

US Oil and Gas

OIM# 656: Refiners earnings resilience, maybe the only game in town

Industry Overview

Refiners: best place in a mediocre market

Refining margins are notoriously seasonal with the rotation to summer grade gasoline still several months away. But what has our attention is that at the worst part of the year, in terms of weak seasonal gasoline demand, margins have stabilized and in recent weeks, have moved despite burgeoning inventories. Similarly, despite a mild winter so far, distillate cracks have stabilized in the wake of exogenous shocks - namely the ongoing attacks in the Red Sea and perhaps more acute, a series of strikes by Ukrainian drones on Russian refineries which appear to have broken the weakness signaled by weak natural gas prices as a leading indicator for heat cracks.

Refining fundamentals also look fragile: both gasoline and distillate inventories are high on both an absolute and demand adjusted basis; but winter planned maintenance looks to be one of highest in several years. Additionally, backwardation in forward crack spreads remains a disincentive for storage – implying that most of current gasoline inventories in particular are winter grade and hence with volumes boosted by highly evaporative blending components (RVP) such as butane. However, between May 15th and Sep 15th lower RVP gasoline requirements are imposed across the US, and mainly in the warmer Southern States including California. It follows that with high levels of winter grade gasoline, but also high levels of maintenance, that current elevated gasoline stocks likely follow the seasonal decline ahead of the switch from summer to winter – and take the lead on defining benchmark margins for US refiners.

We will not revisit the factors we believe are exacerbating volatility of summer gasoline: but it is worth remembering that the elevated freight rates, will specifically impact west coast imports from Asia. With Phillips 66 Rodeo refinery due to stop traditional crude processing in February, the likelihood of elevated margins on the West Coast is maybe the best example of how the US market overall has been impacted by significant refinery closures over the past four years.

Current crack resilience supports positive earnings

For now, the impact of all these factors has been a rebound in margins, to levels that tip earnings estimates higher in 2024. At the same time, the critical determinant of value for the US refiners that is the long term ‘mid cycle’ margins remain within sight of our base case that assumes \$11.50/bbl Gulf Coast 321 margin. With that said, we see long term ramifications of US refinery closures being a greater dependence on higher cost imports and a higher level of volatility that leaves upside risks to mid cycle margins for a market more vulnerable to periodic maintenance – as is playing out right now.

The US refining sector has already responded to current margin strength. However, the reality is that with a backwardated oil market capped by OPEC+ spare capacity and a weak natural gas market pending delayed LNG starts, the US refining sector will remain the best proverbial house in a mediocre market, and the only sub sector in energy where earnings revisions are pointed higher. We remain Neutral in the broader sector, with pure plays PBF Energy and Valero preferred for incremental exposure.

BofA Securities does and seeks to do business with issuers covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision. Refer to important disclosures on page 24 to 28. Analyst Certification on page 23. Price Objective Basis/Risk on page 22.

12656998

Timestamp: 08 February 2024 03:17AM EST

08 February 2024

Equity
United States
Oils

Doug Leggate
Research Analyst
BofAS
+1 713 247 6013
doug.leggate@bofa.com

Kalei Akamine
Research Analyst
BofAS
+1 713 247 7880
kalei.akamine@bofa.com

Noah Hungness
Research Analyst
BofAS
+1 832 341 5807
noah.hungness@bofa.com

Exhibit 1: BBG vs. Actuals (mbbls)

Gasoline draws while crude inventories build

Crude Stocks	
Est	1,514
Actual	5,520
Diff	4,006
Distillate Stocks	
Est	(2,146)
Actual	(3,221)
Diff	(1,075)
Gasoline Stocks	
Est	836
Actual	(3,146)
Diff	(3,982)
Utilization	
Est	83.5%
Actual	82.4%
Diff	-1.1%

Source: EIA

BofA GLOBAL RESEARCH

OPEC – organization of petroleum exporting countries
E&P – exploration and production
IEA – international energy agency
DOE – department of energy
OIM – oil inventory monitor
bpd – barrel per day
bbl – barrel
LNG - liquid natural gas
RVP – Reid Vapor Pressure

DUC – drilled uncompleted

OIM #656

Exhibit 2: Summary DOE

Summary of DOE Weekly Statistics

	Current	Prev	Change	%
Crude Oil	427.4	421.9	5.520	1.3%
of which cushioning	28.1	28.1	(0.033)	-0.1%
Lower 48 Production	12,900	12,600	0.300	2.4%
Motor Gasoline	251.0	254.1	(3.146)	-1.2%
Gasoline production	9,011	9.3	(0.270)	0.0
Gasoline demand	8,807	8,144	0.663	8.1%
Gasoline demand cover	28.5	31.2	(2.706)	-8.7%
Distillate	127.6	130.8	(3.221)	-2.5%
of which Heating Oil	6.2	6.4	(0.223)	-3.5%
of which Diesel	121.4	124.4	(2.998)	-2.4%
Distillate demand	3.8	3.8	0.060	1.6%
Distillate demand cover	33.4	34.8	(1.391)	-4.0%
Jet Fuel	40.9	41.1	(0.254)	-0.6%
Jet fuel demand	1.6	1.6	0.014	0.9%
Jet fuel demand cover	25.5	25.9	(0.384)	-1.5%
Residual	27.5	26.7	0.773	2.9%
Resid demand	0.3	0.4	(0.044)	-11.7%
Resid demand cover	83.0	71.2	11.806	16.6%
Utilization	82.4%	82.9%	-0.5%	na
Product Stocks	1227.1	1231.5	-4.5	0.0%

Source: DOE

BofA GLOBAL RESEARCH

Crude and products inventory change

Exhibit 3: Distillate inventory by PADD

Distillate inventories drew by -3220 kbbbls

BBG Estimates	(2,146)
Actual stock change	(3,221)
Exports	1,126
Imports	126
Prod / consumption net	540
Production	4,357
Product Supplied	(3,817)
PADD 1	70
PADD 2	(533)
PADD 3	(1,937)
PADD 4	(481)
PADD 5	(339)
Total	(3,220)

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Exhibit 4: Crude inventory by PADD

Crude inventories built by 5521 kbbbls

BBG Estimates	1,514
Actual stock change	5,520
Exports (Monthly avg)	3,596
Imports	6,907
Prod / consumption net	(6,907)
Production	13,300
Product Supplied	(20,207)
PADD 1	(616)
PADD 2	1,928
PADD 3	6,235
PADD 4	295
PADD 5	(2,321)
Total	5,521

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Exhibit 5: Gasoline inventory by PADD

Gasoline inventories drew by -3144 kbbbls

BBG Estimates	836
Fnsh'd MoGas stock chn'g	(487.0)
Exports	747
Imports	56
Prod / consumption net	204
Production	9,011
Product Supplied	(8,807)
PADD 1	601
PADD 2	997
PADD 3	(5,145)
PADD 4	605
PADD 5	(202)
Total	(3,144)

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Exhibit 6: Jet inventory by PADD

Jet inventories drew by -254 kbbbls

BBG Estimates	(254)
Actual stock change	(254)
Exports	223
Imports	(354)
Prod / consumption net	61
Production	1,665
Product Supplied	(1,604)
PADD 1	159
PADD 2	(170)
PADD 3	(472)
PADD 4	92
PADD 5	137
Total	(254)

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Refiners: best place in a mediocre market

Current crack resilience supports positive earnings

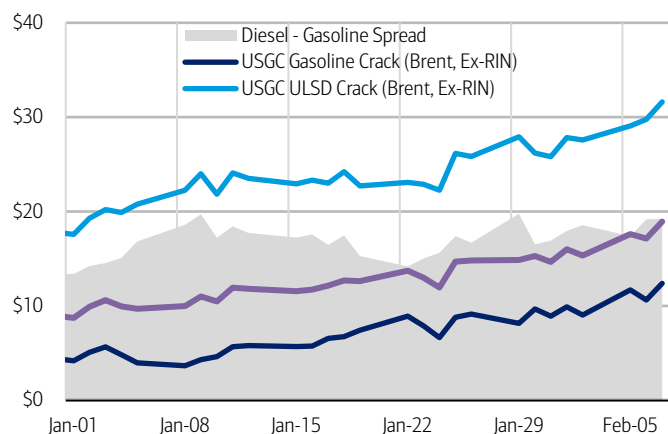
Refining margins are notoriously seasonal. And with the rotation to summer grade gasoline still several months away, investors can be forgiven for some optimism that a summer tailwind can support upward earning revisions for a sector that typically follows margins, within a range.

However, what has our attention is that at the worst part of the year, in terms of weak seasonal gasoline demand, margins have stabilized and in recent weeks, have started to move higher despite burgeoning inventory levels that might otherwise weigh on gasoline cracks. Similarly, despite a mild winter, so far, distillate cracks have also stabilized within sight of recent highs at the start of winter and before the levels of demand through an El Nino winter were known. Winter is not done yet: but any reticence to avoid diesel margin weakness that has weak natural gas as a leading indicator has arguably been mitigated by exogenous shocks outside the normal course of events - namely the ongoing attacks in the Red Sea and perhaps more acute, a series of strikes by Ukrainian drones on Russian refineries.

- Since the disruptions in the Red Sea began to intensify the week of January 19th, spot cracks have surged \$5/bbl. Risk is now priced into 1H24, with 1Q24 up \$2.50/bbl (now \$16.18) and 2Q24 up \$2.0 (now \$18.37).
- Spot diesel cracks in the Gulf Coast have jumped \$9/bbl over the same period, with a \$3/bbl increase from March to July. Gasoline also followed suit though to a lesser extent with an increase of \$6/bbl in the spot and \$2/bbl from March to July.

Exhibit 7: Gulf Coast RIN adjusted 321

Counter seasonal strength on red Sea attacks

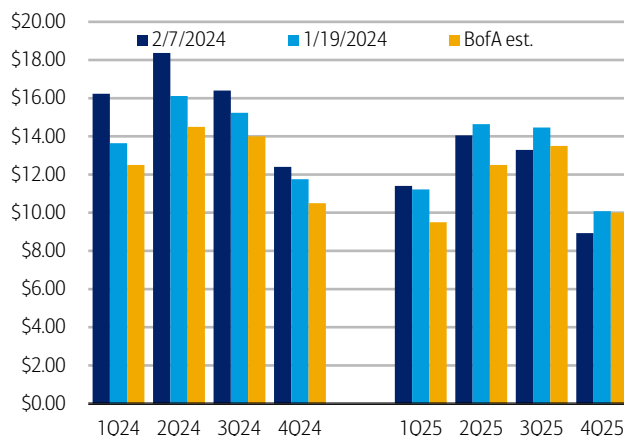


Source: BofA Global Research; Bloomberg

BofA GLOBAL RESEARCH

Exhibit 8: Gulf Coast RIN adjusted 321 forward crack spreads

Rapid recovery now sits above BofA estimates



Source: BofA Global Research; Bloomberg

BofA GLOBAL RESEARCH

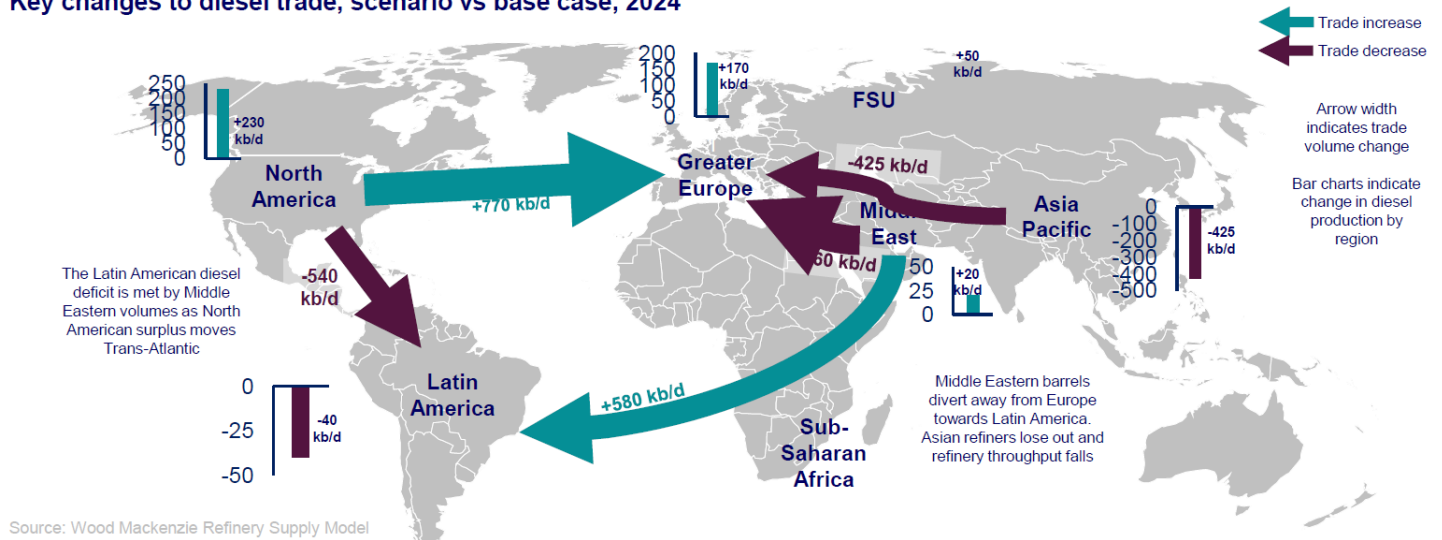
Assessing the impact is tricky – less movement in 2H24, suggests that the market is indicating that current disruptions are transitory and may have downside risk at the front of the curve should headline risk begin to reverse. With this in mind, over the last several weeks we have attempted to frame the issues through a series of conference calls, culminating with a call with WoodMac on 2/7, with the issues characterized in the charts below:

- First, we see the impact of Red Sea attacks as one where theoretical trade flows are reorientated in favor of the Atlantic basin – but only partially so far.
- Still, the net impact is the higher costs of delivery for import dependent regions for distillate, specifically, and a direct benefit to realized margins on the US Gulf Coast.



Exhibit 9: Red Sea attacks should have theoretically reorientated trade flows

Atlantic basin is the primary beneficiary higher costs of supplies

Key changes to diesel trade, scenario vs base case, 2024

Source: Woodmac

BofA GLOBAL RESEARCH

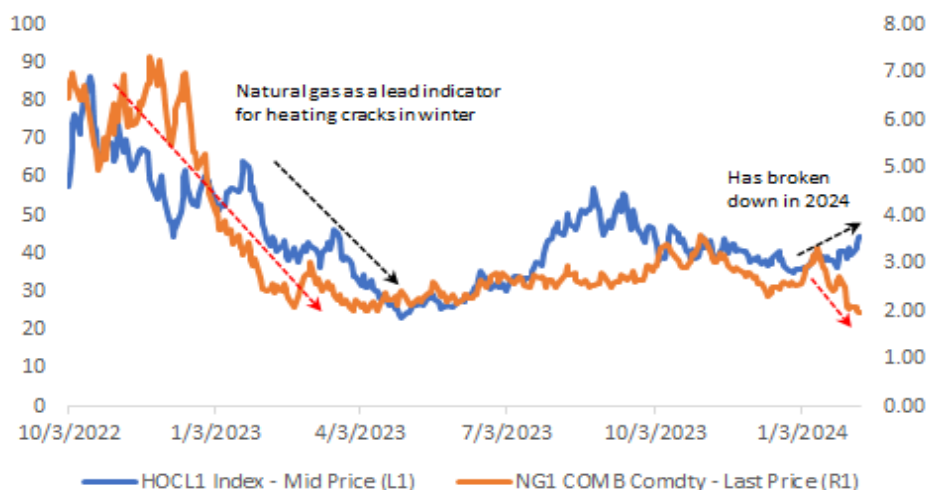
The net result is that while the heating market aspect of distillate dominates diesel margins in winter, disruptions in global markets is seemingly providing offset support from what might otherwise be a repeat of the weather-related weakness in 2023.

- Recall that distillate margins dropped towards \$20 in April 2023, from a high of over \$70 in November 2022.
- With natural gas a useful lead indicator of heating demand, we might ordinarily have expected renewed weakness in 2024, following an equally mild winter so far that might pose a risk to heating cracks, which have been the only meaningful support for benchmark margins over the last few months.

Instead, heating cracks have diverged, a consequence we suggest of the disruptions seen outside of the US.

Exhibit 10: US HH natural gas vs Heating cracks

Natural gas as a lead indicator: seasonal weakness has diverged on Red Sea attacks so far in 2024



Source: BofA Global Research; Bloomberg

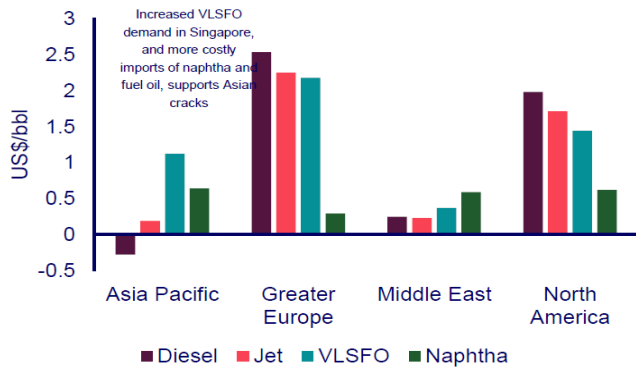
BofA GLOBAL RESEARCH

Woodmac suggests the impact is around \$1.50-2.00/bbl. But with spikes in volatility the net result is that both heating oil & gasoline margins have turned higher, offsetting seasonal weakness and looking past current inventory levels that are seasonally elevated.

Exhibit 11: Impact of red Sea attacks on realized refining margins

\$1.50 / bbl - \$2.00/bbl in the US

Change in product pricing, scenario vs base case, 2024

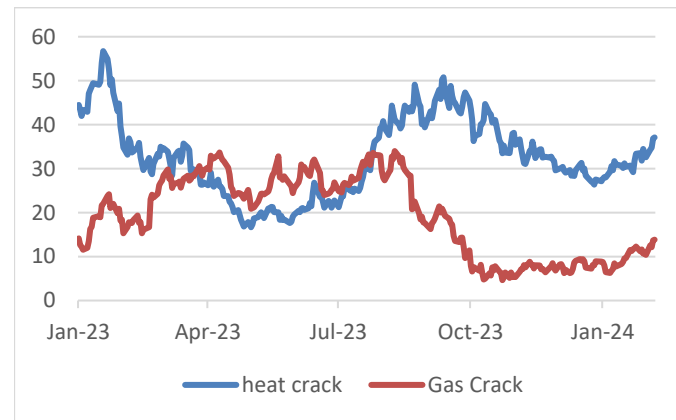


Source: Woodmac

BofA GLOBAL RESEARCH

Exhibit 12: Distillate vs Gasoline cracks

Distillate still holds strength vs gasoline



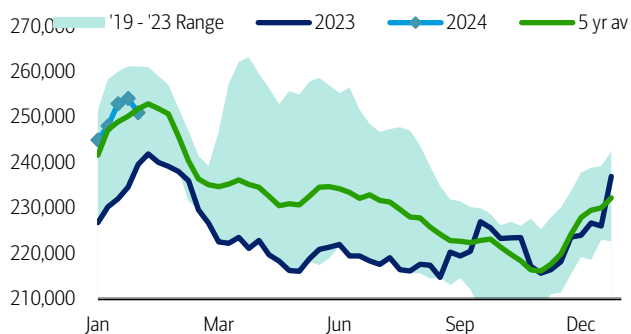
Source: BofA Global Research; Bloomberg

BofA GLOBAL RESEARCH

Both gasoline and distillate inventories are high on both an absolute and demand adjusted basis. However, after the 4Q23 reports from VLO, PSX, MPC, XOM & CVX, it is now clear that planned maintenance in 1Q24 will be one of highest in several years.

Exhibit 13: Gasoline Stocks

Gasoline Stocks -1.2% Lower w/w and 6.1% Higher y/y

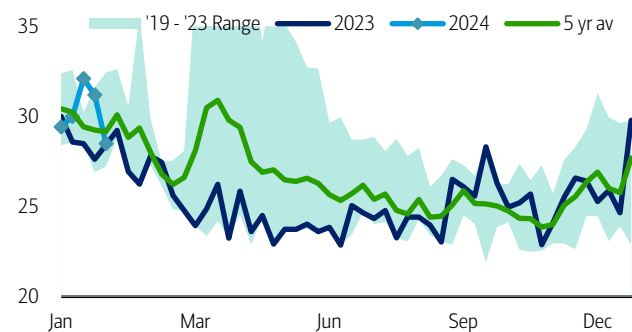


Source: DOE

BofA GLOBAL RESEARCH

Exhibit 14: Gasoline Demand Cover

Gasoline Demand Cover -8.7% Lower w/w and 9.8% Higher y/y

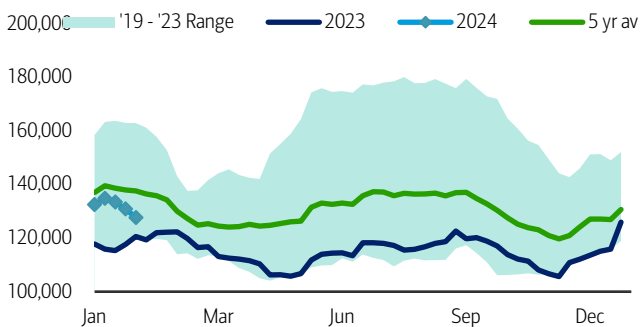


Source: DOE

BofA GLOBAL RESEARCH

Exhibit 15: Distillate Stocks

Distillate Stocks -2.5% Lower w/w and 8.5% Higher y/y

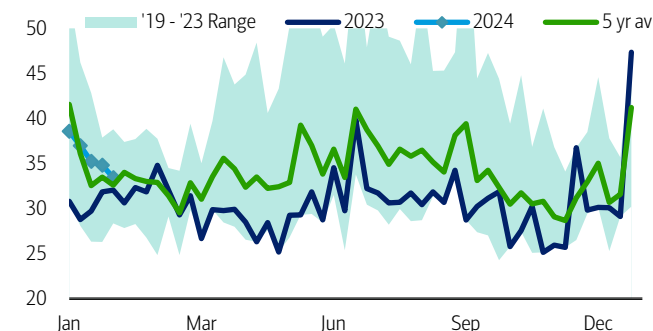


Source: DOE

BofA GLOBAL RESEARCH

Exhibit 16: Distillate Demand Cover

Distillate Demand Cover -4.0% Lower w/w and 8.7% Higher y/y



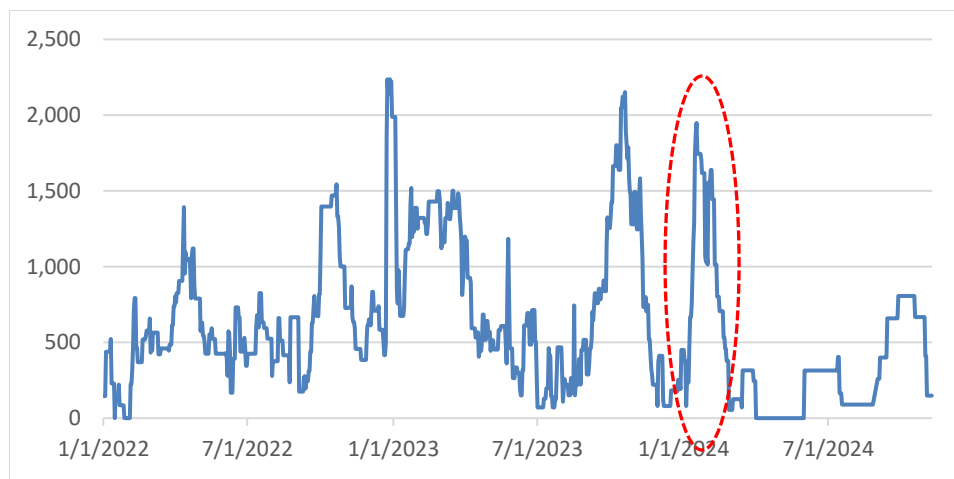
Source: DOE

BofA GLOBAL RESEARCH

A glance at the chart below shows what this looks like in practice the highest winter maintenance on several years, and the backdrop that we expect to clean up elevated winter grade inventories.

Exhibit 17: Planned refinery maintenance

One the highest 1Q24 periods in several years



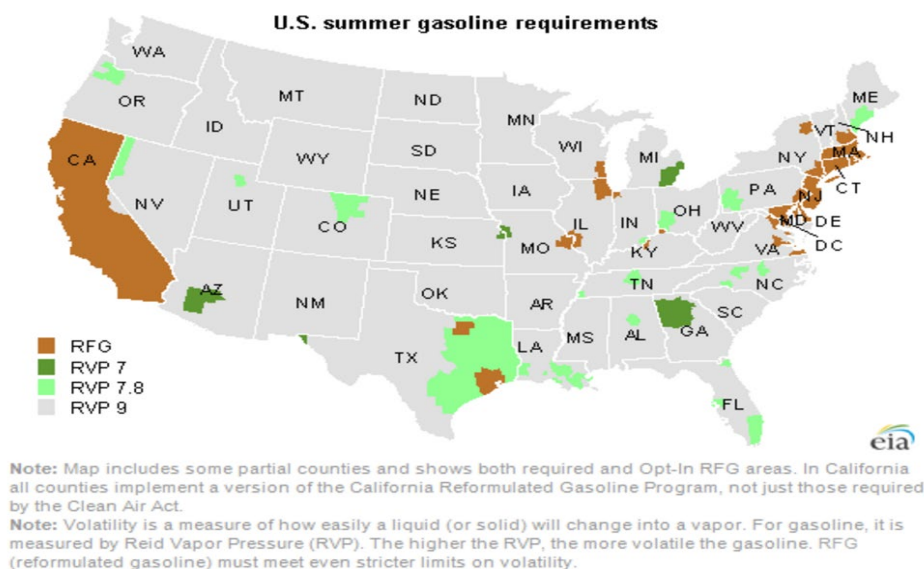
Source: Bloomberg; BofA Global Research

BofA GLOBAL RESEARCH

Additionally, the backwardation in forward crack spreads remains a disincentive for storage – implying that most of current gasoline inventories in particular are winter grade and hence, with volumes boosted by highly evaporative blending components (RVP¹) such as butane. However, between May 15th and Sep 15th lower RVP gasoline requirements are imposed across the US, and mainly in the warmer Southern States including California. It follows that with high levels of winter grade gasoline, but also high levels of maintenance, that current elevated gasoline stocks likely follow the seasonal decline ahead of the switch from summer to winter – and take the lead on defining benchmark margins for US refiners.

Exhibit 18: RVP changes across the US effective May 15

The critical catalyst for summer grade gasoline strength



Source: EIA

BofA GLOBAL RESEARCH

¹ RVP – Reid Vapor Pressure as a measure evaporative quality of gasoline blending components.

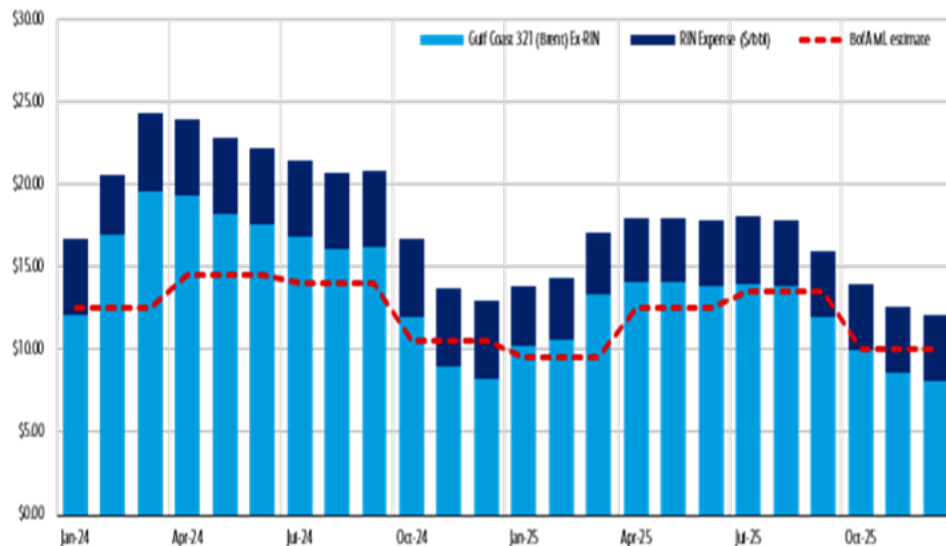
We will not revisit the factors we believe are exacerbating volatility of summer gasoline: but it is worth remembering that the elevated freight rates mentioned above, will specifically impact west coast imports from Asia. With Phillips 66 Rodeo refinery due to stop traditional crude processing in February, the likelihood of elevated margins on the West Coast maybe the best example of how the US market overall has been impacted by significant refinery closures over the past four years.

For now the impact of all of these factors has been a rebound in margins, to levels that now tip earnings estimates higher in 2024 and in 1Q24 in particular. At the same time, refinery maintenance will be an offset while the critical determinant of value for the US refiners that is the long term 'mid cycle' margins remains within sight of our base case that assumes \$11.50/bbl Gulf Coast 321 margin.

With that said, we see long term ramifications of a change in the dynamics of US refining markets as a result of closures and the greater dependence on higher cost imports, being a higher level of volatility that leaves upside risks to mid cycle margins for a market more vulnerable to periodic maintenance – as is playing out right now.

Exhibit 19: Forward crack spreads vs BofA estimates

2024 now stands above our base case, 2025 looks in line



Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

The US refining sector has already responded to current margin strength. However, the reality is that with a backward oil market capped by OPEC+ spare capacity and weak natural gas market pending delayed LNG starts, the US refining sector will remain the best proverbial house in a mediocre market, and the only sub sector in energy where earnings revisions are pointed higher. We remain Neutral in the broader sector, with pure plays PBF Energy and Valero preferred for incremental exposure.

DOE Review

Refinery maintenance in full swing

Crude inventories increased by 5.5mm bbls w/w as commercial inventories continue to bounce off recent lows, as refinery maintenance gets underway.

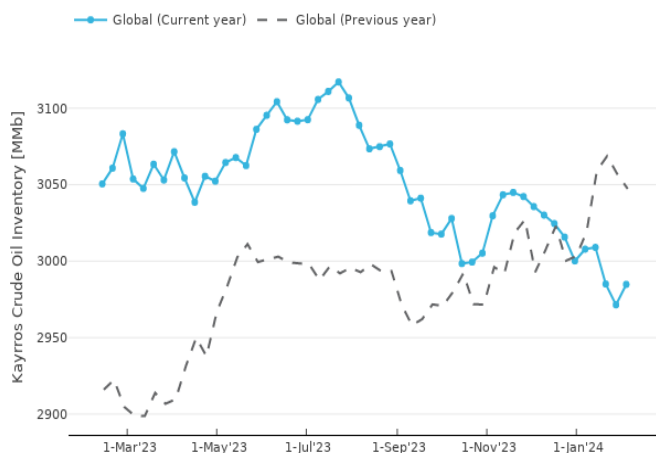
This week, the build was concentrated in PADD 3 (6.2mm bbls) and PADD 2 (1.9mm bbls) – with the PADD 3 increase helped also by a 300,000 bpd drop in crude exports and a 1.3mm bpd gain in imports. In PADD 2 crude inventories increased as a result of the Whiting refinery outage (430,000 bpd of capacity) due to a power loss on Jan 30th and has so far not returned online. Lower 48 production rebounded by 300,000 bpd, returning to pre-storm levels at 12.9mm bpd. However refining utilization has stayed in the low 80s, with planned maintenance near peak levels.

Gasoline inventories fell by 3.2mm bbls concentrated in PADD 3. While early, we see this as the start of the seasonal decline in winter grade stocks: look to next week's data to confirm the trend. Distillate inventories also fell by 3.4mm bbls and remain below the 5-yr average as seasonal demand from heating season remains high versus refineries now in maintenance. Product supplied was flat versus last week with production. Looking forward we expect distillate inventories will continue to decline, following seasonal trends but note that inventories are above 2023 levels.

Global crude inventories increased slightly (13.4mm bbls) after several weeks of decline by 13.4mm bbls w/w lead by a 10.4mm bbl increase in Europe and a 7.6mm bbl increase in MENA. This was partially offset by China who fell by 7.6mm bbls. Since the start of the year we estimate inventories have declined on average by 623,000 bpd, which compares to the latest EIA and IEA estimates of a supply / demand deficit at 840,000 bpd and 100,000 bpd respectively. However, even the current supply deficit we see no room for a material return of OPEC+ supply given over 6.4mm bpd of spare capacity.

Exhibit 20: Global inventories

Inventories increase by 13.4 mm bbls lead by growth in Europe

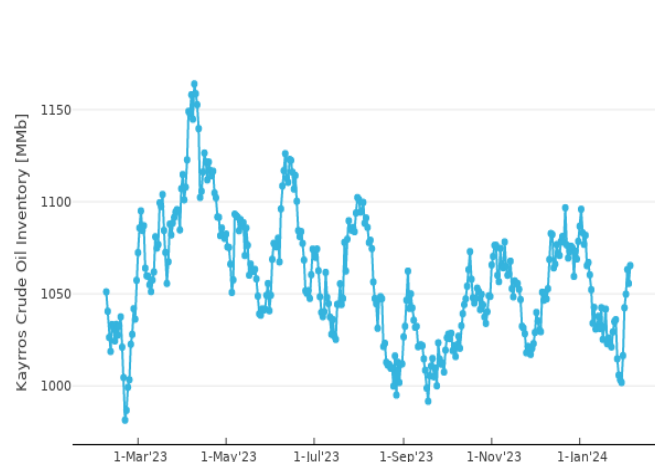


Source: Kayrros

BofA GLOBAL RESEARCH

Exhibit 21: Crude on water

Remains range bound but bounces off of recent bottoms



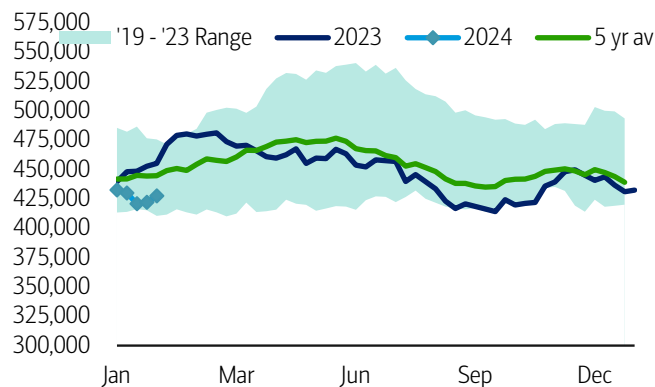
Source: Kayrros

BofA GLOBAL RESEARCH

Crude oil stocks

Exhibit 22: Crude Stocks

Crude Stocks 1.3% Higher w/w and -7.3% Lower y/y

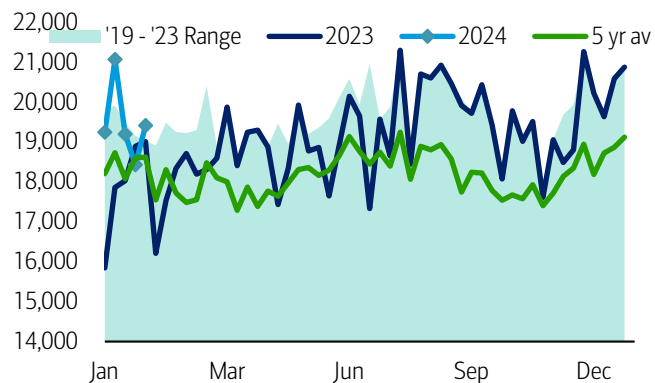


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 24: Crude Implied Demand (000 bpd)

Crude Implied Demand 5.4% Higher w/w and -3.1% Higher y/y

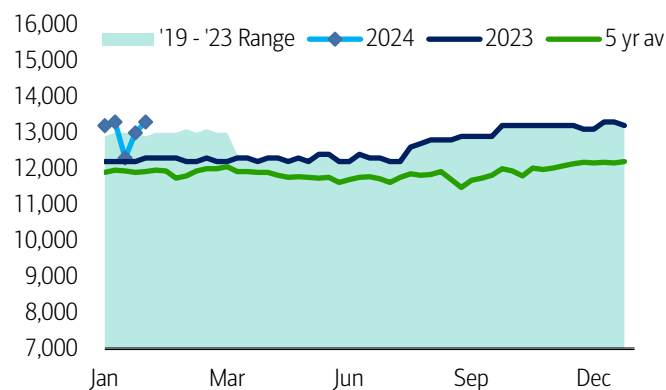


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 26: Crude Production

Crude Production 2.3% Higher w/w and 5.7% Higher y/y

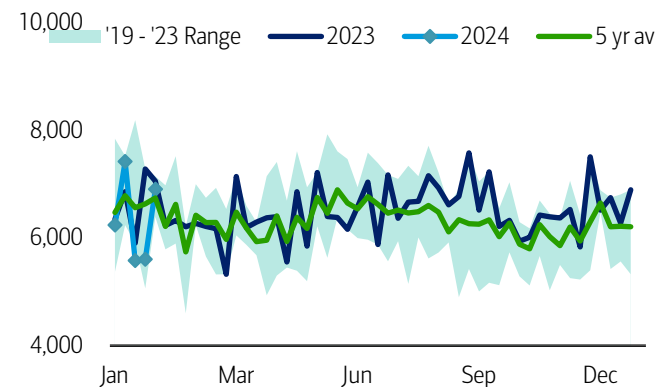


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 23: Crude Imports

Crude Imports 23.2% Higher w/w and -20.6% Lower y/y

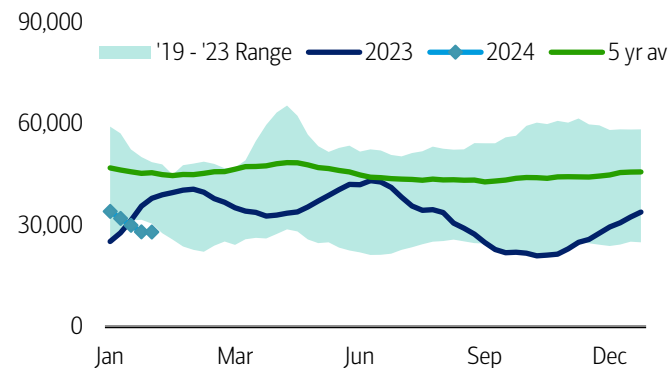


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 25: Cushing Inventory

Cushing Inventory -0.1% Lower w/w and -28.1% Lower y/y

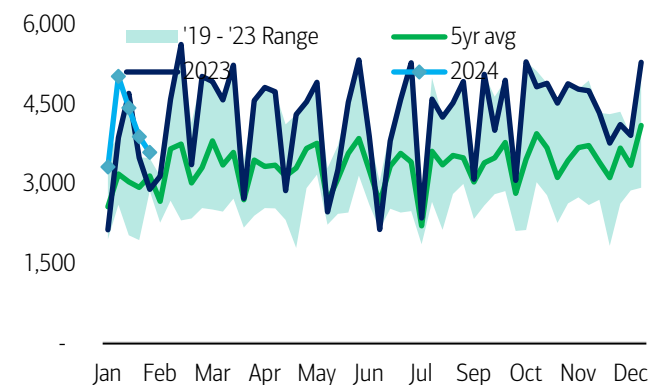


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 27: Crude Oil Exports

Crude Oil Exports -7.7% Lower w/w and 34.3% Higher y/y



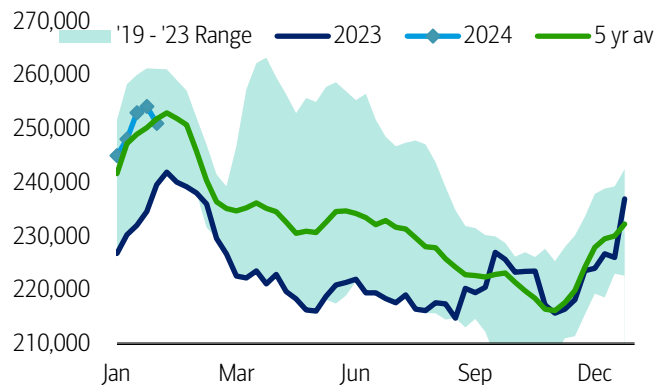
Source:DOE

BofA GLOBAL RESEARCH

Gasline stocks

Exhibit 28: Gasoline Stocks

Gasoline Stocks -1.2% Lower w/w and 6.1% Higher y/y

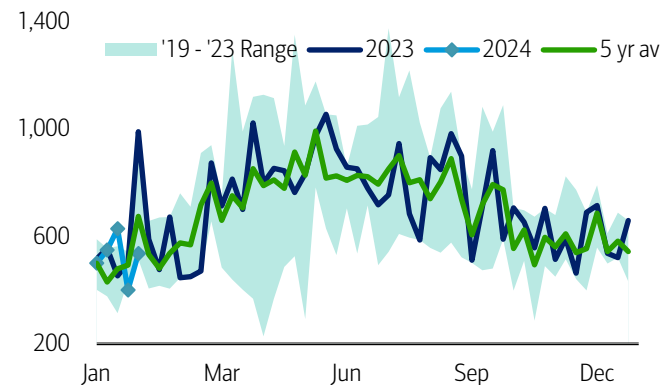


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 29: Gasoline Imports

Gasoline Imports 34.0% Higher w/w and -59.6% Lower y/y

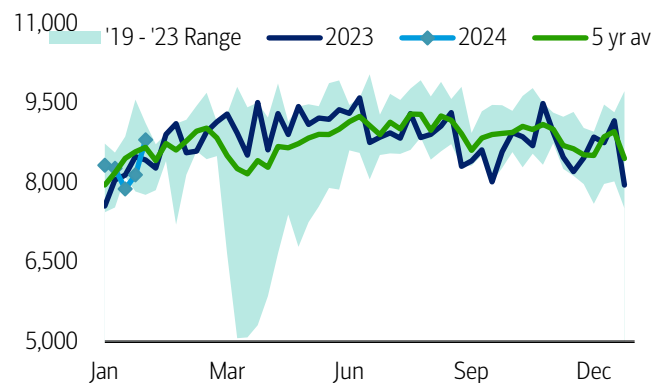


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 30: Gasoline Product Supplied (000 bpd)

Gasoline Product Supplied 8.1% Higher w/w and -3.4% Higher y/y

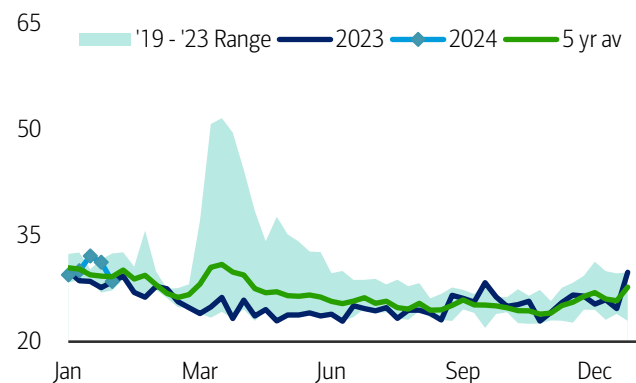


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 31: Gasoline Demand Cover

Gasoline Demand Cover -8.7% Lower w/w and 9.8% Higher y/y

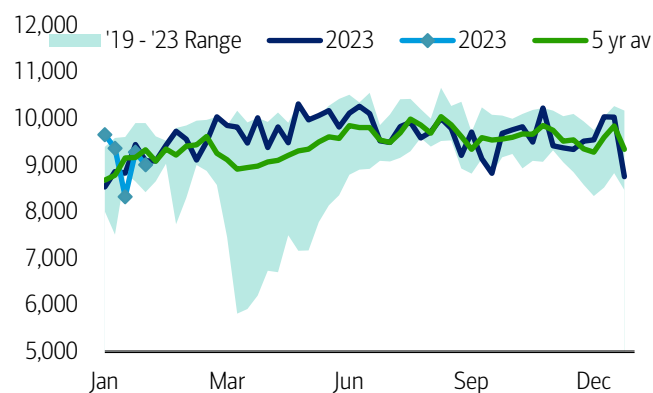


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 32: Gasoline Production

Gasoline Production -2.9% Lower w/w and 2.1% Lower y/y

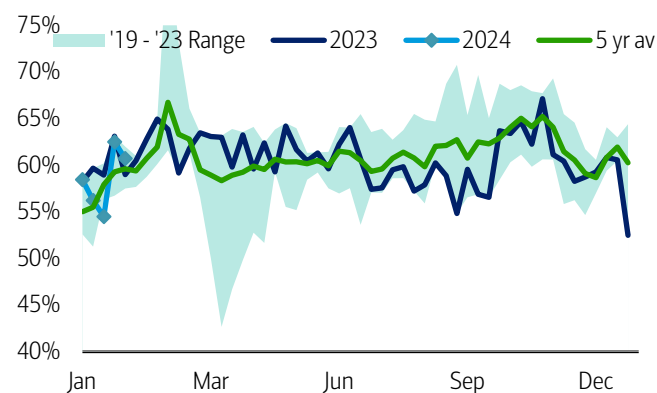


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 33: Gasoline Yield

Gasoline Yield 0.4% Higher w/w and 5.6% Higher y/y



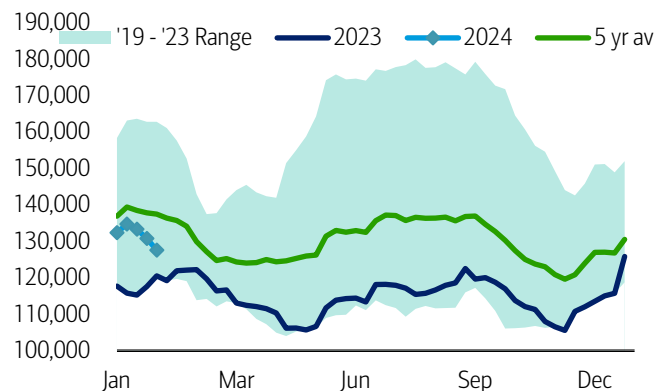
Source:DOE

BofA GLOBAL RESEARCH

Distillate stocks

Exhibit 34: Distillate Stocks

Distillate Stocks -2.5% Lower w/w and 8.5% Higher y/y

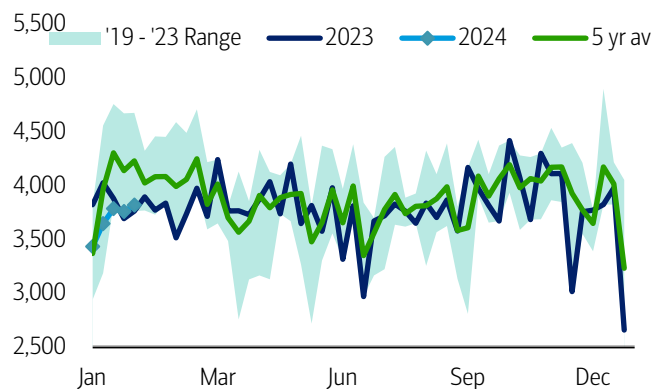


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 36: Distillate Product Supplied (000 bpd)

Distillate Product Supplied 1.6% Higher w/w and -0.1% Higher y/y

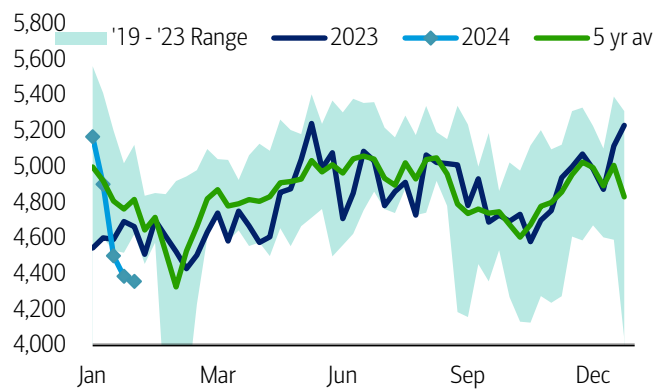


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 38: Distillate Production

Distillate Production -0.6% Lower w/w and -6.0% Lower y/y

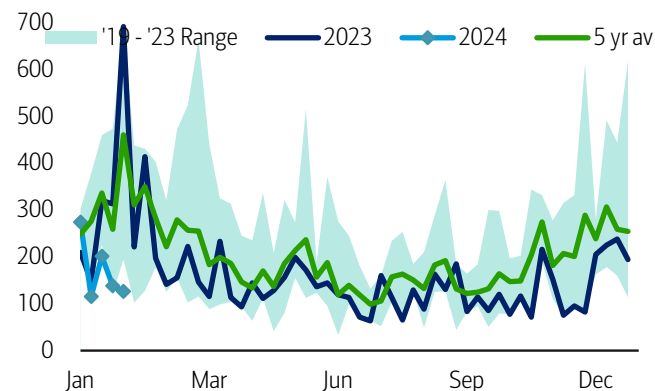


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 35: Distillate Imports

Distillate Imports -8.7% Lower w/w and -80.1% Lower y/y

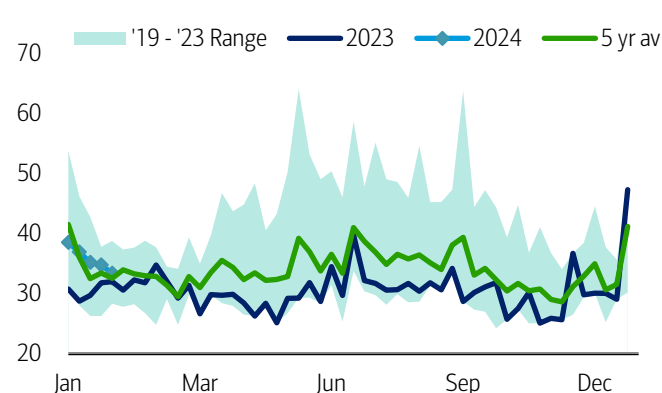


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 37: Distillate Demand Cover

Distillate Demand Cover -4.0% Lower w/w and 8.7% Higher y/y

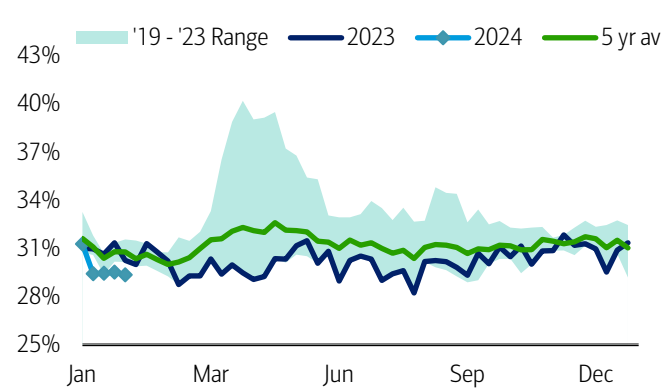


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 39: Distillate Yield

Distillate Yield -0.6% Lower w/w and -2.4% Lower y/y



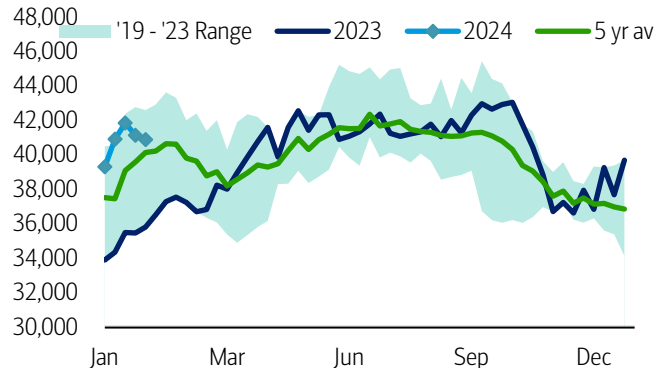
Source:DOE

BofA GLOBAL RESEARCH

Jet stocks

Exhibit 40: Jet Stocks

Jet Stocks -0.6% Lower w/w and 14.9% Higher y/y

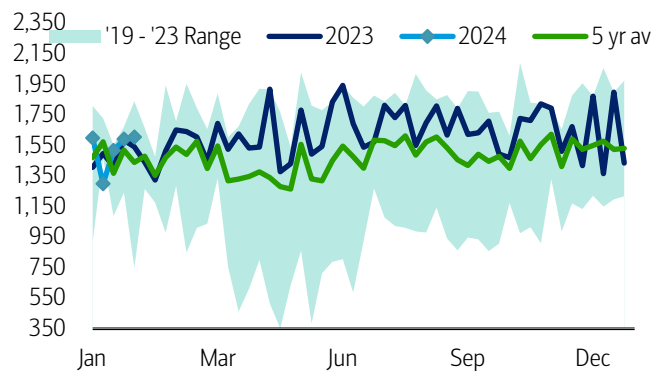


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 42: Jet Implied Demand (000 bpd)

Jet Product Supplied 0.9% Higher w/w and 3.2% Higher y/y

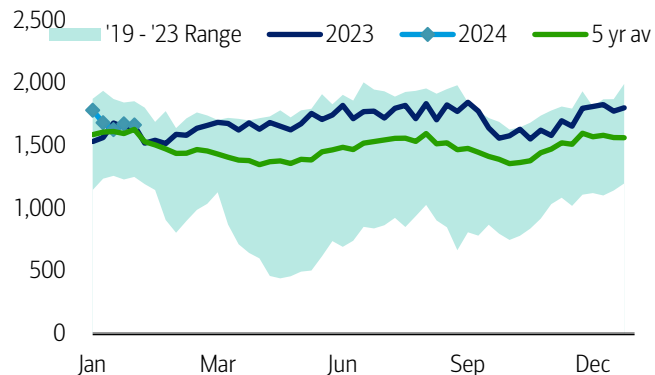


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 44: Jet Production

Jet Production -0.5% Lower w/w and 0.8% Higher y/y

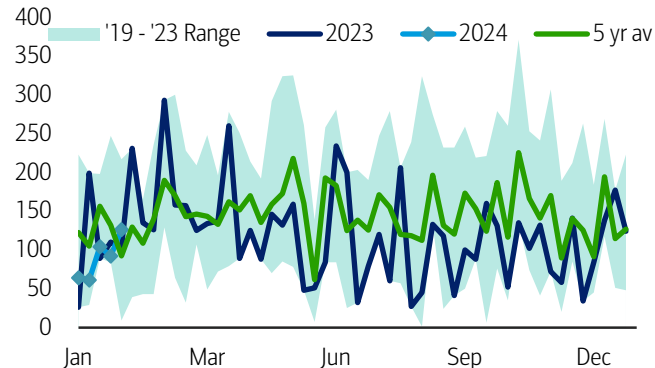


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 41: Jet Imports

Jet Imports 37.0% Higher w/w and -10.7% Higher y/y

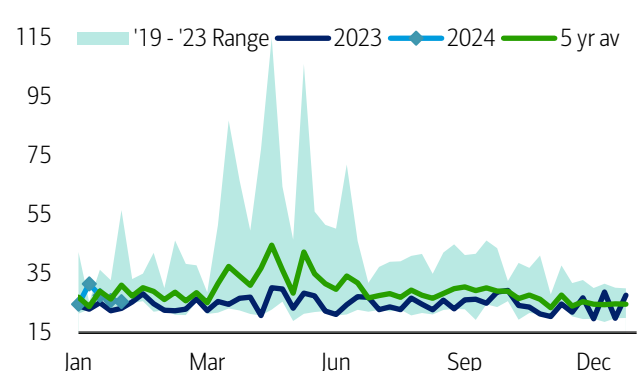


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 43: Jet Demand Cover

Jet Demand Cover -1.5% Lower w/w and 11.3% Higher y/y

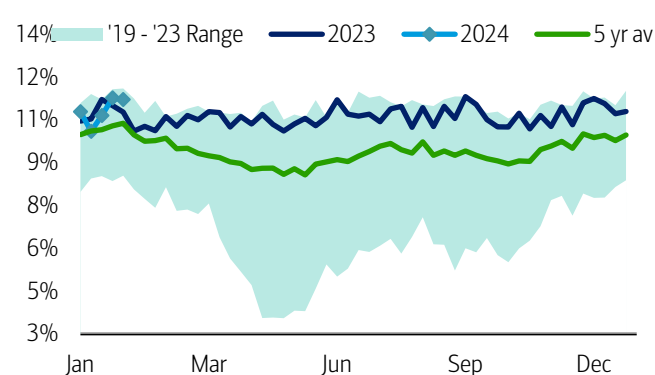


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 45: Jet Yield

Jet Yield -0.5% Lower w/w and 4.6% Higher y/y



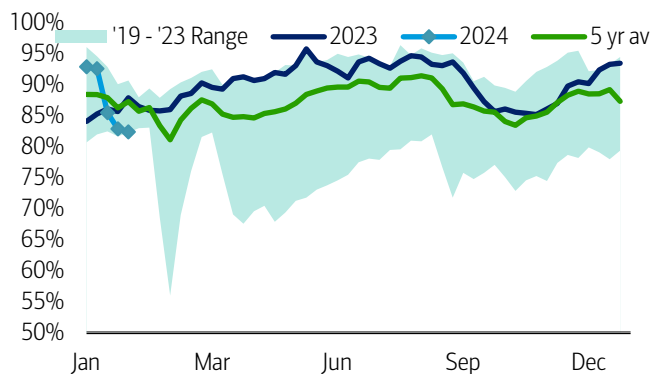
Source:DOE

BofA GLOBAL RESEARCH

Refinery Utilization

Exhibit 46: Utilization

Refinery Utilization -0.6% Lower w/w and -5.7% Lower y/y

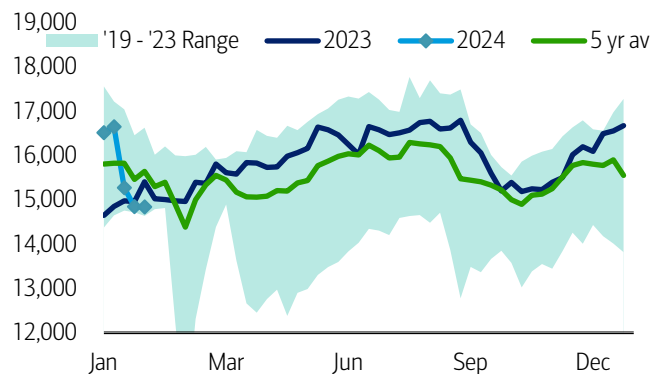


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 47: Crude Throughput

Crude Throughput -0.1% Lower w/w and -3.6% Lower y/y

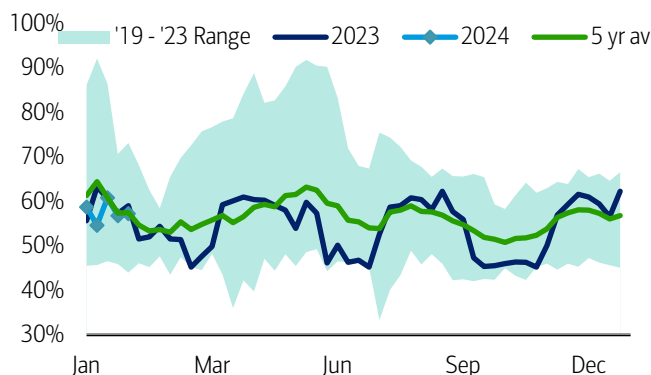


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 48: PADD I Utilization

PADD 1 Utilization Higher w/w and -4.6% Lower y/y

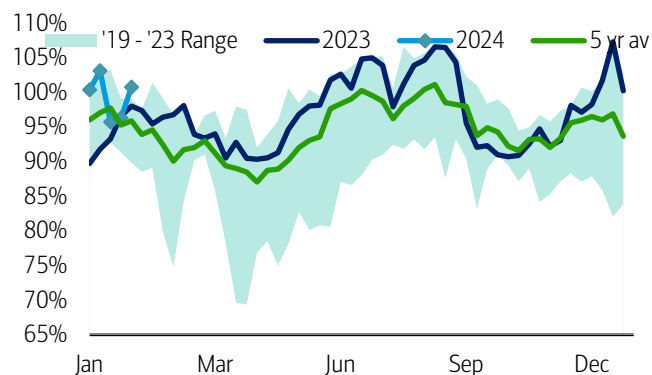


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 49: PADD II Utilization

PADD 2 Utilization -0.9% Lower w/w and -1.1% Lower y/y

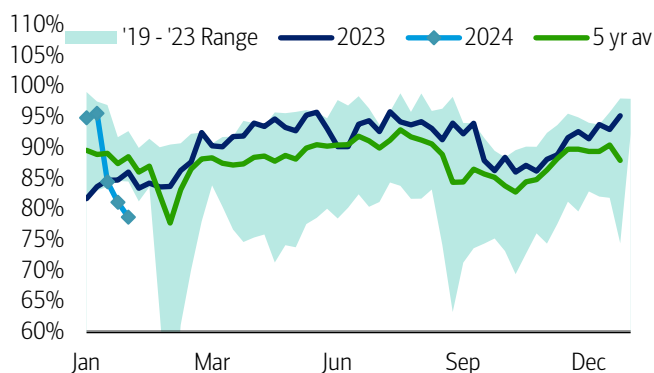


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 50: PADD III Utilization

PADD 3 Utilization -3.7% Lower w/w and -9.2% Lower y/y

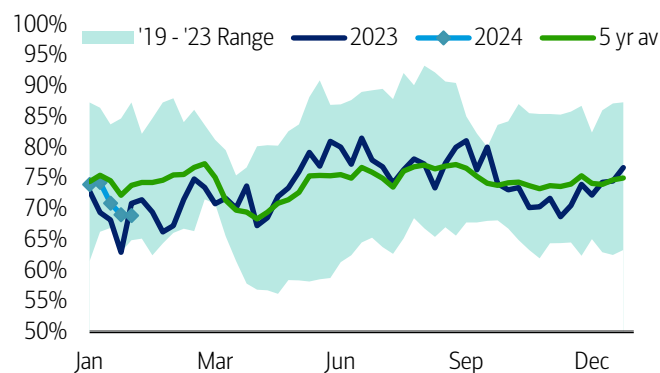


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 51: PADD V Utilization

PADD 5 Utilization -0.6% Lower w/w and -3.5% Lower y/y



Source:DOE

BofA GLOBAL RESEARCH

Crude demand coverage

Exhibit 52: US Crude Demand Cover
US Crude Demand Cover 1.4% Higher w/w and -3.8% Lower y/y

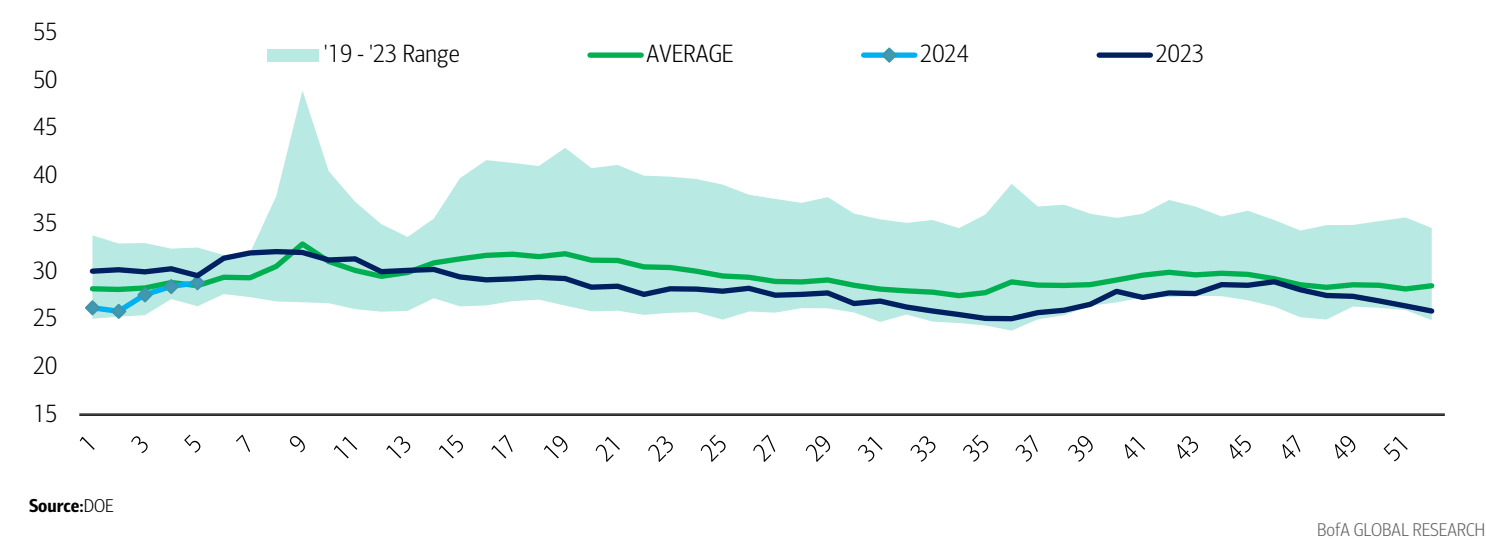
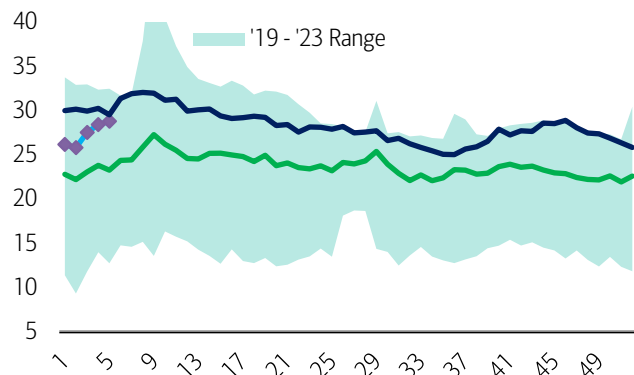


Exhibit 53: PADD I Crude Demand Cover

PADD 1 Crude Demand Cover -8.8% Lower w/w and 5.7% Lower y/y

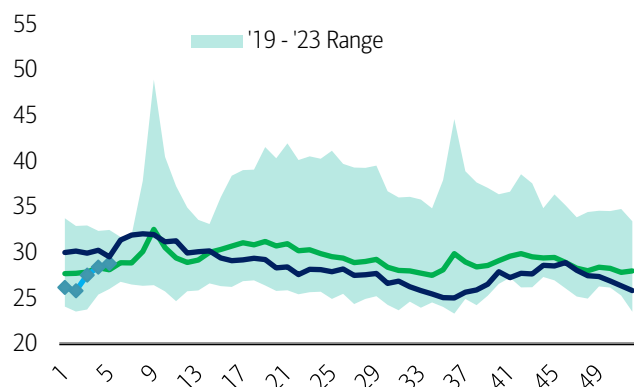


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 55: PADD III Crude Demand Cover

PADD 3 Crude Demand Cover 4.2% Higher w/w and 10.0% Higher y/y

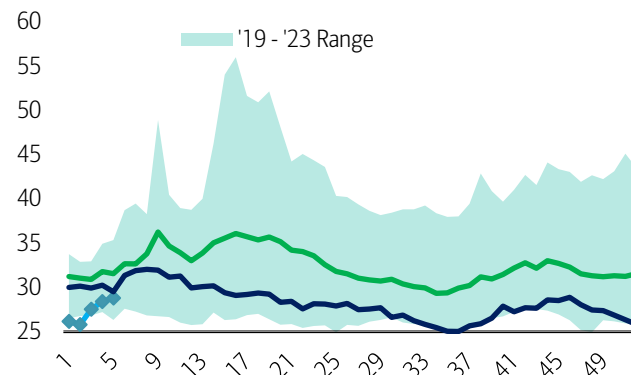


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 54: PADD II Crude Demand Cover

PADD 2 Crude Demand Cover -2.7% Lower w/w and -12.5% Lower y/y

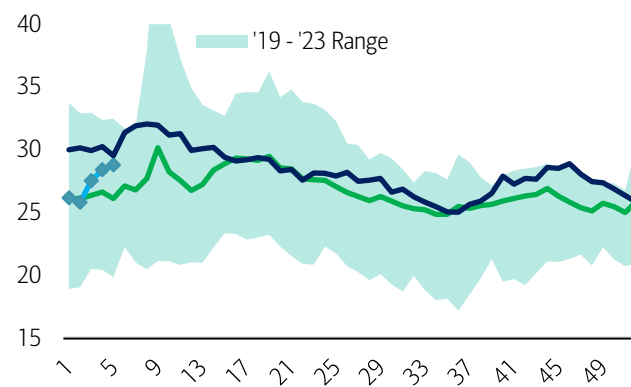


Source:DOE

BofA GLOBAL RESEARCH

Exhibit 56: PADD V Crude Demand Cover

PADD 5 Crude Demand Cover -4.7% Lower w/w and -0.4% Lower y/y



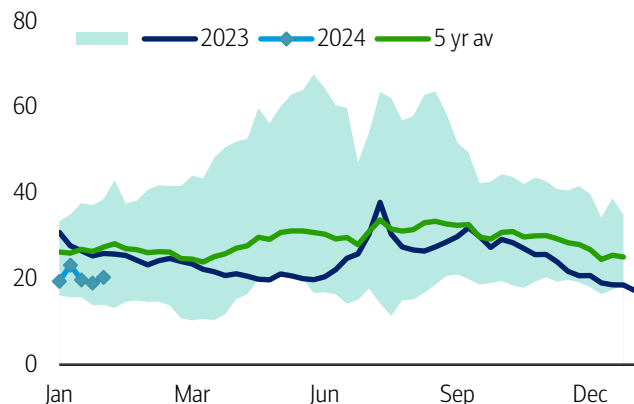
Source:DOE

BofA GLOBAL RESEARCH

NGL pricing

Exhibit 57: Ethane

Ethane Price is 5.1% Higher w/w and -24.5% Lower y/y

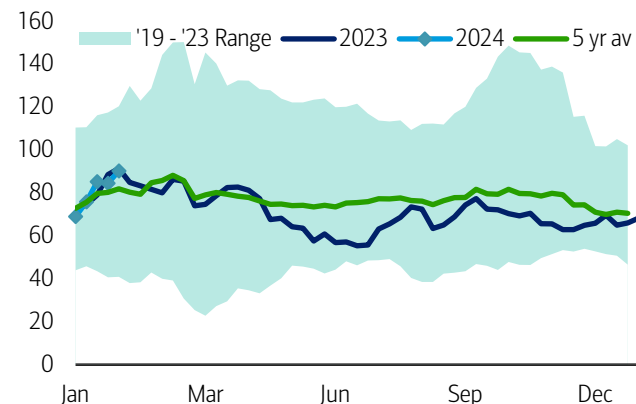


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 58: Propane

Propane Price is 8.5% Higher w/w and 6.6% Higher y/y

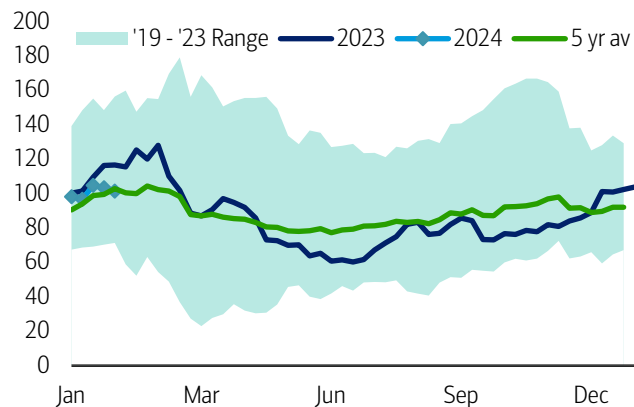


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 59: Butane

Butane Price is 2.5% Higher w/w and -14.3% Lower y/y

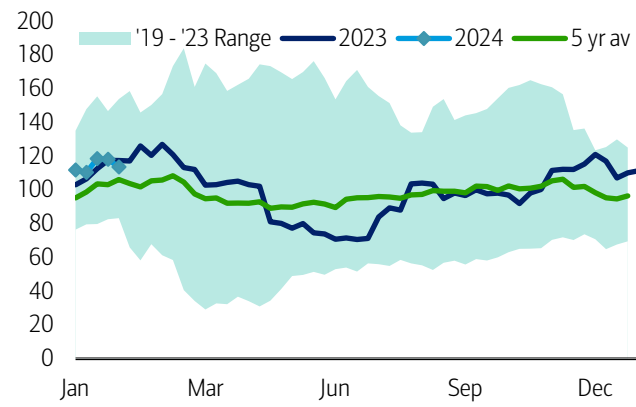


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 60: Isobutane

Isobutane Price is -1.5% Lower w/w and -3.4% Lower y/y

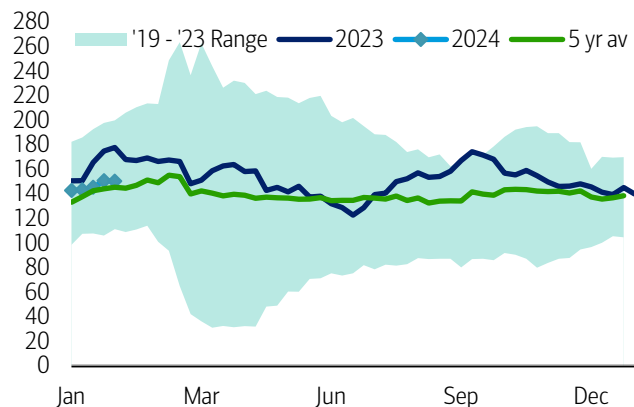


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 61: Natural Gasoline

Natural Gasoline Price is -7.2% Lower w/w and -1.7% Lower y/y

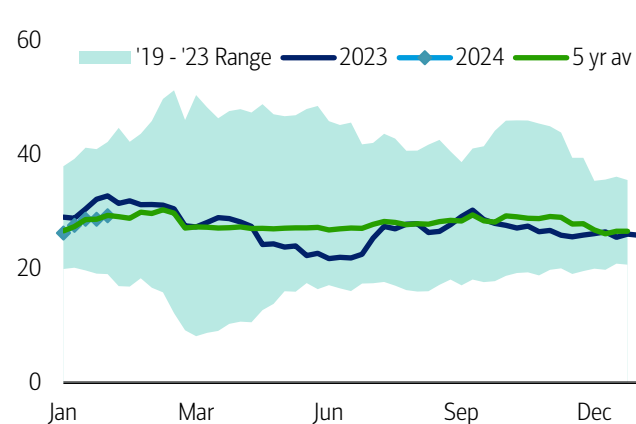


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 62: NGL Composite Barrel

NGL Composite Barrel is -71.8% Lower w/w and -5.0% Lower y/y



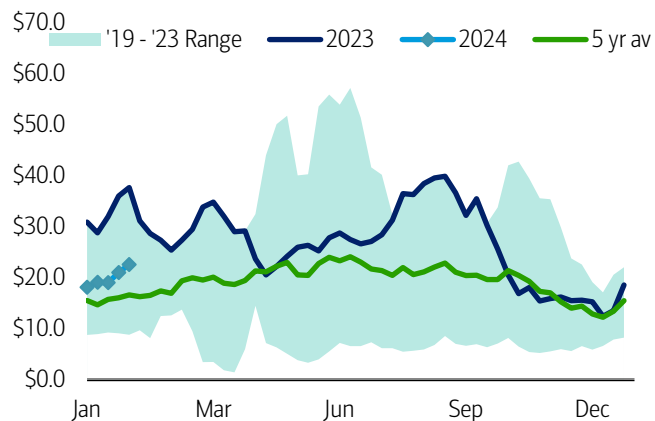
Source: Bloomberg

BofA GLOBAL RESEARCH

Crack spreads

Exhibit 63: Gulf Coast 321

Gulf Coast 321 LLS 5.2% Higher w/w and -22.2% Lower y/y

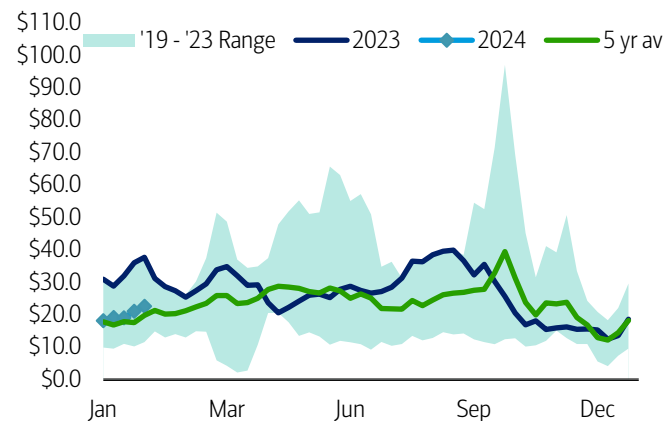


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 64: West Coast 321

West Coast 321 ANS -21.0% Lower w/w and -34.2% Lower y/y

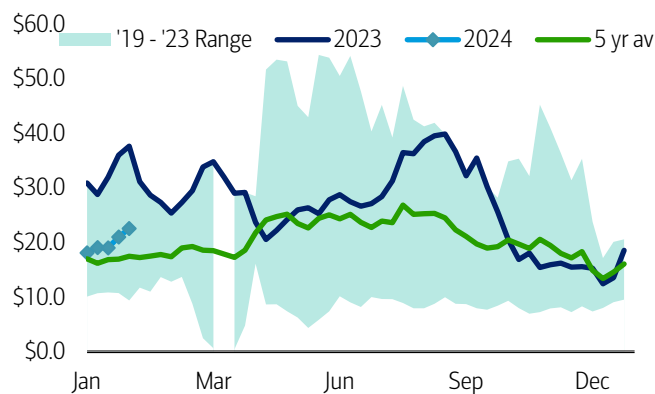


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 65: Northeast 321

New York 321 Brent 16.8% Higher w/w and -30.3% Lower y/y

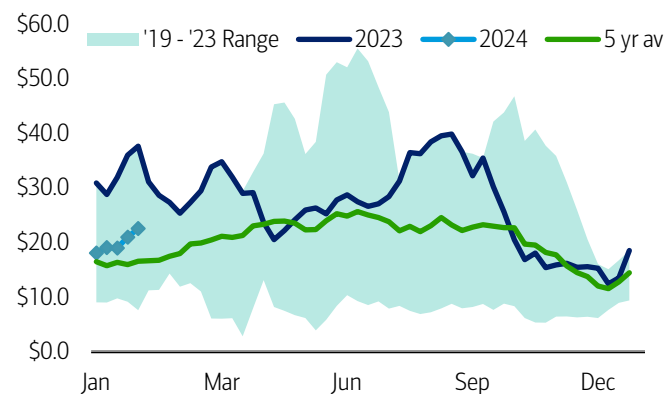


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 66: Midcont 321

Mid Cont 321 WTI 40.9% Higher w/w and -76.7% Lower y/y

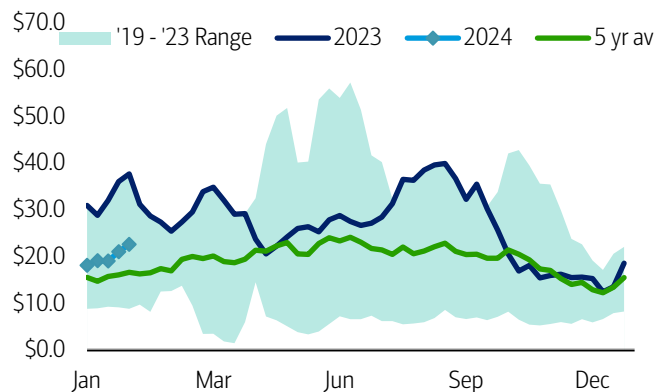


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 67: NWE 321

Northwest Europe 321 Brent 12.0% Higher w/w and -30.6% Lower y/y

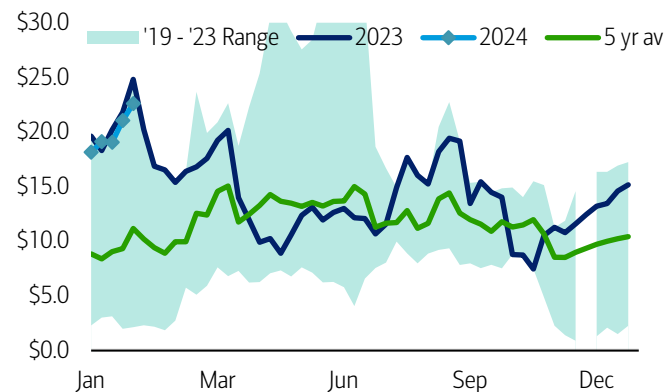


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 68: Dubai 321

Dubai 321 -11.5% Lower w/w and 1.1% Lower y/y



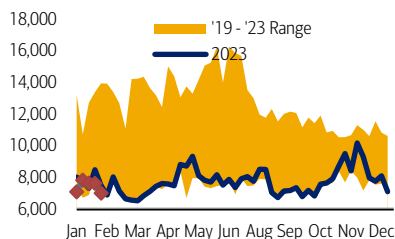
Source: Bloomberg

BofA GLOBAL RESEARCH

Regional Breakdown

Exhibit 69: PADD I Crude Stock

PADD 1 Crude Stock -12.1% Lower w/w and -17.8% y/y

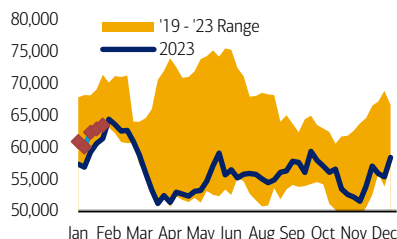


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 70: PADD I Gasoline Stock

PADD 1 Gasoline Stock 1.2% Higher w/w and -7.3% y/y

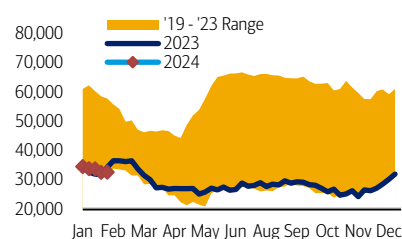


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 71: PADD I Distillate Stock

PADD 1 Distillate Stock -0.3% Lower w/w and -32.7% y/y

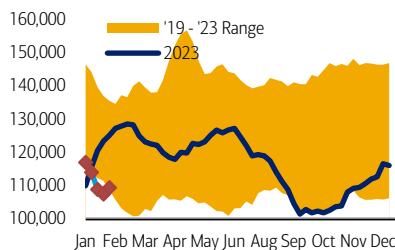


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 72: PADD 2 Crude Stock

PADD 2 Crude Stock -2.5% Lower w/w and -18.6% y/y

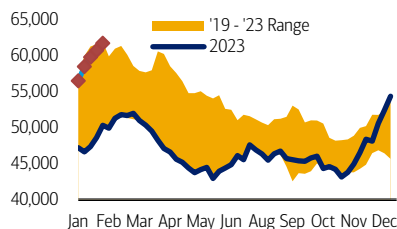


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 73: PADD 2 Gasoline Stock

PADD 2 Gasoline Stock 7.5% Higher w/w and -4.1% y/y

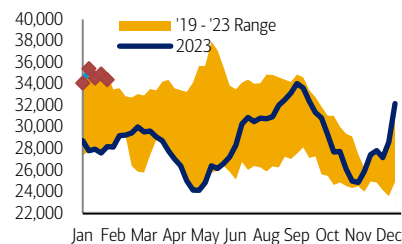


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 74: PADD 2 Distillate Stock

PADD 2 Distillate Stock 6.7% Higher w/w and -1.4% y/y

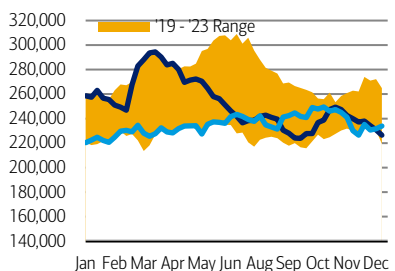


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 75: PADD 3 Crude Stock

PADD 3 Crude Stock -1.2% Lower w/w and -13.4% y/y

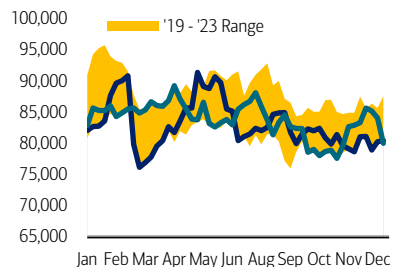


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 76: PADD III Gasoline Stocks

PADD 3 Gasoline Stock 2% Higher w/w and -14.5% y/y

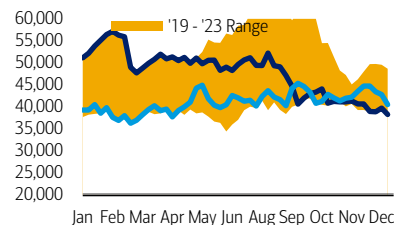


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 77: PADD III Distillate Stocks

PADD 5 Distillate Stock 1% Higher w/w and -1.3% y/y

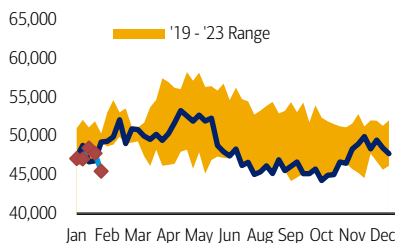


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 78: PADD 5 Crude Stock

PADD 5 Crude Stock 6.1% Higher w/w and -2.0% y/y

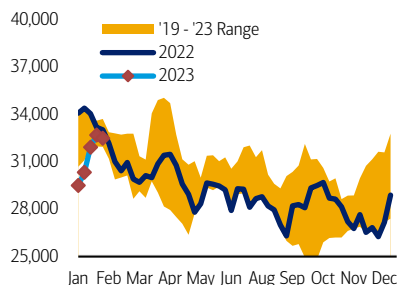


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 79: PADD 5 Gasoline Stock

PADD 5 Gasoline Stock 6.5% Higher w/w and -13.0% y/y

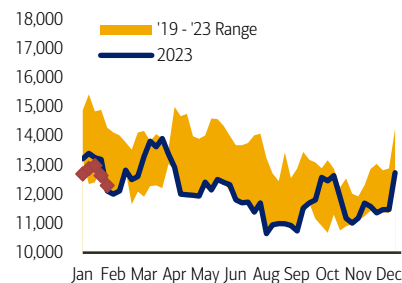


Source: EIA

BofA GLOBAL RESEARCH

Exhibit 80: PADD 5 Distillate Stock

PADD 5 Distillate Stock 1.6% Higher w/w and -15.2% y/y



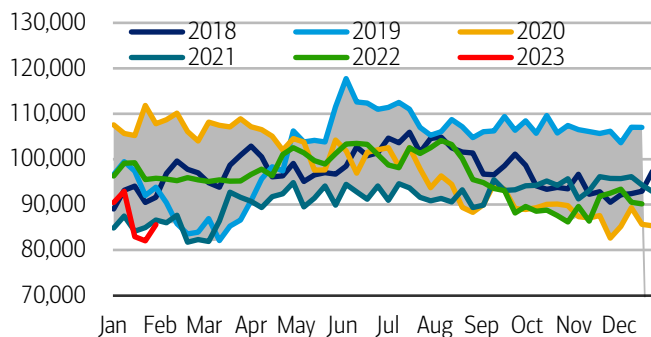
Source: EIA

BofA GLOBAL RESEARCH

Amsterdam, Rotterdam, Antwerp

Exhibit 81: Total ARA Petroleum Stocks (thousand barrels)

Inventories -1% lower w/w

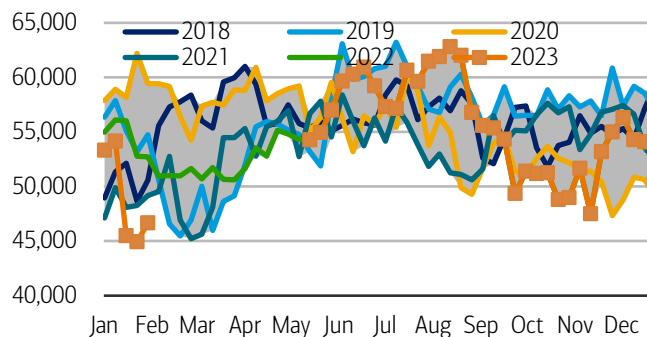


Source: Genscape, PJK

BofA GLOBAL RESEARCH

Exhibit 82: Genscape ARA Crude Stocks (thousand barrels)

Inventories 4% higher w/w

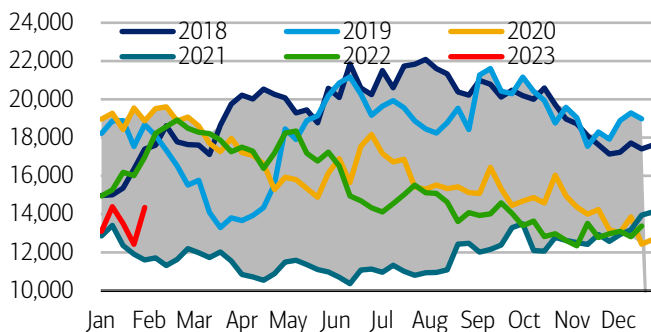


Source: Genscape, PJK

BofA GLOBAL RESEARCH

Exhibit 83: ARA Gasoil Stocks (thousand barrels)

Inventories 16% higher w/w

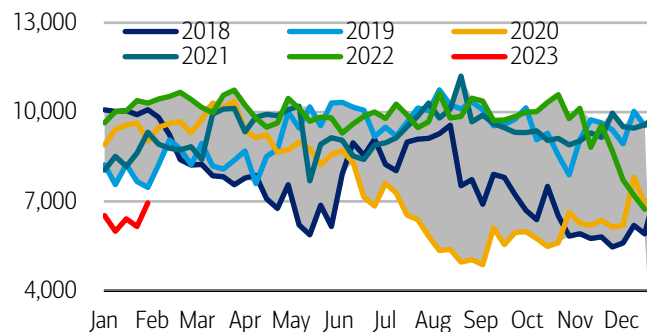


Source: Genscape, PJK

BofA GLOBAL RESEARCH

Exhibit 84: ARA Gasoline Stocks (thousand barrels)

Inventories 13% higher w/w

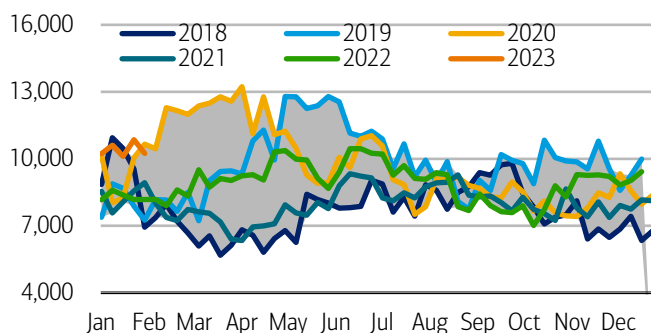


Source: Genscape, PJK

BofA GLOBAL RESEARCH

Exhibit 85: ARA Fuel Oil Stocks (thousand barrels)

Inventories -6% lower w/w

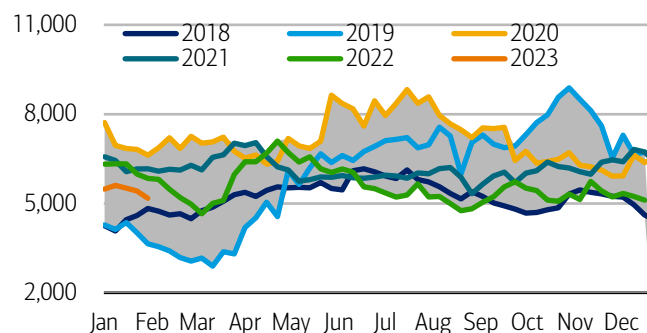


Source: Genscape, PJK

BofA GLOBAL RESEARCH

Exhibit 86: ARA Jet Stocks (thousand barrels)

Inventories -4% lower w/w



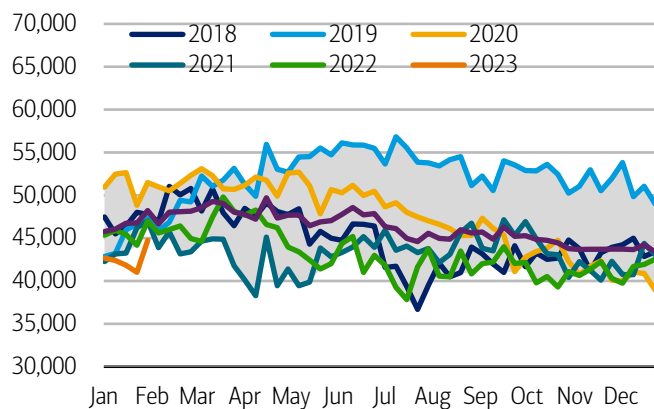
Source: Genscape, PJK

BofA GLOBAL RESEARCH

Singapore

Exhibit 87: Total Singapore Light Distillate, Middle Distillate and Residue Stocks (thousand barrels)

Inventories 9% higher w/w

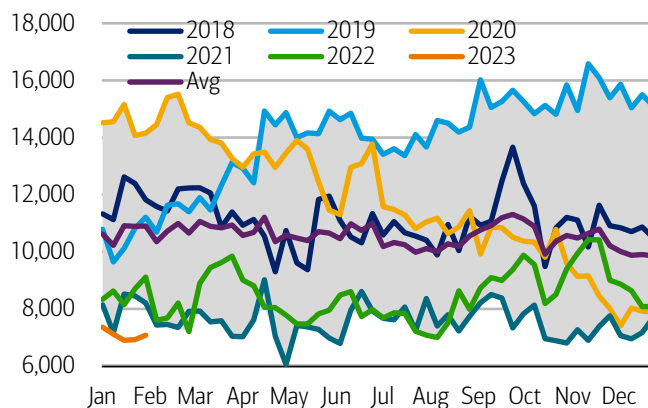


Source: International Enterprise

BofA GLOBAL RESEARCH

Exhibit 88: Singapore Middle Distillate Stocks (thousand barrels)

Inventories 2% higher w/w

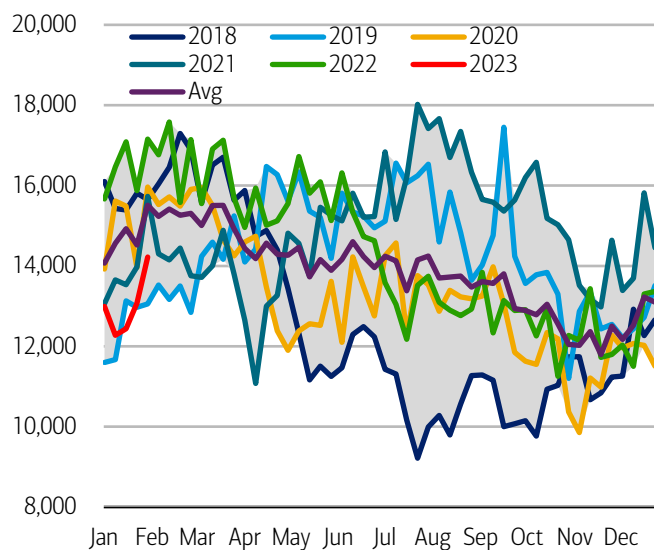


Source: International Enterprise

BofA GLOBAL RESEARCH

Exhibit 89: Singapore Light Distillate Stocks (thousand barrels)

Inventories 9% higher w/w

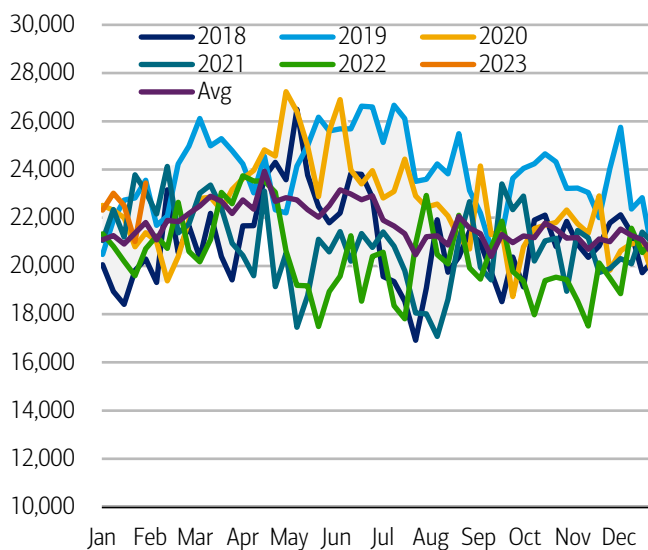


Source: International Enterprise

BofA GLOBAL RESEARCH

Exhibit 90: Singapore Residue Stock (thousand barrels)

Inventories 12% higher w/w



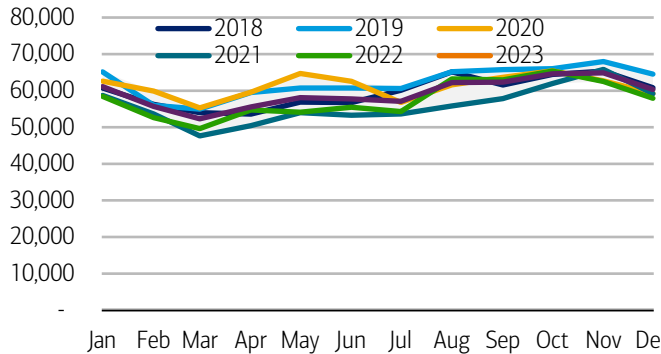
Source: International Enterprise

BofA GLOBAL RESEARCH

Japan

Exhibit 91: Japan Total Product Stock (thousand barrels)

Inventories -7% lower w/w

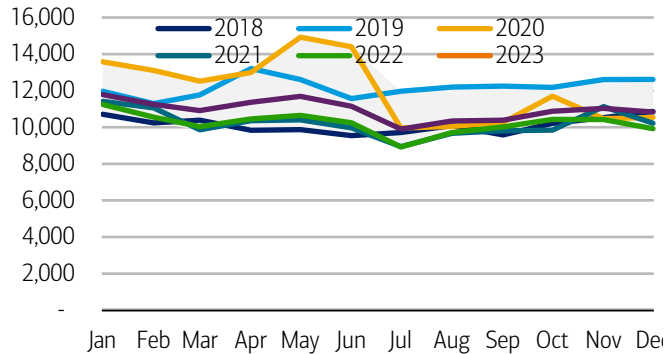


Source: Ministry of Economy Trade and Industry of Japan

BofA GLOBAL RESEARCH

Exhibit 92: Japan Gasoline Stock (thousand barrels)

Inventories -5% lower w/w

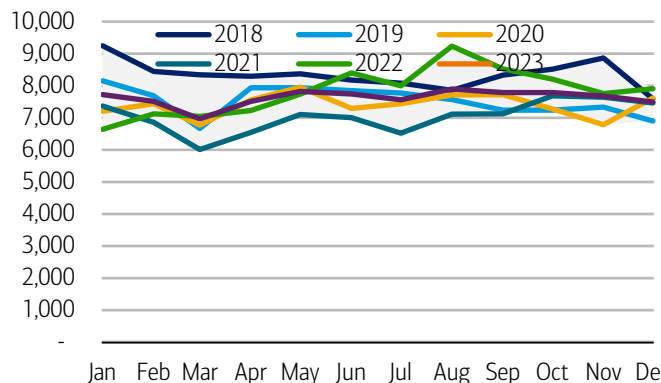


Source: Ministry of Economy Trade and Industry of Japan

BofA GLOBAL RESEARCH

Exhibit 93: Japan Fuel Oil Stock (thousand barrels)

Inventories 2% higher w/w

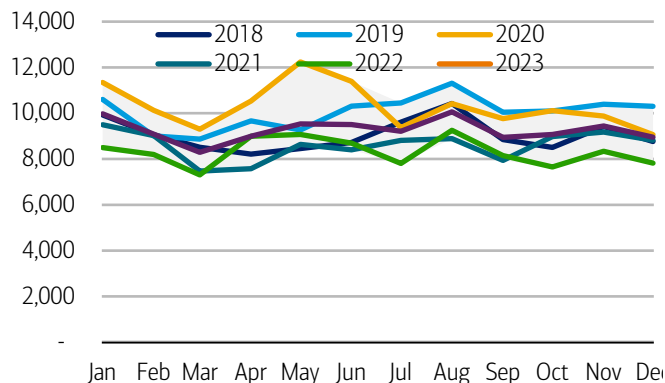


Source: Ministry of Economy Trade and Industry of Japan

BofA GLOBAL RESEARCH

Exhibit 94: Japan Gas Oil Stock (thousand barrels)

Inventories -6% higher w/w

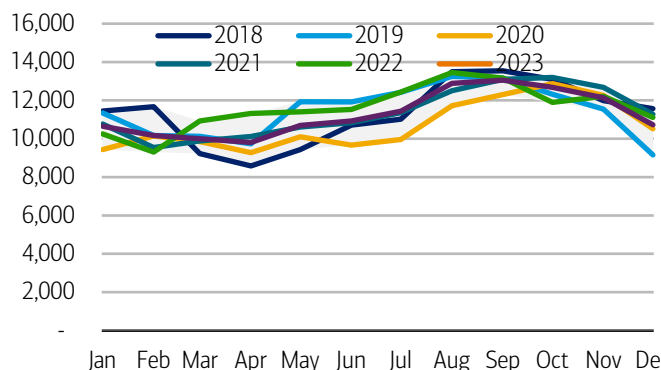


Source: Ministry of Economy Trade and Industry of Japan

BofA GLOBAL RESEARCH

Exhibit 95: Japan LPG Stock (thousand barrels)

Inventories -9% lower w/w

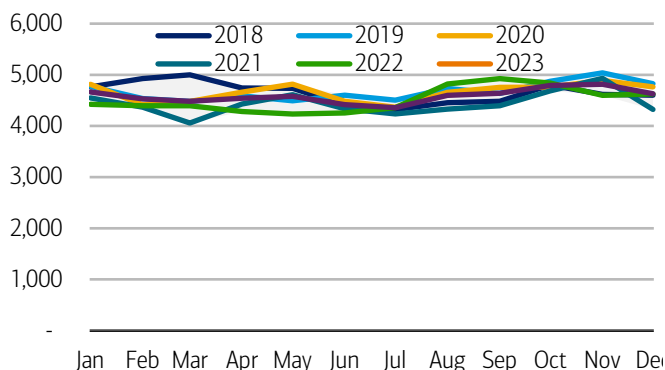


Source: Ministry of Economy Trade and Industry of Japan

BofA GLOBAL RESEARCH

Exhibit 96: Japan Heavy Fuel Oil Stock (thousand barrels)

Inventories 1% higher w/w



Source: Ministry of Economy Trade and Industry of Japan

BofA GLOBAL RESEARCH

Exhibit 97: Reported Global Oil and Product Stocks

Crude oil Increased 12,024 thousand barrels and Products Increased 109 thousand barrels

Current

	Crude	Products	Light Distillates	Middle Distillates	Heavy Distillates / Residue	For Week Ended
US	785,449	446,945	250,988	168,468	27,489	2/2/2024
Japan	68,899	88,756	34,799	34,593	19,363	2/3/2024
ARA		36,716	6,949	19,527	10,240	2/1/2024
Singapore		44,745	14,221	7,085	23,439	1/31/2024
Fujairah		18,791	6,662	2,539	9,590	2/5/2024

Previous

	Crude	Products	Light Distillates	Middle Distillates	Heavy Distillates / Residue
US	779,314	452,793	254,134	171,943	26,716
Japan	63,010	89,482	34,724	35,327	19,430
ARA		34,854	6,157	17,841	10,856
Singapore		41,012	13,074	6,927	21,011
Fujairah		17,703	6,662	2,157	8,884

Stock Change

	Crude	Products	Light Distillates	Middle Distillates	Heavy Distillates / Residue
US	6,135	(5,848)	(3,146)	(3,475)	773
Japan	5,889	(726)	74	(734)	(67)
ARA		1,862	792	1,686	(616)
Singapore		3,733	1,147	158	2,428
Fujairah		1,088	-	382	706
Plus / Minus	12,024	109	(1,133)	(1,983)	3,225

Source: EIA, International Enterprise Singapore, Jetroleum Association of Japan, FEDCom/S&P Global Platts

BofA GLOBAL RESEARCH

Exhibit 98: Stocks mentioned

Prices and ratings for stocks mentioned in this report

BofA Ticker	Bloomberg ticker	Company name	Price	Rating
PBF	PBF US	PBF Energy	US\$ 52.54	C-2-7
VLO	VLO US	Valero	US\$ 141.18	C-2-7

Source: BofA Global Research

BofA GLOBAL RESEARCH

Price objective basis & risk**PBF Energy (PBF)**

Our price objective (PO) of \$51/share is based on an assessed discounted cash flow (DCF) value treating the assets as annuities after deducting maintenance capital. We use a long term Gulf Coast 321 crack spread in our benchmark assumptions of \$11.50/barrel, a long-term crude differential of \$3.5, a weighted-average cost of capital (WACC) of 9.50%, a zero terminal growth rate, and a 26% corporate tax rate.

Upside risks to our PO are if crude spreads and crack spreads remain above our expectations there could be upside to earnings and valuation. Downside risks to our PO are: if margins and crude spreads compress faster than we forecast, this could hurt earnings and shares.

Valero Energy Corp. (VLO)

Our price objective of \$156/share is based on an assessed DCF value by treating the assets as annuities after deducting maintenance capital. We use a long term Gulf Coast 321 crack spread in our benchmark assumptions of \$11.50/bbl, a long-term crude differential of \$3.5 and a WACC of 9.25%, a zero terminal growth rate, and a 22%



corporate tax rate.

Downside risks to our price objective are: (1) the company is heavily weighted toward sour crude. As light-heavy crude differentials narrow, the benefits of a more complex refinery will diminish, which may delay return on investment, (2) the company is vulnerable to refining margin correction. If demand for refined products is weaker than expected, or if oil prices remain robust, this could pressure margins, (3) the inability to capture the price environment due to cost pressures (opex, capex, and taxation), (4) tax reform is not passed.

Upside risks to our price objective are: (1) higher-than-expected crack spreads, and (2) stronger-than-expected gasoline demand.

Analyst Certification

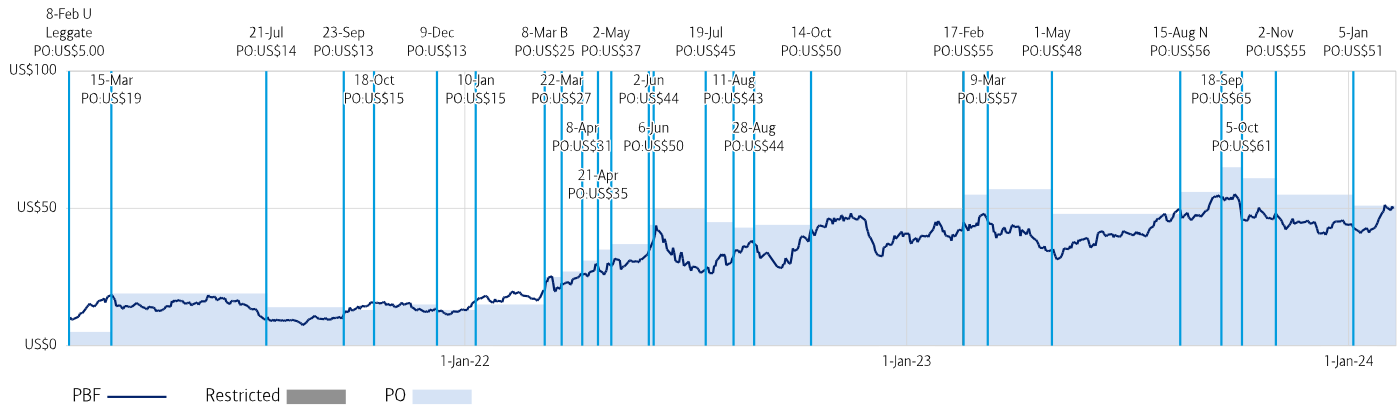
I, Doug Leggate, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

US - Large Cap Oils Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
BUY				
	APA Corporation	APA	APA US	Doug Leggate
	Canadian Natural Resources	YCNQ	CNQ CN	Doug Leggate
	Canadian Natural Resources	CNQ	CNQ US	Doug Leggate
	Chesapeake Energy	CHK	CHK US	Doug Leggate
	Chevron Corp.	CVX	CVX US	Doug Leggate
	ConocoPhillips	COP	COP US	Doug Leggate
	Coterra Energy Inc	CTRA	CTRA US	Doug Leggate
	EQT Corporation	EQT	EQT US	John H. Abbott
	ExxonMobil Corp.	XOM	XOM US	Doug Leggate
	Granite Ridge Resources, Inc	GRNT	GRNT US	John H. Abbott
	Imperial Oil	IMO	IMO US	Doug Leggate
	Imperial Oil	YIMO	IMO CN	Doug Leggate
	Kimbell Royalty Partners	KRP	KRP US	John H. Abbott
	Occidental Petroleum Corp.	OXY	OXY US	Doug Leggate
	Ovintiv Inc	YOVV	OVV CN	Doug Leggate
	Ovintiv Inc	OVV	OVV US	Doug Leggate
	Range Resources Corp	RRC	RRC US	Doug Leggate
	Suncor	YSU	SU CN	Doug Leggate
	Suncor	SU	SU US	Doug Leggate
NEUTRAL				
	California Resources Corporation	CRC	CRC US	Kalei Akamine
	CNX Resources	CNX	CNX US	John H. Abbott
	Delek US Holdings, Inc.	DK	DK US	Doug Leggate
	Devon Energy Corp.	DVN	DVN US	Doug Leggate
	EOG Resources	EOG	EOG US	Doug Leggate
	Gulfport Energy Corporation	GPOR	GPOR US	Doug Leggate
	HF Sinclair Corporation	DINO	DINO US	Doug Leggate
	Marathon Petroleum Company	MPC	MPC US	Doug Leggate
	PBF Energy	PBF	PBF US	Doug Leggate
	Permian Resources Corporation	PR	PR US	Doug Leggate
	Phillips 66	PSX	PSX US	Doug Leggate
	Valero Energy Corp.	VLO	VLO US	Doug Leggate
UNDERPERFORM				
	Chord Energy Corporation	CHRD	CHRD US	John H. Abbott
	Crescent Energy Company	CRGY	CRGY US	John H. Abbott
	Diamondback Energy Inc.	FANG	FANG US	Doug Leggate
	Marathon Oil Corp.	MRO	MRO US	Doug Leggate
	National Fuel Gas Company	NFG	NFG US	John H. Abbott
	Northern Oil and Gas	NOG	NOG US	John H. Abbott
	Vital Energy Inc	VTLE	VTLE US	John H. Abbott
RSTR				
	Pioneer Natural Resources	PXD	PXD US	Doug Leggate

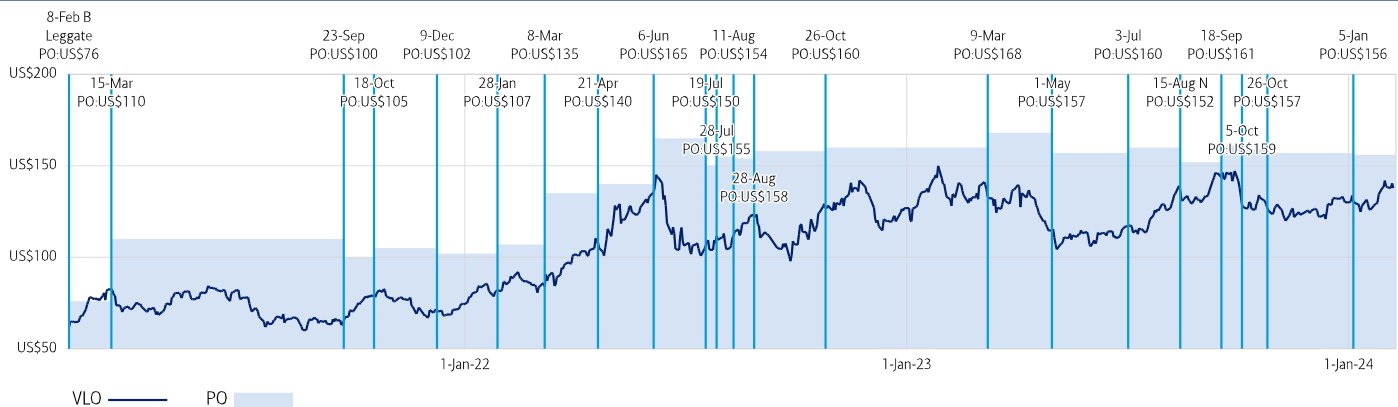
Disclosures

Important Disclosures

PBF Energy (PBF) Price Chart

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

The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

Valero (VLO) Price Chart

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

The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

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

Coverage Universe	Count	Percent	Inv. Banking Relationships ^{R1}	Count	Percent
Buy	83	61.48%	Buy	64	77.11%
Hold	28	20.74%	Hold	21	75.00%
Sell	24	17.78%	Sell	18	75.00%

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

Coverage Universe	Count	Percent	Inv. Banking Relationships ^{R1}	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%

^{R1} 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.

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

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

^{R2}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.

INCOME RATINGS, indicators of potential cash dividends, are: 7 - same/higher (dividend considered to be secure), 8 - same/lower (dividend not considered to be secure) and 9 - pays no cash dividend. *Coverage Cluster* is comprised of stocks covered by a single analyst or two or more analysts sharing a common industry, sector, region or other classification(s). A stock's coverage cluster is included in the most recent BofA Global Research report referencing the stock.

Price Charts for the securities referenced in this research report are available on the [Price Charts website](#), or call 1-800-MERRILL to have them mailed.

BofAS or one of its affiliates acts as a market maker for the equity securities recommended in the report: PBF Energy, Valero.

The issuer is or was, within the last 12 months, an investment banking client of BofAS and/or one or more of its affiliates: PBF Energy, Valero Energy.

BofAS or an affiliate has received compensation from the issuer for non-investment banking services or products within the past 12 months: PBF Energy, Valero Energy.

The issuer is or was, within the last 12 months, a non-securities business client of BofAS and/or one or more of its affiliates: PBF Energy, Valero Energy.

BofAS or an affiliate has received compensation for investment banking services from this issuer within the past 12 months: PBF Energy, Valero Energy.

BofAS or an affiliate expects to receive or intends to seek compensation for investment banking services from this issuer or an affiliate of the issuer within the next three months: Valero Energy.

BofAS together with its affiliates beneficially owns one percent or more of the common stock of this issuer. If this report was issued on or after the 9th day of the month, it reflects the ownership position on the last day of the previous month. Reports issued before the 9th day of a month reflect the ownership position at the end of the second month preceding the date of the report: Valero Energy.

BofAS or one of its affiliates is willing to sell to, or buy from, clients the common equity of the issuer on a principal basis: PBF Energy, Valero.

The issuer is or was, within the last 12 months, a securities business client (non-investment banking) of BofAS and/or one or more of its affiliates: PBF Energy, Valero Energy.

BofA Global Research personnel (including the analyst(s) responsible for this report) receive compensation based upon, among other factors, the overall profitability of Bank of America Corporation, including profits derived from investment banking. The analyst(s) responsible for this report may also receive compensation based upon, among other factors, the overall profitability of the Bank's sales and trading businesses relating to the class of securities or financial instruments for which such analyst is responsible.

Other Important Disclosures

From time to time research analysts conduct site visits of covered issuers. BofA Global Research policies prohibit research analysts from accepting payment or reimbursement for travel expenses from the issuer for such visits.

Prices are indicative and for information purposes only. Except as otherwise stated in the report, for any recommendation in relation to an equity security, the price referenced is the publicly traded price of the security as of close of business on the day prior to the date of the report or, if the report is published during intraday trading, the price referenced is indicative of the traded price as of the date and time of the report and in relation to a debt security (including equity preferred and CDS), prices are indicative as of the date and time of the report and are from various sources including BofA Securities trading desks.

The date and time of completion of the production of any recommendation in this report shall be the date and time of dissemination of this report as recorded in the report timestamp.

Recipients who are not institutional investors or market professionals should seek the advice of their independent financial advisor before considering information in this report in connection with any investment decision, or for a necessary explanation of its contents.

Officers of BofAS or one or more of its affiliates (other than research analysts) may have a financial interest in securities of the issuer(s) or in related investments.

Refer to [BofA Global Research policies relating to conflicts of interest](#).

"BofA Securities" includes BofA Securities, Inc. ("BofAS") and its affiliates. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor if they have questions concerning this report or concerning the appropriateness of any investment idea described herein for such investor. "BofA Securities" is a global brand for BofA Global Research.

Information relating to Non-US affiliates of BofA Securities and Distribution of Affiliate Research Reports:

BofAS and/or Merrill Lynch, Pierce, Fenner & Smith Incorporated ("MLPF&S") may in the future distribute, information of the following non-US affiliates in the US (short name: legal name, regulator): Merrill Lynch (South Africa): Merrill Lynch South Africa (Pty) Ltd., regulated by The Financial Service Board; MLI (UK): Merrill Lynch International, regulated by the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers (AMF). BofA Securities Europe SA ("BofASE") with registered address at 51, rue La Boétie, 75008 Paris is registered under no 842 602 690 RCS Paris. In accordance with the provisions of French Code Monétaire et Financier (Monetary and Financial Code), BofASE is an établissement de crédit et d'investissement (credit and investment institution) that is authorised and supervised by the European Central Bank and the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers. BofASE's share capital can be found at www.bofam.com/BofASEdisclaimer; BofA Europe (Milan): Bank of America Europe Designated Activity Company, Milan Branch, regulated by the Bank of Italy, the European Central Bank (ECB) and the Central Bank of Ireland (CBI); BofA Europe (Frankfurt): Bank of America Europe Designated Activity Company, Frankfurt Branch regulated by BaFin, the ECB and the CBI; BofA Europe (Madrid): Bank of America Europe Designated Activity Company, Sucursal en España, regulated by the Bank of Spain, the ECB and the CBI; Merrill Lynch (Australia): Merrill Lynch Equities (Australia) Limited, regulated by the Australian Securities and Investments Commission; Merrill Lynch (Hong Kong): Merrill Lynch (Asia Pacific) Limited, regulated by the Hong Kong Securities and Futures Commission (HKSF); Merrill Lynch (Singapore): Merrill Lynch (Singapore) Pte Ltd, regulated by the Monetary Authority of Singapore (MAS); Merrill Lynch (Canada): Merrill Lynch Canada Inc, regulated by the Canadian Investment Regulatory Organization; Merrill Lynch (Mexico): Merrill Lynch Mexico, SA de CV, Casa de Bolsa, regulated by the Comisión Nacional Bancaria y de Valores; Merrill Lynch (Argentina): Merrill Lynch Argentina SA, regulated by Comisión Nacional de Valores; BofAS Japan: BofA Securities Japan Co., Ltd., regulated by the Financial Services Agency; Merrill Lynch (Seoul): Merrill Lynch International, LLC Seoul Branch, regulated by the Financial Supervisory Service; Merrill Lynch (Taiwan): Merrill Lynch Securities (Taiwan) Ltd., regulated by the Securities and Futures Bureau; BofAS India: BofA Securities India Limited, regulated by the Securities and Exchange Board of India (SEBI); Merrill Lynch (Israel): Merrill Lynch Israel Limited, regulated by Israel Securities Authority; Merrill Lynch (DIFC): Merrill Lynch International (DIFC Branch), regulated by the Dubai Financial Services Authority (DFSA); Merrill Lynch (Brazil): Merrill Lynch S.A. Corretora de Títulos e Valores Mobiliários, regulated by Comissão de Valores Mobiliários; Merrill Lynch KSA Company: Merrill Lynch Kingdom of Saudi Arabia Company, regulated by the Capital Market Authority.

This information has been approved for publication and is distributed in the United Kingdom (UK) to professional clients and eligible counterparties (as each is defined in the rules of the FCA and the PRA) by MLI (UK), which is authorized by the PRA and regulated by the FCA and the PRA - details about the extent of our regulation by the FCA and PRA are available from us on request; has been approved for publication and is distributed in the European Economic Area (EEA) by BofASE (France), which is authorized by the ACPR and regulated by the AMF; has been considered and distributed in Japan by BofAS Japan, a registered securities dealer under the Financial Instruments and Exchange Act in Japan, or its permitted affiliates; is issued and distributed in Hong Kong by Merrill Lynch (Hong Kong) which is regulated by HKSF; is issued and distributed in Taiwan by Merrill Lynch (Taiwan); is issued and distributed in India by BofAS India; and is issued and distributed in Singapore to institutional investors and/or accredited investors (each as defined under the Financial Advisers Regulations) by Merrill Lynch (Singapore) (Company Registration No 198602883D). Merrill Lynch (Singapore) is regulated by MAS. Merrill Lynch Equities (Australia) Limited (ABN 65 006 276 795), AFS License 235132 (MLEA) distributes this information in Australia only to 'Wholesale' clients as defined by s.761G of the Corporations Act 2001. With the exception of Bank of America N.A., Australia Branch, neither MLEA nor any of its affiliates involved in preparing this information is an Authorised Deposit-Taking Institution under the Banking Act 1959 nor regulated by the Australian Prudential Regulation Authority. No approval is required for publication or distribution of this information in Brazil and its local distribution is by Merrill Lynch (Brazil) in accordance with applicable regulations. Merrill Lynch (DIFC) is authorized and regulated by the DFSA. Information prepared and issued by Merrill Lynch (DIFC) is done so in accordance with the requirements of the DFSA conduct of business rules. BofA Europe (Frankfurt) distributes this information in Germany and is regulated by BaFin, the ECB and the CBI. BofA Securities entities, including BofA Europe and BofASE (France), may outsource/delegate the marketing and/or provision of certain research services or aspects of research services to other branches or members of the BofA Securities group. You may be contacted by a different BofA Securities entity acting for and on behalf of your service provider where permitted by applicable law. This does not change your service provider. Please refer to the [Electronic Communications Disclaimers](#) for further information.

This information has been prepared and issued by BofAS and/or one or more of its non-US affiliates. The author(s) of this information may not be licensed to carry on regulated activities in your jurisdiction and, if not licensed, do not hold themselves out as being able to do so. BofAS and/or MLPF&S is the distributor of this information in the US and accepts full responsibility for information distributed to BofAS and/or MLPF&S clients in the US by its non-US affiliates. Any US person receiving this information and wishing to effect any transaction in any security discussed herein should do so through BofAS and/or MLPF&S and not such foreign affiliates. Hong Kong recipients of this information should contact Merrill Lynch (Asia Pacific) Limited in respect of any matters relating to dealing in securities or provision of specific advice on securities or any other matters arising from, or in connection with, this information. Singapore recipients of this information should contact Merrill Lynch (Singapore) Pte Ltd in respect of any matters arising from, or in connection with, this information. For clients that are not accredited investors, expert investors or institutional investors Merrill Lynch (Singapore) Pte Ltd accepts full responsibility for the contents of this information distributed to such clients in Singapore.

General Investment Related Disclosures:

Taiwan Readers: Neither the information nor any opinion expressed herein constitutes an offer or a solicitation of an offer to transact in any securities or other financial instrument. No part of this report may be used or reproduced or quoted in any manner whatsoever in Taiwan by the press or any other person without the express written consent of BofA Securities. This document provides general information only, and has been prepared for, and is intended for general distribution to, BofA Securities clients. Neither the information nor any opinion expressed constitutes an offer or an invitation to make an offer, to buy or sell any securities or other financial instrument or any derivative related to such securities or instruments (e.g., options, futures, warrants, and contracts for differences). This document is not intended to provide personal investment advice and it does not take into account the specific investment objectives, financial situation and the particular needs of, and is not directed to, any specific person(s). This document and its content do not constitute, and should not be considered to constitute, investment advice for purposes of ERISA, the US tax code, the Investment Advisers Act or otherwise. Investors should seek financial advice regarding the appropriateness of investing in financial instruments and implementing investment strategies discussed or recommended in this document and should understand that statements regarding future prospects may not be realized. Any decision to purchase or subscribe for securities in any offering must be based solely on existing public information on such security or the information in the prospectus or other offering document issued in connection with such offering, and not on this document.

Securities and other financial instruments referred to herein, or recommended, offered or sold by BofA Securities, are not insured by the Federal Deposit Insurance Corporation and are not deposits or other obligations of any insured depository institution (including, Bank of America, N.A.). Investments in general and, derivatives, in particular, involve numerous risks, including, among others, market risk, counterparty default risk and liquidity risk. No security, financial instrument or derivative is suitable for all investors. Digital assets are extremely speculative, volatile and are largely unregulated. In some cases, securities and other financial instruments may be difficult to value or sell and reliable information about the value or risks related to the security or financial instrument may be difficult to obtain. Investors should note that income from such securities and other financial instruments, if any, may fluctuate and that price or value of such securities and instruments may rise or fall and, in some cases, investors may lose their entire principal investment. Past performance is not necessarily a guide to future performance. Levels and basis for taxation may change.

This report may contain a short-term trading idea or recommendation, which highlights a specific near-term catalyst or event impacting the issuer or the market that is anticipated to have a short-term price impact on the equity securities of the issuer. Short-term trading ideas and recommendations are different from and do not affect a stock's fundamental equity rating, which reflects both a longer term total return expectation and attractiveness for investment relative to other stocks within its Coverage Cluster. Short-term trading ideas and recommendations may be more or less positive than a stock's fundamental equity rating.

BofA Securities is aware that the implementation of the ideas expressed in this report may depend upon an investor's ability to "short" securities or other financial instruments and that such action may be limited by regulations prohibiting or restricting "shortselling" in many jurisdictions. Investors are urged to seek advice regarding the applicability of such regulations prior to executing any short idea contained in this report.

Foreign currency rates of exchange may adversely affect the value, price or income of any security or financial instrument mentioned herein. Investors in such securities and instruments, including ADRs, effectively assume currency risk.

BofAS or one of its affiliates is a regular issuer of traded financial instruments linked to securities that may have been recommended in this report. BofAS or one of its affiliates may, at any time, hold a trading position (long or short) in the securities and financial instruments discussed in this report.

BofA Securities, through business units other than BofA Global Research, may have issued and may in the future issue trading ideas or recommendations that are inconsistent with, and reach different conclusions from, the information presented herein. Such ideas or recommendations may reflect different time frames, assumptions, views and analytical methods of the persons who prepared them, and BofA Securities is under no obligation to ensure that such other trading ideas or recommendations are brought to the attention of any recipient of this information.

In the event that the recipient received this information pursuant to a contract between the recipient and BofAS for the provision of research services for a separate fee, and in connection therewith BofAS may be deemed to be acting as an investment adviser, such status relates, if at all, solely to the person with whom BofAS has contracted directly and does not extend beyond the delivery of this report (unless otherwise agreed specifically in writing by BofAS). If such recipient uses the services of BofAS in connection with the sale or purchase of a security referred to herein, BofAS may act as principal for its own account or as agent for another person. BofAS is and continues to act solely as a broker-dealer in connection with the execution of any transactions, including transactions in any securities referred to herein.

BofA ESGMeter Methodology:

ESGMeter is a proprietary metric based on quantitative analysis and fundamental analyst inputs that reflects our assessment of a company's Environmental, Social and Governance-related attributes. The ESGMeter is intended to indicate a company's likelihood of experiencing stronger financial stability (higher return on equity and lower earnings and price volatility) over the next three years relative to peer group. There are three ESGMeter levels - Low, Medium, and High - which indicate whether a company has attributes most likely to translate into superior financial stability (in the case of a High level) or weaker financial stability (in the case of a Low level) over the next three years relative to its peer group. A Medium level suggests that a company exhibits ESG characteristics that are likely associated with financial stability results in line with its peer group over the next three years. Full details of our methodology, financial stability definition and disclaimers are available at [BofA ESGMeter methodology](#). ESGMeter is not indicative of a company's future stock price performance and is not an investment recommendation or rating. ESGMeter is independent of the BofA Global Research fundamental equity analyst's investment rating, volatility risk rating, income rating or price objective for that company.

Copyright and General Information:

Copyright 2024 Bank of America Corporation. All rights reserved. iQDatabase® is a registered service mark of Bank of America Corporation. This information is prepared for the use of BofA Securities clients and may not be redistributed, retransmitted or disclosed, in whole or in part, or in any form or manner, without the express written consent of BofA Securities. BofA Global Research information is distributed simultaneously to internal and client websites and other portals by BofA Securities and is not publicly-available material. Any unauthorized use or disclosure is prohibited. Receipt and review of this information constitutes your agreement not to redistribute, retransmit, or disclose to others the contents, opinions, conclusion, or information contained herein (including any investment recommendations, estimates or price targets) without first obtaining express permission from an authorized officer of BofA Securities.

Materials prepared by BofA Global Research personnel are based on public information. Facts and views presented in this material have not been reviewed by, and may not reflect information known to, professionals in other business areas of BofA Securities, including investment banking personnel. BofA Securities has established information barriers between BofA Global Research and certain business groups. As a result, BofA Securities does not disclose certain client relationships with, or compensation received from, such issuers. To the extent this material discusses

any legal proceeding or issues, it has not been prepared as nor is it intended to express any legal conclusion, opinion or advice. Investors should consult their own legal advisers as to issues of law relating to the subject matter of this material. BofA Global Research personnel's knowledge of legal proceedings in which any BofA Securities entity and/or its directors, officers and employees may be plaintiffs, defendants, co-defendants or co-plaintiffs with or involving issuers mentioned in this material is based on public information. Facts and views presented in this material that relate to any such proceedings have not been reviewed by, discussed with, and may not reflect information known to, professionals in other business areas of BofA Securities in connection with the legal proceedings or matters relevant to such proceedings.

This information has been prepared independently of any issuer of securities mentioned herein and not in connection with any proposed offering of securities or as agent of any issuer of any securities. None of BofAS any of its affiliates or their research analysts has any authority whatsoever to make any representation or warranty on behalf of the issuer(s). BofA Global Research policy prohibits research personnel from disclosing a recommendation, investment rating, or investment thesis for review by an issuer prior to the publication of a research report containing such rating, recommendation or investment thesis.

Any information relating to the tax status of financial instruments discussed herein is not intended to provide tax advice or to be used by anyone to provide tax advice. Investors are urged to seek tax advice based on their particular circumstances from an independent tax professional.

The information herein (other than disclosure information relating to BofA Securities and its affiliates) was obtained from various sources and we do not guarantee its accuracy. This information may contain links to third-party websites. BofA Securities is not responsible for the content of any third-party website or any linked content contained in a third-party website. Content contained on such third-party websites is not part of this information and is not incorporated by reference. The inclusion of a link does not imply any endorsement by or any affiliation with BofA Securities. Access to any third-party website is at your own risk, and you should always review the terms and privacy policies at third-party websites before submitting any personal information to them. BofA Securities is not responsible for such terms and privacy policies and expressly disclaims any liability for them.

All opinions, projections and estimates constitute the judgment of the author as of the date of publication and are subject to change without notice. Prices also are subject to change without notice. BofA Securities is under no obligation to update this information and BofA Securities ability to publish information on the subject issuer(s) in the future is subject to applicable quiet periods. You should therefore assume that BofA Securities will not update any fact, circumstance or opinion contained herein.

Subject to the quiet period applicable under laws of the various jurisdictions in which we distribute research reports and other legal and BofA Securities policy-related restrictions on the publication of research reports, fundamental equity reports are produced on a regular basis as necessary to keep the investment recommendation current.

Certain outstanding reports or investment opinions relating to securities, financial instruments and/or issuers may no longer be current. Always refer to the most recent research report relating to an issuer prior to making an investment decision.

In some cases, an issuer may be classified as Restricted or may be Under Review or Extended Review. In each case, investors should consider any investment opinion relating to such issuer (or its security and/or financial instruments) to be suspended or withdrawn and should not rely on the analyses and investment opinion(s) pertaining to such issuer (or its securities and/or financial instruments) nor should the analyses or opinion(s) be considered a solicitation of any kind. Sales persons and financial advisors affiliated with BofAS or any of its affiliates may not solicit purchases of securities or financial instruments that are Restricted or Under Review and may only solicit securities under Extended Review in accordance with firm policies.

Neither BofA Securities nor any officer or employee of BofA Securities accepts any liability whatsoever for any direct, indirect or consequential damages or losses arising from any use of this information.