

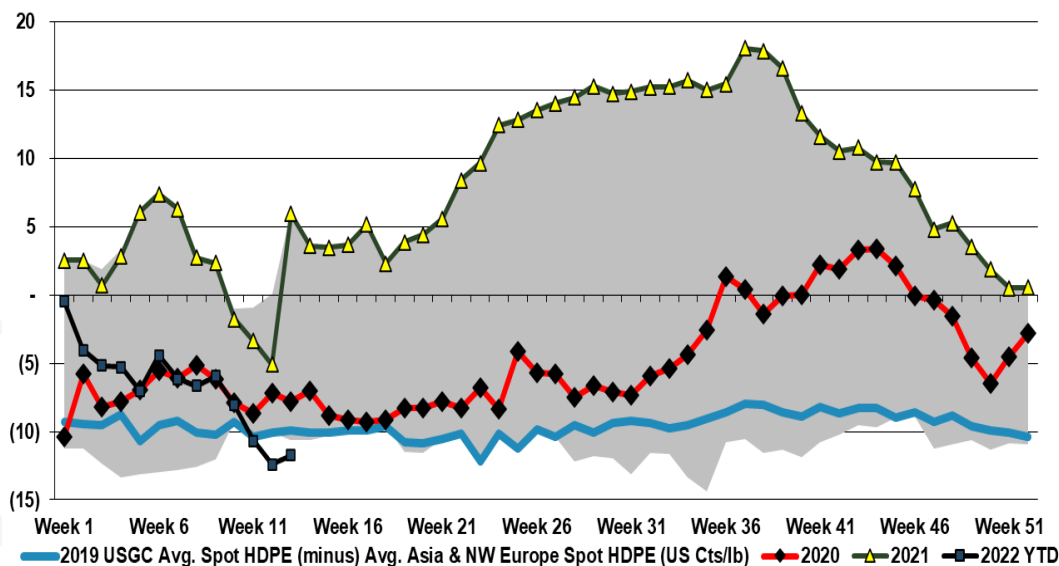
Daily Chemical Reaction

Hot N Cold – US PE Price Premiums Have Turned To Discounts, High Prices Abroad Benefit US Producers

Key Points:

- US spot polyethylene (PE) prices declined from a historic market premium relative to avg. NW Europe and Asia prices in 2021 to now reflect a discount. We discuss PE and other polymer market trends and our general outlook.
- We flag pertinent energy, chemical, and other corporate updates (e.g., Air Liquide, Air Products, Aramco, Hexion, Polynt, Gevo, Ecolab, Fluor, others).
- We discuss relevant ESG items that range from CA emission credit price strength to several sector GHG emission reduction initiative Capex updates.
- We discuss numerous other pertinent chemical sector items in this report.

Exhibit #1: During the past three months, NW Europe and Asia polyethylene (PE) spot values on average have increased more than US levels, and the significant price premium seen in US PE markets in 2021 has turned to a discount that now sits near a five-year low. This is despite US PE spot values increasing ~8% during the past three months, which has bolstered domestic contract price support, as shown in Exhibit #4. As a comparison, we find other major US polymers, such as polypropylene and polyvinyl chloride, remain at higher relative levels to their respective NW Europe and Asia price points as shown in our latest [global chemical update yesterday](#). Our research discusses other relevant findings.



Source: Bloomberg, C-MACC Analysis, April 2022

General thoughts. In early March, we published research titled, [Hard Knock Life – Asia and NW Europe Chemical Production Cuts To Spur Global Price Increases](#), and since its posting date, we have seen global polymer prices broadly rise, in part the result of broadly higher energy and chemical feedstock prices that further pushed the case for production cuts. An item that has caught our attention is the uptick in US polyethylene (PE) spot values during the past 30 days that has been dwarfed by average improvement in NW Europe and Asia prices. Yesterday, we highlighted the significant drop in US ethylene values in our weekly report, which we partly link to some ethylene production turning on ahead of new US polyethylene (PE) capacity. However, a higher Ex-US market that is priced at a premium to US levels is a significant plus for domestic producers, and unless supplies are landlocked due to export limitations, which is a real risk, we

April 5, 2022

Today's Commodities:

- Plastics (PVC, PP, PE, PU, PC, PET, etc.)
- Clean Energy Minerals
- Carbon Dioxide
- Hydrogen
- Natural Gas/NGLs
- Crude/Naphtha

Today's Companies:

- Dow
- LyondellBasell
- ExxonMobil
- Sabic
- Shell
- CP Chemical
- Nova Chemicals
- Westlake
- Formosa Plastics
- Braskem
- Ineos
- Chevron
- Sempra
- TotalEnergies
- Mitsui
- Talos
- Pemex
- Atotech
- Iluka
- Mineral Resources
- Albemarle
- Ganfeng Lithium
- Bartek
- Covia
- Croda
- Evoqua Water Technologies
- Hexion
- Hexpol
- Indorama
- JSR
- Koppers
- Mesaieed Petrochemical
- Milliken
- Polynt
- Seqens
- Synthomer
- Solvay
- Ecolab
- Air Products
- Air Liquide
- Gevo
- Mitsubishi Power
- Primobius

think a case could be made for US polyethylene prices to hold up better than most envisioned only a few months ago, assuming the current global ethylene production cost curve holds. US integrated PE producer margins have shrunk from late 2021 highs amid higher ethane feedstock costs and lower prices, but a supportive export market implying still notably healthy US integrated PE margins is a “win” for US producers facing capacity additions in 2022 from Baystar, ExxonMobil/Sabco, and Shell, but virtually no new capacity slated after these developments currently. We view Dow, LyondellBasell, CP Chemical, Nova Chemicals, ExxonMobil, Westlake, and peer PE producers in the US as well-positioned to benefit and likely highlight this general market view with their upcoming 1Q22 business updates. An item to also consider when looking at global markets is the significant premium in US polypropylene (PP) relative to both NW Europe and Asia price points, which has been exacerbated by recent production issues at LyondellBasell and Ineos, as noted in our supply chain news items. If import/export issues remain, US PP producers online could benefit more than US PE producers in the near term, however, the PP market holds more risk linked to a clearing of global supply chains compared to PE, given that US PE spot levels are at a discount to major overseas price points. Major PP producers include Braskem, LyondellBasell, Ineos, Formosa Plastics, and ExxonMobil, among others. Other items worthy of notice in this report include the recent shifts in NW Europe and Asia natural gas values and Brent Crude relative to US natural gas prices. We also highlight persistent concerns with the ability to source materials for manufacturing in Europe. Freight rates from China to the US remain high, though we find some emerging news of freight hold-ups into European markets that could help curb global rates. Overall, we find a global market still facing significant near-to-medium term uncertainty – this is a negative for new growth capital investment in petrochemicals, and [we continue to take a positive view of a global sector mega-cycle development mid-decade](#).

Energy/Upstream:

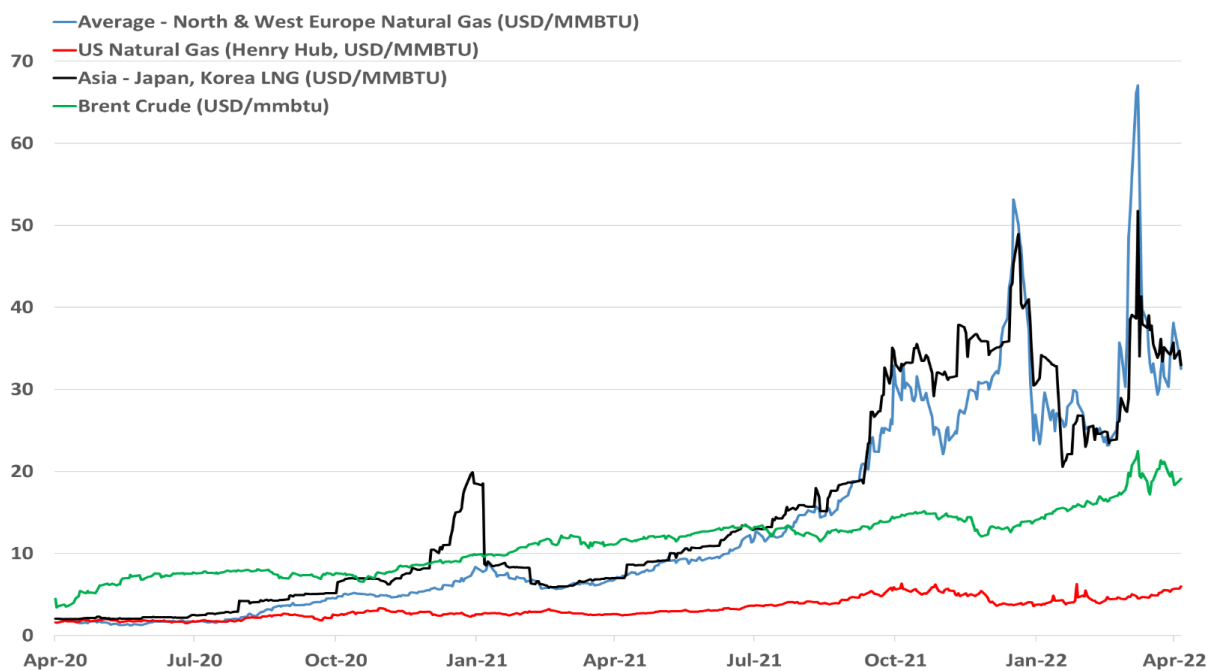
The headline about US gasoline consumption echoes a point we made a couple of weeks ago when the IEA made its suggestions about how the world could conserve energy. We have no doubt that the world could probably survive with 10% or more fewer barrels of crude oil equivalent barrels of crude oil/natural gas, but we do not believe you can rely on consumers' “good nature and community spirit” to make it happen. There will always be a handful of public-spirited people who feel they need to do their bit, but it is not nearly enough, and to get any sort of conservation, you either need government intervention or you need to let pricing do its thing. Reserve releases are also a “Band-Aid” as they can only help for a limited time – they send a positive message, but they have done very little to reduce oil prices. As we noted last week, we may be limited on refining capacity in the US today, and releasing more reserves may not generate more refining throughput – we may just be transferring one pool of contingency inventory to another – government to oil producer/refiner.

We wrote a piece in February about some of the limitations that the Biden Administration is placing on the oil and gas industry that we believe are counter-productive both from an energy security perspective and from an energy transition perspective. The government should not be preventing pipelines – as they are the most effective way to move hydrocarbons – in the same way, that they should not be preventing drilling. What they should be doing is raising the standards around both to ensure that we get both the energy we need and the emission reduction. There will be situations where the cost of emission abatement may make a pipeline or well uneconomic – but that then becomes a sound and efficient commercial decision as opposed to an inefficient government mandate – see the EIA pipeline analysis below.

- [About 650,000 barrels per day of Russian crude oil to be ‘swapped’](#)
- [American motorists press the accelerator despite oil shortfall](#)
- [Analysis: In the Russia-Europe gas standoff, both sides lose](#)
- [Aramco Lubref Refinery Unit Plans \\$1B IPO](#)
- [Argentina tries to head off shortages for transportation diesel, power generation](#)
- [Asia base oils supply to tighten; demand to recover in H2](#)
- [Asian refiners hope US SPR release leads to more crude exports, lower global spot premiums](#)
- [Brussels prepares ban on Russian coal imports and transport operators](#)
- [Biden says 30 countries to join US in stock draw](#)
- [Canada Postpones OK of Equinor’s Newfoundland Oil Project](#)
- [Chevron Looks to Reduce Operating Expenses as It Steps Up Production](#)
- [Citgo refinery runs highest since 2019](#)
- [Crude oil futures extend gains as EU mulls Russian energy ban](#)
- [Driving Discussions: Market volatility continues for European diesel](#)
- [ExxonMobil flags highest quarterly profit since the boom year of 2008](#)
- [France top destination for US LNG in March amid Europe supply disruption fears](#)

- [Guyana approves ExxonMobil's biggest oil project](#)
- [Higher Natural Gas Prices, Less Production Without Infrastructure Growth, Says EIA](#)
- [High energy prices to hit India industries hard](#)
- [I Can't Go For That \(No Can Do\), Part 3 - Drilling Down Into Major E&Ps' Capex And Production Guidance](#)
- [IEA members agree on another oil stocks release](#)
- [Indian and Chinese buyers open to Russia spot LNG procurement, with price discounts](#)
- [India raises jet fuel prices for first-half April](#)
- [Max Energy to Convert Natural Gas Pipe to Move More Eagle Ford, Permian Crude to Texas Coast](#)
- [New York jet fuel hits \\$7.59/gal, or \\$318.62/b, likely a refined product market record](#)
- [Panama Canal plans LNG carrier tariff hike](#)
- [Saudi Aramco lifts official May crude prices](#)
- [Threat of Further Sanctions Against Russia Keeps European Natural Gas Prices Volatile – LNG Recap](#)

Exhibit #2: Asia and European Natural Gas values mostly held up WoW, remaining significantly above USGC levels and 2021 average respective levels. Brent Crude values rebounded early this week after moderating late last week.

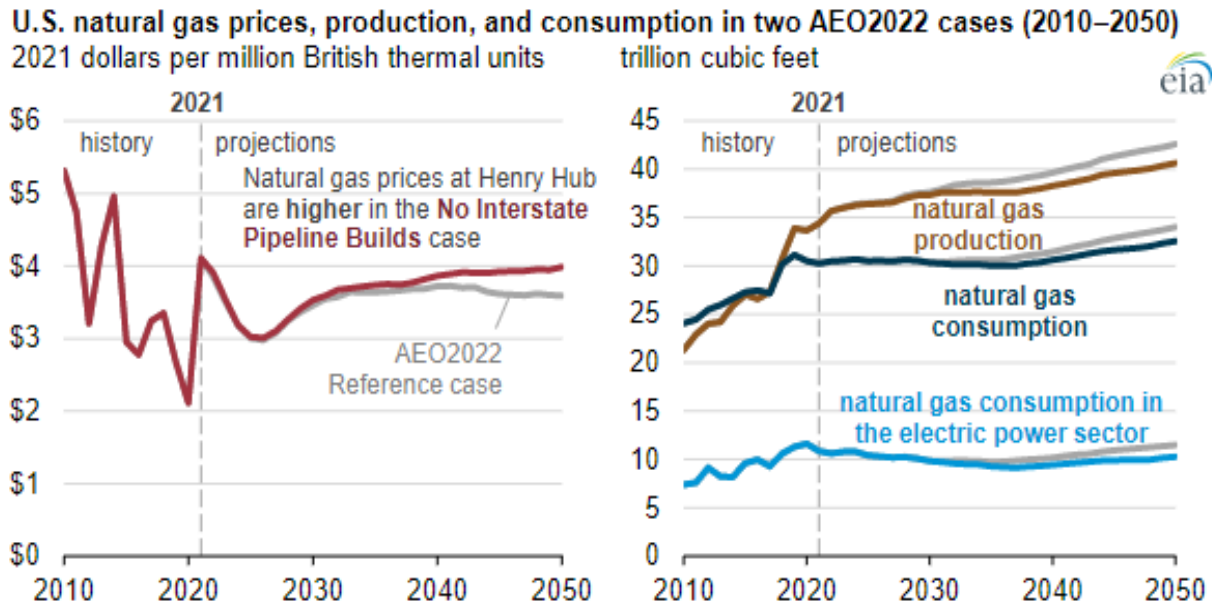


Source: Bloomberg, C-MACC Analysis, April 2022

- [Natural Gas 'Golden Age' Could Diversify LDC Project Players](#)
- [Nymex Futures Falter, but \\$6.00 Natural Gas 'Potentially in Play' in Coming Days](#)
- [Offtaker Interest Heating Up for Mexico LNG Projects](#)
- [REFINERY MARGIN TRACKER: Russian crude cargoes taper off as margins rise](#)
- [Rethinking energy security](#)
- [Russia maintains gas deliveries as Europe mulls tighter sanctions](#)
- [Russian sanctions reshuffle crude, VGO supply chains](#)
- [Saudi Aramco raises May crude OSPs to highest-ever level](#)
- [Saving Ukraine's electricity market is as important as saving its grid - Ukrenergo CEO](#)
- [Sempra Taps TotalEnergies, Mitsui and Japan LNG for Cameron Expansion](#)
- [Suspension Of Russian Oil, Gas Threatens Germany With Recession](#)
- [Talos finalises Zama unitisation deal with Pemex](#)
- [TotalEnergies, Sempra To Develop Mexican LNG Project](#)
- [Ukrainian oil refining and fuel storage infrastructure hit by Russian attacks](#)
- [US Drilling Activity Has Risen 60% In One Year](#)

- [The US East Coast jet fuel costs soar on shortage fears](#)
- [US, Europe in talks on additional pressure on Russian energy: White House](#)
- [US liquefied natural gas exports rise 16%, to new record](#)
- [US oil demand stays afloat despite soaring prices](#)
- [USAC refiners could replace Russian crude with Bakken to loosen tight supply](#)

Exhibit #3: [EIA explores effects of not building future interstate natural gas pipelines](#)



Source: [EIA – Today In Energy](#), April 2022

[Supply Chain, Commodity Chemicals, & Chemical Sector News:](#)

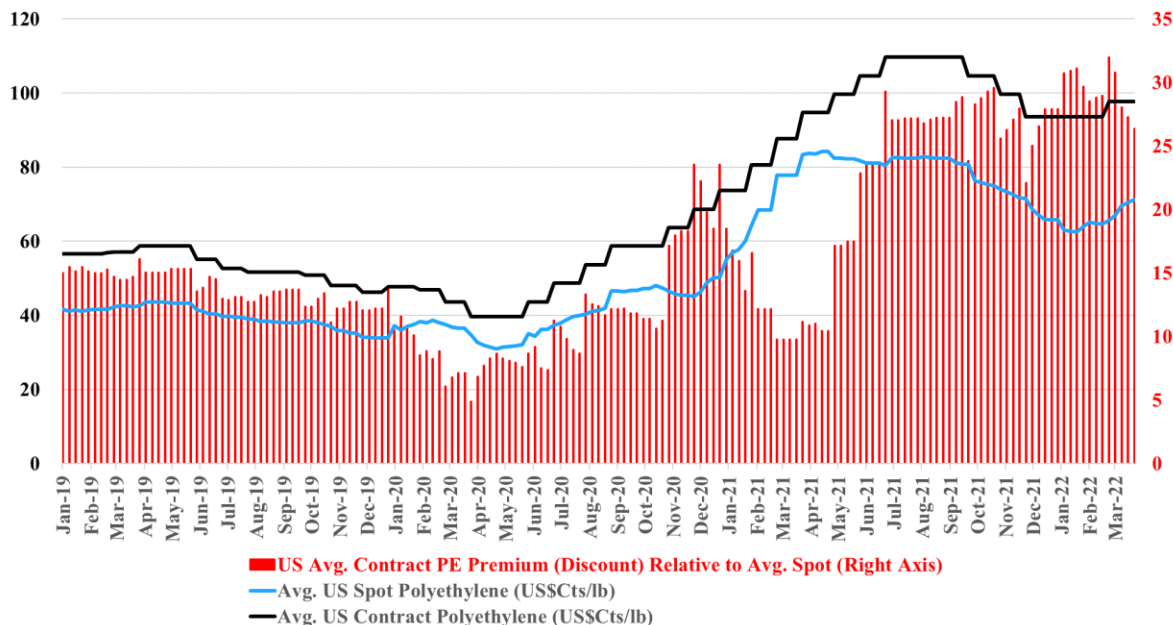
It's back to 2012/2013 for polyethylene, but with a potential twist. As we noted above, international prices for polyethylene are being pushed up by oil prices, and even with higher prices in Asia, margins are still negative locally, which suggests that they will go higher. This margin umbrella is what generated windfall profits for US and Middle East producers in 2012, 2013, and half of 2014. The upward pressure remains high for international polyethylene prices because producers are not covering costs locally and in theory, the US should continue to benefit and we see domestic polyethylene prices rising again, both contract and spot. The risk for the US is local overcapacity of polyethylene and potential export challenges. The pricing arbitrage to export US polyethylene is huge and rising, but we are in a constrained trade world and we understand that export terminals are at capacity and warehouses are full. It is possible that the sharply lower US ethylene price is not just a function of new ethylene capacity, but also a function of integrated polyethylene producers choosing to limit production and looking for homes for the extra ethylene. If the polyethylene producers in the US try to push more volume domestically we could see local prices fall well below their export alternative – this is possible, but unlikely, in our view. Polypropylene does not have the same significant net export and the two plant closure in the US are likely enough to drive the price support that we are seeing this week.

The fall in US ethylene prices has driven margins below those in Europe, which have jumped on much higher local ethylene prices. What the chart below does not show is that the US could very profitably supply Europe with ethylene today if the terminal and shipping capacity was available. We see the price weakness in the US as driven by a lack of options – partly because of logistics. Liquid carrier rates are higher and any attempts to move liquid ethylene derivatives out of the US, such as ethylbenzene, glycol, and especially EDC, face higher transportation costs and therefore require lower input costs.

- [Another Force Majeure Hits the US Polypropylene Market](#)
- [Argus European monthly methanol CP up €72.5/t in April](#)
- [Atotech posts higher revenue driven by growth in electronics business](#)
- [Australia's Iluka approves rare earths refinery](#)
- [Australia's Mineral Resources with JV partners Albemarle and Ganfeng Lithium to lift spodumene production](#)
- [Australia Kore Potash receives optimization study for Kola project](#)
- [Bartek breaks ground on malic, fumaric acid plant in Canada](#)

- [Benzene contract prices in the Atlantic Basin increase markedly for April](#)
- [China polyolefins 2022 growth and import risks increase](#)
- [Copper TC/RCs seen rising in Q2 as supply eases](#)
- [Covia Announces Price Increase for Industrial Products](#)
- [Spot trades for copper concentrates surge in March on Xiangguang output cuts](#)
- [Croda receives grant from UK government to support expansion of lipid systems manufacturing facility](#)
- [Dangote commissions urea plant in Nigeria](#)
- [Electric vehicle start-ups face their toughest challenge: making cars](#)
- [ESG is a category error that needs unbundling](#)
- [Europe, US strive to develop regional rare earths value chains: conference](#)
- [Evoqua Water Technologies Completes Acquisition of Frontier Water Systems](#)
- [Germany's chemical industry seeks new wage deal in shadow of Ukraine war](#)
- [Germany's materials shortage in chemicals worsens in March on Ukraine war](#)
- [Gujarat Heavy Chemicals completes divestment of home textiles business](#)
- [Hexion mulls US formaldehyde capacity expansion amid demand growth - CEO](#)
- [Hexpol completes acquisition of 70% stake in German firm Almaak](#)
- [High commodity prices, comparative calm keeping investors interested in Latam M&A](#)
- [High raw material costs, COVID-19 measures challenge China's NEV industry](#)
- [Higher ammonia prices prompting European restarts, but shortages remain: traders](#)
- [Hyosung Advanced Materials to build carbon fiber production line in South Korea](#)
- [How the Ukraine-Russia war could reshape EU '30 chemicals industry, economy](#)
- [Indorama eyes integration gains with Oxiteno acquisition](#)
- [Thailand's IVL completes \\$1.3bn acquisition of Oxiteno](#)
- [Japanese API producers form contract manufacturing JV](#)
- [JSR completes transfer of elastomer business to Eneos](#)
- [Koppers Announces Sale of Property and Assets at Facility in Sweetwater, Tennessee](#)
- [Ukraine war hurts Europe PE producers, opens door to Middle East, US exporters](#)

Exhibit #4: US polyethylene (PE) producers are set to lift contract values in March, given strength in feedstock/energy values and recent spot market strength, though proposed increases MoM for April appear unlikely to us at this time.

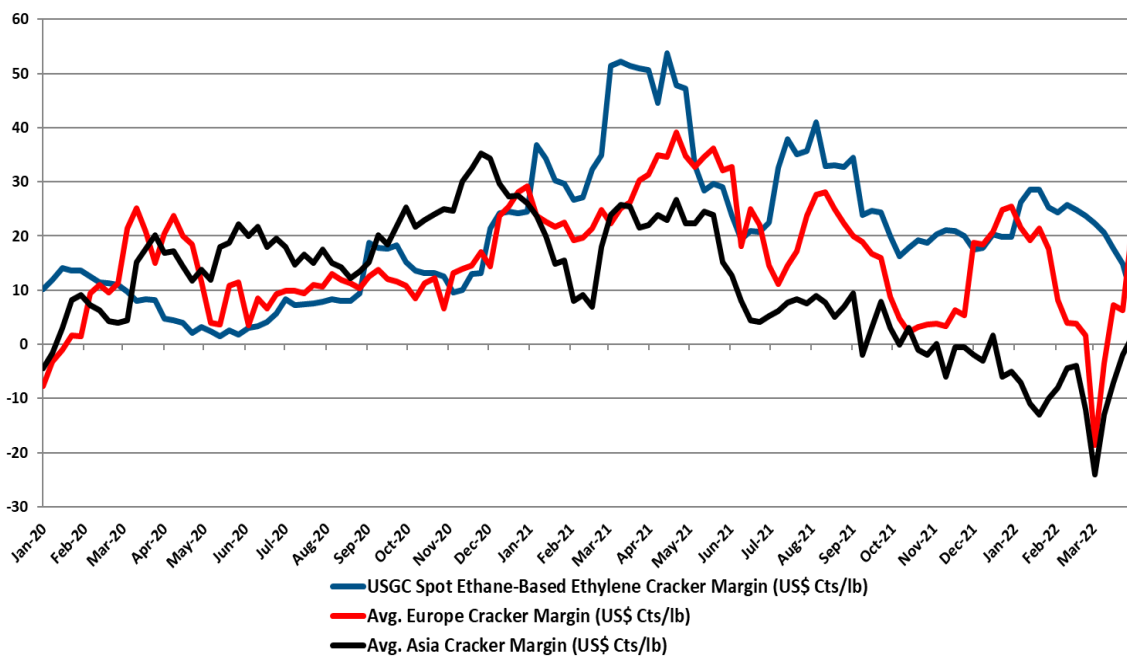


Source: Bloomberg, C-MACC Analysis, April 2022

- [Mesaieed Petrochemical, IQ give green light for PVC project in Qatar, issue EPC contract](#)
- [Mexico suspends gasoline subsidy as U.S. drivers cross border for deals](#)

- [Milliken to expand capacity of recently acquired plant in Germany](#)
- [Polynt Composites hikes prices in Europe again, cites force majeure, supply-chain pressure](#)
- [Seqens invests at US R&D lab](#)
- [Shortage of Materials in Germany Worsens Following the Attack on Ukraine](#)
- [Solvay hikes prices for mining products](#)
- [Surging price of battery materials complicates carmakers' electric plans](#)
- [Synthomer forms adhesive technologies division following acquisition from Eastman](#)
- [Taiyo Nippon Sanso restricts shipments of helium](#)
- [Tate & Lyle closes sale of controlling stake of Primient to KPS Capital](#)
- [Toppan carves out semiconductor photomask business](#)
- [US soybean 2022-23 output expected at record-breaking 125 million mt](#)
- We highlight our global chemical weekly that highlights global commodity chemical prices in [LINK](#).

Exhibit #5: Recent production cutbacks in Asia and NW Europe have helped spur Ex-US prices higher, while the recent drop in naphtha cash costs provided a further boost to help producer margins in these regions entering 2Q22. As we flagged in our weekly [Global Chemical Update](#), Avg. Asia integrated margins to polymer production remained negative WoW.



Source: Bloomberg, C-MACC Analysis, April 2022

Sustainability, Clean Energy, Recycling & ESG:

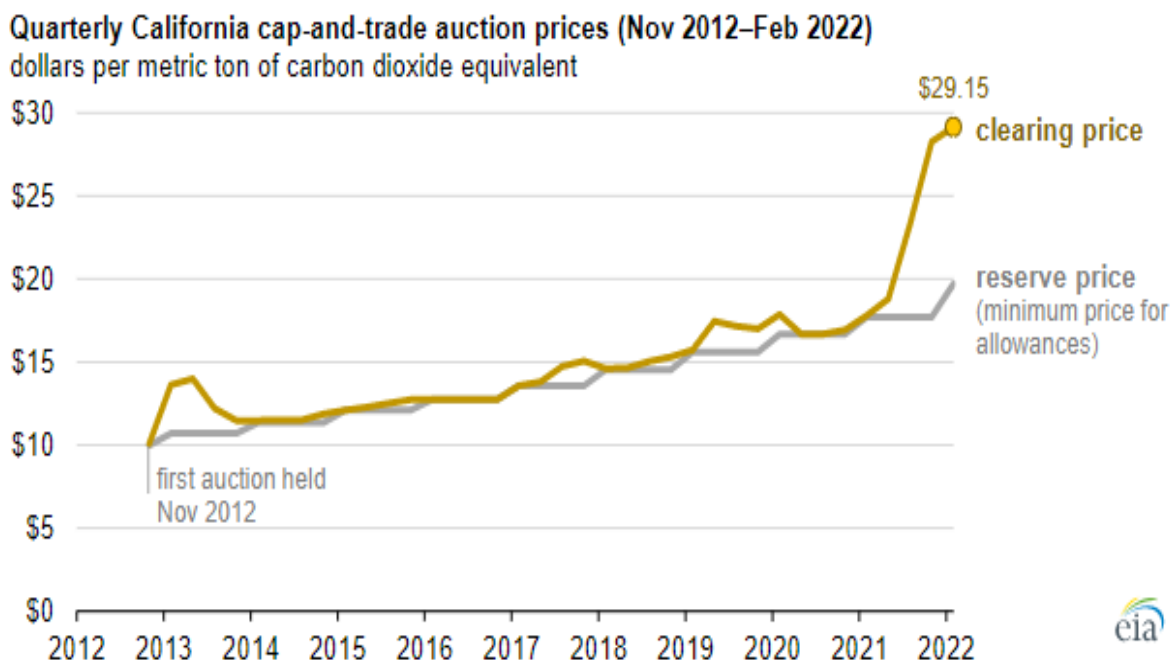
The Neom projects finally gets moving after a year plus of press releases and other PR. This is a very expensive project in our view and may get more expensive as the JV looks to secure the materials for the project, including the renewable power project. We see demand for the ammonia, but possibly a higher margin selling directly to Japan and other Asian-based power producers rather than shipping to Europe and converting back to hydrogen.

We have written extensively about carbon prices over the last two years and followers of our dedicated ESG and Climate service will know that our expectation is for all CO2 markets to see prices rise to levels that justify large investments to avoid CO2 production or sequester it. We see that price closer to \$100 per ton than the \$50 per ton that 45Q will rise to by 2026. The California price shown below has much more upside as credits demand rises. Many of the net-zero pledges made by manufacturers and energy producers today cannot be achieved without buying some sort of credit and we expect to demand to rise relative to supply through the balance of the decade and possibly quite quickly.

The European wind and solar push looks much better than other regions in the chart below, but it is partly the cause of the energy troubles that the region faces today. The region has relied on renewable to meet energy demand growth but has also closed power production facilities that are needed today. As other regions build out more wind and solar, they should think about redundancy and the variability of power sources and ensure that they do not make premature shutdown decisions.

- [Air Liquide, Sogestran form JV to ship liquid CO2 from CCS projects](#)
- [Air Products, ACWA, Neom sign EPC deal for green hydrogen, ammonia project in Saudi Arabia](#)
- [Analysis: What does China's coal push mean for its climate goals?](#)
- [Australia fertilizer producer NeuRizer awards CCUS contract to DL E&C](#)
- [Brazil's ethanol production premium surpasses 200 points over sugar](#)
- [Canada to invest C\\$2 billion on mineral strategy for EV battery supply chain](#)
- [Carmakers dream of clean, green, mean electric machines](#)
- [China's BYD ends full combustion engine cars to focus on electric, plug-in hybrids](#)
- [Cities drive climate change, and can provide a solution, UN says](#)
- [Climate change could cost U.S. budget \\$2 trillion a year by the end of the century, White House says](#)
- [Ecolab Investment in Renewable Energy to Source 100% of Company's European Power Requirements](#)
- [Ecolab to power all European sites with renewable electricity from wind farm in Finland](#)
- [Electrified cars overtake petrol models in French Q1 sales](#)
- [Emissions must peak by 2025 for 1.5°C: IPCC](#)
- [EU Commission signs off on \\$1.2 billion of funding for low-carbon projects](#)
- [Europe R-PET April price offers still not clear](#)
- [First time in Thailand: Dow partners with Thepvimol Plastic to develop low-carbon frozen food packaging trays](#)
- [Fluor Announces Japan Bank for International Cooperation Investment of \\$110 Million Into NuScale Power](#)
- [General Motors to launch Canada's first commercial electric vehicle hub in Ontario](#)
- [German H2Global hydrogen import auction to open in Q2 for green ammonia](#)
- [Gevo and Farmers Edge Partner to Verify Sustainable Fuels from Low-Carbon Grain through Verity Tracking](#)
- [Grassley Urges EPA to Update Biofuel Emissions Modeling](#)
- [Hertz Agrees to Buy 65,000 Electric Vehicles From Polestar](#)
- [India needs \\$25 billion for renewable hydrogen supply chain: industry body](#)
- [Indian Oil, Larsen & Toubro, ReNew to form JV for green hydrogen business](#)
- [India's solar power prospects compromised by steep import duty, commodity hikes](#)
- [Indonesia defers carbon tax launch to July due to global turmoil, energy market volatility](#)
- [Investors warn European companies over climate accounting](#)
- [IPCC report warns of too little action to cut emissions](#)
- [IPCC report: GHG emissions can be halved by 2030](#)

Exhibit #6: [Prices for California's emissions credits increase in early 2022 auction](#)

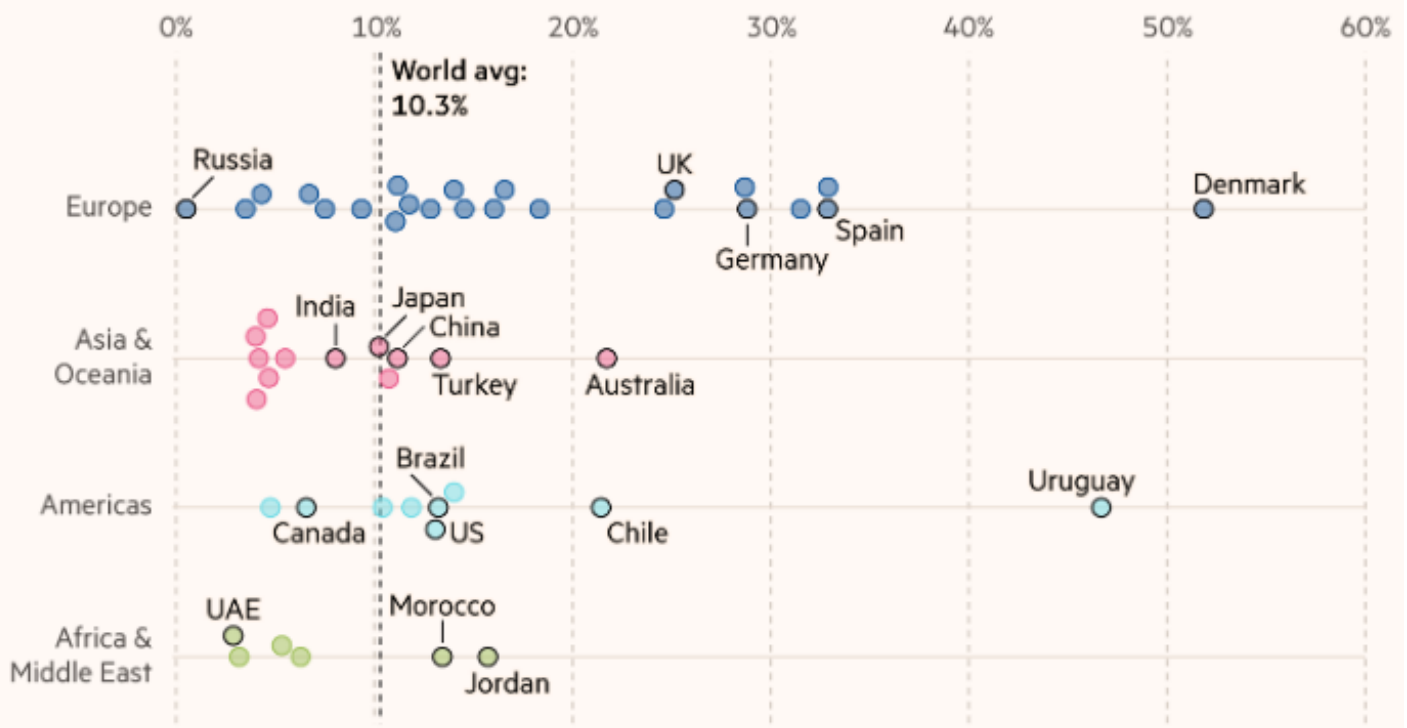


- [Japan's Tocom starts trial listing of cash-settled LNG futures](#)
- [Kentucky Becomes 18th State to Pass Advanced Recycling Law, Spurring Job Growth and a More Circular Economy for Plastics](#)
- [Landmark UN report on global warming solutions delayed by top polluters](#)
- [Mitsubishi Power orders electrolyzers for green hydrogen plant in US](#)
- [MOL expands plastics recycling capacity through acquisition in Hungary](#)
- [Monkey Wrench - Energy Transition Slams Into Energy Reality Slams Into War In Europe](#)
- [Neste completes EU grant process for clean hydrogen project in Finland](#)
- [New Jersey deli with \\$100-million valuation to merge with bioplastics maker](#)
- [Nickel and copper: building blocks for a greener future](#)
- [Norwegian shipowners fear potential 'patchwork' of emissions rules](#)
- [PetroChina constructs 2.6 mil mt/year LSFO project at Guangdong Petrochemical](#)
- [Nissan delays Ariya electric SUV sales again, citing supply chain woes](#)
- [PetroChina to lift output, intensify trade and bolster green energy against rising supply risks](#)
- [Primobius opens Li-ion battery recycling facility in Germany](#)
- [The north wind and the sun – Germany harnesses record numbers in wind generation](#)

Exhibit #7: [Europe exceeded its renewable energy goals for 2020 | World Economic Forum](#)

Europe leads the way with wind and solar

Wind and solar as a share of electricity generation, 2021 or latest
(top 50 countries by electricity demand in 2020)



Source: [Ember, Financial Times](#), April 2022

- [Red Hook Container Terminal Announces Operating Performance Results for its Fleet of 10 Heavy-Duty Zero Emission Battery Electric Terminal Tractors](#)
- [Reducing cost of clean hydrogen requires optimization of several factors](#)
- [Removal credits see high retirements despite low supply reflecting buyer preference in offsetting carbon emissions](#)
- [Renewcell and Birla Cellulose to produce circular fiber](#)

- [Rising fossil fuel prices could disadvantage blue hydrogen projects -- JM](#)
- [SAF demand on the rise but feedstock availability a concern: industry experts](#)
- [Solvay, Procter & Gamble team up to support sustainable guar production in India](#)
- [Suedzucker's annual profit jumps nearly 40% on strong sugar, bioethanol performance](#)
- [Tesla delivers record vehicles in first quarter; output falls during China shutdown](#)
- [Tesla unable to restart Shanghai production on Monday](#)
- [Thailand's PTT to sell Indonesian coal mines amid lower sales, clean energy drive](#)
- [The Clean Energy Sector Has Turned Bullish Again](#)
- [Turning down thermostat in EU energy crisis will save estimated 10%](#)
- [Ukraine War Drives Countries to Embrace Renewable Energy—but Not Yet](#)
- [US airlines cast a wider net in search for sustainable aviation fuel supply](#)
- [US weighs solar tariffs, unsettling industry](#)
- [Why Renewables Can't Solve Europe's Energy Crisis](#)

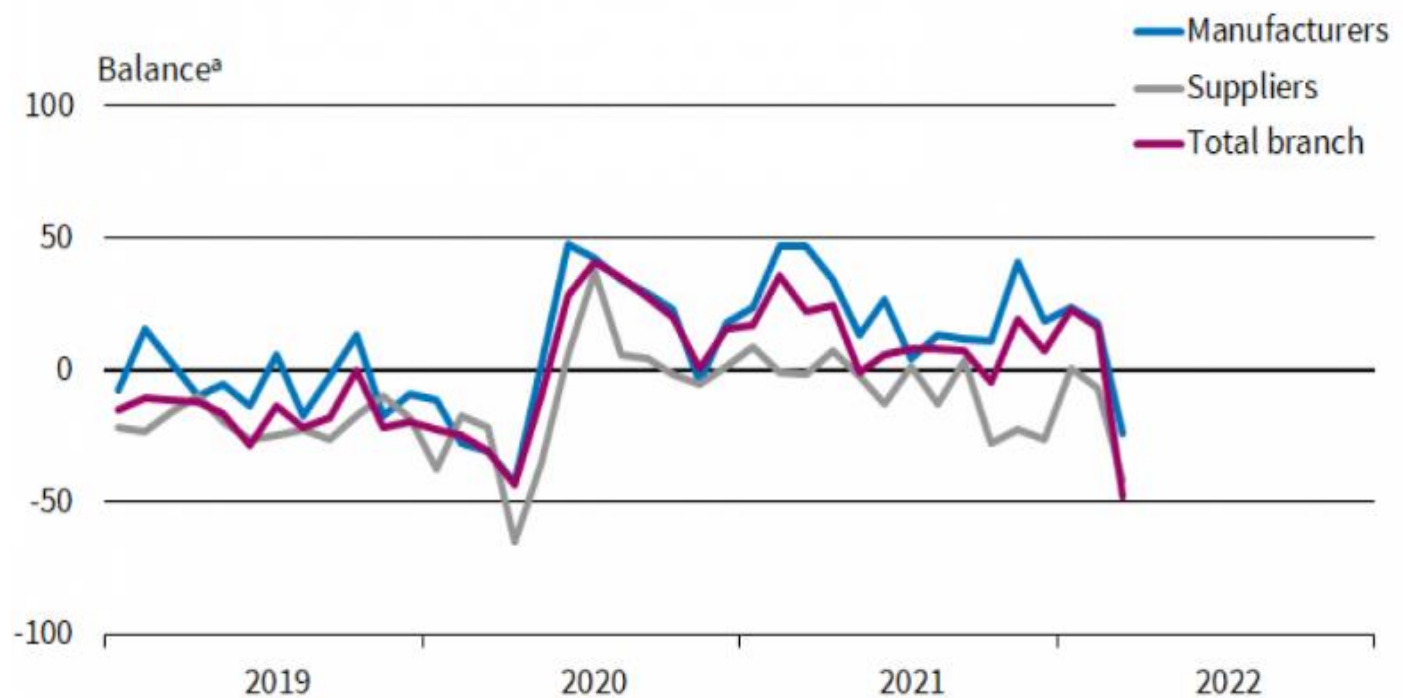
Other Chemical Industry, Demand & Downstream News:

The auto industry problems persist and are reflected in the German sentiment below. We see the potential for a very fast reversal in this industry, which might initially be seen as positive, but likely will not be. The strength in semiconductor demand amidst increased supply suggests an inventory build through the chain and we could see the market awash with semiconductors as new capacity arrives this year and inventory chains fill. This may also be the case for other tight auto components today and if the auto suppliers get all that they want as consumer spending falls because of higher rates, we could go from auto shortage to auto glut within a few months – possibly as early as 2H 2022. This would still be good for the chemical and polymer suppliers to the auto industry as they care about volume rather than automaker profits.

- [Air Canada wants more cargo jets 3 months after launching service](#)
- [Big inflows for U.S. money market funds on talk of recession](#)
- [BMW of North America Reports Q1 2022 U.S. Sales Results.](#)
- [Caixin China March manufacturing PMI falls to 48.1 on lockdowns](#)
- [Canada to support GM multi-billion-dollar investments in two plants](#)
- [Canadian factory activity grows at record pace despite surging costs](#)
- [Canadian firms pressured by labor shortage, supply chains - Bank of Canada survey](#)
- [Companies Put M&A on Hold Amid Ukraine War](#)
- [Container Premiums: Market continues lull amid Chinese output slowdowns](#)
- [Container rates from Asia to US Pacific Coast tick lower, edge higher to Atlantic Coast](#)
- [Cracking the supply chain data code](#)
- [Dow transport index drops nearly 5% on concerns of freight downturn](#)
- [East Asia & Pacific GDP growth to slow to 5.0% on Ukraine war – World Bank](#)
- [ECB expects to hike rates after ending bond buys in Q3: Schnabel](#)
- [Economists Seek Recession Clues in the Yield Curve](#)
- [Eurozone economy got March boost from reopening, prices soared](#)
- [Eurozone March factory growth slumped, downturn possible -PMI](#)
- [Eyes on Inflation, Shoppers Cut Back on Staples](#)
- [Fed's Williams: Pace of rate increases depends on how economy responds](#)
- [Gatik CEO on why middle-mile autonomy is the future of the supply chain](#)
- [German trade jumps in February; Ukraine war to be felt in March](#)
- [Germany faces steep recession if Russian oil and gas halted, bank lobby says](#)
- [GM says NorthAm production will improve](#)

Exhibit #8: [Expectations Slump in the German Automotive Industry](#)

Business Expectations in the German Automotive Industry



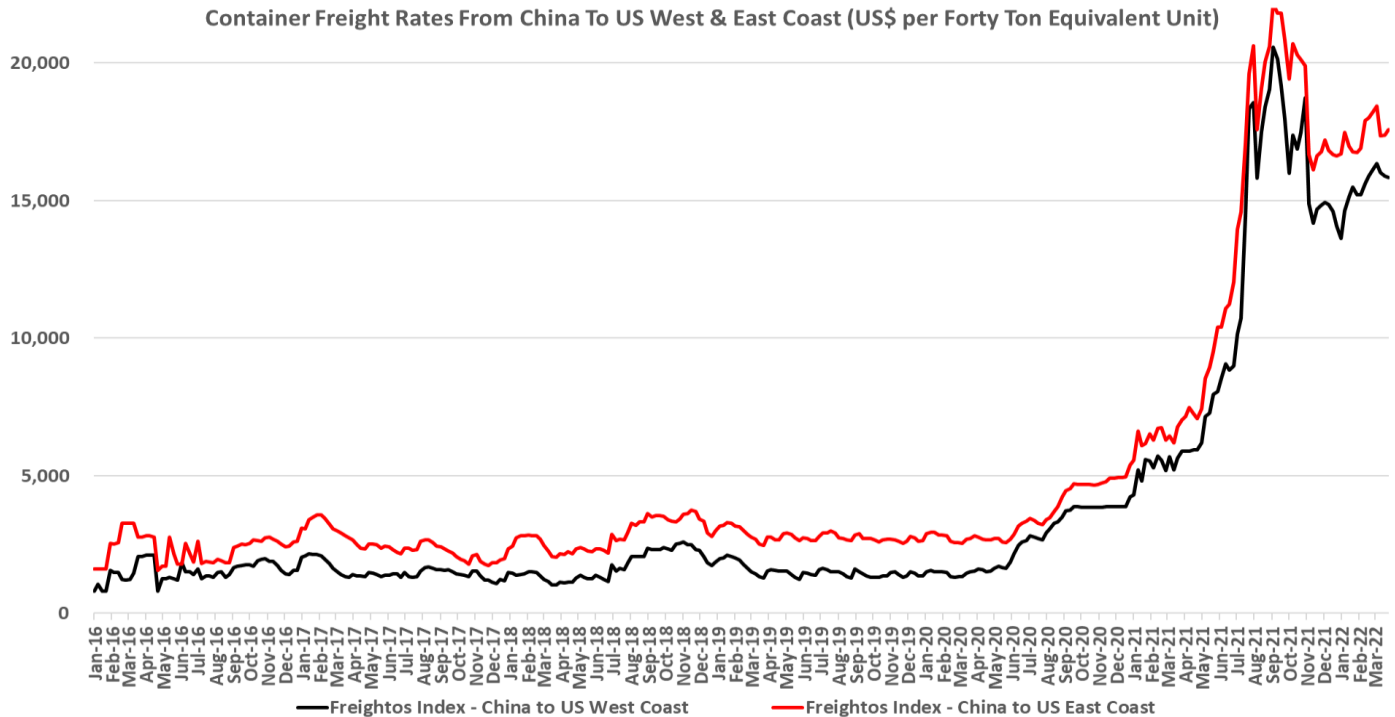
^a Seasonally adjusted.

Source: [ifo Institute](#), April 2022

- [Japan's household spending up but price rises weigh on outlook](#)
- [Lindsay Corporation Reports Fiscal 2022 Second Quarter Results](#)
- [Logistics giants hedge their bets in uncertain U.S. self-driving truck race](#)
- [Mercedes-Benz puts 5,600 workers on vacation in Brazil due to chips shortage](#)
- [Mexican Factories Gain in Supply-Chain Revamps](#)
- [M. Holland Company Launches New Healthcare Packaging Portfolio](#)
- [Peru's monthly inflation hits 26-year high in March](#)
- [PPG Delivers 1,000th PPG MOONWALK Automotive Refinish Mixing System](#)
- [Russia faces rising sugar prices, shortages as traders divert shipments](#)
- [Russian coal, semiconductors targeted in new EU sanction proposals](#)
- [Samsung Elec likely to report highest Q1 profit since 2018 on chips](#)
- [Semiconductor Sales Surge Despite Ongoing Supply Shortages](#)
- [Short-Time Work in Germany Somewhat Lower](#)
- [Soaring imports deepen EU's China trade deficit - Eurostat](#)
- [Spain's jobs market improves as reforms help offset strike, inflation](#)
- [Spectre of inflation threatens Macron's economic gains as election looms](#)
- [Stellantis adds to NorthAm auto cuts](#)
- [The cost of corporate kowtowing to China: podcast](#)
- [The Manitowoc Company Statement about Its Business in Russia](#)
- [UK shoppers turn to own-label food as inflation bites, research shows](#)
- [Ukrainian Factories Struggle as Russia's Assault Rattles Supply Chains](#)
- [US adds 431,000 jobs in March, jobless rate falls](#)
- [US dollar gains on safe-haven flows on possibly more Russia sanctions over Ukraine](#)
- [US manufacturing PMI shows sharp improvement](#)
- [US March payrolls confirm economy strong, jobs market tight](#)

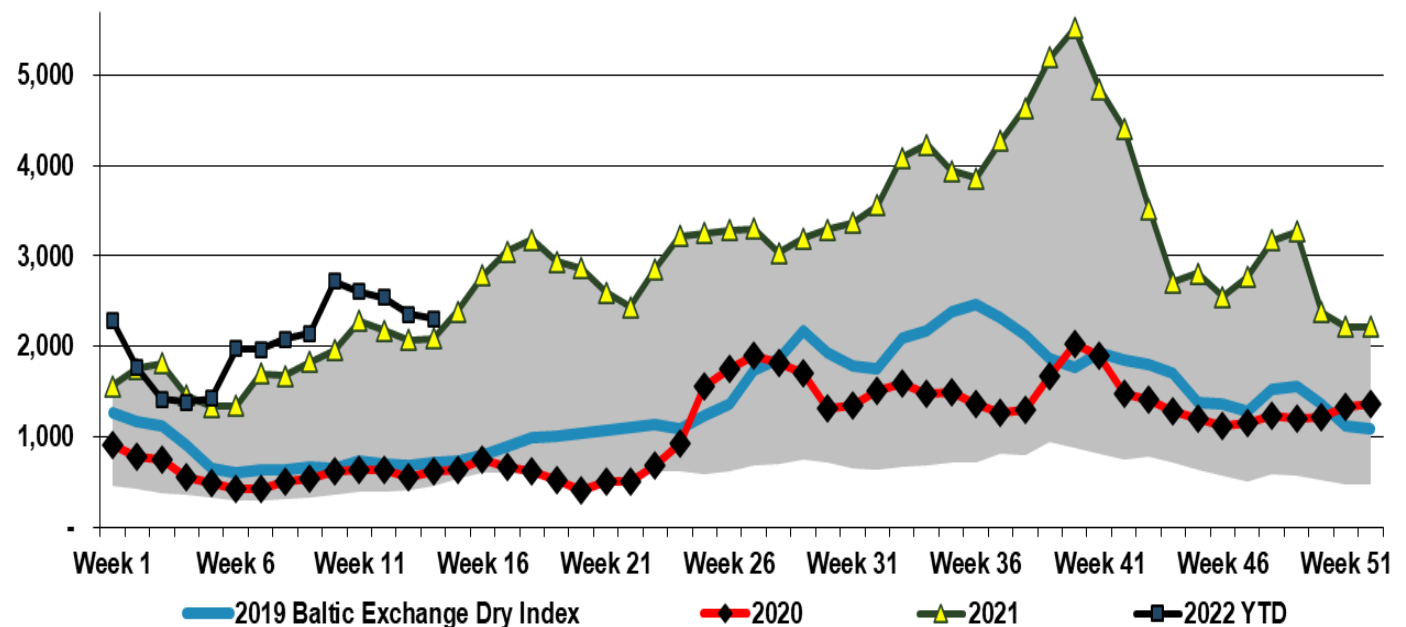
- [US stops Russian bond payments, raising risk of default](#)
- [Viewpoint: ‘Shanghai Surprise’ — and a new lockdown to worry abouts](#)
- [Volvo Cars says March sales fall 22%, hurt by chip shortage](#)
- [With spot rates falling, carriers blank more sailings and plan surcharges](#)
- [Container supply chain chaos set to run as industry dodges ‘curveballs’](#)

Exhibit #9: Freight rates from China to US West & East Coast ports on avg. held up WoW.



Source: [Freightos Index](#), Bloomberg, C-MACC Analysis, April 2022

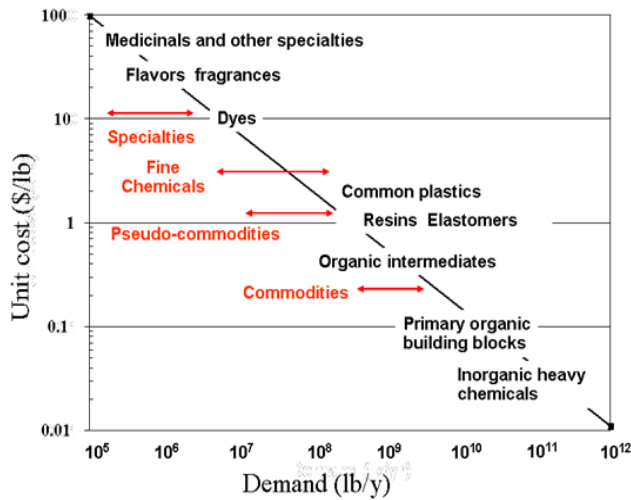
Exhibit #10: [Baltic Exchange Index](#) rates fall for the fourth week, but remain at a five-year high for the time of year.



Source: [Baltic Exchange Index](#), Bloomberg, C-MACC Analysis, April 2022

Flow Charts & Ancillary Data

Ex. 11 Specialty versus commodity



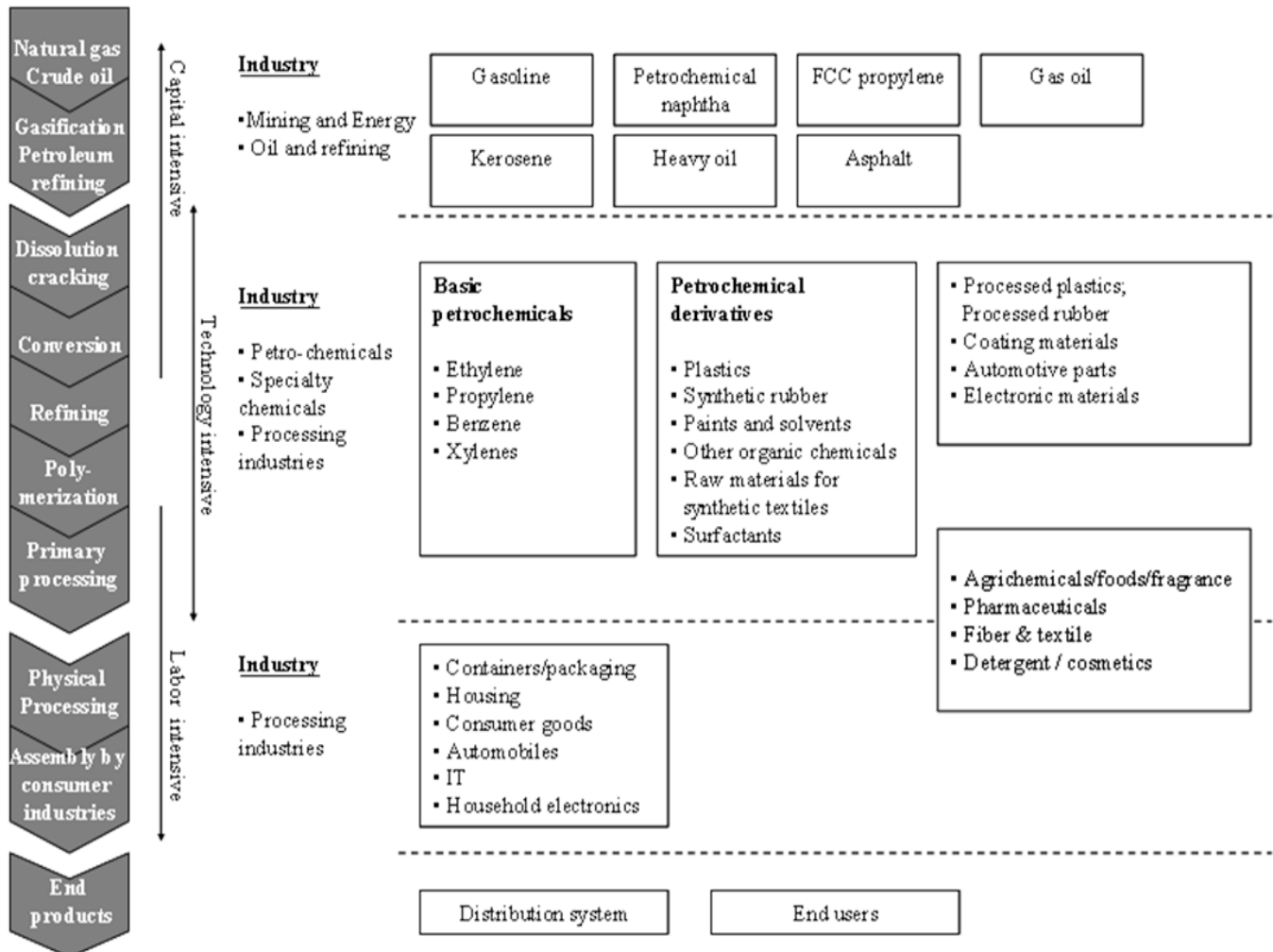
Source: SRI consulting, C-MACC, April 2022

Ex. 12 Chemical industry characteristics

	BULK CHEMICALS	FINE CHEMICALS	SPECIALTY CHEMICALS
Product life cycle	Long	Moderate	Short/moderate
# of products	00's	000's	0000's
Product volumes	>10,000t/y	<10,000t/y	highly variable
Product prices	<5US\$/kg	>5US\$/kg	>10US\$/kg
Product differentiation	none	very low	high
Value added	low	high	high
Capital intensity	high	moderate	moderate/low
R&D focus	process improvement	process development	application/product
KEY SUCCESS FACTORS			
• cost	✓ ✓ ✓	✓ ✓	✓
• technical service	-	✓ ✓ ✓	✓ ✓ ✓
• links with customer	-	✓ ✓	✓ ✓ ✓

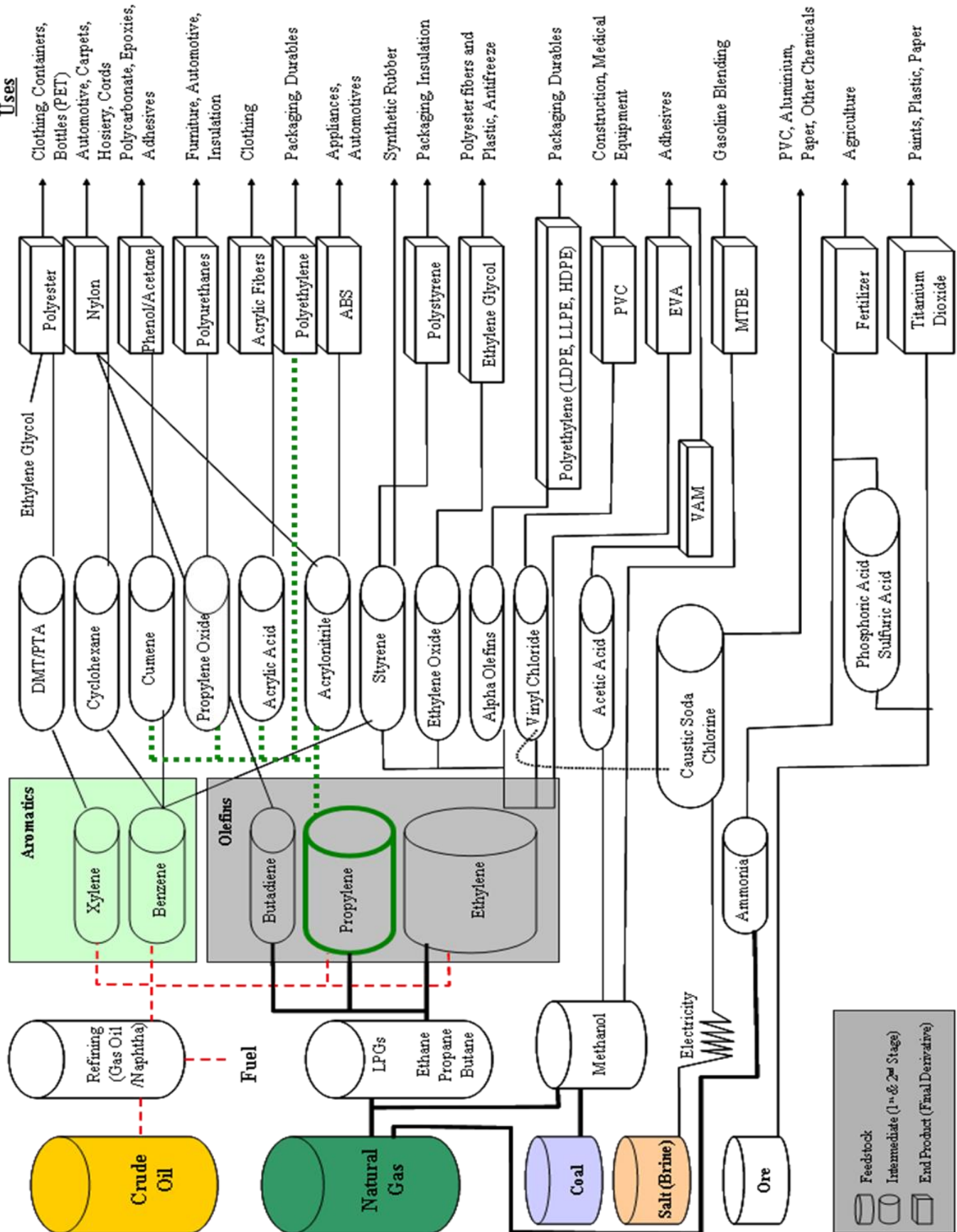
Source: C-MACC, April 2022

Ex. 13 Chemical industry and its upstream and downstream industries



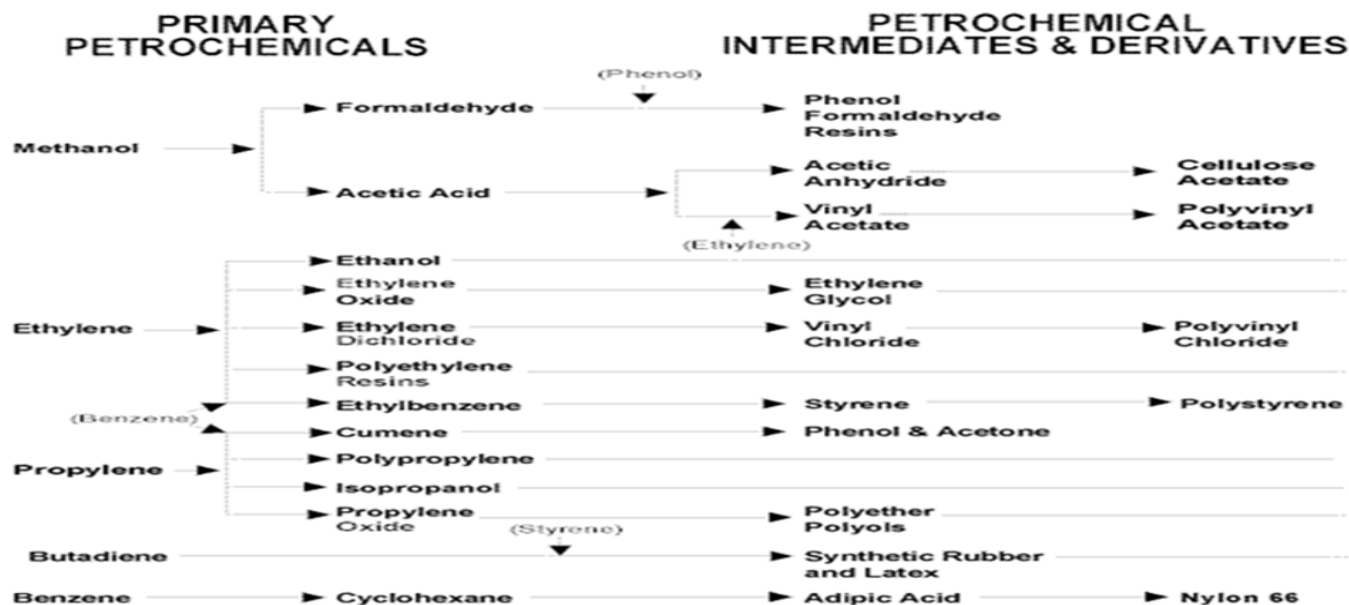
Source: C-MACC, April 2022

Ex. 14 Petrochemical Industry Production Flow – a look at the commodities and their end use



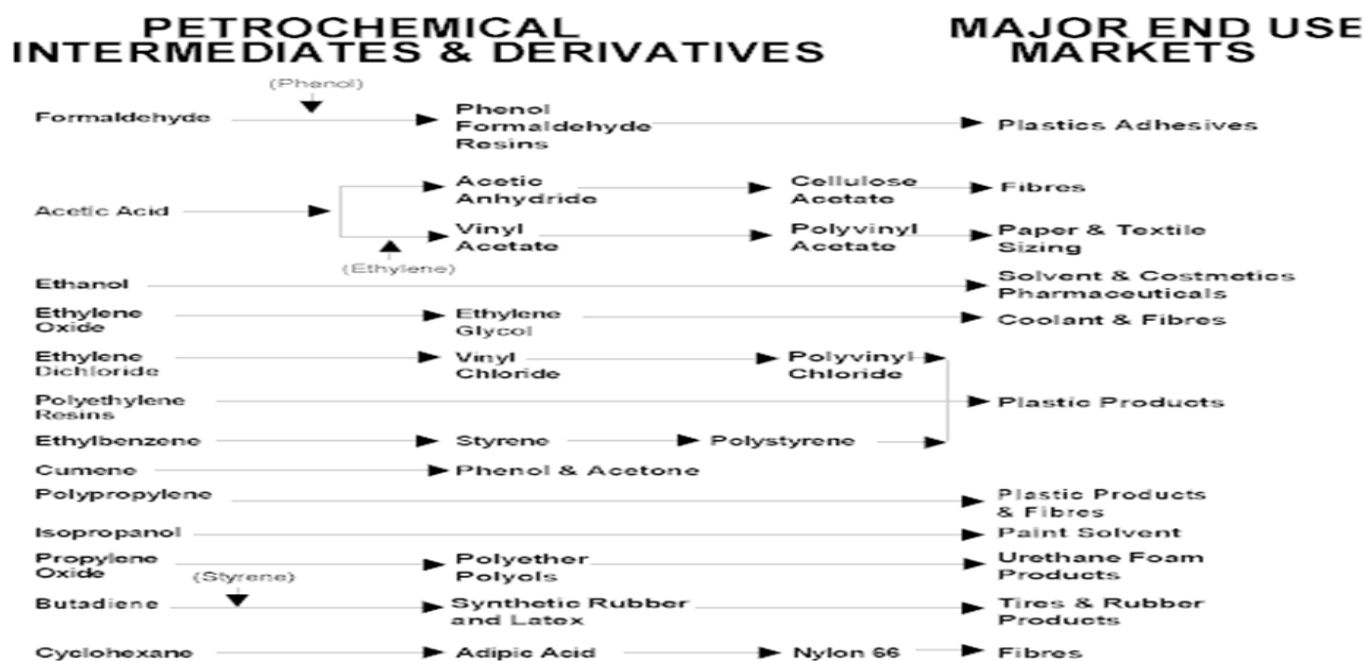
Source: C-MACC, April 2022

Ex. 15 The conversion of petrochemicals to primary intermediates/derivatives



Source: C-MACC, April 2022

Ex. 16 Intermediates & derivative conversion to end markets



Source: C-MACC, April 2022

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