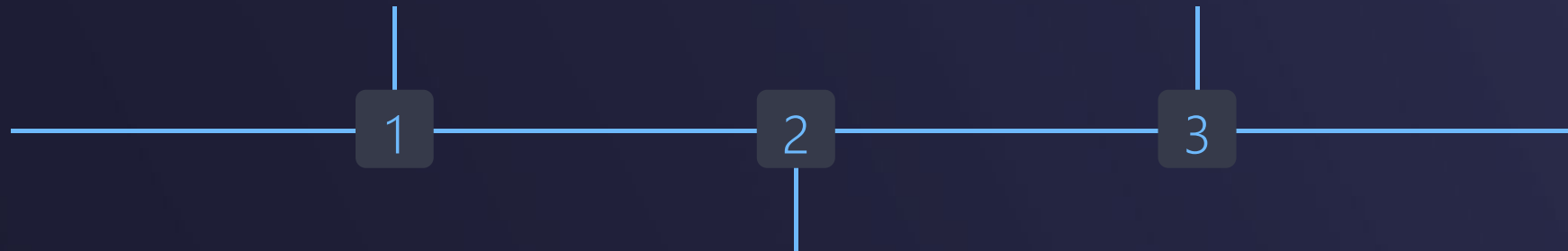
Producing POE resins presents two key challenges: the synthesis of high carbon α -olefins and the preparation of metallocene catalysts. Major POE polymerization processes include Dow Chemical's Insite liquid polymerization process, ExxonMobil's high-pressure polymerization process, NOVA's process, and SABIC's Compat process.

α -Olefin Synthesis

The first hurdle in POE production is the synthesis of high carbon α -olefins like 1-butene, 1-hexene, and 1-octene, which serve as comonomers.

Polymerization

Once the α -olefins and catalysts are ready, the polymerization process can take place, typically using high-temperature solution polymerization techniques.



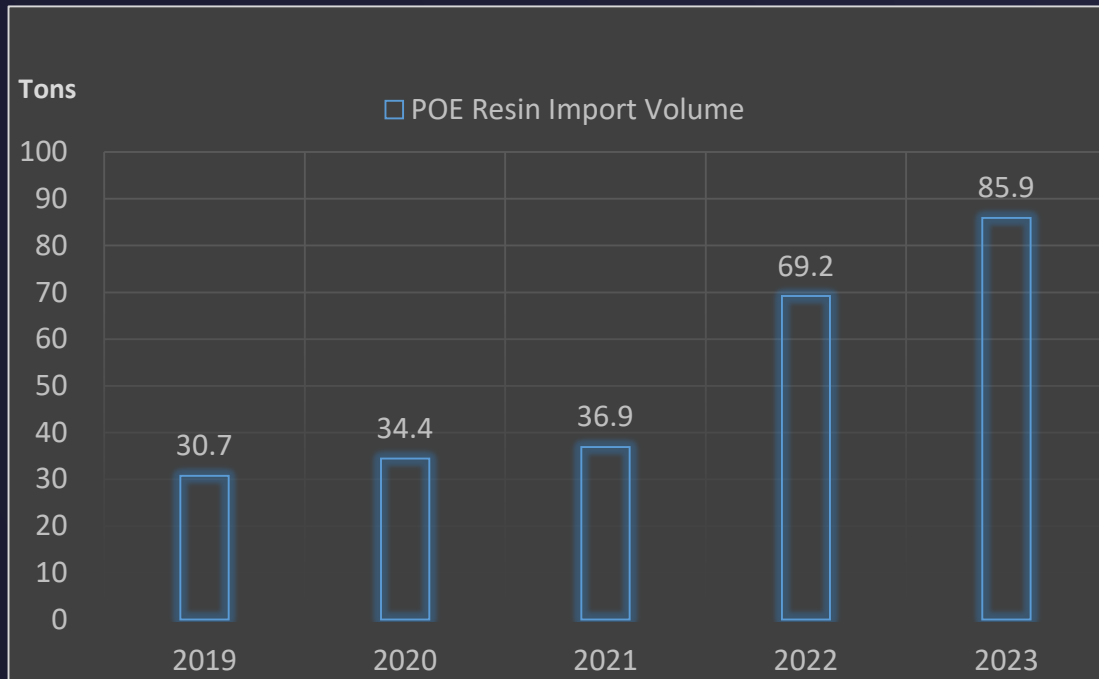
Catalyst Preparation

The second challenge lies in the preparation of metallocene catalysts, which are essential for the polymerization process.

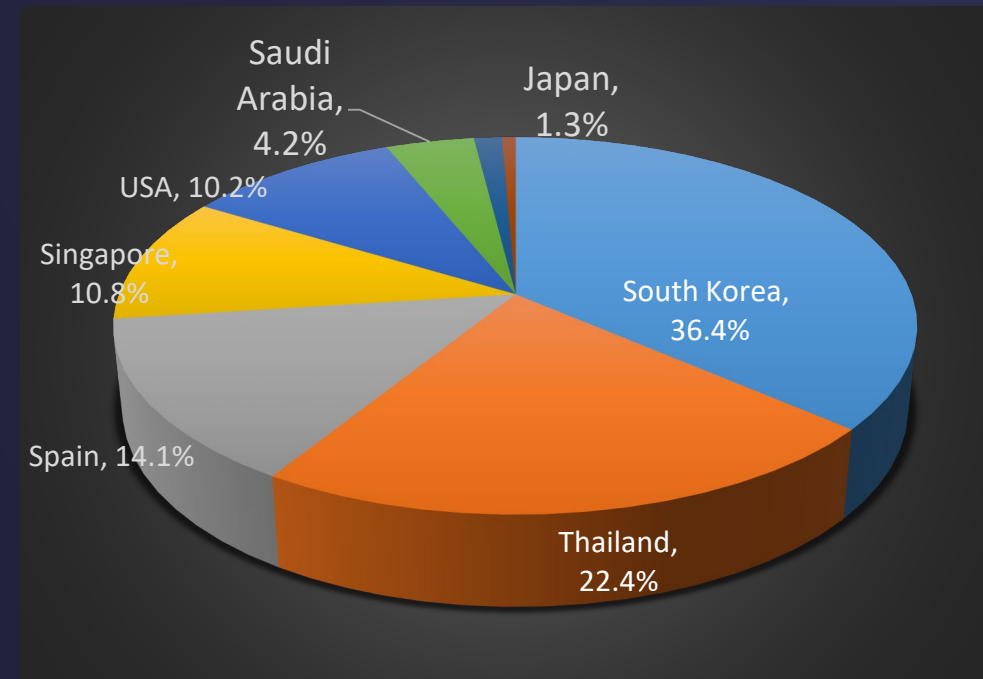
China's Supply of POE Resin is Entirely Reliant on Imports.

- Due to the high technical barriers associated with POE, there is no mass production of POE resin particles in the market, making China completely dependent on imports.
- In 2023, China mainly imports POE resin from South Korea and Thailand.

China POE resin imports 2019-2023



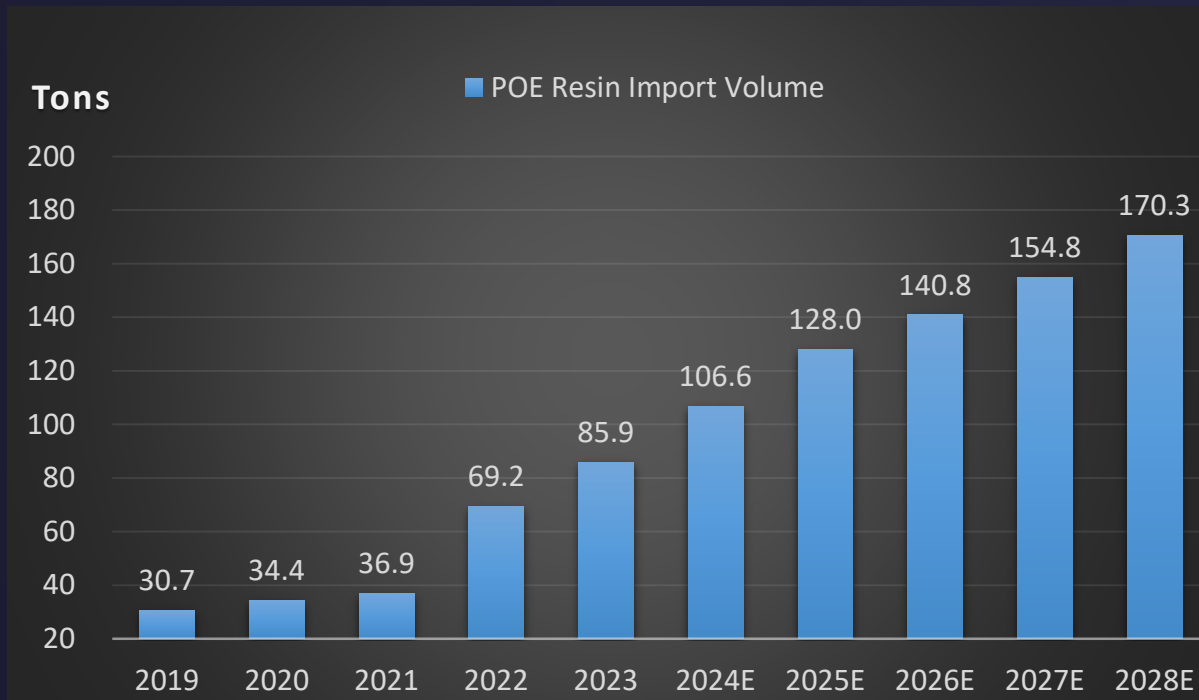
China POE Resin Import Sources (with Transit), 2023



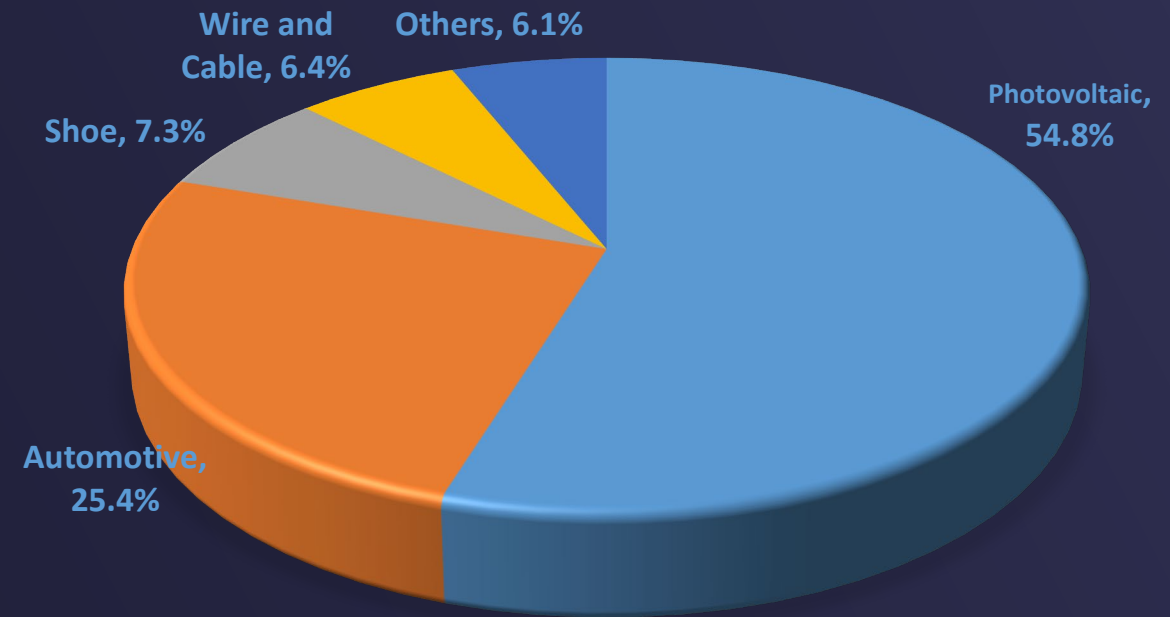
China POE Resin Consumption

- Over the past five years, China's consumption of POE has increased from 307,000 tons to 859,000 tons, entirely reliant on imports. The compound annual growth rate of China's POE resin consumption from 2019 to 2023 has been an impressive 29.33%. This upward trend is projected to continue over the next five years, with consumption expected to exceed 1 million tons in 2024 and reach 1.7 million tons by 2028.

POE Resin Import Volume



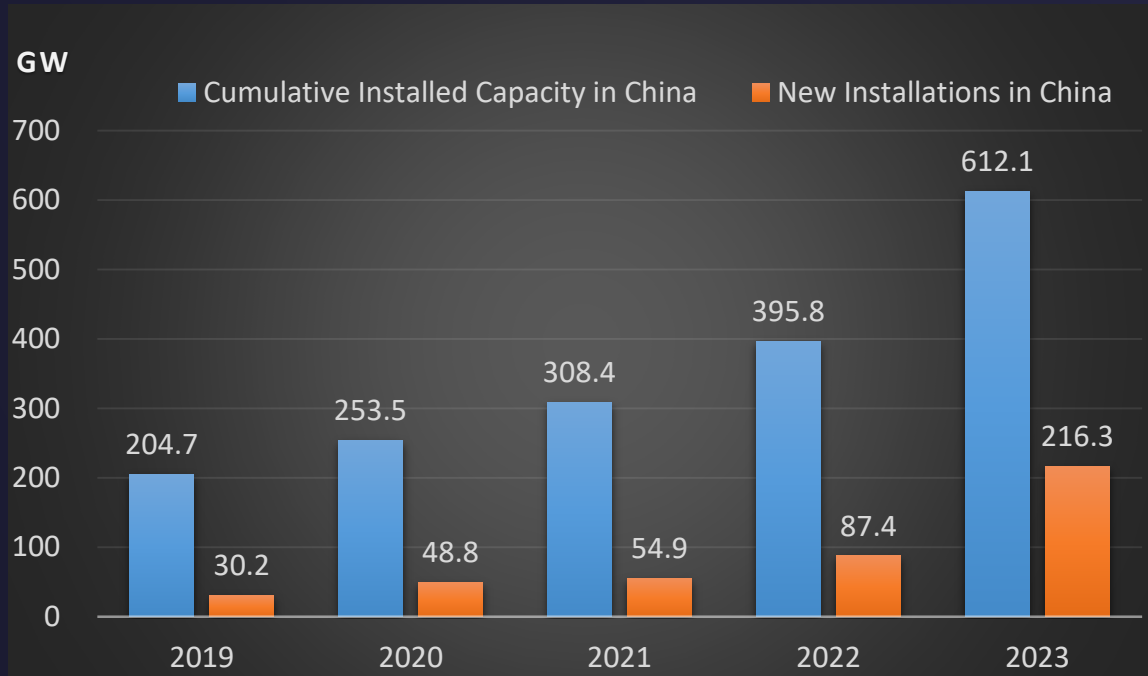
China POE Resin Consumption Structure in 2023



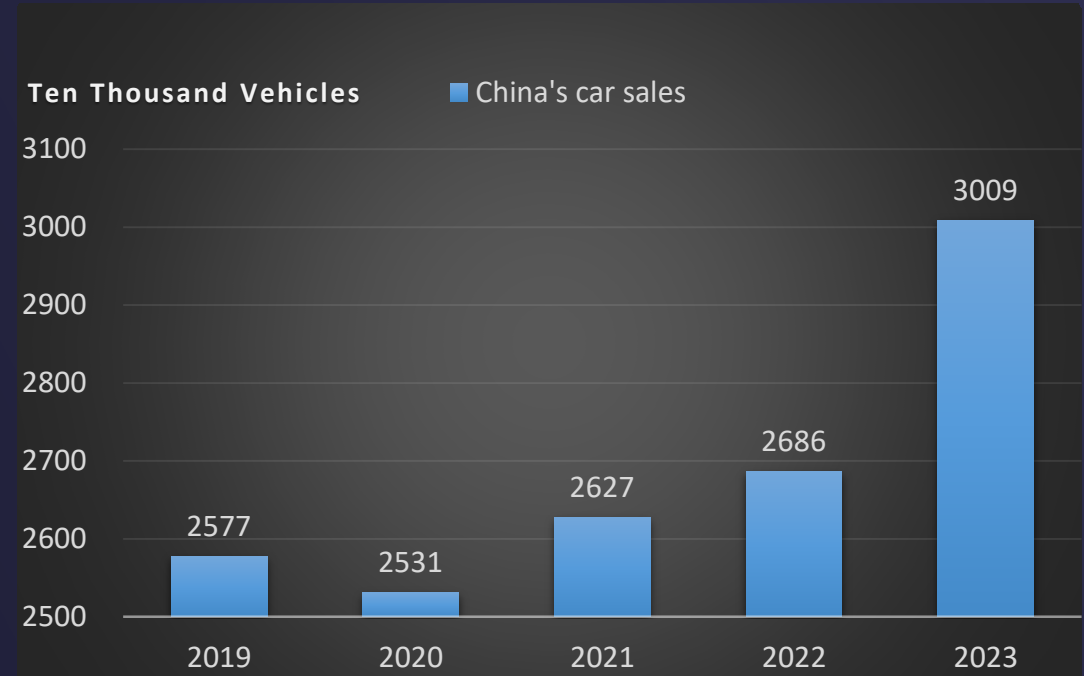
Drivers of POE Consumption Growth in China: Photovoltaic Film & Automotive

- In the photovoltaic sector, POE film outperforms EVA in several aspects, including multi-volume resistivity, water vapor permeability, aging resistance, and potential-induced attenuation. Looking ahead, POE particles are anticipated to represent a larger proportion of PV films, particularly for single-glass module encapsulation films and EPE films.
- In the automotive sector, the proportion of POE incorporated into various components typically ranges from 8% to 20%. On average, each vehicle utilizes approximately 5 to 7 kilograms of POE. This material is extensively used in the production of automotive bumpers, radiator grills, and outer body panels.

China's Installed Photovoltaic Capacity 2019-2023



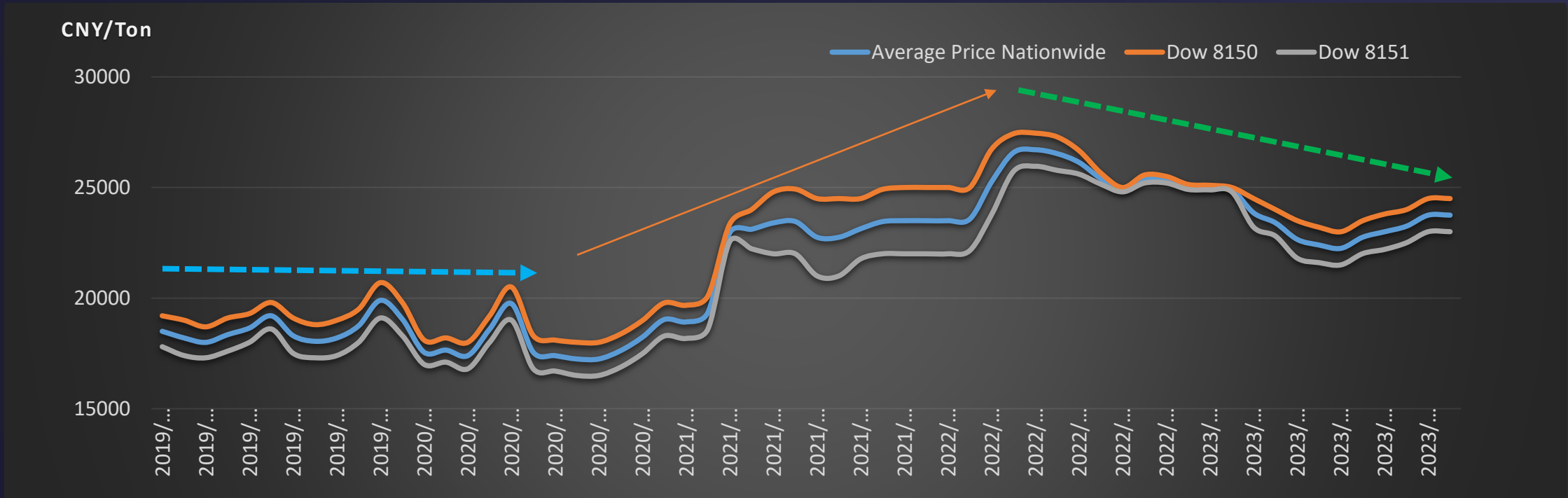
China's Automobile Sales, 2019-2023



POE Resin Price Analysis and Forecast

- At present, China lacks mass production capabilities for POE resin in the market, resulting in consistently high prices. However, as domestic technology for POE advances, a slight decline in prices is anticipated. In the short term, the prices are expected to remain elevated due to the substantial production barriers currently in place.

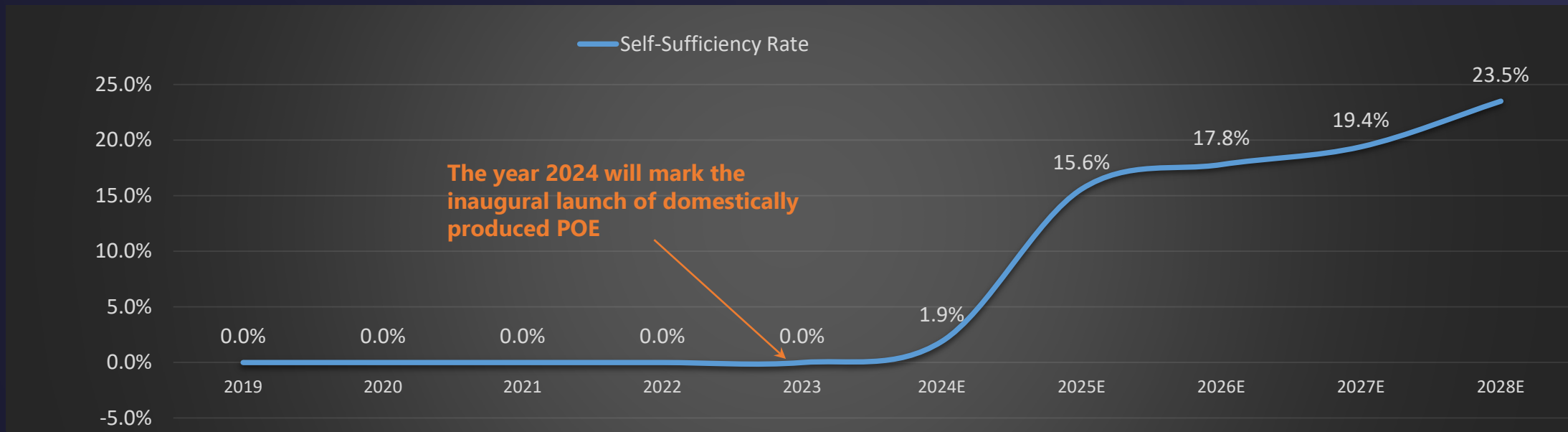
China POE Resin Market Price Trend 2019-2023



Proposed POE Installations in China

- In recent years, China's petrochemical enterprises, guided by policy and driven by market forces, have consistently accelerated the independent research and development of POE resin. Currently, certain enterprises have surmounted the technical challenges associated with POE production, enabling the potential for industrial-scale mass production within the next one to two years. This progress is poised to promote the domestication of POE and gradually dismantle the long-standing monopoly of foreign petrochemical enterprises in the POE sector.

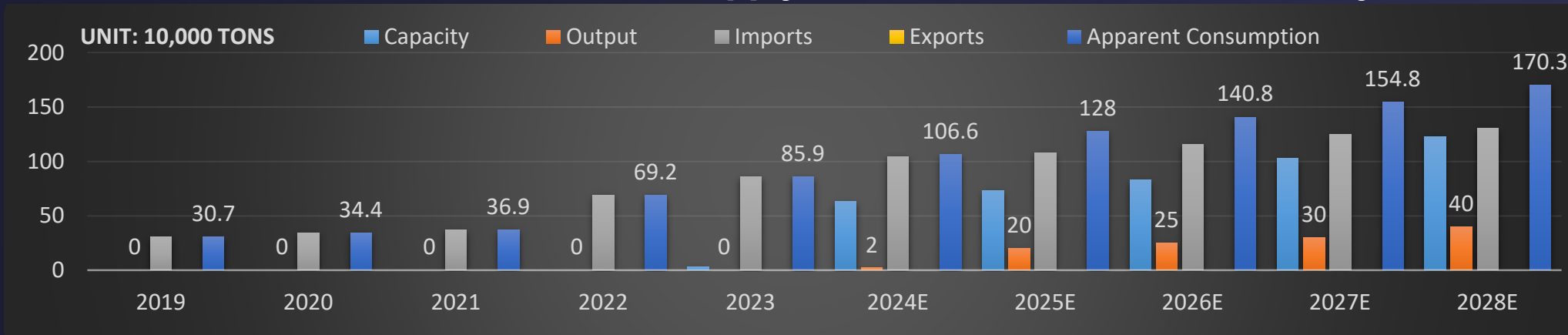
China POE Resin Self-sufficiency Rate



Supply and Demand Forecast of POE Resin in China

- Driven by the rapid increase in demand, domestic enterprises have initiated POE project layouts. In 2023, POE production facilities began operating, resulting in an improved self-sufficiency rate. By 2028, China's POE self-sufficiency rate is projected to reach 23.5%, with the shortfall expected to rise to 1.3 million tons.

China POE Resin Market Overall Supply and Demand Balance Data Analysis and Forecasts



Year	2019	2020	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	Average Growth Rate 2019-2023	2024-2028E aAverage Annual Growth Rate
Production Capacities	0	0	0	0	3	63	73	83	103	123	/	18.2%
Output	0	0	0	0	0	2	20	25	30	40	/	111.5%
Import Volume	30.7	34.4	36.9	69.2	85.9	104.6	108	115.8	124.8	130.3	29.3%	5.6%
Export Volume	0	0	0	0	0	0	0	0	0	0	/	/
Apparent Consumption	30.7	34.4	36.9	69.2	85.9	106.6	128	140.8	154.8	170.3	29.3%	12.4%
Self-sufficiency rate	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	15.6%	17.8%	19.4%	23.5%	/	/

China Ethylene-Vinyl Acetate Copolymer (EVA) Market

Copolymerization

EVA is produced by the copolymerization of ethylene and vinyl acetate, making it one of the most important ethylene copolymers.

High-Pressure Polymerization

EVA production utilizes high-pressure polymerization, which can be interchanged with high-pressure polyethylene production processes.

Classification

EVA copolymers are classified according to their vinyl acetate content into EVA resin, EVA rubber, and VAE emulsion categories.

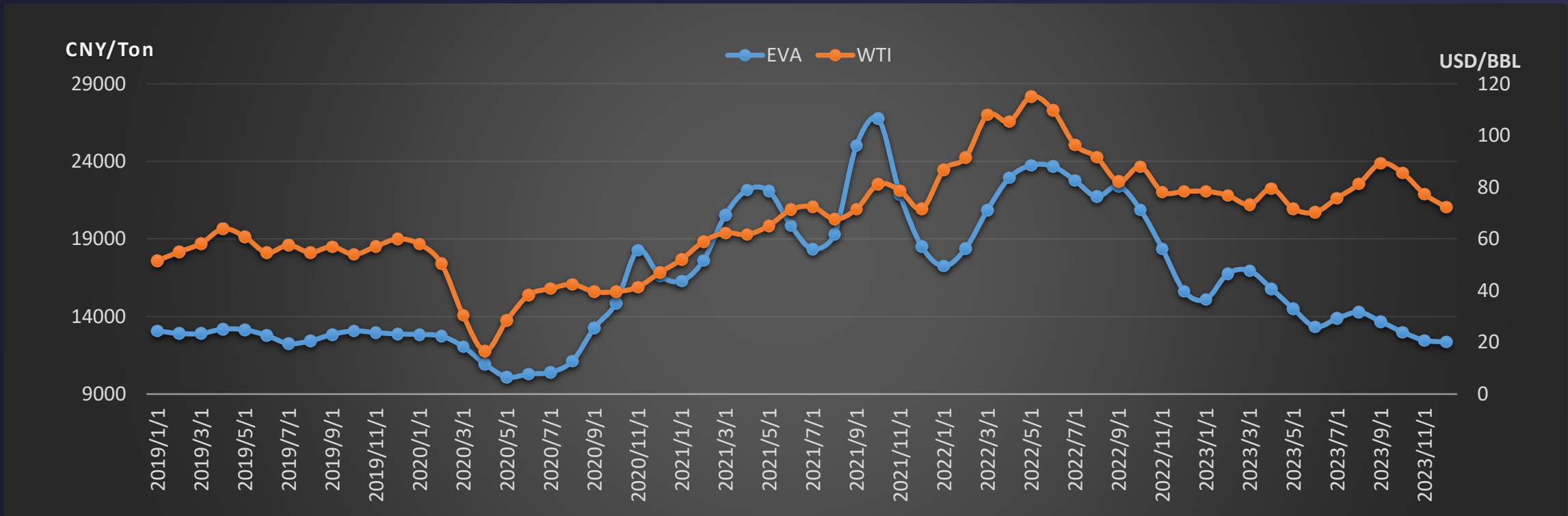
Unique Properties

EVA offers flexibility, elasticity, transparency, surface gloss, chemical stability, non-toxicity, and excellent processing characteristics.

China EVA Resin Market Price

- EVA resin market prices exhibit a strong correlation with the price trends of crude oil and upstream raw materials.
- With the ongoing commissioning of new production facilities, it is anticipated that from 2024 to 2028, the price of EVA will fluctuate within the range of 14,000 to 15,000 CNY per ton

China EVA Resin Market Price Trend 2019-2023



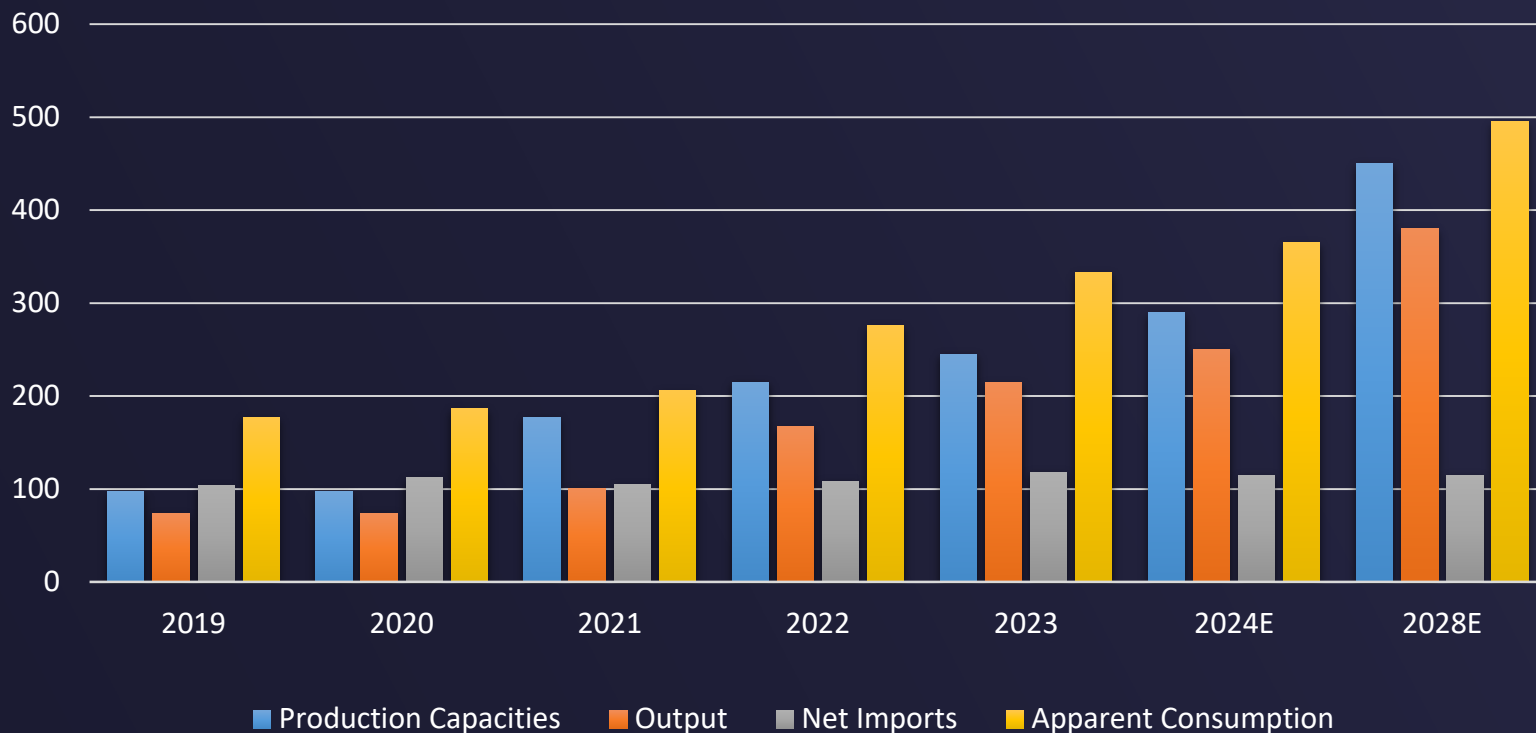
The Supply and Demand in China's EVA Resin Market

- China's EVA resin production has an average annual growth rate of 30.6%; however, the market remains in short supply, necessitating net imports of over 1 million tons annually.
- In China, EVA resin is primarily utilized in photovoltaic films, with secondary applications in foam production

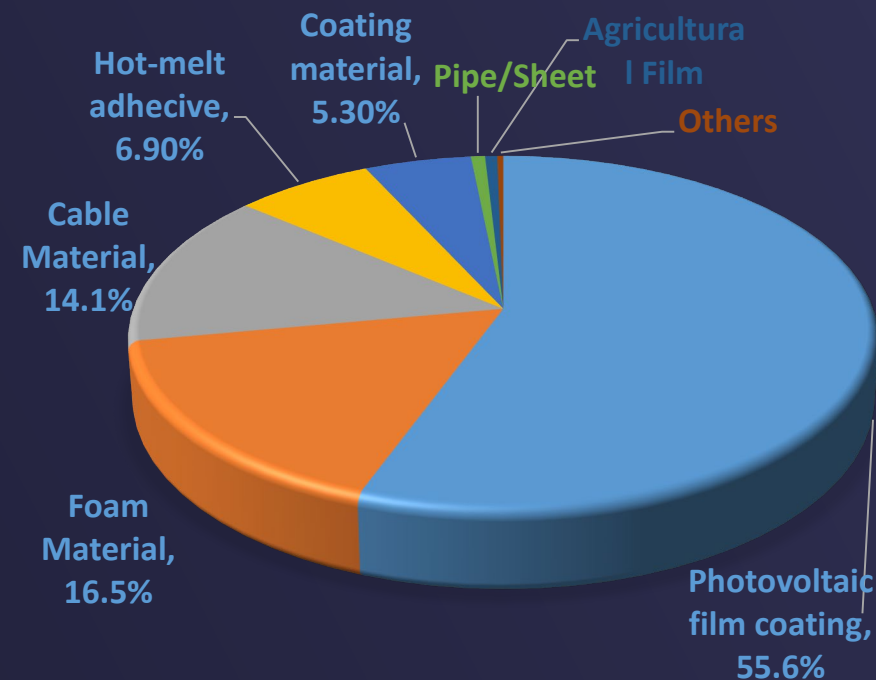
China EVA Resin Market Overall Supply and Demand Balance Data Analysis and

Forecasts

Unit: 10,000 tons



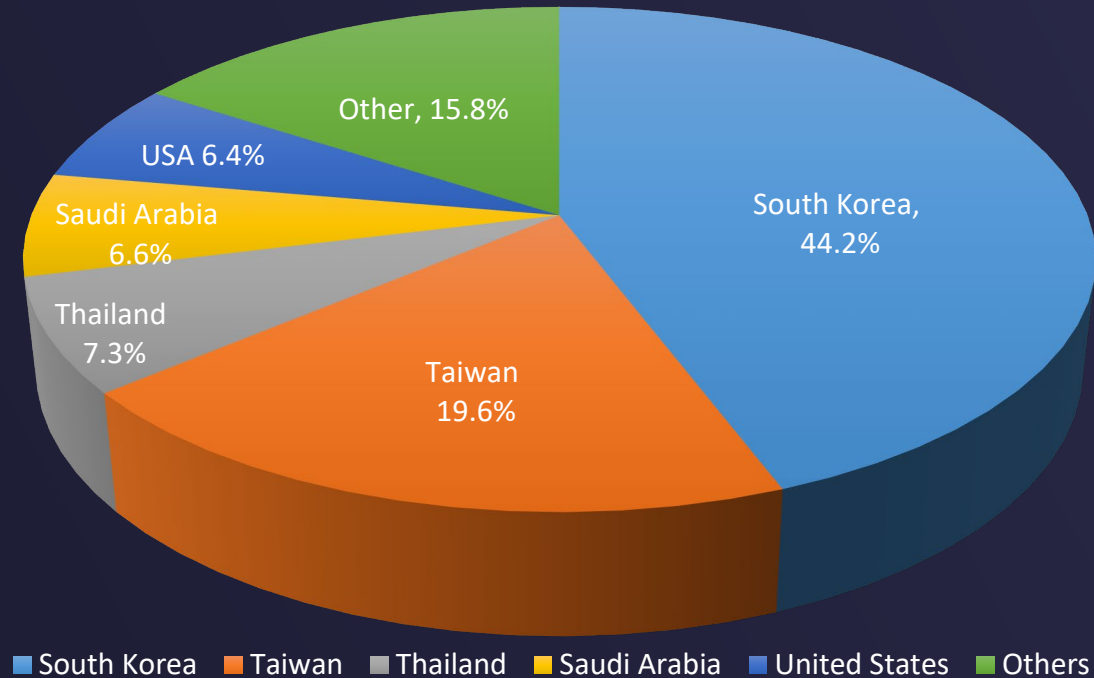
CHINA EVA RESIN DOWNSTREAM CONSUMPTION 2023



China's EVA Resin Imports

- In 2023, China's imports of EVA resin amounted to 1.392 million tons.
- The primary source of these imports was South Korea, which accounted for 44.2% of the total volume

China EVA Resin Import Share in 2023

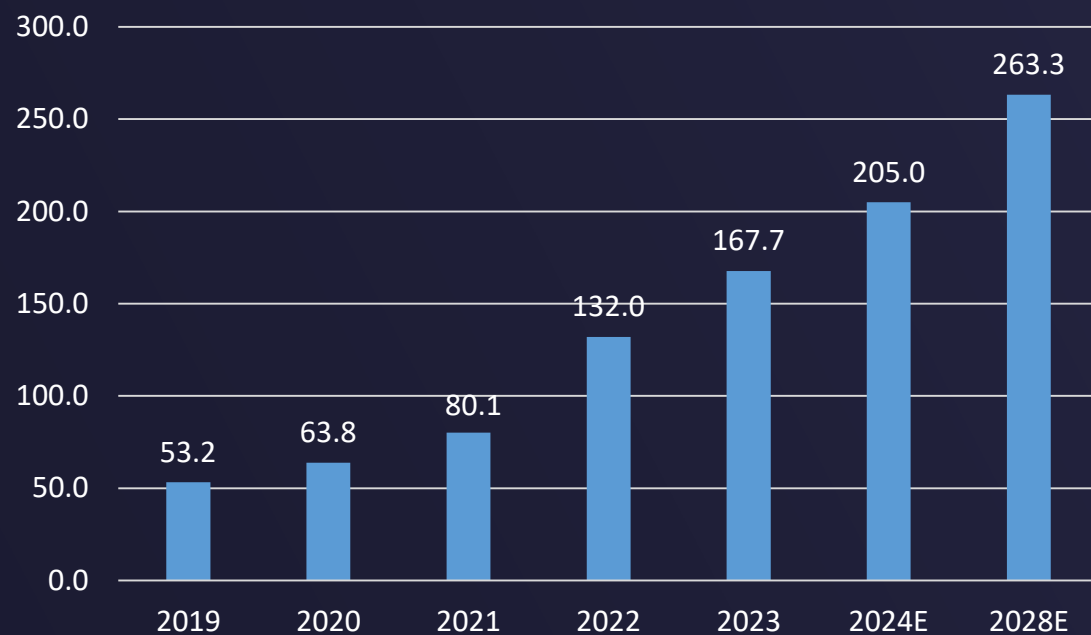


Demand of EVA Photovoltaic Material in China

- The growth in PV installations has driven the demand for EVA photovoltaic materials, resulting in a compound annual growth rate (CAGR) of 33.3% from 2019 to 2023.
- Demand for EVA photovoltaic materials now accounts for more than 50 percent of EVA resin sales.
- Currently, the primary EVA PV grades produced in China include Zhejiang Petrochemical's V6110S, and Sierpong's UE2825 and UE2827. Moving forward, with the continued increase in installation capacity and the diversification of application scenarios, the demand for EVA photovoltaic materials is expected to maintain its growth trajectory, reaching an estimated 2.65 million tons by 2028

China EVA Photovoltaic Material Demand

Unit: 10,000 tons



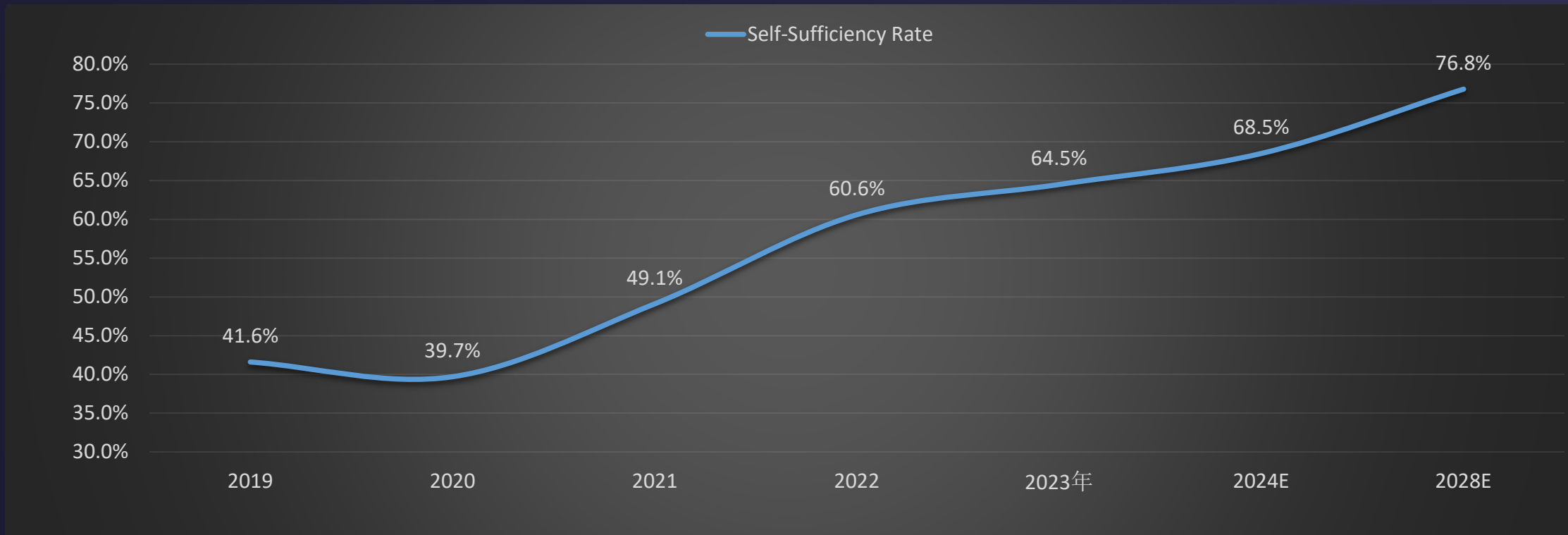
China EVA Photovoltaic Material Key Grades, 2023

EVA photovoltaic material grade	VA content (%)	MI index	manufacturer	Production (tons)
V6110S	28	25	Zhejiang Petroleum and Chemical Corporation	27
UE2825	28	25	Silbon Petrochemicals	25
UE2827	28	27	Silbon Petrochemicals	
V2825	28	25	Silbon Petrochemicals	
V2825Y	28	25	Yanchang China Coal Yulin	18
V7110P	28	9	BASF-YPC	7
V7110S	28	9	BASF-YPC	
FL02528	28	25	Lianhong New Material	7
TL-V2825	28	25	Tianli High-Tech	6.5
UE2825	28	25	China National Science and Technology Refining Corporation (abbr.)	4.5
UE2815	28	15	China National Science and Technology Refining Corporation (abbr.)	
2825DV	28	25	Yangzi Petrochemical Company	4
7760S	28	25	Ningbo Formosa Plastics	4
7870S	28	15	Ningbo Formosa Plastics	
7870Y	29	13	Ningbo Formosa Plastics	
C28V25	28	25	Yanshan Petrochemical Company	2.5
C28V15	28	15	Yanshan Petrochemical Company	
UL02528	28	25	Sinochem Quanzhou	2.5

Prominent Manufacturers of EVA Resin in China

- The self-sufficiency rate of China's EVA resin has been increasing annually.
- The primary producers—Silbon, Zhejiang Petrochemical, Yanchang Yunengchem, Gulei Petrochemical, and Yanshan Petrochemical—collectively account for 60% of the total production capacity .

The Self-Sufficiency Rate of China's EVA Resin



Prospective Upcoming EVA Resin Projects in China

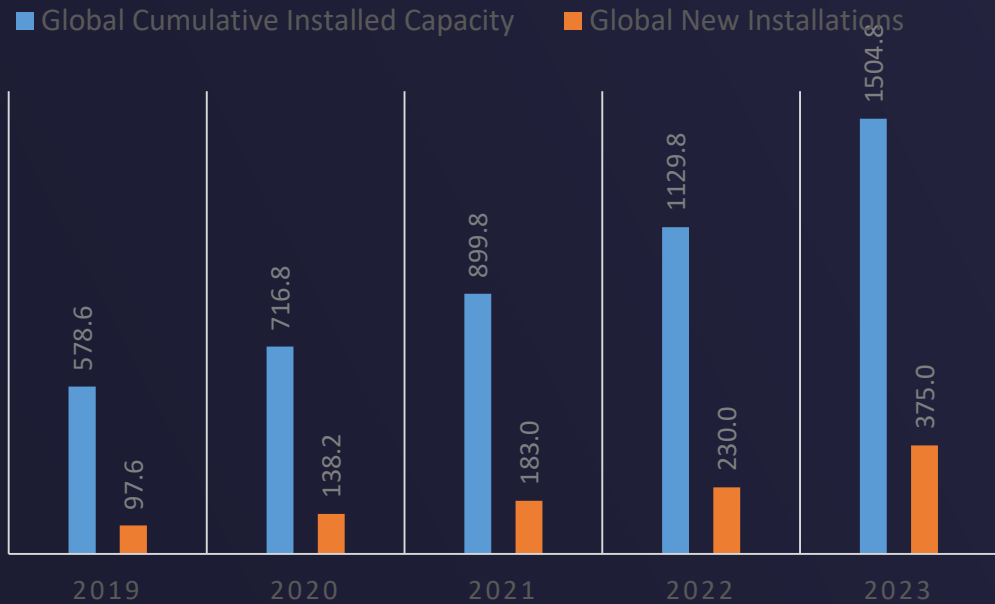
- Currently, China's EVA industry is experiencing a significant expansion in production capacity, utilizing the high-pressure continuous body polymerization process through either the kettle method or the tubular method. The planned new production capacity is expected to reach up to 6.15 million tons. However, due to the substantial increase in capacity placement in recent years, the commencement or operation of some units will be delayed.



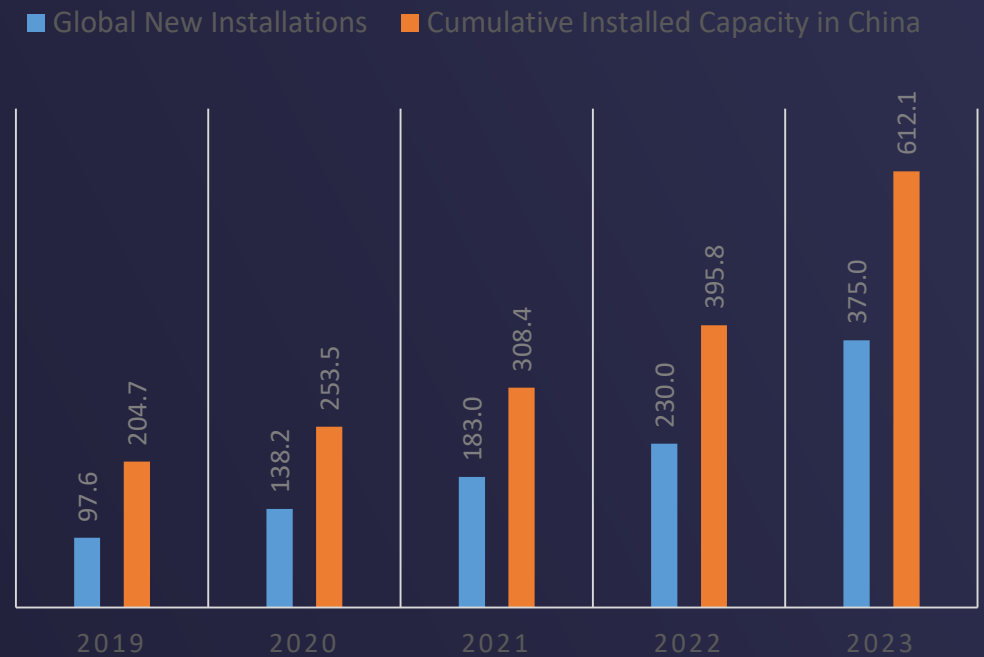
Global and Chinese Installed PV Capacity

- In 2023, a record 375 GW of new PV will be installed globally. China is the main growth driver. To capacitance ratio of 1.20-1.25 calculation, corresponding to the module demand 450-469 GW, if each production of 1 GW photovoltaic module using 10 million square meters of photovoltaic film, corresponding to the photovoltaic film demand for 4.5-4.7 billion square meters.

Global Installed Photovoltaic Capacity 2019-2023



China's Installed Photovoltaic Capacity 2019-2023



A close-up photograph of two hands shaking in a firm grip. The hands are wearing light-colored, ribbed business suit sleeves. The background is a dark blue world map with a grid of latitude and longitude lines. The text 'THANK YOU' is centered in the upper half of the image, and 'JLC International' is centered in the lower half.

THANK YOU

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