

Chemicals

Chem Weekly: Updates on Industrial Gases, Fertilizer, Dicamba, and Gene Editing

Industry Overview

Industrial gases backlog continues to climb

The 4 big global industrial gases companies all have expanding project backlogs, driven largely for clean energy (blue/green hydrogen/ammonia, carbon capture, renewable fuel). We highlight in Exh 1 the steady climb in sale of gas backlog (long-term take-or-pay) for Linde and Air Liquide, which is similar for Nippon Sanso. Most of Air Products' capex is for clean energy projects in which APD will be the seller of these products. Join our **gases industry webinar with colleague Alex Jones today at 10amET.**

Chinese urea/phosphate export restrictions remain tight

China's corn yields are 41% below US levels, and thus even though corn planted area is 26% more than the US, China's corn production is insufficient and requires an additional 8% of imports (see Exh 2). With a focus on reducing these imports, Chinese authorities have kept pressure on domestic fertilizer producers to make sure there is adequate supply this spring. Export controls remain tight, with quotas for producers yet to be issued, limiting export volumes in the first few months of 2024. CRU expects that these restrictions will remain through April, with 1H24 volumes well below year-ago levels, keeping global supplies tight. The same cadence is projected for phosphates, with DAP/MAP exports of 7mn tonnes (flat y/y). **Keytrade (global trader) and Eurochem Americas will present at our Florida Conference (Feb 28-29).**

Potential seed/herbicide scramble from dicamba ruling

Last week, a US District Court judge in Arizona ruled that when the EPA renewed the registrations for dicamba herbicide for use over Bayer's dicamba-tolerant soybeans and cotton, proper procedures were not followed (comment period and hearing) heightening the controversy from airborne drift impacting other crops. Bayer is urging EPA to pursue actions to allow use of dicamba this year, given near-term plantings and it may be challenging for growers to switch to alternate seeds (e.g. Enlist seeds - 2'4-D tolerant), but we expect increased use of pre-emergent herbicides to help control glyphosate-resistant weeds. If the ruling is not reversed and a more thorough reregistration process is required, we expect a more significant shift to Enlist seeds in 2025.

EU moving ahead with Gene Edited Seeds

Last week, the full EU Parliament voted in favor of a streamlined regulatory path for gene edited seeds, to promote EU farm productivity. The next steps involve discussions between the EU Parliament, Council and Commission. Poland has not been supportive of this path, and thus approval may require a shift in 2-3 other Member States with a similar combined population. The Commission indicated their target date to complete the process and adopt final legislation is July, 2024. We have long viewed gene editing as a transformational tool to accelerate genetic yield gains in seeds, but the EU ban effectively prevented the use of this technology in US exported crops, and thus this approval is significant to seed companies. Corteva, Cibus, Pairwise, and GDM will discuss this on a panel at our **Ag/Matls conference in Florida (Feb 28-29).**

12 February 2024

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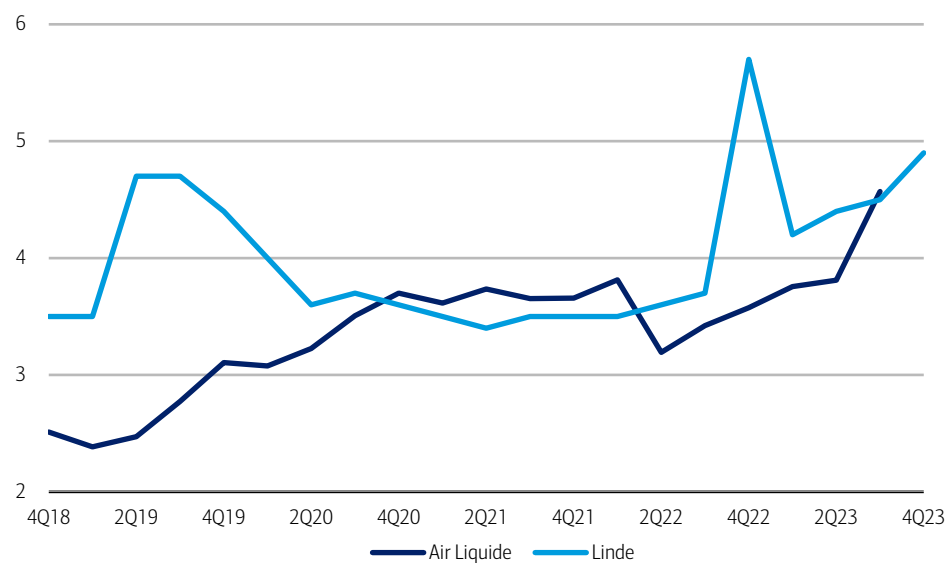
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Timestamp: 12 February 2024 12:00AM EST

Exhibit 1: Linde and Air Liquide sale of gas backlog continues to climb

Customer decarbonization initiatives are a big driver of this trend

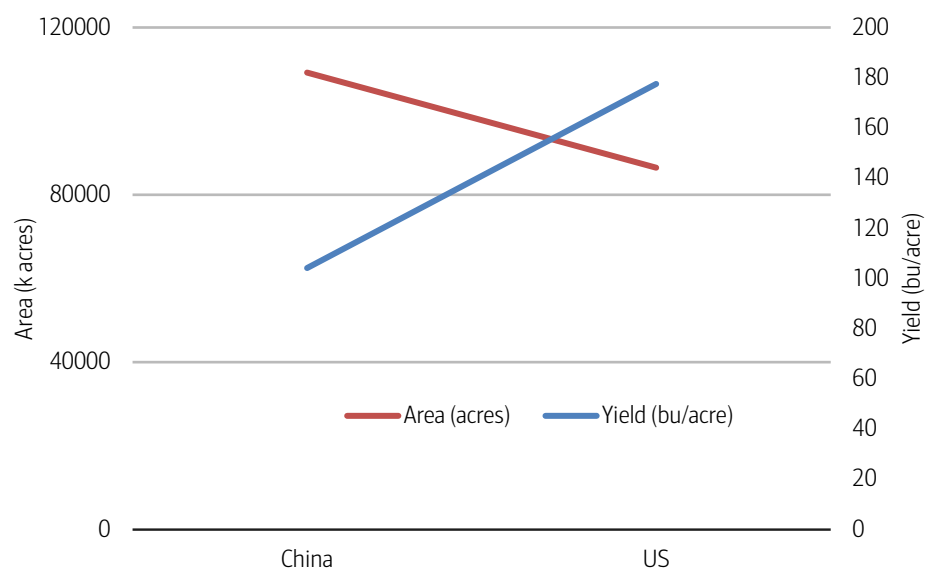


Source: Company reports

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Exhibit 2: US and China corn yields and planted area

China's corn yields are 40% below the US, which leads to imports



Source: USDA

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Petrochemical & Chlor-Alkali

Exhibit 3: Historical pricing overview for PE, PP, PVC, LNG, Isocyanates

US ethane margins are currently higher than EU naphtha PE margins

| | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 1Q22 | 2Q22 | 3Q22 | 4Q22 | 1Q23 | 2Q23 | 3Q23 | 4Q23 |
|------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Integrated PE Margins | | | | | | | | | | | | | | |
| US Ethane | 34 | 28 | 25 | 58 | 34 | 29 | 42 | 38 | 26 | 28 | 30 | 30 | 25 | 29 |
| EU Naphtha | 31 | 28 | 29 | 49 | 45 | 29 | 36 | 55 | 56 | 34 | 28 | 35 | 23 | 30 |
| China Naphtha | 17 | 5 | 11 | 2 | -17 | -11 | -22 | -17 | -14 | -16 | -12 | -6 | -11 | -13 |
| Polyethylene Prices | | | | | | | | | | | | | | |
| HDPE Net Transaction (NA c/lb) | 62 | 52 | 49 | 85 | 69 | 54 | 74 | 78 | 65 | 61 | 55 | 54 | 53 | 54 |
| HDPE Discounted Contract (EU c/lb) | 74 | 66 | 60 | 91 | 87 | 75 | 91 | 100 | 79 | 76 | 77 | 75 | 71 | 75 |
| HDPE Spot (Asia c/lb) | 58 | 44 | 40 | 50 | 47 | 42 | 51 | 50 | 45 | 42 | 43 | 42 | 42 | 41 |
| Ethylene Prices | | | | | | | | | | | | | | |
| Ethylene (US Gulf c/lb) | 20 | 19 | 19 | 45 | 29 | 20 | 38 | 30 | 25 | 21 | 23 | 19 | 19 | 21 |
| Ethylene (EU c/lb) | 50 | 42 | 27 | 53 | 51 | 35 | 60 | 65 | 40 | 40 | 42 | 32 | 30 | 35 |
| Ethylene (SE Asia c/lb) | 53 | 39 | 33 | 47 | 49 | 41 | 54 | 55 | 44 | 43 | 44 | 40 | 37 | 42 |
| Ethylene Cash Costs | | | | | | | | | | | | | | |
| US Ethane (c/lb) | 15 | 11 | 11 | 14 | 23 | 13 | 18 | 27 | 26 | 20 | 12 | 11 | 15 | 12 |
| US Propane (c/lb) | 23 | 13 | 13 | 23 | 32 | 19 | 39 | 34 | 32 | 25 | 20 | 18 | 20 | 16 |
| US Naphtha (c/lb) | 29 | 30 | 21 | 24 | 47 | 41 | 61 | 47 | 38 | 43 | 39 | 38 | 46 | 39 |
| EU Naphtha (c/lb) | 30 | 25 | 18 | 29 | 28 | 33 | 43 | 31 | 10 | 29 | 37 | 27 | 35 | 32 |
| Asia Naphtha (c/lb) | 35 | 33 | 21 | 40 | 53 | 43 | 64 | 55 | 46 | 47 | 45 | 37 | 43 | 46 |
| US Butane (c/lb) | 19 | 11 | 14 | 18 | 31 | 20 | 41 | 32 | 25 | 25 | 24 | 16 | 21 | 20 |
| Feedstock Dynamics | | | | | | | | | | | | | | |
| US Ethane (c/gal) | 33 | 22 | 19 | 31 | 48 | 25 | 39 | 57 | 55 | 39 | 25 | 21 | 29 | 23 |
| US Propane (c/gal) | 88 | 55 | 46 | 105 | 112 | 71 | 131 | 126 | 109 | 81 | 81 | 69 | 68 | 67 |
| US Butane (c/gal) | 92 | 59 | 53 | 117 | 125 | 80 | 159 | 134 | 111 | 96 | 108 | 67 | 61 | 85 |
| Brent Oil (\$/bbl) | 72 | 64 | 44 | 71 | 99 | 82 | 97 | 112 | 99 | 89 | 83 | 78 | 85 | 84 |
| Isocyanates | | | | | | | | | | | | | | |
| US MDI (c/lb) | 184 | 158 | 142 | 189 | 218 | 171 | 221 | 231 | 223 | 199 | 185 | 175 | 164 | 160 |
| US TDI (c/lb) | 162 | 154 | 218 | 268 | 233 | 263 | 231 | 224 | 227 | 251 | 272 | 270 | 260 | 251 |
| EU MDI (Eur c/lb) | 150 | 119 | 87 | 130 | 140 | 124 | 139 | 145 | 138 | 137 | 139 | 136 | 114 | 105 |
| EU TDI (Eur c/lb) | 89 | 111 | 154 | 141 | 99 | 136 | 83 | 80 | 86 | 146 | 173 | 153 | 114 | 106 |
| China MDI (c/lb) | 114 | 71 | 76 | 115 | 98 | 84 | 120 | 104 | 91 | 78 | 86 | 83 | 86 | 81 |
| China TDI (c/lb) | 84 | 114 | 190 | 173 | 84 | 101 | 85 | 81 | 75 | 96 | 114 | 102 | 96 | 90 |

Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 4: Historical pricing overview for PE, PP, PVC, LNG, Isocyanates

US ethane margins are currently higher than EU naphtha PE margins

| | 11/2 | 11/9 | 11/16 | 11/23 | 11/30 | 12/7 | 12/14 | 12/21 | 12/28 | 1/4 | 1/11 | 1/18 | 1/25 | 2/1 | 2/8 |
|------------------------------------|------|------|-------|-------|-------|------|-------|-------|-------|-----|------|------|------|-----|-----|
| Integrated PE Margins | | | | | | | | | | | | | | | |
| US Ethane | 30 | 30 | 31 | 32 | 32 | 27 | 28 | 28 | 28 | 31 | 29 | 29 | 31 | 30 | 30 |
| EU Naphtha | 32 | 32 | 32 | 32 | 32 | 25 | 25 | 25 | 25 | 23 | 23 | 23 | 23 | 28 | 28 |
| China Naphtha | -11 | -10 | -12 | -12 | -13 | -14 | -14 | -18 | -17 | -14 | -11 | -14 | -15 | -18 | -11 |
| Polyethylene Prices | | | | | | | | | | | | | | | |
| HDPE Net Transaction (NA c/lb) | 56 | 56 | 56 | 56 | 56 | 51 | 51 | 51 | 51 | 54 | 54 | 54 | 54 | 54 | 54 |
| HDPE Discounted Contract (EU c/lb) | 75 | 75 | 75 | 75 | 75 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 75 | 75 |
| HDPE Spot (Asia c/lb) | 42 | 42 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 41 | 41 | 41 | 41 | 41 |
| Ethylene Prices | | | | | | | | | | | | | | | |
| Ethylene (US Gulf c/lb) | 22 | 21 | 19 | 21 | 21 | 20 | 19 | 18 | 18 | 19 | 20 | 20 | 20 | 21 | 21 |
| Ethylene (EU c/lb) | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 37 | 37 |
| Ethylene (SE Asia c/lb) | 43 | 43 | 43 | 43 | 43 | 43 | 41 | 41 | 41 | 41 | 40 | 40 | 41 | 43 | 43 |

Exhibit 4: Historical pricing overview for PE, PP, PVC, LNG, Isocyanates

US ethane margins are currently higher than EU naphtha PE margins

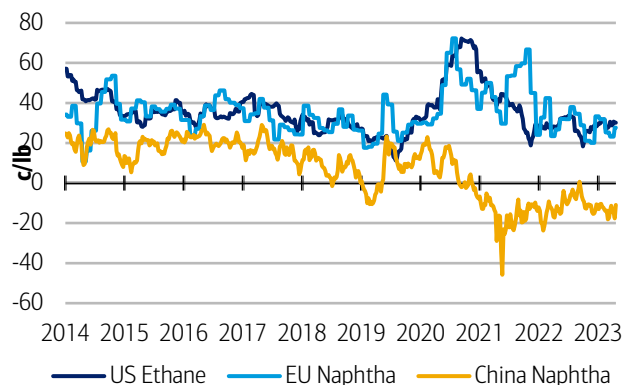
| | 11/2 | 11/9 | 11/16 | 11/23 | 11/30 | 12/7 | 12/14 | 12/21 | 12/28 | 1/4 | 1/11 | 1/18 | 1/25 | 2/1 | 2/8 |
|----------------------------|------|------|-------|-------|-------|------|-------|-------|-------|-----|------|------|------|-----|-----|
| Ethylene Cash Costs | | | | | | | | | | | | | | | |
| US Ethane (c/lb) | 13 | 13 | 12 | 11 | 11 | 11 | 10 | 10 | 10 | 10 | 12 | 12 | 10 | 11 | 11 |
| US Propane (c/lb) | 14 | 12 | 11 | 16 | 16 | 19 | 17 | 16 | 18 | 19 | 19 | 23 | 28 | 29 | 29 |
| US Naphtha (c/lb) | 39 | 36 | 36 | 39 | 40 | 40 | 36 | 38 | 38 | 37 | 37 | 35 | 39 | 41 | 41 |
| EU Naphtha (c/lb) | 30 | 30 | 30 | 30 | 30 | 35 | 35 | 35 | 35 | 38 | 38 | 38 | 38 | 34 | 34 |
| Asia Naphtha (c/lb) | 44 | 44 | 44 | 44 | 46 | 46 | 46 | 51 | 50 | 47 | 42 | 44 | 42 | 44 | 39 |
| US Butane (c/lb) | 15 | 14 | 15 | 20 | 21 | 29 | 30 | 28 | 29 | 28 | 25 | 26 | 30 | 27 | 27 |
| Feedstock Dynamics | | | | | | | | | | | | | | | |
| US Ethane (c/gal) | 25 | 26 | 23 | 21 | 21 | 21 | 17 | 20 | 17 | 18 | 21 | 24 | 19 | 20 | 21 |
| US Propane (c/gal) | 66 | 64 | 63 | 64 | 64 | 71 | 69 | 64 | 66 | 70 | 70 | 82 | 86 | 86 | 92 |
| US Butane (c/gal) | 79 | 82 | 84 | 85 | 83 | 96 | 104 | 99 | 96 | 101 | 93 | 96 | 102 | 95 | 96 |
| Brent Oil (\$/bbl) | 90 | 85 | 81 | 81 | 81 | 79 | 76 | 77 | 79 | 77 | 79 | 78 | 79 | 84 | 77 |
| Isocyanates | | | | | | | | | | | | | | | |
| US MDI (c/lb) | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 170 | 160 | 160 |
| US TDI (c/lb) | 254 | 254 | 254 | 249 | 249 | 249 | 249 | 249 | 249 | 249 | 244 | 244 | 244 | 244 | 244 |
| EU MDI (Eur c/lb) | 99 | 100 | 109 | 109 | 110 | 108 | 110 | 110 | 111 | 111 | 111 | 112 | 112 | 112 | 111 |
| EU TDI (Eur c/lb) | 104 | 106 | 108 | 108 | 110 | 108 | 104 | 106 | 106 | 105 | 106 | 104 | 105 | 104 | 103 |
| China MDI (c/lb) | 81 | 81 | 82 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 82 | 83 | 83 |
| China TDI (c/lb) | 95 | 95 | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 90 |

Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 5: Global PE Margins based on feedstock mix

Integrated margins remain negative for Chinese producers



Source: IHS, Bloomberg, BofA Global Research

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Exhibit 6: US premium to global netbacks

The US polyethylene price continues to have a premium to historic

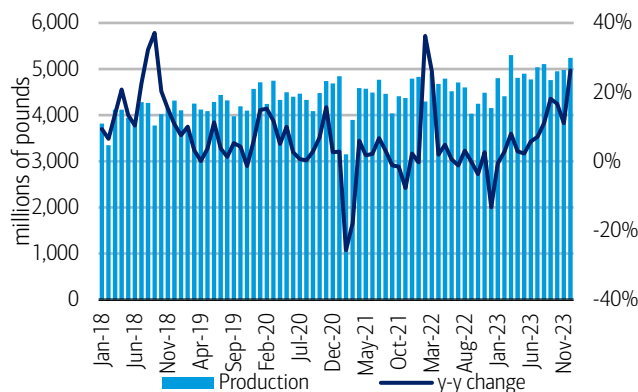


Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 7: US polyethylene production

Production is accelerating with new capacity

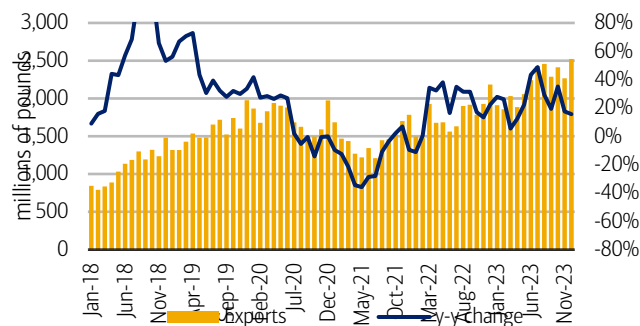


Source: American Chemistry Council, BofA Global Research

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Exhibit 8: US polyethylene exports

Exports have improved more recently

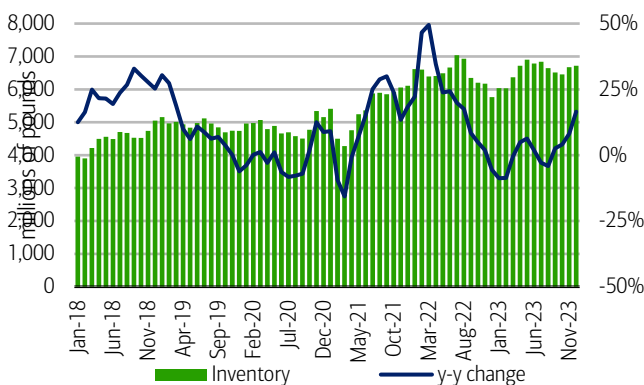


Source: American Chemistry Council, BofA Global Research

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Exhibit 9: US polyethylene inventory

Inventories remain elevated, returning to near peak levels

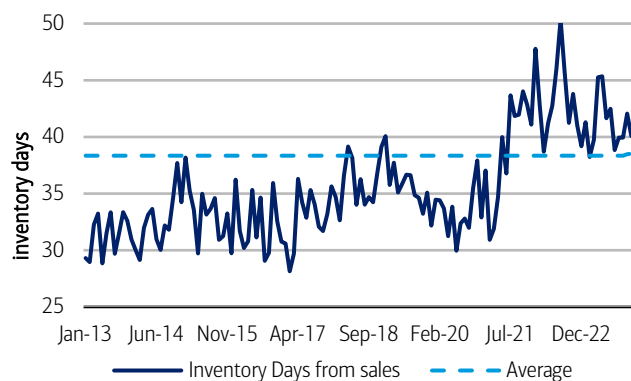


Source: American Chemistry Council, BofA Global Research

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Exhibit 10: US polyethylene days of sales in inventory

Days of sales in inventory are above normal

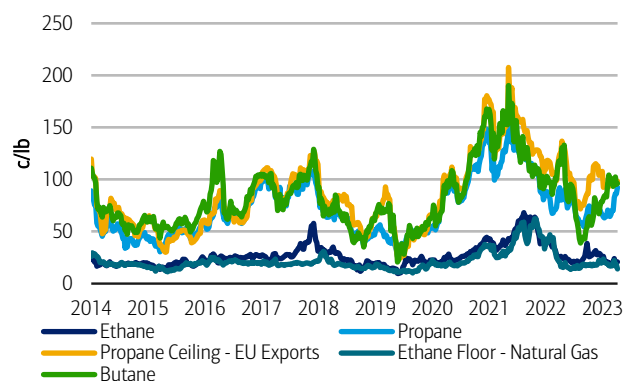


Source: American Chemistry Council, BofA Global Research

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Exhibit 11: US NGL Dynamics (c/lb)

US ethane is at the low end of the PE cost curve

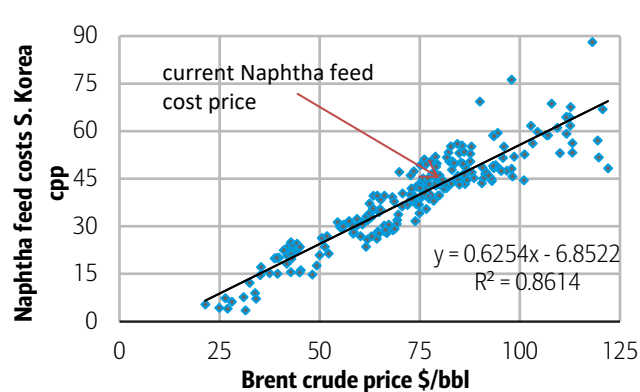


Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 12: Brent Oil vs Naphtha feed cost (S. Korea) price regression

Naphtha feedstock cost closely follow changes in Brent crude

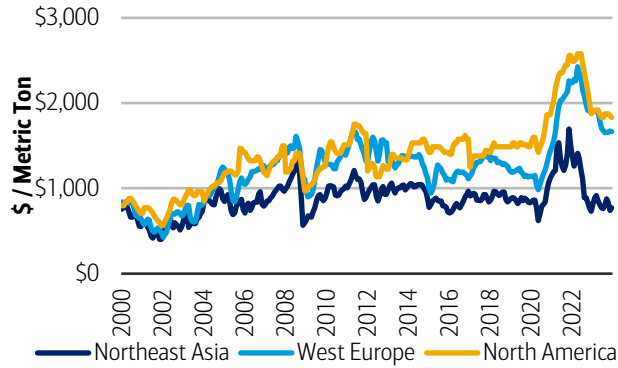


Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 13: PVC prices (\$/mt)

PVC prices moving off of multi-decade highs

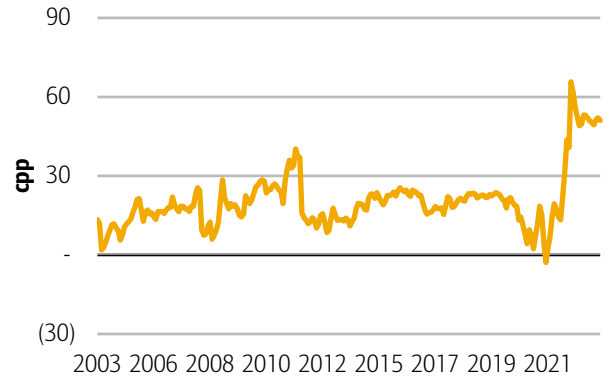


Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 14: US Contract PVC Premium over Spot

Spot markets trade at a significant discount to contract

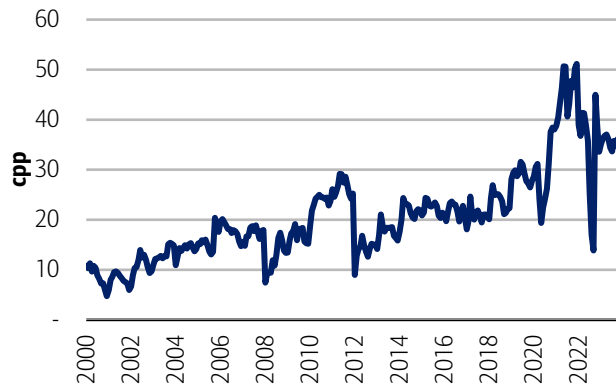


Source: OPIS, BofA Global Research Estimates

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Exhibit 15: non-integrated PVC margin (80% contract 20% spot)

PVC margins are moving off peak



Source: OPIS, Bloomberg, BofA Global Research Estimates

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Exhibit 16: US ethylene dichloride price

Prices have collapse with international PVC price

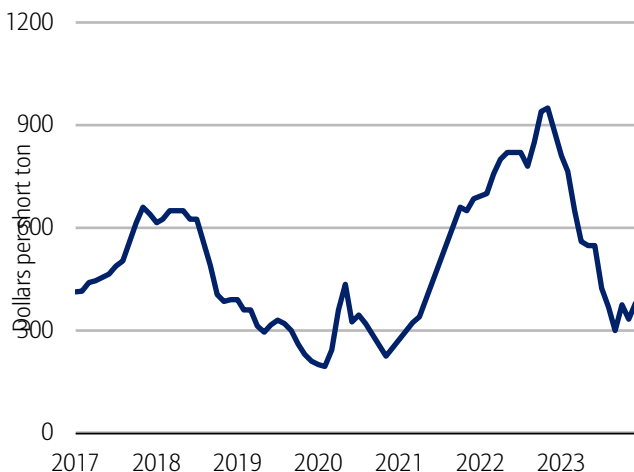


Source: Bloomberg, BofA Global Research

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Exhibit 17: Caustic export price (\$/ short ton)

At \$580/short ton caustic export prices have fallen off of highs

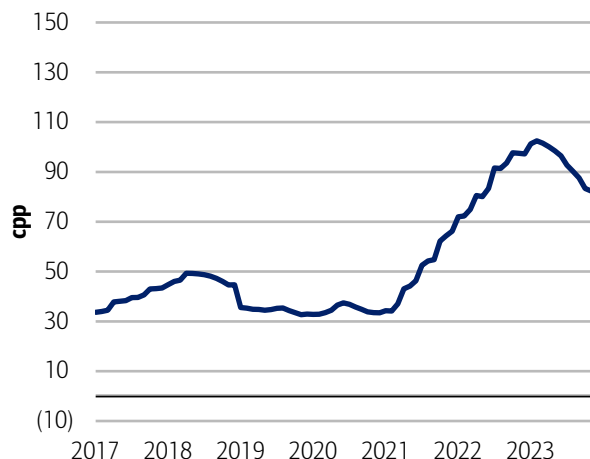


Source: Bloomberg

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Exhibit 18: US ECU Cash Margins

Cash margins remain high as cost deflation offset softer contract caustic

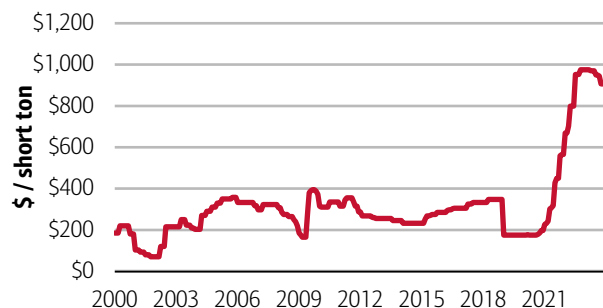


Source: Bloomberg, OPIS

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Exhibit 19: US chlorine price

Chlorine prices have moved higher on initiatives by Olin

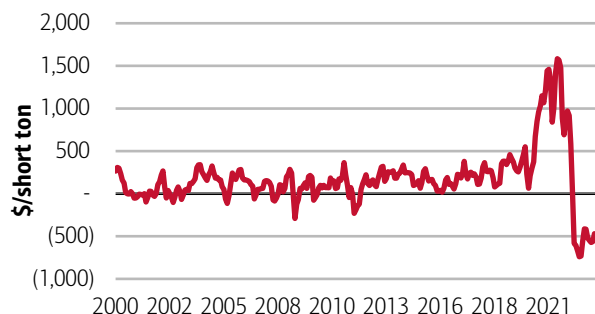


Source: OPIS

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Exhibit 20: Implied chlorine premium in spot PVC vs. merchant price

A negative value indicates an incentive to sell chlorine vs spot PVC

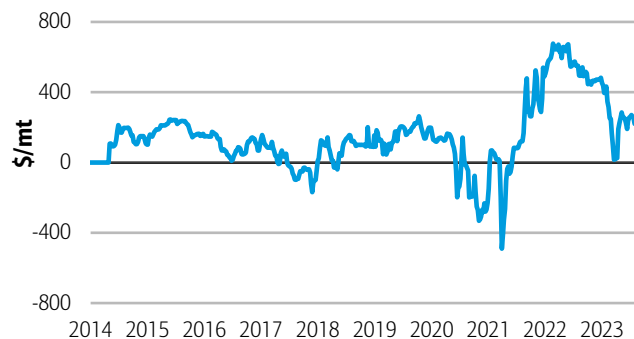


Source: OPIS, BofA Global Research

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Exhibit 21: US acetic acid spread to China

US acetic acid spread to china is near to zero

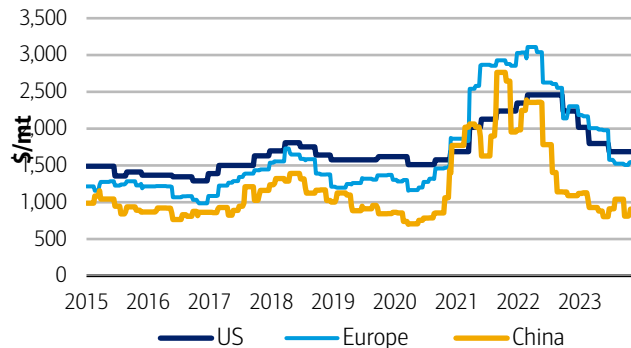


Source: Bloomberg, BofA Global Research

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Exhibit 22: Global VAM contract prices

US & European VAM prices remain bid

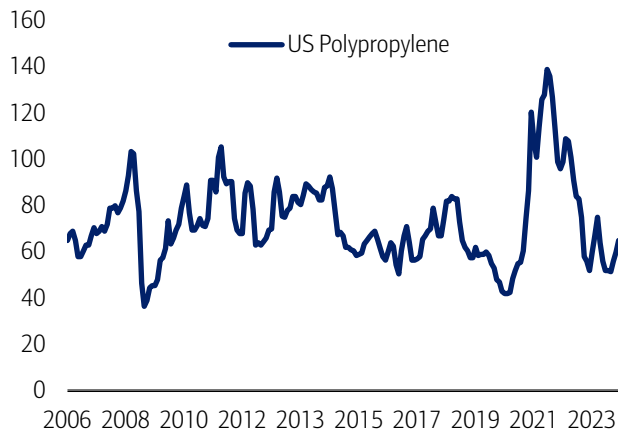


Source: Bloomberg

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Exhibit 23: US Polypropylene price

Polypropylene prices have retraced sharply

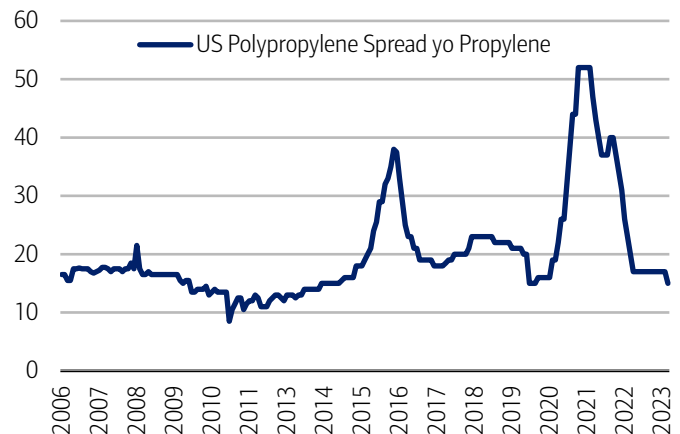


Source: OPIS

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Exhibit 24: Polypropylene spread to propylene

PP spread to monomer would seem to have more downside

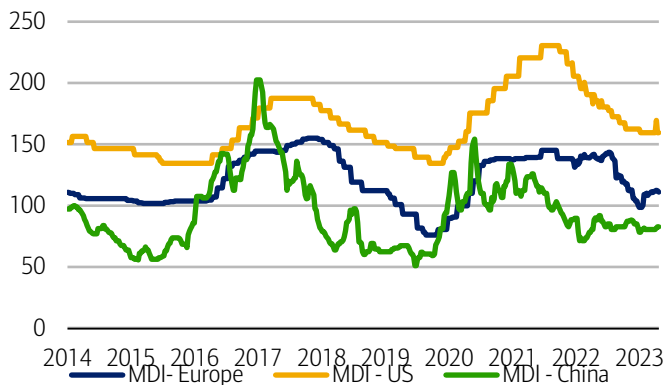


Source: OPIS and BofA Global Research

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Exhibit 25: Global polymeric MDI price deck

US remains at a healthy premium to global markets

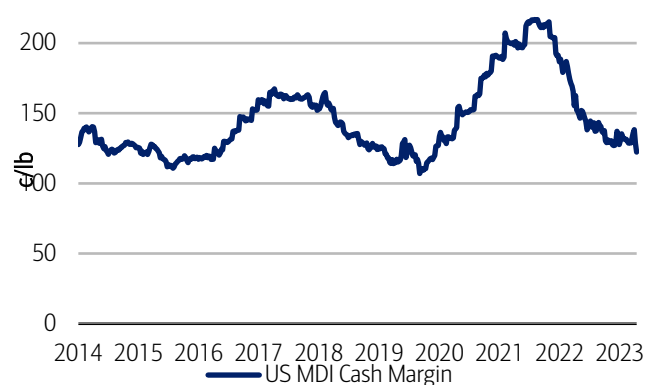


Source: ICIS

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Exhibit 26: US Polymeric MDI spread over raw material costs

US margins are off peak, but still at healthy levels

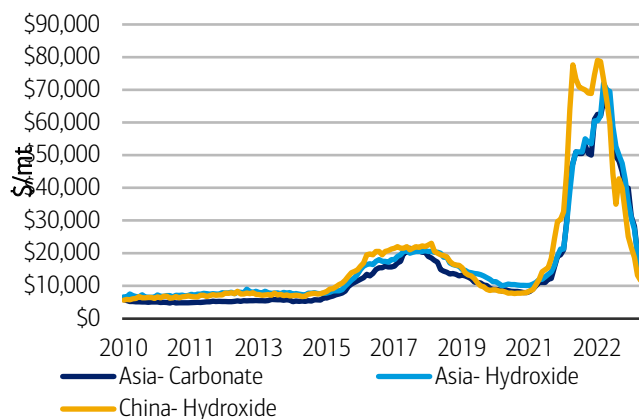


Source: ICIS, OPIS, BofA Global Research Estimates

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Exhibit 27: China and Asia (non-China) Prices

China prices continue to trade at a premium to other benchmarks



Source: Benchmark Minerals, BofA Global Research

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Exhibit 28: Premium of lithium hydroxide over carbonate

Hydroxide has historically carried a \$2,000/mt premium over carbonate



Source: Benchmark Minerals, BofA Global Research

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Nitrogen**Exhibit 29: Nitrogen pricing overview**

Nitrogen prices have started to decrease materially

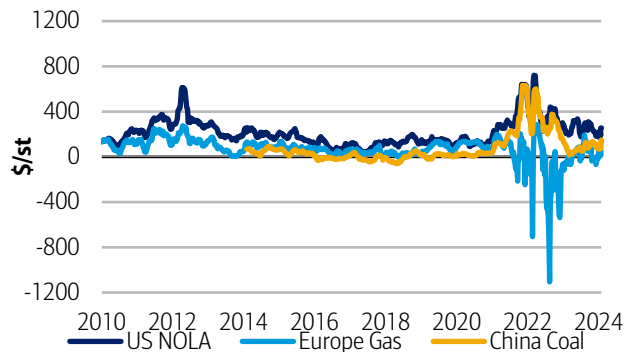
| | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 1Q22 | 2Q22 | 3Q22 | 4Q22 | 1Q23 | 2Q23 | 3Q23 | 4Q23 |
|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Nitrogen Prices | | | | | | | | | | | | | | |
| Urea granular (US NOLA \$/st) | 259 | 244 | 228 | 492 | 601 | 357 | 678 | 613 | 591 | 522 | 342 | 388 | 349 | 357 |
| Urea granular (US Midwest \$/st) | 297 | 302 | 272 | 535 | 667 | 437 | 752 | 679 | 633 | 605 | 421 | 463 | 430 | 439 |
| Urea granular (Mediterranean \$/st) | 265 | 252 | 238 | 510 | 687 | 366 | 800 | 703 | 682 | 562 | 386 | 324 | 369 | 377 |
| Urea granular (SE Asia \$/st) | 267 | 255 | 240 | 503 | 629 | 354 | 728 | 687 | 570 | 533 | 366 | 329 | 352 | 366 |
| Ammonia (US Midwest \$/st) | 421 | 401 | 328 | 766 | 1248 | 593 | 1396 | 1267 | 1129 | 1199 | 719 | 426 | 492 | 695 |
| UAN (US Midwest \$/st) | 216 | 209 | 166 | 384 | 573 | 308 | 612 | 626 | 496 | 558 | 355 | 302 | 267 | 305 |
| Feedstock Costs | | | | | | | | | | | | | | |
| Natural Gas (US HH \$/mmbtu) | 3.07 | 2.53 | 2.12 | 3.70 | 6.49 | 2.66 | 4.53 | 7.39 | 7.78 | 6.01 | 2.71 | 2.35 | 2.65 | 2.92 |
| Natural Gas (UK ICE \$/mmbtu) | 7.89 | 4.86 | 3.30 | 15.81 | 31.84 | 12.65 | 32.03 | 21.98 | 41.54 | 31.09 | 16.30 | 10.24 | 10.58 | 13.48 |
| Anthracite coal (China \$/mt) | 139 | 131 | 131 | 164 | 212 | 182 | 237 | 221 | 200 | 194 | 204 | 179 | 183 | 162 |
| | 11/2 | 11/9 | 11/16 | 11/23 | 11/30 | 12/7 | 12/14 | 12/21 | 12/28 | 1/4 | 1/11 | 1/18 | 1/25 | 2/1 |
| Nitrogen Prices | | | | | | | | | | | | | | |
| Urea granular (US NOLA \$/st) | 376 | 359 | 350 | 355 | 343 | 328 | 299 | 304 | 300 | 319 | 302 | 300 | 345 | 304 |
| Urea granular (US Midwest \$/st) | 450 | 443 | 410 | 413 | 425 | 425 | 425 | 425 | 398 | 398 | 385 | 398 | 395 | 380 |
| Urea granular (Mediterranean \$/st) | 406 | 395 | 399 | 379 | 375 | 363 | 340 | 332 | 312 | 321 | 329 | 312 | 364 | 322 |
| Urea granular (SE Asia \$/st) | 395 | 384 | 363 | 363 | 363 | 363 | 327 | 322 | 316 | 329 | 311 | 316 | 363 | 316 |
| Ammonia (US Midwest \$/st) | 750 | 725 | 725 | 725 | 725 | 725 | 600 | 600 | 610 | 600 | 600 | 600 | 280 | 600 |
| UAN (US Midwest \$/st) | 305 | 305 | 305 | 305 | 305 | 305 | 305 | 305 | 305 | 305 | 305 | 305 | 280 | 280 |
| Feedstock Costs | | | | | | | | | | | | | | |
| Natural Gas (US HH \$/mmbtu) | 3.52 | 3.03 | 2.96 | 2.86 | 2.81 | 2.58 | 2.49 | 2.61 | 2.51 | 2.89 | 3.31 | 2.52 | 2.71 | 2.08 |
| Natural Gas (UK ICE \$/mmbtu) | 15.25 | 15.17 | 14.40 | 14.17 | 15.10 | 13.94 | 12.18 | 10.47 | 10.84 | 10.27 | 11.07 | 10.19 | 8.87 | 8.81 |
| Anthracite coal (China \$/mt) | 164 | 164 | 163 | 164 | 161 | 159 | 157 | 157 | 156 | 155 | 154 | 151 | 146 | 143 |

Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 30: Global Granular Urea Cash Margins (\$/st)

European urea margins are negative

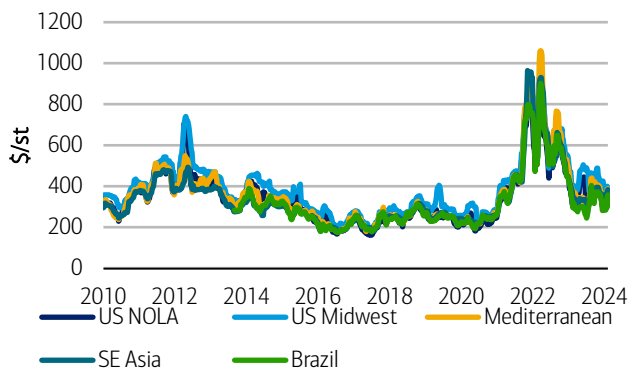


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 32: Global Granular Urea Prices (\$/st)

Prices have come off their recent highs

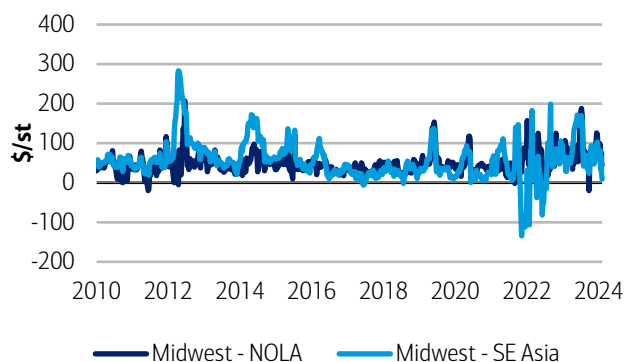


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 34: US Urea Price Differentials (\$/st)

US Midwest urea prices are above NOLA import price

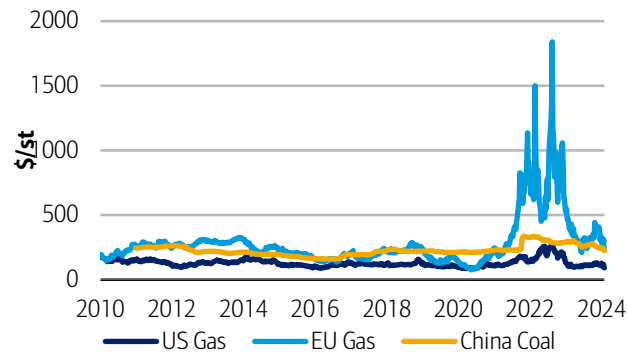


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 31: Global Granular Urea Cash Cost (\$/st)

US gas costs at bottom of cost curve

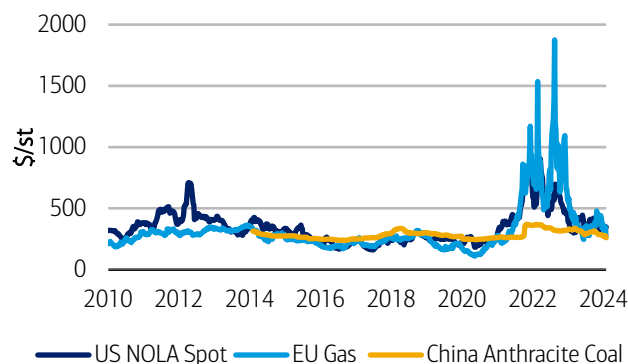


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 33: US NOLA Urea vs Delivered Costs (\$/st)

Product costs have fallen off their peak, but still remain elevated vs 2019 (pre-covid)

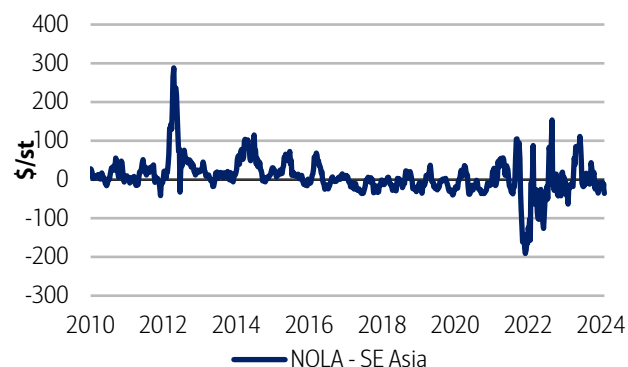


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 35: US NOLA - SE Asia Urea Price (\$/st)

US NOLA urea price is below Asia prices

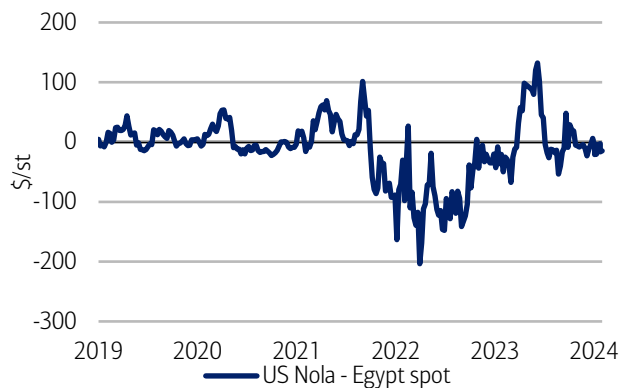


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 36: US NOLA – Egypt Urea Price (\$/st)

US NOLA price is now above Egypt prices

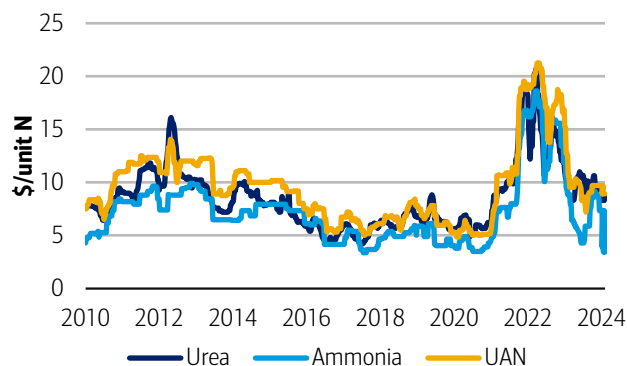


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 38: US Midwest Prices (\$/unit N)

Midwest UAN prices have surpassed urea on a unit N basis

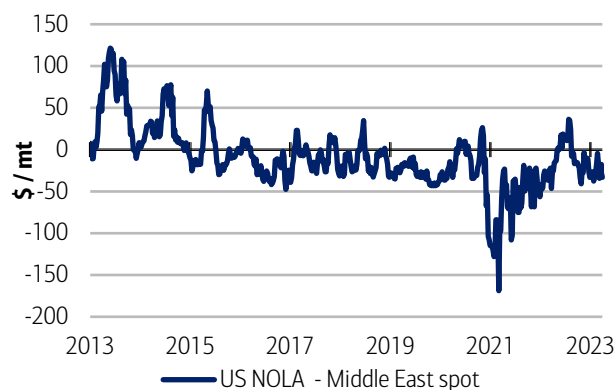


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 40: US NOLA implied vs. Middle East urea price spread

US NOLA urea price is now comparable to Middle East levels

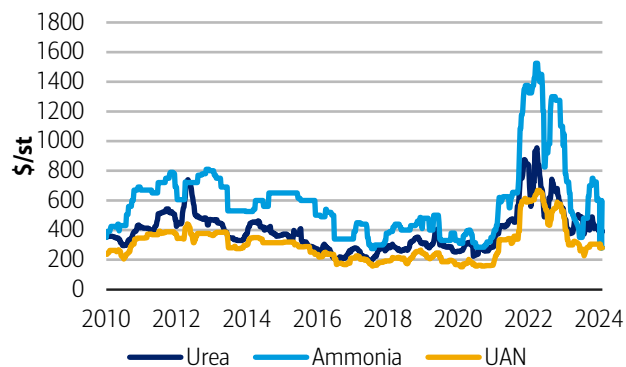


Source: CRU, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 37: US Midwest Prices (\$/st)

All nitrogen fertilizer products have increased sharply

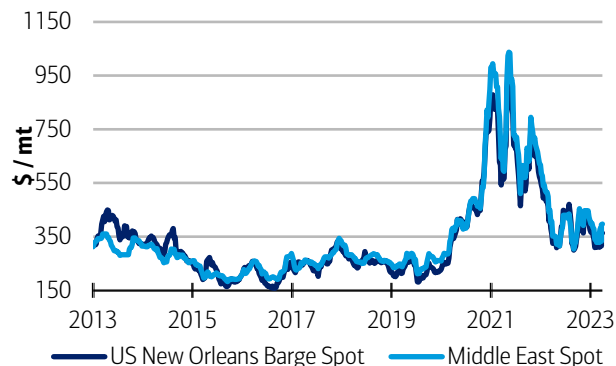


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 39: US NOLA implied vs. Middle East urea prices (\$/mt)

Prices have both fallen off their- peak, but still remain elevated vs 2019 (pre-covid)

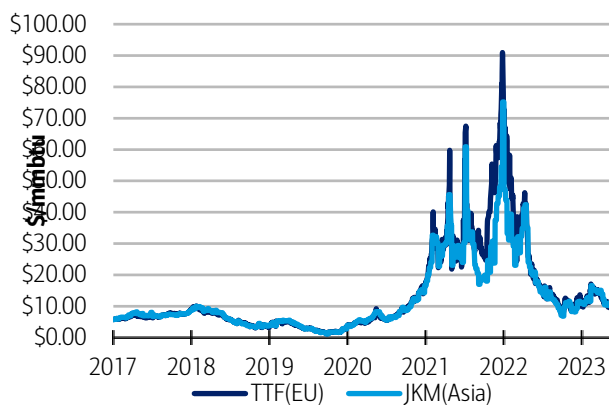


Source: CRU, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 41: EU vs. Asia NatGas Prices (\$/mmBTU)

Asian nat gas prices are well below EU prices

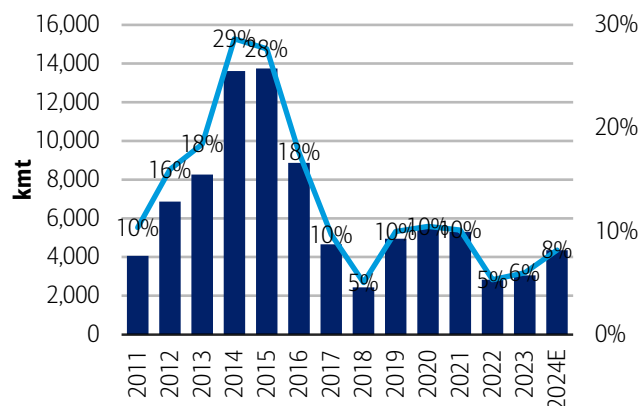


Source: Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 42: Chinese Urea Exports & % of World Total

Chinese urea exports are well below prior peak levels

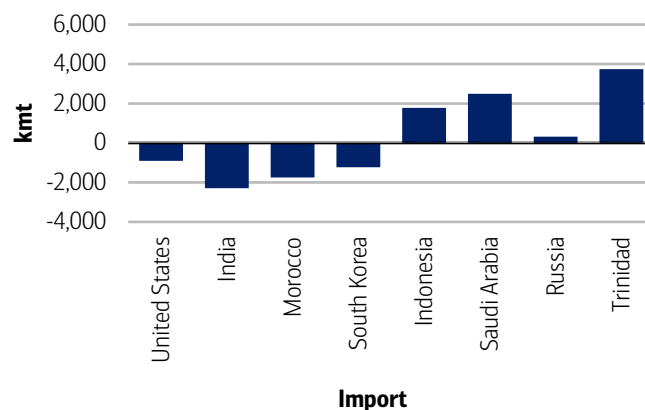


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 43: Global NH3 Trade Balance 2023

Trinidad is the largest ammonia exporter

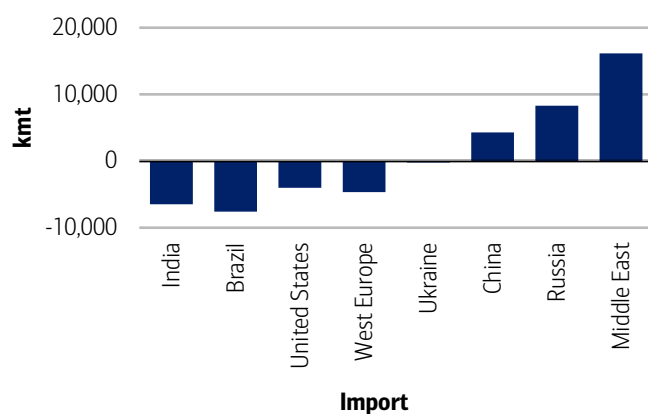


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 44: Global Urea Trade Balance 2023

Middle East is the largest urea exporter

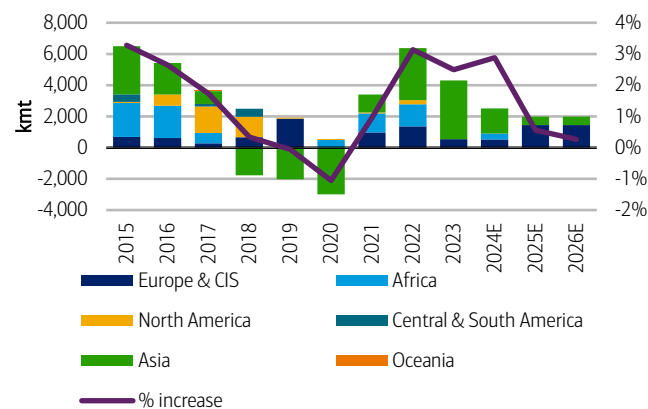


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 45: Global Urea Capacity additions by region

Global urea capacity additions are set to decrease from the 2022 peak

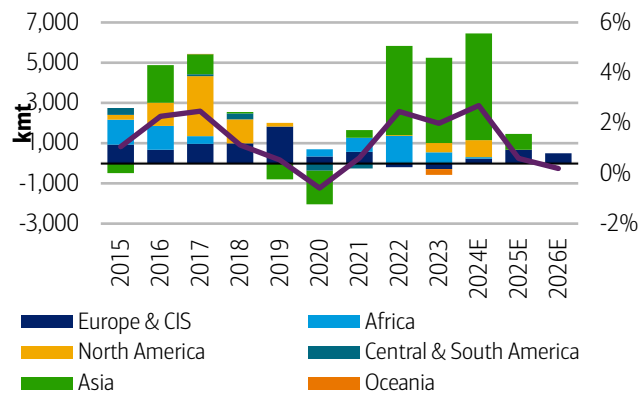


Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 46: Global NH3 Capacity additions by region

New global ammonia coming in 2022

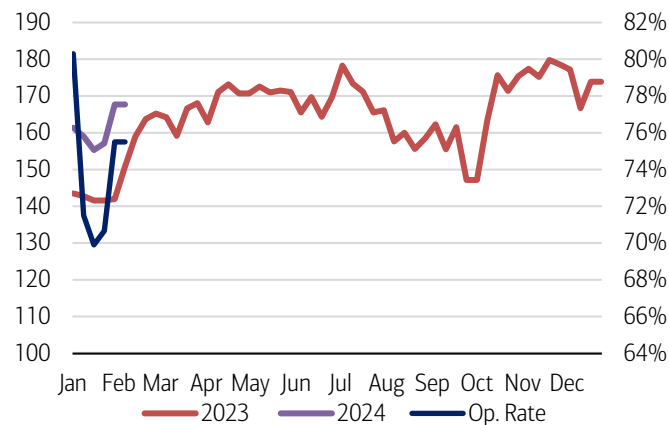


Source: CRU, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 47: Chinese Urea Daily Production (weekly kmt)

China's urea production has dipped below year-ago levels

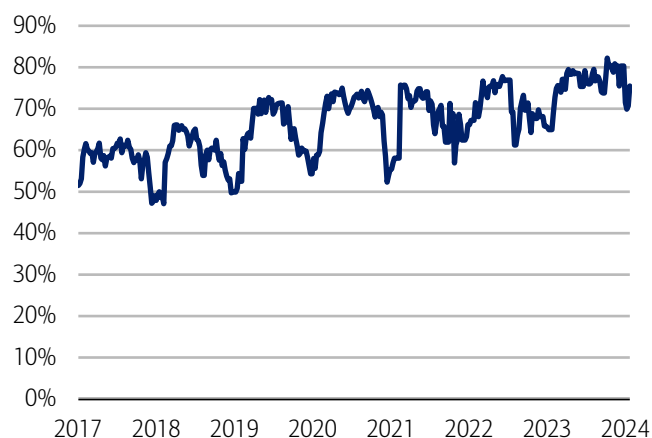


Source: CFMW, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 48: Chinese Urea Daily Production as a % of 5-yr max Daily production (weekly kmt)

China's urea production is seasonally strong

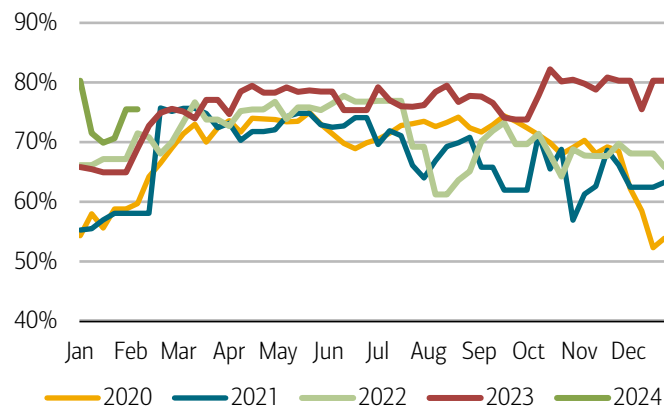


Source: CFMW, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 49: Chinese Urea Operating Rates

Operating rates have collapsed recently

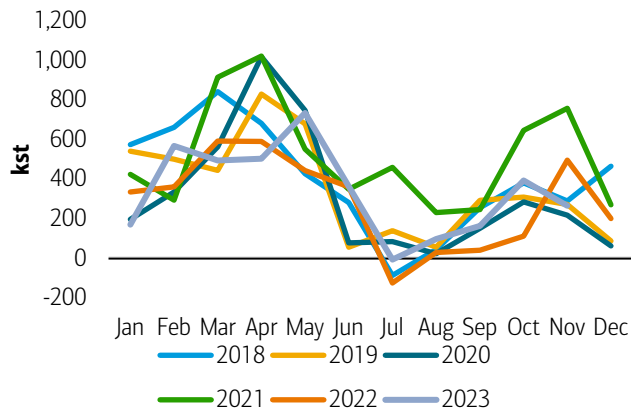


Source: CFMW, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 50: US Urea Net Imports (kst)

Net imports running at low levels year-to-date

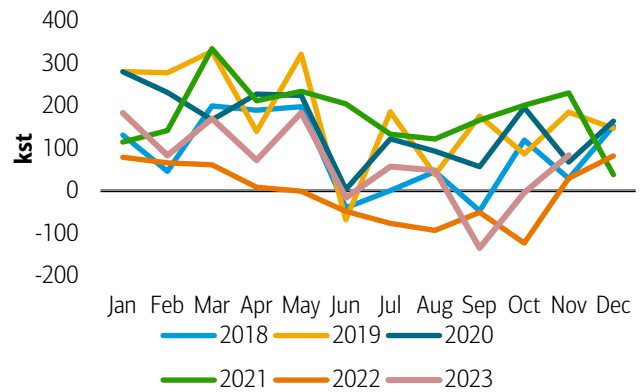


Source: TFI, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 51: US UAN net imports

UAN net imports are down sharply

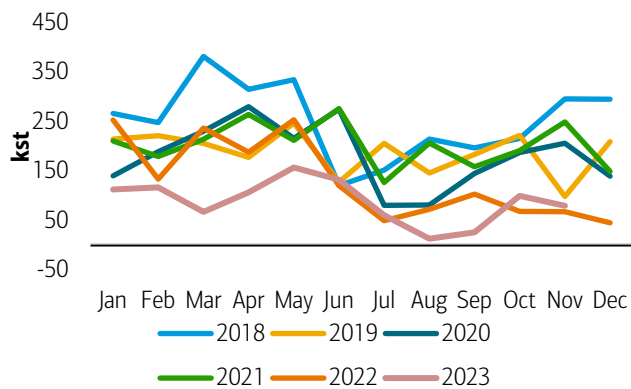


Source: TFI, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 52: US Ammonia net imports

The US is a net importer of ammonia all year



Source: TFI, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Potash**Exhibit 53: Potash pricing overview**

Potash fertilizer prices have continued to rise

| | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | | 1Q22 | 2Q22 | 3Q22 | 4Q22 | 1Q23 | 2Q23 | 3Q23 | 4Q23 |
|-----------------------------|------|------|-------|-------|-------|------|-------|-------|-------|------|------|------|------|------|------|
| Potash Prices | | | | | | | | | | | | | | | |
| Midwest Spot (\$/mt) | NM | NM | NM | NM | 761 | 466 | | NM | 861 | 808 | 684 | 503 | 496 | 427 | 440 |
| Brazil Spot (\$/mt) | 321 | 329 | 239 | 539 | 850 | 390 | | 877 | 1115 | 844 | 565 | 495 | 383 | 351 | 330 |
| Southeast Asia Spot (\$/mt) | 279 | 294 | 245 | 393 | 781 | 380 | | 656 | 929 | 873 | 664 | 494 | 397 | 309 | 318 |
| Vancouver Spot (\$/mt) | 281 | 295 | 230 | 432 | 795 | 381 | | 755 | 986 | 828 | 612 | 497 | 380 | 326 | 321 |
| China Contract (\$/mt) | 247 | 290 | 242 | 244 | 550 | 427 | | 432 | 590 | 590 | 590 | 590 | 503 | 307 | 307 |
| India Contract (\$/mt) | 257 | 288 | 248 | 293 | 573 | 428 | | 523 | 590 | 590 | 590 | 590 | 422 | 382 | 319 |
| | 11/2 | 11/9 | 11/16 | 11/23 | 11/30 | 12/7 | 12/14 | 12/21 | 12/28 | 1/4 | 1/11 | 1/18 | 1/25 | 2/1 | 2/8 |
| Potash Prices | | | | | | | | | | | | | | | |
| Midwest Spot (\$/mt) | 444 | 441 | 446 | 446 | 446 | 446 | 446 | 446 | 446 | 439 | 422 | 408 | 406 | 408 | 417 |
| Brazil Spot (\$/mt) | 343 | 343 | 338 | 333 | 333 | 315 | 308 | 295 | 295 | 295 | 295 | 295 | 295 | 295 | 295 |
| Southeast Asia Spot (\$/mt) | 315 | 320 | 320 | 320 | 320 | 320 | 320 | 320 | 320 | 320 | 320 | 315 | 315 | 310 | 308 |
| Vancouver Spot (\$/mt) | 282 | 287 | 284 | 286 | 286 | 286 | 284 | 287 | 287 | 287 | 288 | 283 | 283 | 278 | 277 |
| China Contract (\$/mt) | 307 | 307 | 307 | 307 | 307 | 307 | 307 | 307 | 307 | 307 | 307 | 307 | 307 | 307 | 307 |
| India Contract (\$/mt) | 319 | 319 | 319 | 319 | 319 | 319 | 319 | 319 | 319 | 319 | 319 | 319 | 319 | 319 | 319 |

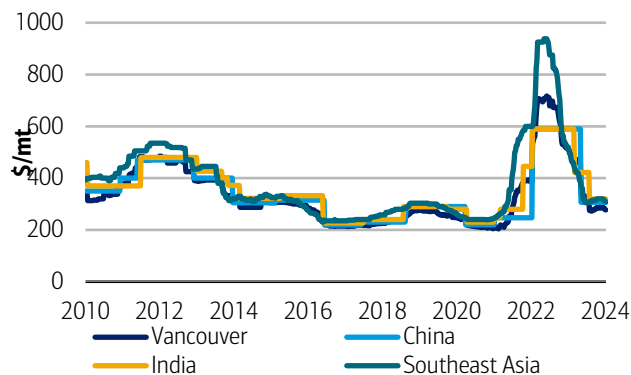
Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH



Exhibit 54: Global Standard Potash Prices (\$/mt)

Standard potash prices have fallen from their recent peaks but still remain elevated vs 2019 (pre-covid)

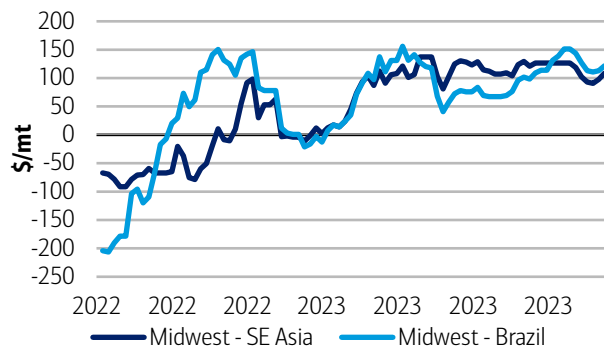


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 56: Potash Price Differentials (\$/mt)

US Midwest potash prices trade at a discount to global ones

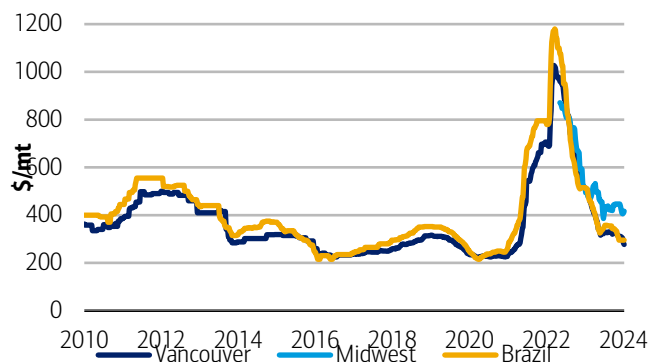


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 55: Global Granular Potash Prices (\$/mt)

Granular potash prices are off their highs

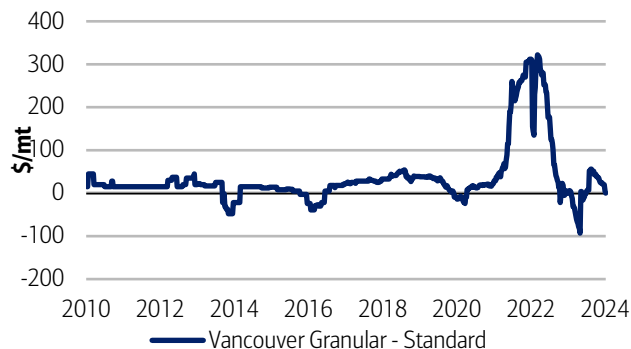


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 57: Granular Premium over Standard (\$/mt)

The granular premium over standard has recently reversed

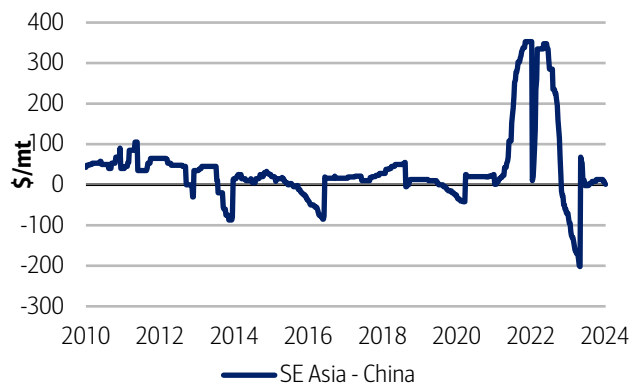


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 58: SE Asia Spot vs. China Contract (\$/mt)

SE Asia spot potash market is well above the contract price

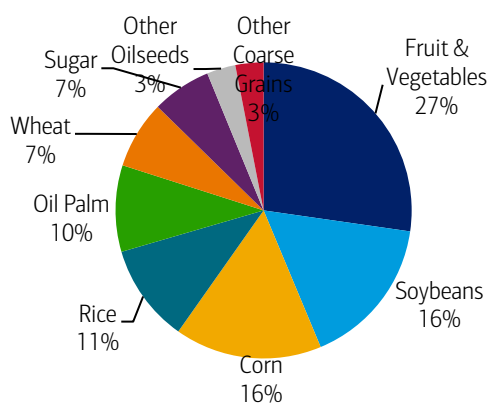


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 60: Global Potash Demand By Crop(2018)

Potash is used on all crops

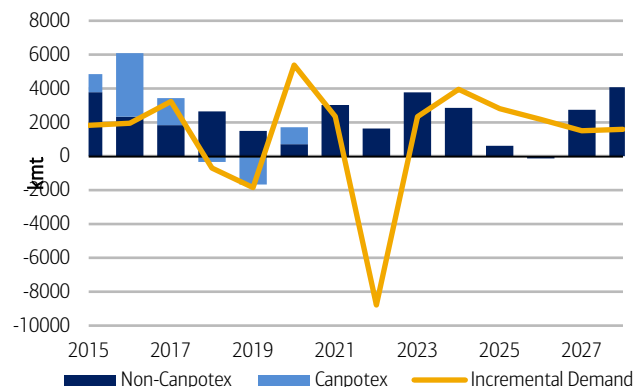


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 62: Global Capacity addition and demand growth

Most capacity additions were expected to come from Russia



Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 59: US NOLA vs. Brazil potash price spread

US NOLA urea price is now far below Brazil levels

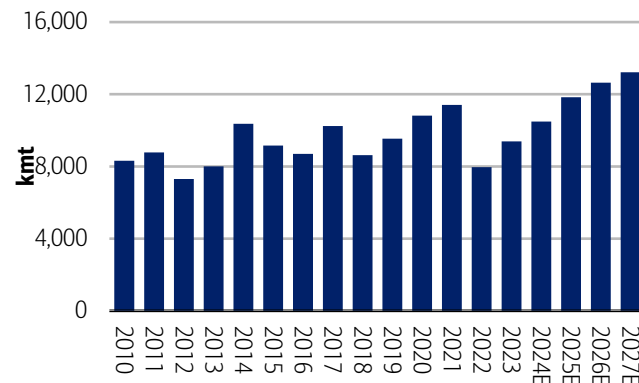


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 61: Russian Potash Exports (kmt)

Russia remains a large potash exporter

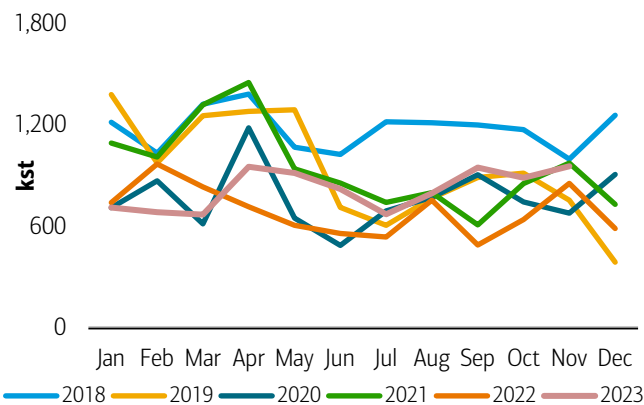


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 63: US MOP Net Imports

The US normally imports roughly 1mnt of potash per month

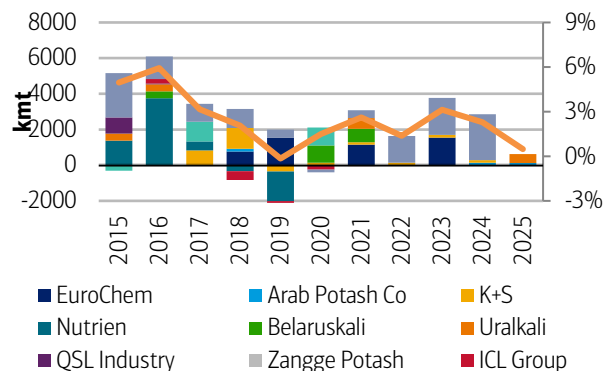


Source: TFI, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 64: Net Potash Capacity Addition by Company

Eurochem has significant Potash capacity to provide to the market

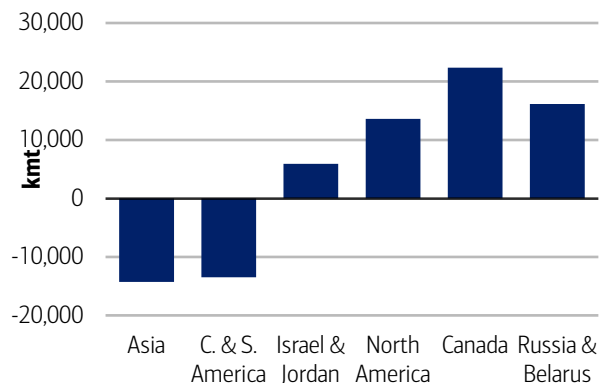


Source: CRU, BofA Global Research

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Exhibit 65: Global Potash Trade Flows

Canada & FSU are key potash supply regions



Source: CRU, BofA Global Research

BofA GLOBAL RESEARCH

Phosphate**Exhibit 66: Historical pricing data for phosphate fertilizer**

Phosphate pricing is four-fold higher than mid-2020 levels

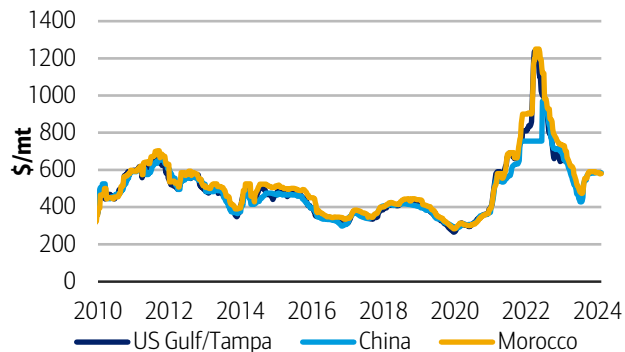
| | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | | 1Q22 | 2Q22 | 3Q22 | 4Q22 | 1Q23 | 2Q23 | 3Q23 | 4Q23 |
|--|------|------|-------|-------|-------|------|-------|-------|-------|------|------|------|------|------|------|
| Phosphate Prices | | | | | | | | | | | | | | | |
| DAP (US Midwest , \$/mt) | 471 | 402 | 385 | 706 | 912 | 692 | | 929 | 1000 | 889 | 830 | 740 | 743 | 622 | 664 |
| DAP (US Gulf/Tampa, \$/mt) | 419 | 344 | 324 | 644 | 894 | 560 | | 950 | 1115 | 838 | 674 | 644 | 546 | 501 | 550 |
| DAP - barge (New Orleans, \$/mt) | 435 | 338 | 345 | 667 | 845 | 605 | | 880 | 932 | 833 | 733 | 676 | 584 | 559 | 599 |
| DAP (China, \$/mt) | 435 | 338 | 345 | 667 | 845 | 605 | | 880 | 932 | 833 | 733 | 676 | 584 | 559 | 599 |
| DAP (Morocco, \$/mt) | 412 | 348 | 323 | 595 | 779 | 557 | | 755 | 805 | 846 | 709 | 636 | 503 | 507 | 583 |
| MAP (US Gulf/Tampa, \$/mt) | 429 | 361 | 324 | 656 | 964 | 589 | | 979 | 1203 | 918 | 759 | 685 | 557 | 524 | 589 |
| MAP - barge (New Orleans, \$/mt) | 418 | 344 | 323 | 659 | 898 | 552 | | 959 | 1114 | 845 | 674 | 641 | 525 | 497 | 546 |
| MAP (Morocco, \$/mt) | 444 | 340 | 356 | 706 | 869 | 633 | | 907 | 967 | 869 | 731 | 638 | 568 | 643 | 682 |
| MAP (Brazil, \$/mt) | 427 | 361 | 327 | 679 | 964 | 574 | | 1008 | 1195 | 935 | 720 | 668 | 553 | 514 | 562 |
| Feedstock Costs | | | | | | | | | | | | | | | |
| Phosphate Rock (N. Africa, FOB, \$/mt) | 190 | 190 | 190 | NM | NM | 254 | | NM | NM | NM | NM | 300 | 285 | 215 | 219 |
| Ammonia, (Tampa, CFR, \$/mt) | 312 | 247 | 233 | 604 | 1160 | 514 | | 1168 | 1272 | 1089 | 1110 | 744 | 369 | 343 | 598 |
| Sulphur, (Tampa, FOB, \$/mt) | 122 | 83 | 54 | 166 | 313 | 97 | | 297 | 481 | 362 | 110 | 124 | 107 | 59 | 98 |
| | 11/2 | 11/9 | 11/16 | 11/23 | 11/30 | 12/7 | 12/14 | 12/21 | 12/28 | 1/4 | 1/11 | 1/18 | 1/25 | 2/1 | 2/8 |
| Phosphate Prices | | | | | | | | | | | | | | | |
| DAP (US Midwest , \$/mt) | 661 | 650 | 650 | 650 | 650 | 694 | 694 | 678 | 678 | 714 | 758 | 742 | 742 | 742 | 742 |
| DAP (US Gulf/Tampa, \$/mt) | 550 | 550 | 550 | 550 | 550 | 550 | 560 | 560 | 560 | 560 | 560 | 560 | 560 | 560 | 560 |
| DAP - barge (New Orleans, \$/mt) | 588 | 582 | 590 | 601 | 599 | 615 | 623 | 623 | 623 | 643 | 665 | 659 | 657 | 648 | 648 |
| DAP (Morocco, \$/mt) | 590 | 590 | 590 | 590 | 590 | 590 | 585 | 585 | 585 | 585 | 585 | 578 | 580 | 580 | 580 |
| MAP (US Gulf/Tampa, \$/mt) | 545 | 545 | 545 | 545 | 545 | 545 | 560 | 560 | 560 | 560 | 560 | 560 | 560 | 560 | 560 |
| MAP - barge (New Orleans, \$/mt) | 692 | 698 | 659 | 650 | 661 | 665 | 672 | 678 | 678 | 689 | 694 | 694 | 689 | 694 | 683 |
| MAP (Morocco, \$/mt) | 545 | 548 | 573 | 578 | 578 | 578 | 578 | 578 | 578 | 578 | 578 | 578 | 578 | 578 | 578 |
| MAP (Brazil, \$/mt) | 555 | 558 | 560 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 560 | 560 |
| Feedstock Costs | | | | | | | | | | | | | | | |
| Phosphate Rock (N. Africa, FOB, \$/mt) | 215 | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 |
| Ammonia, (Tampa, CFR, \$/mt) | 625 | 625 | 625 | 625 | 625 | 625 | 625 | 525 | 525 | 525 | 525 | 525 | 445 | 445 | 445 |
| Sulphur, (Tampa, FOB, \$/mt) | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 69 | 69 | 69 | 69 | 69 |

Source: CRU, Bloomberg, BofA Global Research

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Exhibit 67: Global DAP Prices

DAP prices globally are up sharply

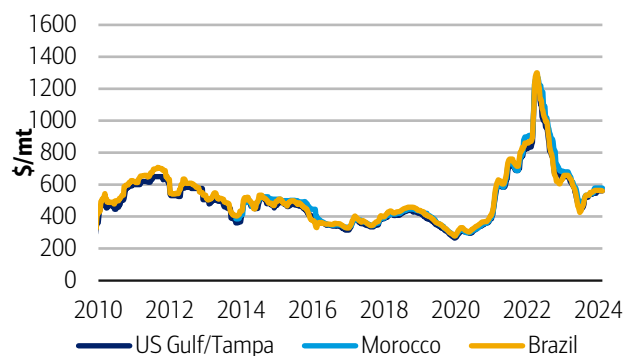


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 68: US MAP Prices (\$/mt)

Morocco currently has the highest MAP prices

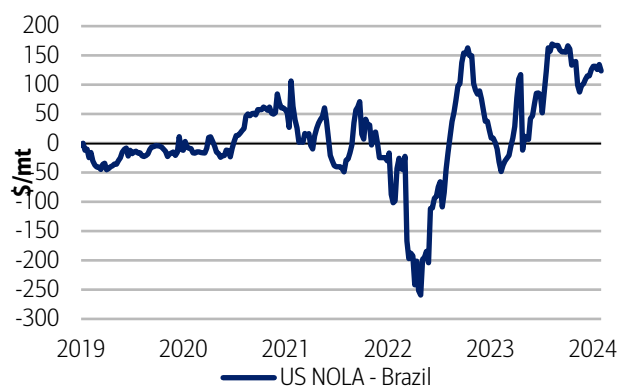


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 69: US NOLA vs Brazil phosphate price spread

US NOLA phosphate prices is above Brazil levels

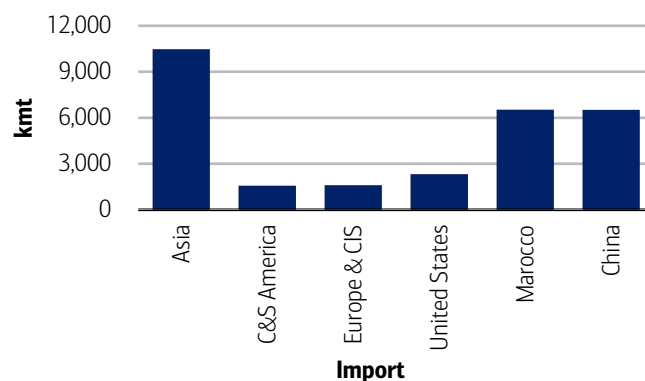


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 70: Global Phosphate Trade Flows 2023

China is the largest phosphate importer

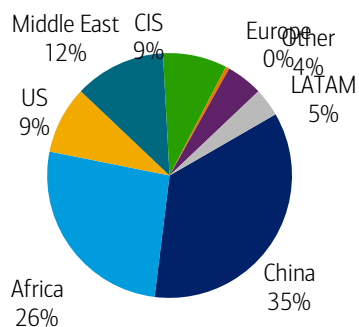


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 71: Phosphate Rock Production by Region

China is the largest phosphate rock supplier



Source: CRU, Bloomberg, BofA Global Research

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Disclosures

Important Disclosures

FUNDAMENTAL EQUITY OPINION KEY: Opinions include a Volatility Risk Rating, an Investment Rating and an Income Rating. **VOLATILITY RISK RATINGS**, indicators of potential price fluctuation, are: A - Low, B - Medium and C - High. **INVESTMENT RATINGS** reflect the analyst's assessment of both a stock's absolute total return potential as well as its attractiveness for investment relative to other stocks within its Coverage Cluster (defined below). Our investment ratings are: 1 - Buy stocks are expected to have a total return of at least 10% and are the most attractive stocks in the coverage cluster; 2 - Neutral stocks are expected to remain flat or increase in value and are less attractive than Buy rated stocks and 3 - Underperform stocks are the least attractive stocks in a coverage cluster. An investment rating of 6 (No Rating) indicates that a stock is no longer trading on the basis of fundamentals. Analysts assign investment ratings considering, among other things, the 0-12 month total return expectation for a stock and the firm's guidelines for ratings dispersions (shown in the table below). The current price objective for a stock should be referenced to better understand the total return expectation at any given time. The price objective reflects the analyst's view of the potential price appreciation (depreciation).

| Investment rating | Total return expectation (within 12-month period of date of initial rating) | Ratings dispersion guidelines for coverage cluster ^{R1} |
|-------------------|---|--|
| Buy | ≥ 10% | ≤ 70% |
| Neutral | ≥ 0% | ≤ 30% |
| Underperform | N/A | ≥ 20% |

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