

Capacity Challenges and Demand Recovery in the Olefin & Polyolefin Market

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APIC 2024, Seoul

Olefins Outlook
Polyolefin Outlook

Oil Peak, Gas Peak and
Plastics Peak ?



Olefins Outlook

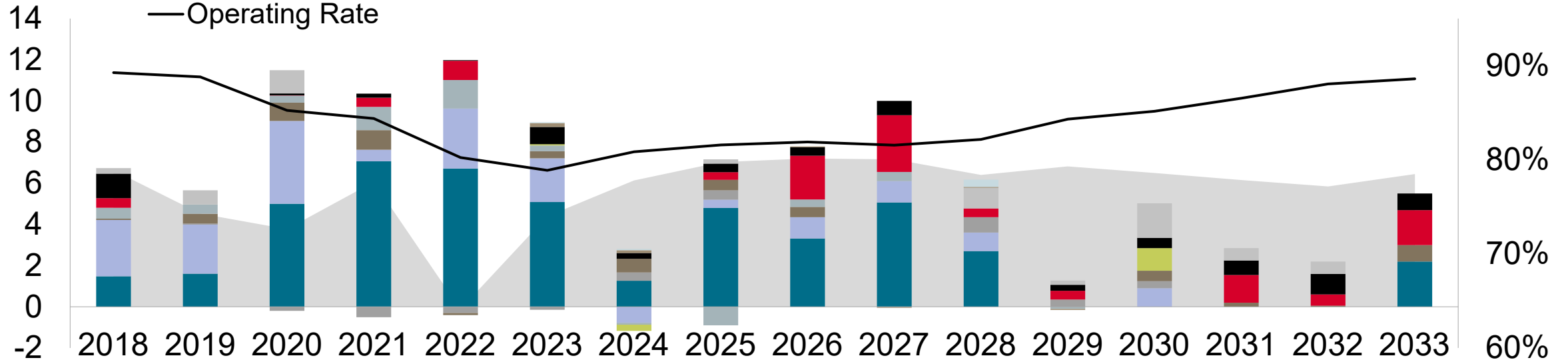
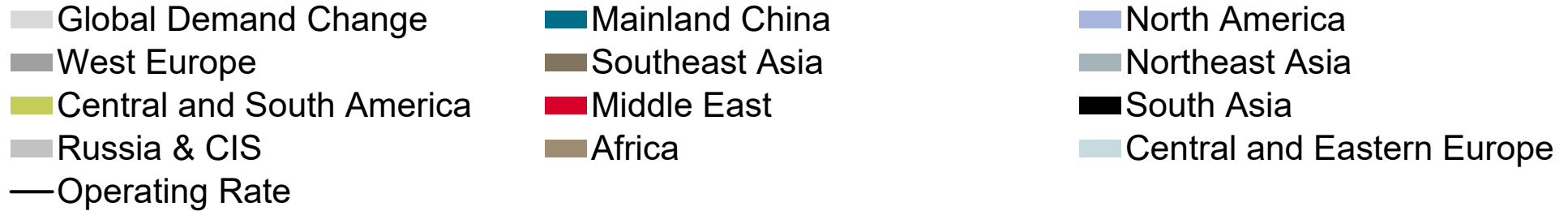
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Ethylene capacity build-ups of 45 million tons for past 5 years, a quarter of the world's total capacity, and 30 million tons of new capacity coming by 2028.

ETH Capacity vs. Demand Increases (MMT)

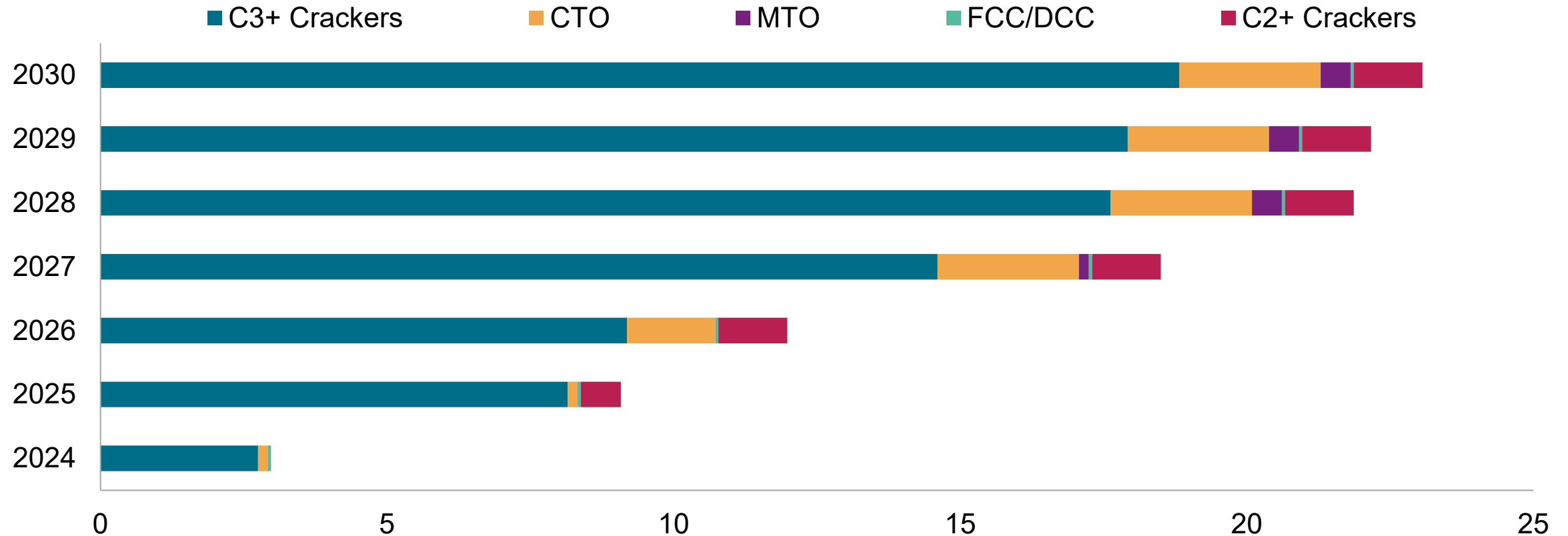


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China has been at the forefront, driving 70% of the total increase. (23million mts by 2030) .

Cumulative Mainland China ethylene capacity added beyond 2023 (mmt)

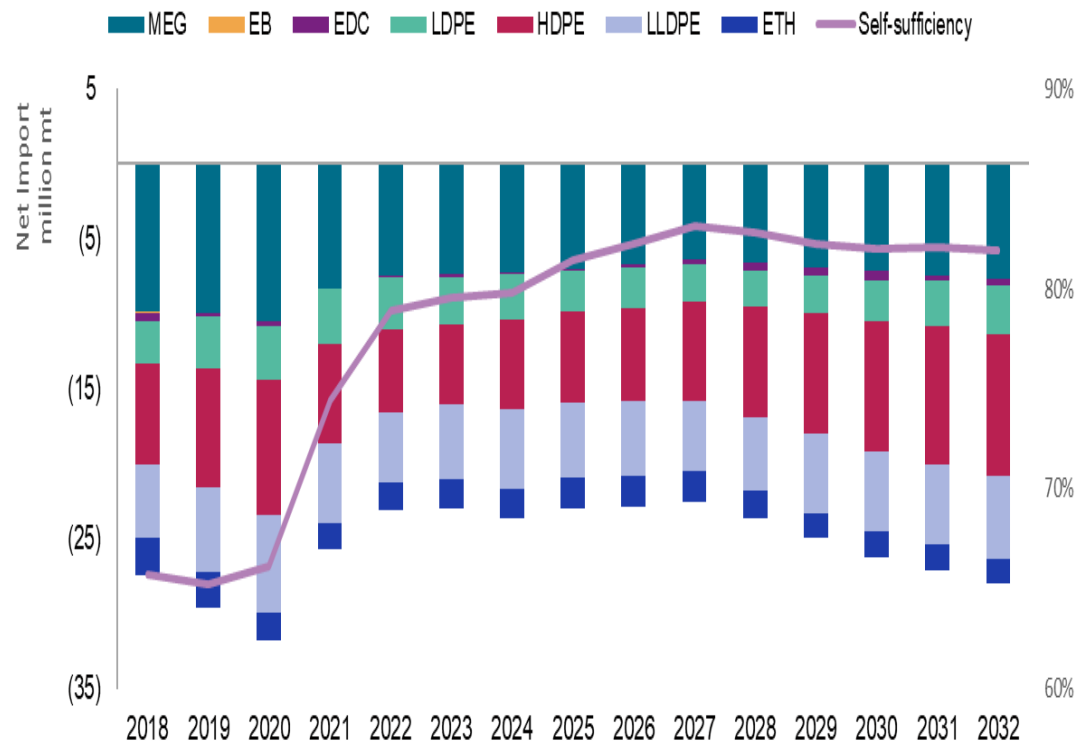


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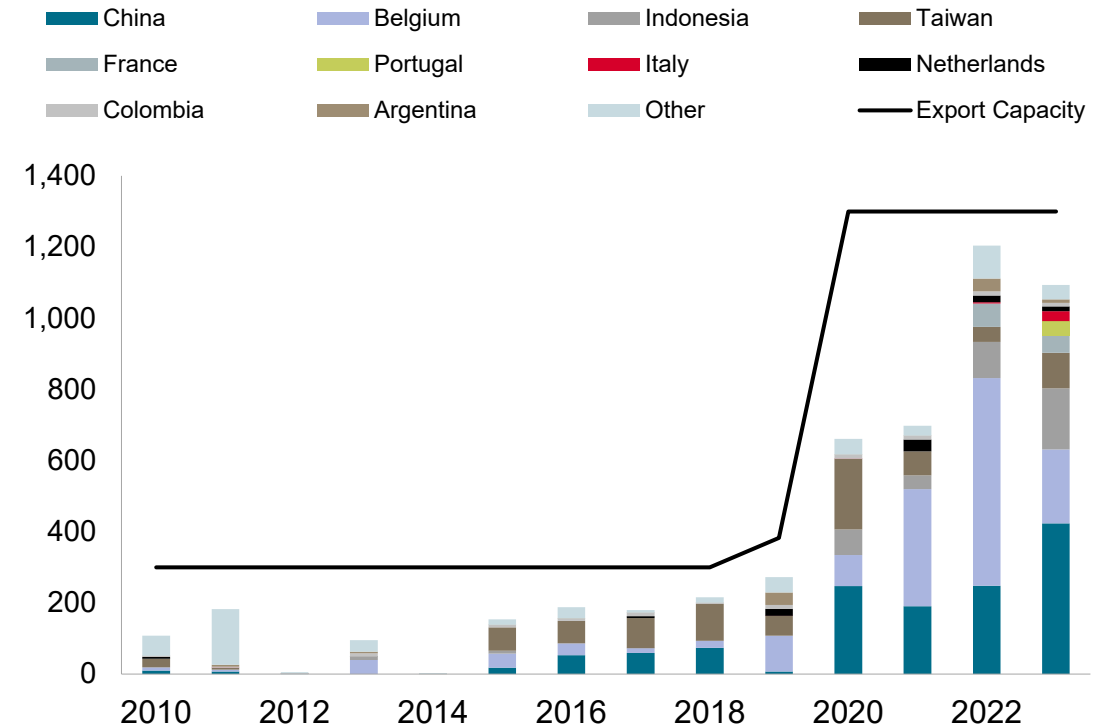
China's production of ethylene and its derivatives bolstered its self-sufficiency, jumping from 50% in 2020 to over 80% by 2025.

The United States began substantial exports of ethylene in 2020.

Mainland China ethylene equivalent trade



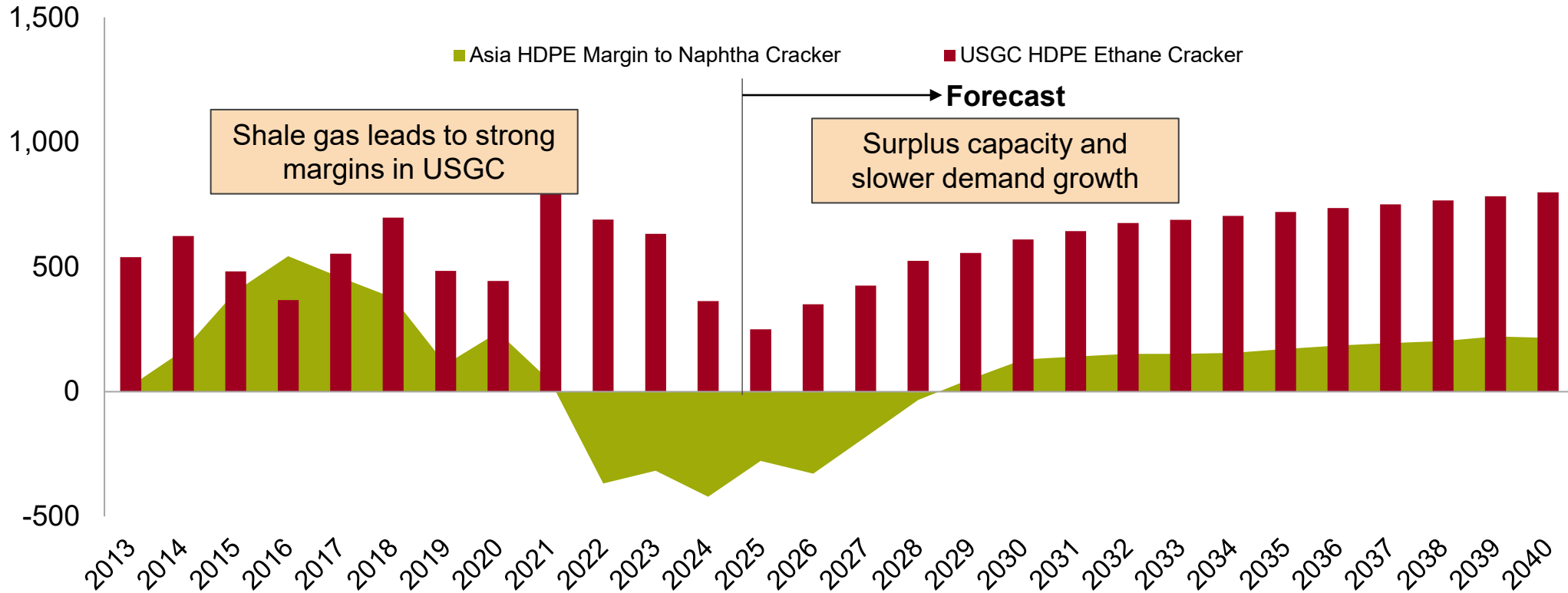
ETH Exports vs. Export Capacity (KTA)



Source: S&P Global Commodity Insights.

The US maintains favorable PE margin on the advantage of competitive gas price while Asia PE will see negative margins until 2028.

Integrated HDPE Cash Margin Trends (US\$ per metric ton)



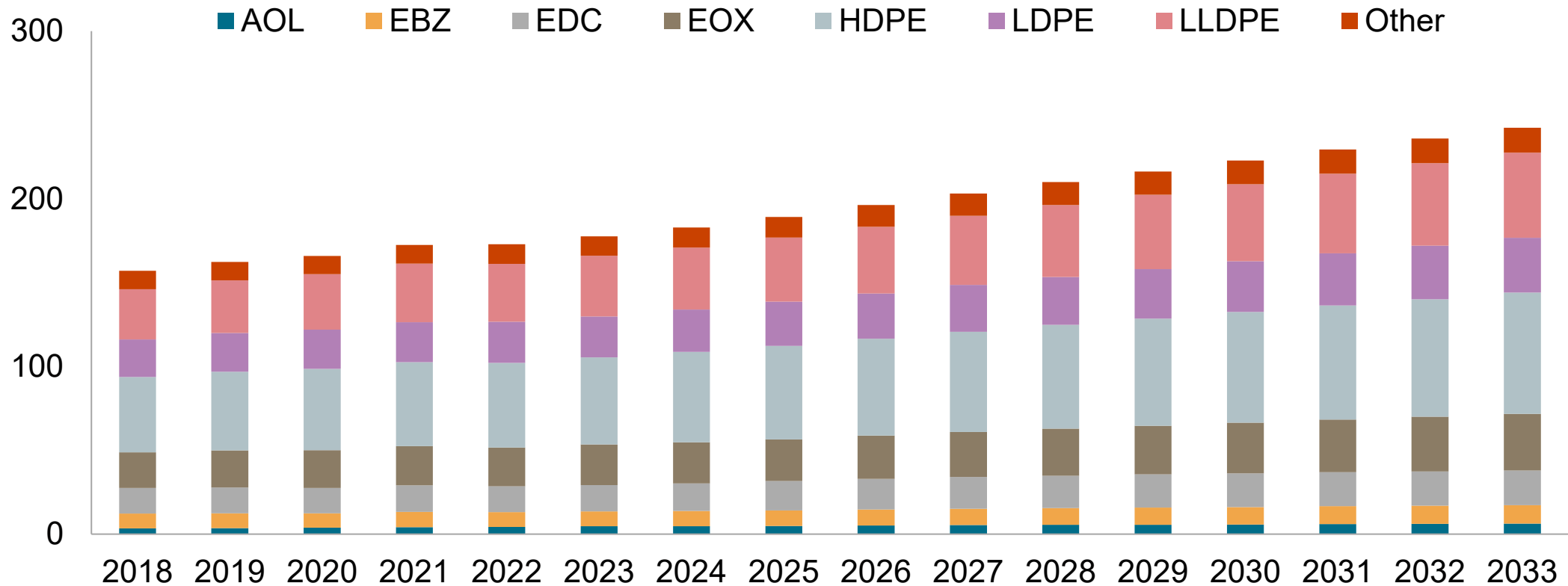
As of Nov. 29, 2023.

Source: S&P Global Commodity Insights.

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However, we can expect an annual increase in ethylene demand of about 5-6 million tons, an equivalent to the three or four world-scale ethylene capacities.

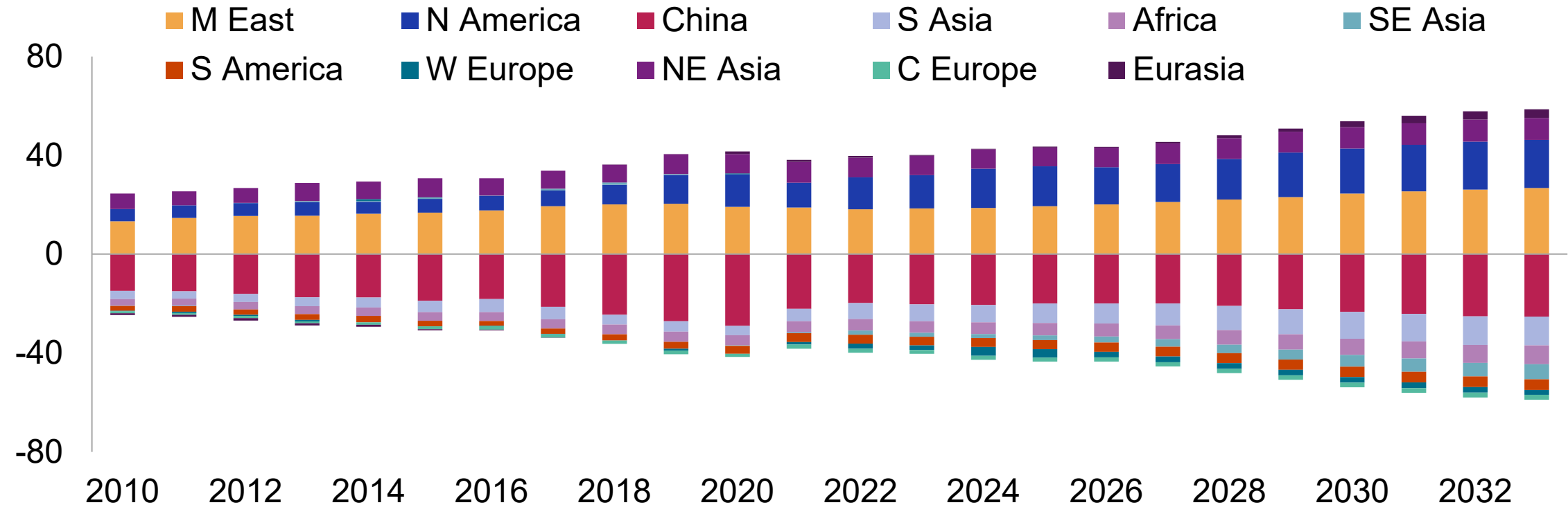
Global ethylene demand by derivative (mmt)



Source: S&P Global Commodity Insights
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With no new project announcements from China beyond 2028, a steady rise in the global trade of ethylene anticipated and operating rates to normalize post-2027.

World net equivalent trade (mmt)

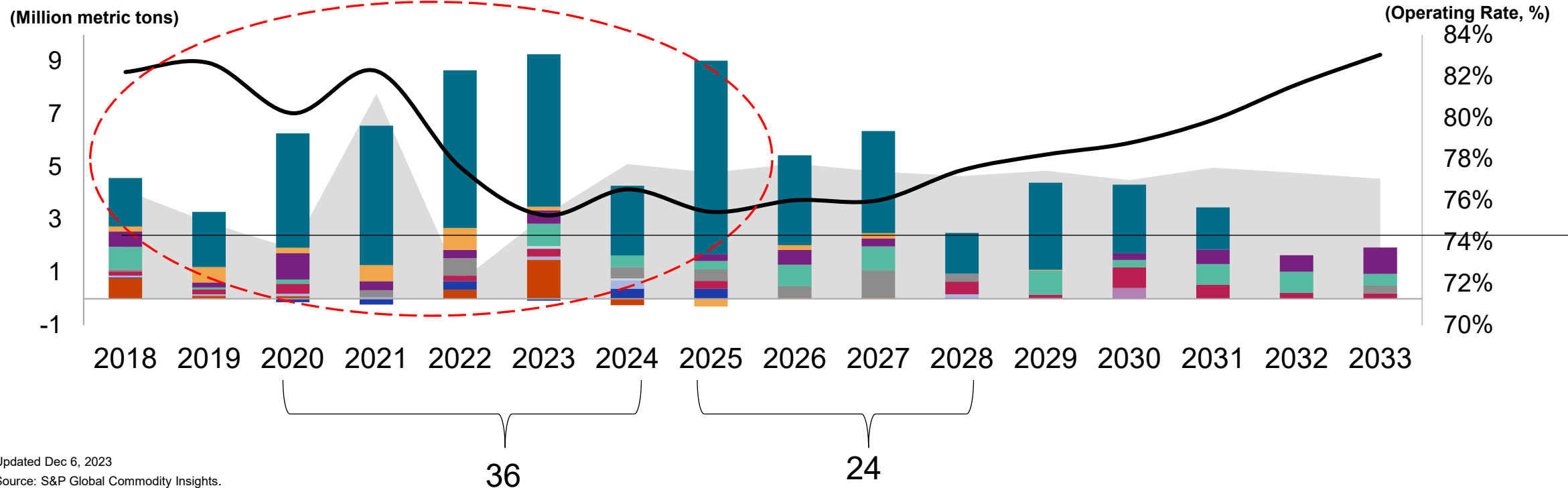
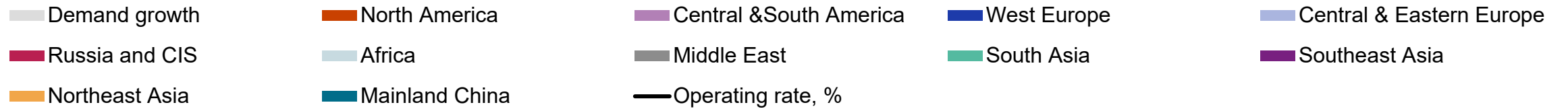


Source: S&P Global Commodity Insights.

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Propylene : From 2020 to 2024, 36 million tons of capacity added, and an additional 24 million tons by 2028 with demand growing by only 3-4 million tons per year leading a substantial surplus.

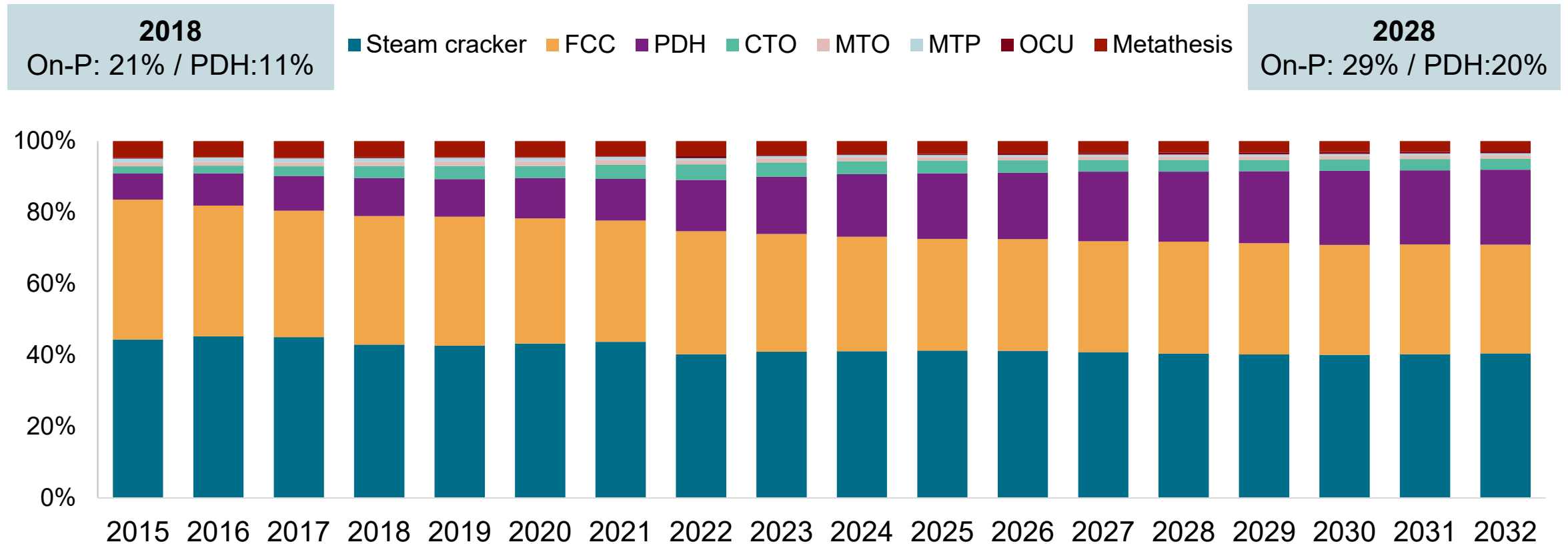
Propylene capacity vs demand growth



Updated Dec 6, 2023
 Source: S&P Global Commodity Insights.

On-purpose production, especially PDH, will continue to gain supply market share as FCC source of PGP/CGP is expected to decline due to energy transition

Propylene Supply Sources



Updated Dec 6, 2022
Source: S&P Global Commodity Insights, Platts | CERWeek | ChemicalWeek

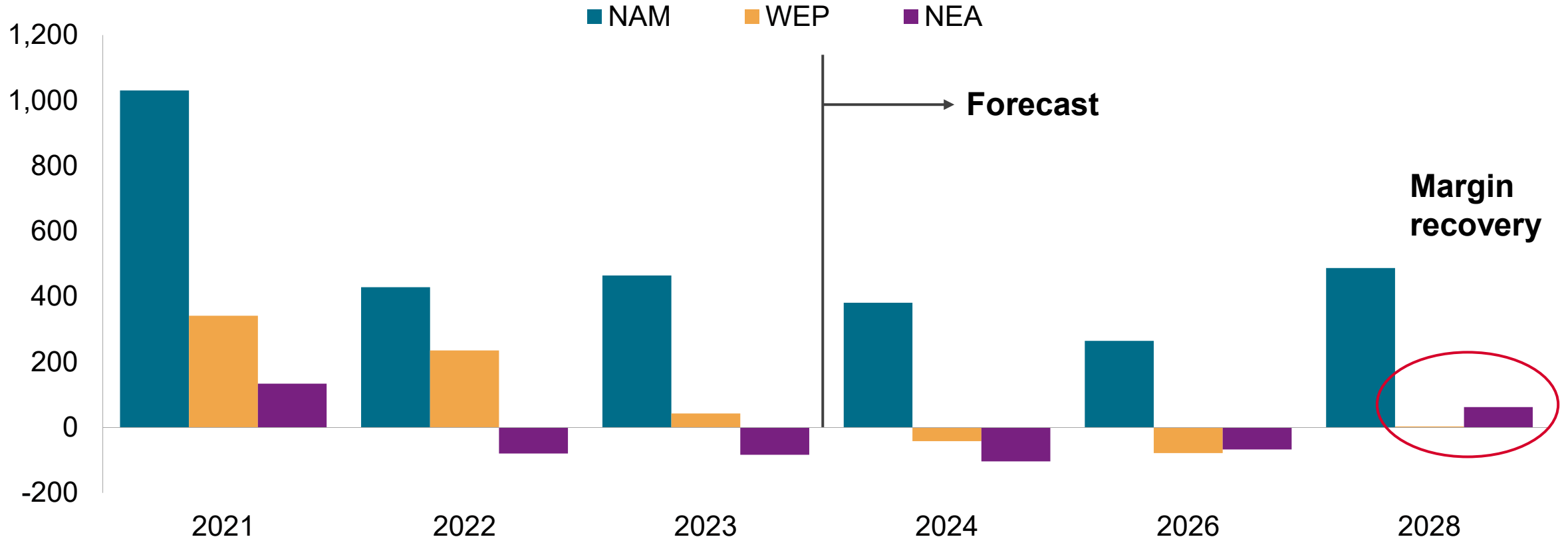
2024-2028 New PDH plants in China (nearly 10 million tons of new PDH projects are scheduled to begin operations by 2028)

NO.	Company Name	Caps
1	Fujian Meide Petrochemical Co., Ltd.	900
2	Ningbo Kingfa Advanced Materials Co Ltd	600
3	SP Chemical	800
4	Quanzhou Grand Pacific Chemical Co., Ltd.	660
5	PetroChina Hohhot Petrochemical Co	50
6	Jinneng Chemical (Qingdao) Co., Ltd	900
7	Formosa Industries (Ningbo) Co., Ltd.	600
8	Zhenhua Petrochemical Co., Ltd	750
9	Zhejiang Yuanjin New Materials Co., Ltd.	750
10	Wanhua Chemical (Penglai)	900
11	Wuhan Lianke Chemical	170
12	Jinbei Energy	300
13	Fujian Yongrong New Material	900
14	Satellite Chemical Co., Ltd.	900
15	Nanpu Group	200



A rebound in margins for Asia's PDH producers to occur only after 2027. Industry trough to prolonging into 2027; margin recovery likely around 2027/28 onwards

Propylene margins outlook (\$/ton)



Weighted average of steam cracker and PDH unit margins in each region based on average S&P assessed Propylene, Polymer grade delivered USGC and NWE CP and Spot prices, CFR China Spot prices

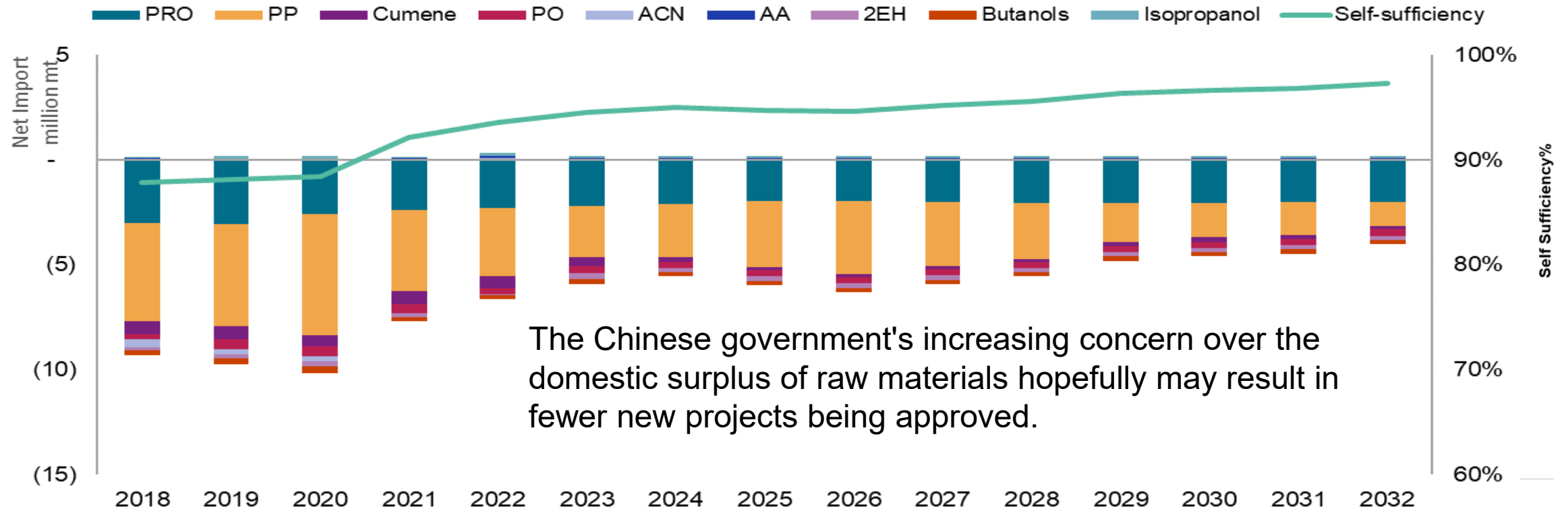
Source: S&P Global Commodity Insights.

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Trade volume decreased in middle term and China become more self-sufficient

Post-2028, this trend towards self-sufficiency will level off, allowing the propylene market to gradually stabilize.

Mainland China Propylene equivalent trade



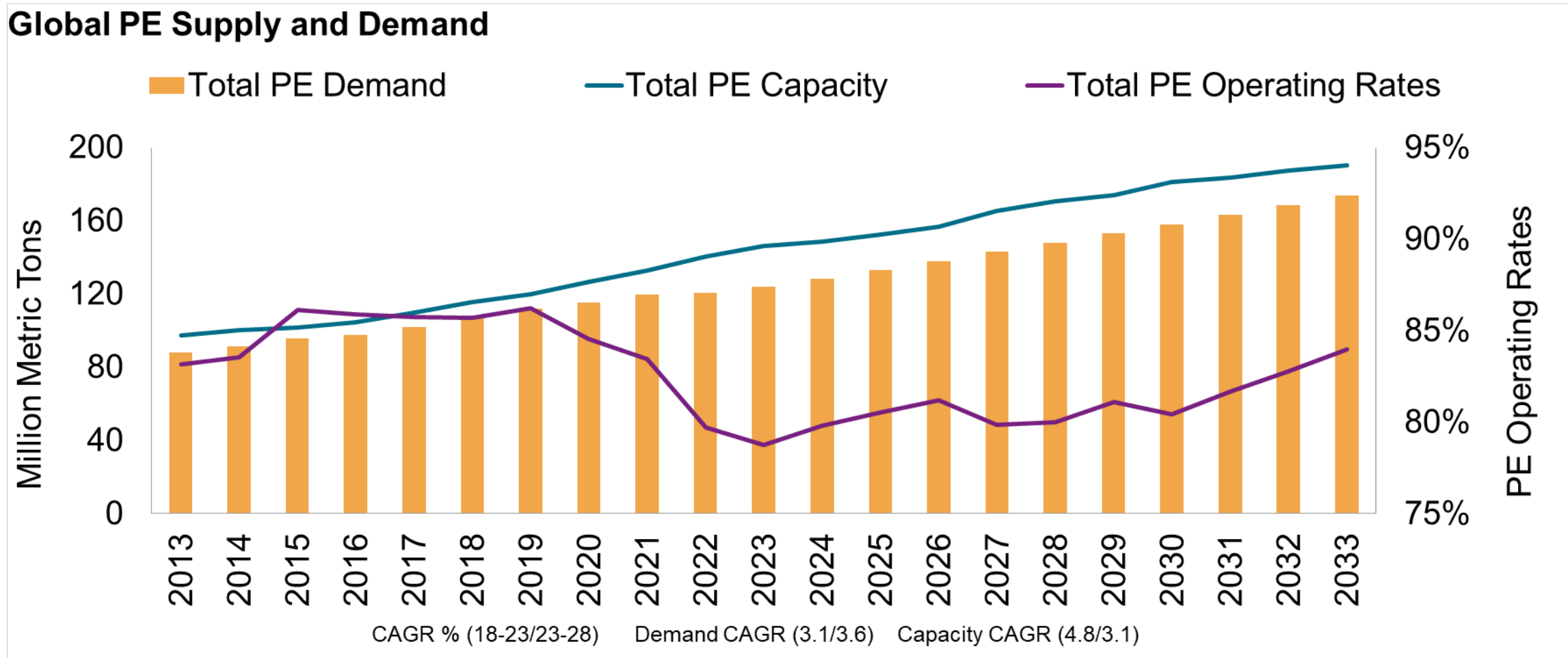
Source : China Customs

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Polyolefins Outlook



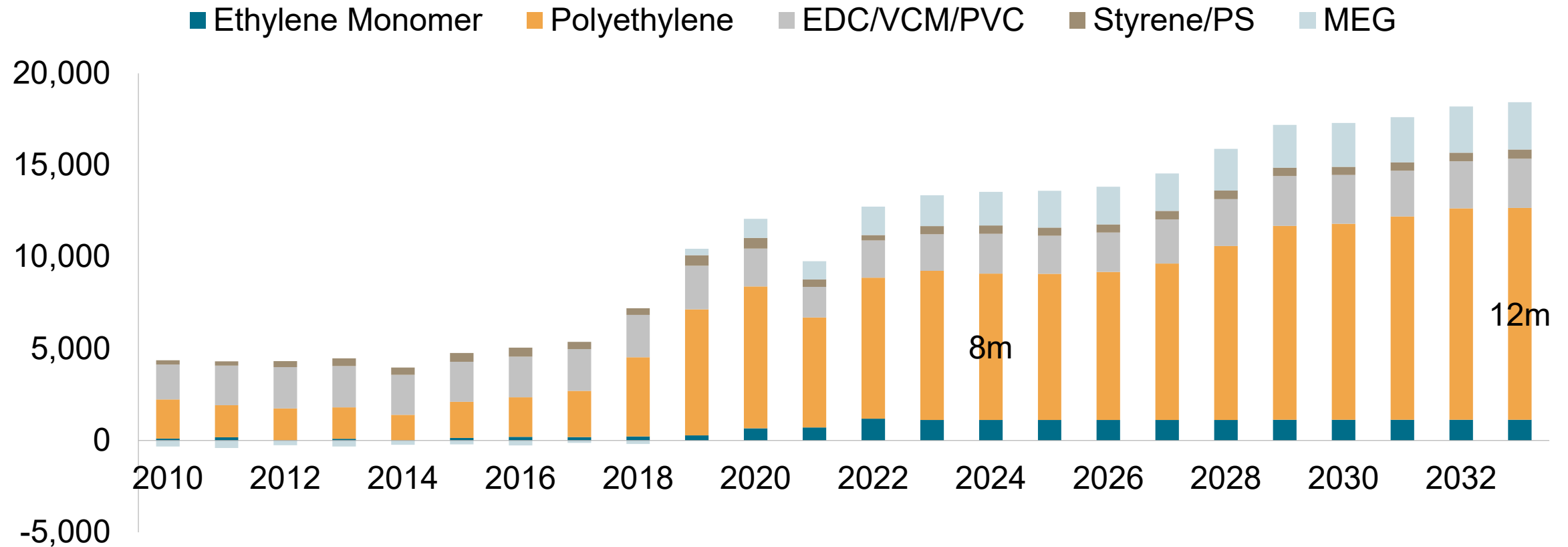
The operating rate reached its lowest in 2023 and an 'L-shaped' recovery up to 2028. Due to capacity expansions in China and the USA, global capacity is set to increase from 130 million tons to 160 million tons by 2028.



Source: S&P Global, Commodity Insights
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U.S. exports to grow from 8 million tons in 2024 to 12 million tons by 2033, impacting the operation rates of PE facilities worldwide.

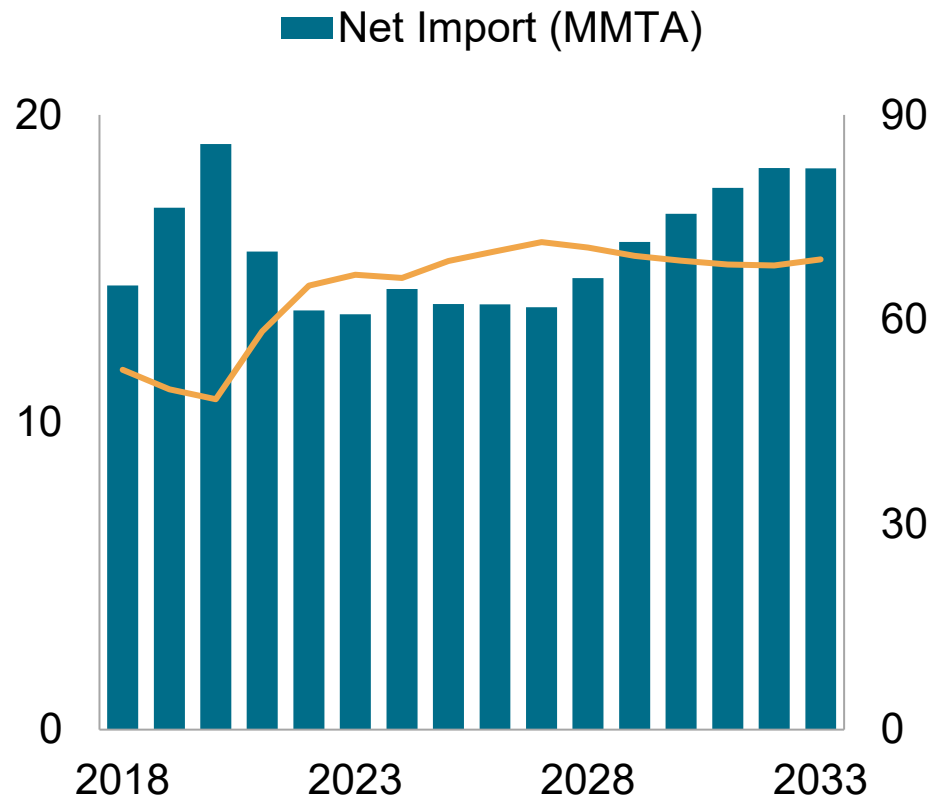
United States Ethylene Net Equivalent Trade (TMT)



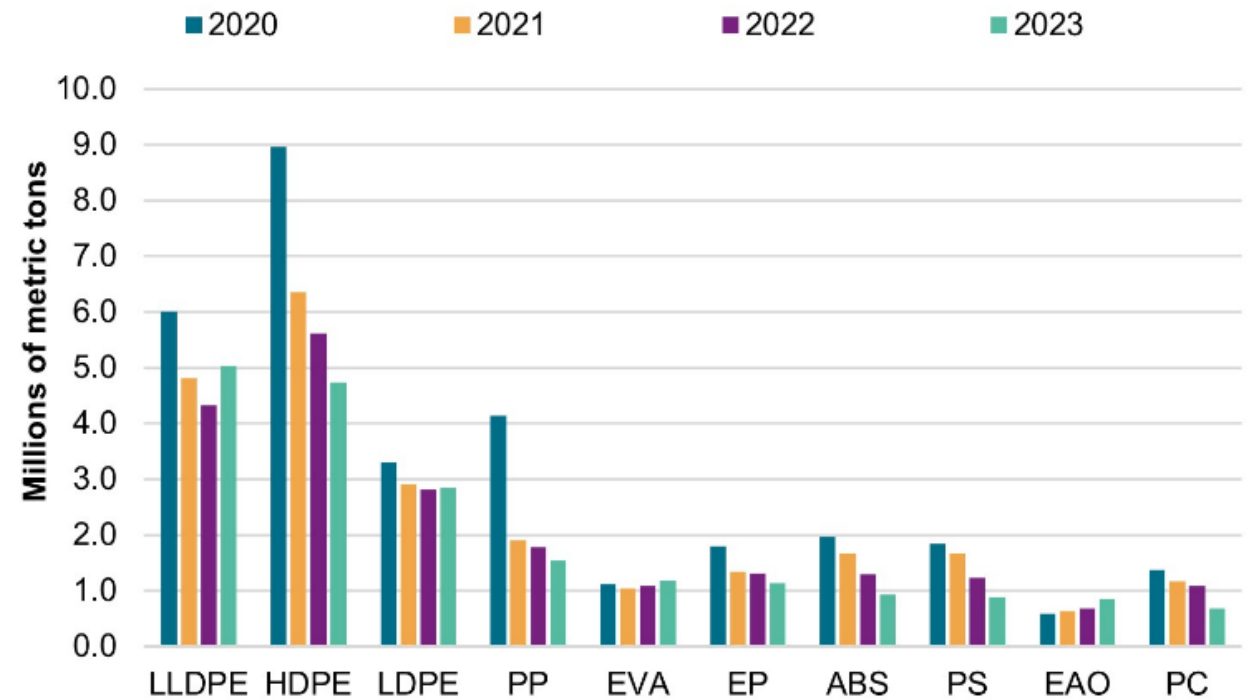
Source: S&P Global Commodity Insights, Platts | CERWeek | ChemicalWeek

China PE self-sufficient rate projected to reach 70% and projections from 2028 suggest a plateau as the pace of new capacity development eases.

China PE self-sufficient rate



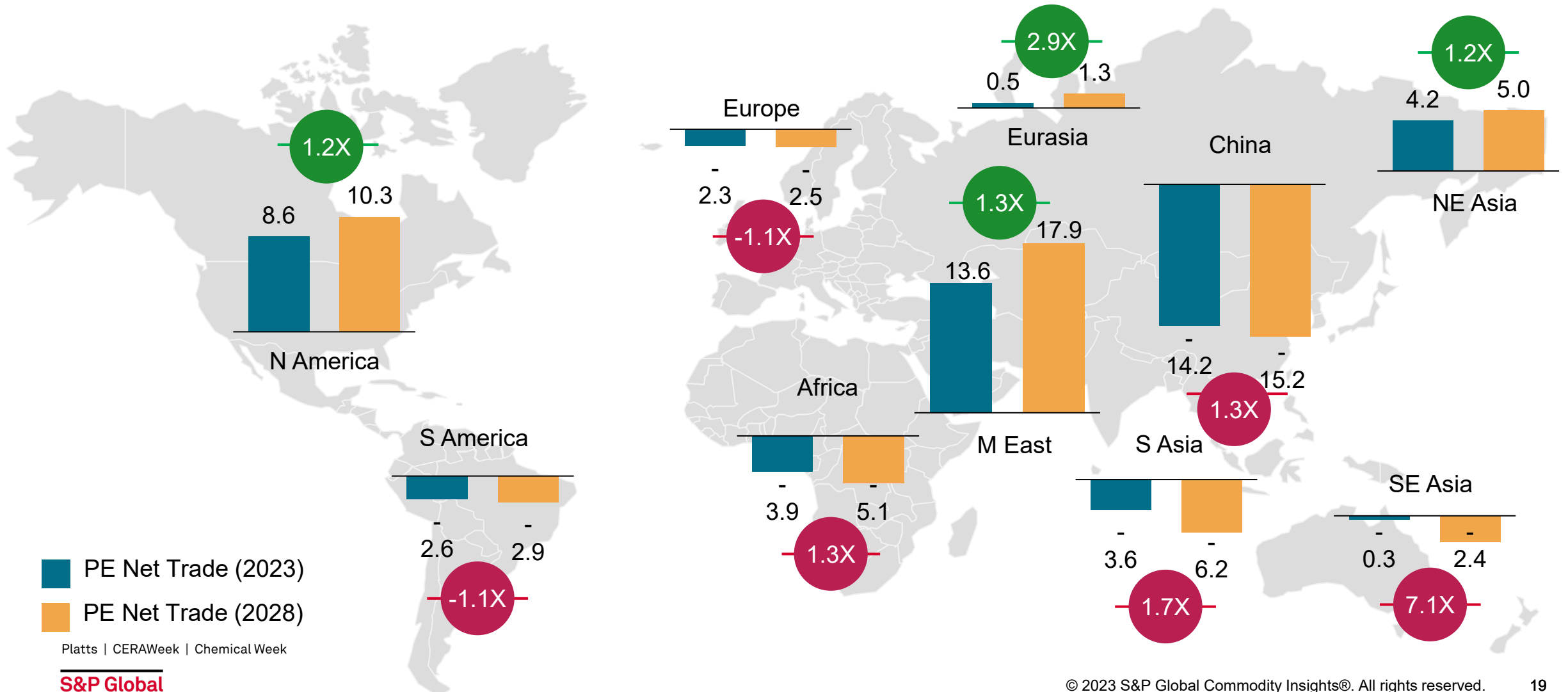
China's net imports are declining for most major polymers



As of Feb. 26, 2024.
 Source: S&P Global Commodity Insights.
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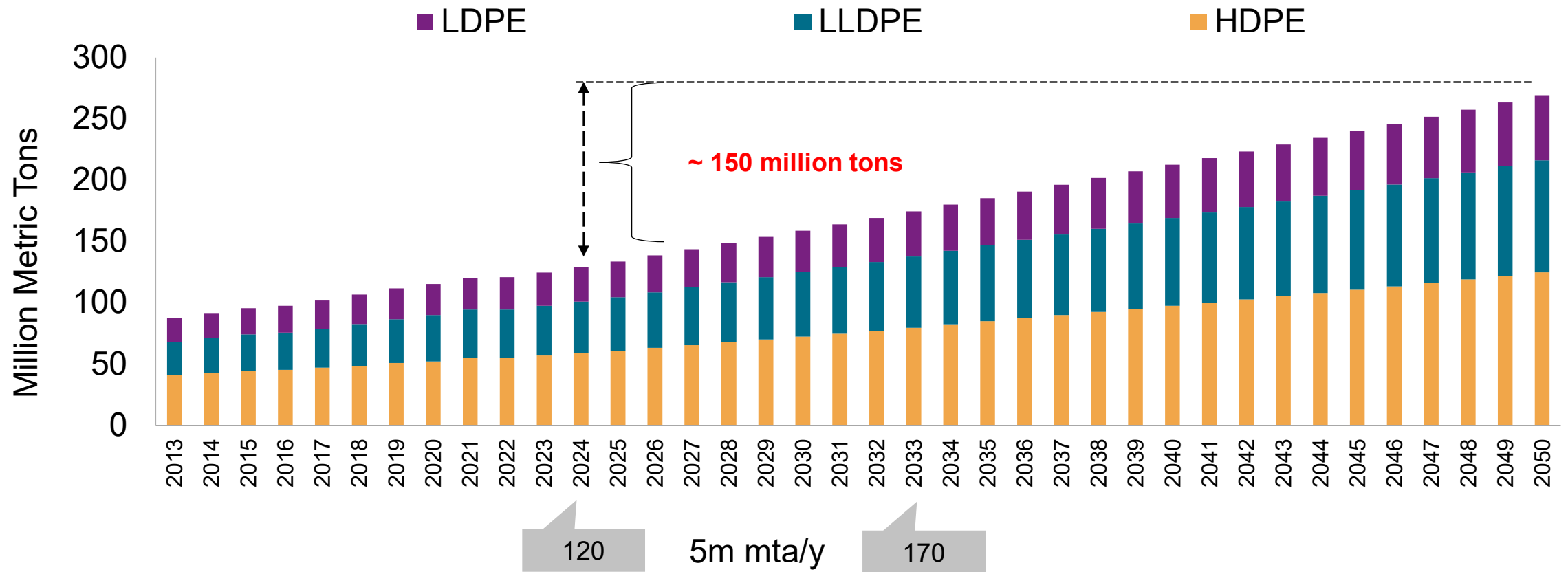
With self-sufficiency levels out around 70%, China remains as the largest importer of PE. South Asia, Southeast Asia, and Africa will increasingly depend on imports.



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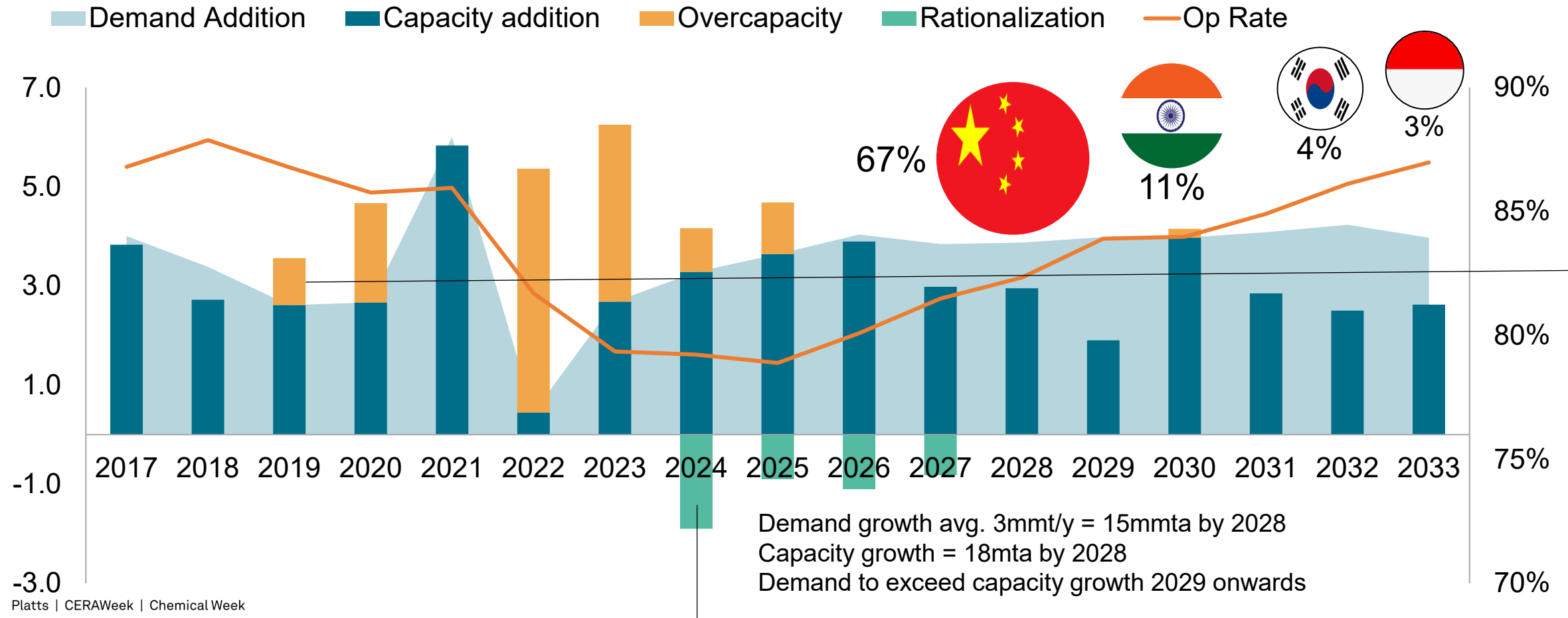
There is good news as a recovery will come and polyethylene will continue to enjoy healthy growth - requiring 7-8 world-scale PE plants per year out to 2050

Global Total PE Demand



Polypropylene capacity will likely exceed demand by large until 2026, with the excess driven by new projects in Asia.

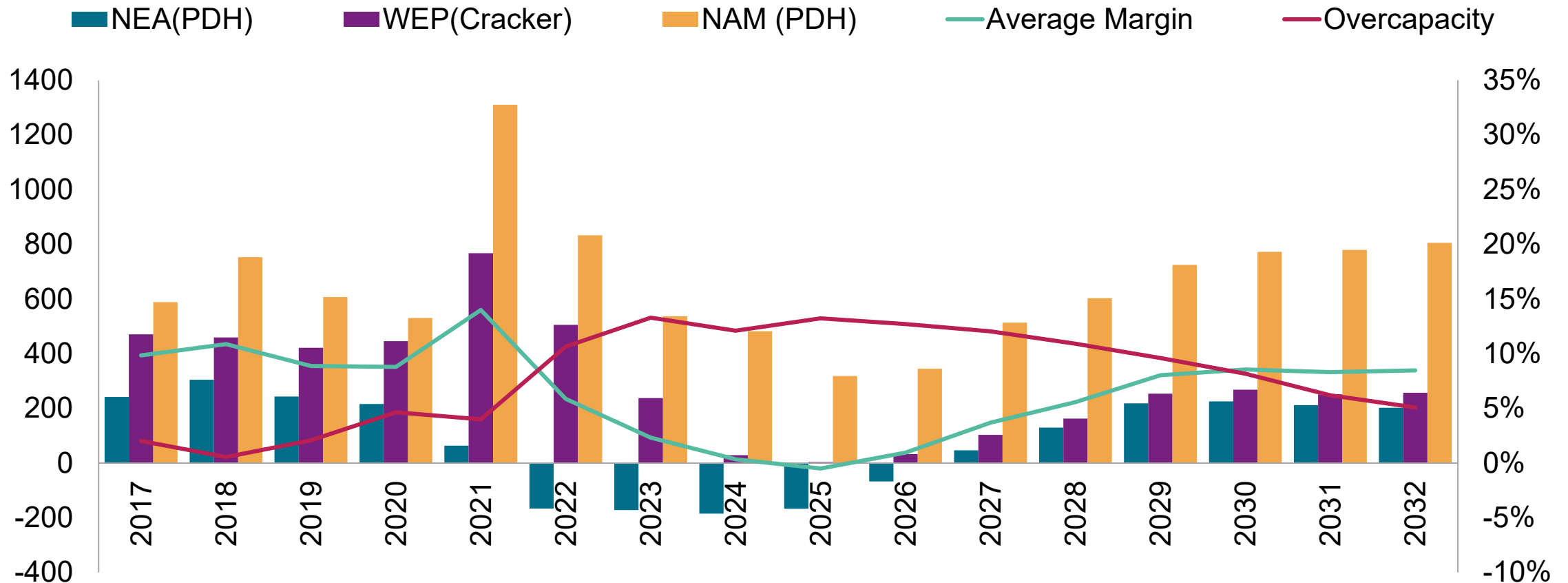
Capacity addition and demand growth (million mt)



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Margins anticipated to be squeezed by the oversupply situation in the medium term. PP pricing is likely to be led by Northeast Asia's PDH facilities, which have the highest production costs.

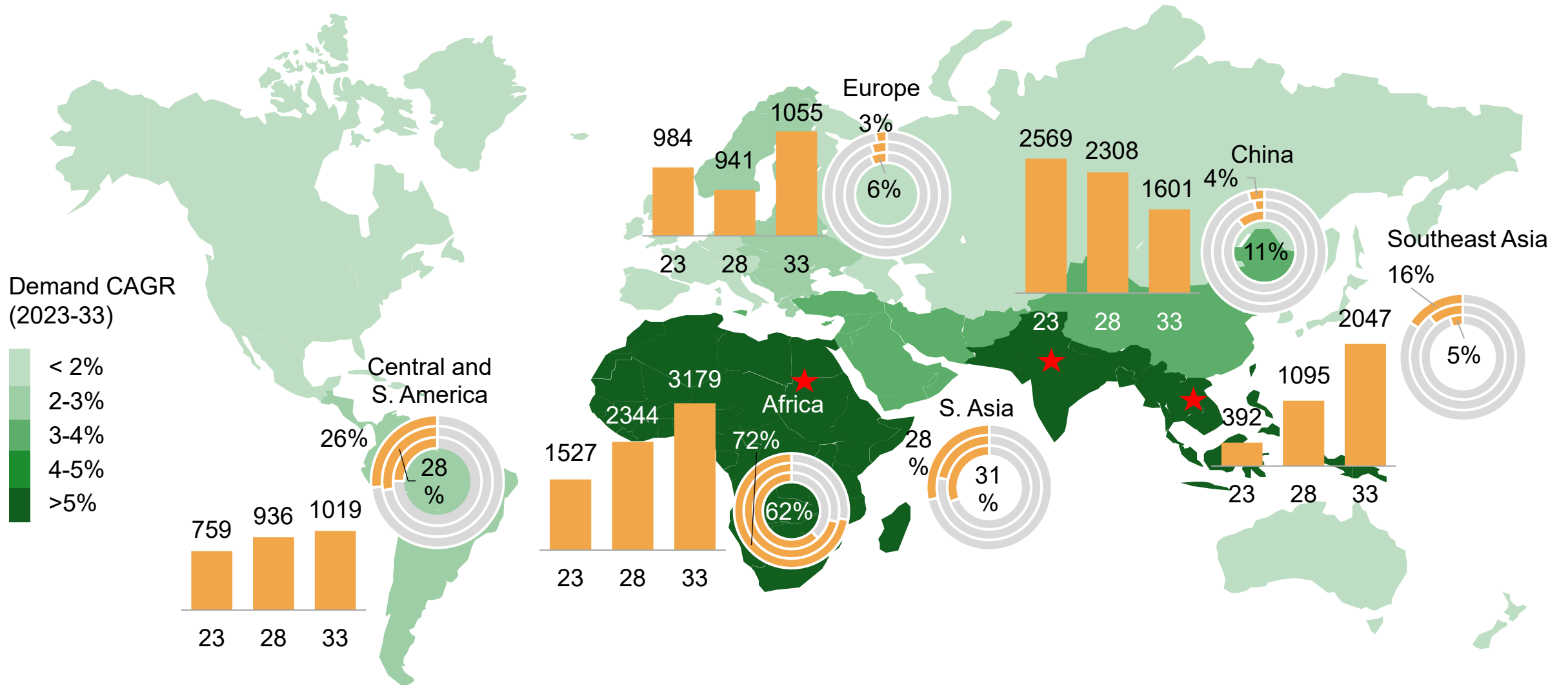
Global average cumulative overcapacity vs margin



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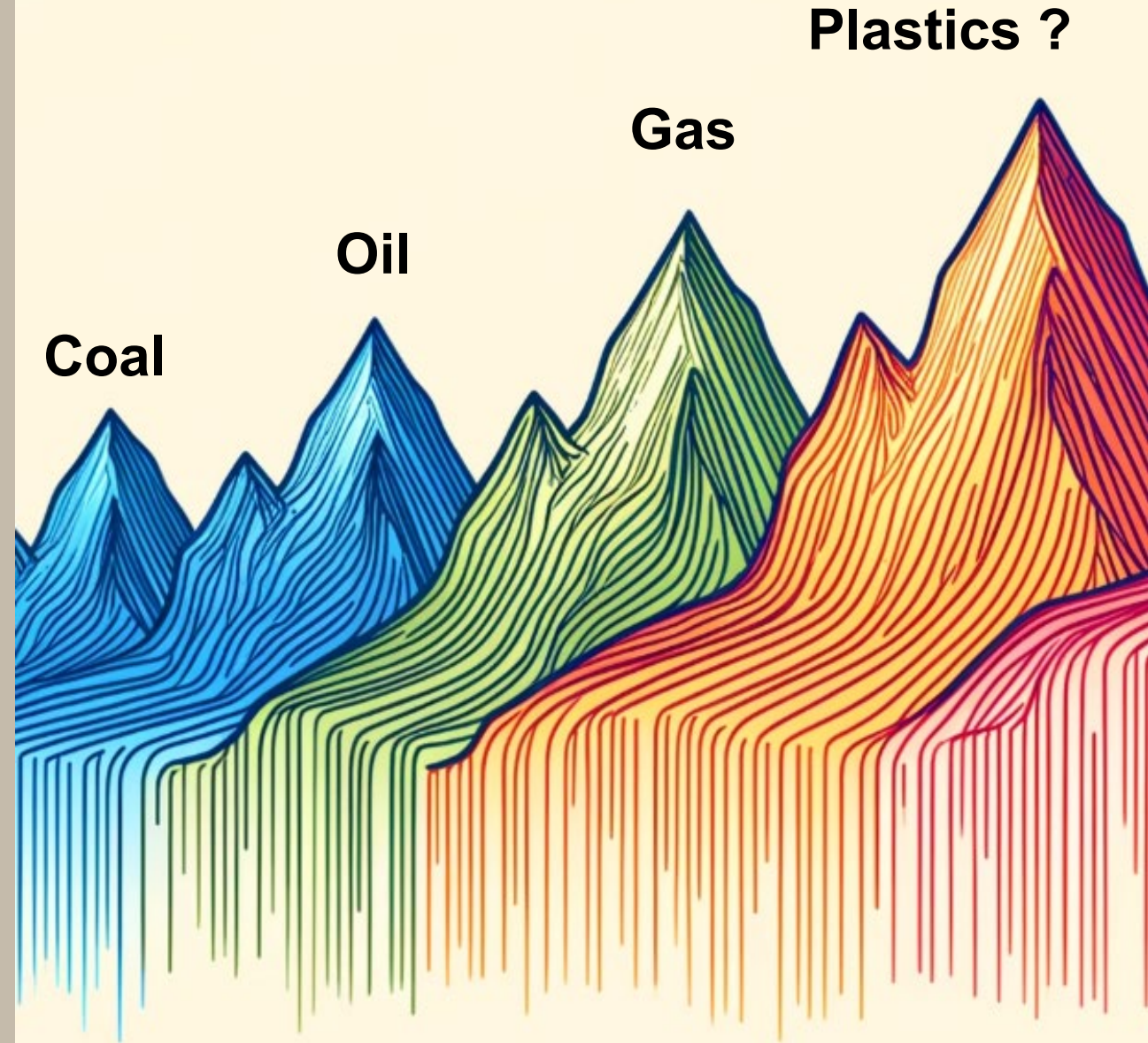
Export opportunities beyond China: Emerging regions to target

China -1 mmt import decrease can be compensated by 2.9 mmt import increase to other regions in 2033.



**Oil Peak
Gas Peak**

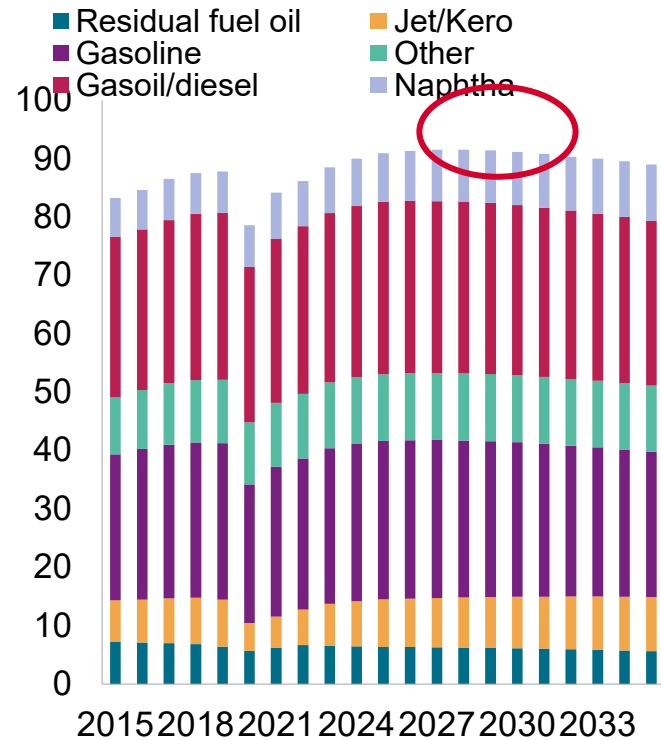
But, No Plastics Peak



Oil peak will come in 2030-2035, Ethane, LPG will peak near in 2035~2040

As these primary energy sources reach their peaks, the availability of chemical feedstocks like ethane, naphtha and LPG are expected to become more limited.

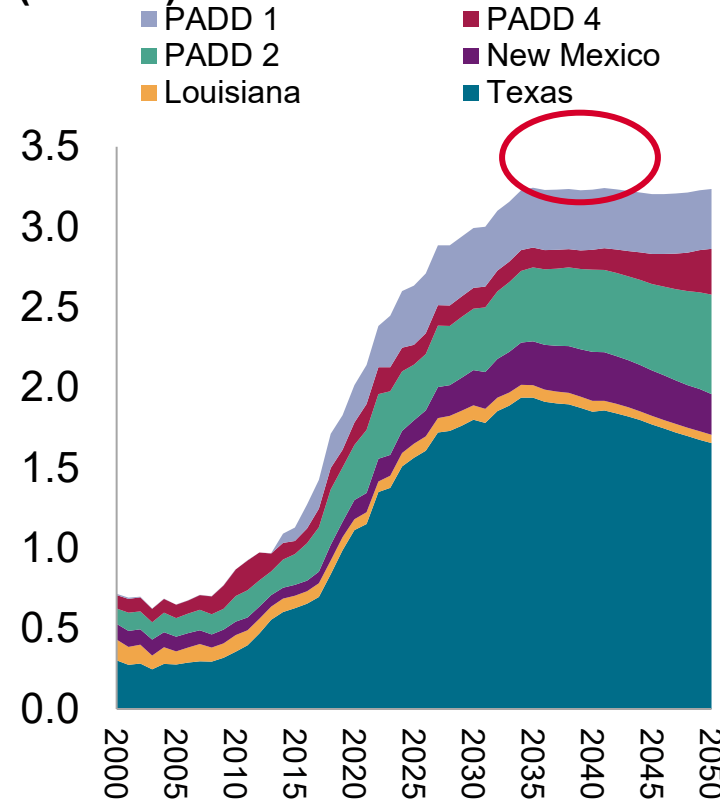
Global refined product demand (million b/d)



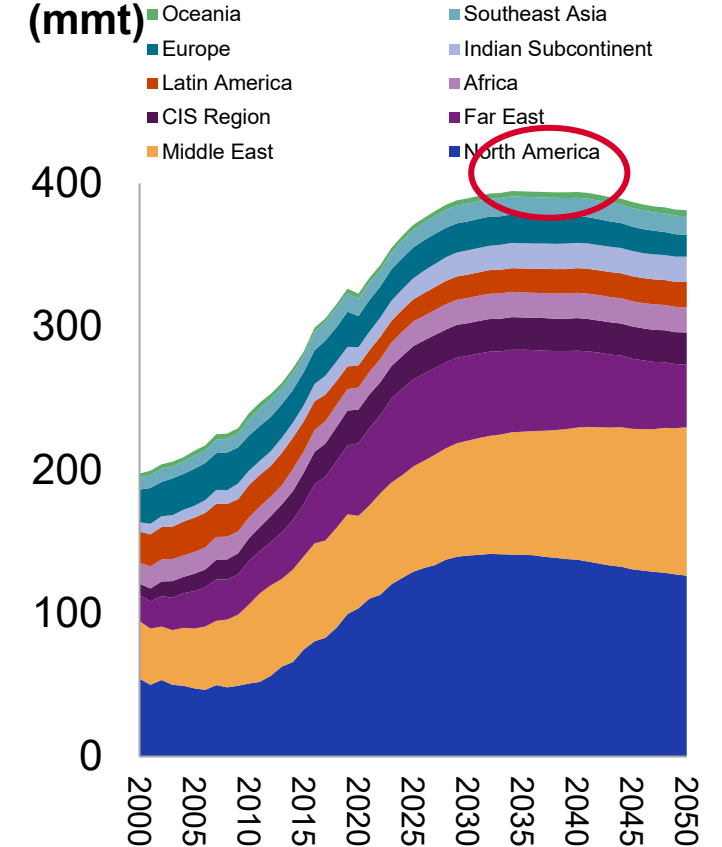
Source: S&P Global Commodity Insights.

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US ethane production by region (MMb/d)



World LPG production by region (mmt)

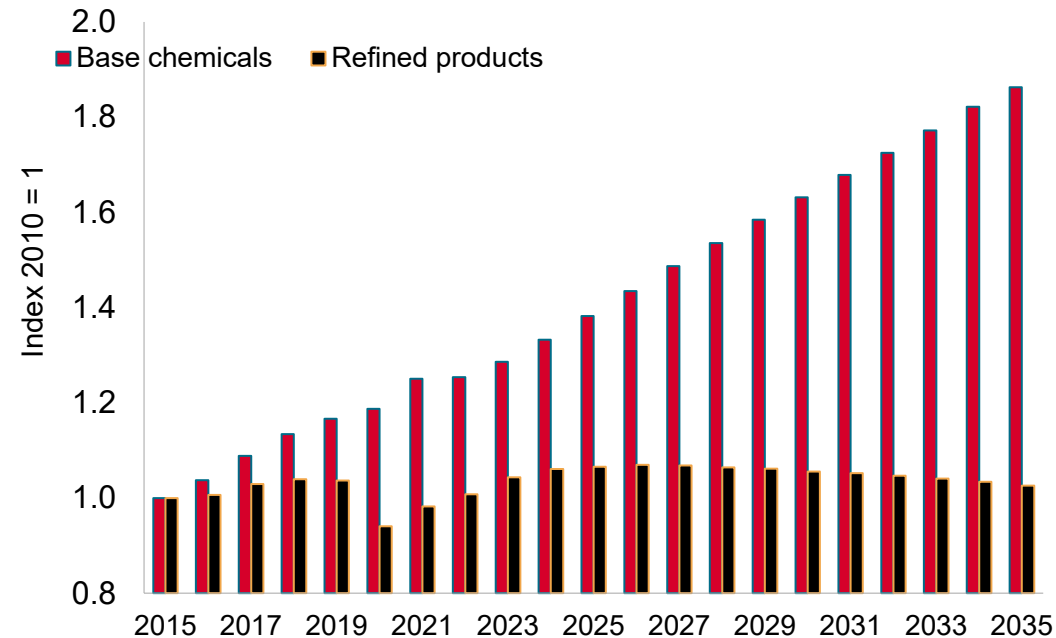


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However, despite the anticipated peaks in oil and gas production, the demand for chemicals is projected to keep growing.

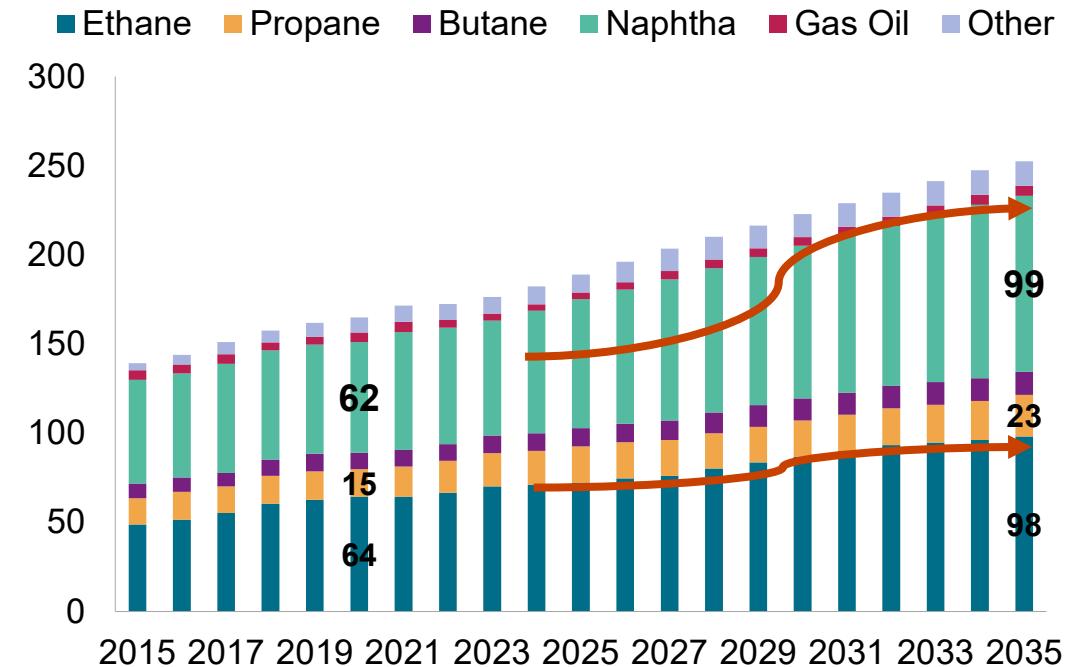
Plastics peak will never come leading liquid feedstock as primary source of chemical production.

Index of base chemicals and refined products growth



Data compiled Feb. 24, 2024.
Base chemicals includes ethylene and propylene.
Source: S&P Global Commodity Insights.

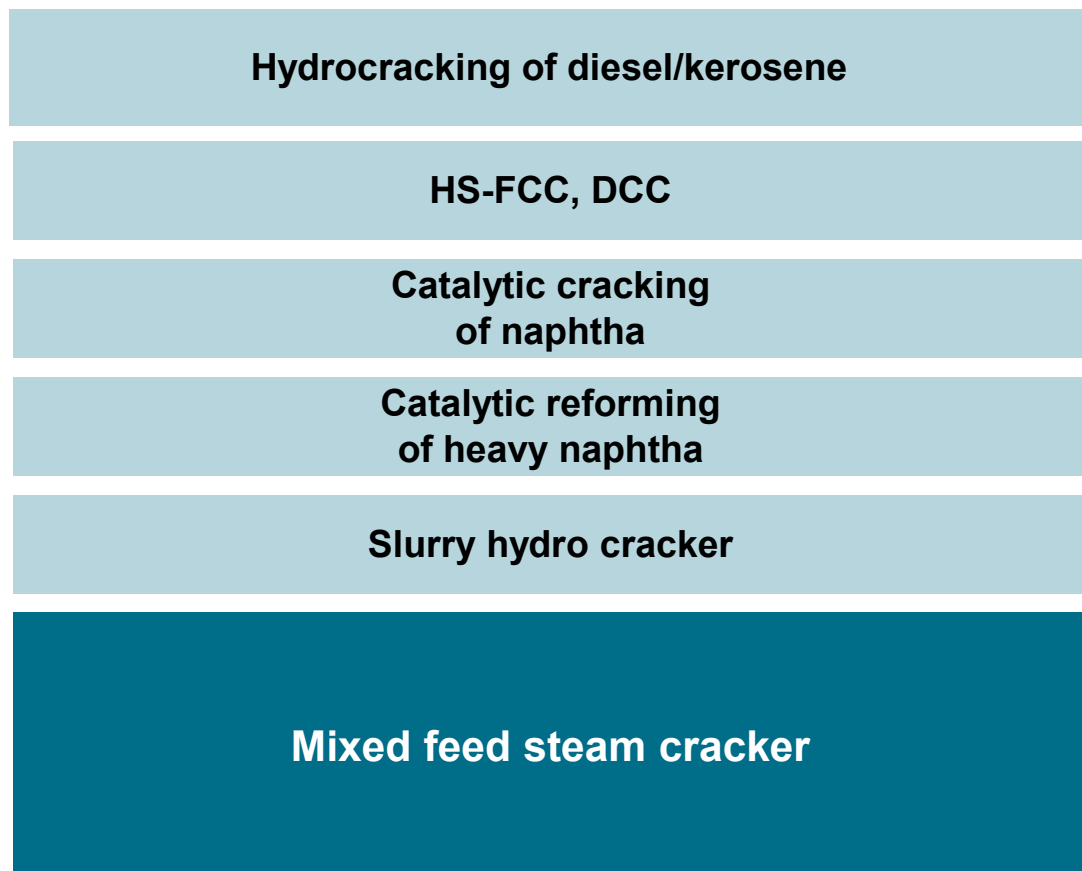
Ethylene production by feedstock (million metric tons)



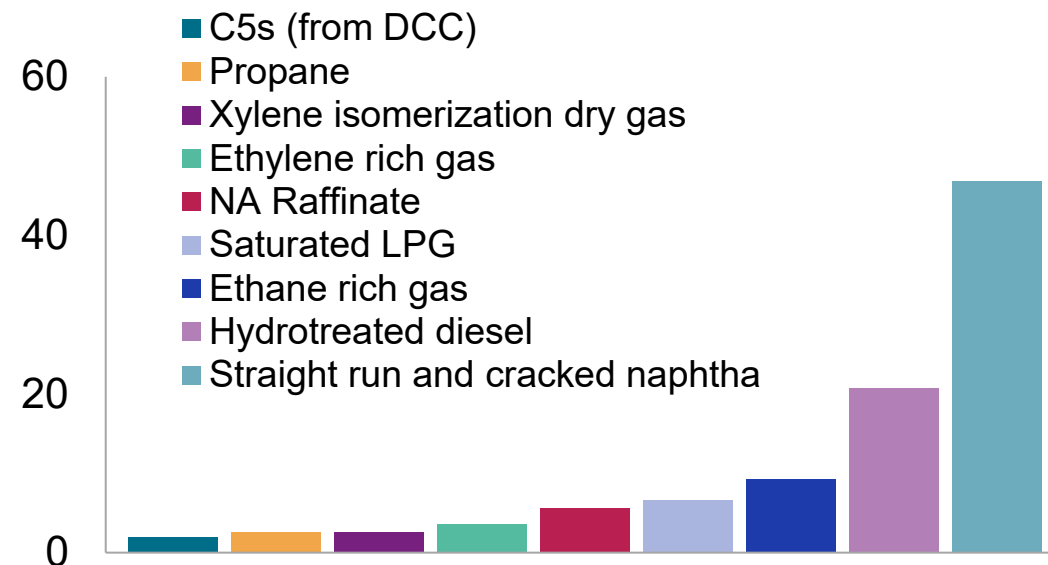
Data compiled Feb. 24, 2024.
Source: S&P Global Commodity Insights.

Efforts are underway to offset the decline in refinery run-rates by maximizing chemical output through facility modifications and new technologies.

The future of chemical production will increasingly rely on naphtha and liquid feedstock, which is an encouraging factor for liquid steam crackers that are currently suffering the most.



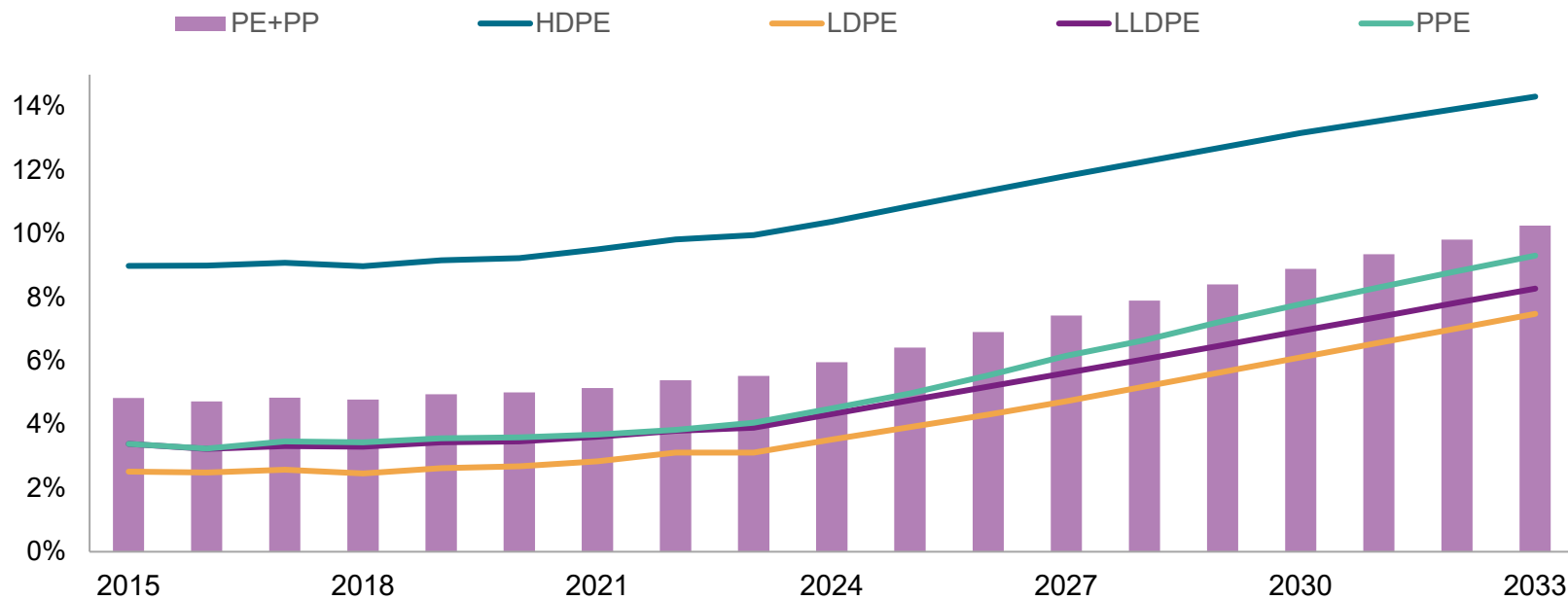
Example of feeds to MFSC from a integrated refinery
MMTPA. For 2x1.5 mmtpa ethylene unit



As of August 2022
Source: S&P Global Commodity Insights.

By 2033, recycled polyethylene to account for no more than 10% of total PE demand, insufficient to significantly affect the continued growth of virgin plastic demand.

Global Recycled PE demand (%)



Consequently, we don't foresee a peak in plastic demand, suggesting a stable and promising future for the chemical industry.



Key Takeaways

- The global olefin industry is undergoing a very serious trough.
- From 2027 onwards, the operating rate of crackers will return to normal as capacity build-ups slow and demand continues to increase by 5 million tons per year for ethylene.
- The global polyethylene and polypropylene outlook appears gloomy until 2027.
- However, thanks to steadily growing demand, the operating rate will start to increase from 2028 onwards.
- Polyolefin recycling volumes are becoming significant but the growth in demand for virgin materials remains robust. 'Peak Polymer' is not seen on the horizon.

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