Energy Tidbits

December 11, 2022

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ICYMI, CNQ's Multilateral Success is "Applicable Across our Large Heavy Oil Land Base" ie. Should Work Broadly for Industry

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. CNQ's multilateral well success in conventional heavy oil is being overlooked for its impact on conventional heavy oil for western Canada in total ie. not just CNQ (Click Here)

2. TC Energy's latest Keystone update notes they are evaluating a return to partial service on eastern leg to Patoka. (Click Here)

3. China reduced Covid restrictions, but bigger oil watch is on increasing Covid cases and expectations that new cases don't peak for another month or two (Click Here)

4. Exxon expects 2023 Permian oil growth at half current levels that were boosted by working down DUCs (Click Here)

5. BlackRock warns that accelerating energy transition could lead to inflation/economic issues if low-carbon isn't ramped up fast enough to replace any phase-out of fossil fuels. (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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YoY storage at -51 bcf YoY deficit

Natural Gas – Natural gas draw of -21 bcf, storage now -51 bcf YoY deficit

We should see a return to widening the YoY deficit in gas storage primarily because last Dec was the hottest on record. This winter started with a YoY storage deficit of -101 bcf YoY on Oct 28 but had flipped to a +4 bcf YoY surplus for Nov 11 storage data. This week is a -51 bcf YoY deficit. The EIA reported a -21 bcf draw (-28 bcf expectations) for the Dec 2 week, which was a smaller draw vs both the 5-yr average of a -49 bcf draw, and last year's draw of -59 bcf. Storage is 3.462 tcf as of Dec 2, with a now YoY deficit of -51 bcf YoY vs -89 bcf YoY surplus last week and is flat at -86 bcf below the 5-year average vs -86 bcf below last week. Below is the EIA's storage table from its Weekly Natural Gas Storage Report [LINK].

Figure 1: US Natural Gas Storage

	Stocks billion cubic feet (Bcf)				Historical Comparisons			
					Year ago (12/02/21)		5-year average (2017-21)	
Region	12/02/22	11/25/22	net change	implied flow	Bcf	% change	Bcf	% change
East	834	840	-6	-6	846	-1.4	852	-2.1
Midwest	1,028	1,040	-12	-12	1,022	0.6	1,023	0.5
Mountain	193	197	-4	-4	206	-6.3	205	-5.9
Pacific	217	226	-9	-9	266	-18.4	284	-23.6
South Central	1,191	1,181	10	10	1,173	1.5	1,157	2.9
Salt	327	314	13	13	329	-0.6	327	0.0
Nonsalt	864	867	-3	-3	843	2.5	829	4.2
Total	3,462	3,483	-21	-21	3,513	-1.5	3,520	-1.6

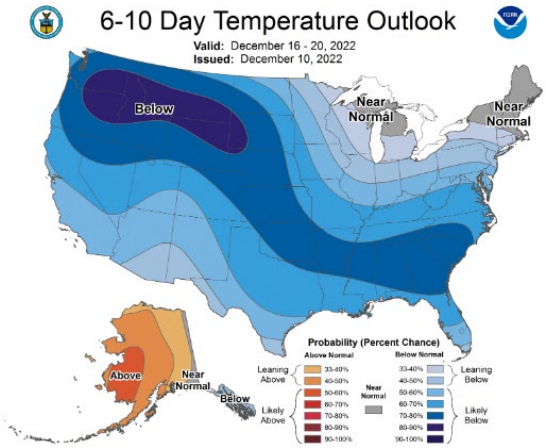
Source: EIA

NOAA 6-10 & 8-14 day temp outlook

Natural Gas – Finally, NOAA forecasts cold weather expected across all of the US

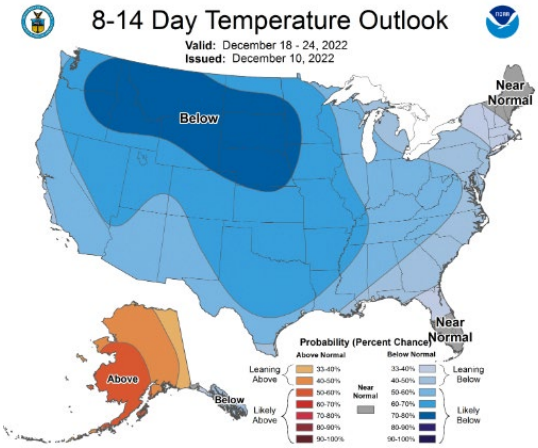
Yesterday, we tweeted [LINK] "*Finally, some cold weather expected across all of the US in the lead up to Xmas.*" And included NOAA's yesterday updated 6-10 day and 8-14 day outlook that run up to Dec 24. Below are NOAA's 6-10 day and 8-14 day temperature outlooks as of yesterday afternoon.

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



Source: NOAA

Figure 3: NOAA 8-14 day temperature outlook as of Dec 10



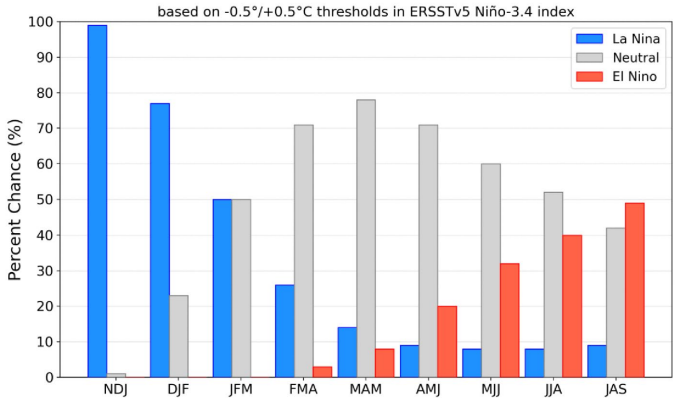
Source: NOAA

Natural Gas – Continued La Nina/Neutral conditions for the winter

On Thursday, NOAA posted its updated El Nino/La Nina forecast [LINK], which still calls for a La Nina/Neutral peak winter Dec/Jan/Feb. The probability is for La Nina ~78%, Neutral 22%%, El Nino 0%. In Jan/Feb/Mar the probability of a La Nina and Neutral weather turns to a 50/50 split. The El Nino/La Nina forecast isn't a temperature outlook and weather forecasts are far from 100% correct. However, the major natural gas concern tends to be strong El Nino winters, which tend to lead to warmer than normal winters. Whereas La Nina winters are typically viewed to more likely to be a normal type winter, but as noted in the following item, La Nina winters can be warm.

Forecasts for La Nina winter

Figure 4: Early-Oct NOAA El Nino/La Nina Outlook



Source: CPC/IRI

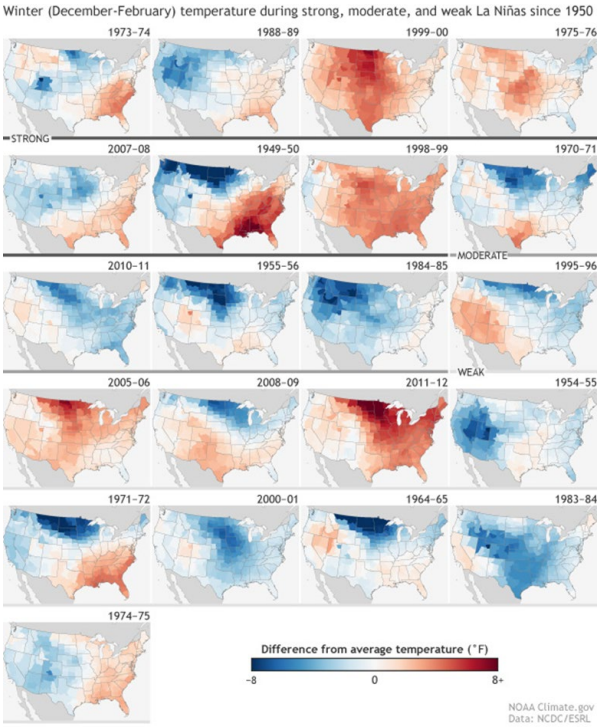
Natural Gas – But La Nina correlations to cold winters are far from 100%

As we have seen so far in winter 2022/23, it hasn't been a colder than normal winter in the US. La Nina winters are more often normal to colder than normal than a warmer winter. But

La Nina winters are unpredictable

we remind of an Oct 6, 2017 NOAA brief *"Temperature patterns during every La Niña winter since 1950"*, which looked at all La Nina winters from 1950 thru 2016/17, classified them as strong, moderate or weak La Ninas, and then showed the average winter (Dec thru Feb) temperature map. We checked this weekend and the link still works [LINK]. The bottom line is that it may slightly favor a normal to colder than normal winter, but there have some been near record high temperature La Nina winters. Below is the NOAA graphic.

Figure 5: Winter (Dec-Feb) Temp in Strong, Moderate And Weak La Ninas 1950 - 2017



Source: CPC

Natural Gas – EIA raises 2022 US gas production exit, increase for 2023

EIA US natural gas production forecast

The EIA released its monthly Short Term Energy Outlook Dec 2022 [LINK]. (i) The EIA forecasts higher prices and some pipeline constraints will reduce drilling activity. However, the EIA Dec STEO increased its Q4/22 US gas production forecast from 100.11 bcf/d to 100.50 bcf/d ie. more momentum to leave 2022. (ii) US natural gas production is expected to average 98.11 bcf/d in 2022 (98.05 bcf/d previously) and 2022 is up 4.56 bcf/d YoY. (iii) The EIA expects US gas production to dip in Q1/23 to 99.87 bcf/d. The EIA wrote "*we raised our forecast for U.S. natural gas production by almost 1% in 2023 compared with last month's forecast. Although we continue to expect natural gas production in the Permian Basin to be limited early in 2023 by the lack of pipeline capacity to bring associated natural gas production to market, we expect that these constraints will be resolved earlier than we had previously assumed.*" (iii) The EIA only increased its 2023 forecast to 100.40 bcf/d vs 99.68

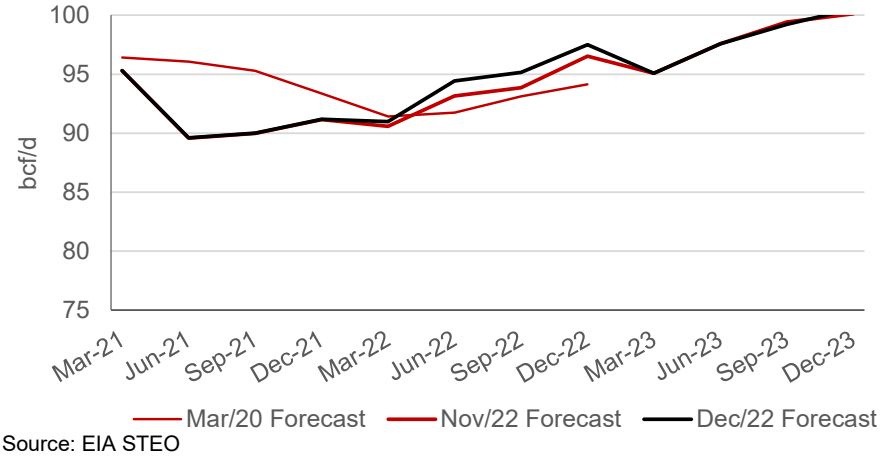
bcf/d last month. This would be +2.26 bcf/d YoY. (iv) Our Supplemental Documents package includes excerpts form the STEO.

Figure 6: EIA STEO US Natural Gas Supply Forecasts by Forecast Month

bcf/d	Q1/20	Q2/20	Q3/20	Q4/20	2020	Q1/21	Q2/21	Q3/21	Q4/21	2021	Q1/22	Q2/22	Q3/22	Q4/22	2022	Q1/23	Q2/23	Q3/23	Q4/23	2023
Dec-2022	95.31	89.61	90.01	91.17	91.52	90.98	94.43	95.14	97.49	94.51	95.08	97.58	99.22	100.5	98.11	99.87	99.52	100.5	101.6	100.4
Nov-2022	95.29	89.59	89.99	91.15	91.49	90.59	93.15	93.86	96.52	93.55	95.08	97.58	99.43	100.11	98.05	99.00	99.42	99.99	100.33	99.68
Oct-2022	95.29	89.59	89.99	91.15	91.49	90.59	93.15	93.86	96.52	93.55	95.08	97.55	98.48	99.06	97.54	99.19	99.57	99.73	100.00	99.62
Sep-2022	95.29	89.59	89.99	91.15	91.49	90.59	93.15	93.86	96.52	93.55	94.60	96.87	97.85	98.99	97.08	99.65	100.51	100.59	100.67	100.36
Aug-2022	95.29	89.59	89.99	91.15	91.49	90.59	93.15	93.86	96.52	93.55	94.60	96.61	97.02	98.09	96.59	98.90	100.13	100.52	100.51	100.02
July-2022	95.29	89.59	89.99	91.15	91.49	90.59	93.15	93.86	96.53	93.55	94.61	95.51	96.88	97.89	96.23	98.40	99.62	100.60	101.25	99.98
June-2022	95.29	89.59	89.99	91.15	91.49	90.59	93.15	93.86	96.53	93.55	94.61	95.48	96.90	98.94	96.50	99.94	101.30	102.33	102.66	101.57
May-2022	95.29	89.59	89.99	91.15	91.49	90.59	93.15	93.86	96.53	93.55	94.66	95.82	97.17	99.14	96.71	100.25	101.55	102.42	102.42	101.71
Apr-2022	95.29	89.59	89.99	91.15	91.49	90.59	93.15	93.86	96.63	93.57	95.41	97.01	97.94	99.23	97.41	99.72	100.56	101.41	101.72	100.86
Mar-2022	95.29	89.59	89.99	91.15	91.51	90.59	93.15	93.86	96.57	93.54	95.69	96.09	96.97	98.00	96.69	96.11	98.75	99.60	100.10	98.64
Feb-2022	95.29	89.59	89.99	91.15	91.51	90.59	93.15	93.86	96.69	93.57	95.43	95.54	96.26	97.12	96.09	97.11	97.57	98.34	98.84	97.97
Jan-2022	95.29	89.59	89.99	91.14	91.50	90.59	93.15	93.89	96.33	93.49	95.94	95.55	95.96	96.69	96.04	96.71	97.13	97.89	98.45	97.55
Dec 2021	95.29	89.59	89.99	91.14	91.50	90.48	93.20	94.01	95.59	93.32	95.22	95.35	96.10	97.21	95.97					
Nov 2021	95.29	89.59	89.99	91.14	91.50	90.48	93.20	94.52	94.94	93.29	95.41	96.00	97.12	98.18	96.68					
Oct 2021	95.29	89.57	89.99	91.14	91.50	90.30	92.89	93.32	93.65	92.54	94.38	95.41	97.12	98.69	96.40					
Sept 2021	94.80	89.68	89.83	91.15	91.36	90.30	93.05	92.64	92.70	92.18	93.17	94.54	96.25	97.59	95.40					
Aug 2021	94.79	89.68	89.83	91.15	91.35	90.29	92.49	92.67	93.11	92.15	93.34	94.15	95.51	96.47	94.88					
July 2021	94.79	89.68	89.83	91.15	91.35	90.31	92.88	93.17	93.80	92.55	93.65	94.10	95.16	95.82	94.69					
June 2021	94.79	89.68	89.83	91.15	91.35	90.53	92.26	92.63	93.26	92.18	93.13	93.48	94.31	94.81	93.93					
May 2021	94.79	89.68	89.83	91.15	91.35	90.09	90.75	91.34	92.03	91.06	91.97	92.54	93.60	94.36	93.12					
Apr 2021	94.79	89.68	89.83	91.18	91.36	90.82	90.90	91.59	92.31	91.41	92.23	92.75	93.76	94.39	93.29					
Mar 2021	94.79	89.68	89.82	91.08	91.34	90.50	91.04	91.71	92.13	91.35	91.87	92.25	93.28	93.90	92.83					

Source: EIA STEO

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



Source: EIA STEO

Natural Gas – EIA STEO forecasts Apr 1, 2023 storage 1.445 tcf, up small YoY

EIA STEO storage forecast

The EIA STEO also forecasts US gas storage. No surprise, the higher actual storage levels In Oct and Nov led the EIA to immaterially increase its forecasts for storage levels. With the higher start to winter 2022/23 natural gas withdraw season, the EIA now forecasts storage to end the winter at 1.445 tcf on April 1, which is +0.044 tcf YoY and +0.012 tcf vs its Nov STEO forecast. For winter 2023/24, the EIA now forecasts Nov 1 storage at 3.186 tcf, which is +0.259 tcf YoY, but basically unchanged from 3.183 tcf in the Nov STEO forecast.

Figure 8: EIA STEO forecast US gas storage

	US Working Natural Gas in Storage (billion cubic feet)					
	Storage	2016-2023				
	Level	Low	High	Range	Average	Deviation
Mar 2016	2,486.3	1,184.9	2,486.3	1,301.4	1,835.6	35.4%
Oct 2016	4,012.7	3,236.3	4,012.7	776.4	3,624.5	10.7%
Mar 2017	2,062.5	1,184.9	2,486.3	1,301.4	1,835.6	12.4%
Oct 2017	3,816.5	3,236.3	4,012.7	776.4	3,624.5	5.3%
Mar 2018	1,390.3	1,184.9	2,486.3	1,301.4	1,835.6	-24.3%
Oct 2018	3,236.3	3,236.3	4,012.7	776.4	3,624.5	-10.7%
Mar 2019	1,184.9	1,184.9	2,486.3	1,301.4	1,835.6	-35.4%
Oct 2019	3,762.0	3,236.3	4,012.7	776.4	3,624.5	3.8%
Mar 2020	2,029.4	1,184.9	2,486.3	1,301.4	1,835.6	10.6%
Oct 2020	3,928.5	3,236.3	4,012.7	776.4	3,624.5	8.4%
Mar 2021	1,801.2	1,184.9	2,486.3	1,301.4	1,835.6	-1.9%
Oct 2021	3,665.4	3,664.6	4,012.7	348.1	3,838.6	-4.5%
Mar 2022	1,401.5	1,184.9	2,486.3	1,301.4	1,835.6	-23.6%
Oct 2022	3,567.4	3,236.3	4,012.7	776.4	3,624.5	-1.6%
Mar 2023	1,445.1	1,184.9	2,486.3	1,301.4	1,835.6	-21.3%
Oct 2023	3,816.0	3,236.3	4,012.7	776.4	3,624.5	5.3%

Source: EIA

Natural Gas – Long-term LNG deal, Sempra/ENGIE sign a 15-year deal for 0.12 bcf/d

There haven't been many long-term LNG deals over the past six months because most, if not all the available long term LNG supply available before 2025 was locked up in the July 2021 to July 2022 rush. Rather, the long-term deals now being done are for long term supply starting in 2026 or late. On Wednesday, Sempra Infrastructure and ENGIE announced their new agreement which will span 15 years and ship 0.12 bcf/d with expected first shipment not yet announced [LINK]. Sempra's Port Arthur LNG Phase 1 is expected to have final investment decision done by Q1/23 with Phase 2 under development. Justin Bird, CEO of Sempra Infrastructure explains *"ENGIE is a leader in Europe's energy transition and a great addition to our Port Arthur LNG customer portfolio. We are excited to work with ENGIE to deliver reliable energy resources like LNG and contribute to the security of natural gas supply to their clients while supporting both companies' ESG commitments."* Sempra Infrastructure is a US-based energy company focused on the energy networks, LNG, and net-zero solutions. ENGIE is a multinational utility company with a focus on energy transition, electricity generation and distribution, and natural gas headquartered in the France. Our Supplemental Documents package includes the Sempra Infrastructure release.

Asia is still well in front of Europe in securing long term LNG supply

Our March 13, 2022 Energy Tidbits memo noted that Europe LNG buyers were starting 9 months behind the wave of Asian LNG buyers who started to lock up long term LNG supply starting in July 2021. The LNG supply crunch is not a 2022 development. Rather, it was clear in H1/21 that there was a major sea change in LNG outlook. We turned very bullish on LNG outlook for the 2020s once TotalEnergies went force majeure on its Mozambique LNG in April 2021. We posted our April 28, 2021 blog *"Multiple Brownfield LNG FIDs Now Needed To Fill New LNG Supply Gap From Mozambique Chaos? How About LNG Canada Phase 2?"* as we thought the market had overlooked that this force majeure backed up 5.0 bcf/d of Mozambique LNG that was originally planned to start in phases in 2024. And that this would create an earlier and larger LNG supply gap in the mid 2020s. Then we started to see validation of this view when Asian LNG buyers in July made an abrupt change to their LNG contracting and pivoted to trying to lock in long term LNG

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

There have been 12.71 bcf/d of long-term LNG supply deals since July 1, 2021

We first highlighted this abrupt shift to long term LNG supply deals in our July 14, 2021 8-pg "*Asian LNG Buyers Abruptly Change and Lock in Long Term Supply – Validates Supply Gap, Provides Support For Brownfield LNG FIDs".* We included a table of the deals done in that short two week period. We continue to update that table, which now shows 12.59 bcf/d of long term LNG deals since July 1, 2021. 65% 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. 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 9: Long Term LNG Supply Deals since July 1, 2021

Long-Term LNG Buyer Deals Since July 1, 2021							
Date	Buyer	Seller	Country	Volume	Duration	Start	End
			Buyer / Seller	(bcf/d)	Years		
Asian LNG Deals							
Jul 7, 2021	CNOOC	Petronas	China / Canada	0.30	10.0	2022	2032
Jul 9, 2021	CPC	QatarEnergy	Taiwan / Qatar	0.16	15.0	2022	2037
Jul 9, 2021	Guangzhou Gas	BP	China / US	0.13	12.0	2022	2034
Jul 12, 2021	Korea Gas	QatarEnergy	Korea / Qatar	0.25	20.0	2025	2045
Sep 29, 2021	CNOOC	QatarEnergy	China / Qatar	0.50	15.0	2022	2037
Oct 7, 2021	Shenzhen	BP	China / US	0.04	10.0	2023	2032
Oct 11, 2021	ENN	Cheniere	China / US	0.12	13.0	2022	2035
Nov 4, 2021	Unipec	Venture Global LNG	China / US	0.46	20.0	2023	2043
Nov 4, 2021	Sinopec	Venture Global LNG	China / US	0.53	20.0	2023	2043
Nov 5, 2021	Sinochem	Cheniere	China / US	0.12	17.5	2022	2040
Nov 22, 2021	Foran	Cheniere	China / US	0.04	20.0	2023	2043
Dec 6, 2021	Guangdong Energy	QatarEnergy	China / Qatar	0.13	10.0	2024	2034
Dec 8, 2021	S&T International	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 10, 2021	Suntien Green Energy	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 15, 2021	SPIC Guangdong	BP	China / US	0.03	10.0	2023	2033
Dec 20, 2021	CNOOC Gas & Power	Venture Global LNG	China / US	0.26	20.0	2023	2043
Dec 29, 2021	Foran	BP	China / US	0.01	10.0	2023	2032
Jan 11, 2022	ENN	Novatek	China / Russia	0.08	11.0	2024	2035
Jan 11, 2022	Zhejiang Energy	Novatek	China / Russia	0.13	15.0	2024	2039
Feb 4, 2022	CNPC	Gazprom	China / Russia	0.98	30.0	2023	2053
Mar 24, 2022	Guangdong Energy	NextDecade	China / US	0.20	20.0	2026	2046
Mar 29, 2022	ENN	Energy Transfer	China / US	0.36	20.0	2026	2046
Apr 1, 2022	Guangzhou Gas	Mexico Pacific Ltd	China / Mexico	0.26	20.0	n.a.	n.a.
Apr 6, 2022	ENN	NextDecade	China / US	0.20	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
Total Asian LNG Buyers New Long Term Contracts Since Jul/21				**8.16**			
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	0.67	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.
Total Non-Asian LNG Buyers New Long Term Contracts Since Jul/21				**4.55**			
Total New Long Term LNG Contracts since Jul/21				**12.71**			
*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/							

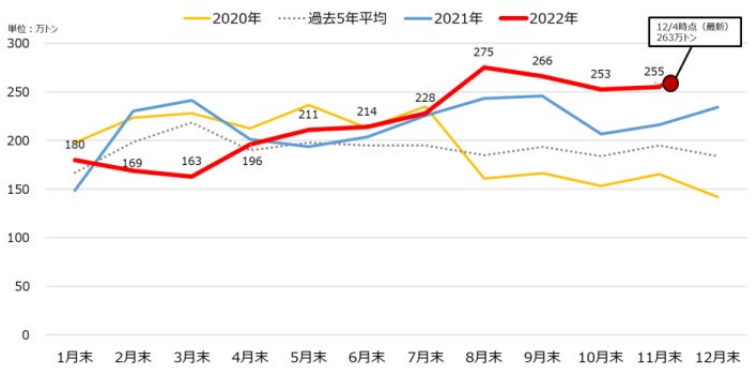
Source: Company reports, SAF Group

Natural Gas – Japan's LNG stocks up 4.4% WoW to 126 bcf

Japan LNG stocks +4.4% WoW

It continues to be warmer than normal in Japan and the forecasts are for continued warmer than normal temperatures in Dec. But the risk for Japan in the winter is that they need full storage and continued LNG imports to avoid natural gas outages. Although that risk lessens the longer it stays warmer than normal in Dec, Japan's LNG stockpiles are not huge relative to LNG imports that have ranged from 7 to 14 bcf/d since Jan 1, 2021. A cold winter or interruption in LNG imports could lead to a shortage. LNG stockpiles held by Japanese power producers have exceeded 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 Dec 4 were ~126 bcf, -3.1% WoW from Nov 27 of 121 bcf and above the 5-yr average of 112 bcf. Below is the LNG stocks graph from the METI weekly report.

Figure 10: Japan's LNG Stocks



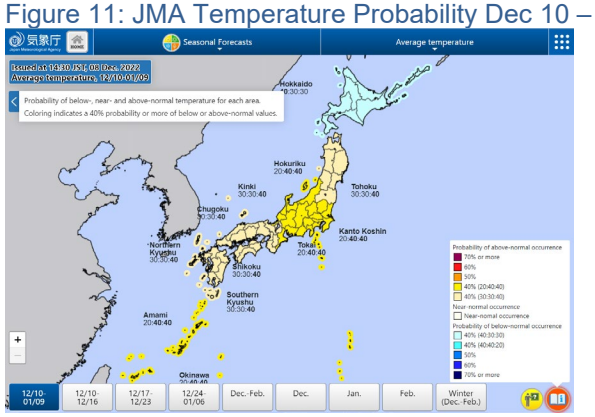
Source: METI

Natural Gas – Japan still expects warmer than normal temperatures in Dec

Japan temperature outlook

It's not just that it was warm in Japan in November, but the forecasts for Dec changed over the past month from expectations for a colder than normal Dec to a warmer than normal Dec. Every Thursday, the Japan Meteorological Agency provides an updated 30-day temperature probability outlook. The expectation has been that the warmer than normal weather would continue in November, but then to give way to a cold. The new weekly JMA forecast builds on the view of the last two weeks and call warmer than normal temperatures in Dec. Below is the JMA's Dec 8 updated 30-day outlook. [LINK]

Figure 11: JMA Temperature Probability Dec 10 – Jan 9

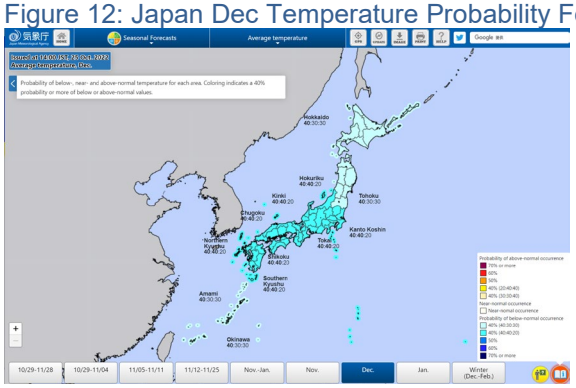


Source: Japan Meteorology Agency

Recall JMA's Oct 25 seasonal forecasts called for colder than normal Dec/Jan

The last three weeks JMA 30-day forecasts are a good reminder that forecasting weather is far from a 100% game. These last three 30-day forecasts for Dec were a change from the JMA's Oct 25 seasonal forecast for Nov/Dec/Jan. Here is what we wrote in the Oct 30, 2022 Energy Tidbits memo. *"On Thursday, we tweeted [LINK] "Still early, but Japan Meteorological Agency 10/25 forecast calls for colder than normal Dec and Jan. Nov expected warmer than normal. #NatGas #LNG #OOTT". With winter right around the corner, Japan expects a warmer end to fall with November being warmer than normal, but then switching to below normal temperatures in December and January. On Thursday, the Japan Meteorological Agency posted its seasonal forecast for Nov 2022 – Jan 2023 and overall it is a positive indicator for electricity demand as residents look to heat their homes [LINK]. So far in 2022, Japan has been trying to maximize coal and petroleum products due to the sky-high prices of LNG. But a cold Dec/Jan should lead to increased natural gas/LNG consumption. The JMA forecasts that most of the country should expect colder than average winter temperatures, especially in the southern regions of the island."* Below is the JMA Oct 25 seasonal forecast for Dec 2022.

Figure 12: Japan Dec Temperature Probability Forecast



Source: JMA

Germany $3b loan guarantee to Trafigura

Natural Gas – Germany $3b loan guarantee to Trafigura to secure long-term LNG

It looks like Germany has done another deal to try to secure long-term natural gas where Germany companies don't have to say they committed to buy long-term natural gas, but where Germany has to pay someone to do it. In this case, they are paying Trafigura to secure long term LNG. On Monday, we tweeted [LINK] "*Hmm! 12/05. Germany $3b loan guarantee for #Trafigura to secure long-term #NatGas #LNG. 11/29 tweet 👇, wonder what the DE "give" was to get @qatarenergy @conocophillips 15-yr LNG supply deal to DE? Seems Germany needs long-term #NatGas!. #OOTT.* On Monday, Trafigura announced [LINK] "*Trafigura signs USD3 billion loan agreement guaranteed by the Federal Republic of Germany to secure gas supply. Geneva, December 5, 2022 - Trafigura, a market leader in the global commodities industry, has entered into a USD3 billion four-year loan jointly arranged and underwritten by Deutsche Bank and another international bank and syndicated to a number of participating banks. Over 25 banks participated in the successful syndication which was 1.6 times oversubscribed. The loan is secured, in part, by a guarantee under the Untied Financial Loan program (UFK) of the government of the Federal Republic of Germany acting through the German Export Credit Agency (ECA) Euler Hermes Aktiengesellschaft. The program is a tool to secure the long-term delivery of strategic commodities to Germany."* Our Supplemental Documents package includes the Trafigura release.

What did it cost Germany to get the Conoco/Qatar 15-yr LNG supply deal

Our tweet referenced the recent Qatar/Conoco deal to supply long-term LNG to Germany. We are still not convinced it was an LNG supply deal or whether it was a Qatar/Conoco tying up the regas capacity in Germany. Germany had to give up something or pay something somewhere to get the Qatar/Conoco supply deal. Here is what we wrote in our Dec 4, 2022 Energy Tidbits "There was a lot of backslapping on how Germany stepped up to the table to do a 15-yr LNG deal with Qatar, but, based on the Qatar Energy press release, we wonder how firm the LNG supply is and whether the deal is actually Qatar and Conoco tying up the LNG regasification capacity at Germany's Brunsbuttel regasification terminal? (i) We tweeted [LINK] "*@qatarenergy /@conophillips long-term 15-yr supply of "UP TO" 0.26 bcfd Qatari #LNG to Germany. No DE buyers announced, so feels more like COP/Qatar tieing up DE regas capacity. 0.26 bcf/d equals COP 3.125% of 4.4 bcfd NFE plus its 0.625% of 2.1 bc/d NFS expansions."* (ii) Qatar Energy "*announced the signing of two long-term LNG sale and purchase agreements (SPAs) between QatarEnergy and ConocoPhillips affiliates for the delivery of up to two (2) million tons per annum (MTPA) of LNG from Qatar to Germany.Pursuant to the two SPAs, a ConocoPhillips wholly owned subsidiary will purchase the agreed quantities to be delivered ex-ship to the "German LNG" receiving terminal, which is currently under development in Brunsbüttel in northern Germany, with deliveries expected to start in 2026." (iii) No where did we see any disclosure of any German buyers in the deal ie. utilities, major industrial users, etc. Everyone got excited with the deliver from Qatar to Germany so no ones seemed to ask the question, were there any German buyers who stepped up to commit to buy 15-year LNG that starts delivery from 2026? (iv) Also, it's not clear from the release what the firm LNG volumes are to be delivered. Rather the release says the deliver of "up to two (2) million tons per annum of LNG". That is equal to "up to" 0.26 bcf/d But the "up to" seemed to have been overlooked. (v) With the "up to"*

condition, we actually wonder if the strategy for Qatar and Conoco is that this deal was done for them to tie up the regasification capacity at Brunsbuttel? (vi) Hopefully, there will be more disclosure to answer these questions. Our Supplemental Documents package includes the Qatar Energy release. [LINK]

Germany floating regas unit cost overrun

Natural Gas – Germany floating regas unit costs 3x initial budgeted cost

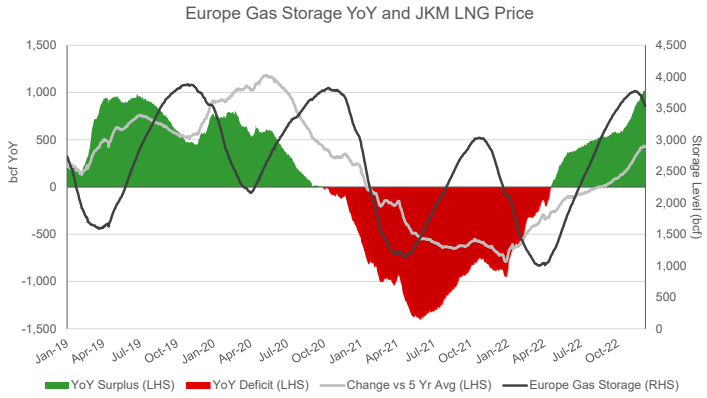
It looks like Germany's rush to get its first floating regasification unit up and running had a big impact on its cost. We think it is fair to expect there would be cost overruns but we were surprised that the cost ended up being 3x the planned cost. And this cost estimate wasn't from years ago, but sometime earlier in 2022 when Germany decided it needed to get regas facilities and to do so as soon as possible. On Friday, Bloomberg reported "*Germany's bill for new floating liquefied natural gas terminals is ballooning, with the cost now more than three times higher than initially budgeted. The facilities are estimated to cost €9.7 billion ($10.2 billion) for the period from 2022 — when the first units are set to start — until 2038, German Economy Ministry spokeswoman Beate Baron said at regular government news conference in Berlin Friday. "These costs will then be offset against income from regasification fees, which of course would only start flowing when they go into operation," she said. "Of course we can't see into the future and they could of course change." The price tag of the terminals, which Germany is investing in to replace Russian gas, was already more than twice as high as the €3 billion in the program's initial budget, according to estimates that Economy Minister Robert Habeck gave less than three weeks ago. "*

Europe storage now 89.41% full

Natural Gas – Europe storage is now +26.09% YoY ie. 89.41% full vs 63.32%

It was a very good Oct/Nov for lower natural gas consumption driven by warmer than normal weather and industrial demand destruction. But at least, this week the approach of some colder weather brought draws in Europe gas storage levels that are still at very high levels. Europe gas storage began the year in a YoY deficit, but the YoY Europe storage deficit changed to a YoY storage surplus, and it continues to build this week. Europe gas storage started the winter 17.86% YoY and is now a YoY surplus of 25.10%. Europe gas storage started 2020 winter (Nov 1/20) at basically full levels at 94.66% and had dropped by 65.77% to be 28.89% at Apr/21. Europe storage levels bottomed in late Apr/22 at 29%, which was the lowest level since Apr 2018. Last winter began (Nov 1/21) with gas storage at 77.14% capacity, down 18.52% YoY. The YoY deficit has turned to surplus after months of the deficit tightening. This winter (Nov 1/22) began with gas storage at 94.94% capacity, up 17.86% YoY. Thanks to the warm weather and US LNG, storage as of Dec 8 is at 89.41%, which is +26.09% greater than last year levels of 63.32% and are +10.63% above the 5-year average of 78.78%. Below is our graph of Europe Gas Storage Level.

Figure 13: Europe Gas Storage Level



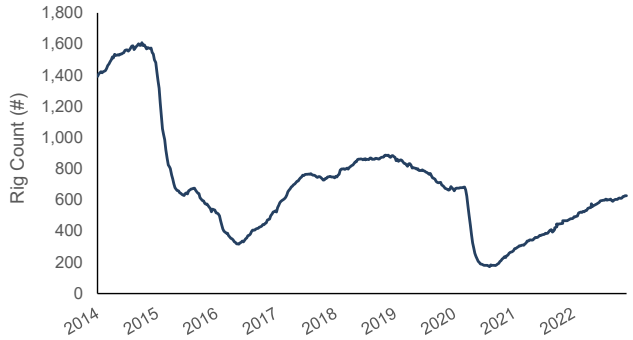
Source: Bloomberg

Oil – US oil rigs down -2 rigs to 625 oil rigs on Dec 9

US oil rigs down WoW

Baker Hughes released its weekly North American drilling activity data on Friday. US rigs don't typically have a Christmas drop like in Canada. Normally rigs are relatively flat over Christmas, but, with oil down over the past two weeks, there might be some declines. This week US oil rigs fit the trend of being down slightly -2 rigs at 625 oil rigs. The big change came from the smaller basins which decreased -3 rigs this week. US oil rigs hit a 15-week low of 591 on September 9. US oil rigs are still +446 oil rigs since the Covid Sept 17, 2020 oil rigs of 179 oil rigs. And US oil rigs are +154 oil rigs YoY. US gas rigs were also down -2 WoW at 153 gas rigs.

Figure 14: Baker Hughes Total US Oil Rigs



Source: Baker Hughes

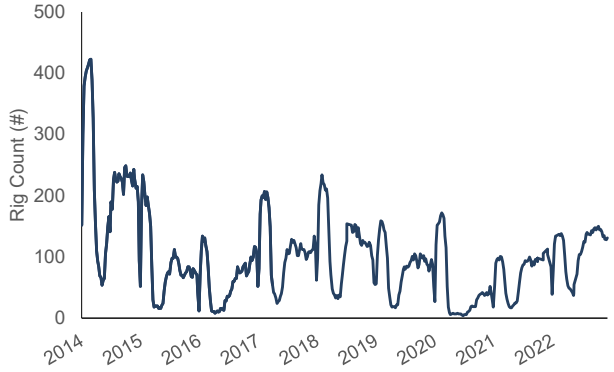
Oil – Total Cdn rigs up +7 WoW to 202 total rigs, +21 rigs YoY

Cdn rigs +7 WoW

Total Cdn rigs were +7 to 202 rigs as of Dec 9, 2022. Cdn oil rigs were +3 to 131 oil rigs. Cdn gas rigs were +4 to 71 rigs. Cdn rigs normally start to decline in the 3rd week of December and then more thru Xmas week and New Years week. Total rigs are now +91 vs the comparable Covid period of 111 rigs on Dec 11, 2020. Cdn drilling has recovered YoY, a

year ago Cdn oil rigs were 110 and Cdn gas rigs were 67 for a total Cdn rigs of 177, meaning total Cdn oil rigs are +25 YoY to 131 oil rigs and Cdn gas rigs are flat at 71 gas rigs.

Figure 15: Baker Hughes Total Canadian Oil Rigs



Source: Baker Hughes

Oil – US weekly oil production up slightly at 12.2 mmb/d

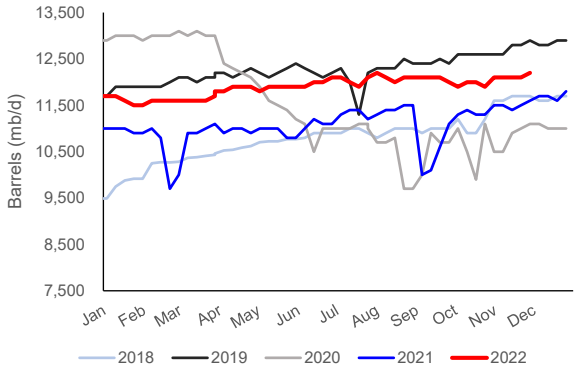
No one should be surprised to see the EIA weekly forecasts up. We have been highlighting how the EIA actuals were running ahead of the weekly estimates and we expected this to flow thru to these weekly oil forecasts. After a few flat weeks, it looks like the EIA's weekly estimates of US oil production saw a slight increase this week. The EIA estimates US oil production was up 0.1 mmb/d WoW to 12.2 mmb/d for the week ended Dec 2. 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. This is the first time breaking above 12.1 mmb/d since it touched 12.2 mmb/d in the 1st week of August. Lower 48 production was flat WoW at 11.7 mmb/d this week and Alaska was up 0.1 mmb/d WoW at 0.5 mmb/d. US oil production is up +0.500 mmb/d YoY at 12.2 mmb/d but is still down significantly at -0.9 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
2020-Jun	06/05	11,100	06/12	10,500	06/19	11,000	06/26	11,000		
2020-Jul	07/03	11,000	07/10	11,000	07/17	11,100	07/24	11,100	07/31	11,000
2020-Aug	08/07	10,700	08/14	10,700	08/21	10,800	08/28	9,700		
2020-Sep	09/04	10,000	09/11	10,900	09/18	10,700	09/25	10,700		
2020-Oct	10/02	11,000	10/09	10,500	10/16	9,900	10/23	11,100	10/30	10,500
2020-Nov	11/06	10,500	11/13	10,900	11/20	11,000	11/27	11,100		
2020-Dec	12/04	11,100	12/11	11,000	12/18	11,000	12/25	11,000		
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								

Source: EIA

Figure 17: US Weekly Oil Production



Source: EIA, SAF

Oil – EIA's Dec STEO increases Q4/23 oil production forecasts by +140,000 b/d

EIA increases Q4/22 oil production forecast

Similarly, no one should be surprised to see the EIA increase its 2022 oil production forecast given how the EIA actuals were tracking ahead of their weekly estimates. The EIA raised its 2022 oil production forecasts by 50,000 b/d, but also lowered its US oil production forecast for 2023 by 20,000 b/d. The EIA posted its December Short-Term Energy Outlook on Tuesday. (i) The EIA increased its 2022 US oil production forecast from 11.82 mmb/d to 11.87 mmb/d, which would be +0.62 mmb/d YoY vs 11.25 mmb/d in 2021. (ii) The EIA forecasts Q4/22 at 12.29 mmb/d, which would be +0.63 mmb/d vs Q4/21 of 11.66 mmb/d. This +0.62 mmb/d YoY is down from +0.85 mmb/d YoY as late as its March STEO. So it's a more reasonable forecast. To the end of September, the EIA "actuals" are +0.63 mmb/d vs

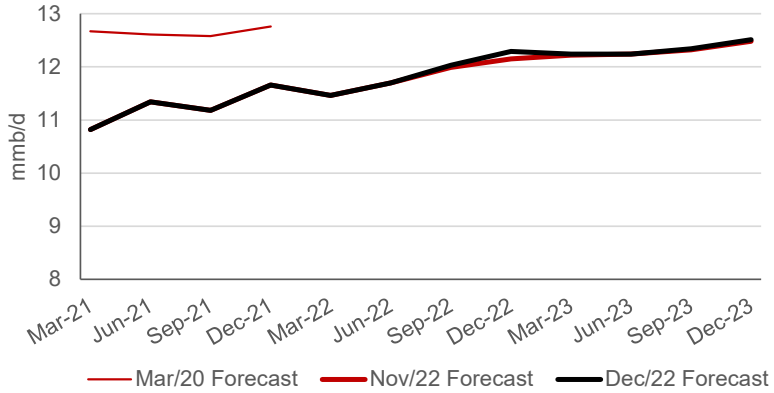
Dec 2021, so it looks to be on track or close to the EIA's new STEO. (iii) Dec STEO 2023 average forecast is 12.33 mmb/d, which is down -0.66 mmb/d from their March STEO. It is only up marginally from Nov STEO of 12.31 mmb/d, but down from Oct STEO of 12.35 mmb/d, Sep STEO of 12.63 mmb/d, Aug STEO of 12.70 mmb/d, July STEO of 12.77 mmb/d, and June STEO of 12.97 mmb/d.

Figure 18: Estimated US Crude Oil Production By Forecast Month

(million b/d)	Q1/20	Q2/20	Q3/20	Q4/20	2020	Q1/21	Q2/21	Q3/21	Q4/21	2021	Q1/22	Q2/22	Q3/22	Q4/22	2022	Q1/23	Q2/23	Q3/23	Q4/23	2023
Dec-2022	12.83	10.69	10.83	10.94	11.32	10.82	11.34	11.18	11.66	11.25	11.46	11.7	12.03	12.29	11.87	12.24	12.24	12.34	12.51	12.33
Nov-2022	12.83	10.69	10.83	10.94	11.32	10.82	11.34	11.18	11.66	11.25	11.46	11.70	11.99	12.15	11.82	12.22	12.24	12.32	12.48	12.31
Oct-2022	12.83	10.69	10.83	10.94	11.32	10.82	11.34	11.18	11.66	11.25	11.46	11.70	11.83	11.99	11.74	12.27	12.29	12.36	12.50	12.35
Sep-2022	12.83	10.69	10.83	10.94	11.32	10.82	11.34	11.18	11.66	11.25	11.47	11.70	11.81	12.16	11.79	12.42	12.55	12.70	12.87	12.63
Aug-2022	12.83	10.69	10.83	10.94	11.32	10.82	11.34	11.18	11.66	11.25	11.46	11.69	12.01	12.28	11.86	12.39	12.50	12.82	13.10	12.70
July-2022	12.81	10.68	10.79	10.87	11.28	10.69	11.28	11.13	11.63	11.19	11.46	11.75	12.08	12.34	11.91	12.45	12.58	12.87	13.17	12.77
June-2022	12.81	10.68	10.79	10.87	11.28	10.69	11.28	11.13	11.63	11.19	11.45	11.71	12.08	12.43	11.92	12.64	12.82	13.07	13.33	12.97
May-2022	12.81	10.68	10.79	10.87	11.28	10.69	11.28	11.13	11.63	11.19	11.42	11.78	12.07	12.35	11.91	12.56	12.71	12.94	13.18	12.85
Apr-2022	12.81	10.68	10.79	10.87	11.28	10.69	11.28	11.13	11.63	11.19	11.52	11.90	12.15	12.46	12.01	12.73	12.88	13.02	13.17	12.95
Mar-2022	12.81	10.68	10.79	10.87	11.28	10.69	11.28	11.13	11.62	11.18	11.59	11.89	12.15	12.48	12.03	12.75	12.91	13.06	13.24	12.99
Feb-2022	12.81	10.67	10.79	10.87	11.28	10.69	11.28	11.13	11.69	11.20	11.67	11.86	12.06	12.27	11.97	12.46	12.54	12.63	12.75	12.60
Jan-2022	12.81	10.67	10.79	10.87	11.28	10.69	11.28	11.12	11.54	11.16	11.58	11.70	11.88	12.05	11.80	12.26	12.33	12.46	12.58	12.41
Dec-2021	12.81	10.67	10.79	10.87	11.28	10.69	11.28	11.11	11.63	11.18	11.67	11.72	11.91	12.09	11.85					
Nov-2021	12.81	10.67	10.79	10.87	11.28	10.69	11.28	11.07	11.47	11.13	11.69	11.77	11.97	12.16	11.90					
Oct-2021	12.81	10.67	10.79	10.87	11.28	10.69	11.28	10.98	11.13	11.02	11.54	11.64	11.78	11.96	11.73					
Sept 2021	12.81	10.67	10.79	10.87	11.28	10.69	11.28	11.06	11.28	11.08	11.42	11.58	11.81	12.06	11.72					
Aug 2021	12.81	10.67	10.79	10.87	11.28	10.69	11.22	11.26	11.30	11.12	11.46	11.62	11.86	12.11	11.77					
July 2021	12.75	10.81	10.81	10.90	11.31	10.70	11.20	11.17	11.34	11.10	11.54	11.72	11.95	12.20	11.85					
June 2021	12.75	10.81	10.81	10.90	11.31	10.70	11.04	11.17	11.38	11.08	11.55	11.67	11.88	12.05	11.79					
May 2021	12.75	10.81	10.81	10.90	11.31	10.65	10.97	11.12	11.34	11.02	11.51	11.68	11.96	12.21	11.84					
Apr 2021	12.75	10.81	10.81	10.90	11.31	10.75	10.93	11.13	11.35	11.04	11.54	11.74	11.99	12.18	11.86					

Source: EIA STEO

Figure 19: Estimated US Crude Oil Production By Forecast Month



Source: EIA STEO

EIA Sept oil actuals of 12.268 mmb/d was +208,000 b/d vs weekly estimates

Here is why no one should be surprised to see the EIA increase its Q4/22 oil production forecast. Last week's (Dec 4, 2022) Energy Tidbits memo highlighted the EIA Form 914, which is the EIA's best estimate at actuals for Sept US oil production. We noted that the EIA actuals for Sept US oil production was 12.268 mmb/d, which was +634,000 b/d YTD and +208,000 b/d vs weekly estimates. This variance to the weekly estimates is why we expected to see the EIA increase its forecast for 2022 US oil production. The Sept 12.268 mmb/d was also up +289,000 b/d vs the immaterially revised up Aug actual of 11.979 mmb/d. The other key takeaway from

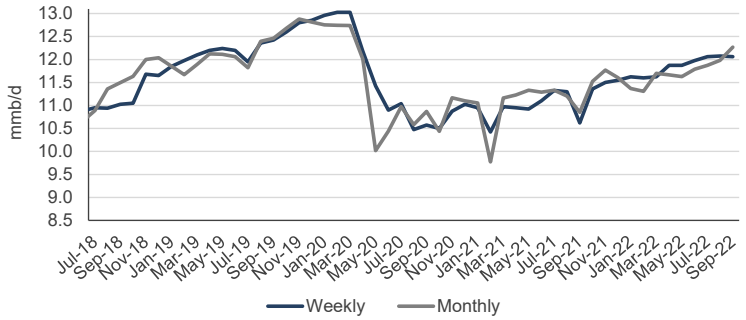
the higher actuals is that it means US oil growth in 2022 is likely higher than most expect.

Figure 20: EIA Form 914 US Oil Production

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	11,369	11,316	11,701	11,668	11,629	11,797	11,844	11,979	12,268			
2021	11,124	9,925	11,326	11,305	11,356	11,356	11,347	11,277	10,918	11,569	11,790	11,634
2020	12,852	12,842	12,797	11,914	9,713	10,442	11,006	10,577	10,921	10,457	11,196	11,168
2019	11,869	11,673	11,913	12,149	12,154	12,218	11,902	12,486	12,590	12,809	13,000	12,978
2018	10,001	10,281	10,467	10,500	10,435	10,641	10,897	11,392	11,443	11,509	11,886	11,945
2017	8,875	9,110	9,166	9,101	9,185	9,111	9,247	9,250	9,517	9,669	10,085	9,983
2016	9,202	9,066	9,101	8,874	8,835	8,676	8,662	8,690	8,544	8,804	8,903	8,816

Source: EIA

Figure 21: EIA Form 914 US Oil Production vs Weekly Estimate



Source: EIA

Oil – Exxon sees lower Permian oil growth with DUCs caught up

There was a good reminder of why the math supports lower US oil growth rates post 2022 from the Exxon webcast on Thursday – the build up of DUCs in 2020 have been worked down in 2021 and 2022 and that has led to stronger YoY growth rates in 2021 and 2022. As the Q&A was going on, we tweeted [LINK] on the first question in the Q&A on Permian growth. We tweeted [LINK] "*Lower Permian #Oil growth rate as DUCs worked thru in 21/21. 7:40am MT, #Exxon Q&A. CEO Woods expect ~20% Permian growth this year, but "going forward, i would say a more ratable growth of 10% per year roughly". DUCs down = less US growth is for US in total, not just XOM. #OOTT*" CEO Woods said "*And thank you for the question. I mean, just maybe give some context, you know, we've increased our Permian production into 21 at 25% this year, we expect to finish at around 20%. As we go forward, I would expect that to come down as we work through the DUC inventory that we generated during the pandemic and have been working off in '21 and 2022. And so, going forward I'd say more ratable growth of about 10% per year roughly.*"

Lower Permian growth rates in 2023

DUCs need to be replenished to have stronger growth in 2023

Every month, we highlight the EIA's Drilling Productivity Report's data on Drilled UnCompleted Wells (DUCs) [LINK] and say we still believe a key risk to how much US oil production can grow in 2022 and 2023 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

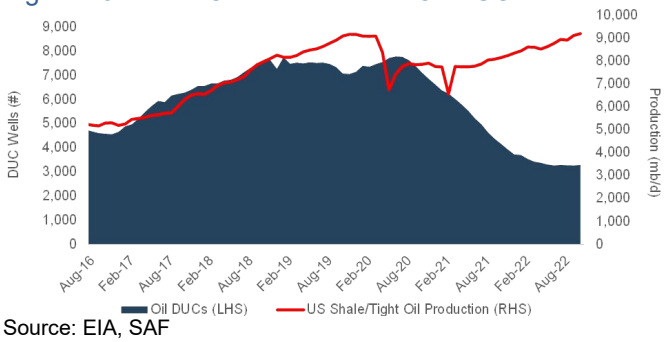
spreads and completions. The EIA's estimates of DUCs provide a clear picture of the trend that DUCs still haven't really increased since Feb. It's why there is the need for drilling rigs to pick up to replenish the DUC inventory if the US is to have strong oil growth in 2023. It is also important to 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. There is a clear correlation with the drawing down of DUCs inventory with increasing shale/tight oil production. 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 22: EIA - Estimated Drilled UnCompleted Wells

					2022											
Drilled UnCompleted	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Oct YoY %	Oct YoY
Anadarko	812	799	787	773	758	753	740	724	727	723	716	722	723	718	-10%	-81
Appalachia	557	537	513	565	457	473	471	497	526	524	529	562	576	573	7%	36
Bakken	541	516	485	464	436	426	426	429	425	427	426	474	494	494	-4%	-22
Eagle Ford	833	796	760	685	683	653	642	612	598	611	620	593	582	579	-27%	-217
Haynesville	396	392	386	372	369	371	395	419	441	466	483	513	535	546	39%	154
Niobrara	375	372	362	354	343	331	317	320	310	328	345	362	393	414	11%	42
Permian	1,812	1,669	1,537	1,444	1,482	1,380	1,302	1,294	1,244	1,218	1,180	1,117	1,097	1,084	-35%	-585
Total	5,326	5,081	4,830	4,657	4,528	4,387	4,293	4,295	4,271	4,297	4,299	4,343	4,400	4,408	-13%	-673

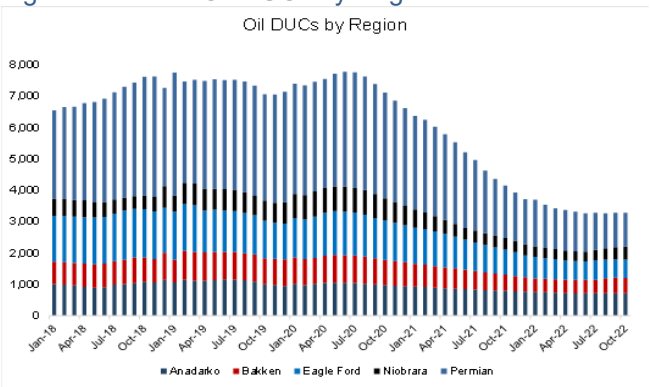
Source: EIA, SAF

Figure 23: Shale Oil Production vs Oil DUC Wells



Source: EIA, SAF

Figure 24: EIA – Oil DUCs by Region



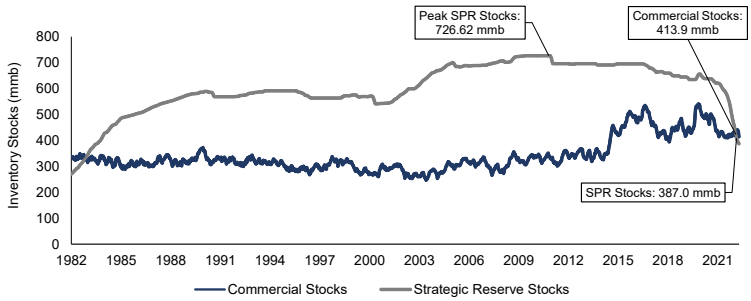
Source: EIA, SAF

Oil – US SPR reserves now -26.9 mmb lower than commercial crude oil reserves

SPR reserves remain lower

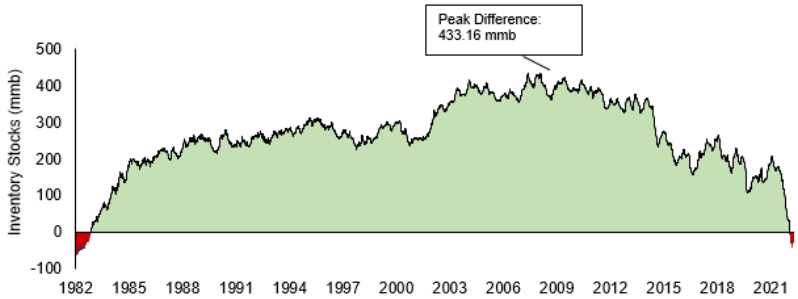
Oil in US Strategic Petroleum Reserves (SPR) moved below total US commercial crude oil reserves in the Sept 16 week for the first time since 1983, with the deficit narrowing this week. The EIA's new weekly oil data for Dec 2 has SPR reserves at 387.0 mmb vs commercial crude oil reserves at 413.9 mmb. The below graph highlights the difference between commercial and SPR stockpiles.

Figure 25: US Oil Inventories: Commercial & SPR



Source: EIA

Figure 26: US Oil Inventories: SPR less commercial



Source: EIA

Oil – Breakthrough: upside to many/most conventional Cdn heavy oil plays

Upside to Cdn conventional heavy oil

We were surprised that Canadian Natural Resources Nov 30 institutional open house comments on conventional heavy oil plays didn't get more attention and excitement from investors. It certainly got our attention. CNQ openly discussed a breakthrough that many oil industry players knew and it is a breakthrough that has big implications to the western Cdn conventional heavy oil potential for big to small companies. Drilling tightly spaced, multilateral wells (no fracking) is opening up many/most conventional heavy oil plays. (i) We see it as a breakthrough much like horizontal drilling was in the late 80s. Ask any old-time oil and gas person what they saw when horizontal drilling first came to western Canada in the late 80's what happened after they had or saw success. Remember this doesn't require any special technical skill to execute. We were fortunate to be in industry with an intermediate producer who drilled one of the first horizontal wells in the late 80s in a Mississippian oil play in SE Sask (Souris/Workman) and as we and others saw industry successes, we tried them in other oil plays. And then no surprise, horizontal wells took off. (ii) The key for that play and

the plays being drilled today in the Clearwater, Sparky, SE Sask Bakken, Se Mississippian, SW Sask Shaunavon etc is that these are all conventional oil plays. And to the great degree what we used to call crappy conventional oil plays. The economics didn't work great with vertical wells and then horizontal wells made the math work. Some of these crappy conventional wells have been drilled with horizontal wells with fracks and that has made them work very well. But these aren't like a true shale well that is so tight, it needs the frac to split the rock. Rather industry is drilling these no-frack horizontal wells close to each and there is enough perm to make the math work. There is no special technical knowledge gap stopping anyone from trying this in a crappy conventional play. This is why we said before it is applicable to any sized company. (iii) This week CNQ noted their strong success in their conventional heavy oil plays. They updated the continued strengthening conventional heavy oil wells in the Clearwater oil play. But then, they highlighted the conventional heavy oil success leveraging improved multilateral technology in the Bonnyville and Lloydminster regions. They noted the 2022 wells, vs the pre-2018 wells had 50% higher production at 230 b/d and 42% lower capital efficiency at $9,450 per flowing b/d. As a result, their 2023 Bonnyville & Lloydminster oil production is forecast to almost double in 2023. (iv) The key though is their comment that the new multilateral technology is "*applicable across our large heavy oil land base".* (v). It's why we tweeted [LINK] "*It's Working! tightly spaced multi-leg horizontal wells without fracking in Cdn conventional #oil plays 11/30. $CNQ "applicable across our large heavy oil land base" See 👇10/26 tweet. $CPG in light oil at Viewfield & seeing "if can apply it throughout our other assets" #OOTT."* Our Supplemental Documents package includes some of the CNQ heavy oil slides.

Is it inevitable Cdn conventional heavy oil success will hurt SAGD growth?

We were also surprised that we didn't see any concerns that success in Cdn conventional heavy oil will impact SAGD growth. CNQ stressed that this breakthrough is applicable across their conventional heavy oil lands, and also is forecasting strong conventional heavy oil growth. How can this not impact SAGD growth potential? Especially for companies that both conventional heavy oil and small scale SAGD potential? The risk is that conventional heavy oil development growth potential is much more than expected a couple years ago and, for multiple reasons, will be the preferred heavy oil growth area moreso than small scale SAGD. Over the past few years, the giant oil sands mining and SAGD projects have mostly been put on hold and the primary bitumen growth potential future has been considered to be small scale SAGD projects (ie. 10,000 b/d). But if producers are seeing this breakthrough in their conventional heavy oil plays and the breakthrough is applicable across a wide range of conventional heavy oil plays, we have to believe producers, if they have a choice, will drilling tightly spaced horizontal wells in conventional heavy oil over small scale SAGD in bitumen reserves. Recall CNQ's comment that this is applicable across their large heavy oil land base. And then for those companies that do not have conventional heavy oil but only bitumen lands for SAGD, they will be competing to produce SAGD against other companies that are producing these low capital efficiency conventional heavy oil.

Upside to Cdn oil plays following CPG tightly spaced multi leg no frac wells

CNQ highlighted the breakthrough success in conventional heavy oil zones. But this breakthrough has been proven to work in conventional medium/light oil zones in western Canada. In other words, it is working in conventional heavy, medium and light oil. Here is what we wrote in our Oct 30, 2022 Energy Tidbits memo. "*We think its worth noting this "technology" development from that is applicable to a wide range of oil plays for a wide range of Cdn oil producers. This should provide upside to many Cdn oil and gas oil plays. On Wednesday, we tweeted [LINK] "It's Working! Upside is applicable to many Cdn #Oil plays by small/big producers. See 👇$CPG tightly spaced multi-leg horizontal wells without need for fracking cost/execution. Works in Viewfield, looking at Shaunavon & "see if "can apply it throughout our other assets". #OOTT". Crescent Point held its Q3 call on Wednesday. This seems straightforward and not any proprietary technology. It's a simple drilling concept and the reality of the world is, it's the part of drilling a well (the horizontal section) that would seem difficult to not execute. Afterall, industry has been drilling horizontal wells, especially in SE Sask, since the late 80s. This can be copied easily by any company especially small ones that are disadvantaged by not being able to access the frac spreads. Technology advancements are on plays that we have called for years crappy conventional oil zones that became way better with multi stage frac wells. We don't think the math will work as well for true shale plays, but, the reality is that most of the "new" oil plays over the past decade are crappy conventional oil zones in Canada and the US. This should make more of any potential recoverable oil reserves economic, extend the recovery factor of these pools by sweeping up more of the pool edges. This will add to reserve values as it makes previously uneconomic oil reserves economic. The concept is drilling multi-leg horizontal wells on a tight spacing without fracking. So it is a drilling cost play. And not a fracking play. Crescent Point is doing it in the Viewfield Bakken and say also the Shaunavon, but there is no reason why the concept shouldn't work in the other crappy conventional plays. And they also note that they are looking to apply it "throughout our other assets". Here is what CPG said in the opening statement, and then in the Q&A where they explained it. It's not huge but we suspect the payouts are very quick. And the other advantage is that it becomes impossible to screw up a well, which could happen with a bad frac job. This is drilling several legs so each leg is an independent well bore. "For example, in our Viewfield Bakken play, we drilled our first multilateral open horizontal well and are now drilling a second based on the success of the first. By adopting a new well design, we have removed the need for fracture stimulation in these multilateral horizontals, expanding the economic boundaries of the play. We also continue advancing our decline mitigation projects throughout our Saskatchewan operations to enhance secondary recoveries and moderate future capital requirements" "Yeah, thanks for the question, Michael. So this is something that our teams have been looking at. Trying to figure out how to expand the economic boundaries of the play as you step out from the core. So with this, I think drilling has -- the drilling technology has gotten so good that -- it's a little bit cheaper now to attack some of the areas in this play with just drilling instead of having to frac. So these multilaterals are obviously tighter space than our frac wells and if you look at total recovery and initial production from a section under these multilateral wells versus our conventional frac well, you get higher production and*

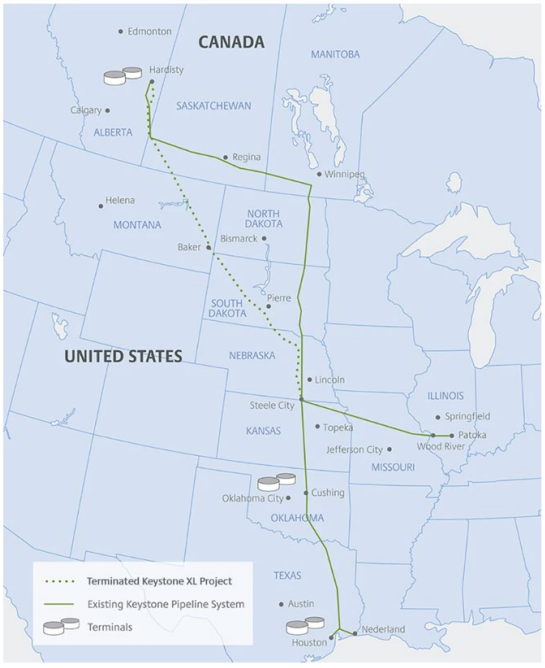
higher reserves potentially for lower capital. So we're pretty excited about it. It's early days, 125 plus boe per day per well, and if our production hangs in and it hits our UR estimates, we probably have over 100 or more locations to go and incorporate that into our five-year plan in Viewfield. And we are looking at other areas in our portfolio i.e. like Shaunavon, obviously this area and Viewfield has a little bit better porosity permeability maybe then say Shaunavon does. So early days still, but we will to see if we can apply it throughout our other assets." There was nothing specific in the slide deck."

Oil – TC Energy evaluating a partial restart to Keystone oil pipeline

Keystone pipeline shut down

As of our 7am MT news cut off, TC Energy's latest "Milepost 14 Incident" update is as of 2:18pm CT on Friday. Note TC Energy started to call this Milepost 14 Incident almost as if to have people less call it a Keystone Oil Pipeline leak or spill. (i) TC calls it a release and not a leak or spill. But it happened at 8pm CT on Dec 7 just south of the Nebraska/Kansas border on the southern leg of Keystone that runs to Cushing. TC later estimated the release volume at 14,000 barrels. (ii) Our initial tweet on Dec 8 was [LINK] was "*Negative to Cdn #Oil differentials as @TCEnergy says #Keystone pipeline shut due to leak in Nebraska. Will back up Cdn oil until it reopens. Keystone moved ~620,000 b/d in Q2. #OOTT [LINK]."* We do not know the volumes before the incident, rather, we used the Q2/22 volumes. (iii) The key to the incident is that happened south of Steele City, Nebraska. At Steele City, Keystone's single pipeline splits into two lines: a line going south to Cushing and the Gulf Coast, and a line going east to Patoka, Illinois. (iv) Early Friday morning, we tweeted after reviewing the PHMSA Corrective Action Order [LINK]. What jumped out at us was how the PHMSA's COA is all about the "*Affected Segment*", which signaled the potential for an early restart of the eastern leg that runs to Patoka, Illinois. We tweeted [LINK] *"#Keystone Force Majeure @PHMSA_DOT on "Affected Segment" (south leg to Cushing). No hint of when PHMSA will approve a "Restart", but limited to 80% of operating pressure upon restart. Partial relief to Cdn #Oil diffs, nothing on east leg to Patoka. #OOTT [LINK]."* (v). One key item from the PHMSA CAO was "*Operating Pressure Restriction. TC Oil must reduce and maintain a twenty percent (20%) pressure reduction in the actual operating pressure along the entire length of the Affected Segment such that upon restart the operating pressure along the Affected Pipeline will not exceed eighty percent (80%) of the actual operating pressure in effect at the failure location, immediately prior to the failure on December 7, 2022."* This is significant. We don't know what the operating pressure was at the failure location prior to the failure. (vi) But we suspect TC may have been operating Keystone at a higher than normal pressure. Our Oct 9, 2022 Energy Tidbits memo wrote "*On Thursday, Argus reported [LINK]* "*TC Energy's Keystone Pipeline system will be able to handle up to an additional 110,000 b/d of crude starting in early November, according to a notification sent to shippers. The notification seen by Argus indicates shippers will have room to ship as much as 720,000 b/d of crude on the system starting around 7 November, up from the 610,000 b/d reported in July."* (vii) In Friday's update, TC said "*Plans for return-to-service continue to be evaluated."* This must refer to the eastern leg from Steele City to Patoka. Our Supplemental Documents package includes the TC Energy updates posted as of 7am MT today an the PHMSA COA.

Figure 27: Keystone pipeline



Source: TC Energy

Source: TC Energy

Oil – Cdn oil differentials hit by Keystone stoppage, a little back with partial restart talk

Cdn oil differentials hit by Keystone

As expected, Cdn oil differentials were immediately hit by the Keystone oil shutdown. The leak happened after the markets close on Dec 7, when WCS less WTI differentials were $26.30. On Dec 8, the diffs jumped up to $32 as all of Keystone was shut down, but then got some back once it became clear that the leak was south of Steele City and there was likely going to be a partial restart of the eastern leg to Patoka. The WCS less WTI differential closed on Friday at $28.00. Below is Bloomberg's current WCS–WTI differential as of Friday Dec 9 close.

Figure 28: WCS less WTI oil differentials up to Dec 9 close

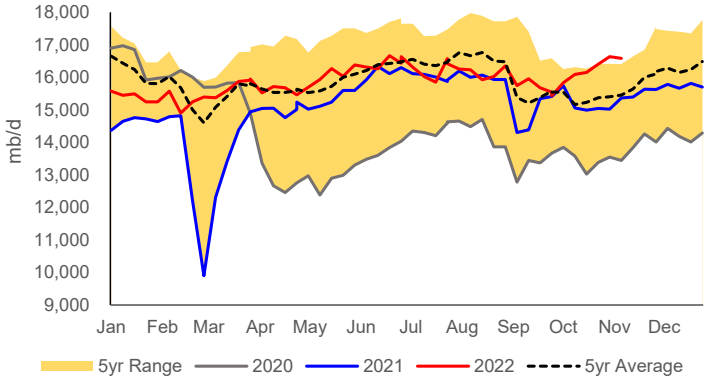
Source: Bloomberg

Refinery inputs down slightly WoW

Oil – Refinery inputs -0.053 mmb/d WoW to 16.585 mmb/d

It's been a good month for US oil refineries in terms of increased crude oil input to be refined. Nov is normally the start of the seasonal increase in crude oil inputs to refineries as they have finished their normal Sept/Oct seasonal refinery maintenance period as refineries change from summer to winter fuel blends. Crude oil input into refineries tends to increase in Nov and Dec. On Wednesday, the EIA released its estimated crude oil input to refinery data for the week ended Dec 2. The EIA reported crude oil inputs to refineries down -0.053 mmb/d WoW to 16.585 mm/d, which is +0.800 mmb/d YoY from 15.785 mmb/d for the week ended Dec 3, 2021. Note last year's week ended Dec 3, refineries saw an increase as refineries normally ramp up oil processing to year end. Total products supplied (i.e., demand) decreased WoW, down -0.091 mmb/d to 19.626 mmb/d, and Motor gasoline was up +0.041 mmb/d at 8.358 mmb/d from 8.317 mmb/d last week. The 4-week average for Motor Gasoline was down -0.647 mmb/d YoY to 8.436 mmb/d.

Figure 29: US Refinery Crude Oil Inputs (thousands b/d)



Source: EIA

California wants to cap refiner margins

Oil – California proposes "price gouging penalty" as way to cap refiner margins

On Monday night, we tweeted [LINK] "*California follows RUS oil price cap approach to propose to cap refiner margins Bill 2(c) would give "CA authority to order that refinery maintenance & turnarounds be rescheduled in specific circumstances.." Will this just lead to higher for longer CA #Gasoline prices?"* Governor Newsom had just announced [LINK] "*Governor Newsom Unveils Price Gouging Penalty on Big Oil's Excessive Profits to Protect Californians from Being Ripped Off."* And "*The proposal introduced today by Senator Skinner comes as the California Legislature is assembling in a special session called by the Governor to pass a price gouging penalty. The Legislature will also consider efforts to empower state agencies to more closely review gas costs, profits and pricing as well provide the state with greater regulatory oversight of the refining, distribution and retailing segments of the gasoline market in California. The proposal would discourage oil refiners from fleecing Californians by making it unlawful to charge excessive profits – excessive refiner margins would be punishable by a civil penalty from the California Energy Commission (CEC). The amount of the maximum margin and the amount of the penalty will be determined through the legislative process. Any penalties collected by the penalty will go to a Price Gouging Penalty Fund and then given back to Californians."* We reviewed the proposed legislation and it would give

California the ability to set what it deems to be the appropriate gasoline refining margin ie. a price cap on refiner margins. The clause writes "*(1) (A) On and after the effective date of this section, the maximum gross gasoline refining margin shall be ____ cents per gallon."* In theory, it should be like a price cap and work. California will set what they view as a reasonable maximum refining margin that should provide sufficient return for the refinery to operate. That is the in theory part. Our Supplemental Documents package includes the Newsom announcement.

California to be able to reschedule refinery maintenance if needed

We suspect most just read the Newsom announcement and not the proposed legislation because, if they did, they would have also been surprised by the clause "(*c) Expand the Energy Commission's authority to order that refinery maintenance and turnarounds be rescheduled in specified circumstances, when consistent with employee and public safety and necessary to avoid supply shocks in the market for transportation fuels."* We put this in our tweet. California will have the right to reschedule maintenance and turnarounds in specified circumstances. This is amazing. It's like the politicians see refinery maintenance as something that can

Occidental CEO's reaction says it all

On Tuesday, Bloomberg reported "*Occidental Petroleum CEO Vicki Hollub says plans by California lawmakers to consider levying penalties on the oil industry for high profits are "ridiculous." "I think too many of the politicians just don't understand the industry. They don't understand any industry," Hollub says at WSJ's CEO Council Summit. California lawmakers opened a special session yesterday to consider an annual maximum profit margin for oil refiners and other measures. Hollub adds that politicians don't understand the basics of economics and supply-and-demand."*

California has ~10% of total US refinery capacity

The EIA's Refinery Capacity Report June 2022 is the best recap of US refining capacity, by refinery, in the US. The refining capacity data is as of Jan 1, 2022. The EIA estimates total US barrels per stream day capacity at 18.949 mmb/d, and California is 9.7% at 1.844 mmb/d. Our Supplemental Documents package includes excerpts from the EIA refinery capacity report.

Oil – US "net" oil imports up 1.494 mmb/d WoW to 2.582 mmb/d

US "net" oil imports up WoW

US "NET" imports were up 1.494 mmb/d to 2.582 mmb/d for the Dec 2 week. US imports were down -0.024 mmb/d to 6.012 mmb/d. US exports were down -1.518 mmb/d to 3.430 mmb/d. The WoW decrease in US oil imports was driven by "others" with a decrease of -0.232 mmb/d, but was offset by a similar increase of 0.207 mmb/d by the Top 10. Some items to note on the by country data. (i) Canada was up this week 0.069 mmb/d to 3.423 mmb/d. (ii) Saudi Arabia was down -0.064 mmb/d to 0.274 mmb/d this week. (iii) Colombia was up +0.002 mmb/d WoW to 0.292 mmb/d. (iv) Ecuador was down this week -0.083 mmb/d to 0.159 mmb/d. (v) Iraq was down -0.111 mmb/d to 0.252 mmb/d. (vi) Mexico was up +0.285 mmb/d to 0.585 mmb/d.

Figure 30: US Weekly Preliminary Oil Imports by Major Countries

(thousand b/d)	Sep 30/22	Oct 7/22	Oct 14/22	Oct 21/22	Oct 28/22	Nov 4/22	Nov 11/22	Nov 18/22	Nov 25/22	Dec 2/22	WoW
Canada	3,298	3,300	3,372	3,483	3,410	3,235	3,076	3,844	3,354	3,423	69
Saudi Arabia	398	370	230	325	533	519	211	685	338	274	-64
Venezuela	0	0	0		0	0	0	0	0	0	0
Mexico	539	759	747	509	748	503	528	495	300	585	285
Colombia	360	242	214	215	218	341	143	170	290	292	2
Iraq	275	109	130	220	134	503	141	385	363	252	-111
Ecuador	203	136	134	201	0	102	101	42	242	159	-83
Nigeria	0	0	29	42	81	119	181	43	50	159	109
Kuwait	0	0	0	0	0	0	0	0	0	0	0
Angola	0	0	0	0	0	0	0	0	0	0	0
Top 10	5,073	4,916	4,856	4,995	5,124	5,322	4,381	5,664	4,937	5,144	207
Others	874	1,147	1,052	1,185	1,081	1,132	1,178	1,399	1,100	868	-232
Total US	5,947	6,063	5,908	6,180	6,205	6,454	5,559	7,063	6,037	6,012	-25

Source: EIA

Oil – Mexico still targets to eliminate oil exports by Dec 2023

Mexico wants to end oil exports by Dec 2023

The math may not be 100% clear, but there was a good reminder of a future upside for Cdn heavy/medium oil exports to the Gulf Coast – Mexico's goal is still to eliminate oil exports by the end of 2023 other than to their owned 275,000 b/d Deer Park refinery in the Gulf Coast. If so, that would reduce Mexico oil exports to the US by ~300,000 to 400,000 b/d. We couldn't' find any other reporting, including on Spanish websites like el Economista, on the Bloomberg report on Thursday "*Pemex Will Send Oil to Its Texas Refinery, Instead of Exporting. Petroleos Mexicanos will send crude oil earmarked for exports to its Texas refinery instead of selling it abroad as part of a government goal to end the country's dependency on foreign fuels. Energy Minister Rocio Nahle said about 700,000 barrels a day that Pemex is currently exporting will be sent to its Deer Park refinery in Texas and the Dos Bocas refinery in Tabasco state. "We have to be self-sufficient," she said in an interview on the sidelines of an event Thursday, adding that the goal is to end oil exports by December 2023. The paradox is that Deer Park isn't selling fuel to Mexico and is instead sending it mainly to US customers, according to data from Pemex. That's calling into question whether the move will actually help Mexico achieve self-sufficiency in domestic gasoline sales. Nahle said that Pemex is expected to have produced about 1.62 million barrels of oil a day in November, marking a continued decline in spite of pledges by President Andres Manuel Lopez Obrador to turn around the company's oil operations."* Nahle reminded of the target to eliminate oil exports by Dec 2023, which we assume means oil exports other than to Deer Park. We say the math may not be clear because Pemex exports approx. 1 mmb/d, of which approx. 650,000 b/d goes to the US. That leaves approx. 350,000 b/d of exports to other countries. Nahle says exports are about 700,000 b/d, which we can only assume means the 1 mmb/d less Pemex owned Deer Park that has capacity of 275,000 b/d.

Oil – Colombia oil production still below pre-Covid, September was 0.754 mmb/d

Colombia September oil & gas production

The concern remains that the recent election of Colombia President Petro means that Colombia oil production isn't likely to grow on a sustained basis. Colombia oil production remains stuck and really hasn't moved in the last two years and is still below pre-Covid levels despite stronger oil prices. Colombia oil production in September was up 1.3% MoM, to 0.754 mmb/d vs 0.749 mmb/d in August. Last Friday, Colombia Ministry of Mines and Energy released its September oil and gas production data [LINK]. The Columbian Ministry of Mines and Energy reported *"the controlled oil production during September of this year was 753,584 average barrels per day (bopd), 0.57% higher than that registered in August 2022 when it reached 749,299 average barrels per day."* The increase in crude oil production was

attributed to the entry of new wells in the Meta, Putumayo, Casanare and Arauca departments. Note that Colombia wants to attract more capital to its oil sector. Our Jan 23, 2022 Energy Tidbits highlighted that week's Argus report [LINK], that Colombia's Mines and Energy Ministry expects to increase the oil production to 0.800 mmb/d in 2022, which were the same production goals the nation had entering 2021. The ministry hopes that 60 exploration wells will be drilled in 2022, up from the 34 wells drilled from Jan-Nov. A total of 112 upstream contracts will be in the exploration phase with agreed investments close to $4.11bn in 2022. Our Supplemental Documents package includes the Google Translate version of the Colombia release.

Figure 31: Colombia Oil Production

Colombia Oil Production										
mmb/d	2015	2016	2017	2018	2019	2020	2021	21/20	2022	22/21
Jan	1.036	0.986	0.860	0.860	0.899	0.884	0.745	-15.7%	0.740	-0.7%
Feb	1.030	0.955	0.864	0.823	0.893	0.878	0.746	-15.1%	0.740	-0.8%
Mar	1.023	0.917	0.804	0.856	0.885	0.857	0.745	-13.0%	0.751	0.8%
Apr	1.029	0.915	0.857	0.865	0.891	0.796	0.745	-6.4%	0.751	0.8%
May	1.027	0.904	0.851	0.866	0.895	0.732	0.703	-3.9%	0.746	6.1%
June	1.010	0.888	0.857	0.864	0.892	0.730	0.694	-4.9%	0.752	8.4%
July	0.947	0.843	0.856	0.860	0.869	0.735	0.731	-0.5%	0.748	2.3%
Aug	0.968	0.827	0.858	0.866	0.883	0.742	0.748	0.8%	0.749	0.1%
Sept	1.009	0.859	0.851	0.869	0.879	0.749	0.744	-0.7%	0.754	1.3%
Oct	1.005	0.846	0.864	0.879	0.883	0.751	0.740	-1.5%		
Nov	0.990	0.855	0.851	0.883	0.880	0.761	0.747	-1.9%		
Dec	0.999	0.837	0.870	0.889	0.882	0.759	0.745	-1.8%		

Source: Bloomberg, Colombia Ministry of Mines and Energy

Oil –Waiting on Putin to announced Russia response to price cap

$60 Russia oil price cap

As of our 7am MT news cut off, we still have not seen any formal Russia position on the oil price cap on Russian oil. The latest was Putin's comments on Friday. On Friday, TASS reported [LINK] "*Russia is considering the possibility of reducing oil production as one of the measures in response to the decision of Western countries to introduce a price ceiling. This was announced on Friday by Russian President Vladimir Putin following a visit to Bishkek."As for our reaction, I have already said: we simply will not sell to those countries that make such decisions. We will think, maybe even about the possible, I am not saying that this is a decision, we will think, if necessary, about the possibility of reducing production. We have an agreement with OPEC+ on the well-known production bar. We'll think about that additionally, if necessary. I mean Russia now," Putin said. According to him, Russia is now considering options for responding, the final version of the answer will soon be fixed in the presidential decree. "We're thinking about it. There are no decisions yet. Well, specific steps will be set out in the decree of the President of Russia, which will be released in the next few days," Putin said.*"

Oil – India says Russia oil price caps have no impact on India

India on Russia oil price cap

No surprise, India oil minister Puri was quick to say that the EU/US price cap on Russian oil would not have any impact on India. Puri has been consistently clear that any price cap on Russian oil would not impact India. On Monday, we tweeted [LINK] "*A "Big NIL" impact of Russia oil price cap on India says @HardeepSPuri. "i have been on record to say we will buy from whomever we have to" "My moral duty is to my consumers". See 👇 10/08 thread, just like he told @SecGranholm in Washington in Oct. #OOTT.*" Our tweet included a transcript

we made of Puri's comments with Senthil Chengalvarayan on BQ Prime on Dec 5, 2022. [LINK] Items in "italics" are SAF Group created transcript. On the new price cap on Russia oil, at 13:20 min mark, Chengalvarayan "what are the implications to India?" Puri "*Nil. Big "N" I" "L". can I, because you know I don't want you to be reporting a statement by a minister who said Nil. let me explain that. Let me explain that. I have said repeatedly on record. When saying are you under pressure. "A", I am under no pressure. "B", it is unlikely that I can be put under pressure. And "C", I have already diversified. I used to source my imports from 27 countries. We are already sourcing from 29 countries. Russia was a marginal supplier, up until 31st of March 2022 they accounted for 0.2% of our total imports. I, I meaning India, India consumes 5 million barrels a day. 60 million people go to the petrobank to fill up. Our month on month consumption is rising. Today, I have Iraq as the largest supplier. I have the Saudis, I have the Emirates, I have Kuwait, I have Russia. Each one of us, each one of them wanting to sell more to India. So you would be very much within your right to ask is India playing a market card even if you don't ask the question, I am saying, Yes, we are playing the market card. And I have been on record to say we will buy from whomever we have to. I was asked by a particular lady, not in the interview you are referring to, but another lady, don't you have any moral compunction. My moral duty is to my consumers"*.

1st time we recall India playing the market card

Perhaps the most important takeaway from Puri's comments is that he is giving a clear warning that India is a major oil consumer with growing oil import needs and is prepared to use this market card. Puri's comments above were interesting as it is the first time we recall him ever saying that India is the growing oil demand country and he will is using that market card. Note his comments "*I, I meaning India, India consumes 5 million barrels a day. 60 million people go to the petrobank to fill up. Our month on month consumption is rising. Today, I have Iraq as the largest supplier. I have the Saudis, I have the Emirates, I have Kuwait, I have Russia. Each one of us, each one of them wanting to sell more to India. So you would be very much within your right to ask is India playing a market card even if you don't ask the question, I am saying, Yes, we are playing the market card. And I have been on record to say we will buy from whomever we have to. I was asked by a particular lady, not in the interview you are referring to, but another lady, don't you have any moral compunction. My moral duty is to my consumers."*

India told US it will buy oil from anyone for energy security & affordability

We say Puri's comments should not have surprised anyone because he has been clear that he will buy oil from anyone. And he told that to the US two months ago. Here is what we wrote in our Oct 9, 2022 Energy Tidbits. "*It got very little press but US Energy Secretary Jennifer Granholm met in Washington with India oil minister Hardeep Singh Puri. The US Dept of Energy released a joint ministerial statement from the ministers that does not even note their names or quotes. Not the norm. And, to no surprise, it made zero mention of oil, LNG or Russia. We did see the photo-op but didn't see a joint press conference as is normally the case. No surprise why it looks like they didn't have a joint press conference based Puri's comments at a subsequent press conference in Washington. We watched multiple ANI (Indian news) video clips and their posted stories hit the highlights. (i) Russian oil. We tweeted [LINK] "1/3. Great @ANI reporting on clear India energy position from*

@HardeepSPuri post @SecGranholm meeting. "Have I been told by anyone to stop buying Russian oil? The answer is a categorical No". #OOTT #NatGas #LNG". (ii) India will buy oil from anyone. We tweeted [LINK] "2/3. "India will buy oil from wherever it has to for the simple reason that this kind of a discussion cannot be taken to the consuming population of India" says @HardeepSPuri. #OOTT @ANI." (iii) Priority is energy security/affordability. We tweeted [LINK] "3/3. ""If you are clear about your policy, which means you believe in energy security, energy affordability you will buy from wherever you have to. Our energy purchases from sources hitherto unheard of, we are in discussion with them." @HardeepSPuri. Thx @ANI. #OOTT." (iv) India has been able to keep prices down. Puri also noted that they have been able to keep oil price impact low. ANI wrote ""In terms of petrol and diesel, if the increases in North America are 43-46 per cent, in India we allow prices to go up by only 2 per cent or so. In terms of gas, global benchmarks went up by 260-280 per cent and our own ability to contain gas price increases was something around 70 per cent," Puri told reporters in Washington DC." (v) There are other items n the ANI reports. Our Supplemental Documents package includes three ANI reports."

Oil – Xi tells GCC wants oil, LNG trade settled in Renminbi over next 3-5 yrs

China wants Renminbi used

Yesterday, we tweeted [LINK] "Over next 3-5 yrs, Xi wants "Shanghai Petroleum & Natural Gas Petroleum Exchange platform will be fully utilized for RMB settlement in #Oil #LNG trade". Saudi, UAE, Qatar, have to give their big customer something, but can they give China more than nominal volumes in RMB? #OOTT." Xi addressed the China-Gulf Cooperation Summit leaders on Friday in Riyadh and Xi said *"in the next three to five years, China is ready to work with GCC countries in the following priority areas*." Ie. these are want China wants to accomplish with the GCC counties. No surprise, his first priority is that he wants China's oil and LNG imports to be in Renminbi, of course he said this after reminding China will continue to import crude and will increase LNG imports. We find it hard for the GCC countries to not go along to some degree with their biggest customer, but find it hard to believe they can abandon US $ and do more than small amount of their China trade in Renminbi. Xi said "*In the next three to five years, China is ready to work with GCC countries in the following priority areas: First, setting up a new paradigm of all-dimensional energy cooperation. China will continue to import large quantities of crude oil on a long-term basis from GCC countries, and purchase more LNG. We will strengthen our cooperation in the upstream sector, engineering services, as well as storage, transportation and refinery of oil and gas. The Shanghai Petroleum and Natural Gas Exchange platform will be fully utilized for RMB settlement in oil and gas trade."* Our Supplemental Documents package includes the Xi address. [LINK]

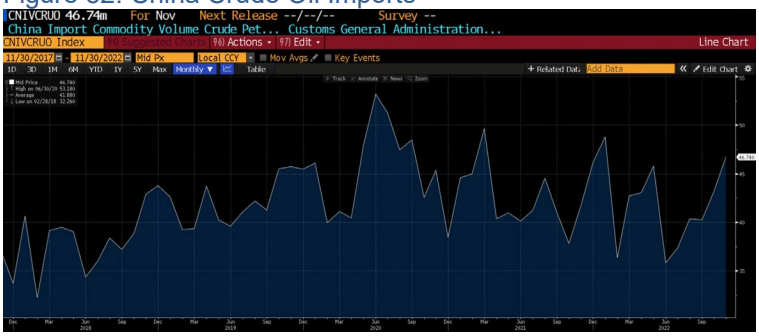
Oil – Higher fuel export quotas give big jump in China oil imports for Nov

China Covid restrictions

On Wed morning, Bloomberg reported *"Chinese refiners bought more of the feedstock from abroad as they increased their processing rates to take advantage of a higher fuel exports quota for this quarter. Weakened demand and maintenance are expected to lead to a slowdown this month, although the easing of domestic quarantine measures may help raise domestic use of oil products in the longer term."* The higher export quotas led to a big MoM increase in China oil imports in Nov ie. a catch up in oil imports. So it may not be sustainable given Bloomberg noted how "*Net exports of fuels including gasoline, diesel and jet fuel jumped by 58% last month to the second-highest level this year, Wednesday's data*

showed. Run rates for China's state-owned refineries rose to 78.49% of capacity on Nov. 10, the highest since March, according to OilChem data." Regardless, at least for Nov, there was a big jump in China oil imports in Nov up to 11.42 mmb/d, which was actually higher than pre-Covid Nov 2019 of 11.08 mmb/d. On Wed, we tweeted [LINK] "*China customs data for #Oil imports. Higher fuel export quotas drove MoM jump, but good to see higher than pre-Covid. Nov 2022: 11.42 mmb/d, +11.9% YoY, +12.0% MoM. Nov 2021: 10.21 mmb/d. Nov 2020: 11.08 mmb/d. Nov 2019: 11.18 mmb/d. Oct 2022: 10.20 mmb/d. Thx @business #OOTT."*

Figure 32: China Crude Oil Imports



Source: Bloomberg

Oil – China Covid in key southern region not likely to peak until mid-Jan to mid-Feb

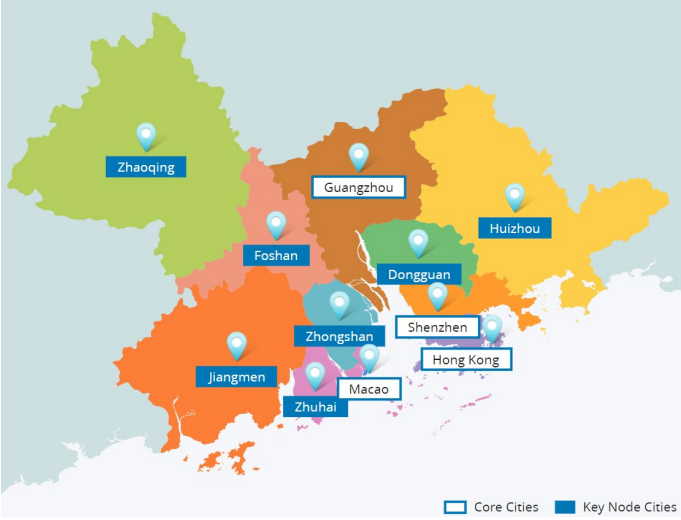
China Covid cases peak still to come?

Looks like world economy and oil markets are waiting and watching to see if China can have a sustained economy reopening following the latest formal relaxation in Covid restrictions in the face of Covid cases likely not peaking for another month or two. The fear is that China muddles thru the winter in a series of mini up and down waves. (i) More China Covid relaxation and by China State Council. Early Wed morning, we tweeted [LINK] "*China State Council "New Ten Rules" to optimize Covid response. Not a complete "Let Go", but an active optimization rather than a passive one. ie. test results & health codes will no longer be checked for domestic cross-regional travel or for travelers upon arrival. #OOTT."* (ii) No question the new 10 rules are a big relaxation especially for cross-regional travel. And we have to expect there will be some pickup in economic activity and mobility. (iii) However, most also expect to see China be like other places that opened up and see an initial surge in Covid cases. And there is an uncertainty on how local governments will react as they are faced with rising Covid. (iv) Earlier this morning we tweeted [LINK] "*Covid cases likely to peak mid-Jan to mid-Feb in Guangzhou, a major city in south China's Greater Bay Area that is >10% of China GDP. #Oil markets will keep waiting to see if China's economy can sustainably reopen after Covid relaxation this week. #OOTT*." The peaking timing is from a Global Times (communist party media) report today [LINK] "*The first wave of COVID-19 infections in Guangzhou, South China's Guangdong Province, is likely to peak between mid-early January and mid-February in 2023, and t local society will return to pre-epidemic conditions in the first half of 2023, China's top respiratory disease expert Zhong Nanshan said on Friday*." (v) The other story is how Covid cases are rising around China, but the Guangzhou report was the only one we could see that is from someone like Nanshan. Our Supplemental Documents package includes the 10 new reasons and the Global Times report this morning.

Greater Bay Area is 11% of China GDP

Our tweet this morning noted that Guangzhou is a major city in the Guandong region that is part of the Greater Bay Area, which is also known by its longer name Guangdong-Hong Kong-Macao Greater Bay Area, in the south of China. We also tweeted [LINK] "*Good reference report on why Greater Bay Area is a must watch area if Covid isn't peaking until mid-Jan to mid-Feb from @SPGlobal July 8 "China's Greater Bay Area Becomes Key Mega Region in Global Economy". #OOTT [LINK].*" S&P estimates "*By 2021, the Greater Bay Area's GDP was estimated at USD 2 trillion, which was equivalent to 11% of the combined GDP of mainland China, Hong Kong SAR and Macao SAR. When the Greater Bay Area GDP is benchmarked globally, its GDP was equivalent to Canada's GDP in 2021. When compared with large APAC industrial nations, the GDP of the Greater Bay Area exceeded the GDP of South Korea in 2021.*" Our Supplemental Documents package includes the S&P report.

Figure 33: China's Greater Bay Area



Source: Greater Bay Area

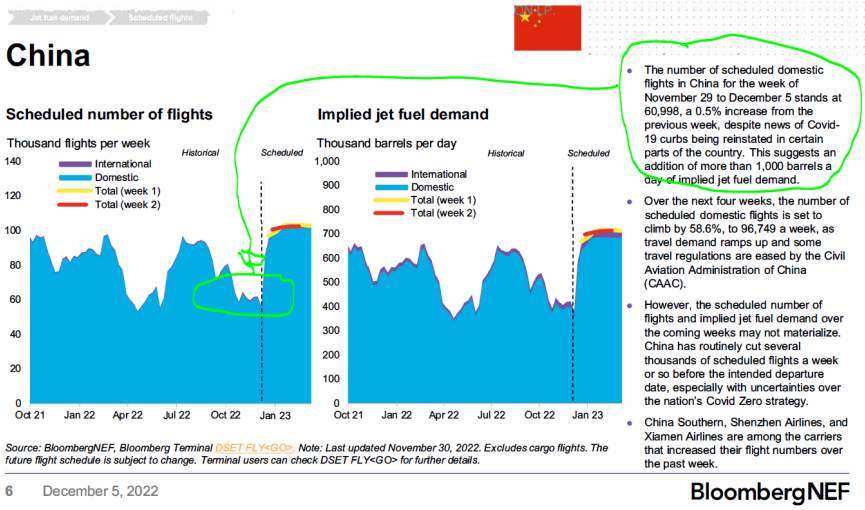
Oil – Chinese domestic flights; another small uptick WoW

Scheduled China air flights

It will be interesting to see how quickly China's relaxing of a number of Covid restrictions will impact China air travel in the short term and to see if there is any sort of sustained increase in air travel Three was a small uptick of +0.5% in China domestic scheduled air flights for the Nov 29-Dec 5 week following an uptick the Nov 22-28 week. With the relaxation, in particular not needed a negative test for cross region travel, we should see a continued increase over the coming weeks. The question will be is there is a rebound like seen in May, when the number of scheduled flights increased +53.9% MoM as major cities eased lockdown restrictions following the high case numbers seen in April. On Tuesday, we tweeted [LINK] "*China #JetFuel demand & scheduled domestic air flights finding a bottom for now until clear momentum for reopening. Like seen in Apr Covid peak. Flights Nov 29-Dec 5 +0.5% WoW,*

Nov 22-28 +3.5% WoW, Nov 15-21 -2.7% WoW, Nov 8-14 -5.3% WoW. Thx @BloombergNEF Claudio Lubis. #OOTT." Scheduled domestic airflights were +0.5% WoW to 60,998 flights for the Nov 29 to Dec 5 week. The prior Nov 22-28 week was an increase of +3.5% WoW, and the prior week was -2.7% WoW. The number of scheduled domestic air flights is supposed to increase by 58.6% to 96,749 per week. Our tweet included the below BloombergNEF graph from its Aviation Indicators Weekly report.

Figure 34: China Scheduled # of flights & Implied jet fuel demand Nov 29 – Dec 5 week



Source: BloombergNEF

Oil – Trafigura reiterates its view on commodities underinvestment

Trafigura bullish commodities view

On Thursday, we tweeted [LINK] "*#Trafigura The Year Ahead, @saadrahim reiterates 👇09/14 tweet theme - realities of structural under-investment, low inventories, lack of spare capacity set up risk moving away from world of commodity cycles to one of commodity spikes. ie. each subsequent low is higher. #OOTT."* On Thursday, Trafigura posted its 2022 results including their annual report. Trafigura includes its outlook views on all the key commodities, including oil in the Annual Report section "The Year Ahead". Trafigura continued to highlight the same bullish oil themes driven by underinvestment and concluded The Year Ahead section "*However, renewed demand growth will run up against the realities of structural under-investment across commodities. Given how low inventories are for key raw materials already, together with a lack of readily available spare capacity, any sustained rebound in consumption could lead to significant tightness and a supply crunch. Indeed, we appear to be running the risk of moving away from a world of commodity cycles to one of commodity spikes, where a lack of production capacity results in prices rising to levels that cause demand destruction, before falling. But even then, prices will remain elevated, given how long it takes to bring online new projects and the unyielding focus on capital discipline and shareholder returns of the major mining houses and big oil companies*." Our Supplemental Documents package includes excerpts of the Trafigura annual report on commodities.

Why Trafigura sees spikes/drops as the case for a serious upcycle in oil

In Sept, Trafigura Chief Economist gave a good explanation of what it means to oil prices to have moved to a series of oil price spikes and drops, and why he believes this paints a picture for a "*serious upcycle in oil*". Here is what we wrote in our Sept 16, 2022 Energy Tidbits. ""*We weren't able to see Trafigura Chief Economist Saad Rahim's presentation at the Pareto Securities conference on Wednesday, but did see the subsequent webcast Q&A. [LINK]. Rahim clearly had a very bullish view for oil. Rahim highlights the lack of investment in oil, and that investment never gets a chance to get caught up so the end result is a series of upward spikes with the lows keep getting higher. We tweeted [LINK] "#Trafigura case for a serious upcycle in #Oil. Prices spike to where causes demand destruction, but because haven't had enough time to catch up on investment, each subsequent low is actually higher. See 👇 SAF Group transcript. Thx @saadrahim @paretosec. #OOTT." We created a transcript of his comments. At the 9:00 min mark, Pareto asks ".. you believe that you believe we are in the start of a serious upcycle in oil. And saw in your presentation this morning you describe the current market as spike. I think it's time we debate." Rahim replies ".. for me, I don't think these things are mutually exclusive. I think you can have a series of spikes that actually when you put them together, effectively are a cycle. Or at least an upcycle. If you are in a position where you're ultimately, the spikes I was referring to because of the underinvestment, you get to a point where prices spike to a level that then causes demand destruction. And you come off, but because you haven't had enough time to catch up on investment, your lows. Each subsequent low is actually higher. Right, so again if you put all those series together you maybe end up in a cycle."*

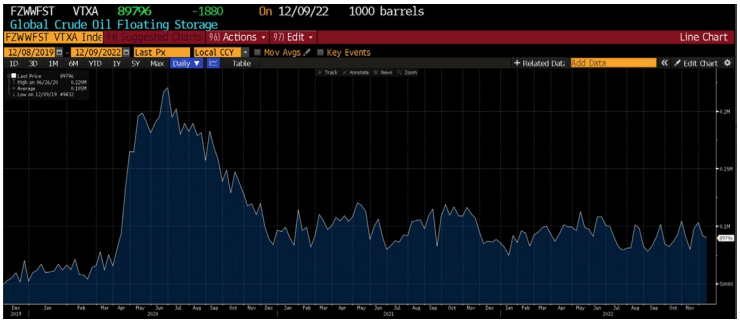
Oil – Vortexa crude oil floating storage 89.80 mmb as of Dec 10, -1.88 mmb WoW

Vortexa crude oil floating storage

There were upward revisions to most of the last several weeks of Vortexa estimates for 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 today on the new estimates are compared to the prior weeks Vortexa estimates posted on Bloomberg on Dec 3 at 10am MT. (i) As of 10am MT yesterday, Bloomberg posted Vortexa crude oil floating storage estimate for Dec 9 at 89.80 mmb, which is -1.88 mmb WoW vs upwardly revised Dec 2 of 91.68 mmb. Note Dec 2 of 91.68 mmb was revised +7.12 mmb vs 84.56 mmb originally posted on Bloomberg at 10am on Dec 2. (ii) Other than the revisions to Dec 2, the range of revisions for the prior several weeks were not large. The revisions from the estimates posted today at 10am MT vs the estimates posted on Bloomberg at 10am on Dec 3 are as follows: Dec 3 revised +7.12 mmb. Nov 25 revised +0.59 mmb. Nov 18 revised -0.95 mmb. Nov 11 revised -1.51 mmb. Nov 4 revised -0.43 mmb. Oct 28 revised -0.43 mmb. Oct 21 revised -0.61 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 still around 95 mmb. (iv) Also remember Vortexa revises these weekly storage estimates on a regular basis and we do not track the revisions through the week. (v) Dec 9 estimate of 89.80 mmb is -130.58 mmb vs the post-Covid peak on June 26, 2020 of 220.38 mmb. (vi) Note that the below graph goes back 3 years and not just 2 years as floating oil storage was in the big ramp up period in Q2/20 as Covid started to have a huge impact. Dec 9 estimate of 89.80 mmb is +40.37 mmb vs pre-Covid Dec 9, 2019 of 49.43 mmb. Dec 9 estimate of

89.80 mmb is +2.77 mmb YoY vs dec 10, 2021 of 87.13 mmb. (vii) Below are the last several weeks of estimates posted on Bloomberg as of 10am yesterday, 10am on Dec 3, and 10am on Nov 26.

Figure 35: Vortexa Floating Storage posted on Bloomberg Dec 10 at 10am MT



Source: Bloomberg, Vortexa

Figure 36: Vortexa Estimates Posted Dec 10 10am MT, Dec 3 10am MT, Nov 26 10am MTT

Posted Dec 10am MT

Date	Last Px
Fr 12/09/2022	89796
Fr 12/02/2022	91676
Fr 11/25/2022	103.023k
Fr 11/18/2022	98439
Fr 11/11/2022	80061
Fr 11/04/2022	90422
Fr 10/28/2022	104.324k
Fr 10/21/2022	92152
Fr 10/14/2022	86547
Fr 10/07/2022	82070
Fr 09/30/2022	84505

Dec 3, 10am MT

Date	Last Px
Fr 12/02/2022	84560
Fr 11/25/2022	102.426k
Fr 11/18/2022	99390
Fr 11/11/2022	81568
Fr 11/04/2022	90847
Fr 10/28/2022	104.752k
Fr 10/21/2022	92757
Fr 10/14/2022	88119
Fr 10/07/2022	82746
Fr 09/30/2022	85376
Fr 09/23/2022	101.147k

Nov 26, 10am MT

Date	Last Px
Fr 11/25/2022	94763
Fr 11/18/2022	100.361k
Fr 11/11/2022	79153
Fr 11/04/2022	87680
Fr 10/28/2022	102.227k
Fr 10/21/2022	90045
Fr 10/14/2022	85100
Fr 10/07/2022	81244
Fr 09/30/2022	85521
Fr 09/23/2022	100.327k
Fr 09/16/2022	87396

Source: Bloomberg, Vortexa

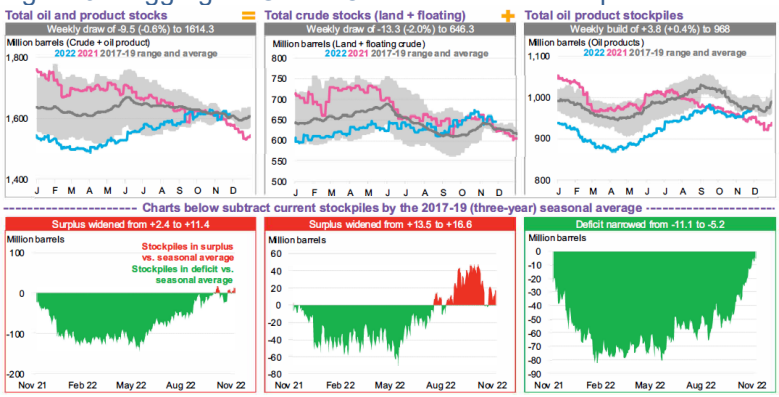
Oil – BNEF: global oil and product stocks surplus widened

BNEF's global oil inventories

For those with a Bloomberg terminal we recommend flipping thru BloombergNEF's "Oil Price Indicators" weekly that came out on Wednesday as it provides good charts depicting near-term global oil demand and supply indicators. The global oil and products stockpile surplus widened for crude and products from 13.5 mmb to 16.6 mmb. The stockpile deficit against the five-year average (2015-19) widened from 42.7 mmb to 55.5 mmb. Total crude inventories decreased by 2.0% to 646.3 mmb, including global floating inventories. Product stocks was up 1.9% WoW with the stockpile deficit against the 3-year average widening from 4.9 to 3.4 mmb. Gas oil and middle distillate stocks have narrowed against their three-year average deficit (2017-2019) from 20.6 mmb to 18.5 mmb. Jet fuel consumption by international departures increased by 67,900 b/d WoW while consumption by domestic passenger departures decreased by 43,200 b/d. Below is a snapshot of aggregate global

stockpiles. Our Supplemental Documents package includes excerpts from the BloombergNEF report.

Figure 37: Aggregate Global Oil and Product Stockpiles



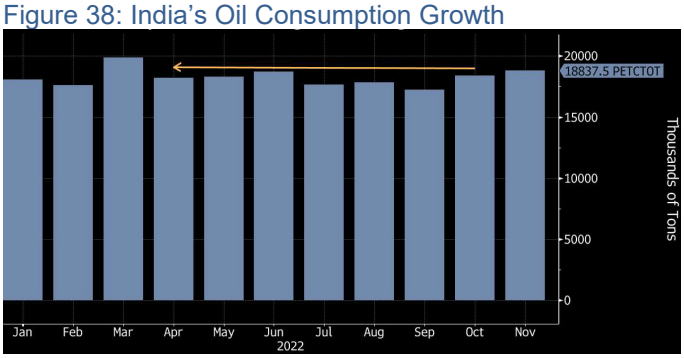
Source: BloombergNEF

Oil – Bloomberg Oil Demand Monitor: India's oil consumption growth a bright spot

Bloomberg Oil Demand Monitor

We recommend reading the Bloomberg Terminal Oil Demand Monitor for a good recap of key oil demand indicators around the world. The Oil Demand Monitor noted India's oil consumption increased, Chinas pivoting Covid-19 strategy, and air travel recovers. Positives for demand this week are Indian fuel consumption grows, a slow recovery in air travel, and a changing zero-covid policy in China. Headwinds still include an anticipated recession. A global recession risk and other negative fuel demand indicators have caused brent prices to drop WoW. Saudi Arabia lowered most prices for Asia, in a sign that the need for oil is declining, with Kuwait's state energy company forecasting a flat or declining customer import level for 2023. China's actual crude demand is expected to fall 2% YoY in 2022. In the US, gasoline demand is down both MoM and YoY, as well as trailing the five-year average. In India, consumption of diesel jumped 19% YoY in November, with demand for gasoline and LPG also rising. Overall oil-product usage added 10%, to the highest since March. For flight demand, global seat capacity continues to trail 2019 levels by about 16%, even with airlines providing about 31% more capacity this year than in 2021. It is expected that flight demand will see a 22% YoY increase in the first quarter of 2023. Elsewhere, China eases its long-held Covid-Zero approach. Below is a figure from the Oil Demand Monitor that highlights the growth in India's oil consumption growth. Our Supplemental Documents package includes the Bloomberg Oil Demand Monitor.

Figure 38: India's Oil Consumption Growth



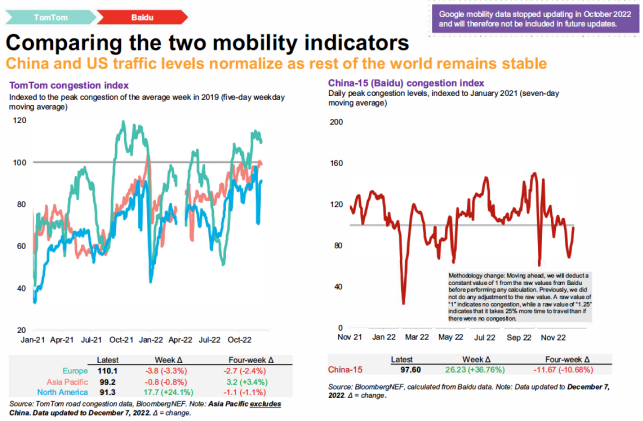
Source: Bloomberg, PPAC

Oil – BNEF, China road mobility indicators increase

Mobility mixed globally

We are big fans of the BloombergNEF weekly indicators reports as they provide updates on WoW changes, but also remind that WoW changes do not necessarily mark a trend. On Friday, BloomergNEF posted its Global Road Traffic Indicators which included a significant jump in North American and Chinese mobility, while the Asia Pacific and Europe both slightly decreased WoW. Mobility in North America jumped following the Thanksgiving dip last week. The softness in the TomTom indicators we highlighted in the last two weeks memo continued this week. Over the last few weeks TomTom trends are moving lower relative to 2019 as two of the three regions dropped WoW. So, it's worth keeping an eye on these indicators as they are happening at the same time as places like the US have seen lower gasoline prices. TomTom congestion index showed Europe down 3.3%, Asia Pacific down 0.8%, China up 36.8%, and North America up 24.1% from last week. Europe and North America are bearish and subject to drivers responding to rising cost, including high gasoline prices. China's mobility data continues to show weekly volatility and reflects the easing of the zero-covid policy and various lockdowns throughout the country. Our Supplemental Documents package includes excerpts from the BNEF Global Road Traffic Indicators report.

Figure 39: BloombergNEF Mobility Indicators



Source: BloombergNEF

Oil & Natural Gas – Exxon see peak oil demand ~2040, peak natural gas demand >2050

Peak oil demand ~2040

We recognize that the climate change side immediately trashes Exxon's long term view on oil and natural gas markets, but the reality is that they have been way more accurate than the IEA Net Zero scenarios. Don't forget the IEA's work are scenarios, whereas Exxon is a forecast that they use as the basis for their capital allocation. And if they really believed oil demand had peaked, we doubt they would be committing to their long term capital programs. On Thursday, Exxon held its 2022 Corporate Plan Update webcast and one of the questions said it was too bad Exxon didn't' publish its long term energy outlook anymore, but CEO Woods said it was stopped during the pandemic but "*In fact I think the energy outlook is actually we've got that online now. So that's probably something that you can reference today."* And it was posted, although nowhere near as long a document or detailed information as in the past. Regardless, we went and then tweeted [LINK] "*Buckle Up! Imagine long-term #Oil #NatGas prices if #Exxon is even within 5 years to being right on timing of peak demand? Exxon 2022 Outlook for Energy: Peak #Oil demand ~2040 even if transportation peaks ~2030. Peak #NatGas demand after 2050. #OOTT [LINK]."* Our tweet included sections of the Exxon excel that shows they forecast peak oil demand ~2040 and that is based on the assumption that transportation demand for oil peaks in 2030. And Exxon forecasts peak natural gas demand is sometime after 2050. Our Supplemental Documents package includes the Exxon forecast table.

Oil & Natural Gas – Manchin may keep some leverage with Sinema leaving the Dems

Sinema leaves Dems to sit as Independent

The initial takeaway from Warnock beating Walker in the Georgia Senate seat runoff was that at 51-49 Democrats, it would take away some of Manchin's leverage with Biden. But things are not clear as of yet with Arizona Senator Sinema (Dem) announcing she would move to sit as an independent and would not caucus with the Democrats. It meant tha the seats are now Dems 50, Republicans 49, and Sinema as an Independent 1. And it seems like Manchin will still retain some of his leverage. Sinema apparently is planning on or hoping to retain her committee positions, but we have to believe there is still some negotiation to come with Schumur on how that would work. But, at least for now, it seems like Manchin is still going to retain some of his leverage with Biden.

Energy Transition – BlackRock warns on accelerating the Energy Transition

BlackRock warns on Energy Transition

Last week, BlackRock posted its '*2023 Global outlook: A new investment playbook*" and, for sure, it's a new playbook that prefers energy and warns on the risk of future energy shortages. (i) This is very much a big picture outlook so it doesn't get into any stock recommendations or even many references to stocks for industry groups. But energy is one of their favored equity sectors and they have a big warning for economic outlook especially as leaders want to accelerate the energy transition because of Russia/Ukraine. Yesterday, we tweeted [LINK] "Big #BlackRock warning 👇can't get rid of #Oil #NatGas without low-carbon truly able to fill the void. "the faster the #EnergyTransition, the more out of sync the handoff could be - meaning more volatile inflation & economic activity". Positive for #Oil #NatGas in 2020s. #OOTT." Sounds like a clear warning that politicians need a reality check on having an Energy Transition that isn't just aspirational, but one that can work without throwing the world in to a lasting economic crisis. (ii) Pg 8, Tactical views. We tweeted [LINK] "*1/2. #BlackRock prefers #Energy stocks in its 2023 Global Outlook. "Among cyclicals, we prefer energy and financials. We see energy sector earnings easing from historically elevated levels yet holding up amid tight energy supply." #OOTT."* Here is their full equities

conclusion. *"In equities, we believe recession isn't fully reflected in corporate earnings expectations or valuations and we disagree with market assumptions that central banks will eventually turn supportive with rate cuts. We look to lean into sectoral opportunities from structural transitions such as healthcare amid aging populations as a way to add granularity even as we stay overall underweight. Among cyclicals, we prefer energy and financials. We see energy sector earnings easing from historically elevated levels yet holding up amid tight energy supply. Higher interest rates bode well for bank profitability. We like healthcare given appealing valuations and likely cashflow resilience during downturns*." (iii) Pg 12, Faster Transition. On one hand, we have to admire the crafty drafting of big companies/governments in how they want to be able to say they warned the world the energy transition wasn't working to aspirations. And then, on the other hand, we get annoyed their crafty drafting doesn't let readers really know they worry about the energy transition. We tweeted [LINK] "*2/2. Is #BlackRock warning #EnergyTransition path is for 2020s Energy Crisis? #Oil #NatGas needed to meet future energy demand under any plausible transition. Economic activity at risk if high-carbon production falls > than low-carbon adds. Faster transition = more risk. #OOTT."* Here is the BlackRock comment "*Yet the transition is set to add to production constraints, in our view. It involves a huge reallocation of resources. Oil and gas will still be needed to meet future energy to meet future energy demand under any plausible transition. If high--carbon production falls faster than low--carbon alternatives are phased in, shortages could result, driving up prices and disrupting economic activity. The faster the transition, the more out of sync the handoff could be – meaning more volatile inflation and economic activity*." It seems like a big warning to the western leaders who have all come out with the need to accelerate the energy transition because of Russian/Ukraine. BlackRock seems to be warning – watch out, there could be more volatile inflation and economic activity if low carbon isn't added fast enough to the western leaders desire to phase out high carbon. Our Supplemental Documents package includes excerpts from the BlackRock 2023 Global Outlook.

June 2, 2021, BlackRock's Fink "we do not have the technology to do all this"

BlackRock CEO Fink warned on that the energy transition wasn't ready 18 months ago. Here is what we wrote in our June 6, 2021 Energy Tidbits memo. "*Our longstanding view is unchanged - we believe the world is being put on a path and that energy transition is happening but that it will take longer, be a bumpy road and cost more than the aspirations. It also means the demise of oil and natural gas will not be as fast as hoped for by the energy transition and policymakers aspirations. On Wed, BlackRock CEO Larry Fink spoke at a US sellside conference and he made several comments that are in line with our thesis. Don't forget Fink has been one of the global financial leaders supporting and pushing the energy transition view. Fink isn't talking about anything new, but hopefully the policymakers will listen. Fink says several comments on this thesis, but concluded "The last thing I just want to say and to link in ESG&E with the question on inflation, let's be clear. If we rush this and if our solution is entirely just to get a green world, we're going to have much higher inflation, because we do not have the technology to do all this yet to have it equivalent to the cheapness of hydrocarbons. And so that's going to be a big policy issue going forward too. Are we going to be willing to accept more inflation if the inflation is to accelerate our green footprint? And that's going to be a big policy question". Note there are numerous other relevant Fink comments. Our*

Supplemental Documents package includes Finks' numerous comments on the energy transition."

The technology concern has been well known, just ignored by policymakers

Technology to support the Energy Transition not being ready is not new. It's just been ignored. We just don't get why policymakers have ignored that technology isn't there yet for the aspirations of energy transition. In H1/21, we noted John Kerry's comments that 50% of the emissions reductions will come from technologies to be developed. Note he subsequently kind of backtracked on that. But technology not being ready was the key reason for the blog we wrote 30 months ago, our June 11, 2020 blog "*Will The Demise Of Oil Take Longer, Just Like Coal? IEA and Shell Highlight Delays/Gaps To A Smooth Clean Energy Transition*". One of the items from that blog was "*The IEA reminds the energy transition has many "critical energy technologies", the vast majority of which are not on track. There was an excellent illustration of the many significant areas, or major pieces of the puzzle, involved in an energy transition by the IEA last week. The IEA also noted the progress of each of the major pieces and the overall conclusion is that the vast majority of the pieces are behind or well behind where they should be to meet a smooth timely energy transition. It is important to note that these are just what the IEA calls the "critical energy technologies" and does not get into the wide range of other considerations needed to support the energy transition. The IEA divides these "critical energy technologies "into major groupings and then ranked the progress of each of these pieces in its report "Tracking Clean Energy Progress" [LINK] by on track, more efforts needed, or not on track".* Our Supplemental Documents package includes our SAF Group June 11, 2020 blog.

Figure 40: IEA's Progress Ranking for "Critical Energy Technologies" for Clean Energy Transition

Power	Renewable Power Solar PV Onshore Wind Offshore Wind Hydropower Bioenergy Power Generation Concentrating Solar Power	Geothermal Ocean Power Nuclear Power Natural Gas-Fired Power Coal-Fired Power CCUS in Power
Fuel Supply	Methane Emissions from O&G	Flaring Emissions
Industry	Chemicals Iron and Steel Cement	Pulp and Paper Aluminum CCUS in Industry and Transformation
Transport	Electric Vehicles Rail Fuel Consumption of Cars and Vans Trucks and Busses	Transport Biofuels Aviation International Shipping
Buildings	Building Envelopes Heating Heat Pumps Cooling	Lighting Appliances and Equipment Data Centres and Data Transmission Networks
Energy Integration	Energy Storage Hydrogen Smart Grids	Demand Response Direct Air Capture

Source: IEA

On Track | More Efforts Needed | Not on Track

Source: IEA Tracking Clean Energy Progress, June 2020

BlackRock gets hit by Bluebell on not following thru on its climate change

No one should be surprised that BlackRock is now taking hits from the climate change side who don't like what they believe is BlackRock backtracking on their ESG positions. It's kind of hard to argue against the climate change side. BlackRock was the most prominent investor being pro climate change and, as we have been highlighting over the past year, started to backtrack from that sole vision. We have also noted they are not alone in that backtrack. Our Energy Tidbits memos have been highlighting how BlackRock has been getting hitting by states, most recently Florida and Louisiana, taking their capital away from BlackRock because they lost confidence in BlackRock's ability to generate the best returns for them in light of BlackRock's social activism. Now they are taking shots from climate change side on their backtracking on their climate change statements. On Tuesday, WSJ [LINK] reported "*BlackRock Draws Activist Gunning For CEO Fink. Activist investor Bluebell Capital Partners Ltd. has taken a position in BlackRock Inc. and is calling for Larry Fink to be replaced as chief executive officer.*
Bluebell wrote to the big asset manager's board last month, arguing that BlackRock has failed to live up to its commitments on so-called ESG initiatives, according to a copy of the letter reviewed by The Wall Street Journal. Bluebell is also asking BlackRock to initiate a strategic review of its stance on ESG and appoint a new lead independent director who would replace the current one, Murry Gerber."

Energy Transition – Norway wealth fund realizes energy transition will take longer

Norway wealth fund Strategy

This week, we saw one of the best examples of "careful" drafting from Norges Bank Investment Management, the manager of Norway's massive wealth fund. (i) The backdrop to their new strategy has been the negative returns in 2022 and their initial steps last December that they wouldn't be selling oi and gas integrated stocks. Luckily they did that. (ii) This week, they posted their Strategy 25, which we decided to do a word by word comparison of their relatively short Strategy outlines compare to their prior posted Strategy from Apr 7, 2021. (iii) No surprise, there were some significant changes to their strategy, which we believe were driven by results. (iv) Yesterday, we tweeted [LINK] "*OOPS! Note 👇comparison of Norway wealth fund's new 12/22 strategy vs 04/21 strategy. Seems Norway now realizes #EnergyTransition will take longer, cost more, etc. 12/22 new sentence "Managing climate-related risks and opportunities is a key priority. ... 1/2. #OOTT"* and [LINK] "2/2. ..."*We have a financial interest in an orderly energy transition in line with the Paris Agreement. We will drive the companies we invest in towards net zero emissions by 2050." Why not just say it, #Oil #NatGas is needed for longer. #OOTT."* (v) There were other changes in the new Strategy that point to the same point – they are changing how they look at the risks/opportunities from climate ie. it seems like the implied message is there is more risk than they thought form the energy transition. (vi) In comparing the two strategies, there are things like making sure people know it's the government that dictates the asset classes they can invest in. They don't say their climate approach has been wrong, but say they will sharpen their expectations on climate change. They also don't say they climate change approach has been wrong but this year they talk about how they "will develop their principles for climate risk management". This year they also highlight how they "*have a financial interest in an orderly energy transition*" instead of saying the energy transition plan is wrong.

And more. Our Supplemental Documents package includes the comparison of key quotes from the new vs last year's strategy and most of the text from the new Strategy 2025.

In Dec 2021, Norway wealth fund changed its stance on oil and gas stocks
As noted above, Norway's wealth fund did change their stance a year ago on oil and gas stocks. 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." At that time, we wrote "*Energy Transition – Norway's wealth fund is another that isn't selling oil & gas. 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.*"

Energy Transition – Exxon CEO, policymakers changing energy transition approach

Exxon CEO on policymakers

On Tuesday, Exxon CEO Darren Woods was interviewed at the Wall Street Journal's CEO Council Summit. The WSJ report highlighted the Exxon view that fossil fuel demand isn't peaking. The WSJ report [LINK] also included the video replay of the interview . We listened to the replay and Woods reminds that the energy transition was flawed before the Russian invasion of the Ukraine. And he also noted that he is starting to see policymakers stepping back on how they are approaching the energy transition. We made a transcript of the Q&A with WSJ editor Elena Cherney. Items in italics are SAF Group created transcript. At 0.01

min mark, Cherney "*the Ukraine War has shown the vulnerability of the world's energy supply, how has this crisis redefined the West's approach to energy?"* Woods "*I think what we are seeing, actually even before the Russian invasion of Ukraine is what has been I think a policy and approach dominated by ideology, aspiration, hope, kind of collide with the realities of a global energy system that is complicated, multi-dimensional and critically important to economic growth and people's prosperity. So what we are seeing today play out is what has been taken for granted for quite some time become more of an important lens to view this transition and the very real challenge of dealing with the threat of climate change and reducing emissions, but doing it in a way that more effectively addresses a number of the dimensions of the problem: national security being just one of those. Affordability, reliability, availability of energy. All critically important and I think what we are seeing today now is policymakers stepping back and looking at managing this transition through that lens and evaluating the impact and the balance between those different dimensions. And hopefully, striking a better policy and a better approach*."

Energy Transition – Our #1 prediction for 2023 is same as our #1 prediction for 2022

Energy Transition isn't working as planned

Throughout 2022, we have seen political and business leaders step back from their actions that the energy transition plan was working. The beauty is they have the cover to blame it on Russia/Ukraine and, no question, that has had a big impact. But this was happening a year ago. It really started with Macron on the eve of COP26. In 2022, we are seeing leaders not want to directly say it isn't working, but they will craftly draft their messages (as Norway wealth fund earlier) or just back away from their energy transition plans, or just say it will cost way way more. Regardless, it all fits our long-stated view that the Energy Transition is happening but it will take longer, cost a lot more and be a bumpy/rocky road. No one disagrees that that is the aspiration, but it hasn't been working. And, as Exxon CEO notes above, it wasn't working prior to Russia invading Ukraine. This was exactly our view a year. So when we look at the big global themes that are shaping economies and energy, we have a similar view as one year ago, we expect to see more leaders admit, directly or by their actions, that the energy transition isn't working as they planned/aspired.

Excerpt Dec 12, 2021 Energy Tidbits memo on our 2022 prediction

Note all of the below in *"italics*" is from what we wrote a year ago, when our Dec 12, 2021 Energy Tidbits memo was titled "*Time for 2022 Predictions: Our #1 is More Leaders Have a #MacronMoment & Admit Energy "Transition" Needs Changes*". Here is what we wrote a year ago "*It's December and so analysts will soon be coming out with 2022 predictions, so we thought we would beat them with one of our main 2022 predictions. On Thursday, we tweeted [LINK] "Time for #2022Predictions. My #1 is more #EnergyTransition #NetZero leaders come out of closet, have a #MacronMoment ie. have "transition" not self inflicted shortage so 2021 energy crisis isn't every year. A return to #EnergySecurity = #Oil #NatGas #LNG strong thru 2030. #OOTT." This should not surprise readers as we have been noting the start of energy transition leaders starting to admit, in a politician's manner, that the energy transition isn't working as per aspirations and energy costs will be a lot higher than aspired. We have said for years that the energy transition will happen, but it will take longer, be bumpy road and cost more than the aspirations. Last week's (Dec 5, 2021) Energy Tidbits wrote on the ADNOC CEO speech There was much more in the speech, which is why we tweeted [LINK] "If more leaders have a "Macron Moment" in*

2022, maybe COP28 UAE in 2023 can be catalyst for getting down to work on practical, commercial, sustainable energy solutions: pro climate/pro growth? See SAF Group transcript of @SultanAhmedalj8 #ADIPEC keynote. #EnergyTransition #OOTT." We do wonder if we will see more world leaders accept that the energy transition isn't working according to their aspirations and that there is an increasing risk of a decade of energy crisis like seen in Europe in H2/21 unless the world puts in an achievable energy transition plan." We think COP26 will turn out to be turning point, but a turning point to force energy transition leaders into changing their plan. It why we think we will more of the energy transition leaders come out of the closet and admit this in 2022. But what got us to tweet this week was after seeing Saudi Aramco CEO Nasser speech at the WPC in Houston. Nasser said "There is one more thing that can no longer remain unsaid. A majority of key stakeholders agree with these realities as much as they believe in addressing climate change. We know this, because they say so in private. They should say it publicly too. I understand their dilemma. Publicly admitting that oil and gas will play an essential and significant role, during the transition and beyond, will be hard for some." So our #1 2022 Prediction is that we will see leaders come out of the close and admit, in a politician's way, that the energy transition plan needs to be changed. The key result will be that fossil fuels are needed for way longer and the outlook for oil, natural gas and LNG will be stronger thru 2030 and beyond."

A #MacronMoment can take three forms

We use the term "Macron Moment" and the #MacronMoment as when an energy transition leaders come to the realization that the energy transition will take longer, be bumpy and cost more ie. it just won't be ready for prime time and they need to change their plans on how quickly they get rid of oil and natural gas. We are already seeing politicians start to publicly have a #MacronMoment but, so far, it has come in three forms of admission as noted below.

First, a direct #MacronMoment clearly saying it isn't working as planned

We aren't picking on Macron, but he recently said it the clearest when he warned the energy transition aspiration has to be modified/reduced or else there will be years of an energy crisis. And, even more importantly, he wants to bring a more pragmatic Energy Transition plan to the EU. On Nov 9, we tweeted [LINK] on Macro's address to the nation [LINK] that closed with his call for a more practical approach to the CO2 emissions and one that will include Europe. Macron said "But France will not be strong alone. With the European Union:➔ We will be able to build a credible strategy for reducing our CO2 emissions, compatible with our industrial and technological sovereignty." The Macron release had at the bottom a reminder "Next January, it is a new model of investment and growth that the President will defend with the French presidency of the Council of the European Union." The day before COP26 started, we tweeted [LINK] on Macron's comments to the FT [LINK] that was a clear view on higher fossil fuel prices for the foreseeable future. Macron said "on demand for fossil fuels isn't going away for the foreseeable future. Macron said "What is happening now is ironic, because we are building a system where in the medium and long term

fossil energy will cost more and more, that's what we want [to fight climate change]." he said." Japan is another calling for a pragmatic time frame ie a change in the plan.

Second, Japan says must have a "pragmatic time frame" for decarbonization
No one should is surprised to see how Japan says their #MacronMoment. They don't say it isn't working, they don't say energy costs are way higher than expected. But they do clearly make the point. They say it important to have a pragmatic time frame for decarbonization. That sounds like Japan-speak for the energy transition aspirations plan isn't working and needs to be changed. On November 9, Japan and the IEA issued a press release and we tweeted [LINK] "Today's Japan "go slow" getting rid of #Oil #NatGas fits Japan's Nov 9 on acceleration of decarbonization that must have "the importance of measures with pragmatic time frame". Japan is having a "Macron Moment". See Nov 9 tweet [LINK] #OOTT." On Nov 9, we tweeted [LINK] on Japan's release [LINK] on its conference with IEA Executive Director Faith Birol. Japan wrote "The two sides also exchanged views on acceleration of decarbonization efforts following COP26, and shared the importance on measures with pragmatic time frame based on individual circumstances that each countries face including its renewable energy potentials". A pragmatic time frame or a go slow process, whatever you want to call it, it means the same thing – Japan doesn't want to get rid of fossil fuels too quickly.

Third, US doesn't say it isn't working, just higher energy costs for yrs to come
US Energy Secretary Granholm has shown the third way of admitting the energy transition plan isn't working. She doesn't say specifically the energy transition plan isn't working or needs to be changed. She just avoids saying that. But she puts on the record that high energy costs are here for years. No one ever heard the Biden sales pitch on accelerating the push to Net Zero and reducing emissions including the warning that this will mean higher energy prices are here for years. That wasn't in the sale pitch. Here is what we wrote in our November 14, 2021 Energy Tidbits "Last week's (November 7, 2021) Energy Tidbits noted Biden seemed to also acknowledge a longer life for oil and natural gas. On Oct 31, we tweeted [LINK] "Is #Biden following #Macron & finally realizing demand for #Oil #NatGas is going to be more for 2020s than in his #NetZero aspiration? Oops, cancel #KeystoneXL, do zero to support US oil supply growth, etc. 2020s will be very good for #Oil #NatGas prices & #OPEC+. #OOTT." Biden wasn't as direct as Macron the week before on demand (see our Oct 31, 2021 Energy Tidbits), but seemed to be acknowledging demand for oil isn't going away as fast as he had planned. And, as everyone now knows, supply has been hurt by lack of oil investment so its sets up the tighter oil market for the 2020s. In his closing G20 press conference, Biden said "Well, on the surface, it seems like an irony, but the truth of the matter is — you've all known; everyone knows — that the idea we're going to be able to move to renewable energy overnight and not have — from this moment on, not use oil or not use gas or not use hydrogen is just not rational." Energy Secretary Granholm was on MSNBC Morning Joe on Monday. We tweeted [LINK] on her comments and noted she that US/Can voters weren't warned in the recent elections that the Energy Transition will happen but will lead to higher prices on oil, natural gas and electricity for years to come. We created a transcript of her saying "So the long term strategy is that. and yes we have

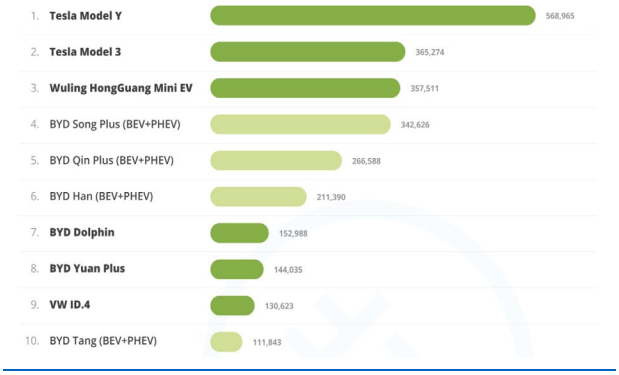
a short term cost issue because the economy is still coming back on . we have a supply, demand that does not, the supply doesn't meet the demand. that is an issue we are going through. The president is all over this both in the short term and in the long term."

Energy Transition – EVs gain market share in global vehicle sales

We continues to see EVs sales continue to ramp up all around the world and that shows up as EVs increase market share in new care sales. On Monday, CleanTechnica reported [LINK] on the current level of EV sales and their market share relative to global sales. They reported that both registrations of EVs and sales of EVs were up in October. This should come as no surprise as the continued trend towards net zero puts pressure on countries and individuals to become greener. The article wrote, *"Global plugin vehicle registrations were up 55% in October 2022 compared to October 2021, reaching 932,000 units, the second-best result ever. That was only behind the record 1,040,000 registrations of the previous month of September. With such a strong month in October, plugins represented 16% share of the overall auto market."* It seems limited incentive programs and China purchases are propping up the EV market, which are not sustainable. An important note that although the plugin hybrid vehicles are up +60% YoY, China makes up a majority of this and if excluded, plugin hybrid vehicles are only up +5% YoY. Below is a chart containing the best selling plugin vehicles across the globe and total units sold between Jan and Oct 2022. Our Supplemental Documents package includes the CleanTechina release.

11% of new vehicle sales globally are all electric

Figure 41: Best Selling Plugin Vehicles in the World



Source: CleanTechina

Energy Transition – Sustainable aviation fuel ramping up but still 0.1% of total jet fuel

We have been highlighting that the biggest challenge for sustainable aviation fuel (SAF) is how the SAF suppliers note the huge relative cost to jet fuel. SAF production is increasing at a fast rate, but its penetration is still at most 0.1% of total jet fuel consumption. On Wednesday, the IATA released [LINK] "*2022 SAF Production Increases 200% - More Incentives Needed to Reach Net Zero Geneva) – The International Air Transport Association (IATA) estimates that Sustainable Aviation Fuel (SAF) production will reach at least 300 million liters in 2022—a 200% increase on 2021 production of 100 million liters. More optimistic calculations estimate total production in 2022 could reach 450 million liters. Both scenarios position the SAF industry on the verge of an exponential capacity and production*

SAF is 0.1% of total jet fuel

ramp-up toward an identified tipping point of 30 billion liters by 2030, with the right supporting policies." On Wed, we tweeted [LINK] "*#EnergyTransition is happening but will take way longer than aspirations. Especially if Sustainable Aviation Fuel is to account for 65% of #FLYNetZero @IATA "optimistic calculations" est 450 million "liters" SAF in 2022 is ~0.1% of #JetFuel consumption pre-Covid in gallons #OOTT."* We compared the "optimistic calculations" estimate of 450 million liters to the IATA's prior presentation figure out it was ~0.1% of 2019 jet fuel consumption. And if SAF is to account for 65% of the FlyNetZero targets, then it is another reminder why the Energy Transition will take way longer than expected. Our Supplemental Documents package includes the IATA release.

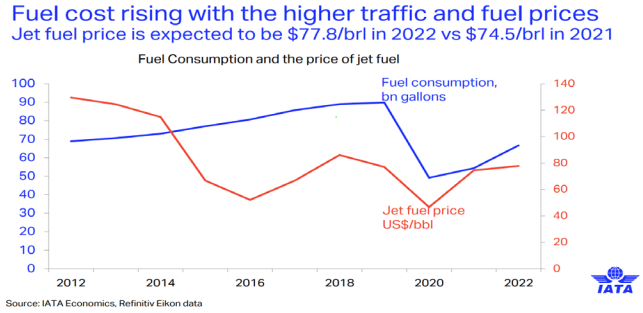
Figure 42: Sustainable Aviation Fuel Production to Date

SAF Production To-Date

YEAR	2019	2020	2021	2021E
Estimated SAF Output (Million Liters)	25	62.5	100	300-450

Source: IATA

Figure 43: Jet Fuel Consumption



Source: IATA

Climate Change – Venice's MOSE system worked when it was activated

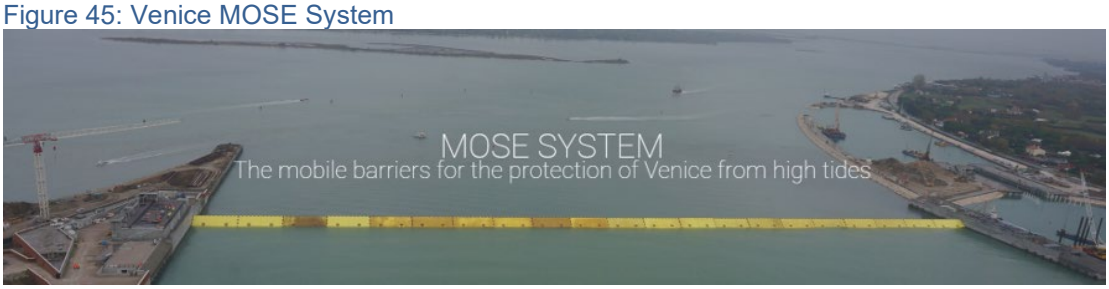
Venice's MOSE flood system

We hadn't seen this report until this morning on CTV National News on how there was major flooding this week in Venice when the new MOSE flood prevention system didn't activate. It has been working and prevented flooding, but didn't activate earlier this week. On Wed, CTV reported [LINK] "I*t was an event that was never meant to happen again. After suffering centuries of flooding, Venice held back the sea for the first time in 1,200 years in October, thanks to the activation of its long-awaited flood barriers. Tested for the first time in adverse conditions, their successful deployment kept the historic centre dry for the first time in the city's history. It meant that the devastating floods of 2019 -- which caused more than US$1 billion worth of damage to the city -- should be a thing of the past. In the two months since its introduction, at the start of what would traditionally be the flooding season, the barrier system, known as MOSE, has been successfully activated five times -- including for a three-day period last week. But on Tuesday, the barriers were not raised, and the city flooded again. St Mark's Square, one of the lowest parts of the city, was particularly badly hit, with water thigh deep."* Our Supplemental Documents package includes the MOSE overview.

Figure 44: Best Selling Plugin Vehicles in the World

Source: CTV

Figure 45: Venice MOSE System



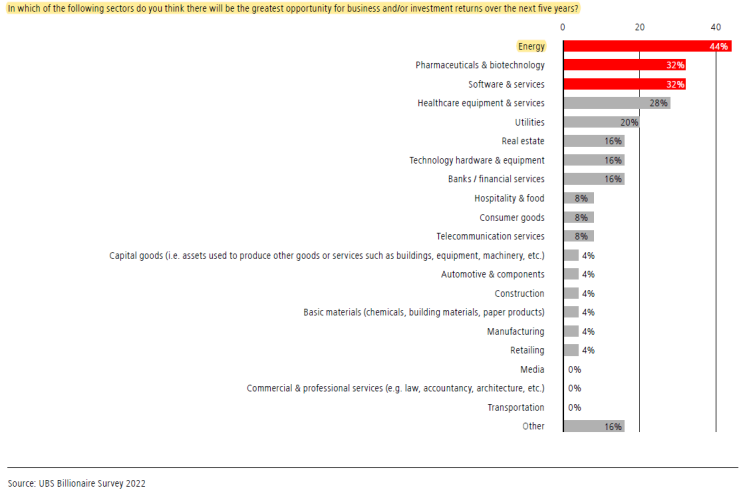
Source: MOSE

Capital Markets – UBS billionaires, energy is top investment opportunity for next 5 yrs

UBS billionaires favor energy

The headline from this week's UBS Billionaires Ambitions Report 2022 [LINK] is how, as of March 2022, the number of billionaires was -87 to 2,668 billionaires. But, on Friday, we tweeted [LINK] *"#UBS survey of 50 billionaire clients says energy 44%, pharma/bio 37%, software 32% as to where they see the most potential in the next 5 yrs when it comes to purely commercial & investment opportunities. unfortunately, didn't split out #NatGas #Oil etc vs renewable. #OOTT,"* Note this was the survey results of 50 of the UBS billionaire clients. In the introduction, UBS noted a big difference in this year's billionaires report. UBS wrote "*For the first time, we have spoken to UBS's billionaire clients for this report, canvassing 50 of them for their views on how to approach global challenges in a two-stage exercise, including both a survey and questions at a UBS event."* The unfortunate part is that UBS didn't split energy into oil & natural gas vs renewable energy. UBS wrote "*When it comes to purely commercial business and investment opportunities, the billionaires surveyed have clear ideas about where they see most potential in the next five years (irrespective of global challenges). From a sector perspective, they favor energy, possibly due to today's supply constraints and the accelerating secular transition to renewables."*

Figure 46: Energy viewed as top sector for business/investment returns



Source: UBS

Capital Markets – Big Oil shares continue to far outperform oil prices

Big Oil shares outperform oil prices

One of the big changed trends in 2022 has been how large funds have changed their public stance on investing in oil and gas stocks. In particular, this is for the Big Oil shares that Exxon. As a result, this has led to big outperformance in the Big Oil shares versus oil prices and this has been most pronounced since the price oil crashed off its recent June 8 peak. We have had a number of tweets tracking that outperformance. That outperformance narrowed a bit this week as one of the big US sellside firms recommended its time to sell oil stocks as their massive outperformance relative to oil prices isn't likely to last Regardless, the outperformance continues to be strong. In our tweet, we ask if its revaluation of the Big Oil and/or investors believing oil prices are going back up. Here is the comparison as of Friday close vs the recent June 8 Brent oil price peak. June 8: Brent $123.58. Exxon $104.59. Chevron $181.13 Dec 9: Brent $76.10. Exxon $103.54. Chevron $168.00. Percentage change: Brent -38.4%. Exxon -1.0%. Chevron -7.2%.

Figure 47: Brent oil price, $/b

Source: Bloomberg

Figure 48: Exxon Share Price

Source: Bloomberg

Figure 49: Chevron Share Price

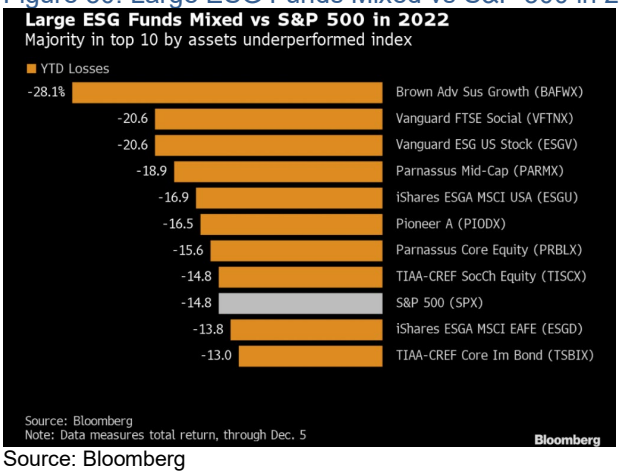
Source: Bloomberg

Capital Markets – Big ESG funds having a tough year

Big ESG Funds are underperforming

The underperformance of ESG funds seems to be getting more attention with how states are taking money away from BlackRock. And it is close to year-end so we are seeing the recap of what did the best or worst in 2022. On Wednesday, Bloomberg posted "*Big ESG Funds Are Doing Worse Than the S&P 500: Green Insight. Funds linked to environmental, social and governance principles are by definition supposed to minimize risks tied to those three factors. In 2022, the approach did little to help protect investors from the brutal slide in the financial markets. The 10 largest ESG funds by assets have all posted double-digit losses, with eight of them falling even more than the S&P 500's 14.8% decline. The laggards include BlackRock Inc.'s $20.7 billion iShares ESG Aware MSCI USA exchange-traded fund (ESGU) and Vanguard Group's $5.9 billion ESG US Stock ETF (ESGV).* Our Supplemental Documents package includes the Bloomberg report.

Figure 50: Large ESG Funds Mixed vs S&P 500 in 2022



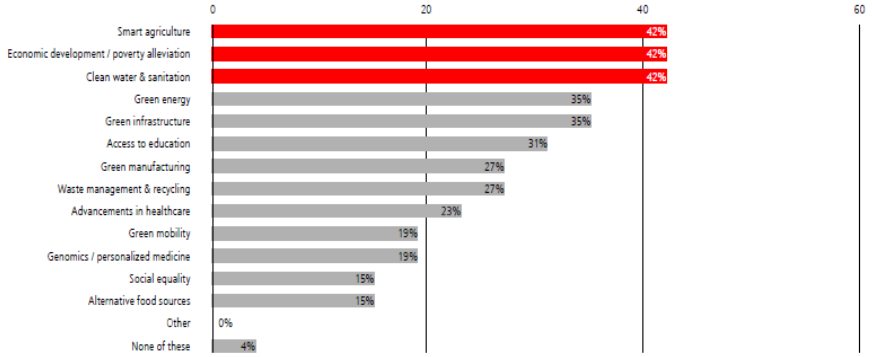
Source: Bloomberg

Demographics – Number of billionaires down 87 YoY to 2,668

Slightly lower number of billionaires YoY

Earlier, we noted how billionaires favor energy as their top sector for equities. It is important to note that this billionaires data is as of March 2022 and we would expect there will be less tech billionaires if the data was up to today. On Thursday, UBS posted its *Billionaire Ambitions Report 2022* [LINK]; giving an overview on ultra-wealthy capital allocation and current billionaire status. It reported that the number of billionaires as of March 2022 decreased to 2,668 with a total wealth of US$12.7T, down 87 YoY from 2,755 and US$13.1T in 2021. UBS notes that due to the global decline in asset prices, both number of billionaires and total wealth has likely to have fallen. The UBS survey found smart agriculture, alleviation of poverty, and clean water were the main areas of focus for billionaires with geographical emphasis on North America, Asia-Pacific, and Mainland China. Sectors that saw the most billionaires fall was fashion and retail (45), manufacturing (37), and real estate (35). Below is a chart of the areas of focus for billionaires and governments. Our supplemental documents package contains excerpts from the UBS report.

Figure 51: Areas of focus for billionaires and governments



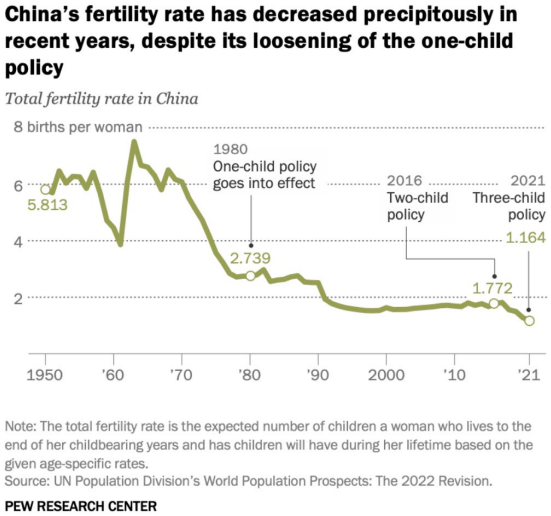
Source: UBS

Demographics – China's fertility rate is nowhere near replacement rate

China's low fertility rate

The reminder about demographics is that they are predictive. Demographic trends don't turn around overnight so it's why the reality is that China is an ageing population. We have had a number of recent items on China's ageing population. This week, we saw a good Pew Research graph [LINK] that highlighted the key reason for an ageing population – a fertility rate far below the replacement rate. Pew wrote "*China's 2022 total fertility rate is estimated to be 1.18 children per woman – down substantially from earlier decades and significantly below the "replacement rate" of 2.1 children per woman. This is despite the relaxation of the country's well-known one-child policy, which was introduced in 1980 but amended to allow two children beginning in 2016 and three children beginning in 2021. A chart showing that China's fertility rate has decreased precipitously in recent years, despite its loosening of the one-child policy. Notably, fertility rates in China were already falling prior to the introduction of the one-child policy, as they often fall alongside economic development and urbanization. And aside from a brief one-year increase following the allowance of a second child, fertility rates have continued to fall in China.*

Figure 52: China's declining fertility rate



Source: Pew Research

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

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

Look for energy items on LinkedIn

Misc Facts and Figures.

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

Massive draw on Javelin/Stinger missiles to support Ukraine

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

Joey Chestnut loses St. Elmo Shrimp Cocktail eating for 1st time in 9 years

There was a massive upset in the Major League Eating circuit when Joey Chestnut lost the St. Elmo Shrimp Cocktail eating contest after winning all eight years the contest has been held. In fact, Chestnut ended up 4th. Major League Eating tweeted "*THE STREAK FALLS! DREAMS BECOME REALITY! Geoff Esper with a staggering 16 lb. 6.4 oz. of @stelmo Shrimp Cocktail in 8 mins #ANDTHENEW World Famous St. Elmo Shrimp Cocktail Eating Champion!!"* Esper ate over 2 pounds of shrimp cocktail a minute.

Figure 53: Geoff Esper and Joey Chestnut

Source: MSN