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APIC 2025

Polyamide Intermediates –
embracing transformation on the path ahead

Hong Shen(Grace)

Principal Analyst, Aromatics

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Agenda

Polyamide industry chain introduction

Caprolactam - supply chain restructuring

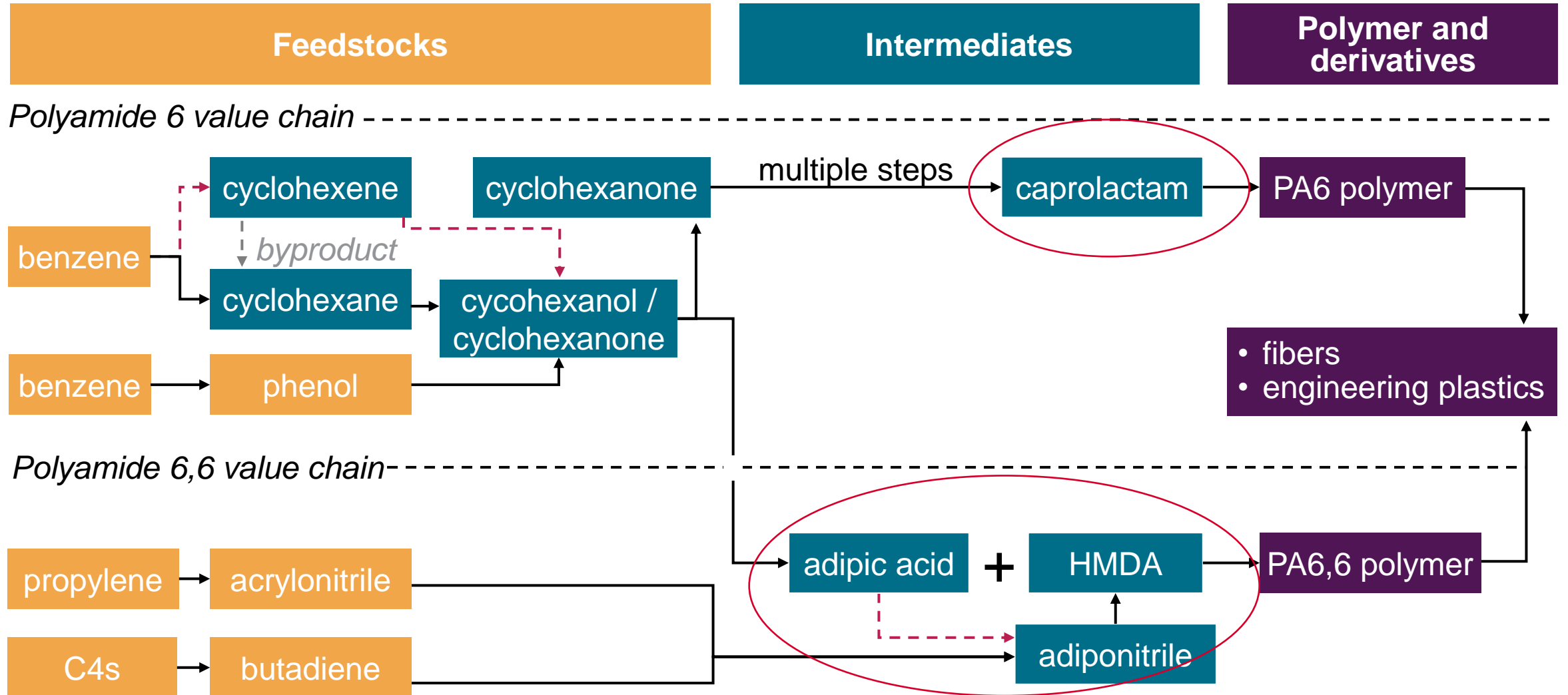
HMDA/Adiponitrile - embracing uncertainties

Adipic acid - oversupply, but hope is ahead

Conclusions

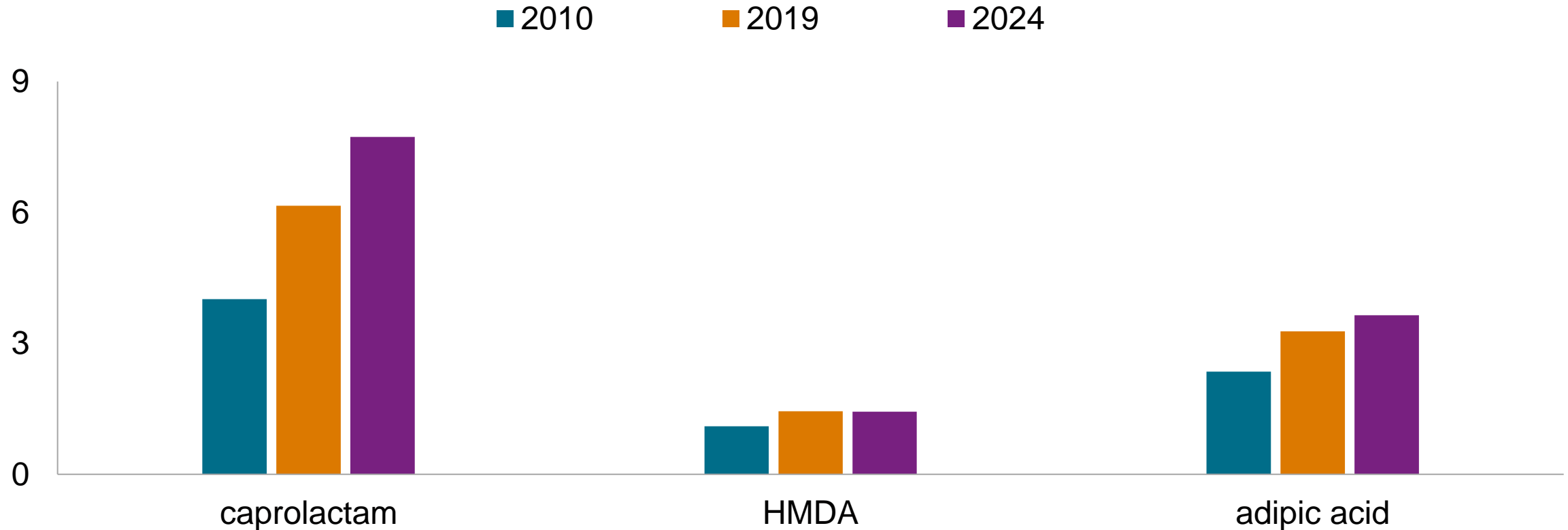


Polyamide industry overview



Market growth paths vary significantly of polyamide intermediates

Global demand for caprolactam, HMDA, adipic acid (million mt)



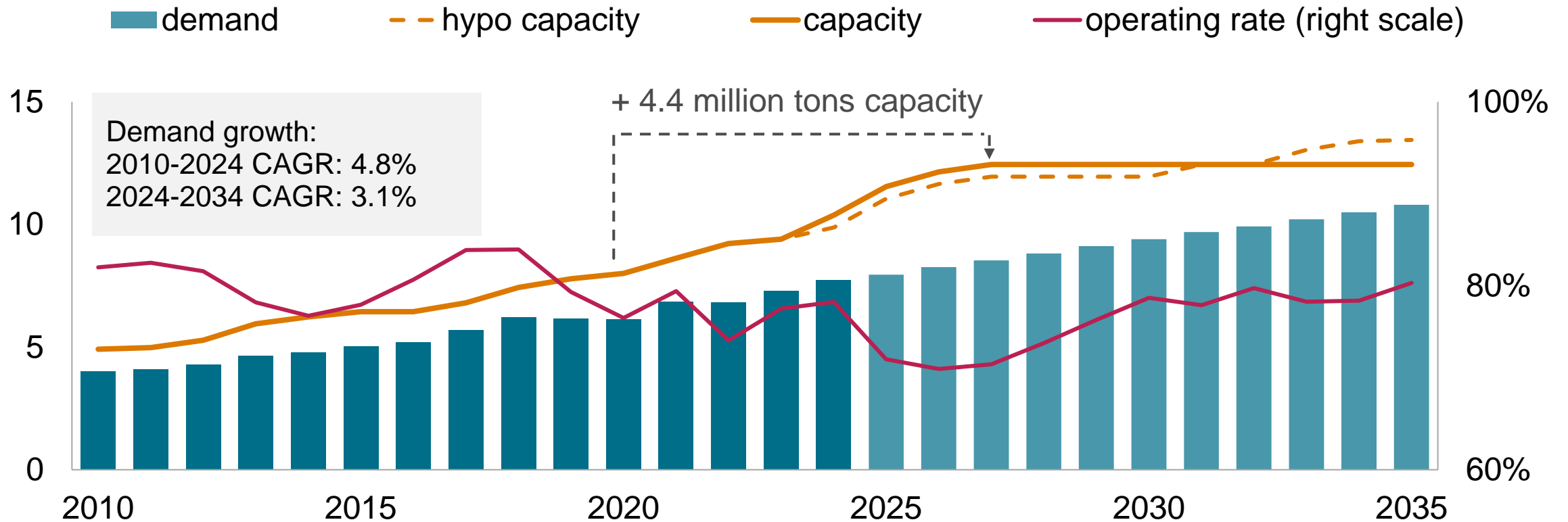
Data compiled Apr 2025
Source: S&P Global Commodity Insights



Caprolactam - supply chain restructuring

Global caprolactam demand has been growing robustly and should continue

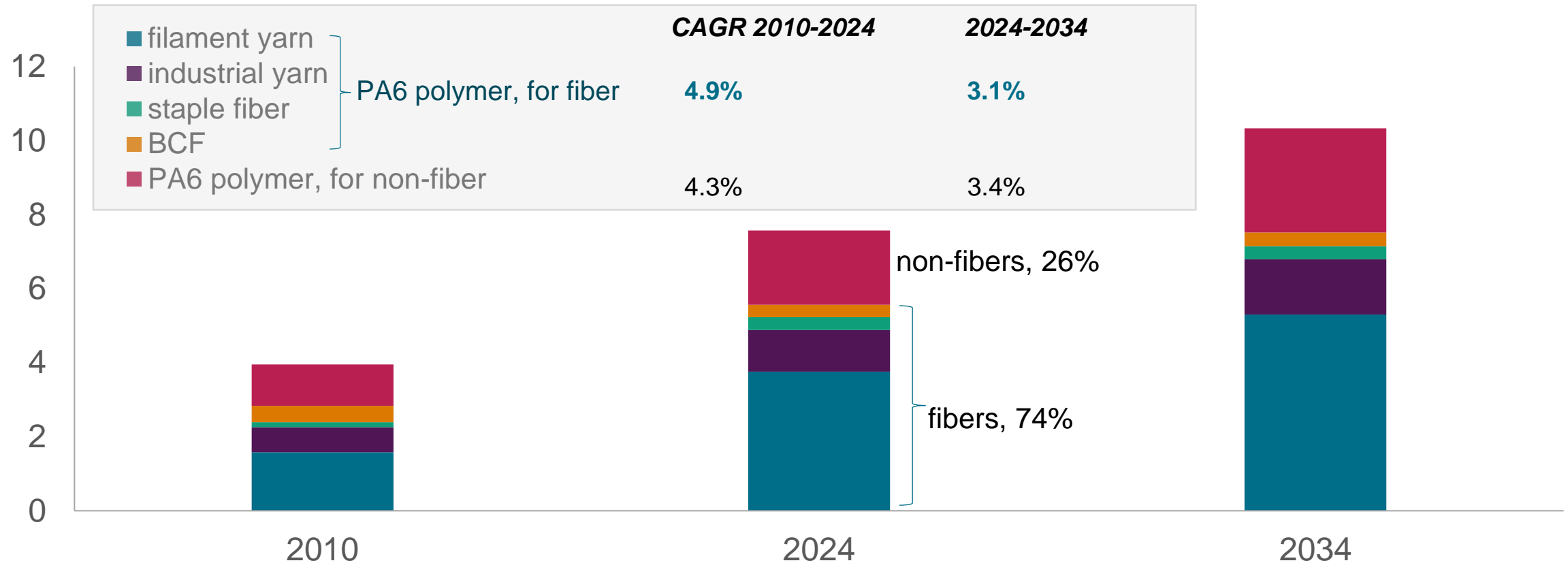
Global caprolactam supply and demand (million mt)



Data compiled Apr 2025
Source: S&P Global Commodity Insights

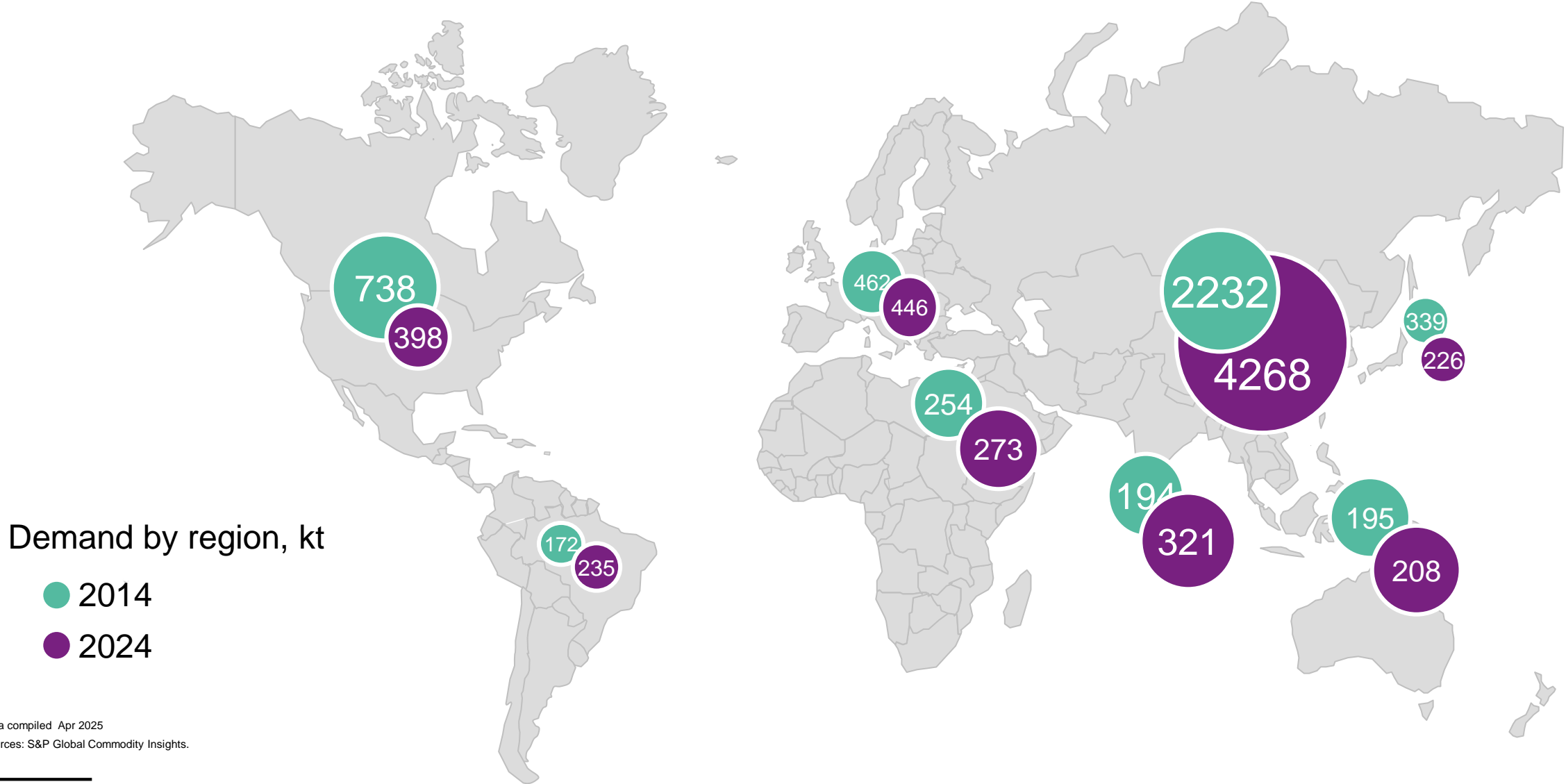
Caprolactam demand is largely driven by fiber applications

Polyamide 6 polymer demand (million mt)



Data compiled Apr 2025
Source: S&P Global Commodity Insights

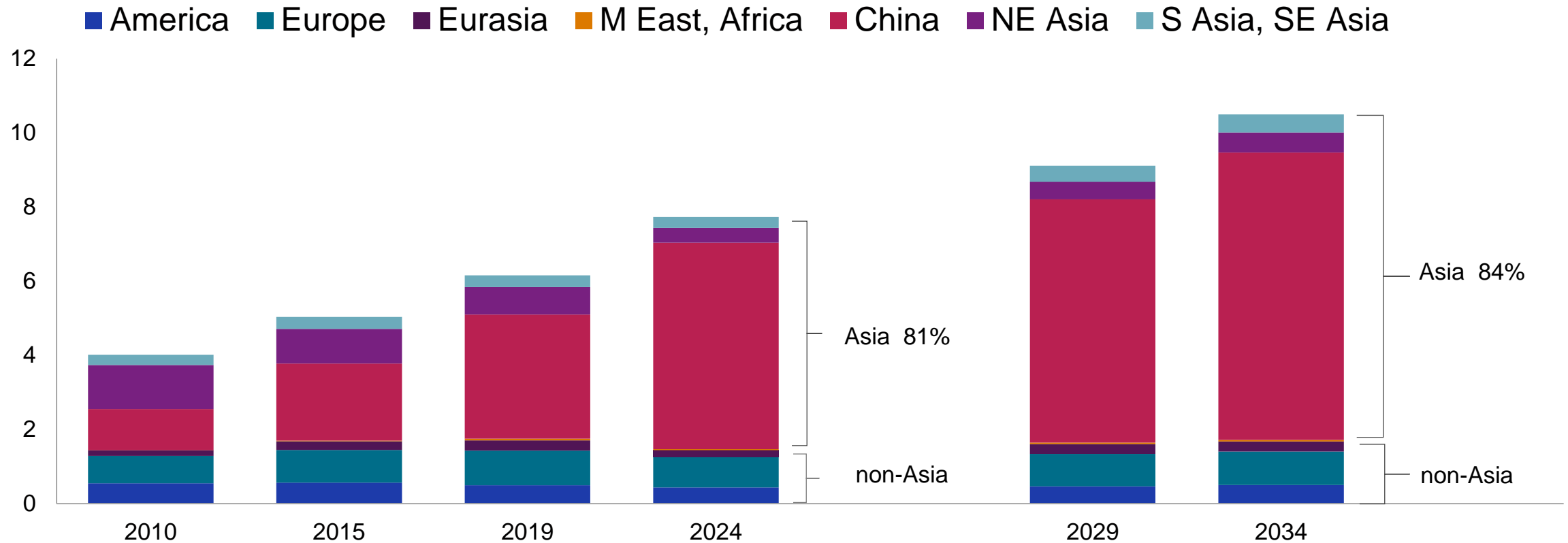
Center of the world for polyamide fibers is Asia



Data compiled Apr 2025
Sources: S&P Global Commodity Insights.

China now dominates caprolactam demand, and this will continue

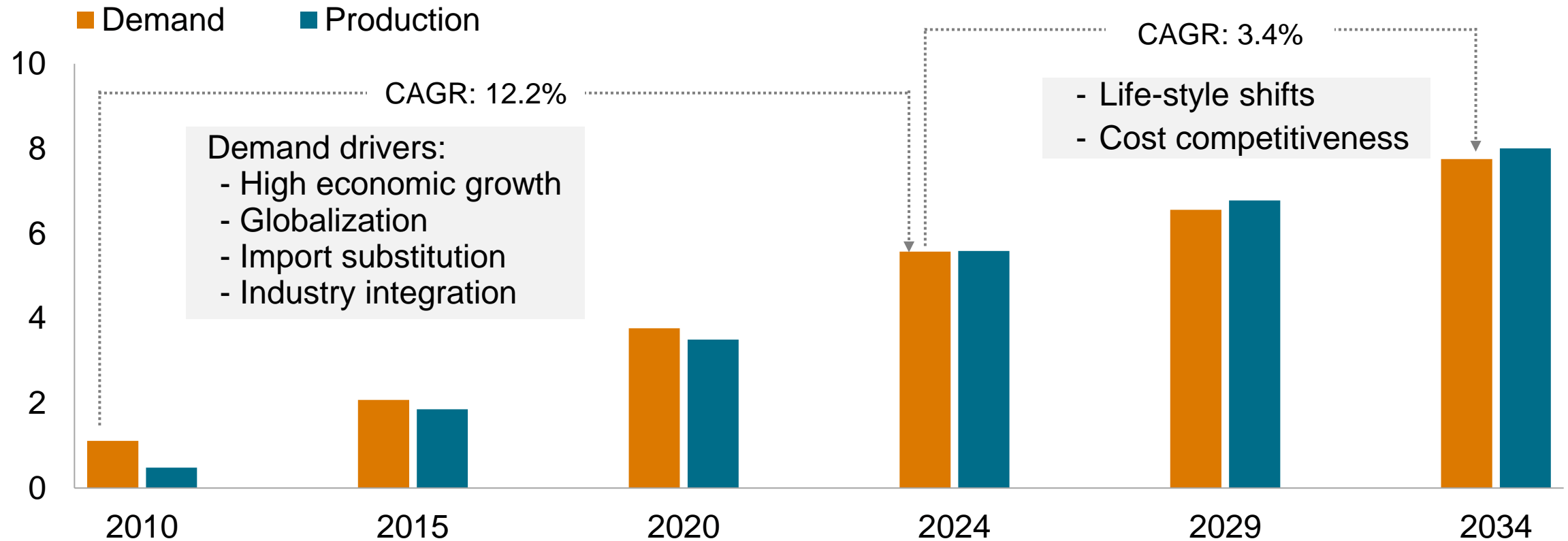
Caprolactam demand by region (million mt)



Data compiled Apr 2025
Source: S&P Global Commodity Insights

China achieved self-sufficiency then became net exporter of caprolactam

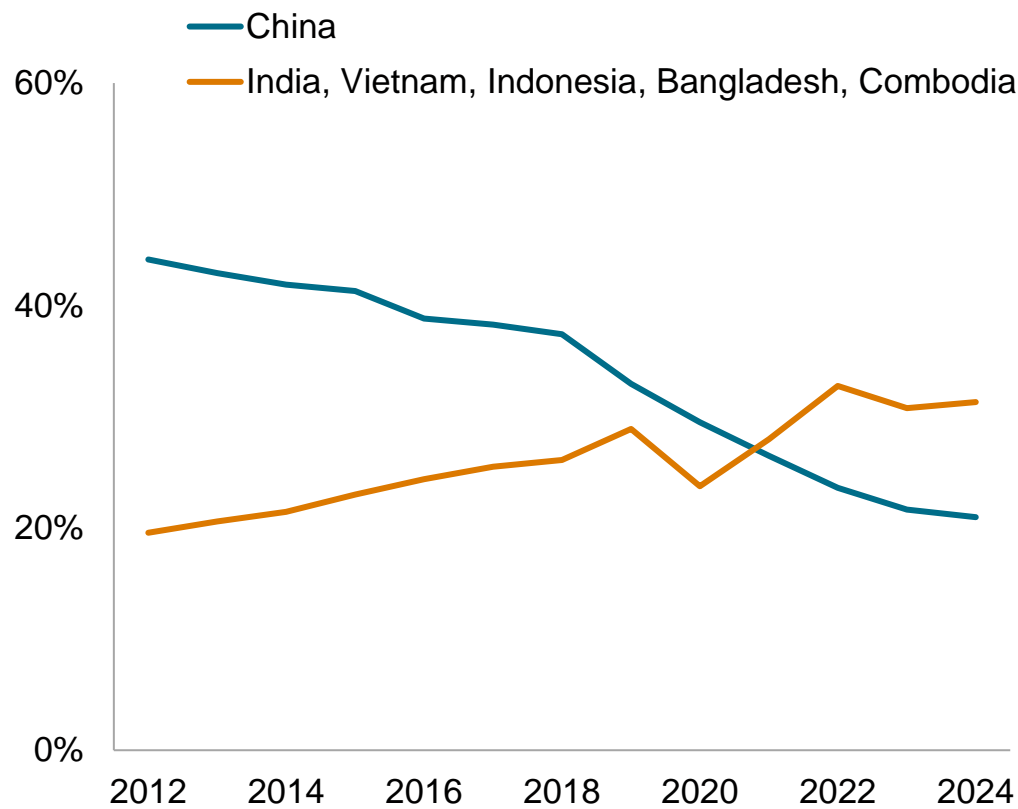
China caprolactam demand and production (million mt)



Data compiled Apr 2025
Source: S&P Global Commodity Insights

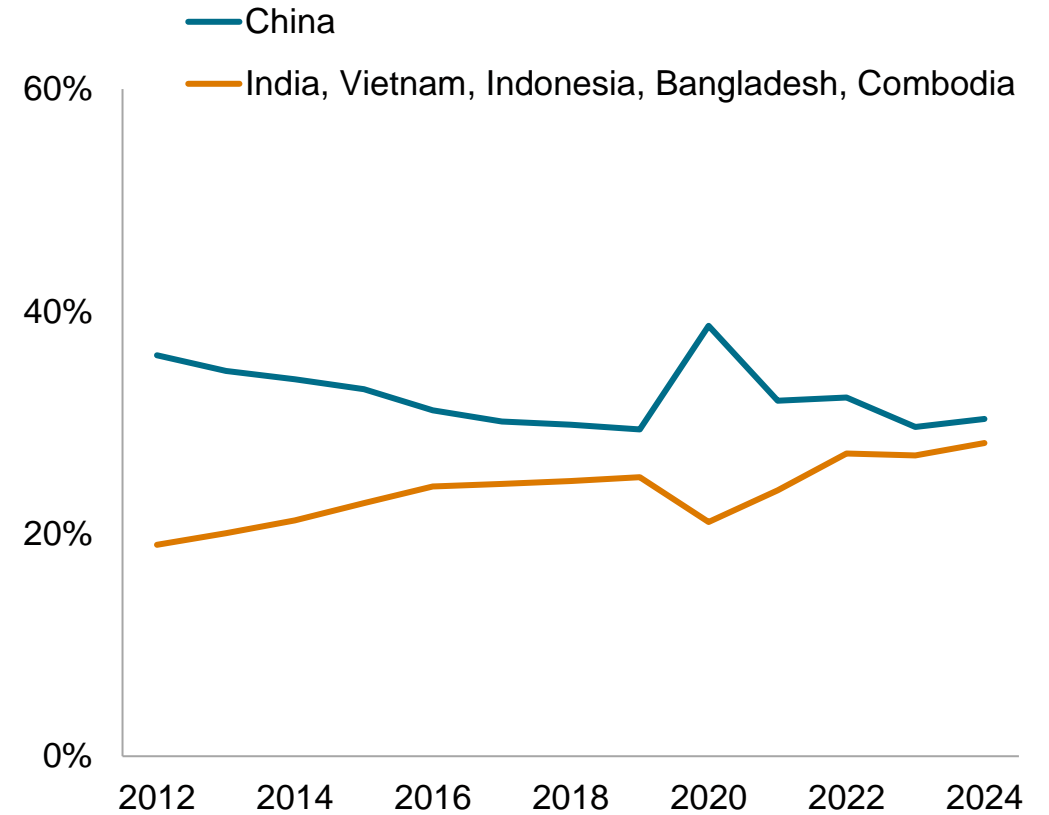
Downstream textile & apparel industries are relocating

US imports of apparel, footwear, textiles, % of total



Data compiled Apr. 01, 2025.
Source: GTA.

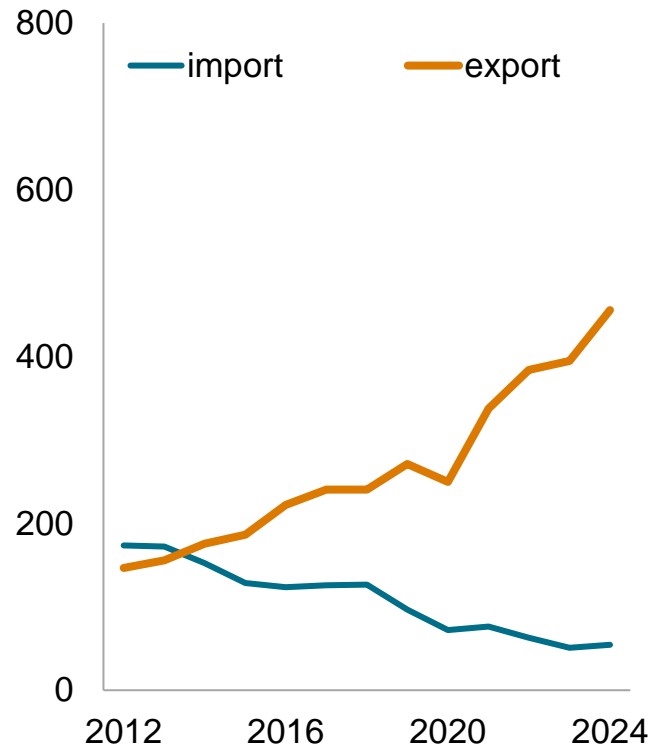
EU imports of apparel, footwear, textiles, % of total



Data compiled Apr. 01, 2025.
Source: GTA.

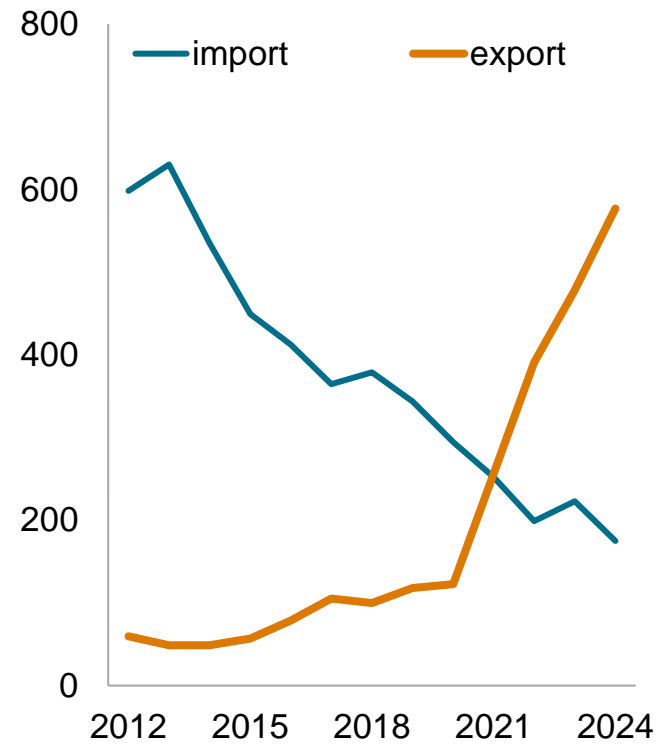
China is moving up value chain - exporting intermediates to other Asian countries

China polyamide filament trade (1,000 mt)



Data compiled Apr. 01, 2025.
Source: GTA

China polyamide 6 polymer trade (1,000 mt)



Data compiled Apr. 01, 2025.
Source: GTA

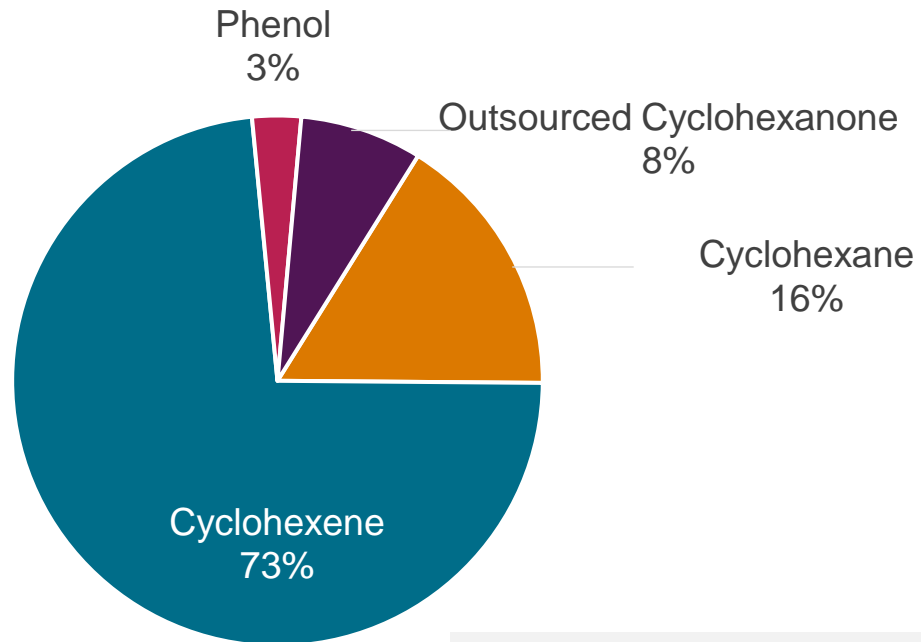
China caprolactam trade (1,000 mt)



Data compiled Apr. 01, 2025.
Source: GTA

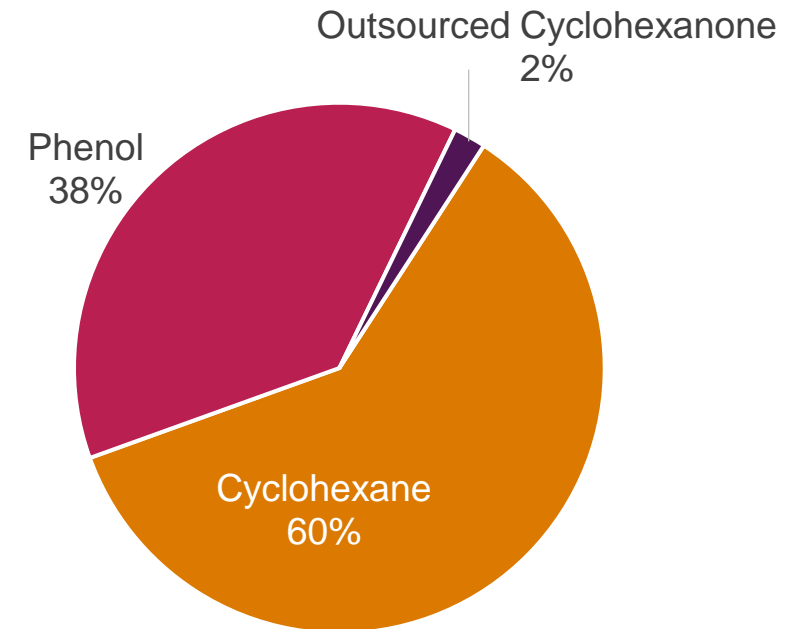
China caprolactam competitiveness: scale and technology

China caprolactam capacity by process, 2024



- New caprolactam unit: 300 ktpa
- Cyclohexene process
- Ammoximation process

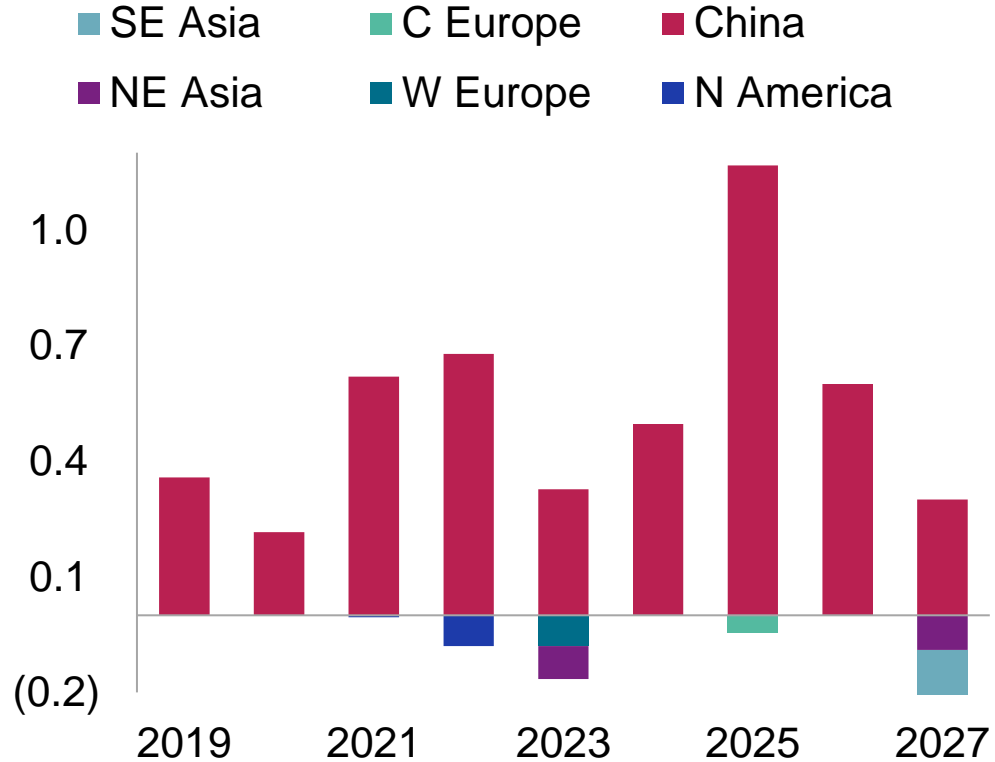
Non-China caprolactam capacity by process, 2024



Data compiled Apr 2025
Source: S&P Global Commodity Insights

China's rapid caprolactam build has put pressure on others

Caprolactam capacity changes (million mt)

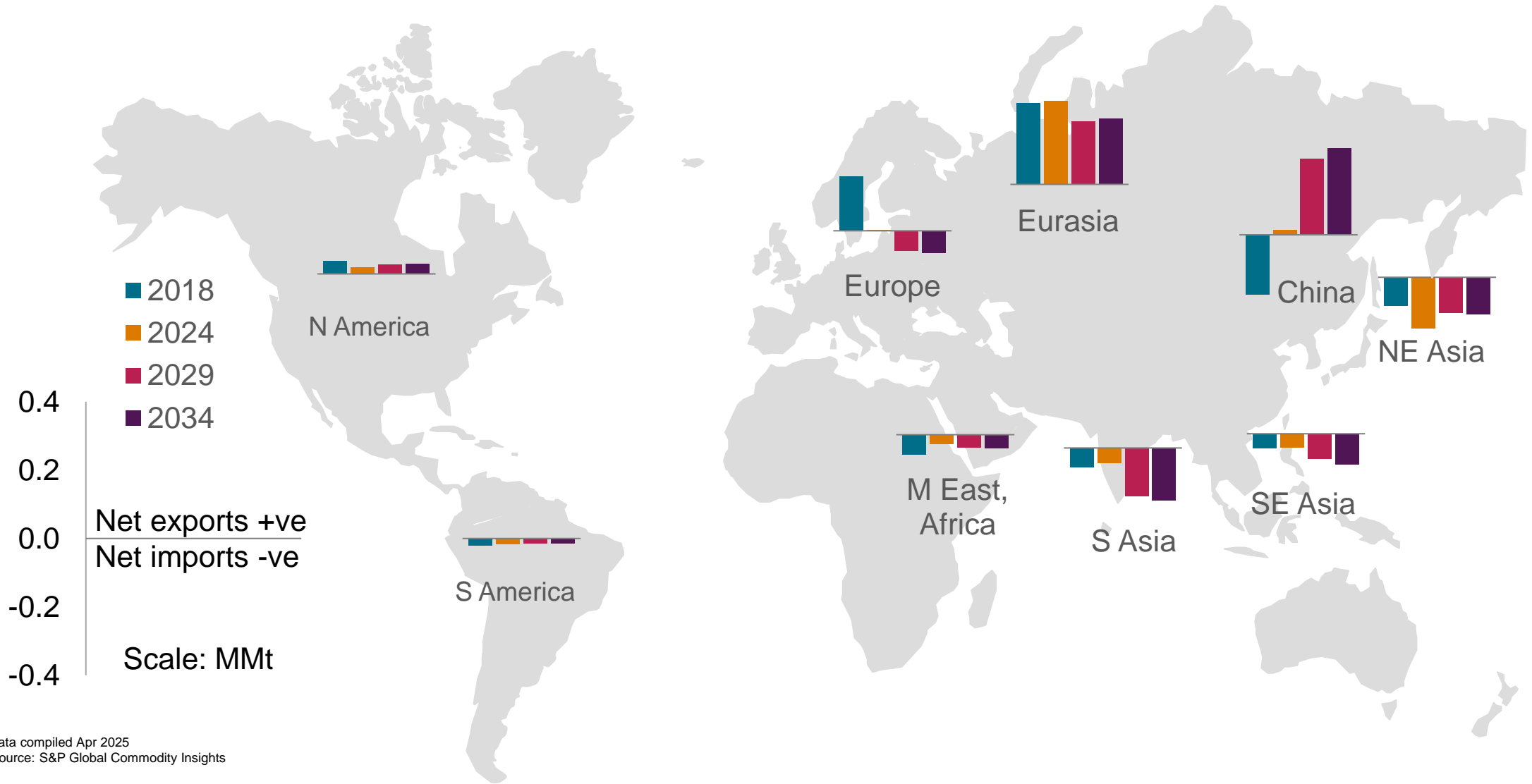


Capacity closures in recent years

Producer	Country	Capacity	Timing
Univex	Mexico	85 ktpa	2021
BASF	Germany	80 ktpa	2023
Sumitomo	Japan	85 ktpa	2023
Spolana	Czech	47 ktpa	2025
Ube	Japan	90 ktpa	2027
Ube	Thailand	130 ktpa	2027

Data compiled Apr 2025
Source: S&P Global Commodity Insights

Europe, China and South Asia have changed trade patterns



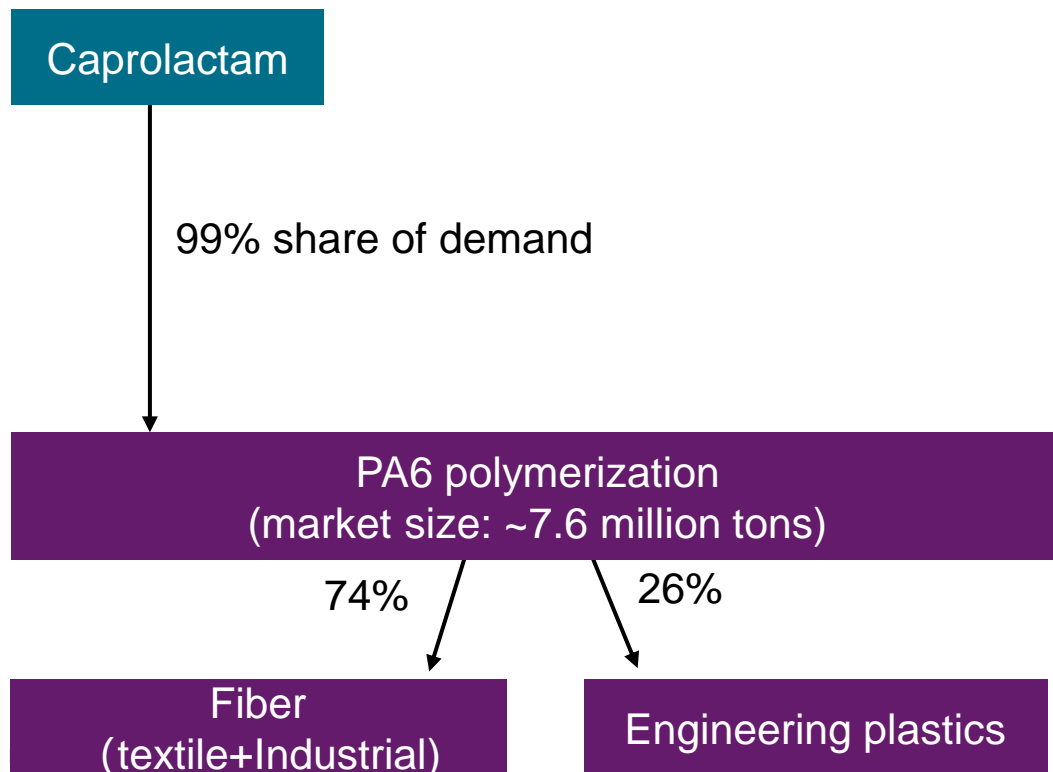
Data compiled Apr 2025
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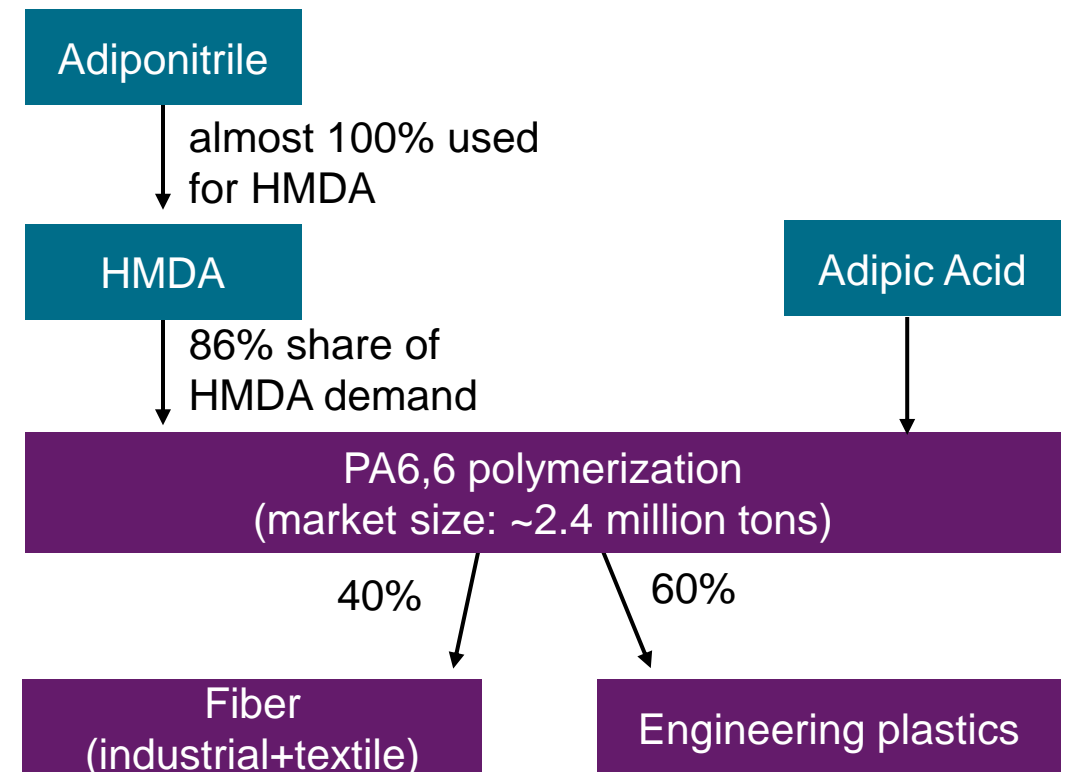
HMDA/Adiponitrile - embracing uncertainties

How is the PA6,6 different?

PA6 industry chain



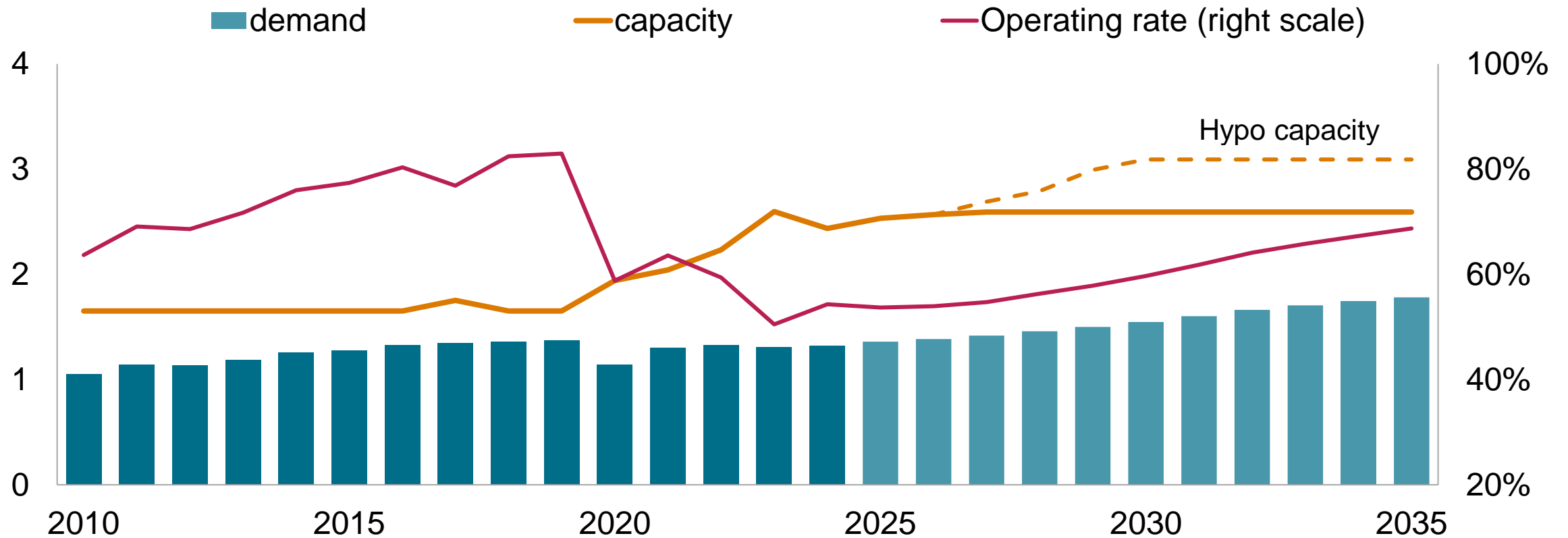
PA6,6 industry chain



Data compiled Apr 2025
Source: S&P Global Commodity Insights

Adiponitrile supply-side bottleneck breakthrough

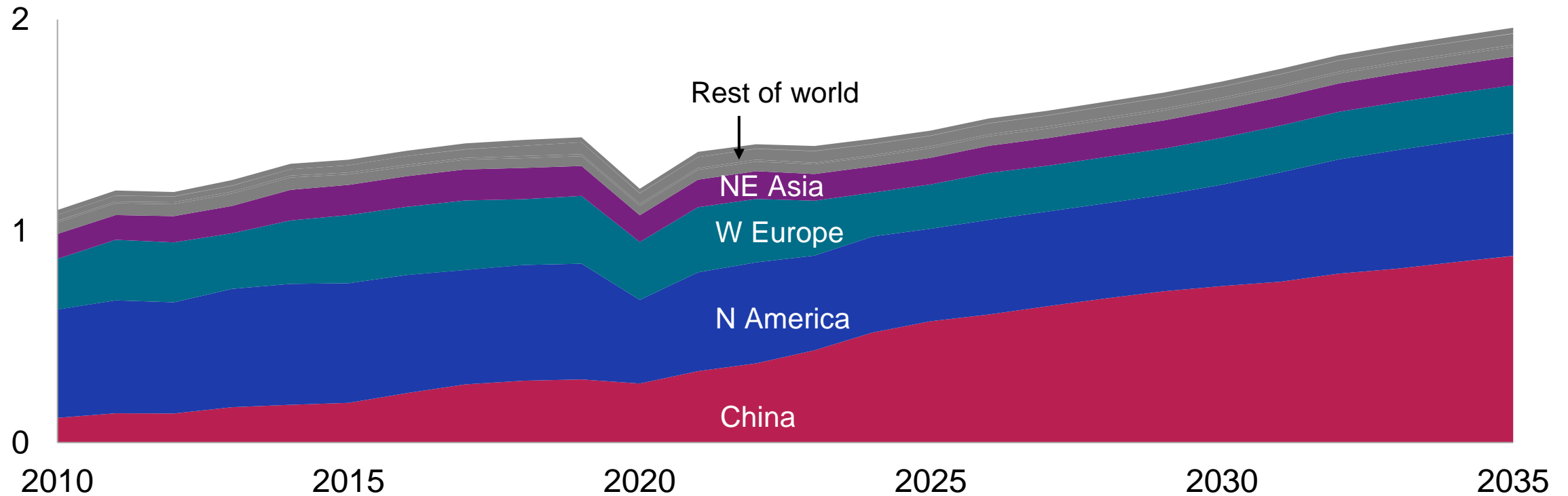
Global adiponitrile supply and demand (million mt)



Data compiled Apr 2025
Source: S&P Global Commodity Insights

China is not dominant in HMDA but is catching up

HMDA demand by region (million mt)



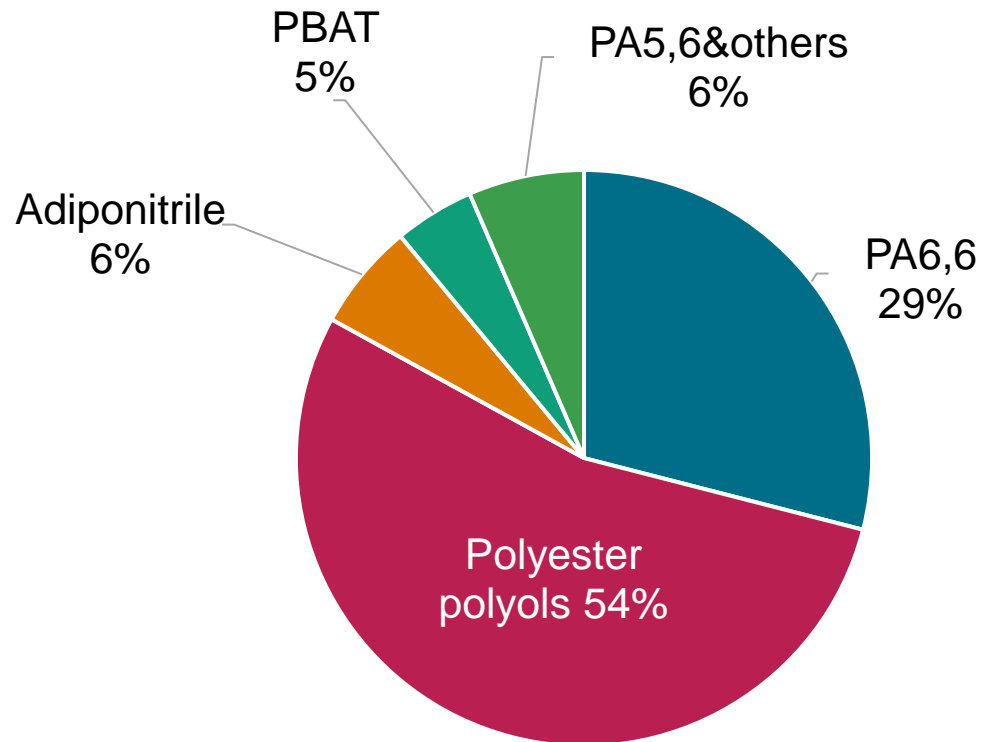
Data compiled Apr 2025
Source: S&P Global Commodity Insights



Adipic acid - oversupply, but hope is ahead

Adipic acid has diverse demand applications in China

China adipic acid demand breakdown



Demand potential sectors:

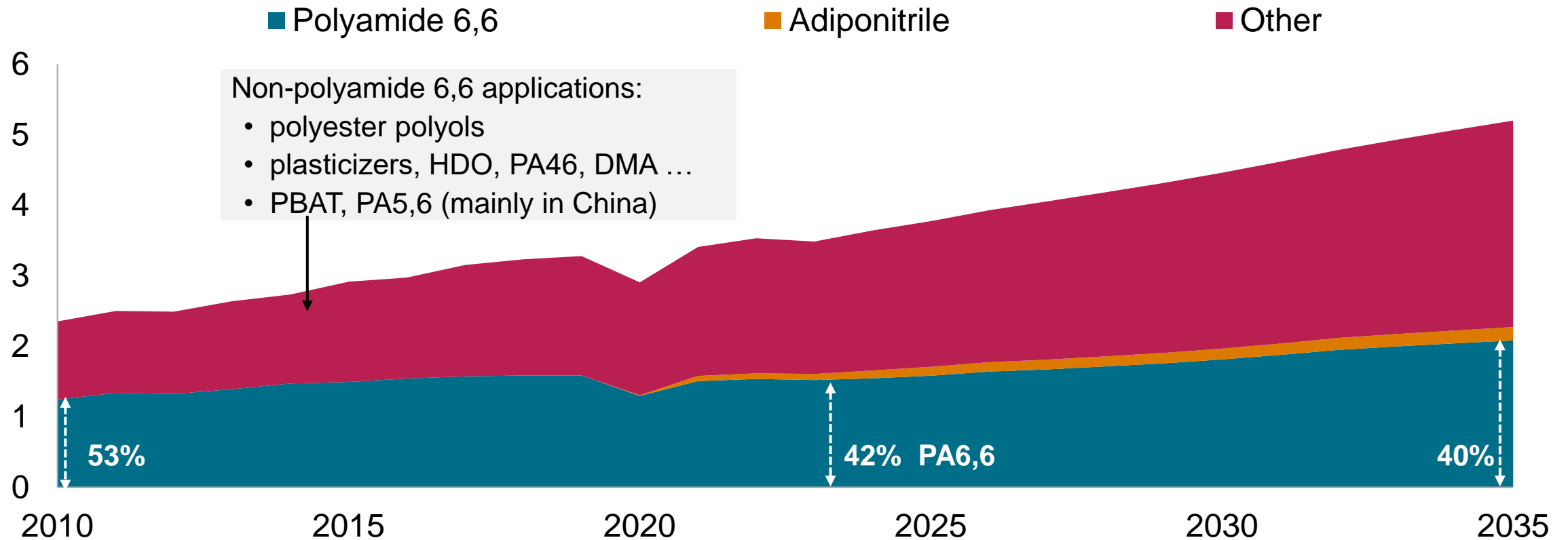
- **PA6,6** → adiponitrile availability improved
- **PA5,6** → made by adipic acid and bio-based pentadamine
- **PBAT** → biodegradable polymer
- **TPU** → high performance polyurethane
- **Specialty polyamides** → high performance

Plus, bio-based adipic acid routes

Data compiled Apr 2025
Source: S&P Global Commodity Insights

PA6,6 accounts for less than half of global adipic acid demand

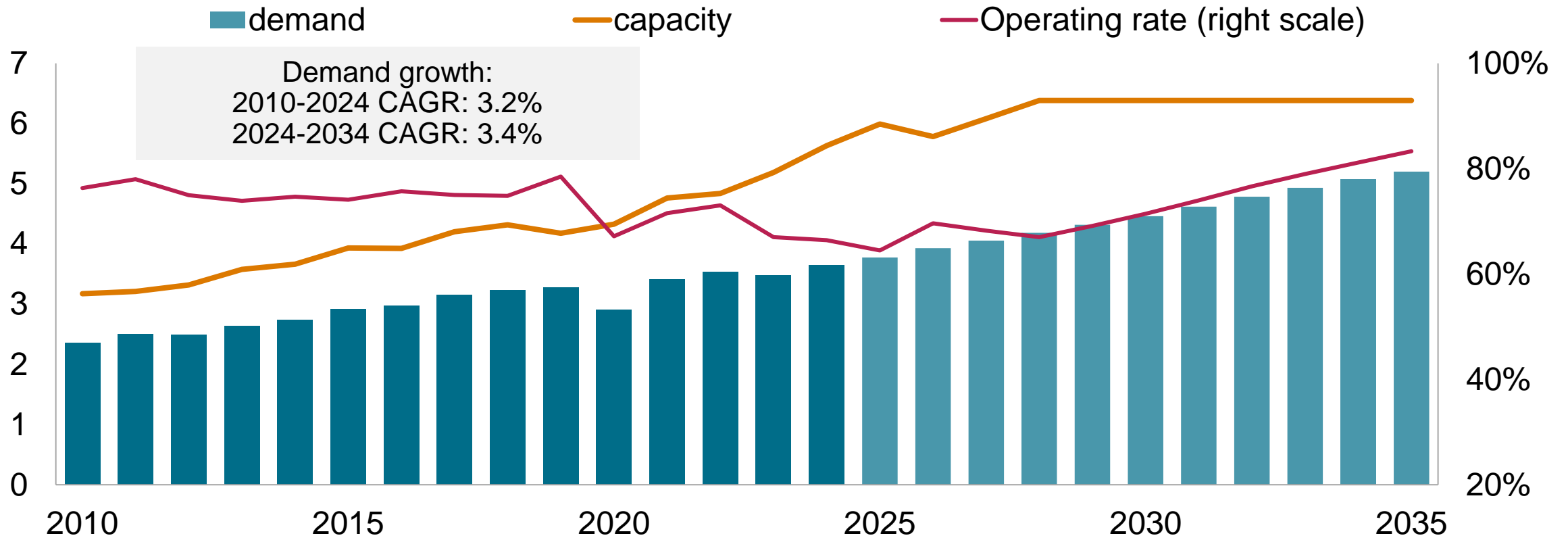
Global adipic acid demand breakdown (million mt)



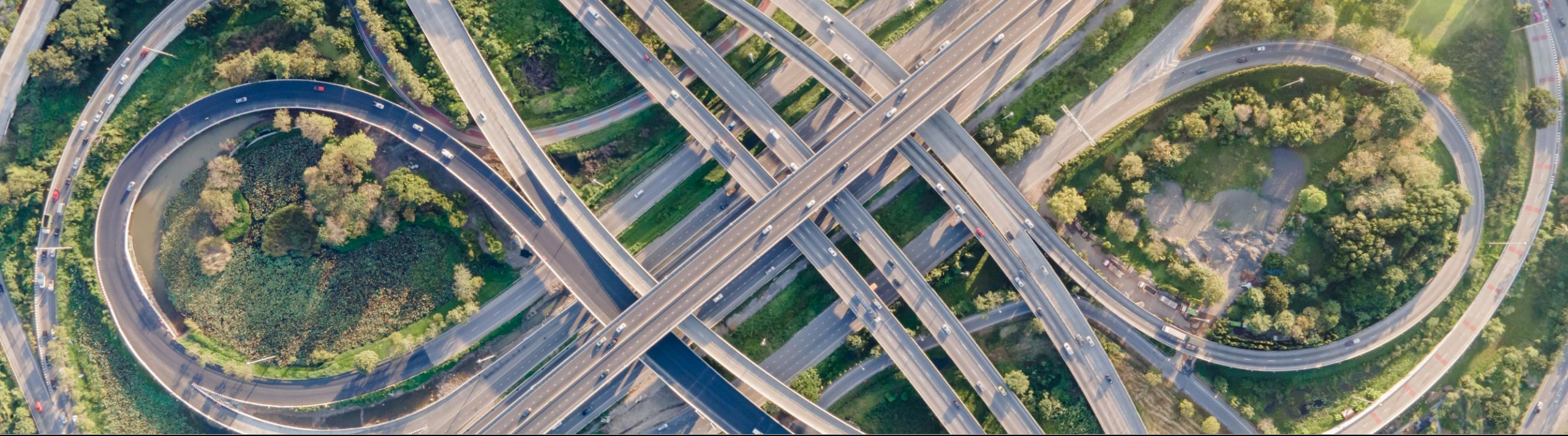
Data compiled Apr 2025
Source: S&P Global Commodity Insights

Global adipic acid demand continues to grow healthily

Global adipic acid supply and demand (million mt)



Data compiled Apr 2025
Source: S&P Global Commodity Insights



Conclusions

Key takeaways: Caprolactam

Global supply chain restructuring is reshaping caprolactam market

China's multi-dimensional competitiveness supports demand growth

Key takeaways: Adiponitrile / HMDA

Supply breakthrough brings demand potential

Demand takes time to catch up with supply growth

Key takeaways: Adipic acid

Grapple with oversupply amid China capacity expansions

Demand growth potential: PA6,6, PBAT, PA5,6, TPU, ...