

Energy Tidbits

May 14, 2023

Produced by: Dan Tsubouchi

Norway: "We Must Further Develop Our Petroleum Sector"

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. Our 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 our review of investor days, conferences and earnings calls focusing on sector developments that are relevant to the sector. Our target is to write on 48 to 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. Norway's revised budget release says, "we must further develop our petroleum sector" to fund social costs for "current and future generations" ([Click Here](#))
2. EIA continues to forecast strong +3 bcf/d YoY increase in US natural gas production ([Click Here](#))
3. OPEC's MOMR didn't change its demand/supply outlook but noted lower oil + product stocks relative to the 2015-2019 average ([Click Here](#))
4. Saudi Aramco still pushing for Blue Hydrogen but high \$250/boe cost is holding up long term buyer commitments. ([Click Here](#))
5. Warren Buffett warns that the US is far behind where it needs to be on adding transmission for the energy transition. ([Click Here](#))
6. Happy Mother's Day to all the great moms out there!
7. 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.
8. 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 [\[LINK\]](#).

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Natural Gas – +78 bcf build in US gas storage; now 509 bcf YoY surplus

It's May so it's the normal natural gas injection season absent some unusual event. For the week of May 5, the EIA reported a +78 bcf build (on par with the expectations of a 78 bcf build), compared to the +76 bcf build reported for the week of May 5 last year. This is a slight increase from last week's build of +54 bcf, and the 5-year average build of +43 bcf. Total storage is now 2.141 tcf, representing a surplus of +509 bcf YoY compared to a surplus of +507 bcf last week and is +332 bcf above the 5-year average vs +341 bcf above last week. Below is the EIA's storage table from its Weekly Natural Gas Storage Report [\[LINK\]](#).

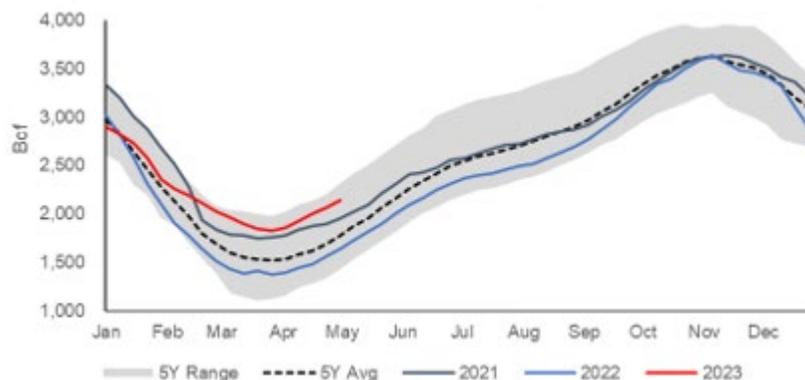
**US gas storage
509 bcf YoY
surplus**

Figure 1: US Natural Gas Storage

Region	Stocks billion cubic feet (Bcf)				Year ago (05/05/22)		5-year average (2018-22)	
	05/05/23	04/28/23	net change	implied flow	Bcf	% change	Bcf	% change
East	422	410	12	12	271	55.7	322	31.1
Midwest	497	481	16	16	339	46.6	379	31.1
Mountain	104	95	9	9	95	9.5	102	2.0
Pacific	114	100	14	14	182	-37.4	202	-43.6
South Central	1,002	977	25	25	745	34.5	803	24.8
Salt	287	278	9	9	240	19.6	257	11.7
Nonsalt	715	699	16	16	504	41.9	546	31.0
Total	2,141	2,063	78	78	1,632	31.2	1,809	18.4

Source: EIA

Figure 2: US Natural Gas Storage



Source: EIA, SAF

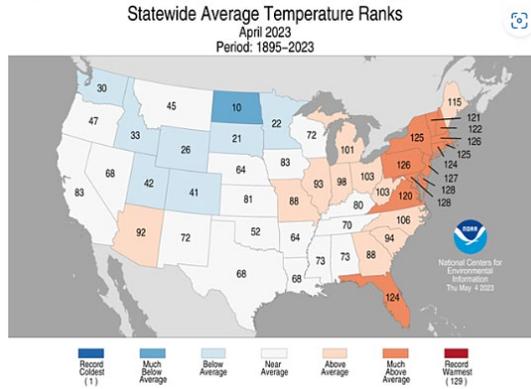
Natural Gas – NOAA April was very warm, for April, in the populous east

On Monday, NOAA posted its National Climate Recap for April [\[LINK\]](#). April is the start of shoulder season for natural gas. As a general rule, there isn't really any significant weather driven demand for natural gas unless its really cold to start the month. And if its warmer than normal, it isn't enough to drive a big air conditioning demand. On a national basis, NOAA ranked April 2023 as the 67th coldest in the last 129 years so basically right in the middle. It was very warm in the populous east but, again, that isn't hot enough to drive a big air conditioning demand push. Below is NOAA's by state ranking for April temperatures.

**April was very
warm in the east**

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Figure 3: NOAA Statewide Average Temperature Ranks – April 2023



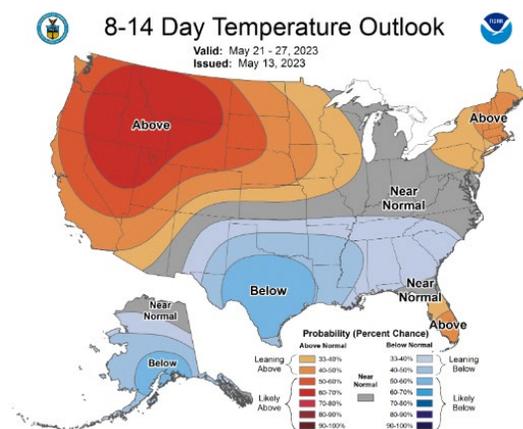
Source: NOAA

Natural Gas – NOAA 8-14 day temperature outlook is no major weather driven demand

We are now into almost halfway thru May and soon to move into hotter summer temperatures. Sometimes there will be really hot temperatures in May that drive a good weather driven boost to natural gas demand. But there doesn't look to be that big boost in the current NOAA near term outlooks. NOAA posts daily an updated 6-10 day and 8-14 day temperature probability outlook. Yesterday, we tweeted [LINK](#) "Updated @NOAA 8-14 day temperature outlook for May 21-27. Doesn't look like big driver for #NatGas prices. It's May so a lot of the US will be leave the windows open weather & no A/C. Hot in NW & Plains, but normal & cooler than normal in most of the rest of the US. #OOTT." Yesterday's NOAA 8-14 day outlook [LINK](#) is valid for May 21-27, the 4th week of May, and calls for hot weather in the NW and Plains, normal to cooler temperatures thru the south and eastern half of the US. At this time of year, we don't see this forecast being a big driver of temperature driven natural gas demand.

NOAA 8-14 day outlook

Figure 4: NOAA 8-14 day temperature outlook May 14-20



Source: NOAA

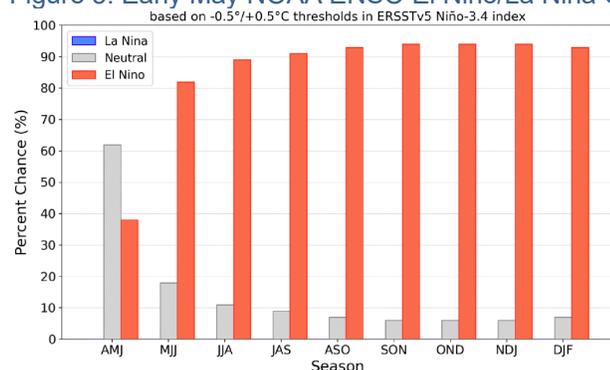
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La Nina/El Nino focus to turn to summer

Natural Gas – NOAA sees 90% probability for El Nino conditions this summer

On Thursday, NOAA posted the updated monthly El Nino/La Nina outlook, which is issued on the 2nd Thurs of every month [LINK](#). Now that it is spring, the El Nino/La Nina focus shifts to the summer and to hurricane season. Last month, the probability forecast was just above a 62% chance for El Nino conditions in the peak hurricane months of Aug/Sept/Oct. In contrast, this week’s outlook expects 90% chance of El Nino conditions in May and continuing thru hurricane season. Forecasts state that a third westerly wind event in mid to late May is likely to occur. Combined with an above average oceanic heat content, it strongly indicates that a potentially significant El Nino is within sight. NOAA writes, *“If the surface westerly wind anomalies fizzle out and do not continue to recur and intensify throughout the year (the interannual variability), then El Niño can similarly fail to get going. Unfortunately, we can only see this interannual wind variability after the year is over (and we are looking back at the previous year). In the midst of the spring/summer, we do not know whether these winds are random-random or are going-somewhere-random (they are considered mostly forecastable out to 7-10 days). Not ideal, we know.”* Again, weather is never 100% the same, but El Nino summers are normally associated with low Atlantic hurricane seasons, whereas neutral/La Nina conditions are more likely normal hurricane seasons. Below is the NOAA CPC ENSO Mar update.

Figure 5: Early May NOAA ENSO El Nino/La Nina Outlook



Source: CPC/IRI

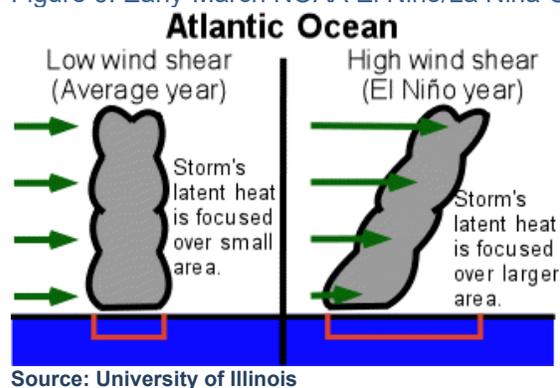
El Nino years tend to be low Atlantic hurricane years

Our prior Energy Tidbits over the years/decades noted that *“The hurricane forecasters note that warm El Nino years tend to have less hurricane activity in the Atlantic and Gulf of Mexico, but typically more hurricane activity in the Pacific. The primary explanation for the decline in hurricane frequency during El Niño years is due to the increased wind shear in the environment. It is commonly explained that “In El Niño years, the wind patterns are aligned in such a way that the vertical wind shear is increased over the Caribbean and Atlantic. The increased wind shear helps to prevent tropical disturbances from developing into hurricanes. In the eastern Pacific, the wind patterns are altered in such a way to reduce the wind shear in the atmosphere, contributing to more storms”.* This is the common explanation, and we

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referenced the University of Illinois's description because they also had a good simple graphic (see below). We double checked the link this week, and it is still active after more than a decade, the University of Illinois explanation is found at: [LINK](#)

Figure 6: Early-March NOAA El Niño/La Niña Outlook



Natural Gas – EIA forecasts US gas production +3.00 bcf/d YoY in 2023, +0.10 in 2024

Natural gas prices will continue to be pressured by strong US natural gas production growth. One of the big US natural gas stories last year was that US dry natural gas production was up approx. 3.5 bcf/d YoY in 2022. This growth was much more than expected going into 2022. US dry natural gas production is expected to continue to have another year of strong YoY growth in 2023 at +3.00 bcf/d YoY, and then basically flat in 2024. The EIA released its monthly Short Term Energy Outlook on Tuesday for May 2023 [LINK](#). (i) The EIA lowered its HH natural gas price expectations to \$2.91 in 2023 and increased the 2024 expectation to \$3.72 due the growth in stockpiles to above the 5-year average, following a warmer-than-normal winter and subsequent lower-than-normal consumption of natural gas. The EIA continues to expect US gas supply to increase in Q1/23 and is forecasting production of 102.1 bcf/d which is up from last month's estimate of ~101.6 bcf/d. The EIA May STEO left the 2022 US gas production forecast unchanged at 98.08 bcf/d which is up 3.59 bcf/d YoY from the 2021 exit of 94.5 bcf/d. (ii) US dry natural gas production is forecasted to average 101.10 bcf/d in 2023 (100.88 bcf/d previously), a +3.00 bcf/d increase YoY. (iii) The EIA lowered its 2024 forecast by -0.38 bcf/d to 101.20 bcf/d vs 101.58 bcf/d for the April STEO. But 2024 is still +0.10 bcf/d YoY. Our Supplemental Documents package includes excerpts from the STEO.

EIA US natural gas production forecast

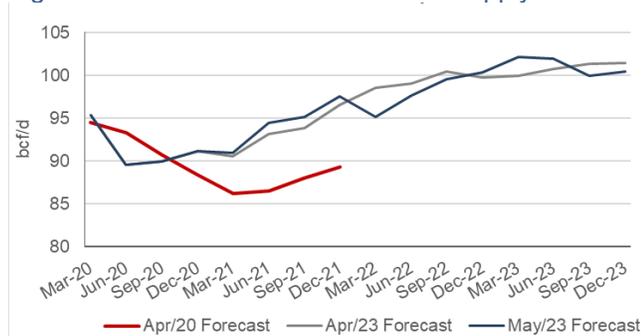
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Figure 7: EIA STEO US Natural Gas Supply Forecasts by Forecast Month

bcf/d	2021	Q1/22	Q2/22	Q3/22	Q4/22	2022	Q1/23	Q2/23	Q3/23	Q4/23	2023	Q1/24	Q2/24	Q3/24	Q4/24	2024
May-2023	94.51	95.10	97.60	99.50	100.30	98.10	102.10	101.90	99.90	100.40	101.10	100.70	101.10	101.40	101.80	101.20
Apr-2023	94.51	95.10	97.60	99.50	100.20	98.10	101.60	100.50	100.50	100.90	100.88	101.20	101.50	101.80	101.80	101.58
Mar-2023	94.51	95.10	97.60	99.50	100.20	98.08	100.96	100.21	100.56	100.96	100.67	101.37	101.40	101.96	102.04	101.69
Feb-2023	94.57	95.10	97.60	99.50	100.10	98.10	99.90	100.00	100.30	100.90	100.30	101.20	101.60	102.00	101.90	101.70
Jan-2023	94.57	95.10	97.59	99.44	99.87	98.02	100.82	99.87	100.08	100.62	100.34	101.12	101.75	102.72	103.57	102.29
Dec-2022	93.55	95.08	97.58	99.22	100.54	98.11	99.87	99.52	100.50	101.60	100.37					
Nov-2022	93.55	95.08	97.58	99.43	100.11	98.05	99.00	99.42	99.99	100.33	99.68					
Oct-2022	93.55	95.08	97.55	98.48	99.06	97.54	99.19	99.57	99.73	100.00	99.62					
Sep-2022	93.55	94.60	96.87	97.85	98.99	97.08	99.65	100.51	100.59	100.67	100.36					
Aug-2022	93.55	94.60	96.61	97.02	98.09	96.59	98.90	100.13	100.52	100.51	100.02					
Jul-2022	93.55	94.61	95.51	96.88	97.89	96.23	98.40	99.62	100.60	101.25	99.98					
Jun-2022	93.55	94.61	95.48	96.90	98.94	96.50	99.94	101.30	102.33	102.66	101.57					
May-2022	93.55	94.66	95.82	97.17	99.14	96.71	100.25	101.55	102.42	102.42	101.71					
Apr-2022	93.57	95.41	97.01	97.94	99.23	97.41	99.72	100.56	101.41	101.72	100.86					
Mar-2022	93.54	95.69	96.09	96.97	98.00	96.69	96.11	98.75	99.60	100.10	98.64					
Feb-2022	93.57	95.43	95.54	96.26	97.12	96.09	97.11	97.57	98.34	98.84	97.97					

Source: EIA STEO

Figure 8: EIA STEO US Natural Gas Supply Forecasts by Forecast Month



Source: EIA STEO

Natural Gas - EIA STEO forecasts Nov 1, 2023 storage at 3.76 tcf, +0.19 tcf YoY

The EIA STEO also forecasts US gas storage and to no surprise, the warmer than expected winter has led to a big increase in forecast US gas storage levels, but this month the EIA slightly lowered its storage estimate for Nov 1 to 3.76 tcf. In the May STEO [\[LINK\]](#), the EIA uses a slightly higher end of winter Apr 1, 2023 starting point of 1.93 tcf (vs the EIA reported 1.86 tcf). The 1.86 tcf actual storage on Apr 1, 2023 is +32% YoY vs Apr 1, 2022. For winter 2023/24, the EIA now forecasts Nov 1, 2023 storage at 3.76 tcf, which is +5.4% YoY or +0.19 tcf YoY. In addition, Nov 1, 2024, storage is forecasted to be 3.96 tcf, up +0.20 tcf YoY and down -0.04 tcf from the Apr STEO. The EIA commented, “We forecast inventories will increase by almost 300 Bcf from the end of April through the end of October, placing inventories at 2% more than the five-year average at the end of the injection season.”

EIA STEO storage forecast

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Figure 9: EIA STEO forecast US working gas storage

	Storage Level	2016-2024 (billion cubic feet)				
		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	4,012.7	776.4	3,624.5	10.7%
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	4,012.7	776.4	3,624.5	5.3%
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	4,012.7	776.4	3,624.5	-10.7%
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	4,012.7	776.4	3,624.5	3.8%
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	4,012.7	776.4	3,624.5	8.4%
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	4,012.7	776.4	3,624.5	1.1%
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	4,012.7	776.4	3,624.5	-1.5%
Mar 2023	1,856.7	1,184.9	2,486.3	1,301.4	1,835.6	1.2%
Oct 2023	3,762.1	3,236.3	4,012.7	776.4	3,624.5	3.8%
Mar 2024	1,728.3	1,184.9	2,486.3	1,301.4	1,835.6	-5.8%
Oct 2024	3,963.0	3,236.3	4,012.7	776.4	3,624.5	9.3%

Source: EIA STEO

Natural Gas – Is TC Energy saying, but not saying a minor delay in Coastal GasLink?

On Tuesday, TC Energy issued a press release “*Coastal GasLink proactively pauses construction work in Section 3 ahead of stop work orders issued by B.C. EAO*” [\[LINK\]](#). (i) The purpose of the press release was on this Section 3 pause. TC Energy wrote “*Third-party experts engaged to assess additional erosion and sediment control procedures to enhance effectiveness during accelerated spring melt Coastal GasLink has received stop work orders from the B.C. Environmental Assessment Office (EAO) on an approximately 20-km stretch of the project route in Section 3, near the Anzac River, North of Prince George, B.C. Two weeks prior to the latest orders being issued, we halted the majority of construction in the area, so that we could enhance our erosion and sediment control measures during this challenging Spring melt season.*” (ii) Whenever we see project updates on a project like Coastal GasLink that has had major cost overruns, timing delays and partner disputes, we like to see if there are any changes to what they say. We believe big companies don’t change items like construction completion unless there is a change. (iii) We compared TC Energy’s May 9 release vs their Q1/23 release on Apr 28. On Tuesday, we tweeted [\[LINK\]](#) “*Is #TCEnergy saying, but not saying, a minor delay in #CoastalGasLink? Today, pause construction in Sec 3, “We continue to be on track to complete construction by the end of 2023”. 04/28. “we continue to target mechanical completion in late 2023.” “complete construction” sounds later vs “mechanical completion”. #LNGCanada*”. TC Energy has been specific to include “mechanical” when it talks about construction being complete and we believe that is a more advanced stage than just completing “construction”. As our tweet noted, we think this would only be a minor delay. But it gets back to our view that big companies on big projects that have faced delays/cost overruns/disputes are careful in what they say about the project. Our Supplemental Documents package includes TC Energy’s May 9 release and the excerpt from the Q1 on April 28.

TC Energy on Coastal GasLink

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Are big companies careful on their writing on projects with history?

We are big fans of Twitter and appreciate the information and views, as well as the support for our views. And we don't go out of our way to block people who disagree with our views. In particular, there have been a number of comments that point to better data or information. We try to use Twitter for information, data, and views. But we weren't surprised to see a response to our tweet on potential delays to Coastal GasLink saying *"Your content is better when you cover things in a positive light for the sector as there are enough 'Within-industry' Debbie Downers/negative Normans around. You're better :)"* And we have learned that the last thing we want to waste time on is getting into Twitter debates with Twitter accounts that only want you to write what they want to see. There is no question we are big fans of LNG Canada and were the first by several months or more to predict Shell was going to FID LNG Canada Phase 1. And we are big believers that LNG Canada 1.8 bcf/d Phase 1 is a material positive for western Canada natural gas. But we also believe it is important that we not ignore items that have any sort of negative connotation, even if minor. And especially so in the case of a project like Coastal GasLink that has had major project cost overruns and partner disputes. So keeping Warren Buffett's advice in mind, we didn't send a reply until the next day and wrote *"it's worth considering the option that a large company is careful about what they write about a project that has had significant cost overrun & partner dispute. And i don't mind being a Debbie Downer/Negative Norman by always considering that option."* The project will get done and we put in our tweet the potential risk we see is of a "minor delay".

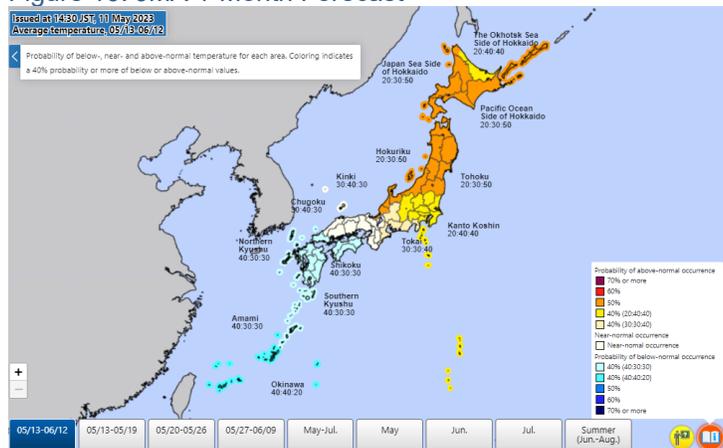
Natural Gas – No real weather natural gas demand expected in May in Japan

It looks like there won't be any significant weather driven natural gas demand in May in Japan. Every Thursday, the Japan Meteorological Agency updates its 30-day outlook [\[LINK\]](#) and its May 11 update calls for normal to cooler than normal temperatures in the south half of Japan and warmer than normal temperatures in the less populous northern half of Japan. We checked AccuWeather's daily temperature forecast for Tokyo for the next few weeks and there were two days with 28C high, but all the rest had daily highs below 25C. Basically not temperatures that will drive a lot of weather-related demand for natural gas. Rather its what we call leave the windows open weather. Below is the JMA's temperature probability forecast for May 13 to June 12.

Japan's 30-day
temperature
forecast

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Figure 10: JMA 1-Month Forecast

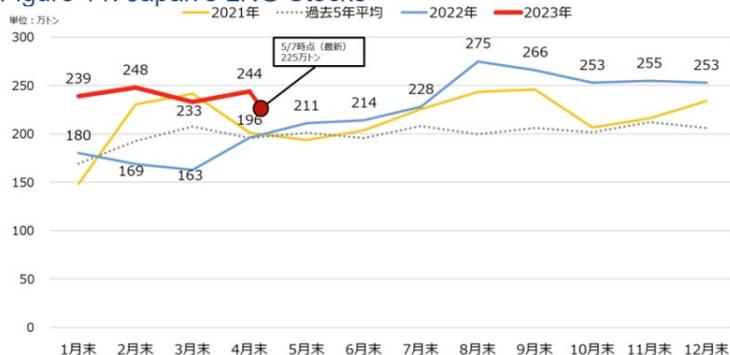


Source: Japan Meteorological Agency

Natural Gas – Japan’s LNG stocks down -7.8% WoW to ~108 bcf

Japan had a mild winter with a hot March to end winter, so it was able to escape any weather-driven LNG shortages. It’s shoulder season now so there aren’t any expectations of strong weather-related natural gas demand. LNG stockpiles held by Japanese power producers continue to exceed both last year’s level and the seasonal average. Japan’s METI weekly LNG stocks data was released on Wednesday [\[LINK\]](#). LNG stocks on May 7 were 108.1 bcf and down -7.8% WoW from Apr 30 of 117.2 bcf and well above the 5-year average of 93.7 bcf. Below is the LNG stocks graph from the METI weekly report.

Figure 11: Japan’s LNG Stocks



Source: METI

Natural Gas – China LNG vs natural gas via pipelines vs coal fundamentals

On Friday, we tweeted [\[LINK\]](#) “Reminders from @BloombergNEF on China #LNG vs #NatGas Vs #Coal fundamentals. Pipeline gas is cheaper than LNG & doesn’t have same price spikes. Even in big 2022 LNG price spike, gas pipeline supply capacity limits substitution. Coal power is way cheaper than LNG power. #OOTT.” BloombergNEF posted its China Gas Quarterly on Friday and we thought the graphs/tables provided some good

China LNG, natural gas & coal fundamentals

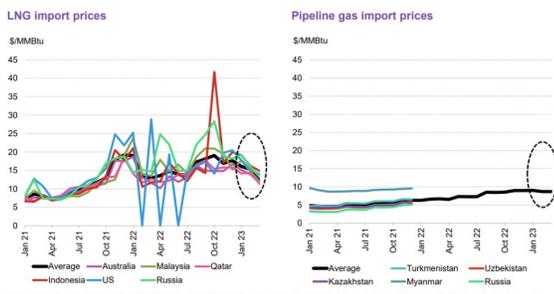
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reminders on China's natural gas fundamentals. (i) Their “Gas prices by source” graphs show LNG import prices and pipeline gas import prices, which remind that pipeline natural gas imports are cheaper and don't have the same prices spikes as LNG prices. (ii) Their “Power sector fuel comparison” graph show the marginal costs of power generation by spot LNG, contracted gas proxy, spot coal and contracted coal proxy. The graph reinforces that coal power is way cheaper than LNG/gas power. (iii) Their “China's natural gas import dynamics” have separate graphs that show LNG imports breakdown and share of total imports, and pipeline imports breakdown and share of total imports. It reminds that LNG imports can only drop so much in the huge 2022 LNG prices spikes due to limits in natural gas pipeline import capacity. Below are the three graphs attached to our tweet.

Figure 12: China gas prices by source

Gas prices by source

Qatari LNG was cheapest on average among all LNG supply sources in 1Q



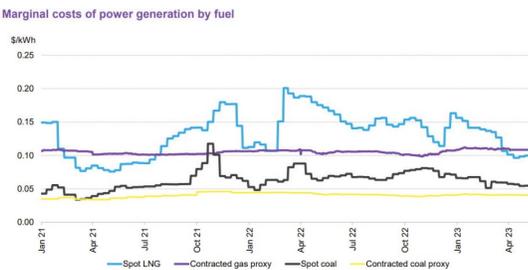
Source: China Customs, Bloomberg's LINE «GO», BloombergNEF. Note: Prices calculated by dividing total import value by total volume. Pipeline import prices by country were not updated since 2022 by China Customs. BloombergNEF

Source: BloombergNEF

Figure 13: China power sector fuel comparison

Power sector fuel comparison

Marginal generation cost for spot LNG fell below contracted volumes by the end of March



Source: National Bureau of Statistics (NBS), company websites, BloombergNEF. Note: Market prices of coal and LNG are from NBS reports published every 10 days and are taken as proxies of spot prices (spot LNG). Spot coal price is of Chinese mixed coal of 5,000 kilocalories per kilogram. National average of gas prices for non-residential users is taken as a proxy of contracted gas price. China Coal Transportation and Distribution Association's long-term contracts' prices are taken as proxies for contracted coal prices. BloombergNEF

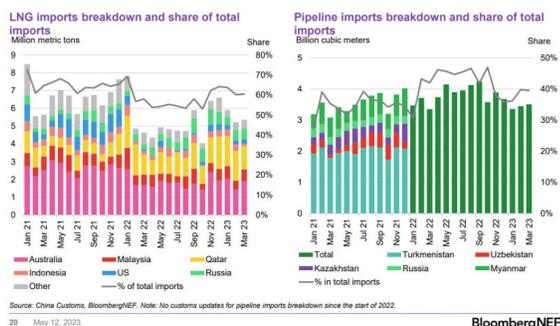
Source: BloombergNEF

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Figure 14: China's natural gas import dynamics

China's natural gas import dynamics

Share of LNG fell over 1Q 2023, while pipeline share increased



Source: BloombergNEF

Natural Gas – China's YTD natural gas imports down -0.3% YoY in April

No one should have been surprised to see China natural gas imports down YoY in Jan/Feb with the mild weather, increasing domestic natural gas production, earlier Lunar New Year, etc. China's natural gas import data reflects the cumulative YTD import volumes up to April with YoY comparisons to using YTD total imports for the same 3-month period last year. On Monday, Bloomberg reported on China's preliminary import data for Apr that was posted on the General Administration of Customs website. Bloomberg reported "[China] Natural Gas imports in April 8977m tons; Natural gas imports YTD fell 0.3% y/y to 35.687m tons". Natural gas imports for Apr totalled 8.977m MT (~14.37 bcf/d) bringing total YTD imports to 35.687m MT (~57.13 bcf/d) which is down -0.3% compared to the same 3-month period last year. One of the reasons for the continued so so performance of natural gas imports is coal. As noted above, coal power generation continues to be significantly cheaper than LNG power generation. Bloomberg did not provide the split of thermal vs coking coal, but did note that YTD April 30 coal imports were +88.8% YoY. We don't have the split of natural gas imports between pipeline imports vs LNG imports so we can't provide the bcf/d conversions. We typically use bp's conversion factors, which are 1 million tonnes of natural gas = 41.071 bcf, and 1 million tonnes LNG = 48.028 bcf. Our Supplemental Documents package includes the Bloomberg report.

Natural Gas – Forecast a hot summer in Europe but not as hot as summer 2022

Europe can expect higher than usual temperatures this summer with the most recent Copernicus forecast. The Copernicus forecast are widely used in Europe as the Copernicus Climate Change Service is "is one of six thematic information services provided by the Copernicus Earth Observation Programme of the European Union." On Wednesday, Copernicus posted their monthly seasonal forecast for the summer in Europe [\[LINK\]](#). On Wednesday we tweeted [\[LINK\]](#) "#NatGas #LNG markets hoping the new @CopernicusECMWF summer Europe forecast for a hot summer is right. #OOTT". Copernicus wrote "For temperature, the signal is for above-average seasonal values virtually across all land areas, strongest over southern and western Europe. Both the ensemble-mean anomalies and the probabilities are lower than in the May 2022 forecast for last year's European summer, in most regions." The summer refers to June/Jul/Aug, and Copernicus is

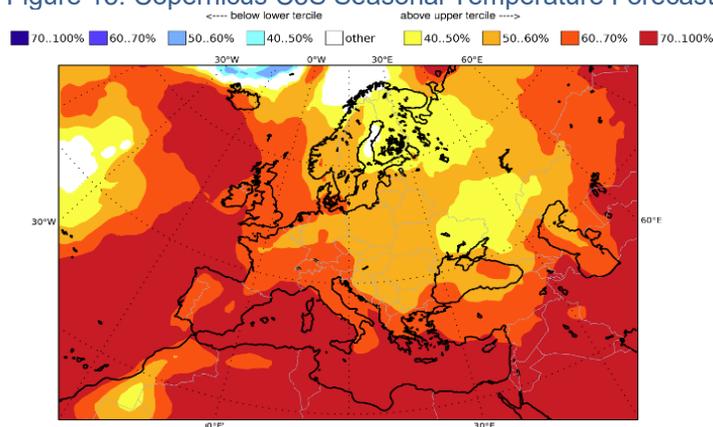
China natural gas imports

Forecast for Hot summer in Europe

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highlighting this summer is expected to hot but not as hot as last summer. Our Supplemental Documents package includes an excerpt from the Copernicus forecast.

Figure 15: Copernicus C3S Seasonal Temperature Forecast for Jun/Jul/AUG



Source: Copernicus

Summer 2023 was record heat in Europe

The Copernicus new summer forecast expects a hot summer 2023 but not as hot as last summer, which was record heat. Here is what we wrote in our Sept 11, 2022 Energy Tidbits memo. *“It was record heat this summer in Europe. We have spoken to several people who traveled to the continent this summer and they all noted the high temperatures but also how their hotels had their A/C at much higher levels than normal and not just in the public areas. The problem is that they all stayed in bigger hotels that have central control of A/C so they couldn’t set their rooms to lower temperatures. On Thursday, Copernicus Climate Change Services reported [\[LINK\]](#) “Summer 2022 Europe’s hottest on record” and “The average temperature over Europe in 2022 was: • the highest on record for both August and summer (June – August) by substantial margins of 0.8°C over 2018 for August and 0.4°C over 2021 for summer”. Our Supplemental Documents package includes the Copernicus recap.”*

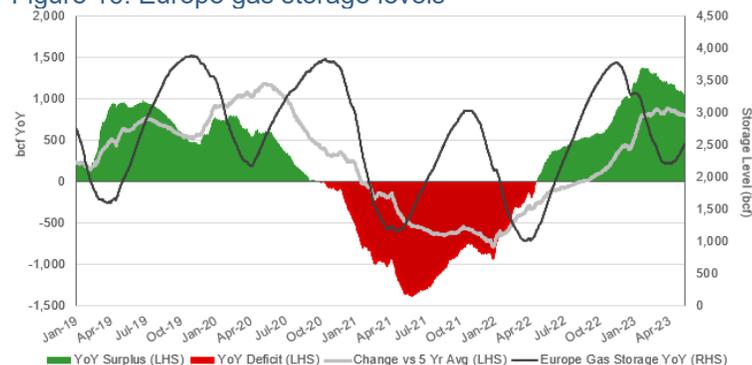
Natural Gas – Europe storage is now +18.90% vs 5-yr average, +24.63% YoY

The big global natural gas story for Q1/23 was how mild winters in Europe and Asia were the key reason why Europe made it through winter without a natural gas shortage. There was negligible weather driven demand for natural gas, along with the continued industrial demand destruction, meant storage levels are at still at high levels. However, we are seeing a narrowing of the Europe gas storage surplus with the lower European natural gas prices and how the strikes in France reduced LNG imports in April. This winter (Nov 1/22) began with gas storage at 94.94% capacity, up 17.86% YoY and is now a YoY surplus of 26.42%. However, average temps continued to get warmer this past week resulting in storage increasing by +1.94% WoW to 62.68% on May 11. Storage is now +24.63% greater than last year levels of 38.05 % and is +18.94% above the 5-year average of 43.78%. In addition,

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current storage is currently within the 5-year range, albeit at the top end of the range. Below is our graph of Europe Gas Storage Level.

Figure 16: Europe gas storage levels



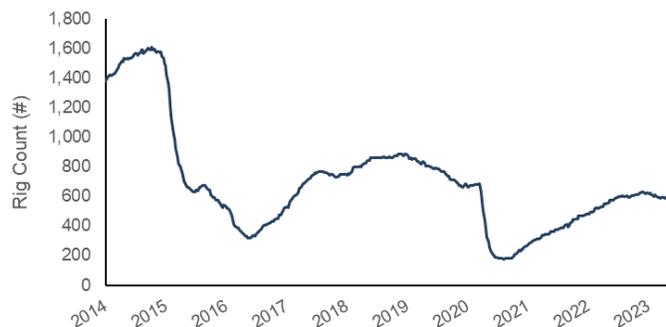
Source: Bloomberg

Oil – US oil rigs -2 WoW at 586 oil rigs on May 12, US gas rigs -16 WoW

Baker Hughes released its weekly North American drilling activity data on Friday. This week total US oil rigs were down -2 rigs WoW as of May 12. The total US oil rig count is now at 586 rigs, +23 rigs YoY, +105 from the 2022 low of 481 rigs in January and +414 since the 2020 low of 172 rigs on Aug 14. Notably, on a per basin basis the Permian was down -2 rigs to 350. Williston and Cana Woodford rig counts both declined this week by -1 rigs to 38 and -2 rigs to 24, respectively. Note it looks like US gas rigs are starting to feel the effects of the low \$2 Henry Hub and were down -16 rigs WoW to a total of 141 rigs. Notable gas rig declines were Haynesville down -5 rigs to 57 total gas rigs and Eagle Ford down -4 rigs to 2 rigs. US gas rigs have decreased -8 rigs YoY. Below is our graph of total US oil rigs.

US oil rigs down WoW

Figure 17: Baker Hughes Total US Oil Rigs



Source: Baker Hughes

Oil – Total Cdn rigs up +1 WoW to 94 total rigs, but wildfires could see rigs go down

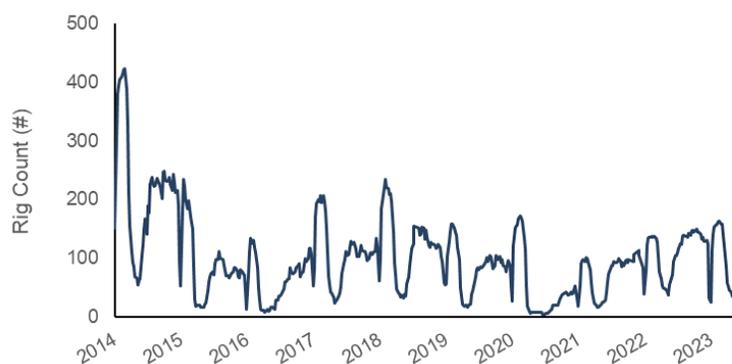
Cdn drilling is now in what is the normal yearly trough when rigs start to increase from early May thru to Xmas. Traditionally, Cdn rigs hit their trough the last week of April or first week of

Cdn total rigs up WoW

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May. And it looks, at least for now, that happened this year as there was a +1 WoW increase for the week ended May 12. Last week, we warned that we could see rigs being reduced because of the impact of the many Alberta wildfires so we were a little surprised that it didn't seem to have an impact on rigs. But we still won't be surprised to see the wildfires lead to some rig reductions. Total Cdn rigs were up +1 rig WoW at 94 rigs as of May 12. Notably, the week of May 12 saw a +1 rig increase in AB, while BC stayed flat through the wildfires. Newfoundland saw a +1 rig increase to 2, and Saskatchewan decreased -1 rig to 1. There are now a total of 94 active rigs, +43 rigs vs the comparable Covid period of 51 rigs on Apr 30, 2021. Cdn oil rigs were up +3 WoW to 37, while Cdn gas rigs decreased -2 to 57 rigs. Cdn oil rigs are now flat YoY compared to 37 rigs last year, while gas rigs are +6 YoY from 51 rigs. Below is our graph of total Cdn oil rigs.

Figure 18: Baker Hughes Total Canadian Oil Rigs



Source: Baker Hughes

Oil - US weekly oil production unchanged WoW at 12.3 mmb/d

We shouldn't be surprised to see the EIA weekly oil production estimates maintained higher this week at 12.3 mmb/d given how the EIA's "actuals" from their Form 914 data have been reporting US oil production higher than the weekly estimates. The EIA estimates US oil production remained unchanged WoW at 12.3 mmb/d for the week ended May 5 with the Lower 48 and Alaska flat at 11.9 mmb/d and 0.442 mmb/d respectively. US oil production, based on the weekly estimates, was mostly range bound in 2022 between 11.9 to 12.1 mmb/d since the 2nd week of May. But this year production broke above 12.1 mmb/d to 12.2 mmb/d for the week ended Jan 6, and has remained at or above 12.2 mmb/d ever since. The first time since it touched 12.2 mmb/d since the pandemic was the 1st week of August in 2022. Total US production reached its highest level since March 13, 2020, this year on Feb 3 at 12.3 mmb/d. US oil production is up +0.500 mmb/d YoY at 12.3 mmb/d but is still down significantly at -0.900 mmb/d since the 2020 peak of 13.1 mmb/d on March 13, 2020.

US oil production flat WoW

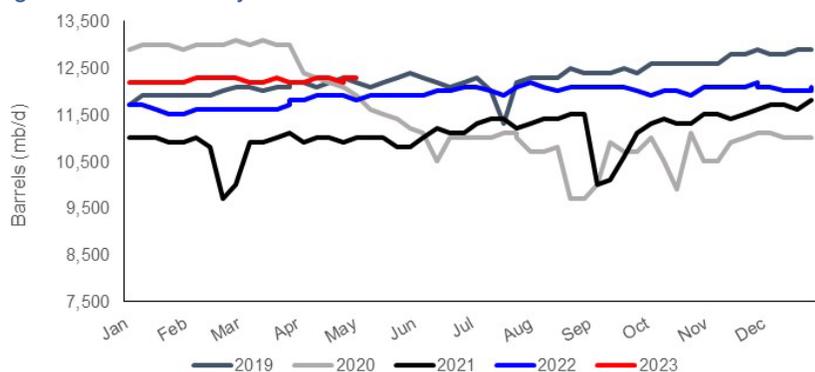
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Figure 19: EIA's Estimated Weekly US Oil Production

Year-Month	Week 1		Week 2		Week 3		Week 4		Week 5	
	End Date	Value								
2021-Jan	01/01	11,000	01/08	11,000	01/15	11,000	01/22	10,900	01/29	10,900
2021-Feb	02/05	11,000	02/12	10,800	02/19	9,700	02/26	10,000		
2021-Mar	03/05	10,900	03/12	10,900	03/19	11,000	03/26	11,100		
2021-Apr	04/02	10,900	04/09	11,000	04/16	11,000	04/23	10,900	04/30	10,900
2021-May	05/07	11,000	05/14	11,000	05/21	11,000	05/28	10,800		
2021-Jun	06/04	11,000	06/11	11,200	06/18	11,100	06/25	11,100		
2021-Jul	07/02	11,300	07/09	11,400	07/16	11,400	07/23	11,200	07/30	11,200
2021-Aug	08/06	11,300	08/13	11,400	08/20	11,400	08/27	11,500		
2021-Sep	09/03	10,000	09/10	10,100	09/17	10,600	09/24	11,100		
2021-Oct	10/01	11,300	10/08	11,400	10/15	11,300	10/22	11,300	10/29	11,500
2021-Nov	11/05	11,500	11/12	11,400	11/19	11,500	11/26	11,600		
2021-Dec	12/03	11,700	12/10	11,700	12/17	11,600	12/24	11,800	12/31	11,800
2022-Jan	01/07	11,700	01/14	11,700	01/21	11,600	01/28	11,500		
2022-Feb	02/04	11,600	02/11	11,600	02/18	11,600	02/25	11,600		
2022-Mar	03/04	11,600	03/11	11,600	03/18	11,600	03/25	11,700		
2022-Apr	04/01	11,800	04/08	11,800	04/15	11,900	04/22	11,900	04/29	11,900
2022-May	05/06	11,800	05/13	11,900	05/20	11,900	05/27	11,900		
2022-Jun	06/03	11,900	06/10	12,000	06/17	12,000	06/24	12,100		
2022-Jul	07/01	12,100	07/08	12,000	07/15	11,900	07/22	12,100	07/29	12,100
2022-Aug	08/05	12,200	08/12	12,100	08/19	12,000	08/26	12,100		
2022-Sep	09/02	12,100	09/09	12,100	09/16	12,100	09/23	12,000	09/30	12,000
2022-Oct	10/07	11,900	10/14	12,000	10/21	12,000	10/28	11,900		
2022-Nov	11/04	12,100	11/11	12,100	11/18	12,100	11/25	12,100		
2022-Dec	12/02	12,200	12/09	12,100	12/16	12,100	12/23	12,000	12/30	12,100
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								

Source: EIA

Figure 20: US Weekly Oil Production



Source: EIA

EIA's Form 914 "actuals" for Feb were +0.18 mmb/d vs weekly estimates

We remind that the EIA's actuals have been running higher than the weekly estimates. Here is what we wrote in our Apr 30, 2023 Energy Tidbits memo. "As a reminder there is a sizeable difference between what the EIA looks as "actuals" for US oil production vs the EIA's weekly estimates noted above. On Friday, we tweeted [LINK](#) "#EIA Form 914 actuals: US oil production stronger than many expect. Feb 23 was 12.483 mmb/d, +1.177 mmb/d YoY. 2nd highest since Covid, following revised up Jan 23 of 12.536 mmb/d. Note Feb actuals of 12.483 mmb/d are +0.18 mmb/d vs @EIAgov weekly estimates. #OOTT." On Friday, The EIA released its Form 914 data [LINK](#), which is the EIA's "actuals" for February US oil and natural gas

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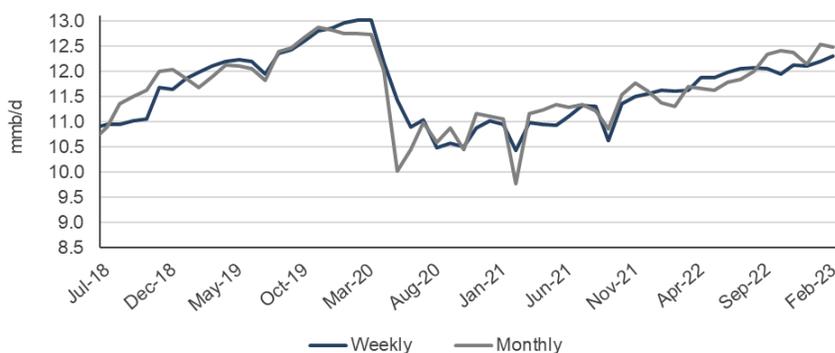
production. There were two key takeaways from the EIA's weekly US oil production data for Feb – the actuals were 183,000 b/d more than the weekly estimates, and Feb was the 2nd highest US oil production since Covid at +1.177 mmb/d YoY to 12.483 mmb/d vs. Jan's post-Covid peak of 12.536 mmb/d. Note that Jan's data was revised up by +74,000 b/d since the March Form 914 release. (i) Form 914 estimates that total US oil production saw a marginal decrease of -53,000 b/d MoM to 12.483 mmb/d in February. The actuals for February were 183,000 b/d higher than the EIA's weekly estimates that worked out to 12.300 mmb/d. January actuals were adjusted higher to 12.536 mmb/d and were 336,000 b/d higher than weekly estimates of 12.200 mmb. (ii) There was a slight MoM decrease of -0.053 mmb/d vs Jan of 12.536 mmb/d. Our Supplemental Documents package includes the New Mexico, Texas and offshore Gulf of Mexico tables attached to our tweet.

Figure 21: EIA Form 914 US Oil Production (thousand b/d)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2023	12,536	12,483										
2022	11,369	11,316	11,701	11,668	11,629	11,797	11,844	12,002	12,337	12,417	12,379	12,149
2021	11,124	9,925	11,326	11,305	11,356	11,356	11,347	11,277	10,918	11,569	11,790	11,634
2020	12,852	12,842	12,797	11,914	9,713	10,442	11,006	10,577	10,921	10,457	11,196	11,168
2019	11,869	11,673	11,913	12,149	12,154	12,218	11,902	12,486	12,590	12,809	13,000	12,978
2018	10,001	10,281	10,467	10,500	10,435	10,641	10,897	11,392	11,443	11,509	11,886	11,945
2017	8,875	9,110	9,166	9,101	9,185	9,111	9,247	9,250	9,517	9,669	10,085	9,983

Source: EIA

Figure 22: EIA Form 914 US Oil Production vs Weekly Estimate



Source: EIA

Oil – North Dakota Mar oil production down -3.1% MoM to 1.122 mmb/d

As expected, North Dakota oil production in March was down -3.1% MoM to 1.122 mmb/d, which was flat YoY with 1.123 mmb/d in March 2022. North Dakota warned in March that March oil production would be lower MoM. On Friday, the North Dakota Industrial Commission posted its Director's Cut, which includes March oil and natural gas production data [\[LINK\]](#). North Dakota Feb production was down -3.1% MoM to 1.122 mmb/d and is flat YoY from 1.123 mmb/d in March 2022. Estimated well completions were 96 in February, but then down to 62 in March and 51 in April. North Dakota did not comment specifically that the lower completions in April were due to weather, but we assume so as they expect weather to lead to lower MoM oil production in April. ally impacting May oil production. But, as noted

North Dakota oil production

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below, they expect April down MoM due to weather. Our Supplemental Documents package includes excerpts from the Director's Cut.

Figure 23: North Dakota Oil Production by Month

(b/d)	2017	2018	2019	2020	2021	2022	2022/21	2023	2023/22
Jan	981,380	1,179,564	1,403,808	1,430,511	1,147,377	1,088,613	-5.1%	1,060,708	-2.6%
Feb	1,034,248	1,175,316	1,335,591	1,451,681	1,083,554	1,089,091	0.5%	1,158,837	6.4%
Mar	1,025,690	1,162,134	1,391,760	1,430,107	1,108,906	1,122,640	1.2%	1,122,693	0.0%
Apr	1,050,476	1,225,391	1,392,485	1,221,019	1,123,166	900,597	-19.8%		
May	1,040,995	1,246,355	1,394,648	859,362	1,128,042	1,059,060	-6.1%		
June	1,032,873	1,227,320	1,425,230	893,591	1,133,498	1,096,783	-3.2%		
July	1,048,099	1,269,290	1,445,934	1,042,081	1,076,594	1,072,632	-0.4%		
Aug	1,089,318	1,292,505	1,480,475	1,165,371	1,107,359	1,075,307	-2.9%		
Sept	1,107,345	1,359,282	1,443,980	1,223,107	1,114,020	1,121,063	0.6%		
Oct	1,183,810	1,392,369	1,517,936	1,231,048	1,111,910	1,121,754	0.9%		
Nov	1,194,920	1,375,803	1,519,037	1,227,138	1,158,622	1,098,389	-5.2%		
Dec	1,182,836	1,402,741	1,476,777	1,191,429	1,144,999	957,864	-16.3%		

Source NDIC, NDPA

North Dakota warned on lower March oil production

As noted above, in March North Dakota warned that March oil production would be down vs February. Here is what we wrote in our March 19, 2023 Energy Tidbits memo. *"We used to reference the local reporting on the monthly North Dakota press conference on the monthly Director's Cut for the local reporters insights but those webcasts are now posted so we just listen to the 30 min webcasts. There are always additional insights from the press conference and Q&A webcast [\[LINK\]](#). At 12:15 min mark Director Lynn Helms said "... and the last half of Jan and most of Feb pretty good weather. So like I said, we have about a 6% increase in oil production [in Jan], a little bit higher increase in gas production Looking forward into Feb, the gas number look very strong and so we're expected Feb production to see another major increase. Unfortunately with the weather last week and with what's coming this week, March looks like it could be a bit of a struggle. It looks comparable to last Aug and to Jan, above a million barrels a day. But we are seeing impacts from difficult transportation for crude oil. Still a significant amount of crude oil is trucked from well sites to the pipeline transportation system. And so that causes some problems." Then in the Q&A, he gave more color when asked about the weather impact right now. At 19:25 min mark, Helms said "we're already experiencing a downturn from Feb and that's the result of what happened last week. You saw the maps when there was no travel advised on any highway in the state of North Dakota, anywhere. So crude oil transportation really took a hit. We haven't really fully recovered from that and now we're looking at, at least the western and southern parts of the state, another 1 to 3 inches of snow tonight and tomorrow. Of course that's going to slow things again."*

North Dakota warns April oil production to be down MoM due to weather

Every month, North Dakota has a webcast press conference to present its monthly oil and gas production. We find there are always additional insights on North Dakota oil and gas. In Friday's press conference, at 9:00 min mark, North Dakota's Lynn Helms warned that April oil production would be down MoM. Helms said *"March was a pretty cold month, very cold, less snowfall. I'm anticipating that April will not look so good. As you know, we had major snowstorms in the month of April. We had some*

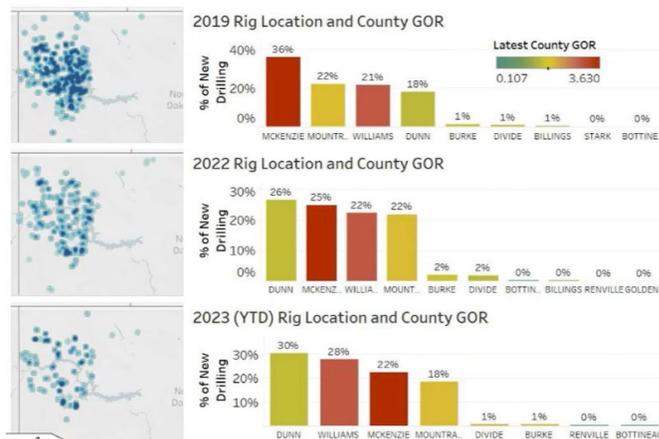
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days when we were really very severely impacted and so we'll see those March production numbers probably come down as we look at April numbers next month."

Gas/oil ratio temporarily decline due to moving drilling out of core

There was some good insight from North Dakota's Justin Kringstad in the Friday press conference including why the gas/oil ratio declined in the last half of 2022. Recall we have consistently said that the Bakken is like other shale/tight oil plays that produce associated natural gas and NGLs in that, over time, the gas/oil ratio always increases in a well as the well produces. That is the case in the Bakken, but Kringstad did a deeper dive as to why the Bakken gas/oil ratio went down in the last half of 2022 and he found it was because drilling had shifted outside of the core in 2022/2023 to more areas outside the historic core and these outside the core areas have wells that are less gassy. His below slide shows the 2019 locations were in the core, but how 2022 and 2023 move to outside the core. These wells have a lower gas/oil ratio to start and this is the flush high rate production period, but will, like other Bakken wells, get gassier over time. So Kringstad called it a temporary reprieve. Kringstad said *"so that is influencing the near-term gas/oil ratios we have been seeing. However, fundamentally, even the wells from Dunn county, Williams and every county you see here, those wells will get gassier over time and so we will continue to see that trend. What we've seen and experienced over the last 9-months was a blip. Not by accident, this is what happens when rigs move around. But fundamentally, over time, we will continue to see that gas/oil continue to increase"*.

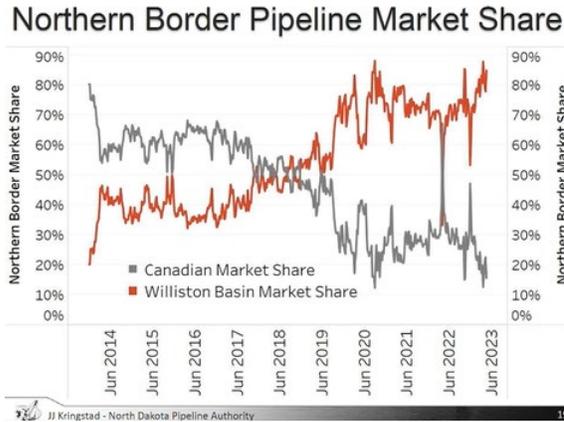
Figure 24: Bakken Near-term GOF influenced by drilling location
Near-term GOR Influenced by Drilling Location



Source: North Dakota Pipeline Authority

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Figure 25: Bakken Northern Border Pipeline Market Share

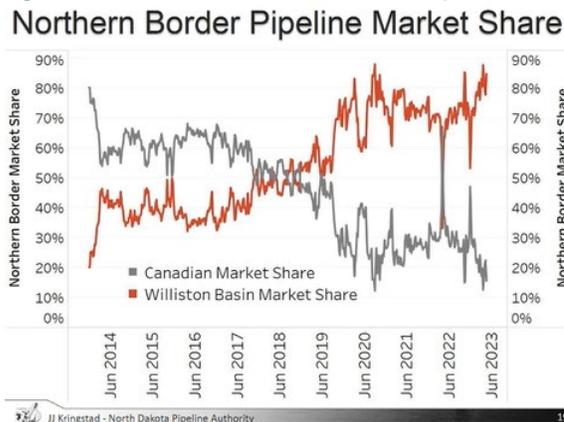


Source: North Dakota Pipeline Authority

More ethane extraction means Bakken natural gas exports are less liquids rich

Kringstad also highlighted a key benefit for exporting Bakken natural gas. There is more ethane extraction in North Dakota, which means that the exported Bakken natural gas is less hot and below the BTU threshold that causes potential issues meeting pipeline specs. So if Bakken gas is less hot/less liquids rich, it means that there is less of a need for drier Alberta gas to keep the total natural gas flows within pipeline specs. Kringstad provided the below graph as part of the explanation why Bakken gas has been about 80% of Northern Border flows over the past few weeks.

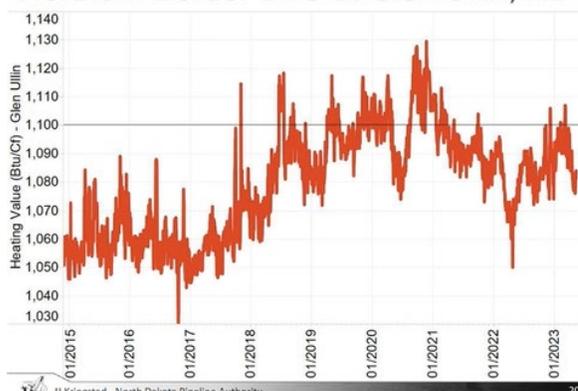
Figure 26: Bakken Northern Border Pipeline Market Share



Source: North Dakota Pipeline Authority

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Figure 27: Bakken Northern Border BTU at Glen Ullin, North Dakota
Northern Border BTU at Glen Ullin, ND



Source: North Dakota Pipeline Authority

Oil – North Dakota crude by rail down MoM to 77,699 b/d in March

The North Dakota Pipeline Authority posted its monthly update “April 2023 Production & Transportation” [LINK]. Please note that we always go to the backup excel sheets from the North Dakota Pipeline Authority for more detailed numbers of crude by rail out of North Dakota. The NDPA Monthly Update (graph below) report only provides rounded numbers, and these rounded numbers are not accurate enough to match the graphs. In the backup excel, the NDPA estimates crude by rail in March from a low of 62,669 b/d and a high of 92,669 b/d for an average of 77,669 b/d. This is below the Feb average of 95,615 b/d. Below is a chart from the NDPA monthly update showing the crude by rail volumes since 2014. Our Supplemental Documents package includes excerpts from the NDPA monthly update.

**North Dakota
CBR down MoM
in March**

Figure 28: Estimated North Dakota Rail Export Volumes



Source: North Dakota Pipeline Authority

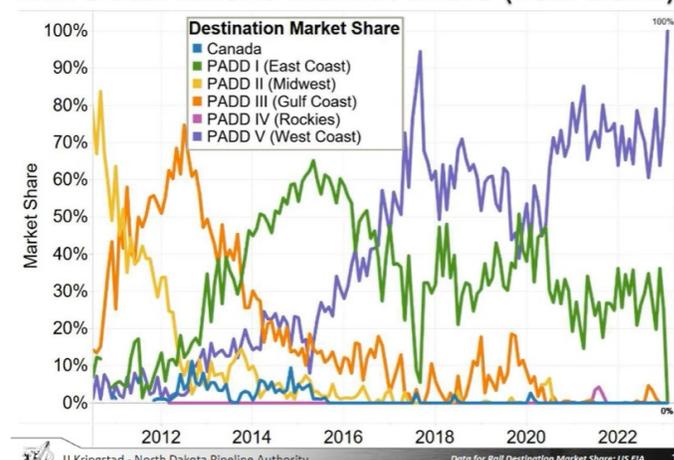
Gas/oil ratio temporarily decline due to moving drilling out of core

There was another good insight from North Dakota’s Justin Kringstad in the Friday press conference on Bakken crude-by-rail destinations in that time for the first time ever, 100% of Bakken crude-by-rail went to PADD 5 West Coast and none went to

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the PADD 1 East Coast. This is not the norm. Kringstad qualified that it is not uncommon for these numbers to get “refreshed” so the numbers change. And he did not know if that is a fundamental change.

Figure 29: Bakken Near-term GOF influenced by drilling location
Rail Destinations Market Share (Feb. 2023)



Oil - Immaterial change to EIA STEO 2023 oil production forecast

On Tuesday, the EIA posted its May Short-Term Energy Outlook [\[LINK\]](#). (i) The May STEO forecast for 2023 oil production is immaterially down vs the Apr STEO. The May STEO forecast is down 10,000 b/d to 12.53 mmb/d from Apr STEO of 12.54 mmb/d. There was no change to the Q4/23 exit or to Q1/23, while Q2/23 saw an increase off 10,000 b/d and Q3/23 saw a decrease of 40,000 b/d. (ii) The EIA revised its 2022 forecast to 11.89 mmb/d from 11.88 mmb/d in the April STEO. The growth was driven by a 10,000 b/d increase in Q4/22, while all other quarters remained the same. (iii) STEO 2023 average forecast is 12.53 mmb/d, which is up ~64,000 b/d YoY from 2022's exit production of 11.89 mmb/d. (iv) The EIA decreased its 2024 oil production forecast by -60,000 b/d to 12.69 mmb/d compared to 12.75 mmb/d in the April STEO, which is a YoY increase of +0.16 mmb/d.

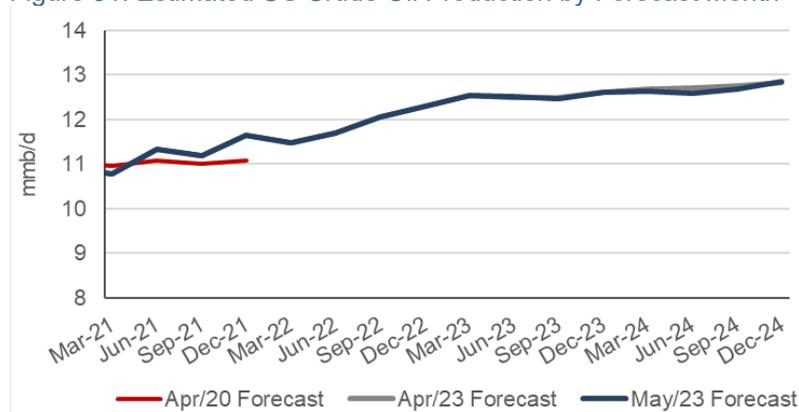
Immaterial
change to EIA
2023 oil
production
forecast

Figure 30: Estimated US Crude Oil Production by Forecast Month

(million b/d)	2021	Q1/22	Q2/22	Q3/22	Q4/22	2022	Q1/23	Q2/23	Q3/23	Q4/23	2023	Q1/24	Q2/24	Q3/24	Q4/24	2024
May-23	11.25	11.47	11.70	12.06	12.31	11.89	12.54	12.51	12.46	12.61	12.53	12.63	12.58	12.68	12.85	12.69
Apr-2023	11.24	11.47	11.70	12.06	12.30	11.88	12.54	12.50	12.50	12.61	12.54	12.69	12.71	12.77	12.83	12.75
Mar-2023	11.24	11.47	11.70	12.06	12.30	11.88	12.31	12.43	12.48	12.54	12.44	12.58	12.58	12.64	12.71	12.63
Feb-2023	11.25	11.47	11.70	12.06	12.36	11.90	12.44	12.46	12.49	12.56	12.49	12.63	12.62	12.65	12.70	12.65
Jan-2023	11.25	11.47	11.70	12.05	12.23	11.86	12.37	12.34	12.40	12.51	12.41	12.63	12.72	12.86	13.03	12.81
Dec-2022	11.25	11.46	11.70	12.03	12.29	11.87	12.24	12.24	12.34	12.51	12.33					
Nov-2022	11.25	11.46	11.70	11.99	12.15	11.82	12.22	12.24	12.32	12.48	12.31					
Oct-2022	11.25	11.46	11.70	11.83	11.99	11.74	12.27	12.29	12.36	12.50	12.35					
Sep-2022	11.25	11.47	11.70	11.81	12.16	11.79	12.42	12.55	12.70	12.87	12.63					
Aug-2022	11.25	11.46	11.69	12.01	12.28	11.86	12.39	12.50	12.82	13.10	12.70					
Jul-2022	11.19	11.46	11.75	12.08	12.34	11.91	12.45	12.58	12.87	13.17	12.77					
Jun-2022	11.19	11.45	11.71	12.08	12.43	11.92	12.64	12.82	13.07	13.33	12.97					
May-2022	11.19	11.42	11.78	12.07	12.35	11.91	12.56	12.71	12.94	13.18	12.85					
Apr-2022	11.19	11.52	11.90	12.15	12.46	12.01	12.73	12.88	13.02	13.17	12.95					
Mar-2022	11.18	11.59	11.89	12.15	12.48	12.03	12.75	12.91	13.06	13.24	12.99					
Feb-2022	11.20	11.67	11.86	12.06	12.27	11.97	12.46	12.54	12.63	12.75	12.60					

Source: EIA STEO

Figure 31: Estimated US Crude Oil Production by Forecast Month



Source: EIA STEO

Oil - Did Warren Buffett & Charlie Munger mean to throw so much shade on shale?

We were surprised by the Warren Buffett and Charlie Munger negative comments on shale considering their large position in Permian producer Occidental Petroleum at the Berkshire Hathaway annual meeting last Saturday. They were very negative on the high decline rate of shale and how tough the high decline rate makes it for US shale. We have to believe that, other than a blind Buffett follower, many listeners would have turned negative on shale after listening to Buffett and Munger. The other thing is that its Buffett so it typically means that, in this forum, the answers aren't short. So there wasn't much doubt on their concern on high decline rates for shale. On Tuesday, we tweeted [\[LINK\]](#) "Is this what #WarrenBuffett & #CharlieMunger wanted? Reason to not like #Shale? Huge initial production but 1 1/2 yrs, "it becomes practically nothing. "it really dies fast, those shale wells, if you like quick death in your wells, we have them for you", "it's not a long-term source".#OPEC loves it. Doubt about shale oil growth potential is a positive for #Oil in 2020s. See 🙌 SAF transcript." Here are a couple excerpts from the transcript we made of the Buffett and Munger comments on shale. Buffett "Well, in the Permian, this should sink in on you, in the first day, the first day when you bring in a well, it may be 12,000 barrels, it may be 15,000 barrels. It's dangerous. Occidental

Buffett & Munger throw shade on shale

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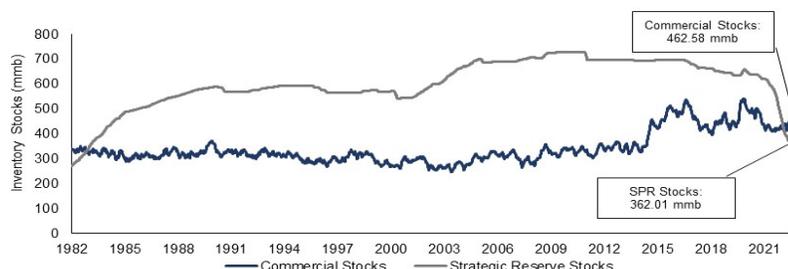
had one come in at 19,000 barrels or something like that. One day. And in a year, a year and a half, it becomes practically nothing. It's a different business." Munger "Yeah, it really dies fast, those shale wells. If you like quick death in your oil wells, we have them for you". Our Supplemental Documents package includes the transcript we made of the Buffett and Munger comments.

Oil - US SPR reserves now -100.57 mmb lower than commercial crude oil reserves

Oil in US Strategic Petroleum Reserves (SPR) continues to move below total US commercial crude oil reserves in the May 5 week for the first time since 1983, with the deficit widening this week due to the build in commercial oil stocks and a draw in the SPR. However, this week's data showed another SPR draw of -2.9 mmb compared to the -2.0 mmb draw last week and came after 10 consecutive weeks of no change up until the Jan 13 week. The EIA's weekly oil data for May 5 has SPR reserves at 362.01 mmb vs commercial crude oil reserves at 462.58 mmb. The last time the SPR was down at this level was on Oct 14, 1983, at 364.93 mmb. The below graphs highlight the difference between commercial and SPR stockpiles.

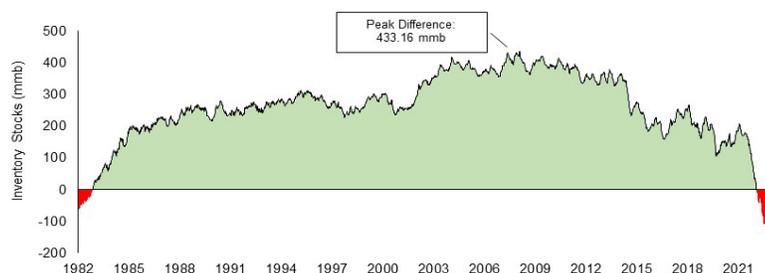
US SPR reserves

Figure 32: US Oil Inventories: Commercial & SPR



Source: EIA

Figure 33: US Oil Inventories: SPR less Commercial



Source: EIA

Oil – SPR now down 9.5 mmb of planned 26 mmb SPR draw ie. 16.5 mmb to go

We have been reminding that the US SPR was going 26 mmb lower. With the 2.9 mmb draw for the May 5 week, the recent SPR withdrawals are now up to 9.5 mmb, which means there is still another 16.5 mmb to go until the 26 mmb draw is reached. Here is what we wrote in our Feb 19, 2023 Energy Tidbits memo. "On Monday, Bloomberg reported "The Biden

SPR going 26 mmb lower

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administration plans to sell more crude oil from the Strategic Petroleum Reserve, fulfilling budget directives mandated years ago that it had sought to stop as oil prices have stabilized. The congressionally mandated sale will amount to 26 million barrels of crude, according to people familiar with the matter. The sale is in accordance with a budget mandate enacted in 2015 for the current fiscal year, said a spokesperson for the Department of Energy. The Energy Department has sought to stop some of the sales required by 2015 legislation so that it can refill the emergency reserve, which currently has about 371 million barrels. After this latest release, the reserve will dip to about 345 million." The last time the SPR was 345 mmb was in Aug 1983 at 345.7 mmb.

Oil – Sec Granholm in June, “will flip the switch and then seek to repurchase” for SPR

We were surprised to see the Reuters report on Thursday on Energy Secretary Granholm’s comments to a House committee on what the Biden Administration plans to do on repurchasing to fill the SPR. Granholm said that the 26 mmb sale, noted above, will be completed by June, which we think she meant in June. And then she was specific that they will then flip the switch and “seek to purchase” oil for the SPR. Granholm is an experienced politician so didn’t specifically say they will start to buy for the SPR in June, but that was the clear impression she wanted to leave with the House committee. On Thursday, we tweeted [\[LINK\]](#) “Hmmm! US to seek to purchase for #SPR in June says @SecGranholm “That congressionally mandated sale of 26 million barrels will be completed by June, and it’s at that point where we will flip the switch and then seek to purchase” reports @TimoGard #OOTT.” Our Supplemental Documents package includes the Reuters report. [\[LINK\]](#)

Granholm’s latest on SPR

Oil – Suncor’s oil sands maintenance to shut in more oil

It may not be huge by itself, but WCS-WTI are always helped when there is more oil sands production shut-in. Suncor’s updated oil sands maintenance schedule in its Q1/23 update that will see more shut-in oil production. It’s not huge, another 25,000 b/d in Q2, another 15,000 b/d in Q3 and another 20,000 b/d in Q4. So small relative to the impact of Alberta wildfires and the OPEC+ cuts, but a small help. On Tuesday, we tweeted [\[LINK\]](#) “#Suncor expanded upstream maintenance schedule shuts in more production. 4/22 planned, shuts in. Q2 40 kbd. Q3 115 kbd. Q4 75 kbd. Q1/23 planned, shuts in. Q2 65 kbd. Q3 130 kbd. Q4 95 kbd. WCS less WTI differentials narrowed \$0.60/b today. #OOTT.” Our Supplemental Documents package includes the Suncor oil sands maintenance per its Q4/22 update and Q1/23 update.

Suncor’s revised maintenance

Oil – Cdn oil differentials narrowed \$1.50 to close at \$12.85 on May 12

It’s not clear exactly what the formula for the factors driving the \$1.50/b narrowing of WCS less WTI differential this week but it was a good week as WCS less WTI differentials narrowed \$1.50/b to \$12.85/b. On the negative, we have been highlighting how Chevron’s start of Venezuela oil imports into PADD 3 Gulf Coast should have a negative impact on Cdn heavy/medium oil prices. The more Venezuela oil that reaches the Gulf Coast means less Cdn barrels are needed in the Gulf Coast. And we have noted three positives to help narrowing the differential: the voluntary OPEC+ cuts that started May 1, less Mexico crude oil into PADD 3 Gulf Coast with Mexico increasing its refinery runs, and the wildfires causing some oil interruptions. WCS less WTI differentials were \$14.15 on March 31, which was the Friday before the Sun Apr 2 reports that OPEC+ was going to cut. The WCS less WTI differential widened to \$15.40 on Apr 13, and then narrowed to \$14.65 on Apr 28, then to

WCS less WTI differentials

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\$14.15/b on May 5, and now \$12.85/b on May 12. For perspective, a year ago, the WCS-WTI differential was \$13.75 on May 12, 2022. And as noted below, WCS less WTI differentials normally begin to widen after early May, but it looks like the extraordinary factors (OPEC+ cuts and wildfires) are having an impact. Below is Bloomberg's current WCS-WTI differential as of May 5, 2023 close.

Figure 34: WCS less WTI oil differentials including May 12 close



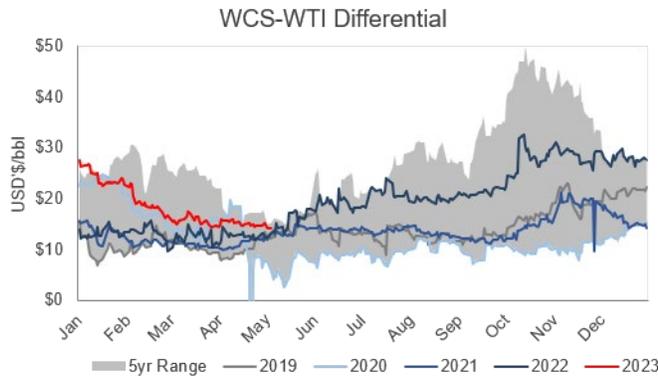
Source: Bloomberg

Oil – May is normally when Cdn heavy oil differentials are at their narrowest

As noted above, we are seeing the impact of extraordinary unplanned events that are impacting WCS less WTI differentials – the OPEC+ cuts and the wildfires impacting. Our prior comments on the normal WCS-WTI differentials pattern said there are always unplanned events that impact WCS-WTI differentials. However, special items aside, May is normally when Cdn heavy oil differentials are at their narrowest. In 2022, the narrowest for WCS-WTI differential was May 2, 2022 at \$12.50/b and increased to \$18.25/b by May 31. Cdn heavy oil differentials normally narrow in the Feb/Mar/Apr period as this is when refineries tend to maximize production of asphalt ahead of the annual summer paving season. As is said in Canada, there are two seasons in Canada – winter and paving season. Below is graph showing WCS-WTI differentials that shows this normal seasonal trend of narrowing WCS-WTI differentials from Feb thru April with the narrowest normally being in May ie. right now.

WCS differentials normally widen after early May

Figure 35: WCS less WTI oil differentials



Source: Bloomberg

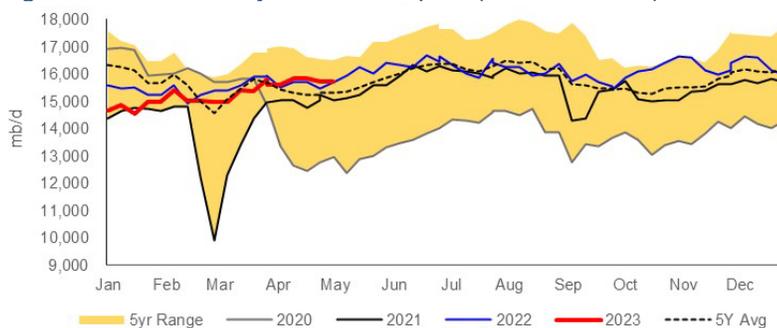
Source: Bloomberg

Oil - Refinery inputs up +0.010 mmb/d WoW to 15.745 mmb/d

Refinery crude oil inputs increased this week after being down last week. There are always unplanned refinery issues, and we remind Feb/early March is normally when we see refineries move into turnaround/maintenance i.e., crude oil inputs seasonally decline as refineries switch to produce more summer blend fuels. And normally, refineries come out of turnarounds in late March/early April to start their ramp up in refining of summer blend fuels. We are now at the end of the turnaround season and should begin to see refinery inputs begin to ramp up for peak driving season. On Wednesday, the EIA released its estimated crude oil input to refinery data for the week ended May 5. The EIA reported crude oil inputs to refineries were up +0.010 mmb/d this week to 15.745 mmb/d but are up +0.049 mmb/d YoY from 15.696 mmb/d for the week ended May 6, 2022. This week's refinery utilization was up +1.0% WoW to 91.0% and is up +1.0% YoY as well. Total products supplied (i.e., demand) increased WoW, up +0.358 mmb/d to 20.164 mmb/d, and Motor gasoline was up +0.685 mmb/d to 9.303 mmb/d from 8.618 mmb/d last week. The 4-week average for Motor Gasoline was up +0.197 mmb/d YoY to 8.988 mmb/d. The 4-week average of Total demand was up +0.486 mmb/d YoY to 19.874 mmb/d.

Refiners switching to summer fuel blends

Figure 36: US Refinery Crude Oil Inputs (thousands b/d)



Source: EIA

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US net oil imports

Oil - Something doesn't look right in the EIA weekly oil imports by country data

We repeat the same commentary as last week that something doesn't look quite right in the EIA weekly oil imports by country data. It looks like something is off in the EIA's estimates of weekly oil imports by country data. (i) For some reason, the EIA weekly data does not include any oil imports from Venezuela in 2023, when we have seen Chevron importing oil from Venezuela into its and other PADD 3 Gulf Coast refineries. What we don't know if the EIA has just allocated to some other country. Yet, as noted below, the EIA monthly data shows imports from Venezuela in Jan and Feb. And Bloomberg tanker tracker data shows it up higher in Mar and Apr. (ii) US "NET" imports were up +1.018 mmb/d to 2.677 mmb/d for the May 5 week. US imports were down -0.843 mmb/d to 5.553 mmb/d. US exports were down -1.861 mmb/d to 2.876 mmb/d. The WoW decrease in US oil imports was driven in part by "Others" while the Top 10 had a decrease of -0.411 mmb/d. Some items to note on the by country data. (iii) Canada was down this week -0.257 mmb/d to 3.269 mmb/d. (ii) Saudi Arabia was up +0.139 mmb/d to 0.381 mmb/d. (iv) Colombia was down -0.096 mmb/d to 0.047 mmb/d. (v) Ecuador was up +0.088 mmb/d to 0.145 mmb/d. (vi) Iraq was up +0.099 mmb/d to 0.247 mmb/d. (vii) Mexico was down -0.313 mmb/d to 0.393 mmb/d.

Figure 37: US Weekly Preliminary Oil Imports by Major Countries

(thousand b/d)	Feb 17/23	Feb 24/23	Mar 3/23	Mar 10/23	Mar 17/23	Mar 24/23	Mar 31/23	Apr 7/23	Apr 14/23	Apr 21/23	Apr 28/23	May 5/23	WoW
Canada	3,197	3,605	3,780	3,371	3,240	2,957	3,980	3,590	3,519	3,327	3,526	3,269	-257
Saudi Arabia	545	310	476	385	483	228	514	376	339	393	242	381	139
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0
Mexico	683	725	556	633	1,118	541	920	450	615	728	706	393	-313
Colombia	284	143	222	294	244	269	71	159	303	143	143	47	-96
Iraq	251	290	265	346	144	138	345	241	180	222	148	247	99
Ecuador	145	97	55	46	0	118	80	242	131	36	57	145	88
Nigeria	256	98	243	170	129	104	302	236	112	104	214	143	-71
Kuwait	0	0	0	0	0	0	0	0	0	0	0	0	0
Angola	0	0	0	0	0	0	0	0	0	0	0	0	0
Top 10	5,361	5,268	5,597	5,245	5,358	4,355	6,212	5,294	5,199	4,953	5,036	4,625	-411
Others	965	940	674	971	814	970	932	899	1,095	1,423	1,360	928	-432
Total US	6,326	6,208	6,271	6,216	6,172	5,325	7,144	6,193	6,294	6,376	6,396	5,553	-843

Source: EIA

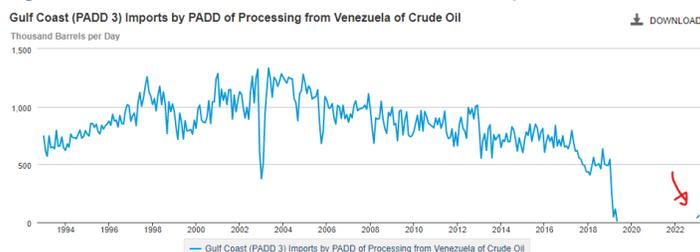
Bloomberg tanker tracker data: Venezuela oil increasing into Gulf Coast,

More Venezuela oil into the Gulf Coast is a negative to Cdn heavy/medium oil into the Gulf Coast. As noted above, we are seeing Bloomberg tanker tracker data reflect steadily increasing Venezuela oil into the Gulf Coast and even the EIA's own monthly data show Venezuela oil into the Gulf Coast in Jan and Feb. (i) Here is what we wrote in last week's (May 7, 2023) Energy Tidbits memo. "Last week's (Apr 30, 2023) Energy Tidbits memo highlighted our Apr 29 tweet [\[LINK\]](#) that Chevron's start of Venezuela oil imports into the Gulf Coast is likely impacting Cdn WCS less WTI differentials and how Venezuela oil into the Gulf Coast will be increasing in March and April. On Monday, Bloomberg's Tanker Tracker for Venezuela confirmed the increases in March and April. We tweeted [\[LINK\]](#) 'Blame it on #Chevron. Seasonal narrowing for WCS-WTI differentials, but not as much as might be expected. Increasing PADD 3 Gulf Coast imports of VEN #Oil. Feb: 89 kbd. Mar: 115 kbd. Apr: 143 kbd. Thx @business Tanker Tracker, @lkassai. #OOTT". (ii) Here is what we wrote in our Apr 30, 2023 Energy Tidbits memo on the EIA monthly data. "Our tweet included the below EIA graphs of crude oil imports into the Gulf Coast PADD 3. They remind how Cdn heavy/medium crude was able to penetrate PADD 3 (Gulf Coast)

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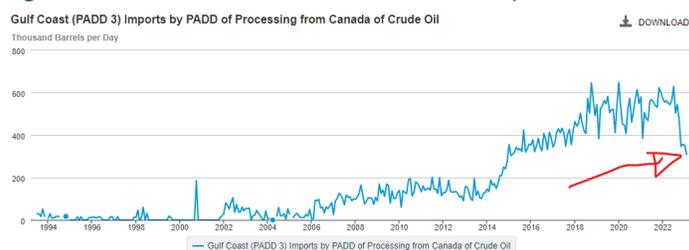
because there was a need with declining Mexico and Venezuela crude oil. Conversely, if Venezuela increases, it will mean more Venezuela crude to the Gulf Coast and less need/increased pressure on Cdn differentials. It's hard to see from the graph but we pointed to the first Venezuela oil imports into the Gulf Coast in about 3 ½ years were 40,000 b/d in Jan and 58,000 b/d in Feb, and this will be higher in March."

Figure 38: Gulf Coast PADD 3 Crude Oil Imports From Venezuela



eia Data source: U.S. Energy Information Administration
Source: EIA

Figure 39: Gulf Coast PADD 3 Crude Oil Imports From Canada



eia Data source: U.S. Energy Information Administration
Source: EIA

Oil – Venezuela back to 800,000 b/d for first time in three years

It's a good thing for Cdn heavy/medium oil differentials that Chevron hasn't gone into full investment mode in Venezuela because, if it did, Venezuela's oil production and exports would be cranking up at a multiples higher pace. Even still, it looks like Venezuela oil production is now back over 800,000 b/d for the first time in three years. (i) Early Thursday morning, we tweeted [LINK](#) "Chevron Impact on Venezuela #Oil production should show up in #OPEC MOMR May. @globaloilrisks : Chevron's VEN right now 140 kbd, PDVSA data Apr was averaging 800 kbd. OPEC MOMR Apr Secondary Sources 695 kbd, Direct Communications 754 kbd. #OOTT @gulf_intel @FrankKaneDubai." Our tweet included the transcript we made of Jose Chalhoub's comments on the Gulf Intelligence daily podcast. Chalhoub "... it's [Chevron] averaging right now 140,000 b/d. that's kind of close to how much Chevron was producing back in 2004, 2005, 2006. That's the average of how much Chevron was producing back then the problems in finding accurate data because you have the data presented by the Ministry of Petroleum, the data presented by OPEC and now PDVSA recently presented some data to investors, private investors including Chevron, that the

**Venezuela
>800,000 b/d**

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production for April was averaging 800,000 b/d. That's significant. That's some significant numbers. So we have to see the OPEC monthly report that's coming out today". (ii) Later Thursday morning, OPEC's MOMR confirmed his views. We tweeted [\[LINK\]](#) "#OPEC. As @globaloilrisks said to @gulf_intel pre-MOMR, Venezuela says produced 810 kbd in Apr 2023. Been 3 yrs since they were >800 kbd. And #Chevron expects to keep increasing its VEN oil production/exports even without big investment approach. Low hanging fruit! #OOTT." OPEC's Monthly Oil Market Report included Venezuela reporting that it produced 810,000 b/d in April.

Chevron's limited capex case to add 50,000 b/d to 150,000 b/d in 2023

We keep highlighted that Chevron is not in a full investment case in Venezuela, but a limited capex case. Here is what we wrote in our Apr 30, 2023 Energy Tidbits memo. *"It is important to remember Chevron CEO Wirth's prior comments that, given the Administration's license is only for six months and the Administration is under no obligation to do a monthly rollover to keep a six-month effective license, Wirth said Chevron wouldn't be doing any drilling in the first six months. Wirth wanted to know there was a longer term before they committed to a drilling program. As a result, Chevron would be increasing oil production by well workovers, fixing operations, bringing in diluent, etc ie. non-drilling items. The reminder is that if Chevron ever gets at it, they could ramp up production by probably 250 to 500,000 b/d within a year or so. And expects it to increase production by 50% from current 100,000 b/d in 2023. Production was 50,000 b/d at the end of Nov when Chevron got the license. In the Q1 call, mgmt. was asked about Venezuela oil production. Note it looks like a typo in the transcript that says it was a six-month license from OPEC as the license was from the US. Mgmt replied "Is there a maximum? I mean, it's limited by our position there, and the entities that we're involved in, and what our portion of that production that we're entitled to market is. We're currently seeing about 100,000 barrels a day of production up from about 50,000 when the license terms changed. That could go up further this year, maybe another 50% if everything goes well. The crude comes to the U.S. and we're finding a market for the crude. And yes, it's a six-month license from OPEC and we have to bear that in mind. So that's why we are proceeding as you said which is we've got some past receivables that are being paid from some of these proceeds and there's a lot of relatively straightforward work over another activity that can help bring production up at – without major capital commitments. And so that's current model, we'll see how things unfold, and hopefully, pointed in a good direction, but it's been a bit of an up-and-down situation and we have to -- we just have to take this one step at a time."*

Huge Chevron Venezuela oil production capacity without drilling a single well

Here is what we wrote in our Dec 25, 2022 Energy Tidbits memo. *"There was an overlooked Argus report on Wed [\[LINK\]](#) "High hurdles to grow Chevron's Venezuela oil output." It was likely overlooked for the title of the report. (i) But, yesterday, we tweeted [\[LINK\]](#) "Tip of the Iceberg! Chevron VEN Nov production is ~90,000 b/d, 1,400 wells, ~65 b/d ave well. Note 📌 category 2: ~8,700 wells need ~\$0.5 mm/well to become operational. At 65 b/d ave = ~550,000 b/d capacity add without drilling one well. Thx @ArgusMedia Carlos Camacho! #OOTT." (ii) The Argus report reminds of the huge near term upside For Chevron to add production in Venezuela without*

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drilling one well. (iii) Recall that the US only gave a waiver for six months. It's a rolling six-month waiver as the current month ends so it's basically saying to Chevron you have six months from today, but no guarantee for longer. This lack of visibility beyond the six-month window is why Chevron CEO said they aren't planning to do any drilling within six months. Rather working to move the existing oil in inventory and do some well reworking. (iv) Chevron's go-slow plan looks to add >110,000 b/d in the next six months in the Occidente basin. I think most refer to it as the Oriente Basin. Production was 150,000 b/d early this year and is down to 90,000 b/d in Nov. Argus reports "An internal Chevron plan to increase Venezuelan oil production to 200,000 b/d by mid-2023 relies on efforts to rehabilitate some 18,000 wells in various states of disrepair in the country's once-prolific Occidente region". This addition makes sense given the rolling six-month term and what we call the go-slow plan. (v) Adding >110,000 b/d by mid-203 is the Tip of the Iceberg. (vi) We believe Chevron could crank up to add another 200,000 b/d by end of 2023, and a further 200,000 b/d or likely a lot more in 2024. We don't think it's unreasonable to see this up at 500,000 b/d to 1,000,000 b/d in two years if Chevron moves from a go-slow to a get-at-it plan. And this is without drilling one new well. This Argus report shows these elements. (vii) There is so much low-hanging fruit to Chevron to grow Venezuela oil production without drilling any wells. It's all existing wells that need some sort of work or power. (viii) Remember, this is apart from the previously reported 1.79 mmb of oil in storage ready for export. (ix) Argus reporting on an internal Chevron plan. Says "Occidente" region was 150,000 b/d earlier in 2022, but is now down to 90,000 b/d in Nov. Says there are 18,000 wells in total. But only 1,400 producing wells, that is ~65 bpd per well on average. Remember, this is in an industry starved for capital, equipment and basic operating efforts. The question is how much would these 1,400 producing wells be producing with proper maintenance, etc? we suspect a lot more than 65 bpd, would guess something over 100 bpd on average. Category 1 is producing wells. ~7% or 1,400 wells producing oil "but many at decline rates". As noted, these are on average producing 65 bpd. They don't say it, but these heavy oil wells are all likely now or soon to be candidates to reworking so we would expect also some upside here to effectively hold production if not increase. Category 2 is the huge low hanging fruit with "About 8,700 wells fall into Category 2, which includes non-operating wells that may just need minor work to become operational. These wells may need around \$500,000 each in new investment to be viable, according to sources familiar with the field." If we use the current producing average of 65 bpd, that is ~550,000 b/d of incremental production capacity for \$4.35 billion. That assumes the 65 b/d average. Is it reasonable to assume the average as these are wells that down for some reason? If Chevron is prepared to spend \$500,000 per well, it's safe to say these aren't stripper wells that produce a very low amount of production. Rather, we can't believe Chevron would put in this category any wells that aren't capable of a decent level of production and we suspect much more than the average well of 65 b/d. Again, this is not drilling, rather we expect well cleanouts, reworking, etc. If use 100 bpd, that is 870,000 bpd of incremental production capacity. Category 3 "are more than 7,900 wells that need between \$5mn-\$6mn of investment each to be commercially viable". We are not clear what is required here. Plus upside from wells that don't fit in to category, 1, 2 or 3. Argus notes 'Hundreds of wells in the PdV report are reportedly shut down just for a lack of reliable

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electricity, which plagues many parts of the country". This is where something like diesel power generation comes into play. The reality is that reliable power is something that is also involved in the above categories. Our Supplemental Documents package includes the Argus report."

Oil – OPEC MOMR: neutral to slightly positive with narrowing oil/products stocks

On Thursday, OPEC released its Monthly Oil Market Report at ~6:40 am MT. (i) We thought the overall takeaway from the data and forecasts was neutral to slightly positive. There are basically no changes in forecasts for oil demand, non-OPEC supply and call on OPEC. But there is a widening of the oil + products stocks deficit vs the 2015-2019 average. (ii) Reminder that the OPEC+ voluntary cuts of 1.16 mmb/d were supposed to start on Monday May 1. This excludes the 0.5 mmb/d that Russia said they were making good progress within April. These additional OPEC cuts are what makes H2/23 much stronger given OPEC hasn't really changed its balance of 2023 oil supply and demand forecasts. (iii) 2023 average demand was basically unchanged at 101.90 mmb/d (was 101.89). (iv) Notably, the 2023 outlook does not seem show the normal quarterly trends in oil demand. Normally, Q1 is down vs the prior year Q4, and Q2 tends to see a marginal ramp up followed by a significant seasonal increase in Q3. In contrast, OPEC's current 2023 outlook shows a QoQ increase of +0.58 mmb/d between Q4/22 and Q1/23, and a QoQ decrease of -0.88 mmb/d from Q1/23 to Q2/23. OPEC's 2023 demand changes by quarter: Q1/23 now 101.58 mmb/d (was 101.55) which implies a +0.58 mmb/d increase over Q4/22. Q2/23 is unchanged at 100.70 mmb/d implying a -0.88 mmb/d decrease from Q1. Q3/23 is unchanged at 102.03 mmb/d, an increase of +1.33 mmb/d over Q2. Q4/23 demand is now 103.25 mmb/d (was 103.27). This means 2023 YoY growth remains immaterially increases to +2.33 mmb/d. (v) China demand forecast for 2023 was increased to 15.66 mmb/d, compared to 15.61 mmb/d in the Apr MOMR and 15.56 mmb/d in the Mar MOMR. The increase was due to a stronger Q1/23 China demand up to 15.63 mmb/d (was 15.43), while all other quarters remained unchanged with Q2/23 at 15.40 mmb/d, Q3/23 at 15.43, and Q4/23 at 16.16. (vi) non-OPEC supply. For 2023, YoY growth was unchanged and remains at +1.43 mmb/d with average production of 67.19 mmb/d. Note that 2023 growth is inclusive of NGLs. Key YoY non-OPEC growth areas are US +1.04 mmb/d YoY (unchanged), Brazil +0.24 mmb/d YoY (was +0.25), Norway +0.18 mmb/d YoY (unchanged), Canada +0.16 mmb/d YoY (was +0.17), and Kazakhstan +0.11 mmb/d YoY (unchanged). In contrast, Russia was unchanged at -0.75 mmb/d YoY. For the US, OPEC estimates +1.04 mmb/d YoY to 20.24 mmb/d in 2023 (unchanged) and US tight/shale oil supply was increased slightly to YoY growth of +0.69 mmb/d to 8.57 mmb/d (was +0.69 mmb/d to 8.53 mmb/d). (vii) OPEC Secondary Sources for Mar was down -191,000 b/d MoM to 28.603 mmb/d. The OPEC10 share of the MoM was unchanged at -1.273 mmb/d and the non-OPEC share was unchanged at -0.727 mmb/d. (viii) Direct Communications (what the OPEC countries report). There were a few items to note vs what countries directly reported vs Secondary Sources estimates: Libya still not providing direct communications estimates for OPEC, but recall they posted on Facebook that production has been steady over 1.2 mmb/d ie. slightly more than Secondary Sources. Venezuela says it produced 810,000 b/d in Apr. Iraq says it produced 3.938 mmb/d vs Secondary Sources of 4.139 mmb/d. Finally, Nigeria says it produced 0.999 mmb/d compared to the 1.180 mmb/d reported by Secondary Sources. Our Supplemental Documents package includes excerpts from the Mar OPEC MOMR.

OPEC Monthly Oil Market Report

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Oil – Reminder OPEC+ 1.157 mmb/d voluntary cuts were to start May 1

We remind May 1 was when the OPEC+ voluntary cut (production adjustments) of 1.157 mmb/d were to start and to run thru 2023. This was the breaking news in our April 2, 2023 Energy Tidbits memo, which OPEC followed up with their April 3, 2023 press release. [\[LINK\]](#). These voluntary cuts were in addition to Russia's prior announcement of cutting 500,000 b/d vs Feb 2023 production and that would be until the end of 2023. The voluntary cuts were Saudi Arabia 500,000 b/d, Iraq 211,000 b/d, UAE 144,000 b/d, Kuwait 128,000 b/d, Kazakhstan 78,000 b/d, Algeria 48,000 b/d, Oman 40,000 b/d, and Gabon 8,000 b/d.

OPEC+ voluntary cuts

Oil – Three weeks until OPEC+ in-person June 4 meeting

We are now three weeks away from OPEC+ June 4 ministerial meeting in Vienna. At first, there was no indication that OPEC+ would have an in-person meeting, rather OPEC watchers were given the expectation for another virtual meeting. However, that changed last week, when key OPEC watchers reported that the meeting was now an in-person meeting at the OPEC offices in Vienna. As we wrote in last week's (May 7, 2023) Energy Tidbits memo, we have trouble believing that OPEC+, in particular Saudi Energy Minister Abdulaziz, would change from a virtual to an in-person meeting if they didn't expect or, at least set the expectation, for something other than a no change. Rather we would think Abdulaziz will do something other than no change, whether it be to change to their production levels, either voluntary or via quota changes, or some clear signal on more OPEC support for oil prices. It's why, on May 3, we tweeted [\[LINK\]](#) "Can't see "The Man" Saudi Energy Minister Abdulaziz having an in-person OPEC meeting June 4 in Vienna to say no change. His track record is clear: great read of supply/demand, surprises are to support Oil. Especially given the below #IMF breakeven prices ie. KSA \$80.90. #OOTT."

OPEC+ June 4 in-person meeting

Oil – Saudi Arabia runs \$0.77 billion deficit in Q1/23

On Monday, Saudi Arabia reported on its Q1 fiscal results and budget. And we tweeted [\[LINK\]](#) "Another reminder why The Man, Saudi Energy Minister Abdulaziz will keep the market in balance. See 📌 05/03 tweet, #IMF KSA fiscal breakeven price is \$80.90 in 2023. KSA Q1 fiscal deficit of \$0.77b, spending nearly +30% YoY reports @MiretteMagdy7. #OOTT." Saudi running a deficit in Q1 is a good reminder why Saudi Energy Minister coordinated the OPEC+ voluntary cuts that kicked in on May 1 as a way to balance the markets and provide support for oil prices. Bloomberg reported "Saudi Arabia reported a deficit of 2.91 billion riyals (\$770 million) in the first quarter of the year as the government increased spending on salaries and economic diversification projects. Government income rose in the first quarter, driven by higher non-oil revenues, but was outpaced by a nearly 30% rise in spending, according to a budget report from the Ministry Of Finance published Sunday. The government "maintains a great ability to continue the expansionary fiscal policy and consider accelerating projects," according to a separate statement on the official Saudi Press Agency. Oil revenues fell by 3% to 179 billion riyals in the first three months of the year on lower crude prices." Our Supplemental Documents package includes the Bloomberg report.

Saudi Arabia Q1 fiscal deficit

IMF fiscal breakeven oil prices for Middle East oil exports ie. \$80.90/b in 2023

Our May 8 tweet on the Saudi Arabia Q1 fiscal deficit referenced the IMF's estimate that Saudi Arabia has a breakeven fiscal price of \$80.90 in 2023. Here is what we wrote in last week's (May 7, 2023) Energy Tidbits on the IMF estimates. "For those

that follow the economies of the Middle East and Central Asia, the IMF posted a good report this week, its “May 2023 Regional Economic Outlook: Middle East and Central Asia”. The report includes some good economic data on each of the countries. One of the headline stories coming out of the report is the IMF’s forecast of breakeven oil prices needed for Middle East exports to reach fiscal breakeven in their budgets. The headline on Saudi Arabia was that they still need \$80.90/b oil price to have a fiscal breakeven in their budget. What is getting overlooked is that Saudi Arabia’s breakeven oil price continue to decline with its push to strengthen non-oil sectors. It still has a way to go catch up to countries like UAE, but MBS’s push in his Vision 2030 is making progress, albeit at a modest pace. The other number that jumped out at us was the IMF estimating Iran needs \$351.70/b for a fiscal breakeven price. On Wednesday, we tweeted [\[LINK\]](#) “#IMF fiscal Breakeven #Oil price. Saudi declining \$85.80 in 22, \$80.90 in 23, \$75.10 in 24 with push on non-oil sectors. Iran \$351.70 in 23! Many other great tables in Appendix ie. current account balance. #OOTT.” Our tweet references the many good tables in the Statistical Appendix. Our Supplemental Documents include excerpts from the Statistical Appendix.”

Figure 40: IMF Breakeven oil prices

Table 6. Breakeven Oil Prices
(U.S. dollars per barrel)

	Average				Projections	
	2000–2019	2020	2021	2022	2023	2024
FISCAL BREAKEVEN OIL PRICE¹						
Oil exporters						
Algeria	102.1	89.6	111.4	85.7	112.4	111.9
Azerbaijan	51.9	66.3	57.9	63.6	77.0	78.2
Bahrain	83.2	113.7	134.8	133.6	126.2	129.1
Iran	85.6	546.5	259.4	278.3	351.7	375.4
Iraq	75.8	56.6	53.3	66.3	75.8	76.4
Kazakhstan	...	192.1	183.5	95.5	99.8	83.9
Kuwait ²	46.8	76.2	62.4	63.2	70.7	66.3
Libya	71.7	141.7	52.0	85.1	64.4	62.2
Oman	69.1	86.4	76.7	62.1	72.2	66.4
Qatar	45.1	49.3	46.5	44.7	44.8	41.5
Saudi Arabia	80.4	76.3	83.6	85.8	80.9	75.1
Turkmenistan	...	40.5	32.3	37.3	38.1	40.0
United Arab Emirates	49.9	51.7	53.1	55.1	55.6	54.8

Source: IMF

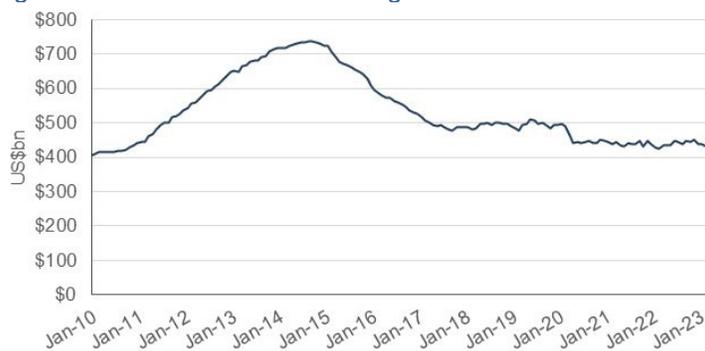
Saudi nest egg, its net foreign assets were down \$14.04b MoM in March

Saudi Arabia can afford to run budget deficits, but that would mean they would continue to grind down on their nest egg. And in the face of the massive investment needed to drive towards the MBS Vision 2030, they really don’t want to keep dipping into their nest egg. Here is what we wrote in last week’s (May 7, 2023) Energy Tidbits memo on their nest egg. “We continue to believe the #1 financial theme for Saudi Arabia in the 2020s will be their continued, and likely increasing, use of Other People’s Money as they try to transition their country to MBS’s Vision 2030. We believe this has been obvious with how Saudi Arabia’s net foreign assets dropped by about \$300 billion over seven years. We are surprised that markets and oil watchers didn’t seem to pay attention to the Saudi net foreign assets data i.e., what we call

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their nest egg to help them thru the Energy Transition. Above \$100 oil last year helped arrest the decline in the Saudi nest egg. But Saudi net foreign assets have dropped by \$304.9 in the last 8 years, from its peak of \$737.0b on Aug 31, 2014, to \$419.0b on Mar 31, 2023. That is an average of \$3.0b per month for the last 8 years. Oil prices remained relatively flat throughout the month with Brent crude averaging ~\$79 in March compared to ~\$82 in February. Saudi Arabia's net foreign assets on March 31 were down -\$14.04b MoM to \$419.0b vs \$433.0b in February and \$437.6b in January. Saudi Arabia is far from going broke but there has been a huge decline in the last 8 years, but it is still a very big nest egg. This net foreign asset depletion is why we have been highlighting that the primary financial theme for Saudi Arabia in the 2020s is getting Other People's Money (OPM) to fund as much of their Vision 2030 as possible. And no question, accessing OPM has helped to slow down and temporarily pause the decline in net foreign assets. Saudi Arabia's central bank (SAMA) doesn't provide explanations for the monthly swings. Below is our graph of Saudi Arabia net foreign assets updated for the March 31 data."

Figure 41: Saudi Arabia Net Foreign Assets



Source: Bloomberg

Oil – Iraq doesn't expect more OPEC cuts, and it can't reduce further

On Friday, Reuters reported [LINK](#) "Iraq does not expect OPEC+ to make further cuts to oil output at its next meeting in June, its oil minister Hayan Abdel-Ghani said, in the first indication from an OPEC minister about a potential decision as oil prices slide. "At the next meeting, which will be held on the 3rd and 4th (of June), there will be no additional reduction, and as for Iraq, we cannot reduce further," Abdel-Ghani said in an interview, his first to foreign media since taking office last year. In a following statement, he said Iraq is committed to voluntary oil production cuts that started in May and last until the end of 2023, and noted that Iraq was not asked to make any additional such cuts before a June 4 OPEC+ meeting."

Iraq says it can't reduce further

Oil – Still no visibility for restart Iraq/Kurdistan oil thru Turkey

The key conclusion from our update this week is unchanged – there is no visibility to when Kurdistan/Iraq oil will resume exports via Ceyhan in Turkey. As of our 7am MT news cut off, we have not seen any reports giving any indication of when there will be a resumption of ~450,000 b/d of Iraq/Kurdistan oil exports via Ceyhan (Turkey). But what is different is that on Thursday, Rudaw (Kurdistan media) reported [LINK](#) that Kurdistan and Iraq finalized their

Turkey holds up Kurdistan oil exports

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agreement to allow oil exports to resume thru Turkey. Iraq then asked Turkey to resume oil exports yesterday. But then on Friday, Bloomberg reported “Turkey probably won’t accept a request from Baghdad for oil exports through the port of Ceyhan to resume on Saturday, according to a Turkish official familiar with the matter.” We haven’t expected any resumption until sometime after today’s Turkey elections.

But Vitol sees Iraq compensating by increasing oil exports from the south

Here is what we wrote in our May 7, 2023 Energy Tidbits memo. “One of the supply surprises to the negative from the northern Persian Gulf countries is Iraq. No question they are not exporting their +400,000 b/d of Kurdistan/Iraq oil via Turkey. However an interesting comment this morning from Vitol’s Mike Muller on the Gulf Intelligence daily podcast that Iraq is making up for a good portion of the >400,000 b/d Kurdistan and Iraq oil that hasn’t been able to be moved thru the northern pipeline to export via Ceyhan in Turkey. Earlier this morning, we tweeted [\[LINK\]](#) “#Oil supply surprise. There is no visibility to return of .400 kbd of Kurdish/Iraq exports via Turkey, BUT @michaelwmuller to @gulf_intel “i think Iraq seems to have compensated for reduced or cancelled Kurdish exports to the north by exporting more from the south”. #OOTT.”

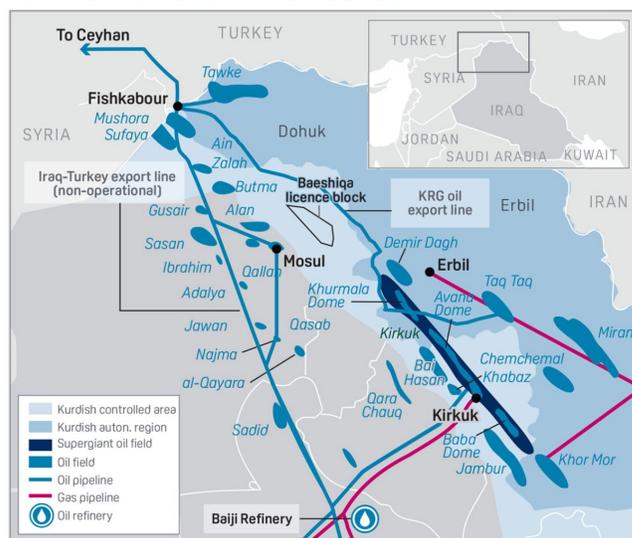
Iraq’s court case win halted 370,000 Kurdistan & 75,000 b/d Iraq oil exports

Here is what we wrote in our March 26, 2023 Energy Tidbits memo. “Breaking news yesterday that Iraq reportedly halted 445,000 b/d of crude oil exports thru its north on the export pipeline to Ceyhan, Turkey. Iraq won an arbitration with Turkey, which means that Turkey has to deal with Iraq’s oil marketing arm for approval of all Iraq oil exports, including oil from Kurdistan. It’s not clear how long it will take to get to a mechanism for Iraq dealing with Turkey on the oil exports. Don’t know if’s wishful thinking but Kurdistan media was pointing to not too long to get an understanding. Regardless, until Iraq resumes oil exports via Turkey, it means there will be ~445,000 b/d of crude oil off the market. Yesterday, we tweeted [\[LINK\]](#) Iraq reportedly halts 370 kbd KRG + 75 kbd federal oil thru export pipeline thru Turkey reports @Ahmed_Rasheed_R @RowenaCaine. Positive for #Oil until Iraq resumes northern exports ie. agrees on mechanism to export Iraq oil thru Turkey in line with its arbitration win. #OOTT.” Yesterday, Reuters reported [\[LINK\]](#) “Iraq halted crude exports from the semi-autonomous Kurdistan region and northern Kirkuk fields on Saturday, an oil official told Reuters, after the country won a longstanding arbitration case against Turkey. The decision to stop shipments of 450,000 barrels per day (bpd) of crude relates to a case from 2014, when Baghdad claimed that Turkey violated a joint agreement by allowing the Kurdistan Regional Government (KRG) to export oil through a pipeline to the Turkish port of Ceyhan. Baghdad deems KRG exports via Turkish Ceyhan port as illegal. The International Chamber of Commerce ruled in favour of Iraq on Thursday, Iraq’s oil ministry confirmed on Saturday. Turkey has informed Iraq that it will respect the arbitration ruling, a source said. Turkish shipping officials told Iraqi employees at the Ceyhan oil export hub that no ship will be allowed to load Kurdish crude without the approval of the Iraqi government, according to a document seen by Reuters. Turkey subsequently halted the pumping of Iraqi crude from the pipeline that leads to Ceyhan, a separate document seen by Reuters showed. On Saturday, Iraq stopped pumping oil through its side of the

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pipeline which runs from its northern Kirkuk oil fields, an official told Reuters. Iraq had been pumping 370,000 bpd of KRG crude and 75,000 bpd of federal crude through the pipeline, according to a source familiar with its operations. "A delegation from the oil ministry will travel to Turkey soon to meet energy officials to agree on new mechanism to export Iraq's northern crude oil in line with the arbitration ruling," a second oil ministry official said." Kurdistan region Prime Minister Masrour Barzani expects this to be quickly resolved. Yesterday Kurdistan 24 news reported [\[LINK\]](#) "Kurdistan Region Prime Minister, Masrour Barzani, on Saturday reiterated the Kurdistan Regional Government's (KRG) good relations with the Iraqi federal government. "Our recent understandings with Baghdad have laid the groundwork for us to overcome the arbitration ruling today," PM Barzani wrote in the tweet. "A team from the KRG will visit Baghdad for talks tomorrow to build on the goodwill of our discussions," Barzani added." Below is a Platts Northern Iraq's oil infrastructure map from 2020 [\[LINK\]](#).

Figure 42: Northern Iraq's oil infrastructure map from 2020
NORTHERN IRAQ'S OIL INFRASTRUCTURE



Source: S&P Global Platts, PolGeoNow
Source: Platts

Oil – Libya NOC says oil production continues to be stable at ~1.2 mmb/d

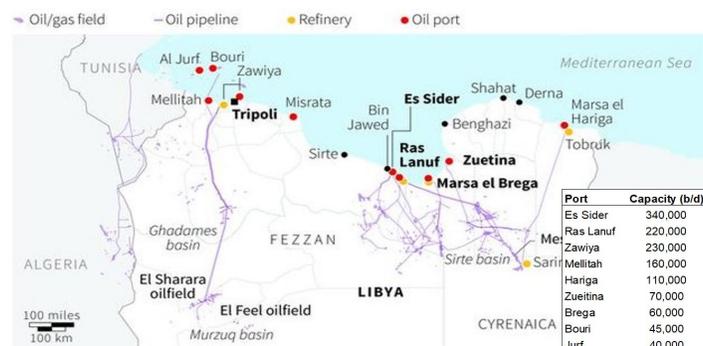
We have to give the Libya National Oil Corporation credit that it's been able to keep oil production pretty stable right around 1.2 mmb/d for the past six months or so. The Libya National Corporation tends to post a short oil production update on its Facebook [\[LINK\]](#). The latest update was on Thurs May 11 and the Google Translate was "Crude oil production reached 1.219 million barrels per day, and condensate production reached 18 thousand barrels per day during the past 24 hours."

Libya oil production ~1.2 mmb/d

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Figure 43: Libya Ports, Major oilfields and Terminals map

SAF Group Compiled Libya Ports & Terminals Status



Source: Bloomberg, HFI Research, SAF
Source: SAF Group

Libya sees low-risk development to go from 1.2 to 1.5 mmb/d in 2023

Here is what we wrote in our Feb 19, 2023 Energy Tidbits memo. “We have been reporting on how Libya has surprisingly been able to keep oil production steady ~1.2 mmb/d. At the same time, we have always highlighted the big near term upside potential to its oil production if east vs west armed fighting can stay on the sidelines as that will see the return of foreign capital for both natural gas and oil. But even before foreign capital, the Libya National Oil Corporation has many low risk development opportunities to increase oil production. On Tuesday, the Libya Herald reported [\[LINK\]](#) on comments from one of Libya NOC’s operating companies, Arabian Gulf Oil Company (AGOCO) Chairman Salah Gaatrani. The Libya Herald wrote “The continuation of the Arabian Gulf Oil Company’s (AGOCO) development operations at this pace will inevitably lead to Libya reaching a production rate of more than 1.5 million barrels of oil per day in 2023, AGOCO chairman Salah Gaatrani said in an exclusive statement to Libya Herald. He said this was because of the stability witnessed by the country in general, and by the oil sector in particular. Therefore, he continued, the Gulf Company has developed its own plan within the efforts of the National Oil Corporation (NOC). Libya has been unable to maintain production beyond 1.2 million bpd. Gaatrani was commenting to Libya Herald following Sunday’s AGOCO’s meeting on developing reserves and increasing oil production in the sector companies, attended by relevant AGOCO and NOC management. The AGOCO chairman said that his company has already begun to implement the plan prepared by the NOC to raise production and increase reserves.” Our Supplemental Documents package includes the Libya Herald report.”

Oil – China scheduled domestic flights for May/June still well below Mar 28 expectation

The Chinese mobility indicators continue to point to a stalling or at least a slower than expected China recovery in China domestic scheduled flights in May and continuing into June. China scheduled domestic flights are increasing but at a much slow rate of increase than expected at the end of March. On Tuesday, we tweeted [\[LINK\]](#) “Much slower increase in China domestic flights than expected at end of Mar. China scheduled domestic flights +2.8 WoW for May 2-8 to 97,087. Schedule for next 4-weeks is increasing to 100,864. BUT that is

China domestic flights

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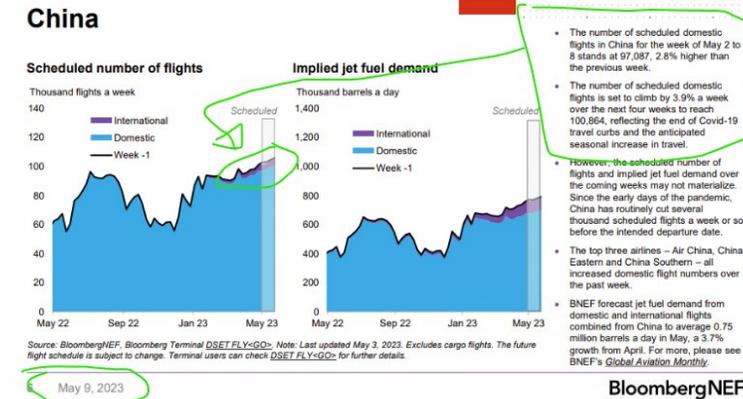
18.5% below 119,180 flights that were scheduled on Mar 28 for Apr. Thx @BloombergNEF Claudio Lubis #OOTT.” China’s scheduled domestic flights were up +2.8% WoW, but the negative or the stalling of the China domestic air travel remains in that the scheduled next 4 weeks of domestic flights for the last three weeks of May and to start June is still well below the next 4 weeks flights forecast from March 28 for April of 119,180 flights. This big drop from the March 28 forecast for April and May is the negative as it is showing the recovery seems to be stalling out or at least is growing at a much slower than expected pace vs March 28. This is still saying the big jump up in scheduled domestic flights for April didn’t happen and not expected to happen in May. Rather April was a more modest increase and May is expected to be more of the same. BNEF wrote “The number of scheduled domestic flights in China for the week of May 2 to 8 stands at 97,087, 2.8% higher than the previous week. • The number of scheduled domestic flights is set to climb by 3.9% a week. Scheduled over the next four weeks to reach 100,864, reflecting the end of Covid-19 travel curbs and the anticipated seasonal increase in travel.” Our tweet included the BloombergNEF chart and our listing of WoW changes from the prior BloombergNEF reports.

Figure 44: China scheduled domestic flights from BNEF Aviation Indicators Weekly reports

May 2-8: +2.8% WoW to 97,087
 Apr 25-May 1: basically flat at +0.04% to 94,471
 Apr 18-24: +2.1% WoW
 Apr 11-17: +0.7% WoW
 Apr 3-10: -4.2% WoW
 Mar 28-apr 3: +6.8% WoW
 Mar 21-27: +1.5% WoW
 Mar 14-20: -0.6% WoW
 Mar 7-13 week: -0.8% WoW
 Feb 27-Mar 3 week: -2.6% WoW
 Feb 21-27 week: +0.0% WoW (note this was +0.01%)
 Feb 14-20 week -0.5% WoW
 Feb 7-13 week -0.7% WoW
 Jan 31- Feb 6 week +10.9% WoW
 Jan 24-30 week -9.2% WoW
 Jan 17-23 week +7% WoW
 Jan 10-16 week +20% WoW

Source: BloombergNEF

Figure 45: China scheduled domestic air flights



Source: BloombergNEF

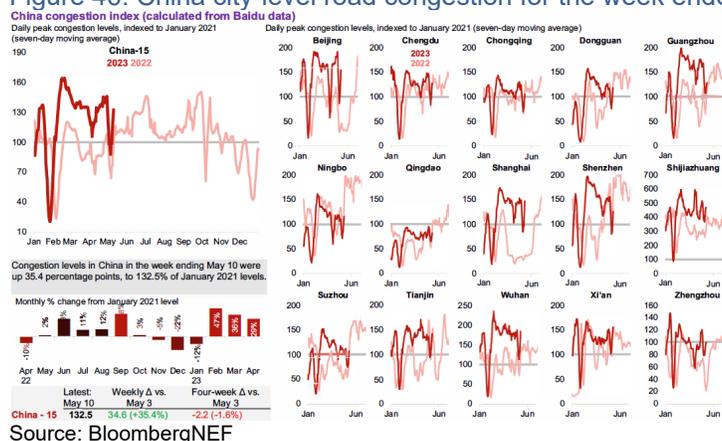
Oil – China city-level road congestion immediately rebounds after May Day holiday

It was an important week for China city traffic congestion to see if the big drop in city traffic congestion was due to the 5-day May Day holiday weekend that saw people leave the cities and therefore a big drop in city traffic congestion. On May 4, we tweeted [\[LINK\]](#), “China’s [road] congestion nosedives as Labor Day celebrated. It was a holiday BUT traffic -30.2% WoW to lowest point since Jan. Asia Pacific Ex China +3.7% WoW, still well <2019 EU -6.7% WoW, back <2019 NA +2.6% WoW, close to 2019 @BloombergNEF Global Road Traffic Indicators #OOTT”. There was a massive drop in China city traffic congestion for the holidays. But it jumped right back up this week. On Thursday, we tweeted [\[LINK\]](#) “China’s city traffic congestion +35.4% WoW, 5-day holiday was over so people back to cities to work. Asia Pacific Ex China +4.0% WoW, still well <2019 EU +10.7% WoW, back >2019 NA +0.7% WoW, close to 2019 Thx @BloombergNEF Global Road Traffic Indicators #OOTT.” BloombergNEF reported China city-level road congestion was +35.4% WoW for the week ended May 10 to 132.5% of Jan 2021 levels. Our tweet also included the below BloombergNEF graphic on China road congestion.

China city traffic congestion

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Figure 46: China city-level road congestion for the week ended May 10



Oil – China’s YTD crude oil imports up +4.6% YoY in April

No one should have been surprised to see China crude oil inputs begin to increase through 2023. With the world's second largest economy beginning to re-open after the Covid pandemic, expectations of a high increase in oil consumption were proven correct. On Monday, Bloomberg reported on China's preliminary import data for Apr that was posted on the General Administration of Customs website. Bloomberg reported "China April crude oil imports 42.407m Tons; Crude oil imports YTD rose 4.6% y/y to 178.769m tons" Crude oil imports for April were 42.407 MT (~10.36mm/d) falling from March's 33 month high of 12.37 mmb/d. S&P analysts expect [LINK](#) crude inflows to rebound strongly in May due to heavy trade volumes between the US and China.

China crude oil imports

Oil – Vortexa crude oil floating storage at May 12 was 84.25 mmb, -3.25 mmb WoW

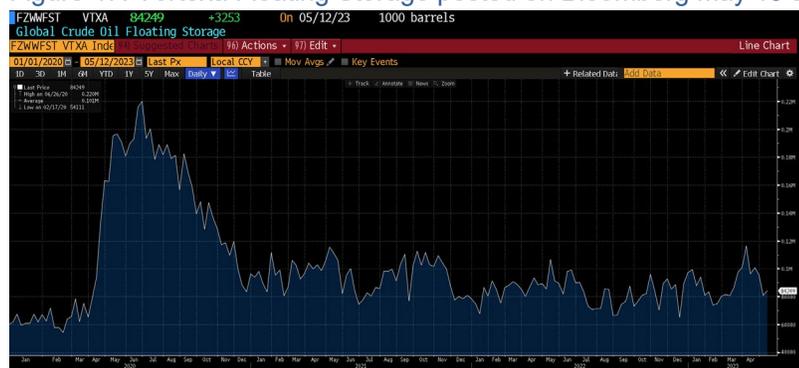
We are referencing the Vortexa global crude oil floating storage data posted on the Bloomberg terminal as of 9am MT yesterday. Note that these estimates get revised over the course of the week and the revisions can go back months. We do not check daily for the revisions, so our comments on the new estimates are compared to the prior week's Vortexa estimates posted on Bloomberg on May 6 at 9am MT. (i) As of 9am MT yesterday, Bloomberg posted Vortexa crude oil floating storage estimate for May 12 at 84.25 mmb, which was -3.25 mmb WoW vs upwardly revised May 5 of 81.00 mmb. Note May 5 was revised +8.46 mmb vs the 72.54 mmb posted on Bloomberg as of 9am MT on May 6. (ii) Please note our tweet yesterday [LINK](#) on Vortexa floating storage highlighted the big -32.11 mmb drop in floating storage vs Apr 7, 2023. And we wrote "See [table](#), -32.11 mmb vs 04/07, is this Iran selling floating storage, RUS oil being rerouted after being transferred?" We discuss this more in a couple items in this memo. (iii) The last three weeks had upward revisions, but then the prior weeks had revisions less than 1 mmb. The revisions from the estimates posted yesterday at 9am MT vs the estimates posted on Bloomberg at 9am on May 6 are as follows: May 5 revised +8.46 mmb. Apr 28 revised +2.02 mmb. Apr 21 revised +4.12 mmb. Apr 14 revised +0.84 mmb. Apr 7 revised -0.68 mmb. Mar 31 revised +0.57 mmb. Mar 24 revised +0.64 mmb. (iv) There is a wide range of floating storage estimates for the past seven weeks, but a simple average for the past seven weeks is 96.45 mmb, which is up small vs last week's then seven-week average of 96.06mmb. (v) Also remember Vortexa

Vortexa floating storage

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revises these weekly storage estimates on a regular basis and 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. (vi) May 12 estimate of 84.25 mmb is -135.67 mmb vs the Covid peak on June 26, 2020 of 219.92 mmb. (vii) Note the below graph now goes back to Jan 1, 2020 and not just three years as floating storage in Apr 2020 had started to reflect the Covid impact. (viii) May 12 estimate of 84.25 mmb is +18.64 mmb vs pre-Covid Feb 28, 2020 of 65.61 mmb. (ix) May 12 estimate of 84.25 mmb is -22.24 mmb YoY vs May 13, 2022 of 106.49 mmb. (x) Below are the last several weeks of estimates posted on Bloomberg as of 9am MT May 13, 9am MT May 6, and 9am MT Apr 29.

Figure 47: Vortexa Floating Storage posted on Bloomberg May 13 at 9am MT



Source: Bloomberg, Vortexa

Figure 48: Vortexa Estimates Posted May 13 9am MT, May 6 9am MT, Apr 29 9am MT

Posted May 13, 9am MT						May 6, 9am MT						Apr 29, 9am MT					
FZWWFST VTXA Inde						FZWWFST VTXA Inde						FZWWFST VTXA Inde					
01/01/2020 - 05/12/2023						01/01/2020 - 05/05/2023						01/01/2020 - 04/28/2023					
ID	3D	1M	6M	YTD	5Y	ID	3D	1M	6M	YTD	5Y	ID	3D	1M	6M	YTD	5Y
Date						Date						Date					
Fr 05/12/2023						Fr 05/05/2023						Fr 04/28/2023					
Last Px						Last Px						Last Px					
84249						72541						87301					
Fr 05/05/2023						Fr 04/28/2023						Fr 04/21/2023					
80996						93501						96026					
Fr 04/28/2023						Fr 04/21/2023						Fr 04/14/2023					
95522						96627						94491					
Fr 04/21/2023						Fr 04/14/2023						Fr 04/07/2023					
100.751k						95425						116.598k					
Fr 04/14/2023						Fr 04/07/2023						Fr 03/31/2023					
96272						117.039k						102.661k					
Fr 04/07/2023						Fr 03/31/2023						Fr 03/24/2023					
116.357k						100.406k						97293					
Fr 03/31/2023						Fr 03/24/2023						Fr 03/17/2023					
100.981k						96842						87009					
Fr 03/24/2023						Fr 03/17/2023						Fr 03/10/2023					
97478						86070						80922					
Fr 03/17/2023						Fr 03/10/2023						Fr 03/03/2023					
86636						80467						84681					
Fr 03/10/2023						Fr 03/03/2023						Fr 02/24/2023					
80804						81210						79295					
Fr 03/03/2023						Fr 02/24/2023						Fr 02/17/2023					
81511						80599						72822					

Source: Bloomberg, Vortexa

Oil – Vortexa crude oil floating storage WoW changes by regions

Please note the following comment on Iran/Russia floating storage. Bloomberg also posts the Vortexa crude oil floating storage in the 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. The largest WoW changes were in Middle East +3.99

Vortexa floating storage by region

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mmb WoW, Asia -3.55 mmb WoW, Other -3.09 mmb WoW and West Africa +3.01 mmb WoW. Below is the table we created of the WoW changes by region posted on Bloomberg at 9am MT yesterday. Our table also includes the “Original Posted” regional data for May 5 that was posted on Bloomberg at 9am MT on May 6.

Figure 49: Vortexa Floating Crude Oil Storage Weekly Changes by Region

Region	Vortexa Crude Oil Floating Storage by Region (mmb)		Original Posted		Recent Peak	
	May 12/23	May 5/23	WoW	May 5/23	Apr 7/23	May 12 vs Apr 7
Asia	40.95	44.50	-3.55	40.70	61.88	-20.93
Europe	10.31	7.52	2.79	6.97	23.97	-13.66
Middle East	7.70	3.71	3.99	3.71	5.29	2.41
West Africa	7.92	4.91	3.01	4.94	5.96	1.96
US Gulf Coast	0.39	0.29	0.10	0.23	3.17	-2.78
Other	16.98	20.07	-3.09	15.99	16.09	0.89
Global Total	84.25	81.00	3.25	72.54	116.36	-32.11

Vortexa crude oil floating storage posted on Bloomberg 9am MT on May 13
Source: Vortexa, Bloomberg

Source: Bloomberg, Vortexa

Oil – Is it Russia/Iran floating oil that is impacting the Vortexa floating oil data?

Last week’s (May 7, 2023) Energy Tidbits memo noted how Saudi Arabia is increasing imports of Russian oil and petroleum products, Russian oil getting rerouted out of the Middle East, and Iran is reportedly selling its floating storage/very slow in transit oil at discounted prices. When we look at the Vortexa data, we have to wonder if these two factors are part of what is at play in the Vortexa data. Floating crude oil recent peak was on Apr 7 at 116.36 mmb, and May 12 is down -32.11 mmb. This includes Asia -20.93 mmb and Europe -13.66 mmb since Apr 7. We have to wonder if these large declines represent Russian and Iran oil being rerouted to Asia and Europe, and Iran selling down its floating storage and very slow moving oil in Asia. Note the above table shows the floating storage by region at Apr 7 and the changes vs May 12 floating storage.

Is it Russia and Iran floating oil?

Oil - BNEF: global oil and product stocks surplus narrowed WoW to 28.6 mmb

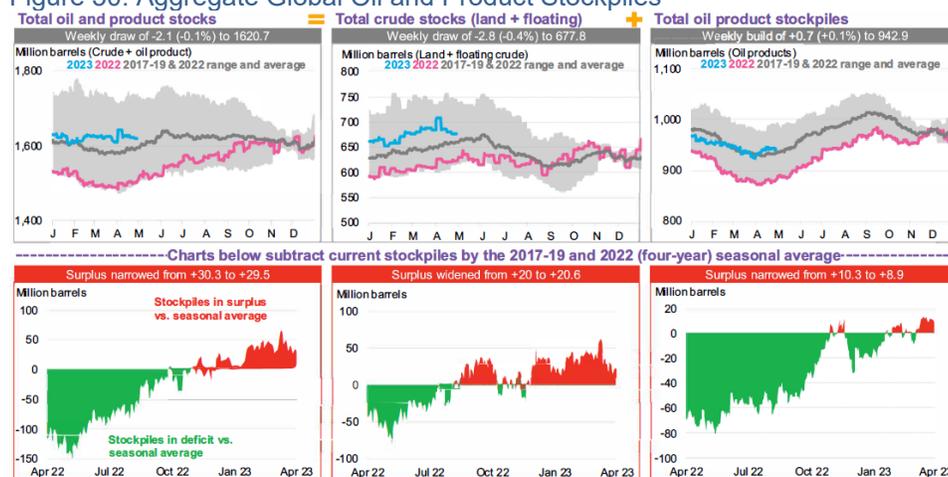
One of the negatives for oil going into 2023 was that there was expected to be surplus oil in Q1 and a building of global oil inventories. That’s happened. So, a key data point to watch has been if this build turns into a draw in Q2/23. And we remind that there are weekly changes that can flip flop but the key will be to watch the trend. For those with a Bloomberg terminal we recommend flipping through BloombergNEF’s “Oil Price Indicators” weekly that is released weekly on Monday, as it provides good charts depicting near-term global oil demand and supply indicators. The global stockpile for crude oil and products surplus narrowed from 30.3 mmb to 29.5 mmb for the week ending Apr 28. Land crude oil inventories increased by +1.1 mmb WoW to 584.8 mmb, shortening the deficit to 25.8 mmb against the five-year average (2016-2019, 2022). Total crude inventories (incl. floating) decreased by – 2.8 mmb WoW to 677.8 mmb, widening the surplus from 20.0 mmb to 20.6 mmb. Total product stocks were up by +0.7 mmb WoW to 942.9 mmb, narrowing the stockpile surplus against the 4-year average (2017-2019,2022) to 8.9 mmb for the Apr 28 week. The gas, oil, and middle distillate stocks decreased by -2 mmb WoW at 147.1 mmb/d, with the deficit against the four-year average widening to 15.4 mmb. Jet fuel consumption by international departures for the week of May 14 is set to increase by +3,700 b/d WoW, while consumption

BNEF’s global oil inventories

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by domestic passenger departures is forecast to increase by +2,560 b/d WoW. Below is a snapshot of aggregate global stockpiles.

Figure 50: Aggregate Global Oil and Product Stockpiles



Source: BloombergBNEF

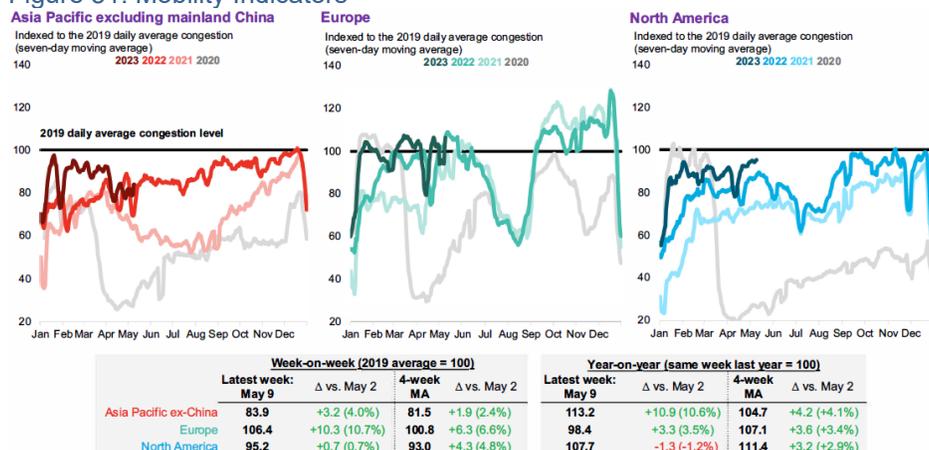
Oil – TomTom mobility indicators: NA, EU, Asia Pacific traffic increases

In the BloombergNEF Global Road Traffic Indicators Weekly report we continue to see the same signals as the US gasoline consumption data from BloombergNEF US Oil Indicators Weekly. Mobility indicators like TomTom data point to stable levels in North American driving YoY, although cumulative road congestion has yet to recover to 2019 levels. For week ending May 9, North American, European, and Asia Pacific (ex-China) traffic levels all increased WoW by +0.7%, +10.7%, and +4.0%, respectively. Traffic levels in Europe are now +6.4% above the 2019 average and up +10.6% YoY. North American traffic is -4.8% below the 2019 average and is -1.2% YoY. Finally, traffic levels in the Asia Pacific (ex-China) region are -16.1% below the 2019 average but up +4.1% YoY. Traffic in the Asia-Pacific region has been exceptionally high since Feb. The TomTom mobility data seems logical as MoM North American road traffic is up slightly resulting in a widened differential to 2022’s levels, but overall congestion remains strong despite being below the 2019 average. It its worth noting that TomTom data on congestion levels now reflects daily average congestion compared to peak congestion previously. The change in methodology took effect from January 19.

Global road traffic indicators

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Figure 51: Mobility Indicators



Source: BloombergBNEF

Oil - International air passenger travel continues to grow in March

On Tuesday, the International Air Transport Association (IATA) announced passenger data for March 2023 [\[LINK\]](#). Total traffic in March, measured in revenue passenger kilometers, rose +52.4% YoY, a slight decrease from last month's +55.5% YoY growth seen in Feb 2023. Globally, traffic is now at 88.0% of March 2019 levels. Domestic traffic for March 2023 was up +34.1% YoY, now only 1.1% below pre-pandemic levels. We continue to see strong growth after January 2023 which was influenced by the reopening of China. International traffic saw the largest increase in March with growth coming in at a staggering +57.9% YoY reaching 81.3% of pre-pandemic levels. All markets continued reporting strong growth, led by Asia-Pacific. The IATA commented, "Reflecting positive developments in China's travel policies, Asia Pacific carriers continued to show strong signs of recovery in March, with an annual growth of 283.1% in international RPKs. Over the same period, the region's airlines saw their RPKs increase from 16.8% to 64.4% of 2019 levels" Our Supplemental Documents package includes the IATA release.

Air travel up significantly in March

Figure 52: March 2023 Air Passenger Market

	World	March 2023 (% year-on-year)		
	share ¹	RPK	ASK	PLF (%-pt) ²
TOTAL MARKET	100.0%	52.4%	41.2%	5.9%
Africa	2.1%	66.1%	51.0%	6.7%
Asia Pacific	22.1%	158.9%	109.0%	15.3%
Europe	30.7%	37.0%	25.9%	6.5%
Latin America	6.4%	19.9%	19.8%	0.1%
Middle East	9.8%	40.4%	28.3%	6.9%
North America	29.9%	16.9%	15.9%	0.7%

Source: IATA

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Oil - Air cargo in March “maintained their annual decline for 13 consecutive months”

The slowing or risk to the global economy is showing up in air cargo. Air cargo volume is the result of export orders and trade so really isn't a leading indicator. Rather the air cargo data reflects export orders, trade and the state of the global economy. On Friday, we tweeted [\[LINK\]](#) “ICYMI. Good monthly read for state of the global economy - @IATA Air Cargo data for March. “industry-wide air cargo CTKs have maintained their annual decline for 13 consecutive mth pace of the annual decline in air cargo CTKs has moderated over the past 2 mth” #OOTT.” On Tuesday, the International Air Transport Association (IATA) announced cargo data for the month of March [\[LINK\]](#). The global demand in air cargo markets remained in a YoY deficit for the 13th consecutive month in March 2023. However, the IAEA wrote “On a positive note, the pace of the annual decline in air cargo CTKs has moderated over the past two months, suggesting some level of stabilization.” Global demand, measured in cargo tonne-kilometres, fell -7.7% YoY compared to February's -7.5% YoY decline but despite the YoY weakness total demand was -2.2% below pre-pandemic levels. Cargo demand has returned to being under 2019 levels once again after February's total demand broke the threshold for the first time in 8 consecutive months. On the international level, all regions saw their YoY declines lesson in Mar compared to Feb but continue to remain below levels seen a year ago. Asia-Pacific airlines saw their air cargo volumes decrease by -7.3% YoY in Mar (-8.3% YoY in Feb), North American carriers posted a -9.4% YoY decrease (-1.0% YoY in Feb), European carriers saw a -7.8% YoY decline (-16.0% YoY in Feb), and finally, Middle Eastern carriers experienced an -5.5% YoY decline in cargo volumes (-8.0% YoY in Feb). ” Our Supplemental Documents package includes the IATA release.

Air cargo demand in March

Figure 53: March 2023 Air Cargo Market

	<i>World share ¹</i>	March 2023 (% year-on-year)		
		CTK	ACTK	CLF (%-pt) ²
TOTAL MARKET	100.0%	-7.7%	9.9%	-8.8%
Africa	2.0%	-6.2%	-4.1%	-1.1%
Asia Pacific	32.4%	-7.3%	23.6%	-16.2%
Europe	21.8%	-7.8%	8.8%	-10.3%
Latin America	2.7%	-5.3%	12.9%	-7.0%
Middle East	13.0%	-5.5%	9.7%	-7.3%
North America	28.7%	-9.4%	0.4%	-4.2%

Source: IATA

Oil and Natural Gas –Very high wildfire risk in Alberta/BC, peak is normally Jul/Aug

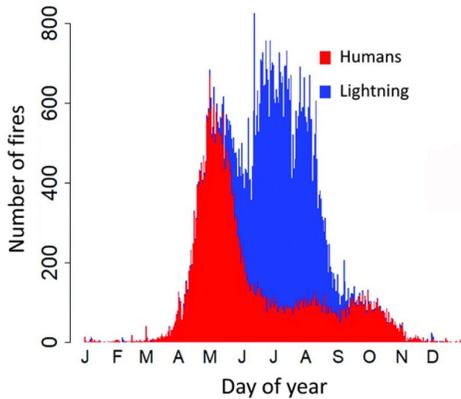
The amount of shut-in oil and gas production varies daily and has been over 500,000 boe/d at times. But as long as we are seeing high number of out of control wildfires, but less than last week, there will be ongoing shut-ins of oil and natural gas production. And we remind that wildfire season is just starting. Unfortunately, we have to remind that wildfire season peak isn't normally until July/Aug. (i) On Tuesday, we tweeted [\[LINK\]](#) “#Wildfire season is, unfortunately, only just starting with normal peak Jul/Aug. See 📌 excerpts. SAF 06/13/21 Energy Tidbits re distribution of wildfires by month in Canada. SAF 05/07/23 Energy Tidbits re heightened 2023 risk with very low precipitation in Nov 1-Mar 31 & Apr. Hope everyone can be safe! #OOTT.” (ii) Our tweet included two graphs from our June 13, 2021 Energy Tidbits memo that shows the normal peak for Canada wildfires is July/Aug with a key reason

High wildfire risk this summer

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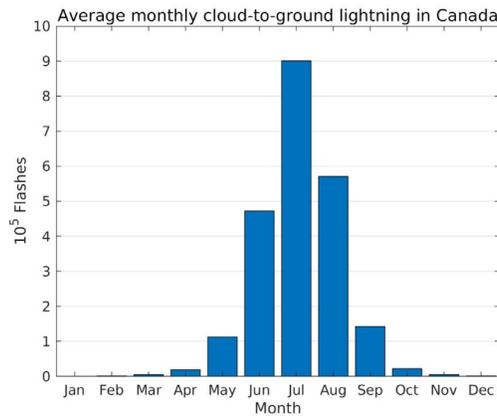
being that is when lightning strikes normally peak. (ii) Our tweet also included the Alberta Environment maps of precipitation % of normal for Nov 1 thru Mar 31, and for the month of April that clearly show how dry it was this winter and especially so in April. We have included these maps previously in our memos.

Figure 54: Canada Wildfires Distribution Over Year



Source: Wildfire Today

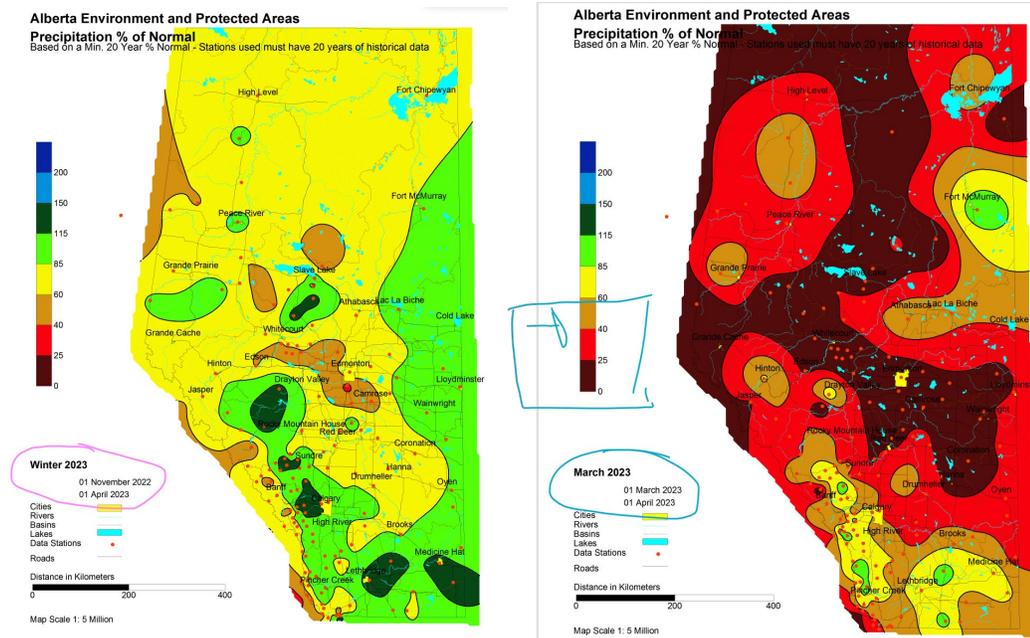
Figure 55: Average monthly cloud-to-ground lightning in Canada



Source: Canada Environment and Natural Resources

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Figure 56: Alberta Precipitation % of Normal for Nov 1-Mar 31, and for April



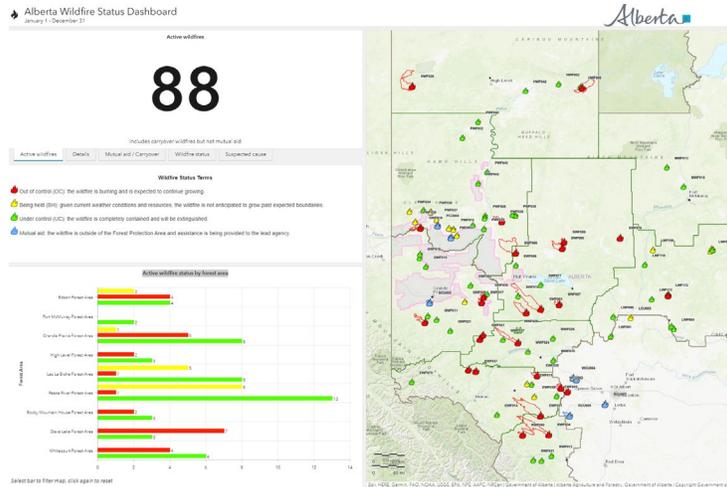
Source: Alberta Environment

Links to Alberta and BC wildfire status maps

We recommend bookmarking the starting points for wildfire information are the Alberta Wildfire Status interactive map [\[LINK\]](#) and the BC Active Wildfires interactive map [\[LINK\]](#). Please note these links have changed over the past few years. Both maps are interactive and open up for the information on any particular fire. Here are the wildfire maps as of 8:30pm MT yesterday.

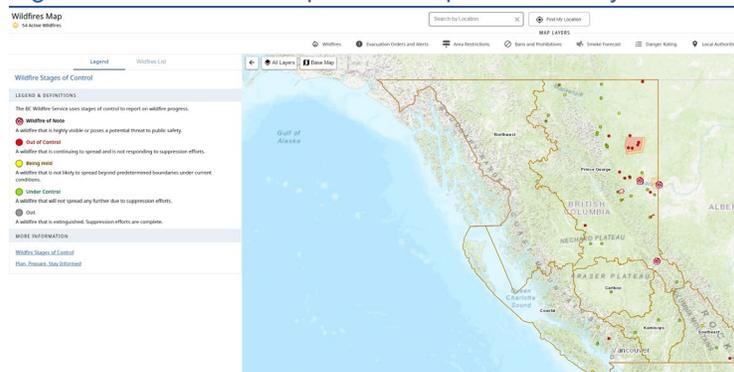
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Figure 57: Alberta wildfire map as of 8:30pm MT on May 13



Source: Alberta Wildfire Status Dashboard

Figure 58: BC wildfire map as of 8:30pm MT on May 13



Source: Alberta Wildfire Status Dashboard, BC Wildfire Service

Oil & Natural Gas –April tornadoes in US were less than 1991-2010 average

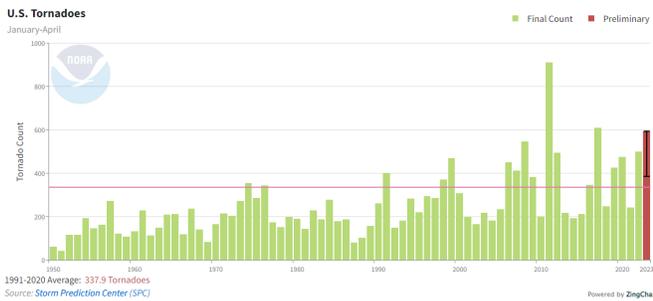
We follow tornado activity as it can impact oil and gas onshore operations in Oklahoma and Kansas. Most of Texas oil and gas operations tend to be south of major tornado activity. But so far, we haven't seen any reports of any major impact to oil and gas in either March or April. March saw record US tornadoes but there were almost zero tornadoes in Oklahoma and Kansas, whereas there were a lower level of tornadoes in the US in April, but a lot more in Oklahoma and Kansas. We haven't seen an reports of a major impact on oil and gas operations from tornadoes. This week, NOAA's National Centers for Environmental Information posted its "April 2023 Tornadoes Report" [\[LINK\]](#). NOAA wrote "According to data from NOAA's Storm Prediction Center, during April, there were 121 preliminary tornado reports. This was below the 1991-2010 average of 155 tornadoes for the month of April." And "A tornado outbreak occurred on April 19 across areas of the southern and central Plains. In

NOAA's April tornadoes report

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total, there were 19 preliminary tornadoes that impacted central Oklahoma, eastern Kansas and western Iowa. These tornadoes included two rated as EF-3s in Oklahoma that caused heavy damage to many homes, businesses, vehicles and other infrastructure. There was at least one reported injury and one fatality.”.

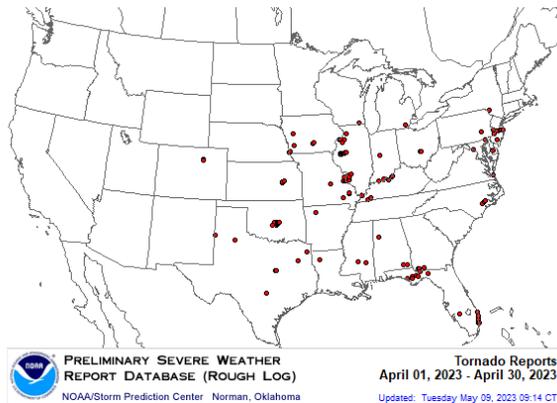
Figure 59: U.S. Tornadoes: January-April



Source: NOAA

Figure 60: April 2023 Tornadoes

April 2023 Tornadoes



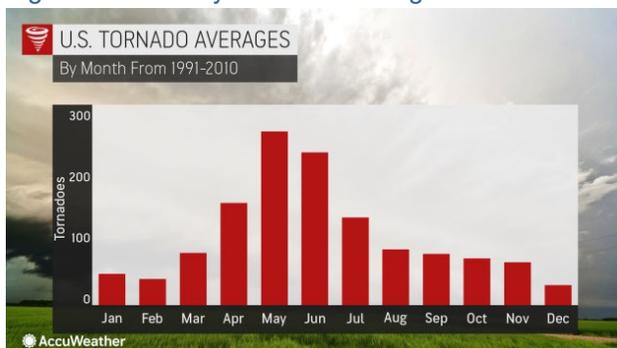
Source: NOAA

Normal peak tornado season is May

We remind that the peak tornadoes month is May. Our April 11, 2021 Energy Tidbits included AccuWeather’s 2021 tornado forecast [\[LINK\]](#), which called for 1,350 to 1,500 tornadoes (vs 1,376 actual). AccuWeather also included the below graph that shows the tornado distribution throughout the year and that the normal peak tornado month is May followed by June, April and July.

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Figure 61: Monthly Tornado Averages



Source: AccuWeather

Tornados Enhanced Fujita Scale (EF Scale) Intensity & Rating

NOAA’s National Weather Service has a recap of the Enhanced Fujita Scale (EF Scale) for the intensity and rating of tornadoes. [\[LINK\]](#). NOAA explains “*The Fujita Scale. Fujita Scale (or F Scale) of tornado damage intensity. The F Scale was developed based on damage intensity and not wind speed; wind speed ranges given are estimated, based on the extent of observed damage.*” But there is also the Enhanced Fujita Scale (EF Scale). NOAA explains “*The Enhanced Fujita Scale or EF Scale, which became operational on February 1, 2007, is used to assign a tornado a 'rating' based on estimated wind speeds and related damage. When tornado-related damage is surveyed, it is compared to a list of Damage Indicators (DIs) and Degrees of Damage (DoD) which help estimate better the range of wind speeds the tornado likely produced. From that, a rating (from EF0 to EF5) is assigned. The EF Scale was revised from the original Fujita Scale to reflect better examinations of tornado damage surveys so as to align wind speeds more closely with associated storm damage. The new scale has to do with how most structures are designed.*”

Figure 62: Enhanced Fujita Scale (EF Scale) for Tornadoes

EF SCALE	
EF Rating	3 Second Gust (mph)
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

Source: NOAA

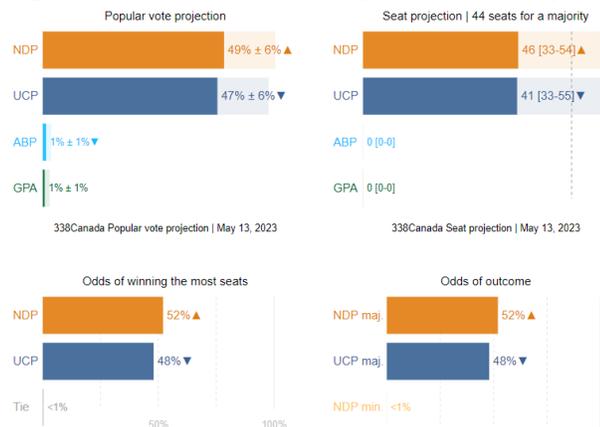
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Alberta provincial election on May 29

Oil & Natural Gas –NDP move into the lead with 2 weeks until Alberta May 29 election

The 4-week sprint for the Alberta provincial election kicked off on May 1 with the election to be held on Mon May 29. The first week saw the UCP party increase its lead driven in great part by the UCP’s Day 1 announcement that there would be cuts to personal income taxes for every taxpayer. But there were as a huge shift in momentum this week and the polls are now showing the NDP in the lead with just over two weeks to go. Below are the 333Canada election projections as of May 13 and as of May 5 that shows the reversal.

Figure 63: Alberta election projection as of May 13

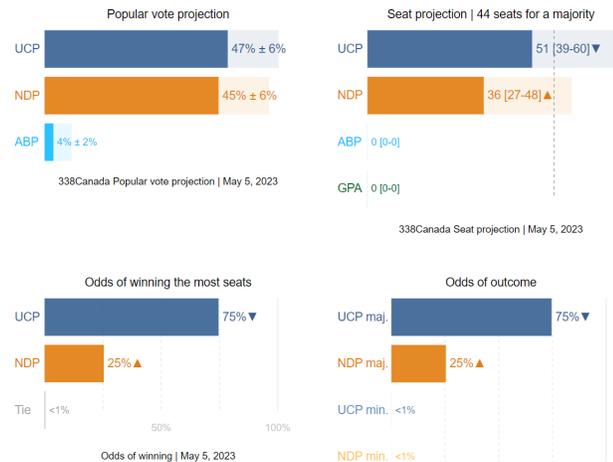


Source: 338Canada

Figure 64: Alberta election projection as of May 5

338Canada Projection | Alberta

Latest update: May 5, 2023



Source: 338Canada

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Oil & Natural Gas – Turkey election too close to call

Turkey's election is today and the question is can Erdogan pull off a bit of a upset as he has been trailing in the polls. Erdogan has been pulling out all stops and making big spending commitments to try to pull off another win. Although the question will be if he or his opponent, Kemal Kilicdaroglu, will get the 50% minimum needed to avoid a May 28 runoff. The fear is that if Erdogan can get into a May 28 runoff, he can somehow pull off a May 28 win. It will be interesting for markets if either Erdogan or Kilicdaroglu gets past the 50% threshold and if that bring an immediate return of international capital to Turkey.

**Turkey's
Presidential
election today**

Oil & Natural Gas –Biden keeping Big Oil as his #1 villain

The reality of elections is that, to the most part, the election campaigning is all about picking villains and highlighting the negative they do and how they should be penalized. There was also a good reminder this week that Biden's 2024 election campaign, which has effectively started, that he will continue to keep the oil industry as the #1 villain. So with the focus turning to the 2024 Presidential election, people should be aware that the Biden Administration will have to be doing things that fit Biden's narrative on the oil industry ie. cutting what he always calls subsidies for Big Oil. On Wednesday, we tweeted [\[LINK\]](#) "545 days to go until nov 5, 2024 presidential election means 545 more days of #BigOil being the #1 villain for #Biden. #OOTT." Our tweet included a clip of Biden's comments post the meeting with the Republican leaders in the White House. Biden said "this debate is about fundamental choices. Would you rather cut, would you rather continues a subsidy of \$30b for Big Oil or cut \$30b from veterans, dollars.

Biden on Big Oil

Energy Transition – Norway wants more oil & gas to fund social costs for generations

Norway is a global leader in the Net Zero push such as its early and continued strength in new EV sales. However, it also has taken a reality check on what it needs – it needs more oil and natural gas. And there is no doubt that Norway wants more oil and natural gas and needs more oil and natural gas to pay the bills for its social programs for current and future "generations". (i) On Thursday, we tweeted [\[LINK\]](#) "Greta may not like it, but Norway knows reality that #Oil #NatGas pays the social bills & more production is needed for future generations. "we must further develop our petroleum sector" "income from petroleum industry ... makes an important contribution to the financing of the welfare state for current & future generations" says @terjeaa in revised national budget. #OOTT", and [\[LINK\]](#) "ICYMI. See  earlier tweet on Norway's clear statement. Norway needs more #Oil & #NaGas to pay the social bills for current and future "GENERATIONS". Plural! The demise of #Oil and #NatGas will take a lot longer than expected. #OOTT." (ii) Our tweet included Norway's release (it was in Norwegian only) on its Revised National Budget. Norway noted that its 2023 net cash flow from the oil and gas industry was going to be down YoY, but still at approx. three times the average in the prior decade. (iii) Norway was very clear that it wants and needs increased oil and gas production. And that oil and gas net cash flows are needed to help fund the social costs for the current generation and futures "generations". The part that caught our attention were the quotes attributed to Oil and Energy Minister Terje Aasland. Aasland said "we must further develop our petroleum sector" and "The income from the petroleum industry is unique for the country and makes an important contribution to the financing of the welfare state for current and future generations". (iv) Norway may well be a climate change leader, but there isn't any doubt that Norway needs more oil and gas to fund its social programs for decades to

**Norway wants
more oil and
natural gas**

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come. Our Supplemental Documents package includes the Google Translate of the Norway statement on its Revised National Budget. [\[LINK\]](#)

Energy Transition – Buffett on inability to build transmission in the US

Warren Buffett highlighted what he sees is the big miss so far on the execution of the Energy Transition in his response to a question at the Berkshire Hathaway annual meeting last Saturday – the inability to get the needed transmission lines from new renewable energy sources to demand markets. (i) Buffett and Greg Abel went thru a lengthy explanation of the inability to get transmission lines done. And Buffett also didn't want to let it lie with their answer and stepped in and said he want to take an extra minute as this is very important. There were multiple comments such as Buffett "... *but it is not easy when you cross state lines. Different jurisdictions, we should, this country should be ahead of where it is in terms of transmission.*" Abel ". *Here we are in 2023 and we have a little more than 1/3 of that, at the time it was \$6 billion transmission project. Today, we have a little more than 1/3 of it built and we've spent probably closer to \$7 billion. It's the right outcome. It's still a great outcome for our customers, but that transmission is part of the transformation. You absolutely have to build it to move all that renewable energy and that's sort of the complexity Warren was highlighting. It is a, you can't just wake up one day and solve this problem. You start with transmission and you build the resources.*" Buffett "*The present democratic system, I am not sure I know the answer, but I sure know the problem. If you've got an emergency, need to re-engineer the energy system of the US, I don't think you can do it without something resembling the machinery, the urgency, whatever. The capital is there, the people are there, the objective is obvious. We just don't seem to be able to do it in peace time where we're used to follow a given set of procedure and. China has got one country and we've got 50 states. And we got a whole different set of government. We should be up to the test but so far, it hasn't worked,*" (ii) Inability to get transmission done is something that has been obvious but one that leaders have put their head in the sand. Renewable energy, solar and wind, to the most part isn't generated near electricity demand areas. And mostly isn't in areas with existing major electricity transmission lines or sufficient electricity transmission capacity. So new transmission lines have to be built to take renewable energy to get to markets. And this means crossing many state lines. And each state has their way to stop it. After all, the only benefit to those states is whatever revenues come from the providing the transmission route. And then even within states, there is always the NIMBY as people don't want power lines thru their areas. (iii) The big difference for natural gas for power generation is you move the natural gas to power stations at the demand location and not move the electricity generated by natural gas demand thousands of miles. And there is a network of natural gas pipelines that can provide last mile delivery. Plus there is electricity loss as there is more distance of transmission so less efficient. Our Supplemental Documents package includes the transcript we made of the Buffett and Abel replies.

**Warren Buffett
on inability to
build
transmission**

Energy Transition – Aramco CEO, can't get offtake as blue hydrogen cost \$250/boe

We continue to believe that one of the key assumed parts of the energy transition, hydrogen, will take way longer than the aspirations. There will be small deals, but the challenge for the needed big anchor deals is that hydrogen is very expensive. There is no question that Saudi Aramco has been trying to do long term Blue Hydrogen supply deals, but Saudi Aramco CEO Nasser also gave a reality check why that hasn't happened – Blue Hydrogen is too expensive at a cost of \$250/boe/d. That's a huge premium and why Saudi Aramco hasn't been able to

**Blue hydrogen
costs \$250/boe**

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get a major long term capital commitment to get the needed anchor deals. No one should be surprised to hear that, and we actually thought the cost might be higher. On Wednesday, we tweeted [LINK](#) “#NatGas #LNG will be needed for a very long time. #SaudiAramco CEO, #BlueHydrogen cost ~\$250/boe! “very difficult to identify any off-take agreement in EU” “Even the customers in Japan and Korea are waiting for government incentives” Thx @MattMartin128 @faaj22 #OOTT.” Nasser made his comments in the Q&A of the Aramco Q1 call on Wed. Our tweet included the Bloomberg report, which was consistent with the Q1 call transcript that wasn’t public until Thursday night. Here is what Bloomberg wrote “Yet existing technology means blue hydrogen could cost the equivalent of around \$250 a barrel of oil, Aramco’s chief executive officer said on Tuesday. “It is very difficult to identify any off-take agreement in Europe” for blue hydrogen, Amin Nasser said on a call with analysts on Tuesday. “Even the customers in Japan and Korea are waiting for government incentives. Until they get these incentives, it’ll be costly for them to pursue that blue hydrogen.” The company won’t make a final investment decision to build hydrogen export facilities without first signing supply deals, he said. It’s so far sent test shipments in the form of ammonia to South Korea and Japan. “This is a very expensive program,” Nasser said. “It’s a lot of capital and you need customers. So we will not sanction a project without securing an off-take agreement.” Our Supplemental Documents package includes the Bloomberg report.

01/08/23, Norway minister, hydrogen light years away from being reasonable

In January, Norway came out with very blunt comments that hydrogen is “light years away from being justifiable or reasonable”. Here is what we wrote in our Jan 15, 2023 Energy Tidbits memo. “Earlier this morning, we tweeted [LINK](#) on Norway cabinet minister Moe’s common sense approach as to why hydrogen is “light years away from being justifiable or reasonable”. Moe said “And we must have a proven relationship with simple factors such as resource efficiency and effectiveness”. He just wants to go with the economics as known. We also earlier tweeted [LINK](#) “Inmate escaping or crazyman? See 🇳🇴 Norway cabinet minister Moe 01/08 posting. Hydrogen has large energy losses at both ends of the process, “in my opinion, light years away from being justifiable or reasonable”. Energy will be \$\$\$\$ in the #EnergyTransition. #OOTT #NatGas .” Our tweet referenced a Facebook Jan 8 posting by Norway cabinet minister Moe. Moe is currently Minister of Research and Higher Learning, but was previously Minister of Petroleum and Energy from 2011 to 2013. Moe went thru his analysis of the energy losses in hydrogen and why he says “It is, in my opinion, light years away from being justifiable or reasonable.” Here is his math on why hydrogen doesn’t make sense. This is from Google Translate “Hydrogen is certainly good for many things, but the fact is that it is a highly explosive storage medium with large energy losses at both ends of the process. If you use 100 kwh of electricity to produce hydrogen, you will be left with an amount of energy in hydrogen corresponding to 50 kwh. In other words, half of the energy is lost. If you are going to use this hydrogen in a fuel cell, you lose a further 50%. If you run it in a turbine to produce electricity, you lose 70%. In other words, you get a utilization rate in a car of about 25% or 25 kwh of the original 100 kwh due to energy loss in the processes. In a simple turbine, the loss is even greater. Alternatively, this current/energy could have been used directly all the time it is taken from the grid in Norway with a utilization rate for, for example, heating, production or transport of 90-100%! If Statkraft together with NEL succeeds in establishing 2 gw electrolysis of

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hydrogen in Norway, this corresponds to an energy quantity of approximately 17.5 twh, or approximately 12-13% of all power production in Norway.” Our Supplemental Documents package includes Moe’s Facebook posting and the Google Translate thereof.”

Hydrogen is an energy carrier, produced from another substance

We recognize that the Energy Transition world is aggressively pushing hydrogen and, unfortunately, many or most of the general comments on hydrogen talk about it as this great clean energy source. However, we want to remind that hydrogen is just like electricity in that it is produced from another substance such as coal, natural gas, etc. it is an energy carrier or storer. Here is what we wrote a year ago in our Jan 23, 2022 Energy Tidbits memo. “On Friday, we tweeted [\[LINK\]](#) “takes more energy to produce #hydrogen (by separating it from other elements in molecules) than hydrogen provides when it is converted to useful energy” “an energy carrier that must be produced from another substance”. nice to see @EIAgov give facts not fiction. #OOTT #NatGas.” This follows the new Jan 20 update from the EIA “Hydrogen explained”. Hydrogen is considered one of the must be a significant contributor to any and all plans to get to Net Zero. Our view is unchanged, we understand why the Net Zero side pushes it for items like heavy industry, but it seems to get overlooked that hydrogen is not an energy sources like natural gas or solar. Rather it is an energy carrier. The EIA stuck to the basics on hydrogen and didn’t politicize their message in their Jan 20 update on hydrogen. The EIA explained this concept clearly. “Hydrogen is an energy carrier Energy carriers allow the transport of energy in a usable form from one place to another. Hydrogen, like electricity, is an energy carrier that must be produced from another substance. Hydrogen can be produced—separated—from a variety of sources including water, fossil fuels, or biomass and used as a source of energy or fuel. Hydrogen has the highest energy content of any common fuel by weight (about three times more than gasoline), but it has the lowest energy content by volume (about four times less than gasoline). It takes more energy to produce hydrogen (by separating it from other elements in molecules) than hydrogen provides when it is converted to useful energy. However, hydrogen is useful as an energy source/fuel because it has a high energy content per unit of weight, which is why it is used as a rocket fuel and in fuel cells to produce electricity on some spacecraft. Hydrogen is not widely used as a fuel now, but it has the potential for greater use in the future”. Our Supplemental Documents package includes the EIA Jan 20 update Hydrogen explained. [\[LINK\]](#)”

Energy Transition – UAE takes its common sense approach to agriculture

The UAE continues to put forward a practical approach to climate change including a key starting point – what are the priorities. That was clearly shown by the UAE vs the US on their comments on the goals for the big AIM for Climate Summit in Washington. The US described the summit as “bringing together public- and private-sector partners who are working to increase action and investment for climate-focused innovation in agriculture and food systems.” The US and UAE are co-hosts for the summit. We were watching Morning Joe on Wednesday, when Mika Brzezinski asked each of the co-hosts what are the goals of the summit. Their answers were very different. The climate change side in the west may not like the UAE goal because the UAE didn’t say the goal is to reduce emissions. But we have to

UAE’s goal for agriculture

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believe the rest of the world that isn't rich likes the UAE goal to be able to feed people around the world. We can't help think the UAE goal should be the issue for a world challenged to feed people. We tweeted [\[LINK\]](#) "Big difference in what cohosts highlight as the goal of @AIMforClimate summit to @morningmika. US @SecVilsack. "to accelerate innovation. #Agriculture has the opportunity globally to be the 1st industry to a net zero future". UAE @mariammalmheiri. "what it comes down to is really what can we do to make food more affordable, available, and accessible for everyone. Key here is as @SecVilsack said is innovation". Reminds of UAE approach for COP28, Dr. Al Jaber's focus is for "pragmatic, just and well-managed energy transition". #OOTT." Our tweet included a 2 min clip that is worth a listen.

Energy Transition – UAE's approach for COP28, climate change doesn't like it

The UAE are the hosts for COP28 and their comments continue to highlight their approach to COP28 that isn't being liked by the climate change side. Here is what we wrote in last week's (May 7, 2023 Energy Tidbits memo. "It would have been interesting to see how many pro-climate protestors would be show up for COP28 if UAE was more easily accessible and open to protests. So we won't get the true social protest effect when COP28 is held in the UAE because there shouldn't be any doubt that COP28 President (UAE's Dr. Sultan al Jaber) message isn't what the pro-climate people want to hear. And he is already setting the stage for that message. (i) Earlier in the memo, we highlighted Amena Bakr's (Energy Intelligence) expectation for good news soon on a Saudi/Houthi deal. Bakr is Chief Opec Correspondent & Deputy Bureau Chief and based in Dubai, UAE. On Tuesday, we tweeted [\[LINK\]](#) "#COP28 should be interesting. @Amena__Bakr always has good insight into #OPEC thinking. "what EU is facing today in terms of energy security should really be a warning sign that hydrocarbons are still relevant. They're here to stay for some time. Sure we need to invest in the transition but it can happen in parallel. And i think this message is going to be conveyed later in the year by the UAE when we have COP28". #OOTT". (ii) Later on Tuesday, Al Jaber made a keynote speech at the St. Petersburg Climate Dialogue 2023. We tweeted [\[LINK\]](#) "UAE lays out vision for #COP28. "in a pragmatic, just & well-managed energy transition" "must be laser focused on phasing out fossil fuel EMISSIONS" "scaling up viable, AFFORDABLE zero carbon alternatives". And more! Interesting debate & negotiations ahead for delegates. #OOTT." Jaber is talking about phasing out fossil fuel emissions but not fossil fuels. And he is onsite with scaling up viable, affordable zero-carbon knowing that most isn't viable on a commercial scale or affordable. And there are more. Our tweet included the transcript we made of Al Jaber's comments. [\[LINK\]](#) Al Jaber ""Trust is also essential in the negotiations process. In fact, trust is a critical success factor. And as COP28UAE President-Designate, I will ensure a fair, inclusive and transparent presidency that provides space for all parties to reach consensus across the whole agenda. And here, let me assure you that, under this Presidency's leadership, the negotiations will give space for all parties to discuss, debate and agree on the role of all sources of energy. And on that point, let me say this and let me be perfectly clear. In a pragmatic, just and well-managed energy transition, we must be laser focused on phasing out fossil fuel emissions, while phasing up and scaling up viable, affordable, zero carbon alternatives. This is the approach we have been taking in the UAE for more than 20 years, where we have embraced, in practice, the energy transition. We know that the energies used today will continue to be part of the global energy mix for the foreseeable future. And, as such, we will continue to work with the world to decarbonize the

UAE's vision for COP28

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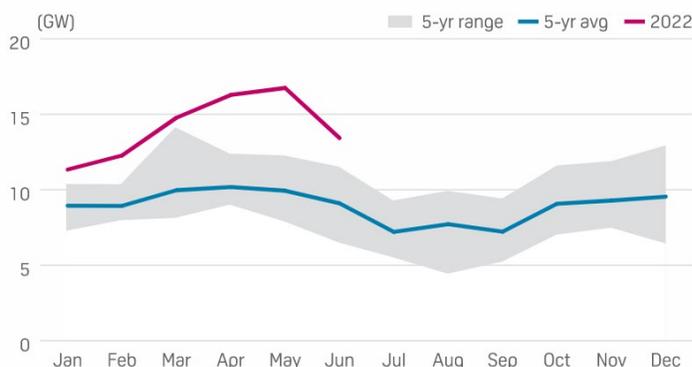
current energy system while we build the new energy system that is capable of transitioning even the most heavy emitting industries.”

Energy Transition – Texas wind generation typically declines in May/June/July

Earlier in the memo, we noted the current NOAA 8-14 day temperature forecast that calls for colder than normal temperature for Texas to end May ie. no real temperature driven demand for electricity. One key Texas electricity to remember for May is that normally Texas wind generations starts to seasonally decline in Many June and July. Here is what we wrote ion our July 31, 2022 Energy Tidbits memo. *“There was a good reminder this week on two key elements of Texas wind power generation – it’s up big YoY and the summer is the seasonally low period for wind generation. On Tuesday, we tweeted [\[LINK\]](#) “Texas #Wind generation up big in 2022, however, average wind output tends to wane from June thru Sept. and risk increases for sufficient wind power to be unavailable during certain peak hours in Aug & Sept. Great reminder from @SPGlobalPlatts Mark Watson. #NatGas #OTT”. There has to be some sort of power that can come to the rescue with the unpredictability of wind power. In Texas’ case, it would be natural gas. Platts posted the report “As Texas heat persists, ERCOT forwards indicate risk of triple-digit power prices” [\[LINK\]](#). Platts included the key graph below of average hourly wind output in 2022 compared to 5-year historical output”*

Texas wind power risk

Figure 65: ERCOT Average Hourly Wind Output



Source: ERCOT

Energy Transition – Car and Driver reminds EVs are best for city drivers

There was a good reminder from Car and Driver on April 21 that it is important to understand the assumptions in how range estimates for EVs and ICE are calculated. The Car and Driver report is titled *“EVs Fall Short of EPA Estimates by a Much Larger Margin Than Gas Cars in Our Real-World Highway Testing”* [\[LINK\]](#). They co-authored a paper with SAE International paper that used *“real-world highway test”* and wrote *“Basically we’ve taken a look at how vehicles perform relative to the values on the window sticker, looking at the difference between what the label says and what we actually see in our real-world highway test,” explained VanderWerp. “We see a big difference in that gap between gas-powered vehicles and the performance of EVs. The real question is: When first-time customers are buying EVs, are they going to be pleasantly surprised or disappointed by the range?” On Car and Driver’s 75-mph highway test, more than 350 internal-combustion vehicles averaged 4.0 percent better fuel economy than what was stated on their labels. But the average range for an EV*

EVs vs EPA range estimates

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was 12.5 percent worse than the price sticker numbers.” Note this is for a highway test and not for the combined city/highway assumptions in the EPA ratings. Car and Driver writes “*The combined rating is weighted 55 percent in favor of the city figure, where EVs typically perform better. This inflates the range estimates, making it harder to match in real-world highway driving. The paper proposes publishing both city and highway range figures—as with fuel-economy estimates for gas-powered vehicles—to give shoppers a more holistic sense of a vehicle's abilities. The way the tests are conducted also skews the reported range figure. Unlike Car and Driver's real-world test—carried out at a constant 75 mph—the EPA's cycle is variable, with the speed increasing and decreasing over the course of the test. While this is detrimental to the results for gas vehicles, which tend to be most efficient at a steady rpm, the ability to regenerate energy under braking leads to higher range results for EVs, which are shifted even higher by the slight bias towards the city results in the combined rating.*” It's a good reminder that EVs are better suited for city drivers and not those that drive on highways. Our Supplemental Documents package includes the Car and Driver report.

Capital Markets – Surely AI & Automation will deal with Jamie Dimon's shorting issue

On Friday morning, we tweeted [\[LINK\]](#) “Coming soon! Surely #AI and #Automation will give regulators the tool to deal with #JamieDimon concern re short selling, tweeting, etc on all sectors, not just banks. See 📌 @flacqua clip. #OOTT.” JP Morgan CEO Jamie Dimon was interviewed on Bloomberg TV and gave his view that regulators could deal with short selling of banks question. When we heard his views, our first thought was that surely AI and Automation will give the right at hand tools to figure out items like short sellers and tweeting and not just for banks but for all sectors. Our tweet included a 50-second clip of Dimon's comments. And we created a transcript of his comments. Bloomberg's Francine Lacqua asked “Do regulators to look at short sellers and banks?” Dimon replied “Yes. You know, look, my folks would tell me that that's not the problem. The short selling ban and if you actually analyze stocks and short sell, it's noting that big a deal. I think they may be partially wrong, because as you know, some of the people are unscrupulous and they use other means to go short. I think that if you look at the detail, the SEC has the enforcement capability to look at what people are doing by name, in options, derivatives, and short sales. If someone's doing anything wrong, people are in collusion or people are going short and then making a tweet, you know about a bank, they should go after 'em and, and, and vigorously they should be punished to the full extent the law allows you. So, uh, I think it's positive taking place. You have no evidence of it, but, you know, my experience in life has been don't, don't assume too much.”

**Jamie Dimon's
short selling
issues**

Capital Markets – Many Charlie Munger investor insights in one response

We listened to the 5+ hours of Berkshire Hathaway annual meeting last Saturday and one of the items that got our attention was one Warren Buffett and Charlie Munger answer that had multiple investor reminders in a short answer. On Monday, we tweeted [\[LINK\]](#) “#Berkshire2023. Lots in this one short #CharlieMunger answer. See 📌 SAF transcript not easy to have a vast plethora of good opportunities that are easily identified. some people can't tell their best ideas from their worst and in deciding that an investment idea is already good, they get to thinking it is better than it is. lot of people who are geniuses on IQ tests think they are a lot smarter than they are and what they are is dangerous. #OOTT.” There was actually more in a short answer. Our tweet included the transcript we made of their reply. Items in “italics” are SAF Group created transcript. At 2hr 6:10 min mark, Munger “I

**Charlie Munger
investor insights**

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think one of the inane things that is taught in modern university education is that a vast diversification is absolutely mandatory in investing in common stocks. That is an insane idea. It's not that easy to have a vast plethora of good opportunities that are easily identified. if you only got three, I'd rather it be invest in my best idea not my worst. Now some people can't tell their best ideas from their worst and in deciding that an investment idea is already good, they get to thinking it's better than it is. I think we make fewer mistakes like that than other people. And that is a blessing to us. We're not so smart but we kind of know where the edge of our smartness is. That is a very important part of practical intelligence. A lot of people who are geniuses on IQ tests think they are a lot smarter than they are and what they are is dangerous. But If you know the edge of your own ability pretty well, you should ignore most of the notions of our experts about what I call de-worseification of portfolios".

Capital Markets – Continued negative nonfarm labor productivity

One of the monthly economic data that caught our eye this week was nonfarm labor productivity for Q1/23. It's a data point that has caught our attention for the past couple years as we keep watching it get worse. It's one of those data points that, in theory, should be getting better with technology, education, etc. Last Sunday night, we tweeted [\[LINK\]](#) "ICYMI from Thurs morning. US nonfarm labor productivity in Q1/23 was -0.9% YoY. 1st time, 4-quarter change has remained negative for 5 consecutive quarters since data started in Q1/48. #OOTT." The US Bureau of Labor Statistics presents the data, but doesn't get into analysis of the Why. But they wrote [\[LINK\]](#) "From the same quarter a year ago, nonfarm business sector labor productivity decreased 0.9 percent, reflecting a 1.3-percent increase in output and a 2.3-percent increase in hours worked. (See table A1.) The 0.9-percent productivity decline is the first time the four-quarter change series has remained negative for five consecutive quarters; this series begins in the first quarter of 1948." And "Labor productivity, or output per hour, is calculated by dividing an index of real output by an index of hours worked by all persons, including employees, proprietors, and unpaid family workers. During the current business cycle, starting in the fourth quarter of 2019, labor productivity has grown at an annual rate of 1.1 percent, reflecting a 1.9-percent rate of growth in output and a 0.8-percent rate of growth in hours worked during the business cycle. The 1.1-percent rate of productivity growth in the current business cycle thus far is a historically low productivity growth rate; no other previous business cycle had lower productivity growth, except for the brief six-quarter cycle from 1980 Q1 to 1981 Q3, which exhibited 1.0 percent growth."

**US nonfarm
labor
productivity**

Largest decline in US labor productivity since 1948

Here is what we wrote in our Aug 21, 2022 Energy Tidbits memo, which was the last time we noted US nonfarm labor productivity in our memo. We generally don't include a lot of general economic data points because they generally get a lot of business news discussion. But there was one US economic data point that had to catch everyone's attention when you hear it's the worse since 1948. It was the US labor productivity data. On Aug 8, the U.S. Bureau of Labor Statistics [\[LINK\]](#) reported "From the same quarter a year ago, nonfarm business sector labor productivity decreased 2.5 percent, reflecting a 1.5-percent increase in output and a 4.1-percent increase in hours worked. The 2.5-percent decline in labor productivity from the same quarter a year ago is the largest decline in this series, which begins in the first quarter of 1948."

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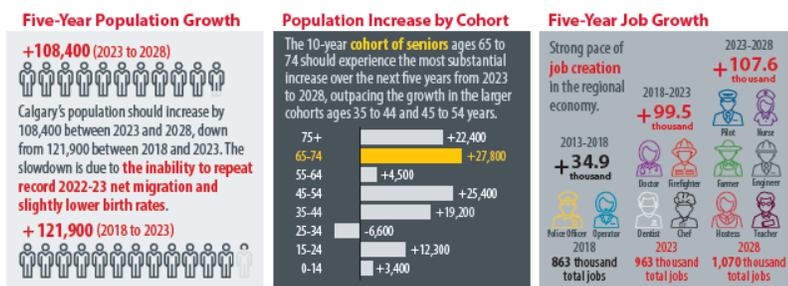
Demographics – Warren Buffett “you can always tell someone to go to hell tomorrow”
 Earlier in the memo, we referenced some Warren Buffett advice. We listened to the CNBC replay of the 5+ hours of Berkshire Hathaway AGM Q&A [\[LINK\]](#). As noted earlier, the posted transcripts weren’t the greatest in spots. But here is the transcript of his good advice. Items in *italics* are SAF Group created transcript. At 3hr 26 min mark, Buffett *“It’s not that complicated, but I will give you a couple lessons. Tom Murphy, the first time I met him, he said two things to me. He said you can always tell someone to go to hell tomorrow. Well, that was great advice then, think about great advice it is when can you sit down on a computer and screw your life up forever by telling someone to go to hell or something else in 30 seconds and you can’t erase it. You haven’t lost the option. He said praise my name, criticize my category. What makes more sense than that. Who do you like to criticize as you’ve always done. You don’t need to vilify anybody to make your point on subjects of discussion.”* Great advice before you hit the send or post or tweet button.

Great Warren Buffett advice

Demographics – Calgary population +3.0% to 1,389,200 at Apr 1, 2023
 Calgary continues to see strong population growth. Earlier this morning, we tweeted [\[LINK\]](#) *“More people = more demand for housing = higher house prices. May 1: @CREBNow, Calgary benchmark home price was +2% MoM to \$550,800 in April, new monthly record high. @cityofcalgary, Calgary population +3% to 1,389,200 at Apr 1/2023, followed +2% growth for 2022. Imagine if #Oil #NatGas was not out of favor with Energy Transition. #OOTT.”* Our tweet included the Calgary Real Estate Board May1 update that wrote *“Persistent sellers’ market conditions placed further upward pressure on home prices in April. After four months of persistent gains, the total unadjusted benchmark price reached \$550,800, nearly two per cent higher than last month and a new monthly record high for the city.”* Our tweet also included an excerpt from The City of Calgary new Calgary and Region Economic Outlook 2023-2028 this week. *“The City of Calgary’s estimate for the local population as of April 1, 2023, is 1,389,200. The annual rate of population increase was about 40,600 people or 3.0 per cent, which is an acceleration from 2.0 per cent in 2022.”* And *“Calgary’s population should increase by 108,400 people between 2023 and 2028.”* One other demographic tit is the biggest growth will be in seniors, expected to be +27,800 from 2023 to 2028. Our Supplemental Documents package includes the population excerpt from the City of Calgary outlook. [\[LINK\]](#)

XXXX

Figure 66: Calgary Five-Year Population Growth



Calgary and Region Economic Outlook 2023-2028 | Spring 2023

6 Source: City of Calgary

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Twitter – Look for our first comments on energy items on Twitter every day

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.

**@Energy_Tidbits
on Twitter**

LinkedIn – Look for quick energy items from me 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 [\[LINK\]](#).

**Look for energy
items on LinkedIn**

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 and Calgary items.

Mother's Day means KFC will be very busy

Happy Mother's Day! Mother's Day is a holiday first recognized by Congress in 1914. A lot has changed, but one tradition has not changed. Its taking Mom out for a meal or picking up takeout food so Mom doesn't have to cook. One food establishment that still has very busy Mother's Day is KFC, or Kentucky Fried Chicken as it was known in the 60s. KFC's May 4 press release [\[LINK\]](#) "*For nearly 70 years, KFC has been bringing families together for Mother's Day through its Original Recipe® fried chicken and finger lickin' good food. KFC sells nearly 400,000 buckets of fried chicken each Mother's Day, making it one of its most popular days of the year.*" As busy as it may be, we have to believe it is nowhere near as busy in the 60s when there was less takeout selection, families went to church and less Dads knew how to cook. In the 60s, KFC was a zoo after church as Dad would stop on the way home to pick up the bucket of fried chicken. The family going to church may have changed, but in a world of disruptive and rapid change, one tradition that hasn't changed is that Mother's Day is still KFC's busiest, or one of the busiest, days of the year. The KFC release doesn't include the data that they did a few years ago when they said business is normally at least 40% higher on Mother's Day than a comparable Sunday. We have to believe that in the 60s, it was way higher when there weren't very many take out food choices. One other different item now is that it seems like more people are taking their moms out on Saturday to avoid the mass rush on Mother's Day.