Energy Tidbits

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EIA's First Look at 2024: Record Oil Consumption +1.72 mmb/d YoY to 102.2 mmb/d ie. No Sign of Peak Oil Demand

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. EIA had their first look at 2024 and is forecasting another year of record oil consumption ie. no sign of peak oil demand (Click Here).

2. It's been seven weeks since BC affirmed they were very close to a deal with Blueberry First Nations and now seeing how no deal is impacting 2023 drilling programs (Click Here).

3. QatarEnergy CEO believes Russia pipeline natural gas will eventually again flow to Germany, which we believe will be a key factor for global natural gas and LNG markets for the 2020s (Click Here).

4. The oil and markets story continues to be China moving quickly to herd immunity and domestic activity is cranking up (Click Here).

5. Biden makes it easier for permitting of solar/wind projects and tougher for oil and gas projects (Click Here).

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

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

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Natural Gas – 1st ever natural gas build in Jan, storage now -114 bcf YoY deficit

YoY storage at -114 bcf YoY deficit

No one should be surprised to see the huge narrowing of the YoY storage deficit given it was well above normal temp across the US, but not many expected to see the first ever build in gas storage in Jan. The YoY deficit narrowed from -308 bcf YoY for Dec 30 to -114 bcf YoY as of Jan 6. The EIA reported a +11 bcf build (-10.9 bcf draw expectations) for the Jan 6 week, which was a small build vs the 5-yr average of a -157 bcf draw, and last year's draw of -179 bcf. Storage is 2.902 tcf as of Jan 6, with a now YoY deficit of -114 bcf vs -308 bcf YoY deficit last week and is -40 bcf below the 5-year average vs -208 bcf below last week. Below is the EIA's storage table from its Weekly Natural Gas Storage Report [LINK].

Figure 1: US Natural Gas Storage

	Stocks billion cubic feet (Bcf)				Historical Comparisons Year ago (01/06/22)		5-year average (2018-22)	
Region	01/06/23	12/30/22	net change	implied flow	Bcf	% change	Bcf	% change
East	700	691	9	9	735	-4.8	702	-0.3
Midwest	823	839	-16	-16	843	-2.4	826	-0.4
Mountain	153	157	-4	-4	161	-5.0	162	-5.6
Pacific	160	165	-5	-5	206	-22.3	235	-31.9
South Central	1,067	1,040	27	27	1,096	-2.6	1,017	4.9
Salt	295	270	25	25	332	-11.1	301	-2.0
Nonsalt	772	770	2	2	764	1.0	715	8.0
Total	2,902	2,891	11	11	3,042	-4.6	2,942	-1.4

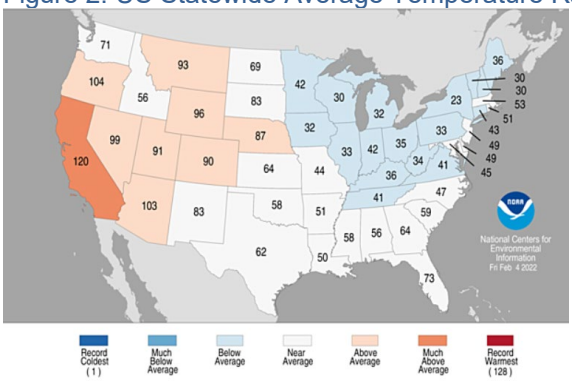
Source: EIA

Natural Gas – Jan 2023 storage draws are being comp'd vs normal temps in Jan 2022

Jan 2022 was normal temperatures

It's been warmer than normal in the US to start Jan, which means there should be a narrowing of the YoY storage deficit because the comparison will be to a relatively normal temperature Jan 2022. NOAA's recap of Jan 2022 [LINK] was the 58th warmest in the last 127 years ie. More or less normal. The NE US saw slightly below average temperatures in January while the western states were warmer. The average temperatures across all lower 48 states was 31.0 degrees F, 0.9 degrees F above the 20th century average for January. Below is a graphic depicting the state average temperature ranks.

Figure 2: US Statewide Average Temperature Ranks January 2022



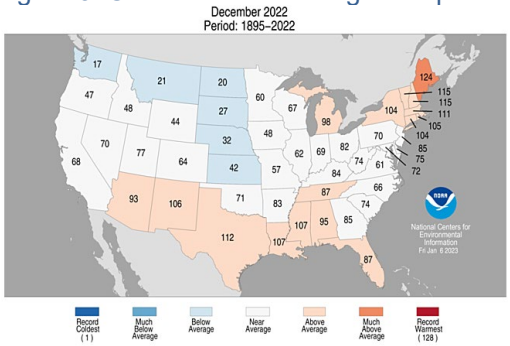
Source: NOAA

Natural Gas – NOAA Dec US was normal temps, but warmer than normal in NE

December weather recap

It didn't seem like it for natural gas markets, but overall, the US had a normal Dec fo temperatures. But what hurt natural gas was it was warmer than normal to end Dec in the populous NE US. NOAA posted its recap of US weather for Dec [LINK] that showed Dec 2022 ranked 64th, exactly in the middle, in the 128-year record, despite the warmer temperatures in the northeast and south US.

Figure 3: US Statewide Average Temperature Ranks December 2022

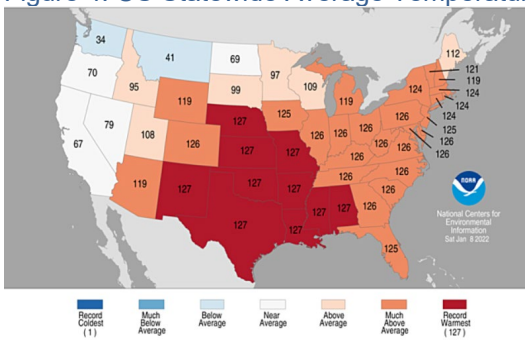


Source: NOAA

Whereas Dec 2021 was the hottest in the last 127 years

Even though it was a normal temperature month in Dec 2022, Freeport LNG's 2.2 bcf/d was shut-in and UJS natural gas production was up big YoY, storage deficit widened YoY. That's because Dec 2021 was the hottest in the last 127 years. [LINK]. On Jan 10, 2022, we tweeted [LINK] "*Hottest Dec on record. Pre #LNG days, record warmth in 1 of 3 key winter demand months would have crashed HH #NatGas prices. But with US LNG exports currently #1 and ~11 bcf/d (~4 tcf/yr), HH is still above $4. #OOTT*". Without LNG, HH probably would have been $2. The average temperatures across all lower 48 states was 39.3 degrees F, 6.7 degrees F above the 20th century average for December.

Figure 4: US Statewide Average Temperature Ranks Dec 2021



Source: NOAA

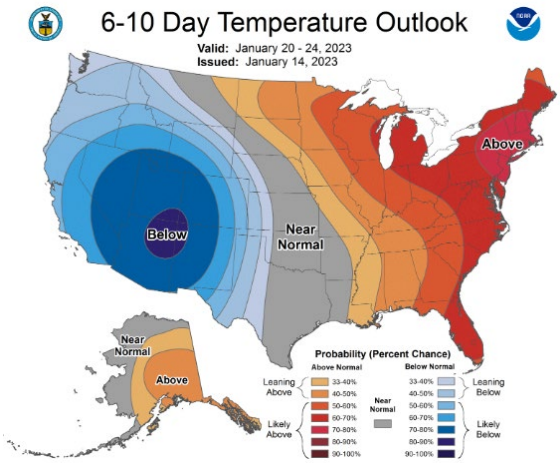
Natural Gas – NOAA expects more of US to normal to below normal to end Jan

NOAA 6-10 & 8-14 day temp outlook

Yesterday, we tweeted [LINK] "*HH #NatGas -24% in Jan to ~$3.40 driven by very warm temps across most of US in Jan. Finally, seeing a forecast for more normal to below normal temps for more of US to end Jan. May not drive HH #NatGas higher, but hopefully at least supports a floor.Thx @NOAA. #OOTT."* Our tweet inlcuded NOAA's Jan 7 updated 6-10 day and 8-14 day outlook that run up thru Jan 28. It's finally showing the expectaton for more ot the US to be normal to below normal temps to end Jan. So far, most of the US has seen

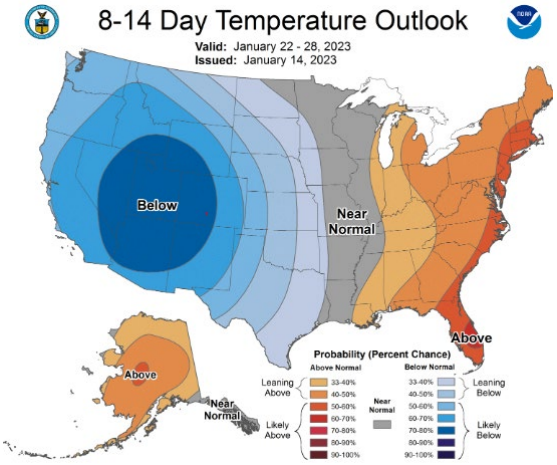
warmer than normal temps. Below are NOAA's 6-10 day and 8-14 day temperature outlooks as of yesterday afternoon.

Figure 5: NOAA 6-10 day temperature outlook as of Jan 14



Source: NOAA

Figure 6: NOAA 8-14 day temperature outlook as of Jan 14



Source: NOAA

Natural Gas – A hot vs cold month can be a swing of ~500 bcf of consumption

It's now halfway thru Jan, which is normally the peak weather temperature driven natural gas consumption month. So no surprise, HH gas prices remain stuck below $4 given the warmer than normal temperatures across most of the US thru the first two weeks of Jan and the forecasts for the rest of Jan have been slightly warmer than normal for the east half of the US. On Jan 7, we tweeted [LINK] on the below data on why temperature is key for winter natural gas demand and prices. It's why warm weather in the winter, especially in Jan, is never a positive for natural gas prices. There can be huge swings in residential/commercial

Jan is the big month for natural gas demand

natural gas demand depending if it's hot, normal, or cold. The different between a hot and cold month can be almost 500 bcf in a month. Below is a table we have previously posted that shows these swings. It shows AGA heating degree days vs US total natural gas consumption and US residential/commercial natural gas consumption. (i) Residential/commercial demand is normally >40% of total US natural gas consumption in DJF. (ii) For the last 10 year average, Jan was 46.7 bcf/d, Feb 43.4 bcf/d, and Dec 38.0 bcf/d. (iii) The high to low swings for Dec can be up to 12.6 bcf/d, Jan can be up to 9.8 bcf/d, and Feb can be up to 17.2 bcf/d. (iv) The biggest months over the past 10 winters were Jan 2014 at 51.9 bcf/d, Feb 2015 at 50.9 bcf/d, and then Dec 2017 at 49.5 bcf/d.

Figure 7: US Winter Natural Gas Consumption vs Heating Degree Days

US Winter Natural Gas Consumption vs Heating Degree Days
Heating Degree Days By Month

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	10 Year Average	
	HDDs	HDDs	HDDs	HDDs	HDDs	HDDs	HDDs	HDDs	HDDs	HDDs	HDDs	HDDs	%
Oct	308	303	265	257	200	218	306	307	308	205	332	280	7%
Nov	572	623	658	484	459	542	650	636	469	539	597	569	14%
Dec	763	920	763	649	856	873	789	778	804	696	876	807	20%
Jan	918	1,019	967	935	843	963	941	808	899	1005		921	23%
Feb	795	903	955	718	597	699	810	760	896	790		793	20%
Mar	827	831	738	511	618	660	804	555	572	638		680	17%
Oct 1 - Mar 31	4,183	4,599	4,346	3,554	3,573	3,955	4,300	3,844	3,948	3,873	1,805	4,050	100%

Note: Oct includes Sept if applicable. March includes Apr if applicable.
Source: AGA, SAF

Total US Consumption

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	10 Year Average	
	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	%
Oct	61.3	60.2	61.7	64.3	62.1	65.5	73.7	75.1	74.9	73.0	76.4	67.2	13%
Nov	72.3	77.2	78.6	75.2	72.1	78.6	90.5	92.6	81.3	89.8		80.8	15%
Dec	80.8	94.0	86.4	83.6	92.5	99.5	96.8	101.6	101.9	97.0		93.4	18%
Jan	92.8	103.4	100.5	100.0	93.3	107.8	110.0	106.3	106.0	115.9		103.6	20%
Feb	91.6	97.9	104.5	91.8	82.9	96.8	107.5	108.3	108.5	109.3		99.9	19%
Mar	81.3	82.5	83.6	76.3	81.1	90.2	93.8	87.4	84.1	89.8		85.0	16%
Average	**80.0**	**85.9**	**85.9**	**81.9**	**80.7**	**89.7**	**95.4**	**95.2**	**92.8**	**95.8**	**76.4**	**88.3**	100%

Source: EIA, SAF

US Residential & Commercial Demand

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	10 Year Average	
	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	bcf/d	%
Oct	14.6	13.9	13.4	12.8	12.2	13.1	15.9	14.4	14.4	12.6	15.1	13.7	7%
Nov	26.3	28.8	30.2	23.0	22.0	26.3	32.8	32.6	24.4	27.3		27.4	14%
Dec	34.2	43.0	36.9	30.4	40.5	42.2	39.5	39.0	40.1	34.5		38.0	19%
Jan	47.0	51.9	47.4	45.0	42.4	49.5	48.6	42.2	44.1	48.8		46.7	23%
Feb	42.3	48.0	50.9	38.4	33.7	39.8	45.7	42.0	48.2	45.1		43.4	22%
Mar	34.3	36.2	33.1	24.4	30.8	34.8	35.9	27.8	29.7	31.5		31.8	16%
Average	**33.1**	**37.0**	**35.3**	**29.0**	**30.3**	**34.3**	**36.4**	**33.0**	**33.5**	**33.3**	**15.1**	**33.5**	100%

Source: EIA, SAF
Data source EIA Natural Gas Monthly

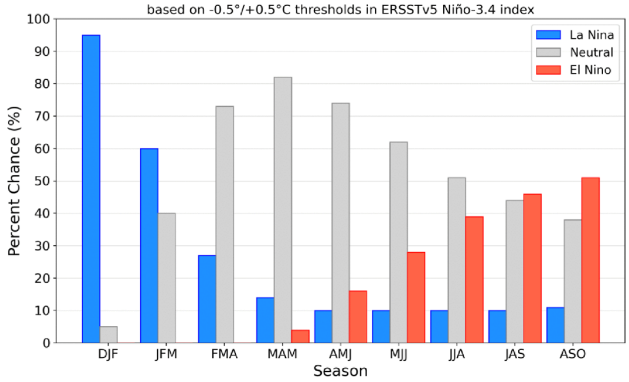
Source: EIA, AGA, SAF

Natural Gas – Continued La Nina/Neutral conditions for balance of winter

On the second Thursday of every month, the NOAA posts its updated El Nino/La Nina forecast [LINK], which still calls for La Nina/Neutral in the second half of winter Jan/Feb/Mar. The probability is for La Nina 60%, Neutral 40%, El Nino 0%. In Feb/Mar/Apr the probability of a La Nina and Neutral weather turns to a 27/73 split respectively. The El Nino/La Nina forecast isn't a temperature outlook and weather forecasts are far from 100% correct. However, the major natural gas concern tends to be strong El Nino winters, which tend to lead to warmer than normal winters. Whereas La Nina winters are typically viewed to more likely to be a normal type winter.

Forecasts still call for La Nina/Neutral winter

Figure 8: Early Jan NOAA El Nino/La Nina Outlook

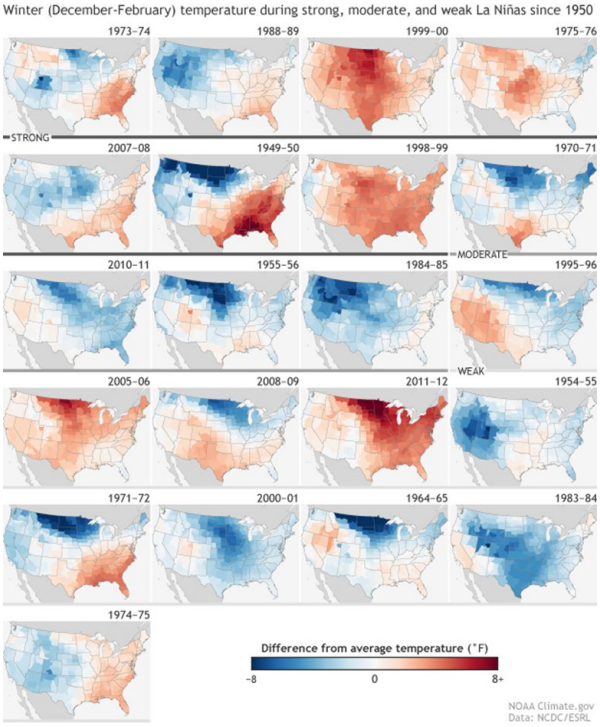


Source: CPC/IRI

Natural Gas – But La Nina correlations to cold winters are far from 100%

As we have seen so far in winter 2022/23, it hasn't been a colder than normal winter in the US. La Nina winters are more often normal to colder than normal than a warmer winter. But we remind of an Oct 6, 2017 NOAA brief *"Temperature patterns during every La Niña winter since 1950"*, which looked at all La Nina winters from 1950 thru 2016/17, classified them as strong, moderate or weak La Ninas, and then showed the average winter (Dec thru Feb) temperature map. We checked this weekend and the link still works [LINK]. The bottom line is that it may slightly favor a normal to colder than normal winter, but there have some been near record high temperature La Nina winters. Below is the NOAA graphic.

Figure 9: Winter (Dec-Feb) Temp in Strong, Moderate And Weak La Ninas 1950 - 2017



Source: CPC

Natural Gas – EIA gas forecast flat for 2023 with slight growth in 2024 US production

EIA US natural gas production forecast

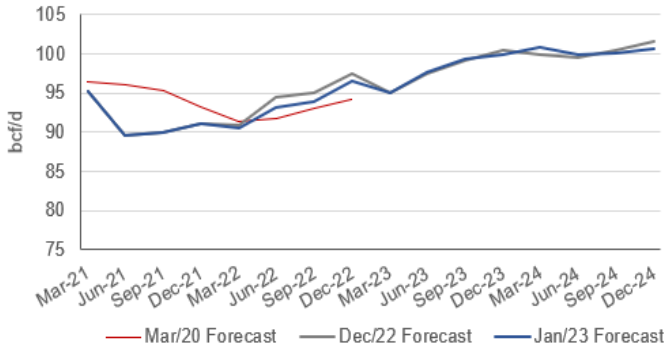
One of the big US natural gas stories in 2022 has been that US dry natural gas production is up approx. 3.5 bcf/d YoY in 2022. This growth was more than expected coming into 2022. US dry natural gas production is expected to continue to have strong, but lesser, YoY growth in 2023 and in 2024. The EIA released its monthly Short Term Energy Outlook for Jan 2023 [LINK]. This is the first STEO to include 2024 forecasts. (i) The EIA expects higher prices for late Jan and into Feb as colder winter weather returns and as Freeport LNG exports resume after being shut since early June. The EIA expects US gas production to increase in Q1/23 to 100.82 bcf/d. But the EIA Jan STEO revised its 2022 US gas production forecast from 98.11 bcf/d to 98.02 bcf/d ie. less momentum leaving 2022. This is still up 3.45 bcf/d YoY. (ii) US dry natural gas production is forecasted to average 100.34 bcf/d in 2023 (100.37 bcf/d previously), a +2.32 bcf/d increase YoY. (iii) The EIA wrote *"Increases in U.S. natural gas production, relatively flat LNG exports, and declining domestic consumption in the electric power and industrial sectors will limit upward pressure on prices in 2023."* (iv) The EIA put out its first 2024 forecast at 102.29 bcf/d vs 100.34 bcf/d for 2023, a +1.95 bcf/d increase YoY. Our Supplemental Documents package includes excerpts from the STEO.

Figure 10: EIA STEO US Natural Gas Supply Forecasts by Forecast Month

bcf/d	Q1/21	Q2/21	Q3/21	Q4/21	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
Jan-2023	90.59	93.15	93.86	96.52	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	90.59	93.15	93.86	96.52	93.55	95.08	97.58	99.22	100.54	98.11	99.87	99.52	100.5	101.6	100.37					
Nov-2022	90.59	93.15	93.86	96.52	93.55	95.08	97.58	99.43	100.11	98.05	99.00	99.42	99.99	100.33	99.68					
Oct-2022	90.59	93.15	93.86	96.52	93.55	95.08	97.55	98.48	99.06	97.54	99.19	99.57	99.73	100.00	99.62					
Sep-2022	90.59	93.15	93.86	96.52	93.55	94.60	96.87	97.85	98.99	97.08	99.65	100.51	100.59	100.67	100.36					
Aug-2022	90.59	93.15	93.86	96.52	93.55	94.60	96.61	97.02	98.09	96.59	98.90	100.13	100.52	100.51	100.02					
July-2022	90.59	93.15	93.86	96.53	93.55	94.61	95.51	96.88	97.89	96.23	98.40	99.62	100.60	101.25	99.98					
June-2022	90.59	93.15	93.86	96.53	93.55	94.61	95.48	96.90	98.94	96.50	99.94	101.30	102.33	102.66	101.57					
May-2022	90.59	93.15	93.86	96.53	93.55	94.66	95.82	97.17	99.14	96.71	100.25	101.55	102.42	102.42	101.71					
Apr-2022	90.59	93.15	93.86	96.63	93.57	95.41	97.01	97.94	99.23	97.41	99.72	100.56	101.41	101.72	100.86					
Mar-2022	90.59	93.15	93.86	96.57	93.54	95.69	96.09	96.97	98.00	96.69	96.11	98.75	99.60	100.10	98.64					
Feb-2022	90.59	93.15	93.86	96.69	93.57	95.43	95.54	96.26	97.12	96.09	97.11	97.57	98.34	98.84	97.97					
Jan-2022	90.59	93.15	93.89	96.33	93.49	95.94	95.55	95.96	96.69	96.04	96.71	97.13	97.89	98.45	97.55					
Dec 2021	90.48	93.20	94.01	95.59	93.32	95.22	95.35	96.10	97.21	95.97										
Nov 2021	90.48	93.20	94.52	94.94	93.29	95.41	96.00	97.12	98.18	96.68										
Oct 2021	90.30	92.89	93.32	93.65	92.54	94.38	95.41	97.12	98.69	96.40										
Sept 2021	90.30	93.05	92.64	92.70	92.18	93.17	94.54	96.25	97.59	95.40										
Aug 2021	90.29	92.49	92.67	93.11	92.15	93.34	94.15	95.51	96.47	94.88										
July 2021	90.31	92.88	93.17	93.80	92.55	93.65	94.10	95.16	95.82	94.69										
June 2021	90.53	92.26	92.63	93.26	92.18	93.13	93.48	94.31	94.81	93.93										
May 2021	90.09	90.75	91.34	92.03	91.06	91.97	92.54	93.60	94.36	93.12										
Apr 2021	90.82	90.90	91.59	92.31	91.41	92.23	92.75	93.76	94.39	93.29										
Mar 2021	90.50	91.04	91.71	92.13	91.35	91.87	92.25	93.28	93.90	92.83										

Source: EIA STEO

Figure 11: EIA STEO US Natural Gas Supply Forecasts by Forecast Month



Source: EIA STEO

Natural Gas – EIA STEO forecasts Nov 1, 2023 storage at 3.69 tcf, +0.12 tcf YoY

EIA STEO storage forecast

The EIA STEO also forecasts US gas storage. No surprise, the higher actual storage levels in Nov and Dec led the EIA to increase its forecasts once again for storage levels at the end of the 2022/23 winter season. With the warmer than average start to winter 2022/23 natural gas withdraw season, the EIA now forecasts storage to end the winter at 1.521 tcf on April 1, which is +0.121 tcf YoY and +0.076 tcf vs its Dec STEO forecast. For winter 2023/24, the EIA now forecasts Nov 1 storage at 3.690 tcf, which is +0.121 tcf YoY, a downward revision from 3.816 tcf in the Dec STEO forecast.

Figure 12: EIA STEO forecast US gas storage

(billion cubic feet)

	Storage	2016-2023				
	Level	Low	High	Range	Average	Deviation
Mar 2016	2,486.3	1,184.9	2,486.3	1,301.4	1,835.6	35.4%
Oct 2016	4,012.7	3,236.3	4,012.7	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	3,664.6	4,012.7	348.1	3,838.6	-4.5%
Mar 2022	1,401.5	1,184.9	2,486.3	1,301.4	1,835.6	-23.6%
Oct 2022	3,569.4	3,236.3	4,012.7	776.4	3,624.5	-1.5%
Mar 2023	1,521.1	1,184.9	2,486.3	1,301.4	1,835.6	-17.1%
Oct 2023	3,689.9	3,236.3	4,012.7	776.4	3,624.5	1.8%
Mar 2024	1,503.1	1,184.9	2,486.3	1,301.4	1,835.6	-18.1%
Oct 2024	3,907.1	3,236.3	4,012.7	776.4	3,624.5	7.8%

Source: EIA

Natural Gas – More expectations Freeport LNG restart will be delayed

Sounds like another delay to Freeport LNG

No one should have been surprised to see the report, not from the company, that Freeport LNG restart will not meet their target for second half of Jan and that the more likely speculated date is the 2nd half of Feb. As of our 7am MT news cut off, we haven't seen any official word from Freeport LNG on a delay to their restart, but we are seeing more reports expecting a delay. (i) On Wed, Reuters reported [LINK] "*Top U.S. gas exporter, Freeport LNG, is expected to further extend the seven-month-long outage of its liquefied natural gas (LNG) export plant in Texas to February, as it awaits regulatory approvals, three sources told Reuters on Wednesday." "There has been no official messaging, but nobody expects any cargoes until end-February at the earliest," one of the sources said. "Second half of January is now out of sight," another source said."* (ii) On Thurs, Bloomberg reported that Freeport LNG "has canceled some loadings planned thru early February, according to traders with knowledge of the matter". (iii) As a reminder, on Dec 23, we tweeted [LINK] "*Count on Friday before Xmas press releases to be something negative. "#FreeportLNG now does not anticipate commencing the initial restart of its liquefaction facility until the second half of January 2023". #OOTT #NatGas."* This looks to be over a month later than their previous formal statements for a mid-Dec restart. On Dec 23, Freeport LNG provided an update [LINK] on when they "*anticipate*" to restart. Freeport LNG said *"As of December 23rd, the reconstruction work necessary to commence initial operations is substantially complete, and the company is submitting responses to the last remaining questions included in the Federal Energy Regulatory Commission's December 12 data request. Given the time needed for the regulatory agencies to review the company's responses and to seek any necessary clarification, Freeport LNG now does not anticipate commencing the initial restart of its liquefaction facility until the second half of January 2023."*

Natural Gas – What is going on with BC's "very close" to Blueberry First Nations deal?

Where is BC/Blueberry First Nations deal?

We continue the watch on this item as it is probably the item that can most impact the value of Cdn natural gas over the 2020s. And clearly what is happening for NE BC natural gas in 2023. If BC can't get a deal done with the Blueberry First Nations, it could mean a massive uncertainty on a major part of NE BC natural gas drilling potential. It's now been seven weeks and we have not seen any announcement of a deal that BC said, on Nov 26, was very close to an agreement. Once it got before Xmas, we thought any deal would be after Jan 1.

But the clock is ticking, it's halfway thru Jan and something needs to happen soon. We are hopeful of a deal, but we were surprised by the BC Nov 26 press release. We recognize that most took the BC Government at their word, but it's now been over a month since the BC press release on Nov 26 "*Ministers' joint statement on status of negotiations with Blueberry River First Nations"* [LINK] that had a very clear message that a deal is coming. BC said ""*We wish to affirm that we are very close to an agreement and are discussing final issues. As such, we have initiated early engagement with select industry groups and other Treaty 8 Nations on a proposed agreement to hear their feedback and consider adjustments.*" At that time, we noted in our Dec 4, 2022 Energy Tidbits that we were surprised by the bullish statements in the BC release, primarily because we had been hearing that the Blueberry First Nations ask was too big for even BC to accept. But clearly the BC release seemed to put to bed the chatter we had been hearing that the Blueberry First Nation had asked way too much to get a deal. But, it's now been seven weeks and no word that a deal is coming and coming soon. We continue to check with our key industry contacts and, at least from our contacts, they still hear the likelihood of a deal in the near term is close to zero. We hope, like we put in our prior memos, that our contacts are all wrong and BC is getting a deal done any day now with the Blueberry First Nations. But the silence is deafening. Our Supplemental Documents package includes the BC Nov 26 press release.

It's too late to save most of winter drilling season & therefore a lot of 2023

Our Dec 18, 2022 Energy Tidbits memo warned it was too late to save most of the winter drilling season. When BC Nov 26 release came out, it looked like a big operational positive for BC's winter drilling season. There would be time to get cranked up in the short winter drilling season. But, now that it's Jan 15, it means that the winter drilling season really can't be anywhere near what it should have been in terms of drilling quality wells. This was confirmed by Tourmaline on Thurs in the following item. Producers are down to about six weeks of peak winter drilling conditions. Normally, winter drilling tends to start to decline around the end of Feb although a warm Feb could see drilling decline in mid Feb. But even if there is a deal done in the next week or two, BC producers won't be able to get most of their winter drilling done that they had hoped to do going back to the summer when the first hints of a deal were hoped. Until there is a Blueberry deal, producers will basically be stuck with the well licenses in hand unless there is some sort of agreement to let additional wells be licensed ahead of a BC/Blueberry deal.

Tourmailine will drill less NE BC wells in 2023 and won't be only Tier 1 wells

On Thurs, we saw a clear statement from Tourmaline on how the lack of a deal with Blueberry River First Nations is going to have a major impact on their 2023 NE BC drilling program. We tweeted [LINK] "*What's going on BC? 45 days since you were "very close" to agreement with Blueberry River First Nations! Hurting NE BC 2023 drilling. No deal means $TOU can't drill only Tier 1 wells, expect 140 NE BC wells, less than 2021 drilling, & fraction of ~7,000 NE BC locations. #OOTT."* Tourmailine's Jan 12 operational update [LINK] detailed the impact of not having the normal ability to drill in NE BC – they can't drill only Tier 1 wells, they expect to drill 140 Net wells (ie. lesser wells than drilled in 2021), some of their locations will be Tier 2 wells, and "*the remaining permits don't allow for the most efficient EP program execution. Many*

of the permits are on existing large pads which leads to unusually high frac related impairments during completion operations". Note Tourmaline's Investor presentation notes they have ~7,000 locations in NE BC. Tourmaline wrote "*Tourmaline currently has 301 valid drilling permits in NEBC and expects to drill approximately 140 net wells in BC in 2023. While the Company is well positioned to maintain or modestly grow BC production over the next two-three years, the remaining permits don't allow for the most efficient EP program execution. Many of the permits are on existing large pads which leads to unusually high frac related impairments during completion operations (for example, frac downtime at Gundy increased from 5.5% to 10% in 2022). Some of the remaining permits are for Tier 2 locations which, given the size of Tourmaline's Tier 1 inventory, would not otherwise be drilled at this time. These Tier 2 locations are, however, economic at gas prices of $1.50/mcf. The greater frac-related impairment and the subset of Tier 2 locations being drilled has been factored into current 2023 production guidance. The Company remains confident that an agreement between the BRFN and BC First Nations with the Province of British Columbia will be reached in 2023.*

Without a BC/Blueberry deal, it's hard to see a LNG Canada Phase 2 FID

We have been tracking all the indications from Shell, LNG Canada and TC Energy that were pointing to why a FID on LNG Canada 1.8 bcf/d Phase 2 should have come in Q4/22. But we also realize that, without a BC/Blueberry First Nations deal, it will be highly unlikely to see that FID. Because without a deal, the LNG Canada joint venturers would be questioning their ability to drill to fill its under-construction Phase 1, let alone FID Phase 2. It's why, in our Dec 4, 2022 Energy Tidbits, we wrote "*We wonder if the lack of a BC deal with Blueberry First Nations is why BC hasn't either signed off or rejected LNG Canada's request for BC's views on a potential LNG Canada Phase 2 FID. It makes sense. If Blueberry First Nations had negotiating leverage given the need to crank up drilling to supply natural gas for LNG Canada's 1.8 bcf/d Phase 1, the need for another 1.8 bcf/d of natural gas supply for a LNG Canada 1.8 bcf/d Phase 2 would give even more leverage to Blueberry First Nations. Our Oct 23, 2022 Energy Tidbits noted the first BC confirmation that they were looking at LNG Canada Phase 2. We then wrote "Natural Gas – BC says it is in discussions with LNG Canada on potential Phase 2. It looks like it is coming down to British Columbia to decide if LNG Canada will proceed with its brownfield 1.8 bcf/d Phase 2. We have a clear statement from British Columbia that they are in discussions with LNG Canada on their wish for the potential Phase 2. Last week's (Oct 16, 2022) Energy Tidbits highlighted the separate comments from Canada Deputy Prime Minister Freeland and External Affairs Minister Joly that seemed to point to LNG Canada Phase 2 coming and that the Liberals would be onside. We haven't seen comments from the BC Govt on Phase 2 until this week. On Monday, we tweeted [LINK] "#LNGCanada 1.8 bcfd Phase 2 FID. Liberals seem onside see 👇 @cafreeland. BC. @brentcjang reports @BruceRalston "LNG Canada has expressed the wish to explore the possibility of proceeding with Phase 2, and we're engaged in discussions with them. #OOTT [LINK]." The Globe and Mail wrote "In a recent media briefing in Kitimat, however, LNG Canada chief executive officer Jason Klein said LNG from B.C. will play a crucial role in helping displace coal used in Asia for electricity generation. "The climate challenge isn't a B.C. challenge. It is a global*

challenge," Mr. Klein said. "It's not just about displacing coal. It's also about getting people out of energy poverty around the world." He said Shell, Petronas and the three other co-owners of the megaproject will ultimately decide whether it makes economic sense for Phase 2 to use lower-carbon hydroelectricity from BC Hydro to power motors to produce LNG. There isn't sufficient infrastructure today for BC Hydro to provide enough hydro power for electric-drive technology at the Kitimat facility, but new transmission lines are possible. B.C. Energy Minister Bruce Ralston, who is the cabinet minister responsible for BC Hydro, said electrification would be an important aspect of LNG Canada's potential expansion. "LNG Canada has expressed the wish to explore the possibility of proceeding with Phase 2, and we're engaged in discussions with them," Mr. Ralston said."

Natural Gas – Did Trudeau not want to give Blueberry River FN more leverage?

Trudeau silent on LNG Canada Phase 2

We aren't surprised that there wasn't anything specific on LNG Canada 1.8 bcf/d Phase 2 FID coming out of the Thurs meeting between Japan PM Kishida and PM Trudeau as we thought that any confirmation from Trudeau on the potential for LNG Canada Phase 2 would only make it tougher for BC to get a deal with Blueberry River First Nations. (i) Going into the meeting & subsequent press conference, the chatter was on how Kishida wanted to focus on getting Trudeau t support getting more Cdn LNG beyond LNG Canada Phase 1 as Japan tries to replace Russian LNG. (ii) Nothing specific on LNG Canada in the Japan and Canada read-outs of the meeting. Rather only general comments on expanding cooperation in energy. Our thoughts were that, because of the outstanding BC/Blueberry River First Nation dispute, they didn't want to be specific and only talked about expanding cooperation sin areas such as energy. (iii) On Friday, we tweeted [LINK] on the post meeting press conference that only featured four questions. Our tweet was "*#Kishida "agreed to strengthen cooperation, incl LNG Canada". #Trudeau evaded when asked if CA looking at easing regulatory hurdles so #LNGCanada Phase 2 expansion of #LNGCanada can get approved? let's hope he just didn't want to give Blueberry River FN more leverage? #OOTT."* At the press conference that only had four questions, Trudeau was asked specifically if he was "*looking at easing regulatory hurdles so a project like the Phase 2 expansion of LNG Canada can get approved and start shipping natural gas?*" Trudeau made no reference to Phase 2, rather pivoted to talk about exporting other items such as hydrogen. On the surface, it would seem to suggest Trudeau ducked the question so he wouldn't say no. But we have to wonder if it's linked to the lack of deal with Blueberry River first Nations deal. Imagine if he had said Canada would move to help ease regulatory hurdles for Phase 2 when there still isn't a BC/Blueberry River deal? The Blueberry First Nations would have huge leverage in their negotiations with BC. Our tweet included the transcript we made of the Kishida and Trudeau comments related to LNG Canada. (iv). At the press conference, Kishida's opening remarks included ""… *in the area of economy, we agreed to strengthen cooperation in economic areas including energy and food, including LNG Canada and critical mineral resources".* Kishida seemed to suggest that there might be things to come on LNG Canada Phase 2. Our Supplemental Documents package includes the transcript we made of the Trudeau/Kishida comments and the Japan and Canada readouts of the meeting.

Liberals public teases pointed to them being onside with LNG Canada Phase 2

We have not seen where the Liberals have make public statements saying they would be onside with LNG Canada Phase 2 expansion. However, we have seen

teases and hints that certainly imply they would be onside. (i) Foreign Affairs Minister Joly. On Oct 13, 2022 , we tweeted [LINK] "*Hmm! Is @melaniejoly teasing #LNGCanada 1.8 bcfd Phase 2 FID is coming? "We will become a major supplier of key [#LNG] energy for them, starting in 2025,""There is a lot of interest for all of us to go even further." Thx @withfilesfrom. #OOTT #NatGas.*" In our Oct 16, 2022 Energy Tidbits, we wrote "*Her views on first LNG starting in 2025 would be consistent with Shell/LNG Canada's long stated first LNG by the middle of the decade. What always gets our attention is when CEOs or politicians feel the need or see the opportunity to add a little extra commentary. Joly could have stopped with talking about LNG Canada Phase 1 starting LNG deliveries in 2025. But she added "there is a lot of interest for all of us to go even further". It's hard not to takeaway that the Liberals will be onside with LNG Canada Phase 2. Canadian Press reported "A major export terminal is set to open in 2025 in Kitimat, B.C., with Japanese and Korean companies holding a 20 per cent stake. "We will become a major supplier of key energy for them, starting in 2025," Joly said in a Thursday interview from Seoul. "There is a lot of interest for all of us to go even further."* (ii) Deputy PM Freeland. On Oct 14, 2022, we tweeted [LINK] "*Positive 🇨🇦 #NatGas. Liberals must want to be seen as being onside when #LNGCanada FIDs 1.8 bcfd Phase 2? @cafreeland "We will always be looking at economically viable LNG projects." LNG $ outlook way higher since 👇 02/21 tweet #Shell IRR 14-18% for its pre-FID projects. #OOTT".* On Friday, Reuters reported [LINK] "*LNG "is an important transition fuel," Freeland told reporters in Washington at the end of annual IMF and World Bank meetings. "We will always be looking at economically viable LNG projects."* Freeland did not mention LNG Canada, but Shell disclosed this summer that they were now in the FID review/analysis period for LNG Canada Phase 2 FID. And surely, she is well aware that the brownfield project is expected to have strong economics.

Natural Gas – Another long-term LNG deal, Shell to buy 0.1 bcf/d from Oman

Another long term LNG deal

There was a significant slowdown in long term LNG deals in H2/2022 compared to the July 1, 2021 to June 30, 2022 period. because most, if not all the available long term LNG supply available before 2026 was locked up in the July 1, 2021 to June 30, 2022 rush. Rather, the long-term deals now being done are generally for long term supply starting in 2026 or later. There was one long term LNG deal announced last week. On Tuesday, Oman tweeted [LINK] "*The Oman LNG Company and Shell International Trading Company in the Middle East signed a binding clauses agreement for the supply of liquefied natural gas from Oman LNG to Shell with a total of 0.8 million metric tons per year for a period of ten years, starting from 2025*." This is 0.11 bcf/d and, like it prior long term LNG deals, Shell is doing this to add to its portfolio LNG supply.

Asia was early to secure long term LNG supply

Our March 13, 2022 Energy Tidbits memo noted that Europe LNG buyers were starting 9 months behind the wave of Asian LNG buyers who started to lock up long term LNG supply starting in July 2021. The LNG supply crunch is not a 2022 development. Rather, it was clear in H1/21 that there was a major sea change in LNG outlook. We turned very bullish on LNG outlook for the 2020s once TotalEnergies went force majeure on its Mozambique LNG in April 2021. We posted our April 28, 2021 blog *"Multiple Brownfield LNG FIDs Now Needed To Fill New LNG*

Supply Gap From Mozambique Chaos? How About LNG Canada Phase 2?" as we thought the market had overlooked that this force majeure backed up 5.0 bcf/d of Mozambique LNG that was originally planned to start in phases in 2024. And that this would create an earlier and larger LNG supply gap in the mid 2020s. Then we started to see validation of this view when Asian LNG buyers in July made an abrupt change to their LNG contracting and pivoted to trying to lock in long term LNG supply. On July 14, 2021 we posted our 8-pg "*Asian LNG Buyers Abruptly Change and Lock in Long Term Supply – Validates Supply Gap, Provides Support For Brownfield LNG FIDs".* Here is an excerpt from the blog "*The last 7 days has shown there is a sea change as Asian LNG buyers have made an abrupt change in their LNG contracting and are moving to lock in long term LNG supply. This is the complete opposite of what they were doing pre-Covid when they were trying to renegotiate Qatar LNG long term deals lower and moving away from long term deals to spot/short term sales. Why? We think they did the same math we did in our April 28 blog "Multiple Brownfield LNG FIDs Now Needed To Fill New LNG Supply Gap From Mozambique Chaos? How About LNG Canada Phase 2?" and saw a much bigger and sooner LNG supply gap driven by the delay of 5 bcf/d of Mozambique LNG that was built into most, if not all LNG supply forecasts. Asian LNG buyers are committing real dollars to long term LNG deals, which we believe is the best validation for the LNG supply gap. Another validation, Shell, Total and others are aggressively competing to invest long term capital to partner in Qatar Petroleum's massive 4.3 bcf/d LNG expansion despite plans to reduce fossil fuels production in the 2020s. And even more importantly to LNG suppliers, the return to long term LNG contracts provides the financing capacity to commit to brownfield LNG FIDs. The abrupt change by Asian LNG buyers to long term contracts is a game changer for LNG markets and sets the stage for brownfield LNG FIDs likely as soon as before year end 2021. It has to be brownfield LNG FIDs if the gap is coming bigger and sooner. And we return to our April 28 blog point, if brownfield LNG is needed, what about Shell looking at 1.8 bcf/d brownfield LNG Canada Phase 2? LNG Canada Phase 1 at 1.8 bcf/d capacity is already a material positive for Cdn natural gas producers. A FID on LNG Canada Phase 2 would be huge, meaning 3.6 bcf/d of Cdn natural gas will be tied to Asian LNG markets and not competing in the US against Henry Hub. And with a much shorter distance to Asian LNG markets. This is why we focus on global LNG markets for our views on the future value of Canadian natural gas."* Our Supplemental Documents package includes our April and July blogs.

There have been 12.88 bcf/d of long-term LNG supply deals since July 1, 2021

We first highlighted this abrupt shift to long term LNG supply deals in our July 14, 2021 8-pg "*Asian LNG Buyers Abruptly Change and Lock in Long Term Supply – Validates Supply Gap, Provides Support For Brownfield LNG FIDs".* We included a table of the deals done in that short two week period. We continue to update that table, which now shows 12.88 bcf/d of long term LNG deals since July 1, 2021. 66% of the deals have been by Asian LNG buyers, but we are now seeing rest of world locking up long term supply deals post Russia/Ukraine. Note in our non-Asian LNG deals will major LNG players (ie. Chevron, Shell, etc) buying for their LNG portfolio supply. China has been particularly active in this space, accounting for 75% of all Asian LNG buyers in long term contracts since July 1, 2021. Below is our updated

table of Asian and Europe LNG buyers new long term supply deals since July 1, 2021.

Figure 13: Long Term LNG Supply Deals since July 1, 2021

Long-Term LNG Buyer Deals Since July 1, 2021							
Date	Buyer	Seller	Country	Volume	Duration	Start	End
			Buyer / Seller	(bcf/d)	Years		
Asian LNG Deals							
Jul 7, 2021	CNOOC	Petronas	China / Canada	0.30	10.0	2022	2032
Jul 9, 2021	CPC	QatarEnergy	Taiwan / Qatar	0.16	15.0	2022	2037
Jul 9, 2021	Guangzhou Gas	BP	China / US	0.13	12.0	2022	2034
Jul 12, 2021	Korea Gas	QatarEnergy	Korea / Qatar	0.25	20.0	2025	2045
Sep 29, 2021	CNOOC	QatarEnergy	China / Qatar	0.50	15.0	2022	2037
Oct 7, 2021	Shenzhen	BP	China / US	0.04	10.0	2023	2032
Oct 11, 2021	ENN	Cheniere	China / US	0.12	13.0	2022	2035
Nov 4, 2021	Unipec	Venture Global LNG	China / US	0.46	20.0	2023	2043
Nov 4, 2021	Sinopec	Venture Global LNG	China / US	0.53	20.0	2023	2043
Nov 5, 2021	Sinochem	Cheniere	China / US	0.12	17.5	2022	2040
Nov 22, 2021	Foran	Cheniere	China / US	0.04	20.0	2023	2043
Dec 6, 2021	Guangdong Energy	QatarEnergy	China / Qatar	0.13	10.0	2024	2034
Dec 8, 2021	S&T International	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 10, 2021	Suntien Green Energy	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 15, 2021	SPIC Guangdong	BP	China / US	0.03	10.0	2023	2033
Dec 20, 2021	CNOOC Gas & Power	Venture Global LNG	China / US	0.26	20.0	2023	2043
Dec 29, 2021	Foran	BP	China / US	0.01	10.0	2023	2032
Jan 11, 2022	ENN	Novatek	China / Russia	0.08	11.0	2024	2035
Jan 11, 2022	Zhejiang Energy	Novatek	China / Russia	0.13	15.0	2024	2039
Feb 4, 2022	CNPC	Gazprom	China / Russia	0.98	30.0	2023	2053
Mar 24, 2022	Guangdong Energy	NextDecade	China / US	0.20	20.0	2026	2046
Mar 29, 2022	ENN	Energy Transfer	China / US	0.36	20.0	2026	2046
Apr 1, 2022	Guangzhou Gas	Mexico Pacific Ltd	China / Mexico	0.26	20.0	n.a.	n.a.
Apr 6, 2022	ENN	NextDecade	China / US	0.26	20.0	2026	2026
Apr 22, 2022	Kogas	BP	Korea / US	0.20	18.0	2025	2043
May 2, 2022	Gunvor Singapore Pte	Energy Transfer LNG	Singapore / US	0.26	20.0	2026	2046
May 3, 2022	SK Gas Trading LLC	Energy Transfer LNG	Korea / US	0.05	18.0	2026	2042
May 10, 2022	Exxon Asia Pacific	Venture Global LNG	Singapore / US	0.26	n.a.	n.a.	n.a.
May 11, 2022	Petronas LNG	Venture Global LNG	Malaysia / US	0.13	20.0	n.a.	n.a.
May 24, 2022	Hanwha Energy	TotalEnergies	Korea / France	0.08	15.0	2024	2039
May 25, 2022	POSCO International	Cheniere	Korea / US	0.05	20.0	2026	2036
June 5, 2022	China Gas Holdings	Energy Transfer	China / US	0.09	25.0	2026	2051
Jul 5, 2022	China Gas Holdings	NextDecade	China / US	0.13	20.0	2027	2047
Jul 20, 2022	PetroChina	Cheniere	China / US	0.24	24.0	2026	2050
Jul 26, 2022	PTT Global	Cheniere	Thailand / US	0.13	20.0	2026	2046
Jul 27, 2022	Exxon Asia Pacific	NextDecade	Singapore / US	0.13	20.0	2026	2046
Sep 2, 2022	Woodside Singapore	Commonwealth	Singapore / US	0.33	20.0	2026	2046
Nov 21, 2022	Sinopec	QatarEnergy	China / Qatar	0.53	27.0	2026	2053
Dec 26, 2022	INPEX	Venture Global LNG	Japan/US	0.13	20.0	n.a.	n.a.
Dec 27, 2022	JERA	Oman LNG	Japan/Oman	0.11	10.0	2025	2035
Total Asian LNG Buyers New Long Term Contracts Since Jul/21				**8.46**			
Non-Asian LNG Deals							
Jul 28, 2021	PGNiG	Venture Global LNG	Poland / US	0.26	20.0	2023	2043
Nov 12, 2021	Engie	Cheniere	France / US	0.11	20.0	2021	2041
Mar 7, 2022	Shell	Venture Global LNG	US / US	0.26	20.0	2024	2044
Mar 16, 2022	NFE	Venture Global LNG	US / US	0.13	20.0	2023	2043
Mar 16, 2022	NFE	Venture Global LNG	US / US	0.13	20.0	2023	2043
May 2, 2022	Engie	NextDecade	France / US	0.23	15.0	2026	2041
May 17, 2022	PGNiG	Sempra Infrastructure	Poland / US	0.40	20.0	n.a.	n.a.
May 25, 2022	RWE Supply & Trading	Sempra Infrastructure	Germany / US	0.30	15.0	n.a.	n.a.
Jun 9, 2022	Equinor	Cheniere	Norway / US	0.23	15.0	2026	2041
Jun 21, 2022	EnBW	Venture Global LNG	Germany / US	0.20	20.0	2026	2046
Jun 22, 2022	INEOS Energy	Sempra Infrastructure	UK / US	0.21	20.0	2027	2047
Jun 22, 2022	Chevron	Venture Global LNG	US / US	0.26	20.0	n.a.	n.a.
Jun 22, 2022	Chevron	Cheniere	US / US	0.26	15.0	2027	2042
Jul 12, 2022	Shell	Mexico Pacific Ltd	US / Mexico	0.34	20.0	2026	2046
Jul 13, 2022	Vitol	Delfin Midstream	US / US	0.07	15.0	n.a.	n.a.
Aug 9, 2022	Centrica	Delfin Midstream	UK / US	0.13	15.0	2026	2041
Aug 24, 2022	Shell	Energy Transfer	US / US	0.28	20.0	2026	2046
Oct 6, 2022	EnBW	Venture Global LNG	Germany / US	0.26	20.0	2022	2042
Dec 6, 2022	ENGIE	Sempra Infrastructure	France / US	0.12	15.0	n.a.	n.a.
Dec 20, 2022	Galp	NextDecade	Portugal / US	0.13	20.0	n.a.	n.a.
Dec 20, 2022	Shell	Oman LNG	UK/Oman	0.11	10.0	2025	2035
Total Non-Asian LNG Buyers New Long Term Contracts Since Jul/21				**4.42**			
Total New Long Term LNG Contracts since Jul/21				**12.88**			
*Excludes Asian short term/spot deals							
*on Dec 20, CNOOC also agreed to buy an additional 0.13 bcf/d from Venture Global for an undisclosed shorter period							
Source: Bloomberg, Company Reports							
Prepared by SAF Group https://safgroup.ca/news-insights/							

Source: Company reports, SAF Group

Natural Gas – QatarEnergy CEO thinks Russia pipeline gas will flow to Germany

Will Russia pipeline gas flow to Germany

Earlier this morning, we tweeted on comments from QatarEnergy CEO & Qatar Minister of Energy Security H.E. Eng. Saad Al-Kaabi at the Atlantic Council 2013 Global Energy Forum yesterday in Abu Dhabi. One of his comments was on perhaps the most significant natural gas and LNG question for rest of the 2020s – will Russian pipeline natural gas return to flow to Germany? We recognize that it isn't a question that most don't want to contemplate in light of the continuing increased killing of Ukrainians by Russia attacks. But it will be the major natural gas/LNG variable for the 2020s. We tweeted [LINK] "*Will Russia pipeline #NatGas ever flow again to Germany? @qatarenergy CEO thinks so. not to pre invasion levels but enough to be big relief to EU market and stabilize #NatGas prices. Thx @FredKempe @AtlanticCouncil #OOTT #LNG."* Our tweet included excerpts from the Atlantic Council transcript on al-Kaabi comments. "*MINISTER SAAD SHERIDA AL-KAABI: Yeah, on the German side, we were negotiating with the Germans for about ten years, and suddenly they came to us and said, we want to build terminals. So, you know, the world changes. I think, you know, the equilibrium will be achieved by hopefully some kind of a mediation or truce or some kind of a political solution where Russia and Europe get things, I think, sorted out, if you will, politically hopefully, and the sooner the better. I don't think that—this war and this situation will not last forever. And I understand that the Europeans today are saying there is no way we're going back to Russian gas. We're all blessed to be able to forget and to forgive. And I think things get mended with time. And I don't think some of the countries that were depending 100 percent or, you know, a very large percentage on Russia will not go back to 100 percent or 80 percent or maybe 50 percent. They will diversify and they'll learn from that situation, and probably have a much bigger diversity. But the Russian gas is going to come back, in my view, to Europe. It is next year? Is it in five years? I don't know. But once the situation is sorted out. And that, I think, will be a big relief to the whole gas sector and to the whole market in Europe, and will stabilize prices."*

Natural Gas – China's natural gas imports down 9.9% YoY in 2022

China natural gas imports

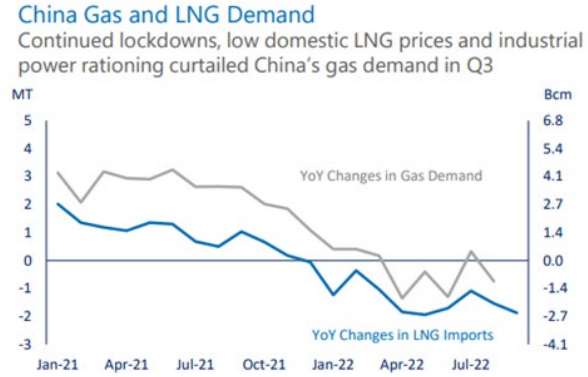
We have been warning that China would have lower YoY natural gas imports and lower YoY LNG imports. And the biggest surprise in 2022 has been that China was going to have its first YoY decline in natural gas consumption in ~20 years. So we aren't surprised to see how, on Friday, Bloomberg reported on China import data for Dec that was posted on the General Administration of Customs website. We assume this is the Chinese website as we checked the English language version and they don't yet show the Dec data. Bloomberg reported "**Natural gas imports in Dec. 10.277m tons ** Natural gas imports YTD fell 9.9% y/y to 109.248m tons".* 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.

1st YoY decline in China natural gas consumption in ~20 years tweet

Here is what we wrote in our Nov 6, 2022 Energy Tidbits memo. "*One of the big global natural gas themes has been how sky-high LNG and global natural gas prices have led to fuel switching where possible and cuts in consumption. This is not just in Europe but also in China. We have been warning that China's LNG imports will be less in 2022 for three key reasons - higher pipeline imports of cheaper Russian*

natural gas via Gazprom's Power of Siberia, increasing domestic natural gas production, and sky-high LNG prices are seeing China switch to coal where possible. But the sky-high LNG prices have also meant something that hasn't happened in ~20 years – China's natural gas consumption will be down YoY in 2022. On Thursday, we tweeted [LINK] "1st YoY decline in China #NatGas consumption in ~20 years was the saving grace for Europe #NatGas this year. See 👇from @Cheniere just posted Q3 call slides. #OOTT." Our tweet included the below graph from Cheniere's Q3 call slide deck.

Figure 14: China natural gas and LNG demand



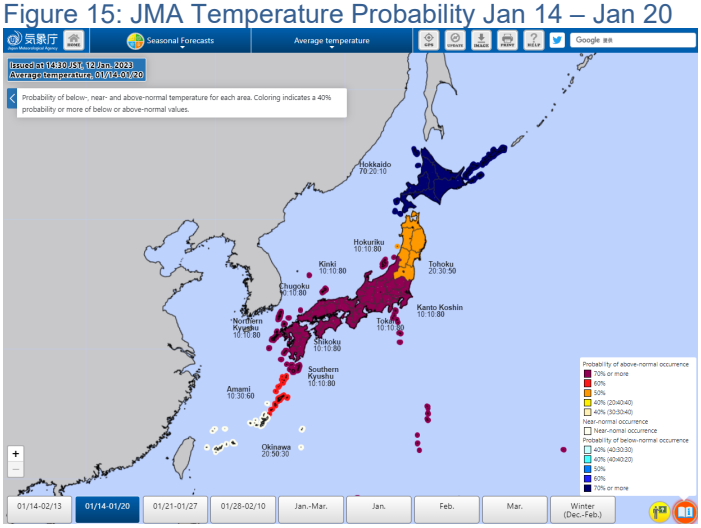
Source: Cheniere

Natural Gas – Very hot in Japan for another week until turning normal to end Jan

It's been warm in most of Japan for the past week or so and that is expected to continue for another week before turning to normal or slightly colder temp to end Jan. Every Thursday, the Japan Meteorological Agency provides an updated 30-day temperature probability outlook. The new weekly JMA forecasts much warmer than normal temperatures to continue for another week in most of Japan. But, at least for now, JMA expects it to turn colder to end Jan and into Feb. Below is the JMA's updated 30-day outlook beginning Jan 7 [LINK].

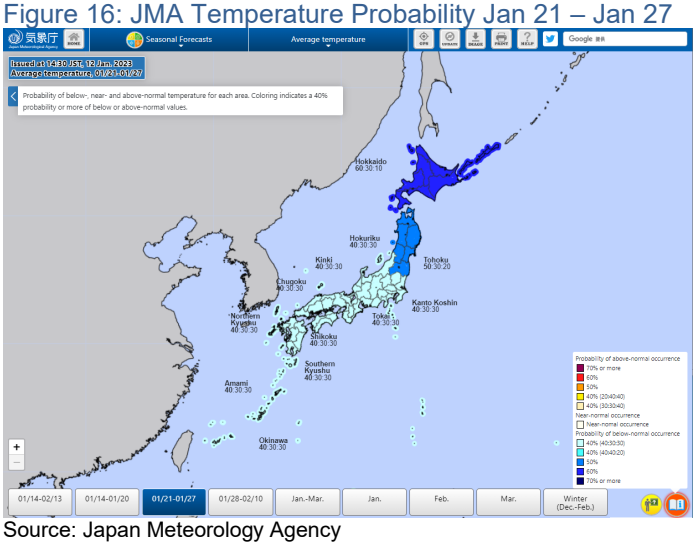
Japan temperature outlook

Figure 15: JMA Temperature Probability Jan 14 – Jan 20



Source: Japan Meteorology Agency

Figure 16: JMA Temperature Probability Jan 21 – Jan 27



Source: Japan Meteorology Agency

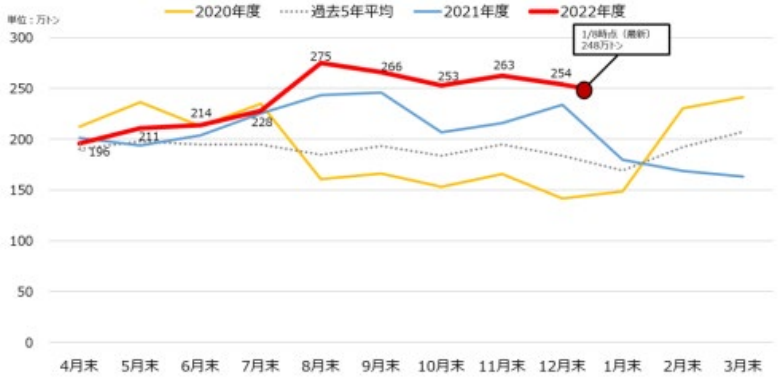
Natural Gas – Japan's LNG stocks down -2.8% WoW to 119 bcf

Japan LNG stocks -2.8% WoW

The warm first few weeks in Jan in Japan is a big plus to Japan to have warm weather in normally the peak cold month. It means that Japan is in pretty good shape to avoid LNG shortages in the winter. Especially since Europe is still warm. We always warn that Japan's LNG stockpiles are not huge relative to LNG imports that have ranged from 7 to 14 bcf/d since Jan 1, 2021. So any warm week in Japan is a positive for Japan's energy picture in the winter. A cold winter or interruption in LNG imports could lead to a shortage. LNG stockpiles held by Japanese power producers continue to exceed both last year's level and the 4-year average. Japan's METI weekly LNG stocks data was released on Wednesday [LINK]. LNG

stocks at Jan 8 were ~119 bcf -3.3% WoW from Jan 1 of ~123 bcf but above the 5-yr average of 112 bcf. Below is the LNG stocks graph from the METI weekly report.

Figure 17: Japan's LNG Stocks



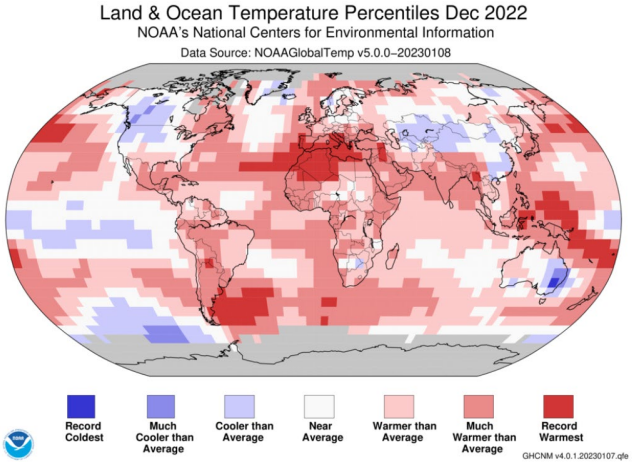
Source: METI

Natural Gas – It was the 10th warmest Dec on record in Europe

10th warmest Dec on record in Europe

The #1 natural gas story and likely energy story over the past two month has been the very hot start to winter in Europe. This has really eliminated the risk of a natural gas and energy outage in Europe this winter and also impacted gas to fuel oil switching. Dec was hot, it was the 10th warmest Dec on record in Europe. NOAA posted its "*December 2022 Global Climate Report*" [LINK] , which wrote "*Europe had its 10th-warmest December on record. Individual countries reported a mix of conditions. December in Italy ranked second-warmest on record. December in Croatia varied from 2.4°C to 4.9°C above the 1981-2010 average; at all stations, air temperature was higher than average.*"

Figure 18: Land & Ocean Temperature Percentiles Dec 2022



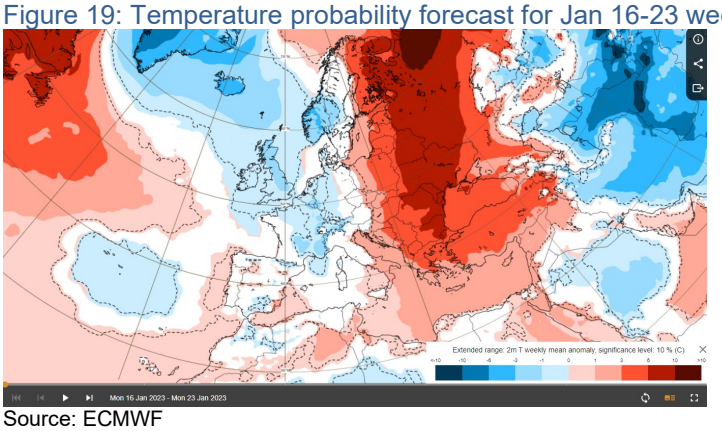
Source: NOAA

Natural Gas – Next week's colder Europe weather only expected to last a week

Continued warm temps in Europe

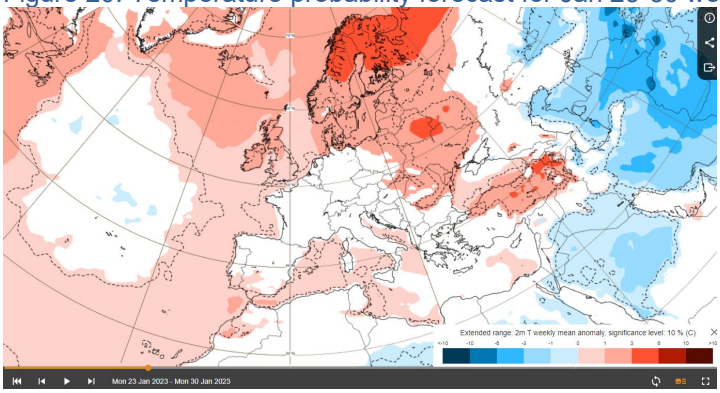
The big negative to Europe TTF natural gas prices and therefore flow thru the LNG prices is that temperatures have been well above normal in Europe and continued into the first half of Jan. We are finally seeing forecasts for some slightly colder than normal weather for Europe for the Jan 16-23 week, but it is only expected to last a week and then back to normal temperatures. Note the new forecast for slightly colder than normal weather for Jan 16-23 is different than last week's forecast for the Jan 16-23 week that called for warmer than normal temperatures across all of Europe. Below are the European Centre for Medium-Range Weather Forecasts for the Jan 16-23 week, and Jan 23-30 week. Red is never good in a temperature forecast for winter.

Figure 19: Temperature probability forecast for Jan 16-23 week



Source: ECMWF

Figure 20: Temperature probability forecast for Jan 23-30 week



Source: ECMWF

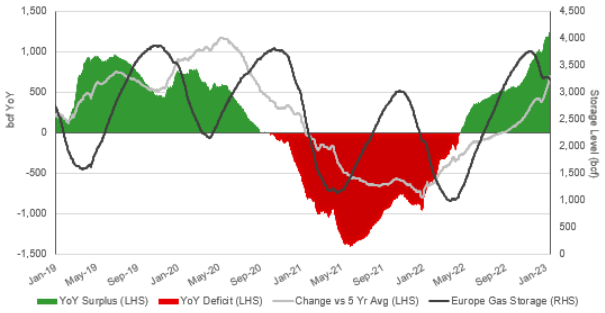
Natural Gas – Europe storage is now +31.98% YoY ie. 82.14% full vs 50.16%

Europe storage now 82.14% full

It's been a great winter so far for Europe in that, other than for a short period, it has been well above normal for most of continental Europe. Last week's (Jan 8, 2023) Energy Tidbits noted that there has been negligible weather driven demand for natural gas, which along with the

continued industrial demand destruction, means storage levels are at very high levels. Europe gas storage started the 2022/23 winter 17.86% YoY and is now a YoY surplus of 31.98%. Europe storage levels bottomed in late Apr/22 at 29%, which was the lowest level since Apr 2018. Last winter began (Nov 1/21) with gas storage at 77.14% capacity, down 18.52% YoY. The YoY deficit has turned to surplus after months of the deficit tightening. This winter (Nov 1/22) began with gas storage at 94.94% capacity, up 17.86% YoY. Thanks to the warm weather and US LNG, storage as of Jan 12 is at 82.14%, which is +31.98% greater than last year levels of 50.16% and is +21.77% above the 5-year average of ~64%. Below is our graph of Europe Gas Storage Level.

Figure 21: Europe Gas Storage Level



Source: Bloomberg

Oil – US oil rigs up +5 rigs to 623 oil rigs on Jan 13

US oil rigs up WoW

Baker Hughes released its weekly North American drilling activity data on Friday. Last week's rigs were -3 and we thought that was likely due to the cold weather in Texas/Oklahoma that had also caused refineries to halt some processes. It look like that was the case as this week's rig increases were in areas hit by the cold such as the Permian the prior week. This week US oil rigs were up +5 rigs at 623 oil rigs as of Jan 13. We did not expect any big increases this week given WTI has been $80 and HH below $4. US oil rigs hit a 16-week low of 591 on Sept 9. US oil rigs are still +444 oil rigs since the Covid Sept 17, 2020 oil rigs of 179 oil rigs. And US oil rigs are +131 oil rigs YoY. US gas rigs were down -2 WoW at 150 gas rigs.

Figure 22: Baker Hughes Total US Oil Rigs

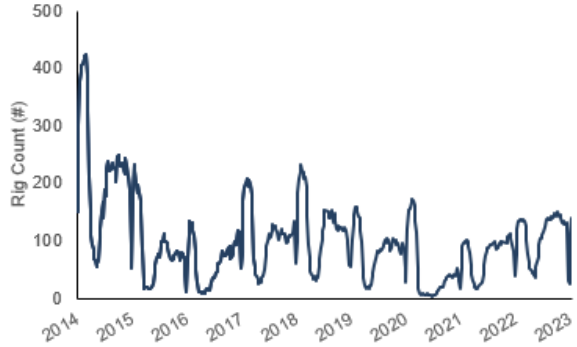
Source: Baker Hughes

Oil – Total Cdn rigs up +38 WoW to 227 total rigs, +36 rigs YoY

Cdn rigs +38 WoW

Cdn rig activity has moved out of its traditional Xmas big crash down thru New Year. As expected post Xmas and New Years, we saw a big ramp up last week that has continued into this week as we move into the peak winter drilling period. Total Cdn rigs were +38 to 227 rigs as of Jan 13, 2023. As noted in last weeks memo, the increase in rig count is no surprise as the holiday season officially wraps up. Total rigs are now +66 vs the comparable Covid period of 161 rigs on Jan 6, 2021. Cdn drilling has recovered YoY, a year ago Cdn oil rigs were 121 and Cdn gas rigs were 70 for a total Cdn rigs of 191, meaning total Cdn oil rigs are +20 YoY to 141 oil rigs and Cdn gas rigs are +16 to 86 gas rigs.

Figure 23: Baker Hughes Total Canadian Oil Rigs



Source: Baker Hughes

Oil – US weekly oil prod up 0.1 mmb/d to 12.2 mmb/d

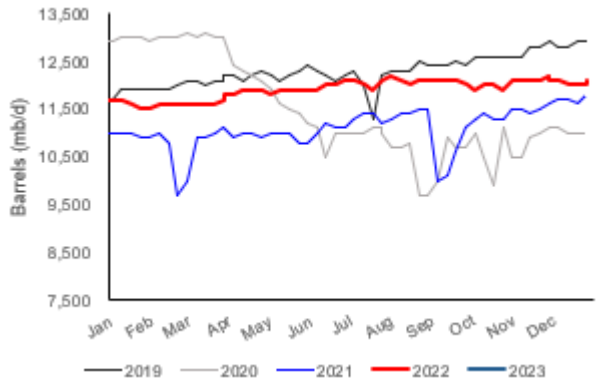
It sounds like North Dakota still had not fully restored oil production as of Jan 6 based on comments from North Dakota that there was still approx. 0.1 mmb/d of offline production. This means that the weekly increase of 0.1 mmb/d would have been more if all of North Dakota oil had been restored. The EIA estimates US oil production was up 0.1 mmb/d WoW to 12.2 mmb/d for the week ended Jan 6. US oil production, based on the weekly estimates, has been mostly range bound between 11.9 to 12.1 mmb/d since the 2nd week of May. But broke above 12.1 mmb/d to 12.2 mmb/d for the week ended Jan 6 as well as four weeks ago, the first time since it touched 12.2 mmb/d in the 1st week of August. Lower 48 production was up 0.2 mmb/d WoW to 11.8 mmb/d this week and Alaska was flat again at 0.4 mmb/d WoW. US oil production is up +0.500 mmb/d YoY at 12.2 mmb/d but is still down significantly at -0.900 mmb/d since the 2020 peak of 13.1 mmb/d on March 13.

Figure 24: EIA's Estimated Weekly US Oil Production

	Week 1		Week 2		Week 3		Week 4		Week 5	
Year-Month	End Date	Value	End Date	Value	End Date	Value	End Date	Value	End Date	Value
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								

Source: EIA

Figure 25: US Weekly Oil Production



Source: EIA, SAF

Oil – EIA's Jan STEO increases 2023 oil production forecasts by +80,000 b/d

The EIA posted its December Short-Term Energy Outlook on Tuesday [LINK]. The EIA raised its 2023 oil production forecasts by 80,000 b/d, while also releasing its US oil production forecast for 2024. (i) The EIA made a small revision to its 2022 US oil production "actuals" from 11.87 mmb/d to 11.86 mmb/d, which is +0.61 mmb/d YoY vs 11.25 mmb/d in 2021. (ii) The EIA forecasts Q1/23 at 12.37 mmb/d, which is +0.90 mmb/d vs Q1/22 of 11.47 mmb/d. This +0.90 mmb/d increase YoY is up from +0.85 mmb/d YoY as late as its March STEO, the previous highest forecast for Q1/23 year to date. This increase is more in line with EIA forecasts made in the summer of 2022. Dec 2022 EIA "actuals" are +0.57 mmb/d vs Dec 2021, so it still looks to be on track or close to the EIA's new STEO. (iii) Jan STEO 2023 average forecast is 12.41 mmb/d, which is down -0.58 mmb/d from their March STEO. This is

EIA increases 2023 oil production forecast

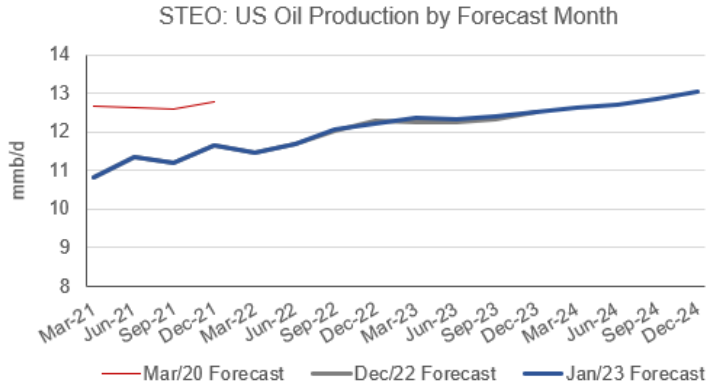
an increase from Dec STEO of 12.33 mmb/d, but down from Sep STEO of 12.63 mmb/d, Aug STEO of 12.70 mmb/d, July STEO of 12.77 mmb/d, and June STEO of 12.97 mmb/d. (iv) The EIA is forecasting 2024 oil production to increase modestly to 12.81 mmb/d a YoY increase of +0.40 mmb/d, with relevant increases of +0.12 mmb/d in Q1/24, +0.09 mmb/d in Q2/24, and +0.14 mmb/d in Q3/24.

Figure 26: Estimated US Crude Oil Production By Forecast Month

(million b/d)	Q1/21	Q2/21	Q3/21	Q4/21	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
Jan-2023	10.82	11.34	11.18	11.66	11.25	11.47	11.70	12.05	12.23	11.86	12.37	12.34	12.4	12.51	12.41	12.63	12.72	12.86	13.03	12.81
Dec-2022	10.82	11.34	11.18	11.66	11.25	11.46	11.7	12.03	12.29	11.87	12.24	12.24	12.34	12.51	12.33					
Nov-2022	10.82	11.34	11.18	11.66	11.25	11.46	11.70	11.99	12.15	11.82	12.22	12.24	12.32	12.48	12.31					
Oct-2022	10.82	11.34	11.18	11.66	11.25	11.46	11.70	11.83	11.99	11.74	12.27	12.29	12.36	12.50	12.35					
Sep-2022	10.82	11.34	11.18	11.66	11.25	11.47	11.70	11.81	12.16	11.79	12.42	12.55	12.70	12.87	12.63					
Aug-2022	10.82	11.34	11.18	11.66	11.25	11.46	11.69	12.01	12.28	11.86	12.39	12.50	12.82	13.10	12.70					
July-2022	10.69	11.28	11.13	11.63	11.19	11.46	11.75	12.08	12.34	11.91	12.45	12.58	12.87	13.17	12.77					
June-2022	10.69	11.28	11.13	11.63	11.19	11.45	11.71	12.08	12.43	11.92	12.64	12.82	13.07	13.33	12.97					
May-2022	10.69	11.28	11.13	11.63	11.19	11.42	11.78	12.07	12.35	11.91	12.56	12.71	12.94	13.18	12.85					
Apr-2022	10.69	11.28	11.13	11.63	11.19	11.52	11.90	12.15	12.46	12.01	12.73	12.88	13.02	13.17	12.95					
Mar-2022	10.69	11.28	11.13	11.62	11.18	11.59	11.89	12.15	12.48	12.03	12.75	12.91	13.06	13.24	12.99					
Feb-2022	10.69	11.28	11.13	11.69	11.20	11.67	11.86	12.06	12.27	11.97	12.46	12.54	12.63	12.75	12.60					
Jan-2022	10.69	11.28	11.12	11.54	11.16	11.58	11.70	11.88	12.05	11.80	12.26	12.33	12.46	12.58	12.41					
Dec-2021	10.69	11.28	11.11	11.63	11.18	11.67	11.72	11.91	12.09	11.85										
Nov-2021	10.69	11.28	11.07	11.47	11.13	11.69	11.77	11.97	12.16	11.90										
Oct-2021	10.69	11.28	10.98	11.13	11.02	11.54	11.64	11.78	11.96	11.73										
Sept 2021	10.69	11.28	11.06	11.28	11.08	11.42	11.58	11.81	12.06	11.72										
Aug 2021	10.69	11.22	11.26	11.30	11.12	11.46	11.62	11.86	12.11	11.77										
July 2021	10.70	11.20	11.17	11.34	11.10	11.54	11.72	11.95	12.20	11.85										
June 2021	10.70	11.04	11.17	11.38	11.08	11.55	11.67	11.88	12.05	11.79										
May 2021	10.65	10.97	11.12	11.34	11.02	11.51	11.68	11.96	12.21	11.84										
Apr 2021	10.75	10.93	11.13	11.35	11.04	11.54	11.74	11.99	12.18	11.86										

Source: EIA STEO

Figure 27: Estimated US Crude Oil Production By Forecast Month



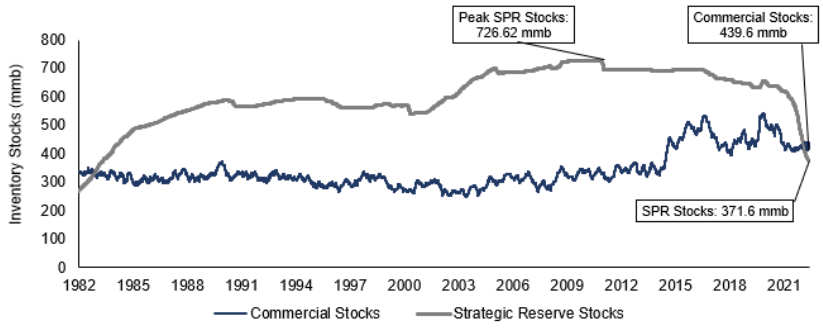
Source: EIA STEO

Oil – US SPR reserves now -68.02 mmb lower than commercial crude oil reserves

Oil in US Strategic Petroleum Reserves (SPR) moved below total US commercial crude oil reserves in the Sept 16 week for the first time since 1983, with the deficit widening again this week due to the big build in commercial oil stocks that was primarily driven by a drop in US oil exports during the cold weather in the Gulf Coast. The EIA's new weekly oil data for Jan 6 has SPR reserves at 371.6 mmb vs commercial crude oil reserves at 439.6 mmb. The below graphs highlight the difference between commercial and SPR stockpiles.

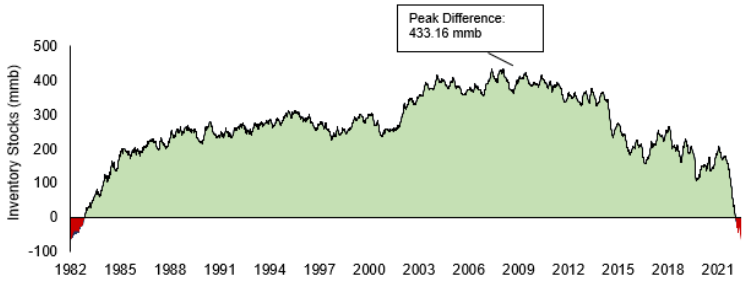
SPR reserves remain lower than commercial

Figure 28: US Oil Inventories: Commercial & SPR



Source: EIA

Figure 29: US Oil Inventories: SPR less commercial



Source: EIA

Oil – Updated oil sands 2023 maintenance schedule

Oil sands 2023 maintenance

On Wed, Local Union 488 (Piping Professionals) posted the updated, still subject to change, tentative 2023 shutdown schedule for oil sands maintenance/turnarounds [LINK]. It is still tentative and subject to change, but the oil sands players typically don't provide maintenance schedules until sometime in 2023. But it still gives an indication of the length of turnarounds at each oil sands project. There are changed and additions to their Nov 10, 2022 update that we highlighted in our Nov 27, 2022 Energy Tidbits memo.

Figure 30: Jan 11 Update to Tentative 2023 Shutdown Schedule for Oil Sands Projects

Tentative Spring Shutdown Schedule *Subject to change

Job Site	Location	Approximate Expected Duration	Pre Shutdown Approximate date	Approximate Start Date	Approximate End Date	Approximate Manpower All Trades or UA	Other Information	Agent
Scotford	Edmonton Area	64 days		April 1, 2023	June 4, 2023	2600		Kevin Morin
Nutrien (ft.sask)	Edmonton Area	TBD		May	TBD	350		Kevin Morin
Nutrien (Redwater)	Edmonton Area	13 days		April	April	20-30 (UA)		Kevin Morin
Edmonton Suncor(TA 123)	Edmonton Area	28 days		April 16, 2023	May 16, 2023	100 (UA)		Neil Ferguson
Edmonton Suncor (TA Light Oils)	Edmonton Area	14 days		may	may	TBD		Neil Ferguson
IOL	Edmonton Area	TBD		April	TBD	500		Neil Ferguson
Suncor Base plant	Fort MacMurray	50 days		May	July	3000	camp- Mackay	Pascal Contant
Suncor Firebag	Fort MacMurray	40 days		TBD	TBD	600		Pascal Contant
Fort Hills	Fort MacMurray	60 days		TBD	TBD	1200		Pascal Contant
Syncrude	Fort MacMurray	60 days		March 23, 2023	May 22, 2023	3500		Robert Taylor
CNRL Horizon	Fort MacMurray	30 days	March 1, 2023	May 16, 2023	June 16, 2023	2600/200 (UA)		Robert Taylor
CNRL Jackpine	Fort MacMurray	30 days		March 28, 2023	April 28, 2023	1250		Robert Taylor
Muskeg River	Fort MacMurray	30 days		May 6, 2023	June 8, 2023	1000		Robert Taylor
Albian	Fort MacMurray	45 days		April	June	1000		Robert Taylor
Mercer Pulp Mill	Peace River	10-12 days		May 7, 2023	May 17, 2023	1000		Terry Fraser

Source: Local Union 488

Oil – Cdn oil differentials narrowed $3.60 WoW to $23.00 at close on Jan 13

WCS less WTI differentials

It's been a rocky month for Cdn oil differentials with the Keystone shut-in, expectations for less of an impact, then moving to uncertainty for a return, then some narrowing two weeks ago with the partial restart with the UnAffected Portion and then last week and again this week with the restart of the Affected Portion. Last week, the WCS-WTI differential was $26.60 on Jan 6, but narrowed by $3.60 to close at $23.00 on Jan 13. For perspective, a year ago, the WCS-WTI differential was $13.85 on Jan 13, 2022. Below is Bloomberg's current WCS–WTI differential as of Jan 13, 2023 close.

Figure 31: WCS less WTI oil differentials including Jan 13 close

Source: Bloomberg

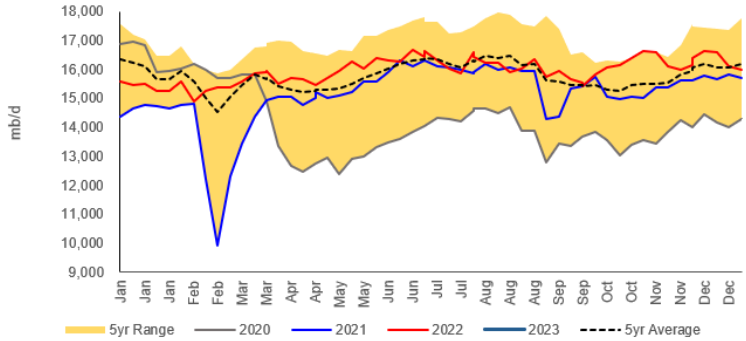
Oil – Refinery inputs +0.831 mmb/d WoW to 14.651 mmb/d as weather warms

Refinery inputs up WoW

There was a partial recovery in refinery crude oil inputs following the cold weather in the Gulf Coast the prior week that led to some temporary refinery impacts. On Wednesday, the EIA released its estimated crude oil input to refinery data for the week ended Jan 6. The EIA reported crude oil inputs to refineries were up +0.831 mmb/d WoW to 14.651 mmb/d, which is -0.922 mmb/d YoY from 15.573 mmb/d for the week ended Jan 7, 2022. We should see some further recovery from the cold weather, but note that refineries normally move into some seasonal maintenance in Feb/early March for the switch to more summer fuels. This week's refinery utilization was 84.1%, a -4.3% YoY decrease. Total products supplied (i.e.,

demand) decreased WoW, down -0.563 mmb/d to 17.627 mmb/d, and Motor gasoline was up +0.044 mmb/d at 7.558 mmb/d from 7.514 mmb/d last week. The 4-week average for Motor Gasoline was down -0.419 mmb/d YoY to 8.278 mmb/d.

Figure 32: US Refinery Crude Oil Inputs (thousands b/d)



Source: EIA

Oil – US "net" oil imports up +2.708 mmb/d WoW to 4.213 mmb/d

US "net" oil imports up WoW

US "NET" imports were up +2.708 mmb/d to 4.213 mmb/d for the Jan 6 week. US imports were up +0.638 mmb/d WoW to 6.350 mmb/d. US exports were down -2.070 mmb/d WoW to 2.137 mmb/d. The WoW increase in US oil imports was driven mostly by Top 10, specifically Canada and Mexico, with an overall increase of +1.028 mmb/d. Some items to note on the by country data. (i) Canada was up this week +0.788 mmb/d to 3.737 mmb/d. (ii) Saudi Arabia was relatively flat at 0.464 mmb/d. (iii) Colombia was down -0.111 mmb/d to 0.246 mmb/d. (iv) Ecuador was up this week +0.050 mmb/d to 0.137 mmb/d. (v) Iraq was down significantly by -0.204 mmb/d to 0.150 mmb/d. (vi) Mexico was up +0.240 mmb/d to 0.668 mmb/d.

Figure 33: US Weekly Preliminary Oil Imports by Major Countries

US Weekly Preliminary Crude Imports By Top 10 Countries (thousand b/d)													
(thousand b/d)	Oct 21/22	Oct 28/22	Nov 4/22	Nov 11/22	Nov 18/22	Nov 25/22	Dec 2/22	Dec 9/22	Dec 16/22	Dec 23/22	Dec 30/22	Jan 6/23	WoW
Canada	3,483	3,410	3,235	3,076	3,844	3,354	3,423	3,795	3,066	3,504	2,949	3,737	788
Saudi Arabia	325	533	519	211	685	338	274	317	513	473	479	464	-15
Venezuela		0	0	0	0	0	0	0	0	0	0	0	0
Mexico	509	748	503	528	495	300	585	602	632	581	428	668	240
Colombia	215	218	341	143	170	290	292	248	71	353	357	246	-111
Iraq	220	134	503	141	385	363	252	282	227	289	354	150	-204
Ecuador	201	0	102	101	42	242	159	157	70	274	87	137	50
Nigeria	42	81	119	181	43	50	159	171	136	66	141	143	2
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	4,995	5,124	5,322	4,381	5,664	4,937	5,144	5,572	4,715	5,540	4,795	5,545	750
Others	1,185	1,081	1,132	1,178	1,399	1,100	868	1,295	1,104	712	917	805	-112
Total US	6,180	6,205	6,454	5,559	7,063	6,037	6,012	6,867	5,819	6,252	5,712	6,350	-540

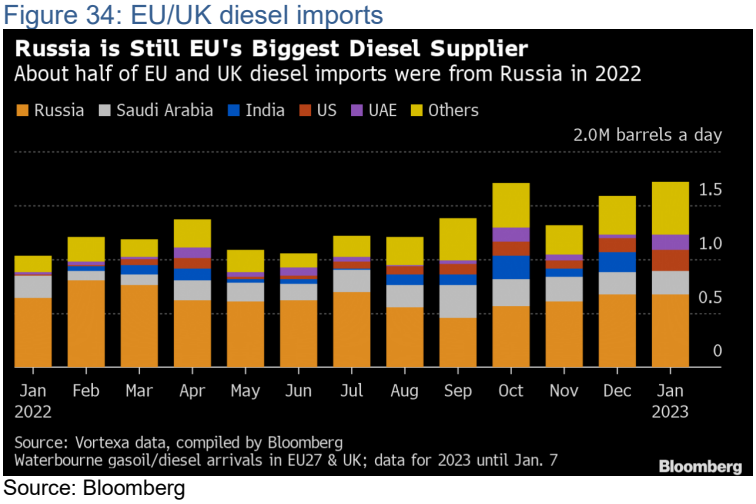
Source: EIA

Oil – Europe loading up on Russia diesel before Feb 5 ban

Europe diesel imports from Russia

The EU ban on importing Russian petroleum products kicks in just under three weeks on Feb 5, 2023. Fortunately, it has been a well above normal temperatures in Europe over the past few weeks, which has reduced the normal Jan demand for fuel oil products. Regardless, Europe has been ramping up its imports of diesel ahead of the Feb 5 ban. Europe has been importing >0.5 mmb/d for the past two months. Below is Bloomberg's graph on Europe's diesel imports split by the country/region of the diesel supply.

Figure 34: EU/UK diesel imports



Source: Bloomberg

Oil – Will US burning thru weapons be an impetus for Ukraine to have Russia talks?

US burning through missiles

It's not just because the Republicans have questioned the level of financial support for Ukraine, but we have to wonder if the US Navy Secretary comments give the Republicans more fuel for their views. Because if they are firm in their view, then we have to wonder if this becomes a factor for Ukraine to worry about for H2/23. The last thing Ukraine can afford to do is find themselves in H2/23 with faltering US weapons support. On Wed, Defense One reported "*If weapons makers can't boost production in the next six to 12 months, the United States may find it "challenging" to continue arming itself and helping Ukraine, the Navy secretary said Wednesday. Carlos Del Toro was speaking to a group of reporters on the sidelines of a Surface Navy Association conference in Arlington, Virginia, just days after the Biden administration announced it would send armored fighting vehicles to Ukraine. Some Republicans are pushing for the U.S. to stop giving weapons to Kyiv. The secretary was asked to respond to comments made at the conference by Adm. Daryl Caudle, commander of U.S. Fleet Forces Command. Caudle, the reporter said, worried that "the Navy might get to the point where it has to make the decision whether it needs to arm itself or arm Ukraine, and has the Navy gotten to that point yet?" Del Toro replied, "With regards to deliveries of weapons systems for the fight in Ukraine…Yeah, that's always a concern for us. And we monitor that very, very closely. I wouldn't say we're quite there yet, but if the conflict does go on for another six months, for another year, it certainly continues to stress the supply chain in ways that are challenging."* Our Supplemental Documents package includes the Defense One report. [LINK]

Massive draw on Javelin/Stinger missiles to support Ukraine

This concern on the US burning thru weapons in their support of the Ukraine is not a new story Here is what we wrote in our Dec 11, 2022 Energy Tidbits memo. "*On Tuesday morning, Raytheon CEO Hayes was on CNBC Squawk Box and he said some amazing stats on how many missiles have been delivered to the Ukraine.*

Hayes noted how all the weapons delivered to the Ukraine were being done so out of current inventory and that they were drawing down inventory much faster. The levels are huge relative to current production rates. We tweeted [LINK] "h/t to US for UA key weapons defence support. "... we've gone thru in the 1st 10 mths of the war, 5 yrs worth of Javelin anti-tank missiles and we've gone thru 13 yrs worth of Stinger [surface-to-air missiles] production" @RaytheonTech CEO to @andrewrsorkin." And he concluded "it's going to take us some time to catch up." We hate to think where Ukraine would be without the US stepping up on Javelins and Stinger missiles.

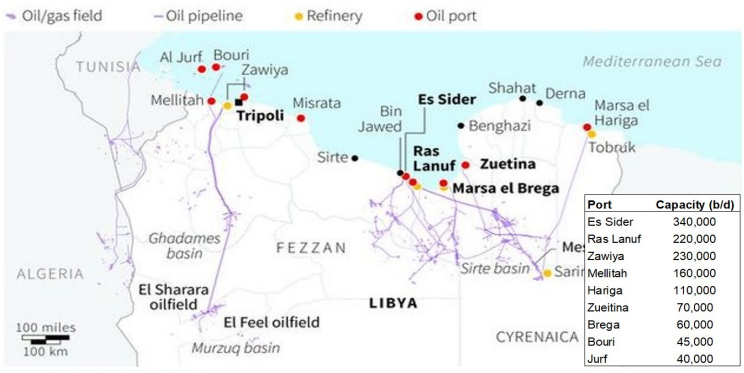
Oil – Libya NOC says oil production continues to be stable at ~1.2 mmb/d

Libya oil production 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 couple months. On Thursday, the Libya National Corporation posted on its Facebook [LINK] a short update on oil production. The Google Translate was "*Crude oil production reached 1.2 million barrels, and condensate production reached 56 thousand barrels during the past 24 hours*."

Figure 35: Libya Ports, Major oilfields and Terminals map

SAF Group Compiled Libya Ports & Terminals Status



Source: Bloomberg, HFI Research, SAF

Source: SAF Group

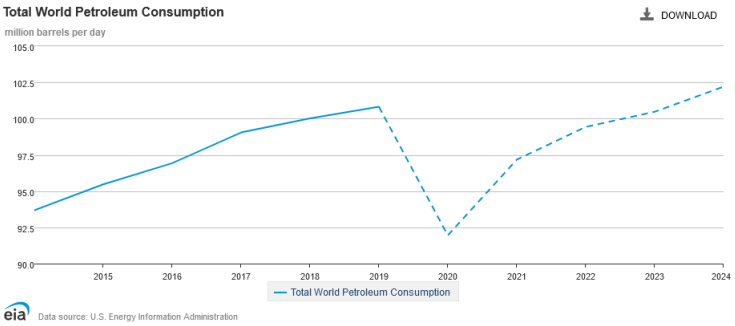
Oil – EIA forecasts record global petroleum demand in 2024, +1.72 YoY to 102.2 mmb/d

EIA sees record oil demand in 2024

On Tues, the EIA released its Short Term Energy Outlook Jan 2023. (i) We tweeted [LINK] "*Peak #Oil demand is still years away. Good reminder #Oil consumption/demand growth may be modest in the 1.4b OECD countries, but can't hold back the 6.4b non-OECD countries from growing economies and petroleum products consumption at stronger rates. Thx @EIAgov. #OOTT".* (ii) We didn't have to dig for this data, rather the EIA tweeted the below graph [LINK] saying "*Our first forecasts for 2024: We expect record global petroleum consumption in 2024, with lower global crude oil prices. #STEO."* (iii) Our tweet had the reminder that oil demand growth is modest in OECD countries, but they are only 1.4 billion o the world's population versus strong oil demand growth in the non-OECD countries that make up 6.4 billion of the world's population. (iv) The EIA forecasts OECD oil consumption of 45.83 mmb/d in 2023 immaterially increasing to 45.92 mmb/d in 2024. But the EIA forecasts non-OECD oil consumption of 54.64 mmb/d in 2023 increasing 1.64 mmb/d to 56.28 mmb/d

in 2024. (v) EIA forecasts global oil consumption +1.05 mmb/d YoY in 2023 to 100.48 mmb/d, and then +1.72 mmb/d YoY in 2024 to 102.20 mmb/d.

Figure 36: EIA's first forecast for 2024 is record oil demand



Source: EIA

Oil – Key oil call for 2023, is China moving to herd immunity in Q1?

Key oil call for 2023

There is no change to our view that we believe the key oil call for 2023 is China and is China moving to herd immunity in Q1? Based on the continuing reports, it looks like China is speeding towards herd immunity. Because we would expect that China will be like all other countries on how they will reopen once there is herd immunity. And if China reopens, then we believe there will be a big quick jump up in China activity and therefore oil fuels demand. No two countries were likely identical on exactly the impact on people and economy once their economies reopened after reaching herd immunity, but we aren't aware of any country that didn't see a big quick jump in mobility, industry and activity post herd immunity. Everyone in western countries remembers what they did once there was a reopening. Why would China be different? This is why we consider China hitting herd immunity to be the key oil call item for 2023 because we believe a China reopening will be a big boost to China oil demand. That is why, on Dec 23, we tweeted [LINK] "*Key #Oil call for 2023 - When will China reach herd immunity? @Pfizer notes herd immunity at 70%-90%. Makes Q1 look likely, @business ~18% in 1st 20 days of Dec & 1st real new year gatherings since Covid. Sets up* 👇 *@michaelwmuller rebound in CN fuels demand as early as Q2. #OOTT.*" And that is why we have continued to track what is going on with respect to China herd immunity and China fuel demand indicators.

Vitol: J curve recovery in China demand in Q2 if herd immunity in Q1

The reason why we have been highlighting the herd immunity focus is because of the Dec 15 comments from Vitol. Here is what we wrote in our Dec 18, 2022 Energy Tidbits memo. "*Great food for thought on China's Covid relaxation from Mike Muller (Head, Vitol Asia) in his monthly appearance on the Gulf Intelligence Daily Energy Markets podcast on Thursday. [LINK]. (i) China is clearly relaxing its Covid restrictions with the key assumption that Omicron version of Covid is not anymore deadly than the flu. And Muller notes that Covid is spreading quickly. So is China effectively moving to herd immunity strategy near term by letting the less deadly Covid version spread quickly? If so, it means that the next few months should see*

choppy, up and down non-broad recovery, But if China gets to herd immunity, does it set up "J" shaped recovery in Q2/23? (ii) Early Thursday morning, we tweeted [LINK] "Nike swoosh or J shaped recovery in China demand transportation fuels.

See 👇Vitol @michaelwmuller inbound international air travel to China as soon as Q2. Freedom of travel + population less scared of Virus = China move faster to herd immunity. @sean_evers @CrystolEnergy. #OOTT." (iii) Our tweet included the transcript we made of Muller's comments. Items in "italics" are SAF Group created transcript. 14:40 min mark. "Covid headlines out of China have all been rather constructive of late. There are clear signs that public policy has shifted towards no longer Zero tolerance and restrictive measures and a realization, that's probably guided by their chief medical scientists, that this particular variation of Omicron that is running thru the population a lot faster, I think if you just go through the small sample of my own colleagues in China, many of them have it right now, they all know somebody n their family or in their close circle of friends that has it and that's across three different cities. So it looks like China is in the process of becoming self immunized if you like by a more liberal policy of allowing the virus to spread in a way that is reasonably contained." 15:50 min mark. "there is a lot more freedom of movement. There has not yet been an edict from central government that the grand migrations for Chinese New Year, where you can get half a billion people getting on trains, cars, public buses and going to their families at Chinese New year is going to be discouraged as was the case for the last two cycles. Chinese New Year falls early and this is going to start around January 7/8. Air travel is up, public transport is being made free of charge in certain cities. China Eastern came out with a headline today they have 1,380 scheduled domestic flights that compares to five hundred and forty odd flights on the first of December. The population of China seems less scared of the Virus than was the case just a few weeks ago, and self-immunizing in a way that might happen a lot faster than we think". 17:15 min mark. ".. and, as such, it stands a reasonable chance of not suffering the same toll that was the case in many other large countries. So with that degree of confidence in the economy, we have colleagues in China suggesting that international inbound air travel in China could be a reality as soon as Q2 next year, which was not in most people's balances in supply demand predictions going forward. So that gives you a bit of a Nike swoosh or "J" shaped sort of view on demand for transportation fuel in China, notably jet fuel which is the big absent portion of the oil demand barrel. And has people getting quite bulled up for the second half of next year, if not somewhat sooner. But in the near term, of course, one has to be cautious because the public has been conditioned to self-isolate themselves and to avoid getting this virus if they can."

Oil – China's major cities have all seen peak Covid, Spring Festival will get the rest

Shanghai also hit peak Covid

We still believe there is no bigger Covid spreader event than Spring Festival, which should drive peak Covid in any areas that haven't yet seen peak Covid cases. There hasn't been any real Chinese Covid statistics for the past 2 to 3 weeks so we have had to look for comments from Chinese health officials on cities that have all seen peak Covid cases. We have previously noted comments that big cities like Beijing had seen peak Covid cases, but we hadn't seen comments on the largest city in China – Shanghai. It's why, on Monday night, we tweeted [LINK] "*china speeding to herd immunity. @AmChamSh Eric Zheng just now. no official stats but in Shanghai, based on anecdotal evidence at least 70% of people have*

already got the Covid infection. set up for sustained #Oil demand recovery on Q2. Thx @business. #OOTT". Zheng was on Bloomberg TV out of Asia on Monday night. He is president of the American Chamber of Commerce in Shanghai, and AmCham Shanghai was the third American Chamber established outside the United States, and has 2,800 members from 1,000+ companies. Zheng is stationed in Shanghai. Shanghai is the most populous city with ~28 million people. And reinforces that China's major cities have all seen peak Covid.

Pfizer's "What is herd immunity?"

Here is Pfizer's explanation. [LINK] "***What is herd immunity?*** *Herd immunity occurs when the majority of a population is immune to a disease or virus. Otherwise known as community immunity, it helps to slow the spread of infectious diseases in two ways: People contract the disease and develop an immune response. People are vaccinated. When enough people are vaccinated, everyone—including those who are too young or too sick to be immunized—receives some protection from the spread of diseases. An infectious disease is less likely to spread from person to person because there are fewer germs around to infect others. And if a person does get sick, the likelihood of an outbreak is low because more people are immune.* ***When is herd immunity most effective?*** *Scientists estimate that in order for herd immunity to be effective, about 70 - 90 percent of a population need to be immune to a disease, either by contracting the disease and recovering or getting a protective vaccine. This reaches what the World Health Organization (WHO) calls the herd immunity threshold. Although, there are factors to consider. For instance, if a disease is considered highly contagious, a higher percentage of immunity is needed. Measles, an extremely contagious disease that is preventable through vaccination, needs 93-95 percent of a population to be immune in order to reach herd immunity threshold and for measles to be eliminated. Herd immunity works best when there is a vaccine to provide protection. For example, diseases like polio and smallpox5 were once very common in the United States, however due to widespread vaccination, these diseases have become extremely rare. In fact, the United States has been polio-free since 1979. The vaccines for these diseases have helped establish herd immunity.*

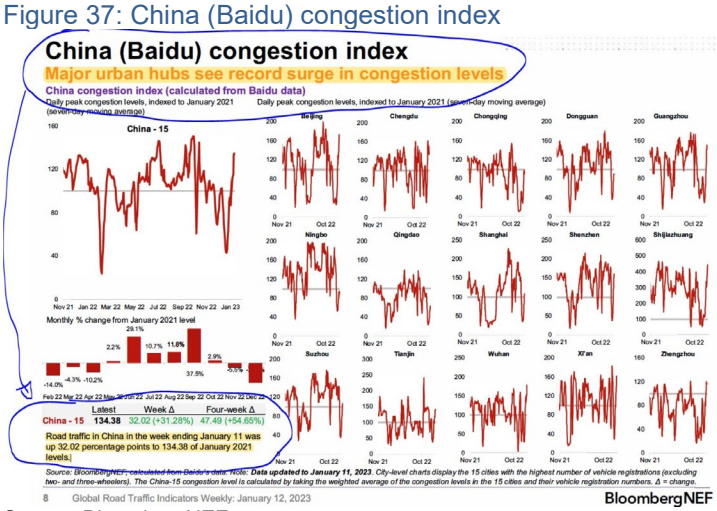
Oil – China road congestion +32% for week ending Jan 11, +34% YoY

China road congestion +32%

It almost seems like old or common now to report on China reopening, But we have been tracking it and will continue to do so as we continue to believe China is the oil story for 2023. On Thurs, we tweeted [LINK] "*China reopening. Run up to 1st New Year without restrictions with all major cities past peak Covid. Major urban hubs see record surge in congestion levels. Baidu data road congestion +32.0% for week ending Jan 11 to 134.38 of Jan 2021 levels. Thx @BloombergNEF Wayne Tan. #OOTT."* The positive trend in Baidu congestion index continues. When we first reported on the Baidu data post what seemed to be a reopening, our Jan 1, 2023 Energy Tidbits memo had an item asking *"A data blip? China road traffic +26% WoW for week ended Dec 28*." That was before the broad acceptance of the China reopening, but it quickly turned out that it wasn't a blip, rather the trend has continued. Our tweet included the below chart from BloombergNEF's weekly Global Road Traffic Indicators, which noted an even larger pick up in the China (Baidu) congestion index. As we noted two weeks ago, this pickup in Baidu congestion seemed to be consistent with the reports out of China on how people are getting out to restaurants, etc. All the reports continue to say Covid

has spread quickly across China, first in the major cities and now in more of the rural areas. The BloombergNEF chart is of congestion in the major cities, all of which are believed to have already hit peak Covid cases. And these cities have, to the most part, been reported as having hit peak Covid cases in early Jan. So these cases fit the thesis that once most people feel three is some sort of herd immunity, they get out and about just like seen in other parts of the world.

Figure 37: China (Baidu) congestion index



Source: BloombergNEF

Figure 38: China Most Populous Cities

Population of Cities in China (millions of people)

Rank	City	2020	2021
1	Shanghai	27.06	27.80
2	Beijing	20.46	20.90
3	Chongqing	15.87	16.38
4	Tianjin	13.59	13.79
5	Guangzhou, Guangdong	13.30	13.64
6	Shenzhen	12.36	12.59
7	Chengdu	9.14	9.31
8	Nanjing, Jiangsu	8.85	8.47
9	Wuhan	8.00	8.27
10	Xi'an, Shaanxi	8.00	8.27

Source: Statistics Times

Source: BloombergNEF

Oil – Oil demand in H1/23 to be hit by less gas-to-oil switching

One of the negatives to near term oil demand is the crashing Europe natural gas prices with the well above normal temperatures across most of the Continental Europe. The dramatically lower TTF natural gas price means there is less pressure for gas-to-oil switching. On Jan 4, we tweeted [LINK] "*TTF #NatGas prices now down ~40% since 12/31/22, down ~80% since*

late Aug. @IEA OMR Dec "expects roughly 550k b/d total switching related deliveries in EU this quarter and next". Thx @JWittels @RefinedRachel. #OOTT." The really warm weather in Europe has hammered Europe TTF gas prices, down 40% since Dec 31, but also down ~80% since the late Aug peak. It's why we believe there has to be an impact on oil demand as there isn't the near-term price incentive to drive users away from natural gas to petroleum products. Our tweet included a Bloomberg report on the recent IEA Oil Market Report Dec (posted Dec 14) that noted "*Industrial users in Europe continued switching from natural gas to "considerably cheaper" gasoil, the International Energy Agency said in its monthly Oil Market Report. * This "helps offset fears of a gas supply crunch over the winter and into 2023 and 2024" * IEA now expects roughly 550k b/d total switching-related deliveries in Europe this quarter and next, 80k b/d higher than in last month's report ** "This upwards revision is almost entirely comprised of gasoil."*

Figure 39: Dutch TTF Gas Feb'23 (TGG23) to Wed Jan 4 close.

Source: Barchart https://www.barchart.com/futures/quotes/TG*1

Source: Barchart

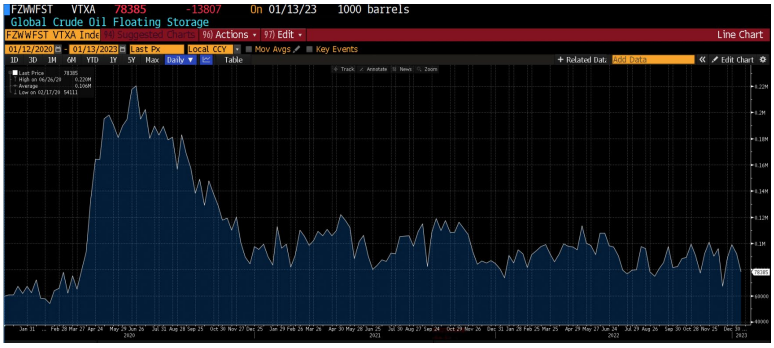
Oil – Vortexa crude oil floating storage 78.39 mmb, -13.8 mmb WoW

Vortexa crude oil floating storage

We are referencing the Vortexa global crude oil floating storage data posted on the Bloomberg terminal as of 10am 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 Jan 7 at 10am MT. (i) As of 10am MT yesterday, Bloomberg has posted Vortexa crude oil floating storage estimate for Jan 13 at 78.39 mmb, which is -13.8 mmb WoW vs upwardly revised Jan 6 of 92.19 mmb. Note Jan 6 of 92.19 mmb was revised +5.47 mmb vs 86.47 mmb originally posted on Bloomberg at 10am on Jan 6. (ii) Other than the revision to Jan 6, the rest of the revisions were smaller for the past several weeks. The revisions from the estimates posted today at 10am MT vs the estimates posted on Bloomberg at 10am on Jan 6 are as follows: Jan 6 revised +5.47 mmb. Dec 30 revised +1.13 mmb. Dec 23 revised +0.59 mmb. Dec 16 revised +1.26 mmb. Dec 9 revised +1,70 mmb. Dec 2 revised -0.62 mmb. Nov 25 was unchanged. (iii) There is still a wide range of floating storage for the past several weeks, but a simple average for the past seven weeks is 87.45 mmb, which is down vs last week's 89.30 mmb with the key difference being the dropping of the Nov 25 big week from the seven week average. (iv) Also remember Vortexa revises these weekly storage estimates on a regular basis and we do not track the revisions through the week. (v) Jan 13 estimate of 78.39 mmb is -141.97 mmb vs the post-Covid peak on June 26, 2020 of 220.36 mmb. (vi) Note that the below graph goes back 3

years and not just 2 years as floating oil storage was in the big ramp up period in Q2/20 as Covid started to have a huge impact. Jan 13 estimate of 78.39 mmb is +18.83 mmb vs pre-Covid Jan 13, 2020 of 59.56 mmb. Jan 13 estimate of 78.39 mmb is +4.76 mmb YoY vs Jan 14, 2022 of 73.63 mmb. (vii) Below are the last several weeks of estimates posted on Bloomberg as of 10am on Jan 14, 10am on Jan 7, and 10 am on Dec 31.

Figure 40: Vortexa Floating Storage posted on Bloomberg Jan 14 at 10am MT



Source: Bloomberg, Vortexa

Figure 41: Vortexa Estimates Posted Jan 14 10a MT, Jan 7 10am MT, Dec 31 10am MT

Posted Jan 14, 10am MT

Date	FZWWFST VT... Last Px
Fr 01/13/2023	78385
Fr 01/06/2023	92192
Fr 12/30/2022	99136
Fr 12/23/2022	89209
Fr 12/16/2022	67245
Fr 12/09/2022	95973
Fr 12/02/2022	90272
Fr 11/25/2022	100.872k
Fr 11/18/2022	92509
Fr 11/11/2022	77508
Fr 11/04/2022	90999

Jan 7, 10am MT

Date	FZWWFST VT... Last Px
Fr 01/06/2023	86473
Fr 12/30/2022	98010
Fr 12/23/2022	88620
Fr 12/16/2022	65993
Fr 12/09/2022	94265
Fr 12/02/2022	90887
Fr 11/25/2022	100.867k
Fr 11/18/2022	92113
Fr 11/11/2022	76062
Fr 11/04/2022	89658
Fr 10/28/2022	98148

Dec 31, 10am MT

Date	FZWWFST VT... Last Px
Fr 12/30/2022	93489
Fr 12/23/2022	88734
Fr 12/16/2022	66097
Fr 12/09/2022	93469
Fr 12/02/2022	90319
Fr 11/25/2022	101.508k
Fr 11/18/2022	92871
Fr 11/11/2022	76732
Fr 11/04/2022	90004
Fr 10/28/2022	98051
Fr 10/21/2022	87631

Source: Bloomberg, Vortexa

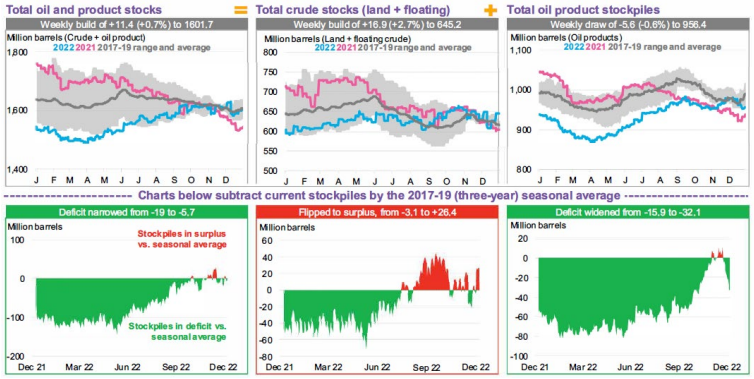
Oil – BNEF: global oil and product stocks deficit flips to 26.4 mmb surplus

BNEF's global oil inventories

For those with a Bloomberg terminal we recommend flipping through BloombergNEF's "Oil Price Indicators" weekly that came out on Monday as it provides good charts depicting near-term global oil demand and supply indicators. The global oil and products stockpile deficit for crude and products flipped to a surplus from a 3.1 mmb deficit to a 26.4 mmb surplus. The stockpile deficit against the five-year average (2015-19) narrowed from 47.8 mmb to 32.5 mmb. Total crude inventories increased by 2.7% to 645.2 mmb, including global floating inventories. Product stocks were down 0.5% WoW with the stockpile deficit against the 3-year average widening from 10.5 to 20 mmb. Gas, oil, and middle distillate stocks have widened against their three-year average deficit (2017-2019) from 18.7 mmb to 26.6 mmb.

Jet fuel consumption by international departures is set to increase by 18,300 b/d WoW while consumption by domestic passenger departures will increase by 99,400 b/d WoW. Below is a snapshot of aggregate global stockpiles. Our Supplemental Documents package includes excerpts from the BloombergNEF report.

Figure 42: Aggregate Global Oil and Product Stockpiles



Source: BloombergNEF

Bloomberg Oil Demand Monitor

Oil – Bloomberg Oil Demand Monitor: 2023 early data promising, but risks remain

We recommend reading the Bloomberg Terminal Oil Demand Monitor for a good recap of key oil demand indicators around the world. Early 2023 has shown promising signs of a coming rise in oil consumption, but economic headwinds may impede growth. The Oil Demand Monitor noted China's covid uptick, a return of city traffic congestion in major cities, and increased fuel consumption in India. The term "wildcard" was used to describe how China plays into forecasting Oil Demand for 2023 as an upward tick in Covid cases may bring back restrictions. As China's strict Covid-Zero policy has started to ease, early data shows it is translating into increased road activity according to BloombergNEF Baidu data. Of the 13 metropolitan centres regularly tracked every Monday by the Oil Demand Monitor, only London, Rome, Paris, and Berlin showed congestion marginally above 2019 pre-covid levels. In India, a multi-month high was reached for fuel consumption in December both WoW and YoY. All flights combined domestically and internationally are up 8.3% YoY but down -0.2% MoM. But is above 2019 levels by 6.5%. Our Supplemental Documents package includes the Bloomberg Oil Demand Monitor.

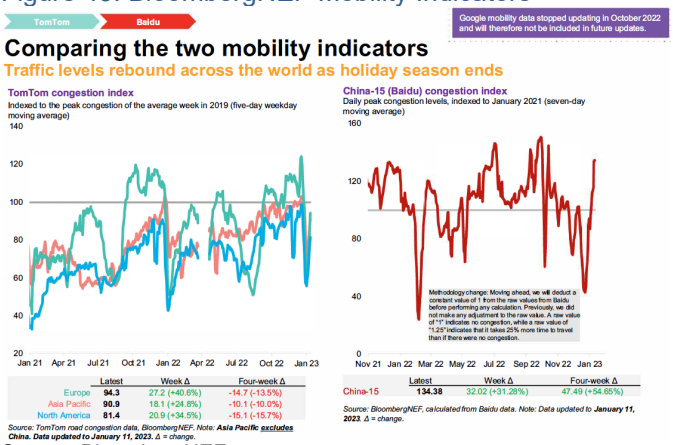
All major mobility indicators rise significantly WoW

Oil – Mobility indicators, all major regions rise as holiday season wraps up

We like to review the BloombergNEF weekly indicators reports as they provide updates on WoW changes, but also remind that WoW changes do not necessarily mark a trend. On Thursday, BloombergNEF posted its Global Road Traffic Indicators which included a turnaround WoW increase in mobility across the globe. This should come as no surprise as the new year typically brings back an increase in congestion levels. As the holiday season is now over, we expect these numbers to maintain their levels if not continue rising. TomTom trends turned around, moving closer relative to 2019 and all three major regions increased WoW. So, it's worth keeping an eye on these indicators as we exit the new year. TomTom congestion index showed Europe up +40.6%, Asia Pacific up +24.8%, and North America up +34.5% from

last week. Europe and North America are bullish and subject to drivers responding to rising cost, including high gasoline prices. Our Supplemental Documents package includes excerpts from the BNEF Global Road Traffic Indicators report.

Figure 43: BloombergNEF Mobility Indicators



Source: BloombergNEF

Oil – International air passenger Nov travel shows strong growth YoY, except China

November 2022 passenger data

This is lookback data at Nov so China data reflects Covid lockdowns. The International Air Transport Association (IATA) announced passenger data for November 2022 on Monday [LINK]. Total traffic in November 2022, measured in revenue passenger kilometers, rose 41.3% YoY. Globally, traffic is now at 75.3% of September 2019. Domestic traffic for November 2022 was up 3.4% YoY. Total November 2022 domestic traffic was at 77.7% of the September 2019. International traffic increased 85.2% YoY, with November 2022 reaching 73.7% of September 2019 levels. All markets continued reporting strong growth, led by Asia-Pacific. IATA's Director General Willie Walsh stated, *"Traffic results in November reinforce that consumers are thoroughly enjoying the freedom to travel. Unfortunately, the reactions to China's reopening of international travel in January reminds us that many governments are still playing science politics when it comes to COVID-19 and travel."* And *"Governments should focus on using available tools to manage COVID-19 effective (…) rather than repeating policies that have failed time and again over the last three years."* Our Supplemental Documents package includes the IATA release.

Figure 44: November 2022 Air Passenger Market

AIR PASSENGER MARKET DETAIL- NOVEMBER 2022	WORLD SHARE[1]	RPK	ASK	PLF(%-PT)[2]	PLF (LEVEL)[3]
Total Market	**100%**	**41.3%**	**23.8%**	**10.0%**	**80.8%**
Africa	1.9%	84.5%	51.7%	13.3%	74.8%
Asia Pacific	27.5%	68.4%	31.3%	17.0%	77.0%
Europe	25.0%	37.0%	19.6%	10.6%	83.8%
Latin America	6.5%	27.8%	27.6%	0.2%	82.0%
Middle East	6.6%	77.9%	41.3%	15.9%	77.5%
North America	32.6%	19.6%	13.3%	4.4%	83.2%

Source: IATA

Oil – Air cargo demand softens in November

Air cargo demand softens again in November

The International Air Transport Association (IATA) announced global air cargo markets showed softening demand for November 2022 on Monday [LINK]. Global demand, measured in cargo tonne-kilometres, fell 13.7% compared to November 2022, but -14.2% for international operations. IATA's Director General Willie Walsh said, *"Air cargo performance softened in November, the traditional peak season. Resilience in the face of economic uncertainties is demonstrated with demand being relatively stable on a month-to-month basis. But market signals are mixed. November presented several indicators with upside potential: oil prices stabilized, inflation slowed and there was a slight expansion in goods traded globally. But shrinking export orders globally and China's rising COVID cases are cause for careful monitoring."* Asia-Pacific airlines saw their air cargo volumes decrease by 18.6% in November 2022 YoY. Airlines in Asia-Pacific suffered from supply chain disruptions and reduced trade and manufacturing activity largely in part to rising Covid cases. North American carriers posted a 6.6% decrease in cargo volumes in November 2022 YoY. European carriers saw a 16.5% decrease in cargo volumes in November 2022 YoY. Middle Eastern carriers experienced a 14.7% YoY decrease in November 2022. Latin American carriers reported an increase of 2.8% in cargo volumes in November 2022 YoY. Our Supplemental Documents package includes the IATA release.

Figure 45: November 2022 Air Cargo Market

AIR CARGO MARKET IN DETAIL - NOVEMBER 2022	WORLD SHARE[1]	CTK	ACTK	CLF(%-PT)[2]	CLF(LEVEL)[3]
Total Market	***100.0%***	**-13.7%**	**-1.9%**	**-6.7%**	**49.1%**
Africa	*1.9%*	-6.3%	-11.4%	2.5%	45.8%
Asia Pacific	*32.6%*	-18.6%	-4.5%	-9.5%	54.5%
Europe	*22.8%*	-16.5%	-6.6%	-6.8%	56.9%
Latin America	*2.2%*	2.8%	19.9%	-6.4%	38.2%
Middle East	*13.4%*	-14.7%	2.1%	-9.3%	47.5%
North America	27.2%	-6.6%	0.3%	-3.1%	41.9%

Source: IATA

Oil & Natural Gas – Scotland maps "fastest possible" transition away from fossil fuels

"Fastest possible" transition away from fossil fuels

On Wed, we tweeted [LINK] *"Is this the #energytransition? Peak #Oil #NatGas demand still years away. Western #Oil #NatGas exporters CAN, US, now Scotland 👇 prioritize reducing #FossilFuels production. KSA,UAE, Qatar say Thank You! #OOTT."* On Tues, Scotland announced its "*Draft Energy Strategy and Just Transition Plan – delivering a fair and secure zero carbon energy system for Scotland."* [LINK] The news release announcing the plan starts off "*A route map to secure Scotland's fastest possible fair and just transition away from fossil fuels has been published*." The western countries went all-in on the energy transition before Russia invaded Ukraine and the key assumption was that the energy transition aspirations would happen smoothly, on time and with many calling peak oil demand hit in 2019. Our view has been unchanged for years – the energy transition was going to happen, but it would take longer, cost way more and be a bumpy/rocky road. The key assumption was always that peak oil demand had hit in 2019 or being hit. We have never been in that camp, rather we thought peak oil demand would be sometime after 2030. So when we saw the Scotland plan, we couldn't help say that Saudi, UAE and Qatar must be loving how the western countries have a priority to eliminate oil and gas in an outlook of increasing demand for both for longer than the energy transition aspirations. They bet oil and natural gas demand wouldn't crash as per energy transition aspirations and it looks like that bet will pay off over the next decade. The Scotland plan is, to a great degree, also trying to reassure the oil and gas workers that there will be a just transition to other work. It looks like all the western countries are using Just Transition as their buzz words. But one of the big advantages for Scotland in this transition away from fossil fuels is that it's renewable resources are driven by offshore wind and that the location for the services will be much the same as for oil and gas ie. workers won't have to move thousand miles away to try to find a job. Our Supplemental Documents package includes the Scotland release and excerpts from the plan.

Oil & Natural Gas –Calgary Herald cartoon on Liberals Just Transition

Liberals Just Transition cartoon

On Tuesday, Alberta Minister of Environment and Protected Areas Sonya Savage tweeted [LINK] "*The cartoon in the Calgary Herald today. We won't let this happen in Alberta. Instead, we will focus on attracting investment into new and emerging sources of energy like hydrogen and technology like CCUS. AND continue to support and reduce emissions in our oil and gas sector*." Her tweet included the below cartoon on the Liberals Just Transition that will transition existing oil and gas workers into other key industries. The cartoon seems to depict older oil and gas workers. But the feedback we get from oil and gas people is that the group that has the toughest decision are the 25 to 40 age who still have 30 years of potential oil and gas career. Whereas the older, call them the 50+ group should have oil and gas jobs for the rest of their career. And the group that found a resurgence is the baby boomers, who seem to be in continued demand. The big problem for the oil and gas sector is that they have trouble attracting grads. This might not have been a problem if the Energy Transition aspirations had come true and peak oil demand had been hit in 2019. But with oil and gas needed for longer, it's a problem. Last week'ss (Jan 8, 2023) Energy Tidbits memo had an item "Liberals Just Transition means less grads to help increase supply". Here is what we wrote "There was a reality check from Precision Drilling CEO Kevin Neveu on the challenge to attract young people to an industry that governments are trying to eliminate. Last Sunday,

we tweeted [LINK] "*Ironic! western leaders know #Oil #NatGas prices drove high inflation/cost of living. Yet, a key factor holding back supply is lack of young people entering oil & gas because they know same leaders are working to end the industry. Thx @ChrisVarcoe. #OOTT."* In the old days, oil companies couldn't hire enough people when oil and gas prices were strong and also didn't offer any jobs (rather cut people) when oil prices crashed to below $20. But now, when even the western leaders grudgingly see higher for way longer oil and gas prices, oil companies can't attract grads. It's understandable, how can a young grad pick a career in a sector that the governments want to eliminate? But as Neveu points out, it means that the industry can't deliver as much supply as they could with more people. Calgary Herald wrote "*As it looks to hire people needed to drill and maintain wells, the company — along with the country's oilfield services industry — also faces a labour challenge: federal talk about "just transition" legislation to help oil and gas workers shift into other sectors. "The energy transition is a great political headline. It's going to take decades, not years, decades," Precision Drilling CEO Kevin Neveu said in an interview. "The tone of some of the charismatic political leaders . . . does not encourage new entrants into the workforce. So, we've had to combat that by aggressively marketing our Evergreen (environmental) products, and the things we're doing to be part of the solution. But it does mean extra costs, extra resources."*

Figure 46: Calgary Herald on Liberals Just Transition

Source: Calgary Herald

Energy Transition – UAE's state oil CEO is President-designate for COP28

UAE oil CEO is president designate for COP28

The UAE is hosting COP28 from Nov 30 to Dec 12 and created a Green stir by naming Dr. Sultan Al Jaber, the Group CEO of the state oil company Abu Dhabi National Oil Company, as the COP28 President Designate. Needless to say, putting the state national oil company CEO as the leader for COP28 wasn't warmly received by the climate change side, who were also generally disappointed by the lack of results at COP27. It's hard for anyone to disagree that the optics of having the CEO of he state oil company for a major OPEC oil producer just don't cut it. However, we also wonder about the concept of having a CEO is also a problem for the climate change side. CEO types generally are more focused on achieving tangible results as much as possible to move closer to the goal. It's why, after hearing Al Jaber's address at the Atlantic Council Global Energy Forum yesterday, we tweeted [LINK] "*Hmm!*

Will Greens be satisfied if @SultanAhmedalj8 #COP28 delivers "tangible progress" and "practical solutions" to Paris 1.5C goal amidst "increasing pressure on energy security"? Or prefer another aspirational COP that sees world falling further behind Paris 1.5C goal? #OOTT." He said that the world needs to "*honest with ourselves about how much progress we have actually achieved and how much further and faster we truly need to go". "We are way off track when it comes to the key Paris goal of holding global temperatures down to 1.5 degrees and the hard reality is that in order to achieve this goal, global emissions must fall 43% by 2030*. " And he emphasized what we call a CEO approach of wanting to achieve results. He said "*We will work very closely with the UNFCC to move from ambition to real action. We will mobilize the private sector and all other sectors to deliver greater, more meaningful impact" "Let us together create a paradigm shift for tangible progress" "I urge all parties to help make COP28 a COP of concrete outcomes and practical solutions*" Our Supplemental Documents package includes the transcript we made of some of his comments.

Energy Transition – Qatar: greens living in a dream they realize they can't achieve

QatarEnergy CEO on Net Zero dreams

Earlier this morning, we tweeted on another of the comments from QatarEnergy CEO & Qatar Minister of Energy Security H.E. Eng. Saad Al-Kaabi yesterday and this was his view on the energy transition and how the Green side has been living in a dream. We tweeted [LINK] *"#NetZero reality check. "If I can just be a little bit blunt, maybe, about this is the community that was driving the green was living in a dream that they realized they can't achieve". Also #NatGss is a destination fuel. @qatarenergy CEO. Thx @FredKempe @AtlanticCouncil. #OOTT."* He was specific about how he approaches it like an engineer – he wants to have a plan, a budget, a timeline, etc. And not just a Net Zero dream that can't be achieved. And also how Natural Gas is not a transition fuel, it is a destination fuel. Our tweet included the Atlantic Council transcript where al Kaabi said "*If I can just be a little bit blunt, maybe, about this is the community that was driving the green was living in a dream that they realized they can't achieve, OK, and, basically, if you want to achieve what we all want to achieve, I think—we're the hottest place in the world, probably. So climate change affects us more than most. So, for us, it's very important that we head in that direction. It's very important that we achieve these goals. But we need to be realistic about what we can and cannot achieve and we can't be driven by just political agendas of people wanting to be elected. OK. It should be based on reality, based on what can be achieved. I'm an engineer. You tell me, I want to achieve an objective, I'll tell you, OK, can I do it per the plan, what's the budget, and [can] we ac hieve it at this timeline. But just to talk about achieving net zero and the majority of the countries that you talk to they talk about net zero and you say how you are going to achieve it, they say we achieve 60 percent, 70 percent of it by 2040 by doing this, this, and that, and the rest is technology improvement. So that—I'm not a native English speaker but that doesn't mean we will achieve net zero. It means we will strive to, we'll try, we'll see what we can do to achieve it. OK."*

Energy Transition – Norway minister hydrogen light years away from being reasonable

Norway minister on hydrogen

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 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.

Energy Transition – Hydrogen is an energy carrier, produced from another substance

Hydrogen is an energy carrier

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 – Biden's easier permitting for wind/solar, tougher for oil/gas

Biden toughens permitting for oil and gas

We have to believe most missed this Biden new guidance for permitting process for energy projects because it came out last Friday afternoon, when we, like everyone else, was watching the House Speaker marathon. (i) On Tues, we tweeted [LINK] "*1/2. ICYMI. Biden boost to #Wind #Solar, big hit to #Oil #NatGas permitting. "relative minor and short-term GHG emissions associated with CONSTRUCTION of certain renewable energy projects" = less detailed emissions est. Plus no need to incl emissions to get critical metals. #OOTT"* and [LINK] "*2/2. But #Oil #NatGas infra must include foreseeable direct & Indirect effects ie. explore, production, processing, transportation, etc. Plus incl est $ impact of social cost. Will any major new #Oil #NatGas infra get permitted or just drawn out for a long time? #OOTT"* (ii) Last Friday, the White House released "*New Guidance to Disclose Climate Impacts in Environmental Reviews"* for "the permitting process for clean energy and other infrastructure projects" effective immediately. There is no mention of fossil fuels in the release but oil and gas is highlighted in the 17-pg detail. (iii) We read the detail and it set off a number of alarms for oil and gas permitting. (iv) Big negative for getting federal approvals for fossil fuels infrastructure as Sunday Jan 8. The detail says "*this interim guidance is effective immediately" but it is open to comments until March 10*." (v) There is a big break for clean energy projects and the priority of the new guidelines is to make it faster for clean energy permitting by requiring less detailed emissions analysis. Note they only mention the minor and short term emissions association with the "*construction*". The White House release says "*Emphasizes a "rule of reason" that the depth of analysis should be proportional to a project's impacts and clarifies that projects that will reduce GHG emissions, such as certain renewable and low GHG projects, can have less detailed GHG emissions analysis*". Here is what the 17-pg detail says "*Absent exceptional circumstances, the relative minor and short-term GHG emissions associated with construction of certain renewable energy projects, such as utility-scale solar and offshore wind, should not warrant a detailed analysis of lifetime GHG emissions. As a second example, actions with only small GHG emissions may be able to rely on less detailed emissions estimates*." Then later "*As with any NEPA review, the rule of reason should guide the agency's analysis and the level of effort can be proportionate to the scale of the net GHG effects and whether net effects are positive or negative, with actions resulting in very few or an overall reduction in GHG emissions generally requiring less detailed analysis than actions with large emissions*." (vi) Note there is another big break for clean energy as there is no requirement to look at the emissions associated with the upstream element of clean energy projects such as the mining of critical metals, refining of the metals, transportation of metals, etc. (vii) There is a huge contrast to oil and gas that must include every potential direct and indirect emissions. The 17-pg detail says "*NEPA requires agencies to consider the reasonably foreseeable direct and indirect effects of their proposed actions and reasonable alternatives (as well as the no-action alternative). The term ''direct effects'' refers to reasonably foreseeable effects that are caused by the action and occur at the same time and place.82 The term ''indirect effects'' refers to effects that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.Indirect effects generally include reasonably foreseeable emissions*

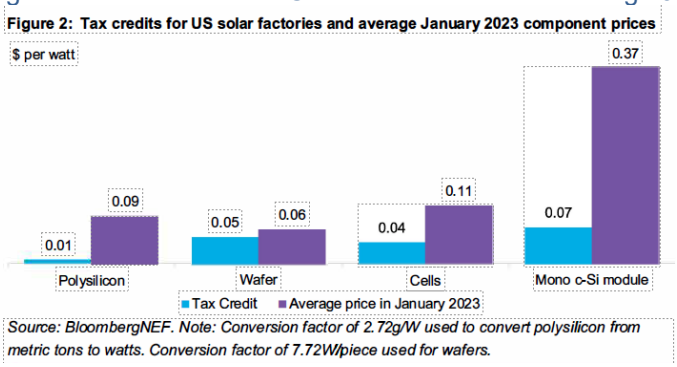
related to a proposed action that are upstream or downstream of the activity resulting from the proposed action. For example, where the proposed action involves fossil fuel extraction, direct emissions typically include GHGs emitted during the process of exploring for and extracting the fossil fuel. The reasonably foreseeable indirect effects of such an action likely would include effects associated with the processing, refining, transporting, and end-use of the fossil fuel being extracted, including combustion of the resource to produce energy. Indirect emissions are often reasonably foreseeable since quantifiable connections frequently exist between a proposed activity that involves use or conveyance of a commodity or resource, and changes relating to the production or consumption of that resource." (vii) Another big warning sign for oil and gas – including the $ estimate of the social cost. Also note the last works to see about "*its alternatives*". This is negative for fossil fuels. The 17-pg detail says "*Recommending that agencies provide additional context for GHG emissions, including through the use of the best available social cost of GHG (SC–GHG) estimates, to translate climate impacts into the more accessible metric of dollars, allow decision makers and the public to make comparisons, help evaluate the significance of an action's climate change effects, and better understand the tradeoffs associated with an action and its alternatives*;" (viii) Those are the two major negatives on oil and gas and in contrast to wind and solar. Our Supplemental Documents package includes the White House release [LINK] and excerpts from the 17-pg detail [LINK].

Energy Transition – IRA annual tax credits cover Hanwha's $2.5b solar plant in 3 years

IRA annual tax credits for solar

Above, we noted how Biden is moving make it easier to permit solar and wind projects. But an even bigger factor are the huge annual tax credits for solar under the Inflation Reduction Act. On Friday, we tweeted [LINK] "*ICYMI. #Hanwha to invest $2.5b for new #solar components factory in Georgia. Why? #InflationReductionAct to provide ~$875 million in annual tax credits ie. recover $2.5b in ~3 yrs just from the tax credits. That's huge risk reduction! Thx @BloombergNEF Pol Lezcano. #OOTT."* The Hanwha announcement got big press but we hadn't looked at the Inflation Reduction Act numbers until we saw the BloombergNEF Thurs report "*Hanwha's Plan to Make It the Largest US Solar Manufacturer*". BNEF highlighted the significance of the IRA "*annual*" tax credits. BNEF wrote "*Hanwha expects to receive about $875 million in annual tax credits under the US production linked incentive in the Inflation Reduction Act (IRA), or $0.16 per watt from the integrated factory. The total subsidies amount to two-thirds of the selling price of modules made in China, which is currently $0.24 in markets without import restrictions, and almost half of the US price of $0.37. The company would recover the $2.5 billion investment in the new 6. 7GW of annual capacity in just over three years from the subsidies and could earn about $2.5 billion a year in module sales at current prices, if the plants operated at full capacity. The IRA makes US solar manufacturing very lucrative despite the country's difficult business environment, and this will not be the last announcement of major capacity building."* BNEF also noted "*When completed, Hanwha will have a total 8.4GW of module capacity in the US and will overtake First Solar as the biggest US manufacturer*." Our Supplemental Documents package includes the BloombergNEF report.

Figure 47: Tax credits for US solar factories and average Jan 2023 component prices



Source: BlombergNEF

Energy Transition – Korea goes all in on nuclear for its energy mix for 2036

Korea's new energy mix targets

On Thurs, Korea Times reported [LINK] "*Korea to boost share of nuclear power to 34.6% of energy mix by 2036"* on the new energy mix targets for 2036 from Korea's Ministry of Trade, Industry and Energy. These are the new targets for Korea for 2036. We prepared the below table comparing the Korea's energy mix in 2021 (bp data) and the new energy mix targets for 2036 per the Korea Times report. The Korea Times reports notes how Korea is cranking up their nuclear share targets and reducing their renewables target. However, the renewables are still big winners in the energy mix to 2036. But the huge losers in this are oil, coal and natural gas, which were 84.9% of the energy mix in 2021 down to 23.7% of the energy mix in 2036. That seems like a huge aspirational task. Our Supplemental Documents package includes the Korea Times report.

Figure 48: Korea energy mix by fuel: bp 2021vs new Korea energy mix targets

	% share of energy mix	
	2021	2036
Oil	[42.9]	n/a
Coal	[24.1]	n/a
Oil + Coal	67.0	14.4
Natural Gas	17.9	9.3
Nuclear	11.4	34.6
Renewables	3.5	30.6
Hydro	0.2	0.0
Hydrogen/Ammonia	0.0	7.1
Other	0.0	4.0
Total	100.0	100.0

Source: bp, Korea Times

Energy Transition – Cdns strongly favor renewables, indifferent on oil and gas

Cdns polled on energy

There is was a good reminder this week on the challenge for the oil and gas industry to win public opinion against years of negative messaging. We always think about how the messaging worked by politicians and climate change side in only calling oil sands "tar sands". It's worked. The challenge for oil and gas is that these views get increasingly cemented over time. (i) On Wed, angus Reid released its "*As support for nuclear energy increases, two-in-five say they'd be comfortable with a plant within 50 km. Three-in-five Canadians want further development of nuclear power in the country*." [LINK] As the title clearly notes, Angus Reid

highlighted the increasing acceptance of nuclear power by Canadians. (i) Angus Reid also highlighted the very high approval of renewable energy, indifference to oil and gas, unfavorable view of fracking and negative view of coal mining. Angus Reid wrote "*There are high levels of support among Canadians for the expansion of solar (81%), and wind (74%) power generation. For both, support is higher among women than men.*
There is less support overall for further development of fossil fuels. Traditional oil and gas receive the most support, with half of Canadians (50%) on board with expansion of that energy source. There is less enthusiasm for hydraulic fracturing (31%) – also known as fracking – and coal mining (19%). For all three fossil fuel sources, men are more interested in seeing their expansion than women." (iii) "*The Angus Reid Institute conducted an online survey from Nov. 28 to Dec. 3, 2022 among a representative randomized sample of 5,030 Canadian adults who are members of Angus Reid Forum*." Our Supplemental Documents package includes the Angus Reid release.

Energy Transition – Increased risk of severe injuries/deaths from heavy EVs

Germany needs nuclear

One of the big issues facing EVs in Norway and other jurisdictions is that they are losing some of the reduced fees/taxes benefits as jurisdictions reduce exemptions for some of the heavier EVs. Part of the concept is that the heavier EVs are tougher on roads. But On Wed, National Transportation Safety Board Chair Jennifer Homendy addressed the Transportation Research Board's annual meeting and she highlighted the unintended consequences of the increased risk of severe injury and death from the heavier weight of EVs. On Friday, we tweeted [LINK] "*OOPS, too late! "careful that we aren't also creating unintended consequences: more death on our roads" "increased risk of severe injury & death for all road users from heavier curb weights & increasing size ..." from EV trucks & cars warns @NTSB Chair @JenniferHomendy. #OOTT*." We started off our tweet with too late as it too late to stop the issue of heavier Electric trucks and SUVs. She used he example of the GMC Hummer EV that is over 3,000 pounds heavier than the regular Hummer and its battery pack alone weighs over 2,900 pounds, about the weight of a Honda Civic. We just think it's too late to stop this. Surely she doesn't think the Biden Administration would somehow stop electrified pickup trucks and SUVs. But she highlighted this in her speech on her concern on the unintended consequences of these heavier electrified vehicles leading to increased risk of severe injury and deaths for all road uses ie. especially for those hit by one of these heavy vehicles. Our Supplemental Documents package includes her speech. [LINK]

Energy Transition – Cathie Wood expects battery costs declines w/ Wright's Law

Wright's Law

You have to give Cathie Wood, CEO of Ark Invest, credit as she certainly knows how to generate agreement and disagreement on her views. She reportedly bought more Tesla shares for her fund, and part of her rationale was her view that battery costs were going down. On Friday, she tweeted [LINK] "*Now that supply chain bottlenecks are diminishing, #Tesla can cut prices in line with battery cost declines, driving demand while limiting the impact on profitability. According to Wright's Law, battery costs drop 28% for every cumulative doubling in unit production.*" No surprise, the disagreements were on the supply chain issues and expectations for continued high costs of the critical metals for batteries as opposed to how labor costs dramatically fall with increased production.

What is Wright's Law?

Ark Invest explains [LINK] "*What is Wright's Law? Pioneered by Theodore Wright in 1936, Wright's Law aims to provide a reliable framework for forecasting cost declines as a function of cumulative production. Specifically, it states that for every cumulative doubling of units produced, costs will fall by a constant percentage." "While studying airplane manufacturing, Wright determined that for every doubling of airplane production the labor requirement was reduced by 10-15%. In 1936, he detailed his full findings in the paper "Factors Affecting the Costs of Airplanes." Now known as "Wright's Law", or experience curve effects, the paper described that "we learn by doing" and that the cost of each unit produced decreases as a function of the cumulative number of units produced."* Our Supplemental Documents package includes the Ark Invest "What is Wright's Law?".

Energy Transition – UAE's state oil CEO is President-designate for COP28

UAE oil CEO is president designate for COP28

The UAE is hosting COP28 from Nov 30 to Dec 12 and created a Green stir by naming Dr. Sultan Al Jaber, the Group CEO of the state oil company Abu Dhabi National Oil Company, as the COP28 President Designate. Needless to say, putting the state national oil company CEO as the leader for COP28 wasn't warmly received by the climate change side, who were also generally disappointed by the lack of results at COP27. It's hard for anyone to disagree that the optics of having the CEO of he state oil company for a major OPEC oil producer just don't cut it. However, we also wonder about the concept of having a CEO is also a problem for the climate change side. CEO types generally are more focused on achieving tangible results as much as possible to move closer to the goal. It's why, after hearing Al Jaber's address at the Atlantic Council Global Energy Forum yesterday, we tweeted [LINK] "*Hmm! Will Greens be satisfied if @SultanAhmedalj8 #COP28 delivers "tangible progress" and "practical solutions" to Paris 1.5C goal amidst "increasing pressure on energy security"? Or prefer another aspirational COP that sees world falling further behind Paris 1.5C goal? #OOTT."* He said that the world needs to "*honest with ourselves about how much progress we have actually achieved and how much further and faster we truly need to go". "We are way off track when it comes to the key Paris goal of holding global temperatures down to 1.5 degrees and the hard reality is that in order to achieve this goal, global emissions must fall 43% by 2030*. " And he emphasized what we call a CEO approach of wanting to achieve results. He said "*We will work very closely with the UNFCC to move from ambition to real action. We will mobilize the private sector and all other sectors to deliver greater, more meaningful impact" "Let us together create a paradigm shift for tangible progress" "I urge all parties to help make COP28 a COP of concrete outcomes and practical solutions*" Our Supplemental Documents package includes the transcript we made of some of his comments.

Capital Markets – Seems like Powell pushing back on Biden admin green push?

Fed is not a climate policymaker

We can't believe anyone listening to Fed Chair Powell's Tues speech didn't have to wonder who in the Biden Admin was gently pushing him or other Fed board members to be greener. On Tues, Power spoke at on a panel on "*Central Bank Independence and the Mandate—Evolving Views*" at a symposium in Sweden. On Tues, we tweeted [LINK] "*WOW! wonder what brought this on? "it would be inappropriate for us to use our monetary policy or supervisory tools for example to promote a greener economy or achieve other climate based goals. we are not and will not be a climate policymaker @federalreserve chair Powell.*

#OOTT." It's hard to believe Powell didn't know he was leaving the clear impression that someone in the Biden Admin was pushing the Fed to be more green. So the best way to get that to stop was tor him to make sure people knew. Our Supplemental Documents package includes the Power speech.

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

@Energy_Tidbits on Twitter

For new followers to our Twitter, we are trying to tweet on breaking news or early views on energy items, most of which are followed up in detail in the Energy Tidbits memo or in separate blogs. Our Twitter handle is @Energy_Tidbits and can be followed at [LINK]. We wanted to use Energy Tidbits in our name since I have been writing Energy Tidbits memos for over 20 consecutive years. Please take a look thru our tweets and you can see we aren't just retweeting other tweets. Rather we are trying to use Twitter for early views on energy items. Our Supplemental Documents package includes our tweets this week.

LinkedIn – Look for quick energy items from me on LinkedIn

Look for energy items on LinkedIn

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

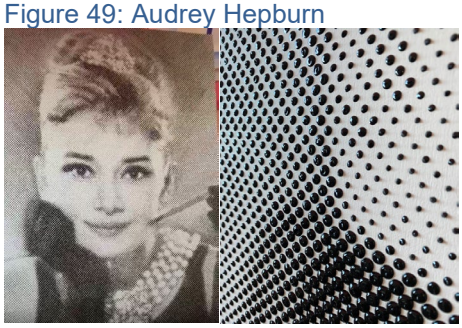
Misc Facts and Figures.

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

Audrey Hepburn passed away 30 years ago on Jan 20, 1993

Couldn't not mention my wife's favorite all time icon, Audrey Hepburn (born Audrey Kathleen Ruston; 4 May 1929), who passed away 30 years ago on Jan 20, 1993. She rose to fame for winning an Oscar in the romcom Roman Holiday (1953) with Gregory Peck. But she is probably best known for her famous role in Breakfast at Tiffany's (1961). She was ranked #3 in the American Film Industry 1999 list of the top 25 female and 25 male greatest screen legends. Ahead of her were Katherine Hepburn (no relationship) and Bette Davis, and just behind her were Ingrid Bergman and Greta Garbo. Below is Maggie Hall's Audrey Hepburn from Breakfast at Tiffany's, it's hard to see but it is actually a series of ink blots of different sizes.

Figure 49: Audrey Hepburn



Source: Maggie Hall

Tom Brady "it's the team that plays the best wins"

Yesterday's NFL first two games Super Wildcard Weekend games saw the favored San Francisco 49ers in an easy 41-23 win over the Seattle Seahawks and then Jacksonville Jaguars came back from a 27 point deficit to win on the last second field goal 31-30 over the favored Los Angeles Chargers. The final game of NFL Super Wildcard Weekend is tomorrow night when the Tampa Bay Buccaneers are at home vs the Dallas Cowboys. The Cowboys were 12-5 this year and are favored to win tvs the Buccaneers who were 8-9. Buccaneers QB Tom Brady reminded that it's not always the best team that wins. Buccaneers.com reported [LINK] on Brady's comments "*It's not the best team that wins, it's the team that plays the best wins," he said. "I was part of a team that won every game until the Super Bowl and we didn't play the best that day and we lost, and you don't end up reaching your goal. I've been on the other end of it where I was a big underdog, my first year starting against the Rams, and we played better than they did that day. But that's all that matters." "That's what single elimination is all about. You've got to be at your best in that moment. It could come down to a kick, it could come down to a Hail Mary, it could come down to a situational play at the end, a third-and-one. Hopefully all the preparation has got us to this point and we're prepared for what we're about to face, a very tough hard-nosed team that plays well, that's been good for a long time, and we're going to have to go play well."*

Shrinkflation: When is a cup not a cup? Lipton Cup-a-Soup

Had a bad cold for over a week but still have managed to avoid Covid for the past few years. That meant having two of the classics – Lipton Chicken Noodle soup and Campbell's Tomato Soup. Both have been hit by the big grocery trend of the past two years – Shrinkflation. Campbell's Tomato Soup has the same basic instructions – add one can of water and cook. But no question a smaller can. Whereas Lipton Cup-a-Soup has a smaller package and they had to move away from their basic instructions of adding the package contents to one cup of boiling water. Rather, the Shrinkflation Cup-a-Soup is adding the contents to ¾ of a cup of boiling water.

Figure 50: Lipton Cup-a-Soup, Campbell's Tomato Soup

Source: SAF Group