

Chemical Market Analytics Sponsored Session:
Navigating Market Turbulence:
Impact of Evolving Energy Markets
and a Chemicals Downturn

8 October 2024



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World Chemical Forum

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2024 Event Highlights

- The world's most influential chemical companies, producers, and business leaders. We convened over **600 individuals** over the course of the event.
- 3-day in-person experience featuring Chemical Market Analytics by OPIS, WSJ News-led panel discussions, leading industry experts spanning the entire supply chain providing deep-dive chemical insights, analysis and knowledge transfer.

>35 countries

>600 attendees

>100 presentations

>100 speakers

Energy & Energy Transition

Carlo Barrasa, Vice President, Energy Markets, Chemical Market Analytics

Economy

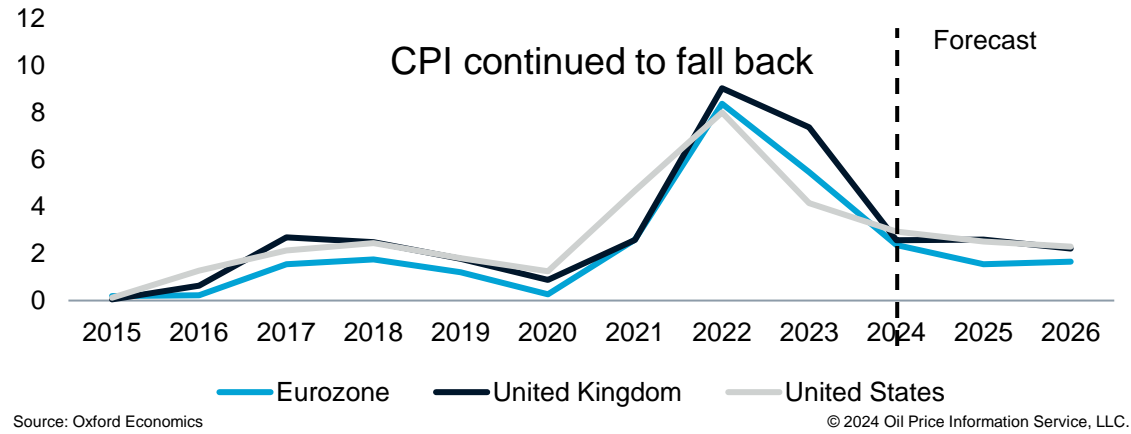
When inflation returning to the target



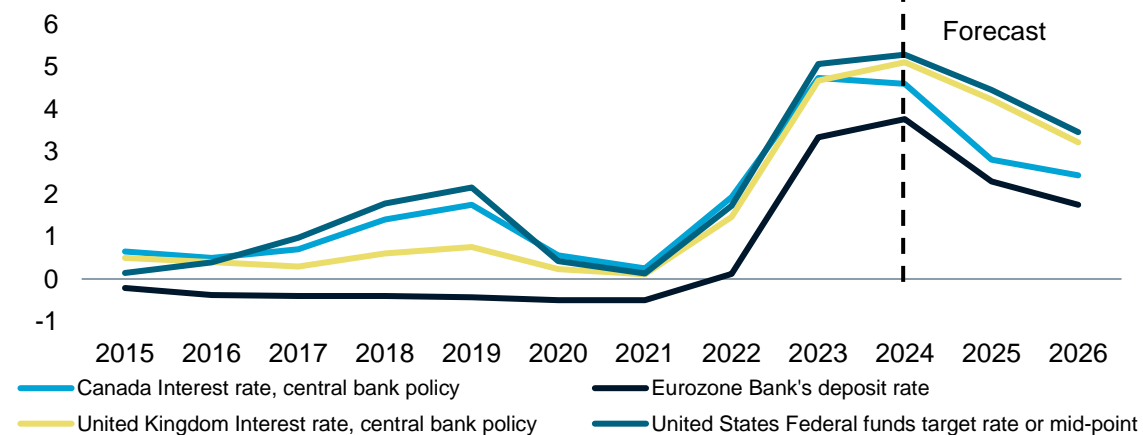
Interest-rate-cutting cycle began

Growth continues in 2025, but no fireworks

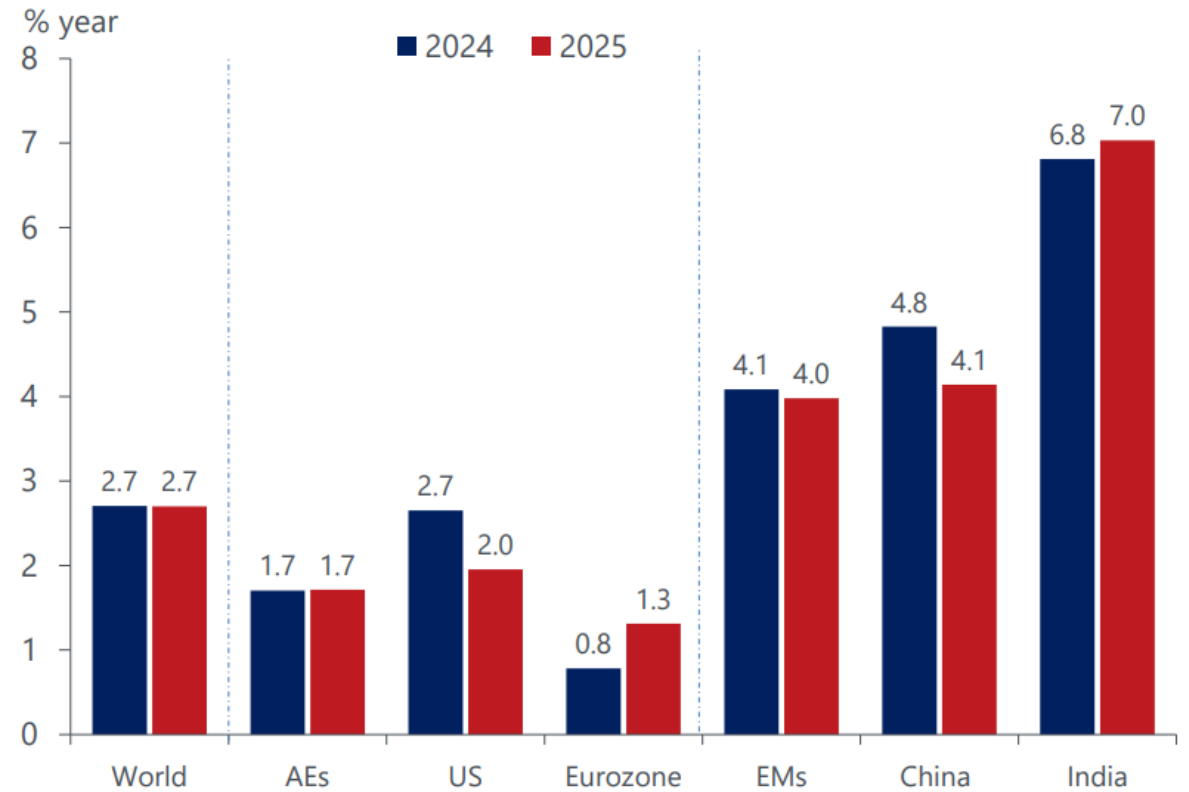
Headline CPI Inflation



Policy Rate Forecasts

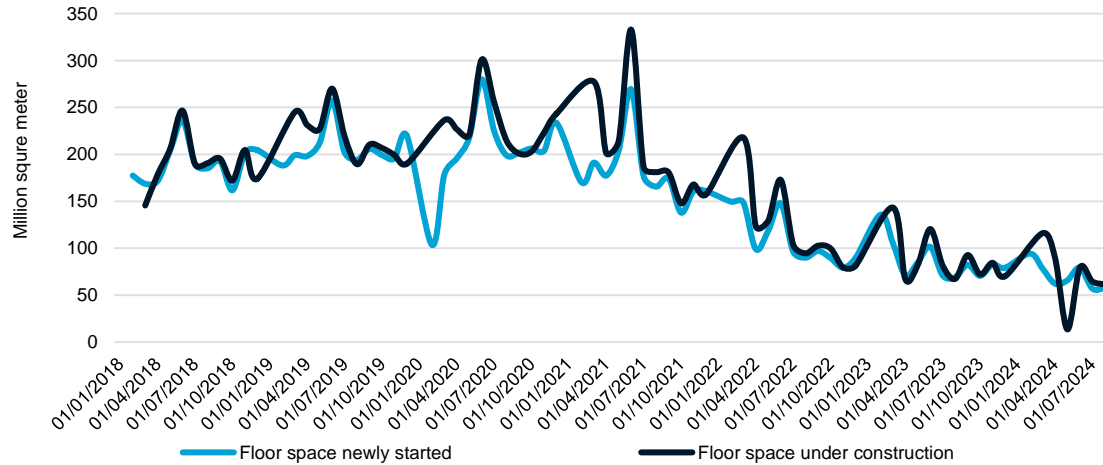


World GDP



China: Economic sequential slowdown

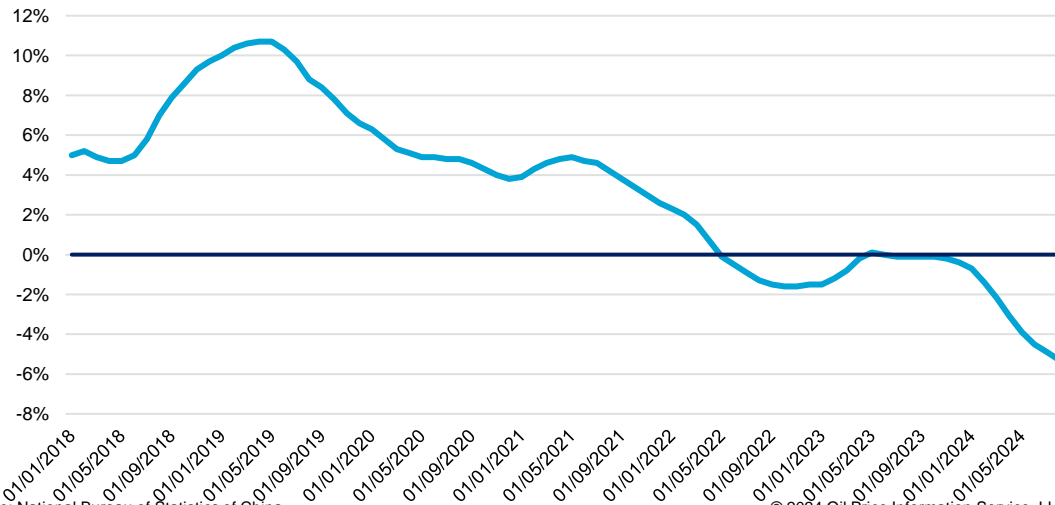
China Newly Started and under Construction Floor Space (Monthly Additions)



Source: National Bureau of Statistics of China

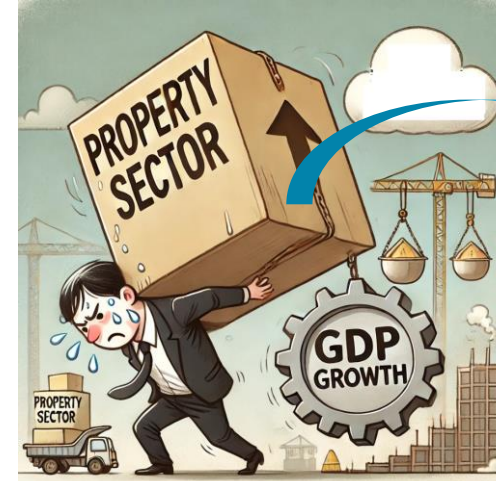
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China Newly Built House Prices (YoY %Change)



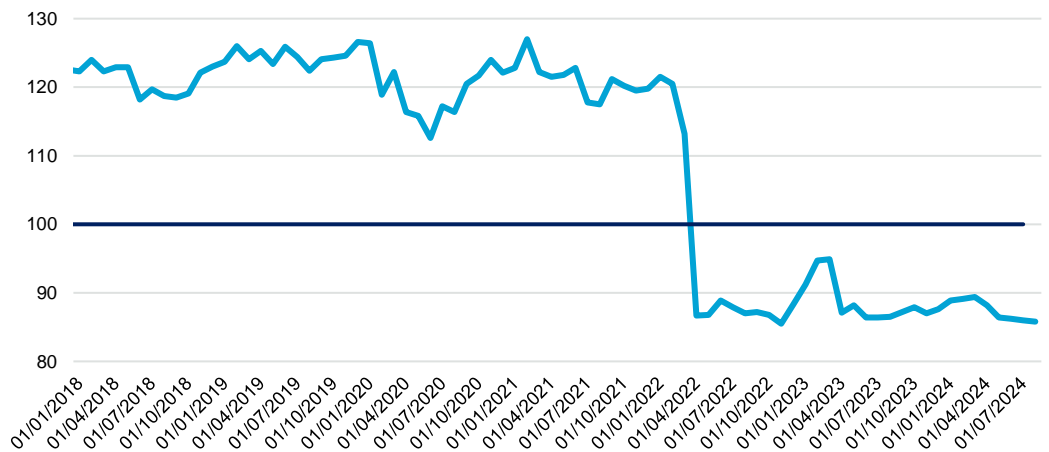
Source: National Bureau of Statistics of China
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20% fiscal revenue
stores 70% household wealth
24% of GDP
25% of bank loans

China Consumer Confidence Index

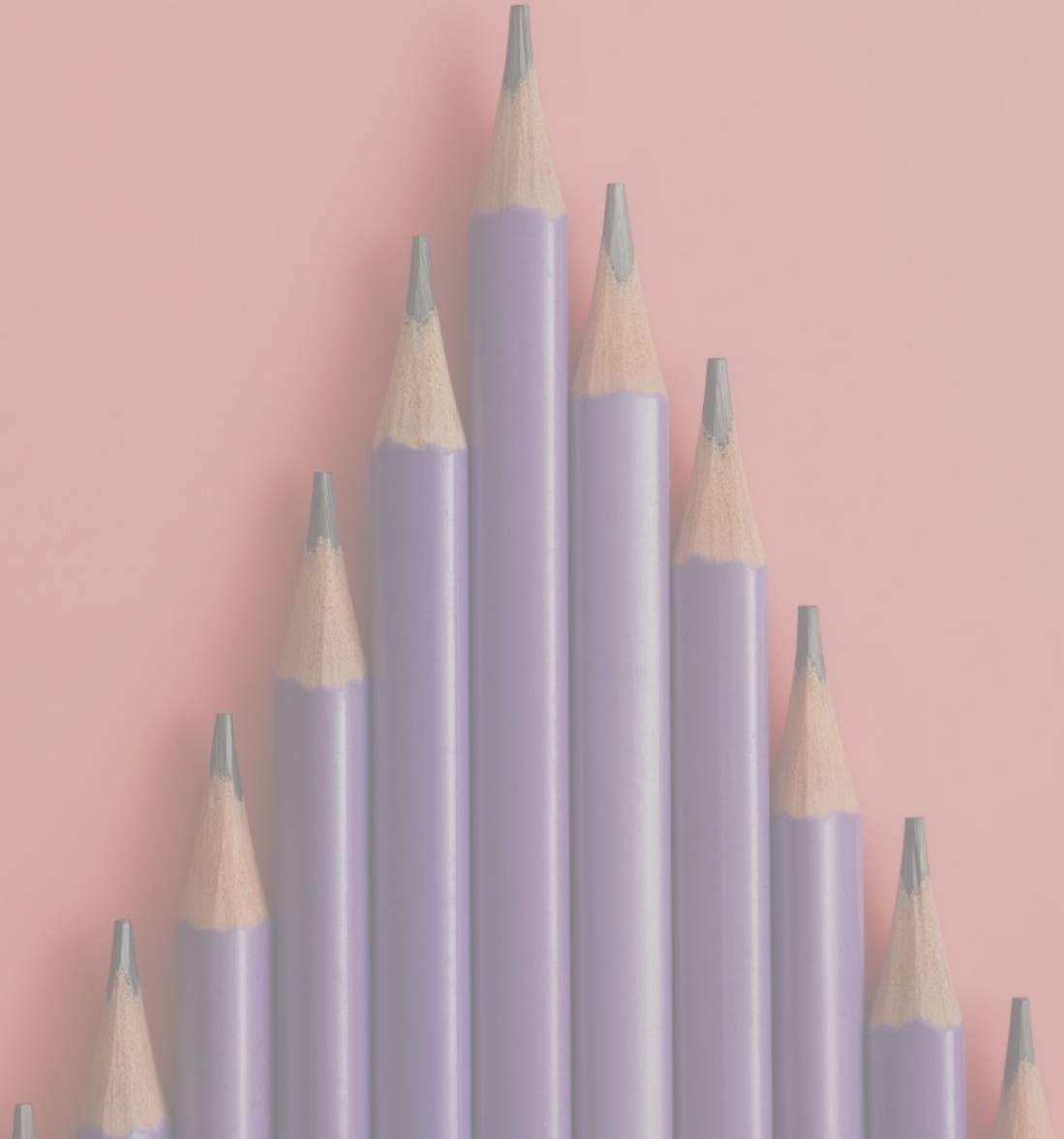


Source: National Bureau of Statistics of China

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Short-term outlook

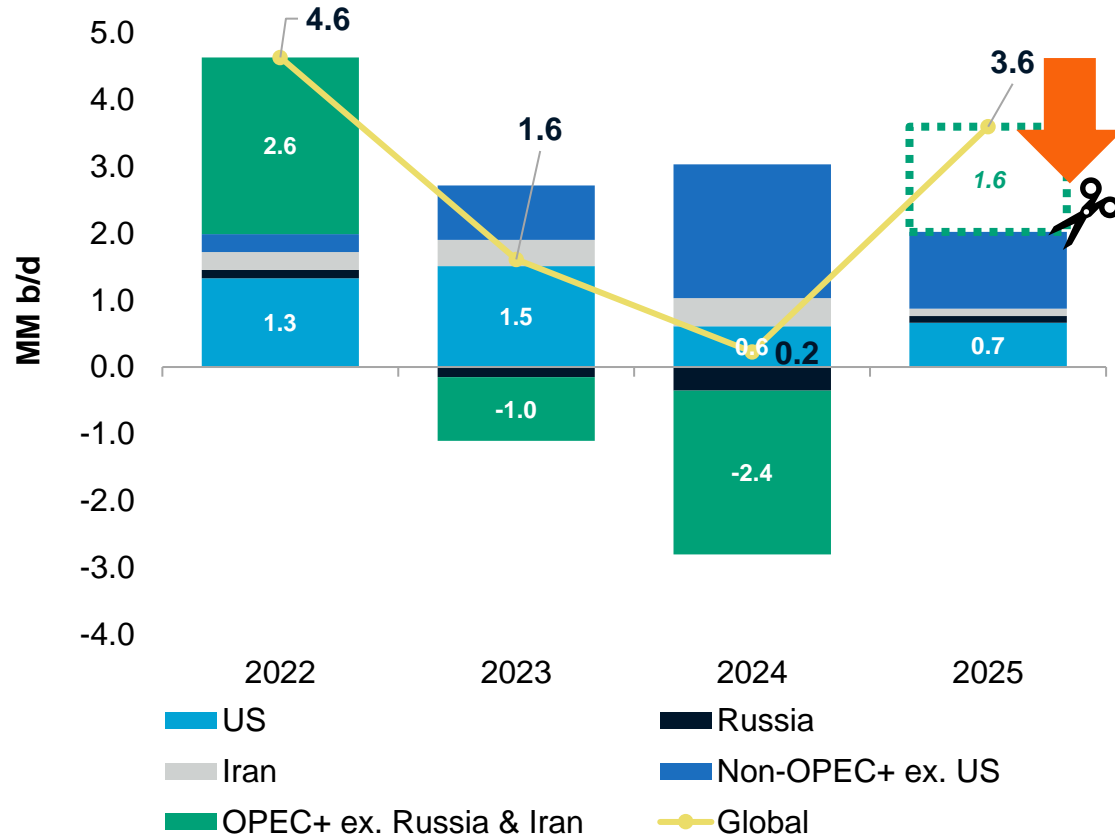
When the growth wanes



Supply growth stagnates this year

Continued output cuts needed next year to avoid market glut

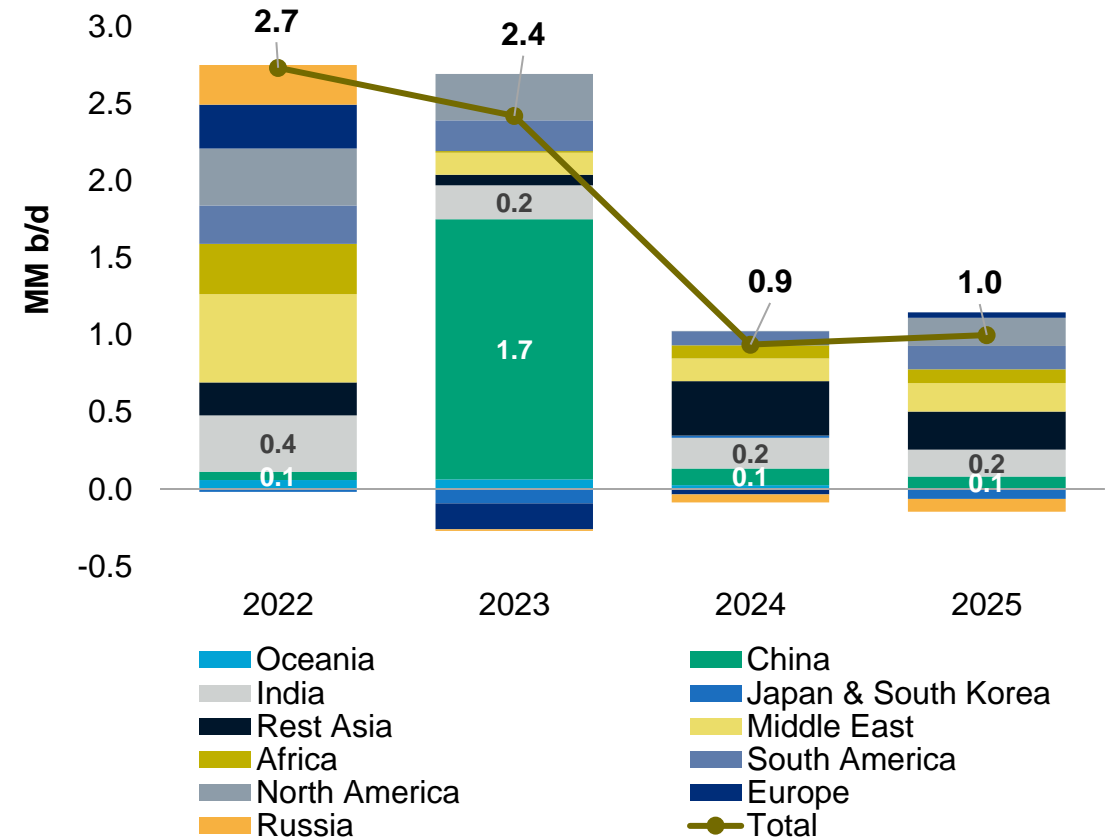
Global Liquids Production Growth by Key Group/Country



Source: Chemical Market Analytics by OPIS, Rystad Energy

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Oil (Total Liquids) Demand by Region/Country



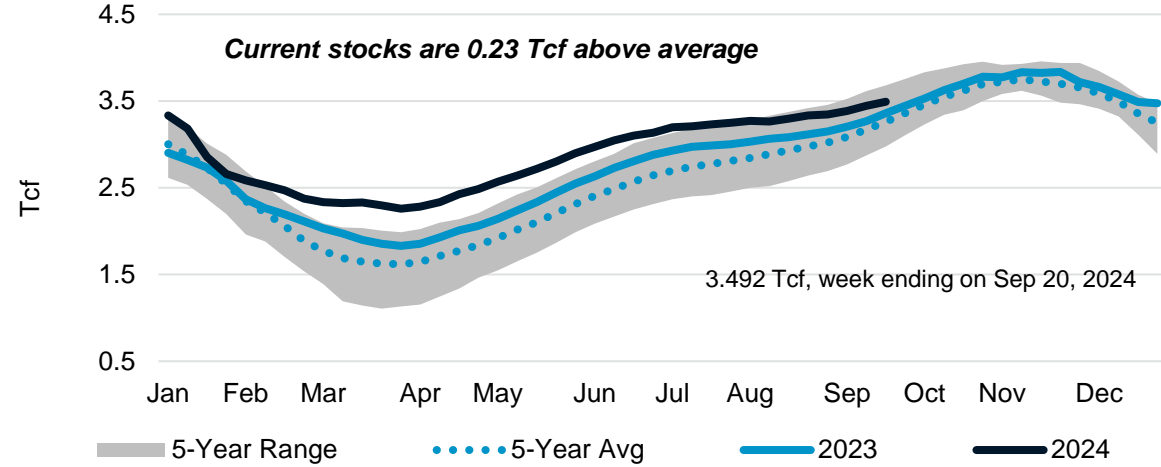
Source: Rystad Energy

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Gas Market: Healthy storage adds flexibility to global markets

Focus shifts to winter temperatures for guidance

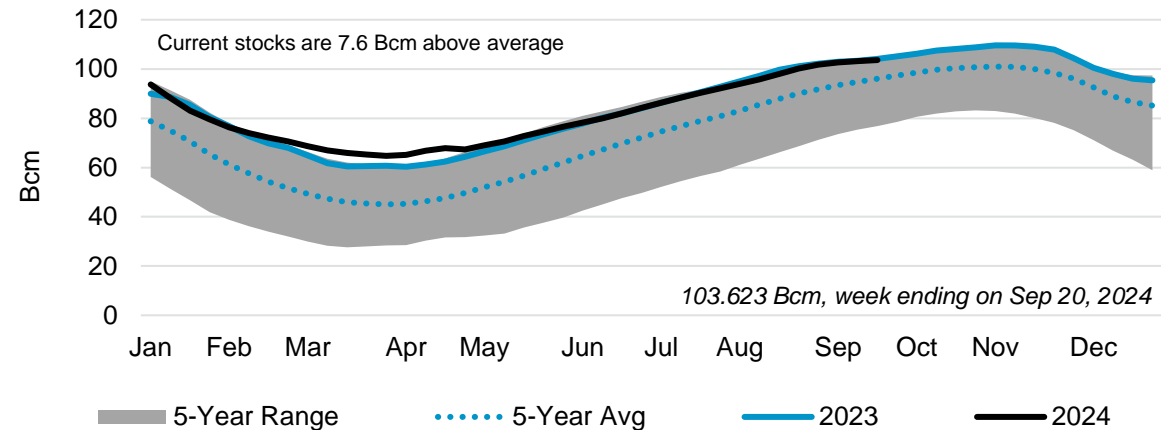
L48 Working Underground Storage



Source: U.S. Energy Information Administration

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Europe Natural Gas Storage

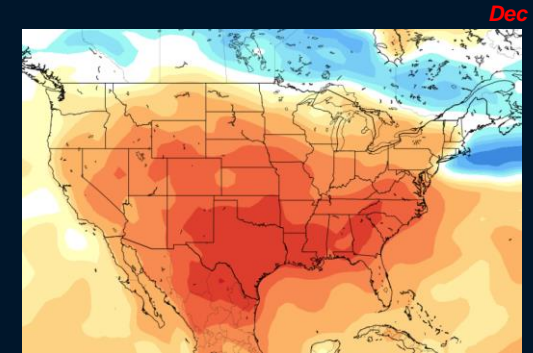
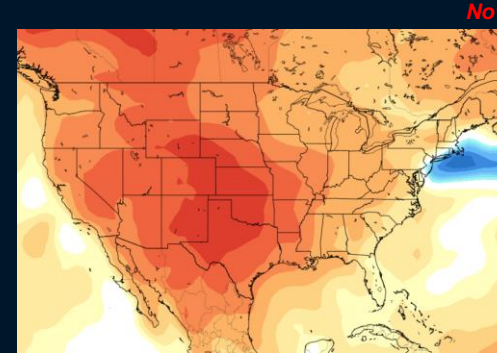


Source: GIE-AGSI

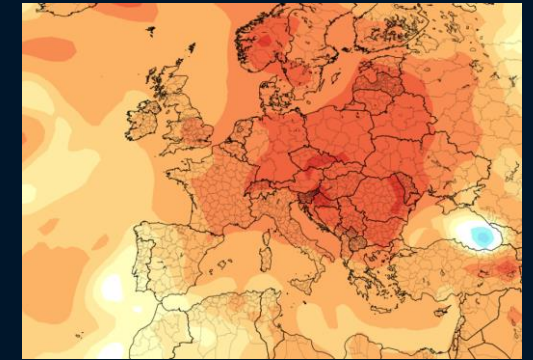
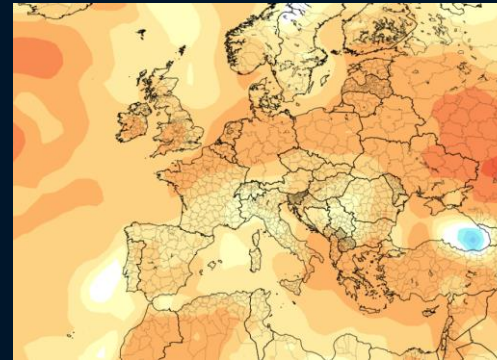
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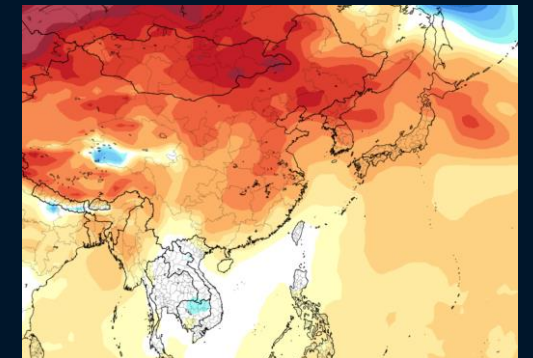
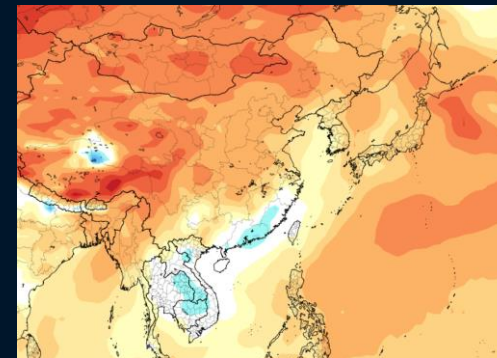
US



EU



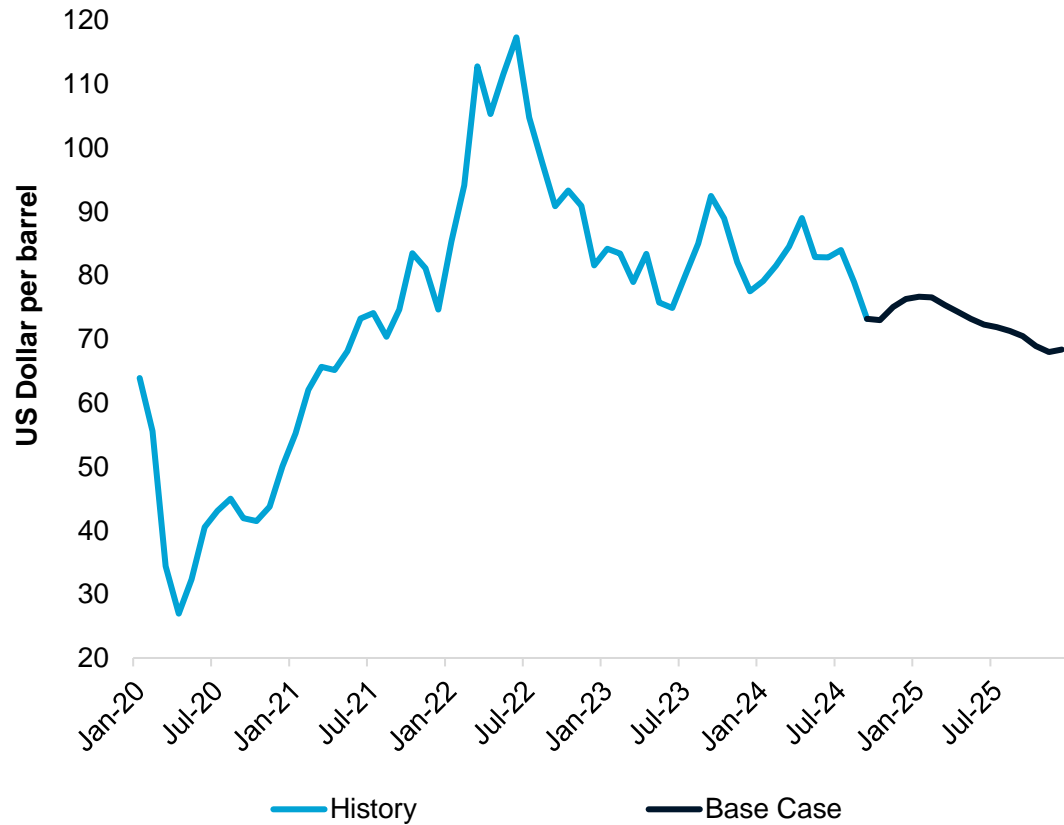
Asia



Oil: Returning OPEC+ volumes only means lower prices

Gas: Benign weather is constructive to a balanced market

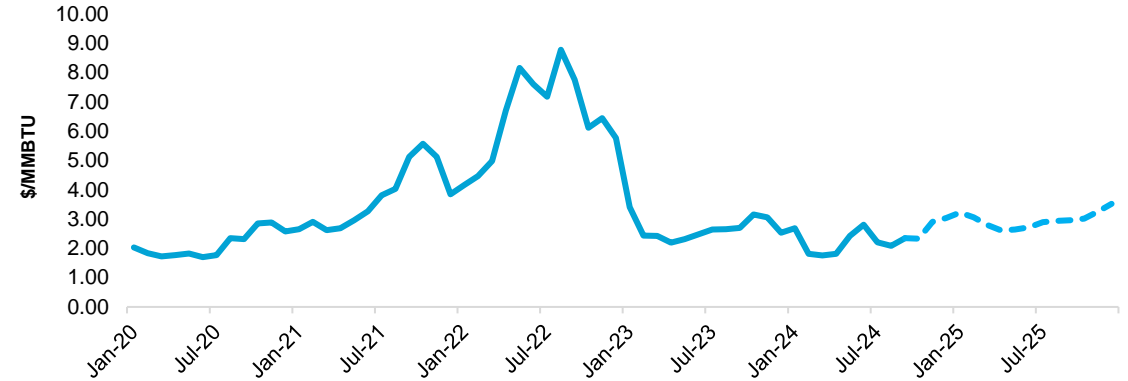
ICE Brent Price Forecast



Source: Rystad, Energy, Chemical Market Analytics by OPIS

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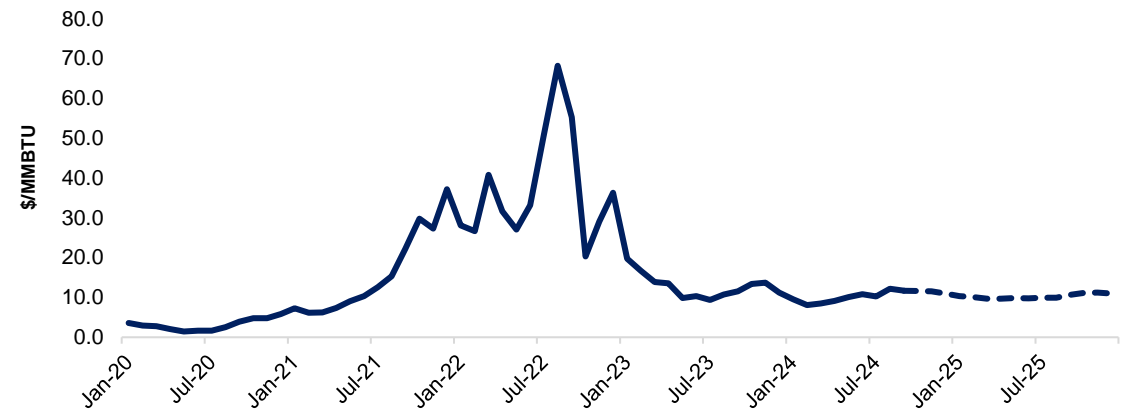
Henry Hub Natural Gas Price



Source: Chemical Market Analytics by OPIS, Rystad Energy, Argus

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TTF Natural Gas Price



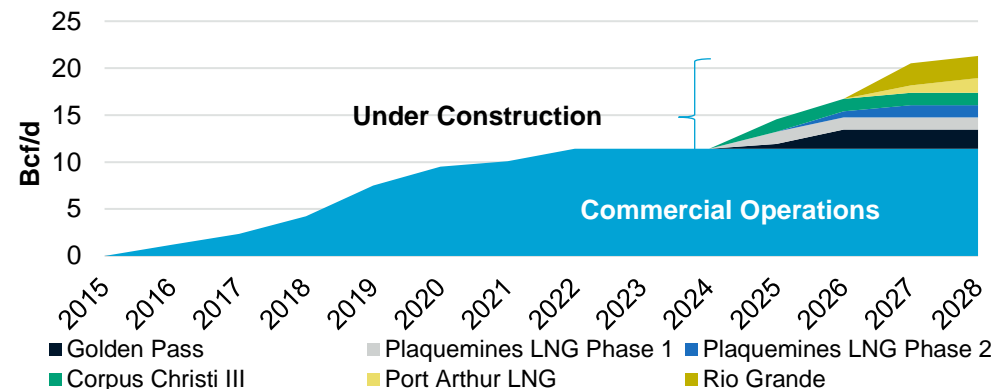
Source: Chemical Market Analytics by OPIS, Rystad Energy

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Supply is on its way, and more to come

North America drives the major growth in LNG liquefaction buildout

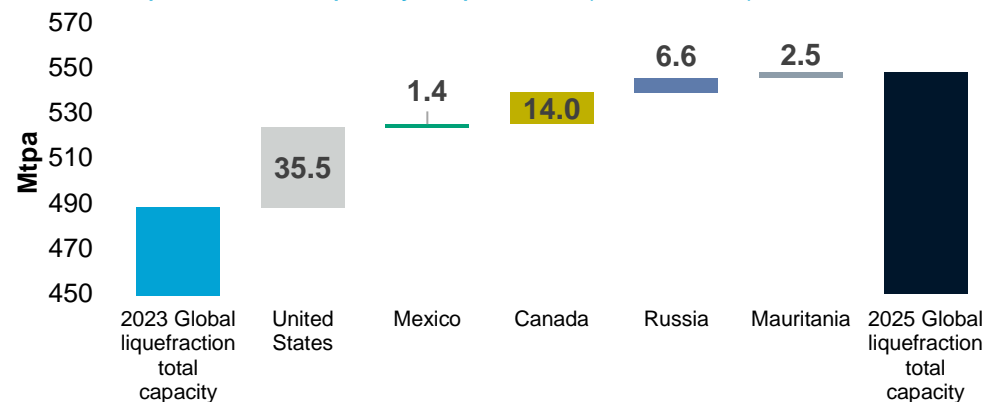
US Liquefaction Capacity



Source: Chemical Market Analytics by OPIS, EIA

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Global Liquefaction Capacity Expansion (2024-2025)



Source: Chemical Market Analytics by OPIS, Rystad Energy

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Project (2026+)	FID year	Country	Operator	Capacity (Mtpa)
Woodfibre LNG (T1-T2)	2022	Canada	Pacific Oil & Gas	2.1
Plaquemines LNG (Phase 2)	2022	US	Venture Global	9.9
Petronas ZLNG	2023	Malaysia	Petronas	2
Freeport LNG (T4)	2023	US	Freeport LNG	5.1
Cameron expansion	2023	US	Sempra Energy	6.8
Qatar NFE South	2023	Qatar	QatarEnergy	15.6
Port Arthur LNG (Phase 1)	2023	US	Sempra Energy	12
Ruwais LNG	2024	UAE	Adnoc	9.6
Cedar FLNG	2024	Canada	Pembina	3
Marsa LNG	2024	Oman	Total Energies	1
Lake Charles LNG	2024	US	Energy Transfer, LP	15
Texas LNG	2024	US	Glenfarne Energy Transition	4
Rovuma LNG	2025	Mozambique	Rovuma Area 4 Partners	18
Mexico Pacific	2025	Mexico	Mexico Pacific Ltd	14.1
Delfin FLNG 1	2025	US	Delfin Midstream	12
Rio Grande Train 4	2025	US	NextDecade	10.8
Driftwood LNG (Phase 1)	2025	US	Woodside	11

* For US, Gulf LNG operated by Kinder Morgan is proposing a 10.85 Mtpa project; Alaska LNG is also eyeing a 20 Mtpa LNG project

~150 Mtpa in the pipeline

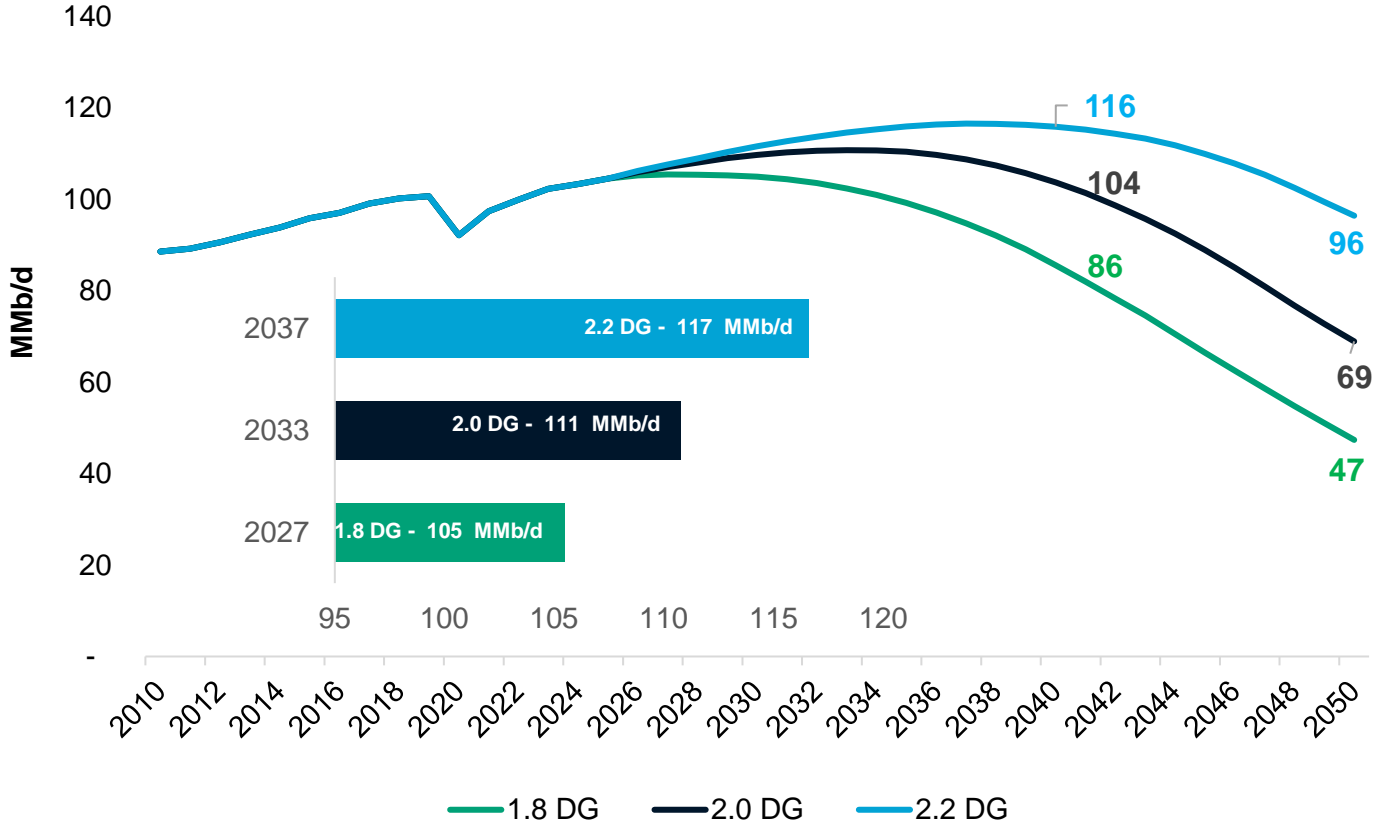
Headwind remains with current LNG permit pause by the current Administration

Long-term outlook

The background features a grid of squares and arrows. The squares are arranged in a pattern that recedes into the distance, creating a sense of depth. The arrows are also arranged in a similar pattern, pointing towards the right. The overall color palette is a gradient from light blue on the left to bright yellow on the right. The text 'Long-term outlook' is positioned on the left side of the image, in a bold, black, sans-serif font.

Decarbonization pathways create distinct challenges for petrochemical industry

Long-term oil demand scenarios



+ Sigma (2.2 DG)

- ~6% loss liquids supply
- Minor dislocations in feedstock supply & pricing
- Modest refining reconfiguration

Mean (2.0 DG)

- ~33% loss liquids supply
- Major supply & pricing impacts
- Refining rationalization & significant reconfiguration

- Sigma (1.8 DG)

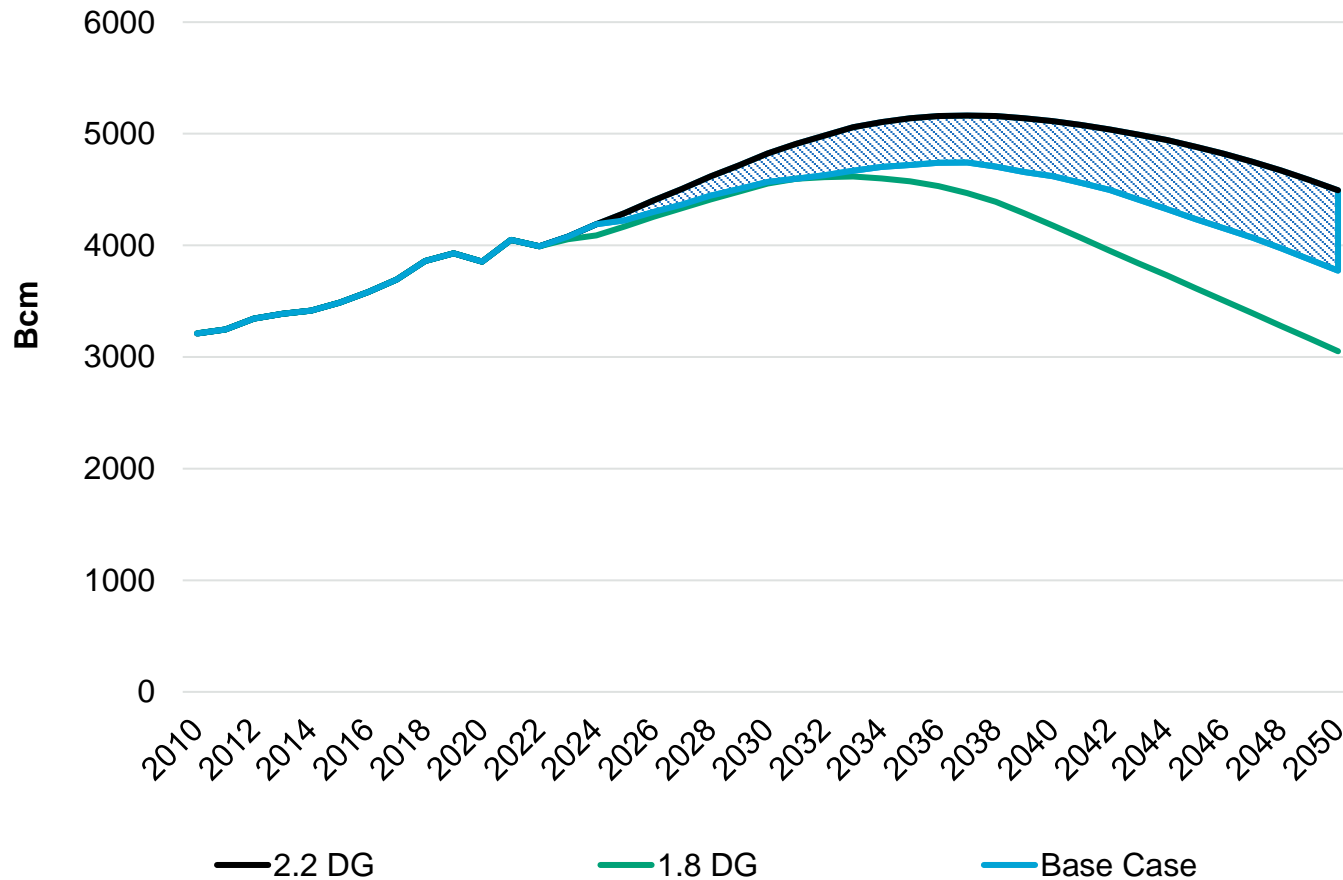
- ~54% loss liquids supply
- Rethinking of chemical demand
- Circularity innovations required

Source: Rystad Energy

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Pace of renewables growth key driver of long-term gas demand

Global Natural Gas Demand



+ Sigma (2.2 DG)

- Slow renewables deployment and electrification
- Gas used as base load in power and robust demand in industry and buildings

Base Case

- Gas used to balance intermittent renewables.
- Robust medium-term demand in industry and buildings
- Moderate development of hydrogen, batteries and CCUS

- Sigma (1.8 DG)

- ~51% loss supply by 2050
- High renewables growth and electrification reducing gas demand across all sectors

Source: Rystad Energy

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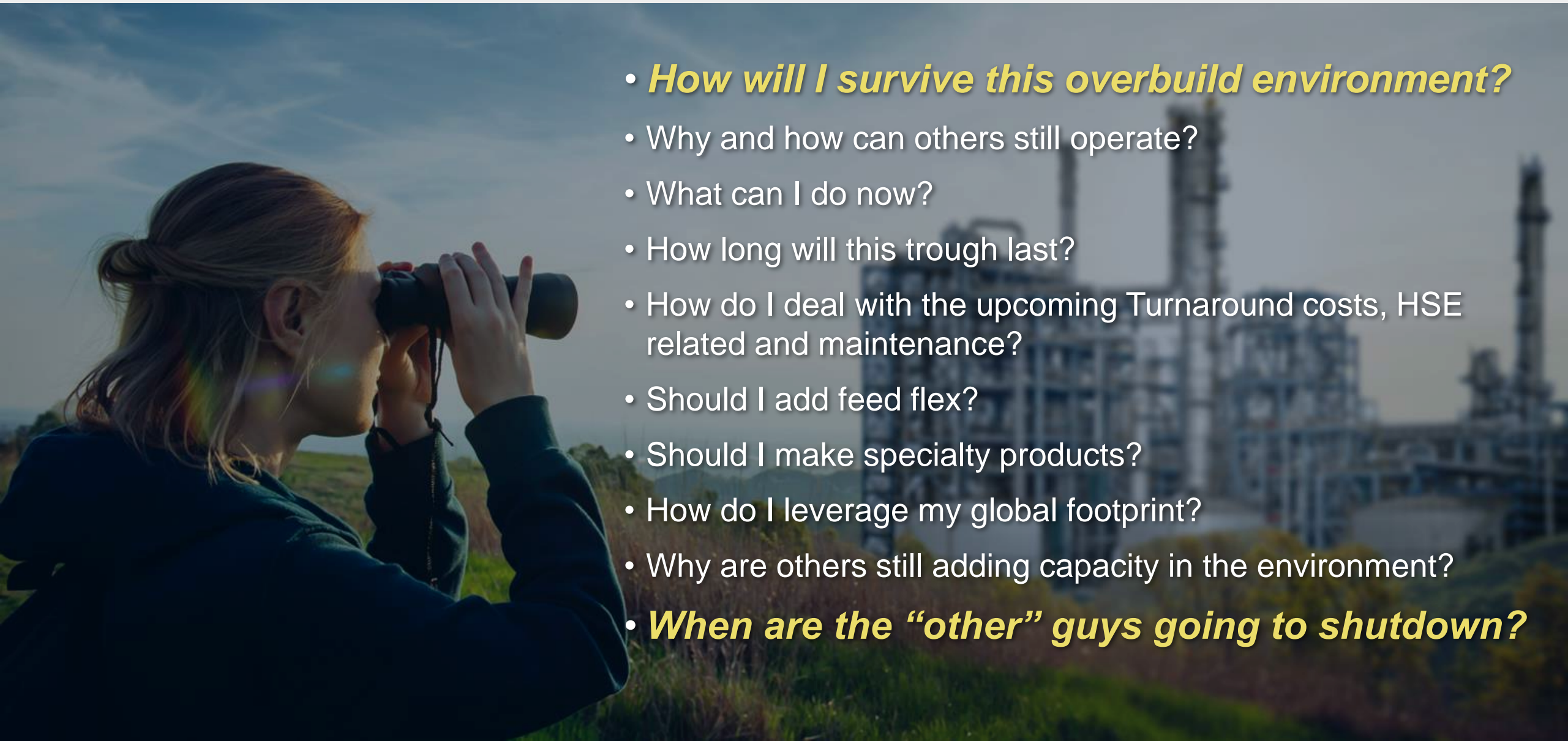
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Global Olefins – EPCA Review

After settling at the bottom of the trough, now what?

Steve Lewandowski Vice President of Global Olefins

What's the industry looking for?

- 
- A woman with blonde hair tied back, wearing a dark green jacket, is shown in profile from the side, looking through black binoculars. She is standing in a field of tall grass. In the background, a large industrial chemical plant with several tall distillation columns and complex piping is visible under a clear blue sky.
- ***How will I survive this overbuild environment?***
 - Why and how can others still operate?
 - What can I do now?
 - How long will this trough last?
 - How do I deal with the upcoming Turnaround costs, HSE related and maintenance?
 - Should I add feed flex?
 - Should I make specialty products?
 - How do I leverage my global footprint?
 - Why are others still adding capacity in the environment?
 - ***When are the “other” guys going to shutdown?***



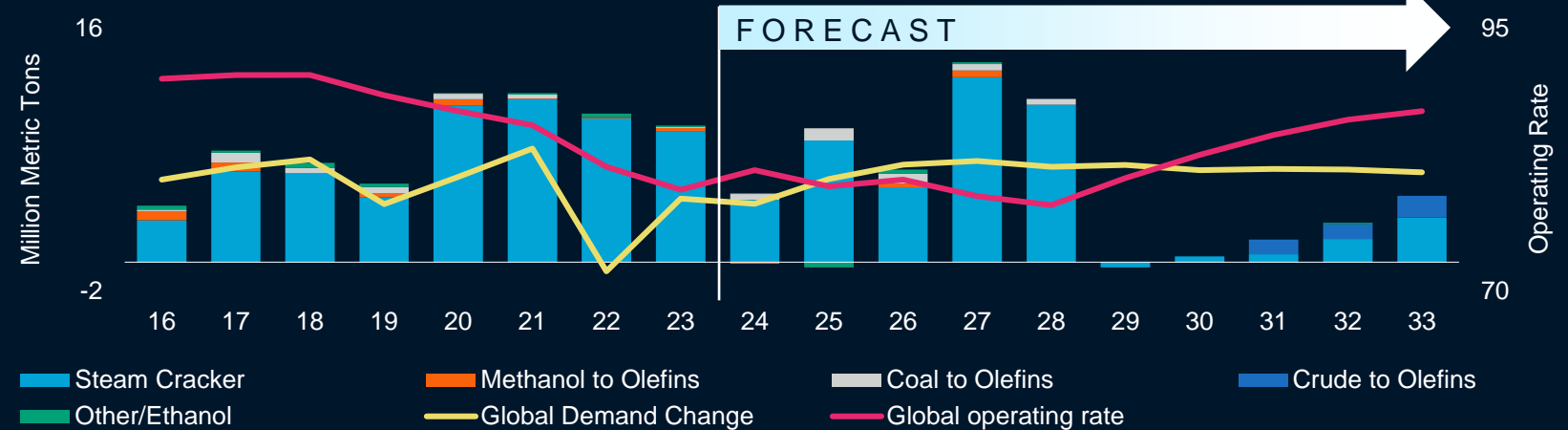
Level setting the outlook

How bad is the overbuild and how long is the trough?

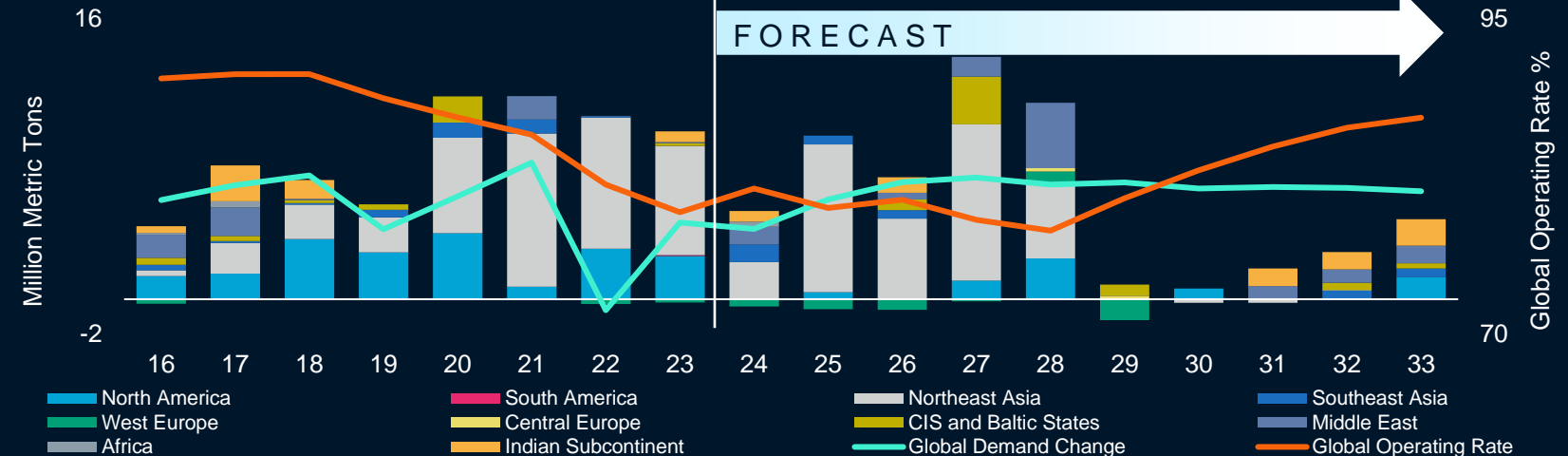
Global ethylene capacity – no relief until 2029+

- 25 balance outlook
- Build wave continues through 2028.
- Generally, even with all the economic pressures we have seen demand growth. 2022 was a 2021 adjustment year.
- Projects in many regions. China, MDE, and NAM contribution to additions in coming wave through 2028.
- Finally, in 2029 to 2033 we are forecasting a build pause to absorb some of the overbuild.

Global Ethylene Capacity and Demand YoY Growth



Global Ethylene Capacity Growth by Region and Demand YoY Growth



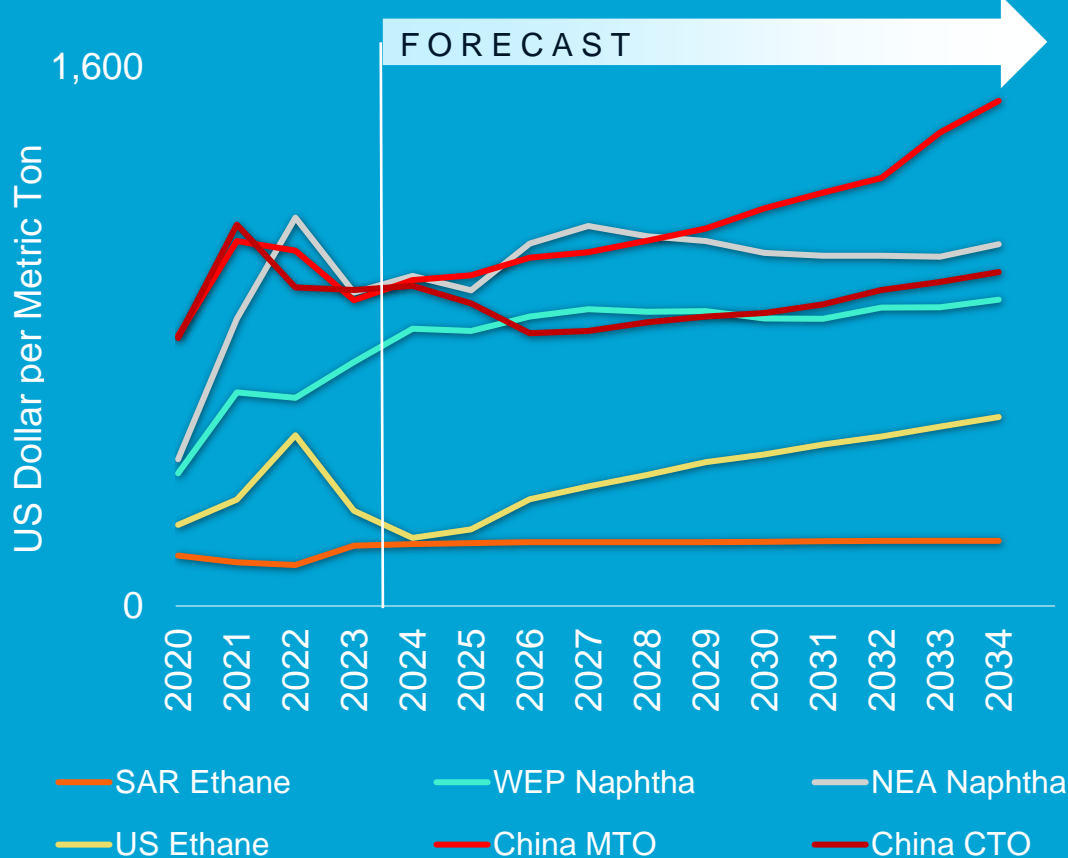
Source: Chemical Market Analytics by OPIS

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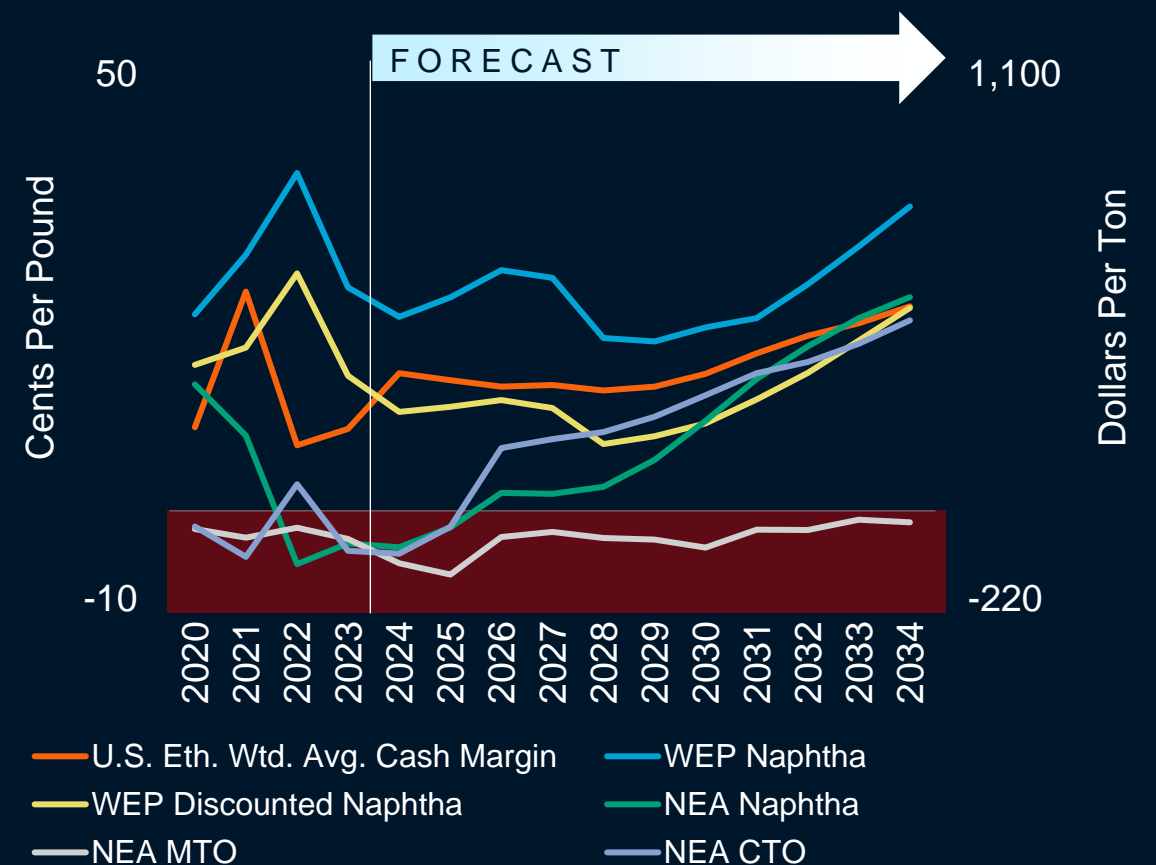
Global ethylene economics

US and MDE continue to have advantage (less for USGC), margin shifts back to crackers versus broader chain – like it has historically

World Ethylene Cash Costs



Global Ethylene Annual Cash Margins

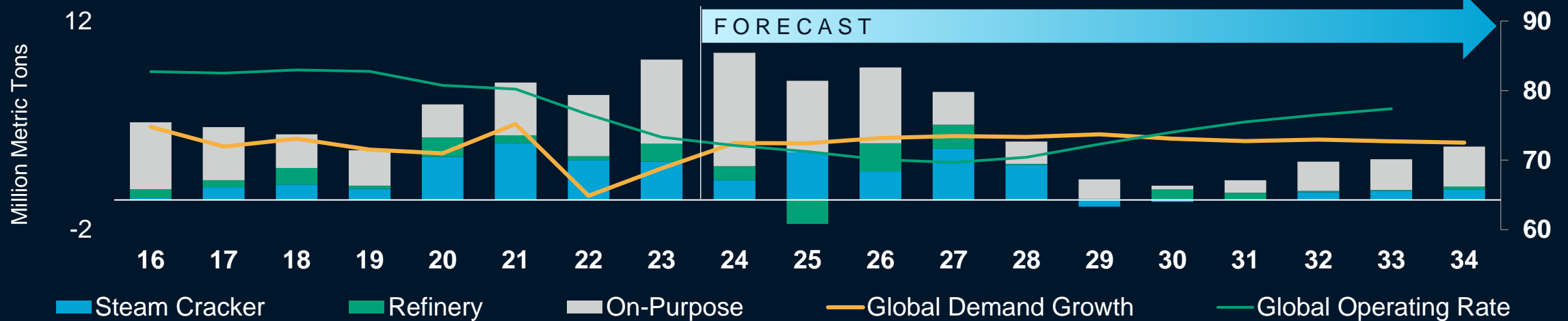


Source: Chemical Market Analytics by OPIS

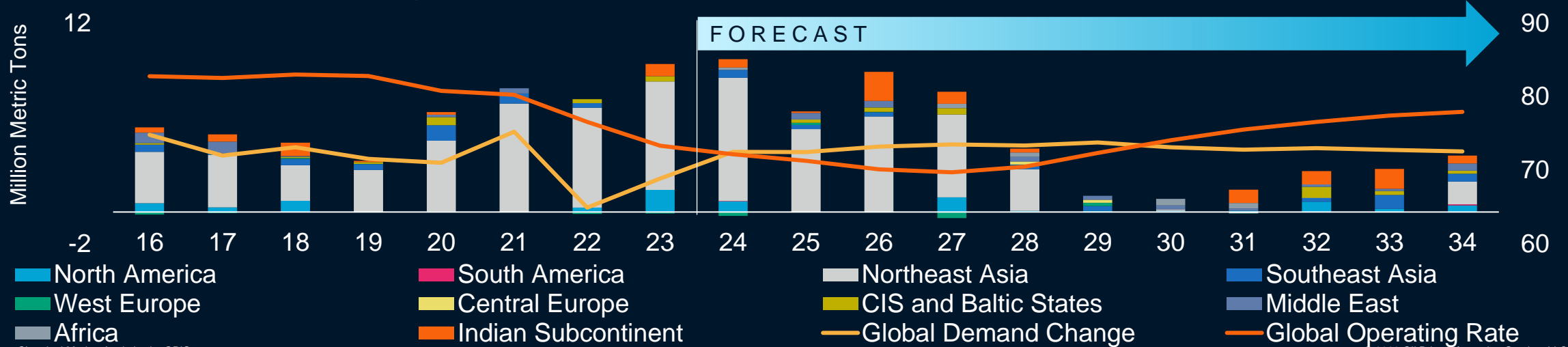
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Picking up where we left off: Propylene Oversupply

Global PG/CG Capacity Growth by Type vs Demand YOY Growth

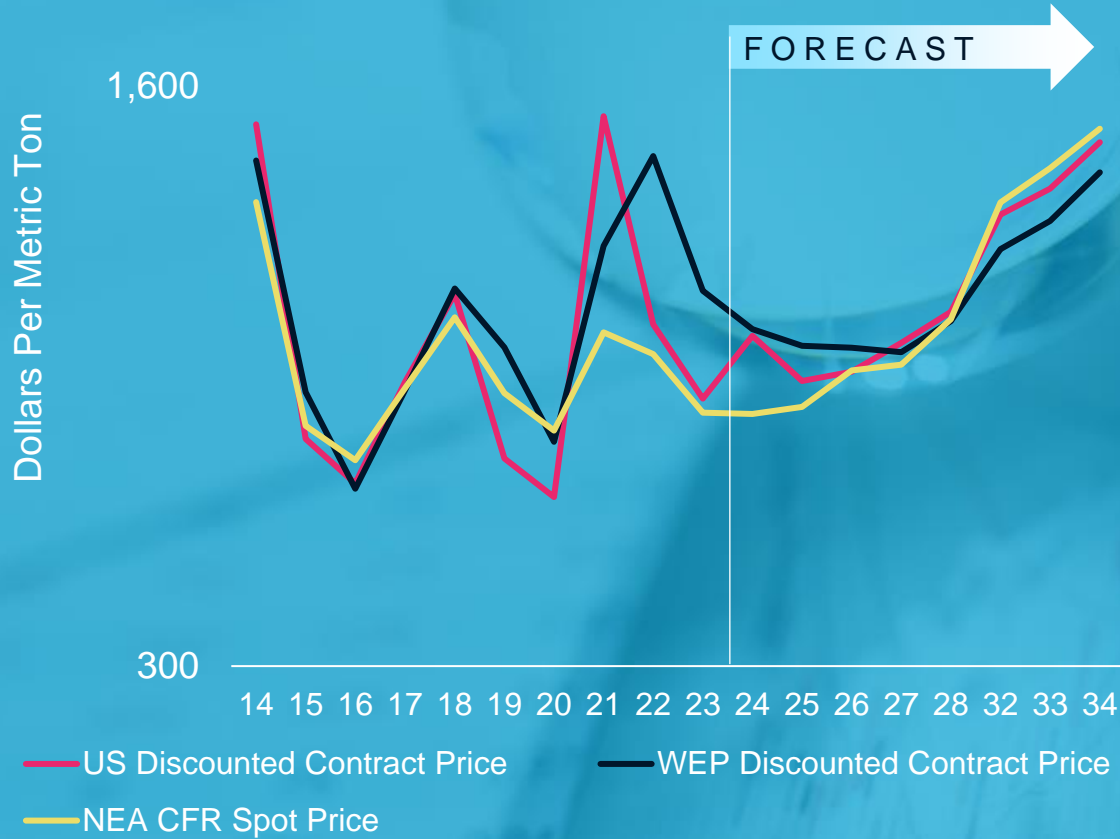


Global PG/CG Capacity Growth by Region vs Demand YoY Growth



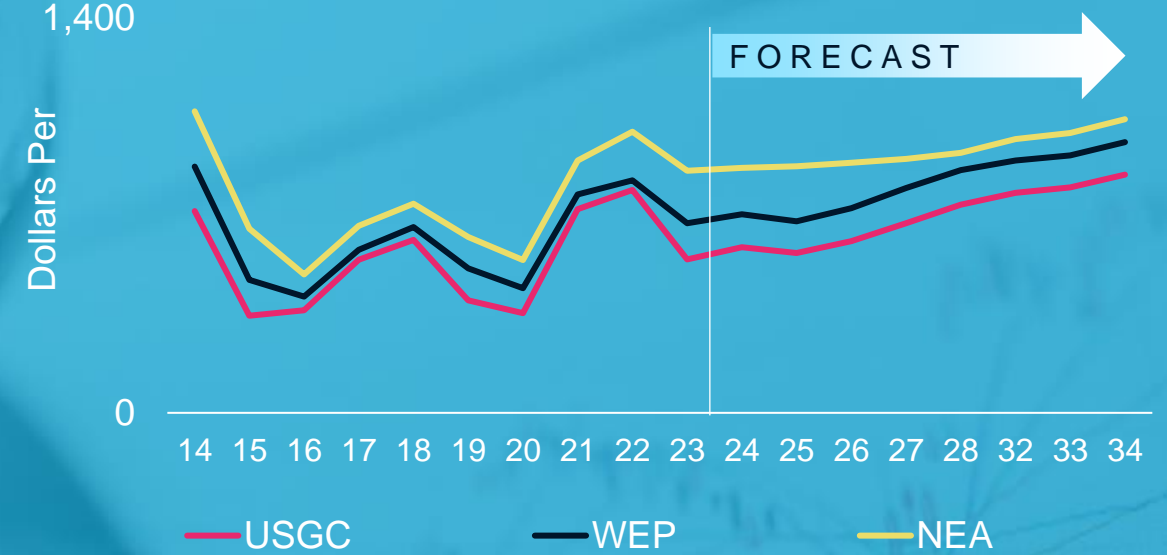
Global propylene cash costs - Annually

Global Annual Propylene Prices



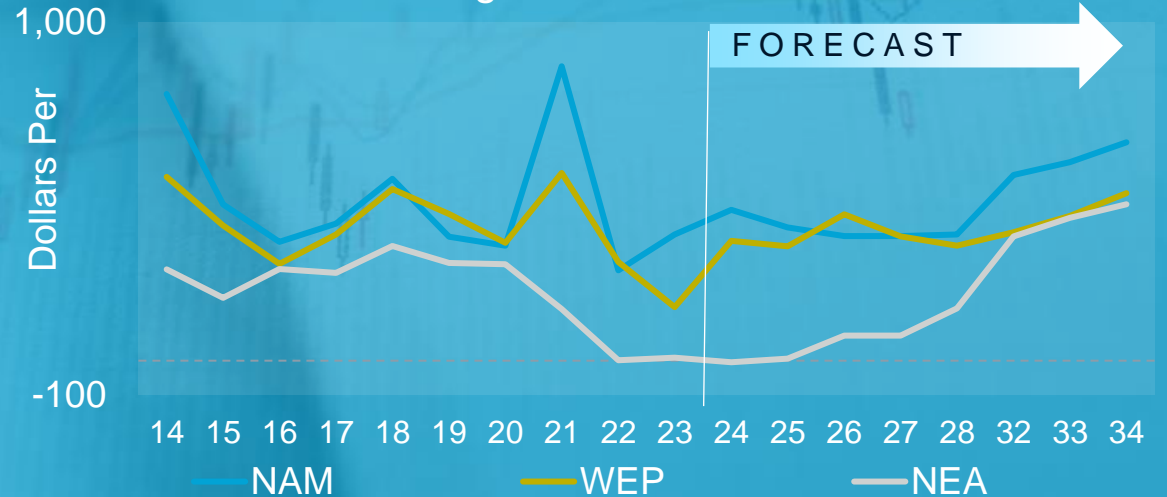
Source: Chemical Market Analytics by OPIS

Global PDH Cash Costs



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Global Annual PDH Margins



Source: Chemical Market Analytics by OPIS

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Wrapping It Up

More than 15 million metric tons of ethylene and 15 million metric tons of propylene capacity would need to shutter to bring back any semblance of margin support.

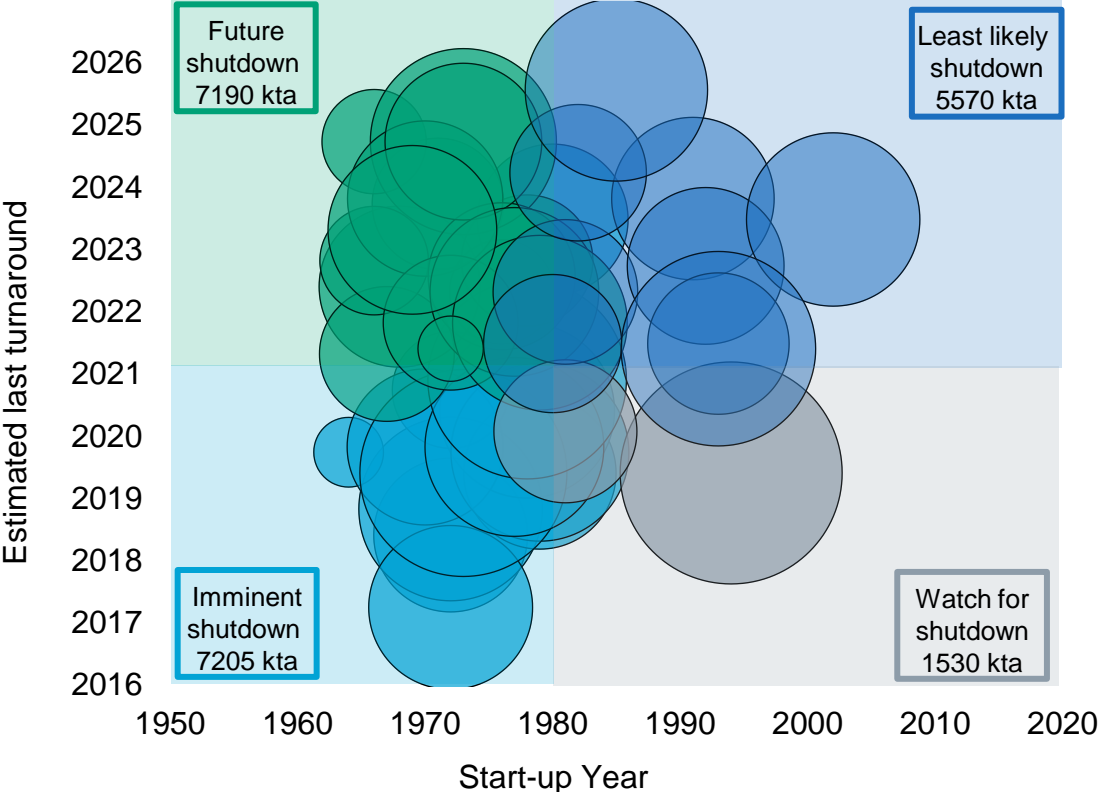




- **Demand growth to surge back:** Unlikely to see a big surge. Global economy continues to face headwinds
- **Slow down new builds underway or delay those looking for Final Investment Decisions:** China strategically unlikely to slow (still short contained ethylene), rest of world could defer/delay (very project specific).
- **Extend turnaround execution:** Take more time on work to be done and not expedite is always possible but still leaves too much capacity.
- **Idle assets:** Idle knowing demand recovery will support return to operations. Comes at some fixed cost.
- **Rationalize assets:** Not a decision to be made in haste. Asia and WEP have announced some of this. Many drivers need to be assessed.

Ethylene: Age, capacity and last turnaround all signals for rationalizing or idling

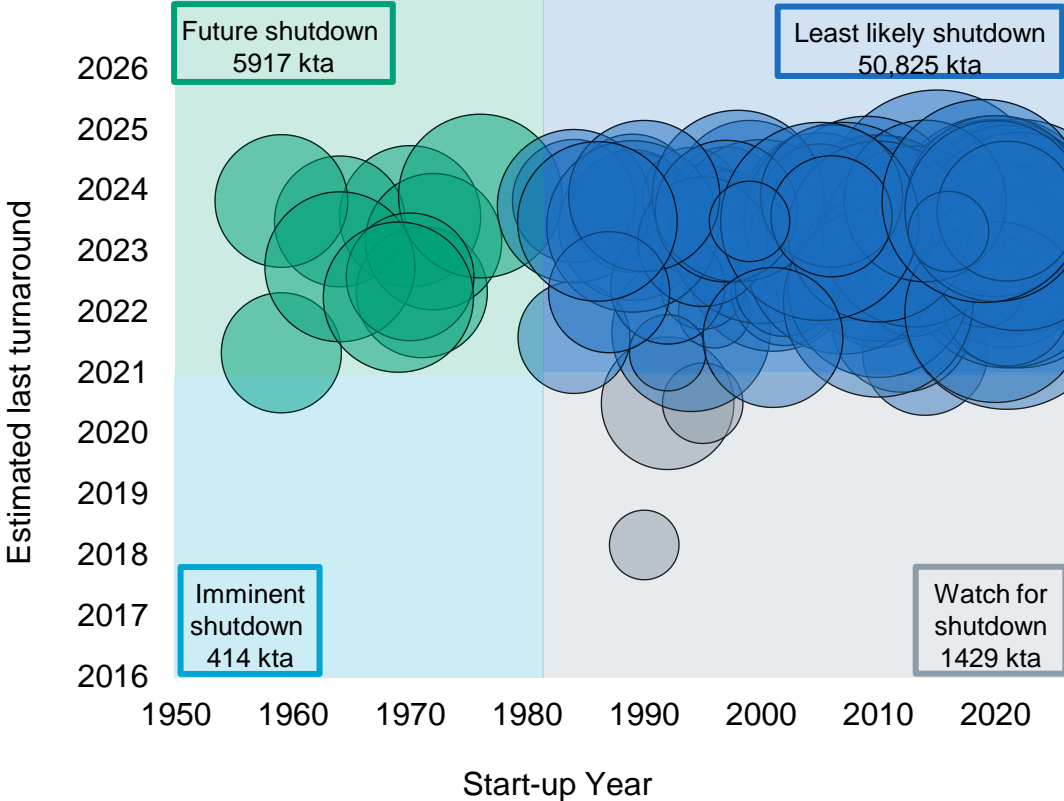
West European Steam Crackers Start-up Versus Turnaround - September 2024



Source: Chemical Market Analytics by OPIS

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Asian Steam Crackers Start-up Versus Turnaround - September 2024

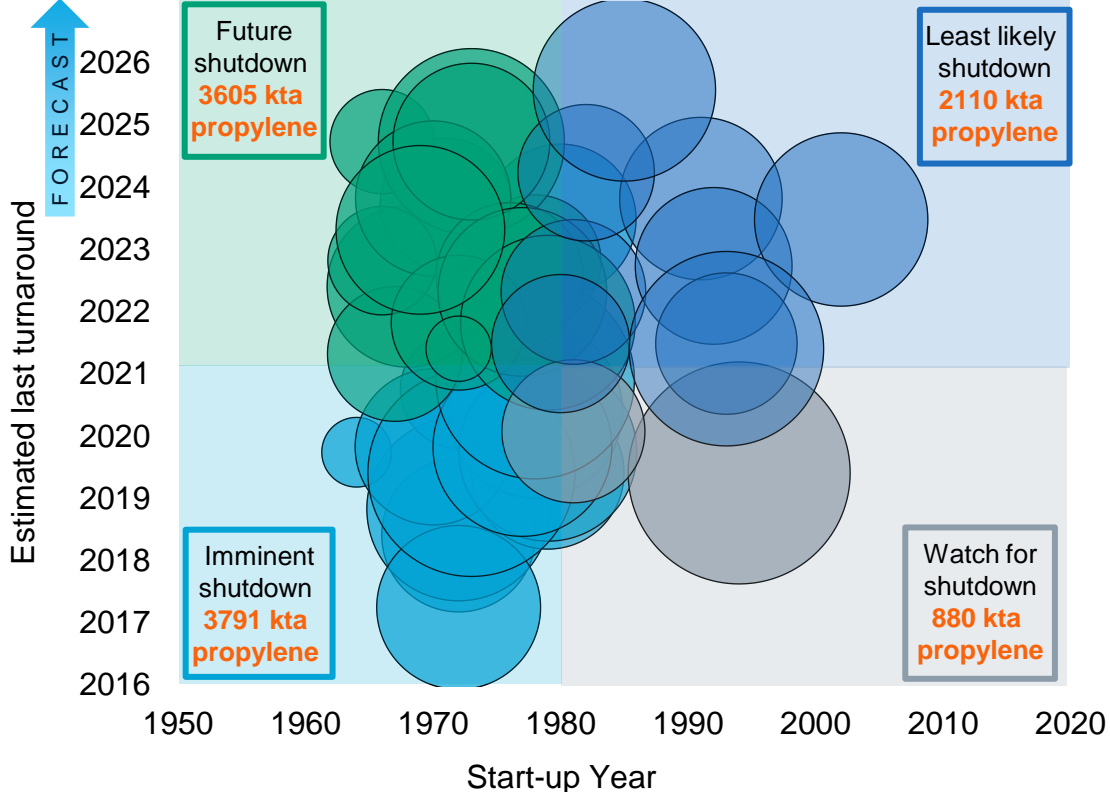


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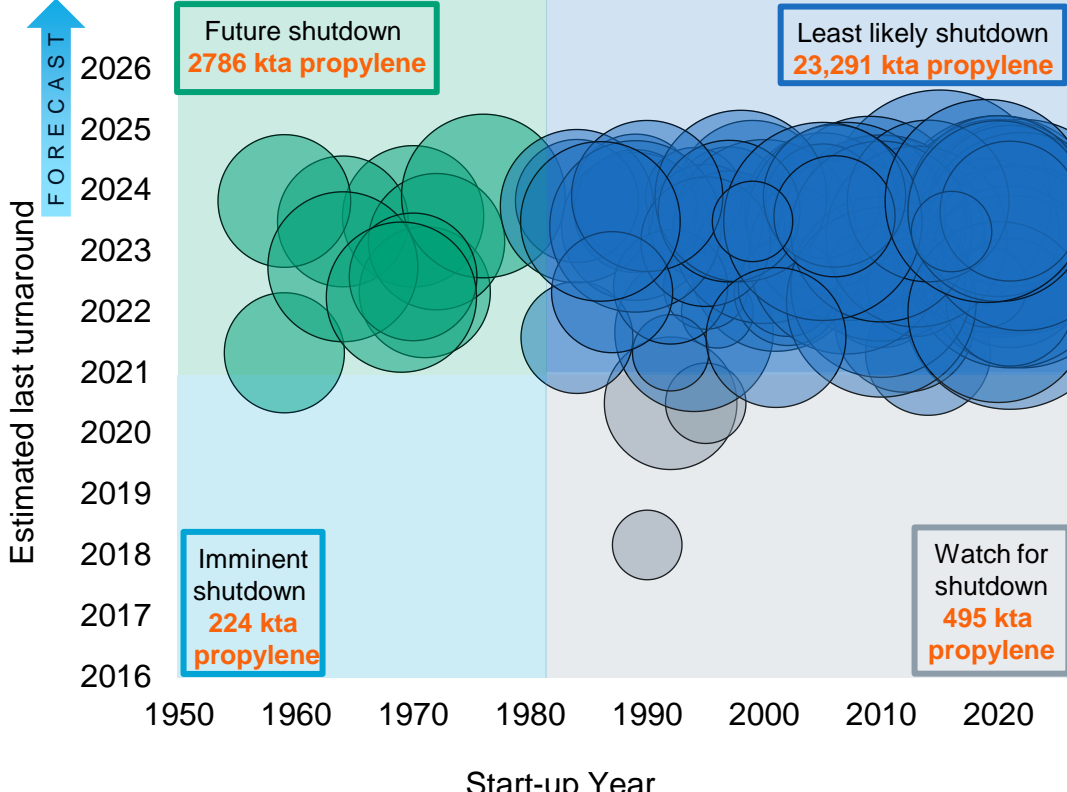
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Propylene Red Era: Negative cash margins – who's at risk – linked to steam crackers?

West European Steam Crackers Start-up Versus Turnaround
September 2024



Asian Steam Crackers Start-up Versus Turnaround
September 2024



Source: Chemical Market Analytics by OPIS

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Thank You.

Happy to answer more idling / rationalizing questions one to one.

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Polyolefins

Kaushik Mitra, Executive Director, EMEA Polyolefins

Macroeconomic Slowdown



- Inflation ↗
- Interest rate ↗
- Spending Power ↘
- China slowdown ↘

Supply Glut



- Operating Rates ↘
- Profitability ↘
- Rationalisation?

Cost Inflation

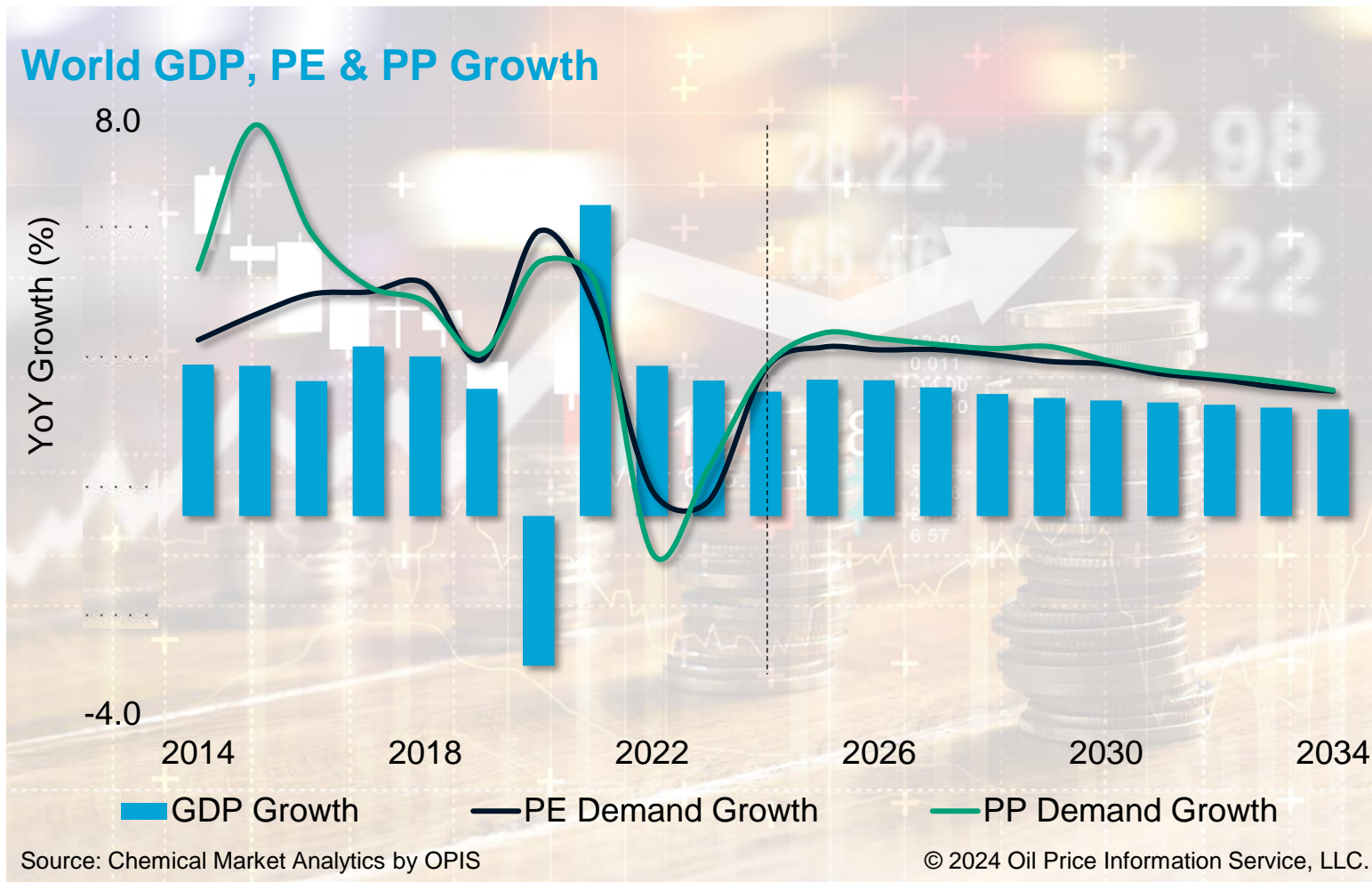


- Production cost ↗
- Supply chain ↗
- Working Capital Cost ↗

Sustainability Focus



- Decarbonization cost ↗
- Resource conservation ↗
- ROI ↘



- PE/ PP Demand growth slowing, to mirror GDP growth rate in future
- Growth of services (as GDP component), optimization of material usage, rise in circularity main reason
- Non-durable (especially short use cycle items) under sustainability scrutiny, durable applications immune

End use Markets Hit By Cyclical & Structural Factors, Even As Strategic Forces Remodel Outlook

- China real estate down
- Globally mortgage rate up
- Wind, solar, Telecom to grow

- Discretionary spending \searrow
- China's exports up
- Packaging: Circularity \nearrow

- Post-Covid Bump
- Self-sufficiency drive
- Drugs, infrastructure



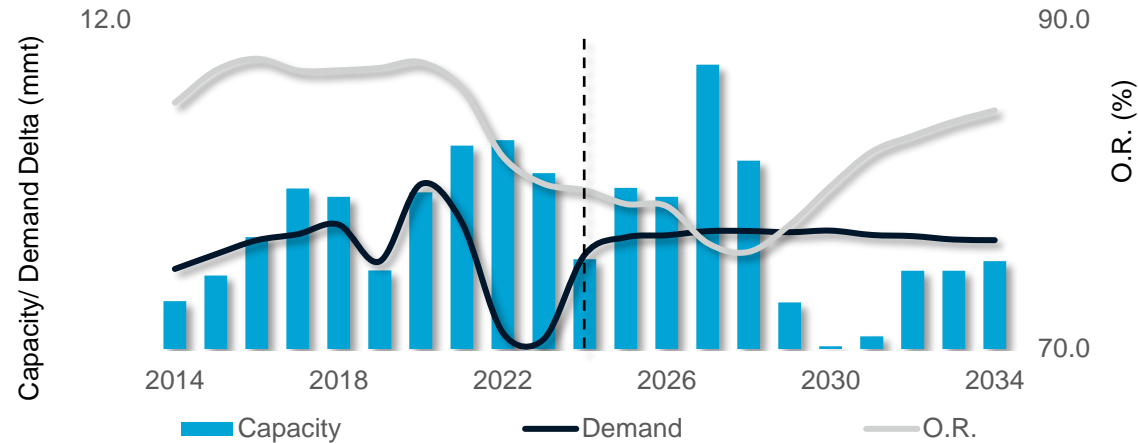
- Agriculture in focus
- Investment lagging
- Focus: Crop, logistics

- Commodity downturn \searrow
- Focus: Secondary, tertiary
- Costs up \nearrow

- Electrification \nearrow
- China Factor
- Lightweighting

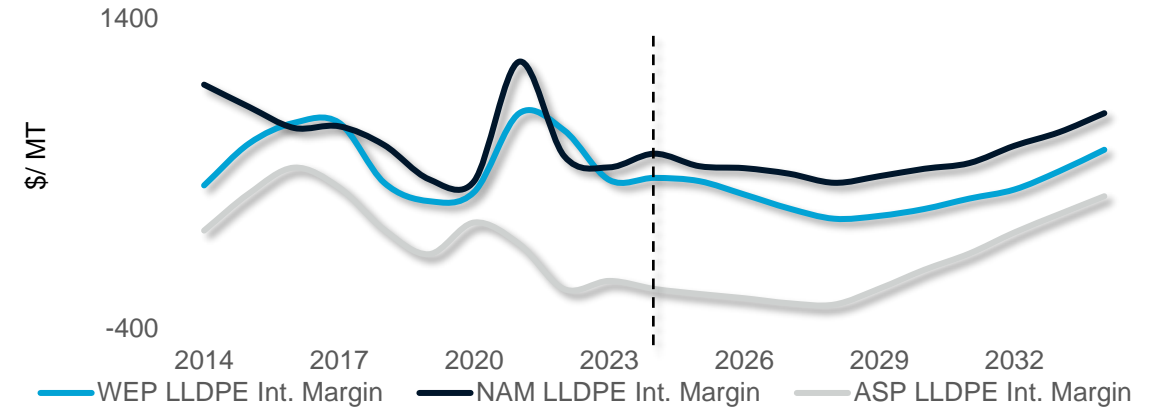
Polyolefin Market Oversupplied, Industry Searching For Bottom

PE World Capacity, Demand Growth & O.R.



Source: Chemical Market Analytics by OPIS

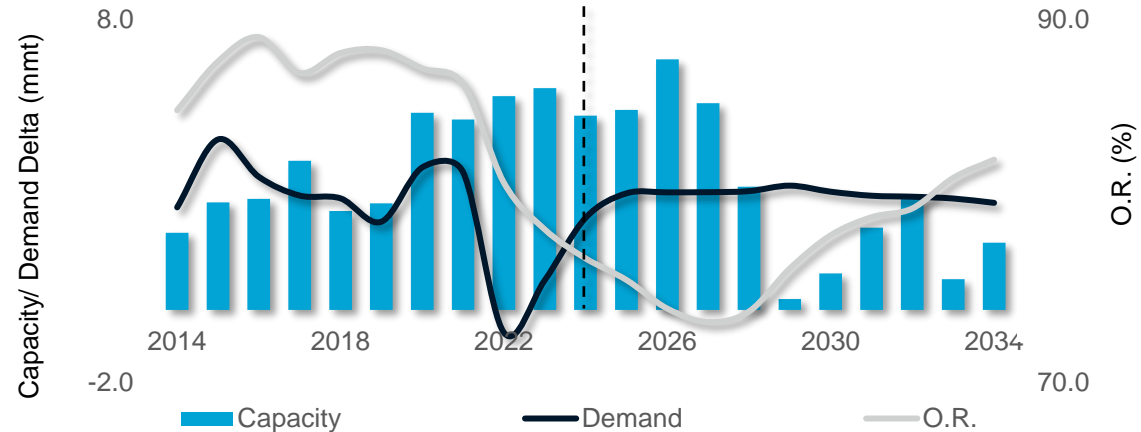
LLDPE Integrated Margin By Region



Source: Chemical Market Analytics by OPIS

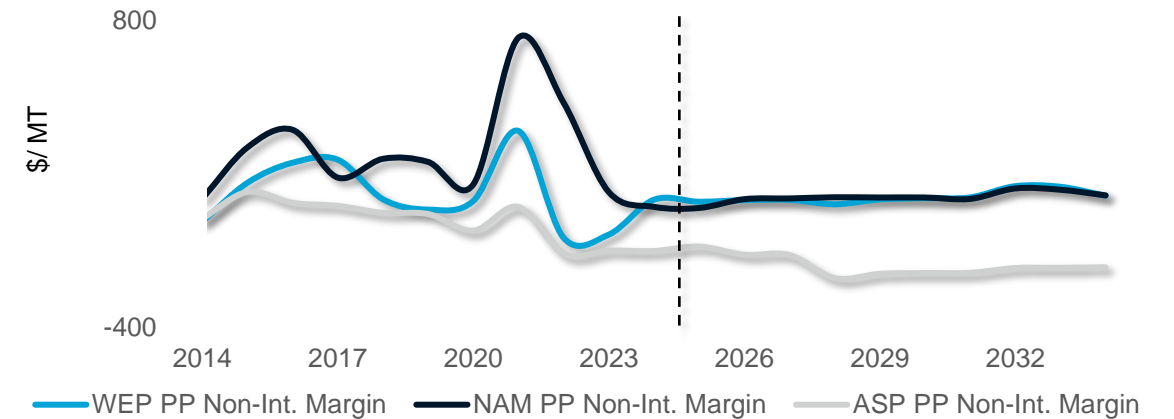
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PP World Capacity, Demand Growth & O.R.



Source: Chemical Market Analytics by OPIS

PP Non-Integrated Margin By Region



Source: Chemical Market Analytics by OPIS

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Decarbonization

- Electrification
- Renewable energy
- ETS shift in Europe
- CBAM

Resource Conservation

- Chemical recycling
- Green feedstock
- Investments & Economics in sharp focus

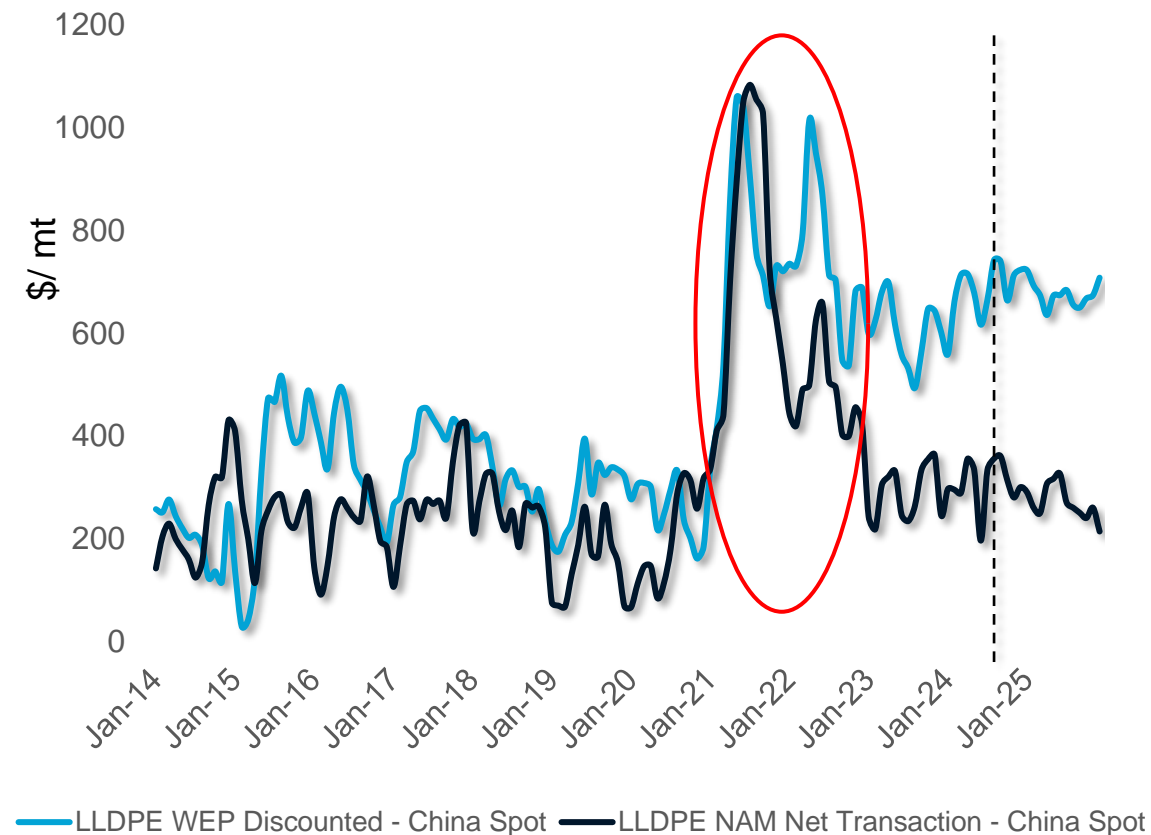
Environmental Leakage

- Single use plastic main focus
- Displacement of virgin modest in base case
- Regulation, investment key

Supply Chain Bottlenecks Becoming Chronic, Causing Dislocation Of Markets & Arbitrage Swings

	Now	Last Month	Last Year
Shanghai – Rotterdam	\$5,876	-36%	363%
Rotterdam – Shanghai	\$293	-9%	51%
Los Angeles – Shanghai	\$299	7%	-35%
Shanghai – New York	\$8,400	-20%	215%
New York – Rotterdam	\$558	3%	21%
Rotterdam – New York	\$2,356	29%	77%

WEP & NAM Price Difference With China



Source: Chemical Market Analytics by OPIS

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Polyolefins, Key Takeaway: Lower For Longer



Demand

Demand recovers on macroeconomic improvement, pent-up demand & restocking



Sustainability/ Circularity

Focus on decarbonization, resource conservation & prevention of environmental leakage



Capacity

Capacity builds continue led by China, with no signs of recalibration despite prevailing market weakness



Supply Chain Bottlenecks

Bottlenecks persists due to geopolitics, asymmetry of trade flow, dislocating markets and causing arbitrage swings



O.R./ Margin/ Profitability

O.R. plummets to unprecedented level, with further downside risk. Margins/ profitability sinks, volatility rises



Plant Closure

Plant closure announced in Europe. Expected closure inadequate to rebalance the market

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Aromatics

Duncan Clark, Vice President of Global Aromatics and Fibers

Aromatics global operating rates have reached historic lows

Aromatics markets have been in a global downturn for a number of years due to significant capacity investments in mainland China

Negative margins in Asia have pressured prices in other regional markets including Europe

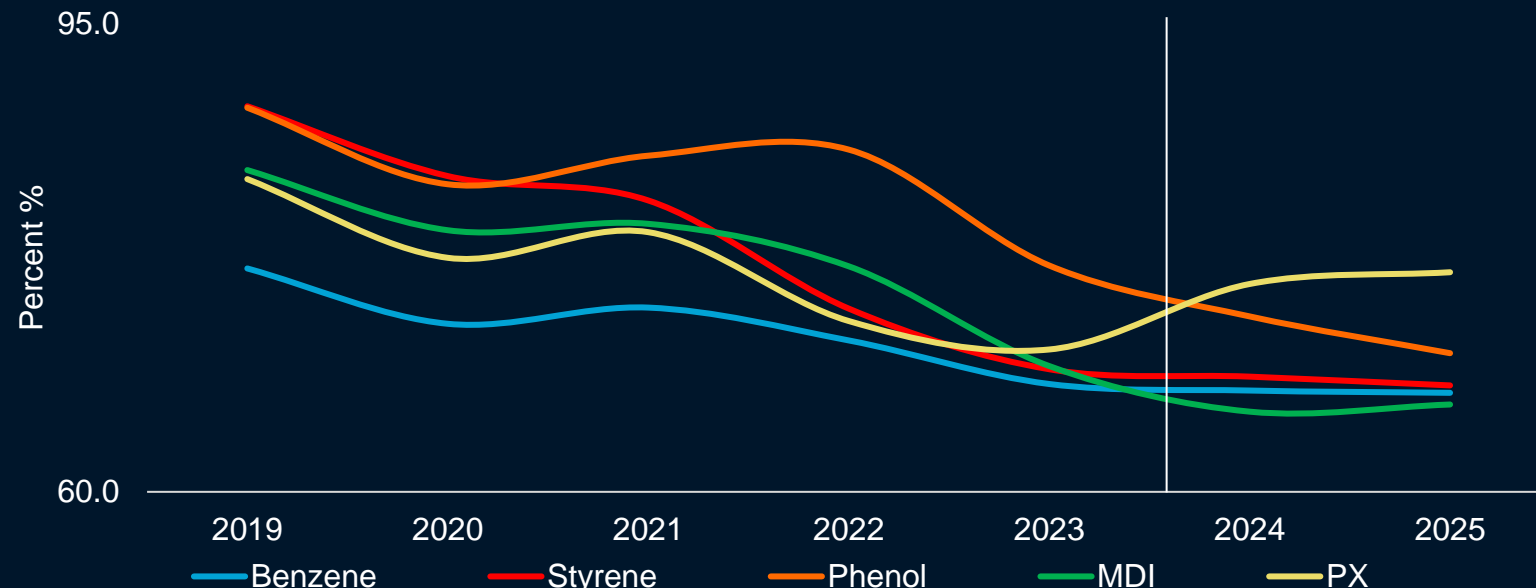
European gas prices have stabilised at double historical levels, exacerbating the cost disadvantage

The European economic situation has not improved sufficiently to boost demand in key sectors

Gasoline and octane have softened, easing cost pressure for benzene and xylenes/toluene derivatives

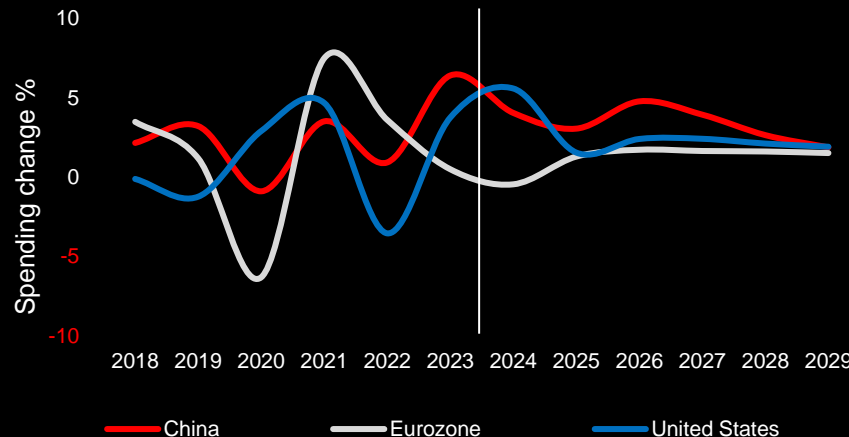
Logistics costs and delays have impaired imports at times but Europe remains cost disadvantaged

Aromatics Nameplate Global Operating Rates



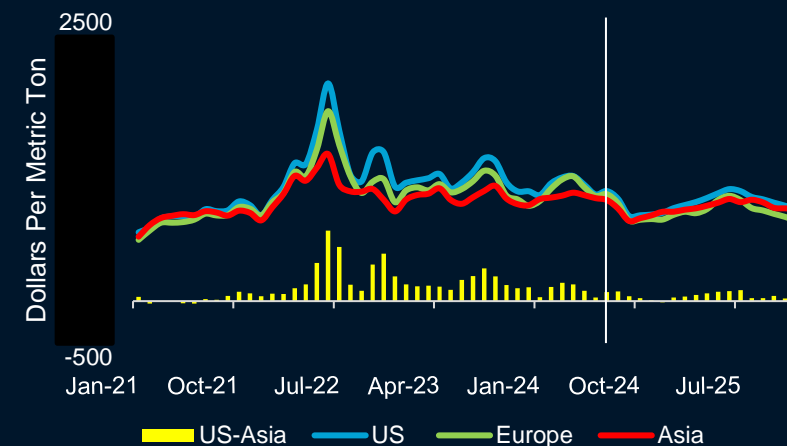
Source: Chemical Market Analytics by OPIS

Building Construction



Source: Oxford Economics

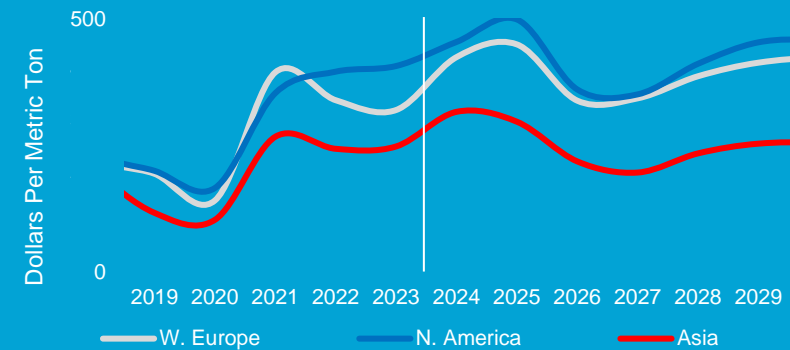
Regional MX spot prices



Source: Chemical Market Analytics by OPIS

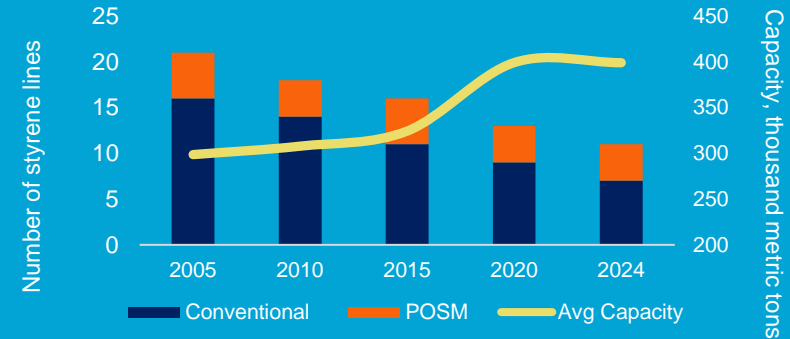
Benzene has been robust, derivatives have struggled

Regional benzene naphtha price spreads

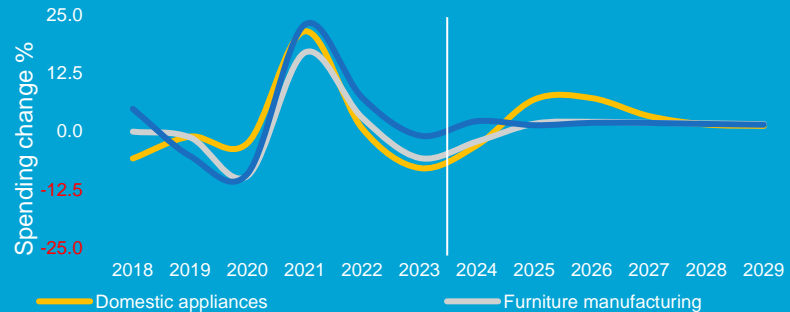


Source: Chemical Market Analytics by OPIS

European styrene capacity



Eurozone - key sectors outlook



Source: Oxford Economics

Benzene

- European benzene pricing has been supported by arbitrage pressure from the US
- Demand remains weak due to negative or slow growth in the automotive, construction and appliances sectors
- Supply has been constrained by low steam cracker rates, weaker gasoline exports to West Africa/US and idled STDP units.
- More benzene will be extracted from pygas after export gasoline specification restrictions in Belgium and the Netherlands were introduced

Styrene

- European styrene costs are globally disadvantaged
- Increasing styrene and derivative imports have reduced local demand, sustainability pressure on PS
- The European styrene industry is rationalising, leading a global trend which is set to continue
- Unplanned outages in Europe and US have created price volatility and maintained reasonable margins

Phenol

- H1 demand better than H2 due to Red Sea import delays but increased phenol derivatives now arriving from Asia
- Adders over benzene have fallen sharply, especially for exports to India but acetone has propped up margins
- Gasoline blending economics for cumene have not been supportive this year
- Cumene and phenol/acetone assets remain idled in Europe with further closures of cumene expected

MDI

- Europe has generally been lowest priced region for MDI, restricting import pressure, despite highest costs
- Margins improved above breakeven due to force majeures/planned turnarounds and benzene decline
- Better demand versus 2023 although construction market has been poor
- Global MDI business has bottomed out in 2024, expectations are for stronger 2025 European recovery

Paraxylene/ PTA

- Regional polyester production has collapsed under pressure from Asian polyester imports
- 1.8 million mt of PTA capacity has closed, paraxylene demand is 60% of 2021 level
- Freight from Middle East remains high for all but Medium Range vessels (40 kt)
- Europe export opportunity to Turkey in 2025 to serve new world scale PTA plant

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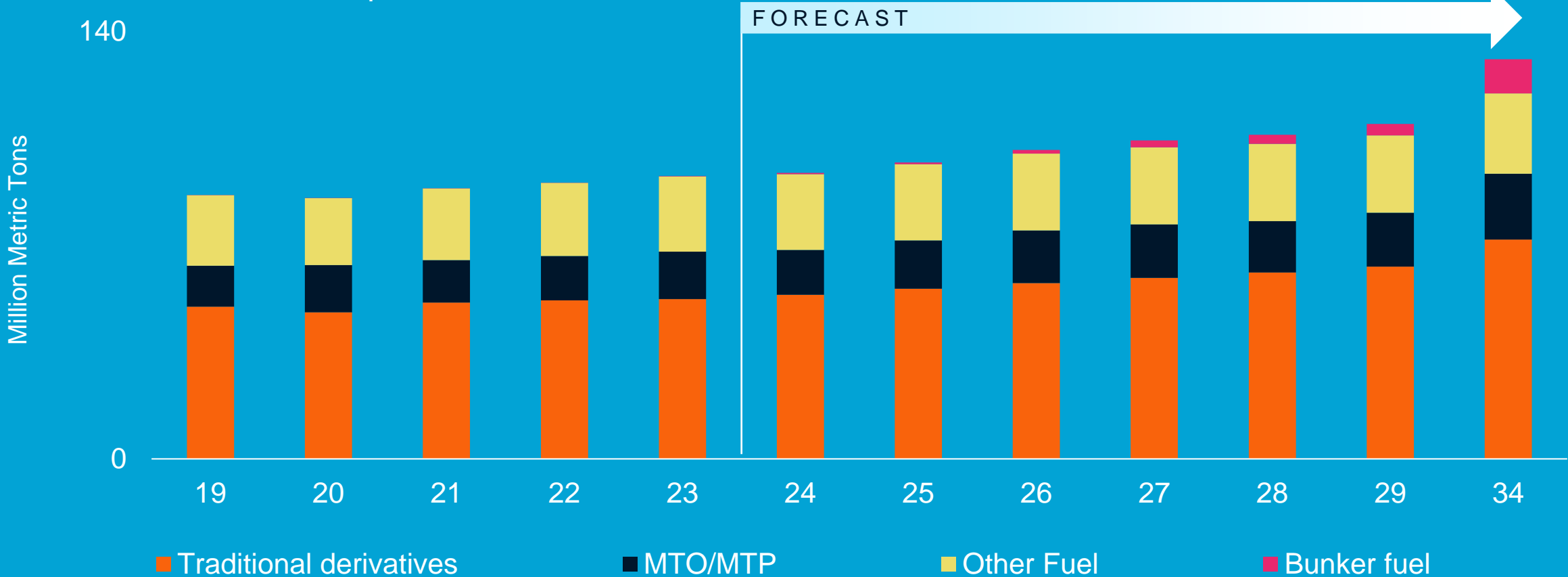
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Methanol

Mike Nash, Vice President, Syngas Chemicals

Methanol to grow at a rate similar to GDP: Reliant more on marine fuel, chemicals, less on MTO/fuels

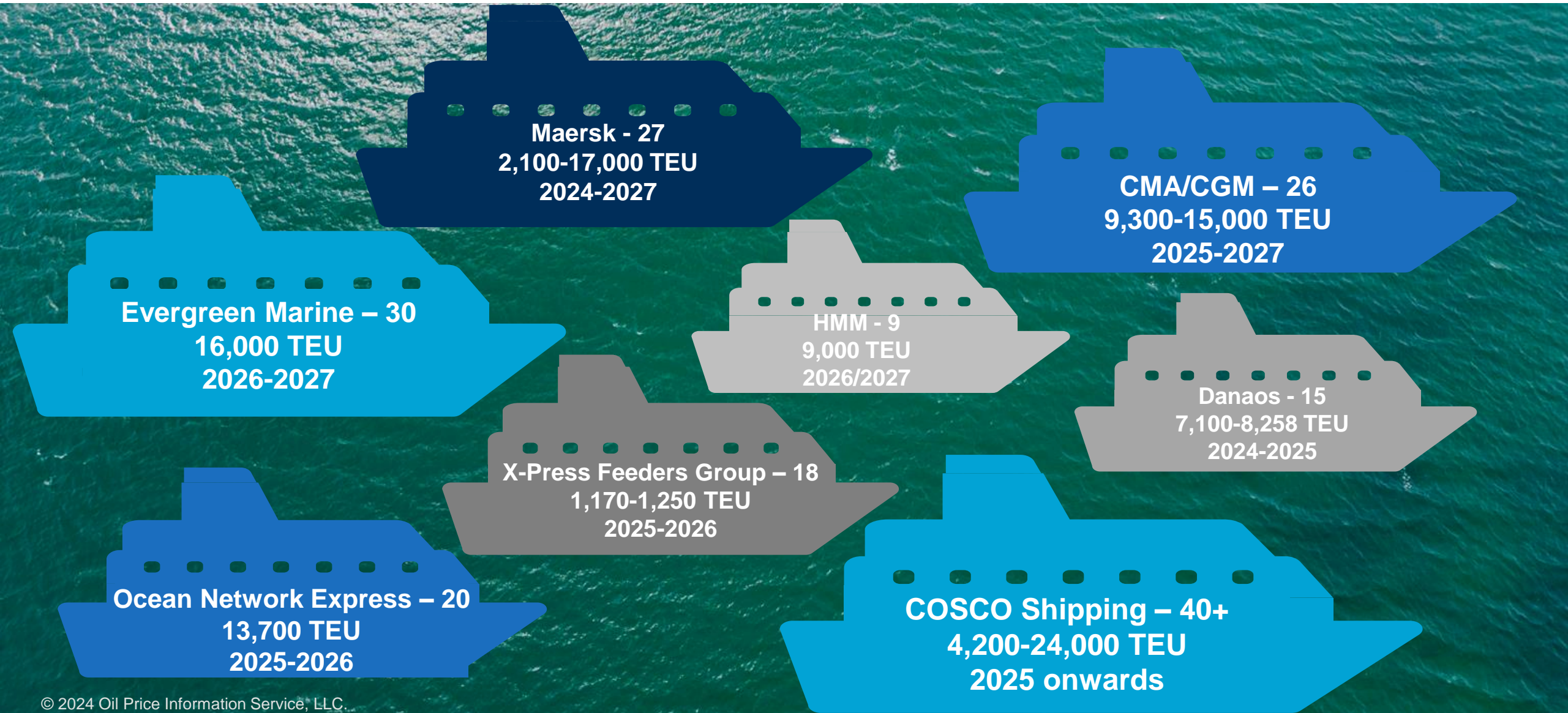
Global Methanol Consumption



Source: Chemical Market Analytics by OPIS

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Some existing and announced ships using methanol as a fuel: The pace of growth has increased

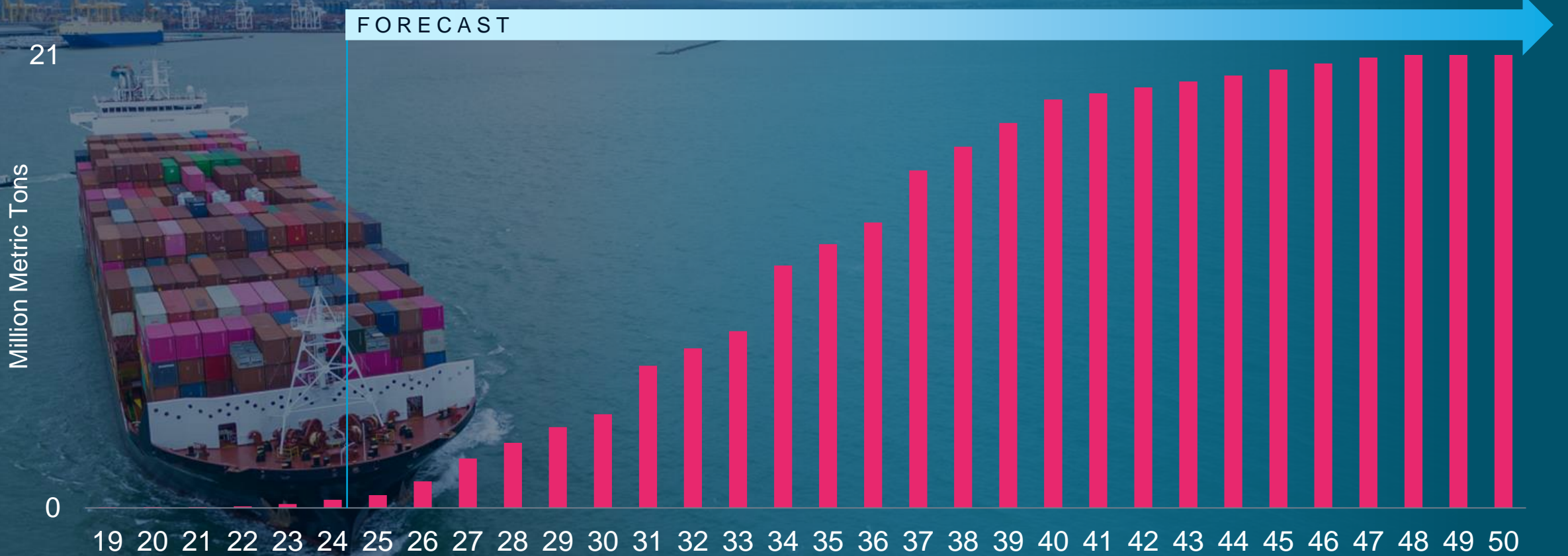


Sustainable methanol projects around the world



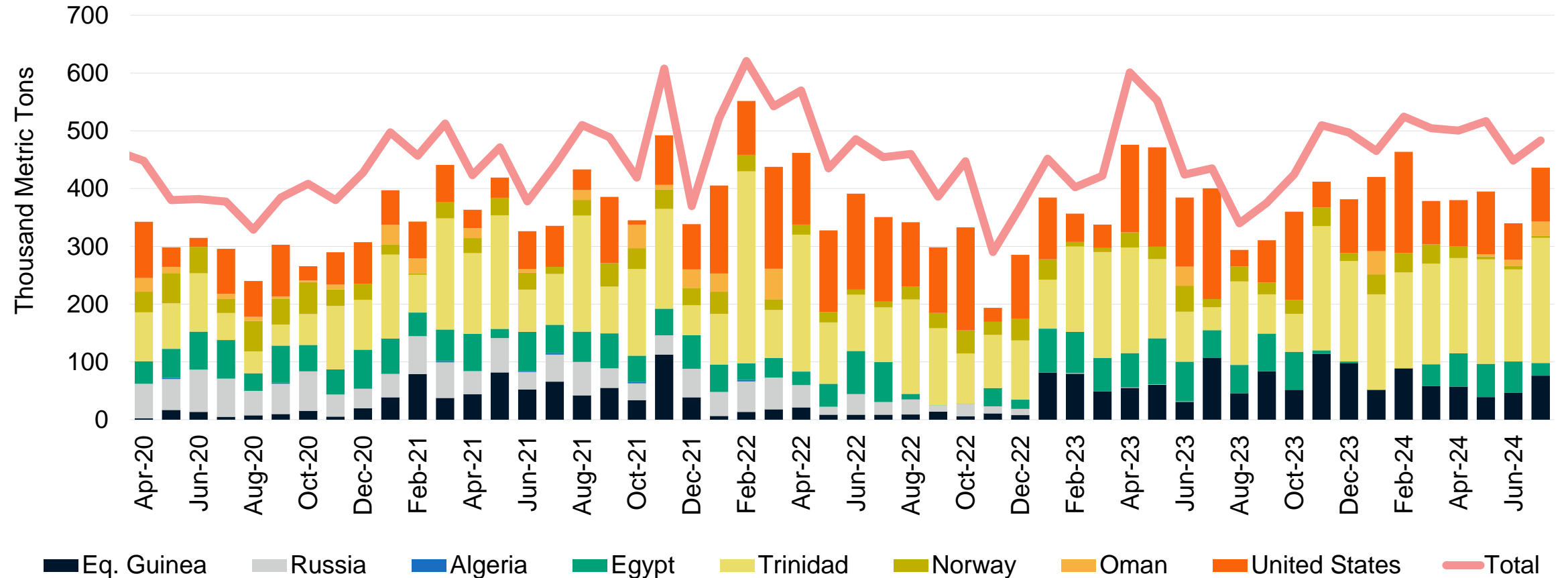
Methanol as a marine fuel: Continues to grow extremely fast from a very low base

Global Bunker Fuel Demand 2019-2050



Europe's Methanol imports primarily sourced from the Atlantic Basin

West Europe Methanol Monthly Imports



Source: Chemical Market Analytics by OPIS

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World Methanol Conference The Two Worlds of Methanol

22-24 October 2024 | Radisson Blu Scandinavia Hotel | Copenhagen, Denmark

Join with participants from across the globe, including Chemical Market Analytics experts and industry leaders to gain the latest insight and deep analysis into the methanol markets as you connect with your peers and industry professionals

Agenda

22 October 2024

- Workshop: The Fundamentals of Methanol

23-24 October 2024

- Conference: The Two Worlds of Methanol



LEARN MORE



Ammonia service launching in December 2024

Insight, data, forecasting and analysis tool.
To include:

- Short and long-term (to 2050) price forecast. Including blue and green ammonia references
- Supply-demand analytics for Ammonia and all derivatives (fertilizer and non-fertilizer) to 2050
- All potential low-carbon ammonia capacities reviewed
- A service shaped through interaction with industry stakeholders
- Open methodology, transparent assessments and concise insights
- Monthly market updates
- Quarterly webinars/podcasts



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Chlor-vinyls

In the valley of a short-term trough

Nick Kovics Vice President, Global Inorganics

Truisms in the sector

Chlorine = Construction

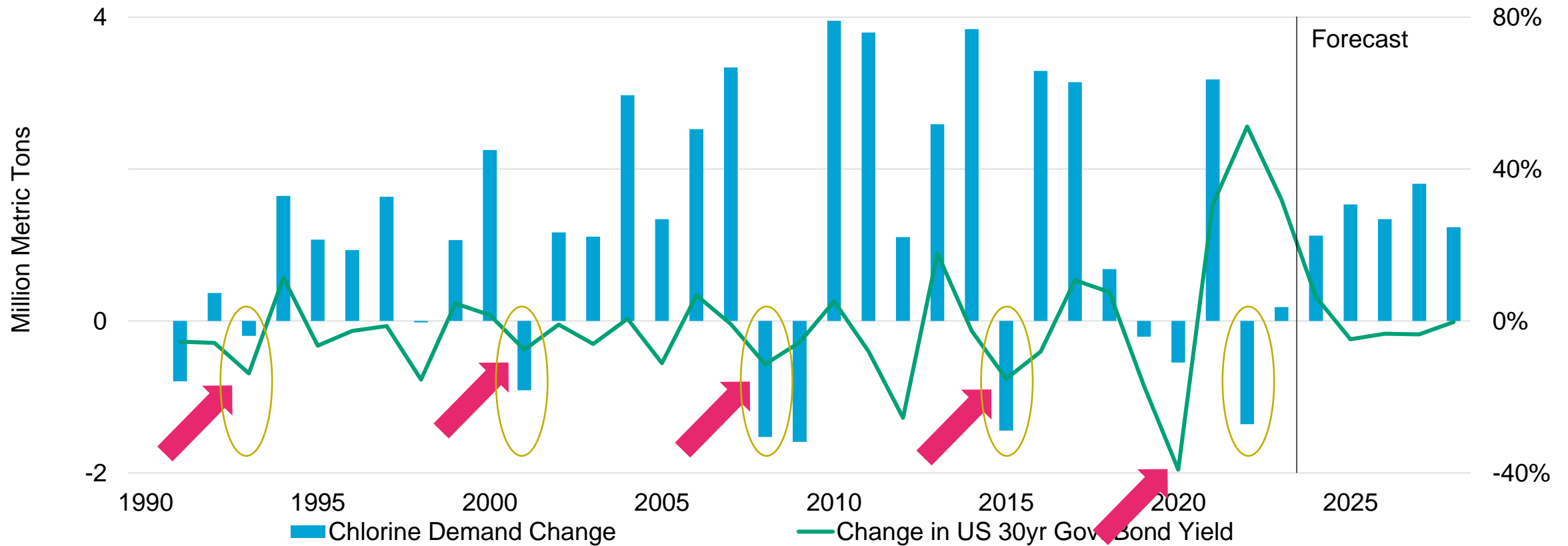


Caustic = Manufacturing



But chlorine doesn't always lead the recovery

Chlorine demand changes and 30 year bond yields

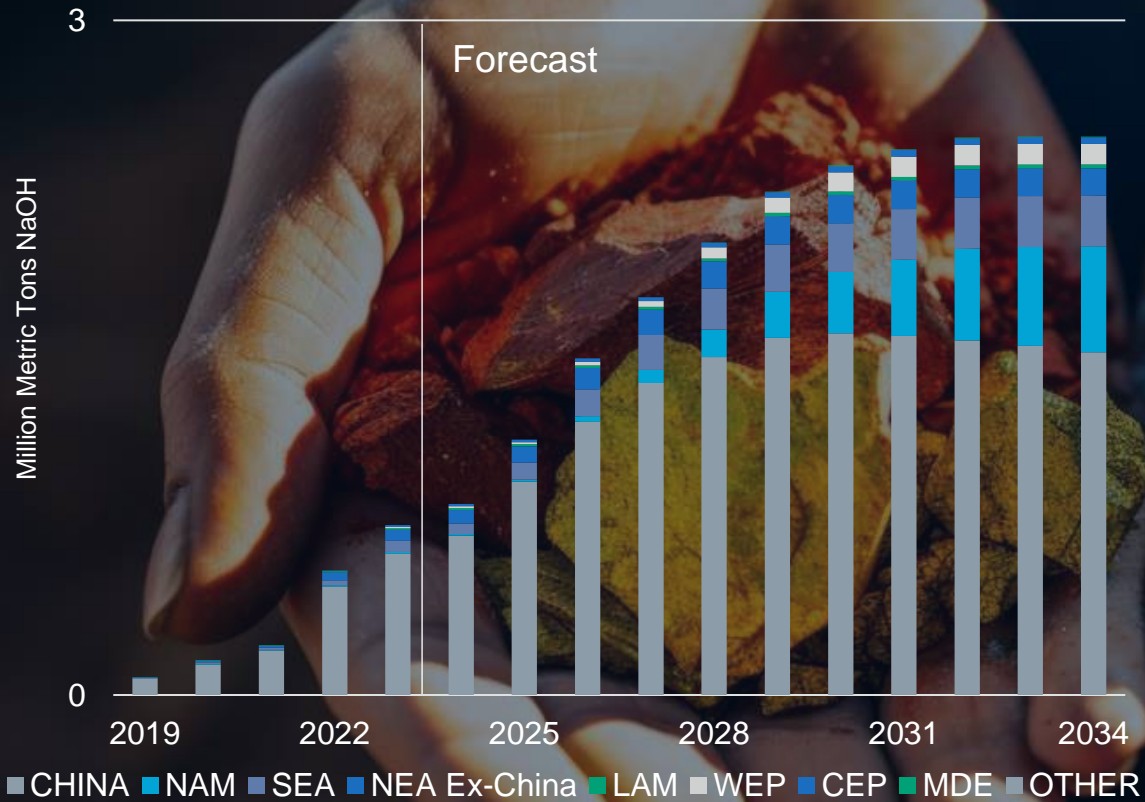


Source: Chemical Market Analytics by OPIS, Oxford Economics

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Electrification driving caustic soda demand

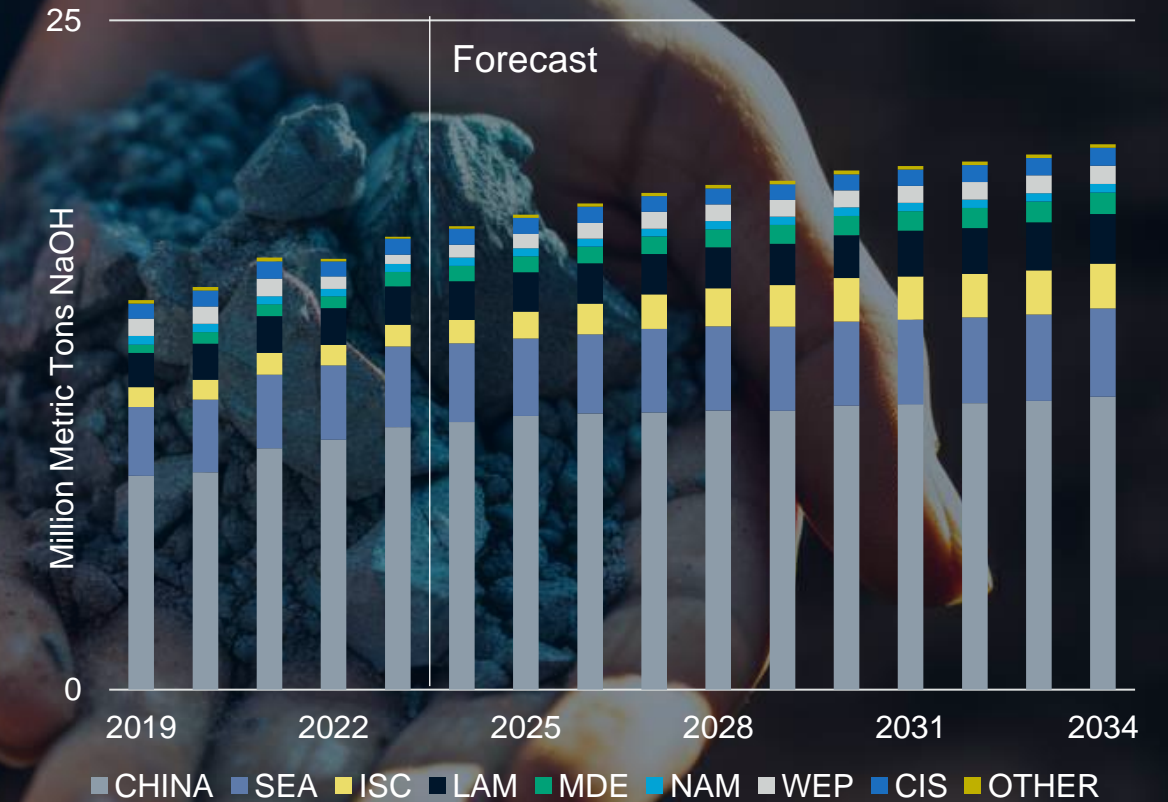
Caustic Soda Demand into Battery Materials



Source: Chemical Market Analytics by OPIS

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Caustic Soda Demand into Alumina Refining

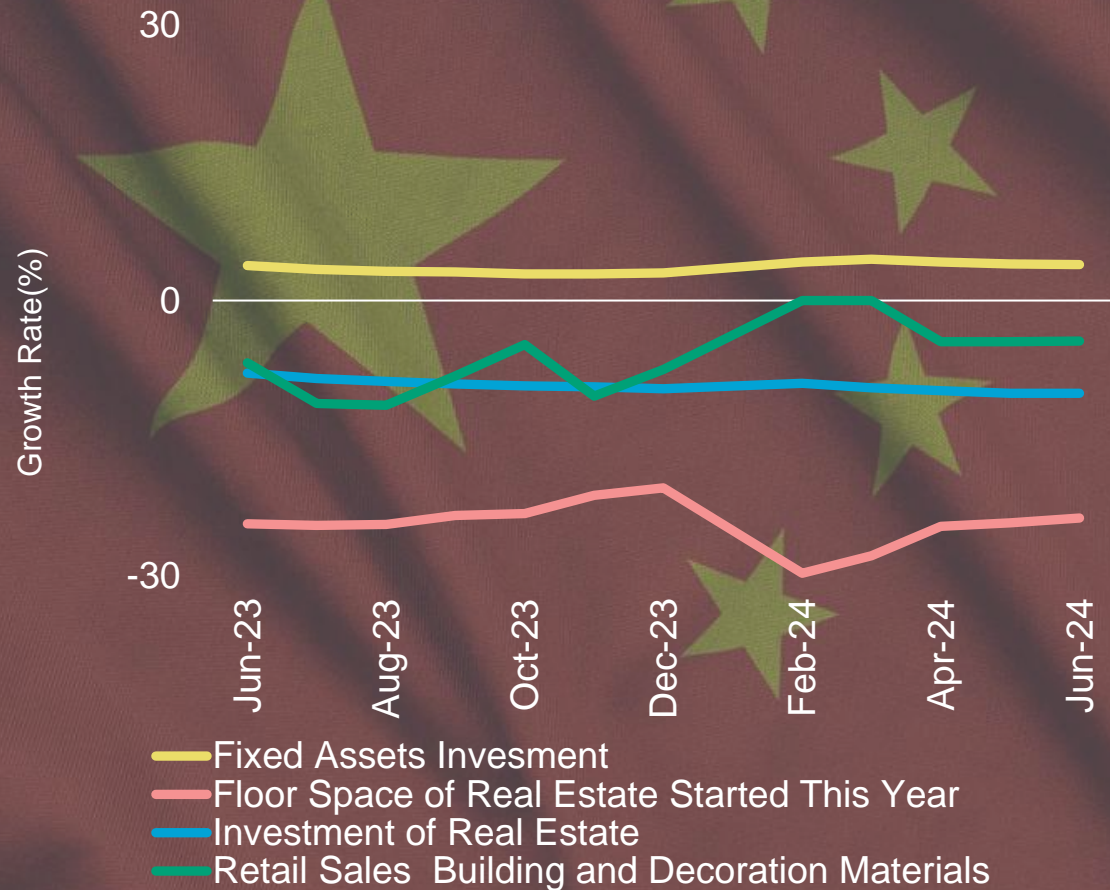


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Mainland China: Two speed economy

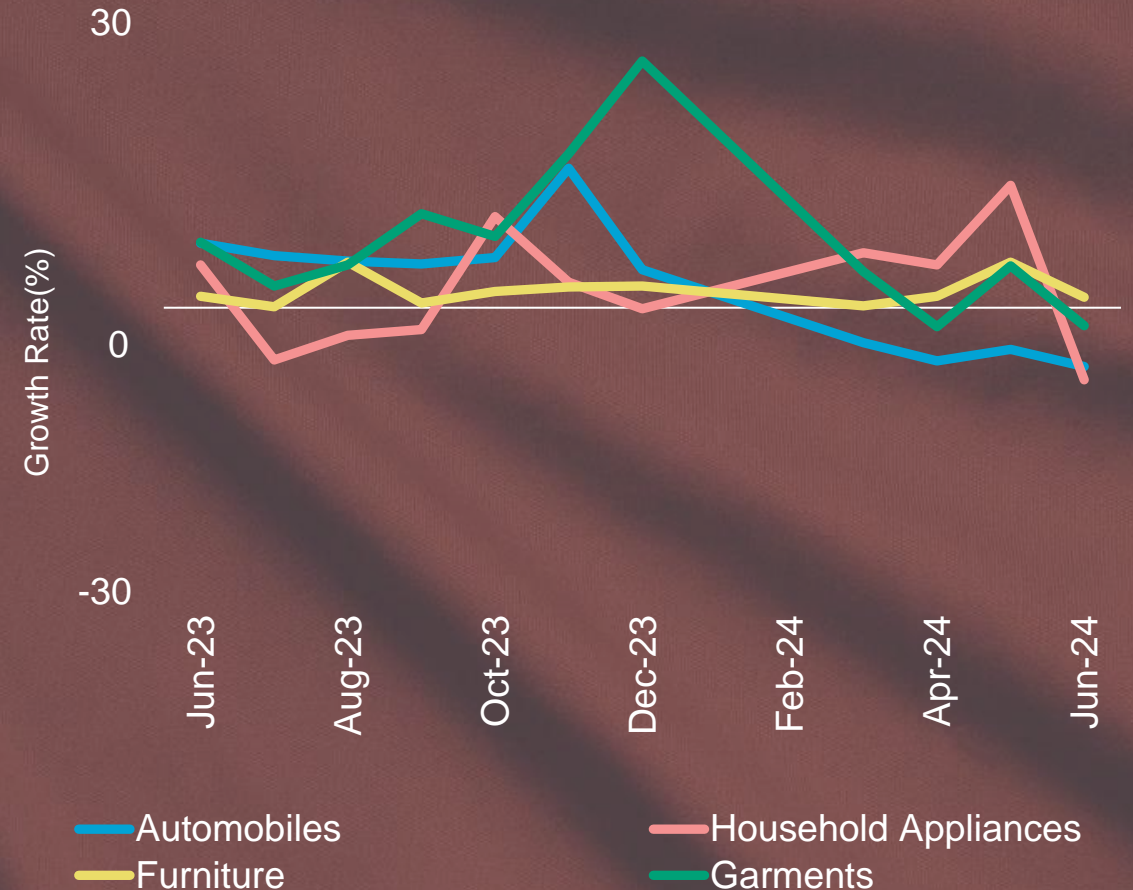
Mainland China (Infrastructure & Real Estate)



Note: Accumulated Growth Rate(%)

Source: NBS, China

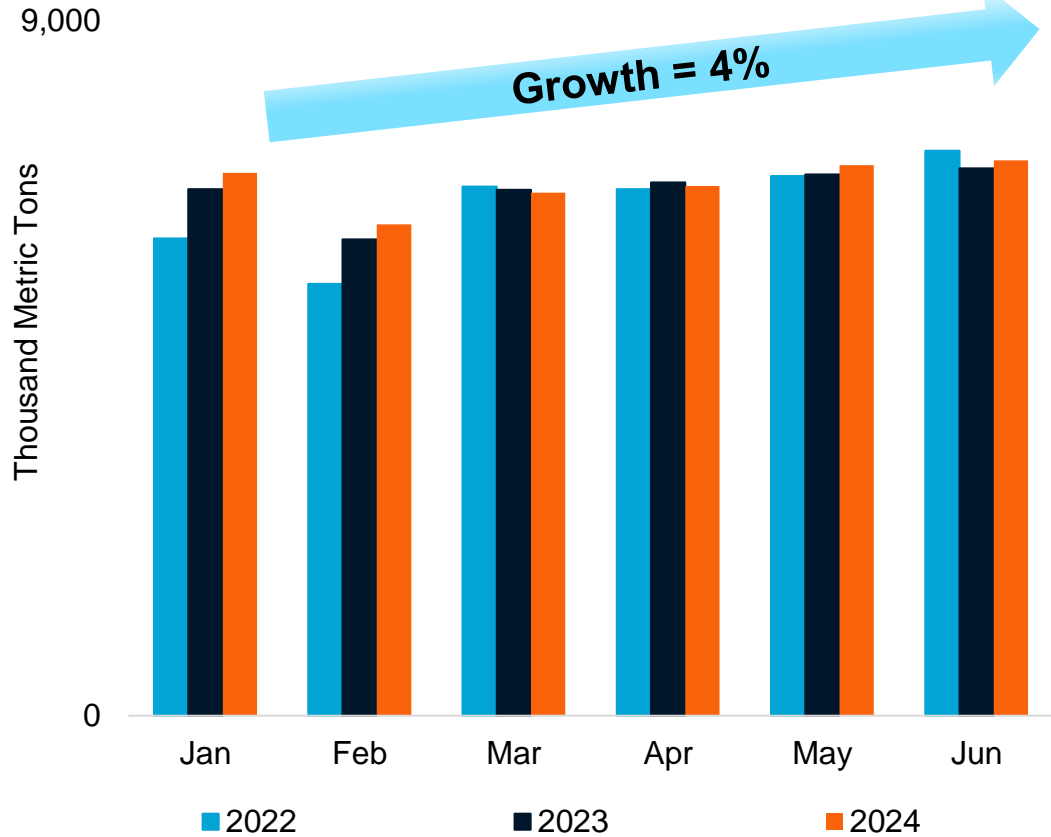
Mainland China Retail Sales Growth



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New Productive Forces / New Three Industries

China(mainland) Alumina Production (YTD Jun 2024)

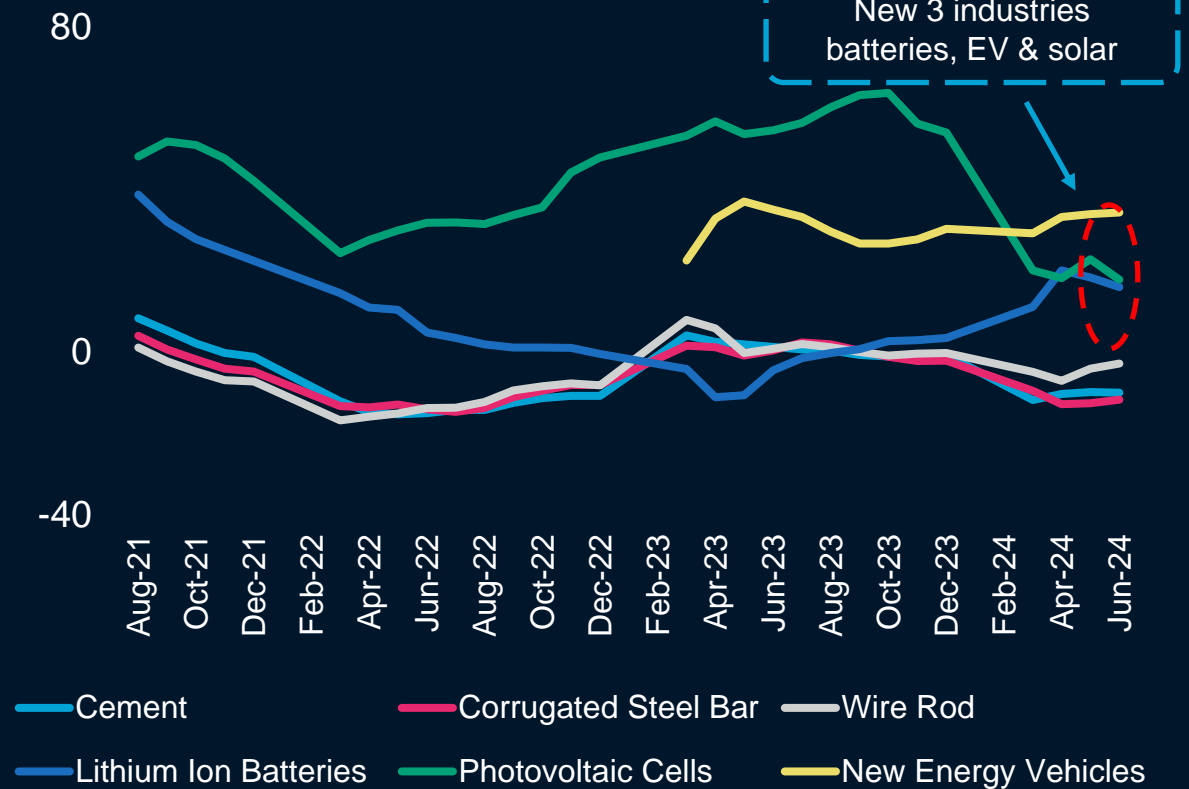


Source: NBS, China

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China manufacturing output 2021-2024



Note: Accumulated Growth Rate(%)

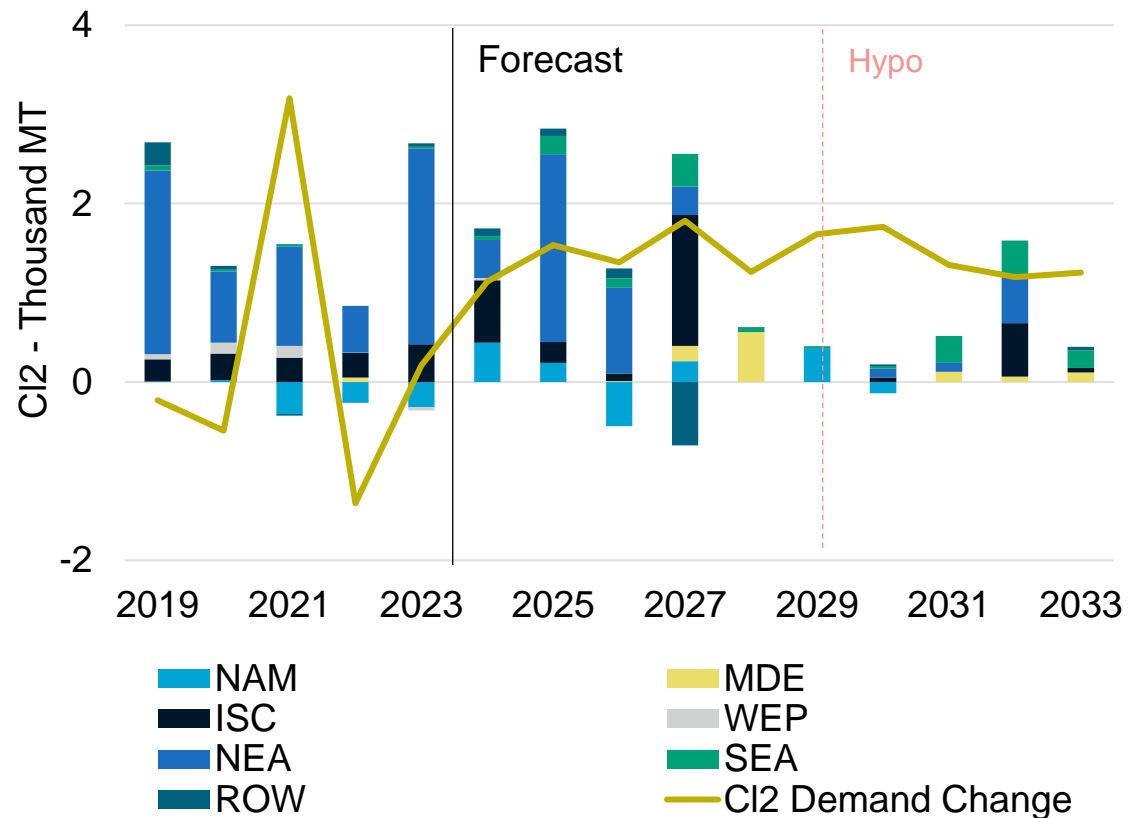
Source: NBS, China

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Source: NBS

Supply overcapacity in the short term

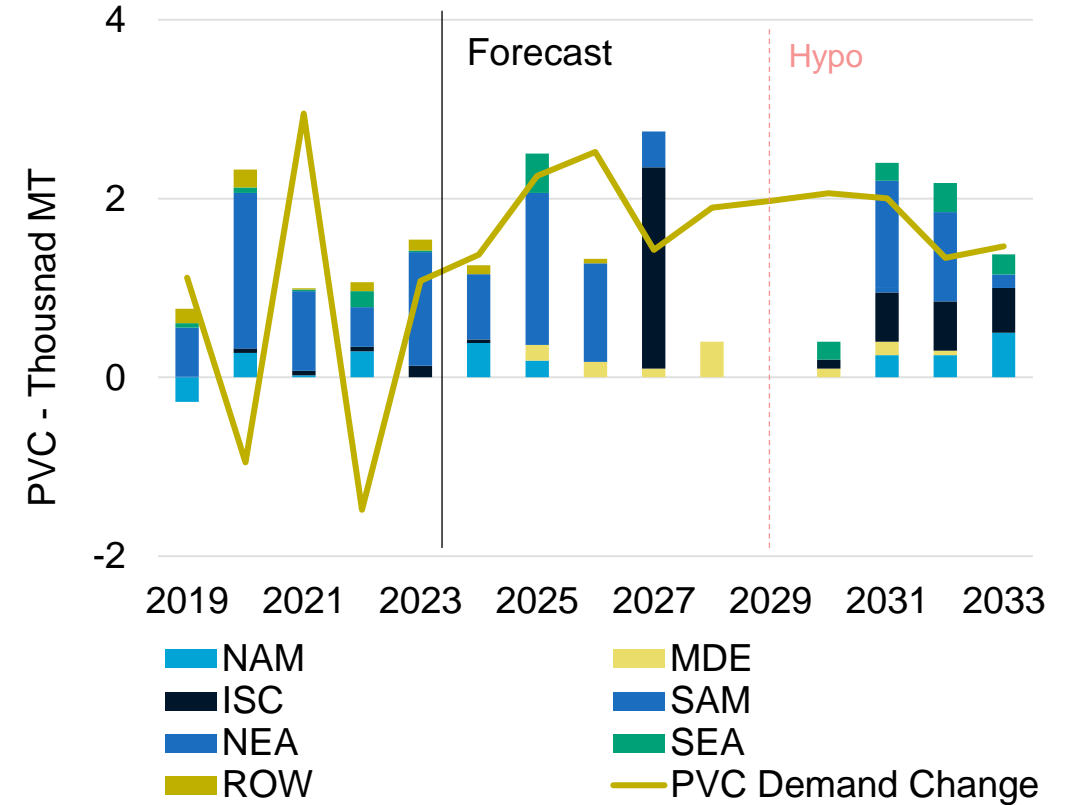
Global chlorine capacity and demand changes



Source: Chemical Market Analytics by OPIS

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Global PVC capacity and demand changes

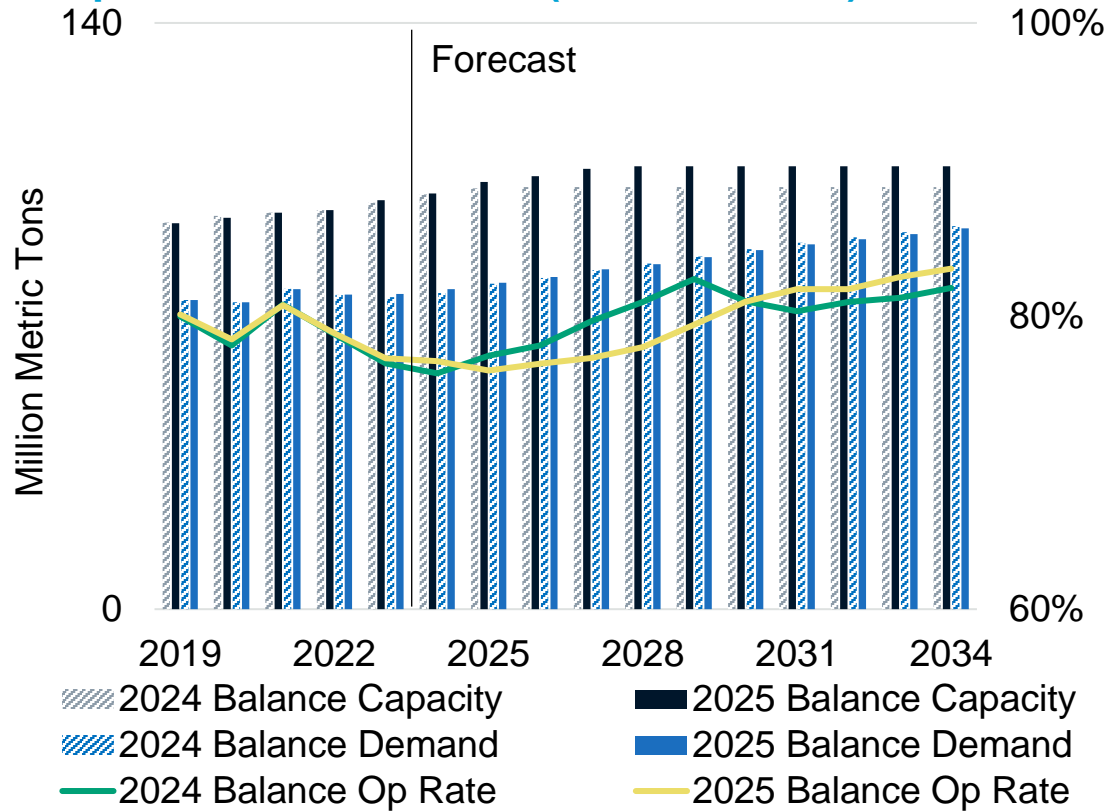


Source: Chemical Market Analytics by OPIS

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ECU demand growth to exceed supply expansions in forecast

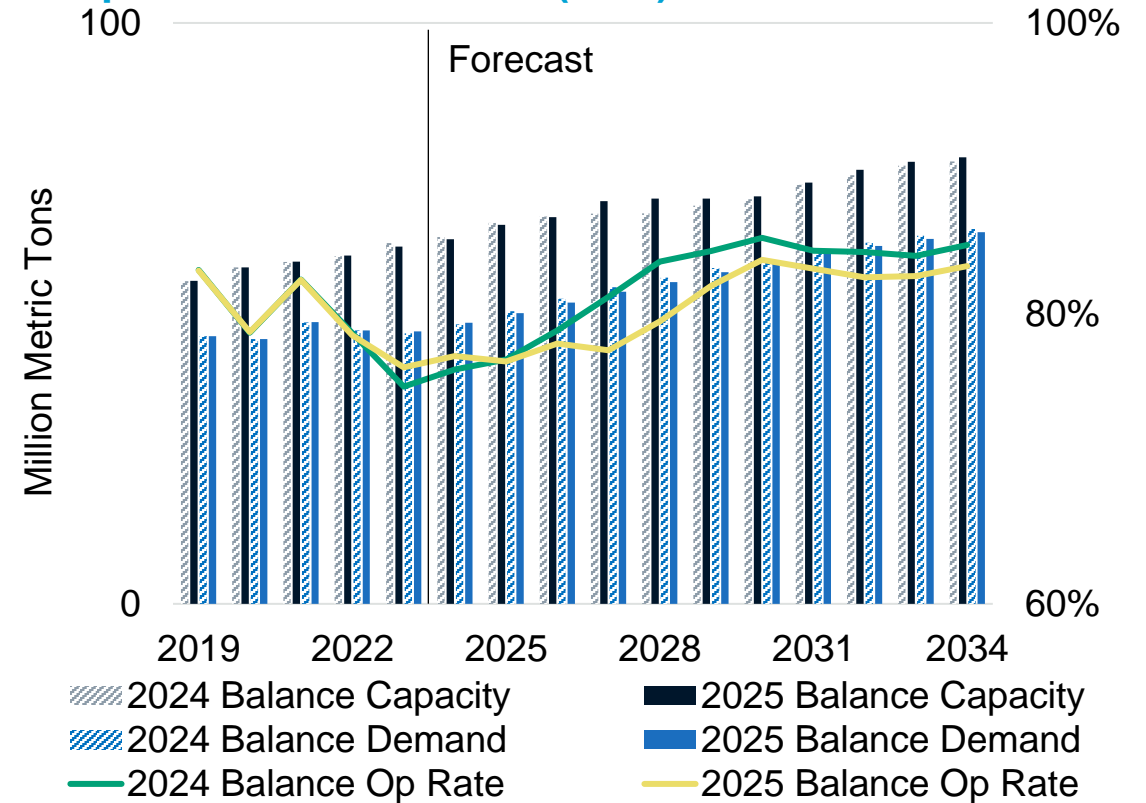
Global capacity, demand and operating rate comparison: 2024 vs 2025 (chlorine basis)



Source: Chemical Market Analytics by OPIS

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Global capacity, demand and operating rate comparison: 2024 vs 2025 (PVC)

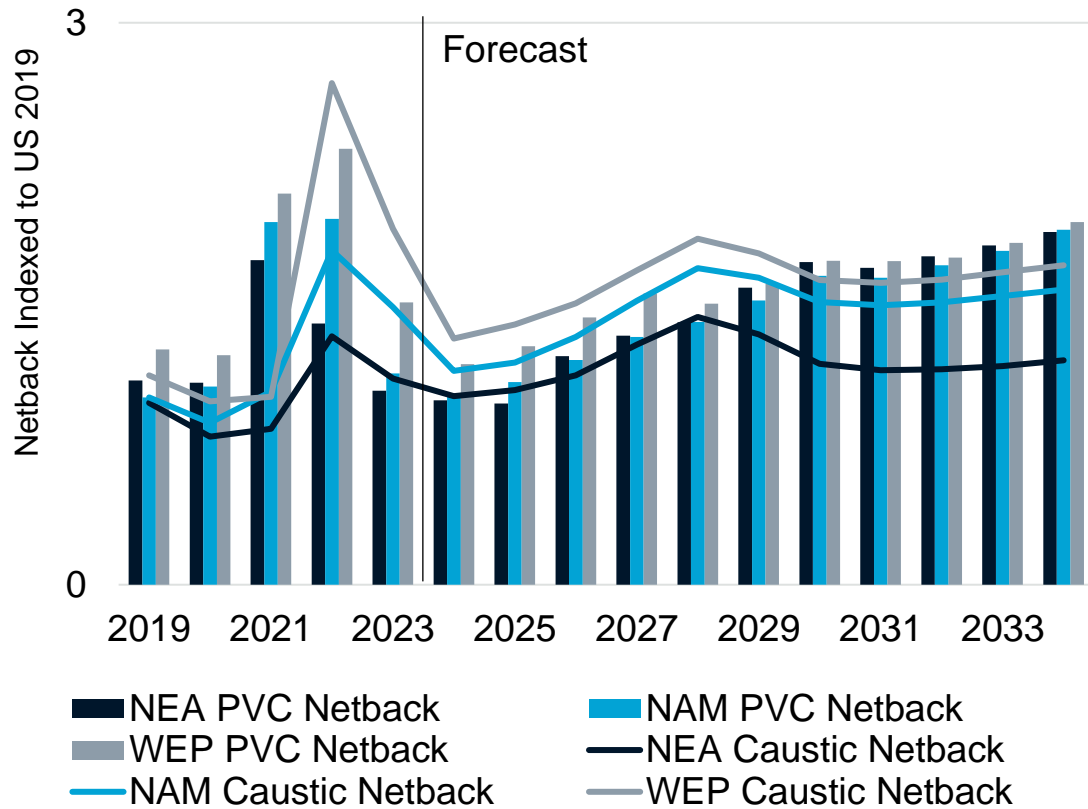


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Reliance on “caustic credit” to continue but lessen through cycle

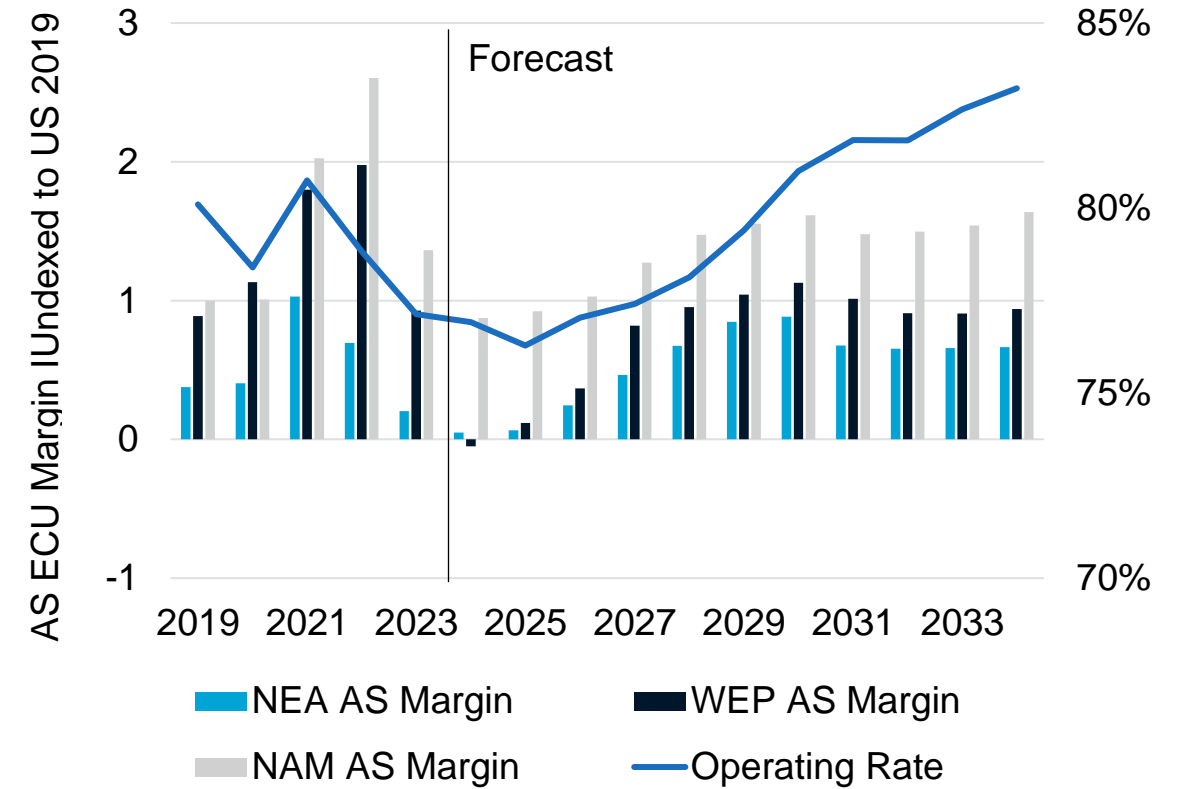
Caustic soda and PVC netbacks indexed to US 2019



Source: Chemical Market Analytics by OPIS

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Integrated asset share ECU margin and operating rate



Source: Chemical Market Analytics by OPIS

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Increasing trade barriers may affect chlor-alkali and PVC trade

PVC

India → China, Korea, Malaysia, Norway, Taiwan, Thailand
EU → USA, Egypt **Imposed**
Brazil → China, USA **Imposed**
Argentina → China, Turkey **Imposed**

Ongoing investigation

TiO₂

India → China **Ongoing investigation**
EU → China **Preliminary Imposed**
Brazil → China **Ongoing investigation**

Epi / Epoxy

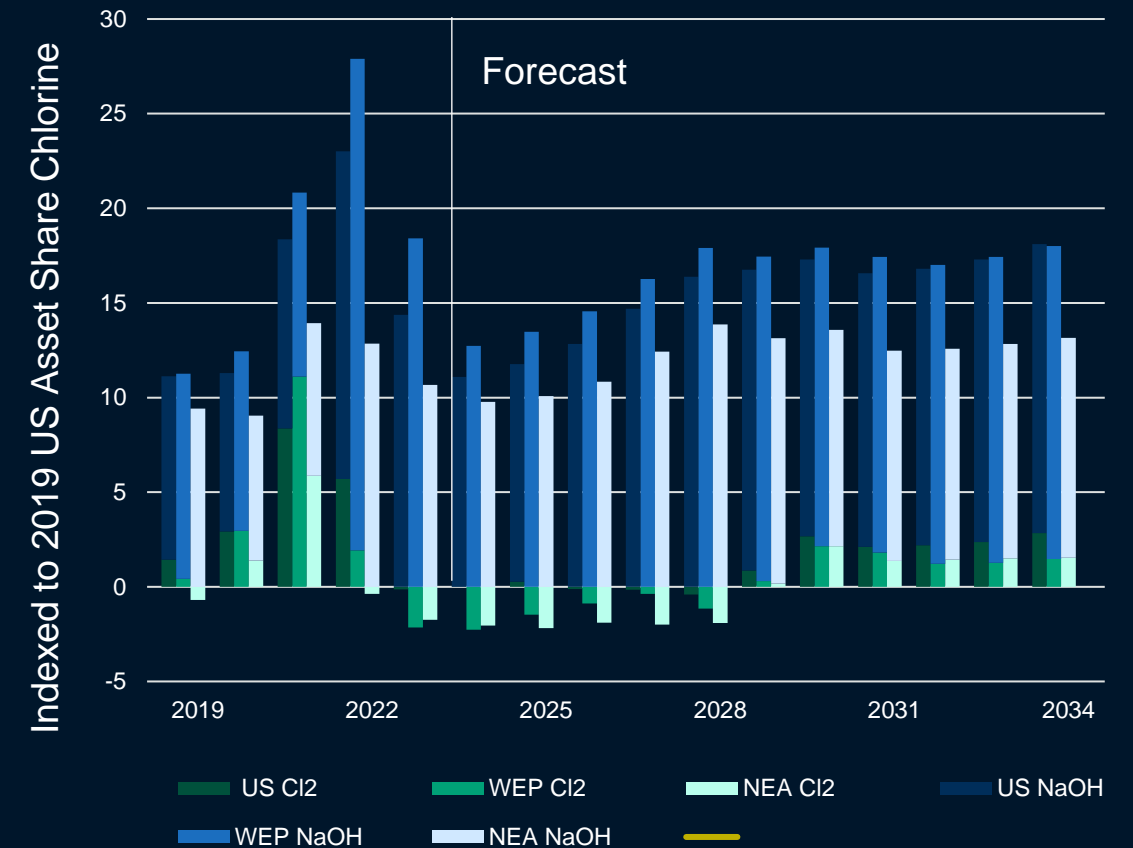
India → China **Imposed**
EU → China, Korea, Taiwan, Thailand **Ongoing investigation**
USA → China, India, Korea, Taiwan, Thailand **Ongoing investigation**

Chlorinated
Isocyanurates

India → China, Korea, Japan **Ongoing investigation**
USA → China, Japan **Imposed**

- Europe energy crisis not driving demand as global chlor-vinyls markets are in a short-term trough
 - European energy costs dropped, but remain elevated by historical measures and are supporting trough level caustic prices higher than prior cycle lows
- Interest rates have begun to drop as inflation falls
 - Persistently strong US economy delayed FED rate drops until September. China followed with easing.
 - Construction spending lags rate reductions, growth in renovations more reactive
- Stagnating trough level ECU values with marginal producing regions (WEP/NEA) at breakeven
- Cautious recovery forecast as economy activity increases
 - Caustic expected to lead recovery as overbuilding in Chinese residential construction must be absorbed and China shifts to “Three New Industries” to drive growth

ECU Values by Asset Share Chlorine and Caustic



Source: Chemical Market Analytics by OPIS

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Question and Answer

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