

Reading the Tea Leaves: A Clearer View on the Global C4s and Elastomers Market

What Forces Are Driving Change in the Butadiene & Elastomers Market Over the Next Decade?

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Agenda

Market Evolution

Forces Shaping the Future

Strategic Opportunities

Conclusions

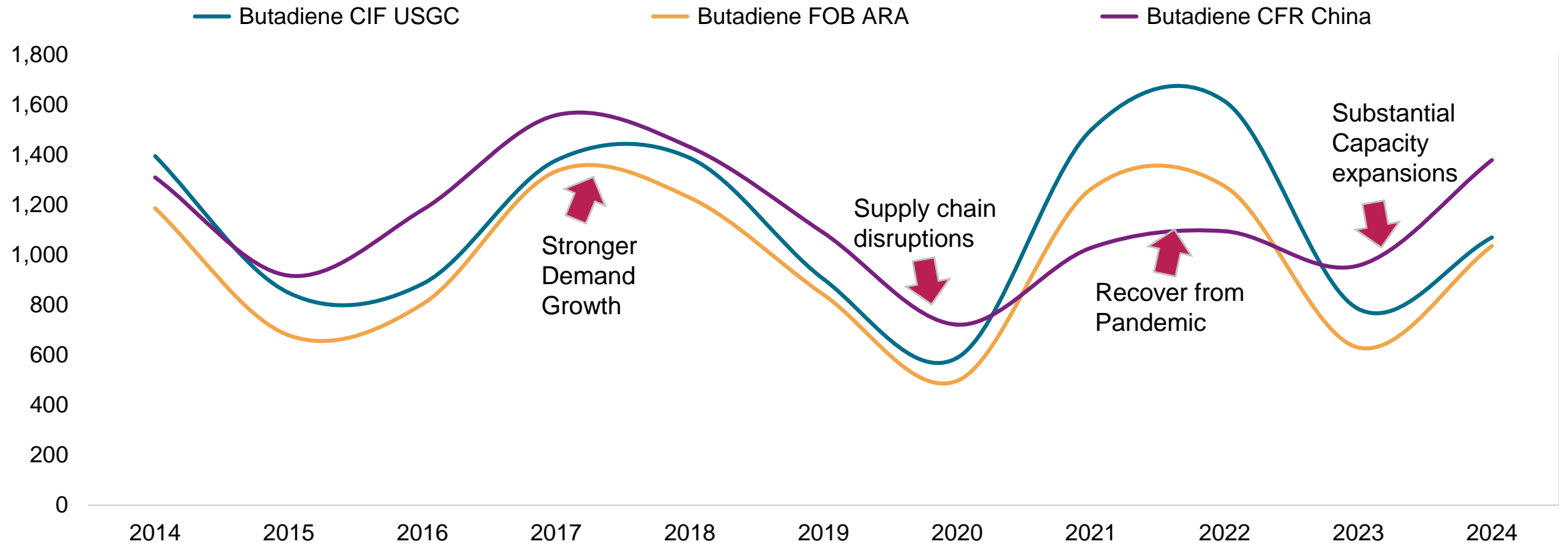




How the Global Order Has Shaped in the Past Decade

The COVID-19 pandemic, supply chain disruptions, and evolving supply and demand dynamics have shaped prices over the past decade

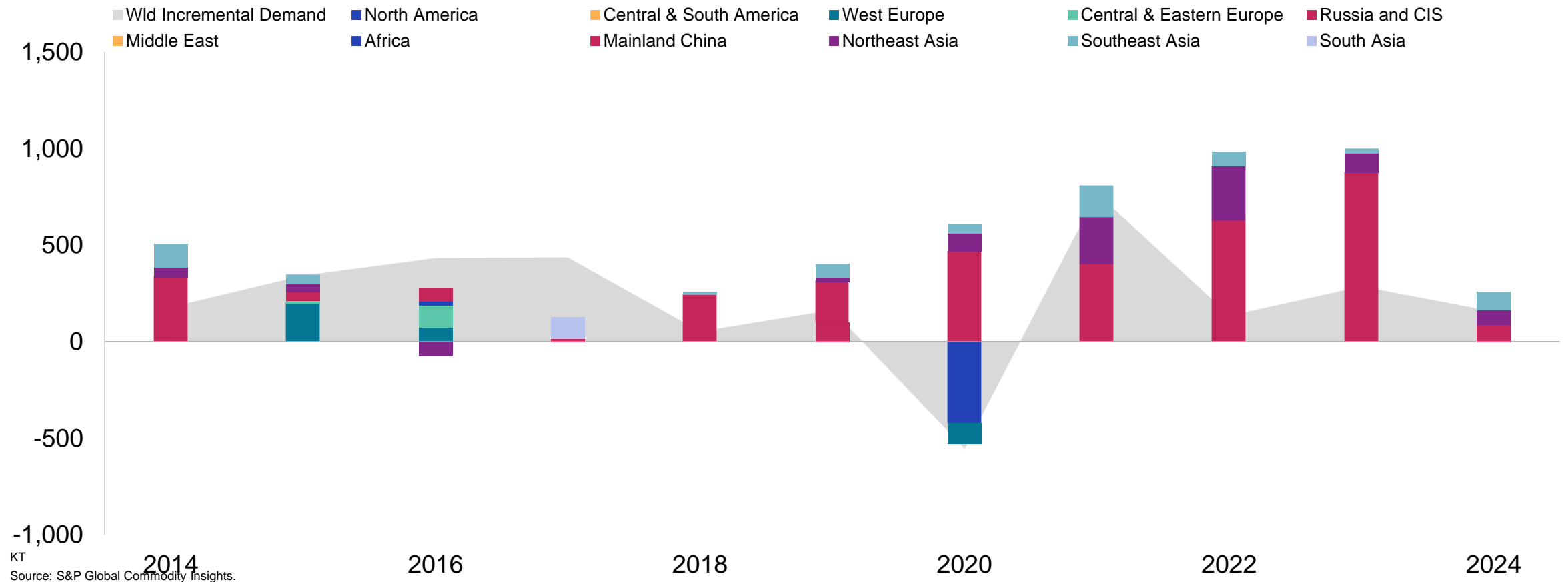
Spot price of butadiene by regions



Source: S&P Global Commodity Insights.
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Global Butadiene Supply Shaped by China's Pivotal Role Over the Past Decade

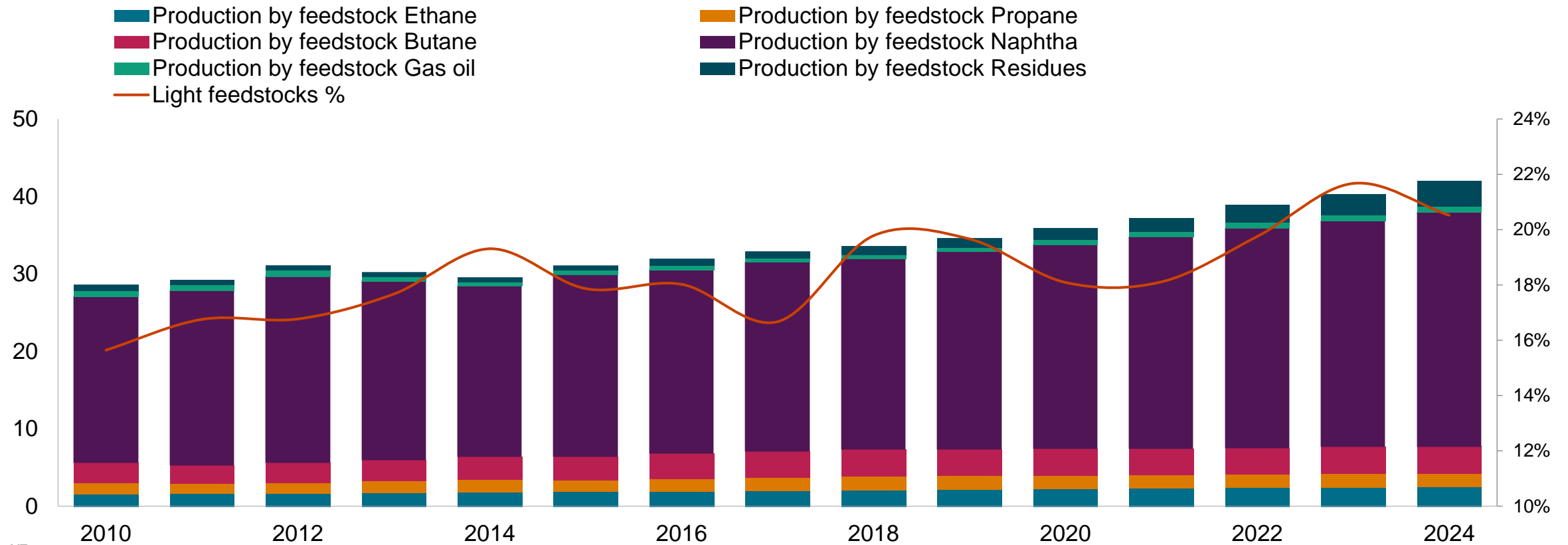
BDE Incremental Capacity Vs Demand



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Source: S&P Global Commodity Insights.
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Global CC4 Feedstock Slates Shaped by Rising Ethane and Butane Amid Propane Fluctuations (2014-2024)

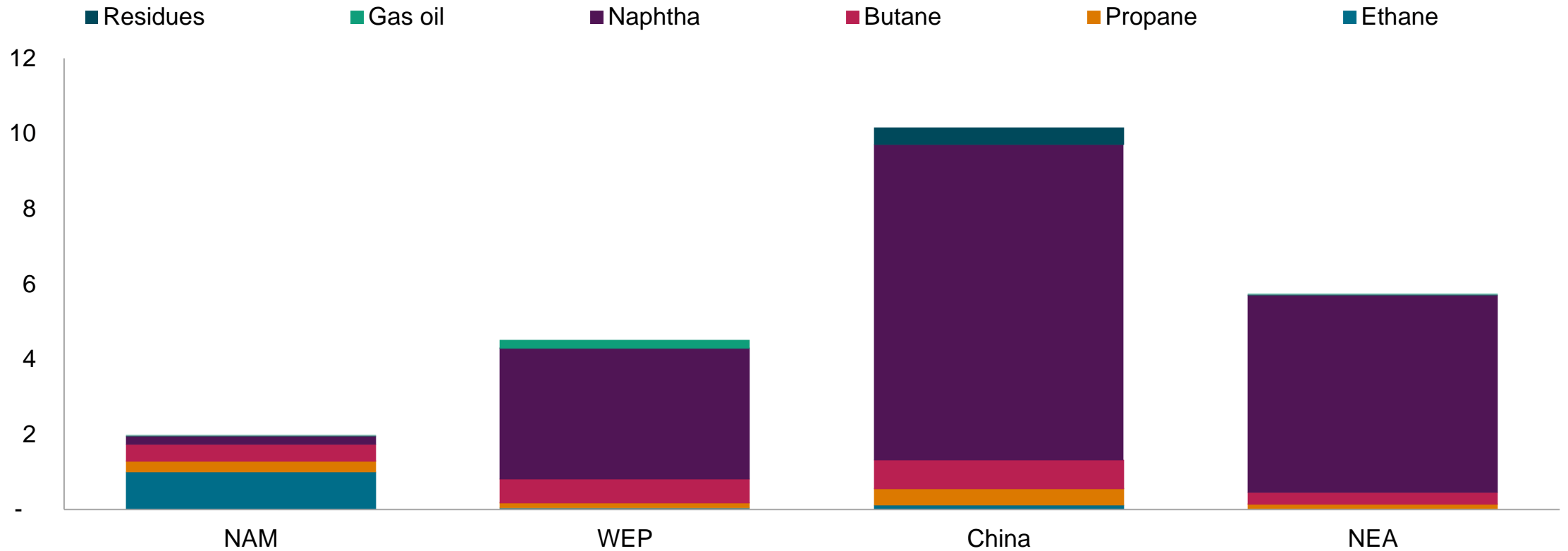
CC4 production composition by feedstocks



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Source: S&P Global Commodity Insights.
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2024 Butadiene Feedstocks Dynamics: Naphtha Dominates Crude C4s Production in China and NEA, While Ethane and Butane Lead in NAM

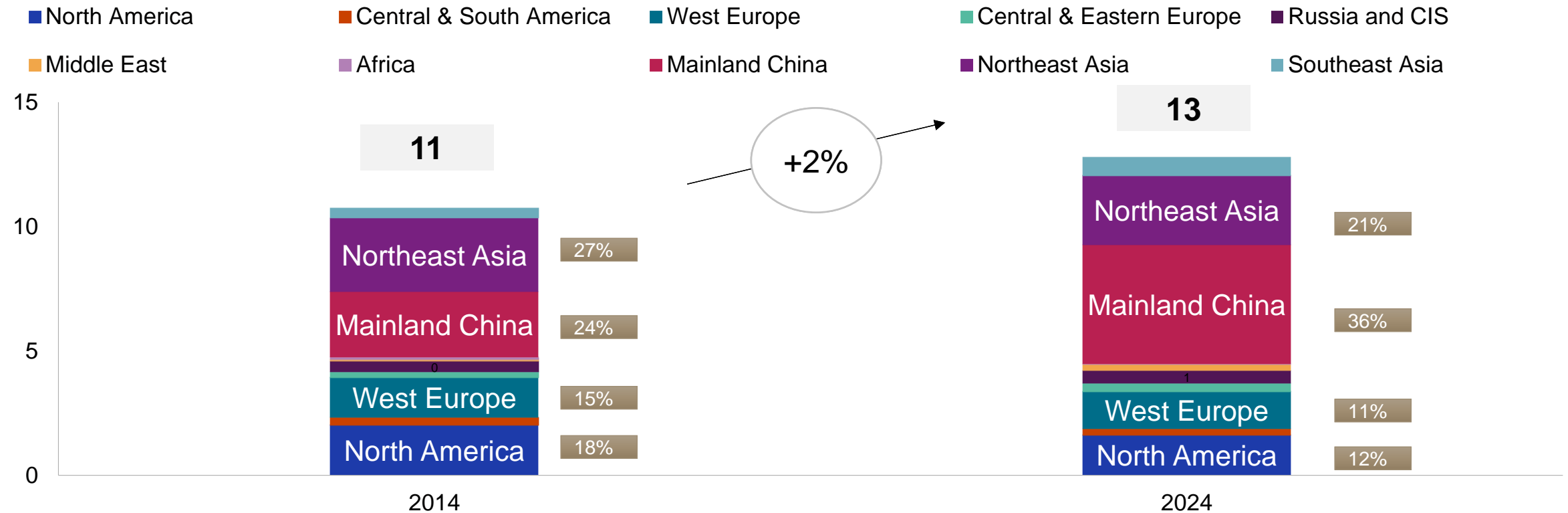
CC4 production feedslates of key regions in 2024



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As of Mar 11, 2025.
Source: S&P Global Commodity Insights.
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Global butadiene demand from 2014 to 2024 reveals a landscape characterized by significant growth in Mainland China and stable demand in mature markets

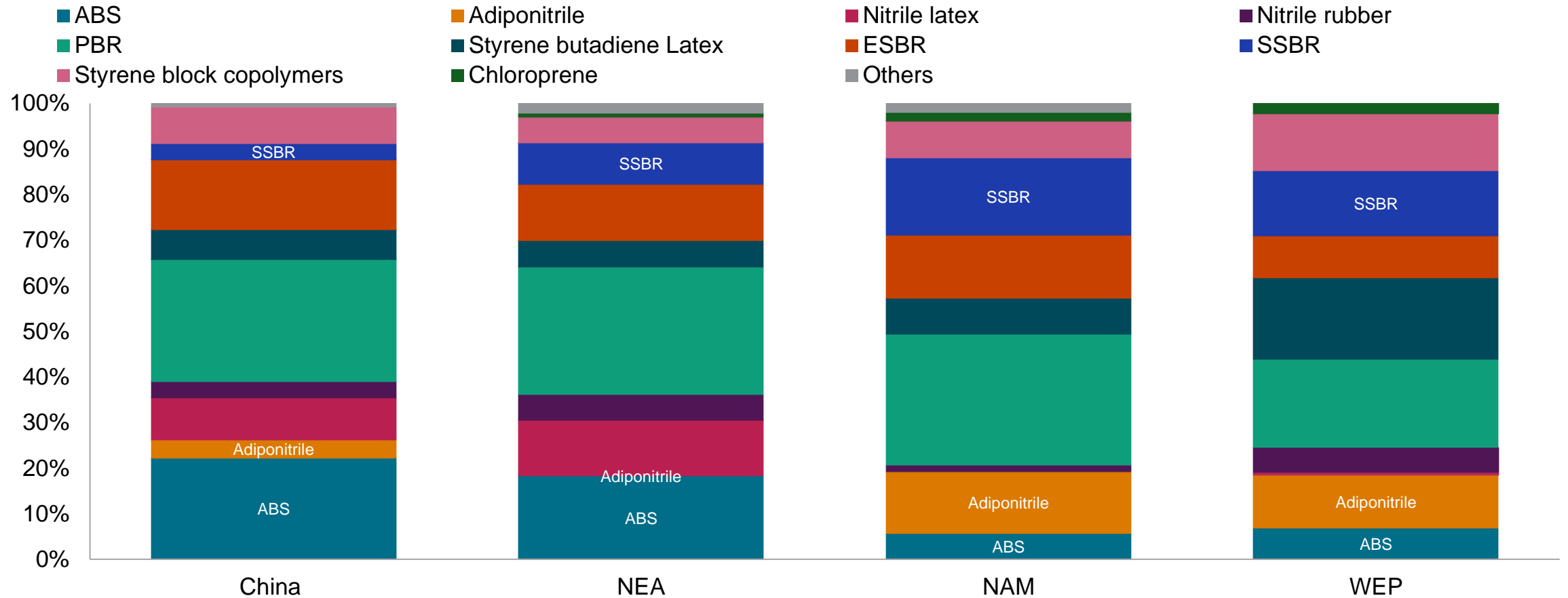
BDE Demand by Regions



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 Source: S&P Global Commodity Insights.
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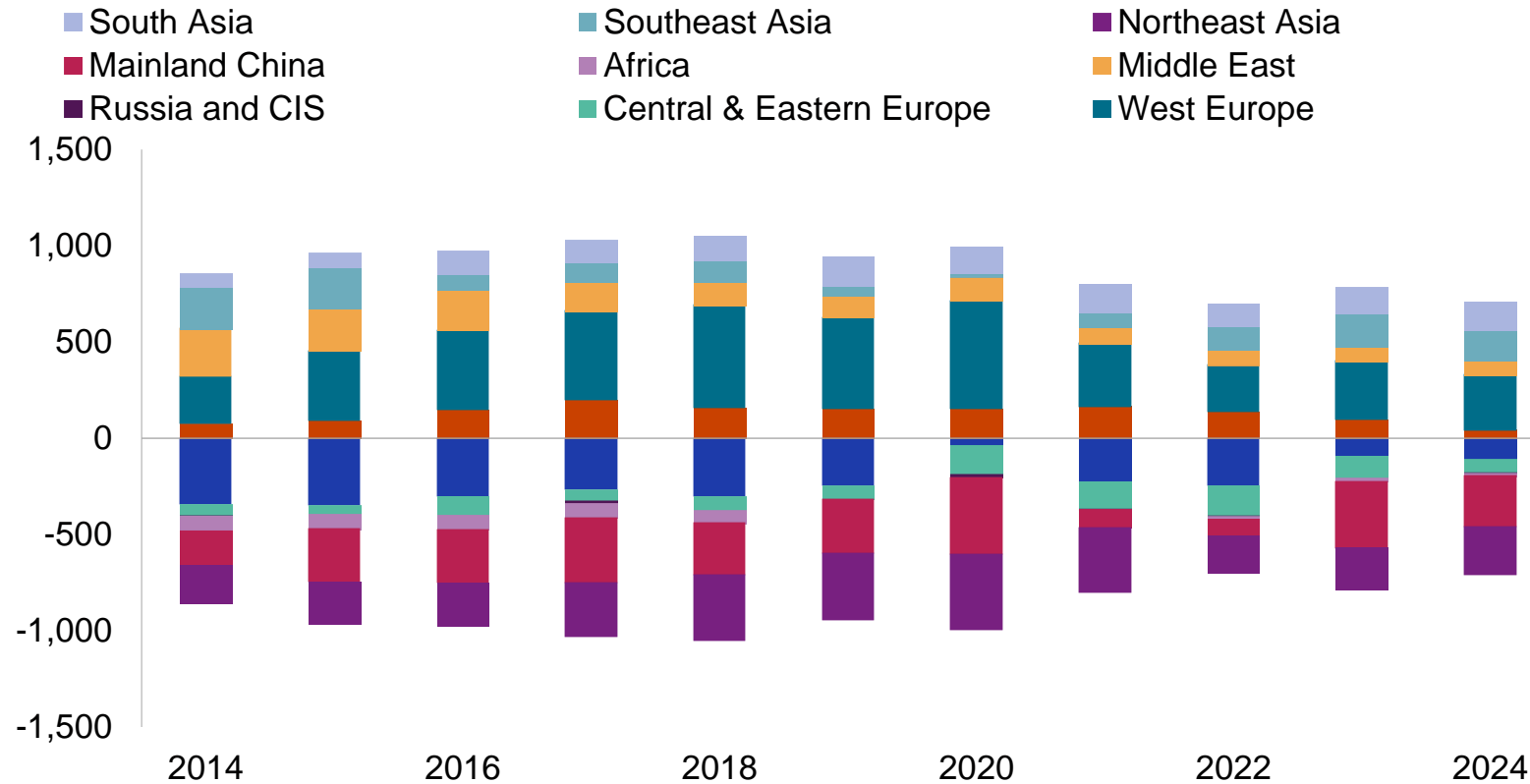
Regional Butadiene Consumption in 2024: Diverse Industrial Drivers and Strategic Opportunities

BDE Consumption Structure in 2024



Decade of Change: Shaping Global Trade Patterns in the Butadiene Market

BDE Regional Net Trade



• **West Europe:** Strong export growth; decreased production and demand.

• **North America:** Reduced trade deficit; decreased production and demand.

• **Mainland China:** Fluctuating trade deficit; strong export growth.

• **Northeast Asia:** Growing import deficit; reduced steam cracker operations.

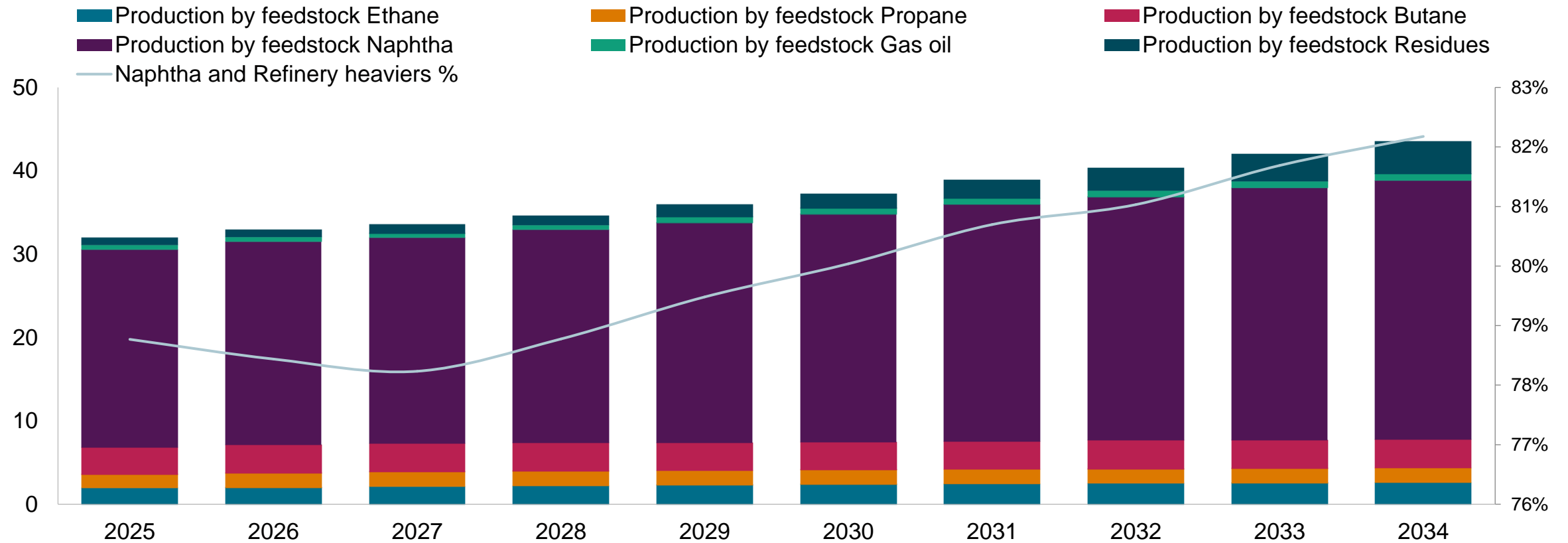
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What Forces Will Shape the New Order in the Next Decade?

Global Crude C4 Production to Hit 43 Million Tons by 2034: Anticipated Shift to Heavier Feedslates Ensures Butadiene Supply

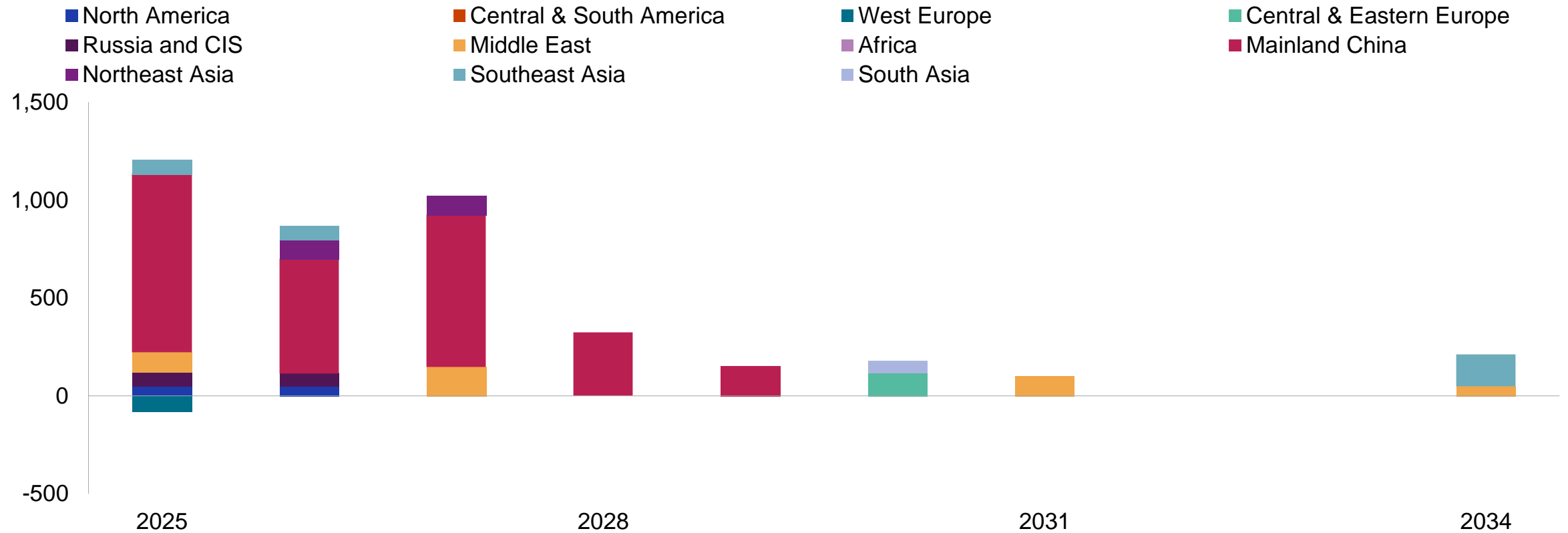
CC4 production composition by feedstocks



Source: S&P Global Commodity Insights.
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Butadiene Industry to Add 4 Million Tons Capacity by 2034: China to Account for 70% of Growth, Outpacing Demand

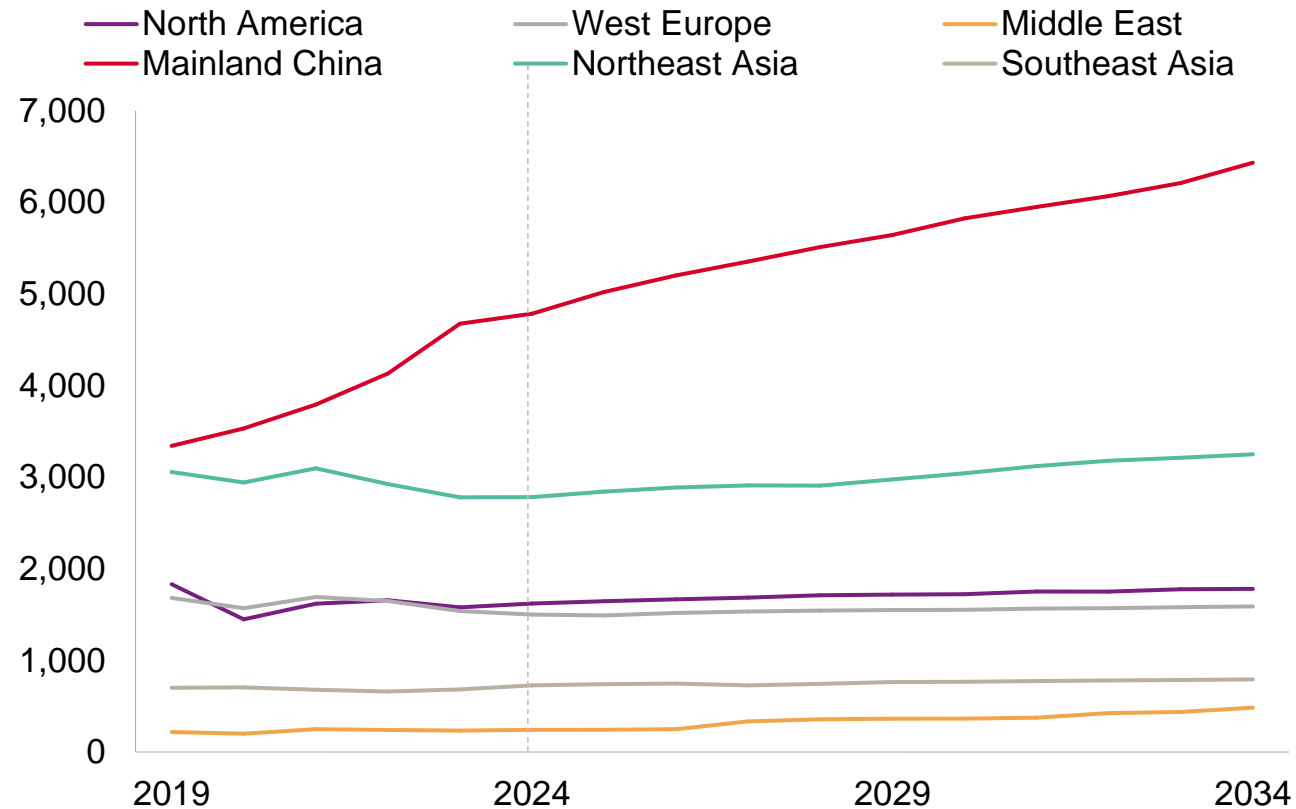
BDE Capacity Growth



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Regional Forces Shaping the Next Decade: Butadiene Demand Dynamics and Growth Drivers

Global Butadiene Demand Growth

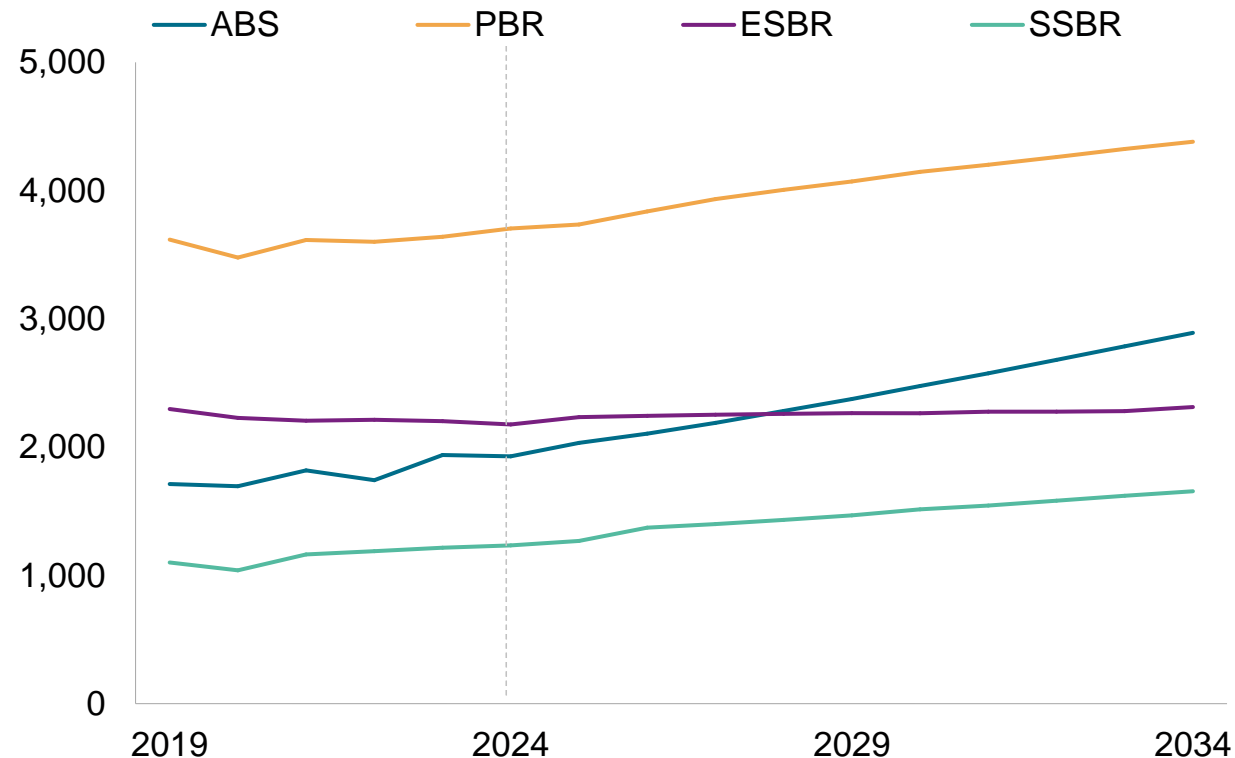


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- **Mainland China:** Leads demand growth, driven by industrial and automotive expansion.
- **Northeast Asia:** Stable demand with gradual increases, benefiting from technological advancements.
- **North America:** Modest growth reflecting automotive recovery, constrained by market maturity.
- **Western Europe:** Cautious recovery influenced by sustainability initiatives and regulatory compliance.
- **Middle East:** Strong growth potential supported by petrochemical investments and automotive sector development.

Global Butadiene Demand Driven by Growth in PBR and SSBR Consumption for High-Performance and Green Tires

Global Butadiene Demand Growth



- **PBR**: Largest butadiene outlet; driven by demand for high-performance tires and labeling initiatives; used as impact modifier for ABS and HIPS.

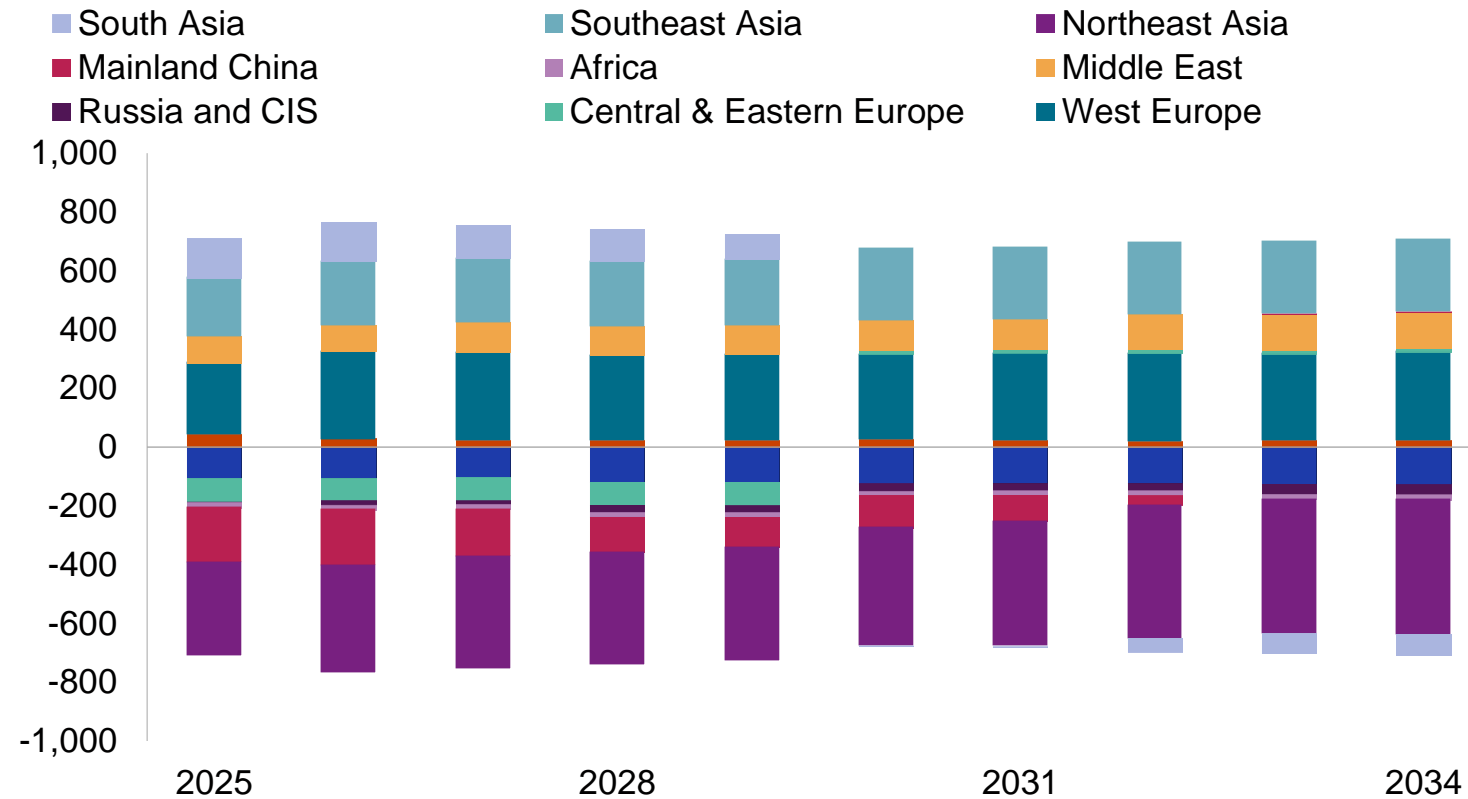
- **SSBR**: Demand fueled by stricter fuel efficiency and emissions regulations, enhancing market appeal.

- **ESBR**: Competitive landscape and consumer shift towards high-performance tires may impact demand as alternatives like SSBR are explored.

- **ABS**: Expected CAGR of 4%; fastest-growing derivative due to aggressive demand in home appliances and improved automotive production

Forces Shaping the Next Decade: Technology, Feedstock, Demand, and Geopolitical Impacts on Butadiene Trade

BDE Regional Net Trade



• **West Europe:** Net exporter; surplus reduction due to light feedstock reliance.

• **North America:** Net importer status maintained.

• **China:** Transition to balanced trade position.

• **Middle East:** Expanding export surplus; supported by capacity growth.

• **Northeast Asia:** Growing import deficit; CC4 supply shortage

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Global Regulatory Forces: Shaping Global Standards, Driving Technological Advancements, and Transforming Supply Chains

Production Costs

- **EPA's NESHAP Updates (US):** Increased compliance costs due to stricter emissions control requirements for hazardous air pollutants like butadiene.
- **REACH Authorization Process (EU):** Costs associated with reformulating products to comply with restrictions on substances of very high concern

Supply Chain Adjustments

- **TSCA Regulations (US):** Adjustments needed to source safer alternatives to chemicals like butadiene, impacting procurement strategies.
- **GHS Compliance (Japan):** Changes in labeling and safety data requirements necessitate updates across the supply chain.

Market Dynamics

- **Circular Economy Initiatives (EU & China):** Opportunities for innovation in recycling and reuse technologies, potentially altering market demand for traditional synthetic rubber products.
- **EPL Amendments (China):** Stricter pollution controls may drive demand for cleaner technologies and sustainable practices

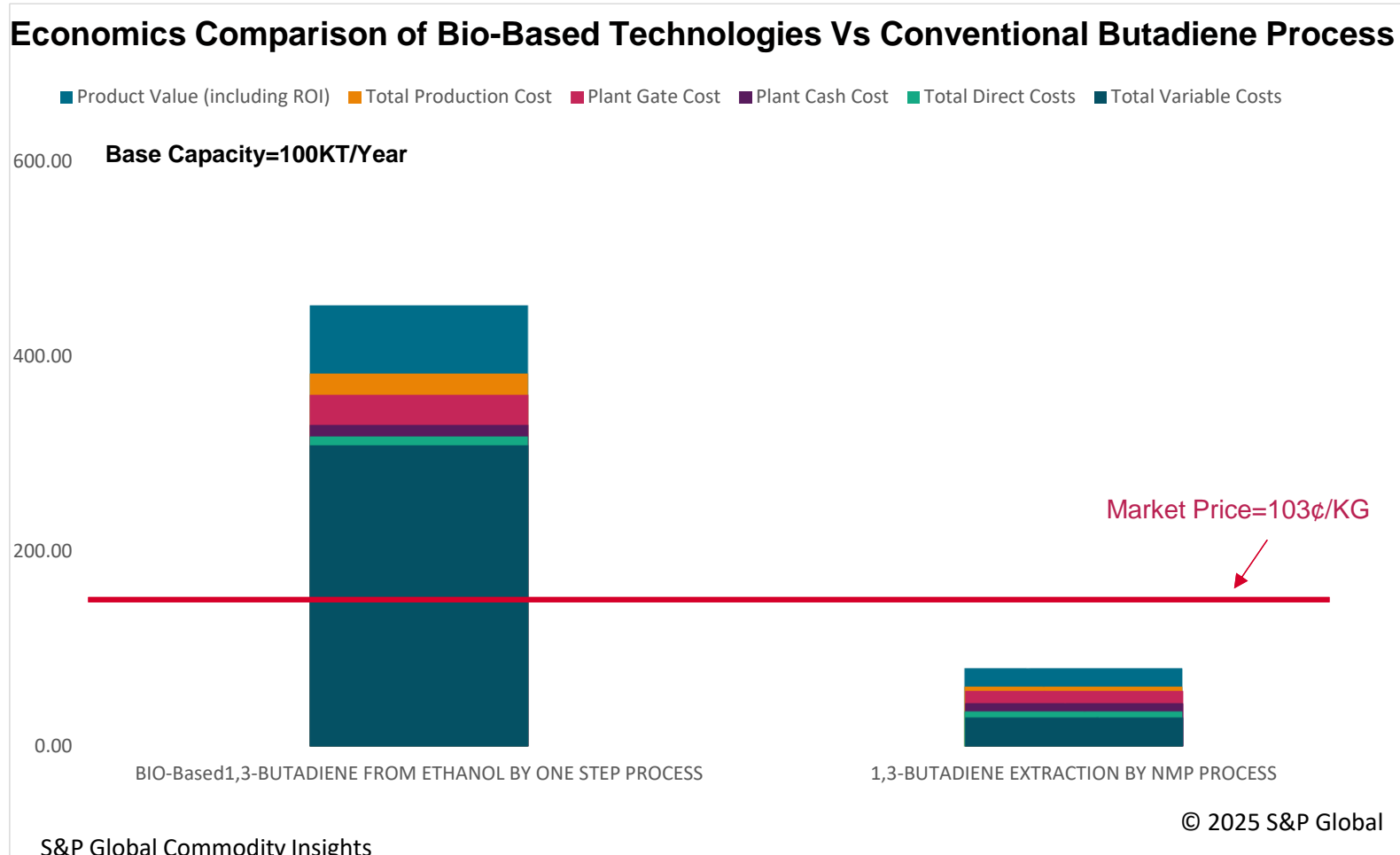
Operational Changes

- **ISHA Regulations (Japan):** Enhanced safety measures and risk assessments required, impacting operational protocols.
- **EPR Mandates (South Korea):** Operational shifts towards recycling and sustainable disposal practices for synthetic rubber products.

Sustainability and Carbon Neutrality

- **EU's CSRD and Green Deal** Increased focus on sustainability reporting and carbon neutrality, impacting corporate strategy and product design.
- **Argentina's EIA Mandate:** Mandatory EIAs for industrial facilities, including synthetic rubber production plants, to monitor emissions and resource use.

Techno-Economic Forces: Evaluating Butadiene Production Pathways for the Next Decade



- **Market Price Challenge:** At 103¢/KG, on-purpose butadiene production is unsustainable in 2024.
- **Ethanol Process Viability:** The ethanol-to-butadiene process is feasible if:
 - Ethanol Prices Decrease
 - Butadiene Prices Rise to Historic Levels

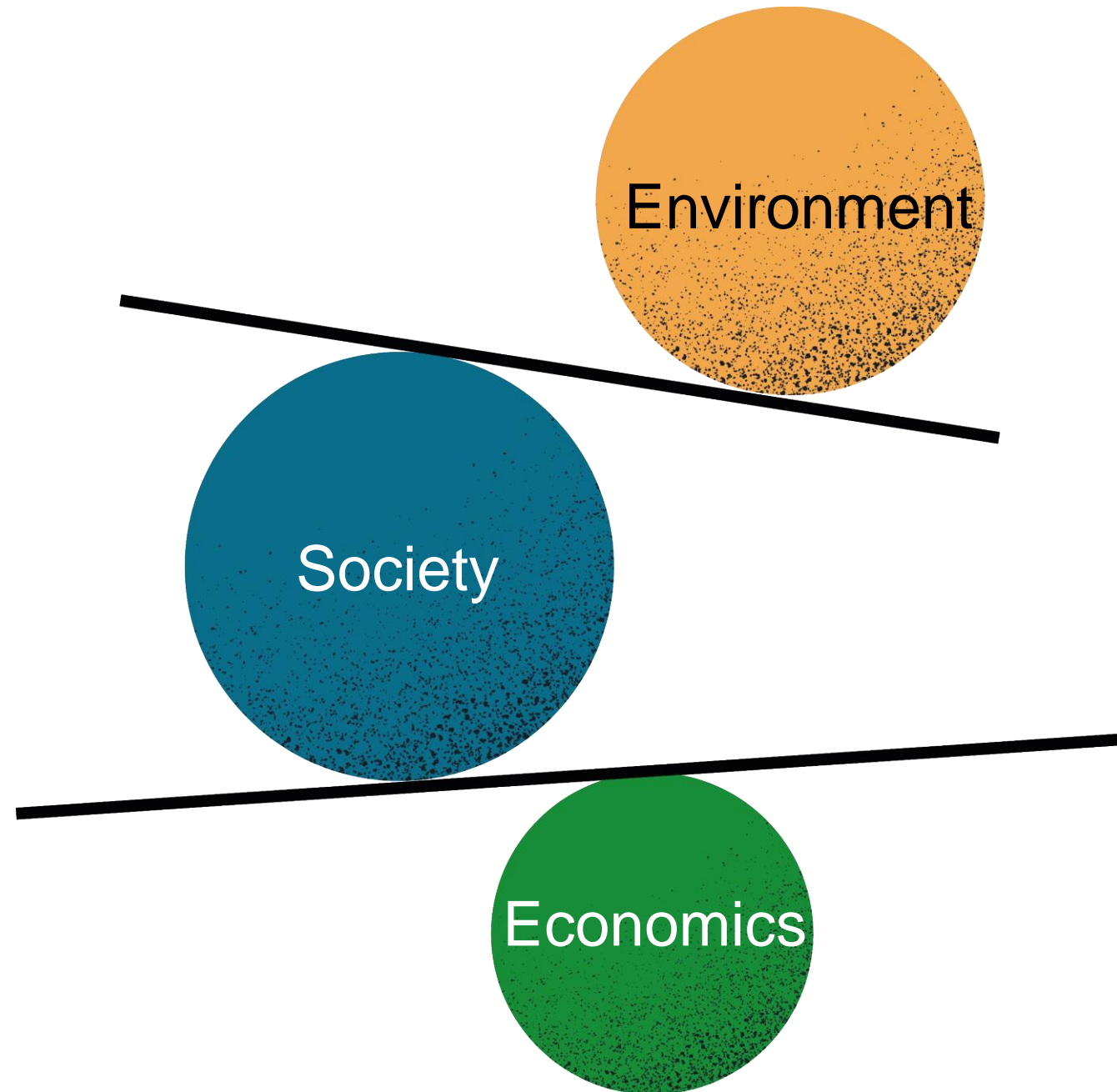
Shaping the Future: Bio-Based Butadiene Projects Drive Sustainable Market Growth

Project Name	Progress	Location	Stakeholders
BioButterfly Project	Industrial-scale demonstrator plant inaugurated, producing bio-butadiene from bioethanol (January 19, 2024)	France	Michelin, IFPEN, Axens
Synthos and Lummus Technology	Engineering and design phase for bio-butadiene plant (from bio-derived ethanol) with 40,000 metric tons/year capacity (February 9, 2022)	Europe	Synthos S.A., Lummus Technology's Green Circle
Global Bioenergies	Announced the schedule for the construction and commissioning of its new biobased isobutene plant by 2027, which will also produce butadiene (December 21, 2023)	France	Global Bioenergies
Bridgestone US Bio-Based Butadiene Pilot Project	Designing a pilot plant to establish a commercially viable and more sustainable method for producing bio-based butadiene from ethanol, which will be used as a feedstock for synthetic rubber in Bridgestone tires (October 24, 2024)	USA	Bridgestone, Pacific Northwest National Laboratory (PNNL)
Yokohama, Zeon Corp. and RIKEN	Announced to install a bench facility for bio-butadiene production from ethanol derived from plant-based materials, operational by 2026 (February 17, 2025)	Japan	Yokohama, Zeon Corp. and RIKEN
OMV and Synthos Collaboration	Signed MoU for sustainable butadiene production using bio-based and circular feedstocks (December 12, 2023)	Germany	OMV, Synthos



How Can We Mapping the Future of Business Opportunities

The Key challenges and opportunities of **Butadiene and Elastomers** will focus on balancing Regulatory compliance with **sustainable innovation** and **competitiveness**



Strategic Dimensions Matrix for Industry Players in the C4s and Elastomers Market

Industry Players/Opportunities mapping	Feedstocks Trends	Expansion in High-Growth Regions	Leveraging Global Trade Dynamics	Seizing downstream growing opportunities	Sustainable Innovation	Regulatory Compliance
Butadiene Producers	<ul style="list-style-type: none"> Optimize feedstocks sourcing strategies 	<ul style="list-style-type: none"> Expand capacity in high growth regions 	<ul style="list-style-type: none"> Expand export capabilities to capture international market share 	<ul style="list-style-type: none"> Develop related downstream clients 	<ul style="list-style-type: none"> Invest in bio-based R&D and projects 	<ul style="list-style-type: none"> Reformulate production processes
Elastomers Producers	<ul style="list-style-type: none"> Optimize sourcing strategies 	<ul style="list-style-type: none"> Optimize regional product strategy in growth area 	<ul style="list-style-type: none"> Optimize sourcing strategies 	<ul style="list-style-type: none"> Innovate to meet evolving customers preferences 	<ul style="list-style-type: none"> Seize the opportunity to collaborate with upstream suppliers 	<ul style="list-style-type: none"> Optimize product formulations for enhanced adaptation
Traders	<ul style="list-style-type: none"> Explore and trade alternative feedstocks 	<ul style="list-style-type: none"> Facilitate market entry and distribution 	<ul style="list-style-type: none"> Identify and capitalize on trading opportunities 	<ul style="list-style-type: none"> Identify and capitalize on opportunities driven by consumer demand shifts 	<ul style="list-style-type: none"> Diversified Sourcing 	<ul style="list-style-type: none"> Diversified products portfolio
Technology Providers	<ul style="list-style-type: none"> Innovate in feedstock diversification technologies 	<ul style="list-style-type: none"> Develop regional entry plan 	<ul style="list-style-type: none"> Develop technologies to support trade logistics 	<ul style="list-style-type: none"> Innovate for high-performance products 	<ul style="list-style-type: none"> Develop sustainable technologies 	<ul style="list-style-type: none"> Provide regulatory solutions

Conclusions

- **Feedstocks Evolution:** The shift towards heavier feedstocks and the strategic use of ethane and butane are influencing production capabilities and supply chain adjustments.
- **Capacity Growth:** Massive capacity additions in China are expected to slow down by 2028
- **Demand Dynamics:** Global butadiene demand will be fueled by the consumption growth of PBR, SSBR and ABS
- **Technological Advancements:** Innovations in production processes, such as bio-based butadiene and more efficient feedstock utilization, are set to redefine market dynamics and competitive advantages.

