Energy Tidbits

May 12, 2024

Produced by: Dan Tsubouchi

Vitol: Strong YoY Growth in Oil Demand BUT Seeing an Easing of 2024 Demand Forecasts including Less Diesel

Welcome to new Energy Tidbits memo readers. We are continuing to add new readers to our Energy Tidbits memo, energy blogs and tweets. The focus and concept for the memo was set in 1999 with input from PMs, who were looking for research (both positive and negative items) that helped them shape their investment thesis to the energy space, and not just focusing on daily trading. My priority was and still is to not just report on events, but also try to interpret and point out implications therefrom. The best example is the review of investor days, conferences and earnings calls focusing on sector developments that are relevant to the sector. My target is to write on 50 weekends per year and to post by noon MT on Sunday. The Sunday noon timing was because PMs said they didn't have research to read on Sundays and Sundays are a day when they start to think about the investing week ahead.

This week's memo highlights:

1. This morning, Vitol's Mike Muller (Head Asia) said oil demand growth will be strong in 2024 but he is seeing easing of demand forecasts including less diesel demand. [click here]

2. US crack spreads were down $1.70 WoW to $25.89, still a solid refiner margin but WTI tends to follow declining spreads. [click here]

3. How will markets interpret Iraq oil minister "'*Iraq has reduced (output) enough and will not agree to any **new** cut*"? [click here]

4. Saudi Aramco's Q1 points to an ~3.5% decline rate in Saudi's oil production, which would tie to Aramco CEO's view of 7% annual decline rate in global conventional + unconventional oil production. [click here]

5. US natural gas storage is still on track to be filled early i.e. before start of winter gas withdraw season. [click here]

6. Please follow us on Twitter at [LINK] for breaking news that ultimately ends up in the weekly Energy Tidbits memo that doesn't get posted until Sunday noon MT.

7. For new readers to our Energy Tidbits and our blogs, you will need to sign up at our blog sign up to receive future Energy Tidbits memos. The sign up is available at [LINK].

Dan Tsubouchi
Chief Market Strategist
dtsubouchi@safgroup.ca

Ryan Dunfield
CEO
rdunfield@safgroup.ca

Aaron Bunting
COO, CFO
abunting@safgroup.ca

Ian Charles
Managing Director
icharles@safgroup.ca

Ryan Haughn
Managing Director
rhaughn@safgroup.ca

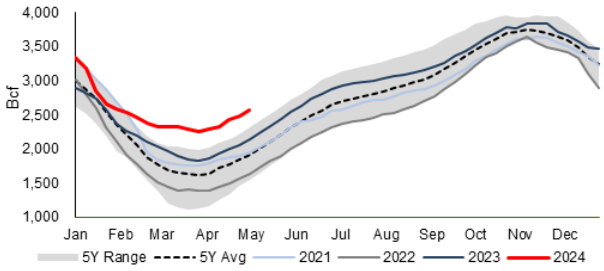
Table of Contents

Natural Gas: Warning for risk US natural gas storage gets filled early

US natural gas storage to be filled early?

We repeat and update our warning from our Apr 28, 2024 Energy Tidbits memo. US storage is well above 5-yr highs. US natural gas storage season has just started but we warn it is pointing to full storage being hit early unless there are some big changes to the storage outlook. The latest EIA Form 914 is for February data and it shows Feb 2024 +4.6 bcf/d YoY. Europe gas storage is looking to be full early so may have some push back on US LNG cargoes in the fall. And Jul/Aug/Sept was the 3rd hottest summer in the last 129 years. There may very well be items such as hurricane interruptions, a big spike up in natural gas for data centers, etc. that will change this patch but when we see natural gas storage this much higher YoY, we think it is at least time to get people focused on the risk for an early fill to US natural gas storage. And if this path continues over the next couple months, we should see analysts reflecting in their natural gas price forecasts, more producers shutting-in supply and low Q3 prices. As noted below, US natural gas storage is now +444 bcf YoY, which is up WoW from +436 bcf YoY last week.

Figure 1: US Natural Gas Storage



Source: EIA

Natural Gas: +79 bcf build in US gas storage; now +444 bcf YoY

+79 bcf build in US gas storage

For the week ending May 3, the EIA reported a +79 bcf build. Total storage is now 2.563 tcf, representing a surplus of +444 bcf YoY compared to a surplus of +436 bcf last week. For this week, and the past few, total storage is above the top end of the 5-yr range. Total storage is +640 bcf above the 5-year average, slightly lower than last week's 642 bcf surplus. Below is the EIA's storage table from its Weekly Natural Gas Storage report [LINK].

Figure 2: US Natural Gas Storage

	Stocks billion cubic feet (Bcf)				Historical Comparisons: Year ago (05/03/23)		5-year average (2019-23)	
Region	05/03/24	04/26/24	net change	implied flow	Bcf	% change	Bcf	% change
East	454	425	29	29	419	8.4	351	29.3
Midwest	584	564	20	20	492	18.7	424	37.7
Mountain	191	182	9	9	101	89.1	103	85.4
Pacific	246	240	6	6	110	123.6	182	35.2
South Central	1,087	1,073	14	14	995	9.2	862	26.1
Salt	314	314	0	0	284	10.6	271	15.9
Nonsalt	773	759	14	14	710	8.9	591	30.8
Total	2,563	2,484	79	79	2,119	21.0	1,923	33.3

Totals may not equal sum of components because of independent rounding.

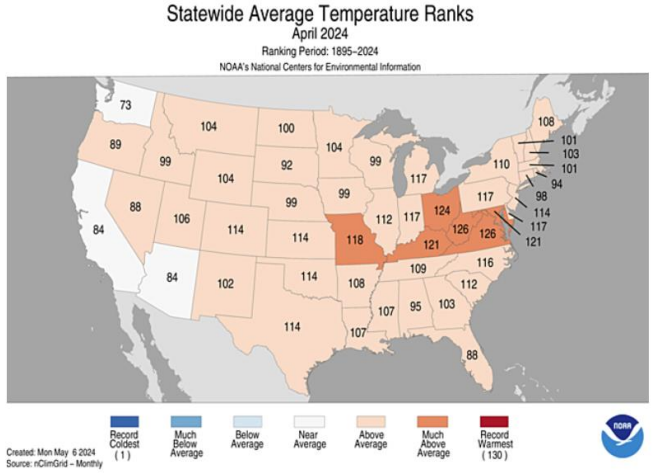
Source: EIA

Natural Gas: NOAA, 12th warmest April in last 130 years in the US

12th warmest April in last 130 years

April is shoulder season so there is normally very little weather driven natural gas demand although there is often early April cold in the north that leads to some modest natural gas demand. On Wednesday, the NOAA published their April recap for assessing the U.S. Climate, which revealed April 2024 was the 12th warmest the US has seen in the past 130 years. In the news release [LINK], the NOAA wrote "*The average temperature of the contiguous U.S. in April was 53.8°F, 2.7°F above average, ranking 12th warmest in the 130-year record. April temperatures were above average across much of the contiguous U.S., while near- to below-average temperatures were observed in parts of the West, northern Plains, Upper Midwest, Southeast and in small pockets of the Northeast. Virginia and West Virginia each had their fifth-warmest April on record.… For January–April, the average contiguous U.S. temperature was 43.0°F, 3.8°F above average, ranking fifth warmest on record for this period".* Below is a picture of statewide average temperature ranks in April.

Figure 3: NOAA Historical US Temperature Ranks by State – April 2024



Source: NOAA

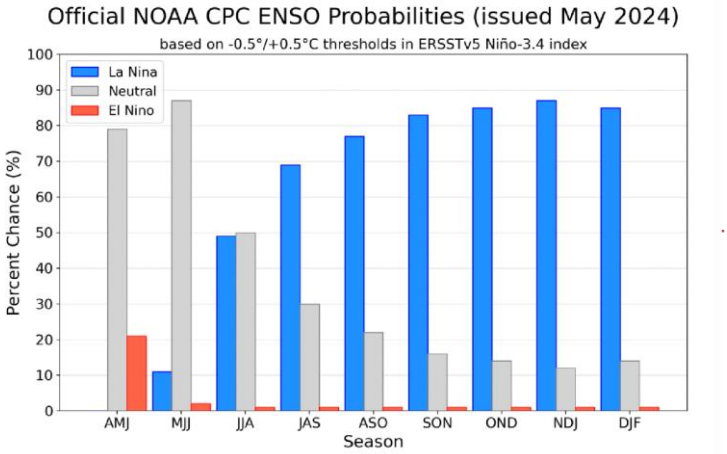
Natural Gas: NOAA sees La Nina summer, ~69% chance for J/A/S and >70% A/S/O

Expecting La Nina summer

On Friday, we tweeted [LINK] "*Forecasts have been for higher than normal Atlantic hurricane activity this summer. @NOAA 👇latest outlook is for La Nina summer. Hurricane season is far from predictable but La Nina summers tend to have increased hurricane activity. @weatherchannel #OOTT #NatGas #LNG."*On Thursday, the NOAA posted the updated monthly El Nino/La Nina outlook, which is issued on the 2nd Thurs of every month [LINK]. Winter 2023-2024 is essentially over and has turned out to be the warmest on record and will support the general, but not 100%, correlation that strong El Ninos lead to warm winters in the US. The El Nino/La Nina focus shifts to the summer and to hurricane season. The probability forecast is at ~49% for La Nina conditions from June-August, and a ~69% chance for conditions to develop from July-September. NOAA writes *"The forecast team continues to favor the dynamical model guidance, which suggests La Niña could form as early as June-*

August 2024, with higher confidence of La Niña during the following seasons. La Niña generally tends to follow strong El Niño events, which also provides added confidence in the model guidance favoring La Niña. In summary, a transition from El Niño to ENSO-neutral is likely in the next month. La Niña may develop in June-August (49% chance) or July-September (69% chance)". Again, weather is never 100% the same, but La Nina summers normally bring a better chance for normal hurricane activity whereas El Nino summers tend to have lesser hurricane activity. Below is the NOAA El Nino/La Nina update for the month of May.

Figure 4: NOAA El Nino/La Nina Outlook

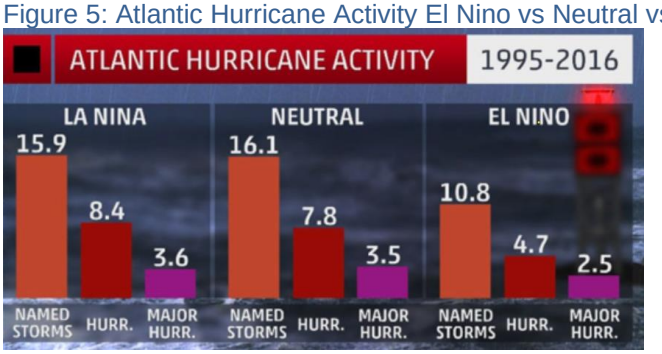


Source: NOAA CPC, IRI

La Nina summers tend to have normal to above normal hurricane seasons

Our above tweet included the below Weather Channel graph. The latest NOAA summer outlook for El Nino/La Nina conditions reflects a neutral probability for conditions to develop in the next month, followed by a ~49% for La Nina conditions to develop from June-August, and a ~69% chance for conditions to develop from July-September. Weather is never 100% accurate but, historically, Neutral and La Nina conditions tend to have normal to above normal hurricane activity, whereas El Nino years tend to have lower hurricane activity seasons. Our May 24, 2020 Energy Tidbits memo included The Weather Channel Aug 28, 2018 story that had the below graphic.

Figure 5: Atlantic Hurricane Activity El Nino vs Neutral vs La Nina



Source: The Weather Channel

Natural Gas: EIA STEO, lowers forecast for 2024 natural gas production

EIA US natural gas production forecast

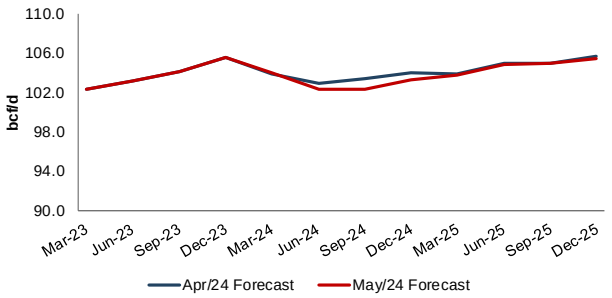
On Tuesday, the EIA released its monthly Short Term Energy Outlook for May 2024 [LINK]. The EIA lowered its 2024 US natural gas production estimate by -0.6 bcf/d to 103.0 bcf/d, which, on a full year average basis, now gives a YoY decline of -0.8 bcf/d from 2023. It looks like the lower forecast is the result of producers shutting in production and not a lower EIA HH gas price forecast. EIA later wrote "*Production is falling as some producers have announced curtailments because of low natural gas prices."* (ii) The EIA raised its 2024 HH price forecast +$0.03/mcf to $2.27/mcf (was $2.24/mcf), and increased their 2025 forecast +$0.21/mcf to $3.21/mcf (was $3.01/mcf). The EIA did not comment on the change in HH gas prices. (iii) The quarterly changes are as follows: Q1/24 +0.1 bcf/d to 104.0 bcf/d, Q2/24 -0.7 bcf/d to 102.3 bcf/d, Q3/24 -1.0 bcf/d to 102.4 bcf/d, and Q4/24 -0.7 bcf/d to 103.3 bcf/d. (iv) The EIA decreased its 2025 forecast -0.1 bcf/d to 104.8 bcf/d, which, on a full year average basis, would be up +1.80 bcf/d YoY. The quarterly changes to 2025 are as follows: Q1/25 -0.1 bcf/d to 103.8 bcf/d, Q2/25 -0.1 bcf/d to 104.9 bcf/d, Q3/25 flat at 105.0 bcf/d, and Q4/25 down -0.2 bcf/d to 105.5 bcf/d. The EIA did not comment on the changes in their natural gas consumption forecast. (v) Our Supplemental Documents package includes excerpts from the STEO.

Figure 6: EIA STEO Natural Gas Production Forecasts

bcf/d	Q1/23	Q2/23	Q3/23	Q4/23	**2023**	Q1/24	Q2/24	Q3/24	Q4/24	**2024**	Q1/25	Q2/25	Q3/25	Q4/25	**2025**
May-24	102.3	103.2	104.1	105.6	103.8	104.0	102.3	102.4	103.3	103.0	103.8	104.9	105.0	105.5	104.8
Apr-24	102.3	103.2	104.1	105.6	103.8	103.9	103.0	103.4	104.0	103.6	103.9	105.0	105.0	105.7	104.9
Mar-24	102.3	103.2	104.1	105.6	103.8	103.2	103.8	103.3	103.2	103.4	103.5	104.7	104.5	104.9	104.4
Feb-24	102.3	103.2	104.1	105.4	103.8	103.5	105.0	104.4	104.7	104.4	105.5	106.7	106.5	107.2	106.5
Jan-24	102.3	103.2	104.2	104.6	103.6	105.1	105.0	104.6	105.5	105.0	106.6	106.7	106.1	106.2	106.4
Dec-23	102.3	103.2	104.0	105.1	103.7	104.8	104.8	104.7	105.3	104.9					
Nov-23	102.3	103.2	104.1	105.1	103.7	105.1	104.8	104.7	105.9	105.1					
Oct-23	102.4	103.2	104.4	104.9	103.7	104.7	104.8	104.8	106.1	105.1					
Sep-23	102.1	102.8	102.7	103.1	102.7	104.3	104.7	104.9	105.9	104.9					
Aug-23	102.1	102.8	103.4	103.6	103.0	104.0	103.9	104.0	104.6	104.1					
July-23	102.0	102.2	103.0	102.2	102.4	101.8	101.5	102.5	103.7	102.4					
June-23	102.0	103.7	103.4	101.9	102.7	102.8	102.8	103.0	103.6	103.0					
May-23	102.1	101.9	99.9	100.4	101.1	100.7	101.1	101.4	101.8	101.2					
Apr-23	101.6	100.5	100.5	100.9	100.9	101.2	101.5	101.8	101.8	101.6					
Mar-23	101.0	100.2	100.6	101.0	100.7	101.4	101.4	102.0	102.0	101.7					
Feb-23	99.9	100.0	100.3	100.9	100.3	101.2	101.6	102.0	101.9	101.7					
Jan-23	100.8	99.9	100.1	100.6	100.3	101.1	101.8	102.7	103.6	102.3					

Source: EIA, STEO

Figure 7: EIA STEO Natural Gas Production Forecasts by Month



Source: EIA, STEO

Natural Gas: EIA STEO estimates Nov 1, 2024 storage at 4.125 tcf, highest on record

EIA May STEO storage forecast

Now that we're past the end of draw season (April 1st), we turn our attention to next winter. (i) Please note that our bias is to not pay much attention to gas storage forecasts past the start of winter 2024/25 on Nov until we get just before Nov 1, 2024 and there is some better near term certainty to the start of winter temperatures. The reason is that winter temperatures are the driving force by far on natural gas demand and it's hard to have condfidence on a winter 2024/25 temperature forecasts when we are still in Q2. (ii) EIA estimates US gas storage ended winter 2023/24 at 2.289 tcf at April 1, 2024, which was +0.439 tcf YoY and unchanged vs April STEO of 2.290 tcf.(iii) The EIA forecasts gas storage to start winter 2024/25 at 4.125 tcf at Nov 1, 2024, which is +315.9 bcf YoY and the highest level on record. The May STEO estimate is essentially unchanged vs the Apr STEO of 4.119 tcf at Nov 1, 2024. (iv) It's early and ultimately winter temperatures will determine if storage is high or low. But the May STEO forecasts a small improvement (less gas in storage) in 2025. The EIA forecasts gas storage to end winter 2024/25 at 2.187 tcf, which would be 102 bcf lower YoY. (v) There is even more uncertainty as you look out to winter 2025/26. The May STEO forecasts winter 2025/26 storage to be 4.059 tcf at Nov 1, 2025, which would be a little better than its forecast for Nov 1, 2024 at 4.125 tcf. Below is a table tracking the working gas inventory forecasts and actuals since 2016.

Figure 8: EIA STEO US Natural Gas in Storage (2016-2025)

US Working Natural Gas in Storage (billion cubic feet)						
	Storage	2016-2025				
	Level	Low	High	Range	Average	Deviation
Mar 2016	2,486.3	1,184.9	2,486.3	1,301.4	1,835.6	35.4%
Oct 2016	4,012.7	3,236.3	4,125.3	889.0	3,680.8	9.0%
Mar 2017	2,062.5	1,184.9	2,486.3	1,301.4	1,835.6	12.4%
Oct 2017	3,816.5	3,236.3	4,125.3	889.0	3,680.8	3.7%
Mar 2018	1,390.3	1,184.9	2,486.3	1,301.4	1,835.6	-24.3%
Oct 2018	3,236.3	3,236.3	4,125.3	889.0	3,680.8	-12.1%
Mar 2019	1,184.9	1,184.9	2,486.3	1,301.4	1,835.6	-35.4%
Oct 2019	3,762.0	3,236.3	4,125.3	889.0	3,680.8	2.2%
Mar 2020	2,029.4	1,184.9	2,486.3	1,301.4	1,835.6	10.6%
Oct 2020	3,928.5	3,236.3	4,125.3	889.0	3,680.8	6.7%
Mar 2021	1,801.2	1,184.9	2,486.3	1,301.4	1,835.6	-1.9%
Oct 2021	3,665.4	3,236.3	4,125.3	889.0	3,680.8	-0.4%
Mar 2022	1,401.5	1,184.9	2,486.3	1,301.4	1,835.6	-23.7%
Oct 2022	3,569.4	3,236.3	4,125.3	889.0	3,680.8	-3.0%
Mar 2023	1,849.9	1,184.9	2,486.3	1,301.4	1,835.6	0.8%
Oct 2023	3,809.4	3,236.3	4,125.3	889.0	3,680.8	3.5%
Mar 2024	2,289.3	1,184.9	2,486.3	1,301.4	1,835.6	24.7%
Oct 2024	4,125.3	3,236.3	4,125.3	889.0	3,680.8	12.1%
Mar 2025	2,187.1	1,184.9	2,486.3	1,301.4	1,835.6	19.2%
Oct 2025	4,059.4	3,236.3	4,125.3	889.0	3,680.8	10.3%

Source: EIA, STEO

LNG Canada

Natural Gas: Shell CEO seems to describe LNG Canada 1.8 bcf/d Phase 2

Here is what we wrote in last week's (May 5, 2024) Energy Tidbits memo on Shell's Q1 call re LNG Canada. "*On Thursday, Shell held its Q1 call. (i) On Thursday, we tweeted [LINK] "Seems like Shell CEO Sawan was describing LNG Canada 1.8 bcf/d Phase 2. Q1 Q&A today, Sawan's LNG growth focus on organic, low carbon intensity, attractive, grow its #LNG portfolio, etc. Sounds like Sawan's 👇07/28/23 Q2/23 Q&A description of LNG Canada incl Phase 2. #OOTT." (ii) In the Q1 call, Shell CEO Sawan did not specifically mention LNG Canada 1.8 bcf/d Phase 2 as a likely FID, but it certainly seemed like Sawan was alluding to it as he talked about potential organic opportunities to grow LNG, especially as he highlithged low carbon intensity LNG projects. And also since Sawan confirmed his positive view for LNG in Shell and that he wasn't looking at LNG M&A, rather was looking at organic growth. Here is what Sawan said in the Q&A "I'd sort of be -- I'd separate them. I think one for example been talked about Ruwais LNG in Abu Dhabi. That's one which Abu Dhabi is developing on a on a greenfield basis. I won't give any specific comments other than to say organic opportunities to continue to grow our LNG portfolio opportunities that potentially can add more supply points to the portfolio in attractive locations where the carbon intensity is low and the value potential is high are very much down the lane that we want to continue to grow. We have a fundamental conviction that this is not an LNG sprint of a few years but that LNG will be required for decades to come. And this is why continuing to find those differentiated opportunities is something we will look at. We are indeed not looking at big M&A in that space. Whenever we're looking at LNG opportunities we're looking at bolt-ons to our existing port for you where we feel that the capabilities we have the portfolio, we have the positions that we have built up over the years would allow us to be able to unlock more value than maybe a seller would be. And so we would be looking at any of these opportunities of course being creative to our overall delivery as as an energy business for, for sure." (iii) We have been closely following Sawan's comments on LNG Canada since before he took over as CEO a year ago. But in the Q2/23 call, Sawan had the below comments on LNG Canada that highlighted items like LNG Canada is the "cleanest, lowest carbon intensity LNG "in the*

world. Our Supplemental Documents package includes Sawan's comments from the Q1/24 and Q2/23 calls on LNG Canada."

07/27/23: Shell CEO Sawan's Q2/23 call comments on LNG Canada

Here is what we wrote in our July 30, 2023 Energy Tidbits memo on CEO Sawan's comments on the Q2/23 call. "*Natural Gas: Surely Shell is going to FID "very attractive" LNG Canada Phase 2. Shell CEO Wael Sawan had the perfect opportunity in the Q&A of the Q2 call on Thursday to throw some caution or doubt on the potential to FID the brownfield LNG Canada 1.8 bcf/d Phase 2 but didn't say do so. Rather he continued to speak glowingly about the under-construction 1.8 bcf/d LNG Canada Phase 1 and also about LNG Canada Phase 2. We believe he is setting the stage to FID Phase 2 in the coming months. (i) On Friday, we tweeted [LINK] "Feels like FID is when, not if. #Shell CEO Sawan on #LNGCanada 1.8 bcfd Phase 2. "while the asset itself is very attractive for us, a big part of the attraction is also the optimization opportunities that full flex #LNG cargos offer us in a portfolio like ours". LNG Canada 1.8 bcfd Phase 1 will be "the cleanest, the lowest carbon intensity LNG out there in the market". Post 2025 should be very good for AB, BC #NatGas! #OOTT." (ii) There was no comments in the Q2 report or Q2 call mgmt. prepared remarks on Phase 2. (iii) But Sawan had the perfect opportunity to play down Phase 2. Shell took an impairment charge on LNG Canada Phase 1, which analysts described as "sizeable". We couldn't find the specific amount. In the Q&A, Shell CFO Sinead Gorman said "This one was an accounting mechanics one, pure and simple discount rates. So as you saw risk free rates changing of course, that played into the whack and that's where we went up 1%. That's where it played in on this asset." Even though it was an accounting mechanics impairment, Sawan could have used this as an opportunity to put some caution on Phase 2. (iv) In the Q&A, Sawan was asked "One on LNG Canada, again, posted this, the impairment. Does that have any implications for a second phase of that project or not really, either from a returns perspective or anything else." Sawan went thru how LNG Canada Phase 1 is a "really advantaged asset with the "cleanest, lowest carbon intensity LNG" in the world, and then how Phase 2 is "very attractive" to Shell. Sawan full reply was "LNG Canada, I'll use the same frame. LNG Canada continues to be an advantaged asset, a really advantaged asset. You have, in essence, a captive export scheme for Western Canadian gas. You have a demand, a market, the Asian market that is within proximity. And you have, in essence, the cleanest, the lowest carbon intensity LNG out there in the market, all coming together at a good point in time for those volumes to, all of which will be full flexibility portfolio volumes for us, something which we, of course, like a lot. All that coming together around middle of this year. That's a project that now is over 75% complete on the midstream, over 90% complete on the pipeline. So it's coming along nicely. All the major units are either at the plant or are enroute to the plant. So knock on wood, all seems to be going well. Phase 2 is going to -- the impairment itself does not impact at all our view on Phase 2. In fact, all the reasons that Sinead, explained around this being more driven by accounting and of course, while the asset itself is very attractive for us, a big part of the attraction is also the optimization opportunities that full flex LNG cargos offers us in a portfolio like ours. And that doesn't change, of course. And so what we will do is we will wait for*

the joint venture to have put their best proposal forward, and with the other joint venture partners, we will assess it and make a decision at the time."

Another long-term LNG deal

Natural Gas: ADNOC and EnBW sign LT LNG agreement for 0.08 bcf/d

The big rush in long-term LNG deals was from July 1, 2021 through June 30, 2022 that locked up almost all the available LNG supply that was available prior to 2026. There was a slow down but there was a pickup again over the last year and a half or so as buyers moved to lock up very long-term LNG supply for the late 2020s and some continuing even out past 2050. Plus, there was a push from global LNG suppliers to lock up other long-term LNG supply to add to their supply portfolio to be able to use to supply to their customers. This week, there was one new long-term LNG deal. On Wednesday, EnBW reported [LINK] that they had signed a 15-year LNG procurement agreement with ADNOC whereby EnBW will purchase 0.08 bcf/d from ADNOC beginning in 2028 to supply gas to Germany. EnBW's Board Member for Sustainable Generation Infrastructure, Peter Heydecker, said "*We are delighted that EnBW has signed its first LNG contract in the Middle East with our experienced partner ADNOC. In doing so, we are taking the next step in terms of diversifying our procurement portfolio and establishing our own LNG value chain. We can also use the experience gained here for our medium-term goal of establishing an import structure for green gases, since the two business fields are very similar".* The LNG will come out of the UAE's Ruwais LNG project, which is commissioned to start in 2028 and will have a total capacity of ~1.3 bcf/d. Our Supplemental Documents package includes the EnBW press release.

There have been 22.13 bcf/d of long-term LNG supply deals since July 1, 2021

The big wave in buyers locking up long term supply started in July 2021. We first highlighted this abrupt shift to long term LNG supply deals in our July 14, 2021 8-pg "*Asian LNG Buyers Abruptly Change and Lock in Long Term Supply – Validates Supply Gap, Provides Support For Brownfield LNG FIDs".* We included a table of the deals done in that short two week period. We continue to update that table, which now shows 22.13 bcf/d of long-term LNG deals since July 1, 2021. 63% of the deals have been by Asian LNG buyers, but we are now seeing rest of world locking up long term supply deals post Russia/Ukraine. Note in our non-Asian LNG deals will major LNG players (ie. Chevron, Shell, etc) buying for their LNG portfolio supply. China has been particularly active in this space, accounting for 52% of all Asian LNG buyers in long term contracts since July 1, 2021. Below is our updated table of Asian and Europe LNG buyers new long-term supply deals since July 1, 2021.

Figure 9: Long-Term LNG Buyer Deals Since July 1, 2021

Date	Buyer	Seller	Country	Volume	Duration	Start	End
			Buyer / Seller	(bcf/d)	Years		
Asian LNG Deals							
Jul 7, 2021	CNOOC	Petronas	China / Canada	0.30	10.0	2022	2032
Jul 9, 2021	CPC	QatarEnergy	Taiwan / Qatar	0.16	15.0	2022	2037
Jul 9, 2021	Guangzhou Gas	BP	China / US	0.13	12.0	2022	2034
Jul 12, 2021	Korea Gas	QatarEnergy	Korea / Qatar	0.25	20.0	2025	2045
Sep 29, 2021	CNOOC	QatarEnergy	China / Qatar	0.50	15.0	2022	2037
Oct 7, 2021	Shenzhen	BP	China / US	0.04	10.0	2023	2032
Oct 11, 2021	ENN	Cheniere	China / US	0.12	13.0	2022	2035
Nov 4, 2021	Unipec	Venture Global LNG	China / US	0.46	20.0	2023	2043
Nov 4, 2021	Sinopec	Venture Global LNG	China / US	0.53	20.0	2023	2043
Nov 5, 2021	Sinochem	Cheniere	China / US	0.12	17.5	2022	2040
Nov 22, 2021	Foran	Cheniere	China / US	0.04	20.0	2023	2043
Dec 6, 2021	Guangdong Energy	QatarEnergy	China / Qatar	0.13	10.0	2024	2034
Dec 8, 2021	S&T International	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 10, 2021	Suntien Green Energy	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 15, 2021	SPIC Guangdong	BP	China / US	0.03	10.0	2023	2033
Dec 20, 2021	CNOOC Gas & Power	Venture Global LNG	China / US	0.26	20.0	2023	2043
Dec 29, 2021	Foran	BP	China / US	0.01	10.0	2023	2032
Jan 11, 2022	ENN	Novatek	China / Russia	0.08	11.0	2024	2035
Jan 11, 2022	Zhejiang Energy	Novatek	China / Russia	0.13	15.0	2024	2039
Feb 4, 2022	CNPC	Gazprom	China / Russia	0.98	30.0	2023	2053
Mar 24, 2022	Guangdong Energy	NextDecade	China / US	0.20	20.0	2026	2046
Mar 29, 2022	ENN	Energy Transfer	China / US	0.36	20.0	2026	2046
Apr 1, 2022	Guangzhou Gas	Mexico Pacific Ltd	China / Mexico	0.26	20.0	n.a.	n.a.
Apr 6, 2022	ENN	NextDecade	China / US	0.26	20.0	2026	2026
Apr 22, 2022	Kogas	BP	Korea / US	0.20	18.0	2025	2043
May 2, 2022	Gunvor Singapore Pte	Energy Transfer LNG	Singapore / US	0.26	20.0	2026	2046
May 3, 2022	SK Gas Trading LLC	Energy Transfer LNG	Korea / US	0.05	18.0	2026	2042
May 10, 2022	Exxon Asia Pacific	Venture Global LNG	Singapore / US	0.26	n.a.	n.a.	n.a.
May 11, 2022	Petronas LNG	Venture Global LNG	Malaysia / US	0.13	20.0	n.a.	n.a.
May 24, 2022	Hanwha Energy	TotalEnergies	Korea / France	0.08	15.0	2024	2039
May 25, 2022	POSCO International	Cheniere	Korea / US	0.05	20.0	2026	2036
June 5, 2022	China Gas Holdings	Energy Transfer	China / US	0.09	25.0	2026	2051
Jul 5, 2022	China Gas Holdings	NextDecade	China / US	0.13	20.0	2027	2047
Jul 20, 2022	PetroChina	Cheniere	China / US	0.24	24.0	2026	2050
Jul 26, 2022	PTT Global	Cheniere	Thailand / US	0.13	20.0	2026	2046
Jul 27, 2022	Exxon Asia Pacific	NextDecade	Singapore / US	0.13	20.0	2026	2046
Sep 2, 2022	Woodside Singapore	Commonwealth	Singapore / US	0.33	20.0	2026	2046
Nov 21, 2022	Sinopec	QatarEnergy	China / Qatar	0.53	27.0	2026	2053
Dec 26, 2022	INPEX	Venture Global LNG	Japan / US	0.13	20.0	n.a.	n.a.
Dec 27, 2022	JERA	Oman LNG	Japan / Oman	0.11	10.0	2025	2035
Jan 19, 2023	ITOCHU	NextDecade	Japan / US	0.13	15.0	n.a.	n.a.
Feb 7, 2023	Exxon Asia Pacific	Mexico Pacific Ltd	Singapore / Mexico	0.26	20.0	n.a.	n.a.
Feb 23, 2023	China Gas Holdings	Venture Global LNG	China / US	0.26	20.0	n.a.	n.a.
Mar 6, 2023	Gunvor Singapore Pte	Chesapeake Energy	Singapore / US	0.26	15.0	2027	2042
Apr 28, 2023	JERA	Venture Global LNG	Japan / US	0.13	20.0	n.a.	n.a.
May 16, 2023	KOSPO	Cheniere	Korea / US	0.05	19.0	2027	2046
Jun 1, 2023	Bangladesh Oil	QatarEnergy	Bangladesh / Qatar	0.24	15.0	2026	2031
Jun 21, 2023	Petro Bangle	Oman	Bangladesh / Oman	0.20	10.0	2026	2036
Jun 21, 2023	CNPC	QatarEnergy	China / Qatar	0.53	27.0	2027	2054
Jun 26, 2023	ENN LNG	Cheniere	Singapore / US	0.24	20.0	2026	2046
Jul 5, 2023	Zhejiang Energy	Mexico Pacific Ltd	China / Mexico	0.13	20.0	2027	2047
Aug 8, 2023	LNG Japan	Woodside	Japan / Australia	0.12	10.0	2026	2036
Sep 7, 2023	Petrochina	ADNOC	China / UAE	n.a.	n.a.	n.a.	n.a.
Nov 2, 2023	Foran	Cheniere	China / US	0.12	20.0	n.a.	n.a.
Nov 4, 2023	Sinopec	QatarEnergy	China/Qatar	0.39	27.0	2026	2053
Nov 27, 2023	Gunvor Singapore Pte	Delfin Midstream	Singapore / US	0.10	15.0	n.a.	n.a.
Dec 20, 2023	ENN	ADNOC	Singapore / UAE	0.13	15.0	2028	2043
Jan 5, 2024	GAIL	Vitol	India / Singapore	0.13	10.0	2026	2036
Jan 8, 2024	Shell	Ksi Lisims LNG	Singapore / Canada	0.26	20.0	2027	2047
Jan 16, 2024	ExxonMobil	Mexico Pacific Ltd	Singapore / Mexico	0.16	20.0	2024	2044
Jan 29, 2024	Excelerate	QatarEnergy	Bangladesh / Qatar	0.13	15.0	2026	2041
Jan 30, 2024	ADNOC	GAIL India	UAE / India	0.07	10.0	2024	2034
Feb 6, 2024	Petronet LNG	QatarEnergy	India / Qatar	0.99	20.0	2028	2048
Feb 19,2024	Deepak Fertilisers	Equinor	India / Norway	0.09	15.0	2026	2041
Feb 28, 2024	Kogas	Woodside	Korea / Australia	0.07	10.5	2026	2037
Feb 29, 2024	Sembcorp	TotalEnergies	Singapore / France	0.11	16.0	2027	2043
Apr 29, 2024	Kogas	BP	Korea / Singapore	0.12	11.0	2026	2037
Total Asian LNG Buyers New Long Term Contracts Since Jul/21				**13.87**			

Date	Buyer	Seller	Country	Volume	Duration	Start	End
			Buyer / Seller	(bcf/d)	Years		
Non-Asian LNG Deals							
Jul 28, 2021	PGNiG	Venture Global LNG	Poland / US	0.26	20.0	2023	2043
Nov 12, 2021	Engie	Cheniere	France / US	0.11	20.0	2021	2041
Mar 7, 2022	Shell	Venture Global LNG	US / US	0.26	20.0	2024	2044
Mar 16, 2022	NFE	Venture Global LNG	US / US	0.13	20.0	2023	2043
Mar 16, 2022	NFE	Venture Global LNG	US / US	0.13	20.0	2023	2043
May 2, 2022	Engie	NextDecade	France / US	0.23	15.0	2026	2041
May 17, 2022	PGNiG	Sempra Infrastructure	Poland / US	0.40	20.0	n.a.	n.a.
May 25, 2022	RWE Supply & Trading	Sempra Infrastructure	Germany / US	0.30	15.0	n.a.	n.a.
Jun 9, 2022	Equinor	Cheniere	Norway / US	0.23	15.0	2026	2041
Jun 21, 2022	EnBW	Venture Global LNG	Germany / US	0.20	20.0	2026	2046
Jun 22, 2022	INEOS Energy	Sempra Infrastructure	UK / US	0.21	20.0	2027	2047
Jun 22, 2022	Chevron	Venture Global LNG	US / US	0.26	20.0	n.a.	n.a.
Jun 22, 2022	Chevron	Cheniere	US / US	0.26	15.0	2027	2042
Jul 12, 2022	Shell	Mexico Pacific Ltd	US / Mexico	0.34	20.0	2026	2046
Jul 13, 2022	Vitol	Delfin Midstream	US / US	0.07	15.0	n.a.	n.a.
Aug 9, 2022	Centrica	Delfin Midstream	UK / US	0.13	15.0	2026	2041
Aug 24, 2022	Shell	Energy Transfer	US / US	0.28	20.0	2026	2046
Oct 6, 2022	EnBW	Venture Global LNG	Germany / US	0.26	20.0	2022	2042
Dec 6, 2022	ENGIE	Sempra Infrastructure	France / US	0.12	15.0	n.a.	n.a.
Dec 20, 2022	Galp	NextDecade	Portugal / US	0.13	20.0	n.a.	n.a.
Dec 20, 2022	Shell	Oman LNG	UK/Oman	0.11	10.0	2025	2035
Jan 25, 2023	PKN ORLEN	Sempra Infrastructure	EU//US	0.13	20.0	2027	2047
Jan 30, 2023	BOTAS	Oman	Turkey / Oman	0.13	10.0	2025	2035
Mar 27, 2023	Shell	Mexico Pacific Ltd	UK / Mexico	0.15	20.0	2026	2046
Apr 24, 2023	Hartree Partners LP	Delfin Midstream	US / US	0.08	20.0	n.a.	n.a.
Jun 21, 2023	Equinor	Cheniere	Norway / US	0.23	15.0	2027	2042
Jun 22, 2023	SEFE	Venture Global LNG	EU//US	0.30	20.0	2026	2046
Jul 14, 2023	ONEE (Morocco)	Shell	Africa/US	0.05	12.0	2024	2036
Jul 18, 2023	IOCL	Adnoc	India/UAE	0.16	14.0	2026	2040
Jul 28, 2023	OMV	BP	Austira/UK	0.13	10.0	2026	2036
Aug 4, 2023	ConocoPhillips	Mexico Pacific Ltd	US/Mexico	0.29	20.0	2025	2045
Aug 22, 2023	BASF	Cheniere	Germany / US	0.10	17.0	2026	2043
Aug 30, 2023	Shell	Oman LNG	US / Oman	0.11	10.0	2025	2035
Oct 11, 2023	TotalEnergies	QatarEnergy	France / Qatar	0.46	27.0	2026	2053
Oct 18, 2023	Shell	QatarEnergy	Netherlands / Qata	0.46	27.0	2026	2053
Oct 23, 2023	ENI	QatarEnergy	Italy / Qatar	0.13	27.0	2026	2053
Oct 31, 2023	Vitol	Chesapeake Energy	Sweden / US	0.13	15.0	2028	2043
Nov 29, 2023	OMV	Cheniere	Netherlands / US	0.11	15.0	2029	2044
Dec 5, 2023	Woodside Energy	Mexico Pacific Ltd	Australia / Mexico	0.17	20.0	2024	2044
Mar 18, 2024	SEFE	ADNOC	Germany / UAE	0.13	20.0	2024	2044
Apr 17, 2024	Shell	Oman LNG	US / Oman	0.21	10.0	2025	2035
Apr 22, 2024	TotalEnergies	Oman LNG	France / Oman	0.11	10.0	2025	2035
May 8, 2024	EnBW	Adnoc	Germany / UAE	0.08	15.0	2028	2043
Total Non-Asian LNG Buyers New Long Term Contracts Since Jul/21				**8.26**			

Total New Long Term LNG Contracts since Jul/21	**22.13**

*Excludes Asian short term/spot deals
*on Dec 20, 2021 CNOOC agreed to buy an additional 0.13 bcf/d from Venture Global for an undisclosed shorter period
Source: Bloomberg, Company Reports
Prepared by SAF Group https://safgroup.ca/news-insights/

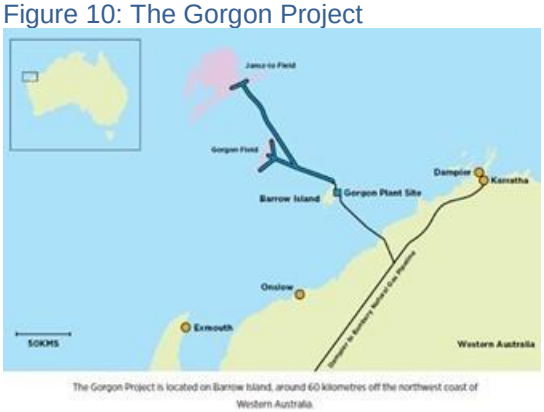
Source: SAF

Natural Gas: Chevron Gorgon LNG train off line for about 5 weeks

Gorgon LNG train down

Last week's (May 5, 2024) Energy Tidbits memo our May 3 tweet [LINK] ""*Chevron says Gorgon LNG production train offline after fault", repairs "expected to take a number of weeks" , remaining 2 trains producing at full rates reports @SStapczynski. See 👇Gorgon LNG is 3-trains, each ~0.7 bcf/d for total ~2.1 bcf/d capacity. #OOTT #LNG."* It looks like it will be down about 5 weeks. On Tuesday, Bloomberg wrote "*A production train at the Gorgon LNG export plant in Australia is slated to remain offline for about 5 weeks for repairs after a fault last week, according to traders with knowledge of the matter. * The facility's compressor tripped offline last week, the people said."* Most importantly, Bloomberg reminded that *"Chevron said Friday that the remaining two LNG production trains at Gorgon are unaffected and are producing at full rates."*

Figure 10: The Gorgon Project



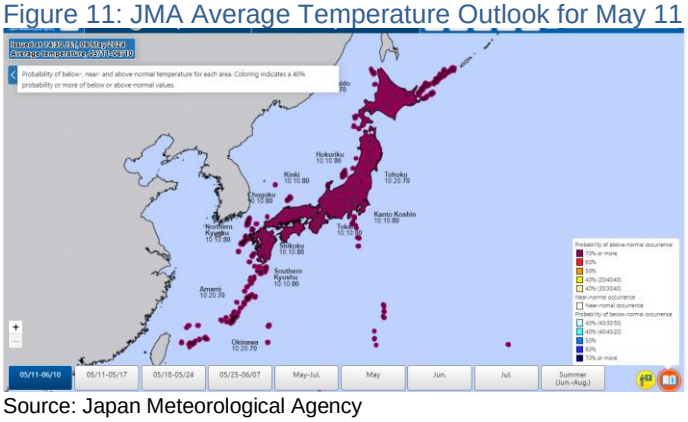
Source: Chevron

Natural Gas: Japan expects warm start to June, ties to call for hot summer

JMA temperature forecast for early June

On Thursday, the Japan Meteorological Agency updated its 4-week forecast for Japan [LINK], which is May 11 - June 10. There is no JMA commentary on the forecast JMA is calling for warmer than normal temperatures for May 11 – June 10. We checked AccuWeather and they are forecasting high 20's C for the first part of June. In Japan, that isn't normally a temperature that drives a lot of electricity demand as Japanese offices and house tend to have air conditioning turned way higher than in North America. But a warm early June is fitting to the JMA's current call for a warmer than normal summer. A warm start to summer may not move natural gas/LNG prices up too much but it's better than seeing a cool start to summer to hit prices. Below is the JMA temperature forecast for May 11 – June 10..

Figure 11: JMA Average Temperature Outlook for May 11 – June 10



Source: Japan Meteorological Agency

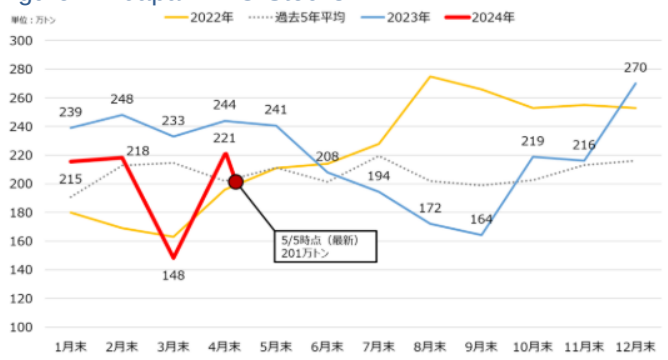
Natural Gas: Japan LNG stocks down WoW, still down YoY

Japan LNG stocks down WoW

Japan's LNG stocks are below 2023 levels and well below the 5-year average. On Wednesdays, Japan's METI releases its weekly LNG stocks data [LINK] except last week when METI did not report their stocks due to a holiday in Japan. LNG stocks on May 5 were 96.5 bcf, down -5.63% WoW from April 28 of 102.3 bcf, and down -17.6% YoY from 117.2 bcf

a year earlier. Stocks are immaterially below the 5-year average for the end of April of 97.0 bcf. The recent build was helped by Japan shutting in some natural gas generation last month to conserve natural gas use and drain on LNG stocks, combined with pleasant temperatures. Below is the Japanese LNG stocks graph from the METI weekly report.

Figure 12: Japan LNG Stocks



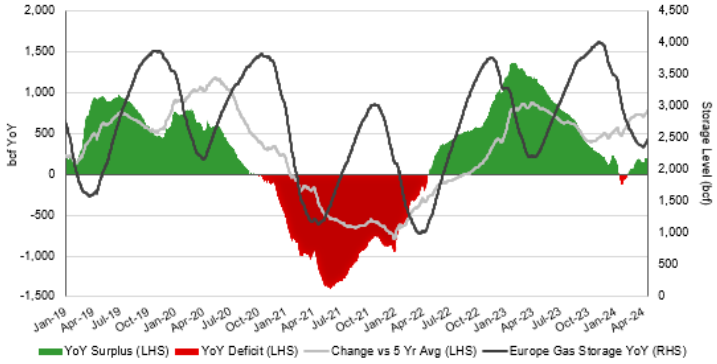
Source: METI

Natural Gas: Europe storage builds WoW to 63.09%, YoY surplus narrows

Europe gas storage

This week, Europe storage increased by +23 bps WoW to 63.09% on May 9 vs 62.86% on May 2. Storage is now +72 bps higher than last year's levels of 62.37% on May 9, 2023, and up huge vs the 5-year average of 49.84%. Even though the YoY surplus is modest, up until the recent Russia bombing of Ukraine natural gas storage facility, there weren't fears for natural gas and LNG supply over the summer months. The big wildcard for Europe natural gas markets over the coming months will be if Russia can damage or put out of operation any Ukraine natural gas storage. Below is our graph of Europe Gas Storage Level.

Figure 13: European Gas Storage Level

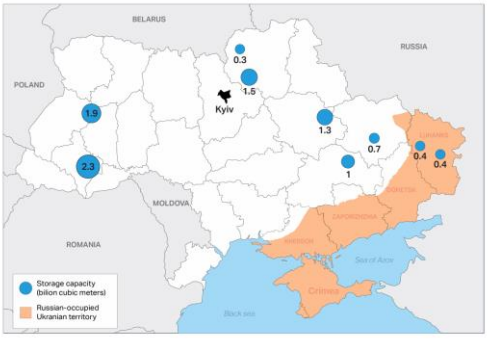


Source: Bloomberg, SAF

Ukraine storage is currently ~6% of total Europe gas storage volume

The reason why natural gas markets reacted to the Russian bombing of the Ukraine natural gas storage was that Ukraine's natural gas storage is an important part of Europe natural gas storage. We broke out the Ukraine storage data from the below Europe data we monitor weekly from the GIE AGSI website [LINK], and we found that on May 9th natural gas in Ukraine storage was at 13.37% of its total capacity, up from 12.78% on May 2nd and started the winter on Nov 1, 2023 at 39.38%. Right now, Ukraine makes up ~6% of Europe's natural gas in storage and, at the beginning of the winter, it was ~10% of Europe's natural gas in storage. So not an unnoticeable portion at risk of being destroyed if the Russians target their facilities well. We don't know how deep down are the Ukraine storage caverns so are unable to assess the potential for underground natural gas in storage to be blown up. But, as seen this week, Russia bombs can damage or destroy above ground infrastructure for the natural gas storage operations. Below is a map of Ukraine's major gas storage facilities.

Figure 14: Ukraine Gas Storage Facilities as of July 2023



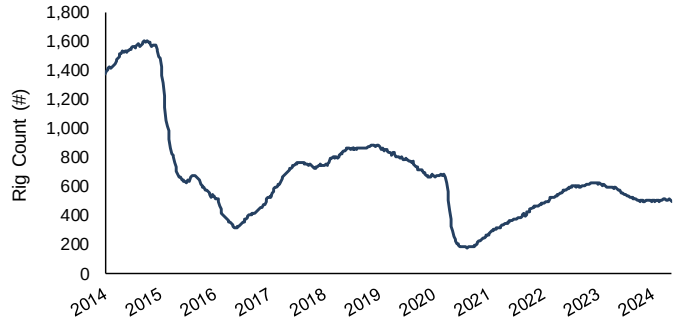
Source: Bruegel

Oil: US oil rigs down -3 WoW to 496 rigs, US gas rigs up +1 WoW to 103 rigs

US oil rigs down WoW

On Friday, Baker Hughes released its weekly North American drilling rig data. (i) Note, after we sent them an email, Baker Hughes confirmed they wouldn't be returning to the old format which previously allowed us to break out the basin changes by rig type. (ii) Total US oil rigs were down -3 rigs WoW to 496 oil rigs as of May 10. US oil rigs went below 520 rigs on Aug 25 and has been around 490-510 rigs for the past several months. (iii) Note we are able to see the basin changes but not by type of rig. The major changes were Ardmore Woodford -1 rig WoW to 2 total rigs, Cana Woodford up +1 rig WoW to 22 total rigs, and Permian -2 rigs WoW to 314 total rigs. (iv) US gas rigs were up +1 rig this week to 103 gas rigs.

Figure 15: Baker Hughes Total US Oil Rigs



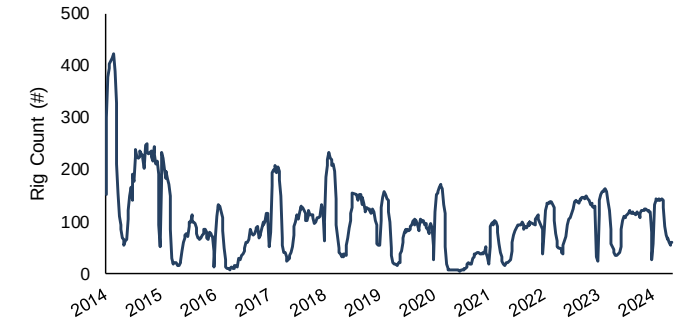
Source: Baker Hughes, SAF

Oil: Total Cdn rigs down -4 WoW, still working through seasonal trough

Cdn total rigs down WoW

As happens every year in Canada, the rig count drops dramatically from early March thru the end of April/beginning of May as winter drilling season ends and the industry moves into spring break up. Spring break up is the period when it warms up and road access becomes limited/restricted in many parts of Western Canada. The last several weeks have seen total Cdn rigs decline drop from 231 at the beginning of March to 116 this week. It looks like the wet weather has put a pause in the normal post spring break up ramp in drilling. Note the earliest trough in the past 7 years was April 30th, as usually it bottoms out in the 1st or 2nd week of May. Cdn oil rigs stayed flat WoW this week at 60 rigs and are up +23 rigs YoY. Gas rigs are down -4 rigs WoW and down -1 YoY. Baker Hughes did not update their old format report, so we weren't able to see the provincial breakouts.

Figure 16: Baker Hughes Total Cdn Oil Rigs



Source: Baker Hughes, SAF

Oil: US weekly oil production flat WoW at 13.100 mmb/d

US oil production flat WoW

It's worth noting that historically, the EIA weekly estimates have been off of the Form 914 actuals, which sometimes require re-benchmarking. Here's what the EIA wrote on their website last month with the April STEO: "*When we release the Short-Term Energy Outlook (STEO) each month, the weekly estimates of domestic crude oil production are reviewed to identify any differences between recent trends in survey-based domestic*

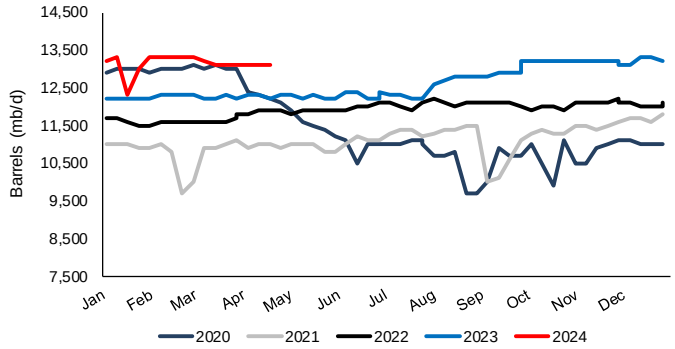
production reported in the Petroleum Supply Monthly (PSM) and other current data. If we find a large difference between the two series, we may re-benchmark the weekly production estimate on weeks when we release STEO. This week's domestic crude oil production estimate incorporates a re-benchmarking that decreased estimated volumes by 177,000 barrels per day, which is about 1.3% of this week's estimated production total". This week, the EIA released its May STEO and they'd revised up Q1/24 production estimates to 12.96 mmb/d from 12.84 mmb/d in April's STEO, so this message is consistent. The latest Form 914 (with February actuals) was -0.146 mmb/d lower than the weekly estimates of 13.300 mmb/d. This week, the EIA's production estimates were flat WoW at 13.100 mmb/d for the week ended May 3. Alaska was down -0.008 mmb/d WoW to 0.421 mmb/d. Below is a table of the EIA's weekly oil production estimates.

Figure 17: EIA's Estimated Weekly US Field Oil Production (mb/d)

	Week 1		Week 2		Week 3		Week 4		Week 5	
Year-Month	End Date	Value	End Date	Value	End Date	Value	End Date	Value	End Date	Value
2023-Jan	01/06	12,200	01/13	12,200	01/20	12,200	01/27	12,200		
2023-Feb	02/03	12,300	02/10	12,300	02/17	12,300	02/24	12,300		
2023-Mar	03/03	12,200	03/10	12,200	03/17	12,300	03/24	12,200	03/31	12,200
2023-Apr	04/07	12,300	04/14	12,300	04/21	12,200	04/28	12,300		
2023-May	05/05	12,300	05/12	12,200	05/19	12,300	05/26	12,200		
2023-Jun	06/02	12,400	06/09	12,400	06/16	12,200	06/23	12,200	06/30	12,400
2023-Jul	07/07	12,300	07/14	12,300	07/21	12,200	07/28	12,200		
2023-Aug	08/04	12,600	08/11	12,700	08/18	12,800	08/25	12,800		
2023-Sep	09/01	12,800	09/08	12,900	09/15	12,900	09/22	12,900	09/29	12,900
2023-Oct	10/06	13,200	10/13	13,200	10/20	13,200	10/27	13,200		
2023-Nov	11/03	13,200	11/10	13,200	11/17	13,200	11/24	13,200		
2023-Dec	12/01	13,100	12/08	13,100	12/15	13,300	12/22	13,300	12/29	13,200
2024-Jan	01/05	13,200	01/12	13,300	01/19	12,300	01/26	13,000		
2024-Feb	02/02	13,300	02/09	13,300	02/16	13,300	02/23	13,300		
2024-Mar	03/01	13,200	03/08	13,100	03/15	13,100	03/22	13,100	03/29	13,100
2024-Apr	04/05	13,100	04/12	13,100	04/19	13,100	04/26	13,100		
2024-May	05/03	13,100								

Source: EIA

Figure 18: EIA's Estimated Weekly US Oil Production



Source: EIA, SAF

Oil: EIA May STEO has unchanged 2024 and 2025 US oil production growth forecasts

EIA STEO US oil production

On Tuesday, the EIA released its Short-Term Energy Outlook for May 2024 [LINK] and slightly decreased its 2024 oil production forecasts and slightly increased its 2025 US oil production forecasts. (i) The May STEO forecasts for 2024 US oil production estimates were

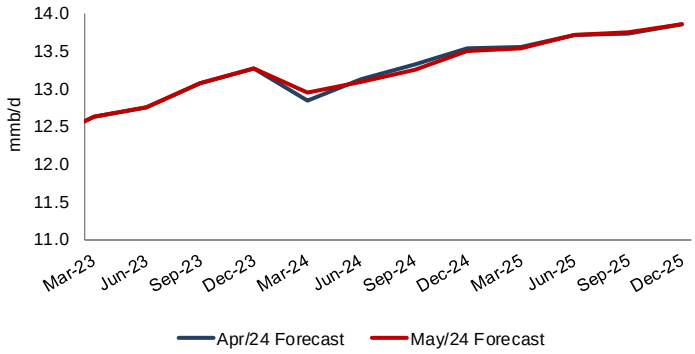
revised down vs the last STEO in April, which was bumped up from March. The 2025 forecasts for US oil production was revised up for 2025, which was already bumped up in April from March. (ii) The lookback to 2023 was unchanged with the May STEO estimate for 2023 was kept flat at 12.93 mmb/d from the April STEO of 12.93 mmb/d.Recall the big +140,000 b/d revision in October's STEO from the September STEO's forecast of 12.78 mmb/d, as the EIA had to play catch-up with higher oil production actuals being reported over weekly estimates. (iii) The May STEO forecasts for 2024 US oil production estimates were essentially unchanged vs the April STEO. The May STEO forecast for 2024 is down -0.01 mmb/d to 13.20 mmb/d from the April STEO of 13.21 mmb/d. There were some small shievisions by quarter were Q1/24 +0.12 mmb/d to 12.96 mmb/d, Q2/24 down -0.03 to 13.10 mmb/d, Q3/24 -0.07 mmb/d to 13.25 mmb/d, and Q4/24 down -0.04 mmb/d to 13.50 mmb/d. (iv) The May STEO forecast for 2025 US oil production forecast is also essentially unchanged. The EIA expects oil production to ramp up to 13.73 mmb/d over 2025, up +0.01 mmb/d from the April STEO. The revisions by quarter were Q1/25 -0.01 mmb/d to 13.55 mmb/d, Q2/25 +0.01 mmb/d to 13.73 mmb/d, Q3/25 +0.02 mmb/d to 13.76 mmb/d, and Q4/25 +0.01 mmb/d to 13.87 mmb/d. If true, these would be record quarters for US oil production. Below is our EIA STEO forecast comparison by month.

Figure 19: EIA STEO Oil Production Forecasts by Month

(million b/d)	Q1/23	Q2/23	Q3/23	Q4/23	**2023**	Q1/24	Q2/24	Q3/24	Q4/24	**2024**	Q1/25	Q2/25	Q3/25	Q4/25	**2025**
May-24	12.63	12.75	13.07	13.26	12.93	12.96	13.10	13.25	13.50	13.20	13.55	13.73	13.76	13.87	13.73
Apr-24	12.63	12.75	13.07	13.27	12.93	12.84	13.13	13.32	13.54	13.21	13.56	13.72	13.74	13.86	13.72
Mar-24	12.63	12.75	13.07	13.28	12.93	12.91	13.13	13.25	13.47	13.19	13.49	13.66	13.68	13.78	13.65
Feb-24	12.63	12.75	13.07	13.29	12.93	13.03	13.12	13.06	13.18	13.10	13.37	13.46	13.50	13.64	13.49
Jan-24	12.63	12.75	13.07	13.22	12.92	13.27	13.22	13.15	13.21	13.21	13.36	13.44	13.43	13.53	13.44
Dec-23	12.63	12.75	13.06	13.26	12.93	13.09	13.07	13.07	13.23	13.11					
Nov-23	12.63	12.75	13.07	13.17	12.90	13.06	13.08	13.11	13.35	13.15					
Oct-23	12.63	12.75	13.13	13.16	12.92	13.07	13.02	13.07	13.31	13.12					
Sep-23	12.63	12.71	12.86	12.94	12.78	13.03	13.09	13.15	13.36	13.16					
Aug-23	12.63	12.67	12.81	12.93	12.76	12.98	13.01	13.08	13.27	13.09					
Jul-23	12.61	12.55	12.48	12.63	12.56	12.67	12.71	12.88	13.13	12.85					
Jun-23	12.60	12.56	12.57	12.70	12.61	12.69	12.63	12.76	13.00	12.77					
May-23	12.54	12.51	12.46	12.61	12.53	12.63	12.58	12.68	12.85	12.69					
Apr-23	12.54	12.50	12.50	12.61	12.54	12.69	12.71	12.77	12.83	12.75					
Mar-23	12.31	12.43	12.48	12.54	12.44	12.58	12.58	12.64	12.71	12.63					
Feb-23	12.44	12.46	12.49	12.56	12.49	12.63	12.62	12.65	12.70	12.65					
Jan-23	12.37	12.34	12.40	12.51	12.41	12.63	12.72	12.86	13.03	12.81					

Source: EIA STEO

Figure 20: Estimated US Crude Oil Productions by Forecast Month



Source: EIA STEO

Oil: Devon says its US 2024 oil production to peak in Q2

Devon's 2024 production to peak in Q2

Devon held its Q1 call last Thursday. (i) On Tuesday, we tweeted [LINK] "*Devon 2024 US oil production to peak in Q2. Front-loaded completions means "2nd quarter, we've guided to with a little bit of additional growth. 3rd and 4th, we'll see a little bit of a rollover on the back of lower completions activity". #OOTT*.' Mgmt was clear that its 2024 plan calls for its US oil production to peak in Q2/24. (ii) US oil production for Q1/24 was: 319,000 b/d oil, 165,000 b/d NGLs, 1.08 bcf/d natural gas for total US of 664,000 boe/d. (iii) Devon's US oil production will peak in Q2 and then fall off a bit to close the year. They highlighted Q12 production is was up and they increased their 2024 production guidance. That makes sense as they front end loaded their program and so having higher production in Q1 and Q2 helps the math average for the year. And they say they front end loaded the capex. But by front end loading their capex they also say that production will peak in Q2/24 and then be off a bit in Q3 and Q4. In the Q&A, mgmt said "'*Yeah, thanks for those questions, Scott. As we have done in years past, we are frontloaded on capital by 55% in the front half of the year, 45% in the back. And that's really driven by that fourth frac crew. Obviously, that comes with more wells online in the front half of the year more growth. And so think about it when we're running those four frac crews that we are consuming some of the pent-up ducks. And then we're running three frac crews. Our production's rolling over a bit, but we're also building a little bit of a duck inventory. And so as I expect, we've guided to first quarters in the bag. Second quarter, we've guided to with a little bit of additional growth. Third and fourth, we'll see a little bit of a rollover on the back of lower completions activity. And then building those ducks, we'll be ready to get back to work with a fourth frac crew, either late in the year or probably more likely early in '25."*

Oil: Hochstein reminds Biden willing to sell SPR reserves

Biden willing to sell SPR reserves

On Tuesday, we tweeted [LINK] "*No surprise, ".. if we need to use the SPR, the president has shown a willingness to use it to support the U.S. economy" @amoshochstein High grocery prices aren't going down, Biden can't afford to have $4 gasoline for summer driving on top of that. Thx @nicholagroom #OOTT".* It's now less than six months to the election and that means gasoline and grocery prices are front and center for Biden's focus to try to keep their prices from escalating. These are the two major cost items that all Americans see every

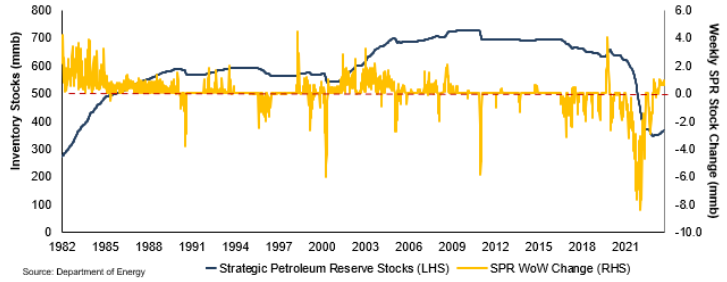
week. And the continued high cost of living still shows ups as the major complaint vs Biden. One of Biden's best tools (and one he used in the 2022 mid-terms) is to to release oil from the SPR to lower the price of oil so it can flow thru to gasoline prices. For the last few months, there have been consistent injections to the SPR reserves, which seems like a build up to allow Biden the flexibility to sell from the SPR this summer. ,Hochstein was clear – Biden will use the SPR to support the US economy ie. keep gasoline prices from running away. We have always used $4 gasoline as a line Biden doesn't want to cross.

US SPR reserves

Oil: US SPR less commercial reserve deficit narrows, now -92.310 mmb

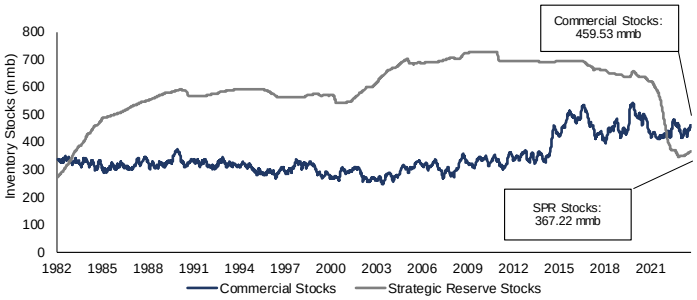
The US Strategic Petroleum Reserves (SPR) continues to be much lower than total US commercial crude oil reserves. The SPR went back below commercial for the first time since 1983 in the Sep 16, 2022 week. This week, we saw a build on the SPR side, but the commercial side saw a draw. The EIA's weekly oil data for May 3 [LINK] saw the SPR reserves increase +0.947 mmb WoW to 367.218 mmb, while commercial crude oil reserves decreased -1.362 mmb to 459.528 mmb. There is now a -92.310 mmb difference between SPR reserves and commercial crude oil reserves. The below graphs highlight the difference between commercial and SPR stockpiles, along with the weekly changes to SPR stockpiles.

Figure 21: Strategic Petroleum Reserve Stocks and SPR WoW Change



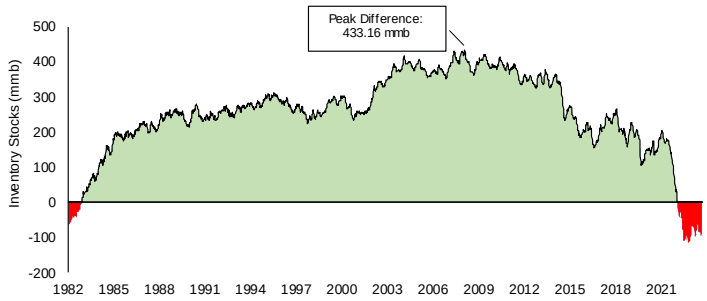
Source: EIA

Figure 22: US Oil Inventories: Commercial & SPR



Source: EIA

Figure 23: US Oil Inventories: SPR Less Commercial



Source: EIA

US gasoline prices

Oil: US national average gasolines prices -$0.03 WoW to $3.63

Yesterday, we tweeted [LINK] "*US gasoline prices -$0.03 WoW to $3.63. Now flat MoM and $0.09 YoY. California at $5.29 is -$0.07 WoW, +$0.16 MoM. 6 or last 10 Mays have seasonally increased into June. 2 were flat, 2 decreased. Biden doesn't want $4 gas in election year. Thx @AAAnews #OOTT.*" Yesterday, AAA reported that US national average prices were $3.63 on May 11, which was -$0.03 WoW, flat MoM and up $0.09 YoY. As of yesterday, the California average gasoline prices were down $0.07 WoW to $5.29, which is a $1.66 premium to the national average gasoline price of $3.63. California gas prices are -$0.12 MoM and $0.16 MoM and +$0.48 YoY.

Crack spreads closed at $25.89

Oil: Crack spreads down $1.70 WoW to $25.89

On Friday, we tweeted [LINK] "*321 crack spreads down again, -$1.70 WoW to $25.89 & WTI ~flat WoW. $25.89 crack are solid margin but spreads down for past couple wks normally point to softer WTI to follow. But summer demand increase should carry the day keeping any softness short in length. Thx @business #OOTT.*" Crack spreads are down a few dollars in the last two weeks. We always say crack spreads around $30 are a big incentive for refiners to buy as much crude as possible. Crack spreads at $25.89 still provide solid margins for refiners but the spreads are down $3.07 in the past two weeks and declining spreads normally lead to softer WTI. And WTI was flat this week at $78.26 to close on May 10, vs $78.11 on May 3. Crack spreads were down $1.70 WoW to $25.89 on May 10, which followed $27.59 on May 3, $28.96 on Apr 26, $28.30 on Apr 19, $30.39 on Apr 12, $29.45 on Apr 5, $29.73 on Mar 29, $32.20 on Mar 22, $33.00 on Mar 15, $29.61 on Mar 8, $31.11 on Mar 1, and $30.61 on Feb 23. Crack spreads at $25.89 are still well above the high end of the more normal pre-Covid that was more like $15-$20 ie. still solid margins for refiners. Our concern is that spreads are declining and that normally points to softer WTI to follow.

Crack spreads point to near term oil price moves, explaining 321 crack spread

We have focused on crack spreads for since the 90s as they are an unchanged fundamental of refineries – big crack spreads provide incentives for refineries to buy more crude because there are big profit margins to be made. People often just say "cracks", which refers to the 321 crack spread. This is the spread or margin that refiners make from buying crude at a certain price and then selling the finished petroleum products at their respective prices. The 321 crack spread is meant to represent what a typical US refinery produces. It assumes that for every three barrels

of crude oil, the refinery will produce two barrels of gasoline and one barrel of distillates. So the crack spread is based on that formula and worked back to a crack spread per barrel. Below is the current 321 crack spread vs WTI that we put in our tweet where we marked the gaps where the crack spread normally drags up oil prices. The crack spread was $25.89 as of the Friday May 10, 2024 close.

Figure 24: Cushing Oil 321 Crack Spread & WTI May 10, 2014 to May 10, 2024

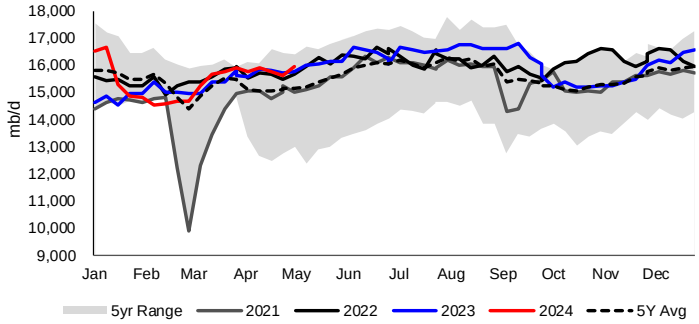
Source: Bloomberg

Oil: Refinery Inputs up +0.307 mmb/d WoW to 15.948 mmb/d

Refinery inputs +0.307 mmb/d WoW

There are always unplanned refinery items that impact crude oil inputs into refineries. And there are always different timing for refinery turnarounds. But, as a general rule, this is the normal seasonal ramp up in refinery runs following winter maintenance. On Wednesday, the EIA released its estimated crude oil input to refinery data for the week ended May 3 [LINK]. The EIA reported crude inputs to refineries were up +3.07 mmb/d this week to 15.948 mmb/d and are up +0.203 mmb/d YoY. Refinery utilization was up +100 bps WoW to 88.5%, which is -250 bps YoY.

Figure 25: US Refinery Crude Oil Inputs



Source: EIA, SAF

US net oil imports

Oil: US net oil imports -0.352 mmb/d WoW as oil exports up +0.550 mmb/d WoW

The EIA reported US "NET" imports were down -0.352 mmb/d to 2.501 mmb/d for the May 3 week. US imports were up +0.198 mmb/d to 6.969 mmb/d, while exports were up +0.550 mmb/d WoW to 4.468 mmb/d. (i) Venezuela weekly imports. We know why the EIA doesn't have any data in the row for Venezuela weekly oil imports but we still don't know if the weekly oil imports are off or if Venezuela is included in the weekly oil imports in the Others number. But we do know the EIA monthly data shows Padd 3 imports from Venezuela >100,000 b/d. Give the EIA credit for putting out weekly oil import estimates, but it's a reminder that we have to be careful about using the weekly oil import estimates. Rather we need to make sure we go to the monthly data for oil imports. (ii) Top 10 was up +0.432 mmb/d. Some items to note on the country data: (i) Canada was down -0.188 mmb/d to 3.659 mmb/d, which may be linked refiners loading up on Cdn crude before TMX startup. Imports from Canada are still at high levels but we expect imports will decrease with last week's May 1 start of TMX. (ii) Saudi Arabia was down -0.047 mmb/d to 0.355 mmb/d. (iii) Mexico was up +0.346 mmb/d to 0.805 mmb/d. (iv) Colombia was down -0.180 mmb/d to 0.183 mmb/d. (v) Iraq was up +0.019 mmb/d to 0.326 mmb/d. (vi) Ecuador was up +0.129 mmb/d to 0.129 mmb/d. (vii) Nigeria was down -0.233 mmb/d to 0.322 mmb/d.

Figure 26: US Weekly Preliminary Imports by Major Country

	Mar 8/24	Mar 15/24	Mar 22/24	Mar 29/24	Apr 5/24	Apr 12/24	Apr 19/24	Apr 26/24	May 3/24	WoW
Canada	3,458	3,735	3,652	3,874	3,546	3,458	3,423	3,847	3,659	-188
Saudi Arabia	265	254	338	321	531	229	398	402	355	-47
Venezuela	0	0	0	0	0	0	0	0	0	0
Mexico	303	353	525	263	209	208	351	459	805	346
Colombia	0	289	143	316	114	246	215	363	183	-180
Iraq	93	252	244	91	142	308	309	307	326	19
Ecuador	102	147	9	146	231	0	124	0	129	129
Nigeria	132	57	215	136	43	173	136	89	322	233
Brazil	272	114	230	147	257	189	492	0	217	217
Libya	66	0	88	117	24	21	100	98	1	-97
Top 10	4,691	5,201	5,444	5,411	5,097	4,832	5,548	5,565	5,997	432
Others	800	1,077	1,258	1,207	1,337	1,629	949	1,207	972	-235
Total US	**5,491**	**6,278**	**6,702**	**6,618**	**6,434**	**6,461**	**6,497**	**6,772**	**6,969**	**197**

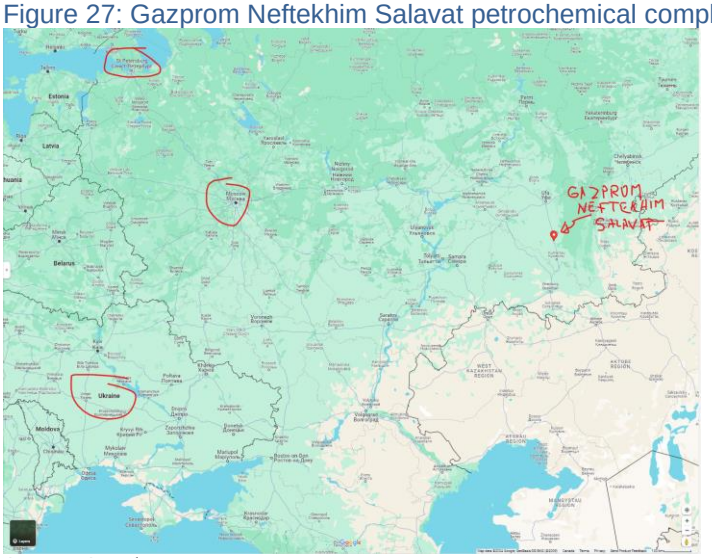
Source: EIA, SAF

Ukraine drone strikes on refineries

Oil: Ukraine hits three more Russian refineries, including 1,500km away from border

Ukraine has been trying to hit Russia's refining capacity as it is a big driver for the Russian economy and the refined products fuel its war machine. This week, Ukraine hit three Russian refineries including earlier this morning when Bloomberg reported "*An overnight drone attack caused a brief fire at an oil refinery in Russia's Volgograd region, Governor Andrey Bocharov reported on Telegram. "The fire was extinguished. There were no casualties," Bocharov said on May 12. Several Telegram channels posted photos and video of the attack with flames ascending into the night sky above what appeared to be an industrial structure with a prominent chimney."* The refinery appears to be the Lukoil refinery and Volgograd is relatively close to Ukraine. An overnight drone attack on Thurs night/Friday morning hit the small25,000 b/d Kaluga refinery (~300km from Ukraine border), which had already previously been hit, And Gazprom Salavat Neftekhim refinery was hit on Thursday. The significance of the Salavat Neftekhim refinery is that is part of a major petrochemical complex and is approx. 1,500 km from the border so this was the farthest Ukraine drone attack. As is the norm, Russia does not disclose any real specifics so it is difficult to determine the extent of an impact on refinery operations and for how long. Our Supplemental Documents package includes excerpts from Gazprom Neftekhim Salavat petrochemical complex overview. [LINK]

Figure 27: Gazprom Neftekhim Salavat petrochemical complex, ~1,500 km from Ukraine



Source: GoogleMaps

Will Ukraine escalate its drones to target after Russia oil/LNG export terminals

Russia and Ukraine continue to escalate their attacks on each other. This week it wasn't just Ukraine hitting two more Russian refineries, Russia continue to hit more Ukraine power facilities. This continued escalation has to raise the risk as to what will Ukraine do next in their escalation. As noted previously, Ukraine keeps going after Russian refineries despite US preferences to not do so. So it is far from clear how or where Ukraine escalates, which is why we keep in mind RBC Helima Croft's recent comment on the increased geopolitical risks including the risk that Ukraine moves at some stage to target Russian oil/LNG export facilities. Our March 31, 2024 Energy Tidbits memo was titled "*Helima Croft "closely watching whether Ukraine moves at some stage to target actual [Russian] export facilities*." Here is what we wrote in our March 31, 2024 Energy Tidbits memo. " *We couldn't help think of the above RBC Helima Croft comment this morning when start looking at overnight news and seeing more Russian escalating drone attacks on Ukraine energy/power infrastructure. Earlier this morning, we tweeted [LINK] "This 👇Must Read from @CroftHelima looks even more relevant with the last 4 days, incl last night, of escalating Russia drone attacks on Ukraine energy/power infra. Will Ukraine expand its drone attacks to target RUS oil export facilities? has to be at least a risk? #OOTT." The news of the last four days, including last night, was on escalating Russian drone attacks on Ukraine energy and power infrastructure. Bloomberg reported "Russia continues almost daily strikes at Ukraine's critical infrastructure, and hit energy facilities in the country's south and in the far western region of Lviv on Sunday, local authorities said. Kremlin forces targeted high-voltage electricity substations in the Odesa region, damaging equipment, which caused power to be cut off to more than 170,000 households in Ukraine's third largest city, according to electricity provider DTEK." Ukraine hasn't gone along with the reported US request to not go after Russian refineries and so we have to believe there is at least a risk they expand their drone*

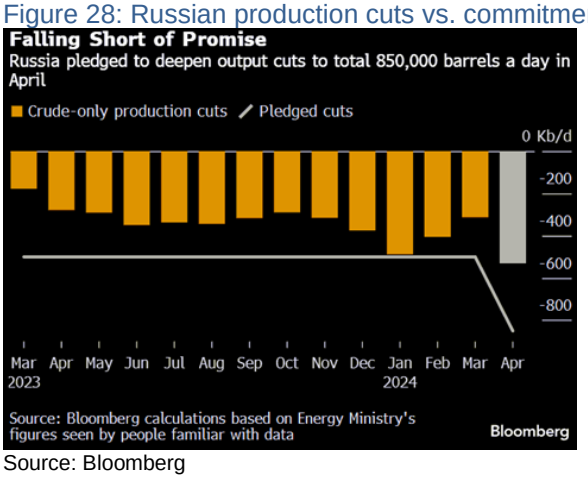
attacks to go after Russian oil and LNG export facilities." Our Supplemental Documents package includes the cover page of the Helima Croft note.

Oil: Russia exceeds production target as new commitments kick in

Russia exceeds production commitment

As a reminder, OPECs April 3, 2024 press release said "*The Committee also welcomed the announcement by the Russian Federation that its voluntary adjustments in the second quarter of 2024 will be based on production instead of exports."* On Thursday, Bloomberg reported that, in April, Russia produced more than they committed to in their voluntary cuts. Recall that Russia committed to cutting an extra 350,000 b/d in April, which is on top of their 500,000 b/d cut announced back in February 2023. Bloomberg wrote "*Russia's crude output in April was about 219,000 barrels below March level, but still some 319,000 barrels above the level specified in its agreement with the Organization of Petroleum Exporting Countries…Russia is the only OPEC+ nation splitting its curbs between production and exports of crude and refined products. This quarter, Moscow promised to reduce its output more, while expanding its exports by a similar amount*". Going forward, Russia will need to extend their cuts to a total of 900,000 b/d in May and 971,000 b/d in June to meet their commitments. Our Supplemental Documents Package includes the Bloomberg report.

Figure 28: Russian production cuts vs. commitment



Source: Bloomberg

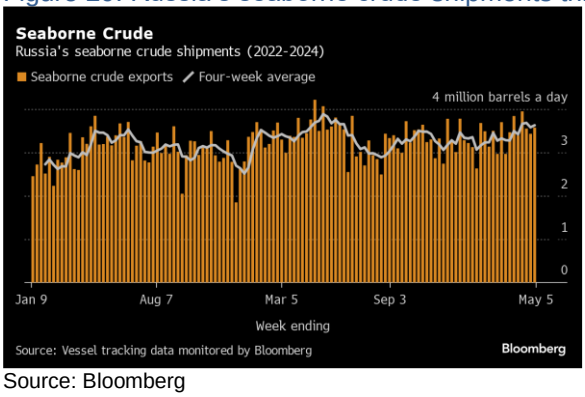
Oil: Russian crude exports +250,000 b/d WoW

Russia crude oil shipments

Information on the impacts on Russian oil infrastructure and its impact on moving crude is still a black hole. So its far from clear how drone strikes reducing refinery capacity in Russia would free up crude for export assuming the crude oil volumes can be moved to export terminals. And as noted previously, there are reports of Russia moving more crude and products via rail. Bloomberg reported "*Russia's crude flows rebounded in the seven days to May 5, with additional vessels leaving the major ports of Kozmino on the Pacific coast and Murmansk on the Arctic. The four-week average also rose. Buoyed by last week's increase, crude shipments for the year so far are running ahead of the average for 2023, with domestic oil processing still under pressure as refineries that have barely recovered from Ukrainian drone strikes enter seasonal maintenance. Attacks on processing plants continue, and Russia plans to reduce daily diesel shipments from its key western ports in May to the lowest since at least 2021"*. In the week to May 5, Russia exported 3.68 mmb/d of crude via tankers,

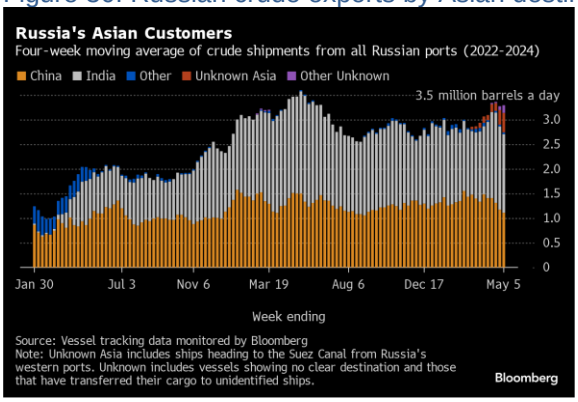
up +250,000 b/d WoW and +170,000 b/d above the April target. Remember that Russia has shifted towards a production-based cut rather than export control for their OPEC+ commitments this quarter. Note that in the 4 weeks preceding this week, 1.15 mmb/d bound for China was loaded, down ~-20,000 b/d WoW compared to the 4-week average leading up to Apr 28 which was 1.17 mmb/d. Recall the comments we heard on Gulf Intelligence's podcast [LINK] made by Victor Yang (JLC Network Technology Snr Analyst) which noted the discount on Russian oil to Brent has evaporated recently, which removes the incentive for Chinese refiners to keep up the pace of imports. The second chart below shows Russia's Asian customers. Our Supplemental Documents package includes the Bloomberg report.

Figure 29: Russia's seaborne crude shipments thru May 5 week



Source: Bloomberg

Figure 30: Russian crude exports by Asian destination



Source: Bloomberg

Iraq & Kazakhstan compensate OPEC

Oil: Iraq & Kazakhstan agree to compensate for OPEC overproduction

Last Sunday, OPEC announced [LINK] that, following a "constructive workshop", Iraq and Kazakhstan have agreed to compensate for cumulative overproductions they ran up between January and March 2024. Secondary sources have reported that in this period, Iraq overproduced approximately 601,000 b/d, and Kazakhstan was ~389,000 b/d above its commitment. To compensate, Iraq will cut an incremental 50,000 b/d each month between May and September, then October November cut 100,000 b/d, and finally 152,000 b/d in

December. Kazakhstan will overproduce again by 100,000 b/d in April but will cut 18,000 b/d in May, 131,000 b/d in August, 299,000 b/d in October and 40,000 b/d in November. Below is a summary of the compensation plan for Iraq and Kazakhstan. Our Supplemental Documents Package includes the OPEC press release.

Figure 31: Iraq and Kazakhstan overproduction compensation schedule

Country	Cumulative over-production Jan. 2024 to March 2024 (tb/d)	Compensation Plan								
		*April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Iraq	602	na.	50	50	50	50	50	100	100	152
Kazakhstan	389	-100	18	0	0	131	0	299	40	0

Source: OPEC

Oil: Gen Milley "War is a horrible thing" when speaking on Israel/Hamas war

Gen Milley on war

On Wednesday, CNBC Squawk Box ran a clip of Gen Milley, (20th Chairman of the Joint Chiefs of Staff from Oct 1, 2019 to Sept 30, 2023) speaking on the Israel/Hamas war. The part that struck us was his general view of war. We tweeted [LINK] ""*War is a horrible thing" Doesn't matter what side you are on, it never hurts our perspective to hear war reality check from General Milley or others who have been on front line in Ukraine, Palestine, Iraq, Vietnam, etc Fortunate to be in Canada. Great forum @andrewrsorkin!"* Our tweet included the video clip that is worth a look to see how Milley says the following "*War is horrible thing. I had a lot of years in combat. I have been shot at, blown up, the whole nine yards, right. It's a horrible brutal vicious thing. Unfortunately, because the character of war is going to be in dense urban areas. That the very conduct of war is going to have very high levels of collateral damage. There is almost no way around it. But, if there is any morality at all, you need to get into it, achieve your political objectives, get it done, Get it done fast and get it over with".* Milley's comments reminded of what one of my good friends, a US Green Beret who was Vietnam, used to say about war when he came back stateside in the early 70s. War is ugly and something regular people can't appreciate. And unfortunately that also includes politicians who make decisions on war. So the tweet and this item are not to pick sides but hopefully help all of us for perspective that war is horrible.

Maersk taking longer routes

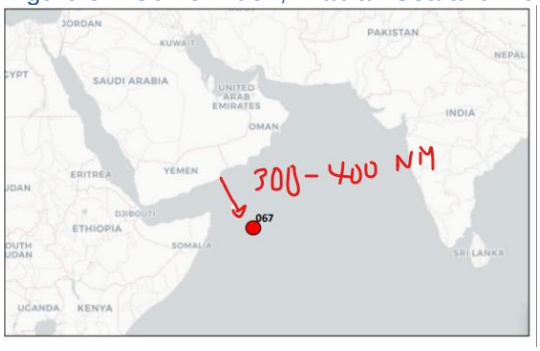
Oil: Maersk says taking longer routes with Houthis expanded attack area

The Houthis expanded attack area is having an impact on shipping – Maersk says the risk zone for shipping has expanded and forced their vessels to longer routes. Last week's (May 5, 2024) Energy Tidbits mem highlighted Maersk's Q1 on May 2 and how they don't see a return to Red Shipping for most of the rest of the year. On May 2, we tweeted [LINK] "*No visible near-term end to #Houthis disrupting Red Sea shipping. "... conditions in the Red Sea remain entrenched ..... we now expect these conditions to stay with us for most of the year" Maersk CEO Clerc. #OOTT."* This week, on Monday, Maersk posted a new advisory *"Maersk Operations through Red Sea / Gulf of Aden*". [LINK] We tweeted [LINK] "*Maersk new Advisory. Houthis "risk zones has expanded and attacks are reaching further offshore. This has forced our vessels to lengthen their journey further". Houthis attacking far into Indian Ocean ie. 300-400 nm south of Yemen. #OOTT."* Maersk wrote "*The effects of the situation in the Red Sea are widening and continuing to cause industry-wide disruptions*." "*The complexity of the situation in Red Sea has intensified over the last few months. To safeguard our crew, vessels, and your cargo, we are rerouting around the Cape of Good Hope for the foreseeable future. However, the risk zone has expanded, and attacks are reaching further offshore. This has forced our vessels to lengthen their journey further, resulting in additional time and costs to get your cargo to its destination for the time being. The knock-on effects of the situation have included bottlenecks and vessel bunching, as well as delays and equipment and capacity shortages. We estimate an industry wide capacity loss of 15-20% on the Far East to North Europe and Mediterranean market during Q2."* Our Supplemental Documents package includes the Maersk advisory.

04/30/24: Houthis hit container ships 300-400 miles south of Yemen

We suspect the event driving the May 6 advisory was the Houthis hitting container ships 300-400 miles south of Yemen on April 30. Here is what we wrote in last week's (May 5, 2024) Energy Tidbits memo. "*On Tuesday, the UKMTO confirmed that the Houthis hit the container ship MSC Orion 300-400 nautical miles south of Yemen in the Arabian Sea. The attack surprised as it was the farthest south Houthis attack on a ship. The significance of this attack is that it is another example of the Houthis leader warning on something that most questioned was possible and then the Houthis doing it. The Houthis leader warned on April 25 that they were expanding their attacks into the Indian Ocean and this attack was four days later*."

Figure 32: Gulf of Aden, Arabian Sea and Indian Ocean



Source: Google Maps

05/02/24: Houthis warned Indian Ocean is a vast area for the US/UK to protect

Here is what we wrote in last week's (May 5, 2024) Energy Tidbits memo. "*The Houthis Leader big speech on Thursday included a couple of good reminders relevant to oil and global economy. (i) On Friday morning, we tweeted [LINK] "Houthis don't plan to go away. Even if Hamas ceasefire, "conflict with the enemy will not end unless it is removed from all of the land of Palestine" Reminds of increasing challenge for US/UK "Red Sea a small pond in view of the vastness of the India Ocean" #OOTT." (ii) Need ore than a Hamas ceasefire for the Houthis to stop their fight, need Israel out of Palestine. Houthis leader said "If the round of negotiations in Gaza succeeds, and the situation calms down, that does not mean the end of the battle and conflict with the enemy, but rather it means the completion of a round of escalation, and when we reach the end of this round with the Israeli enemy, the conflict with the Israeli enemy will continue." He pointed out that the conflict with the Zionist enemy is inevitable, because it is in a state of occupation, usurpation, aggression, crime and injustice, and the conflict with the enemy will not end unless it is removed from all of the land of Palestine and cleansing it... Pointing out that the completion of rounds or the obtaining of certain truces does not mean the end of the conflict with the Zionist enemy." (iii) Increasing challenge for US/UK now that the Houthis have expanded its attacks to Arabian Sea/Indian Ocean. The Houthis Leader made a good point on the challenge for US and UK when the Houthis expanded their attacks to Arabian Sea and Indian Ocean – that is a huge area for the US and UK to protect and will bring risk to some of the travel around the Cape of Good Hope as it nears Arabian Sea and Indian Ocean. Saba wrote "Sayyed, Abdul-Malik Badr Al-Din Al-Houthi addressed the enemies' deep annoyance and anxiety over the Yemeni operations that extended to the Indian Ocean, stressing that the Americans, British, or Israelis may not have expected these operations with their long reach to the Indian Ocean, and with moving targets. He stated that the American was astonished by the level of Yemeni technology, and also by the level of tactics in carrying out the Yemeni military operations to target Zionist, American and British ships... stressing that the American failed miserably even to prevent military operations from hitting the targets, despite his efforts to prevent the launching of missiles and drones and his extensive monitoring. He said: "Experts realize that our naval operations are complex and important, and are based on advanced capabilities, and American-British newspapers quoted experts, officers, and leaders who feared the Yemeni capabilities, their extent, and their accuracy in attacking." He considered the Red Sea a small pond in view of the vastness of the Indian Ocean."*

Figure 33: Gulf of Aden, Arabian Sea and Indian Ocean

Source: Google Maps

Oil: Iran took in $35b in oil revenues, expects oil production up 0.3 to 0.4 mmb/d

What Iran sanctions?

On Wednesday, we ttweeted [LINK] "*What Iran sanctions? Iran oil production keeps increasing providing key cash flow to Iran. Export revenues $35b. Don't know price but if they got $60, that's 1.6 mmb/d. Oil production to increase 300-400,000 b/d in 24/25. Started $47.5b of projects! #OOTT."* Shana (news agency for Iran's Oil ministry) reported on comments by Iranian Minister of Petroleum Javad Owji. We said what Iran sanctions because Owji's clear message was Iran's oil production keeps increasing and export revenues keep going up. Shana reported *"$35-billion revenues. Referring to the export of $35 billion worth of crude oil in 1402 despite all the restrictions, Owji stated that the enemies made efforts to stop Iran's oil tankers, but they failed."* We don't know what oil price Iran received but at $60, that would be 1.6 mmb/d of oil exports. And Iran expects oil production up again in the Persian year that ends on March 20, 2025. Owiji said "*With the implementation of new oil industry projects, 300,000 to 400,000 bpd will be added to oil production, 35 mcm to crude gas production, 50,000 barrels to refining capacity and three million to five million tons to the annual production capacity of petrochemical complexes of the country*." The other interesting part of Owiji's comments is that they have started on $47.5b of new projects. Even if that numbers is exaggerated, it means Iran's oil industry is attracting outside capital from somewhere. Our Supplemental Document includes the Shana report. [LINK]

Oil: Some Iran oil to China will continue to be rebranded as Malaysia oil

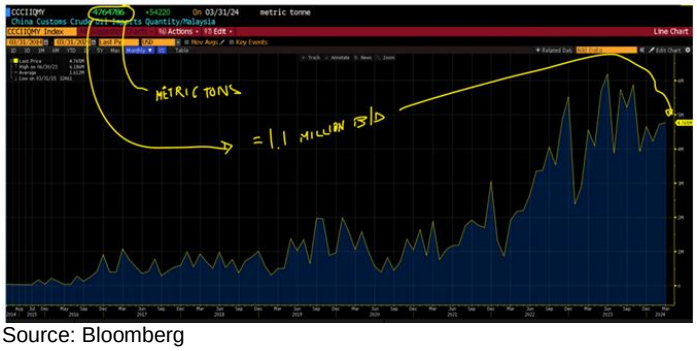
What Iran sanctions?

One of the oil trade themes in the past year is how we see Iran oil rebranded as Malaysia oil and then shipped to China and likely other markets. That will be continuing as Malaysia has said they don't follow individual country sanctions like US on Iran but follow all UN sanctions. The Straits Times reported [LINK] "*Malaysia rebuffs US on Iran oil sales, says it recognises only UN sanctions. Malaysia will recognise sanctions imposed by the United Nations only and not by individual countries, said Home Minister Saifuddin Nasution Ismail on May 9, following claims by a top US official that Iran has relied on Malaysian service providers to sell US-sanctioned oil in the region. "I emphasised that we will only recognise sanctions if they are imposed by the United Nations Security Council. "The delegation from the US respected our stance," Datuk Seri Saifuddin told reporters following a meeting with the US Treasury Department's top sanctions official Brian Nelson, who was visiting Kuala Lumpur*." We hadn't realized the trade level between Malaysia and the US. The Straits Times closed their report "*Still, the "US would also not want to lose the support of Malaysia, which is one of its key Asean partners, as the country will assume the role of Asean chair next year", he said. Malaysia is among the US' top 20 trading partners, with bilateral trade between the two nations amounting to US$78.3 billion (S$106 billion) in 2022."* Our Supplemental Documents package includes the Straits Times report.

China's oil imports from Malaysia are double Malaysia's oil production

We have noted in prior memos how Iran oil is being rebranded as Malaysia oil. For the past several months, China has been importing about a million b/d or more from Malaysia. The latest data, below, shows China imported 1.1 mmb/d from Malysia in March. OPEC's MOMR estimates Malaysia production is flat in 2024 at 0.6 mmb/d but that is forecast to decline to 0.5 mmb/d in 2024.

Figure 34: China oil imports from "Malaysia"



Source: Bloomberg

Oil: Iraq says "*Iraq has reduced (output) enough and will not agree to any new cut*."

Iraq oil minister

It will be interesting to see if oil markets tonight reflect any concern that Iraq might not stick to the OPEC+ group position. Yesterday there were some reports suggesting Iraq doesn't intend to carry on with voluntary cuts. We are in the camp of Vitol that we find it hard to see that especially in light of the earlier noted OPEC press release on how Iraq has a schedule to compensate for prior over production, and that the oil minister was saying they won't make any additional NEW cuts. Regardless, there were a number of reports warning on the Iraq ris. Reuters did not raise that risk in their report yesterday on Iraq oil minister. [LINK]. *"Iraq won't agree to new OPEC+ oil production cuts, oil minister says. Iraq's oil minister said on Saturday Iraq had made enough voluntary oil production reductions and would not agree to any additional cuts taken by OPEC+ at its next meeting early next month. Sources with the knowledge of the matter have told Reuters that OPEC+, which includes the Organization of the Petroleum Exporting Countries, Russia and other non-OPEC producers, could extend some voluntary output cuts should demand fail to pick up. Asked by a reporter whether Iraq would agree to extend the OPEC+ voluntary cuts at the meeting scheduled for June 1, Hayan Abdul Ghani said: "Iraq has reduced (output) enough and will not agree to any new cut. It was not immediately clear if Abdul Ghani meant he opposed an extension of the voluntary cuts - a statement that would fly in the face of widespread expectations that cuts would be rolled over - or was simply against any additional cuts."*

Vitol doesn't see Iraq departing from OPEC+ group approach

Earlier this morning, we tweeted [LINK] ""*I think the smart money in trading circles will assume he [Iraq] did not mean to say he was going to depart from the group & start opening the taps", also doesn't Iraq is opposed to extending voluntary cuts in place. @vitolnews @michaelwmuller #OOTT @sean_evers @CrystolEnergy."* Mike Muller (Head, Vitol Asia) was clear in his view that he doesn't see Iraq breaking away from the group but Iraq was referring to the potential for any additional new cuts. Here is the transcript we attached to our tweet. SAF Group created transcript of comments by Mike Muller (Head, Vitol Asia), Christof Ruhl (Senior Research Scholar, center on Global Energy Policy Columbia University with host Sean Evers (Founder & Managing Partner Gulf Intelligence) on Gulf Intelligence Daily Energy Markets Podcast on May 12, 2024. Items in "*italics*" are SAF Group created transcript. At 19:00 min mark, Evers asks about some of the reports of a throwaway comment from the Iraq oil minister on the sidelines of a conference that Iraq won't roll over OPEC+ cuts for the second half and if OPEC+ has the luxury to start to unravel its cuts. Muller "*The market has always felt that OPEC+ but Saudi in particular, would have the luxury of a market that was going to call for extra production and therefore there was a possible scenario where an easing of the voluntary Saudi cut was possible. However, I think , now that your participants have had enough time to, I didn't want to spoil the question butting in any earlier. We have to be very careful with the reporting of the comments by Hayan Abdul Ghani, the Iraqi oil minister. Because while he did say we've reduced output enough, we will not agree to any new cuts. What he did not say, I don't think, is whether he was opposed to an extension of the voluntary cuts that are in place. I think the smart money in trading circles will assume he did not mean to say he was going to depart from the group and start opening the taps. Far from it. I think that would be a move that wouldn't just make him unpopular with his peers. But I think it almost goes without saying that should OPEC+ see fit to maintain a rollover, I think that's the expectation of Iraq. So I mean the statement, I'm just looking it up myself here. This is on the sidelines of a conference in Baghdad. What he said was they will not agree to any new cut. But I think by that, you can drive a bus through the interpretations but my interpretation of it is further cuts are off the table. He thinks that the market is sufficiently balanced for them to just continue, that was my interpretation of it*."

Oil: Seems like no progress to resuming Kurdistan oil via Turkey pipeline

No visibility to restart Kurdistan oil

No surprise, thre is still no visibility to when Kurdistan oil will resume oil exports via Turkey. Yesterday, Rudaw (Kurdistan news) reported [LINK] o comments from Apikur spokesperson Myles Coggins that reinforce there is no specific progress to a restart. Rudaw wrote "*"We are likely to see more high-level visits from Washington leaders in the State Department to Baghdad and Erbil. We had the under-secretary visiting Baghdad and Erbil and the Yazidi area. So these high-level visits are always talking about oil as well," Myles Caggins, spokesperson for the Association of the Petroleum Industry of Kurdistan (APIKUR), told Rudaw on Saturday. "They are bringing a message from President [Joe] Biden to talk to all of these sides to say 'Let's get the oil back to the pipeline'," said Caggins."*

Will oil companies take a lesser deal to get Kurdistan oil flowing?

Here is what we wrote iun last week's (May 5, 2024) Energy Tidbits memo. "*At least it looks like it is clear what the issue is that is holding up the restart of Kurdistan oil via the pipeline in Turkey – it looks like it is up to the international oil companies to accept the tougher terms in moving from production sharing contracts with Kurdistan to the form of oil agreements and royalties consistent with Iraq oil deals. Yesterday, Rudaw (Kurdistan news) reported that Erbil and Baghdad agreed to the formation of two joint committees to resolve the contract situation. Rudaw reported "Iraqi Oil Minister Hayyan Abdul Ghani told reporters on Thursday that two joint Baghdad-Erbil committees have been formed to resolve the contract situation between Erbil and the international oil companies (IOCs) as they are production-sharing contracts - agreements he said are incompatible with the Iraqi constitution." And ""There has not yet been an agreement with the Kurdistan Regional Government on handing over the oil produced in the Region to the federal oil ministry," the Iraqi oil minister said on Thursday, adding that there are "differences regarding contracts signed with the international companies." Our Supplemental Documents package includes the Rudaw report."*

Oil: No production update from Libya NOC since Mar 21

No Libya oil production update

As of our 7am MT news cut off, we still haven't seen any oil production updates from the Libya National Oil Corporation since their Mar 21 update that oil production was 1.241 mmb/d. Other than the short protest that briefly shut in Sharara oil field in Q1/24, Libya's oil production has been stable at ~1.2 mmb/d for the past several months. Our March 31, 2024 Energy Tidbits memo highlighted the suspension of then Libya Oil Minister Aoun for undisclosed reasons and the subsequent accusation of Libya NOC Chair Bengdara of conflict of interest. Our Apr 14, 2024 Energy Tidbits memo highlighted the appointment a new Libyan oil minister Khalifa Abdul Sadiq, who was previously Deputy Oil Minister. But we still haven't seen any production update.

Oil: Negative net monthly FDI into China for March after positive Jan/Feb

Negative net monthly FDI

All countries want positive net monthly foreign direct investment as it normally means companies have confidence in the country to make capital investments. On Monday, we tweeted [LINK] "*Back to negative indicator for China. Net monthly foreign direct investment back to net negative flows in Mar, after positive net flows in Jan/Feb that followed negative in Nov/Dec. Mar: -$0.9b Feb: $5.3b Jan: $3.9b Dec: -$0.8b Nov: -$2.0b."* This was a reversal of what happened to start 2024, which saw positive inflows during January and February. However, recall before that in the months to close 2023, four of the five months saw negative net monthly direct investment in China. Our tweet include the below Bloomberg graph and we also included a table showing the actual net monthly foreign direct investment by month for the last two years. Here is the Bloomberg table of net monthly foreign direct investment that was -$0.9b in Mar, +$5.3b in Feb, +$3.9b in Jan, -$0.8b in Dec, and -$2.0b in Nov. Below is the Bloomberg graph, which we added the notation is in US$.

Figure 35: China net monthly foreign direct investment

Source: Bloomberg

11/08/23: 1st net outflow of net foreign direct investment in China

Here is what we wrote in our Nov 12, 2023 Energy Tidbits memo. "*There is a big negative to the China recovery that we haven't been tracking – the net inflow or outflow of foreign direct investment in China. And likely because it never got much attention because there has always been a net inflow. FDI is significant as foreign companies disproportionately contribute to trade, generated more tax revenue and urban employment. But this week, we saw the first ever net outflow of FDI since records have been kept in 1998. On Wednesday, we tweeted [LINK] "Here's why China recovery is slow. Huge exodus in foreign direct investment in China & more FDI flowing out for 1st time. Q3/23 saw $11.8b outflow, vs recent $101b in Q1/22. Foreign co's drive disproportionate trade, tax revenue & urban employment. Thx @business #OOTT." Bloomberg wrote "China is struggling in its attempt to lure foreigners back as data shows more direct investment flowing out of the country than coming in, suggesting companies may be diversifying their supply chains to reduce risks. Direct investment liabilities in the country's balance of payments have been slowing in the last two years. After hitting a near-peak value of more than $101 billion in the first quarter of 2022, the gauge has weakened nearly every quarter since. It fell $11.8 billion in the July-to-September period, marking the first contraction since records started in 1998." Our Supplemental Documents package includes the Bloomberg report."*

Figure 36: Foreign Direct Investment in China

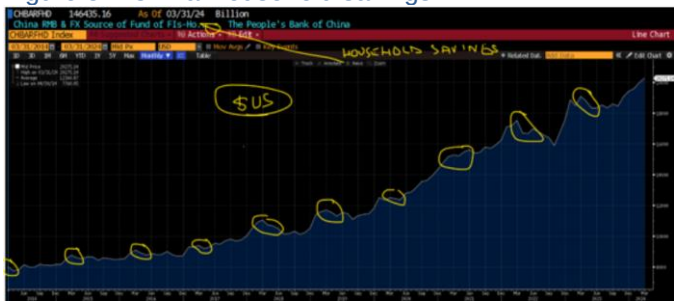
Source: Bloomberg

Oil: Chinese consumers still on sidelines as household savings reach new highs

Chinese household savings

On Monday, we tweeted [LINK] "*Chinese consumer still sitting on the sideline and not convinced to start spending. Household savings continue at high rates compared to pre-Covid. Should see normal seasonal dip into savings in Apr/May linked to May Day holidays. Thx @business #OOTT*". China's household savings at the end of March were US $20.3t, up MoM from $20.0t at the end of Feb and $19.6t in Jan. Keep in mind that every dollar that stays in savings is a dollar not being spent in the economy and not contributing to company earnings, which fuels wages, taxes, etc. So while household savings are at record highs, Chinese consumers are holding back, which would add to the recovery once they come off the sidelines. Our tweet included the below graph that notes every April/May normally sees a seasonal dip in savings.

Figure 37: China Household savings



Source: Bloomberg

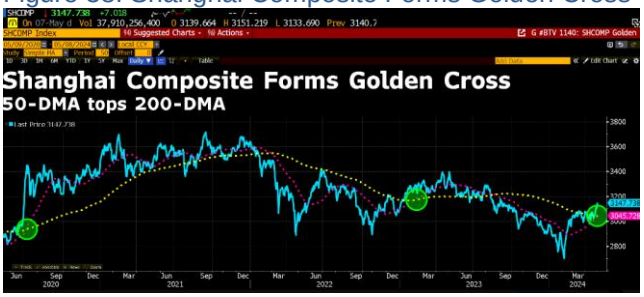
Oil: Chinese stocks have a good run the last few months

Shanghai stocks have been strong

We try to catch the Bloomberg TV shows each evening to get a good update on Asian markets and business. We also love the charts they will use on TV for these reminders. There was a good reminder this week on the strength of Chinese stocks in the past few months and how any Chinese, who are investing in the stocks, are having a great 2024. Bloomberg noted how the Shanghai composite has formed a Golden Cross (50-DMA tops 200-DMA) and that normally points to stronger stocks ahead. On Tuesday night, we tweeted

[LINK] "*Chinese still being hit by falling house prices BUT, if they have money in stocks, are making strong returns in Chinese stock markets. Gives local investors more money for when they get confidence to start spending savings! Graph earlier from @HaidiLun @BelleDroulers #OOTT.*"

Figure 38: Shanghai Composite Forms Golden Cross



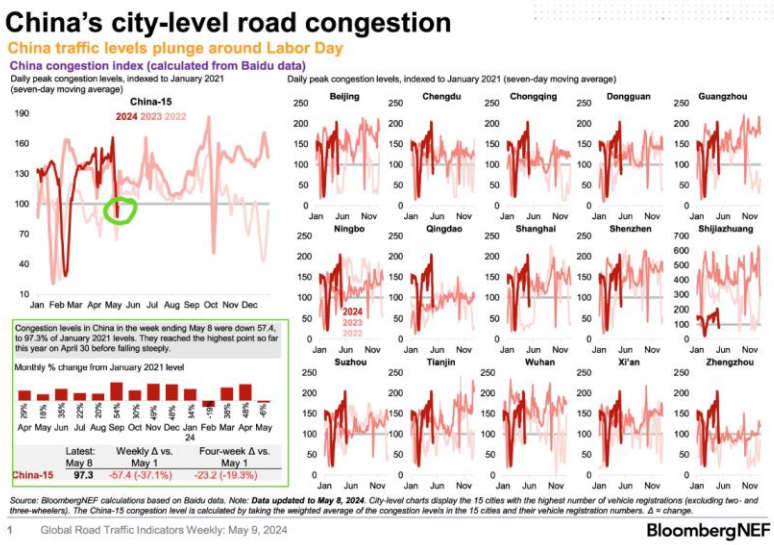
Source: Bloomberg

China city-level traffic congestion

Oil: Baidu China road congestion drops due to Labour Day Holiday

On Thursday, BloombergNEF posted its Global Road Traffic Indicators Weekly May 9 report, which includes the Baidu city-level road congestion for the week ended May 8. BloombergNEF's report was titled "*China's traffic drops to lowest in three months*" and its key slide was titled "*China traffic levels plunge around Labor Day*" This week saw the lowest traffic levels in three months surrounding the Labor Day Holiday, reflecting a sharp decrease after reaching their highest point this year on April 30. Baidu city-level road congestion was -37.1% WoW to 97.3% of Jan 2021 levels.. Below is the BloombergNEF key graph.

Figure 39: China city-level road congestion for the week ended May 8

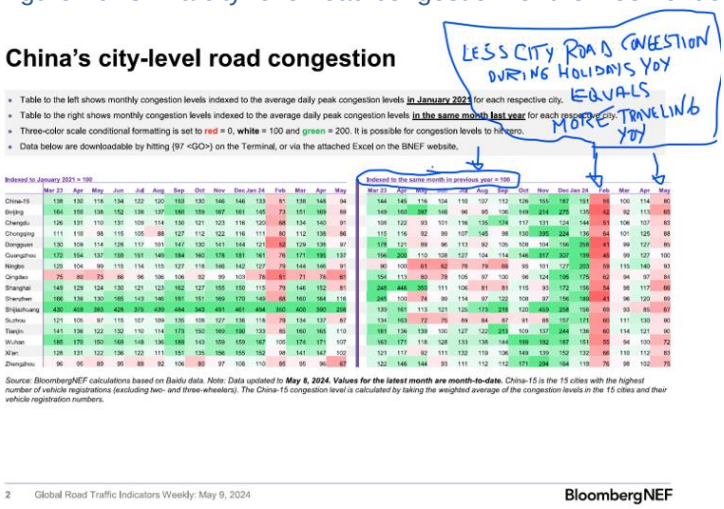


Source: BloombergNEF

Less China city traffic during holidays means more are traveling

On Friday, we tweeted [LINK] "*Positive indicator for more Chinese are travelling in 2024. China Baidu city-level road congestion down YoY in New Year and Labor Day holidays points to more Chinese travelling YoY. Thx @BloombergNEF #OOTT.*" BloombergNEF also posts the data for the top 15 cities and what jumped out at us was how 2024 was down YoY during New Year and again for the first week of May led to our tweet. This is not like Covid when low city-level road congestion meant low business/economic activity. Post Covid is different so when we saw the YoY city level road congestion was down during the key holiday periods meant that more people lef the cities during these holidays. Below is the BloombergNEF table of top 15 cities.

Figure 40: China city-level road congestion for the week ended May 8



Source: BloombergNEF

Oil: Anti-China actions are accelerating with the US election now <6 mths away

More US tariffs on China are coming

One of the few thing Democrats and Republicans agree on is an anti -China stance so, in the run up to the Nov 5 Presidential election, we only see more anti-China actions. What isn't clear is how much this will impact China's recovery. On Thursday, we tweeted [LINK] "*Expect new tariffs on China to accelerate with US election <6 mths away. Next week, Biden "administration is set to impose new, targeted tariffs on some key sectors including electric vehicles, batteries and solar equipment". @josh_wingrove @JenniferJJacobs @EMPosts #OOTT.*" Bloomberg broke the story that Biden is expected to announce new tariffs on EV, batteries, solar equipment. We saw the lead Bloomberg reporter on BloombergTV and he said the tariffs would be higher than existing tariffs. "*President Joe Biden's administration is poised to unveil a sweeping decision on China tariffs as soon as next week, one that's expected to target key strategic sectors with new levies while rejecting the kind of across-the-board hikes sought by Donald Trump, people familiar with the matter said. The decision is the culmination of a review of so-called Section 301 tariffs first imposed under Trump. The administration is set to impose new, targeted tariffs on some key sectors including electric vehicles, batteries and solar equipment. The full announcement is expected to also largely*

maintain existing levies. An announcement is scheduled for Tuesday, two of the people said." Our Supplemental Documents package includes the Bloomberg report.

Oil: Vitol seeing easing oil demand forecasts for 2024 incl less diesel demand growth

Vitol seeing lower oil demand forecasts

Mike Muller (Vitol, Head Asia) highlighted three key 2024 oil demand outlook items this morning: oil demand YoY growth on track to be on one of the top 5 in history, but oil demand forecasts are being pulled back, and lowering growth in diesel demand. Diesel being an indicator for economies given its use in trucks and trains. Earlier this morning, we tweeted [LINK] "*Easing 2024 #Oil demand fcasts."People had been looking at close to 2 mmbpd year-on-year growth and I see consultants easing those numbers off into the 1.65, 1.8 type range" "area where it's been giving back a little is diesel" @vitolnews @michaelwmuller #OOTT @sean_evers @CrystolEnergy."* Our tweet included the tweet we made of Muller's comments. Muller said "*I guess the geopolitical turbulence that we saw early this year is still as is. We still have a recent attack on a Russan refinery far into Russian territory just the other day. We still have disruptions in the Gulf of Aden. And we still have great global concern around Gaza. The point I guess is that none of these events have severely disrupted supply of actual oil flows. And we therefore have now moved from a Q1, which has the added hype of cold weather and concerns like that, into a Q2 trading window. Indeed, for crude oil we are already trading into Q3 because the actual trading month is now July. We're through the period of uncertainty which is characterized by refinery turnarounds every springtime. And people are doing their forward stock projections and factoring the latest inputs on the demand side of the equation where there continues to be concern over Chinese growth rates. So various analysts out there have seen a peaking of the year-on-year demand growth projections. The backdrop is as follows – 2024 is going to go down as one of the years where demand growth, year-on-year, has been the greatest. Possibly one of the top five year-on-year demand growth years ever. That said, people had been looking at close to 2 million barrels per day year-on-year growth and I see consultants easing those numbers off into the 1.65, 1.8 type range. Still a very big year-on-year growth. And if you dissect what that is, where it's coming from. There lots of petrochemicals, lots of NGLs, but the area where it's been giving back a little is diesel. So I think various people have been looking at the nowcast real-time data coming out of eastern economies, China in particular, and have seen fit to reduce, somewhat taper off their forward demand projections. So that's what's giving us a slightly flatter outlook. Now we're still in the low 80s, $82.80 is not a number too many producing nations will be too upset about. it just happens to be $8, $9 off the recent highs you referred to".*

Oil: Aramco points to a 3.5% Saudi oil decline rate, fits to its 7% global decline rate

Aramco Q1 results

Saudi Aramco reported Q1 on Tuesday. (i) Aramco didn't come out and talk about Saudi Arabia oil decline rates but in reading the Q1 highlights, the numbers seemed to point to an oil decline rate in Saudi Arabia of ~3.5%. (ii) On Tuesday, we tweeted [LINK] "*#Oil 101: Need to add ~6-7 mmbd new oil supply/yr to stay flat. Aramco Q1 👇: Damman, Marjan, Berri & Zuluf to add 1.225 mmbd to "maintain MSC at 12.0 mmbpd". Saudi ~3.5% oil decline would fit Aramco 👇12/07/23 tweet global conventional + unconventional decline of 7%. #OOTT."* (iii) in the Q1, Aramco highlighted they were given the directive to maintain MSC at 12.0 mmbpd. And "*This directive will have no impact on announced, nearterm projects including the Dammam development and the Marjan, Berri, and Zuluf crude oil increments. Production from these projects will be used to maintain MSC at 12.0 mmbpd, which provides operational*

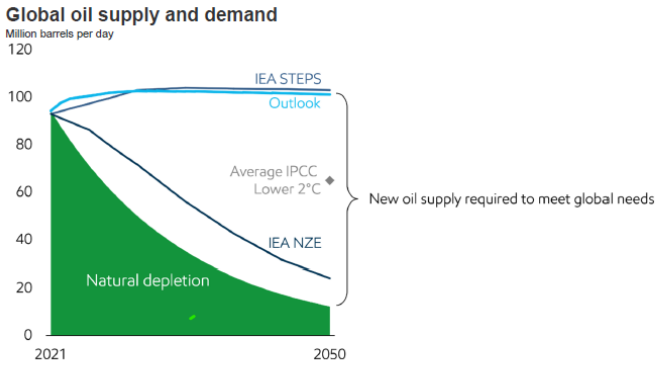
flexibility to increase production and supports Aramco's unique ability to rapidly respond to changing market conditions." So Damam, Marjan, Berri and Zuluf will maintain MSC at 12 mmb/d. (iv) Aramco then detailed these projects would add 1.225 mmb/d over 2025, 2026 and 2027. Adding 1.225 mmb/d over 3 years would effective offset 1.26 mmb/d assuming a 3.5% decline rate. That is just the math. Damman is to add 25 mb/d in 2024 and 50 mb/d in 2027. Marjan is to add 300 mb/d and Berri is to add 250 mb/d, both by 2025. Zuluf is to add 600 mb/d by 2026. (v) Our tweet linked to the below Dec 7, 2023 Saudi Aramco CEO view that overall global conventional + unconventional oil decline rate was 7%. Our Supplemental Documents package includes the excerpt from the Saudi Aramco Q1 report.

12/07/23: Aramco global conventional + unconventional oil decline rate is 7%

Our tweet this week linked to our Dec 7, 2023 tweet on Saudi Aramco CEO's view that global conventional + unconventional oil decline rate is 7%. Here is what we wrote in our Dec 10, 2024 Energy Tidbits memo. "*Aramco CEO global conventional + unconventional oil decline rate is 7%. We recognize that no one is really thinking about mid-term oil outlook given the oil price weakness now going into Q1/24. For months, we have been warning that the key factor driving why Saud would continue its voluntary 1 mmb/d cuts thru Q1/24 was that global oil demand is always seasonally down in Q1 every year vs the preceding Q4. That is the big problem, the normal seasonal decrease in oil demand in Q1 vs Q4 that is approx. 1.5 mmb/d. So no one is focused beyond 2024 but, for those that care, on Thursday, we tweeted [LINK] "For anyone looking at #Oil in 2025+. #Aramco CEO "If you look at existing fields today & the level of maturity that we're seeing in conventional and unconventional resources, you're looking at a 7% decline" ie. 7 mmbd has to be replaced each yr to stay flat. Thx @jcgnana #OOTT." The headlines on the Platts story were "COP28: Saudi Aramco CEO says fossil fuel investment more viable than renewables to meet demand. HIGHLIGHTS Fossil fuel investment down 40% from 2014 levels: Nasser. Q4 2023 oil demand set to be higher than Q4 2019. Renewables, hydrogen not viable in the short term, he says." [LINK]. But what caught our eye were Nasser's comments on global oil declines. Platts wrote "Saudi Aramco's chief called for more investment in fossil fuels while dismissing the short-term viability of renewables due to what he suggested were higher costs and low demand for clean energy. "I think we need more investment," Nasser said citing a 40% decline in investment in fossil fuels from 2014 levels. "If you look at existing fields today and the level of maturity that we're seeing in conventional and unconventional resources, you're looking at a 7% decline," he added." Nasser is reminding the combined global conventional + unconventional oil decline rate is 7%, which means that, on a combined global basis, if spending were to stop oil production would be down 7 mmb/d. The reminder is that the first challenge for the global oil industry is to do the work to replace 7 mmb/d just so global oil production can stay flat. That is why there is the first capital every year to basic production maintenance, development drilling, field extensions, etc to replace the 7% decline. The 7% is an average decline rate across the world, which takes into account the way higher decline rates in the 13 mmb/d of US production. Our Supplemental Documents package includes the Platts report*."

08/28/23: Exxon "*natural decline rate of existing oil is approx. 7% per year*"
Saudi Aramco's estimate of a 7% decline rate in global oil is the same as what Exxon uses in its planning. Here is what we wrote in our Sept 3, 2023 Energy Tidbits memo. "*On Monday Exxon issued its "Global Outlook – Our view to 2050", which is their annual long-term outlook for energy. There is something for everyone on energy. The first thing we checked was if Exxon has changed its view on global oil decline rates as we consider global oil decline rate one of the most important fundamentals to shape oil prices thru the 2020s. (i) On Monday, we tweeted [LINK] "Key factor why #Oil looks good for 2020s. #Exxon today "natural decline rate of existing oil production is approx 7% per yr." WTI was $52 on 06/17/19, when Exxon warned on 7% decline. See 👇SAF 06/20/19 blog. "Exxon's Math Calls For Overall Global Oil Decline Rate of ~7%, A Very Bullish Argument For Post 2020 Oil Prices" #OOTT." (ii) In the new outlook to 2050, Exxon said "Today's new outlook to 2050 is "The natural decline rate of existing oil production is approximately 7% per year. Significant investment is needed to offset this decline and meet the projected demand growth." (iii) Exxon first highlighted global oil decline rates at a sellside conference on June 18, 2019. WTI had closed at ~$52 prior to that presentation that also used a global oil decline rate of ~7%. So their assumption on a 7% decline rate is unchanged. (iv) Our tweet included an excerpt from our June 20, 2019 blog "Exxon's Math Calls For Overall Global Oil Decline Rate of ~7%, A Very Bullish Argument For Post 2020 Oil Prices". This was prior to Russia/Ukraine. We thought the 7% was a very bullish argument for oil prices, which were $52 at that time. Below is Exxon's graph from the new view to 2050*."

Figure 41: Global oil supply and demand



Source: 2022 IEA World Energy Outlook; IPCC: AR6 Scenarios Database hosted by IIASA release 1.0 average IPCC C3: "Likely below 2°C" scenarios; ExxonMobil Analysis
Source: Exxon, August 28, 2023

06/01/23: Exxon CEO "*people continue to forget about the depletion curve*"
Here is what we wrote in our June 4, 2023 Energy Tidbits memo. "*The focus of investor attention on the Exxon sell-side presentation on Thursday was on their shale oil potential. So overlooked was their regular and, at least annual, reminder that there is a 7% annual depletion/decline rate in global oil production. This is on a global*

basis so would work in the very high decline rates in US shale oil and essentially zero decline rate in oil sands mining. It means that, on average, the world has to add another 7 mmb/d of oil production to stay offset decline and stay flat. This is the challenge for growing global oil supply especially in the face of the well understood underinvestment in the oil and gas upstream. And Exxon says that if you're not investing, the market will be short at some point in time. Exxon CEO Darren Woods said "So you can call it being stubborn. Our focus on it is a disciplined approach to understanding what the business required and sticking to it, because the facts didn't change. And with time, the facts were proven right. And it's not, wasn't that we were somehow magical in understanding it. It's basic math and understanding depletion curves and where the rest of the industry is. I'll tell you something else that's happening right now. If you look at, people continue to forget about the depletion curve and that every barrel of crude that you produce, or every ton of LNG that you produce is that much less supply available to the world. And you have to replace that, even if demand is flat So think about a 7% depletion curve. Maintaining volumes flat means you have to grow production by 7% to offset the decline. That's huge growth. People don't appreciate that. And the bigger the demand, that 7% becomes bigger, the bigger the hole that you're digging every year. If you look at where the demand for oil and gas is today, you look at a depletion and then you look at the investment going into the industry, the industry as a whole is under-investing in those resources. So whatever your view of demand is, and I said before, if we go back in time, what we typically miss is supply. No matter what your view of demand and where that's going to be at, that depletion curve eventually catches up to that demand equation. And if you're not investing, you will find the market gets short at some point in time. And my view is we're in that point in time today. The industry is under-investing. You hear that coming out of OPEC in Saudi Arabia, they're making that point. I think many people can see that maybe thinking it's self-serving, but the reality is that's an Issue."

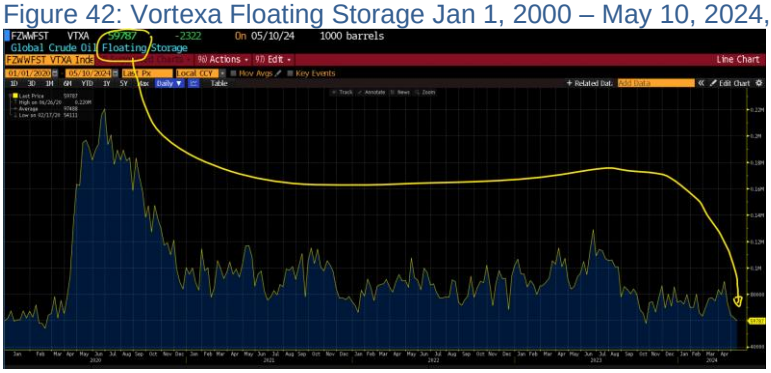
Vortexa floating storage

Oil: Vortexa crude oil floating storage est 59.79 mmb at May103, -2.32 mmb WoW

We are referencing the Vortexa crude oil floating storage data posted on the Bloomberg terminal as of 9am MT yesterday. Note that these estimates get revised over the course of the week and the revisions can go back months. We do not check daily for the revisions, so our comments on the new estimates are compared to the prior week's Vortexa estimates posted on Bloomberg on May 4 at 9am MT. (i) Yesterday, we tweeted [LINK] "*Another low week for #Oil floating storage 59.79 mmb May 10. Big decline was Apr 12-26, with Asia -19 mmb, likely driven by Iran cutting prices to reduce floating. Crude on water may be big with tankers avoiding Red Sea BUT floating storage is low. Thx @vortexa @business #OOTT."* (ii) As of 9am MT yesterday, Bloomberg posted Vortexa crude oil floating storage estimate for May 10 at 59.79 mmb, which is -2.32 mmb WoW vs upwardly revised May 3 of 62.11 mmb. Note May 3 was revised +4.33 mmb to 62.l11 mmb vs 57.78 mmb originally posted at 9am MT on May 4. (iii) Floating storage is down -30.02 mmb over the past four week, which included Asia being down 20.03 mmb in that period. The biggest reduction came in mid-late April, which was likely driven by Iran slashing prices to reduce a build up in its floating storge. (v) Revisions. Other than the +4.33 mmb to May 3, almost all of the other revisions for the past seven weeks were small downward revisions. Here are the revisions for the past seven weeks compared to the estimates originally posted on Bloomberg at 9am MT on May 4. May

3 revised +4.33 mmb. Apr 26 revised -2.62 mmb. Apr 19 revised -1.50 mmb. Apr 12 revised -2.93 mmb. Apr 5 revised -0.21 mmb. Mar 29 revised -0.62 mmb. Mar 22 revised +1.40 mmb. (v) There is a wide range of floating storage estimates for the past seven weeks, but a simple average for the past seven weeks is 73.22 mmb vs last week's then seven-week average of 75.69 mmb. The drop was due to replacing Mar 22 of 74.84 mmb from the 7-week average and replacing it with May 10 of 59.79 and the downward revisions. (vi) Also remember Vortexa revises these weekly storage estimates on a regular basis. For example, when most report on the Vortexa data on Monday morning, they will be reporting on different estimates. We do not track the revisions through the week. Rather we try to compare the first posted storage estimates on a consistent week over week timing comparison. Normally we download the Vortexa data as of Saturday mornings around 9am MT. (vii) Note the below graph goes back to Jan 1, 2020 to show the run up to Covid and then how Covid started to impact Covid in March/April 2020. (viii) May 10 estimate of 59.79 mmb is -69.25 mmb vs the last year peak june 23, 2023 high of 129.04 mmb. Recall Saudi Arabia stepped in on July 1, 2023 for additional cuts. (ix) May 10 estimate of 59.79 mmb is -26.11 mmb YoY vs May 12, 2023 of 85.90 mmb. (x) Below are the last several weeks of estimates posted on Bloomberg as of 9am MT May 11, 9am MT May 4, and 9am MT Apr 27.

Figure 42: Vortexa Floating Storage Jan 1, 2000 – May 10, 2024, posted May 11 at 9am MT



Source: Bloomberg, Vortexa

Figure 43: Vortexa Estimates Posted 9am MT on May 11, May 4, and Apr 27

Posted May 11, 9am MT

Date	Last Px
Fr 05/10/2024	59787
Fr 05/03/2024	62109
Fr 04/26/2024	63996
Fr 04/19/2024	73829
Fr 04/12/2024	89841
Fr 04/05/2024	79699
Fr 03/29/2024	83332
Fr 03/22/2024	74836
Fr 03/15/2024	77271
Fr 03/08/2024	76856
Fr 03/01/2024	70150
Fr 02/23/2024	63409

May 4, 9am MT

Date	Last Px
Fr 05/03/2024	57777
Fr 04/26/2024	66623
Fr 04/19/2024	75328
Fr 04/12/2024	92765
Fr 04/05/2024	79913
Fr 03/29/2024	83948
Fr 03/22/2024	73442
Fr 03/15/2024	75464
Fr 03/08/2024	76969
Fr 03/01/2024	69521
Fr 02/23/2024	62997
Fr 02/16/2024	65681

Apr 27, 9am MT

Date	Last Px
Fr 04/26/2024	60640
Fr 04/19/2024	76105
Fr 04/12/2024	93310
Fr 04/05/2024	80901
Fr 03/29/2024	81486
Fr 03/22/2024	73494
Fr 03/15/2024	75298
Fr 03/08/2024	76132
Fr 03/01/2024	69176
Fr 02/23/2024	62727
Fr 02/16/2024	65563
Fr 02/09/2024	81627

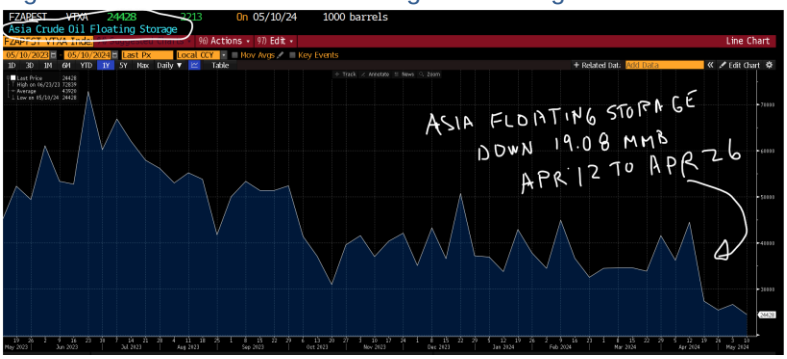
Source: Bloomberg, Vortexa

Oil: Did Iran cut prices to find customers in China or India for its floating oil storage?

Asia floating storage -19 mm in Apr 12-26

Asia crude oil floating storage was down 19.08 mmb from 44.46 mmb on Apr 12 to 25.38 mmb on Apr 26 and, as we wrote in or Apr 28, 2024 Energy Tidbits memo, we have to wonder if this was due Iran slashing prices so they could clear up floating storage in Asia. Iran had trouble moving its oil in March so there would have been a build up in floating storage. So the question is if Iran discounted prices enough to find China or India customers. Our Apr 21, 2024 Energy Tidbits memo was titled '*Vortexa: Iran Floating Oil Storage Up 10 mmb in March, Struggling to Find China Buyers Despite Deeper Discounts*". Our Apr 28, 2024 Energy Tidbits memo wrote "*There was negative oil market views on Iran and China from Vortexa on Wednesday that didn't any market attention. On Thursday, we tweeted [LINK] "Vortexa seeing "little bit of weakness" on China buying. Iranian crude oil floating storage +10 mmb in Mar. Iran offering wider discounts than normal but "struggling to find buyers in China". See 👇SAF Group transcript. Thx @Vortexa Jay Maroo, @gulf_intel #OOTT." Vortexa's Jay Maroo highlighted Iran floating storage was up 10 million barrels in March, and that it was struggling to find buyers in China for its crude even though it was offering wider discounts than normal. Maroo was on the Gulf Intelligence Apr 17 podcast and or tweet was a day later. Maroo is Head of Market Intelligence and Analytics MENA, Vortexa. He also highlighted Iran was exporting 1.4 mmb/d in March and that was very high vs year ago levels. Maroo also said the increasing Ian n floating storage of 10 million barrels "What that suggests and I think we will probably come to this later on is a little bit of weakness coming in from China on the buying side of things. And I guess that probably feeds into the wider comment about bearishness on oil prices because of demand issues." Maroo also highlighted that ""And actually looking ahead to the second half of the year, we think, at best, it will be similar to year ago levels. So when it comes to China importing much more crude, we're not very bullish on that. The only thing that could change that is if there is a significant decrease in the price and obviously Chinese being very opportunistic buyers, they'd be quick to pick that up. But that hasn't really happened yet. Speaking to some of our wider network, we're hearing that some of the Iranian crude that is being offered, is being offered at deeper discounts than usual to some new buyers. And what that suggests to me is that, even with Iranian crude being priced so cheap, they're struggling to find buyers in China that are willing to pay even below market rates. So they are going to have dig deeper to get those barrels into China.".*

Figure 44: Vortexa crude oil floating for Asia region



Source: Bloomberg, Vortexa

Oil: Vortexa crude oil floating storage WoW changes by regions

Vortexa floating storage by region

Bloomberg also posts the Vortexa crude oil floating storage in key regions, but not all regions of the world. The regions covered are Asia, Europe, Middle East, West Africa and US Gulf Coast. We then back into the "Other" or rest of world. (i) As noted above, last week's May 3, in total, was revised +4.33 mmb with the key revisions being Asia revised +3.13 mmb, and US Gulf Coast revised +2.15 mmb. (ii) As noted above, May 10 of 59.79 mmb was -2.32 mmb vs the upwardly revised May 3 of 62.11 mmb. The major WoW changes were Middle East +4.37 mmb WoW, Other -3.79 mmb WoW and Asia -2.21 mmb WoW. (iii) US Gulf Coast floating storage has moved up a bit to 3.71 mmb for May 10 and 3.59 mmb for May 3. It's not a major event but one we will want to watch. (iv) May 10 of 59.79 mmb is -69.25 mmb vs the summer June 23, 2023 peak of 129.04 mmb. Recall Saudi Arabia started its voluntary 1 mmb/d production cuts on July 1, 2023. The major changes by region vs the summer June 23 peak are Asia -48.41 mmb and Other -27.19 mmb.. (iv) Below is the table we created of the WoW changes by region posted on Bloomberg at of 9am MT yesterday. Our table also includes the "Original Posted" regional data for May 3 that was posted on Bloomberg at 9am MT on May 4.

Figure 45: Vortexa crude oil floating by region

				Original Posted	Recent Peak	
Region	May 10/24	May 3/24	WoW	May 3/24	Jun 23/23	May 10 vs Jun 23
Asia	24.43	26.64	-2.21	23.51	72.84	-48.41
Europe	8.08	6.70	1.38	5.87	6.53	1.55
Middle East	11.78	7.41	4.37	8.86	6.76	5.02
West Africa	4.69	6.76	-2.07	6.64	7.62	-2.93
US Gulf Coast	3.71	3.71	0.00	1.56	1.00	2.71
Other	7.10	10.89	-3.79	11.34	34.29	-27.19
Global Total	59.79	62.11	-2.32	57.78	129.04	-69.25
Vortexa crude oil floating storage posted on Bloomberg 9am MT on May 11						
Source: Vortexa, Bloomberg						

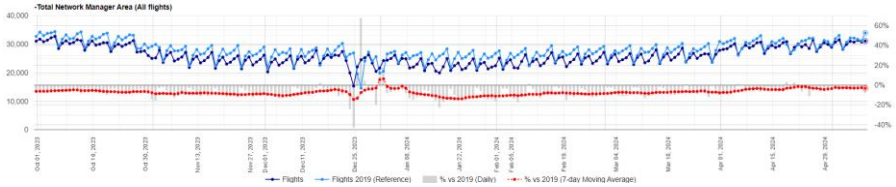
Source: Bloomberg, Vortexa

Oil: Europe airports daily traffic 7-day average is -3.2% below pre-Covid levels

Europe airports daily traffic

Yesterday, we tweeted [LINK] "*Daily Europe air traffic still stuck just below pre-Covid. 7-day average as of: May 9: 3.2% below pre-Covid. May 2: 2.9% below. Apr 25: 3.2% below. Apr 22: 1.5% below. Apr 18: 3.2% below. Apr 11: 3.7% below. Apr 4: 6.2% below. Thx @eurocontrol #OOTT.*" Other than over Christmas, European daily traffic at airports has been below pre-Covid. However, it has been staying just a little below over the past five weeks and even got to only 1.5% below Covid as of Apr 22 before falling back. As of our 7am MT news cut off, the latest Eurocontrol daily traffic at Europe airports shows the 7-day rolling average to the end of May 2 was a little better WoW to 2.9% below pre-Covid levels vs 3.2% below at Apr 25, -3.2% for Apr 18, -3.7% to end of Apr 11, -6.2% to end of Apr 4, and -7.0% to end of March 28. Eurocontrol updates this data daily and it is found at [LINK]

Figure 46: Europe Air Traffic: Daily Traffic Variation to end of May 9



Source: Eurocontrol

Oil & Natural Gas: sector/play/market/global insights from Q1 calls

Sector insights from Q1 calls

Please note that this is under Oil & Natural Gas but we include other sectors in our recap of earnings calls. This was th second big week of Q1 reporting with in Canada, the US and around the world. One of our focus areas for reporting are the non oil and gas producers as we typically get some of the best macro insights from the services, pipelines, refineries, commodities traders, and utilities. We find we get the best insights into a range of oil and gas themes/trends, sectors and plays form the conference calls. As a reminder, our Energy Tidbits memo does not get into the quarterly results, forecasts, or valuation. Rather the purpose of highlighting a company is to note themes/trends and plays that will help shape a reader's investment thesis to the energy sector. In the conference calls, we also tend to find the best insights from the Q&A portion as opposed to the prepared remarks.

Devon: Don't see any reason to push dollars into natural gas drilling

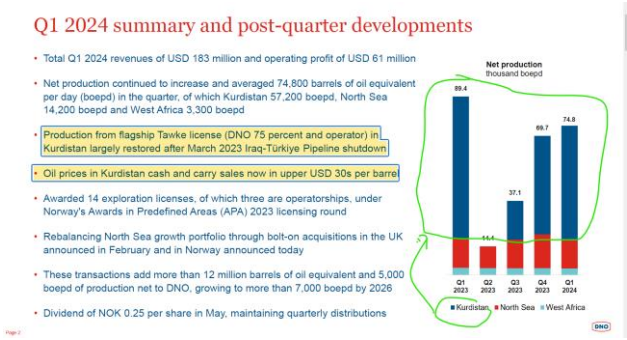
Devon held its Q1 call last Thursday. (i) Earlier in the memo, we highlighted Devon's 2024 plan calls for its US oil production to peak in Q2/24 as they front-loaded their drilling and completion program. (ii) Low natural gas prices mean holding back on higher gas/oil ratio oil plays. In the Q&A, mgmt said "*Now, what I have to tell you is, I'm looking at the forward gas curve, and it's just – it continues to be pretty challenging. Again, with the balanced portfolio that we have, our ability for the Delaware Basin to really carry the company, we just don't see the need to push dollars into an area that's not being fully rewarded*." (iii) Eagle Ford refracs sound good, even as good as new wells, and they are focusing on the best opportunities ie. not all areas are equal. In the Q&A, mgmt replied "*When you start fine-tuning a little bit and look at more recent performance, some of the work that we're doing, you see some really encouraging results, and that's on the back of making sure that we understand the well construction, the opportunity from a geology standpoint, that initial completion design and really focusing on the best opportunities. And then also obviously refining our techniques that we're using to do some of these operations. I would say the wells that we are putting online this year, approximately 25 refracs, compete very favorably with the wells that we're drilling on a heads-up basis, new well construction. So very encouraged about what we're seeing, and I think there's more runway to go."* (iv) Bakken mixed refracs so far, which, at least so far, suggests refracs won't work broadly across the Williston. What isn't clear is how much of the Bakken will work. In the Q&A, mgmt replied "*On the Williston Basin, I would characterize the Williston as a little earlier in the process. Again, you draw a big circle around the Williston, you post praise, what the refracs look like. I think it's a little bit more of a mixed bag. I'm still highly, highly encouraged. I mean, in every one of these very prolific basins, it's still -- we're still recovering a very small amount of the*

total resource in place, and I'm very encouraged about where we sit in a multi-basin resource play company in some very high-quality opportunities to continue to get smarter on how do we create value from these amazing opportunities, and so more to come on that." (v) Permian wells are doing well. There are multiple comments on the Permian wells doing well.

DNO: Selling its Kurdistan oil locally costing them about $30/b

DNO (Kurdistan oil producer) reported Q1 on Wednesday. DNO had their Kurdistan production shut-in when Turkey/Iraq dispute emerged and Kurdistan oil was stopped from going into the oil export pipeline thru Turkey. And then DNO worked to find local buyers for their crude. The good news is that DNO has now largely restored its production but is still having to sell it to local markets in what they call "*cash and carry*" transitions. It looks like this is costing them about $30/b on their sales price. In the Q1, DNO said they were not getting upper $30s/b right now to local buyers. We checked their 2022 Annual Report and their Kurdstan oil for 2022 averaged ~$14/b discount to Brent. If we use a $14/b discount to Brent, it would be a price in the high $60s, which means DNO is losing about $30/b by not being sold in export markets.

Figure 47: DNO Q1 production by region



Source:DNO

MEG: See WCS less WTI differential to remain narrow for years

MEG Energy held its Q1 call on Tuesday. (i) Sees WCs less WTI differentials to remain narrow for years and TMX will get filled but may take five or six years. IN the Q&A, mgmt said "*We are looking forward to the imminent startup of the TMX pipeline. It is great for industry and Canada to have that tremendous asset available. With this critical infrastructure now complete, we anticipate that light-heavy differentials will remain narrow for years while Canadian egress remains unconstrained. Your question about egress, I mean, as an industry, there's a history of filling the available egress, and I think that will happen again over time. There are various estimates out there when that could occur. Seeing things as recent as two years, others within five or six, our thinking is closer to the outer end of that timeframe. Before TMX fills, I think you'll see additional egress from an Enbridge mainline expansion. And while I don't see another pipeline being built, I believe there's debottlenecking of other existing pipelines that will occur."* (ii) See no need to

hedge natural gas or condensate input costs. In the Q&A, mgmt said "*I would say, we still think that there is sufficient supply out there. When we look at the [natural gas] supply-demand dynamics, we don't necessarily feel like we need to rush to get any positions on to hedge those input costs. We will obviously look at it as the market dynamic kind of moves forward, but we're comfortable staying unhedged on that position at this point in time as we move forward. On the condensate front, I would say similar thing. We are buying a significant portion of our condensate out of the US Gult Coast. Prices there continue to be soft relative to where they've been historically speaking, and we don't feel -- we feel that with differentials the way they are, et cetera, we don't need to rush and hedge those input costs*"

Saudi Aramco: Priority is blue hydrogen & ammonia over LNG

Shell held its Q1 call on Tuesday. (i) Earlier in the memo, we highlighted how Aramco Q1 comments point to a 3.5% decline rate in Saudi's oil production based. (ii) There weren't a lot of questions and the questions tend to be polite as the bankers know Aramco pays a lot of fees. (iii) Stressed multiple times that if natural gas supply growth exceeds domestic demand (ie. reducing oil used for power generation), the first priority for any surplus gas supply will be blue hydrogen to the extent they can get offtake agreements. Mgmt said "*On export optionality, as we've said before, we're prioritizing to the extent that domestic demand is met and there are volumes available for export. We are prioritizing blue hydrogen, blue ammonia over that. But then again, that depends on, you know, offtake availability, which we continue to work on. So that's always an option. That's our first priority. And, you know, of course, if that doesn't happen, then to the extent that there are volumes available for export, then LNG is an option*." (iv) No surprise, a positive view for oil supply/demand in 2024. Here is their lengthy commentary. "*Thank you, Henri. On your first question on oil demand, we're seeing -- we saw – let me tie it first to economic growth because that's the main driver. So we're seeing the economy -- global economy remaining resilient. Oil demand remains healthy. The growth year on year is, the 2% I was referring to is about 1.8 million barrels per day in Q1. In the US, the economy is expected to post, what, a 3.1% GDP growth in the firs quarter. That was a big driver. In the eurozone, it's a bit soft economic growth, barely positive. About 0.2% GDP growth assumed for Q1. China, on the other hand, 5.3% GDP expected growth in Q1 surprised a bit to the upside. China registered a 0.6, about 600,000 barrels per day year on year demand growth in Q1 mainly as a recovery in travel. So demand in China reached about 16.6 million barrels per day during Q1 from 16 million barrels per day in Q1 of 2023. Fourth quarter, the previous quarter fourth quarter of 2023, demand in China was a bit higher at 16.9 million barrels per day, but that's due to seasonality. In India, nearly 7% GDP growth year on year resulted in demand growth by 200,000 barrels per day year on year in Q1 reaching 5.4 million barrels per day, again driven by transportation fuels. Now, this is as far as India is concerned, we're in the midst of an election year. Consumer incentives are expected to increase demand further. Q1 24 figures in India, 5.4 million was also stronger than fourth quarter of '23, also by 200,000 barrels per day. If you look at forecasts out there, S&P Global, for example, is -- in its latest report is forecasting demand to average 104.4 million barrels per day, which is 1.7 million barrels per day higher compared to the 2023 average. And we see inventories at five year lows despite increases in supply from*

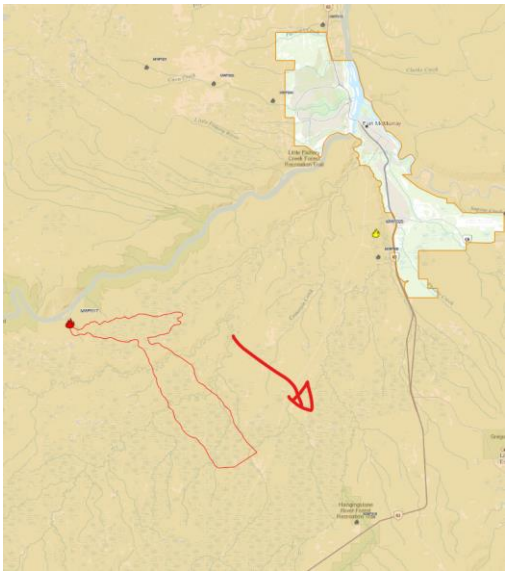
some non OPEC countries. We see jet fuel and kerosene projected to see continued growth in 2024 reaching 7.6 million barrels compared to 7.2 million barrels in 2023. So overall, when you look at the supply and demand picture, we're seeing a tight market out there."

Oil & Natural Gas: Winds kept the wildfire south of Fort McMurray

Wildfire stayed south of fort McMurray

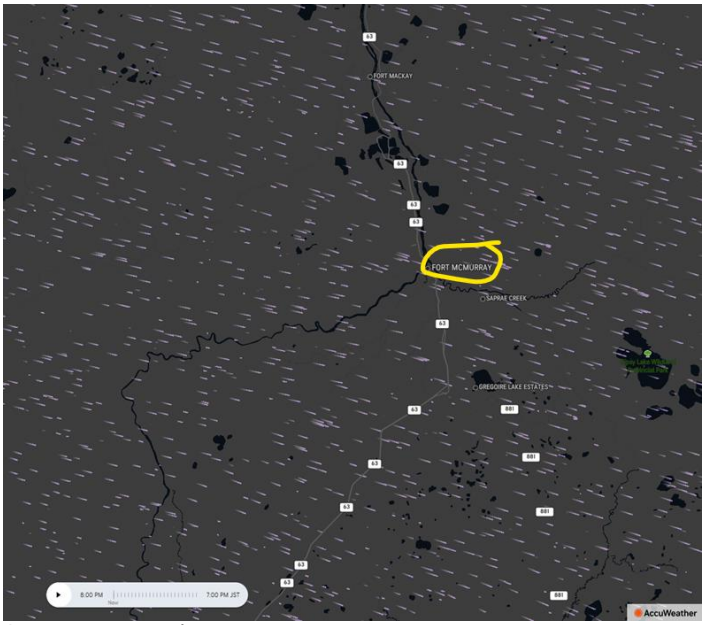
As of our 7am MT news cut off, the wildfire that led to an alert for possible evacuation has been kept south of Fort McMurray due to the winds that have been moving in an southeast direction for the past days. Our latest Alberta wildfire update is as of 6:30am MT and it shows the Out-of-Control wildfire has moved to the SE away from Fort McMurray. So it looks like good news for Fort McMurray in that they aren't gong to be hit by a wildfire. Earlier yesterday morning, we tweeted [LINK] "*Evacuation alert notice to Fort McMurray with Out-of-Control 1,000 ha wildfire just west of city & winds ~25 kph from the west. Key wildfire links. Alberta wildfire status map [LINK] @accuweather live wind flow map [LINK] Stay safe!! #OOTT."* We recommend bookmarking both links and the AccuWeather live wind flow map shows a live wind direction Yesterday morning it was look like the winds were moving to the southeast, which is why they only issued an alert for a possible evacuation instead of an actual evacuation notice. IF the winds had been moving due east or even to the northeast, there would have been evacuation notice instead of an alert. Below are the Alberta wildrire map as of 6:30am MT today and the AccuWeather wind flow map as of yesterday morning around 4:30am MT that showed how the winds were moving southeast and not at Fort McMurray.

Figure 48: Out-of-Control wildfire south of Fort McMurray as of 630am MT May 12



Source: Alberta Wildri

Figure 49: AccuWeather live wind flow map as of 4:30am MT May 11



Source: AccuWeather

Oil & Natural Gas: Will BOEM expand Rice's Whale protection area to all of GoM?

Added costs to GoM oil and gas

It's not a game changer but we have to believe there is a good chance fo the US Bureau of Ocean Energy Management to expand its Rice's Whale protection area to all of the GoM. If so, it means that there will be added costs and time for any tankers and supply ships for offshore GoM oil and gas. On April 30, NOAA Fisheries posted "*Rice's Whales Spotted in the Western Gulf of Mexico.*" [LINK] And "*On April 11, 2024, NOAA Fisheries scientists observed two endangered Rice's whales in the western Gulf of Mexico. There are likely fewer than 100 Rice's whales in the Gulf of Mexico, the only area where the species is known to occur. The whales were observed 55 nautical miles off the coast of Corpus Christi, Texas. The three characteristic ridges on their rostra (in front of their blowhole) were clearly visible and allowed the team to confirm they were Rice's whales. The whales were observed at the ocean surface, and were diving within a small area. They were in an area where the water was approximately 224 meters deep."* IF BOEM expands the Rice's Whale area to include the western GoM, it will mean added restrictions on oil and gas including tankers. On Aug 22, 2023, we tweeted [LINK] "*New #Biden regulatory rule to impact #Oil #natgas leases in GoM. BOEM 08/17 new conditions & expanded Rice's whale map that should impact any vessels going to/from all GoM deepwater platforms and drilling rigs to onshore facilities. #OOTT."* On Aug 17, 2023, the BOEM posted its BOEM NTL No. 2023-G01 on "*Expanded Rice's Whale Protection Efforts During Reinstated Consultations with NMS*". NMS is National Marine Fisheries Services. This notice only went to oil, gas and sulphur lease operators in the GoM Outer Continental Shelf. It looks like it will impact some of the deepwater GoM oil and gas activity. And basically puts restrictions on how the oil and gas and services companies

operate their vessels (ie. speed limits) and it will add costs and time to operations. It did not go to other vessels that traverse thru this expanded Rice's Whale areas. So not a game changer but one that will add costs and time to supply ships servicing offshore GoM oil and gas and impacting tanker traffic. The below map is the BOEM Aug 17, 2023 Rice's Whales Core Area and we noted Corpus Christi. Our Supplemental Documents package includes the NOAA April 30 release.

Figure 50: Expanded Rice's Whale Areas

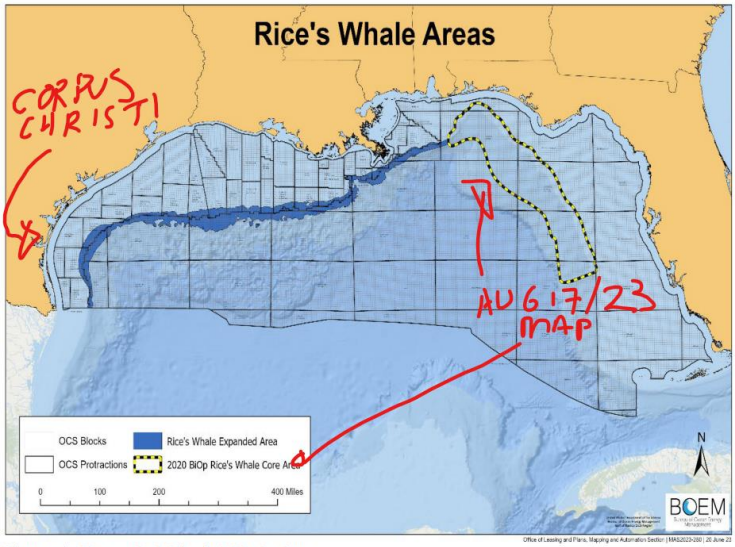


Figure 1: Expanded Rice's Whale Area.
Source: US Bureau of Ocean Energy Management

Rice's whales have three characteristic ridges in front of their blowhole

The NOAA Apr 30 release said "*The whales were observed 55 nautical miles off the coast of Corpus Christi, Texas. The three characteristic ridges on their rostra (in front of their blowhole) were clearly visible and allowed the team to confirm they were Rice's whales*."

Figure 51: Rice's Whale

Source: NOAA Fisheries

08/17/23: GoM "Rice's Whale Areas" add more costs to oil & gas

Here is what we wrote in our Aug 27, 2023 Energy Tidbits memo. "The oil and natural gas sector continue to get more regulatory actions that add costs to industry. On Tuesday, we tweeted [LINK] "*New #Biden regulatory rule to impact #Oil #natgas leases in GoM. BOEM 08/17 new conditions & expanded Rice's whale map that should impact any vessels going to/from all GoM deepwater platforms and drilling rigs to onshore facilities. #OOTT."* Last Thursday, the US Bureau of Ocean Energy Management posted its BOEM NTL No. 2023-G01 on "*Expanded Rice's Whale Protection Efforts During Reinstated Consultations with NMS*". NMS is National Marine Fisheries Services. This notice only went to oil, gas and sulphur lease operators in the GoM Outer Continental Shelf. It looks like it will impact some of the deepwater GoM oil and gas activity. And basically puts restrictions on how the oil and gas and services companies operate their vessels (ie. speed limits) and it will add costs and time to operations. It did not go to other vessels that traverse thru this expanded Rice's Whale areas. We don't know what other species of whales are in the GoM, but the order is that, if the oil and gas vessel operator can't determine from 500 m that it is a Rice's whale, they are to act as if it was a Rice's whale. Here is an excerpt from the notice [LINK] "*Use trained visual observers to monitor the vessel strike avoidance zone (500 m). Such observers may be either third-party observers or crew members but crew members responsible for these duties should be provided with sufficient training to distinguish aquatic protected species to broad taxonomic groups. b. If transiting within the Expanded Rice's Whale Area (as described in this NTL), document and retain records for three years on details of transit, including what port is used for mobilization and demobilization. c. Observe on all vessels, regardless of size, at all times a 10-knot or less, year-round speed restriction in the Expanded Rice's Whale Area (as described in this NTL and Figure 1). This recommendation would not apply when compliance would place the safety of the vessel or crew, or the safety of life at sea, in doubt. To the maximum extent practicable, lessees and operators should avoid transit through the Expanded Rice's Whale Area after dusk and before dawn, and during other times of low visibility to further reduce the risk of vessel strike of Rice's whales. d. Maintain on all vessels a minimum separation distance of 500 m from Rice's whales. If a whale is observed but*

cannot be confirmed as a species other than a Rice's whale, the vessel operator should assume that the whale is a Rice's whale and take appropriate action. e. Include a functioning Automatic Identification System (AIS) onboard all vessels 65 feet or greater associated with oil and gas activity (e.g., source vessels, chase vessels, supply vessels) that is operating at all times, as required by the U.S. Coast Guard. If the vessel does not require AIS, it is strongly encouraged that the operator document and retain records of the transit, including trackline (e.g., time and speed) data and visual marine mammal sightings."

Figure 52: Expanded Rice's Whale Areas per BOEM Aug 17, 2023

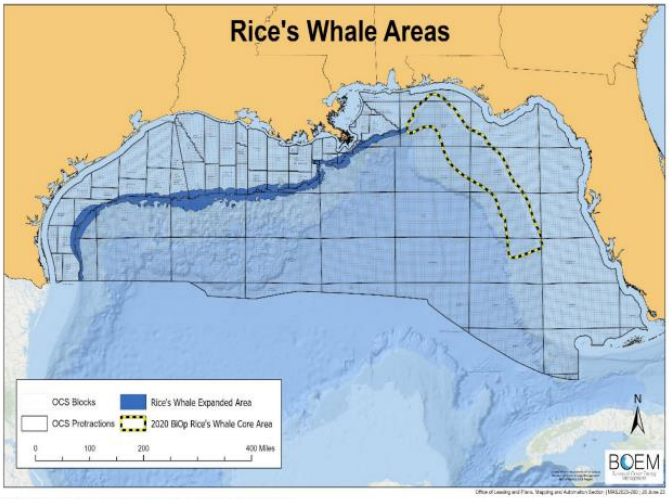


Figure 1: Expanded Rice's Whale Area.

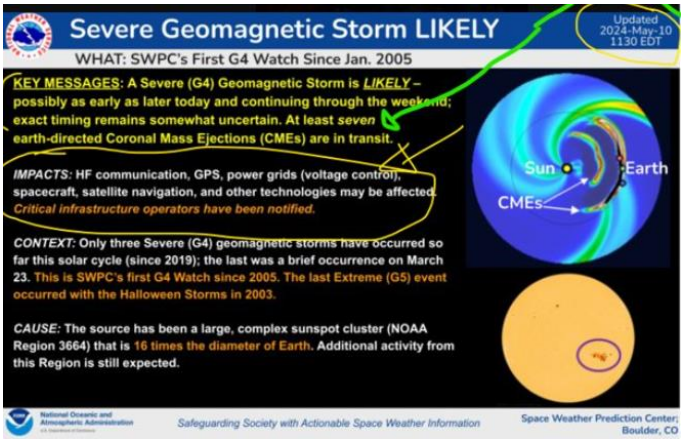
Source: US Bureau of Ocean Energy Management

Electricity – Grid passes a huge test from massive geomagnetic storm

Massive geomagnetic storm

As of our 7am MT news cut off, we have not seen any reports of any major grid hits from the massive geomagnetic storms that hit on Friday night and yesterday. That is great news as this was one of the biggest waves ever. Rather the story from the big hits were amazing pictures of the Northern Lights, including in Canada, from all over the world. It will be interesting to see the analysis of why the grid was so resilient. We had passed on the big warnings from NOAA. On Friday, we tweeted [LINK] "*Breaking! "Severe Geomagnetic Storm is LIKELY ... continuing thru weekend" @NWSSWPC 1130am ET. "Impacts: HF communication, GPS, power grids (voltage control), spacecraft, satellite navigation & other technologies may be affected", One positive -Northern Lights will be visible! #NatGas #OOTT."* And then later on Friday when NOAA ramped up its warning, we tweeted [LINK] "*Big test for Grid! "at least seven earth-directed Coronal Mass Ejections (CMEs) are in transit" @NWSSWPC. Mar 13, 1989 all of Quebec blackout was due to 1, possibly 2, CMEs hitting. #NatGas #OOTT."*

Figure 53: Space Weather Prediction Center May 10 at 11:30am ET



Source: Twitter @KennethLerose

Quebec March 13, 1989 blackout was from a geomagnetic storm

Here is what we have written in prior years on this March 13, 1989 blackout. "*There was a massive blackout on March 13, 1989 that hit all of Quebec, and it was caused by a geomagnetic storm. NASA wrote "The Day the Sun Brought Darkness. On March 13, 1989 the entire province of Quebec, Canada suffered an electrical power blackout. Hundreds of blackouts occur in some part of North America every year. The Quebec Blackout was different, because this one was caused by a solar storm! On Friday March 10, 1989 astronomers witnessed a powerful explosion on the sun. Within minutes, tangled magnetic forces on the sun had released a billion-ton cloud of gas. It was like the energy of thousands of nuclear bombs exploding at the same time. The storm cloud rushed out from the sun, straight towards Earth, at a million miles an hour. The solar flare that accompanied the outburst immediately caused short-wave radio interference, including the jamming of radio signals from Radio Free Europe into Russia. It was thought that the signals had been jammed by the Kremlin, but it was only the sun acting up!"*

Energy Transition: Australia says needs natural gas beyond 2050 & more new supply

Australia says need natural gas for longer

Australia's Labour government took a lot of heat from the climate change side when, on Thursday, they introduced their Future Gas Strategy that was a reality check on how to achieve Net Zero and that Australia needs more natural gas and for a lot longer than expected. On Thursday, we tweeted [LINK] "*OOPS! #NatGas Reality check in Australia Labor Govt's new Future Gas Strategy. "#NatGas is needed thru 2050 and beyond" "New sources of #NatGas supply are needed to meet demand during the economy-wide transition" Much more. [LINK] #OOTT."* Some of the key points from the minister's overview and the Guiding principles for Australia's gas are: (i) Australia needs natural gas beyond 2050. Australia says their analytical findings are clear. *The analytical findings are clear. Under all credible net zero scenarios, natural gas is needed through to 2050 and beyond, though its production and use will change over this period. Gas will be essential to the transition because our energy system needs gas to achieve net zero. Gas will be a transition fuel that*

firms renewable power generation and is required for manufacturing and minerals processing until such time as alternatives are viable." (ii) Need more investment in natural gas supply. "*We cannot rely on past investments in gas to get us through the next decades. We need continued investment in, and development of, gas supply and transport infrastructure to get us through the energy transition with thriving industries."* (iii) Affordable natural gas Is needed. "*Gas must remain affordable for Australian users throughout the transition to net zero. A future made in Australia, our competitive advantage in abundant resources, and our standard of living requires reliable, affordable and clean energy."* (iv) "*New sources of gas supply are needed to meet demand during the economy-wide transition*" (v) There seems to be an urgency to get on natural gas development. "*updating Commonwealth retention lease policies to encourage more timely development of existing gas discoveries, and considering a firmer 'use it or lose it' policy*." (vi) There is a lot more in this report. Australia says their analytical findings are clear. Natural gas is needed for their move to Net Zero and more natural gas is needed beyond 2050. Our Supplemental Documents includes excerpts from their Future Gas Strategy.

Energy Transition: Microsoft AI/Data Center in Wisconsin where fossil fuels are big

Fossil fuels provide 85% of Wisconsin power

Biden was in Wisconsin on Wednesday to announce the new $3.3b investment by Microsoft for a new AI data center in Racine, Wisconsin. When we saw the White House announcement, we tweeted [LINK] "*AI/Data Centers 101: Need 24/7 Reliable Power so More AI/Data Centers = More #Coal #NatGas. Biden announced $3.5b Microsoft AI/Data Center in Wisconsin didn't mention electricity source. 👇EIA data: Fossil fuels (#Coal #NatGas) provide 85% of electricity in Wisconsin. #OOTT.* And a follow up tweet [LINK] "*Biden/Microsoft new AI/data center in Wisconsin likely ~85% powered by #Coal and #NatGas. Data centers need 24/7 power. See 👇#OOTT."* The White House released the Fact Sheet for the new AI data center that had a lot of detail but one missing detail was how will the data center be powered. Our tweet included the EIA data and the reminder that fossil fuel provide 85% of the electricity in Wisconsin. There was nothing n the announcement that Microsoft was building a big wind farm or solar field to fund the new AI data center so they must be falling back on the grid and that would mean it will be coal and natural gas providing 85% or so of the power for Microsoft. Our Supplemental Documents package includes the EIA electricity generation for all states and the White House Fact Sheet.

Wisconsin is one of the key swing states

We should look for Biden to make announcements in all the key swing states in the run up to the Nov 5 election. Wisconsin is one of these swing states and Biden won by 21,000 votes. We created the below table of the other key swing states for Biden's re-election fight.

Figure 54: Key Swing States – 2020 Results

	Electoral Votes Won		Votes in millons		
State	Biden	Trump	Biden	Trump	Biden less Trump
Arizona	11		1.672	1.662	0.010
Georgia	16		2.474	2.462	0.012
Michigan	15		2.804	2.650	0.154
Nevada	6		0.703	0.670	0.033
North Carolina		16	2.684	2.759	-0.075
Pennsylvania	19		3.460	3.378	0.082
Wisconsin	10		1.631	1.610	0.021
Swing States Tot	77	16	15.428	15.191	0.237
Total US	306	232			
Source: Bloomberg					

Source: Bloomberg

Energy Transition: Mercedes politely backs away from all-electric by 2030

Mercedes backs away from all-electric

No on should be surprised to see the continuing backtracking or softening of all the auto company push on EVs, it's just a question of how politely they do so. On Wednesday, Mercedes held its AGM and Chairman Kallenius speech opened up with a polite, but clear backing away from their stated goal for all electric by 2030. Kallenius didn't make any criticism of EVs or even clearly state customers aren't stepping up for EVs as was expected. Kallenius did say they "*want a CO2-neutral new car fleet by 2039",* which looks like a decade deferral of being all electric by 2030. And he was clear on how they will be keeping EVs and ICE models up to date and letting the customer decide. On Wednesday, we tweeted [LINK] *"Mercedes public AGM backtrack from all #EV future! "transformation might take longer than expected" "makes sure all relevant drive systems are fully up to date. And then the customer decides". "we can produce combustion engine models alongside electric cars". Peak #Oil demand will take longer than aspired. #OOTT."* Prior to this, the public goals were for all-electric by 2030.

Mercedes Chairman Kallenius opening to his Ambitious Strategy comments

Our tweet included the Mercedes posted opening remarks in Kallenius's speech on the EV transformation. Kallenius opened "*Our ambitious strategy also makes Mercedes-Benz, Mercedes-Benz. We want a CO2-neutral new car fleet by 2039. Across the entire value chain. That's why the strategic aim of Mercedes-Benz is zero emissions. That is certain. However, the transformation might take longer than expected. We are therefore prepared for all market conditions. We are creating the conditions to become fully electric. But many factors influence the pace of transformation. For example, the expansion of the charging infrastructure. There will be both in the coming years: Electric cars and cars with ultra-modern, electrified combustion engines. If the demand is there, well into the 2030s. We make sure that all relevant drives systems are fully up to date. And then the customer decides. We will build the perfect Mercedes for every wish. We have set our plants up for flexibility. That way we can produce combustion engine models alongside electric cars. And react quickly to the market."*

Energy Transition: German Apr new car sales, BEV flat but Hybrid and ICE up YoY

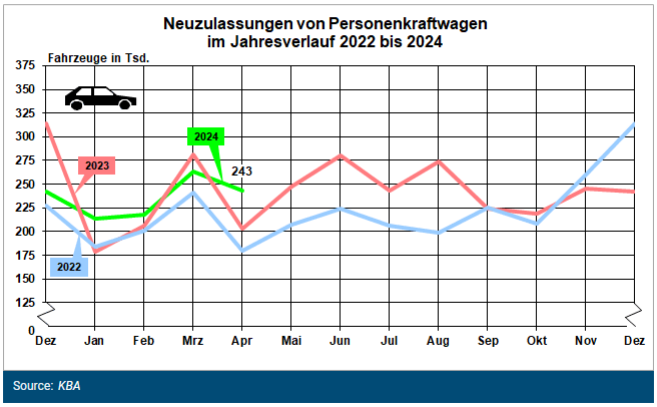
New car sales Germany

On Monday, we tweeted [LINK] "*Bad 2024 for German EV sales, Good 2024 for Hybrid, Petrol, Diesel car sales. Apr YoY % & YTD Apr 30 YoY % Total: +19.8%, +7.8%. BEF: -0.2%,*

-10.8% Hybrid: +26.4%, +16.1% Petrol: +18.6%, +7.5% Diesel: +28.2%, +9.5% #Oil will be needed for longer. #OOTT". We were referencing the monthly KBA data on Germany new cars sales [LINK] that reinforce a global trend – There is a big slowdown in EVs sales and hybrids are taking market share from EVs. And in Germany's case, there is strong growth in petrol and diesel cars. The KBA data that while Battery Electric Vehicles (BEVs) were essentially flat in Germany at -0.2% YoY for the month of April, hybrid registrations were up +26.4% YoY, petrol cars +18.6%, and diesel car sales were +28.2% YoY. On a YTD basis (Jan-Apr period), BEVs are down -10.8% YoY, hybrids are +16.1% YoY, petrol cars are +7.5% YoY, and diesel cars are +9.5% YoY. Below is a chart of Germany's aggregated new car sales. Our Supplemental Documents Package includes the KBA data.

Figure 55: German new registrations of passenger cars – April 2024

New registrations of passenger cars from 2022 to 2024 - April 2024



Source: KBA

Energy Transition: UK EV sales up in April but almost entirely by fleets, not people

New car sales UK

On Wednesday, we tweeted [LINK] "*UK Apr EV sales @SMMT"(BEV) market share rises to 16.9%, sustained entirely by business buyers, as private retail demand continues to drop". "BEV volumes for this year have been revised downwards by -5.2%, with anticipated market share now 19.8%" Hybrids winning. #OOTT".* We referenced the monthly UK new car registrations data posted by The Society of Motor Manufacturers and Traders (SMMT). SMMT provided fleet vs private (people) on an overall basis but didn't give the detail on a by category. The #1 theme of the UK April data is how fleet purchases are making up for almost all BEV purchases and individuals have really backed away from BEV purchases. SMMT wrote "• *Battery electric vehicle (BEV) market share rises to 16.9%, sustained entirely by business buyers, as private retail demand continues to drop."* And *"While the overall increase in BEV demand is positive, urgent action is needed to re-enthuse private buyers into switching. Fewer than one in six new BEVs bought in April went to consumers, whose uptake volumes fell by -21.9%."* On an overall basis, hybrids continue to take market share. While total BEV sales in the UK in April were up +10.7% YoY and increased their market share to 16.9%, private retail sales dropped. HEV (Hybrid) sales increased +16.7% YoY against April 2023, raising their total market share to 13.1%. The SMMT wrote "*the latest market outlook*

shows a diminishing share for BEVs despite a growing overall new car market. 1.984 million new cars are now anticipated to be registered in 2024 – a 4.2% rise on last year, and a 0.5% increase on January's outlook. However, BEV volumes for this year have been revised downwards by -5.2%, with anticipated market share now 19.8%, significantly below the government target of 22% per manufacturer under the Vehicle Emissions Trading Scheme". So a lowered 2024 outlook for battery vehicles specifically. Below is a table of new car sales by type in the UK. Our Supplemental Documents Package includes the SMMT report.

Figure 56: New car sales in April

APRIL

	2024	2023	% change	Mkt share -24	Mkt share -23
Diesel	8,649	11,572	-25.3%	6.4%	8.7%
Petrol	74,877	77,275	-3.1%	55.8%	58.1%
BEV	22,717	20,522	10.7%	16.9%	15.4%
PHEV	10,493	8,595	22.1%	7.8%	6.5%
HEV	17,538	15,026	16.7%	13.1%	11.3%
TOTAL	134,274	132,990	1.0%		

YEAR TO DATE

	YTD 2024	YTD 2023	% change	Mkt share -24	Mkt share -23
Diesel	46,304	51,336	-9.8%	6.8%	8.2%
Petrol	381,802	357,912	6.7%	56.2%	57.1%
BEV	107,031	96,755	10.6%	15.7%	15.4%
PHEV	53,052	40,360	31.4%	7.8%	6.4%
HEV	91,633	80,887	13.3%	13.5%	12.9%
TOTAL	679,822	627,250	8.4%		

BEV - Battery Electric Vehicle; **PHEV** - Plug-in Hybrid Electric Vehicle; **HEV** - Hybrid Electric Vehicle, Diesel and Petrol figures include Mild Hybrid Electric Vehicle (**MHEV**)

Source: SMMT

Energy Transition: China NEV sales increasing, ICE cars are 56% of total sold in Apr

China Jan-Apr car sales

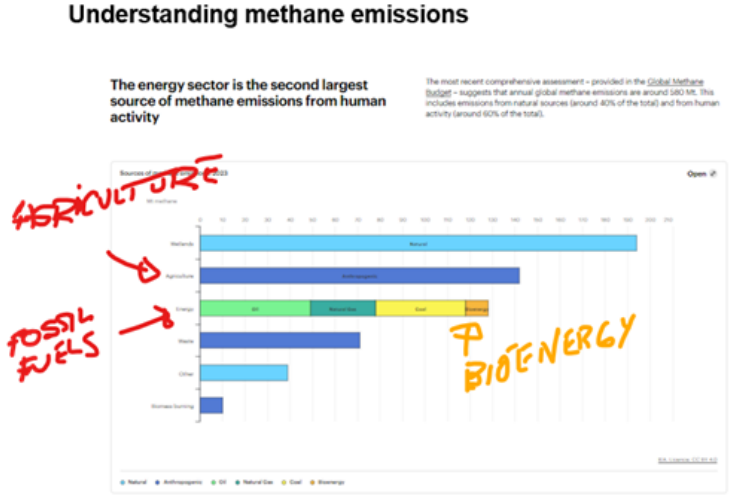
Wednesday night, we tweeted [LINK] "*#EVs + #Hybrids continue to close the gap on ICE in China. Don't have EVs vs Hybrid split so only have total NEV April only: NEVs +34% YoY to 706,000 units or 44% of total China passenger vehicles. ICE at 884,000 units or 56%. #OOTT".* Earlier that day, Xinhua reported on China's Jan-Apr car sales. They only reported NEV in total. New Energy Vehicles are the total of EVs + PHEVs+ HEVs. But as we have previously reported, hybrids are growing and taking market share from EVs in China. The takeaway is that NEV sales continue to show strong YoY growth and are closing the gap but still less than ICE vehicles sales. On Wednesday, Xinhua reported [LINK] "*China's retail sales of passenger cars reached nearly 6.42 million units in the first four months of this year, marking an increase of 9 percent year on year, according to data from an industry association. In April alone, sales of passenger cars decreased 2 percent year on year to nearly 1.59 million units, data from the China Passenger Car Association showed. During the January-April period, nearly 2.48 million units of new energy vehicles (NEVs) were sold through retail channels, surging 35 percent year on year. Retail sales of NEVs stood at 706,000 units in April, up 34 percent from a year ago, the association said"*. We are expecting the China Automobile Dealers Association to release the BEV and PHEV split soon and will check to see if hybrids are continuing to take market share away from pure EVs.

Energy Transition: IEA data, Agriculture emits way more emissions than fossil fuels

Agriculture methane emissions

On Friday, we tweeted [LINK] "*Methane Emissions 101. IEA estimates Agriculture methane emissions > #Oil #NatGas #Coal Bioenergy emissions. Bioenergy was ~0.5% of Oil + NatGas + Coal 2022 production. Yet Bioenergy, an accepted Net Zero fuel, contributes way, way more methane per boe. Thx @aaronaclark1 #OOTT.*" We had seen a Bloomberg report on a group focused on making dramatic reduction in methane from cows and it included the data from the IEA's recent Global Methane Tracker 2024. This was a data point that western governments don't like to talk about but has been there for all to see for a decade or more – agriculture has way more methane emissions than fossil fuels. The Bloomberg report led to our tweet that included the actual IEA Global Methane Tracker 2024 exhibits that show how methane emissions from agriculture are way more than fossil fuels. The annoying part of the IEA graphic is that they included bioenergy fuels in with fossil fuels.

Figure 57: Methane emissions by source



Source: IEA

Bionergy has huge relative methane emissions

As noted above, the IEA included methane emissions from bioenergy in their methane emissions from fossil fuels. Looking at the detail, he methane emissions from bioenergy are ~7% of what the IEA calls from fossil fuels. That is huge considering how small bioenergy production is relative to oil, natural gas and coal. We checked 2022 data and bioenergy is approx. 0.5% of total oil, natural gas, coal and bioenergy. So bioenergy is ~0.5% of the production but contributes approx. 7% of the methane emissions.

Energy Transition: World's newest largest direct air captures offsets >7,000 cars CO2

Largest DAC project

On Thursday, we tweeted [LINK] "*CO2 Direct Air Capture works, BUT could remove multiples more CO2 by increasing fuel mileage. Climeworks new Mammoth DAC takes out 9x more CO2 than its Orca. Removes up to 36,000 tons CO2/yr or equal to removing >7,000 cars. US has 292 million ICE. Thx @DianaOlick #OOTT.*" Our tweet included a clip of CNBC reporting from Iceland on Climeworks new Direct Air Capture plant, called Mammoth, that is

nine times larger than its currently operating Orca DAC in Iceland. Orca was the largest DAC before Mammoth. CNBC reported that Mammoth will remove enough CO2 from the air every year to offset the CO2 from 7,000 cars. Climeworks did not provide a cost estimate of Mammoth. CNBC was there as Climeworks press released, on Wednesday, the start of the first phase of Mammoth. They wrote "*Climeworks starts operations of its to-date largest direct air capture and storage (DAC+S) plant, Mammoth, in Iceland. It is the second commercial DAC+S facility of Climeworks and is about ten times bigger than its predecessor plant, Orca. The plant is designed for a nameplate capture capacity of up to 36,000 tons of CO_2 per year once in full swing by filtering CO_2 from the air and storing it permanently underground. The plant has successfully started to capture its first CO_2, with twelve of its total 72 collector containers installed onsite."* Climeworks noted how Mammoth, once fully developed, would remove 36,000 tones of CO2/yr. Climeworks did not write anywhere that this as the equivalent of removing 7,000 cars off the road but we suspect they likely said this to CNBC in the tour. We would have come up with a slightly higher number of cars. Note our tweet included part of the CNBC report form Iceland. Our Supplemental Documents package includes the Climeworks release.

Figure 58: Mammoth direct air capture plant

Source: Climeworks

Climeworks "Orca" DAC has been operating for a few years

Our tweet on CNBC reporting on Mammoth referred to our Sept 21, 2021 tweet that noted the CO2 savings from what was, up until Mammoth, the world's largest DAC project – Climeworks' Orca project in Iceland. Here is what we wrote in our Sept 26, 2021 Energy Tidbits, when we first reported on Orca. "*We are well aware that governments and capital providers are going to make sure the world is put on a push to get to Net Zero, we just don't want to see that ambition result in an massive energy crisis for multiple years in the 2020s. But it gets increasingly harder to not believe a massive energy crisis is coming because we continue to see capital allocation go to energy transition technologies that are Not Ready for Prime Time. Yet, capital continues to pour into them. A good example is the push into direct capture of carbon from the air. On Tuesday, NowThis news tweeted a video [LINK] from Climeworks CEO (Jan Wurzbacher) on how they just turned into operation their Orca plant in*

Iceland, "which is the largest direct air capture plant currently operational in the world with a capacity of 4,000 tonnes of CO2 that are captured from the air every year. So that's phenomenal capacity." We hadn't realized that the capacity of the direct air capture plants was that low, which is why we tweeted [LINK] "World needs massive cuts to #CO2 emissions & need demonstration projects like this to show it can be done. But world's biggest project can remove 4,000 tonnes CO2/yr only offsets <900 cars, EPA est typcial car emits ~4.6 tonnes CO2/yr. #EnergyTransition will be hugely expensive." Our tweet included the main page from the EPA's Greenhouse Gas Emissions from a Typical Passenger Vehicle [LINK] "a typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year". The math perspective is that the world's largest operating direct air capture of carbon plant will only offset the CO2 emissions of <900 cars. Climeworks did not disclose the capital or operating costs of the Orca plant. But this must be hugely expensive to take the equivalent of <900 cars off the road. Yet direct air capture of carbon is still able to attract massive capital. To illustrate the challenge, the number of cars in the US is approx. 290 million, or the equivalent of ~325,000 Orca direct air capture of carbon plants.

Figure 59: Climeworks Direct Air Capture Plant

Source: Climeworks, NowThis

OXY's planned 500,000 CO2 Direct Air Capture = 110,000 cars off the road

Occidental has plans for a massive Direct Air Capture project that would capture 14 times more CO2 than Mammoth. Here is what we wrote in last week's (May 5, 2024) Energy Tidbits memo. *"We believe most aren't aware that the Direct Air Capture projects don't really do much to offset CO2 from cars. And we have to believe the US could regulate to have a multiple larger impact on CO2 by simple items like increasing required mileage requirements per ICE vehicles. The reality of the Direct Air Capture of CO2 projects is that they don't really offset the CO2 emissions of many passenger cars. On Sunday evening (Riyadh time), Amena Bakr (Energy Intelligence) tweeted on comments from Occidental CEO Vicki Holub on OXY's planned DAC project that Holub said would remove 500,000 tons of CO2 per year.*

When we saw Bakr's reporting, we tweeted [LINK] "C02 Math. See 👇09/21/21 tweet. EPA: 4.6 tonnes CO2/yr per passenger car. Today OXY CEO says Direct Air Capture project to remove 500,000 tonnes CO2/yr reports @Amena__Bakr. Equal to CO2 from ~110,000 cars. Vs 292.3 million registered cars in US. Hedges. #OOTT." We used the EPA's estimate that a typical passenger car emits 4.6 tonnes of CO2 per year to estimate Occidental's DAC project would offset the CO2 of approx. 110,000 cars. And that compared to 292.3 million registered cars in the US."

Energy Transition; Why doesn't Biden push harder on fuel efficiency? It works!

Why not prioritize stronger fuel efficiency

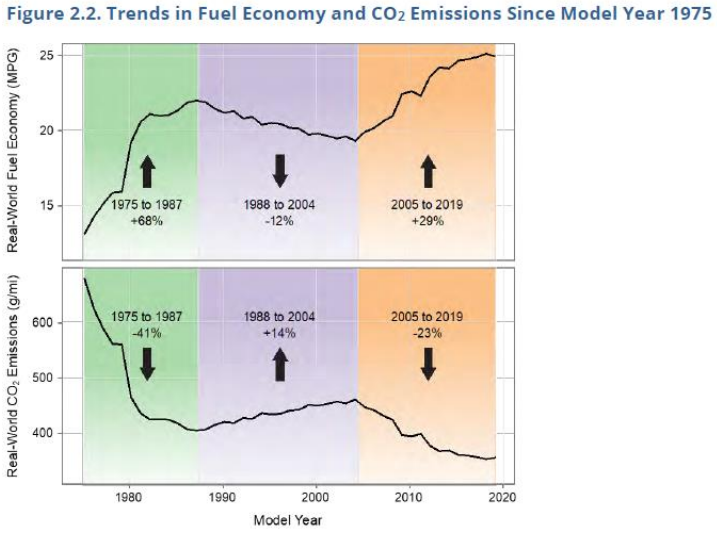
We have said Fuel economy is a no brainer lower emissions. After seeing the reminder on how the world's largest direct air capture plant only offsets the equivalent of ~7,000 cars, we tweeted [LINK] "*Big wins to Biden if pushes harder on increasing fuel mileage in ICE vehicles vs DAC push. Can push all costs down to the automakers and NOT have to subsidize. Proven big impact! Take the low hanging fruit. See 👇SAF Group May 2, 2021 Energy Tidbits memo. #OOTT."* If the priority in Paris is to reduce emissions, why not do what works, what works well and what doesn't require the govt to give billions in subsidies. Why not push harder on fuel efficiency. Why not put the costs of reducing emissions on the auto manufacturers? But that is under the view that Paris is to reduce emissions whereby the climate change side priority is to get rid of fossil fuels.

04/29/21; What's taken Biden so long to focus on vehicle fuel economy?

Here is what we wrote in our May 2, 2021 Energy Tidbits memo. "*We have noted our surprise that Biden hasn't placed a priority on conservation and efficiency items like fuel economy in vehicles and were reminded of this when, on Thursday, Argus Media reported [LINK] "US readies 'very aggressive' fuel-economy targets" "President Joe Biden's administration is preparing to pursue fuel-economy standards for cars and trucks that are ambitious enough to offset the effects of recent regulatory rollbacks, according to a top government official." Fuel economy in vehicles should have been a no brainer for Biden'. We tweeted [LINK] "know its easier to go after #Oil #NatGas Co's, but why wasn't this play 1 in #Biden emissions reduction playbook? He knew Carter & Obama fuel economy push = big emissions reduction. @ArgusMedia US readies 'very aggressive' fuel-economy targets #OOTT #ClimateChange Thx @ArgusMedia." For someone who wants to reduce emissions, we previously said its kind of annoying that Biden didn't go back to the Obama playbook and the Carter playbook and put a priority on restoring increasing fuel economy limits for cars/trucks because its clear that increasing fuel economy can materially reduce emissions. Looks like Biden will finally get at fuel economy. The EPA did a big repot in Jan "The 2020 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975". 75". [LINK] The EPA graphs are pasted below and shows how it all started with post Jimmy Carter election in 1976. If you look at the numbers behind the graphs. Obama did well also. If you look at the data. Obama elected in*

2008. From 2007 thru 2016, he reduced CO2 by ~17%, and fuel economy increased by 20%. Gains under Trump were small."

Figure 60: Fuel economy vs CO2 emissions



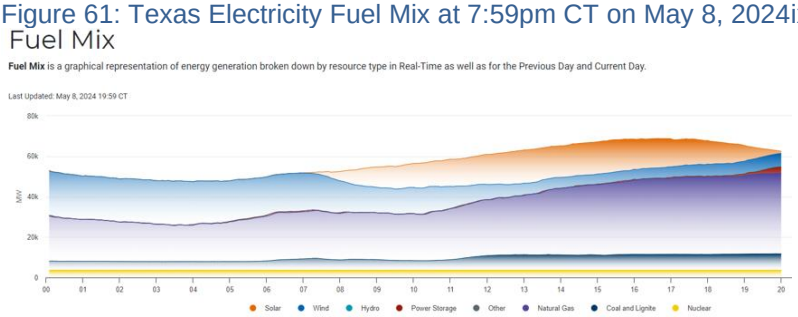
Source: EPA

Energy Transition: Natural gas and coal saves the electricity day for Texas

Natural gas saves Texas electricity

It's been hot in Texas and it is only May. There was a good reminder on Wednesday of how Texas needs natural gas and coal for its electricity supply, On Wednesday, ERCOT had warned that there could be a power squeeze in the peak late afternoon/early evening hours. But they made it through because of natural gas and coal. We watching duing the peak and on Wed evening we tweeted [LINK] *"#NatGas & #Coal saving the day in Texas when the sun goes down and the wind isn't blowing very hard. @ERCOT_ISO Texas fuel mix as of 7:59pm CT. NatGas 63.8%. Coal 13.0%. Wind 10.5%. Nuclear 5.9%. Power Storage 4.8%. Solar 1.7%. Hydro 0.2%. Other 0.1%. #OOTT.* Wind power was low and solar was almost back to zero but fortunately natural gas was at 63.8% and coal was at 13.0%.

Figure 61: Texas Electricity Fuel Mix at 7:59pm CT on May 8, 2024ix

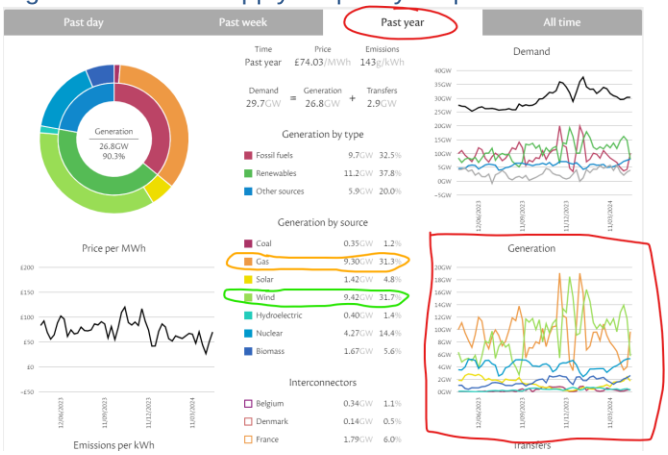


Source: ERCOT

Texas reminds every added MW of wind needs an added MW of natural gas

The Texas power need for natural gas and coal this week reminded of what we saw last week in the UK. Here is what we wrote in last week's (May 5, 2024) Energy Tidbits memo. "*On Wednesday, Bloomberg wrote on how natural gas pries were up as wind power was down. It reminded us of a basic fundamental for wind power – it needs something to fill in when the wind doesn't blow. We tweeted [LINK] "Energy Transition 101. Every added MW of wind needs an added MW of #NatGas to fill in when the wind doesn't blow. @nationalgriduk Wind and NatGas almost identical for past yr. NatGas slightly less for past wk due to solar up vs past yr. #OOTT." Our tweet included the National Grid graphs/charts that show how when wind generation goes down, natural gas generation goes up. And that the two had almost identical power supply for the last year with wind providing 31.7% of UK power and natural gas providing 31.3%."*

Figure 62: Power supply for past year per National Grid: Live as of 4:30am MT May 1

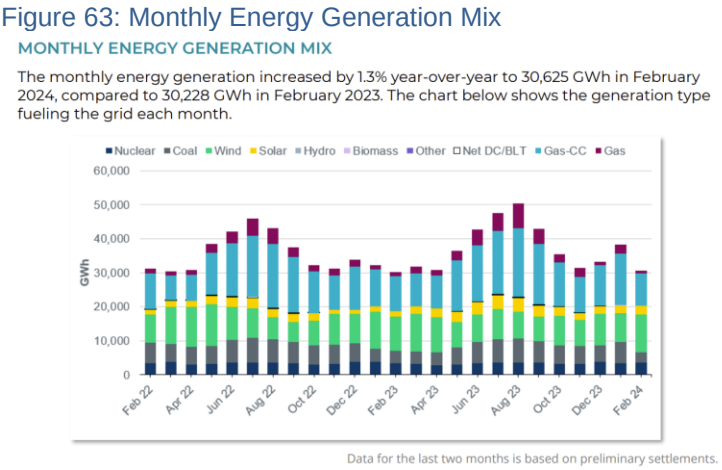


Source: National Grid

Reminder Texas wind generation typically declines in May/Jun/Jul

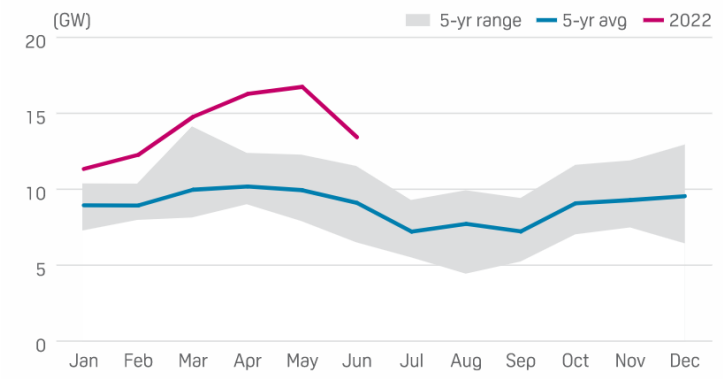
Here is what we wrote in our April 14, 2024 Energy Tidbits memo. "*We remind that Texas is moving into its seasonally low period for wind generation, which happens every summer. One key Texas electricity to remember for May is that normally Texas wind generations starts to seasonally decline in May June and July. This is the key reason why the worries in Texas about electricity reliability are in the summer more than the winter. Fortunately for Texas when the wind doesn't blow in the summer and wind generation is at its low, Texas has natural gas to step and fill the void. Below is ERCOT's current Monthly Energy Generation Mix [LINK], which shows how wind generation seasonally declines around now and natural gas generation seasonally increases. Below that is a graph we used in our July 31, 2022 Energy Tidbits memo from Platts that shows the average hourly wind output in 2022 compared to the 5-year historical output."*

Figure 63: Monthly Energy Generation Mix



Source: ERCOT

Figure 64 ERCOT Average Hourly Wind Output From SAF Group 07/31/22 Energy Tidbits



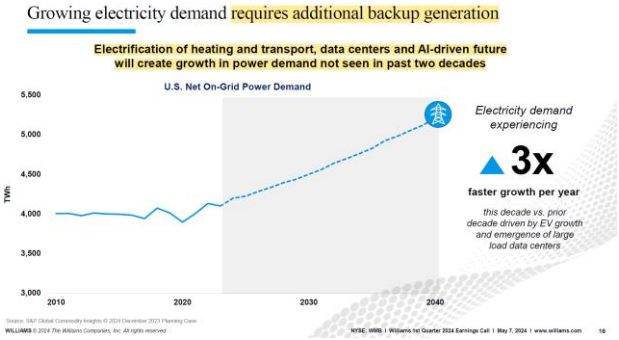
Source: ERCOT

Energy Transition: Williams, electricity demand growth not seen in past 2 decades

Williams reported Q1 on Tuesday and the key theme in the growth in electricity is as not seen in the last 2 decades and that natural gas is needed for electric reliability. Their key electricity slide wrote "G*rowing electricity demand requires additional backup generation. Electrification of heating and transport, data center and AI-driven future will create growth in power demand not seen in the past two decades. Electricity demand experiencing 3X faster growth per year*." The other key concept is that *"peak day gas demand for power generation expected to increase across major ISOs due to growth in electrification. Natural as pipeline contracted capacity is critical to ensure electric reliability on peak days*."

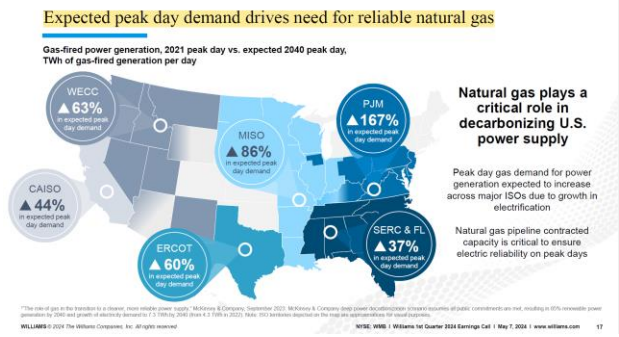
3x faster growth in electricity demand

Figure 65: Electricity demand growth not seen in past 2 decades



Source: Williams

Figure 66: Increasing need for reliable natural gas



Source: Williams

Capital Markets: BofA concerned on younger & lower income

BofA concerns on lower income

On Thursday, Bank of America's Liz Everett Krisberg was talking about the new Consumer Checkpoint Report on SquawkBox and what caught our eye was when she said there was something not in the report that is an area of concern. It's not a broad concern overall for the consumer but it is a concern for younger and lower income that they are increasing credit card debt, reducing savings and increasing buy now pay later. Here is the transcript we made of the exchange. SAF Group created transcript of an excerpt from CNBC Squawk Box interview with Liz Everett Krisberg on May 9, 2024. Items in "*italics*" are SAF Group created transcript. At 1:55 min mark, CNBC's Becky Quick *"Other things have taken their place, and I guess what you're pointing to would be the concern about inflation not tamping down. The idea that we're not going to get back to 2% and as a result the Fed is going to have to maintain if not eventually raise rates."* Liz: *"We are continuing to see the spending, so that underlying fundamental is certainly something that we should all be aware of. I think the one thing to think about though is, are we missing something? Is there something new? And we did a deep dive into buy now pay later, not in this morning's checkpoint report but actually in our report last week to really try and understand, like everybody is, what is happening with buy now pay later. To kind of set the stage, what we found was eight and a half percent of Bank of America customers had a buy now pay later transaction in March. Now that pace is up about half a percent relative to a year ago, but the pace of growth had slowed. It was up*

two and a half percent before that. So, who is using it, how many people are they using it, how big of a deal is it.“ Becky*: “My guess would be younger people”* Liz: *“One hundred percent younger people. But also, what was interesting and potentially concerning is almost half of the buy now pay later users were lower income consumers. And the other thing that was really interesting that I thought we looked at was we looked at people who used it once or twice versus heavy users and we defined that as someone who had twenty or more transactions a month, right. The fundamentals of that group: their credit card balances are rising faster than everybody else and their deposit levels, their checking and savings numbers are lower than the others”.* Becky*: “So they are continuing to spend as if they had it still*” Liz*: “Not only are they continuing to spend as if they had itl, their spending growth is twice the level of the spending growth of the light users and even higher, even more than that than non-users. And again, you are talking about eight and a half percent of our customers that have used buy now pay later in the month. The heavy users, though we are concerned, is only half a percent. So, in terms of the impact on the overall economy*,” Becky*: “Not broad for the overall but very concerning for that particular segment”* Liz: *“Exactly.”*

Capital Markets: US homeowner equity remains elevated but down again in Q1

US homeowner equity down QoQ

On Wednesday, ATTOM posted a report titled “*U.S. Homeonwer Equity Remains Elevated But Dips Downward Again in First Quarter*” [LINK]. Now that rates have been elevated for a while now, we are keeping an eye on home equity values in North America and if higher rates have negatively impacted housing values, and, by extension, homeowners’ equity. ATTOM wrote “*The portion of mortgaged homes that were equity-rich in the first quarter of 2024 is down from 46.1 percent in the fourth quarter of 2023, marking the third straight quarterly decline. The latest figure also was down from 47.2 percent in the first quarter of 2023, hitting the lowest point in two years. At the same time, the report shows that the portion of mortgaged homes that were seriously underwater in the U.S. rose slightly in the first few months of 2024, from 2.6 percent to 2.7 percent of all residential mortgages. Seriously underwater mortgages are those with combined estimated balances of loans secured by properties that are at least 25 percent more than those properties’ estimated market values”.* ATTOM defines “seriously underwater” as mortgages with loan-to-value (LTV) values of 125% or more (the homeowner’s mortgage is for 25% more than what the home is worth today), and “equity-rich” as LTV ratios of 50% or lower. ATTOM noted that seriously underwater mortgage levels increased QoQ in the majority of states, while equity-rich share of mortgages decreased QoQ. If this trend continues, more and more Americans will be saddled with debts higher than the market value of their homes, which could be a problem. Our Supplemental Documents Package includes the ATTOM report.

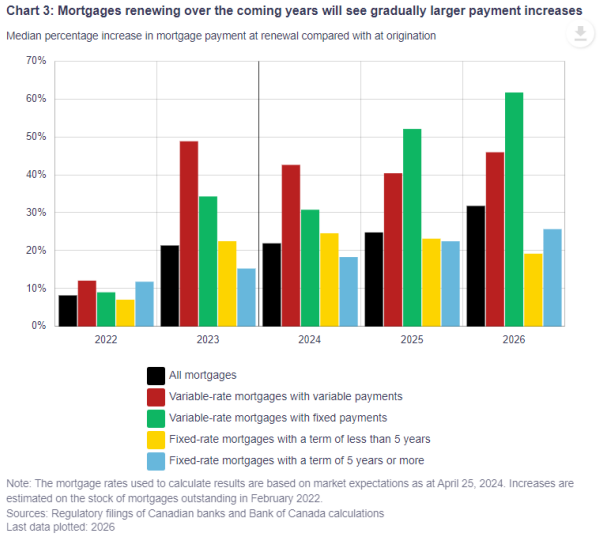
Capital Markets: BoC Macklem Canada’s “*consumption per capita has been weak*”

Bank of Canada Macklem

We listened to the Bank of Canada press conference on Thursday on their just released Financial Stability Report 2024. No surprise, one of the first questions was on their below slide showing mortgage renewals and how Cdns will be seeing larger payments with some potential up 60%. The reality is that the wave of mortgage renewals has only really started and the problem is getting bigger in 2024, 2025 and 2026 given how cost of living has already impacted disposable income. Governor Macklem noted how Cdns have coped to the most part right now with mortgage renewals but really didn’t address the question of looking ahead at the mortgage renewals ion 2024, 2025 and 2026. In his answer on how Cdns are handling it so far, he reminded that it isn’t easy and it has meant cuts in their consumption.

Here is the transcript we created of Mackem's comments in the Q&A when sked about this mortgage renewal risk and he referenced the below chart in a 5 min answer in the press conference. [LINK] on the financial stability report. Note that the non-mortgage stress is from renters not people who outright own their house. ut then he said ho at least so far, Cdns are coping with the higher mortgage rates and gives comments that aren't in the report. At 24:30 min mark, Macklem "… *they do have some buffers. Certainly when we look at things in the base case, it does look like most households have the financial flexibility to cope with higher interest payments. Now, I would say two things. First of all, that doesn't mean it's easy. Canadians are making their mortgage payments. They're keeping up with their car loans. They're keeping up with their credits by and large. The way they're doing that is they're cutting back on their consumption. And we can see that in our macro forecast, our monetary policy deliberation. Consumption per capita has been weak".* Our Supplemental Documents package includes excerpts from the Bank of Canada Financial Stability Report 2024.

Figure 67: Gradually large payment incrases ahead for Cdn mortgages



Source: Bank of Canada

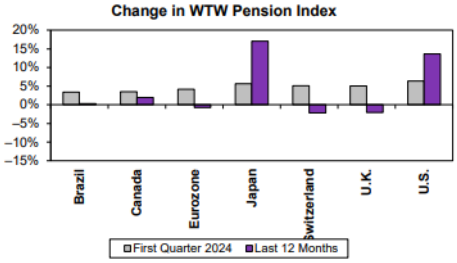
Capital Markets: WTW Cdn Pension Index up QoQ as discount rates rose in Q1/24

WTW Pension Finance Watch

Interest rates going higher is bad for most but one group that benefits from lower liabilities are pension funds as lower interest/discount rates mean the discounted liability of their future pension payouts is higher, and vice versa. We used WTW (Willis Towers Watson) Canada Q1 update to show how a higher discount rate impact helps reduce liabilities for Pension funds. On Thursday, WTW posted its Pension Finance Watch Q1 2024 [LINK], which showed the WTW Pension Index for Canada was up +3.5% QoQ as investment returns grew +1.2% and discount rates rose with the Canadian 30-yr rising +32 bps over Q1/24, which decreased liabilities by -2.2%. WTW stated "*Resilient economic data drove a positive and more stable first quarter of the new year compared to the final quarter of 2023. Discount rates increased across all markets and asset performance was largely positive. Overall, the combined effects drove positive first quarter pension index results for all countries. While it is always the case*

that Global Pension Finance Watch captures results at the end of each quarter, we particularly want to highlight the point in time view of this publication in light of recent volatility." Below is a chart of the WTW Pension Index changes for Q1/24 across WTW's tracked countries, along with Canada's index performance. Our Supplemental Documents package includes the WTW Pension Finance Watch Q1 2024.

Figure 68: Change in WTW Pension Index



Source: WTW (Willis Towers Watson)

How will anti-obesity & cancer vaccines impact pension liabilities?

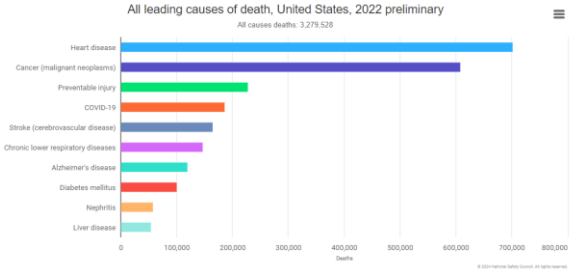
The WTW Pension Finance Watch above doesn't get into what we see as a big uncertainty affecting pensions – how will pension liabilities be increased if anti obesity drugs can avoid big negative side affects and lead to longer life expectations. Here is what we wrote in last week's (May 5, 2024) Energy Tidbits memo. "*We are surprised that we really haven't seen any discussion/reports on how the success of anti-obesity drugs are changing how pension plans assess their liability. It's still early so it isn't clear if there are significant negatives to these drugs but we have to believe they will at least look at potential impacts to liability if these drugs can be broadly used without significant adverse side effects. And if so then the pension plans will have to build in longer life expectancies. There is no official estimate we see estimates up to 20 years but it seems like more tend to use obestity can shorten life expectancy by 5-7 years. Whether the pension plans change life expectancies or layer it in, future pension liabilities should be going up. And if so, we would expect that it also could lead to the pension plans shifting or looking to allocate more to areas like alternatives. Then layer on top of that the question what if cancer deaths can be reduced. It may have not got much attention but Moderna CEO comments on Squawk Box caught our attention and we tweeted [LNK] " Sounds promising! "... if you think about how the [Cancer vaccine] technology is working .....we believe now there is a lot of data demonstrating that the platform of our [Cancer] vaccine treatment is working across..." Moderna CEO. Thx @JoeSquawk for focusing on cancer!" Our tweet included a video clip we made of the CEO's comments but it certainly sounds promising.*

Heart disease and cancer continue to be the top 2 causes of deaths

It doesn't matter where you get the data, heart disease and cancer are always the top 2 leading causes of deaths in the US and Canada. They are basically neck and neck and far ahead of #3, preventative injury. Plus obesity is linked as a major cause

for heart disease and also for cancer. Below is the US National Safety Council [LINK] listing.

Figure 69: All Leading Causes of Deaths in US, Preliminary 2022



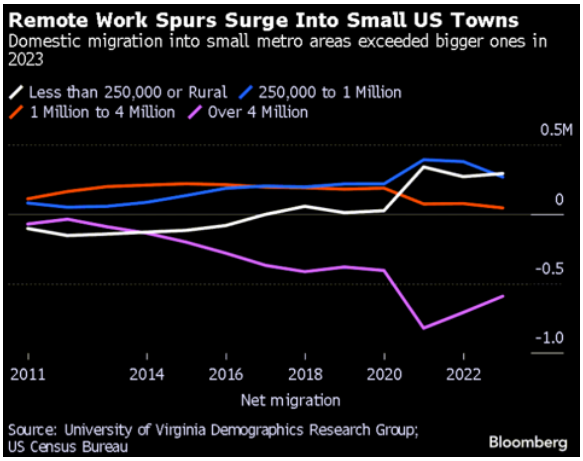
Source: National Safety Council

Demographics: Americans flock to smaller cities

Americans moving to small cities

On Tuesday, Bloomberg posted a report titled "*Record Wave of Americans Fled Big Cities for Small Ones in 2023*". The pandemic shutting down working in offices and move to remote working was the catalyst for Americans moving to smaller cities. That trend continues even with more companies getting people back to the office. We think that is a big part of this shift still, but also now cost of living. Bloomberg wrote "*Score a victory for Mayberry. America's small towns, like the iconic setting of television's The Andy Griffith Show from the 1960s, saw more in-migration in 2023 than larger areas for the first time in decades. The remote work boom that prompted Americans to flee urban areas for mountain hamlets and seaside towns during the pandemic continued at least through last year, according to University of Virginia demographer Hamilton Lombard. An estimated 291,400 people last year migrated from other areas into America's small towns and rural areas, which Lombard defines as metropolitan areas with 250,000 people or fewer*". Also according to the University of Virginia, This number is the highest level of net migration into larger areas since the 1970's. while areas with 250,000 to 1mm people gained 266,448 across the country, areas with over 4mm people lost 600,000 people in 2023. Below is a chart of domestic migration patterns in the US. Our Supplemental Documents Package includes the Bloomberg report.

Figure 70: Domestic migration trends in the US



Source: Bloomberg, US Census Bureau, University of Virginia

Demographics: No surprise, top places for remote workers are smaller cities

Small cities top places for remote workers

Chief among those Americans moving to smaller cities are, unsurprisingly, remote workers. MakeMyMove posted an article [LINK] on April 30th listing 10 locations across the US that offer lower costs of living than the national average and reliable internet service. In their article, MakeMyMove cites a Pew Research poll which showed 22 million Americans in the US are remote workers. People who can work from anywhere don't have as many reasons to live in expensive, big cities, and we aren't surprised these locations on this list would appeal to this sector of the labour force. Among the top 10 locations to move as a remote worker (according to MakeMyMove) were Wichita, boasting a median home price of US $275k, Tulsa with a cost of living 23% below the national average, and Yellow Springs (OH) which has a median home price of $462k. The common element across the list was that these cities were small to medium-sized and are mainly located in the South or Midwest.

Demographics: Korea's working age population to fall almost 10mm by 2044

Korea's low fertility rate impacts workers

Korea is like other developed countries, it has a an aging population and shrinking work force problem that is only going to get worse. On Monday, Korea Times posted an article [LINK] that reported on Korea's declining birth rate and its effects on their future working age population. The Korea Times wrote "*The number of people aged 15 to 64, which stood at 36.57 million in 2023, is projected to decrease to 27.17 million in 2044, according to a report from the Korean Peninsula Population Institute for the Future…"The decline in the economically active population will damage consumption, leading to the collapse of the domestic market. It will also increase the burden of supporting the senior population, leading to an economic slowdown and prolonged low growth," the institute said".* Korea's fertility rate reached a record low of 0.72 expected children per women in 2023. For perspective, a stable population in the absence of immigration needs at least 2.1 births per woman. Our Supplemental Documents Package includes the Korea Times article.

Demographics: Israel's population of 9.9mm is a very young population

Israel population very young

In contrast to a lot of the ageing populations in the West, Israel has a relatively young population demographic. On Thursday, the Jerusalem Post wrote an article on the breakdown of Israel's population [LINK]. The Jerusalem Post wrote "*Israel's population currently stands at 9.9 million people…These numbers show Israel's population has grown by 189,000 people (1.9%) since last year's Independence Day. Over the course of the year, 196,000 babies were born, 37,00 people made Aliyah, and 60,000 people passed away… Israel's population is considered to be young, with 28% of it consisting of children between the ages of 0 and 14, while only 12% of the population is made up of adults aged 65 and over*". Being made "Aliyah" is a term used for Jews ascending to the Holy Land, i.e. immigration to Israel. The Central Bureau of Statistics of Israel estimates their population will grow to 15mm by 2048. Our Supplemental Documents Package includes the Jerusalem Post article.

Demographics: Poll says 6% of Americans currently on GLP-1 (Ozempic, etc)

xxxxxxx

We were listening to Bloomberg radio on Friday in the background when we heard them say 30 million Americans are on GLP-1 drugs like Ozempic, Wegovy and Mounjaro and thought that was a huge number if correct. Yesterday, we saw why they said 30 million. Yesterday, we tweeted [LINK] "*Still early days but, extrapolating the poll results, would put ~15 million Americans currently using GLP-1 drugs ie. Ozempic, Wegovy and Mounjaro. Poll is 6% of American adults currently taking. Thx @KFF #OOTT."* The KFF poll of 1,479 Amerians that Bloomberg and others referenced on Friday was that 12% (one in eight) US adults had taken GLP-1 drugs and 6% of adults were currently on one of the GLP-1 drugs. If the poll can be extrapolated to the US adult population in whole, it would translate in approx. 30 million would have taken the GLP-1 drugs and approx. 15 million would be on GLP-1 drugs. To the extent the answers were accurate, it was interesting to see that 38% said they took the drugs solely to lose weight and 23% said they took in combination to treat chronic condition (ie. diabetes or heart disease). The reminder we put in our tweet is that it's still early days. Our Supplemental Documents package includes the KNN release. [LINK]

Twitter: Thank you for getting me to 10,000 followers

@Energy_Tidbits on Twitter

In January, I went over 10,000 followers on Twitter/X. I really appreciate the support and, more importantly, some excellent insights and items to look at from Twitter followers. It helps me do a better job. For new followers to our Twitter, we are trying to tweet on breaking news or early views on energy items, most of which are followed up in detail in the Energy Tidbits memo or in separate blogs. Our Twitter handle is @Energy_Tidbits and can be followed at [LINK]. We wanted to use Energy Tidbits in our name since I have been writing Energy Tidbits memos for over 20 consecutive years. Please take a look thru our tweets and you can see we aren't just retweeting other tweets. Rather we are trying to use Twitter for early views on energy items. Our Supplemental Documents package includes our tweets this week.

LinkedIn: Look for quick energy items from me on LinkedIn

Look for energy items on LinkedIn

I can also be reached on Linkedin and plan to use it as another forum to pass on energy items in addition to our weekly Energy Tidbits memo and our blogs that are posted on the SAF Energy website [LINK].

Misc Facts and Figures.

During our weekly review of items for Energy Tidbits, we come across a number of miscellaneous facts and figures that are more general in nature and often comment on sports.

Big day for KFC today as it's Mother's Day

Today is going to be a huge day for restaurants as it's Mother's Day. And apparently some things haven't changed in the last 60 years – it's supposed to be very big day for KFC or Kentucky Fried Chicken as it was then known. In the 60s, the line-ups used to be huge for KFC at least in Toronto. People went to church on Sunday morning and then Dad drove right over to KFC to get the bucket, cold slaw and fries to take home so Mom didn't have to cook. In those days, the KFC we would go to on Sheppard Ave, west of Birchmount and the question was whose church service/mass would be out first to beat the line-up. The Holy Spirit church was right beside the KFC, but the Know United Church services tended be shorter than the mass at Holy Spirit.

Northern Lights over Canmore, Alberta on Friday night

There were many great pictures of the Northern Lights over the last two nights from around the world. Yesterday, I tweeted a picture our neighbours in Canmore, Alberta, Deb and Tim, took late Friday night.

Figure 71: Northern Lights over Canmore Alberta on Friday night

Source: Deb & Tim

Taylor Pendrith got his first PGA win last Sunday

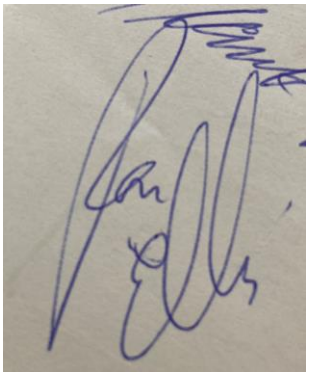
It was a good last Sunday afternoon watching Taylor Pendrith (born in Richmond Hill, just north of Toronto) get his 1st PGA win at the CJ Cup Byron Nelson pocketing $1.71 million. Pendrith is playing well this weekend at the Wells Fargo Championship where he is T6 at -4. Normally T6 would have a good shot but normally T6 is closer to the leader. Pendrith is 8 shots behind lader, Xander

Schauffele and 7 shots behind 2nd places Rory McIlroy. Those two are making it seem like a two-man race today.

Ron Ellis, long time Toronto Maple Leaf, passed away

Long-time Torono Maple Leaf Ron Ellis passed away yesterday at the age of 79. Ellis played over 1,000 games, all with the Leafs in the 60s and 70s. Like any kid growing up in Toronto, all of the Leafs were our hockey heros. But hockey fans from the 70s remember him most for playing on Team Canada in the 1972 summit series against Russia. Ellis was a right winger and played on the line with Flyers Bobby Clarke as center and his Leafs teammate Paul Henderson on the left wing. This was the checking line and Ellis's main job was to shut down Valery Kharlmaov. Ellis and Clarke weren't on the ice for the famous Henderson winning goal with 34 seconds left in game 8. Everyone remembers it was a line change. Henderson was on the bench and yelled at Peter Mahovlich to change, he did, and Henderson came flying off the bench on a line change so Phil Esposito and Yvan Cournoyer were still on the ice instead of Clarke and Ellis. Below is Ron Ellis autograph from 1967.

Figure 72: Ron Ellis autograph with Toronto Maple Leafs 1967



Source: SAF Group