Energy Tidbits

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Tight/Short Oil/Gas Supply for 2020s? SLB's "Distinctive" New Phase in Upcycle, "It's Multi-Pronged. It Moves Multiple Engines, Short and Long, Oil and Gas, Offshore and Onshore"

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. SLB sees a "distinctive" new phase to the upcycle, "it's multi-pronged. It moves multiple engines, short and long, oil and gas, offshore and onshore" (Click Here)
2. BC cuts its long-awaited deal with Blueberry River First Nations (Click Here)
3. China is moving quickly to herd immunity, says around 80% got Covid in last round (Click Here)
4. Hong Kong Exchange CEO says Chinese $2 Trillion in excess savings during covid are waiting to be allocated during the reopening (Click Here)
5. Norway wealth fund CEO says they "invest in the integrated energy companies. I think that's a good place to be." (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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Table of Contents

Natural Gas – 82 bcf draw in US gas storage; now -19 bcf YoY deficit 5
Figure 1: US Natural Gas Storage 5
Natural Gas – NOAA changes outlook, not expected cold across all US to end Jan 5
Figure 2: NOAA 6-10 day temperature outlook as of Jan 21 6
Figure 3: NOAA 8-14 day temperature outlook as of Jan 21 6
Natural Gas – A hot vs cold month can be a swing of ~500 bcf of consumption 6
Figure 4: US Winter Natural Gas Consumption vs Heating Degree Days 7
Natural Gas – NOAA expects warmer than normal end to winter 7
Figure 5: NOAA FMA Temperature Probability Forecast 8
Natural Gas – EIA, US shale/tight natural gas forecast +6.0% or +5.469 bcf/d YoY in Feb 8
Figure 6: MoM Change – Major Shale/Tight Natural Gas Production 9
Natural Gas – US LNG Exports 10.0 bcf/d in Nov, -1.2% YoY 9
Figure 7: Top 5 countries of destination for US LNG exports, Nov 2022 vs Nov 2021 9
Natural Gas – BC/Blueberry River deal, most seemed to like it 10
Natural Gas – Another long-term LNG deal: ITOCHU to buy 0.13 bcf/d from NextDecade 11
Figure 8: Long Term LNG Supply Deals since July 1, 2021 14
Natural Gas – India December natural gas production +1.9% YoY to 3.36 bcf/d 15
Natural Gas – India Dec LNG imports down -11.5% YoY to 2.58 bcf/d, down 11.2% MoM 15
Natural Gas – No significant demand for natural gas in December in Japan 15
Figure 9: Japan Mean Temperature Anomalies December 2022 15
Natural Gas – Colder temperatures expected for Japan to end January 16
Figure 10: JMA Temperature Probability Jan 21 – Feb 20 16
Natural Gas – Japan's LNG stocks up +5.7% WoW to 126 bcf 16
Figure 11: Japan's LNG Stocks 16
Natural Gas – Generally slightly colder than normal in Europe other than UK 17
Figure 12: Temperature probability forecast for Jan 23-30 week 17
Natural Gas – Europe storage is now +34.96% YoY ie. 79.58% full vs 44.62% 17
Figure 13: Europe Gas Storage Level 17

Oil – US oil rigs down -10 rigs to 613 oil rigs on Jan 20 18
Figure 14: Baker Hughes Total US Oil Rigs 18
Oil – Total Cdn rigs up +14 WoW to 241 total rigs, +19 rigs YoY 18
Figure 15: Baker Hughes Total Canadian Oil Rigs 18
Oil – US weekly oil production flat at 12.2 mmb/d 19
Figure 16: EIA's Estimated Weekly US Oil Production 19
Figure 17: US Weekly Oil Production 19
Oil – North Dakota Nov oil production down MoM, will be much lower in Dec 20
Figure 18: North Dakota Oil Production By Month 20
Oil – North Dakota crude by rail up MoM to 83,516 b/d in Nov 21
Figure 19: Estimated North Dakota Rail Export Volumes 22
Oil – EIA shale/tight oil forecast +9.0%, +0.777 mmb/d YoY in Feb 22
Figure 20: MoM Change – Major Shale/Tight Oil Production 22
Figure 21: MoM Change – Major Shale/Tight Oil Production 23
Oil – EIA DUC's basically up slightly in December 23
Figure 22: EIA - Estimated Drilled UnCompleted Wells 24
Figure 23: Shale Oil Production vs Oil DUC Wells 24
Oil – US SPR reserves now -76.4 mmb lower than commercial crude oil reserves 24
Figure 24: US Oil Inventories: Commercial & SPR 24
Figure 25: US Oil Inventories: SPR less commercial 25
Oil – Cdn oil differentials widened $0.75 WoW to $23.75 at close on Jan 20 25
Figure 26: WCS less WTI oil differentials including Jan 20 close 25
Oil – Refinery inputs +0.203 mmb/d WoW to 14.853 mmb/d as weather warms 25
Figure 27: US Refinery Crude Oil Inputs (thousands b/d) 26
Oil – US "net" oil imports down -1.224 mmb/d WoW to 2.989 mmb/d 26
Figure 28: US Weekly Preliminary Oil Imports by Major Countries 26
Oil – Colombia says won't award new oil and gas exploration contracts 26
Oil – Norway December oil production of 1.773 mmb/d, down +1.4% MoM 27
Figure 29: Norway December 2022 production 28
Oil – Palentir CEO view on Russia/Ukraine 28

Oil – OPEC MOMR: neutral with no real change to forecasts 28
Oil – IEA OMR "*well-supplied oil balance at the start of 2023 could quickly tighten*" 29
Figure 30: IEA Global Demand Forecast By OMR Report Month 30
Oil – Saudi use of oil for electricity in seasonal decline ie. more oil for export 30
Figure 31: Saudi Arabia Direct Use of Crude Oil For Electric Generation 31
Figure 32: Riyadh Temperature Recaps for November and December 31
Oil – Saudi oil exports down 493,000 b/d to 7.280 mmb/d in November 31
Figure 33: Saudi Arabia oil exports (mb/d) 31
Oil – Saudi oil inventories increased MoM, up +2.964 mmb barrels MoM 32
Figure 34: Saudi Arabia Crude Oil Inventories (mmb) 32
Oil – Libya NOC says oil production continues to be stable at ~1.2 mmb/d 32
Figure 35: Libya Ports, Major oilfields and Terminals map 32
Oil – Key oil call for 2023, is China moving to herd immunity in Q1? 33
Oil – China says around 80% of population was infected with Covid 34
Oil – $2 Trillion in excess China savings to be allocated in the reopening 35
Oil – China domestic flights +20% WoW for Jan 10-16 week 36
Figure 36: China scheduled domestic flights. 36
Figure 37: China scheduled international flights. 36
Oil – Oil demand in H1/23 to be hit by less gas-to-oil switching 37
Figure 38: Dutch TTF Gas Feb'23 (TGG23) to Wed Jan 4 close. 37
Oil – Vortexa crude oil floating storage 84.94 mmb, -3.62 mmb WoW 37
Figure 40: Vortexa Estimates Posted Jan 21 10a MT, Jan14 10am MT, Jan 7 10am MT 38
Oil – BNEF: global oil and product stocks deficit flips to 15.9 mmb surplus 38
Figure 41: Aggregate Global Oil and Product Stockpiles 39
Oil – US air passenger traffic back to pre-Covid levels 39
Figure 42: US TSA checkpoint traffic 40
Oil & Natural Gas – "Nobody to notice" how strong Cdn E&P stocks are entering 2023 40
Oil & Natural Gas – Bullish for 2020s oil & gas, SLB's "distinct" new upcycle phase 41
Oil & Natural Gas – TIPRO Texas oil natural and gas jobs up MoM in Dec 41
Oil & Natural Gas – Updated EIA Russia country brief 41

Oil & Natural Gas –Norway wealth fund integrated oil companies "good place to be" 42
Capital Markets – Investors coming back to China 44
Figure 43: Bloomberg, Foreign Investors Piling Back into China 45
Capital Markets – BlackRock doesn't see US inflation getting to Fed 2% target 45
Demographics – China's population declines for 1st time in 60 years 45
Demographics – Google layoffs done by email, not by phone or not in person 46
Twitter – Look for our first comments on energy items on Twitter every day 46
LinkedIn – Look for quick energy items from me on LinkedIn 46
Misc Facts and Figures 46

Natural Gas – 82 bcf draw in US gas storage; now -19 bcf YoY deficit

YoY storage at -19 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. The YoY deficit narrowed from -114 bcf YoY for Jan 6 to -19 bcf YoY as of Jan 13. The EIA reported a -82 bcf draw (-75 bcf draw expectations) for the Jan 13 week, which was a small draw vs the 5-yr average of a -156 bcf draw, and last year's draw of -206 bcf. Storage is 2.820 tcf as of Jan 13, with a now YoY deficit of -19 bcf vs -114 bcf YoY deficit last week and is +34 bcf above the 5-year average vs -40 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)				Year ago (01/13/22)		5-year average (2018-22)	
Region	01/13/23	01/06/23	net change	implied flow	Bcf	% change	Bcf	% change
East	662	700	-38	-38	678	-2.4	658	0.6
Midwest	785	823	-38	-38	779	0.8	775	1.3
Mountain	147	153	-6	-6	152	-3.3	154	-4.5
Pacific	157	160	-3	-3	201	-21.9	228	-31.1
South Central	1,069	1,067	2	2	1,029	3.9	971	10.1
Salt	307	295	12	12	311	-1.3	288	6.6
Nonsalt	762	772	-10	-10	718	6.1	684	11.4
Total	2,820	2,902	-82	-82	2,839	-0.7	2,786	1.2

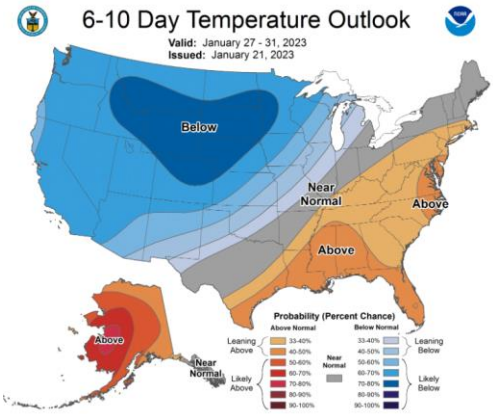
Source: EIA

Natural Gas – NOAA changes outlook, not expected cold across all US to end Jan

NOAA 6-10 & 8-14 day temp outlook

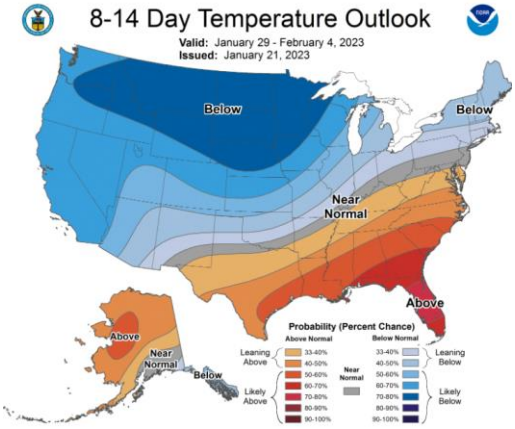
Yesterday, we tweeted [LINK] "*Reminder weather forecasts >1 week out regularly change. Wed 👇 @NOAA expected colder than normal across all of US for last week of Jan. Today, @NOAA calls for normal to colder than normal for 2/3 of US for last week of Jan. Need some sustained cold to boost #NatGas. #OOTT."* On Wed, we tweeted the NOAA forecast for cold across of the US, but it changed by yesterdy. Our tweet inlcuded NOAA's below Jan 21 updated 6-10 day and 8-14 day outlook that run up thru Feb 4. han normal temps.

Figure 2: NOAA 6-10 day temperature outlook as of Jan 21



Source: NOAA

Figure 3: NOAA 8-14 day temperature outlook as of Jan 21



Source: NOAA

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

It's now 2/3 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 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

Jan is the big month for natural gas demand

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 4: 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

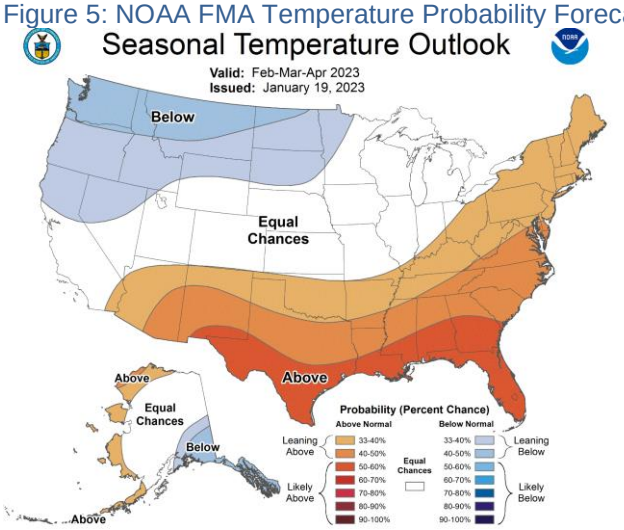
Source: EIA, AGA, SAF

Natural Gas – NOAA expects warmer than normal end to winter

NOAA forecasts a warm JFM

On Thurs, NOAA issued its updated seasonal outlook for US temperatures, which is their rolling 3-month forecasts beginning with FMA [LINK]. As we noted above, weather forecasts are far from 100%, but they do impact tone on natural gas until we see different weather developing. Overall, the NOAA is forecasting a warmer than normal FMA, which would be the story that we have seen for most of the winter. Below is the new NOAA temperature probability map for FMA.

Figure 5: NOAA FMA Temperature Probability Forecast



Source: NOAA

Natural Gas – EIA, US shale/tight natural gas forecast +6.0% or +5.469 bcf/d YoY in Feb

Shale/tight gas production

Warm start to winter aside, the biggest negative to HH prices continues to be the very strong growth in US natural gas production driven by the major shale/tight plays. Remember that the top US shale/tight oil plays are oil wells that produce associated NGLs and natural gas. EIA's Drilling Productivity Report Jan 2023 was released on Tuesday, and the key takeaway is that Feb 2023 would be the 10th consecutive month of growth for US shale/tight natural gas, albeit the last few have been more modest MoM growth but growth, nonetheless. The DPR [LINK] is the EIA's forecast for oil and natural gas production from the major shale/tight oil and gas basins for the current month (in this case Jan) and the next month (in this case Feb). (i) Shale/tight natural gas is forecasted to have 10 months of consecutive growth and has been breaking out since April, as increasing US LNG export capacity out of the Gulf Coast is driving natural gas growth in Louisiana and Texas. US shale/tight natural gas was 90.105 bcf/d in April and Feb is forecasted at 96.656 bcf/d. (ii) MoM. Three of the shale/tight gas areas were basically flat – Anadarko, Bakken and Niobrara. The largest increases came from Haynesville (+0.145 bcf/d MoM), Permian (+0.109 bcf/d MoM) and Appalachia (+0.933 bcf/d MoM). (iii) Total US shale/tight natural gas production is expected +5.469 bcf/d YoY for Feb. All shale/tight plays except for the Niobrara and Appalachia are up YoY, with the most notable YoY increases being Haynesville +2.294 bcf/d YoY Eagle Ford +1.226 bcf/d YoY and Permian +1.491 bcf/d YoY; with Haynesville and Permian acting as key shale/tight plays feeding growth US LNG exports. (iv) Remember US shale/tight gas is ~90% of total US natural gas production. So, whatever the trends are for shale/tight gas are the trends for US natural gas in total. Below is our running table showing the EIA DPR data for the shale/tight gas plays, and the MoM changes in major shale/tight natural gas production. Our Supplemental Documents package includes the EIA DPR.

Figure 6: MoM Change – Major Shale/Tight Natural Gas Production

mmcf/d	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Feb YoY	Feb YoY %	Feb less Jan
Anadarko	6,341	6,286	6,118	6,134	6,275	6,554	6,658	6,715	6,708	6,832	6,997	6,981	7,007	666	11%	26
Appalachia	35,716	36,298	35,443	35,476	35,155	35,121	35,332	35,486	35,577	35,434	35,417	35,279	35,372	-344	-1%	93
Bakken	3,137	3,079	2,932	3,076	3,088	3,086	2,915	3,191	3,156	3,246	3,323	3,308	3,341	204	7%	33
Eagle Ford	6,176	6,288	6,298	6,394	6,538	6,671	6,985	7,101	7,220	7,311	7,390	7,365	7,402	1,226	20%	37
Haynesville	14,291	14,425	14,527	14,863	15,023	15,261	15,643	15,835	15,878	16,083	16,257	16,440	16,585	2,294	16%	145
Niobrara	5,293	5,196	5,254	5,187	5,195	5,205	5,212	5,223	5,062	5,074	5,124	5,211	5,225	-68	-1%	14
Permian	20,233	20,160	19,533	19,870	20,227	20,373	20,417	20,584	20,930	21,143	21,268	21,615	21,724	1,491	7%	109
Total	91,187	91,732	90,105	91,000	91,501	92,271	93,162	94,135	94,531	95,123	95,776	96,190	96,656	5,469	6%	466

Source: EIA, SAF

Natural Gas – US LNG Exports 10.0 bcf/d in Nov, -1.2% YoY

Nov 2022 US LNG Exports

As a reminder the US Dept of Energy posts monthly US LNG export data two weeks before the EIA (part of the US Dept of Energy) posts US LNG export data in its monthly Natural Gas Monthly report (next report is Dec 30). Normally, any differences in data points are due to rounding. The DOE report is better as it provides detailed information on LNG imports and exports including LNG volumes to the top US export countries. The US Department of Energy reported the November LNG export actuals on Tuesday [LINK] and we continue to see the impact of the Freeport LNG shut in in June (2.2 bcf/d). On Thursday, we tweeted [LINK] "*US #LNG exports Nov/22 were 10.0 bcf/d, -1.2% YoY, +2.3% MoM Continued impact of #FreeportLNG 2.2 bcf/d June 8 shut. Nov/22 top 5 export countries: UK, France, Turkey, Japan, Dutch. Nov/21 top 5 export countries: China, Turkey, Japan, Korea, UK. @ENERGY data. #OOTT."* November saw 302.3 bcf (10.0 bcf/d) of LNG exports, up 2.3% MoM. The top 5 countries with export deliveries from the US were the UK (82.8 bcf), France (50.7 bcf), Turkey (31.4 bcf), Japan (24.4 bcf) and the Netherlands (20.6 bcf), representing 69.3% of total US LNG exports. There has been a shift in the over the last year in top 5 exports with the energy crisis in Europe and the geo-political impacts from the Russian invasion of Ukraine when we look at the top export destinations from a year ago. There was 306.1 bcf of exports in November 2021; the top five export countries in November 2021 were China (50.2 bcf), Turkey (47.3 bcf), Japan (33.9 bcf), South Korea (30.8 bcf) and the United Kingdom (30.6 bcf), representing 63.0% of total US LNG exports through the month. Below is part of the graphic from our tweet showing the top 5 export countries in Nov 2022 vs Nov 2021. Our Supplemental Documents package includes excerpts from the DOE LNG Monthly.

Figure 7: Top 5 countries of destination for US LNG exports, Nov 2022 vs Nov 2021

Overview of Activity for November 2022

Top five countries of destination, representing 69.3% of total U.S. LNG exports in November 2022

- United Kingdom (82.8 Bcf), France (50.7 Bcf), Turkey (31.4 Bcf), Japan (24.4 Bcf), and Netherlands (20.6 Bcf)

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- United Kingdom (82.8 Bcf), France (50.7 Bcf), Turkey (31.4 Bcf), Japan (24.4 Bcf), and Netherlands (20.6 Bcf)

Source: DOE

Natural Gas – BC/Blueberry River deal, most seemed to like it

BC/Blueberry First Nations deal

The watch is over. On Wed, BC and Blueberry River First Nations signed the long awaited deal to resolve how industry, not just oil and gas, would be able to operate on Blueberry River First Nations lands. (i) However, there weren't all the details provided so it is unclear, at least from the outside, on exactly how the deal will be implemented. (ii) It seemed like most liked the deal because it's better than no deal and it does provide some certainty for industry to move forward. (iii) The reality of the world is that the deal is going to dramatically reduce the amount of land for oil and gas, will reduce future oil and gas exploration and development and add costs. And unfortunately, the future added costs are not clear.. On Thurs, we tweeted [LINK] "*BC/BRFN deal. "this agreement does have an impact on oil and gas development in the NE" "not a cap on production, it is a cap on land" @Dave_Eby. Less land = less #Natgas growth. 2,500 sq miles protected from new E&P activity. Hard to see #LNGCanada 1.8 bcfd Phase 2 FID! #OOTT."* We suspect most didn't listen to the press conference, but Premier Eby clearly stated "*this agreement does have an impact on oil and gas development in the NE*". And the agreement says there will be ~2,500 sq miles of lands protected from E&P activity. (iv) The other way to look at the 2,500 sq miles of excluded land is that it also gives this much land for the BRFN to do their own separate deals ie. to reopen. BRFN open for negotiation? We suspect so on a deal by deal basis and not likely for broad big swatches of land. This may be the unknown opportunity to add back lands at some unknown future added costs to industry. At the press conference, Eby also said '*Industry is going to have to be more innovative. The oil and gas industry is going to have to find ways to work with less land disturbance. The agreement is not a cap on production, it is a cap on land:"* We found his "innovating" comment interesting. It was taken to be linked to his find ways to work with less land and we agree with that. But we think there is a double meaning – the other way to be innovative and make extra deals with the BRFN to add more land and opportunities. Maybe that isn't what he was hinting, but we think that is the reality of the world – there will be negotiations with the BRFN for more lands. It will just be expensive. (v) Our concern on the being open for negotiations is that, absent a producer negotiating large blocks of land, it won't provide the predictability for producers to commit to large programs. This will be the wildcard – will these extra deals be large enough in area to provide certainty on a timely basis to commit to large programs. (vi) LNG Canada 1.8 bcf/d Phase 2 FID. Our tweet indicated our view that it's hard to see LNG Canada FIDs its Phsae 2. Phase 2 would add 1.8 bcf/d to Phase 1 for a total of 3.6 bcf/d. This is huge and it means that it's much more than a natural gas supply for Shell & LNG Canada alone, it will require natural gas supply from much of NE BC and new supply. This agreement is focused on stopping new exploration and development areas. Just the concept makes it seem unlikely. But you never know. (vii) One exclusion from the press release did catch our attention. The release included positive comments from Tourmaline, Petronas, CAPP and EPAC. We have to believe they would have asked LNG Canada for a positive comment, but LNG Canada was not in the release. (viii) Please keep in mind that there are many uncertainties and details not disclosed. But ultimately, the one thing that will take time to see how it plays out is how much will BRFN negotiate on getting more lands open for exploration and development. Seeing Tourmaline in the release, we suspect one of the first indications for the BRFN to be open for larger deals is likely to come from Tourmaline. Our Supplemental Documents package includes the BC/BRFN release and the transcript we made of Premier Eby's comments.

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

The reason why it makes sense that one of the first indicators to see if the BRFN will be flexible on larger deals is Tourmaline because they have specifically said they would be drilling non Tier 1 wells in 2023 without a BRFN deal. Here is what we wrote in last week's (Jan 15, 2023) Energy Tidbits memo. "*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.*

Natural Gas – Another long-term LNG deal: ITOCHU to buy 0.13 bcf/d from NextDecade

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 Thursday, NextDecade announced its first Japanese LNG deal with ITOCHU for 0.13 bcf/d on a 15-year sale and purchase agreement [LINK]. NextDecade stated "*We are honored to have Itochu Corporation as our first Japanese customer," said Matt Schatzman, NextDecade's Chairman and Chief Executive Officer. "We look forward to providing Itochu and their customers with LNG, and we are actively working to reduce the carbon footprint of the Rio Grande LNG facility through our proposed carbon capture and storage project* ". Our Supplemental Documents package includes the NextDecade release

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 13.01 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 13.01 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 8: Long Term LNG Supply Deals since July 1, 2021

Date	Buyer	Seller	Country	Volume	Duration	Start	End
			Buyer / Seller	(bcf/d)	Years		
Asian LNG Deals							
Jul 7, 2021	CNOOC	Petronas	China / Canada	0.30	10.0	2022	2032
Jul 9, 2021	CPC	QatarEnergy	Taiwan / Qatar	0.16	15.0	2022	2037
Jul 9, 2021	Guangzhou Gas	BP	China / US	0.13	12.0	2022	2034
Jul 12, 2021	Korea Gas	QatarEnergy	Korea / Qatar	0.25	20.0	2025	2045
Sep 29, 2021	CNOOC	QatarEnergy	China / Qatar	0.50	15.0	2022	2037
Oct 7, 2021	Shenzhen	BP	China / US	0.04	10.0	2023	2032
Oct 11, 2021	ENN	Cheniere	China / US	0.12	13.0	2022	2035
Nov 4, 2021	Unipec	Venture Global LNG	China / US	0.46	20.0	2023	2043
Nov 4, 2021	Sinopec	Venture Global LNG	China / US	0.53	20.0	2023	2043
Nov 5, 2021	Sinochem	Cheniere	China / US	0.12	17.5	2022	2040
Nov 22, 2021	Foran	Cheniere	China / US	0.04	20.0	2023	2043
Dec 6, 2021	Guangdong Energy	QatarEnergy	China / Qatar	0.13	10.0	2024	2034
Dec 8, 2021	S&T International	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 10, 2021	Suntien Green Energy	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 15, 2021	SPIC Guangdong	BP	China / US	0.03	10.0	2023	2033
Dec 20, 2021	CNOOC Gas & Power	Venture Global LNG	China / US	0.26	20.0	2023	2043
Dec 29, 2021	Foran	BP	China / US	0.01	10.0	2023	2032
Jan 11, 2022	ENN	Novatek	China / Russia	0.08	11.0	2024	2035
Jan 11, 2022	Zhejiang Energy	Novatek	China / Russia	0.13	15.0	2024	2039
Feb 4, 2022	CNPC	Gazprom	China / Russia	0.98	30.0	2023	2053
Mar 24, 2022	Guangdong Energy	NextDecade	China / US	0.20	20.0	2026	2046
Mar 29, 2022	ENN	Energy Transfer	China / US	0.36	20.0	2026	2046
Apr 1, 2022	Guangzhou Gas	Mexico Pacific Ltd	China / Mexico	0.26	20.0	n.a.	n.a.
Apr 6, 2022	ENN	NextDecade	China / US	0.26	20.0	2026	2026
Apr 22, 2022	Kogas	BP	Korea / US	0.20	18.0	2025	2043
May 2, 2022	Gunvor Singapore Pte	Energy Transfer LNG	Singapore / US	0.26	20.0	2026	2046
May 3, 2022	SK Gas Trading LLC	Energy Transfer LNG	Korea / US	0.05	18.0	2026	2042
May 10, 2022	Exxon Asia Pacific	Venture Global LNG	Singapore / US	0.26	n.a.	n.a.	n.a.
May 11, 2022	Petronas LNG	Venture Global LNG	Malaysia / US	0.13	20.0	n.a.	n.a.
May 24, 2022	Hanwha Energy	TotalEnergies	Korea / France	0.08	15.0	2024	2039
May 25, 2022	POSCO International	Cheniere	Korea / US	0.05	20.0	2026	2036
June 5, 2022	China Gas Holdings	Energy Transfer	China / US	0.09	25.0	2026	2051
Jul 5, 2022	China Gas Holdings	NextDecade	China / US	0.13	20.0	2027	2047
Jul 20, 2022	PetroChina	Cheniere	China / US	0.24	24.0	2026	2050
Jul 26, 2022	PTT Global	Cheniere	Thailand / US	0.13	20.0	2026	2046
Jul 27, 2022	Exxon Asia Pacific	NextDecade	Singapore / US	0.13	20.0	2026	2046
Sep 2, 2022	Woodside Singapore	Commonwealth	Singapore / US	0.33	20.0	2026	2046
Nov 21, 2022	Sinopec	QatarEnergy	China / Qatar	0.53	27.0	2026	2053
Dec 26, 2022	INPEX	Venture Global LNG	Japan/US	0.13	20.0	n.a.	n.a.
Dec 27, 2022	JERA	Oman LNG	Japan/Oman	0.11	10.0	2025	2035
Jan 19, 2023	ITOCHU	NextDecade	Japan / US	0.13	15.0	n.a.	n.a.
Total Asian LNG Buyers New Long Term Contracts Since Jul/21				**8.59**			
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				**13.01**			
*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 – India December natural gas production +1.9% YoY to 3.36 bcf/d

India natural gas production +1.9% YoY

It looks like India's growth in its domestic natural gas production in 2021 and early 2022 hasn't been able to be maintained and it is slipping back into a flattish production profile. India natural gas production peaked in 2010 at 4.6 bcf/d. Its 2018-2019 production averaged 3.18 bcf/d, declining to 3.02 in 2019-2020 and then further declined to average 2.78 bcf/d 2020-2021. But then natural gas production. Returned to growth in 2021-2022 but that growth looks to be gone as the past few months have returned to plateau or small declines. On Wednesday, India's Petroleum Planning and Analysis Cell released their monthly report for November natural gas and oil statistics [LINK]. India's domestic natural gas production was up +1.9% YoY from 3.30 bcf/d in December 2021 to 3.36 bcf/d in December 2022 and up MoM from 3.34 bcf/d in November. Our Supplemental Documents package includes excerpts from the PPAC monthly package.

Natural Gas – India Dec LNG imports down -11.5% YoY to 2.58 bcf/d, down 11.2% MoM

India LNG imports -11.5% YoY

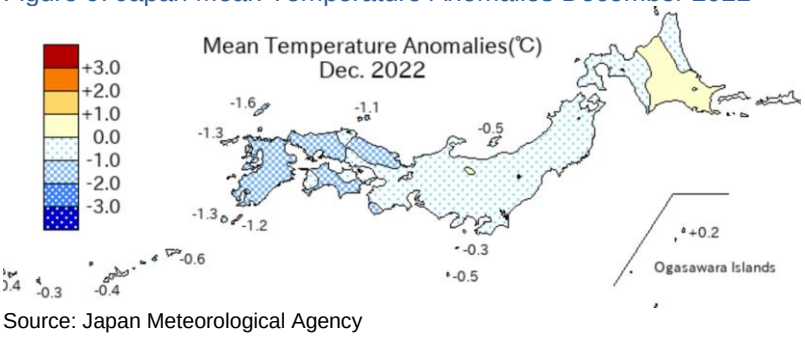
For the past several years, there has been increased India LNG imports whenever domestic natural gas production was flat or decreased. But the overriding factor in 2022 has been the sky-high LNG prices. India is always viewed as an extremely price sensitive buyer in terms of its LNG imports. We saw this in periods of low LNG prices such as June to Oct 2020 when India had a big ramp up in LNG imports. But with the sky-high LNG prices in 2022, India has done their best to minimize LNG imports. On Wednesday, India's Petroleum Planning and Analysis Cell released their monthly report for December natural gas and oil statistics [LINK]. Imports began to decline in November 2020 as LNG prices rose, with the price trajectory ramping up in late Dec and reaching record levels in January. This resulted in India LNG imports declining from a 2020-2021 peak of 3.84 bcf/d in Oct 2020 to just 2.85 bcf/d in Jan 2021. November imports decreased MoM to 2.58 bcf/d, down -11.5% YoY.

Natural Gas – No significant demand for natural gas in December in Japan

Japan December temperatures

Mean temperatures were slightly below normal through most of Japan in December with normal temperatures in the northern regions and cooler temperatures in the east due to air inflows from the continent. On Thursday, the Japan Meteorological Agency posted its recap of December weather [LINK] and their mean temperature anomalies map (below) shows the mean temperature breakdown for the month. Their recap noted, "*Monthly mean temperatures were below normal in eastern/western Japan due to cold air inflow from the continent.*"

Figure 9: Japan Mean Temperature Anomalies December 2022



Source: Japan Meteorological Agency

Natural Gas – Colder temperatures expected for Japan to end January

Japan temperature outlook

It's been warm in most of Japan for the past week or which is expected to come to an end as average temperatures are expected to turn much colder towards then end of the month. Every Thursday, the Japan Meteorological Agency provides an updated 30-day temperature probability outlook. The new weekly JMA forecasts much colder than normal temperatures are to begin next week. The JMA expects the colder weather to continue throughout the remainder of the month and into February. Below is the JMA's updated 30-day outlook beginning Jan 21 [LINK].

Figure 10: JMA Temperature Probability Jan 21 – Feb 20

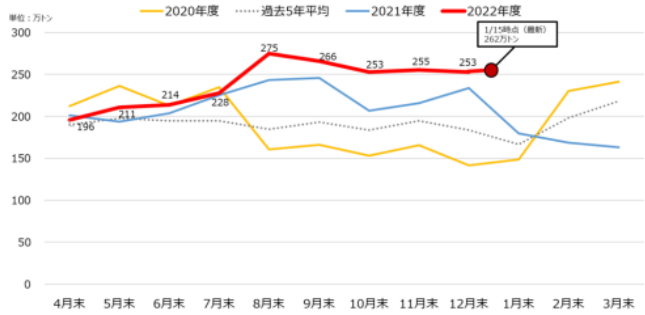
Source: Japan Meteorology Agency

Natural Gas – Japan's LNG stocks up +5.7% WoW to 126 bcf

Japan LNG stocks +5.7% 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 15 were ~126 bcf +5.7% WoW from Jan 8 of ~119 bcf but above the 5-yr average of 86 bcf. Below is the LNG stocks graph from the METI weekly report.

Figure 11: Japan's LNG Stocks

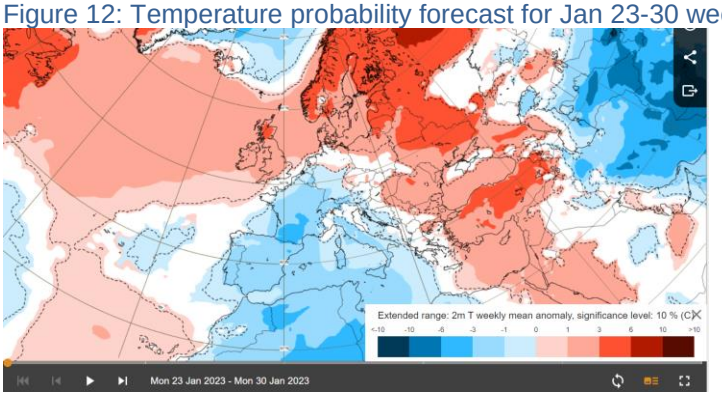


Source: METI

Natural Gas – Generally slightly colder than normal in Europe other than UK

The big negative to Europe TTF natural gas prices and therefore flow thru the LNG prices is that temperatures were well above normal to start Jan. We saw some colder than normal temps in Continental Europe this week and that should is expected to continue this week. The exception is the UK, which is forecast to have warmer than normal temps fo the Jan 23-30 week. Below is the European Centre for Medium-Range Weather Forecasts for the Jan 23-30 week. Red is never good in a temperature forecast for winter.

Figure 12: Temperature probability forecast for Jan 23-30 week



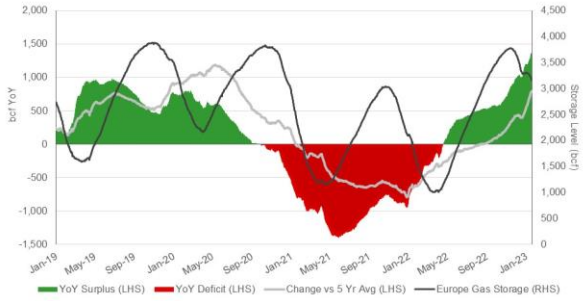
Source: ECMWF

Natural Gas – Europe storage is now +34.96% YoY ie. 79.58% full vs 44.62%

Europe storage now 79.58% 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. Our 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. This winter (Nov 1/22) began with gas storage at 94.94% capacity, up 17.86% YoY and is now a YoY surplus of 34.96%. Thanks to the warm weather and US LNG, storage as of Jan 19 is at 79.58%, which is +34.96% greater than last year levels of 44.62% and is +19.89% above the 5-year average of 59.69%. Below is our graph of Europe Gas Storage Level.

Figure 13: Europe Gas Storage Level



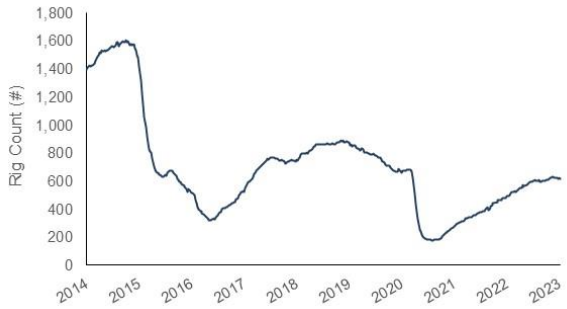
Source: Bloomberg

Oil – US oil rigs down -10 rigs to 613 oil rigs on Jan 20

US oil rigs down WoW

Baker Hughes released its weekly North American drilling activity data on Friday. Last week's rigs were +5 and we thought that was likely due to the rebound after cold weather in Texas/Oklahoma caused some drilling interruptions. This week's data saw another small rig decline basins such as the Permian and Others. This week US oil rigs were down -10 rigs at 613 oil rigs as of Jan 20. We expect this was due to WTI falling below $80 and HH below $4. US oil rigs hit a 16-week low of 591 on Sept 9. US oil rigs are still +434 oil rigs since the Covid Sept 17, 2020 oil rigs of 179 oil rigs. And US oil rigs are +122 oil rigs YoY. US gas rigs were down +6 WoW at 156 gas rigs.

Figure 14: Baker Hughes Total US Oil Rigs



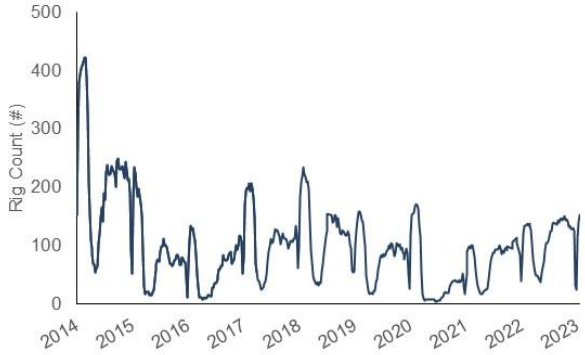
Source: Baker Hughes

Oil – Total Cdn rigs up +14 WoW to 241 total rigs, +19 rigs YoY

Cdn rigs +14 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 +14 to 241 rigs as of Jan 20, 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 +69 vs the comparable Covid period of 161 rigs on Jan 21, 2021. Cdn drilling has recovered YoY, a year ago Cdn oil rigs were 134 and Cdn gas rigs were 78 for a total Cdn rigs of 212, meaning total Cdn oil rigs are +19 YoY to 153 oil rigs and Cdn gas rigs are +10 to 88 gas rigs.

Figure 15: Baker Hughes Total Canadian Oil Rigs



Source: Baker Hughes

Oil – US weekly oil production flat at 12.2 mmb/d

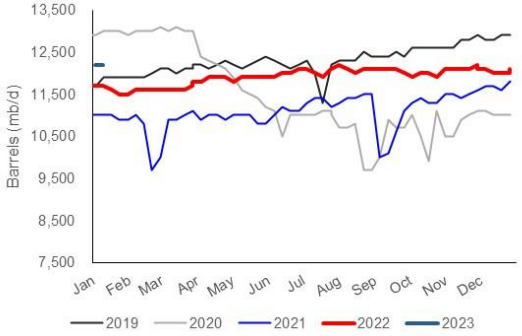
It sounds like North Dakota still had not fully restored oil production as of Jan 13 based on comments from North Dakota that there was still approx. 0.1 mmb/d of offline production. This means that the weekly decrease of 0.1 mmb/d in lower 48 production would have been more if all of North Dakota oil had been restored. The EIA estimates US oil production was flat WoW to 12.2 mmb/d for the week ended Jan 13 with a slight decline in lower 48 production and a slight increase in Alaska production. 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 five weeks ago, the first time since it touched 12.2 mmb/d in the 1st week of August. Lower 48 production was down 0.1 mmb/d WoW to 11.7 mmb/d this week and Alaska up slightly at 0.5 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 16: 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	01/13	12,200						

Source: EIA

Figure 17: US Weekly Oil Production



Source: EIA, SAF

Oil – North Dakota Nov oil production down MoM, will be much lower in Dec

North Dakota oil production

Please note two items we look ahead to North Dakota oil production: Dec will be down due to the blizzard and, even post the return of the snow impacted production, we expect North Dakota production will likely be flat at best given that 50% of the drilling rigs are currently in Tier 2 and 3 areas. Looking back at November data, after a revision to the October data that showed a slight gain in production for October, November showed a small decline in production, which North Dakota said was "*more than likely the result of the November winter weather*". Note we listened to the monthly North Dakota press conference and the quotes in "*italics*" are SAF created transcript. On Tuesday afternoon, the North Dakota Industrial Commission posted its Director's Cut, which includes November oil and natural gas production data [LINK]. The NDIC reported North Dakota November oil production was 1.098 mmb/d, which was down 5.3% YoY, and slightly down MoM vs revised October production of 1.122 mmb/d. NDIC estimated well completions were 58 in November, flat from 58 in October. Our Supplemental Documents package includes excerpts from the Director's Cut.

Figure 18: North Dakota Oil Production By Month

(b/d)	2017	2018	2019	2020	2021	2021/2020	2022	2022/2021
Jan	981,380	1,179,564	1,403,808	1,430,511	1,147,377	-19.8%	1,088,613	-5.1%
Feb	1,034,248	1,175,316	1,335,591	1,451,681	1,083,554	-25.4%	1,089,091	0.5%
Mar	1,025,690	1,162,134	1,391,760	1,430,107	1,108,906	-22.5%	1,122,640	1.2%
Apr	1,050,476	1,225,391	1,392,485	1,221,019	1,123,166	-8.0%	900,597	-19.8%
May	1,040,995	1,246,355	1,394,648	859,362	1,128,042	31.3%	1,059,060	-6.1%
June	1,032,873	1,227,320	1,425,230	893,591	1,133,498	26.8%	1,096,783	-3.2%
July	1,048,099	1,269,290	1,445,934	1,042,081	1,076,594	3.3%	1,072,632	-0.4%
Aug	1,089,318	1,292,505	1,480,475	1,165,371	1,107,359	-5.0%	1,075,307	-2.9%
Sept	1,107,345	1,359,282	1,443,980	1,223,107	1,114,020	-8.9%	1,121,063	0.6%
Oct	1,183,810	1,392,369	1,517,936	1,231,048	1,111,910	-9.7%	1,121,754	0.9%
Nov	1,194,920	1,375,803	1,519,037	1,227,138	1,158,622	-5.6%	1,097,716	-5.3%
Dec	1,182,836	1,402,741	1,476,777	1,191,429	1,144,999	-3.9%		

Source NDIC, NDPA

North Dakota says half of the drilling rigs are in Tier 2 and 3 areas

Yesterday, we tweeted [LINK] "*Looks like Bakken will be challenged for near term #Oil growth. "migration of drilling activity out of the core and into the Tier 2 & Tier 3 areas" "i think it's probably approaching half of our drilling rigs now that are outside the core" says North Dakota. #OOTT."* We listen to the replay of North Dakota's monthly press conference on the monthly oil and gas statistics. And there are almost always great insights therefrom. One key insight from NDIC Director Helms is the increasing drilling in Tier 2 and 3 lands. Here is the transcript we created of his comment at the 1:35 mn mark "*.. I don't think it changes the long term trend, but we have seen a migration of drilling activity out of the core and into the Tier 2 and Tier 3 areas as the advent of three-mile laterals and drilling, more drilling by some of our independent oil and gas companies out on those Tier 2 and Tier 3 areas has picked up. I think it's probably approaching half of our drilling rigs now that are outside the core".*

North Dakota record # of producing wells, but not record oil production

Here is an item from our Oct 16, 2023 Energy Tidbits memo. *"Yesterday, we tweeted [LINK] "#Bakken. "we're at a record number of [ND] producing wells (in Aug) but not record [oil] production" says ND's Helms. He expects an increase in Sept. Jul/Aug*

were below June. Not a good sign if Sept/Oct don't get back to June levels. Thx @bistrib. #OOTT". It looks like Sept will be a big test for North Dakota oil production. It's only two months, but North Dakota oil production has disappointed in both July and Aug. But oil production in Sept and Oct better jump back up to and over June levels or else it will cause a worry on the near term growth potential, if at all. We don't understand why most ignore the local reporting by the Bismarck Tribune and Williston Herald on the monthly press conference by well regarded NDIC Director Lynn Helms following the release of the monthly North Dakota oil and gas data. They always have some added good insight and that is why we always include their insights in our North Dakota review. We recognize it may be nothing and you can't tell from two months data points, but what jumps out at us are comments from Helms in his press conference on the monthly oil data for the last two months. (i) Our Sept 16, 2022 Energy Tidbits memo highlighted the Bismarck Tribune reporting "July oil production fell to just over 1 million barrels per day. The state's oil figures lag two months as officials collect and analyze data from energy companies. Director Lynn Helms said the Mineral Resources Department was surprised to see the decline in July when officials were anticipating to reach June's mark of 1.1 million barrels daily. Helms said the drop is likely because of fewer well completions due to a lack of available workforce." Sounds reasonable, but our memo also referenced the NDIC then estimated well completions were only 27 in June and much higher at 74 in July. So there weren't fewer well completions. (ii) Then in his press conference on Thursday afternoon on the Aug numbers, how could we note highlight his comments that there were a record number of producing oil wells in Aug but not record oil production. The Bismarck Tribune reported [LINK]"There was a "steady stream" of oil and gas drilling permit applications in August, he said. The drilling rig count continues to stall out in the mid-forties and is expected to do so for the rest of the year. There is a steady stream of newly completed wells, with a projection that September's numbers will continue to increase. "So we would seriously anticipate we're going to see an increase in production for the September report," he said. "... We're at a record number of producing wells (in August) but not a record production." Helms is pretty clear he expects Sept oil production up. (iii) So maybe oil production will spring back in Sept to higher than June. But Helms has been surprised by the last two months underperfomance and that alone means we want to focus on Sept oil production. The Bakken isn't viewed as a huge growth area, but still it is viewed as growth area. We will need to North Dakota oil production in Sept and Ot at least jump back to June levels And unless we see that jump back up in oil production, we have to believe four consecutive months of data would raise concerns. It looks like September could be a big month for North Dakota oil production. Our Supplemental Documents package includes the Bismarck Tribune report."

Oil – North Dakota crude by rail up MoM to 83,516 b/d in Nov

North Dakota CBR up MoM in November

Note our comments above that crude-by-rail in Dec will be hit by the extreme cold. The North Dakota Pipeline Authority posted its monthly update "*January 2023 Production & Transportation"* [LINK]. Please note that we always go to the backup excel sheets from the North Dakota Pipeline Authority for more detailed numbers of crude by rail out of North Dakota. The NDPA Monthly Update (graph below) report only provides rounded numbers, and these rounded numbers are not accurate enough to match the graphs. In the backup

excel, the NDPA estimates crude by rail in Nov was a low of 68,516 b/d and a high of 98,516 b/d for an average of 83,516 b/d. This is above the Sept average of 67,563 b/d and above the Sep average of 83,300 b/d. Below is a chart from the NDPA monthly update showing the crude by rail volumes since 2014. Our Supplemental Documents package includes excerpts from the NDPA monthly update.

Figure 19: Estimated North Dakota Rail Export Volumes

Source: North Dakota Pipeline Authority

Oil – EIA shale/tight oil forecast +9.0%, +0.777 mmb/d YoY in Feb

US shale/tight oil production

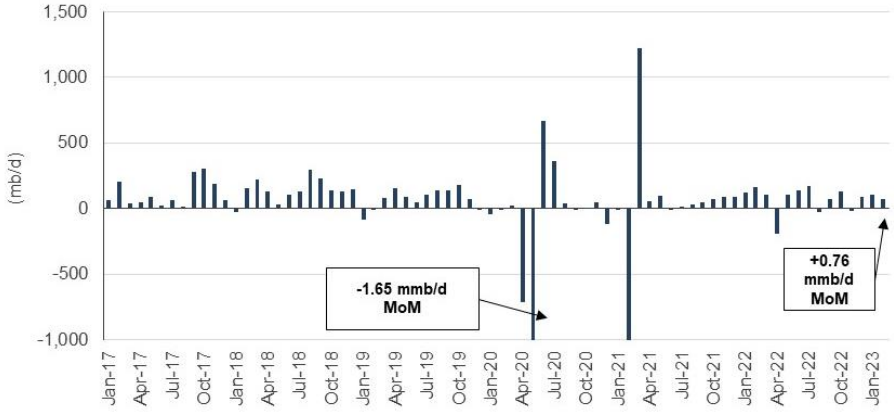
The EIA Drilling Productivity Report Jan 2023 [LINK] forecast for US shale/tight oil shows a continued modest MoM increase in Jan and Feb after being fairly stuck for July-Oct. The DPR is the EIA's forecast for production for the major shale/tight oil and gas basins for the current month (in this case Jan) and the next month (in this case Feb). (i) Shale/tight oil was fairly flat from July thru Oct but there is some modest growth forecast for both Dec, Jan, and now Feb. The EIA now forecasts total US shale/tight oil in Jan at 9.299 mmb/d and Feb at 9.375 mmb/d. (ii) The growth is somewhat distributed across all basins except Haynesville and Appalachia basically flat MoM. The Permian and Bakken have the most significant increases of +30,000 b/d and +20,000 b/d, respectively. The Permian Feb is 5.635 mmb/d, vs 5.605 mmb/d in Jan. Eagle Ford is also forecasted up +4,000 b/d MoM in Feb after increasing last month, benefitting from its higher natural gas ratio and the pull for natural gas for US LNG exports. (iii) Note that shale/tight oil is approx. ~75% of total US production, so whatever the trends are for shale/tight oil are normally the trends for US oil in total. Below is our table of running DPR estimates of shale/tight oil production and our graph of MoM changes in major shale/tight oil production.

Figure 20: MoM Change – Major Shale/Tight Oil Production

Thousand b/d	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Feb YoY	Feb YoY %	Feb less Jan
Anadarko	393	399	398	391	406	413	425	424	425	423	427	431	442	49	12%	11
Appalachia	113	113	111	114	124	130	128	120	120	122	126	136	139	26	23%	3
Bakken	1,192	1,172	1,169	1,172	1,178	1,173	1,136	1,183	1,168	1,182	1,200	1,206	1,226	34	3%	20
Eagle Ford	1,122	1,123	1,140	1,149	1,152	1,180	1,204	1,224	1,208	1,223	1,231	1,209	1,213	91	8%	4
Haynesville	33	33	34	35	36	37	37	37	37	37	37	37	37	4	12%	0
Niobrara	611	613	610	627	630	632	649	648	640	653	662	675	683	72	12%	8
Permian	5,134	5,138	5,055	5,131	5,232	5,367	5,329	5,347	5,403	5,460	5,542	5,605	5,635	501	10%	30
Total	8,598	8,591	8,517	8,619	8,758	8,932	8,908	8,983	9,002	9,100	9,224	9,299	9,375	777	9%	76

Source: EIA Drilling Productivity Report

Figure 21: MoM Change – Major Shale/Tight Oil Production



Source: EIA Drilling Productivity Report

Oil – EIA DUC's basically up slightly in December

DUCs up slightly in Dec

We have been warning that we see a key risk to how much US oil production can sustainably grow in 2023 and beyond is the need to increase rig counts (not have less frac spreads) to replenish the inventory of Drilled UnCompleted wells at higher levels and the challenge for oilfield services to add capacity to increase frac spreads and completions. In our Dec 18, 2022 Energy Tidbits memo, we noted how DUCs in the Permian are really about the same level as five years ago when Permian production was about half current levels. One wildcard is our previously noted caveat that DUCs do not take into account potential refracs. The biggest problem in the past with the EIA's Drilling Productivity Report [LINK] estimate of Drilled UnCompleted wells was that the data had been constantly revised and sometimes significantly. (i) However, the DUC estimates provide a clear picture of the trend that DUCs haven't really increased since Feb. It's why there is the need for drilling rigs to pick up to replenish the DUC inventory if the US is to have strong oil growth in 2023. We highlight a slight increase in the Feb data. (i) It is also important to remember that a portion of the DUCs will never be completed as there are drilled wells that don't look like they can justify the higher cost of completion. (ii) Drilled Uncompleted Wells are up 40 MoM in December to 4,577 DUCs, which compares to 4,387 DUCs in Feb. (iii) But at 4,577 DUCs, it means that a total 4,297 DUCs were worked down since the Jun/20 peak of 8,874. The largest work downs are coming from the Permian (-375 YoY) and Eagle Ford (-177 YoY). With DUCs being worked down so significantly we will need to see rig counts go up to replenish DUCs in the near future. (iii) Note that shale/tight oil is approx. ~70% of total US production, so whatever the trends are for shale/tight oil are normally the trends for US oil in total. Below is our table of running DPR estimates of shale/tight oil production and our graph of MoM changes in major shale/tight oil production. Our Supplemental Documents package includes the EIA DPR.

Figure 22: EIA - Estimated Drilled UnCompleted Wells

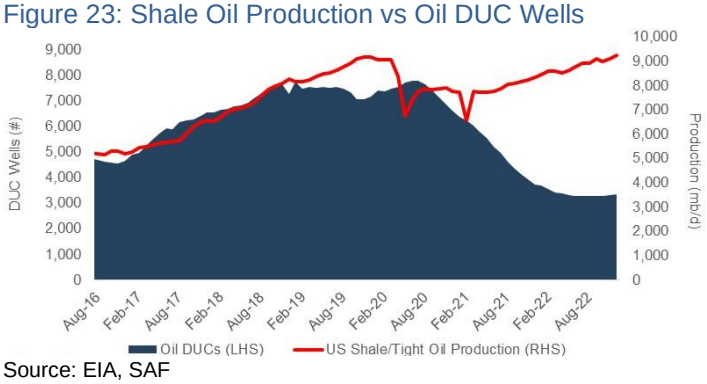
Drilled UnCompleted	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Dec YoY %	Dec YoY
Anadarko	787	773	758	753	740	724	727	723	716	722	723	710	712	715	-8%	-58
Appalachia	513	565	457	473	471	497	526	524	529	562	576	597	620	621	10%	56
Bakken	485	464	436	426	426	429	425	427	426	474	494	501	528	531	14%	67
Eagle Ford	760	685	683	653	642	612	598	611	620	593	582	561	517	508	-26%	-177
Haynesville	386	372	369	371	395	419	441	466	483	513	535	558	595	607	63%	235
Niobrara	362	354	343	331	317	320	310	328	345	362	393	443	497	526	49%	172
Permian	1,537	1,444	1,482	1,380	1,302	1,294	1,244	1,218	1,180	1,117	1,097	1,051	1,068	1,069	-26%	-375
Total	4,830	4,657	4,528	4,387	4,293	4,295	4,271	4,297	4,299	4,343	4,400	4,421	4,537	4,577	-2%	-80

Source: EIA, SAF

DUCs vs US oil production

We continue to be in the camp that believes we need to see increases in US oil rigs to rebuild the inventory of DUCs. Our regular monthly graph below shows US shale/tight oil production plotted against oil DUCs There has been a clear correlation with the drawing down of DUCs inventory with increasing shale/tight oil production.

Figure 23: Shale Oil Production vs Oil DUC Wells



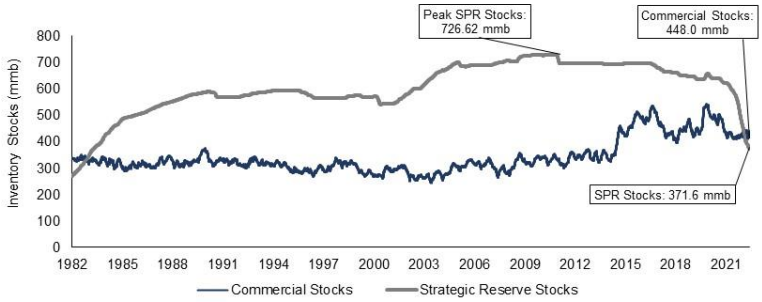
Source: EIA, SAF

Oil – US SPR reserves now -76.4 mmb lower than commercial crude oil reserves

SPR reserves remain lower than commercial

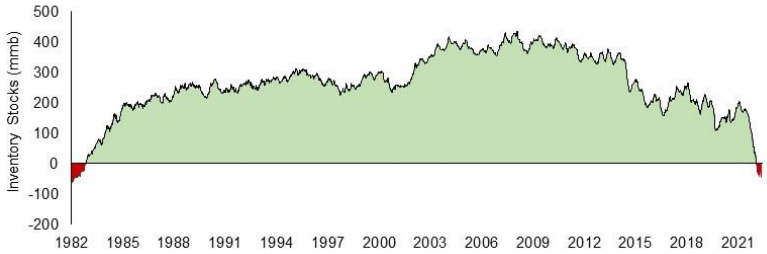
Oil in US Strategic Petroleum Reserves (SPR) moved below total US commercial crude oil reserves in the Sept 16 week for the first time since 1983, with the deficit widening again this week due to the big build in commercial oil stocks that was primarily driven by a drop in US oil exports during the cold weather in the Gulf Coast. The EIA's new weekly oil data for Jan 13 has SPR reserves at 371.6 mmb vs commercial crude oil reserves at 448.0 mmb. The below graphs highlight the difference between commercial and SPR stockpiles.

Figure 24: US Oil Inventories: Commercial & SPR



Source: EIA

Figure 25: US Oil Inventories: SPR less commercial



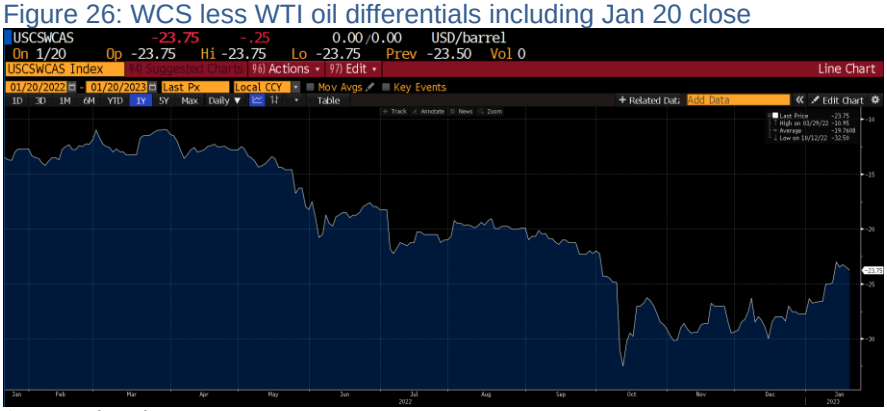
Source: EIA

Oil – Cdn oil differentials widened $0.75 WoW to $23.75 at close on Jan 20

WCS less WTI differentials

It looks like Cdn oil differentials are finding an approximate range over the past couple weeks post the restart of the Affected Portion of the Keystone pipeline. But we would expect to see a narrowing as normally happens every spring. Two weeks ago, the WCS-WTI differential was $26.60 on Jan 6, but narrowed to $23.00 on Jan 13, and this week were up $0.75 to close at $23.75 on Jan 20. For perspective, a year ago, the WCS-WTI differential was $13.50 on Jan 20, 2022. Below is Bloomberg's current WCS–WTI differential as of Jan 20, 2023 close.

Figure 26: WCS less WTI oil differentials including Jan 20 close



Source: Bloomberg

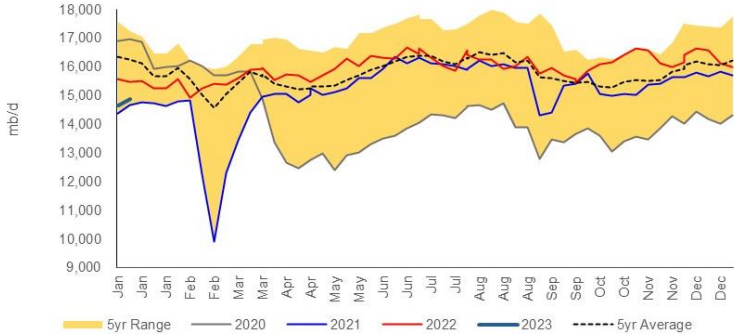
Oil – Refinery inputs +0.203 mmb/d WoW to 14.853 mmb/d as weather warms

Refinery inputs up WoW

There was a partial recovery in refinery crude oil inputs following the cold weather in the Gulf Coast two weeks ago that led to some temporary refinery impacts. On Thursday, the EIA released its estimated crude oil input to refinery data for the week ended Jan 13. The EIA reported crude oil inputs to refineries were up +0.203 mmb/d WoW to 14.853 mmb/d, which is -0.600 mmb/d YoY from 15.453 mmb/d for the week ended Jan 14, 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 85.3%, a -3.4% YoY decrease Total products supplied (i.e., demand) increased WoW, down 2.686 mmb/d to 20.314 mmb/d, and Motor gasoline was up

+0.496 mmb/d at 8.054 mmb/d from 7.558 mmb/d last week. The 4-week average for Motor Gasoline down -0.419 mmb/d YoY to 8.278 mmb/d.

Figure 27: US Refinery Crude Oil Inputs (thousands b/d)



Source: EIA

Oil – US "net" oil imports down -1.224 mmb/d WoW to 2.989 mmb/d

US "NET" imports were down –1.224 mmb/d to 2.989 mmb/d for the Jan 13 week. US imports were up +0.511 mmb/d to 6.861 mmb/d. US exports were up 1.735 mmb/d to 3.672 mmb/d. The WoW increase in US oil imports was driven mostly by Top 10 with a increase of +0.181 mmb/d. Some items to note on the by country data. (i) Canada was down this week -0.030 mmb/d to 3.707 mmb/d. (ii) Saudi Arabia was relatively flat this week at 0.453 mmb/d. (iii) Colombia was re3latively flat this week -0.001 at 0.245 mmb/d. (iv) Ecuador was down this week -0.137 mmb/d to 0.137 mmb/d. (v) Iraq was up +0.051 mmb/d to 0.201 mmb/d. (vi) Mexico was up +0.241 mmb/d to 0.909 mmb/d.

US "net" oil imports down WoW

Figure 28: US Weekly Preliminary Oil Imports by Major Countries

(thousand b/d)	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	Jan 13/23	WoW
Canada	3,410	3,235	3,076	3,844	3,354	3,423	3,795	3,066	3,504	2,949	3,737	3,707	-30
Saudi Arabia	533	519	211	685	338	274	317	513	473	479	464	453	-11
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0
Mexico	748	503	528	495	300	585	602	632	581	428	668	909	241
Colombia	218	341	143	170	290	292	248	71	353	357	246	245	-1
Iraq	134	503	141	385	363	252	282	227	289	354	150	201	51
Ecuador	0	102	101	42	242	159	157	70	274	87	137	0	-137
Nigeria	81	119	181	43	50	159	171	136	66	141	143	211	68
Kuwait	0	0	0	0	0	0	0	0	0	0	0	0	0
Angola	0	0	0	0	0	0	0	0	0	0	0	0	0
Top 10	5,124	5,322	4,381	5,664	4,937	5,144	5,572	4,715	5,540	4,795	5,545	5,726	181
Others	1,081	1,132	1,178	1,399	1,100	868	1,295	1,104	712	917	805	1,135	330
Total US	6,205	6,454	5,559	7,063	6,037	6,012	6,867	5,819	6,252	5,712	6,350	6,861	511

Source: EIA

Oil – Colombia says won't award new oil and gas exploration contracts

Colombia's Energy and Mines Minister Irene Velez took advantage of Davos to make it clear that Colombia will not be awarding any oil and gas contracts. On Thursday Bloomberg reported "*Speaking in a panel on energy transition from the World Economic Forum at Davos, Velez doubled down on President Gustavo Petro's campaign promise to transition the country away from fossil fuels. Her remarks signal a stark difference to comments by Finance Minister Jose Antonio Ocampo, who has said Colombia is open to the possibility of new*

Colombia won't award new oil and gas exploration contracts

contracts given its high fiscal revenue dependence from fossil fuels. "We have decided not to award new oil and gas exploration contracts, and while that has been very controversial, it's a clear sign of our commitment in the fight against climate change," Velez said in a panel alongside the CEOs of Repsol and Honeywell International. "This decision is absolutely urgent and needs immediate action." Velez said the administration's decision to halt new exploration required investment in other sectors, such as agriculture and tourism, to "leave behind coal and hydrocarbons while surviving as a nation." This is for new contracts and Colombia has not indicated any changes to existing contracts.

Nov 20, 2022: Colombia signaled a rethink on stopping oil and gas exploration

No one should be surprised by Velez's comments this week at Davos. Two months ago, Colombia signaled a rethink on its oil and gas exploration. Here is what we wrote in our Nov 27, 2022 Energy Tidbits memo. "*No one should be surprised to see the reports that Colombia may be on a go-slow path on new President Petro's campaign promise to stop oil and gas exploration. It's a reality check that Petro realizes he needs to have a strong Colombia financial position to be able to try to move on his green aspirations. Like other pro-climate change leaders, we do not expect him to abandon his aspirations to cut out oil and gas, but he will be forced to go slow or some effective indefinite pause. Last Sunday, FT reported [LINK] "Colombia signals rethink on pledge to curb oil and gas exploration". FT wrote "Colombia's leftist government has signalled it could row back on its pledge to halt new oil and gas exploration projects, saying it would first examine existing contracts as part of an overhaul of its fossil fuel industry. Gustavo Petro, a former guerrilla fighter who took office as president in August, made the promise during his election campaign. But finance minister José Antonio Ocampo said in an interview that the government would analyse the 180 contracts before deciding whether to fulfil the pledge. "Then we will see if new contracts are necessary," he said. Any energy transition that reduced exports "would have to be gradual" and prioritise gas self-sufficiency, Ocampo added.".*

Oil – Norway December oil production of 1.773 mmb/d, down +1.4% MoM

Norway oil production

The Norwegian Petroleum Directorate released its November production figures [LINK] of 1.773 mmb/d of oil, which is -4.1% YoY but down +1.4% MoM from November of 1.749 mmb/d. December production was down -9.8% (-0.192 mmb/d) from the forecast amount of 1.965 mmb/d. The NPD does not provide any explanations for the MoM changes. The theme for Norway through 2021 was that Norway oil production returned to growth because of the Johan Sverdrup oil field, and tax breaks from the government allowing increased capex in the energy sector. Norway oil production was still expected up modestly in 2022.

Figure 29: Norway December 2022 production

		Oil mill bbl/day	Sum liquid mill bbl/day	Gas MSm³/day	Total MSm³ o.e/day
Production	**December 2022**	**1.773**	**1.983**	**358.6**	**0.674**
Forecast for	December 2022	1.965	2.231	352.9	0.708
Deviation from forecast		-0.192	-0.248	5.7	-0.034
Deviation from forecaset in %		-9.8 %	-11.1 %	1.6 %	-4.8 %
Production	November 2022	1.749	1.971	345	0.658
Deviation from	November 2022	0.024	0.012	13.6	0.016
Deviation in % from	November 2022	1.4 %	0.6 %	3.9 %	2.4 %
Production	December 2021	1.849	2.091	354.8	0.687
Deviation from	December 2021	-0.076	-0.108	3.8	-0.013
Deviation in % from	December 2021	-4.1 %	-5.2 %	1.1 %	-1.9 %

Source: Norwegian Petroleum Directorate

Oil – Palentir CEO view on Russia/Ukraine

Palantir CEO on Putin

The EU and US debate on getting tanks to Ukraine reminds of the issue for world leaders – how and when can the Russia/Ukraine war end. The one thing that we thinks is unchanged is that Putin can't be seen to lose if he expects to remain in power. That view was reinforced by Palentir CEO Alex Karp. We recognize many aren't huge fans, but we always enjoy Palentir CEO's comments as they are normally good food for thought. Alex Karp was interviewed by CNBC at Davos. On Tuesday, we tweeted [LINK] "*can the war end if putin "loses" or he isn't overthrown? how many more massive x22 bomb hits can ukraine take? is there a case for a deal later in 2023 and RUS #NatGas to play a role on some sort of compensation? thx @andrewrsorkin @PalentieTech alex karp. #OOTT."* He does raise a good question, how can Putin agree to anything that looks like a "loss". CNBC wrote "*"I don't think the war is likely to end in Ukraine," says @PalantirTech CEO Alex Karp. "If Putin goes home and says we lost, he will lose life, his friends, and all his money."* Can, hoow and when the war ends will probably be the world's major issue in 2023. One of the items we are still believe is Russia's natural gas will be part of the solution/reparation/cost recovery.

Oil – OPEC MOMR: neutral with no real change to forecasts

OPEC MOMR

On Tuesday, OPEC released its Monthly Oil Market Report at ~7:15 am MT. (i) We thought the overall takeaway from the OPEC MOMR Jan is neutral. There are no changes to their growth forecasts for oil demand and non-OPEC supply for both 2022 and 2023 from the previous report in Dec. (ii) Oil demand growth was unchanged. 2022 YoY average demand was relatively flat noting a -0.01 mmb/d decrease to 99.55 mmb/d from 99.56 mmb/d previously; 2023 was also flat at 101.77 mmb/d. This means 2022 YoY growth is +2.54 mmb/d and 2023 is +2.22 mmb/d. 2023 is above pre-Covid 2019 of 100.3 mmb/d (revised up from 100.2 mmb/d). OPEC made shifts within quarters for 2023 demand with Q1/23 now 101.04 mmb/d, up from 100.87. Q2/23 now 100.65 mmb/d (was 100.74). Q3/23 now 101.90 mmb/d (was 102.4). Q4/23 demand 103.47 mmb/d (was 103.41) (iii) China demand. The MOMR remains cautious on its expectations on China oil demand as moves out of Covid with slight downward revisions in the 2023 forecasts. China's demand forecast now reflects a full year average 15.27 mmb/d, slightly down from 15.31 mmb/d. Q1/23 was revised upwards to

14.90 mmb/d form 14.68 mmb/d; Q2/23 was revised down -0.12 mmb/d to 15.20 mmb/d from 15.32 mmb/d Q3/23 now is 15.32 mmb/d +0.15 mmb/d from was 15.20 mmb/d in Dec. China is forecasted to exit in Q4/23 at 15.89 mmb/d up from 15.78 mmb/d previously. In Jan MOMR, they write *""For 2023, the forecast for world oil demand growth is also the same as in the previous month's assessment at 2.2 mb/d, with the OECD increasing by 0.3 mb/d and non-OECD growth at 1.9 mb/d. Minor upward adjustments were made due to the expected better performance in China's economy on the back of its reopening from COVID-19 restrictions, while other regions are expected to see slight declines, due to economic challenges that are likely to weigh on oil demand.""* (iv) non-OPEC supply. Immaterial increases to YoY growth for 2022 of +1.93 mmb/d to 65.61 mmb/d (was +1.89 mmb/d to 65.57 mmb/d), and for 2023 of +1.55 mmb/d (was +1.54) to 67.16 mmb/d (was 67.11 mmb/d). (v) OPEC Secondary Sources for Dec +91,000 b/d MoM to 28.871 mmb/d. For OPEC10 (the countries in the quota), they produced 24.562 mmb/d in Dec, well below the quota of 25.416 mmb/d. (vi) There were no major variances to highlight in Direct Communications (what the OPEC countries report). Libya did not provide direct communications estimate for Dec; Venezuela says it produced 669,000 b/d in Dec vs Secondary Sources of 676,000 b/d. (vii) Note the one significant difference vs the IEA OMR below is their views of MoM changes in global oil stocks from Oct to Nov. OPEC estimates OECD inventories at November 30 at a MOM narrowing of the deficit in "crude only" stocks -108 mmb (vs October -118), product stocks -65.0 mmb (vs October -79) below 2015-2019 average. Our Supplemental Documents package includes excerpts from the OPEC MOMR Dec.

Oil – IEA OMR "*well-supplied oil balance at the start of 2023 could quickly tighten*"

IEA Oil Market Report

On Wednesday, the IEA released its monthly Oil Market Report for Jan at 2am MT. They only release very limited public info, but Bloomberg provided detailed tables and added color from the report. So big thanks, as usual, to the Bloomberg team. (i) We thought the takeaway was starting 2023 in oversupply, but then moving to a big undersupply in H2/23, which means the cll on OPEC increases by 3.2 mmb/d from Q1/23 to Q4/23. On Thursday, we tweeted [LINK] "*Prescription for higher #Oil prices in H2/23? @IEA OMR. call on #OPEC. Q1/23 - 28.2 mbd. Q2/23 - 29.2 mbd. Q3/23 - 30.8 mbd. Q4/23 - 31.4 mbd. Especially if US doesn't release another 180 mb from SPR. Thx @business Kristian Siedenburg for table. #OOTT."* The IEA Jan OMR starts 2023 with the view that the oil market is oversupplied to start 2023 with caution echoed on near term pricing with the possibility of a quick contraction of supply given the absence of the 180 mmb SPR release and western sanctions against Russian crude. 2022 oil demand growth was impacted by the inclement weather around North America in Q4/22 with full year demand at 99.9 mmb/d, still below the pre-Covid forecast of 100.4 mmb/d. Oil demand YoY growth increased for 2023 +1.9 mmb/d to 101.7 mmb/d. Message is still positive for oil with growth expected in 2023. The IEA writes *"Global oil demand is set to rise by 1.9 mb/d in 2023, to a record 101.7 mb/d, with nearly half the gain from China following the lifting of its Covid restrictions. Jet fuel remains the largest source of growth, up 840 kb/d."* (i) 2022 oil demand growth was flat from last month at 99.9 mmb/d in 2022 and +0.1 mmb/d to 101.7 mmb/d in 2023. (ii) 2022 is still below pre-Covid of 100.4 mmb/d in 2019. (iiI) On Russia, the EIA wrote "*Following an initial collapse in Russian loadings after the EU crude embargo and a G7 price cap came into effect on 5 December, exports have partially rebounded - underscoring the high degree of uncertainty for the outlook. For December as a whole, loadings of Russian oil fell 200 kb/d on average to 7.8*

mb/d, while total oil supply held steady at 11.2 mb/d. The well-supplied oil balance at the start of 2023 could quickly tighten however as western sanctions impact Russian exports." (iv) Non-OPEC supply YOY growth is unchanged for 2022, but 2023 was increased +0.7 mmb/d. Jan OMR non-OPEC supply is +0.2 mmb/d to 65.7 mmb/d for 2022, and +0.7 mmb/d to 66.4 mmb/d for 2023. (v) Changes to call on OPEC for 2022 were revised down at 28.8 mmb/d from 28.9 mmb/d and unchanged for 2023 at 29.9 mmb/d. (vi) OPEC Dec production was -40,000 b/d to 29.19 mmb/d led by Nigeria -51,000 b/d, Angola -36,000 b/d MoM, but UAE was up +21,000 b/d, MoM. (vii) Russia of 9.77 mmb/d for Dec is below it's quoat of 10.48 mmb/d. (viii) OECD crude oil inventories on November 30 were 125.9 mmb below the five-year average vs 150.2 mmb at October 31. The IEA wrote, "*Global observed oil inventories surged by 79.1 mb m-o-m in November, hitting their highest levels since October 2021. The increase was led by non-OECD stocks (+43.9 mb) and oil on water (+38.1 mb)."* Our Supplemental documents package includes the IEA release and the Bloomberg reports.

Figure 30: IEA Global Demand Forecast By OMR Report Month

mmb/d	2020	2021	21-20	Q1/22	Q2/22	Q3/22	Q4/22	2022	22-21	Q1/23	Q2/23	Q3/23	Q4/23	2023	23-22
Jan 23	91.0	97.7	6.7	99.5	98.7	100.7	100.5	99.9	2.2	99.6	100.8	102.9	103.5	101.7	1.8
Dec 22	91.0	97.7	6.7	99.5	98.7	100.7	100.8	99.9	2.2	99.7	100.6	102.7	103.4	101.6	1.7
Nov 22	91.0	97.7	6.7	99.4	98.7	100.3	100.7	99.8	2.1	99.6	100.5	102.3	103.0	101.4	1.6
Oct 22	91.0	97.7	6.7	99.4	98.5	100.0	100.6	99.6	1.9	99.5	100.4	102.1	102.9	101.3	1.7
Sep 22	91.0	97.7	6.7	99.5	98.4	99.9	100.9	99.7	2.0	100.2	101.0	102.6	103.3	101.8	2.1
Aug-22	91.0	97.6	6.6	99.4	98.5	100.0	100.8	99.7	2.1	100.3	101.1	102.5	103.3	101.8	2.1
July 22	91.0	97.5	6.5	99.3	97.8	99.4	100.2	99.2	1.7	99.8	100.8	102.0	102.7	101.3	2.1
June 22	91.0	97.5	6.5	99.3	98.2	99.8	100.4	99.4	1.9	100.5	101.1	101.9	102.7	101.6	2.2
May 22	91.0	97.5	6.5	98.8	98.2	100.0	100.4	99.4	1.9						
Apr 22	91.0	97.5	6.5	98.5	98.3	100.1	100.5	99.4	1.9						
Mar 22	91.0	97.5	6.5	99.0	98.8	100.2	100.6	99.6	2.1						
Feb 22	91.0	97.4	6.4	98.9	100.1	101.7	101.6	100.6	3.2						
Jan 22	91.0	96.4	5.4	97.8	99.3	100.9	100.8	99.7	3.3						
Dec 21	91.0	96.2	5.2	97.9	99.1	100.8	100.3	99.5	3.3						

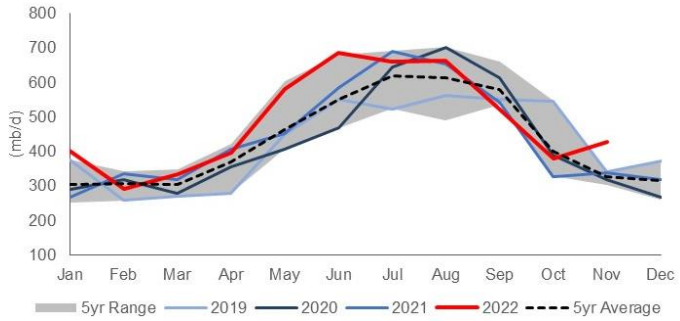
Source: IEA, SAF

Oil – Saudi use of oil for electricity in seasonal decline ie. more oil for export

Saudi to have more oil for export

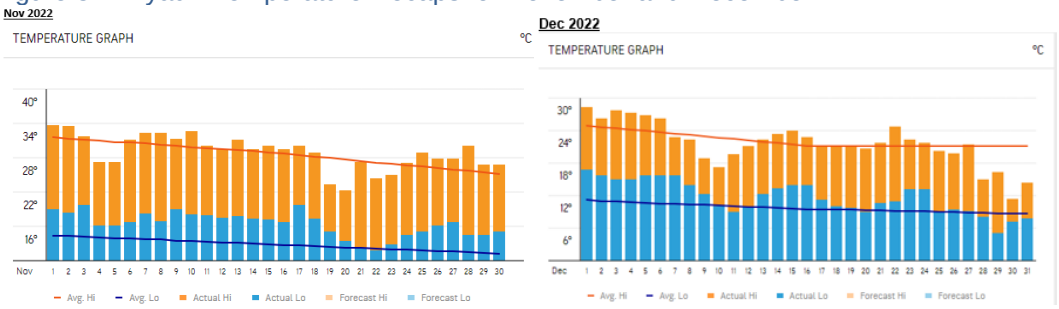
The key theme for the winter months is that Saudi will be able to export more oil as it uses less oil for electricity vs the summer months. A reminder a normal peak to trough decline of ~400,000 b/d. If there is less oil used for electricity, then there is more oil for export. There is one additional wildcard that isn't in the JODI data but could lead to more Saudi oil for export - the JODI data doesn't include how much fuel oil Saudi imports and we saw reports in Q2 that Saudi was importing some Russian fuel oil via Fujairah terminal. The JODI data for Saudi Arabia oil supply and demand for November was updated on Monday. Saudi used more oil for electricity in November vs October. This is attributed to the slightly higher than average temperatures experienced throughout November. November saw varying temperatures that were close to the higher average range for most of the month. It is important to note that December experienced colder temperatures than November and colder means less air conditioning/electricity demand. November was 429,000 b/d (vs November 2021 of 339,000 b/d) and October was 380,000 b/d (vs October 2021 of 328,000 b/d). Below are the AccuWeather Temp maps for Riyadh for November and December. Careful they are different scales but look for oil for electricity to decrease as we move out of peak season.

Figure 31: Saudi Arabia Direct Use of Crude Oil For Electric Generation



Source: JODI

Figure 32: Riyadh Temperature Recaps for November and December



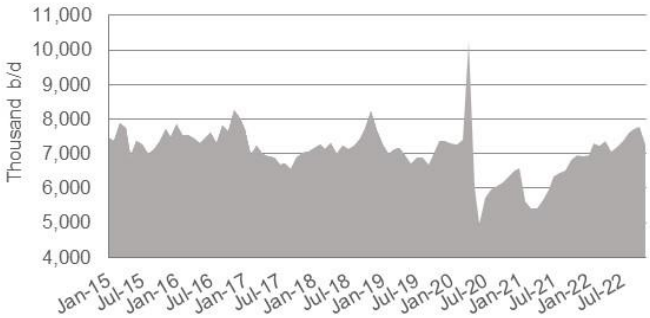
Source: AccuWeather

Oil – Saudi oil exports down 493,000 b/d to 7.280 mmb/d in November

Saudi oil export data for Nov

As expected, Saudi oil exports in November were lower MoM due to the lower Saudi oil production/quotas. Saudi oil production in Nov was down -489,000 b/d MoM to 10.468 mmb/d. This was the key factor for Saudi oil exports being down -493,000 b/d MoM in Nov. The smaller balancing items were Saudi use of oil for electricity was down -49,000 b/d MoM, and also that Saudi oil intake into refineries were down -19,000 b/d MoM in Nov. Saudi oil production in Nov was 10.468 mmb/d, slightly below the quota of 10.478 mmb/d. Saudi oil exports were -493,000 b/d MoM to 7.280 mmb/d in Nov 2022.

Figure 33: Saudi Arabia oil exports (mb/d)



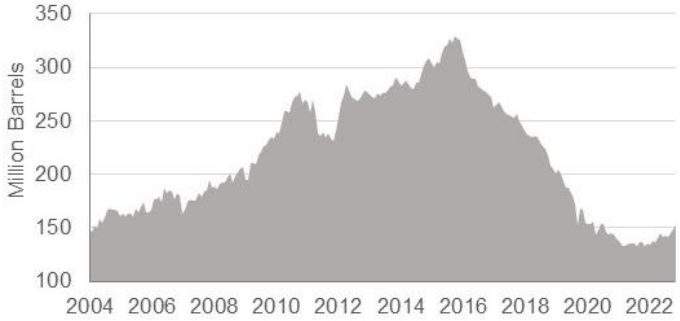
Source: JODI

Oil – Saudi oil inventories increased MoM, up +2.964 mmb barrels MoM

Saudi oil inventory data

JODI doesn't provide data for Saudi fuel oil imports, but, based on the math, we would assume that there were Saudi fuel oil imports in Nov. The JODI data also reported Saudi oil inventory increased +2.964 mmb MoM to 151.625 mmb at Nov 30. If we do the math on the MoM changes in Saudi production, exports, oil used for electricity and oil into refineries, it would come out to a net inventory build of 72,000 b/d or +2.160 mmb for Nov. But the JODI data reported an inventory build of +2.964 mmb. There is an 0.804 mmb difference.

Figure 34: Saudi Arabia Crude Oil Inventories (mmb)



Source: JODI

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 few months. On Wedcnesday, 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 per day, and condensate production reached 55 thousand barrels per day during the past 24 hours."*

Figure 35: Libya Ports, Major oilfields and Terminals map

Source: SAF Group

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 and, if so, we would expect to see a move to a sustained increase in oil demand starting in Q2/23? This spread of Covid is well covered and is moving more outside of major urban areas ie. 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."

~80% of China infected

Oil – China says around 80% of population was infected with Covid

Earlier this morning, we tweeted [LINK] on the SCMP reported comments from China's Centre for Disease Control and Prevention today on Covid. We tweeted "*Set up for sustained Q2 #oil demand rebound, herd immunity in China. #SCMP reports china CDC today: tsunami of infections post reopening, ~80% already infected so little possibility of large-scale epidemic rebound. see @Pfizer 👇what is herd immunity. Thx @sunyue_luna #OOTT."* SCMP reported "*China reported almost 13,000 Covid-19 deaths in one week, while a leading epidemiologist said around 80 per cent of Chinese had already been infected so a second wave was unlikely in the near future." :Separately, Wu Zunyou, the CDC's chief epidemiologist, played down concerns about a second wave in the next few months while also calling for caution over the elderly and other vulnerable groups over the Lunar New Year holiday. "The massive social mobility during Chinese New Year could accelerate the spread of the pandemic to a certain extent, and the number of infected people will increase in some areas," Wu wrote in a post on the social media site Weibo on Saturday. But because the latest wave had infected about 80 per cent of the people in the country there was little possibility of a large-scale epidemic rebound or a second wave of cases in the next two to three months, Wu said. China has seen a tsunami of Covid infections since Beijing abruptly dropped its restrictive zero-Covid policies last month without making preparations for the shift*." Our Supplemental Documents package includes the SCMP report.

Pfizer's "What is herd immunity?"

Our tweet also included 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 – $2 Trillion in excess China savings to be allocated in the reopening

$2 Trillion of excess Chinese savings during Covid

We believe there has been an overlooked factor in China's reopening – Chinese have accumulated significant excess savings during Covid much like was seen in the US, and that a reopening will see Chinese spend just like has been spend in the US in an extra stimulus. In China's case, there is $2 Trillion of excess savings waiting to be spent in the reopening. We have been saying that we don't see why people in China won't be responding to China's reopening the same way people in all major countries responded when their countries reopened. On Tuesday night, we were watching Bloomberg Asia open and immediately tweeted on comments by Hong Kong Exchange CEO Aguzin. We tweeted [LINK] "*1/2. $2 Trillion in EXCESS savings in China to be allocated in the reopening. @HKEXGroup CEO @aguzin "Something important around Covid also that I want to make sure people know. Over the last 2 yr, savings in China which traditionally size ~20% of disposable income... #OOTT"* and [LINK] "*2/2 .. It is very very high. But over the last 2 yr, that jumped to >30% so there's ~$2 trillion EXCESS savings in the system in China. $2 trillion. Now with the reopening that will have to be reallocated somewhere. Thx @haslindatv @aguzin #OOTT."* We made a transcript of Aguzin's comments "*Something important around Covid also that I want to make sure people know. Over the last 2 years, savings in China which traditionally size around 20% of disposable income. It is very very high. But over the last 2 years, that jumped to over 30% so there's about $2 trillion excess savings in the system in China. $2 trillion. Now with the reopening that will have to be reallocated somewhere. To travel, to purchase things, so that is a very significant amount. I hope a good chunk of that comes to the capital markets"*

Blackstone CEO Schwarzman reminds $2.5T US Covid savings drove economy

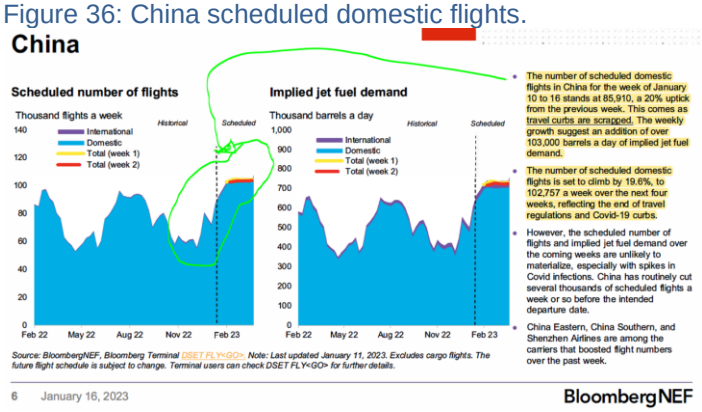
We were reminded of the significance of China $2 Trillion in excess savings waiting to be allocated by comments from Blackstone CEO Schwarzman in his Bloomberg

interview from Davos. Schwarzman highlighted how there was $2.5 Trillion in excess savings in the US during Covid, half has been spent, which has been an extra stimulus to the US economic and there is still another half waiting to be spent. On Thursday morning, we tweeted [LINK] "*Hmm! Overlooked China extra stimulus? US economy "quite good shape": #Blackstone Schwarzman $2.5T in excess savings during Covid, spent half, "an extra stimulus". China $2T in EXCESS savings to be spent on reopening. see 👇 @aguzin tweet last night. Thx @DavidWestin #OOTT."*

Oil – China domestic flights +20% WoW for Jan 10-16 week

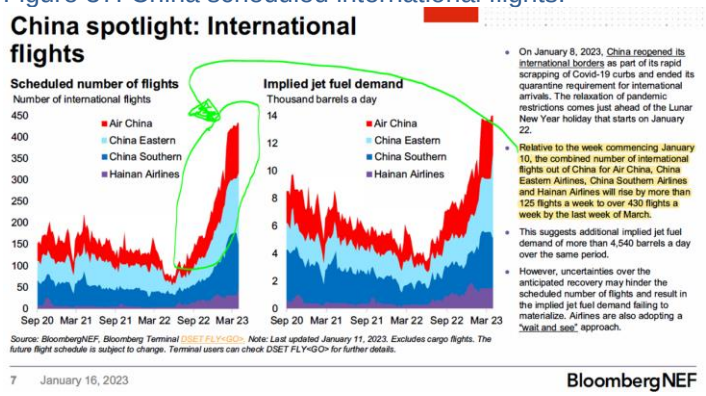
We continue to see the big lagging activity factor in China, flying, pick up post China reopening. On Monday, we tweeted [LINK] "*China reopening! China domestic flights +20% WoW for Jan 10-16 week. Peak Covid cases + rush to herd immunity = people out driving and now flying domestically especially with 1st Spring Festival without Covid restrictions. Thx @BloombergNEF Claudio Lubis. #OOTT."* And BNEF also noted how China's international flights are just starting to increase. Our tweet include the below two BNEF charts from its Aviation Indicators Weekly Jan 16, 2023.

Figure 36: China scheduled domestic flights.



Source: BloombergNEF

Figure 37: China scheduled international flights.



Source: BloombergNEF

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

One of the IEA revisions to its 2023 forecast was reducing its assumption of natural gas to oil switching with the lower natural gas. Here is what we wrote in last week's (Jan 15, 2022) Energy Tidbits memo "*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 38: Dutch TTF Gas Feb'23 (TGG23) to Wed Jan 4 close.

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

Source: Barchart

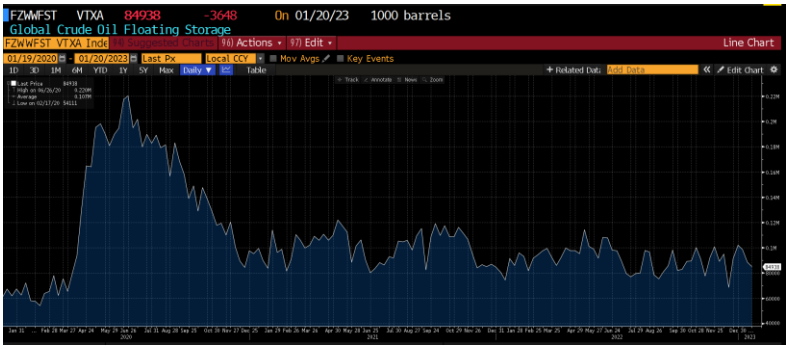
Oil – Vortexa crude oil floating storage 84.94 mmb, -3.62 mmb WoW

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 14 at 10am MT. (i) As of 10am MT yesterday, Bloomberg posted Vortexa crude oil floating storage estimate for Jan 20 at 84.94 mmb, which is -3.62 mmb WoW vs upwardly revised Jan 13 of 88.59 mmb. Note Jan 13 of 88.59 mmb was revised up +10.2 mmb vs 78.39 mmb originally posted on Bloomberg as of 10am MT on Jan 14. (ii) There were large revisions for the prior two weeks data. 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 13 revised +10.2 mmb. Jan 6 revised +6.29 mmb. Dec 30 revised +2.92

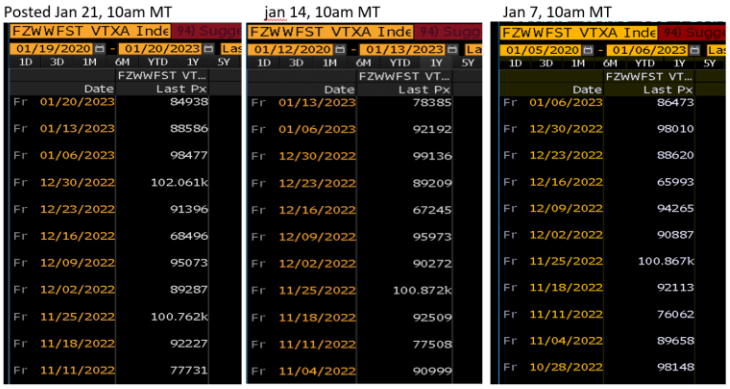
mmb. Dec 23 revised +2.19 mmb. Dec 16 revised +0.75 mmb. Dec 9 revised -0.91 mmb. Dec 2 revised -0.99 mmb. (iii) There is still a wide range of floating storage for the past several weeks, but a simple average for the past seven weeks is 89 86 mmb, which is up vs last week's 87.45 mmb with the key difference being the upward revisions for the last five weeks. (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 20 estimate of 84.94 mmb is -135.39 mmb vs the post-Covid peak on June 26, 2020 of 220.33 mmb. (vi) The 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 20 estimate of 84mmb is 84.94 mmb is +24.05 mmb vs Pre_covid of 60.89 mmb as of Jan 20, 2022. Jan 20 estimate of 84.984 mmb is 7.1 mmb YoY vs Jan 21, 2022 of 91.mmb. (vii) Below are the last several weeks of estimates posted on Bloomberg as of 10am MT on Jan 21, 10am on Jan 14, and 10am on Jan 7.

Figure 39: Vortexa Floating Storage posted on Bloomberg Jan 21 at 10am MT



Source: Bloomberg, Vortexa

Figure 40: Vortexa Estimates Posted Jan 21 10a MT, Jan14 10am MT, Jan 7 10am MT



Source: Bloomberg, Vortexa

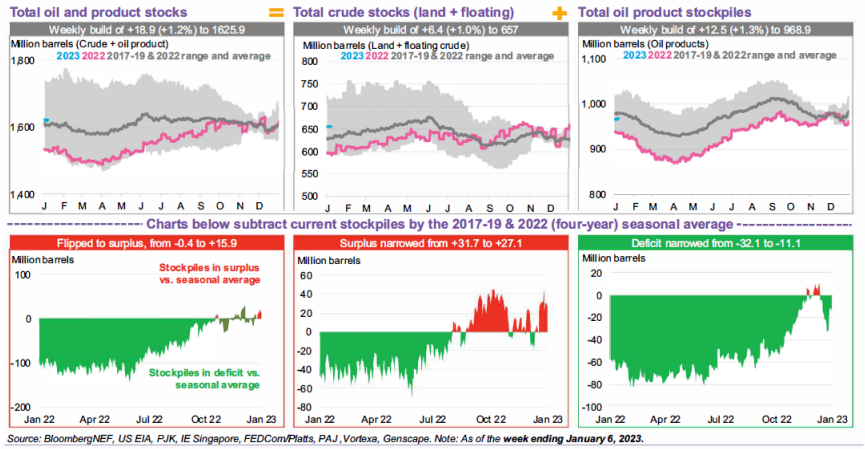
Oil – BNEF: global oil and product stocks deficit flips to 15.9 mmb surplus

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-

BNEF's global oil inventories

term global oil demand and supply indicators. The global oil and products stockpile deficit for crude and products flipped to a surplus from a 0.4 mmb deficit to a 15.4 mmb surplus. The stockpile deficit against the five-year average (2016-19, 2022) narrowed from 32.1 mmb to 11.1 mmb. Total crude inventories increased by 1.0% to 657.0 mmb, including global floating inventories. Product stocks were up 1.3% WoW with the stockpile deficit against the 4-year average narrowing from 32.1 to 11.1 mmb. Gas, oil, and middle distillate stocks have widened against their four-year average deficit (2017-2019,2022) from 26.6 mmb to 29.8 mmb. Jet fuel consumption by international departures is set to decrease by 102,000 b/d WoW while consumption by domestic passenger departures will increase by 38,400 b/d WoW. Below is a snapshot of aggregate global stockpiles. Our Supplemental Documents package includes excerpts from the BloombergNEF report.

Figure 41: Aggregate Global Oil and Product Stockpiles



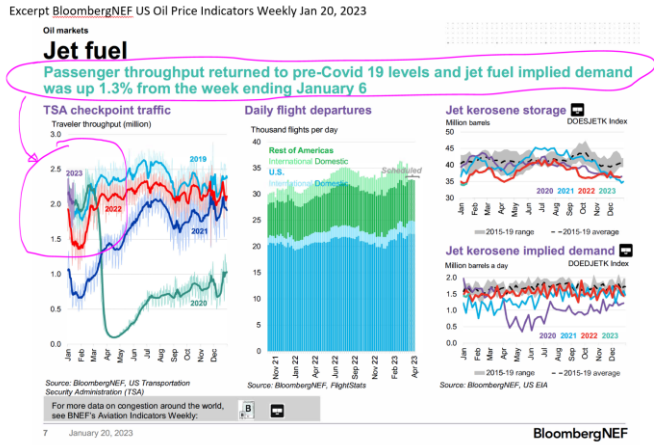
Source: BloombergNEF

Oil – US air passenger traffic back to pre-Covid levels

US air passenger traffic back to pre-Covid

On Friday, we tweeted [LINK] "*US air passengers throughput back to pre-Covid levels. Positive for #JetFuel, but still need Rest of World to get back to 2019 levels. Thx @BloombergNEF. #OOTT*." No one should have been surprised by this given the one of the dominant general news stories over Xmas/New Years was the massive number of US air flight cancellations/delays. It was the headlines for many days on the news. Our tweet included the below BloombergNEF graph showing TSA checkpoint traffic and wrote "*passenger throughput returned to pre-Covid 19 levels and jet fuel implied demand was up 1.3% from the week ending January 6."*

Figure 42: US TSA checkpoint traffic



Source: BloombergNEF

Oil & Natural Gas – "Nobody to notice" how strong Cdn E&P stocks are entering 2023

Cdn E&P stocks

We have a lot of friends and former co-workers in the oil patch and sellside so can understand the frustration on how trading multiples given the strength of the vast majority of the Cdn E&P sector. They survived during the oil and gas price crash from Covid, took advantage of the high oil and gas prices post Covid to built financially and operationally strong businesses and and enter 2023 in great shape even with the pull back in oil and gas prices. But as everyone in the market should know that's what happens when there are buyers for oil and gas stocks. We are referring to institutional investors. There are just way less institutional investors who care about E&P stocks. And those generalist investors that have come back to buy some oil and gas stocks are mostly only buying the really large companies such as the supermajors. It's why these quality Cdn E&P are trading at way lower than historical multiples and also why there is the push for stock buybacks to recognize the value discrepancy. We was reminded of this when I saw the retweeting of an older Oct 12, 2022 Bloomberg interview clip. On Thurs, we tweeted [LINK] "*Reminds why there are really good Cdn E&P trading at low multiples. And why there will be continued push to buy back stock. "That [multiple expansion] isn't happening any more because there is nobody to notice what actually happens at these companies." Thx @BurggrabenH! #OOTT."* Our tweet included the transcript we made of the comments by David Einhorn (Greenlight Capital) with Bloomberg's Sonali Basak on Oct 12, 2022 [LINK]. Items in *"italics*" are SAF Group created transcript. At 1:10 min mark, Einhorn "…. *the world has moved passive and so there is a lot less competition for what we do."* Basak "*Well what does it mean for you as you operate as an investor if you're saying so much of the world has turned passive or quantitative, has that made your job fundamentally different as someone who picks specific securities?*" Einhorn "*It absolutely does. It used to be that we could buy at a reasonably low multiple, whatever we thought that was, think that the company would do somewhat benefit, benefit from it being somewhat better and realize other investors would see what we saw, six months later, a year later and would rerate he shares. So you could buy something you could buy something at 11 times earnings, and maybe they would earn 10% more but you get another three points*

on the multiple. And you'd make 50% over 2 or 3 years. That isn't happening any more because there is nobody to notice what actually happens at these companies."

Oil & Natural Gas – Bullish for 2020s oil & gas, SLB's "distinct" new upcycle phase

Bullish for oil and gas for 2020s

We believe many overlooked Schlumberger's outlook on Friday. They made a point of highlighting there is a distinctive new phase for the upcycle that is seeing IOCs/NOCs not just doing short-cycle but a also long cycle across international basis. We believe this is these IOCs/NOCs putting their capital to work and believing that there will be tight or short supply for oil, natural gas and LNG for the 2020s. This is different from a couple years ago when the IOCs shifted to short cycle and the NOCs were sitting on the sidelines. Now they are moving to long-cycle and the NOCs are cranking up their exploration and production for the 2020s. Moving away from a short cycle focus is significant. And we believe this is a bullish for oil and gas. Earlier this morning, we tweeted [LINK] *"Hmmm! Bullish indicators #Oil #NatGas for 2020s. $SLB "distinctive" new phase in upcycle. "it's multi-pronged. It moves multiple engines, short and long, oil and gas, offshore and onshore". Points to tight/lack #Oil #NatGas #LNG supply for 2020s! #OOTT."* Schlumberger reported Q4/22 results on Friday. Some of their comments from the Q4 release and Q4 call were "Le Peuch said, "*The fourth quarter affirmed a distinctive new phase in the upcycle. In the Middle East, revenue increased by double digits sequentially, with growth in Saudi Arabia, Iraq, and the United Arab Emirates in the solid teens, affirming the much-anticipated acceleration of activity in the region*." "*But I think what I will say is that, what is characterizing international as we see it, is that it has a lot of resilience, because it's multi-pronged. It moves multiple engines, short and long, oil and gas, offshore and onshore."*.

Oil & Natural Gas – TIPRO Texas oil natural and gas jobs up MoM in Dec

TIPRO December jobs update

Employment continues to increase in the Texas oil and gas sector. The Texas Independent Producers and Royalty Owners Association (TIPRO) updated their employment figures for the Texas upstream sector for December [LINK]. TIPRO wrote "*Citing the latest Current Employment Statistics (CES) report from the U.S. Bureau of Labor Statistics (BLS), the Texas Independent Producers and Royalty Owners Association (TIPRO) today highlighted new employment figures showing continued growth in monthly employment for the Texas upstream sector and strong demand for available talent throughout the industry. According to TIPRO's analysis, direct Texas upstream employment for December 2022 totaled 211,200, an increase of 1,300 jobs from November employment numbers, subject to revisions. Texas upstream employment in December 2022 represented the addition of 36,100 positions compared to December 2021, including an increase of 7,000 jobs in oil and natural gas extraction and 29,100 jobs in the services sector. The average monthly gain in Texas upstream employment last year was 3,127. TIPRO's new employment data also indicated a significant rise in job postings for the upstream, midstream and downstream industries for the month of December. According to the association, there were 14,482 active unique jobs postings for the Texas oil and natural gas industry in December, including 6,953 new job postings added in the month by companies."* Our Supplemental Documents package includes the TIPRO release.

Oil & Natural Gas – Updated EIA Russia country brief

EIA's country brief on Russia

We continue to recommend adding the EIA's country analysis briefs to reference libraries as good quick references, in this case its new EIA country executive summary [LINK] on Russia.

Russia is a huge oil and natural gas player, and, in 2021, was just behind the US and Saudi Arabia as third largest producer of petroleum and other liquids. Russia's Feb 24, 2022 invasion of Ukraine has changed that with the range of sanctions Plus there was the added impact that the many of the top international energy companies have withdrawn or limited their Russia-based operations as well. BP, Equinor, Shell, Eni, and ExxonMobil have initiated total divestment from Russian assets. Total Energies, OMV, and Wintershall Dea have paused new investments in Russia. Plus perhaps even more significantly, many of the leading oilfield services have pulled out such as Baker Hughes. Crude production in 2021 averaged 10.6 mmb/d and Russia was the second largest producer of dry natural gas, producing and estimated 26.6 tcf. As of Dec 2022, Russia has 5.4mmb/d of crude oil refining capacity from more than 25 refineries; Rosneft is the largest refinery operator and owns more than 2.0 mmb/d of the total capacity. Russia's domestic oil consumption was approximately 3.2 mmb/d. Approximately 81% of Russia's crude production came from domestic companies, Rosneft, Lukoil, Surgutnetftegas, Gazprom and Tatneft. Russia's main market for oil and gas export is Europe; Russia made up a significant portion of Europe's oil and natural gas imports in 2021 before sanctions were implemented in 2022. While exports to Europe have slowed since Feb 2022, Russia has increased its oil and gas flows to countries where it can still sell and ship, mainly China and India. Russia joined OPEC+ agreement in April of 2020 that aimed to curb production amid rapidly declining demand for crude resulting from the Covid-19 pandemic, it continues to abide by monthly quotas agreed upon by OPEC+. Russia continues to increase its LNG export capacity. The first train of Gazprom's Baltic LNG at Ust-Luga port, a two-train LNG export facility with a total capacity of 624 billion cubic feet (Bcf) per year, is scheduled to begin commercial operations in 2023. Russia has proven total gas reserves of 1,688 tcf as of January 1, 2023. A string of recent natural gas discoveries in Russia's Arctic region will continue to increase natural gas production over the next decade and would compliment West Siberia, where most of Russia's natural gas has historically been produced. Russia aims to become a global supplier of natural gas; Russia released its latest energy policy plan, the *Energy Strategy to 2035*, which prioritizes the development and diversification of energy exports and seeks to significantly increase their investment in LNG. Russia aims to increase LNG exports by 4.5-4.9 tcf per year by 2024, and by 8.3-9.6 tcf per 2035. Our Supplemental Documents package includes the EIA brief.

Oil & Natural Gas –Norway wealth fund integrated oil companies "good place to be"

Norway wealth fund like integrated oil companies

Norway's wealth fund's big shift 13 months ago continues as it keeps investing in oil and gas and he sees the integrated energy companies are a good place to be for the risks of 2023 markets. On Wed, we tweeted [LINK] ""*what we do do is to invest in the integrated energy companies. I think that's a good place to be. They play a very, very important role in the energy transition" Norway wealth fund CEO. See* 👇*12/21/26 tweet on their #Oil #NatGas investing shift. Thx @lisaabramowicz1. #OOTT."* Norway's wealth fund CEO Nicolai Tangen was interviewed by Bloomberg at Davos. Our tweet included the recording we made of Tangen's comments on oil and gas. Tangen said that, since the fund is driven by oil and gas revenues, the Norwegian government decided the wealth fund should not be investing in upstream oil and gas. But then he went on for his positive comments on integrated energy companies.

Dec 21, 2021, Norway's wealth fund changed its oil & gas investment stance

Above, we noted Norway wealth fund's big shift 13 months ago on oil and gas. Our Dec 26, 2021 Energy Tidbits memo was titled "*Norway's Wealth Fund is Another Major Investor, Like CPPIB, to Keep Investing in Oil & Gas Stocks*". Here is what we wrote in that memo. "*We believe there is the case for multiple expansion for oil and gas stocks in 2022 as investors realize more significant institutional investors, especially pension funds, won't be selling down oil and gas stocks. The predictable is happening – more long term investors realize that the demise of oil and gas is many years further away than the Net Zero aspirations and that they will need oil and gas stocks for their returns. We expect to see more of these types of announcements/news over the next couple weeks. History has shown that the Xmas period is the time for announcements to be made to get the minimum attention. On Tuesday, we tweeted [LINK] "Multiple expansion for #Oil #NatGas stocks? Norway wealth fund has #MacronMoment & follows @cppib to slow play #EnergyTransition, won't sell, rather be a driving force for their equity investments to "adjust to #NetZero emissions over time". Less sellers is always good. #OOTT." Norway's sovereign wealth fund may be saying it a little differently but has come to a similar conclusion as CPPIB last week – they aren't selling oil and gas. They don't say it specifically but we also believe they won't be hesitating to buy . On Tuesday, Norway outlined its view on capital allocation [LINK] that had a number of key items. (i) High emissions sectors including oil and gas make up 14% of Norway's equity portfolio. These are companies that Norway believes must be restructured significantly to manage transition risk. (ii) "But that is not our approach, nor is it the expert group's proposal. Instead of selling ourselves out, we will through active ownership be a driving force for the companies to adapt. In order to influence, we must actually be owners." (iii) They want to be invested in all sectors. "If we are to achieve the best balance between expected return and risk, we must spread the investments widely and own a little of everything in the market. There is a solid professional basis for this approach." (iv) Priority to those that have the largest emissions ie. where they can effect change. "Going forward, we will increase ownership activity on climate, both in scope and depth. We will give particular priority to ownership activity towards the companies that have the largest emissions, towards those that have not published their own climate plans or have inadequate climate reporting." Our Supplemental Documents package includes the speech.*

Dec 15, 2021, CPPIB new investment stance called oil & gas a strategic sector

Norway's wealth fund shift on oil and gas in Dec 2021 followed the high profile shift of CPPIB (Canada Pension Plan Investment Board). Our Dec 19, 2021 Energy Tidbits highlighted the CPPIB Dec 15, 2021 "new" investment approach Here is what we wrote in that memo "*There was a significant positive to oil and gas investing this week and one that we expect others to follow, and this will lead to more long term investor capital allocation to oil and gas. On Wednesday, CPPIB announced its "new" investment approach in its release "CPP Investments highlights importance of decarbonizing hard-to-abate sectors in addressing climate change". [LINK] This is a significant change for a couple of reasons and one that we have been expecting based on the feedback we hear from long term investors. CPPIB calls it a "new investment approach" including on oil and gas. (i) CPPIB is a leader and is providing*

the messaging framework that we expect others to follow. Big long term investors like CPPIB have mostly all come out plans on how they taking their investment strategy to Net Zero. But, in discussions, more are realizing the Energy Transition isn't happening as fast as expected so their challenge is how to slow play their capital allocation to Net Zero. CPPIB provide the messaging on how they will do so. (ii) CPPIB now calls oil and gas a "strategic sector" and one for capital allocation. CPPIB said "helping businesses decarbonize is critical to addressing climate change, according to a recent perspective published by Canada Pension Plan Investment Board (CPP Investments). The perspective, "Investing to enable an economy-wide evolution to a low-carbon future," highlights the opportunity decarbonization presents for long-term investors, noting the need to address a particularly serious obstacle to decarbonization: strategic sectors that are essential, high-emitting and hard-to-abate. The perspective also outlines CPP Investments' new investment approach which aims to identify, fund and support companies that are committed to creating value by lowering their emissions over time, consistent with CPP Investments' time horizon advantage. "High-emitting companies that successfully navigate the economy-wide evolution to a low-carbon future will preserve and deliver embedded value for patient long-term investors like CPP Investments," said Deb Orida, Global Head of Real Assets & Chief Sustainability Officer. "This new investment approach complements the Fund's ongoing commitment to investing in companies that have the potential to develop innovative climate technologies around the world and furthers our existing capabilities in technologies that enable the energy evolution." Strategic sectors that are essential, high emitting and hard-to-abate within this investment approach include agriculture, chemicals, cement, conventional power, oil and gas, steel and heavy transportation. The successful decarbonization of these sectors is not only essential to meet wider net-zero ambitions, but also to sustain economic growth, stability and a responsible transition." Our Supplemental Documents package includes the CPPIB announcement."

Capital Markets – Investors coming back to China

Investors coming back to China

One of the markets stories over the past week to gain momentum is that investors are now going back into China. We were watching Bloomberg Markets China Open on Monday night, when Blomberg put up the below chart. We tweeted [LINK] "*China reopening. May not necessarily be smooth, but foreign investors are increasingly believing it will happen. "Foreign investors piling back into China" graph an hour ago from @YvonneManTV on @markets China Open. #OOTT."*

Figure 43: Bloomberg, Foreign Investors Piling Back into China

Source: Bloomberg

Capital Markets – BlackRock doesn't see US inflation getting to Fed 2% target

BlackRock on FED's challenge

On Monday, we tweeted on the BlackRock Vice Chair Philipp Hildebrand comments in his Bloomberg interview from Davos that received some headlines because of his view on inflation and the difficulty he sees in the FED keeping their fight to get to their 2% inflation target. And he believes the FED is likely to back off the fight to get to 2%. On Monday, we tweeted [LINK] "*@BlackRock Vice Chair: "I don't see any chances, frankly, of easing this year. I think the market has that wrong." easy from 9 to 4%, tough is 4 to 2%, Fed may back off from 2% depending on how damaging that fight is to real economy. Thx @flacqua. #OOTT,'* HIldebrand thinks it will be easy and quick to move inflation down to 4%, but it will be tough to go from 4% to 2%, And he isn't sure the FED will go all the way to get to 2% as he thinks it will depend on how damaging it is to the real economy in that fight. The short video clip is at [LINK].

Demographics – China's population declines for 1st time in 60 years

China population decline in 2022

Demographic impacts don't surprise overnight, but demographics are predictive. And one of the key demographic trends for the next 30 years is China's aging population. And it looks lie Covid caused an abrupt pivot to a declining population in 2022. And it may be down the road, but China, like any aging population will eventually face a Japan problem. On Monday, we tweeted [LINK] "*China population shrinks by 850,000 to 1.4118 b, 1st decline in 60 yrs. Seems Covid impact with deaths and also lower birth rates. But reminds of long-term challenge for China - an aging population ie. a Japan demographic problem in 10 or 20 years. Thx @sunyue_luna. #OOTT."* The South China Morning Post [LINK] reported *"2022 officially marked the year China saw its first population decline in six decades, with the national birth rate falling to a record low. And the deepening demographic crisis threatens far-reaching implications for China's already slowing economic growth. China's overall population plummeted by 850,000 people – to 1.4118 billion in 2022, from 1.4126 billion a year earlier, the National Bureau of Statistics (NBS) said. Mothers in China had 9.56 million babies last year, a 9.98 per cent drop from 10.62 million in 2021. The national birth rate fell to a record low of 6.77 births for every 1,000 people in 2022, down from 7.52 in 2021, and marking the lowest rate since records began in 1949. The national death rate was 7.37 per thousand last year, putting the national growth rate at negative 0.6 per thousand people.."*
Our Supplemental Documents package include the SCMP report.

Demographics – Google layoffs done by email, not by phone or not in person

Our Oct 16, 2022 Energy Tidbits memo noted the Beyond Meat layoffs and "*Maybe it's just the new normal, but we have to believe the bar is being set lower for how management is supposed to deal with negatives. Beyond Meat laid off ~19% of its workforce on Thursday, and apparently did so by telling employees to work at home that day, restricted access to documents and then were told by a phone call if they were losing their job*." Google's layoffs this week went one step further and were reportedly done by email or employees finding out by turning on their computer to work and being cut off from any access. And one report was that there was no ability to contact their manager.

Makes it easier for managers to hire people to have to fire them later

There is nothing worse for employees and managers than the process of sitting down to tell someone they have been laid off in a mass layoff. Anyone who was a manager in the oil patch in the 80s knows this well. Layoffs are hugely traumatic event for the person being canned and telling the employee he is being canned is probably the hated management job to do. But, it was always done in person and management knew that was the way it was done. That's changing now. But one thing it is also did for managers was make them think twice in their hiring process as you were always thinking you wanted to make sure you weren't hiring for the sake of hiring, but to make sure it was a needed position that you weren't likely to have to cut if the price of oil dropped a few bucks. Our concern is that if it's easier for managers to fire people, it also makes easier for them to hire people without worrying about having to an in-person firing potentially down the road.

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.

Brooke Henderson has 3-shot lead into final round today

We and other Canadian golf fans, will be doing some channel jumping tomorrow as Brooke Henderson is has a 3-shot lead going into the final round of the 2023 Hilton

Grand Vacations Tournament of Champions. The broadcast time is noon – 3pm MT, and the Bills/Bengals kickoff is 1pm MT. This is the first event of the 2023 LPGA season and is limited to winners on the LPGA tour in the last two years. There are only 29 golfers. Brooke is at -14 ahead of Nasa Hataoka and Nelly Korda at -11, and then Maja Stark and Charley Hull at -9.

Chinese New Year today, it's the year of the Rabbit

It's the year of the Rabbit starting from today, Jan 22, 2023 and ending on Feb 9, 2024 (Chinese New Year's Eve). China Highlights describes it [LINK] "*The sign of Rabbit is a symbol of longevity, peace, and prosperity in Chinese culture. 2023 is predicted to be a year of hope. The luckiest Chinese zodiac signs in 2023 are Oxes, Tigers, and Snakes. Then, with not quite so much luck, come Dogs, Horses, Goats, and Pigs. Rabbits' and Rats' fortunes will be influenced by 'opposition to Tai Sui'. Roosters and Monkeys will have to work especially hard to make headway. People born in a year of the Rabbit are called "Rabbits" and are believed to be vigilant, witty, quick-minded, and ingenious.*"