



Shifting Paradigms: Geopolitics, Energy Transition, Sustainability and the Future of Petrochemicals

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Agenda

- 01 Global megatrends and how they are reshaping demand patterns and the petrochemicals industry
- 02 Petrochemical Market Challenges and Opportunities – market trends and industry outlook as it navigates economic uncertainties and regulatory pressures
- 03 Sustainability Trends and Circular Economy – Plastic circularity, Alternate feedstocks, Regulation and policies as key enablers
- 04 Energy Transition and Alternative Feedstocks – potential scenarios for the shift from fossil fuels to bio-based and recycled feedstocks

Recession risks, US Treasuries and the dollar



ABC News

Scenarios:

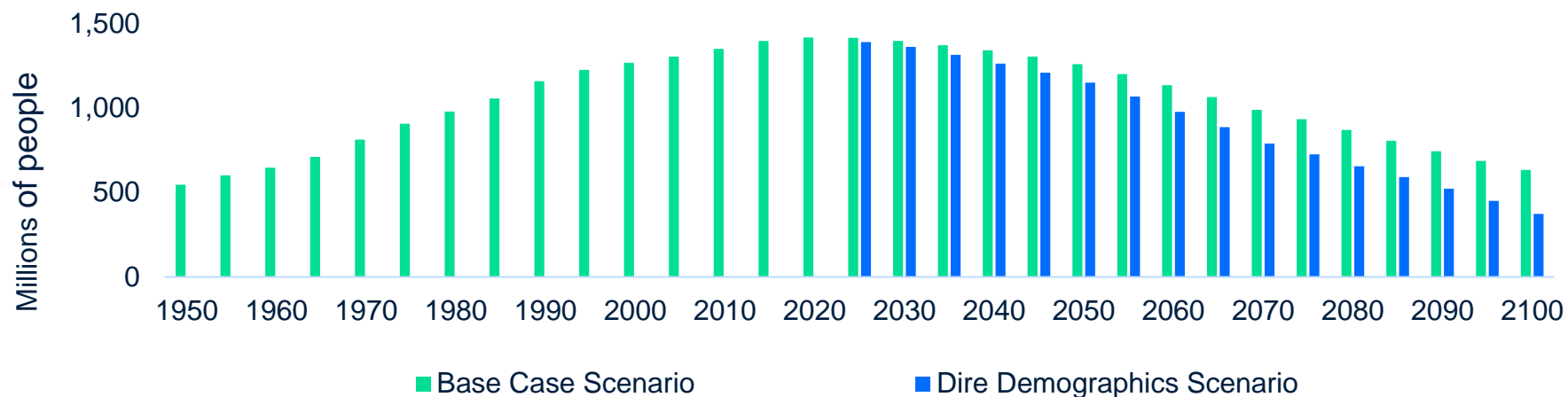
1. US does lots of preferential deals with individual countries and trading blocs, including with China, and the trade war ends
2. All-out trade war = global recession
3. US-China tensions persist → China floods global market with its exports. Trade barriers against China rise

Watch US Treasuries and the dollar

Even before the trade war China's demand was under pressure

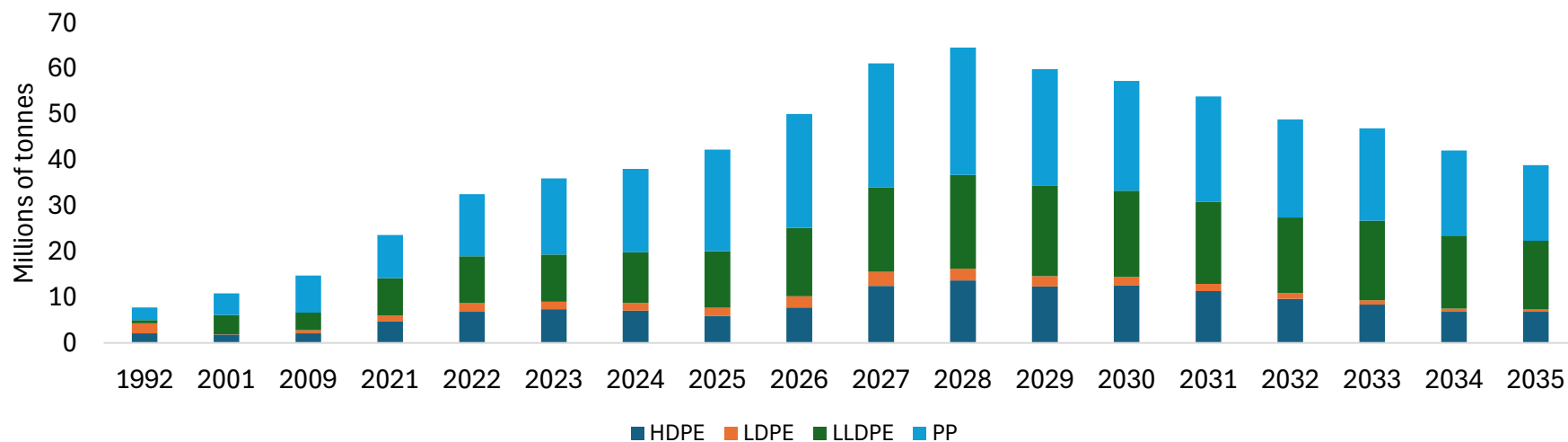


China population scenarios: 1950-2100



Source: Central Bureau of Statistics, United Nations, and ICIS analysis

Global polyolefins capacity exceeding demand

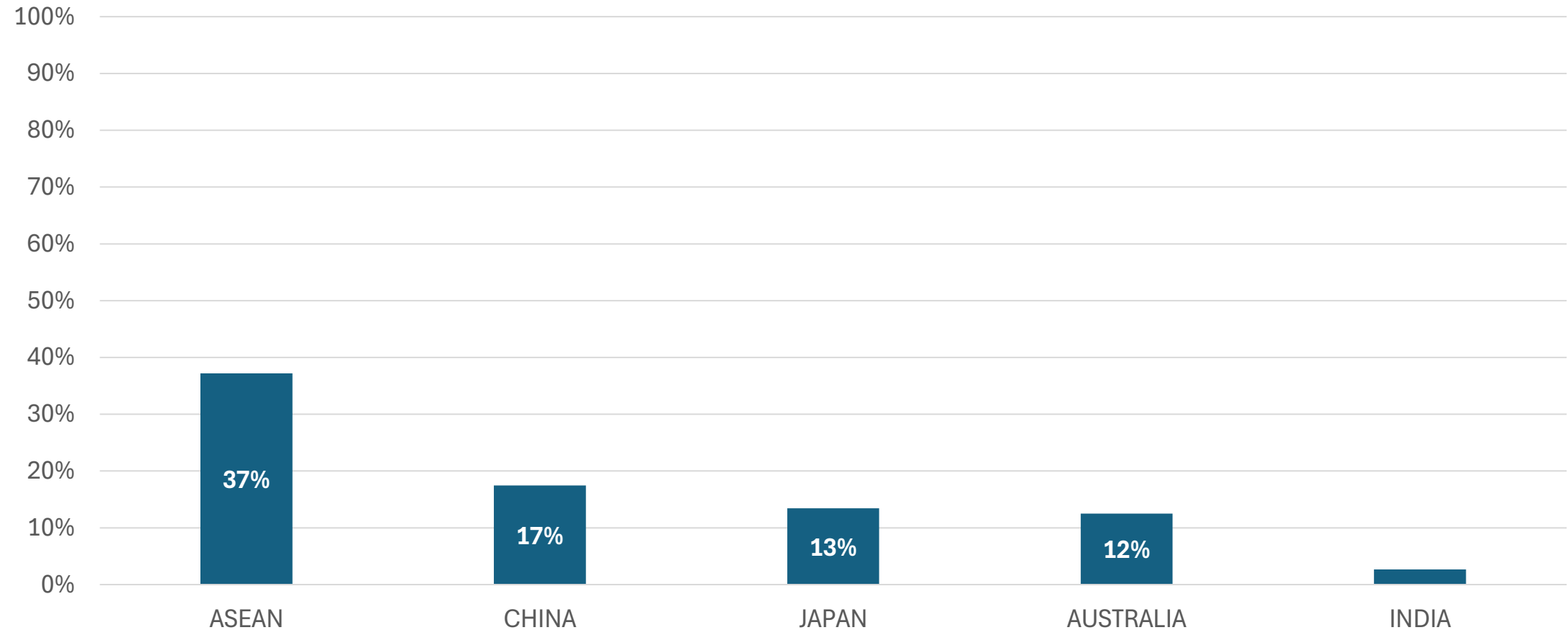


Consensus was that China would grow at 6-8% per year over the long term, but 1-4% for petrochemicals in general now looks more likely. China's growth in capacity was also underestimated.

Second and third-order effects



Thailand's 2024 HDPE exports to these selected countries and regions as percentages of total exports





CNN: November 1989

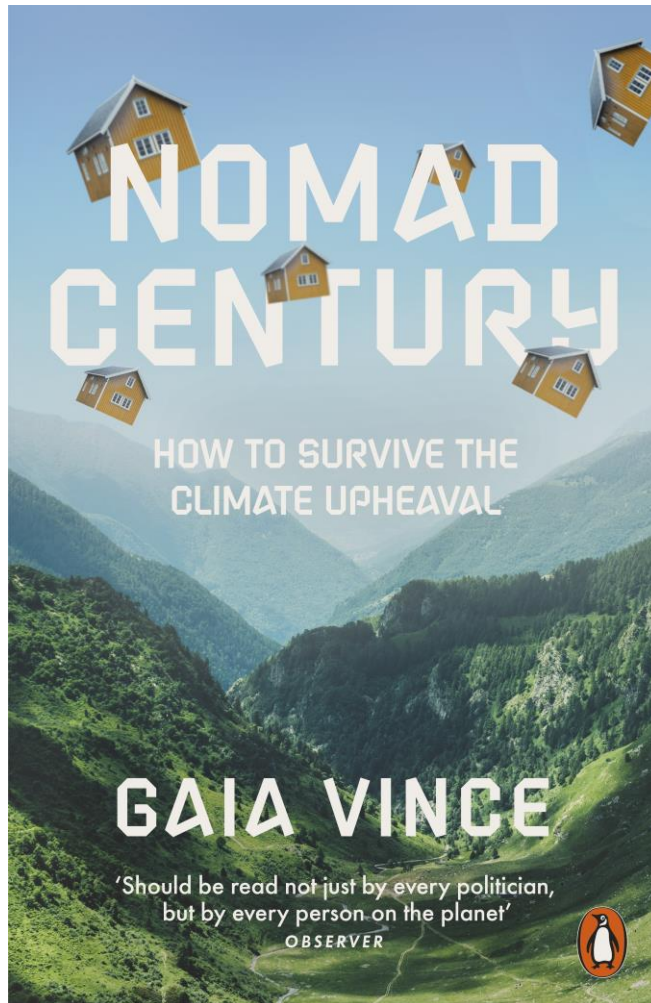
- US Security umbrella and support for globalisation
- Peace dividend
- Babyboomers at the height of their spending power and China is young
- This results in the Chemicals Supercycle



ABC News: April 2025

- Babyboomers and China are old
- US signals possible retreat from NATO, Asia Pacific alliances
- Allies begin rearming
- US-China rivalry intensifies
- Chemicals markets face more regionalisation and volatility





- Mass migration due to Climate Change
- Consumption will shift northwards
- Urban living will densify
- Temporary shelters for displaced people
- Traditional GDP-driven demand forecasting for chemicals may no longer be valid



**One question
500 million data points**

Ask ICIS

Your new AI assistant

Thank you



Petrochemical Market Challenges and Opportunities: Short and Long Term

Alex Lidback, VP Chemical Analytics

More of the Same is Not Sustainable for the Majority of the Industry



- Most chemical companies entered the trough with healthy balance sheets, especially companies integrated with energy and refining
- Industry now realizes demand will not improve measurably anytime soon
- Over-capacity is unprecedented – unless there are extensive shutdowns, the market will not rebalance most products anytime soon
- **Growing out of this excess capacity state will take too long, China will not be the savior.**
- Likely outcome – restructuring & rationalization
- Major capacity shutdowns will take place when companies decide not to maintain existing assets and delay FIDs

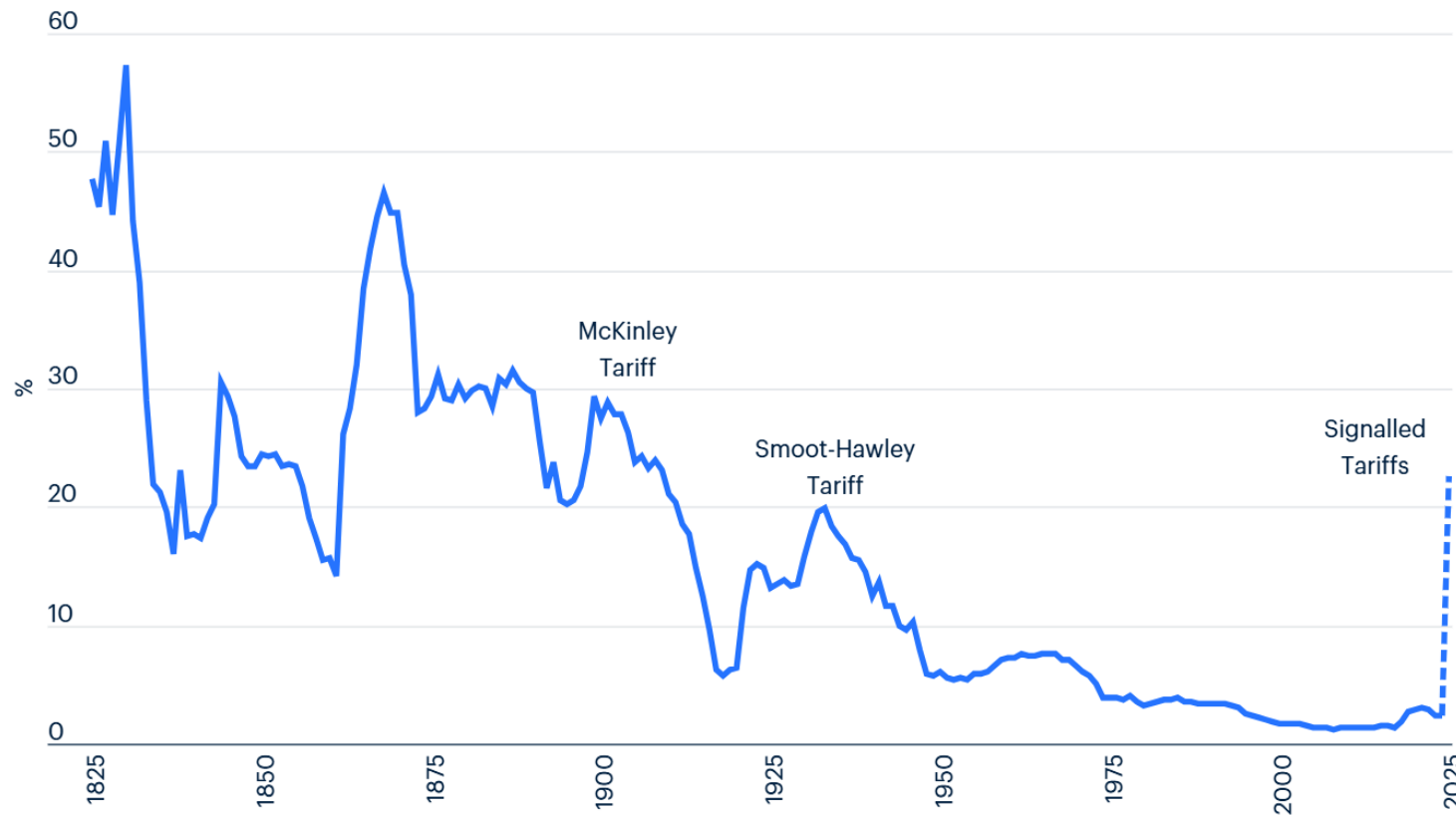


- Survivability
- Uncertainty
- Soft Demand
- Temporary shelters for displaced people
- Restructuring & Rationalizing

US tariff rate to exceed that during Great Depression



US average tariffs on all Imports



- US tariffs, including those signaled to come to bring levels to 22.5%
- This would exceed Great Depression levels from Smoot-Hawley Tariff Act
- Smoot-Hawley widely recognized by economists as causing and prolonging the Great Depression

Second Half of 2025 Should See Limited, if any, Improvement



2025 Scorecard

	Q1	Q2	Q3	Q4
Downstream Inventories	Neutral	Positive	Neutral	Neutral
Interest Rates	Negative	Negative	Neutral	Neutral
Inflation	Neutral	Neutral	Neutral	Neutral
Mortgages Rates	Negative	Negative	Negative	Neutral
PMIs	Neutral	Neutral	Neutral	Neutral
Consumer Confidence	Negative	Negative	Neutral	Neutral
Jobs Market	Neutral	Neutral	Neutral	Neutral

 Neutral

 Negative

 Positive

....the Hope Now Turns to 2026



2026 Scorecard

	Q1	Q2	Q3	Q4
Downstream Inventories	==	+	==	==
Interest Rates	+	+	==	+
Inflation	==	==	+	+
Mortgages Rates	==	+	+	+
PMIs	==	+	+	==
Consumer Confidence	==	+	+	+
Jobs Market	==	==	==	==



Neutral



Negative



Positive



Global operating rate (2030)

		83%	84%	85%
Demand Compound Annual Growth Rate (2023-2030)	3.00%	10.5	14.5	17.5
	2.75%	15.0	19.0	22.0
	2.50%	19.5	23.5	26.5

Required reduction in global capacity to achieve target operating rate (million metric tonnes)

Ethylene Capacity Rationalization | In Cracker Terms, How Many?

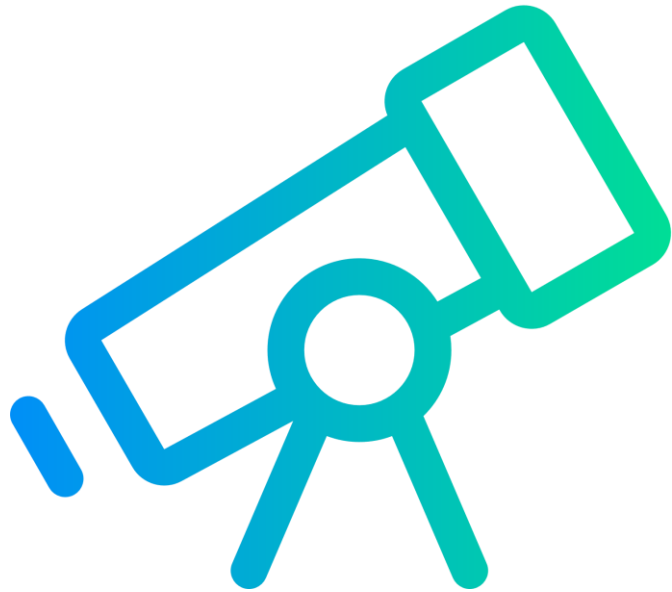


Global operating rate (2030)

		83%	84%	85%
Demand Compound Annual Growth Rate (2023-2030)	3.00%	(21/14)	(29/19)	(35/23)
	2.75%	(30/20)	(38/25)	(44/29)
	2.50%	(39/26)	(47/31)	(53/35)

Required number of crackers to achieve desired operating rates: assuming 500kts/750kts

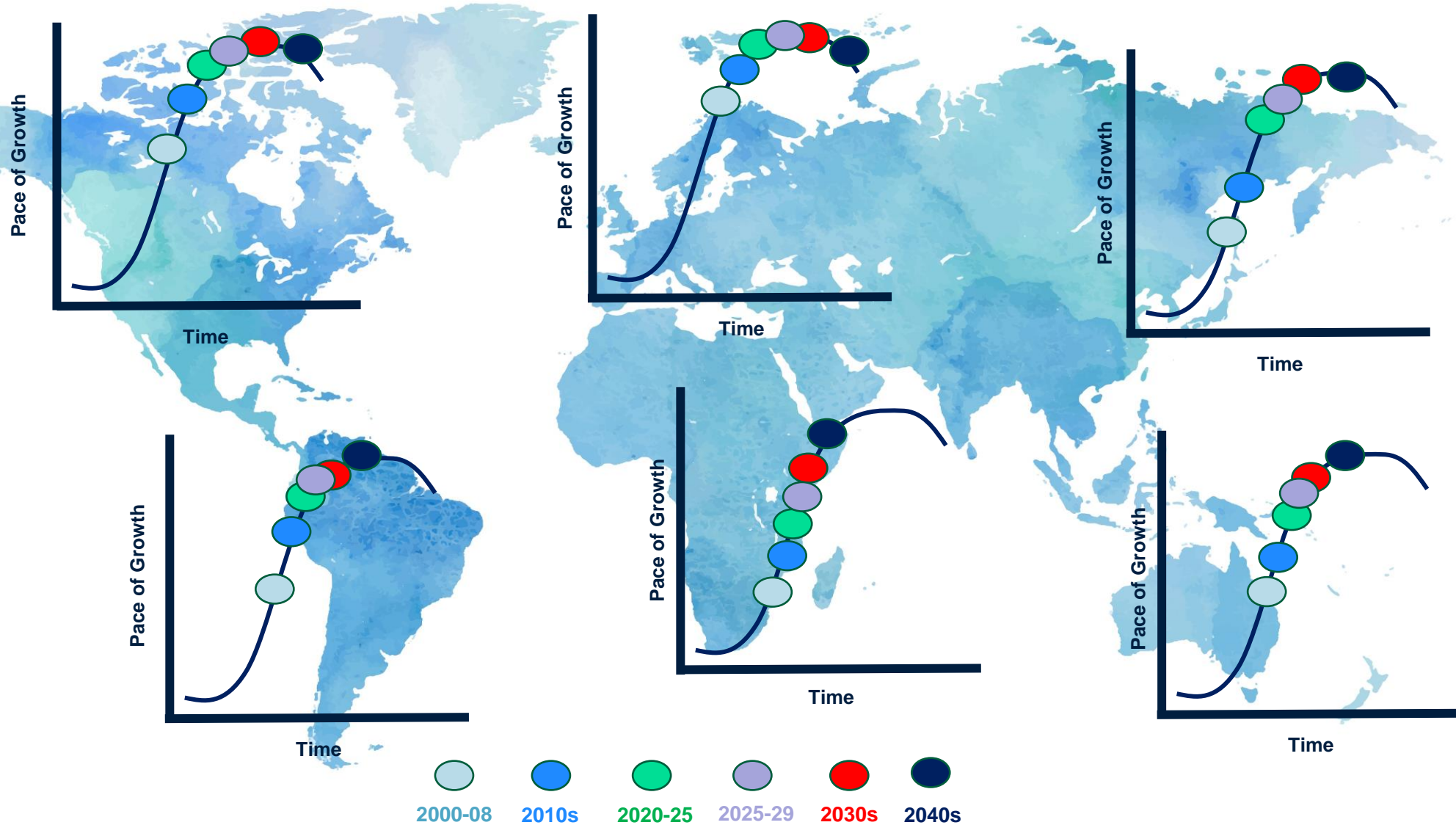
2024: Around 500 crackers worldwide with an average capacity of just under 700kts



- Where will the demand growth come from?
- Are the days of strong demand growth over?
- Who is left standing?

The Pace of Growth and Market Maturity Varies by Region

Faster Pace of Growth Shifts to the Southern Hemisphere



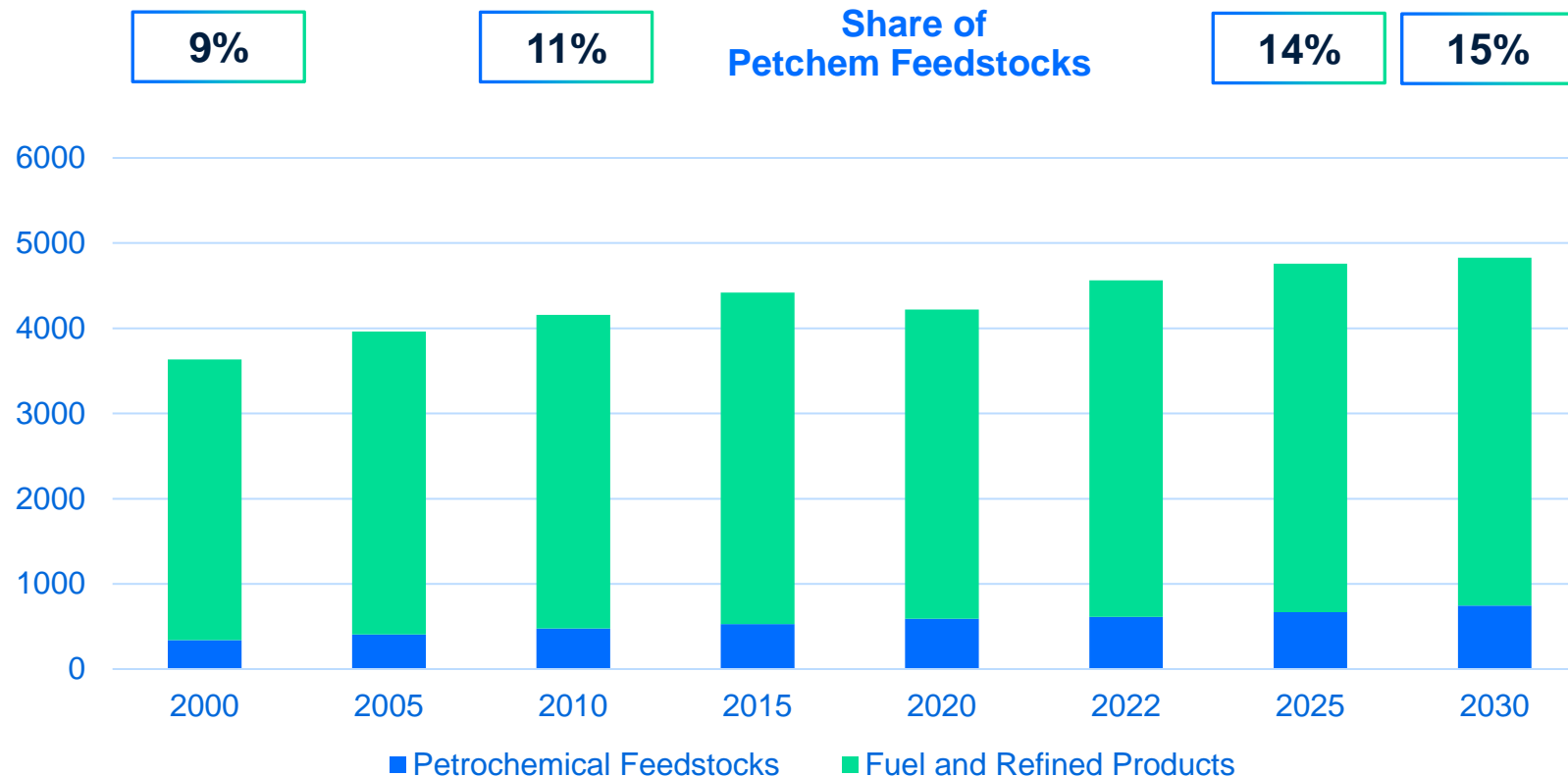
Petrochemicals will be an important lever to support oil demand in the long term

Volume and type of feedstock will evolve, which will shape the competitiveness of future supply



GLOBAL OIL DEMAND

Share of
Petchem Feedstocks



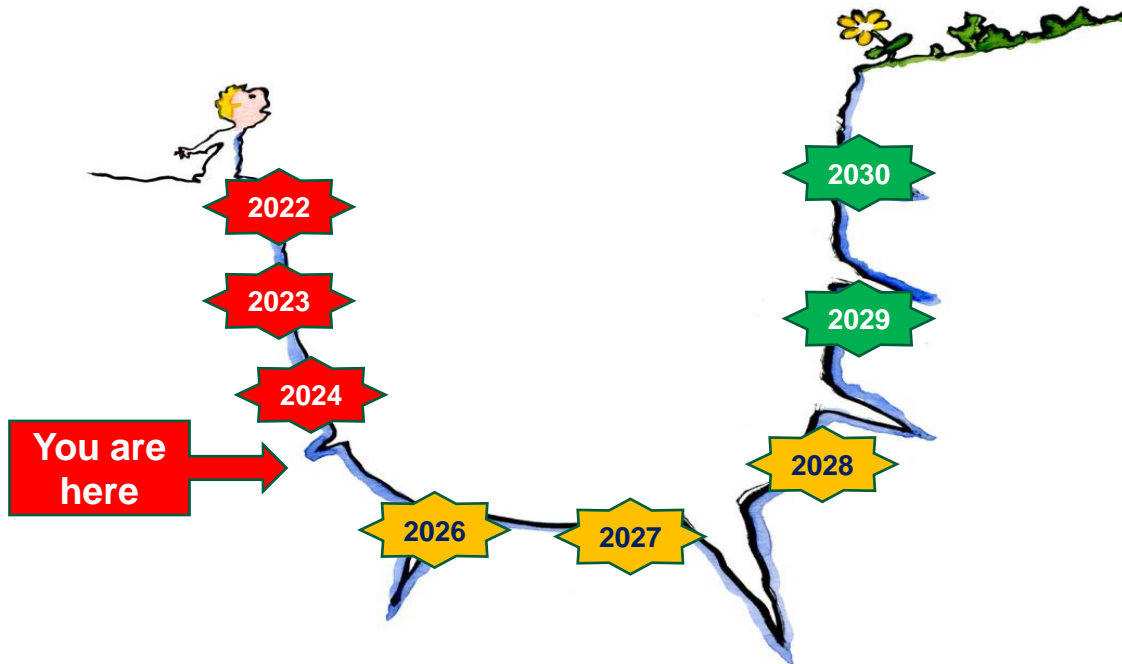
Refined Products CAGR,
2024-2030

~0%

Petrochemical Feedstocks
CAGR, 2024-2030

~1.9%

Times are Tough? How Long Will it Last?



Sometimes you have to go through worse to get better

- Tougher times lay ahead.
- Expect more closures and cancellations.
- Companies and assets that make it to 2027/2028 will survive to get to better times.

Thank you



Sustainability Trends and Circular Economy

Bala Ramani, Director of Sustainability Consulting



Agenda

- 01 State of the Petrochemicals Industry
- 02 Path towards Circularity for Polyolefins
- 03 Circularity through Alternate feedstocks – Pyrolysis & Bio-Naphtha
- 04 Sustainable Polyolefins market opportunity
- 05 Conclusion



Petrochemical industry faces a perfect storm of oversupply, cost volatility, and regulatory shifts, requiring strategic innovation and sustainability to thrive

Navigating Oversupply, Weak Demand, and Geopolitical Uncertainty

Stagnant petrochemical sector faces mounting pressure

Market downturn, surging imports, and high gas costs threaten to accelerate plant closures nationwide

South Korean petrochemical firms' profits plunge in 2024 as oversupply persists

Overcapacity and rationalization: The global petrochemical industry is changing

Trump tariffs poised to exacerbate woes of ailing petchems sector

Bearish sentiment prevails in Asia petrochemicals amid oversupply

Japan, Taiwan, Hong Kong stocks sink 9% amid Trump's tariff war

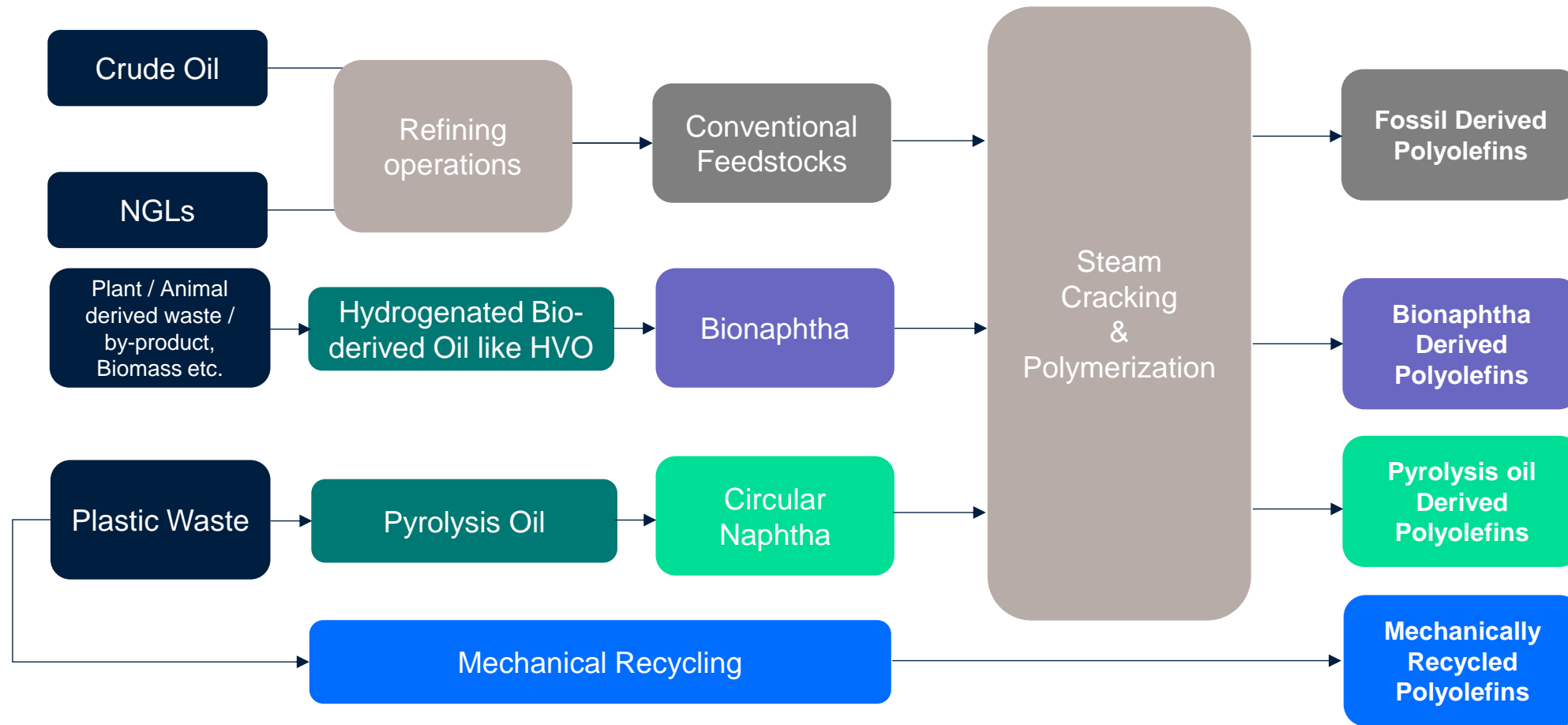
JG Summit's Olefins Corp on 'indefinite commercial shutdown'

Navigating through change and Innovative business models will be crucial for survival in a rapidly evolving market landscape



Sustainable Polyolefins present an interesting opportunity especially for integrated polyolefins producers to leverage existing assets for driving incremental value

Reimagining Polyolefins Production: A Circular Path to Sustainability



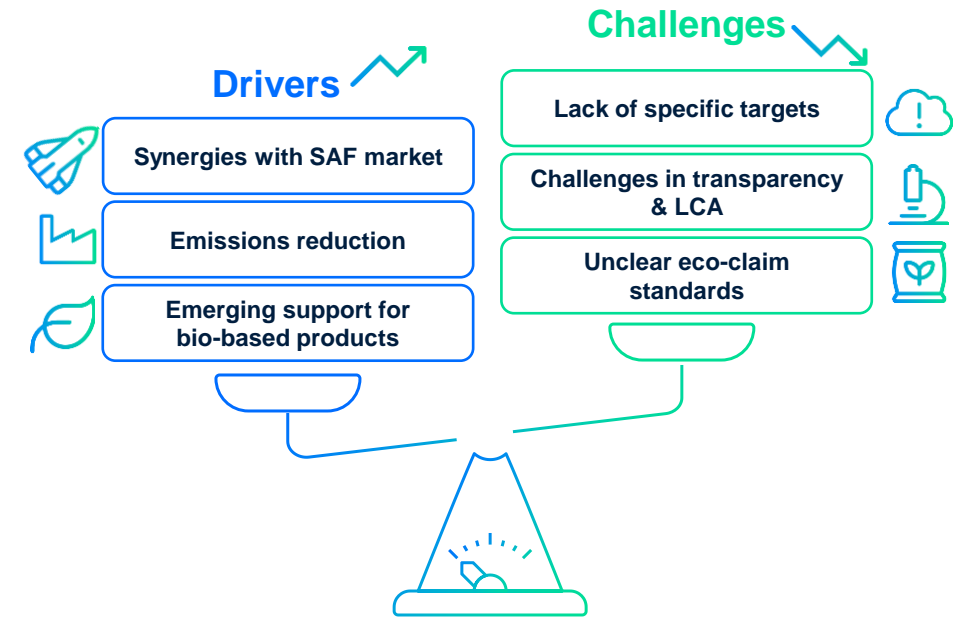
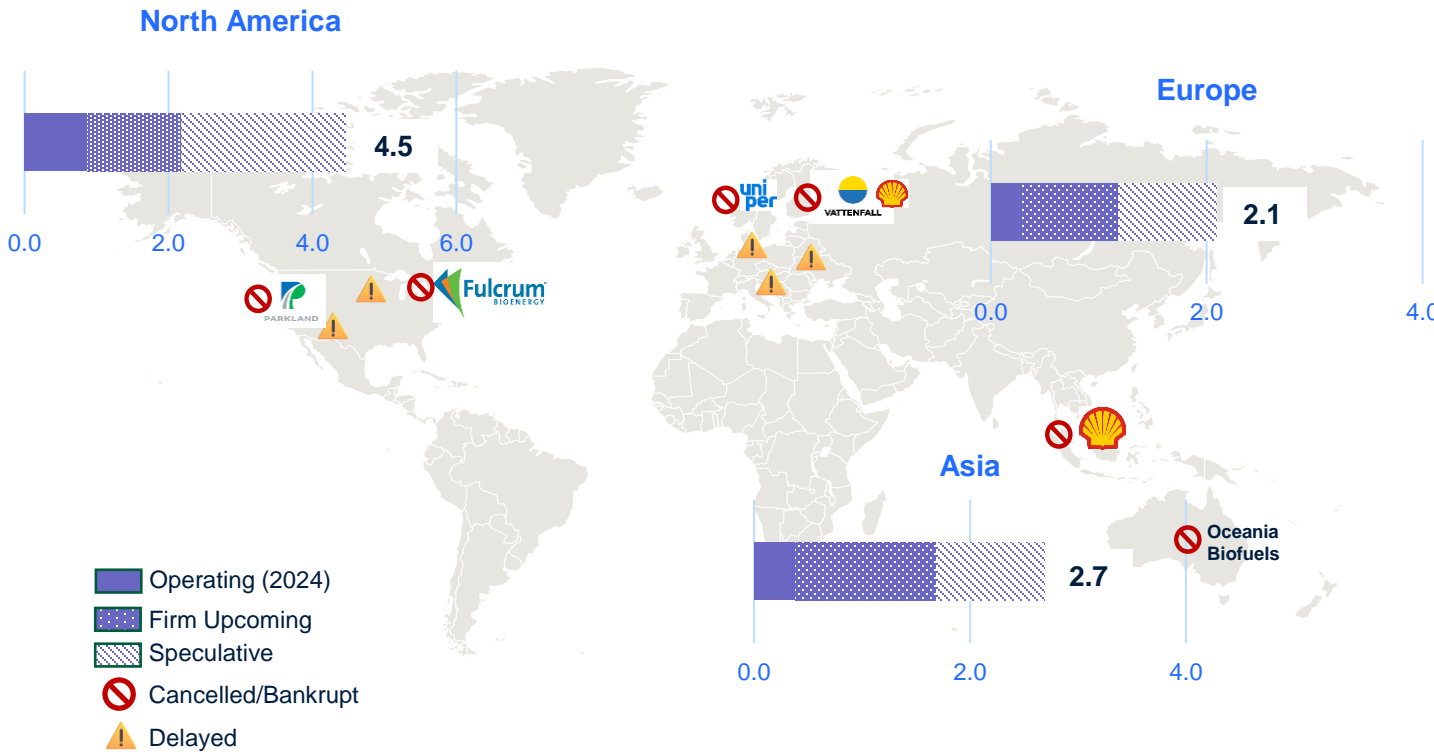
By embracing a multi-faceted production model, the polyolefin industry can reduce its environmental footprint, meet evolving regulatory demands, and unlock new value streams in a resource-constrained world



Driven by investments in SAF and renewable diesel, global Bio-naphtha capacity set to reach over 3.8 million tonnes by 2030 with an additional potential of ~7.2 million tonnes

Current Bio-naphtha capacity stands at about 1.7 million tonnes

Million Tonnes **2030 Global Bio-naphtha* capacity by region including speculative projects**



*Estimated based on SAF capacity developments

Source: ICIS Analytics and Consulting

Bionaphtha can play an important role as a sustainable feedstock, complementing conventional and circular sources as the industry advances towards a low-carbon future

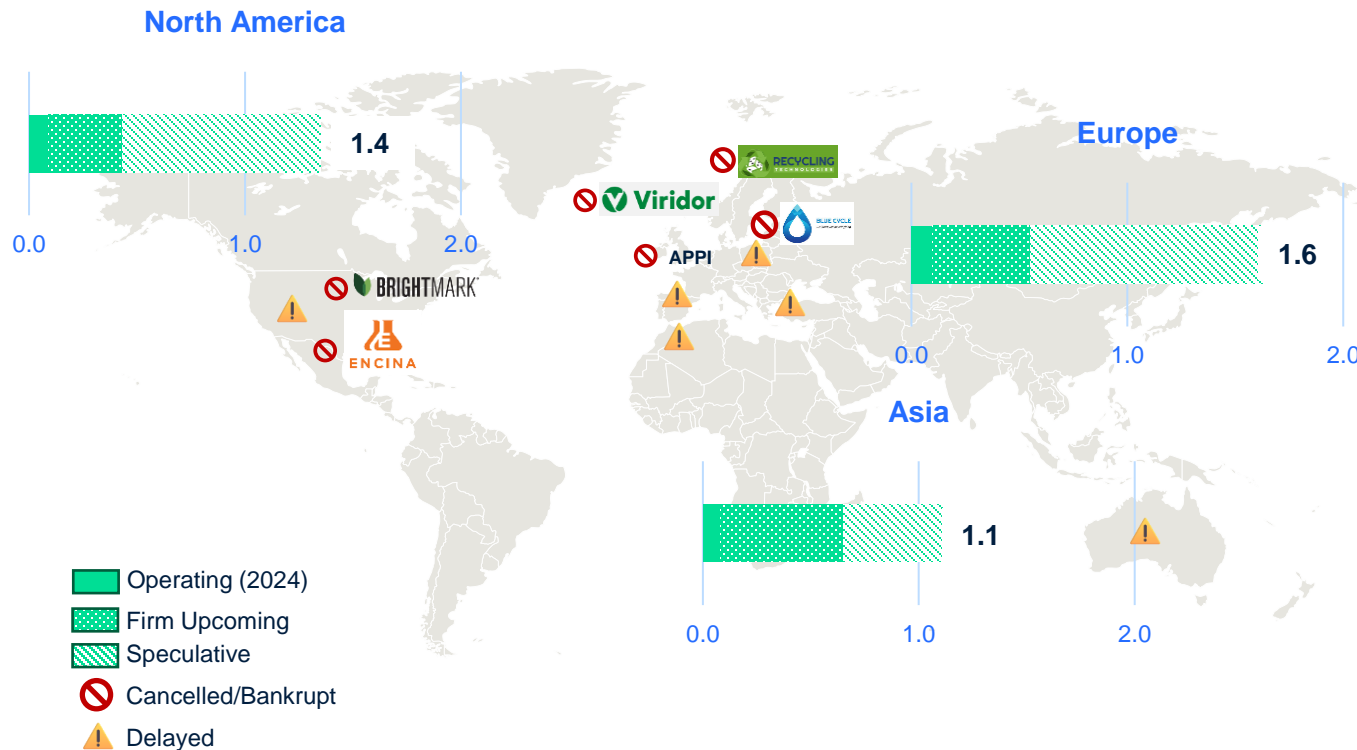
Global Pyrolysis oil capacity set to reach over 1.6 million tonnes by 2030, with an additional potential of ~2.5 million tonnes if all announced projects are implemented



Current operating capacity limited under 300 KT

Million Tonnes

2030 Global Pyrolysis capacity* by region including speculative projects



*Plastic waste processing capacity for plastic-to-plastic intended plants

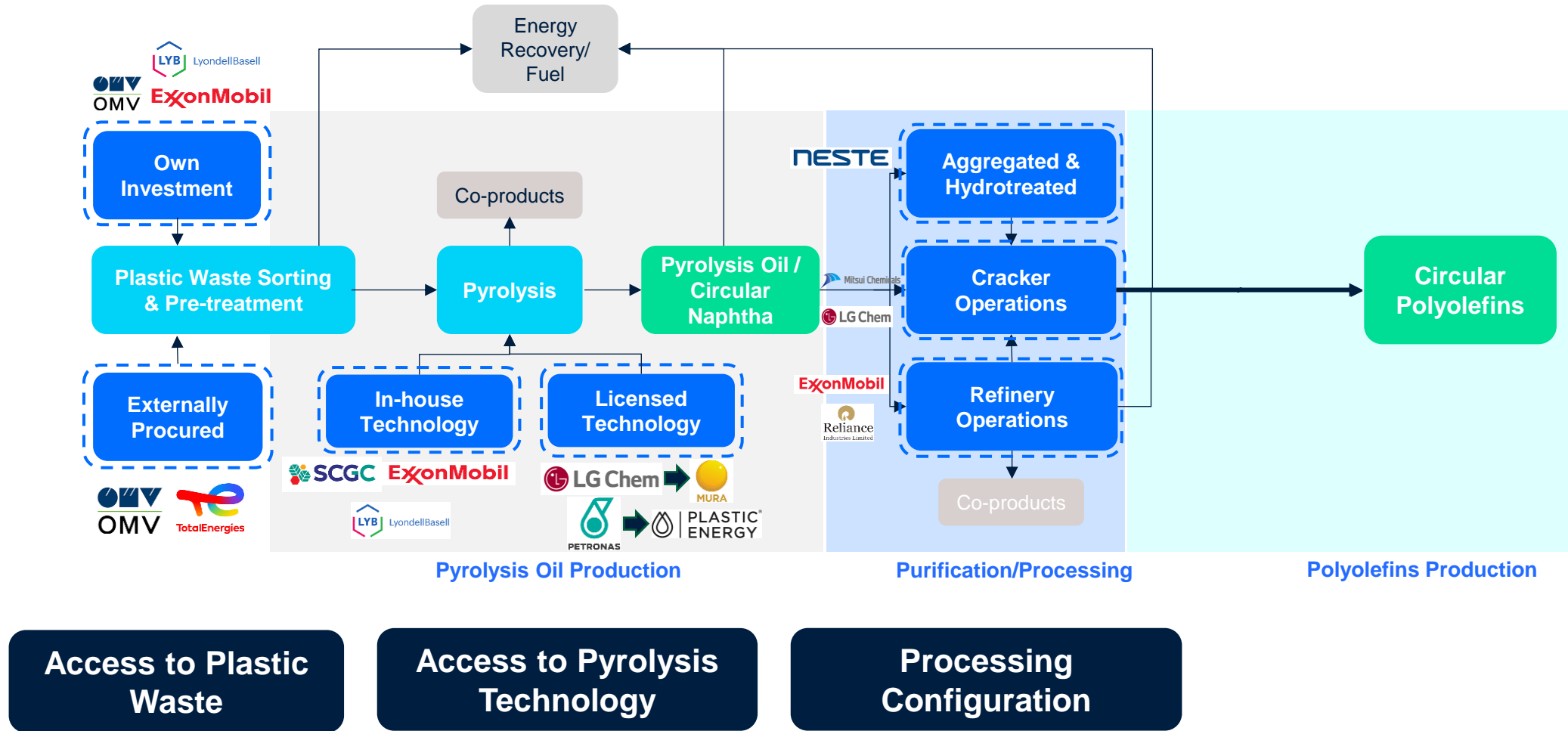
Source: ICIS Analytics and Consulting

Pyrolysis is expected to become a complementary solution alongside mechanical recycling in tackling plastic pollution

Polyolefins producers can maximize the value of pyrolysis oil integration by strategically aligning feedstock procurement, technology, and processing configurations



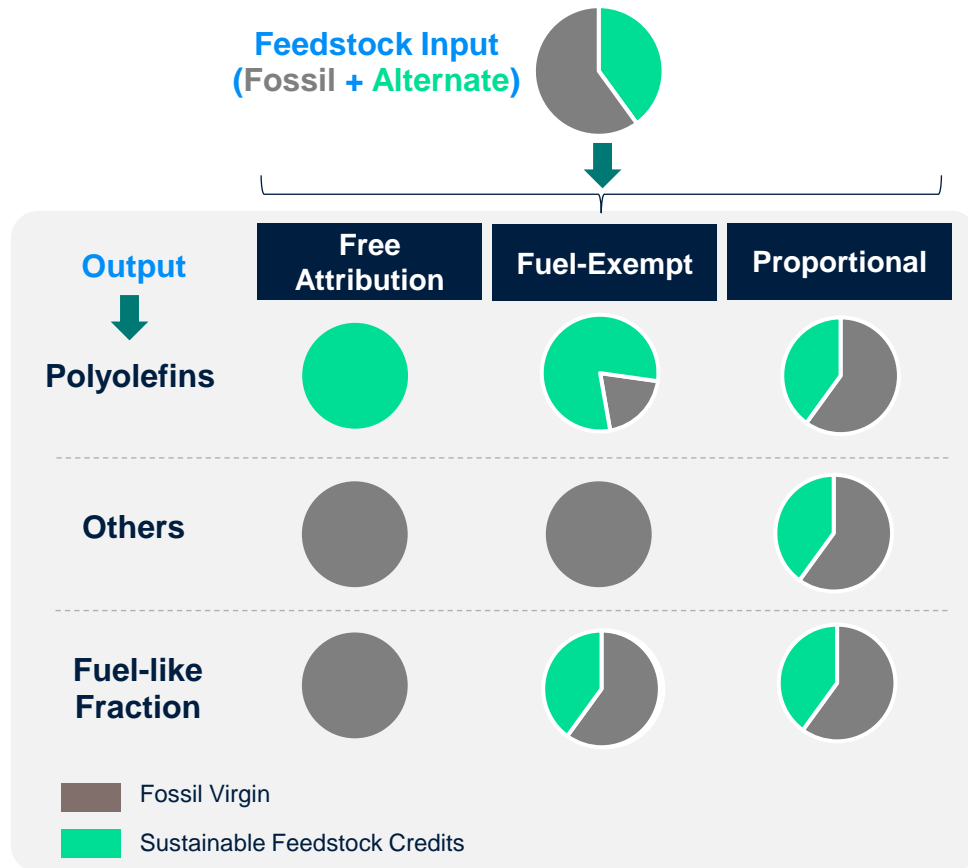
Securing consistent quality and quantity of plastic waste is proving as a key strategic advantage





Mass balance accounting will be critical for scaling Sustainable Polyolefins, offering a practical solution that balances economic viability with environmental considerations

However, adoption of different Mass balance approaches in different regions could prove as means of competitive advantage and guide investment decisions



Mass Balance Approaches

- **Free Attribution:** Credits allocated entirely to Polyolefins.
- **Fuel-Exempt:** Credits assigned to Polyolefins after excluding the fuel component.
- **Proportional Allocation:** Credits distributed based on yield or stoichiometry.

Regional Variations

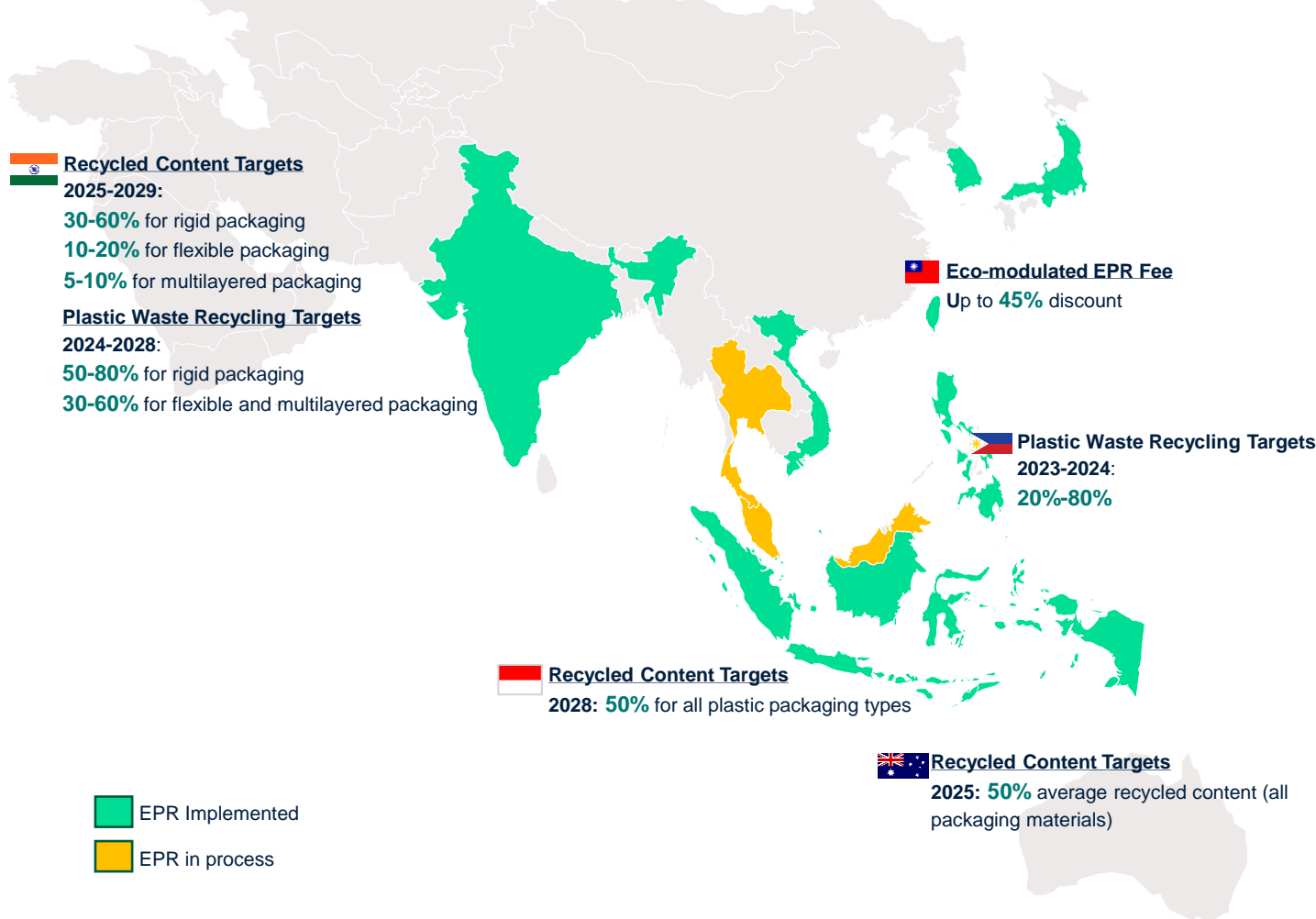
- Regional differences on mass balance approach may fragment markets, shift investments, and drive the need for global standards.

Polymer producers with integrated operations and comprehensive capabilities well positioned to lead the market



Asian regulatory landscape for plastics recycling is evolving, demonstrating intent and momentum

But challenges in policy harmonization and implementation remain



Asia's regulatory landscape is progressing with countries like the Philippines and Vietnam mandating EPR, while India sets ambitious recycled content targets.

Absence of a unified administrative body leading to diverse approaches, with countries like Japan and South Korea leading in EPR implementation, with few others facing enforcement challenges.

The packaging sector will be most impacted by regulations — primarily because of single-use plastic waste generated and highly visibility in consumer markets.

Emerging policies like EPR mandates and recycled content targets signal a growing commitment to sustainability across Asia

Brand owners are catalyzing the early adoption of sustainable Polyolefins



Sustained progress will depend on brand owners' continued commitment and ability to overcome market volatility, supply chain constraints and policy inconsistencies

Strategic Commitments Driving Market Impact

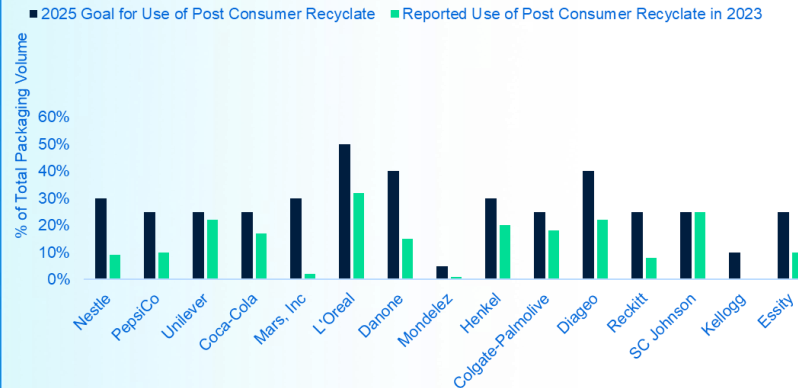
- Ambitious targets driving demand
- Investment in Circular Solutions
- Collaborative Ecosystem Development



Economic Pressures Slowing Progress

- Rising costs delaying commitments
- Inflation and recession concerns
- Two-tier market divide: food vs non-food

Reported Progress Towards 2025 Goal for Use of Post Consumer Recyclate



Source: Ellen MacArthur Foundation, The Global Commitment Progress Report (2024)

Policy and Infrastructure Bottlenecks

- Ambiguous regulations
- Feedstock scarcity limiting scalability
- Reliance on mechanical recycling

PRC '25: US pyrolysis recycling players churning through regulatory, economic uncertainty

Permit delays hurt Europe chemical recycling and mixed plastic waste growth

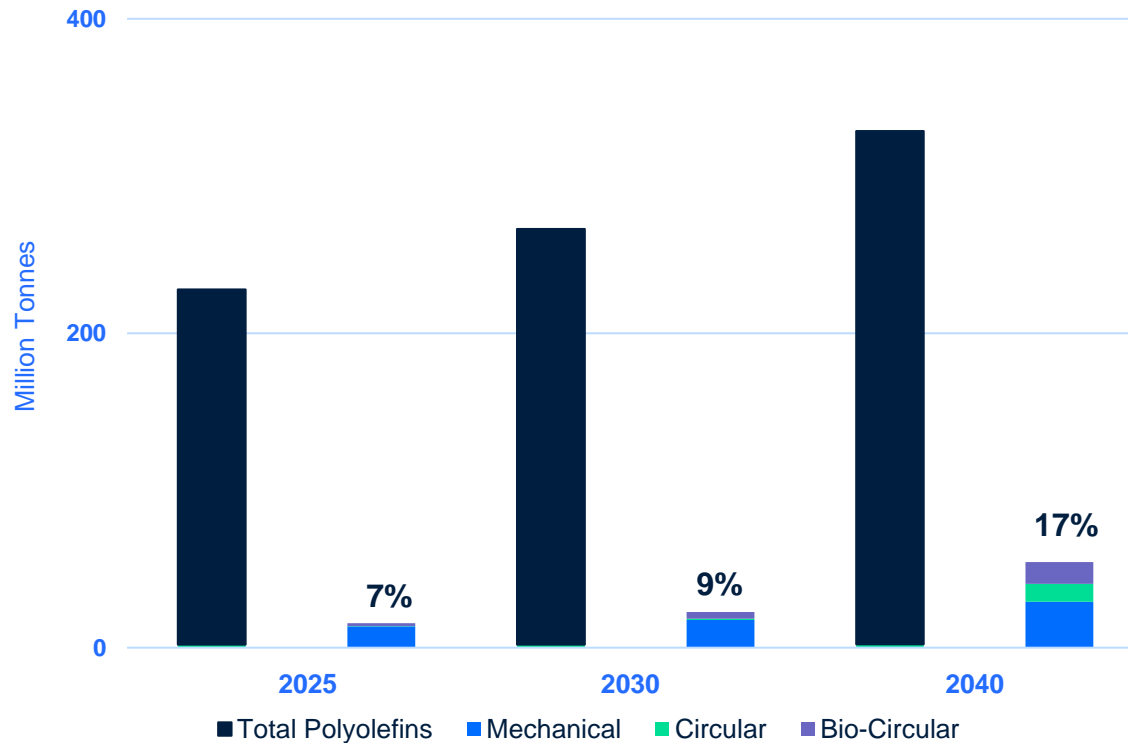
INSIGHT: The data is clear - regulation raises recycling value



Sustainable Polyolefins set to account for over ~17% of Polyethylene & Polypropylene globally by 2040

Wider adoption will be driven by regulatory and technology advancements

Sustainable Polyolefins Penetration - Global (2025-2040)



- Packaging leading early adoption, driven by regulatory requirements. Circular and bio-circular polyolefins to address quality and safety needs unmet by mechanically recycled polyolefins, especially for contact-sensitive applications.
- Europe leading global momentum, supported by strong regulation and industry collaboration, with Asia and the Americas following at varied paces.
- Vertical integration and partnerships to drive future growth, supported by policy, infrastructure, and technology advancements.

Source: ICIS Analytics and Consulting

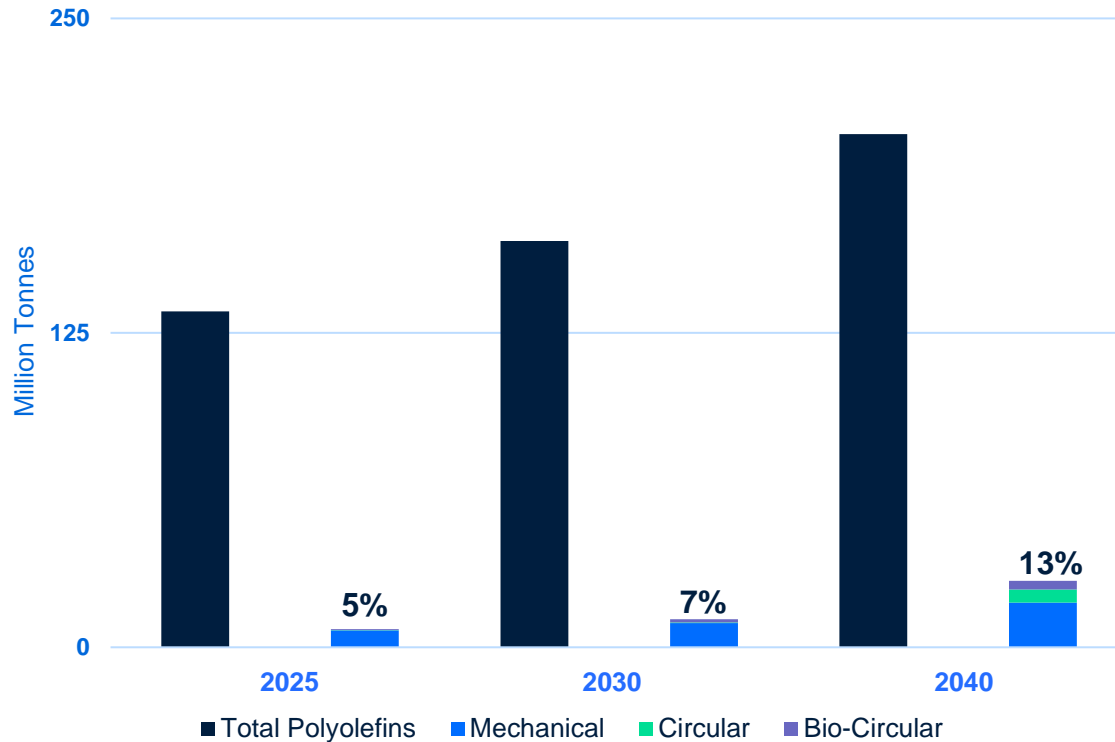
Market demand for Circular and Bio-Circular Polyolefins to be led by regulated sectors needing virgin-like performance



In Asia, despite regulatory fragmentation in countries, Sustainable Polyolefins could account for ~13% of polyolefins by 2040

Significant untapped potential remains constrained by regulatory and infrastructure gaps

**Sustainable Polyolefins Penetration - Asia
(2025-2040)**



- Regulatory fragmentation across Asia hindering scalability, but evolving policies signal strong future demand for sustainable polyolefins.
- Early adoption in Japan and South Korea paving the way for sustainable polyolefins demand, while infrastructure gaps create new opportunities for circular startups in developing Asia.
- Global FMCGs leading early adoption in developing Asia, but local market growth will depend on stricter regional regulations and shifting domestic priorities.

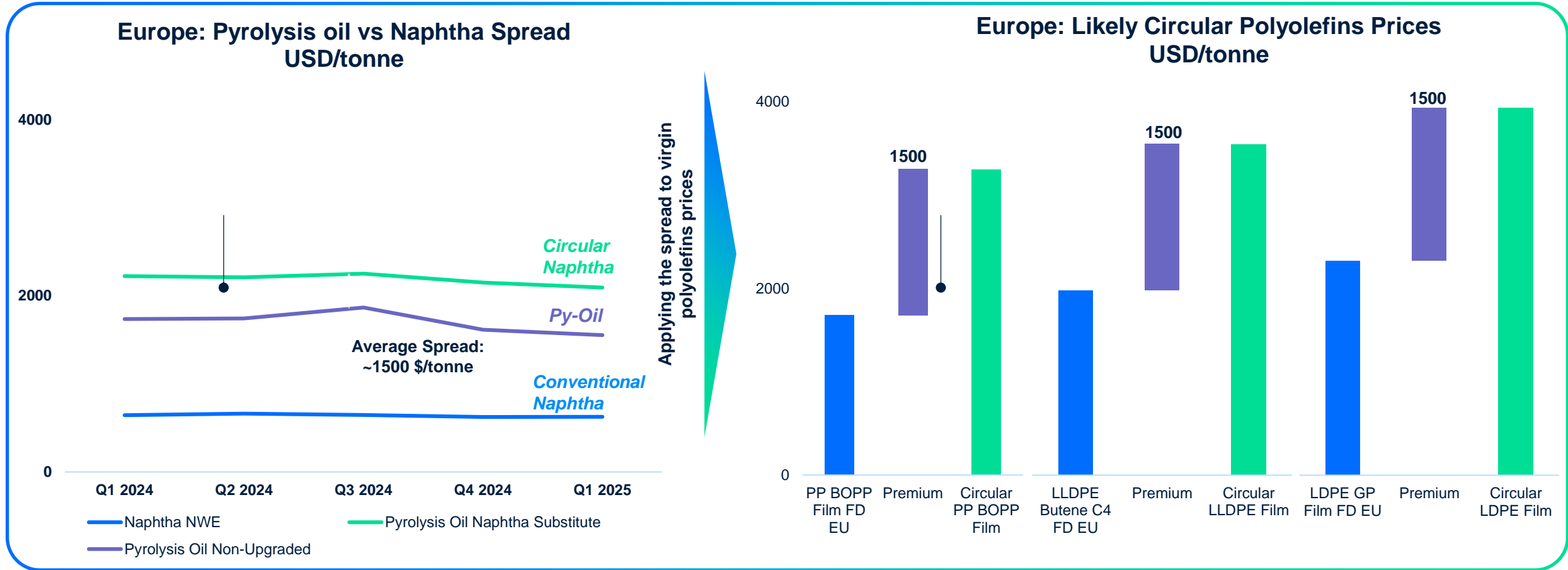
Source: ICIS Analytics and Consulting

With lack of harmonized regulations, Asian investments are expected to find market in developed markets like Europe before pivoting to local and regional markets in the long term



Circular polyolefins are expected to command significant premiums over virgin polyolefins due to high production costs and limited supply

However, as scale and availability grow, premiums are expected to taper over the long term



Source: ICIS Pricing



Asia could unlock over 18 million tonnes of sustainable polyolefins demand by 2040 if European recycled content targets were to be adopted

Diverse regulatory and market drivers will need a multi-pathway approach

Sustainable Polymers	Key Drivers	Key Polymers	Key Applications
<p>Mechanical Recycling</p>	<ul style="list-style-type: none"> • Regulatory Push • Brand-Led Demand Acceleration • Carbon footprint reduction 	<ul style="list-style-type: none"> • Rigid HDPE & PP • PET 	<ul style="list-style-type: none"> • Secondary packaging • Automotive • Food contact packaging (PET)
<p>Circular Polyolefins</p>	<ul style="list-style-type: none"> • Regulatory Push • Brand-Led Demand Acceleration • Solution for Hard to recycle Plastic Waste 	<ul style="list-style-type: none"> • LDPE/LLDPE • PP • HDPE 	<ul style="list-style-type: none"> • Food contact packaging • Contact sensitive packaging (Healthcare, Personal Care, Hygiene etc.) • Automotive
<p>Bio-Circular Polyolefins</p>	<ul style="list-style-type: none"> • SAF market growth • Carbon footprint reduction • Emerging policy support 	<ul style="list-style-type: none"> • LDPE/LLDPE • PP • HDPE 	<ul style="list-style-type: none"> • Food contact packaging • Contact sensitive packaging (Healthcare, Personal Care, Hygiene etc.) • Automotive

Thank you



Energy Transition and Feedstocks Tensions

Stefano Zehnder, Vice President ICIS Consulting



Agenda

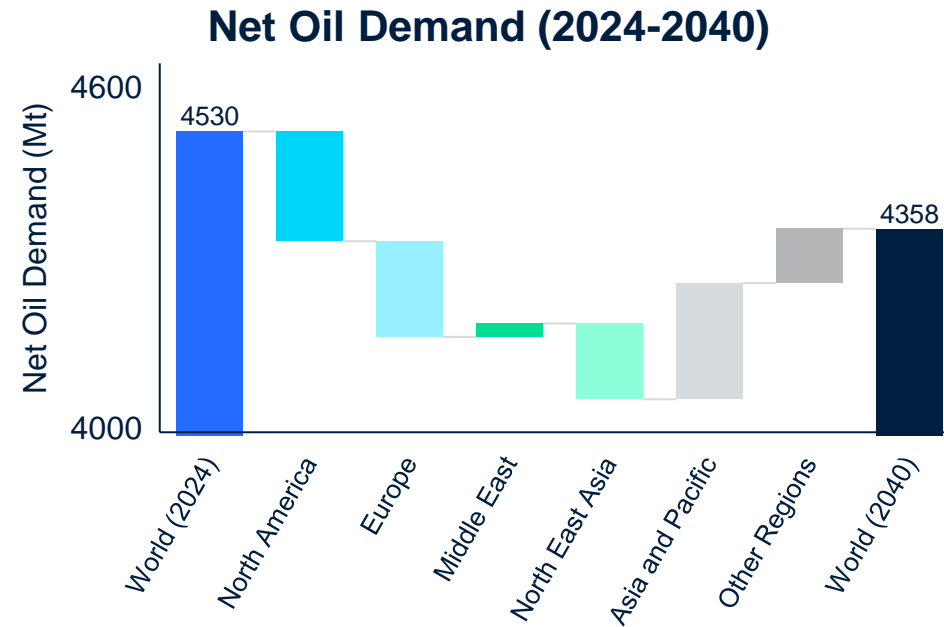
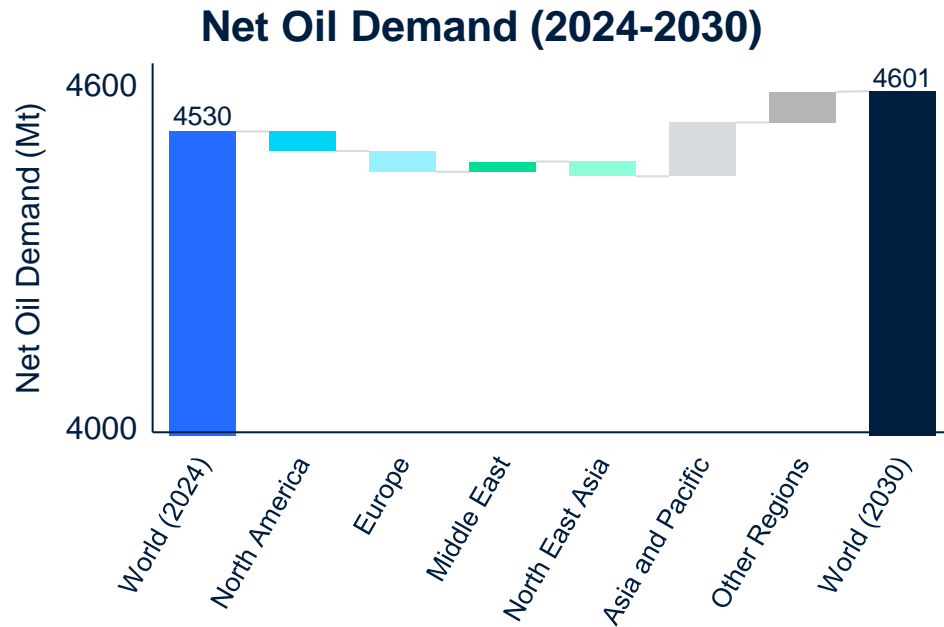
- 01 Trends In Oil Demand – Regional Relevance & Feedstocks
- 02 Refining Operations – Needs for Adjustments and Tensions
- 03 The Gasoline Interface – Impact on Feedstocks Availability
- 04 Feedstock Tensions
- 05 Conclusions



“Net” Oil Demand is likely to decline by the 2030s, on a Global Basis

Regional trends will remain diverse, even within Asia

Refiners’ contribution (~90% of demand) will decline, requiring different Regional Strategies



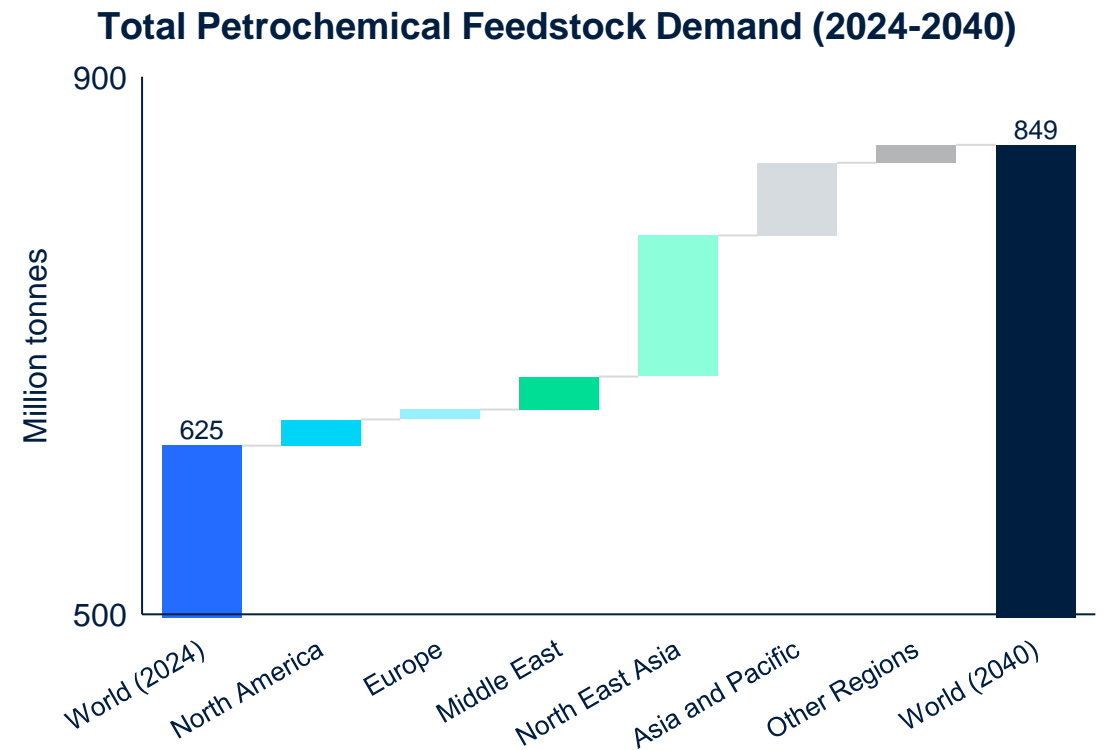
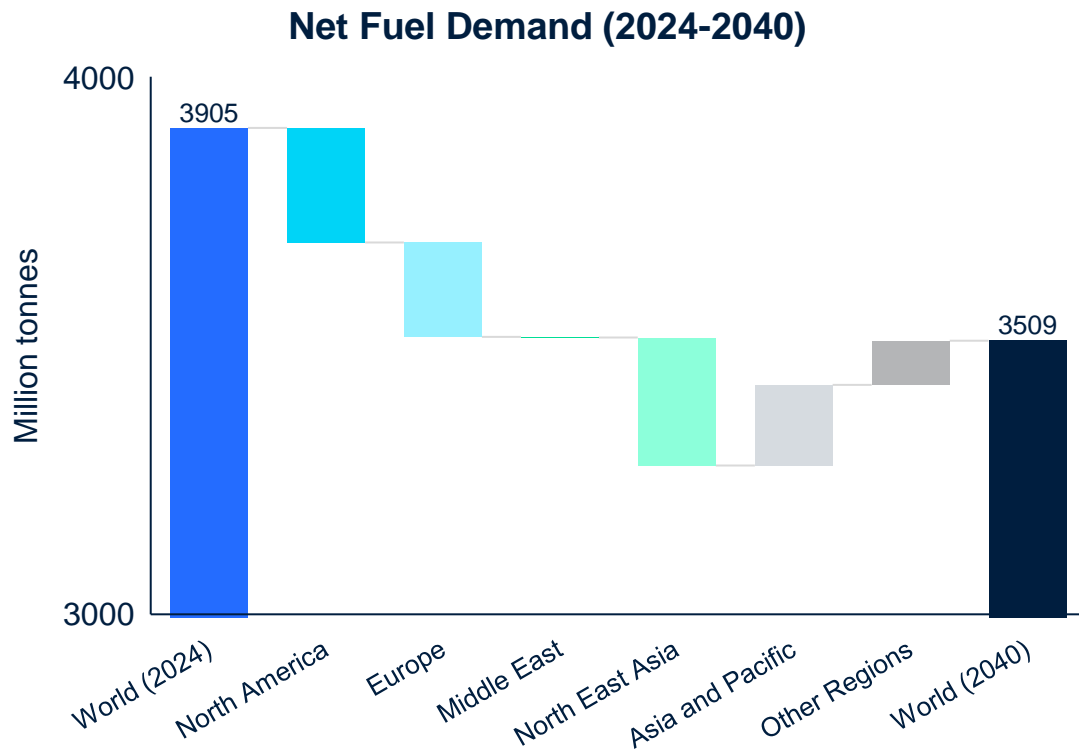
“Net” Oil Demand Excludes Non-Oil, but includes NGLs

Source: ICIS Consulting Elaborations of ICIS Supply & Demand database



Decline in Net Fuel Demand is paralleled by Growth in Petrochemical Feedstocks

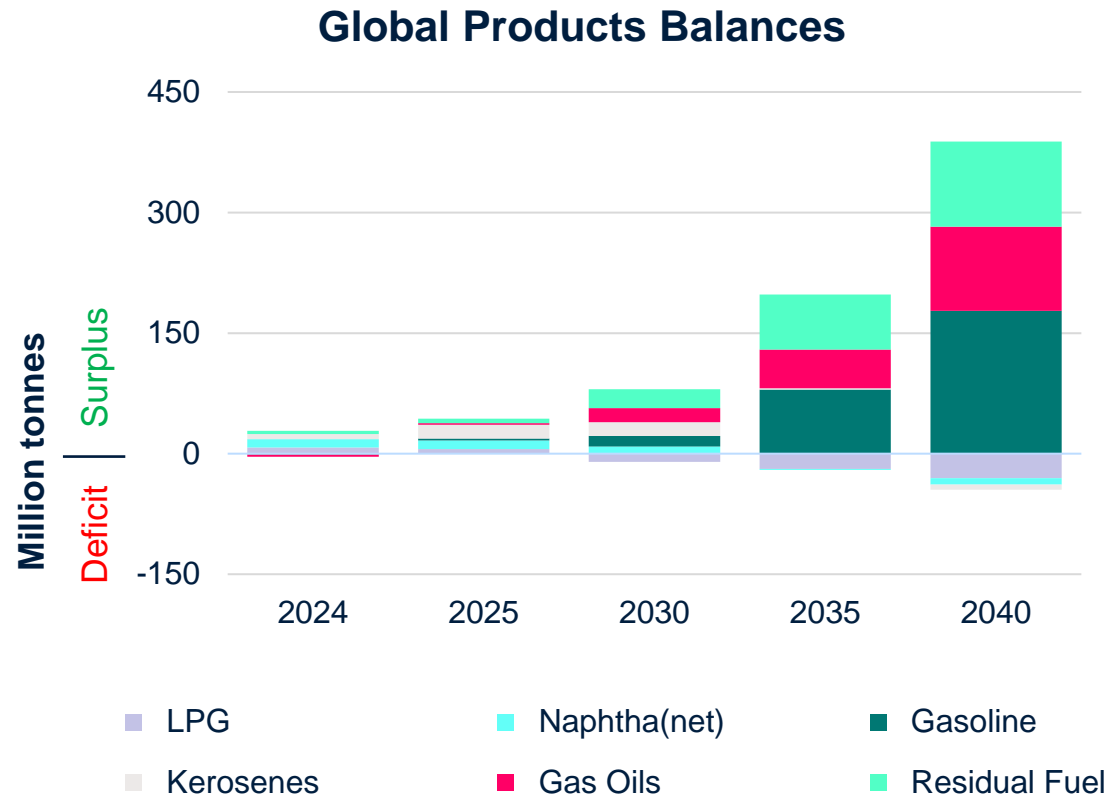
Needs are for more Refining capacity rationalization and for increased Petrochemical Integration
Regional differences are amplified



Source: ICIS Consulting Elaborations of ICIS Supply & Demand database



In a Scenario based on “Announced Rationalizations Only” Crude Runs will need to further decline, Gasoline the key focus



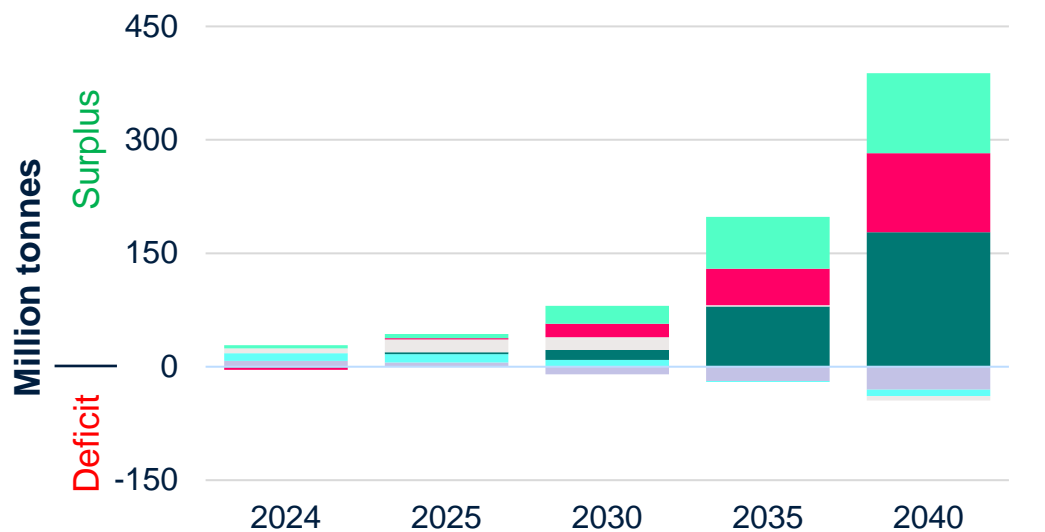
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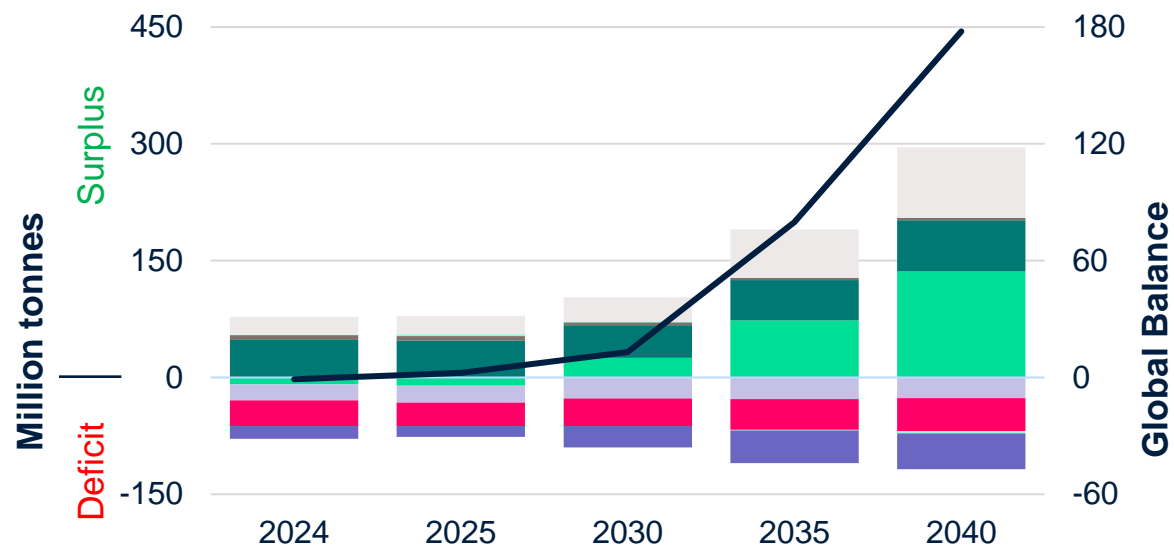
Regional characterizations imply different adjustment capabilities

Global Products Balances



- LPG
- Naphtha(net)
- Gasoline
- Kerosenes
- Gas Oils
- Residual Fuel

Global Gasoline Balance



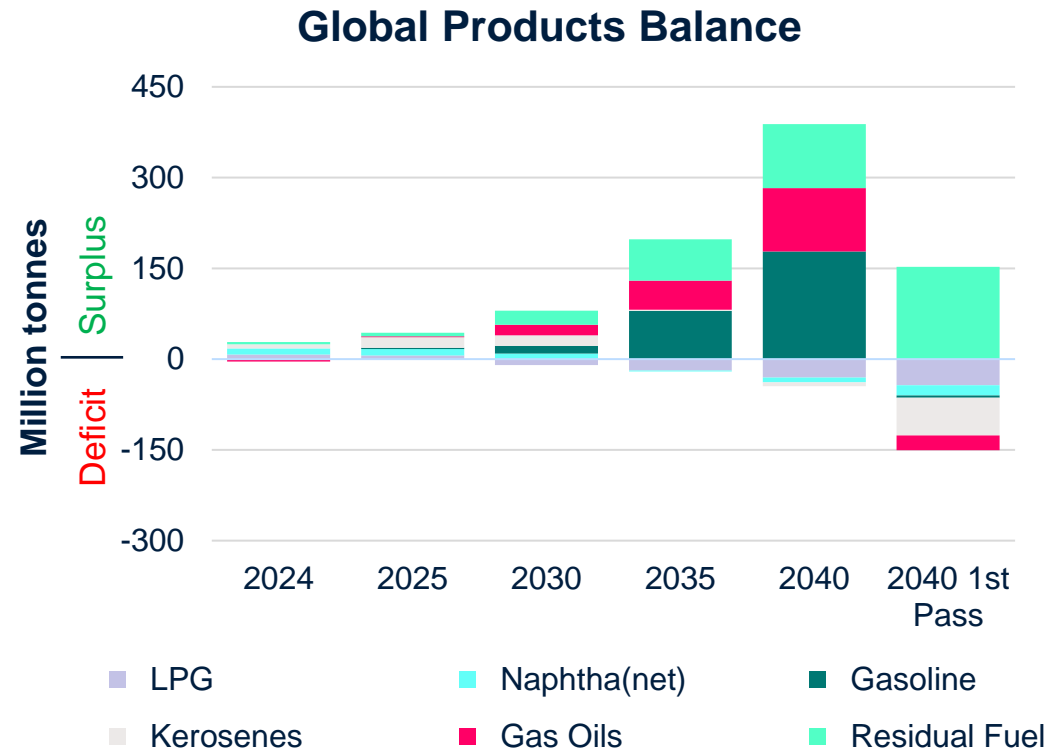
- North America
- South and Central America
- Europe
- Former USSR
- Africa
- Middle East
- North East Asia
- Asia and Pacific
- Global Balance (right axis)

Source: ICIS Consulting Elaborations of ICIS Supply & Demand database



A “First Pass” Crude Runs Correction will Highlight Potential Feedstock Tensions

As Crude Runs decline, Petchem Feedstocks availability deteriorates: how much gasoline-to-naphtha shift?



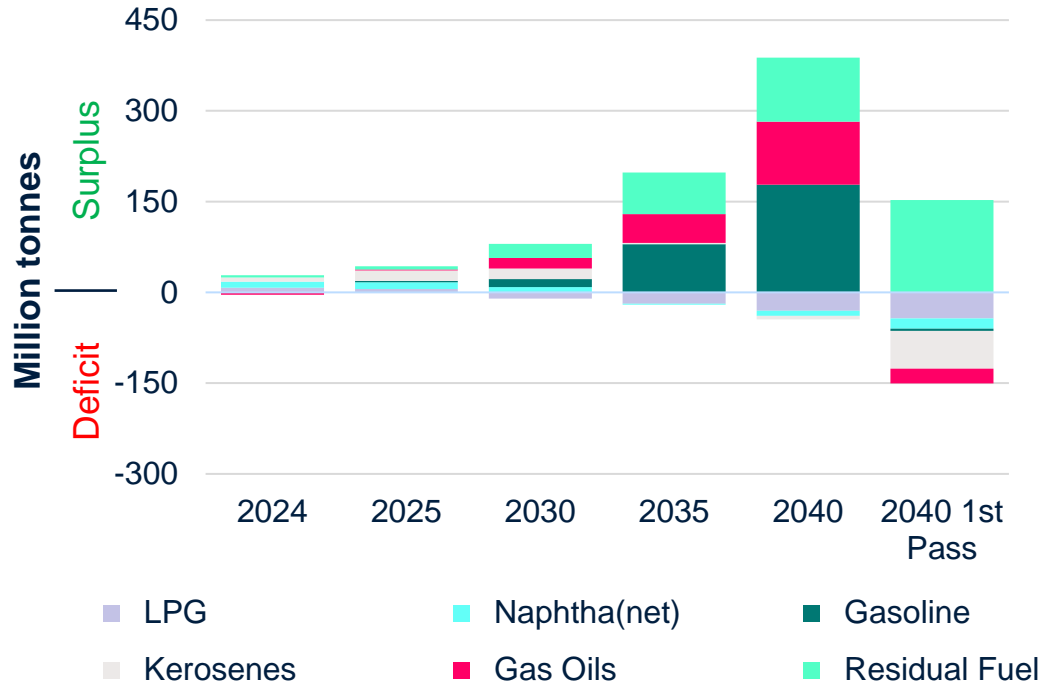
Source: ICIS Consulting Elaborations of ICIS Supply & Demand database



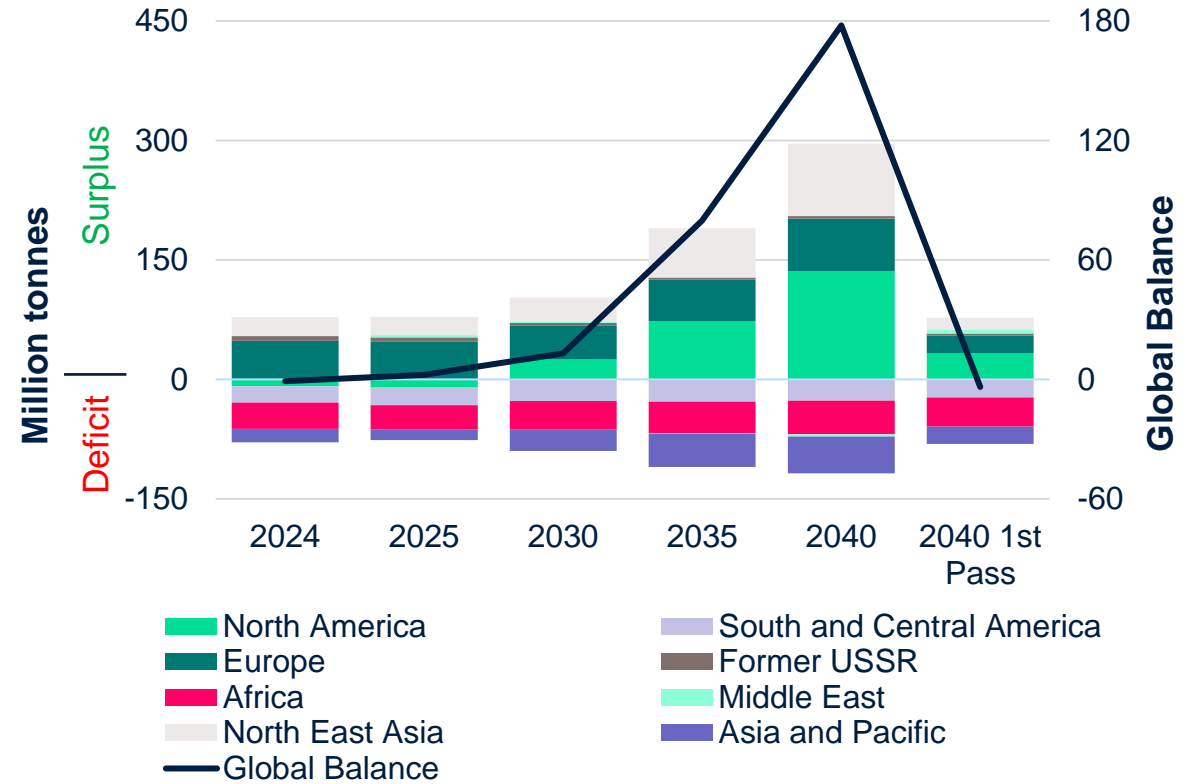
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Global Products Balance



Global Gasoline Balance



Regional characterizations imply different adjustment capabilities

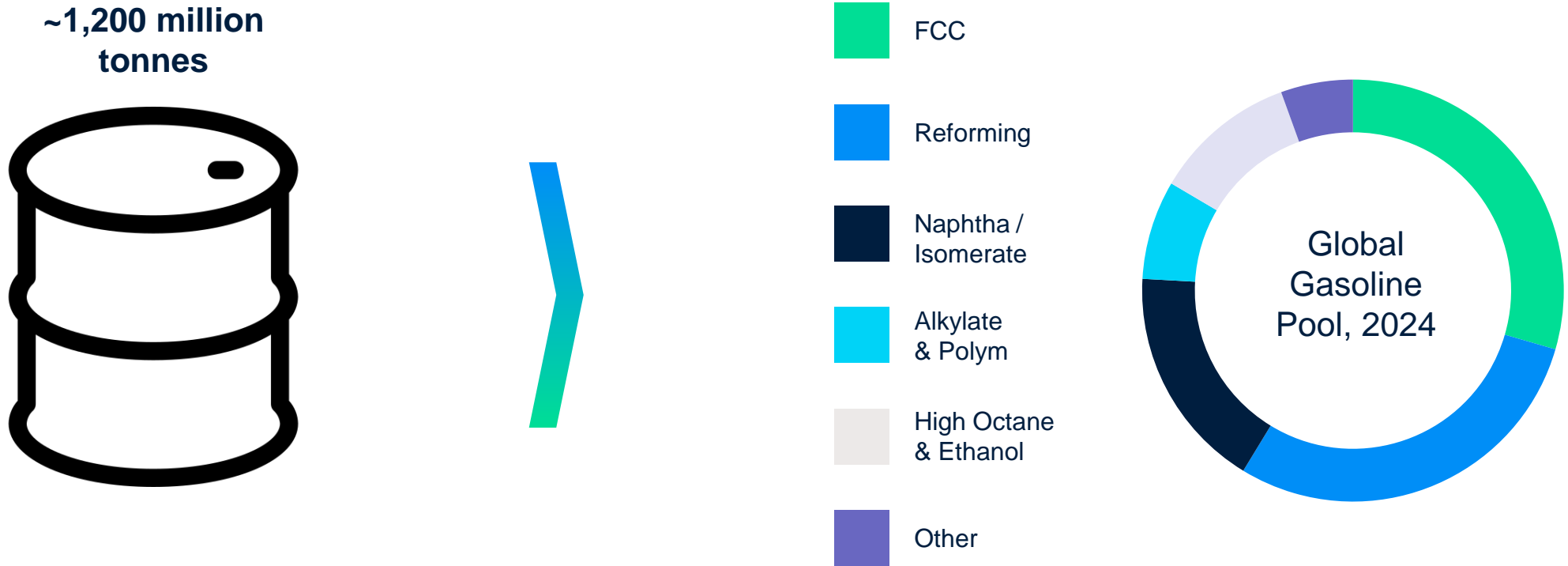
Source: ICIS Consulting Elaborations of ICIS Supply & Demand database



Global Gasoline Composition in 2024

FCCs and Reforming are the largest components in Gasoline

Reducing the Gasoline Pool could release Naphthas to Petchems, but could also reduce Propylene Availability

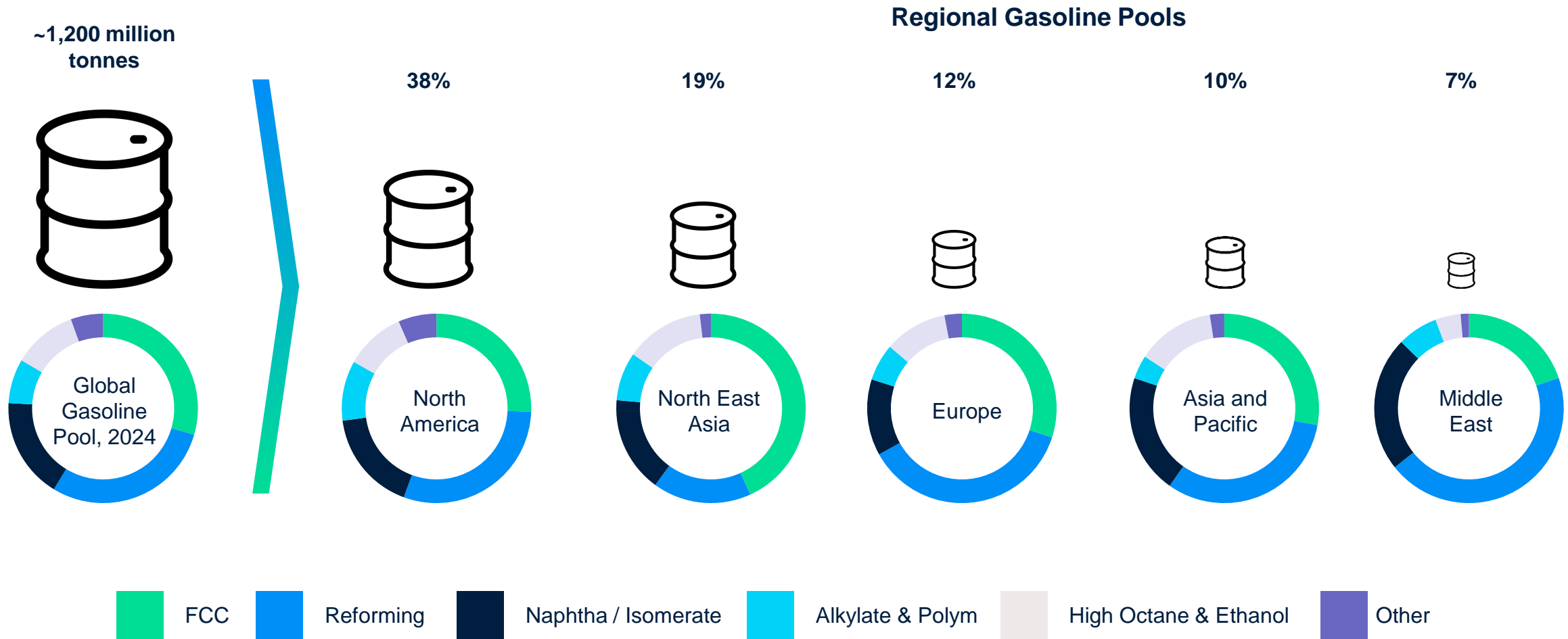


Source: ICIS Consulting Elaborations of ICIS Supply & Demand database



Global Gasoline Composition in 2024

Regional Refinery Configurations and Size impact Capabilities to release Naphtha Volumes and Quality
It will also determine the amount of potential Propylene Losses by Region

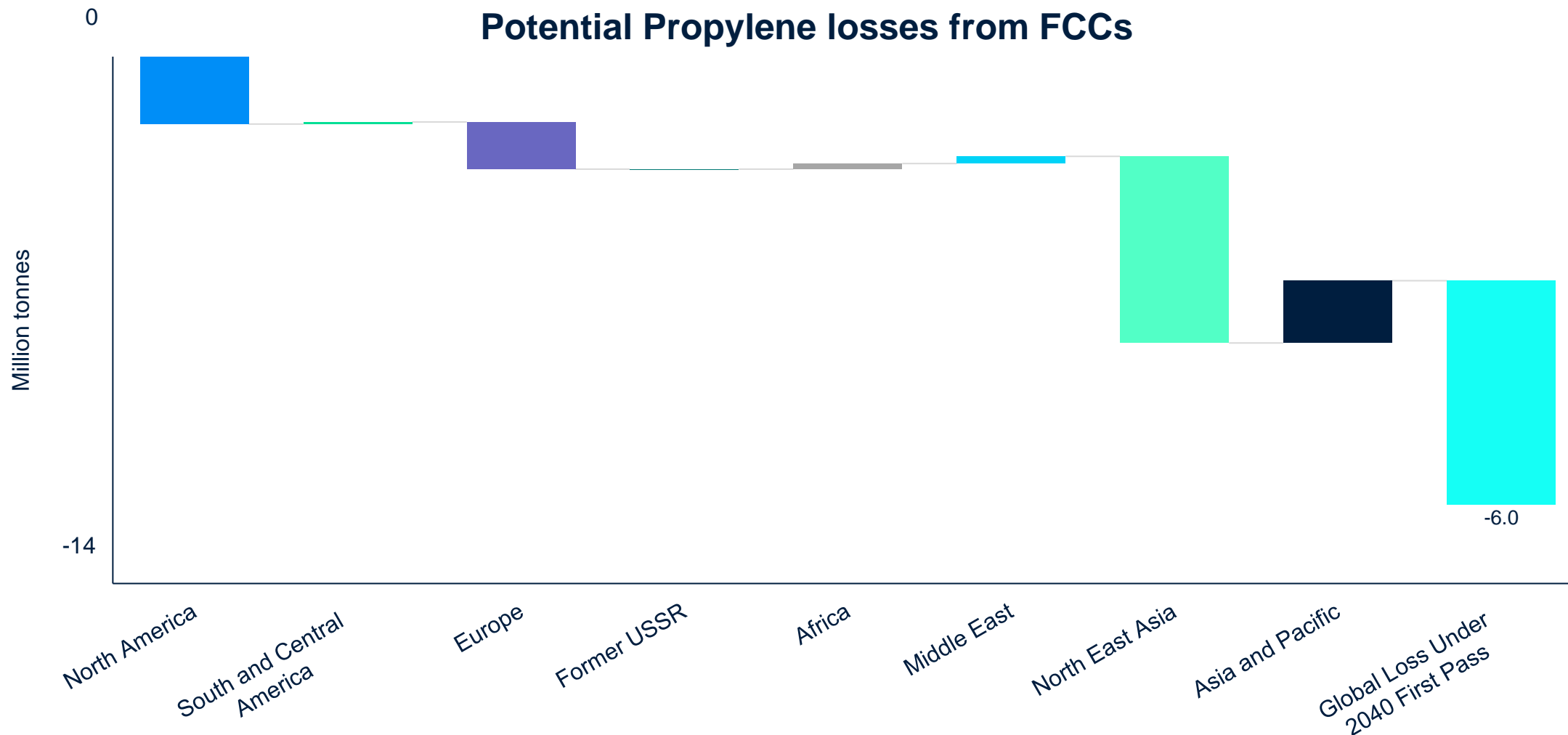


Source: ICIS Consulting Elaborations of ICIS Supply & Demand database



Potential Propylene Loss in a “First Pass” Crude Runs Correction Scenario

An uneven Scenario...

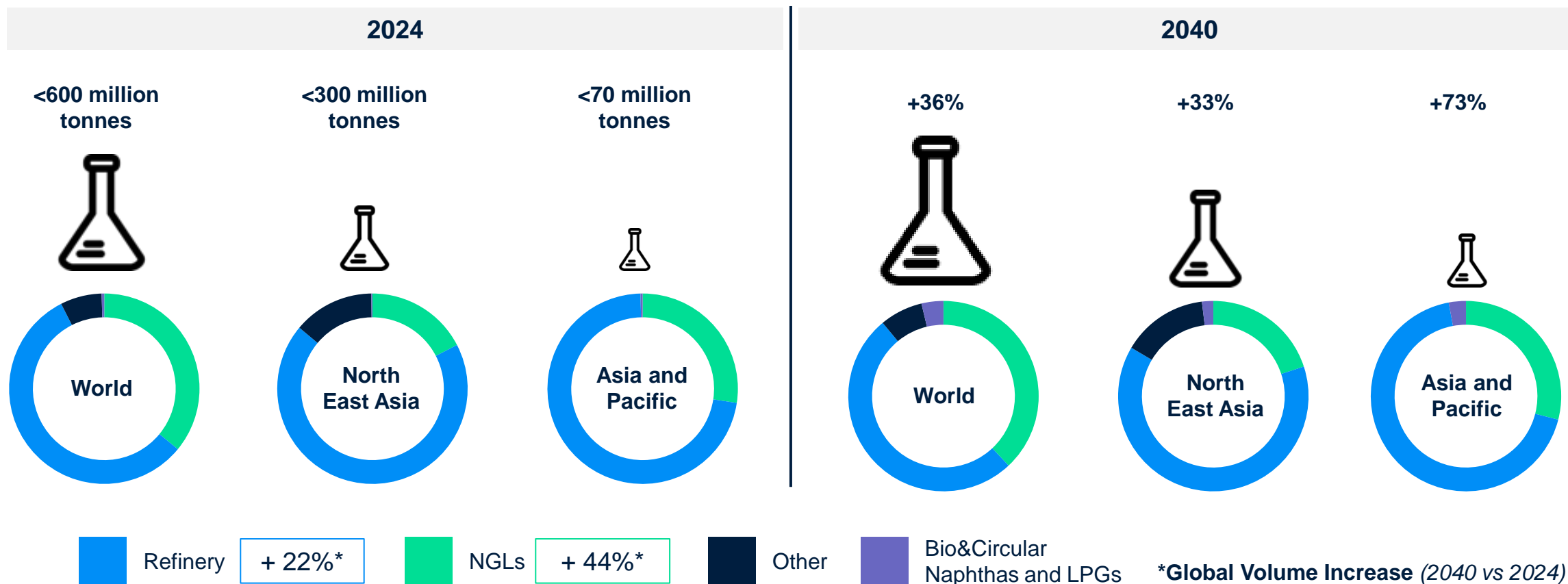


Source: ICIS Consulting Elaborations of ICIS Supply & Demand database



Global Petrochemical Feedstock Tensions

- Crude Runs decline by 10%: Petchem yields from refineries will have to increase considerably
- Desire and dependency on light NGLs may be challenged longer term



An example of a longer-term scenario and key feedstock sourcing – understanding of balance for refining output and NGLs feedstock requirements is important in modelling oil needs

Source: ICIS Consulting Elaborations of ICIS Supply & Demand database

Conclusions



- The decline in net Oil Demand for Fuels will require important reductions in Crude Runs, whilst demand for Petrochemical feedstocks will continue longer term. There is a global call for increasing yields of petrochemicals in future refining operations, with selected Crude to Chemicals opportunities an option to carefully consider.
- Declining Crude runs will reduce naphtha availability, whilst contracting Gasoline Pools will offer opportunities to shift naphthas to petrochemicals. Options from Bio-Circular material are rapidly increasing.
- Function of the Pace in “Energy Transition”, a number of Tensions are emerging for accessing the desired Petrochemical Feedstocks: qualities of incremental naphthas, access to incremental NGLs, potential Propylene losses from FCCs, and uncertainties on the size and contribution from developments in Bio-Circularity.
- Ultimately, these Tensions will impact on the value of the different streams, within different regional dynamics

Thank you

