

## Chemicals

## Chem Weekly: ADM/HUN updates, ALB capex cut, LYB acquisition, China fert data

Estimate Change

**ADM places CFO on leave, lowers 2023 outlook**

On Sunday 1/21, Archer Daniels Midland disclosed that company CFO and former Nutrition CFO Vikram Luthar has been placed in administrative leave, effective immediately. This is as ADM has undertaken an investigation “regarding certain accounting practices and procedures” concerning the Nutrition segment, “including as related to certain intersegment transactions”. ADM has appointed Ismael Roig, President of EMEA and Animal Nutrition, as Interim CFO. Given this investigation, the company will delay its 4Q earnings release and the filing of its 10K.

ADM also noted that it expects its 2023 EPS to be over \$6.90 vs the \$7+ communicated previously. Earnings for the AS&O and Carbohydrate Solutions segments are expected to be in-line with the prior outlook, but the ~\$600mn Nutrition guide has been withdrawn. We view this update negatively given the 2023 consensus stands at \$7.27. We have updated our 4Q23E EPS to \$1.48 from \$1.67 previously, for full-year earnings of \$7.10. Our estimate reflects lower Nutrition earnings (especially since we had viewed the prior \$600mn outlook as tough to achieve) and reduced Carbohydrate Solutions profitability as we previously modeled earnings ahead of ADM’s outlook. We also slightly trim our 2024E EPS to \$6.00 from \$6.05. Our estimate changes do not result in a move for our \$85 PO. We maintain our Neutral rating as we balance this recent negative development and slightly lower EPS forecasts with attractive valuation.

**Huntsman guides down 4Q23 outlook**

On Friday 1/19, HUN disclosed that it now expects its 4Q23 EBITDA to come in at \$40-45mn vs \$65-90mn previously – well below Street (\$77mn) and our (\$87mn) estimates. The main culprit is the Polyurethanes segment, which was impacted by an unplanned outage at the Rotterdam, NL MDI plant and lower equity earnings (potentially due to deteriorating PO/MTBE profitability). As such we have trimmed our 4Q23E EBITDA to \$45mn; our 2024E EBITDA is also lowered to \$654mmn from \$667mn, although our PO (at 9x 2024E EBITDA) remains at \$28 and we remain Buy-rated.

**Albemarle cuts lithium capex, we suspect also op rates**

Albemarle announced last Wednesday (1/17) that they were lowering '24 capex to \$1.6-1.8bn from \$2.1bn in '23 and reduce costs by \$95mn annually through workforce cuts and decreased contracted services, driven by the sharp decline in spot lithium prices. ALB is prioritizing near-completion projects over longer term projects, which could reverse when the lithium market tightens. We expect the company (and others) will slow operating rates near-term to deplete excess inventory in China’s non-integrated supply chain. Benchmark Minerals hosted a Sustainable Lithium call last week, which highlighted their expectation of a significant lithium supply deficit in the next 3-6 years, particularly if projects with limited visibility are excluded (as defined by Benchmark, see Exhibits 1 and 2). The general view from our Lithium Conference last month ([here for takeaways](#)) is that the top quartile of the cost curve is loss-making, and thus a price inflection is likely this year – we remain Neutral. **Six lithium companies are participating in our Global Ag & Materials Conference in Florida on Feb 28-29.**

22 January 2024

Equity  
United States  
Chemicals

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Acronyms:

MDI: Methylene diphenyl diisocyanate

PO: Propylene oxide

MTBE: Methyl tert-butyl ether

PP: Polypropylene

PDH: Propane dehydrogenation

MAP: Monoammonium phosphate

DAP: Diammonium phosphate

EMEA: Europe, Middle East, and Africa

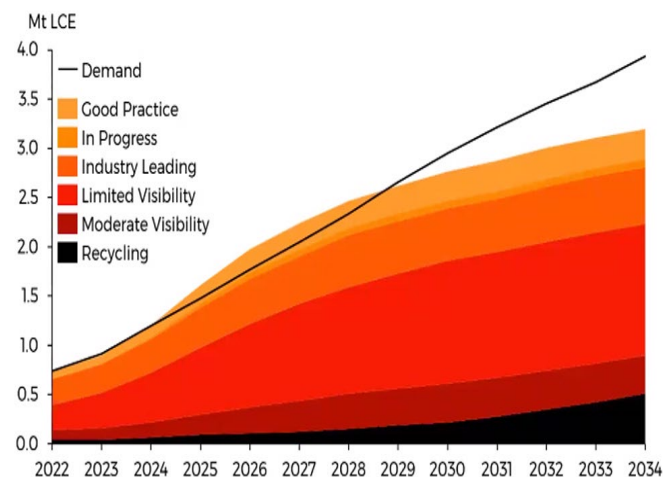
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Timestamp: 22 January 2024 05:06AM EST

### Exhibit 1: Forecasted global mined lithium production by Benchmark ESG Tier

Benchmark predicts a supply deficit occurring in 2029

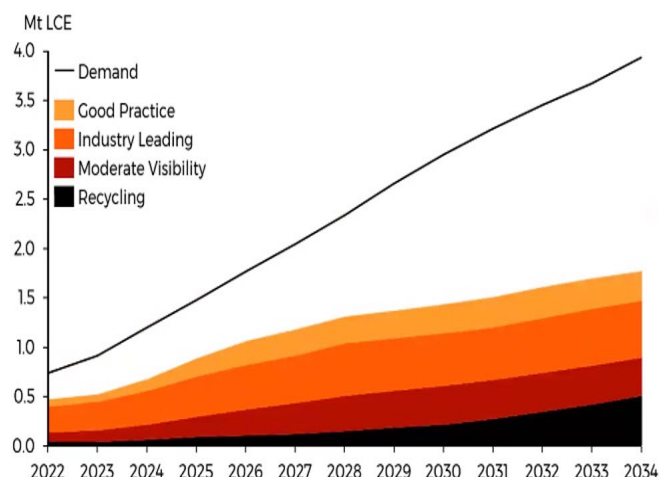


Source: Benchmark

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### Exhibit 2: Forecasted global mined lithium production by Benchmark ESG Tier

Excluding Limited Visibility tiered projects we are already in a supply deficit



Source: Benchmark

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## LyondellBasell acquires stake in Saudi PP producer

On 1/16, LYB disclosed that it reached an agreement to acquire a 35% stake in Saudi Arabian petrochemical company NATPET for ~\$500mn. NATPET owns a 400ktpa polypropylene plant in Western Saudi Arabia based on LYB's Spheripol technology, and is backwards integrated to a PDH unit. The transaction should increase LYB's pro rata Saudi Arabian PP capacity by ~45%. Additionally, LYB and NATPET's controlling shareholder Alujain Corporation will study the construction of a second PP and PDH facility in the site. While the expansion into Middle Eastern petrochemical production will certainly provide LYB with cost-advantaged capacity, we are skeptical of the PP margin outlook over the next few years given very low operating rates globally and continued Chinese supply growth. We reiterate our Neutral on LYB.

## Chinese fertilizer data for 2023

China reported its full-year fertilizer trade statistics on 1/18. Urea exports reached a surprisingly high 4.25mn metric tons, +50% y/y. Prior estimates we saw a couple of months ago pointed to exports below 4mn, given that in early November the Chinese government imposed another round of export restrictions for urea that was expected to bring sales to a halt. Yet the ~340kmt of exported urea in December was largely tied to an October import tender. Additionally, ~30% of the entire year's exported volume traded in September (~1.2mn tonnes), tied to the massive August India tender. Looking ahead, CRU expects urea exports to be largely halted in January and February.

MAP/DAP exports hit ~7.1mn in 2023, up around 30% y/y, largely as expected. Similarly to urea, China has re-imposed strict export restrictions, and CRU doesn't expect substantial export volumes for the first two months of 2024. Shifting to potash, imports easily broke prior records, increasing by 47% y/y and hitting 11.7mn tonnes. Over the past decade annual imports have typically been in the range of 7-9mn tonnes. Starting strong in early-2023 due to increased volumes from Belarus and Laos, Chinese imports continued unabated in the latest part of the year despite an inventory build, as Canpotex was also added to the mix. What remains to be seen now is whether China indeed requires a structurally higher level of potash imports going forward, or if these will revert to normalized levels in 2024.

## 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
<b>Integrated PE Margins</b>														
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
<b>Polyethylene Prices</b>														
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
<b>Ethylene Prices</b>														
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
<b>Ethylene Cash Costs</b>														
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
<b>Feedstock Dynamics</b>														
US Ethane (c/gal)	33	21	19	31	48	24	40	58	54	38	25	21	29	22
US Propane (c/gal)	88	54	47	105	111	71	133	125	106	80	82	67	70	67
US Butane (c/gal)	91	59	53	118	124	80	159	132	108	96	107	63	63	87
Brent Oil (\$/bbl)	72	64	44	71	99	82	97	112	99	89	83	78	85	84
<b>Isocyanates</b>														
US MDI (c/lb)	184	158	142	189	218	171	221	231	223	199	185	175	164	160
US TDI (c/lb)	161	156	223	267	235	263	228	225	226	260	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	114	155	136	103	136	81	81	86	165	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)	82	119	194	165	85	101	84	79	73	105	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

	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21	12/28	1/4	1/11	1/18
<b>Integrated PE Margins</b>															
US Ethane	28	29	30	30	30	31	32	32	27	28	28	28	26	24	24
EU Naphtha	33	33	33	32	32	32	32	32	25	25	25	25	23	23	23
China Naphtha	-11	-11	-13	-11	-10	-12	-12	-13	-14	-14	-18	-17	-14	-12	-14
<b>Polyethylene Prices</b>															
HDPE Net Transaction (NA c/lb)	56	56	56	56	56	56	56	56	51	51	51	51	49	49	49
HDPE Discounted Contract (EU c/lb)	76	76	76	75	75	75	75	75	74	74	74	74	74	74	74
HDPE Spot (Asia c/lb)	43	43	42	42	42	40	40	40	40	40	40	40	40	41	41
<b>Ethylene Prices</b>															
Ethylene (US Gulf c/lb)	23	23	22	22	21	19	21	21	20	19	18	18	19	20	20

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

US ethane margins are currently higher than EU naphtha PE margins

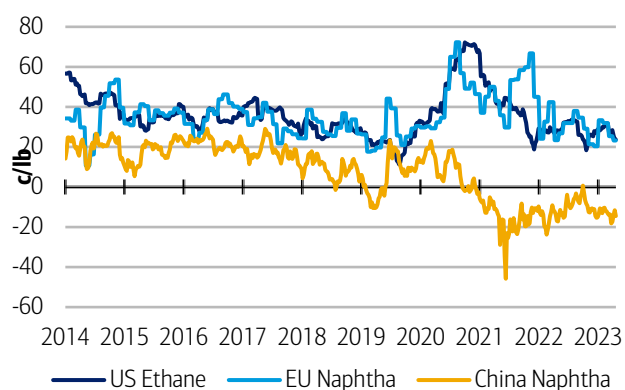
	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21	12/28	1/4	1/11	1/18
Ethylene (EU c/lb)	36	36	36	34	34	34	34	34	34	34	34	34	39	39	39
Ethylene (SE Asia c/lb)	41	42	43	43	43	43	43	43	43	41	41	41	41	40	40
<b>Ethylene Cash Costs</b>															
US Ethane (c/lb)	15	14	13	13	13	12	11	11	11	10	10	10	10	12	12
US Propane (c/lb)	17	17	14	14	12	11	16	16	19	17	16	18	19	19	24
US Naphtha (c/lb)	42	42	41	39	36	36	39	40	40	36	38	38	37	37	37
EU Naphtha (c/lb)	29	29	29	30	30	30	30	30	35	35	35	35	38	38	38
Asia Naphtha (c/lb)	44	45	46	44	44	44	44	46	47	46	51	50	47	42	44
US Butane (c/lb)	15	15	13	15	14	15	20	21	28	30	28	29	28	25	27
<b>Feedstock Dynamics</b>															
US Ethane (c/gal)	29	26	25	26	23	21	21	21	17	20	17	18	21	24	19
US Propane (c/gal)	71	68	66	64	63	64	64	71	69	64	66	70	70	82	88
US Butane (c/gal)	75	78	79	82	84	85	83	96	104	99	96	101	93	96	102
Brent Oil (\$/bbl)	85	91	92	90	85	81	81	81	79	76	77	79	77	79	78
<b>Isocyanates</b>															
US MDI (c/lb)	163	163	160	160	160	160	160	160	160	160	160	160	160	160	160
US TDI (c/lb)	254	254	254	254	254	254	249	249	249	249	249	249	249	244	244
EU MDI (Eur c/lb)	101	99	99	99	100	109	109	110	108	110	110	111	111	111	112
EU TDI (Eur c/lb)	102	104	104	104	106	108	108	110	108	104	106	106	105	106	104
China MDI (c/lb)	82	78	78	81	81	82	81	81	81	81	81	81	81	81	81
China TDI (c/lb)	91	95	95	95	95	87	87	87	87	87	87	87	87	87	87

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

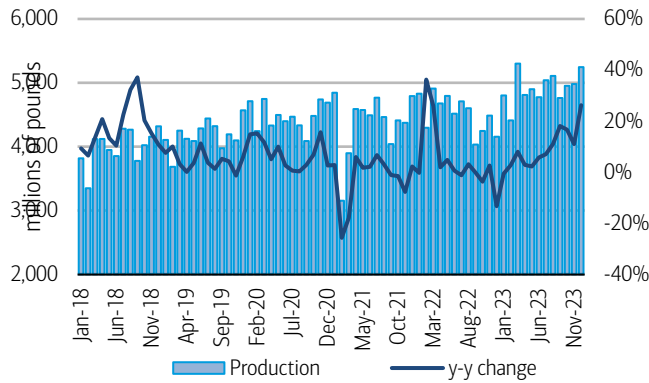


Source: OPIS, Bloomberg, BofA Global Research

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**Exhibit 7: US polyethylene production**

Production is accelerating with new capacity

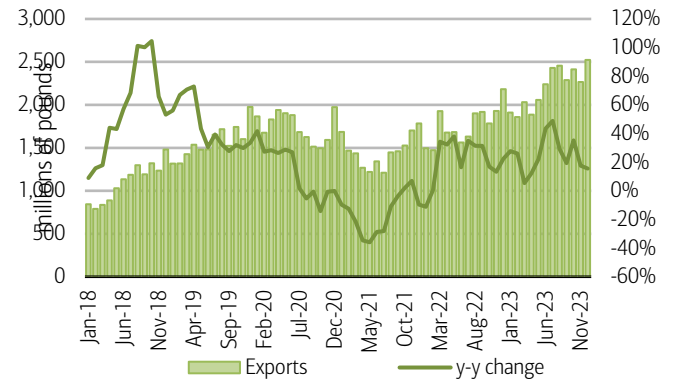


Source: American Chemistry Council, BofA Global Research

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**Exhibit 8: US polyethylene exports**

Exports have improved more recently

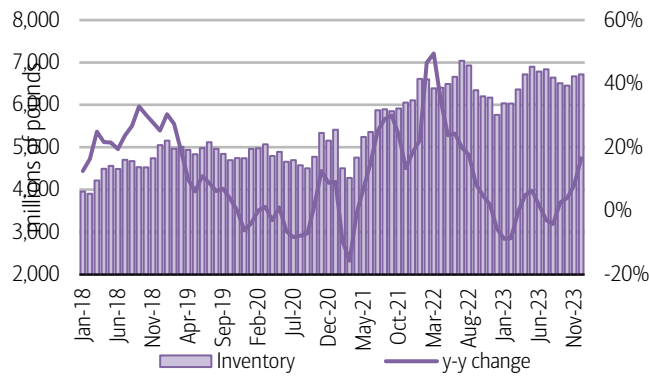


Source: American Chemistry Council, BofA Global Research

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**Exhibit 9: US polyethylene inventory**

Inventories remain elevated, returning to near peak levels

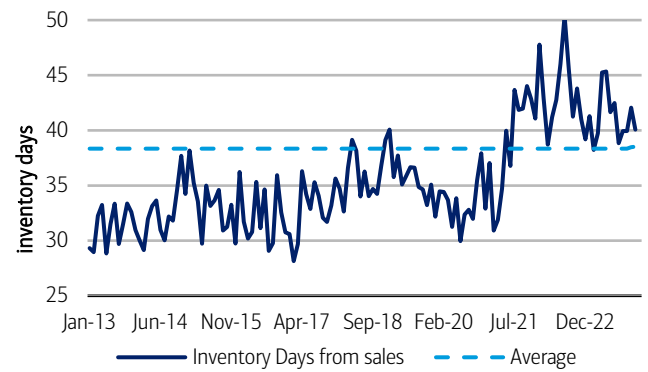


Source: American Chemistry Council, BofA Global Research

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**Exhibit 10: US polyethylene days of sales in inventory**

Days of sales in inventory are above normal

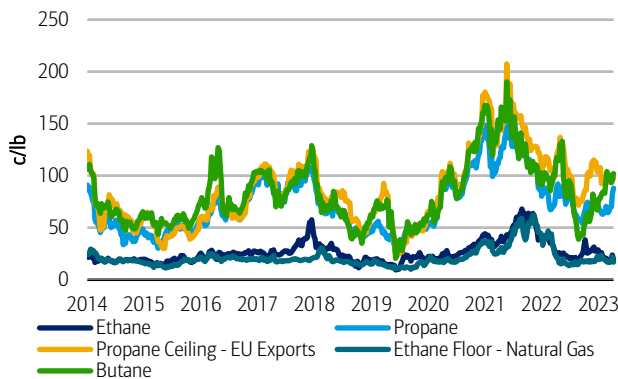


Source: American Chemistry Council, BofA Global Research

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**Exhibit 11: US NGL Dynamics (c/lb)**

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

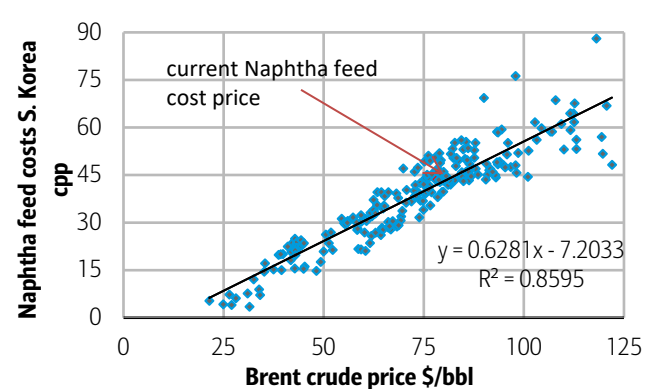


Source: OPIS, Bloomberg, BofA Global Research

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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

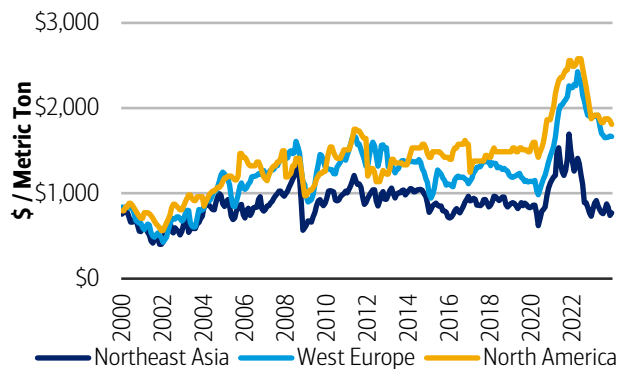


Source: OPIS, Bloomberg, BofA Global Research

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**Exhibit 13: PVC prices (\$/mt)**

PVC prices moving off of multi-decade highs

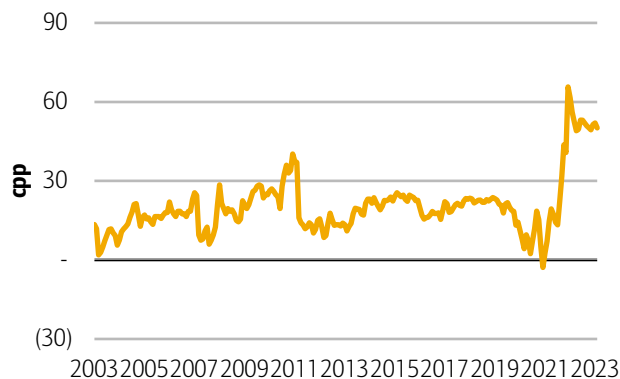


Source: OPIS, Bloomberg, BofA Global Research

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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

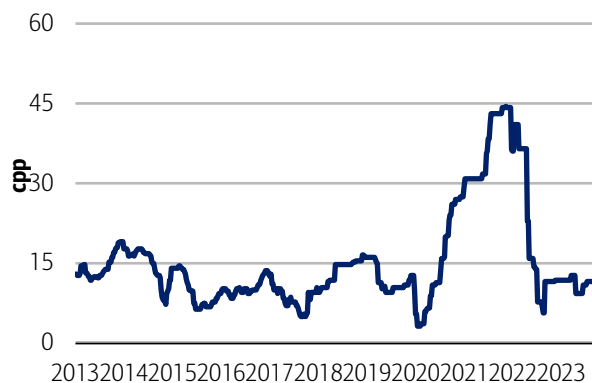


Source: OPIS, Bloomberg, BofA Global Research Estimates

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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

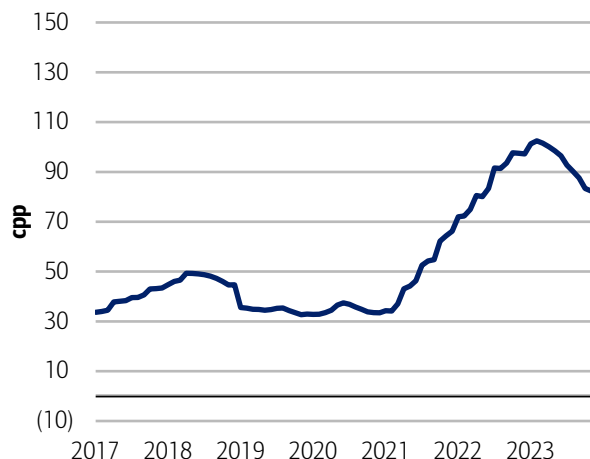


Source: Bloomberg

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**Exhibit 18: US ECU Cash Margins**

Cash margins remain high as cost deflation offset softer contract caustic

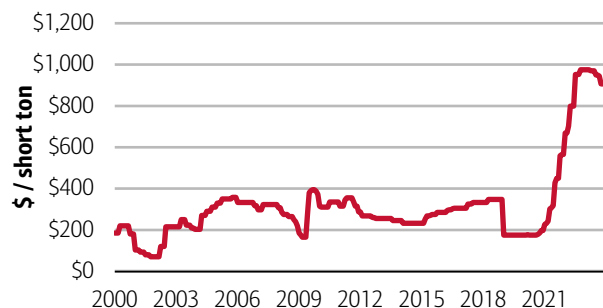


Source: Bloomberg, OPIS

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**Exhibit 19: US chlorine price**

Chlorine prices have moved higher on initiatives by Olin

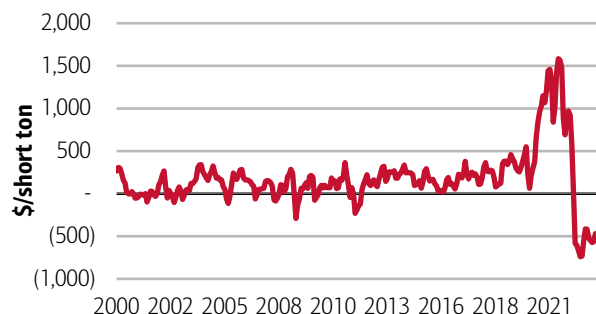


Source: OPIS

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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

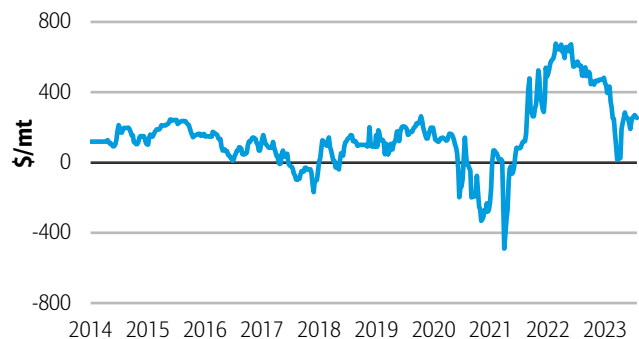


Source: OPIS, BofA Global Research

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**Exhibit 21: US acetic acid spread to China**

US acetic acid spread to china is near to zero

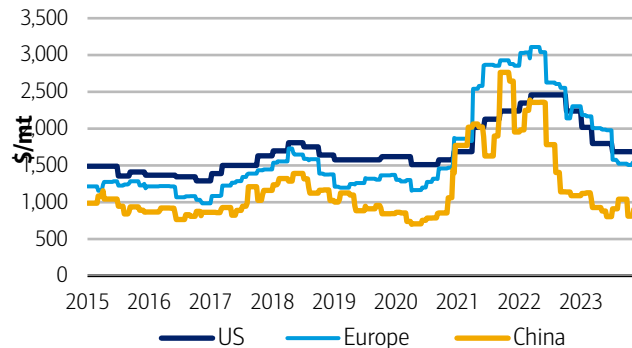


Source: Bloomberg, BofA Global Research

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**Exhibit 22: Global VAM contract prices**

US &amp; European VAM prices remain bid

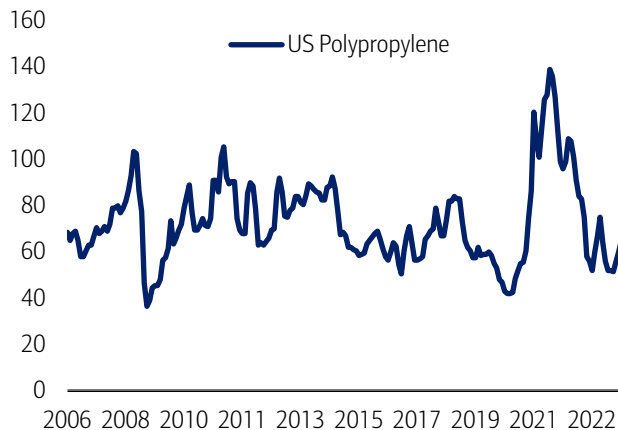


Source: Bloomberg

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**Exhibit 23: US Polypropylene price**

Polypropylene prices have retraced sharply

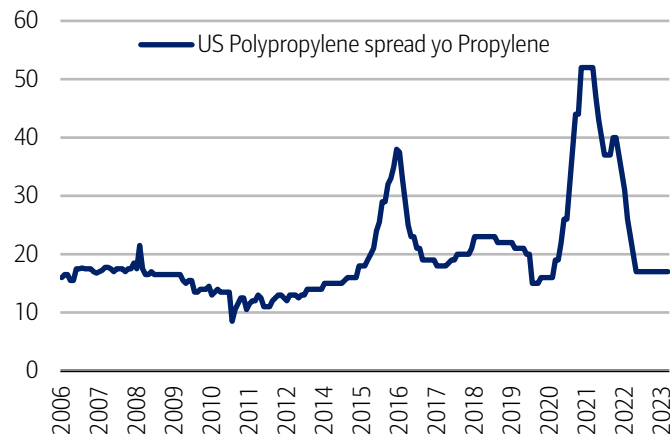


Source: OPIS

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**Exhibit 24: Polypropylene spread to propylene**

PP spread to monomer would seem to have more downside

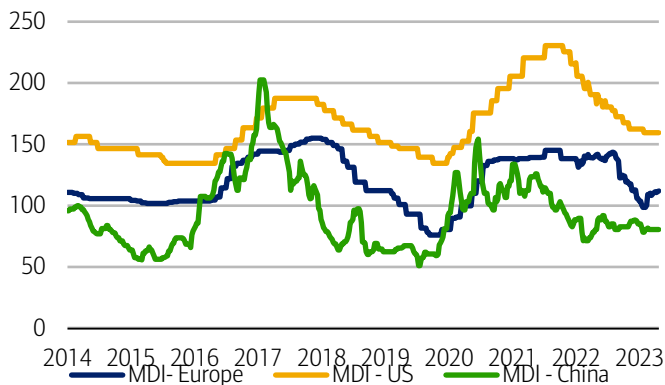


Source: OPIS and BofA Global Research

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**Exhibit 25: Global polymeric MDI price deck**

US remains at a healthy premium to global markets

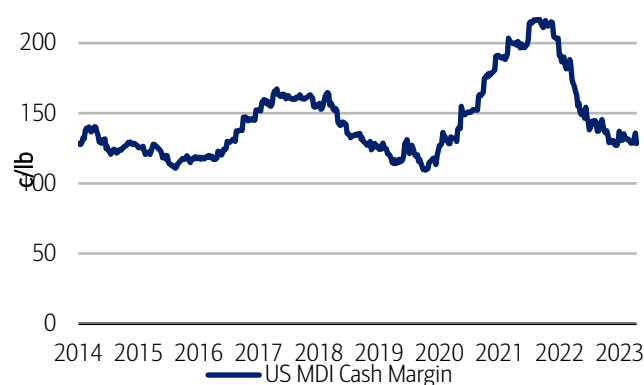


Source: ICIS

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**Exhibit 26: US Polymeric MDI spread over raw material costs**

US margins are off peak, but still at healthy levels



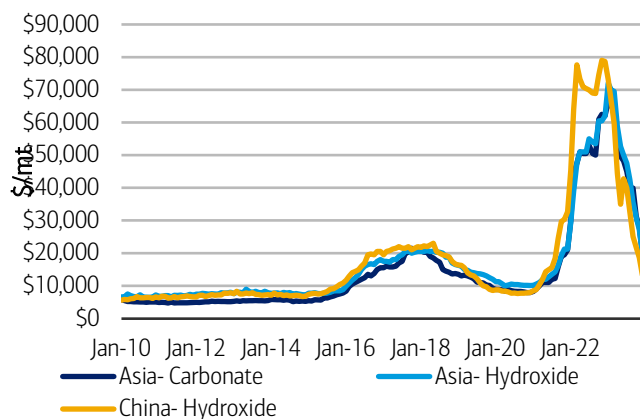
Source: ICIS, OPIS, BofA Global Research Estimates

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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

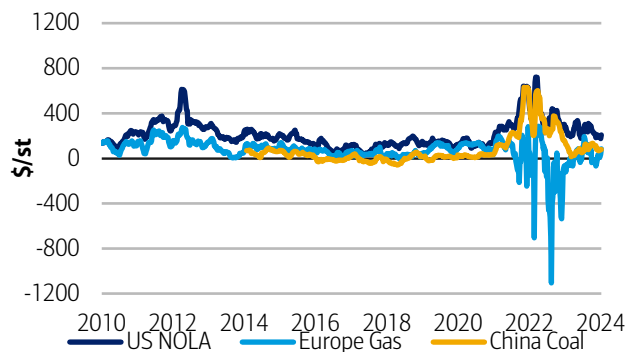
	2018	2019	2020	2021	2022	2023		1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23
Nitrogen Prices															
Urea granular (US NOLA \$/st)	259	244	228	492	601	354		677	613	591	522	342	367	374	334
Urea granular (US Midwest \$/st)	297	302	272	535	667	434		752	679	633	604	421	466	428	422
Urea granular (Mediterranean \$/st)	265	252	238	510	687	364		800	703	682	562	386	317	393	359
Urea granular (SE Asia \$/st)	266	255	240	503	629	352		727	687	570	532	366	325	369	349
Ammonia (US Midwest \$/st)	415	403	328	759	1276	630		1382	1394	1086	1240	834	466	517	703
UAN (US Midwest \$/st)	211	202	160	372	561	300		601	614	482	546	351	285	268	294
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
	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21	12/28	1/4	1/11	1/18
Nitrogen Prices															
Urea granular (US NOLA \$/st)	376	359	350	355	343	328	299	304	319	302	300	300	304	302	318
Urea granular (US Midwest \$/st)	450	443	410	413	425	425	425	425	398	385	398	398	380	380	385
Urea granular (Mediterranean \$/st)	406	395	399	379	374	363	340	332	321	329	312	312	322	327	347
Urea granular (SE Asia \$/st)	395	383	363	363	363	363	327	322	329	311	315	315	315	315	324
Ammonia (US Midwest \$/st)	713	713	750	750	730	730	738	738	738	610	610	610	610	600	600
UAN (US Midwest \$/st)	297	297	297	297	297	297	297	297	287	287	287	287	275	275	268
Feedstock Costs															
Natural Gas (US HH \$/mmbtu)	3.24	2.90	3.16	3.52	3.03	2.96	2.86	2.81	2.58	2.49	2.61	2.51	2.89	3.31	2.62
Natural Gas (UK ICE \$/mmbtu)	11.56	16.60	15.35	15.25	15.17	14.40	14.17	15.10	13.94	12.18	10.47	10.84	10.27	11.07	10.19
Anthracite coal (China \$/mt)	176	172	165	164	164	163	164	161	159	157	157	156	155	154	151

Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

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

European urea margins are negative

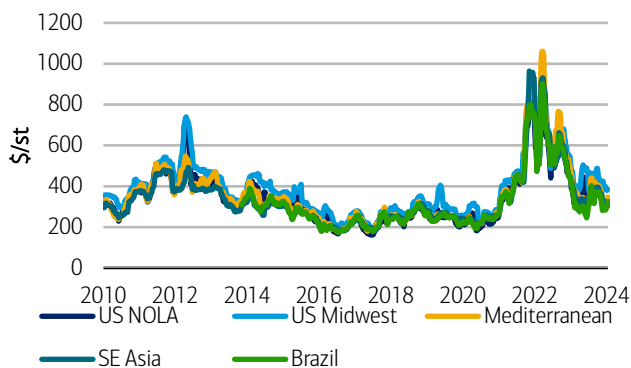


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

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

Prices have come off their recent highs

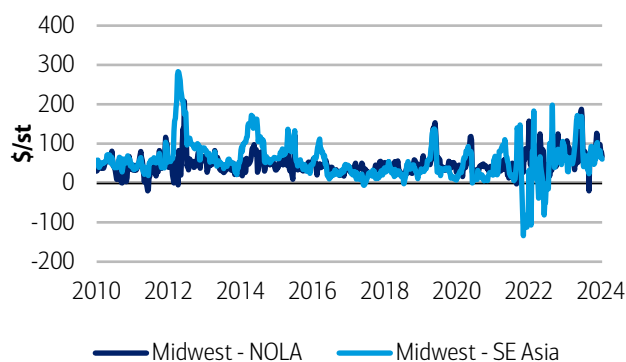


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

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

US Midwest urea prices are above NOLA import price

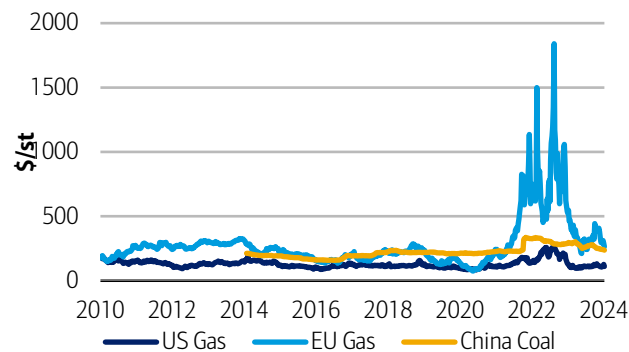


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

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

US gas costs at bottom of cost curve

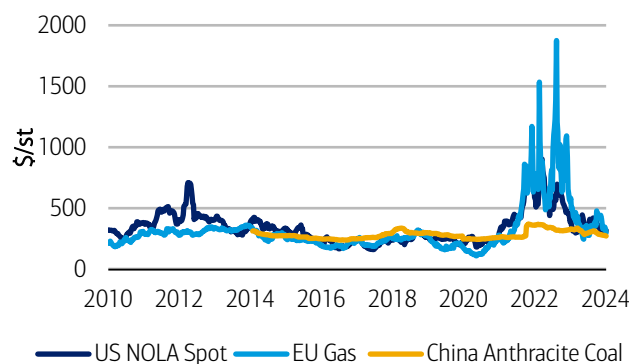


Source: CRU, Bloomberg, BofA Global Research

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

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

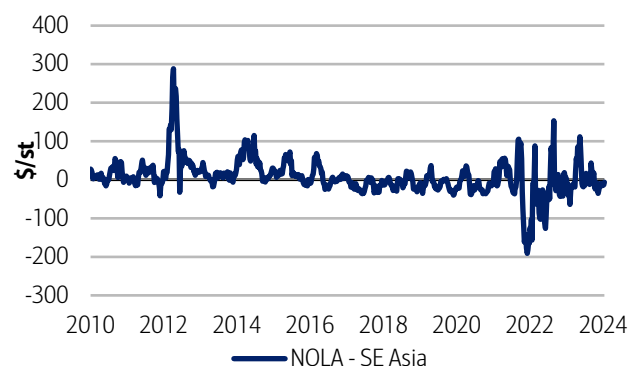


Source: CRU, Bloomberg, BofA Global Research

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

US NOLA urea price is below Asia prices

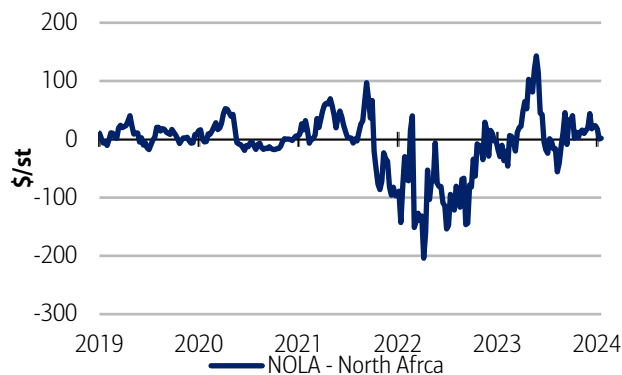


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

**Exhibit 36: US NOLA - North Africa Urea Price (\$/st)**

US NOLA urea price is now above North Africa prices

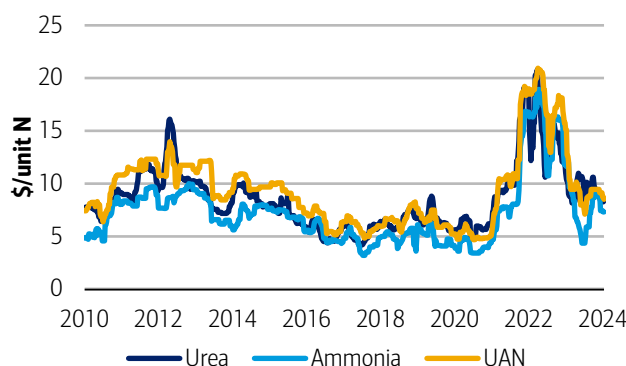


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

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

Midwest UAN prices have surpassed urea on a unit N basis

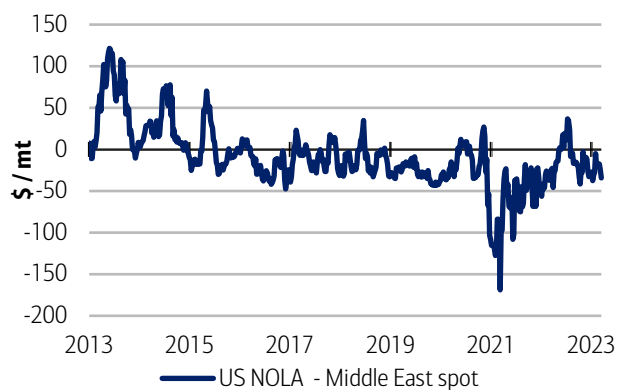


Source: CRU, Bloomberg, BofA Global Research

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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

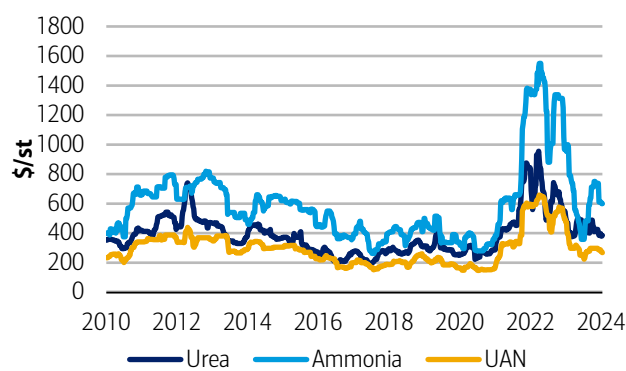


Source: CRU, BofA Global Research

BofA GLOBAL RESEARCH

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

All nitrogen fertilizer products have increased sharply

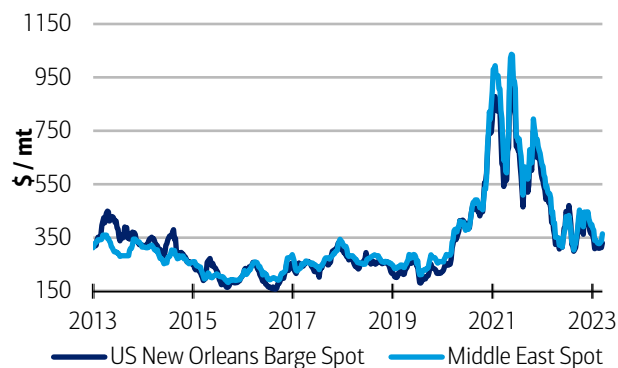


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

**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)

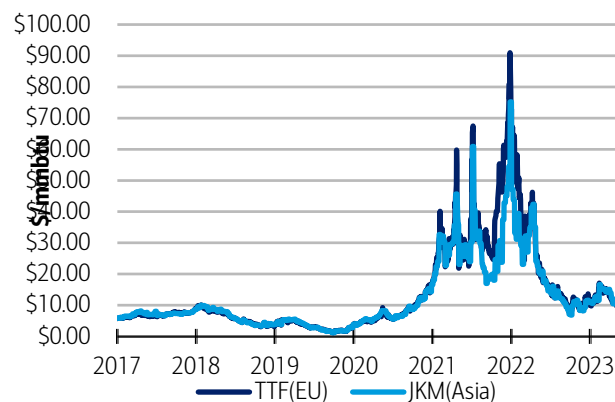


Source: CRU, BofA Global Research

BofA GLOBAL RESEARCH

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

Asian nat gas prices are well below EU prices

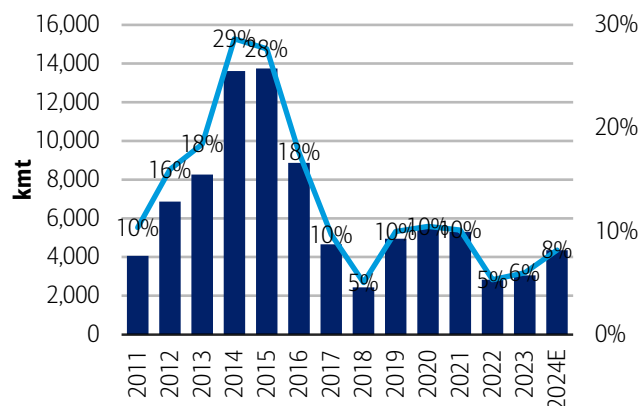


Source: Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

**Exhibit 42: Chinese Urea Exports & % of World Total**

Chinese urea exports are well below prior peak levels

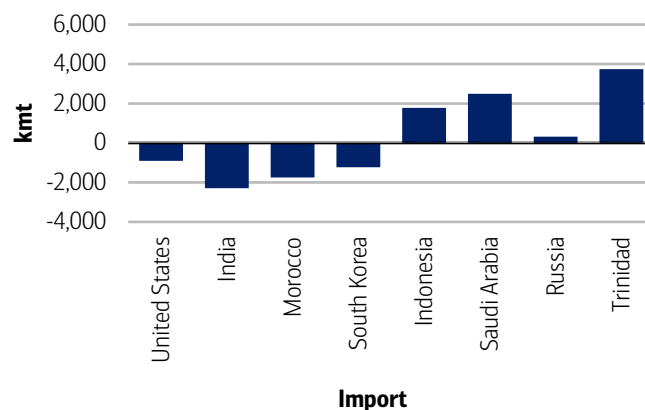


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

**Exhibit 43: Global NH3 Trade Balance 2023**

Trinidad is the largest ammonia exporter

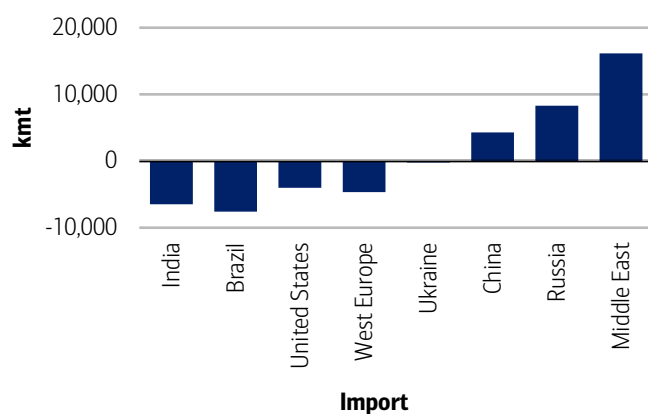


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

**Exhibit 44: Global Urea Trade Balance 2023**

Middle East is the largest urea exporter

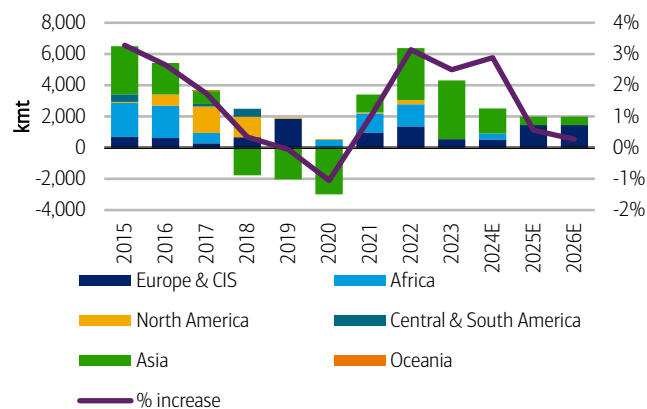


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

**Exhibit 45: Global Urea Capacity additions by region**

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

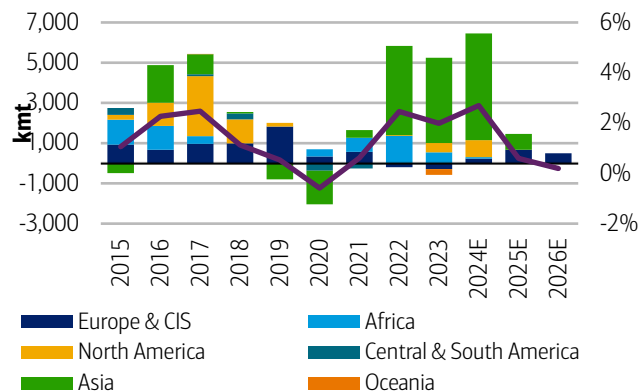


Source: BofA Global Research

BofA GLOBAL RESEARCH

**Exhibit 46: Global NH3 Capacity additions by region**

New global ammonia coming in 2022

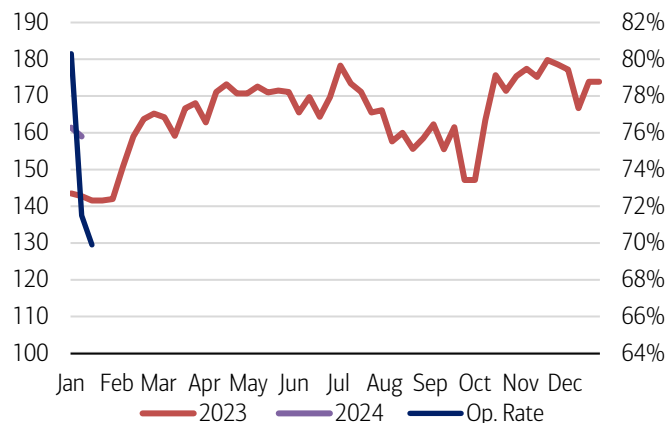


Source: CRU, BofA Global Research

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

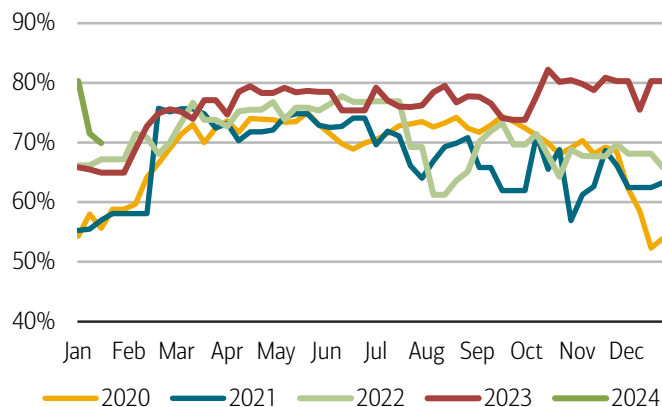


Source: CFMW, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

**Exhibit 49: Chinese Urea Operating Rates**

Operating rates have collapsed recently

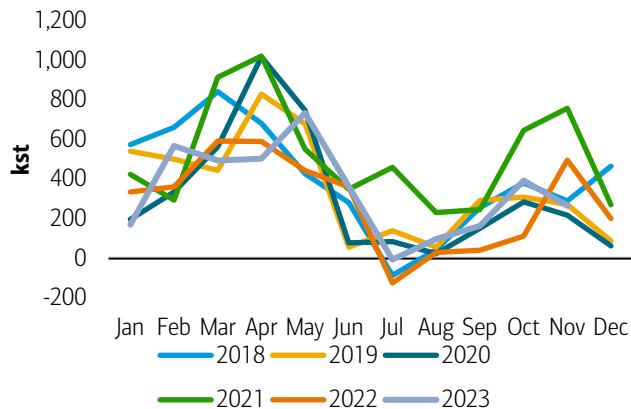


Source: CFMW, Bloomberg, BofA Global Research

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**Exhibit 50: US Urea Net Imports (kst)**

Net imports running at low levels year-to-date

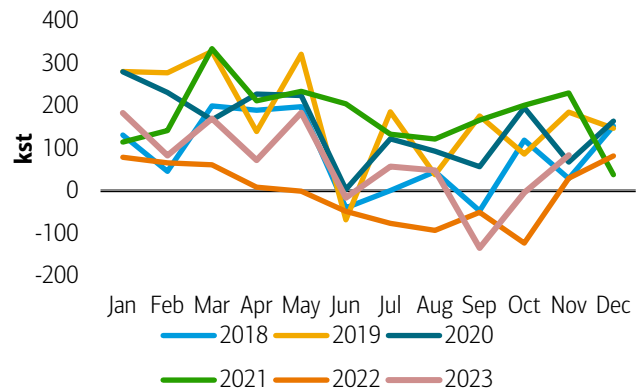


Source: TFI, Bloomberg, BofA Global Research

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**Exhibit 51: US UAN net imports**

UAN net imports are down sharply

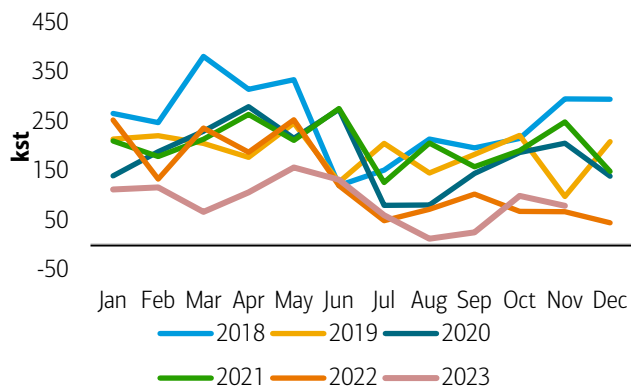


Source: TFI, Bloomberg, BofA Global Research

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**Exhibit 52: US Ammonia net imports**

The US is a net importer of ammonia all year



Source: TFI, Bloomberg, BofA Global Research

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**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)	311	333	282	569	799	466		830	875	808	684	503	495	427	439
Brazil Spot (\$/mt)	321	329	239	539	850	391		877	1115	844	565	495	383	351	335
Southeast Asia Spot (\$/mt)	279	293	245	393	781	380		656	929	873	664	494	397	309	318
Vancouver Spot (\$/mt)	281	295	229	432	795	381		755	985	828	611	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
	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21	12/28	1/4	1/11	1/18
Potash Prices															
Midwest Spot (\$/mt)	424	419	438	444	441	446	446	446	446	446	446	446	438	422	408
Brazil Spot (\$/mt)	355	343	343	343	343	338	333	333	325	315	315	315	315	308	295
Southeast Asia Spot (\$/mt)	315	315	315	315	320	320	320	320	320	320	320	320	320	320	315
Vancouver Spot (\$/mt)	278	277	281	282	287	284	286	286	286	284	287	287	287	288	283
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

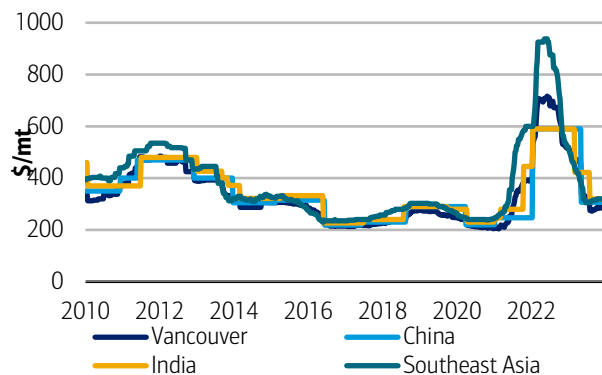
Source: CRU, Bloomberg, BofA Global Research

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)

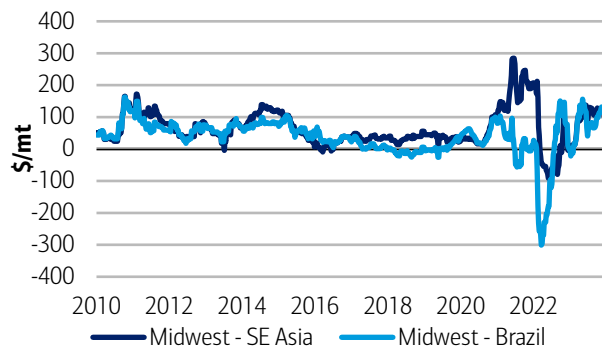


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

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

US Midwest potash prices trade at a discount to global ones

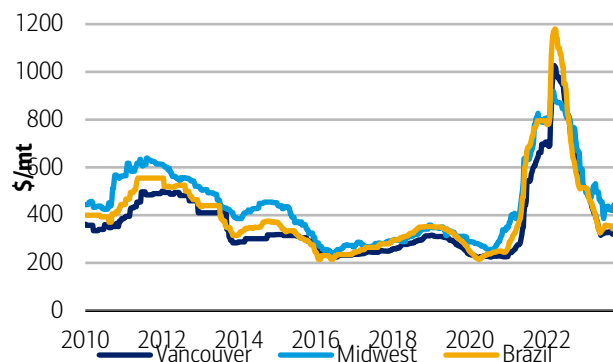


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

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

Granular potash prices are off their highs

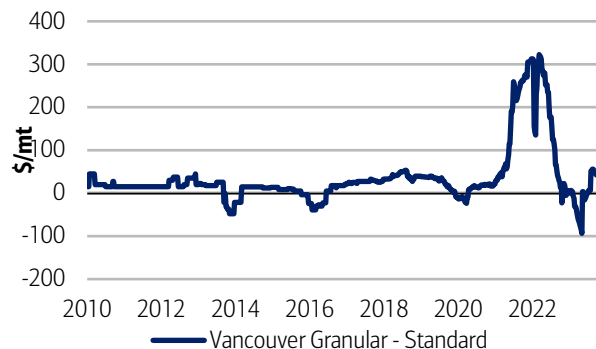


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

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

The granular premium over standard has recently reversed

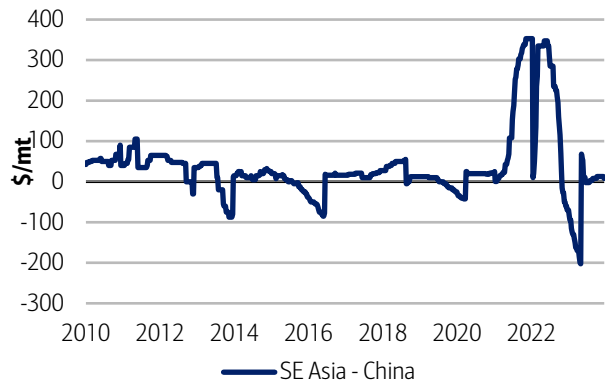


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

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

SE Asia spot potash market is well above the contract price

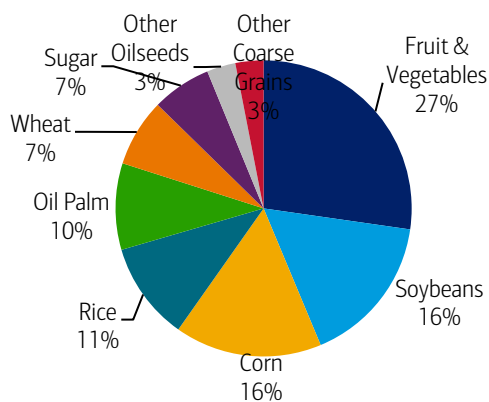


Source: CRU, Bloomberg, BofA Global Research

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**Exhibit 60: Global Potash Demand By Crop(2018)**

Potash is used on all crops

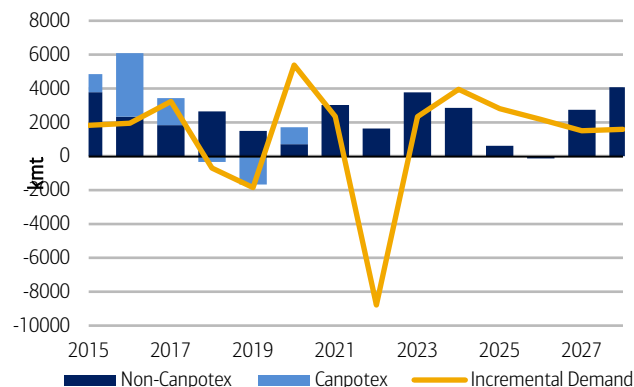


Source: CRU, Bloomberg, BofA Global Research

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**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

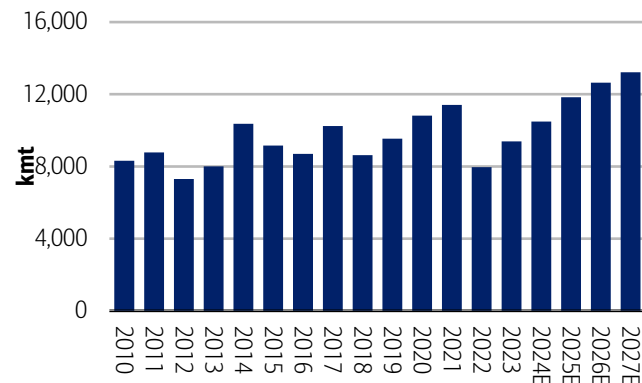


Source: CRU, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

**Exhibit 61: Russian Potash Exports (kmt)**

Russia remains a large potash exporter

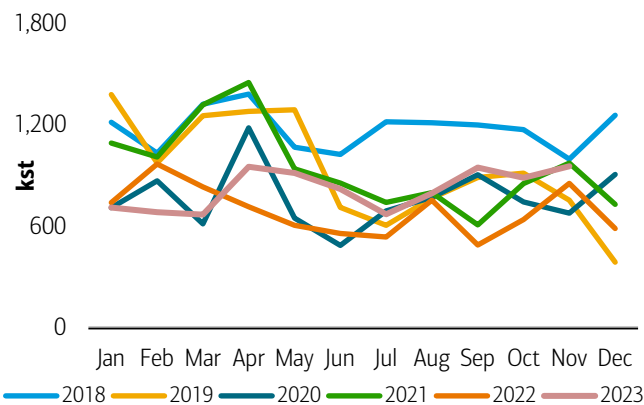


Source: CRU, Bloomberg, BofA Global Research

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**Exhibit 63: US MOP Net Imports**

The US normally imports roughly 1mnt of potash per month



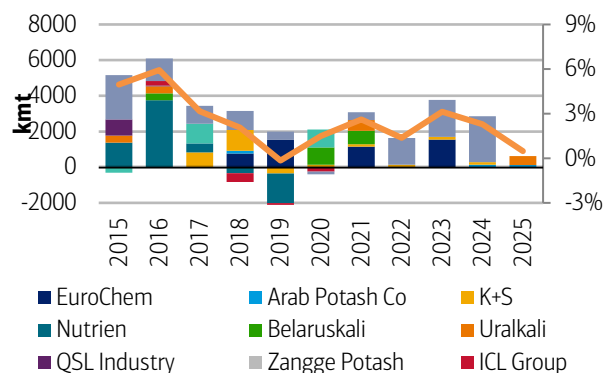
Source: TFI, Bloomberg, BofA Global Research

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**Exhibit 64: Net Potash Capacity Addition by Company**

Eurochem has significant Potash capacity to provide to the market

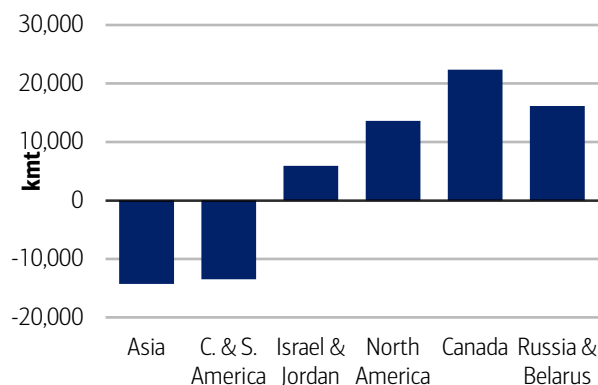


Source: CRU, BofA Global Research

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**Exhibit 65: Global Potash Trade Flows**

Canada &amp; 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

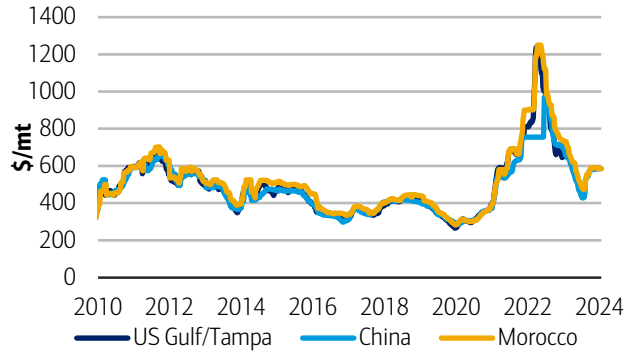
	2018	2019	2020	2021	2022	2023		1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23
Phosphate Prices															
DAP (US Midwest , \$/mt)	471	402	384	706	912	692		928	1000	888	830	740	743	622	664
DAP (US Gulf/Tampa, \$/mt)	419	344	324	644	894	560		950	1115	838	674	644	546	501	550
DAP - barge (New Orleans, \$/mt)	435	338	346	668	846	606		880	932	833	738	676	584	559	603
DAP (China, \$/mt)	435	338	346	668	846	606		880	932	833	738	676	584	559	603
DAP (Morocco, \$/mt)	412	347	323	595	779	557		755	805	845	709	636	503	506	583
MAP (US Gulf/Tampa, \$/mt)	429	361	323	655	964	589		979	1203	917	759	685	557	524	589
MAP - barge (New Orleans, \$/mt)	418	344	322	659	898	552		959	1114	845	674	641	525	497	546
MAP (Morocco, \$/mt)	445	339	357	707	870	634		907	967	869	736	637	568	643	687
MAP (Brazil, \$/mt)	427	361	326	679	964	574		1008	1195	934	720	668	553	514	562
Feedstock Costs															
Phosphate Rock (N. Africa, FOB, \$/mt)	91	95	90	137	277	269		212	286	320	290	300	295	263	218
Ammonia, (Tampa, CFR, \$/mt)	312	247	233	604	1160	514		1168	1272	1089	1110	744	369	343	598
Sulphur, (Tampa, FOB, \$/mt)	122	83	53	166	313	97		297	481	362	110	124	107	59	98
	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21	12/28	1/4	1/11	1/18
Phosphate Prices															
DAP (US Midwest , \$/mt)	656	656	661	661	650	650	650	650	694	694	678	678	714	758	741
DAP (US Gulf/Tampa, \$/mt)	543	540	543	550	550	550	550	550	550	560	560	560	560	560	560
DAP - barge (New Orleans, \$/mt)	587	587	592	587	581	590	601	598	615	623	623	687	642	664	659
DAP (Morocco, \$/mt)	590	590	590	590	590	590	590	590	590	585	585	585	585	585	585
MAP (US Gulf/Tampa, \$/mt)	538	538	538	545	545	545	545	545	545	560	560	560	560	560	560
MAP - barge (New Orleans, \$/mt)	717	711	683	692	697	659	650	661	664	672	678	747	689	694	694
MAP (Morocco, \$/mt)	543	543	543	545	548	573	578	578	578	578	578	578	578	578	578
MAP (Brazil, \$/mt)	550	550	550	555	558	560	563	563	563	563	563	563	563	563	563
Feedstock Costs															
Phosphate Rock (N. Africa, FOB, \$/mt)	215	215	215	215	220	220	220	220	220	220	220	220	220	220	220
Ammonia, (Tampa, CFR, \$/mt)	575	575	625	625	625	625	625	625	625	625	525	525	525	525	525
Sulphur, (Tampa, FOB, \$/mt)	102	102	102	102	102	102	102	102	102	102	102	102	102	69	69

Source: CRU, Bloomberg, BofA Global Research

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**Exhibit 67: Global DAP Prices**

DAP prices globally are up sharply

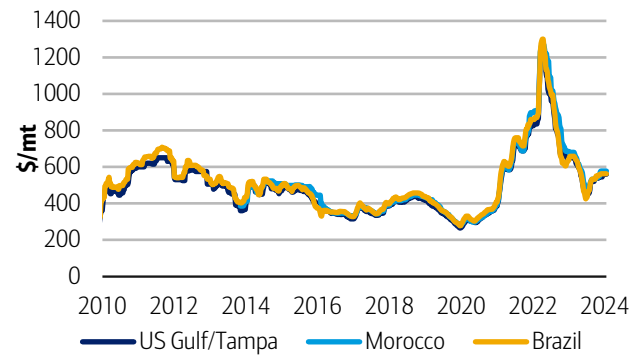


Source: CRU, Bloomberg, BofA Global Research

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

Morocco currently has the highest MAP prices

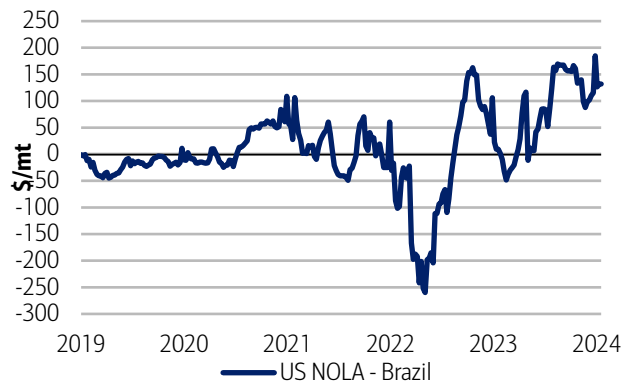


Source: CRU, Bloomberg, BofA Global Research

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**Exhibit 69: US NOLA vs Brazil phosphate price spread**

US NOLA phosphate prices is above Brazil levels

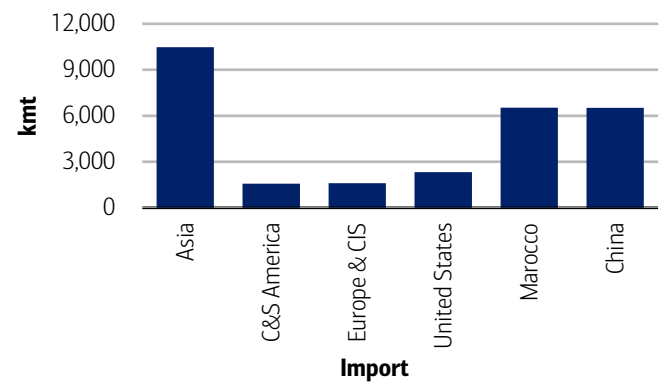


Source: CRU, Bloomberg, BofA Global Research

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**Exhibit 70: Global Phosphate Trade Flows 2023**

China is the largest phosphate importer

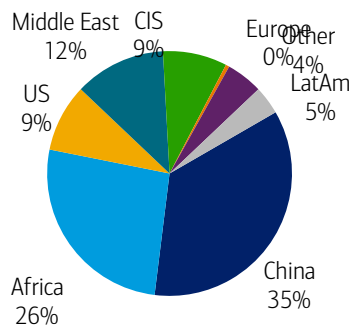


Source: CRU, Bloomberg, BofA Global Research

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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**Stocks mentioned**

<b>BofA Ticker</b>	<b>Bloomberg ticker</b>	<b>Company name</b>	<b>Price</b>	<b>Rating</b>
ALB	ALB US	Albemarle	US\$ 115.13	C-2-7
ADM	ADM US	Archer Daniels	US\$ 68.19	B-2-7
HUN	HUN US	Huntsman Corp	US\$ 23.4	B-1-7
LYB	LYB US	LyondellBasell	US\$ 93.39	B-2-7

Source: BofA Global Research

**Price objective basis & risk****Albemarle (ALB)**

Our \$147 PO is based on the average of two methodologies, a comprehensive NAV model and a multiple against our 2024E EBITDA. The NAV model generates a value of \$214/share. For our NAV, we use WACC of 9.2% and terminal growth rate of 2%. The EBITDA methodology uses an 10x multiple against our 2024E EBITDA forecast which drives a price of \$80/share. This 10x is a premium for commodity companies, but reflects the trough nature of the 2024 earnings profile, and implies a more normal, 5.0x our 2025 EBITDA estimate.

Upside risks to our price objective are higher than anticipated selling prices in Lithium, new capacity announcements at ALB, stronger than expected ramp-ups in production and increasing signs of electric vehicle demand.

Downside risks to our price objective are slower than expected demand growth for consumer electronics and electric vehicles, new supply additions at peers, a potential bidding war for acquisition targets, and price pressure in the lithium and bromine businesses.

**Archer-Daniels-Midland Company (ADM)**

Our \$85 PO is based on the average of our DCF (7.5% WACC and 2% terminal growth rate) and P/E (13.5x 2024E EPS) valuation. This multiple is close to ADM's five-year average, which we believe is appropriate to balance our view of ADM's high-multiple, high-growth Nutrition business and our expectations that earnings will hover near-record levels through 2025, against peak 2022 EPS.

Downside risks to our PO are a supply shock, even if it is temporary, which could result in either excess or insufficient crops and would impact prices and margins. Ethanol margins could deteriorate and African Swine Fever in China could reduce demand for protein meal.

**Huntsman Corp (HUN)**

Our \$28 PO is based on an 9x EV to 2024E EBITDA methodology. This multiple is on the high end of the historic range for HUN, which we believe is appropriate given our expectations of below-normal profitability in 2024.

Downside (upside) risks to our price objective come from volatility in underlying commodity markets, corporate actions, and a slowdown to (expansion in) the broader economic backdrop.



**LyondellBasell Industries (LYB)**

Our \$103 PO is based on a 7.5x multiple to our 2024E EBITDA ex-Refining , plus the cumulative EBITDA generated by Refining through 2024 year-end. The multiple is a slight premium to historic average levels, reflecting below-normal profitability in 2024.

Upside risks to our price objective are an increase in global polyethylene demand, higher oil prices, and lower US NGL prices.

Downside risks to our price objective are lower oil prices, higher natural gas and feedstock costs and slower global economic growth leading to a slowdown in demand for polyethylene.

**Analyst Certification**

We, Steve Byrne, CFA and Salvator Tiano, CFA, hereby certify that the views each of us has expressed in this research report accurately reflect each of our respective personal views about the subject securities and issuers. We also certify that no part of our respective compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

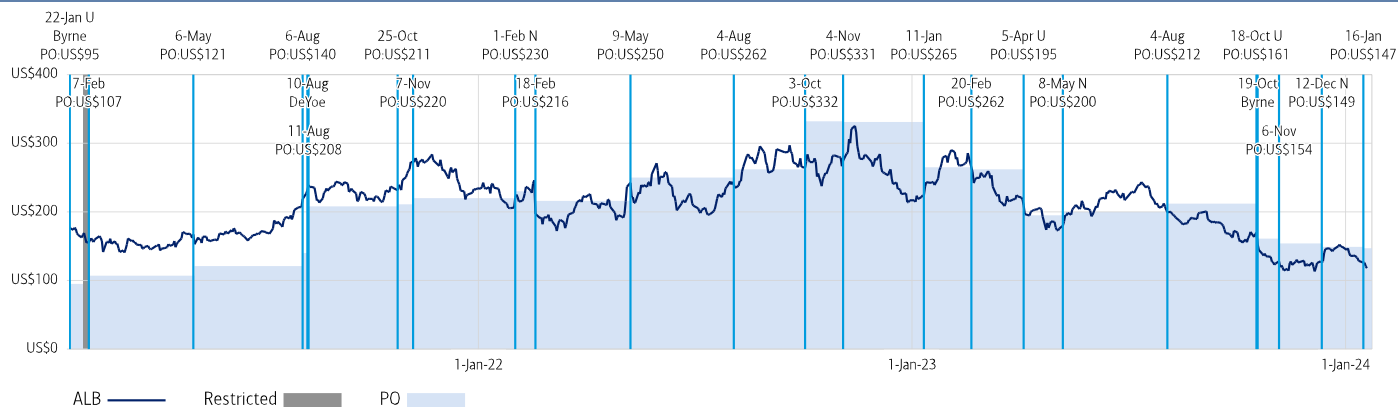
## US - Chemicals Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
<b>BUY</b>				
	Axalta Coating Systems	AXTA	AXTA US	Steve Byrne, CFA
	Bunge Limited	BG	BG US	Salvator Tiano, CFA
	CF Industries	CF	CF US	Steve Byrne, CFA
	Dow Inc	DOW	DOW US	Steve Byrne, CFA
	Eastman Chemical Co	EMN	EMN US	Salvator Tiano, CFA
	Element Solutions Inc.	ESI	ESI US	Steve Byrne, CFA
	Green Plains	GPRE	GPRE US	Salvator Tiano, CFA
	Huntsman Corp	HUN	HUN US	Salvator Tiano, CFA
	Linde	LIN	LIN US	Steve Byrne, CFA
	Linde	LINGY	LIN GY	Steve Byrne, CFA
	Nutrien	NTR	NTR US	Steve Byrne, CFA
	Olin Corp	OLN	OLN US	Steve Byrne, CFA
	PPG Industries Inc.	PPG	PPG US	Steve Byrne, CFA
	Sigma Lithium	SGML	SGML US	Steve Byrne, CFA
	The Mosaic Company	MOS	MOS US	Steve Byrne, CFA
<b>NEUTRAL</b>				
	Air Products	APD	APD US	Steve Byrne, CFA
	Albemarle	ALB	ALB US	Steve Byrne, CFA
	Archer-Daniels-Midland Company	ADM	ADM US	Salvator Tiano, CFA
	Corteva	CTVA	CTVA US	Steve Byrne, CFA
	Ecolab Inc	ECL	ECL US	Steve Byrne, CFA
	International Flavors & Fragrances	IFF	IFF US	Salvator Tiano, CFA
	LyondellBasell Industries	LYB	LYB US	Steve Byrne, CFA
	Origin Materials	ORGN	ORGN US	Steve Byrne, CFA
<b>UNDERPERFORM</b>				
	Celanese Corporation	CE	CE US	Salvator Tiano, CFA
	DuPont	DD	DD US	Steve Byrne, CFA
	FMC Corporation	FMC	FMC US	Steve Byrne, CFA
	RPM International Inc	RPM	RPM US	Steve Byrne, CFA
	Sherwin-Williams Company	SHW	SHW US	Steve Byrne, CFA
	Westlake Chemical Partners, LP	WLKP	WLKP US	Steve Byrne, CFA
	Westlake Corp	WLK	WLK US	Steve Byrne, CFA

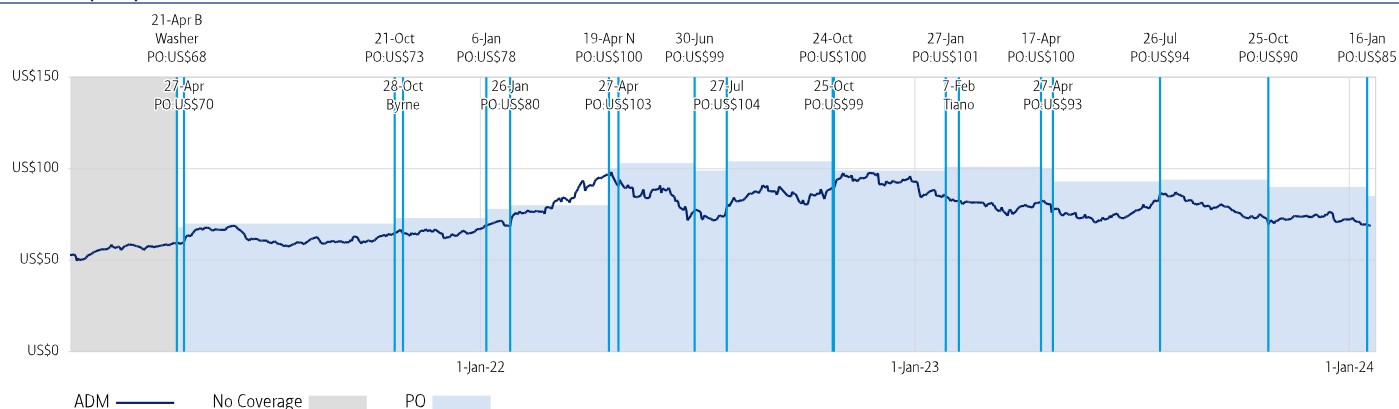
## Disclosures

## Important Disclosures

## Albemarle (ALB) Price Chart

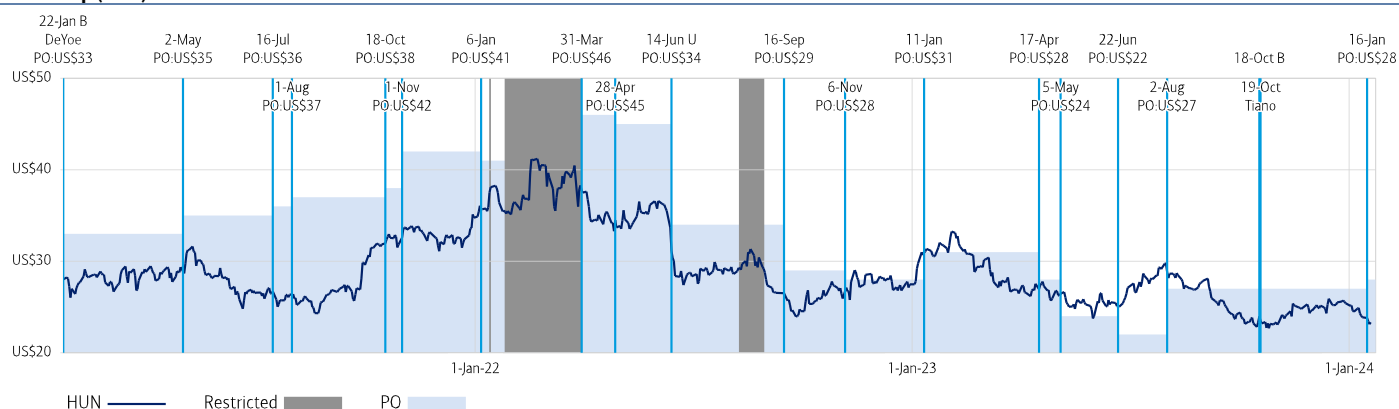


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**Archer Daniels (ADM) Price Chart**

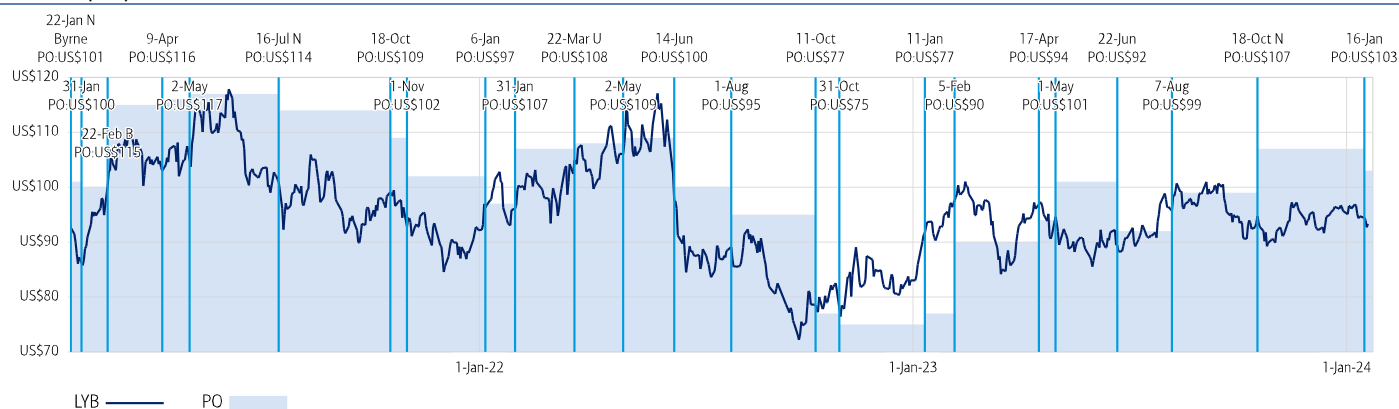
B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

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**Huntsman Corp (HUN) Price Chart**

B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

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**LyondellBasell (LYB) Price Chart**

B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

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**Equity Investment Rating Distribution: Chemicals Group (as of 31 Dec 2023)**

Coverage Universe	Count	Percent	Inv. Banking Relationships <sup>R1</sup>	Count	Percent
Buy	66	47.83%	Buy	33	50.00%
Hold	33	23.91%	Hold	16	48.48%
Sell	39	28.26%	Sell	20	51.28%

**Equity Investment Rating Distribution: Global Group (as of 31 Dec 2023)**

Coverage Universe	Count	Percent	Inv. Banking Relationships <sup>R1</sup>	Count	Percent
Buy	1895	53.62%	Buy	1083	57.15%
Hold	832	23.54%	Hold	454	54.57%
Sell	807	22.84%	Sell	383	47.46%

<sup>R1</sup> Issuers that were investment banking clients of BofA Securities or one of its affiliates within the past 12 months. For purposes of this Investment Rating Distribution, the coverage universe includes only stocks. A stock rated Neutral is included as a Hold, and a stock rated Underperform is included as a Sell.

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster <sup>R2</sup>
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

<sup>R2</sup> Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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