

Chemicals

Chem Weekly: Ag & Chem Decarbonization initiatives, China fert exports to drop in 1Q

Industry Overview

Record global temps requiring Ag & Chem decarbonization

Daily average temperatures calculated from hourly data have been tabulated back to 1940 and graphically presented by the Climate Change Institute (Univ of Maine), which indicates steady temperature gains in recent decades, with 2023 at outlier levels (see Exh 1). These data indicate that global temperatures in the last 7 months have been at 80-yr record levels – every day, likely a confluence of accumulated CO2 emissions and severe El Nino climatic conditions. While the US govt is taking the “carrot” rather than the “stick” approach to reducing CO2 emissions, we see massive decarbonization initiatives underway within Agriculture and the Chemicals industry. These initiatives are highlighted below and **each will be a panel discussion at our Florida Conference on Feb 28-29** – the keynote presentation will be Dept of Energy’s sustainability leader.

- **Hydrogen:** Reforming methane into H2 is a significant source of CO2, with some being converted to blue H2 by 2025 from carbon sequestration, and to green H2 with electrolysis later in the decade (see [Hydrogen Conf takeaways](#))
- **Renewable Fuel:** Renewable diesel and SAF can be derived from vegetable oil and animal fat, or produced from ethanol or CO2. All of these pathways are described here and all the combustion CO2 was originally in the atmosphere
- **Lithium:** While hydrogen fuel-celled vehicles could develop with long-haul trucking, the battery electric mobility market continues to accelerate. See here for our [recent Lithium Conference takeaways](#)
- **Biologicals:** The crop chemical industry is rapidly exploring ways to provide crop protection through bacterial and biologically-produced compounds. Here is our [recent webinar with Pivot Bio](#). We are hosting BioConsortia on Jan 9
- **Seeds:** The path forward for the development of higher-yielding crops with better resistance to drought and disease is increasingly via gene editing, which has been blocked in the EU, but a [favorable regulatory path is in development](#)
- **Sustainable Plastic:** Petrochemical producers are exploring numerous pathways to decarbonize ethylene crackers, using renewable feedstock or [pyrolysis oil from recycled waste plastic](#)

Fertilizer exports from China expected to decline in 1Q

As illustrated in Exhibit 2, China’s exports of nitrogen and phosphate nearly stopped in 1Q22 and then fell again in 1Q23, which we expect to reoccur in 1Q24. Reports from some Chinese fertilizer producers reinforce this view, which could keep domestic prices in China from escalating, but could significantly tighten global supplies. Our Florida conference will include ~10 fertilizer companies.

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Acronyms:

H2 – Hydrogen

SAF – Sustainable Aviation Fuel

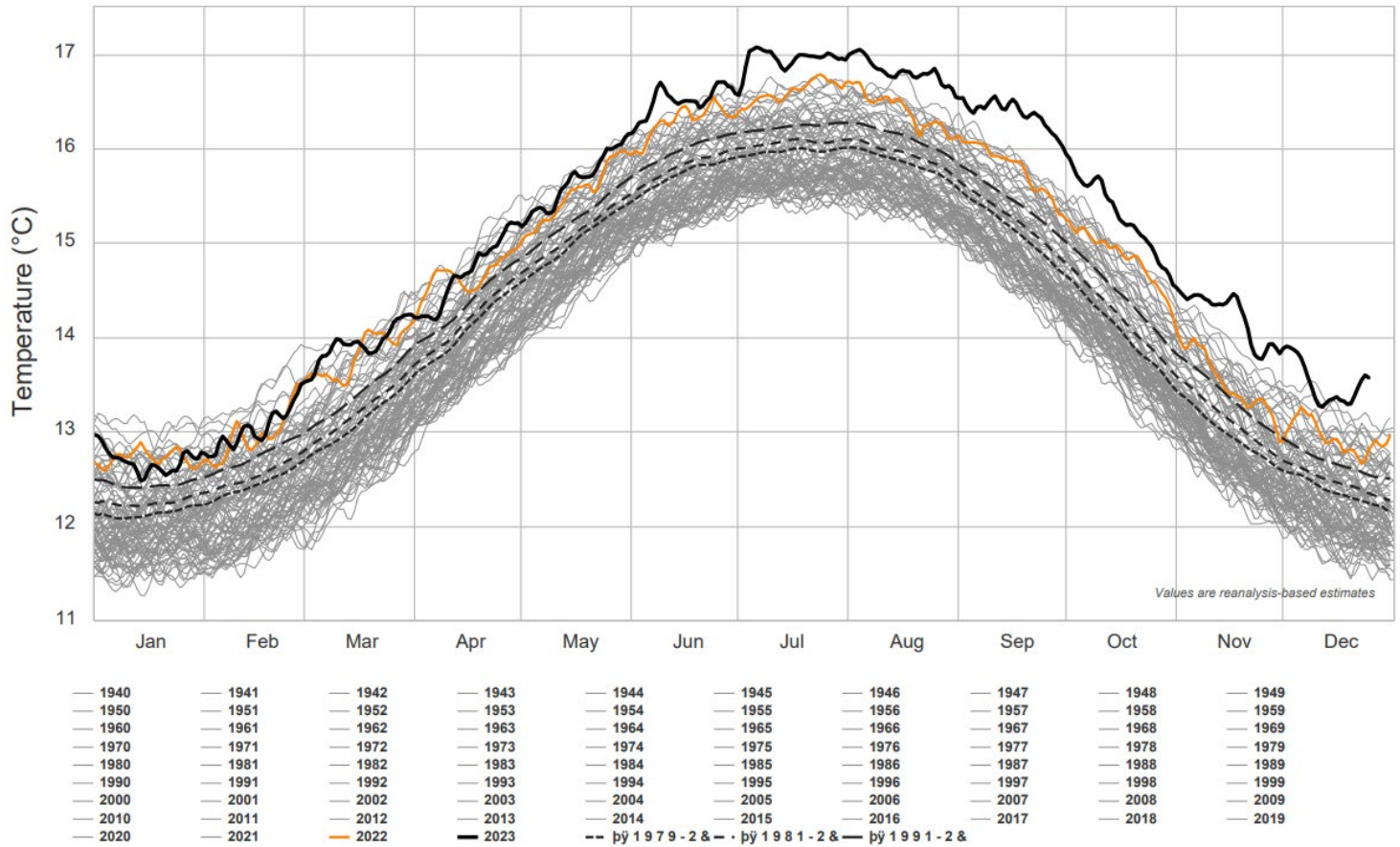
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Timestamp: 02 January 2024 04:58AM EST

Exhibit 1: Daily Surface Temperature, World

For the last 7 months, global temperatures have been at 80-year record levels

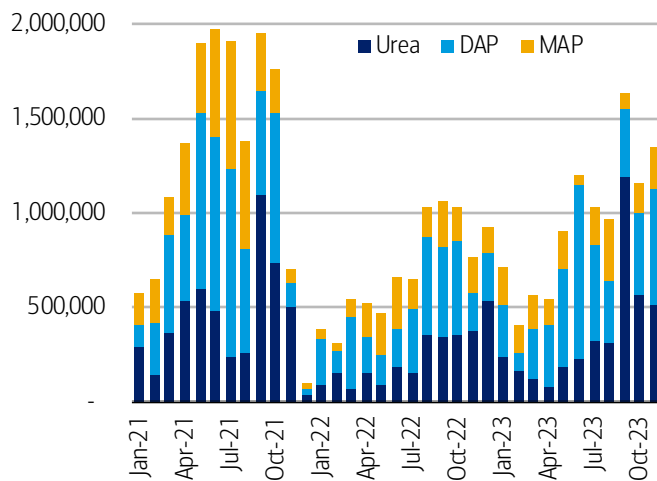


Source: Climate Change Institute, University of Maine

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Exhibit 2: China's Fertilizer Exports

Fertilizer exports from China are still below 2021 levels

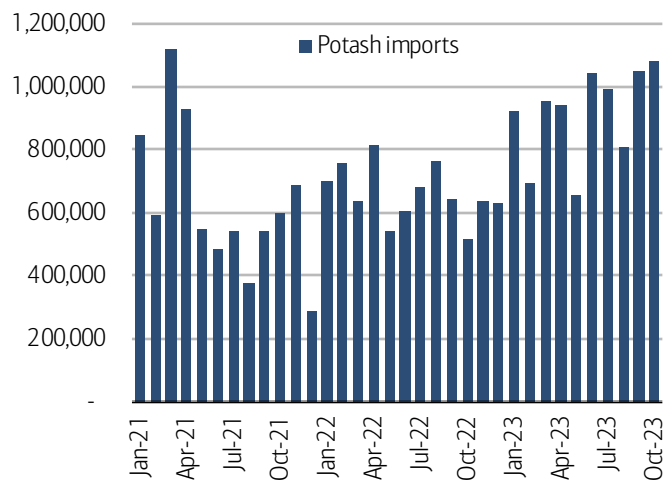


Source: CNCIC

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Exhibit 3: China's potash imports

China has been steadily increasing its potash imports



Source: CNCIC

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Petrochemical & Chlor-Alkali

Exhibit 4: 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	30
EU Naphtha	31	28	29	49	45	29	36	55	56	34	28	35	23	31
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	55
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	18	39	34	32	25	20	18	20	15
US Naphtha (c/lb)	29	30	21	24	47	40	61	47	38	43	39	38	46	38
EU Naphtha (c/lb)	30	25	18	29	28	32	43	31	10	29	37	27	35	31
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	19
Feedstock Dynamics														
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
Isocyanates														
US MDI (c/lb)	184	158	142	189	218	171	221	231	223	199	185	175	164	160
US TDI (c/lb)	160	158	227	265	236	263	225	226	231	263	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	118	157	131	106	136	80	83	92	169	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)	80	125	197	157	87	101	85	77	78	108	114	102	96	90

Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 5: Weekly historical pricing overview for PE, PP, PVC, LNG, Isocyanates

US ethane margins are currently higher than EU naphtha PE margins

	9/21	9/28	10/5	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21	12/28
Integrated PE Margins															
US Ethane	27	29	28	28	29	30	30	30	31	34	34	29	30	30	30
EU Naphtha	20	20	33	33	33	33	32	32	32	32	32	27	27	27	27
China Naphtha	-15	-15	-13	-10	-11	-13	-10	-10	-12	-12	-13	-14	-14	-18	-17
Polyethylene Prices															
HDPE Net Transaction (NA c/lb)	56	56	56	56	56	56	56	56	56	56	56	53	53	53	53
HDPE Discounted Contract (EU c/lb)	73	73	76	76	76	76	75	75	75	75	75	74	74	74	74
HDPE Spot (Asia c/lb)	43	43	43	43	43	42	42	42	40	40	40	40	40	40	40
Ethylene Prices															
Ethylene (US Gulf c/lb)	23	22	23	23	23	22	22	21	19	21	21	20	19	18	18
Ethylene (EU c/lb)	36	36	36	36	36	36	34	34	34	34	34	35	35	35	35
Ethylene (SE Asia c/lb)	39	40	40	41	42	43	43	43	43	43	43	43	41	41	41

Exhibit 5: Weekly historical pricing overview for PE, PP, PVC, LNG, Isocyanates

US ethane margins are currently higher than EU naphtha PE margins

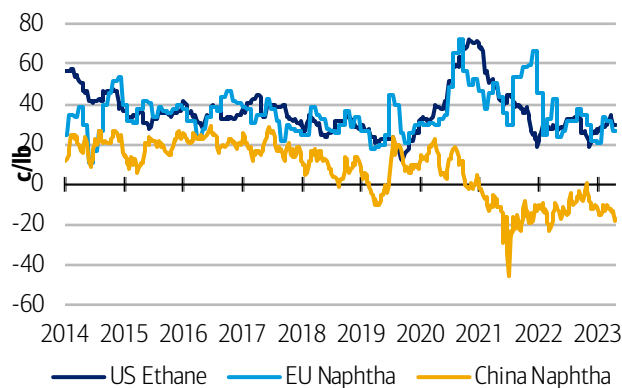
	9/21	9/28	10/5	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21	12/28
Ethylene Cash Costs															
US Ethane (c/lb)	16	14	15	15	14	13	13	13	12	9	9	11	10	10	10
US Propane (c/lb)	20	19	19	17	17	14	14	12	11	12	13	19	17	16	16
US Naphtha (c/lb)	50	48	45	42	42	41	39	36	36	31	32	40	36	38	38
EU Naphtha (c/lb)	40	40	29	29	29	29	30	30	30	30	30	35	35	35	35
Asia Naphtha (c/lb)	48	48	47	44	44	46	43	43	44	44	46	46	46	51	49
US Butane (c/lb)	21	19	18	15	15	13	15	14	15	16	17	28	30	28	28
Feedstock Dynamics															
US Ethane (c/gal)	28	28	29	29	26	25	26	23	21	21	21	17	20	17	18
US Propane (c/gal)	71	72	68	71	68	66	64	63	64	64	71	69	64	66	68
US Butane (c/gal)	72	75	67	75	78	79	82	84	85	83	96	104	99	96	101
Brent Oil (\$/bbl)	94	93	95	85	91	92	90	85	81	81	81	79	76	77	79
Isocyanates															
US MDI (c/lb)	163	163	163	163	163	160	160	160	160	160	160	160	160	160	160
US TDI (c/lb)	259	259	254	254	254	254	254	254	254	249	249	249	249	249	249
EU MDI (Eur c/lb)	106	104	104	101	99	99	99	100	109	109	110	108	110	110	111
EU TDI (Eur c/lb)	103	101	101	102	104	104	104	106	108	108	110	108	104	106	106
China MDI (c/lb)	85	85	85	82	78	78	81	81	82	81	81	81	81	81	81
China TDI (c/lb)	98	95	89	91	95	95	95	95	87	87	87	87	87	87	87

Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 6: 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 7: US premium to global netbacks

The US polyethylene price continues to have a premium to historic

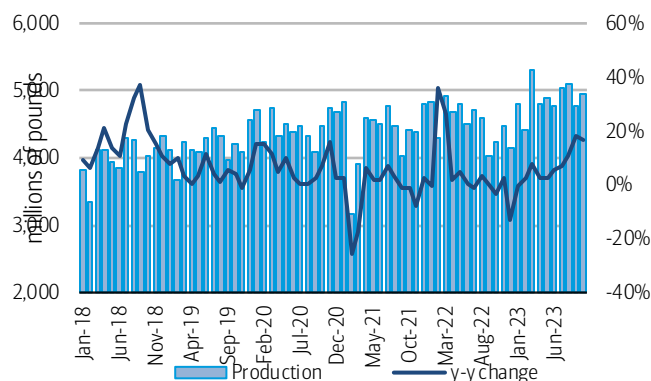


Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 8: US polyethylene production

Production is accelerating with new capacity

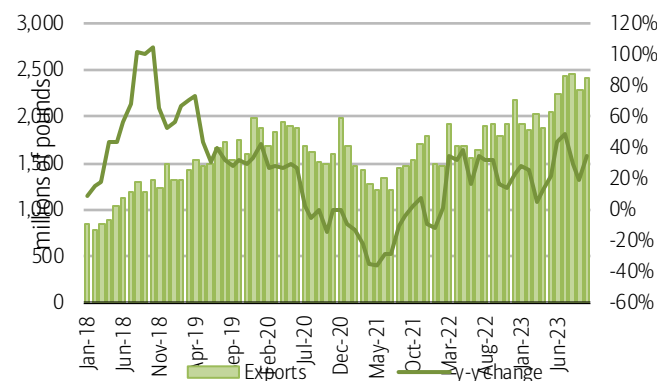


Source: American Chemistry Council, BofA Global Research

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Exhibit 9: US polyethylene exports

Exports have improved more recently

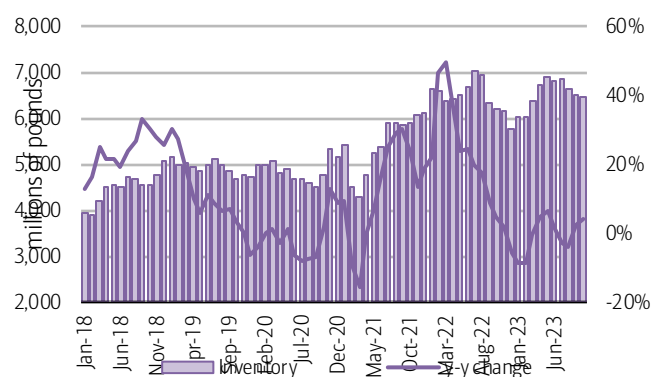


Source: American Chemistry Council, BofA Global Research

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Exhibit 10: US polyethylene inventory

Inventories remain elevated, returning to near peak levels

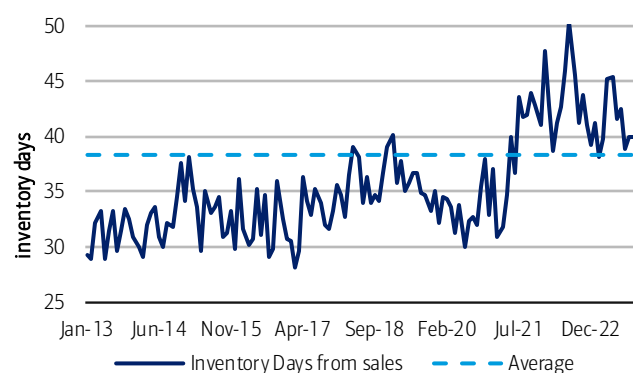


Source: American Chemistry Council, BofA Global Research

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Exhibit 11: US polyethylene days of sales in inventory

Days of sales in inventory are above normal

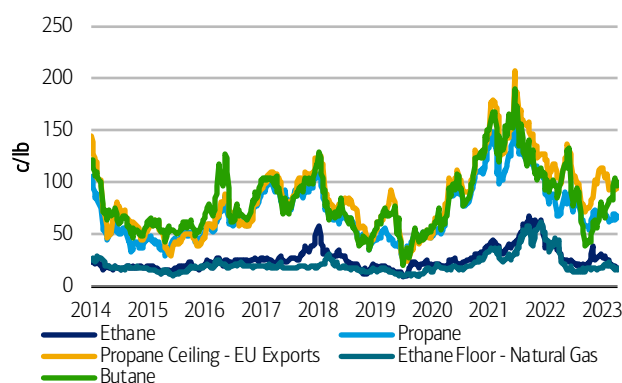


Source: American Chemistry Council, BofA Global Research

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Exhibit 12: US NGL Dynamics (c/lb)

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

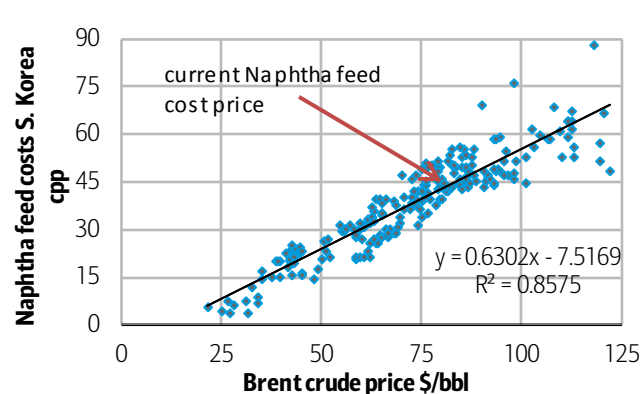


Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 13: Brent Oil vs Naphtha feed cost (S. Korea) price regression

Naphtha feedstock cost closely follow changes in Brent crude

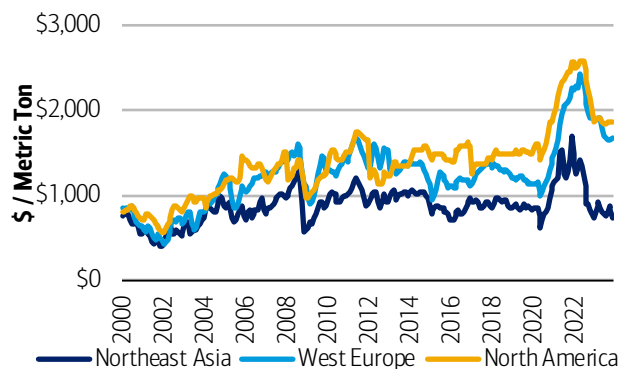


Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 14: PVC prices (\$/mt)

PVC prices moving off of multi-decade highs

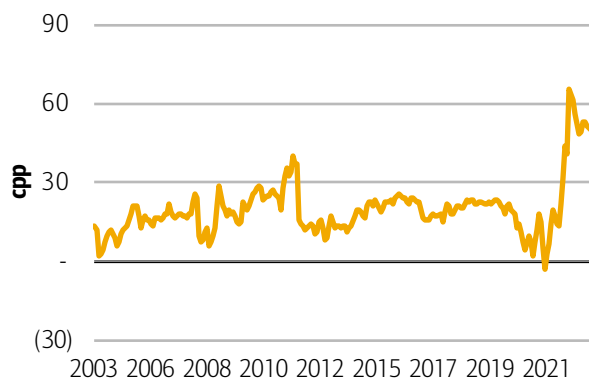


Source: OPIS, Bloomberg, BofA Global Research

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Exhibit 15: 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 16: non-integrated PVC margin (80% contract 20% spot)

PVC margins are moving off peak

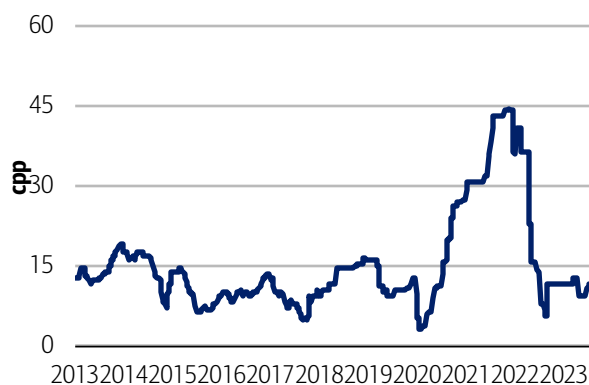


Source: OPIS, Bloomberg, BofA Global Research Estimates

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Exhibit 17: US ethylene dichloride price

Prices have collapse with international PVC price

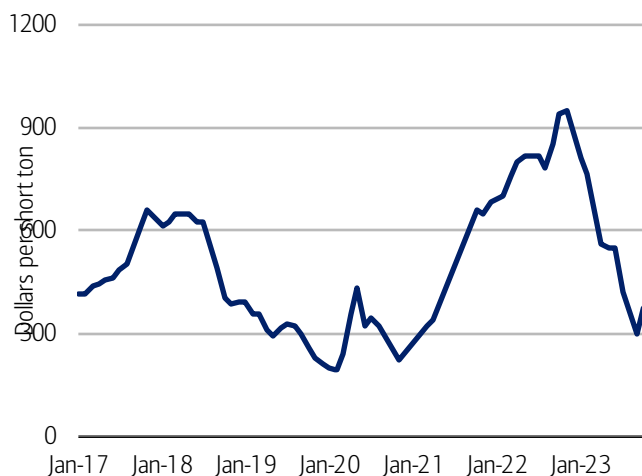


Source: Bloomberg, BofA Global Research

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Exhibit 18: Caustic export price (\$/ short ton)

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

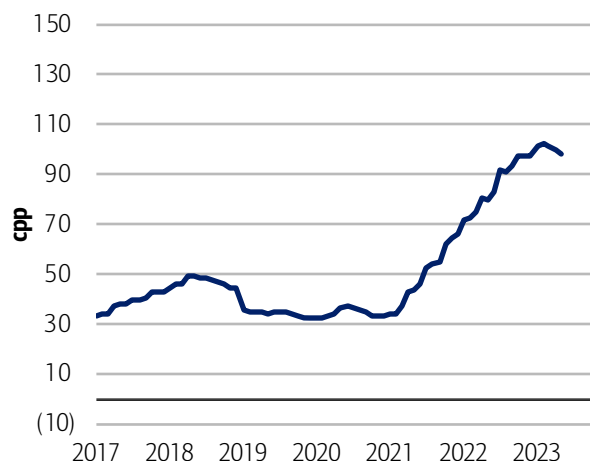


Source: Bloomberg

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Exhibit 19: US ECU Cash Margins

Cash margins remain high as cost deflation offset softer contract caustic



Source: Bloomberg, OPIS

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Exhibit 20: US chlorine price

Chlorine prices have moved higher on initiatives by Olin

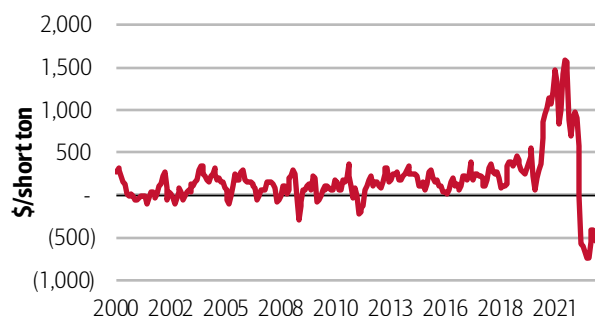


Source: OPIS

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Exhibit 21: Implied chlorine premium in spot PVC vs. merchant price

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

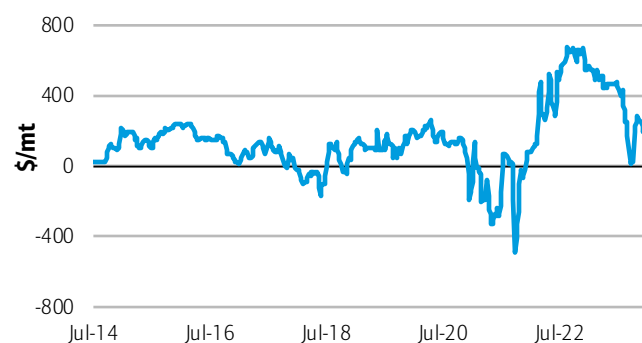


Source: OPIS, BofA Global Research

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Exhibit 22: US acetic acid spread to China

US acetic acid spread to china is near to zero

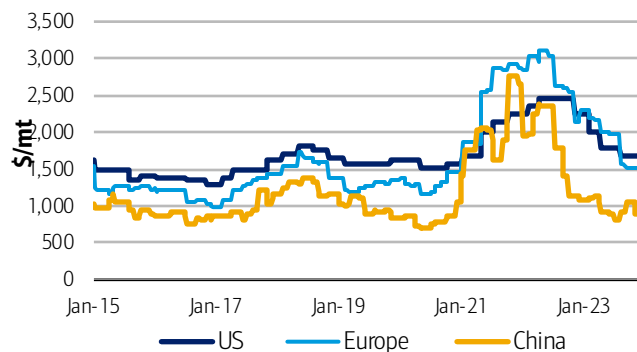


Source: Bloomberg, BofA Global Research

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Exhibit 23: Global VAM contract prices

US & European VAM prices remain bid

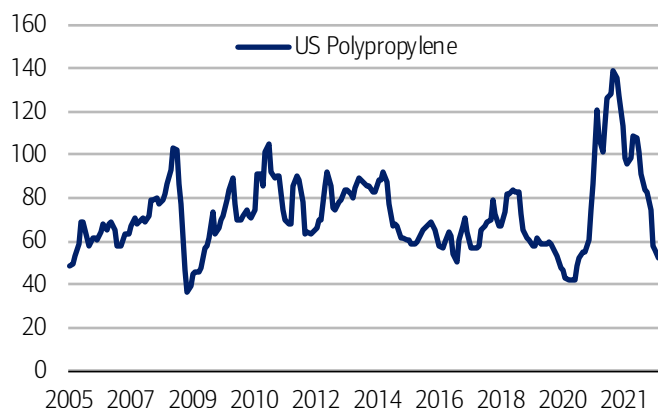


Source: Bloomberg

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Exhibit 24: US Polypropylene price

Polypropylene prices have retraced sharply

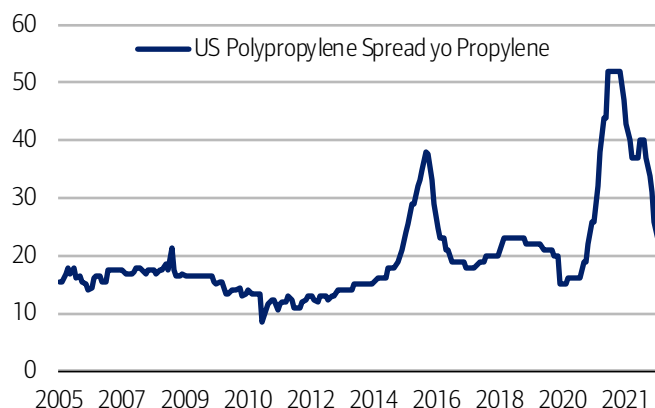


Source: OPIS

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Exhibit 25: Polypropylene spread to propylene

PP spread to monomer would seem to have more downside

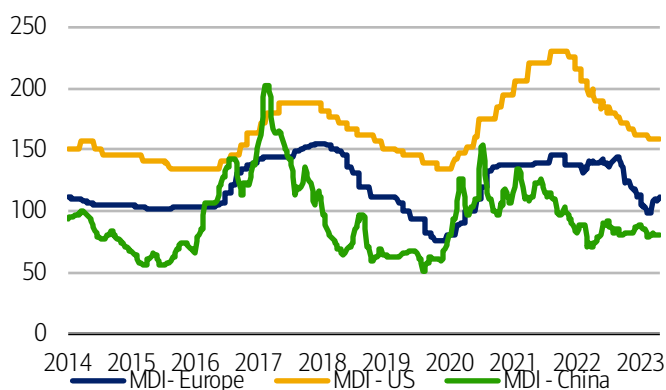


Source: OPIS and BofA Global Research

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Exhibit 26: Global polymeric MDI price deck

US remains at a healthy premium to global markets



Source: ICIS

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Exhibit 27: US Polymeric MDI spread over raw material costs

US margins are off peak, but still at healthy levels

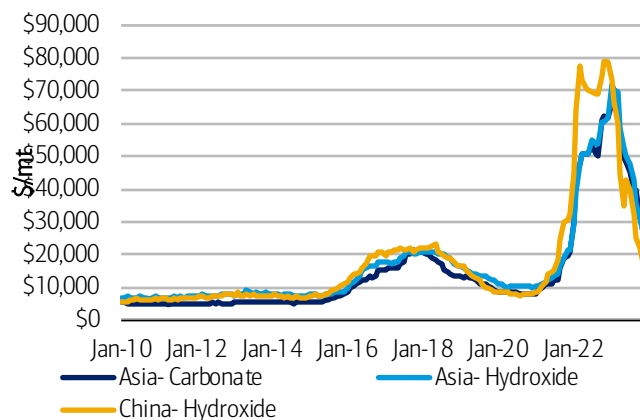


Source: ICIS, OPIS, BofA Global Research Estimates

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Exhibit 28: 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 29: 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 30: Nitrogen pricing overview

Nitrogen prices have started to decrease materially

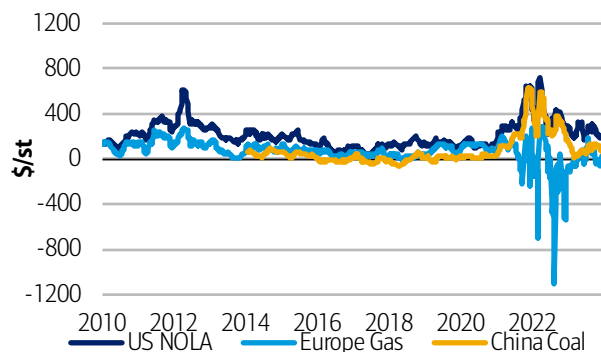
	2018	2019	2020	2021	2022	2023	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23
Nitrogen Prices														
Urea granular (US NOLA \$/st)	259	244	228	492	601	355	677	613	591	522	342	367	374	337
Urea granular (US Midwest \$/st)	297	302	272	535	667	435	752	679	633	604	421	466	428	424
Urea granular (Mediterranean \$/st)	265	252	238	510	687	365	800	703	682	562	386	317	393	362
Urea granular (SE Asia \$/st)	266	255	240	503	629	353	727	687	570	532	366	325	369	352
Ammonia (US Midwest \$/st)	415	403	328	759	1276	630	1382	1394	1086	1240	834	466	517	711
UAN (US Midwest \$/st)	211	202	160	372	561	300	601	614	482	546	351	285	268	295
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	2.93
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	13.49
Anthracite coal (China \$/mt)	139	131	131	164	212	179	237	221	200	194	204	179	183	151
	9/14	9/21	9/28	10/5	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/21
Nitrogen Prices														
Urea granular (US NOLA \$/st)	404	410	404	413	376	359	350	355	343	328	299	304	319	300
Urea granular (US Midwest \$/st)	450	473	488	488	450	443	410	413	425	425	425	425	398	398
Urea granular (Mediterranean \$/st)	404	395	397	399	406	395	399	379	374	363	340	332	321	312
Urea granular (SE Asia \$/st)	376	395	395	395	395	383	363	363	363	327	322	329	311	315
Ammonia (US Midwest \$/st)	638	638	713	713	713	713	750	750	730	730	738	738	610	610
UAN (US Midwest \$/st)	297	297	297	297	297	297	297	297	297	297	297	287	287	287
Feedstock Costs														
Natural Gas (US HH \$/mmbtu)	2.64	2.64	2.93	3.34	3.24	2.90	3.16	3.52	3.03	2.96	2.86	2.81	2.58	2.61
Natural Gas (UK ICE \$/mmbtu)	10.58	11.41	12.50	12.86	11.56	16.60	15.35	15.25	15.17	14.40	14.17	15.10	13.94	10.47
Anthracite coal (China \$/mt)	189	190	182	178	176	172	165	164	164	163	164	161	159	157

Source: CRU, Bloomberg, BofA Global Research

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

European urea margins are negative

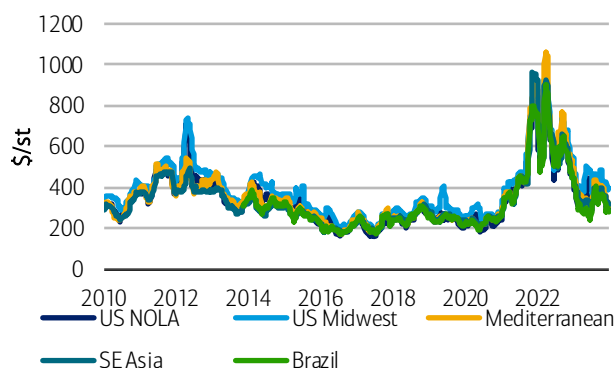


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 33: Global Granular Urea Prices (\$/st)

Prices have come off their recent highs

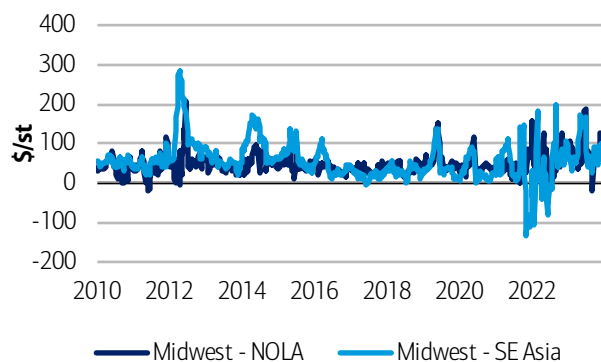


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 35: US Urea Price Differentials (\$/st)

US Midwest urea prices are above NOLA import price

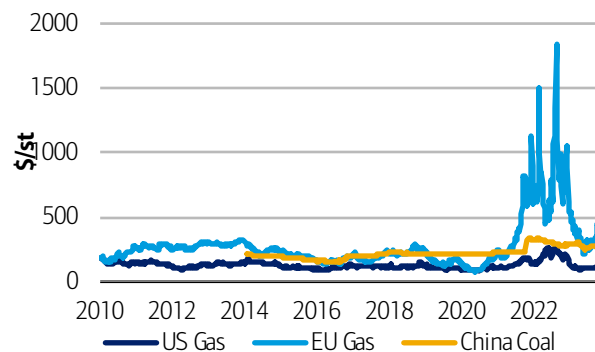


Source: CRU, Bloomberg, BofA Global Research

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

US gas costs at bottom of cost curve

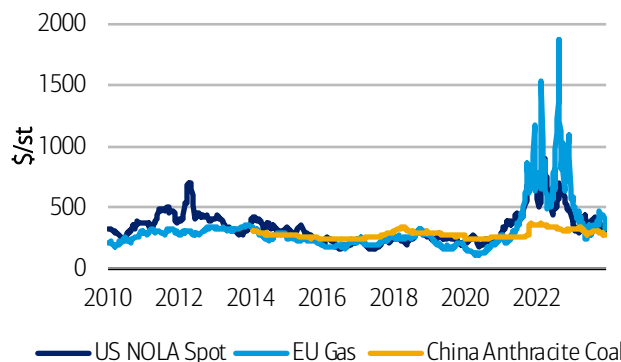


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 34: US NOLA Urea vs Delivered Costs (\$/st)

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

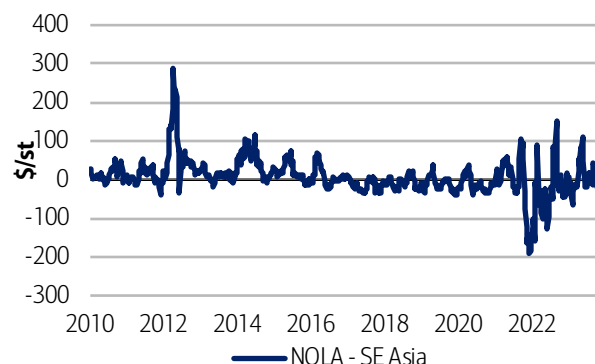


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 36: US NOLA - SE Asia Urea Price (\$/st)

US NOLA urea price is below Asia prices

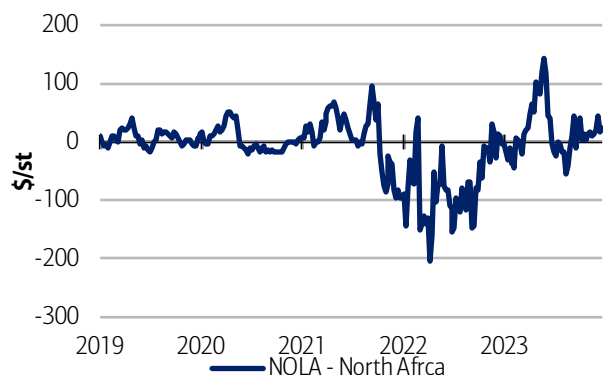


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 37: US NOLA - North Africa Urea Price (\$/st)

US NOLA urea price is now above North Africa prices

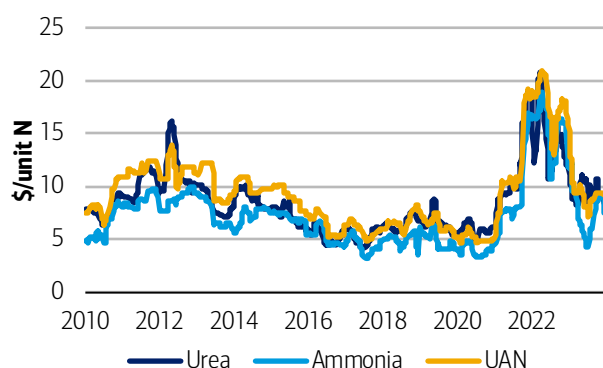


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 39: US Midwest Prices (\$/unit N)

Midwest UAN prices have surpassed urea on a unit N basis

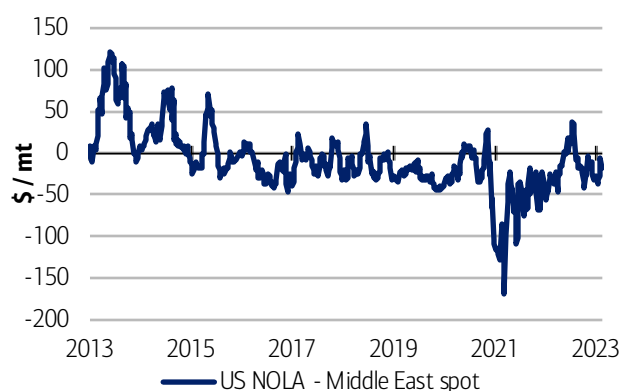


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 41: US NOLA implied vs. Middle East urea price spread

US NOLA urea price is now comparable to Middle East levels

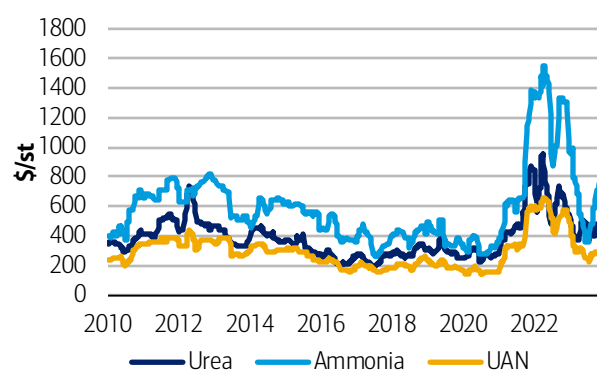


Source: CRU, BofA Global Research

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Exhibit 38: US Midwest Prices (\$/st)

All nitrogen fertilizer products have increased sharply

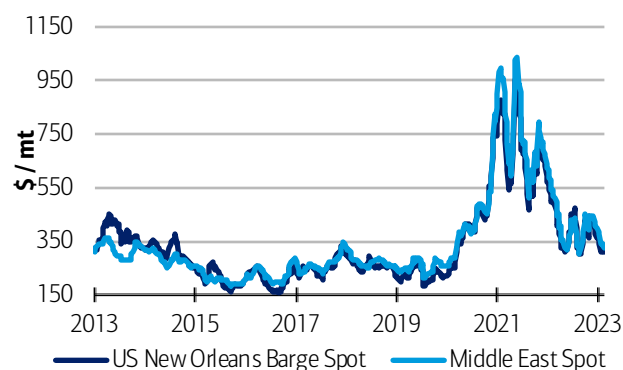


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 40: US NOLA implied vs. Middle East urea prices (\$/mt)

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

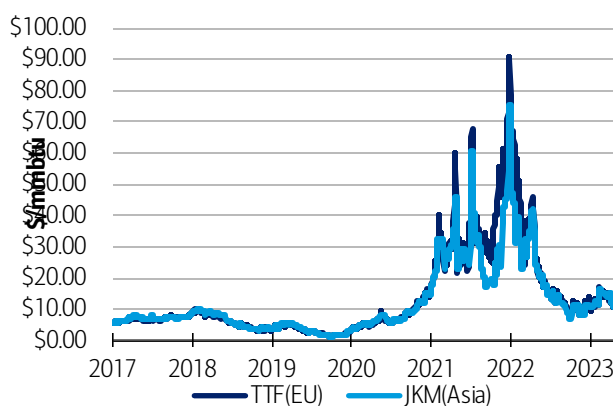


Source: CRU, BofA Global Research

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Exhibit 42: EU vs. Asia NatGas Prices (\$/mmbtu)

Asian nat gas prices are well below EU prices

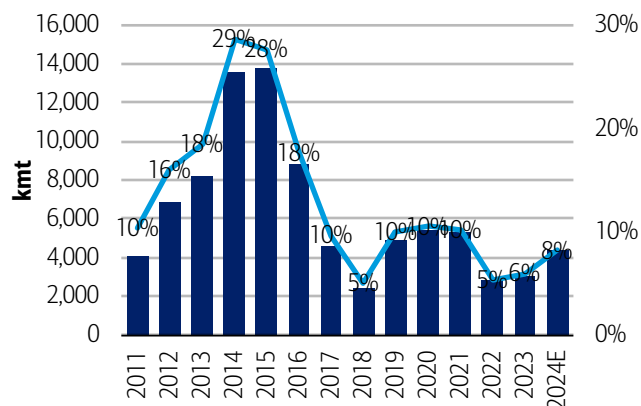


Source: Bloomberg, BofA Global Research

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Exhibit 43: Chinese Urea Exports & % of World Total

Chinese urea exports are well below prior peak levels

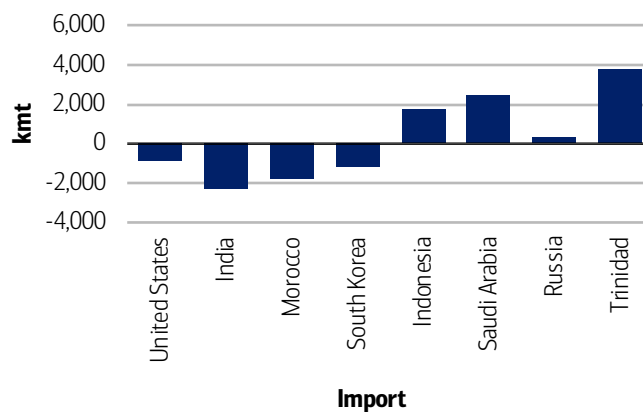


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 44: Global NH3 Trade Balance 2023

Trinidad is the largest ammonia exporter

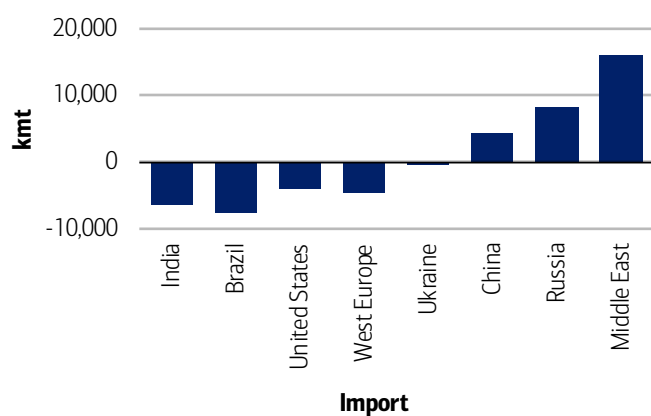


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 45: Global Urea Trade Balance 2023

Middle East is the largest urea exporter

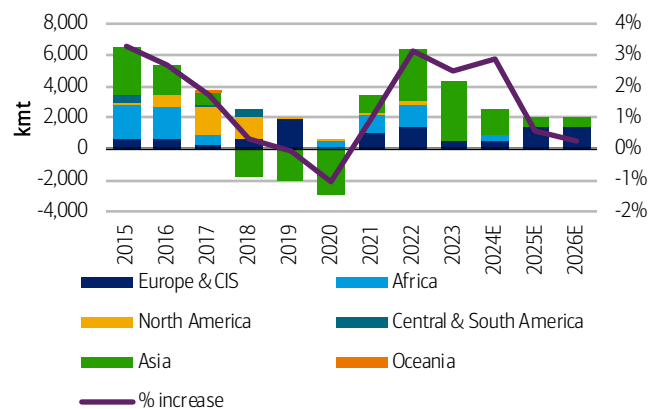


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 46: Global Urea Capacity additions by region

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

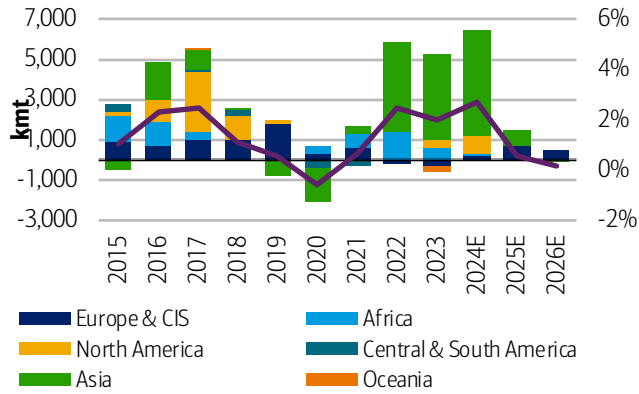


Source: BofA Global Research

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Exhibit 47: Global NH3 Capacity additions by region

New global ammonia coming in 2022

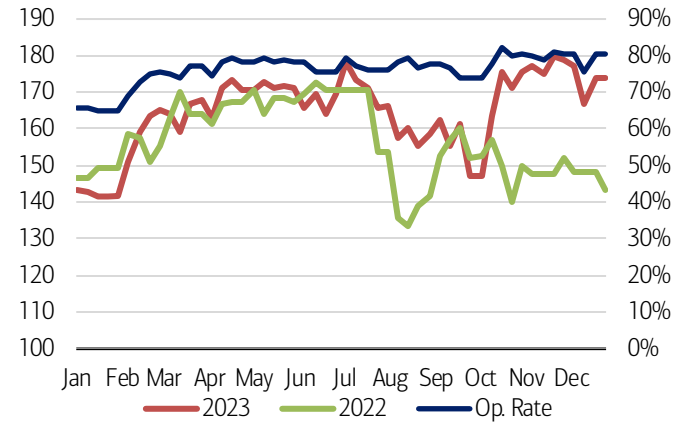


Source: CRU, BofA Global Research

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Exhibit 48: Chinese Urea Daily Production (weekly kmt)

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



Source: CFMW, Bloomberg, BofA Global Research

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Exhibit 49: Chinese Urea Daily Production as a % of 5-yr max Daily production (weekly kmt)

China's urea production is seasonally strong

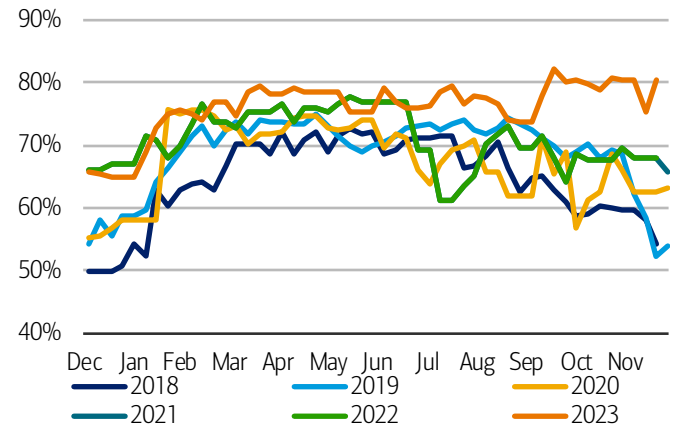


Source: CFMW, Bloomberg, BofA Global Research

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Exhibit 50: Chinese Urea Operating Rates

Operating rates have collapsed recently

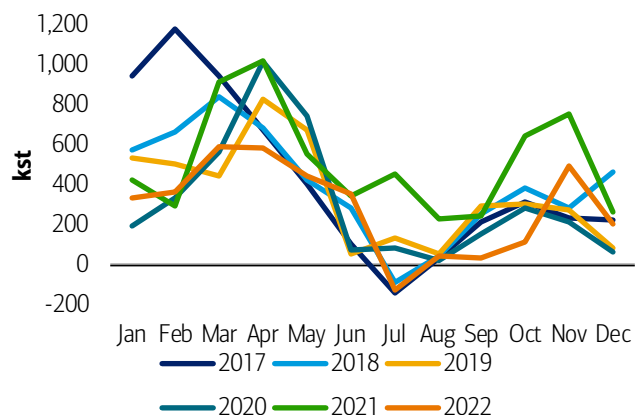


Source: CFMW, Bloomberg, BofA Global Research

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Exhibit 51: US Urea Net Imports (kst)

Net imports running at low levels year-to-date

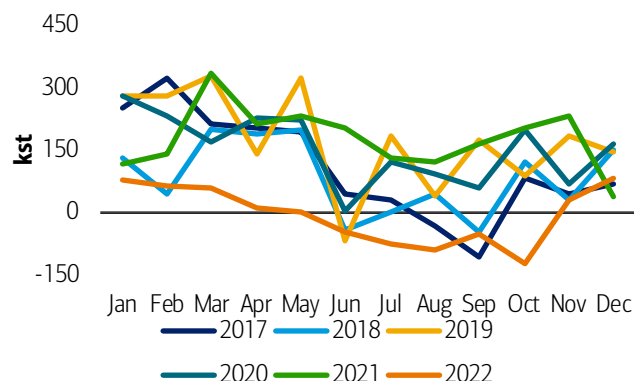


Source: TFI, Bloomberg, BofA Global Research

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Exhibit 52: US UAN net imports

UAN net imports are down sharply

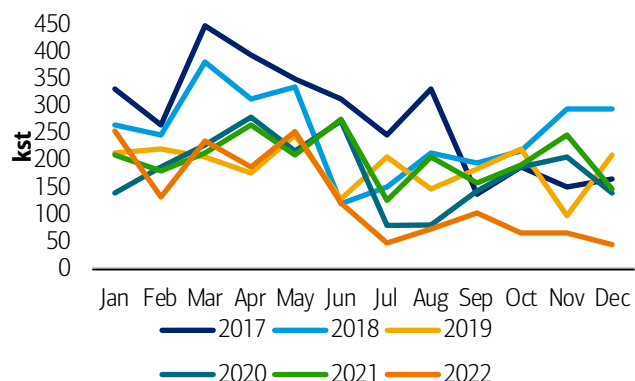


Source: TFI, Bloomberg, BofA Global Research

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Exhibit 53: 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 54: Potash pricing overview**

Potash fertilizer prices have continued to rise

	2017	2018	2019	2020	2021	2022		4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23
Potash Prices															
Midwest Spot (\$/mt)	277	311	333	282	569	799		797	830	875	808	684	503	495	427
Brazil Spot (\$/mt)	263	321	329	239	539	850		788	877	1115	844	565	495	383	351
Southeast Asia Spot (\$/mt)	241	279	293	245	393	781		580	656	929	873	664	494	397	309
Vancouver Spot (\$/mt)	244	281	295	229	432	795		653	755	985	828	611	497	380	326
China Contract (\$/mt)	224	247	290	242	244	550		247	432	590	590	590	590	503	307
India Contract (\$/mt)	233	257	288	248	293	573		369	523	590	590	590	590	422	382
	9/14	9/21	9/28	10/5	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21
Potash Prices															
Midwest Spot (\$/mt)	424	422	422	422	424	419	438	444	441	446	446	446	446	446	446
Brazil Spot (\$/mt)	355	355	355	355	355	343	343	343	343	338	333	333	325	315	315
Southeast Asia Spot (\$/mt)	310	310	315	315	315	315	315	315	320	320	320	320	320	320	320
Vancouver Spot (\$/mt)	274	272	277	278	278	277	281	282	287	284	286	286	286	284	287
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

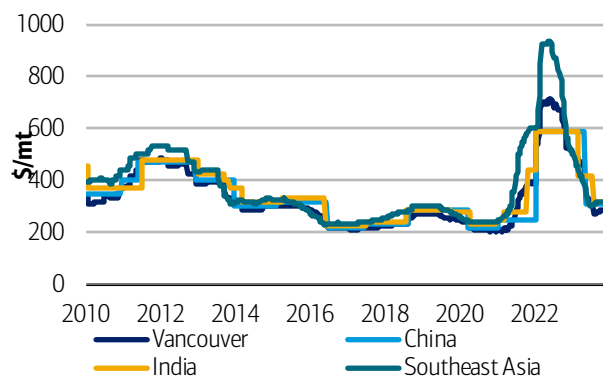
Source: CRU, Bloomberg, BofA Global Research

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

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

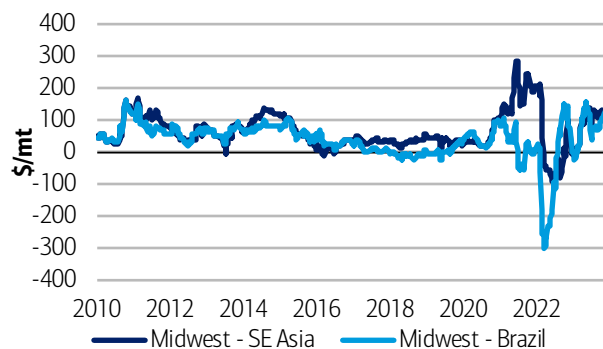


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 57: Potash Price Differentials (\$/mt)

US Midwest potash prices trade at a discount to global ones

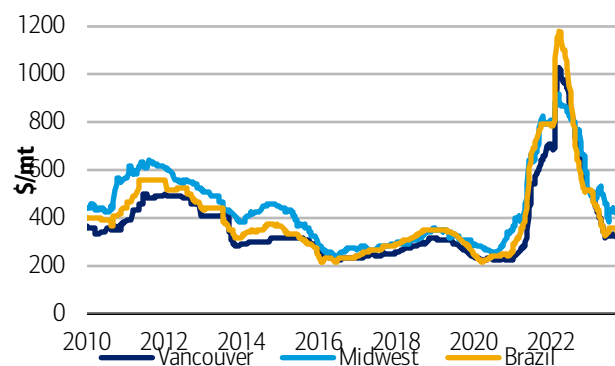


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 56: Global Granular Potash Prices (\$/mt)

Granular potash prices are off their highs

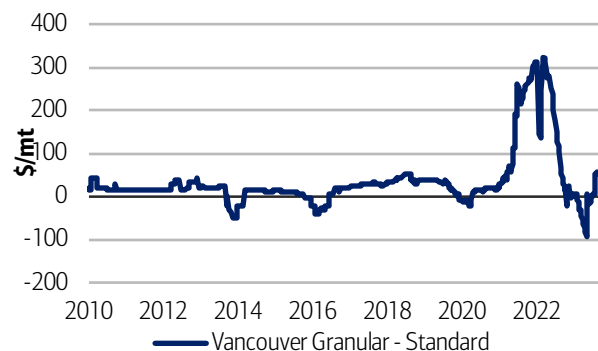


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 58: Granular Premium over Standard (\$/mt)

The granular premium over standard has recently reversed

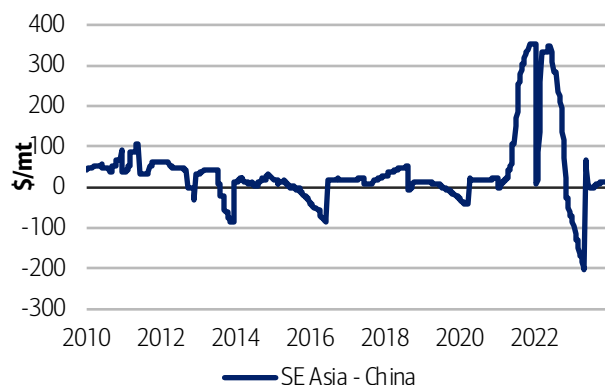


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 59: SE Asia Spot vs. China Contract (\$/mt)

SE Asia spot potash market is well above the contract price

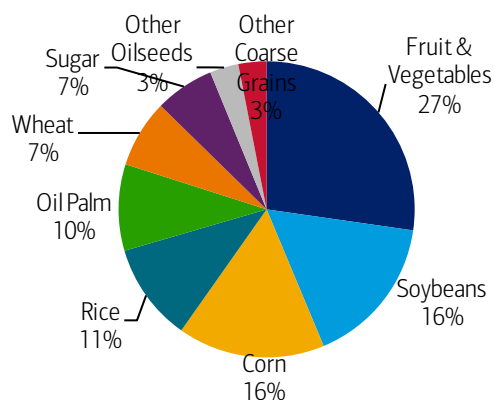


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 61: Global Potash Demand By Crop(2018)

Potash is used on all crops

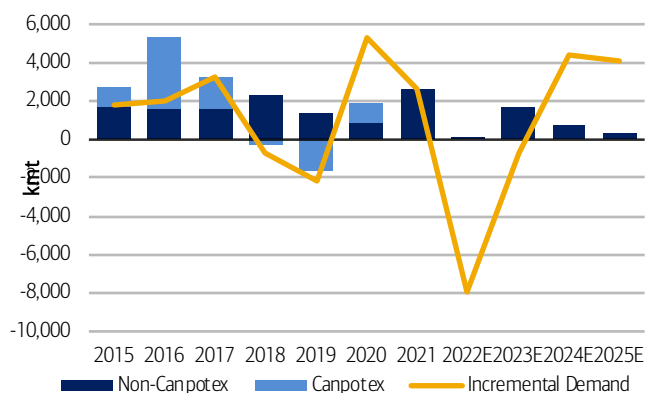


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 63: Global Capacity addition and demand growth

Most capacity additions were expected to come from Russia



Source: CRU, Bloomberg, BofA Global Research

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Exhibit 60: US NOLA vs. Brazil potash price spread

US NOLA urea price is now far below Brazil levels

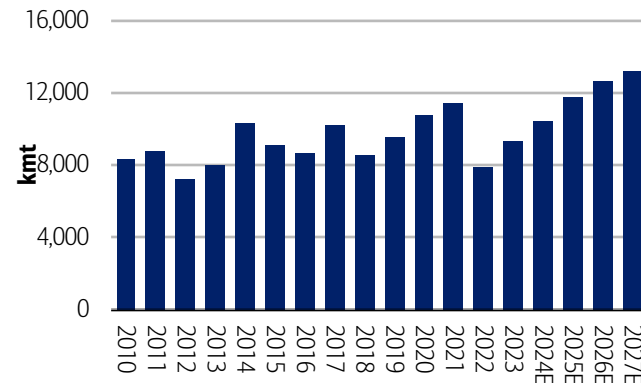


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 62: Russian Potash Exports (kmt)

Russia remains a large potash exporter

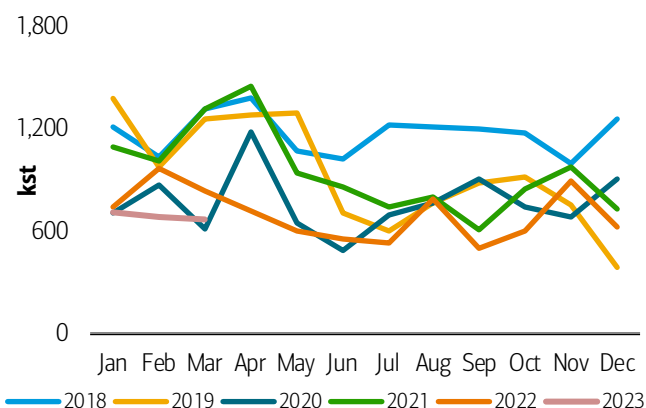


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 64: US MOP Net Imports

The US normally imports roughly 1mnt of potash per month

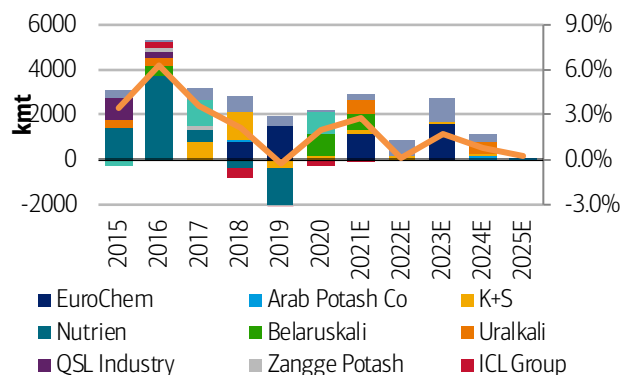


Source: TFI, Bloomberg, BofA Global Research

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Exhibit 65: Net Potash Capacity Addition by Company

Eurochem has significant Potash capacity to provide to the market

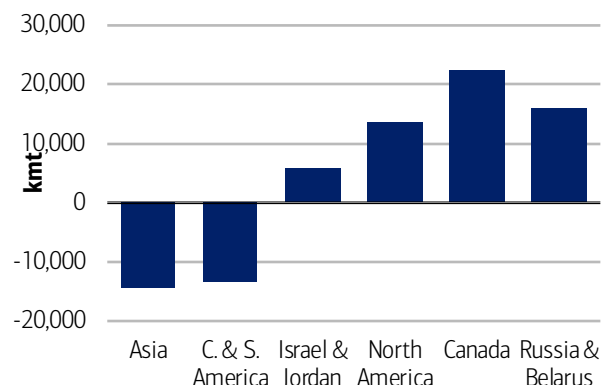


Source: CRU, BofA Global Research

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Exhibit 66: Global Potash Trade Flows

Canada & FSU are key potash supply regions



Source: CRU, BofA Global Research

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Phosphate**Exhibit 67: Historical pricing data for phosphate fertilizer**

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

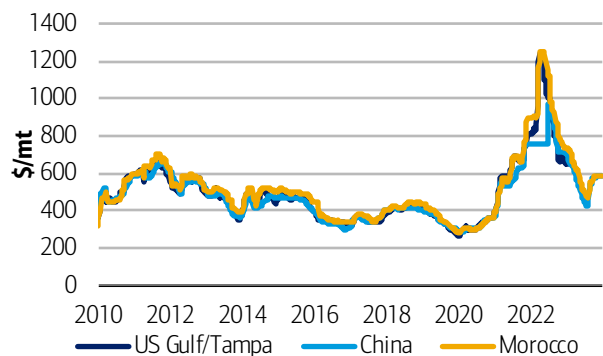
	2018	2019	2020	2021	2022	2023		1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23
Phosphate Prices															
DAP (US Midwest , \$/mt)	471	402	384	706	912	693		928	1000	888	830	740	743	622	663
DAP (US Gulf/Tampa, \$/mt)	419	344	324	644	894	560		950	1115	838	674	644	546	501	549
DAP - barge (New Orleans, \$/mt)	435	338	346	668	846	604		880	932	833	738	676	584	559	596
DAP (China, \$/mt)	435	338	346	668	846	604		880	932	833	738	676	584	559	596
DAP (Morocco, \$/mt)	412	347	323	595	779	556		755	805	845	709	636	503	506	582
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	545
MAP (Morocco, \$/mt)	445	339	357	707	870	632		907	967	869	736	637	568	643	683
MAP (Brazil, \$/mt)	427	361	326	679	964	574		1008	1195	934	720	668	553	514	560
Feedstock Costs															
Phosphate Rock (N. Africa, FOB, \$/mt)	91	95	90	137	277	270		212	286	320	290	300	295	263	218
Ammonia, (Tampa, CFR, \$/mt)	312	247	233	604	1160	513		1168	1272	1089	1110	744	369	343	604
Sulphur, (Tampa, FOB, \$/mt)	122	83	53	166	313	97		297	481	362	110	124	107	59	98
	9/14	9/21	9/28	10/5	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21
Phosphate Prices															
DAP (US Midwest , \$/mt)	648	648	648	648	656	656	661	661	650	650	650	650	694	694	678
DAP (US Gulf/Tampa, \$/mt)	525	535	543	543	543	540	543	550	550	550	550	550	550	560	560
DAP - barge (New Orleans, \$/mt)	584	584	584	573	587	587	592	587	581	590	601	598	615	623	623
DAP (Morocco, \$/mt)	555	578	580	590	590	590	590	590	590	590	590	590	590	585	585
MAP (US Gulf/Tampa, \$/mt)	520	530	538	538	538	538	538	545	545	545	545	545	545	560	560
MAP - barge (New Orleans, \$/mt)	692	689	689	705	717	711	683	692	697	659	650	661	664	672	678
MAP (Morocco, \$/mt)	533	533	533	543	543	543	543	545	548	573	578	578	578	578	578
MAP (Brazil, \$/mt)	533	533	533	550	550	550	550	555	558	560	563	563	563	563	563
Feedstock Costs															
Phosphate Rock (N. Africa, FOB, \$/mt)	215	215	215	215	215	215	215	215	220	220	220	220	220	220	220
Ammonia, (Tampa, CFR, \$/mt)	390	390	575	575	575	575	625	625	625	625	625	625	625	625	525
Sulphur, (Tampa, FOB, \$/mt)	55	55	55	55	102	102	102	102	102	102	102	102	102	102	102

Source: CRU, Bloomberg, BofA Global Research

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Exhibit 68: Global DAP Prices

DAP prices globally are up sharply

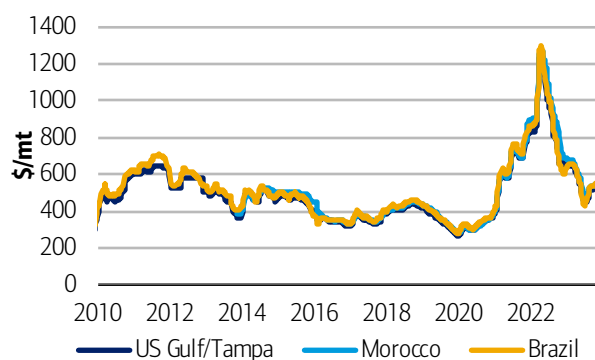


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 69: US MAP Prices (\$/mt)

Morocco currently has the highest MAP prices

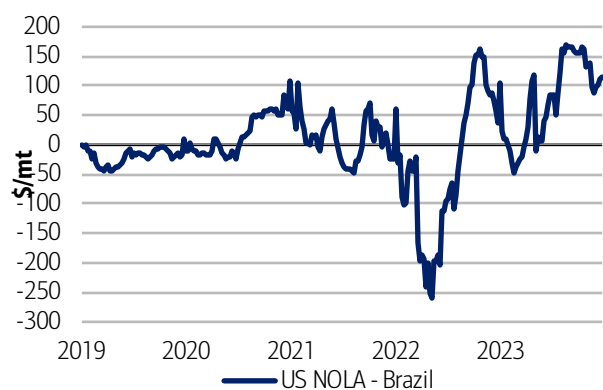


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 70: US NOLA vs Brazil phosphate price spread

US NOLA phosphate prices is above Brazil levels

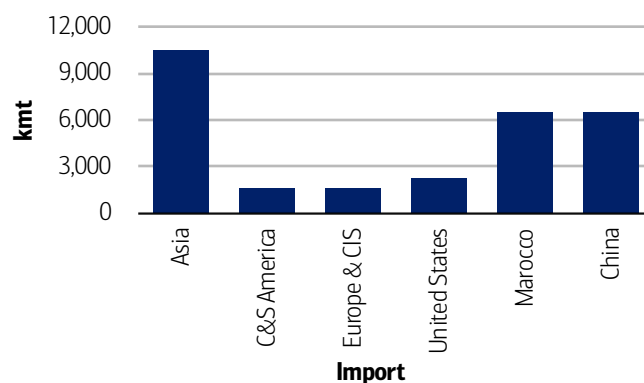


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 71: Global Phosphate Trade Flows 2021

China is the largest phosphate importer

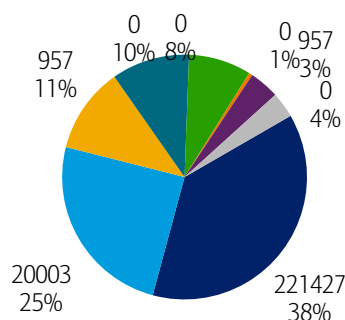


Source: CRU, Bloomberg, BofA Global Research

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Exhibit 72: Phosphate Rock Production by Region

China is the largest phosphate rock supplier



Source: CRU, Bloomberg, BofA Global Research

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