Energy Tidbits

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China Speeding to Herd Immunity, Reports of Big Pick Up in Activity in Cities Like Beijing that have Hit Peak Covid

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. Peak Covid being hit in multiple major Chinese cities and reports of big pick up in activity in cities like Beijing that have hit peak Covid ie. setting up big pick up in fuels consumption. (Click Here)
2. Still no word on BC's Nov 26 being "very close" to an agreement with Blueberry First Nations. (Click Here)
3. Very warm weather expected across almost all the US for first half of Jan. (Click Here)
4. Novak confirms Russian doesn't yet have the technology for large-scale LNG export projects. (Click Here)
5. Cdn oil and gas stocks hugely outperformed other sectors and oil and gas prices in 2022 (Click Here)
6. Happy New Year! I wish good health and happiness to everyone and their families. Thank you for your support in 2022.
7. 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.
8. For new readers to our Energy Tidbits and our blogs, you will need to sign up at our blog sign up to receive future Energy Tidbits memos. The sign up is available at [LINK].

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Natural Gas – Natural gas draw of -213 bcf, storage now -133 bcf YoY deficit

YoY storage at -133 bcf YoY deficit

The YoY deficit widened from -45 bcf YoY for Dec 16 to -133 bcf YoY as of Dec 23. This widening was expected given Dec 2021 was the #1 hottest Dec in the last 127 years. The EIA reported a -213 bcf draw (-198 bcf expectations) for the Dec 23 week, which was a larger draw vs the 5-yr average of a -106 bcf draw, and last year's draw of -136 bcf. Storage is 3.112 tcf as of Dec 23, with a now YoY deficit of -133 bcf YoY vs -45 bcf YoY deficit last week and is -85 bcf above the 5-year average vs +22 bcf above 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 (12/23/21)		5-year average (2017-21)	
Region	12/23/22	12/16/22	net change	implied flow	Bcf	% change	Bcf	% change
East	747	789	-42	-42	782	-4.5	767	-2.6
Midwest	899	974	-75	-75	924	-2.7	914	-1.6
Mountain	166	178	-12	-12	181	-8.3	181	-8.3
Pacific	165	186	-21	-21	237	-30.4	257	-35.8
South Central	1,136	1,199	-63	-63	1,122	1.2	1,078	5.4
Salt	323	340	-17	-17	327	-1.2	315	2.5
Nonsalt	813	858	-45	-45	794	2.4	764	6.4
Total	3,112	3,325	-213	-213	3,245	-4.1	3,197	-2.7

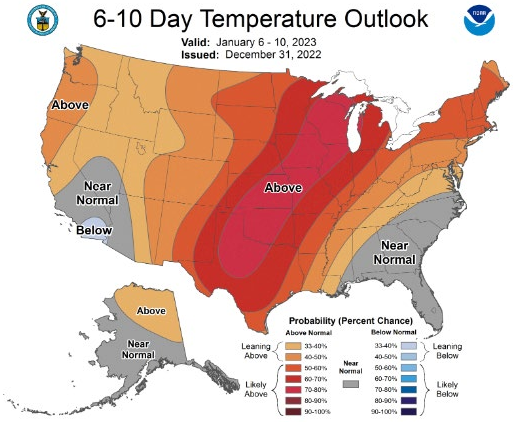
Source: EIA

Natural Gas – NOAA expects warm temps across almost all the US thru mid-Jan

NOAA 6-10 & 8-14 day temp outlook

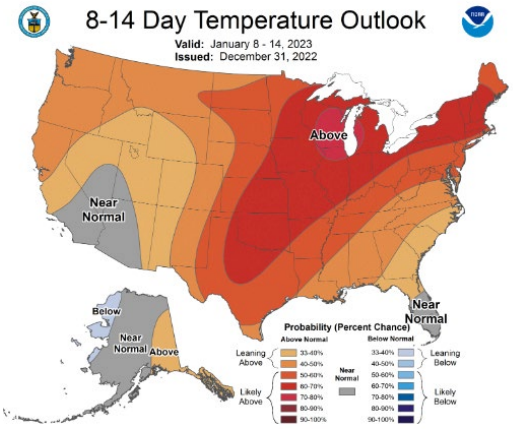
Yesterday, we tweeted [LINK] "*No wonder HH #NatGas is ~$4.50. No change to forecasts, still expect warmer than normal temps across almost all the US thru mid-Jan, which is normally peak winter temperature driven demand period. Thx @NOAA. #OOTT.*" Our tweet inlcuded NOAA's yesterday's updated 6-10 day and 8-14 day outlook that run up thru Jan 7. NOAA's forecast calls for warmer than normal temperatures acorss almost all of the US, and Jan is typically peak weather driven natural gas demand period. elow 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 31



Source: NOAA

Figure 3: NOAA 8-14 day temperature outlook as of Dec 31



Source: NOAA

Natural Gas – US October gas production 100.5 bcf/d, continuing to move higher

There is no change to the US natural gas story that US natural gas supply, driven by shale/tight natural gas, continues to be up strongly YoY. The EIA released its Natural Gas Monthly on Friday, [LINK], which includes its estimates for "actuals" for October gas production. The key takeaway from the October actuals is that October (+0.0 bcf/d MoM to 100.5 bcf/d) is at its highest point, after revised September to 100.5 bcf/d from 99.9 bcf/d and is still comfortably above the pre-Covid February 2020 level of 98.1 bcf/d. October 2022 is +5.0 bcf/d YoY. Our Supplemental Documents package includes excerpts from the EIA Natural Gas Monthly.

US October gas production +5.0 bcf/d YoY

Figure 4: US Dry Natural Gas Production

bcf/d	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Jan	56.0	60.0	66.0	65.3	66.8	73.4	73.6	70.6	78.7	89.4	95.1	92.8	95.3
Feb	57.2	58.8	67.0	65.4	68.4	73.8	77.3	71.5	80.4	90.0	98.1	86.2	94.5
March	57.3	61.5	65.0	65.3	68.9	74.1	73.8	73.2	81.3	90.6	94.6	92.3	95.4
Apr	57.6	62.3	64.8	66.1	70.5	75.2	73.7	73.3	81.2	91.0	92.9	93.2	96.5
May	58.0	62.4	65.0	65.9	70.2	74.1	72.9	73.3	82.1	91.7	87.8	93.0	97.7
June	57.2	62.1	64.6	65.8	70.5	74.0	72.2	74.0	82.5	92.0	88.4	93.2	98.5
July	58.2	62.5	66.3	67.1	72.0	74.2	72.8	74.7	84.2	92.5	89.8	93.7	98.5
Aug	58.9	63.2	66.0	66.9	72.4	74.3	72.2	74.7	85.9	94.8	90.2	94.3	99.3
Sept	59.1	63.1	66.4	66.8	72.4	74.7	71.7	76.0	87.3	94.7	89.5	93.6	100.5
Oct	60.1	65.1	66.5	67.0	73.1	74.2	71.4	77.3	88.4	96.0	88.9	95.6	100.5
Nov	60.1	65.9	66.6	67.7	72.6	73.9	72.0	79.8	89.9	96.7	92.0	97.0	
Dec	61.0	65.6	66.0	66.5	73.2	73.9	71.2	80.4	89.5	97.0	92.5	97.0	
Average	58.4	62.7	65.9	66.3	70.9	74.2	72.9	74.9	84.3	93.0	91.6	93.5	97.7

Source: EIA

Natural Gas – US pipeline exports to Mexico down MoM to 5.5 bcf/d in October

The EIA Natural Gas Monthly also provides its "actuals" for gas pipeline exports to Mexico, which were 5.5 bcf/d in October, which was down 0.4 bcf/d YoY and down 0.1 bcf/d from September. There is no explanation given for the MoM changes. There were no material revisions to last month's data. Mexico's unchanged production over the past five years has created the need for increased US pipeline exports to Mexico as Mexico builds out its domestic natural gas infrastructure. Below is our table of the EIA's monthly gas exports to Mexico.

US pipeline exports to Mexico down MoM

Figure 5: US Pipeline Gas Exports To Mexico (bcf/d)

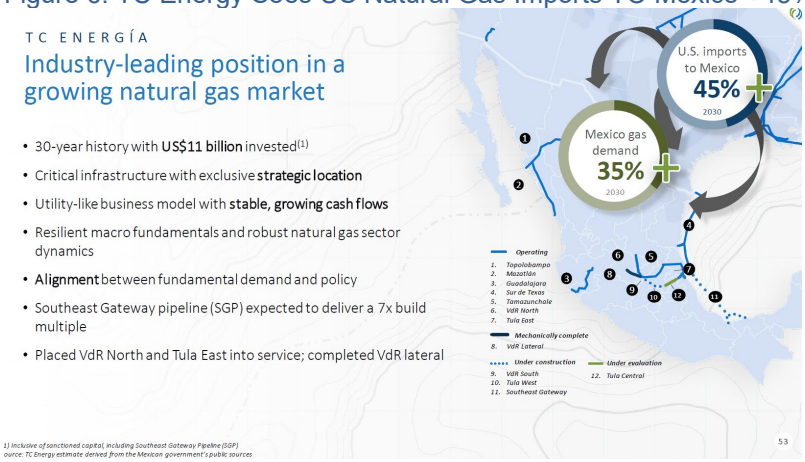
bcf/d	2014	2015	2016	2017	2018	2019	2020	2021	2022
Jan	1.7	2.2	3.2	3.9	4.4	4.9	5.2	5.6	5.6
Feb	1.8	2.3	3.5	4.0	4.5	4.8	5.4	4.9	5.5
March	1.9	2.4	3.3	4.2	4.3	4.8	5.4	5.9	5.5
Apr	1.9	2.6	3.5	3.7	4.4	4.7	4.6	6.1	5.9
May	2.0	2.8	3.7	4.0	4.4	5.0	4.7	6.2	6.0
June	2.2	3.0	3.9	4.5	4.6	5.2	5.4	6.6	6.0
July	2.2	3.3	4.0	4.4	4.9	5.4	5.8	6.4	6.1
Aug	2.1	3.3	4.3	4.4	5.0	5.4	6.0	6.2	5.8
Sept	2.2	3.3	4.1	4.2	5.0	5.4	6.1	6.0	5.6
Oct	1.9	3.2	4.2	4.2	4.9	5.5	6.0	6.0	5.5
Nov	1.9	3.0	4.0	4.5	4.7	5.3	5.5	5.5	
Dec	2.1	3.2	3.6	4.4	4.5	4.9	5.3	5.4	
Full Year	2.0	2.9	3.8	4.2	4.6	5.1	5.5	5.9	5.8

Source: EIA

TC Energy expects +3 bcf/d of Permian gas via pipeline to Mexico by 2030

It may take a couple years to start to ramp up, but we believe an overlooked US natural gas factor is that there should be a big ramp up in Permian natural gas via pipeline to Mexico in the 2020s. TC Energy expects there will be an additional 3 bcf/d of Permian natural gas pipeline demand from Mexico to 2030. Here is what we wrote in our Dec 18, 2022 Energy Tidbits "*It won't affect stock trading, but for those that look at capital allocation on a mid to long term basis or look at tail-end risks/opportunities, the question of Mexico's natural gas infrastructure build-out is worth tracking. We had the opportunity to listen to a major energy analysis group recent US natural gas outlook and it didn't include any slides or commentary on the potential (or expectation by some) for Mexico to ramp up its natural gas pipeline imports from the Permian in the 2020s. It's something that most either overlook or discount or just don't care about, but a factor that could a material impact on the US natural gas view. TC Energy is probably the driving force behind much of Mexico's domestic natural gas pipeline infrastructure build-out and has a very bullish view that Mexico will attract an additional +3 bcf/d to 2030. If they are right, this will attract Permian natural gas, and that means there will be less Permian natural gas for LNG export. And will raise the question is there enough natural gas to support the growth in US LNG exports? And, since US LNG export growth, it means that there will be a need to try to get Appalachia natural gas down to the Gulf Coast. And, or course, TC Energy has the solution for that. But you can see how the TC view on Mexico has a very big impact on US natural gas in the 2020s, if not necessarily in the next couple years. We highlighted this in our Dec 4, 2022 Energy Tidbits.*"

Figure 6: TC Energy Sees US Natural Gas Imports TO Mexico +45% to 2030



Source: TC Energy

Natural Gas – US LNG exports up MoM in Oct at 10.0 bcf/d

US October LNG exports

The new EIA Natural Gas Monthly estimates US LNG exports for October were 10.0 bcf/d and this is a reminder that the US LNG export data is available about two weeks prior to the Natural Gas Monthly. This is the same number as in the DOE monthly LNG data that was posted on Dec 15. Here is what we wrote in our Dec 18, 2022 Energy Tidbits. "*As a reminder, the US Dept of Energy posts monthly US LNG export data two weeks before the EIA (part of the US Dept of Energy) posts US LNG export data in its monthly Natural Gas Monthly report (next report is Dec 30). Normally, the data points are the same. On Thursday, we tweeted [LINK] "US #LNG exports Oct/22 were 9.98 bcf/d, +3.9% YoY, +1.5% MoM. Continued impact of #FreeportLNG 2.2 bcf/d June 8 shut. Oct/22 top 5 export countries: France, UK, Dutch, Korea, China. Oct/21 top 5 export countries: China, Brazil, Japan, Spain, Korea. @ENERGY data. #OOTT." On Thursday, the DOE posted its LNG Monthly for US LNG exports in October. [LINK]. The headline numbers are the US exported 10.0 bcf/d of LNG in October, which was up 1.5% MoM vs September 2022, and +3.9% YoY vs October 2021. Note that although Freeport's terminal has not restarted, Venture Global's Calcasieu Pass and Cheniere Energy's Sabine Pass terminals have ramped up. Our table below is rounded numbers to one decimal and the actual Oct exports were 9.98 bcf/d."* The DOE reported *"Top five countries of destination, representing 62.6% of total U.S. LNG exports in October 2022 was France (48.9 Bcf), United Kingdom (46.0 Bcf), Netherlands (40.5 Bcf), South Korea (31.4 Bcf), and China (26.9 Bcf)."* Our Supplemental Documents package includes excerpts from the DOE LNG Monthly.

Figure 7: US LNG Exports (bcf/d)

(bcf/d)	2016	2017	2018	2019	2020	2021	2022
Jan	0.0	1.7	2.3	4.1	8.1	9.8	11.4
Feb	0.1	1.9	2.6	3.7	8.1	7.4	11.3
March	0.3	1.4	3.0	4.2	7.9	10.4	11.7
Apr	0.3	1.7	2.9	4.2	7.0	10.2	11.0
May	0.3	2.0	3.1	4.7	5.9	10.2	11.3
June	0.5	1.7	2.5	4.7	3.6	9.0	10.0
July	0.5	1.7	3.2	5.1	3.1	9.7	9.7
Aug	0.9	1.5	3.0	4.5	3.6	9.6	9.7
Sept	0.6	1.8	2.7	5.3	5.0	9.5	9.8
Oct	0.1	2.6	2.9	5.7	7.2	9.6	10.0
Nov	1.1	2.7	3.6	6.4	9.4	10.2	
Dec	1.3	2.7	4.0	7.1	9.8	11.1	
Full Year	0.5	1.9	3.0	5.0	6.6	9.7	10.6
Full Year bcf	186.8	707.5	1,083.1	1,819.4	2,390.0	3,560.8	3,223.0

Source: EIA, DOE

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

Where is BC/Blueberry First Nations deal?

We continue the watch on this item as it is probably the item that can most impact the value of Cdn natural gas. If BC can't get a deal done with the Blueberry First Nations, it could mean a massive uncertainty on a major part of NE BC natural gas drilling potential. It's now been over a month and we have not seen any announcement of a deal that BC said, on Nov 26, was very close to an agreement. We had been expecting to see not much happen over Xmas, but it's the new year and something needs to happen soon. We are hopeful of a deal, but we were surprised by BC on Nov 26. We recognize that most took the BC Government at their word, but it's now been over a month since the BC press release on Nov 26 "*Ministers' joint statement on status of negotiations with Blueberry River First Nations"* [LINK] that had a very clear message that a deal is coming. BC said ""*We wish to affirm that we are very close to an agreement and are discussing final issues. As such, we have initiated early engagement with select industry groups and other Treaty 8 Nations on a proposed agreement to hear their feedback and consider adjustments.*" At that time, we noted in our Dec 4, 2022 Energy Tidbits that we were surprised by the bullish statements in the BC release, primarily because we had been hearing that the Blueberry First Nations ask was too big for even BC to accept. But clearly the BC release seemed to put to bed the chatter we had been hearing that the Blueberry First Nation had asked way too much to get a deal. But, it's now been a month and no word that a deal is coming and coming soon. We checked with a few of our industry contacts this week and, at least from our contacts, they still hear the likelihood of a deal in the near term is close to zero. We hope, like we put in our prior memos, that our contacts are all wrong and BC is getting a deal done any day now with the Blueberry First Nations. But the silence is deafening. Our Supplemental Documents package includes the BC Nov 26 press release.

It's too late to save most of winter drilling season

Our Dec 18, 2022 Energy Tidbits memo warned it was too late to save most of the winter drilling season. When BC Nov 26 release came out, it looked like a big operational positive for BC's winter drilling season. There would be time to get cranked up in the short winter drilling season. But, now that it's Jan 1, it really puts a big problem for winter drilling season. Producers are down to about 2.5 mths of peak winter drilling conditions. Normally, winter drilling tends to start to decline around mid March. But even if there is a deal done in the next week or two, BC producers won't be able to get most of their winter drilling done that they had hoped to do going back

to the summer when the first hints of a deal were hoped. Until there is a Blueberry deal, producers will basically be stuck with the well licenses in hand unless there is some sort of agreement to let additional wells be licensed ahead of a BC/Blueberry deal.

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

We have been tracking all the indications from Shell, LNG Canada and TC Energy that were pointing to why a FID on LNG Canada 1.8 bcf/d Phase 2 should have come in Q4/22. But we also realize that, without a BC/Blueberry First Nations deal, it will be highly unlikely to see that FID. Because without a deal, the LNG Canada joint venturers would be questioning their ability to drill to fill its under-construction Phase 1, let alone FID Phase 2. It's why, in our Dec 4, 2022 Energy Tidbits, we wrote "*We wonder if the lack of a BC deal with Blueberry First Nations is why BC hasn't either signed off or rejected LNG Canada's request for BC's views on a potential LNG Canada Phase 2 FID. It makes sense. If Blueberry First Nations had negotiating leverage given the need to crank up drilling to supply natural gas for LNG Canada's 1.8 bcf/d Phase 1, the need for another 1.8 bcf/d of natural gas supply for a LNG Canada 1.8 bcf/d Phase 2 would give even more leverage to Blueberry First Nations. Our Oct 23, 2022 Energy Tidbits noted the first BC confirmation that they were looking at LNG Canada Phase 2. We then wrote "Natural Gas – BC says it is in discussions with LNG Canada on potential Phase 2. It looks like it is coming down to British Columbia to decide if LNG Canada will proceed with its brownfield 1.8 bcf/d Phase 2. We have a clear statement from British Columbia that they are in discussions with LNG Canada on their wish for the potential Phase 2. Last week's (Oct 16, 2022) Energy Tidbits highlighted the separate comments from Canada Deputy Prime Minister Freeland and External Affairs Minister Joly that seemed to point to LNG Canada Phase 2 coming and that the Liberals would be onside. We haven't seen comments from the BC Govt on Phase 2 until this week. On Monday, we tweeted [LINK] "#LNGCanada 1.8 bcfd Phase 2 FID. Liberals seem onside see 👇 @cafreeland. BC. @brentcjang reports @BruceRalston "LNG Canada has expressed the wish to explore the possibility of proceeding with Phase 2, and we're engaged in discussions with them. #OOTT [LINK]." The Globe and Mail wrote "In a recent media briefing in Kitimat, however, LNG Canada chief executive officer Jason Klein said LNG from B.C. will play a crucial role in helping displace coal used in Asia for electricity generation. "The climate challenge isn't a B.C. challenge. It is a global challenge," Mr. Klein said. "It's not just about displacing coal. It's also about getting people out of energy poverty around the world." He said Shell, Petronas and the three other co-owners of the megaproject will ultimately decide whether it makes economic sense for Phase 2 to use lower-carbon hydroelectricity from BC Hydro to power motors to produce LNG. There isn't sufficient infrastructure today for BC Hydro to provide enough hydro power for electric-drive technology at the Kitimat facility, but new transmission lines are possible. B.C. Energy Minister Bruce Ralston, who is the cabinet minister responsible for BC Hydro, said electrification would be an important aspect of LNG Canada's potential expansion. "LNG Canada has expressed the wish to explore the possibility of proceeding with Phase 2, and we're engaged in discussions with them," Mr. Ralston said."*

Natural Gas – New Long-term LNG deals for a total of 0.36 bcf/d

More long term LNG deals

There weren't anywhere near the number of long-term LNG deals over the past six months that were seen in the July 1, 2021 to June 30, 2022 period. because most, if not all the available long term LNG supply available before 2026 was locked up in the July 2021 to July 2022 rush. Rather, the long-term deals now being done are for long term supply starting in 2026 or later. There were two long term LNG deals announced this week. (i) On Tuesday, NextDecade and ENN LNG (China) announced the increase of their original agreement which will span 20 years and ship 0.26 bcf/d with expected first shipments not yet announced [LINK]. This is a 0.06 bcf/d in increase from the original agreement of 0.20 bcf/d. NextDecade is targeting a FID on its first three trains during Q1/23 with potential further trains thereafter. (ii) An additional deal happened this week as Sempra Infrastructure and RWE (Germany) announced their finalised agreement on Wednesday which will span 15 years and ship 0.30 bcf/d with expected first shipments not yet announced [LINK]. Note our May 29, 2022 Energy Tidbits memo highlighted the heads of agreement for this deal that was announced on May 25, 2022 at 0.67 bcf/d. Note that the final agreement has a lesser volume of 0.30 bdf/d, and we adjusted our running table of long term LNG deals for the lesser volume. RWE CEO, Andree Stracke also commented on the finalization, *"Our partnership with Sempra Infrastructure, one of the leading companies for LNG infrastructure in the US, is another important step to diversify Germany's gas supply and thus contributes to enhancing security of supply in Europe on a long-term basis," said Andree Stracke, CEO of RWE Supply & Trading. "Thanks to the LNG supply contract with Sempra Infrastructure, we can also enlarge our international LNG portfolio."* Our Supplemental Documents package includes both news releases.

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 12.53 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 12.53 bcf/d of long term LNG deals since July 1, 2021. 66% of the deals have been by Asian LNG buyers, but we are now seeing rest of world locking up long term supply deals post Russia/Ukraine. China has been particularly active in this space, accounting for 75% of all Asian LNG buyers in long term contracts since July 1, 2021. Below is our updated table of Asian and Europe LNG buyers new long term supply deals since July 1, 2021.

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

Date	Buyer	Seller	Country	Volume	Duration	Start	End
			Buyer / Seller	(bcf/d)	Years		
Asian LNG Deals							
Jul 7, 2021	CNOOC	Petronas	China / Canada	0.30	10.0	2022	2032
Jul 9, 2021	CPC	QatarEnergy	Taiwan / Qatar	0.16	15.0	2022	2037
Jul 9, 2021	Guangzhou Gas	BP	China / US	0.13	12.0	2022	2034
Jul 12, 2021	Korea Gas	QatarEnergy	Korea / Qatar	0.25	20.0	2025	2045
Sep 29, 2021	CNOOC	QatarEnergy	China / Qatar	0.50	15.0	2022	2037
Oct 7, 2021	Shenzhen	BP	China / US	0.04	10.0	2023	2032
Oct 11, 2021	ENN	Cheniere	China / US	0.12	13.0	2022	2035
Nov 4, 2021	Unipec	Venture Global LNG	China / US	0.46	20.0	2023	2043
Nov 4, 2021	Sinopec	Venture Global LNG	China / US	0.53	20.0	2023	2043
Nov 5, 2021	Sinochem	Cheniere	China / US	0.12	17.5	2022	2040
Nov 22, 2021	Foran	Cheniere	China / US	0.04	20.0	2023	2043
Dec 6, 2021	Guangdong Energy	QatarEnergy	China / Qatar	0.13	10.0	2024	2034
Dec 8, 2021	S&T International	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 10, 2021	Suntien Green Energy	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 15, 2021	SPIC Guangdong	BP	China / US	0.03	10.0	2023	2033
Dec 20, 2021	CNOOC Gas & Power	Venture Global LNG	China / US	0.26	20.0	2023	2043
Dec 29, 2021	Foran	BP	China / US	0.01	10.0	2023	2032
Jan 11, 2022	ENN	Novatek	China / Russia	0.08	11.0	2024	2035
Jan 11, 2022	Zhejiang Energy	Novatek	China / Russia	0.13	15.0	2024	2039
Feb 4, 2022	CNPC	Gazprom	China / Russia	0.98	30.0	2023	2053
Mar 24, 2022	Guangdong Energy	NextDecade	China / US	0.20	20.0	2026	2046
Mar 29, 2022	ENN	Energy Transfer	China / US	0.36	20.0	2026	2046
Apr 1, 2022	Guangzhou Gas	Mexico Pacific Ltd	China / Mexico	0.26	20.0	n.a.	n.a.
Apr 6, 2022	ENN	NextDecade	China / US	0.26	20.0	2026	2026
Apr 22, 2022	Kogas	BP	Korea / US	0.20	18.0	2025	2043
May 2, 2022	Gunvor Singapore Pte	Energy Transfer LNG	Singapore / US	0.26	20.0	2026	2046
May 3, 2022	SK Gas Trading LLC	Energy Transfer LNG	Korea / US	0.05	18.0	2026	2042
May 10, 2022	Exxon Asia Pacific	Venture Global LNG	Singapore / US	0.26	n.a.	n.a.	n.a.
May 11, 2022	Petronas LNG	Venture Global LNG	Malaysia / US	0.13	20.0	n.a.	n.a.
May 24, 2022	Hanwha Energy	TotalEnergies	Korea / France	0.08	15.0	2024	2039
May 25, 2022	POSCO International	Cheniere	Korea / US	0.05	20.0	2026	2036
June 5, 2022	China Gas Holdings	Energy Transfer	China / US	0.09	25.0	2026	2051
Jul 5, 2022	China Gas Holdings	NextDecade	China / US	0.13	20.0	2027	2047
Jul 20, 2022	PetroChina	Cheniere	China / US	0.24	24.0	2026	2050
Jul 26, 2022	PTT Global	Cheniere	Thailand / US	0.13	20.0	2026	2046
Jul 27, 2022	Exxon Asia Pacific	NextDecade	Singapore / US	0.13	20.0	2026	2046
Sep 2, 2022	Woodside Singapore	Commonwealth	Singapore / US	0.33	20.0	2026	2046
Nov 21, 2022	Sinopec	QatarEnergy	China / Qatar	0.53	27.0	2026	2053
Total Asian LNG Buyers New Long Term Contracts Since Jul/21				**8.22**			
Non-Asian LNG Deals							
Jul 28, 2021	PGNiG	Venture Global LNG	Poland / US	0.26	20.0	2023	2043
Nov 12, 2021	Engie	Cheniere	France / US	0.11	20.0	2021	2041
Mar 7, 2022	Shell	Venture Global LNG	US / US	0.26	20.0	2024	2044
Mar 16, 2022	NFE	Venture Global LNG	US / US	0.13	20.0	2023	2043
Mar 16, 2022	NFE	Venture Global LNG	US / US	0.13	20.0	2023	2043
May 2, 2022	Engie	NextDecade	France / US	0.23	15.0	2026	2041
May 17, 2022	PGNiG	Sempra Infrastructure	Poland / US	0.40	20.0	n.a.	n.a.
May 25, 2022	RWE Supply & Trading	Sempra Infrastructure	Germany / US	0.30	15.0	n.a.	n.a.
Jun 9, 2022	Equinor	Cheniere	Norway / US	0.23	15.0	2026	2041
Jun 21, 2022	EnBW	Venture Global LNG	Germany / US	0.20	20.0	2026	2046
Jun 22, 2022	INEOS Energy	Sempra Infrastructure	UK / US	0.21	20.0	2027	2047
Jun 22, 2022	Chevron	Venture Global LNG	US / US	0.26	20.0	n.a.	n.a.
Jun 22, 2022	Chevron	Cheniere	US / US	0.26	15.0	2027	2042
Jul 12, 2022	Shell	Mexico Pacific Ltd	US / Mexico	0.34	20.0	2026	2046
Jul 13, 2022	Vitol	Delfin Midstream	US / US	0.07	15.0	n.a.	n.a.
Aug 9, 2022	Centrica	Delfin Midstream	UK / US	0.13	15.0	2026	2041
Aug 24, 2022	Shell	Energy Transfer	US / US	0.28	20.0	2026	2046
Oct 6, 2022	EnBW	Venture Global LNG	Germany / US	0.26	20.0	2022	2042
Dec 6, 2022	ENGIE	Sempra Infrastructure	France / US	0.12	15.0	n.a.	n.a.
Dec 20, 2022	Galp	NextDecade	Portugal / US	0.13	20.0	n.a.	n.a.
Total Non-Asian LNG Buyers New Long Term Contracts Since Jul/21				**4.31**			
Total New Long Term LNG Contracts since Jul/21				**12.53**			
*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 – Novak confirms Russia doesn't have technology for large-scale LNG

Russia doesn't have technology for large-scale LNG

We have been highlighting the LNG market game changer on how Baker Hughes pull out of Russia meant Russia wouldn't have Baker Hughes big gas turbines and therefore Russia's under-construction Arctic LNG 2 project would only have 1/3 the planned capacity pre sanctions. One item that was overlooked this week was Russia Deputy PM Novak confirming that Russia doesn't have the technology for large-scale LNG projects. This came out in his Xmas interview with TASS. Earlier this morning, we tweeted [LINK] "*#LNG Game Changer. Novak 12/25 interview. RUS doesn't yet have technology for large-scale LNG projects. Fits 👇12/12 tweet, Novatek Arctic LNG 2 to add 0.87 bcfd capacity, 1/3 of pre-BKR RUS exit capacity 2.6 bcfd. See 👇06/16 thread, key reason #LNG supply short thru 2026. #OOTT.*" TASS asked "*Is it realistic for Russia to implement the plans and tasks of the LNG energy strategy in the new conditions, given that the country does not yet have its own technology for large-scale liquefaction of gas*?" Novak replies "*As for large-scale LNG, since 2014 we have been engaged in import substitution of LNG technologies, subsidizing the creation of equipment. Already now there is a Russian liquefaction technology "Arctic Cascade" at the Yamal LNG plant with a capacity of 1 million tons. In the future, it can be brought to 2-3 million tons. In parallel, equipment with a capacity of 5-6 million tons is being developed by the structures of Rosatom, Novatek and Gazprom..Work is also underway to create Russian heat exchangers for large-capacity LNG. When they make them, then it will be possible to say that Russia has its own technology of large-scale LNG.*"

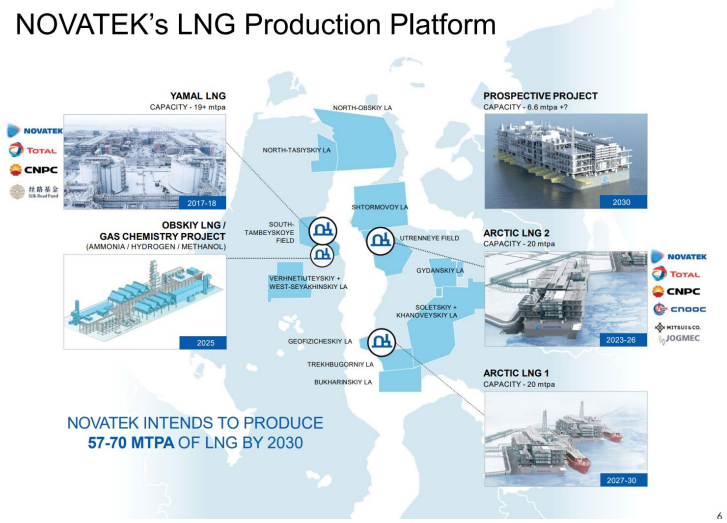
Russia's Arctic LNG 2 capacity only 0.87 bcf/d of pre-sanction 2.6 bcf/d

Baker Hughes pulling out of Russia and not putting its giant gas turbines in Russian LNG projects is a significant global LNG event. Here is what we wrote in our Dec 18, 2022 Energy Tidbits memo. "*We are still surprised that most don't seem to appreciate how sanctions are hurting Russia's next wave of LNG projects. On Monday, we saw confirmation of the expected – Russia's Novatek under construction Arctic LNG 2 would be starting up in Dec 2023 with its three Phases only adding 0.87 bcf/d of LNG capacity in 2023 thru 2026, which is only 1/3 of the pre-sanctions planned capacity of 2.6 bcf/d in 2023 thru 2025. So a little later and a lot less LNG. And a key reason why LNG is supply short thru 2026. (i) We tweeted [LINK] "#LNG Game Changer. No Baker Hughes big turbines = Lower RUS LNG capacity. TASS: under construction Novatek Arctic LNG 2 to add 0.87 bcfd in 2023-26, 33% of pre-BKR RUS exit capacity of 2.6 bcfd. See 👇 06/16 thread. Key reason why #LNG is supply short thru 2026. #OOTT #NatGas." (ii) On Monday, TASS reported "Launch of first line of Arctic LNG 2 set for December 2023" [LINK] ""Arctic LNG-2 is Novatek's second LNG project. It includes the construction of three lines for the production of liquefied natural gas with a capacity of 6.6 mln metric tons per year each and stable gas condensate up to 1.6 mln metric tons per year. The launch of the first line is planned for December 2023, the launch of the second and third lines is expected in 2024 and 2026, respectively." That is 0.29 bcf/d per phase of 0.87 bcf/d for the three phases. (iii) The pre-sanctions planned capacity for Arctic LNG 2 was to add 0.87 bcf/d per phase for a total of 2.6 bcf/d. The reason for the lower capacity is that Baker Hughes is no longer providing its big gas turbines to power the LNG project. Our Supplemental Documents package includes the TASS report.*

LNG game changer, Baker Hughes stops work on 6.2 bcfd RUS LNG

*We have been highlighting the Baker Hughes Russia stoppage as an LNG game changer. Our June 19, 2022 Energy Tidbits memo was titled "Game Changer for LNG: ~6.2 bcf/d Russian LNG is at Risk with Reports Baker Hughes to Stop Providing Services/Equipment". Here is what we wrote in our June 19 memo. "We are still surprised that others haven't jumped on what we called the game changer to LNG – the reports Baker Hughes is stopping servicing, replacing parts, etc for in operating Russian LNG projects and will not provide gas turbines for the under construction LNG projects. This is putting at risk 3.6 bcf/d of existing LNG supply and 2.6 bcf/d of under construction LNG. It is huge or, at least we think so. Don't forget Baker Hughes is the leading global services company for LNG and is involved in almost every recent LNG project. (i) On Thursday, we tweeted [LINK] "1/2. Game Changer for #LNG. 6.2 bcfd RUS LNG is now at risk incl operating 1.3 bcfd Sakhalin-2 LNG & 2.3 bcfd Yamal LNG, and under construction 2.6 bcfd Arctic LNG-2 w/ phase 1 0.87 planned 2023 in service. #OOTT #NatGas" and [LINK] "2/2. Must read, @Kommersant reports #BakerHughes stopping service/replacement parts for existing #LNG & shipping gas turbines for Arctic LNG-2. Projects are designed for specific turbines. Urgent need for LNG FIDs ie. how about @Shell #LNGCanada Phase 2 is 1.8 bcfd. #NatGas #OOTT". Baker Hughes is reportedly stopping servicing two in-service Russian LNG projects (Sakhalin-2 and Yamal LNG) and stopping deliveries on gas turbines for the under construction Arctic LNG-2 project. Sakhalin-2 LNG in operation. Think about what is happening with Nord Stream being shut down waiting on equipment repairs. The operating 3.6 bcf/d LNG will be at risk for now having Baker Hughes servicing and providing any equipment repairs/replacement. And the 2.6 bcf/d of under construction LNG can't be finished without Baker Hughes equipment. (ii) On Friday, we tweeted [LINK] "Game changer for #LNG. See 👇 Thurs thread, $BKR pullout is huge. RUS admits delays in new LNG adds, hopes no more than 1-2 yrs. Arctic LNG-2 2.6 bcfd from 3 phases, phase 1 0.87 bcfd starting in 2023, all on in 2026. Urgent need for FIDs ie. #LNGCanada Phase 2. #OOTT #NatGas." TASS reported on comments from Russia First Deputy Minister Sorokin, who admitted that the under construction 2.6 bcf/d Arctic LNG-2 would be delayed and they hoped the delay wouldn't be more than 1 to 2 years. In the Kommersant Thursday report, they noted that the Baker Hughes equipment could not be replaced. Kommersant wrote ""There is, in fact, nothing to replace this equipment now: analogues are not produced in the Russian Federation, and LNG production lines have already been designed for the LM9000". (iii) There was a good example on how nothing is every clear in Russia. And that Novatek still sees Phase 1 of Arctic LNG-2 starting on time in 2023. On Friday night, Bloomberg reported "Novatek plans to launch Arctic LNG 2 on time despite all the problems amid sanctions, Interfax reports, citing CEO Leonid Mikhelson at St. Petersburg International Economic Forum. * NOTE: Novatek holds 60% stake in the Arctic LNG 2 project with three LNG production trains with a capacity of 6.6m tons/year each. The first train was expected to start production in 2023 * Novatek has revised Arctic LNG 2 financing scheme, there are no problems with that."*

Figure 9: Novatek's LNG production platform, May 2021



Source: Novatek

Baker Hughes Q2 confirmed stopped work on 6.2 bcfd RUS LNG

Our original comment on this LNG game changer was based on the Kommersant report. But we saw the confirmation, although not as clearly written as we hoped, of this Baker Hughes pull out in the Baker Hughes Q2. Here is what we wrote in our July 24, 2022 Energy Tidbits memo. "*Baker Hughes suspends all LNG equipment & services work in Russia. Baker Hughes reported Q2 on Wednesday. All the analysts focused on the impact of Russia on the financial results, but there didn't seem to be any real market concerns on what Baker Hughes suspension of all equipment and services contracts for LNG in Russia would mean to LNG markets. It is important to note Baker Hughes is clearly stating they have suspended work on all of their "equipment" and "services" contracts in Russia. Think about what is happening with Nord Stream and this is very similar. It's not just supplying new equipment for new LNG projects, but also servicing existing equipment in existing LNG projects. We remain surprised that this isn't a major LNG market focus. Baker Hughes LNG business is within its TPS group. In the Q2 call mgmt. said "In TPS we have suspended work on equipment and service contracts in Russia. As a result, these projects have been removed from RPO and second-quarter revenue was impacted by roughly $160 million but with minimal impact to TPS operating margins." And "So at the beginning of the year, we were expecting, around $300 million of EBITDA for Russia this year and our Russian operations are generally quite accretive to our overall mix really due to the risk premium of operating there as well as some business mix primarily in TPS services as well as in some OFS product lines".*

Natural Gas – Shell Prelude 0.47 bcf/d FLNG back off again, this time due to a fire

Shell Prelude FLNG 0.47 bcf/d

Shell's 0.47 bcf/d Prelude FLNG, offshore NW Australia, just can't seem to catch a break. (i) As of our 7am MT news cut off, it is still offline after being shut down on Dec 21 due to a

small fire. Bloomberg reported "*Shell Plc has suspended production on a floating liquefied natural gas facility off the west coast of Australia after a fire broke out. The "small fire" at the Prelude LNG facility was detected on Wednesday afternoon and was "quickly contained using a hand-held extinguisher," Shell said in a statement*." (ii) The unfortunate part is that Shell had just restarted Prelude LNG the prior week after its approx. 2-month maintenance. (iii) Prior the maintenance, Prelude LNG had been shut down by a labor action with the last LNG cargo on July 6, until a labor deal was reached on Aug 24. (iv) And then prior to that, Shell had to shut Prelude FLNG on Dec 2, 2021 from a major power issue and there were no LNG cargos until April 10, 2022.

Figure 10: Shell Crux Project Overview

Source: Shell

Natural Gas – Japan insurers reverse position, will cover LNG from Russia

Japan to continue LNG tankers from Russia

This week, we thought there was a good sign that at least Japan sees a very tight or short LNG supply market in 2023 and it needs Russian LNG even in the face of sanctions on Russia. Japanese power companies are reportedly looking at trying to get shippers of Russia LNG by covering any damages that would normally be covered by insurers. (i) On Tuesday, we tweeted [LINK] "*Lucky, its been mild winter in EU/Japan. Even so, good indicator of tight/short? #LNG supply, Japan gas/power co's will consider promising shippers [LNG] to pay for any potential damage that is normally covered by insurers". Thx @SStapczynski @shoko_oda @Inajima17. #OOTT #NatGas."* Bloomberg reported "*Japan's liquefied natural gas importers are moving to continue receiving deliveries of the fuel from Russia, even if shipping coverage for risks related to the war in Ukraine end. Several Japanese gas and power companies will consider promising shippers to pay for any potential damage that is normally covered by insurers, according to people with knowledge of the matter. This comes after insurance companies said they will stop providing coverage for marine hull war risks in Russian, Ukrainian and Belarusian territorial waters from Jan. 1. The LNG importers need the fuel from Russia and can't lose shipments, so are willing to bear the financial risk in the unlikely scenario that there is damage to the vessel, the people said."* (ii) On Thursday, Nikkei Asia reported [LINK] "*Japan insurers to continue maritime war insurance in Russia. Underwriting capacity shrinks, but deal designed to keep LNG imports flowing. Japan's utilities rely heavily on LNG imports from the Sakhalin-2 project in the Russian Far East. Japanese insurers will continue covering ships sailing through Russian waters against war damage in January and beyond, reversing an earlier decision to halt coverage, Nikkei*

learned Thursday. Tokio Marine & Nichido Fire Insurance, Sompo Japan Insurance and Mitsui Sumitomo Insurance had started informing clients on Dec. 23 that they would stop offering war risk coverage in Russian waters starting Jan. 1, after Western reinsurers withdrew coverage in Russia and Ukraine." Our Supplemental Documents package includes the Bloomberg report.

if no Japan insurance, should be discounted Russia LNG for China/India

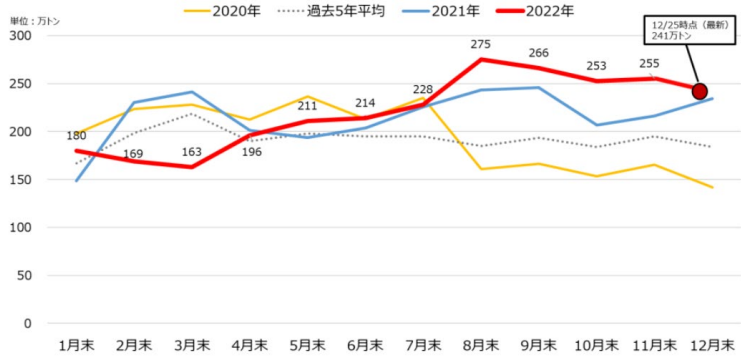
Prior to the Japanese insurers reversing their position, on Monday, we tweeted [LINK] "*Discounted Russia #LNG for China, India, others? Better be a warm Jan/Feb in Japan if Sakhalin-2 #LNG supplies gets impacted by insurers stoppage. Thx @SStapczynski @shoko_oda @Inajima17. #OOTT #NatGas."*

Natural Gas – Japan's LNG stocks down -1.2% WoW to 116 bcf

Japan LNG stocks -1.2% WoW

Japan's weather flipping to very cold in December has now caused weather-related LNG demand as stockpiles fell this week. The risk for Japan in the winter is that they need full storage and continued LNG imports to avoid natural gas outages. 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 25 were ~116 bcf -1.2% WoW from Dec 18 of 117 bcf but above the 5-yr average of 112 bcf. Below is the LNG stocks graph from the METI weekly report.

Figure 11: Japan's LNG Stocks



Source: METI

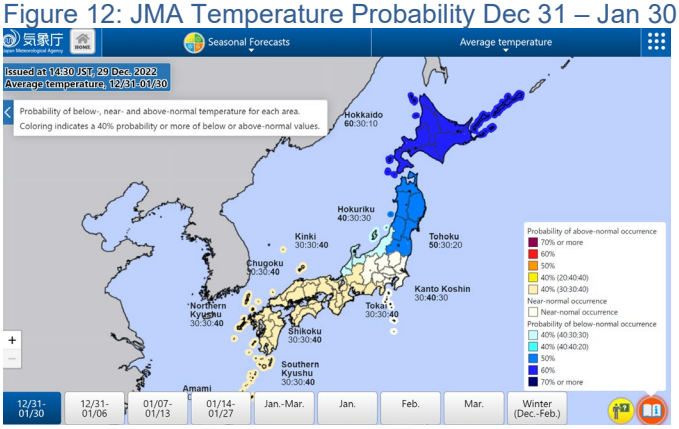
Natural Gas – Japan turning back to a little colder than normal temperatures in Jan

Japan temperature outlook

We have been noting how Japan changed their weather forecasts. Two weeks ago the temperature flipped back from expectations for a warmer than normal Dec to a very cold end to Dec. This week, the forecast for a return to more normal temperatures on an overall basis for Japan in January. Every Thursday, the Japan Meteorological Agency provides an updated 30-day temperature probability outlook. The new weekly JMA forecast starts off cold for early January, but on average has an outlook of very cold in Northern Japan to average in Central Japan to slightly warmer than normal in Southern Japan. It looks like a slightly colder than

normal on an overall basis for Japan. Below is the JMA's Dec 29 updated 30-day outlook. [LINK]

Figure 12: JMA Temperature Probability Dec 31 – Jan 30



Source: Japan Meteorology Agency

Natural Gas – Putin lets "unfriendly" countries pay gas debt in foreign currency

Putin lets non-rubles payments

We have to believe Russia is feeling the financial crunch on the cost of its war and the declining oil and gas revenues. The question, like always, is what will Putin do? One sign of the need for money was the Bloomberg Friday report "*Russian President Vladimir Putin allowed natural-gas buyers from "unfriendly" countries to pay debts for fuel in foreign currency, partly lifting a requirement for ruble-only payments. Repayment of debt doesn't provide grounds for a resumption of Russian gas supplies to buyers that don't comply with other requirements of a presidential decree issued earlier this year, according to amendments published late Friday. Putin shocked the European gas market at the end of March by signing a decree that ordered a full switch to ruble payments for Russian pipeline gas amid the Kremlin's standoff with the western nations over the invasion of Ukraine. Russian gas giant Gazprom PJSC halted gas supplies to clients in Poland, Bulgaria, Finland, the Netherlands and Denmark, as well as supplies to Germany under a contract with Shell Energy Europe, after companies refused to comply with the decree. Other European companies opened special ruble and foreign-currency accounts at Gazprombank JSC, which was authorized to handle payments for natural gas."*

Natural Gas – Sweden, no concrete evidence on who blew up Nord Stream

Sweden on Nord Stream investigation

It looks like the Who Dunnit blowing up Nord Stream is going to stay a mystery, at least for now. (i) Last week's (Dec 25, 2022) Energy Tidbits memo the Washington Post report [LINK] wrote "*But now, after months of investigation, numerous officials privately say that Russia may not be to blame after all for the attack on the Nord Stream pipelines. "There is no evidence at this point that Russia was behind the sabotage," said one European official, echoing the assessment of 23 diplomatic and intelligence officials in nine countries interviewed in recent weeks."* (ii) Looks like Sweden, who is doing the lead investigation, is in that camp. They don't have concrete evidence on who below up Nord Stream, but On Tuesday, we tweeted [LINK] "*"we have no concrete evidence" on which state actor blew up #NordStream says Sweden's top counterintelligence official reports @RebeccaRuiz. is RUS*

just good at disguising or Who Dunnit? #NatGas #OOTT." New York Times reported on comments f*om Daniel Stenling, Swede*n's top counterintelligence official."*"But like any good mystery story, the sabotage has layers of intrigue and multiple players with degrees of motive and ability. Even the decision by the Swedish government to keep details of its inquiry secret from Western allies has prompted whispered speculation that perhaps investigators have cracked the case and are strategically keeping quiet. Not so, Mr. Stenling said. "We have no concrete evidence," he said. "But hopefully we will." As for his government's choice to keep its cards close, Mr. Stenling said: "The entire investigation is unusual."* Our Supplemental Documents package includes the New York Times report. [LINK]

Natural Gas – "unbelievably warm" in Europe right now

"Unbelievably warm" in Europe

Early Thurs morning, we happened to catch the 3am MT opening of Bloomberg Surveillance when Guy Johnson did his recap of European markets that were showing a Europe map with a lot of red countries on the screen and he said this could have been a map for the weather in Europe. We tweeted [LINK] "*Negative for EU #NatGas #LNG demand & prices. "it's been unbelievably warm here in Europe right now" "It's going to be T-shirt weather in Berlin this New Year's Eve" @GuyJohnsonTV on @bsurveillance opening. 👇 @business max temp map for 12/30, 12/31."* Our tweet included Bloomberg terminal's mapping system for maximum forecast temperatures for Dec 31 and we included in our map the forecast for 60-65F in Belgium and France, 55-60F for Germany, Italy, Netherlands and Spain, and 50-55F for England. The other Europe countries are as warm, we just didn't list them all. That's pretty hot for Dec 31. For those with a Bloomberg terminal, the maps are easy to create starting at MAP Markets <GO>.

Figure 13: Forecast made Dec 30 for maximum temperatures in Europe on Dec 31

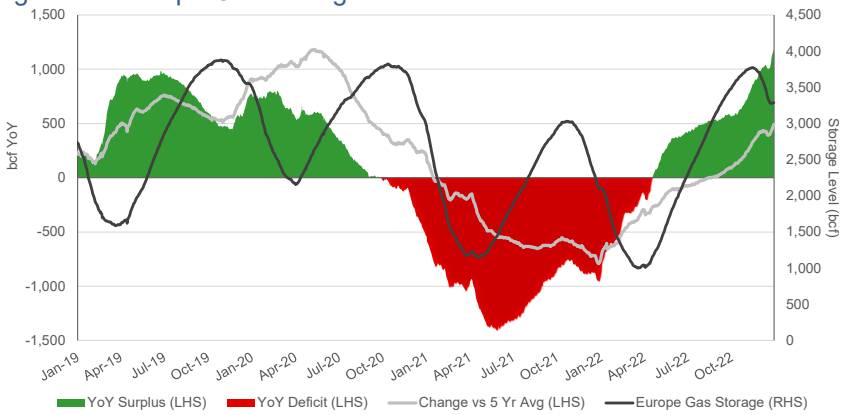
Source: Bloomberg

Natural Gas – Europe storage is now +29.64% YoY ie. 83.19% full vs 53.55%

Europe storage now 83.19% full

The cold burst that hit a lot of Europe didn't last too long, but and it's been much warmer than normal. As a results, Europe gas storage is in excellent shape, especially with more very warm weather ahead for the next few days. Last 2021/22 winter began (Nov 1/21) with gas storage at 77.14% capacity, down 18.52% YoY. Whereas the months of massive industrial demand cuts and record US LNG imports put Europe gas storage in almost the best possible position to start winter 2022/23. 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 28 is at 83.19%, which is +29.64% greater than last year levels of 53.55% and are +12.37% above the 5-year average of 70.82%. Below is our graph of Europe Gas Storage Level.

Figure 14: Europe Gas Storage Level



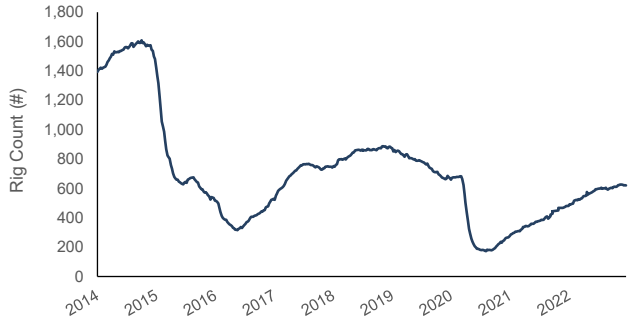
Source: Bloomberg

Oil – US oil rigs down -1 rigs to 621 oil rigs on Dec 30

US oil rigs down WoW

Baker Hughes released its weekly North American drilling activity data on Friday. US rigs don't typically have a big Christmas drop like in Canada. Normally rigs are relatively flat over Christmas, but, with oil down over the past few weeks, we thought there might be some declines. We also thought the extreme cold forecast in the Bakken and overnight freeze temperatures in Texas/Oklahoma might have caused some rig move delays especially given it's Xmas and New Years. This week US oil rigs were down -1 rigs at 621 oil rigs. The big change came from the smaller basins which decreased -2 rigs this week. The Ardmore added +3 rigs this week. US oil rigs hit a 15-week low of 591 on September 9. US oil rigs are still +442 oil rigs since the Covid Sept 17, 2020 oil rigs of 179 oil rigs. And US oil rigs are +141 oil rigs YoY. US gas rigs were up +1 WoW at 156 gas rigs.

Figure 15: Baker Hughes Total US Oil Rigs



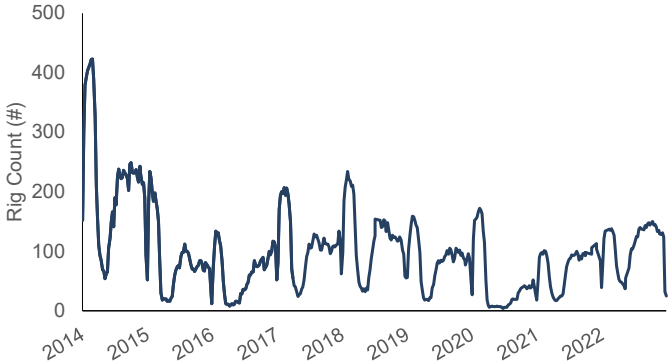
Source: Baker Hughes

Oil – Total Cdn rigs down -12 WoW to 84 total rigs, -6 rigs YoY

Cdn rigs -12 WoW

Cdn rig activity has moved into its traditional Xmas big crash down thru New Year. Total Cdn rigs were -12 to 84 rigs as of Dec 30, 2022. Note this follows the big -103 WoW as of Dec 22, sop Cdn rigs are -115 rigs over the past two weeks. Cdn oil rigs were -7 to 25 oil rigs. Cdn gas rigs were -5 to 59 rigs. As noted in last weeks memo Cdn rigs normally start to decline in the 3rd week of December and then more thru Xmas week and New Years week. The decline is no surprise. Total rigs are now +25 vs the comparable Covid period of 59 rigs on Dec 31, 2020. Cdn drilling has recovered YoY, a year ago Cdn oil rigs were 39 and Cdn gas rigs were 51 for a total Cdn rigs of 90, meaning total Cdn oil rigs are -14 YoY to 25 oil rigs and Cdn gas rigs are +8 to 59 gas rigs.

Figure 16: Baker Hughes Total Canadian Oil Rigs



Source: Baker Hughes

Oil – US weekly oil production down -0.1 mmb/d to 12.0 mmb/d

Please note that next week's numbers should be down again, probably lower than 11.5 mmb/d as the full impact of the blizzard should drive North Dakota down and assuming some impact in Texas/Oklahoma/Louisiana from the cold weather. We had expected to see some North Dakota weather impact in the EIA weekly oil production for the week ended Dec 23. The EIA estimates US oil production was down -0.1 mmb/d WoW to 12.0 mmb/d for the week

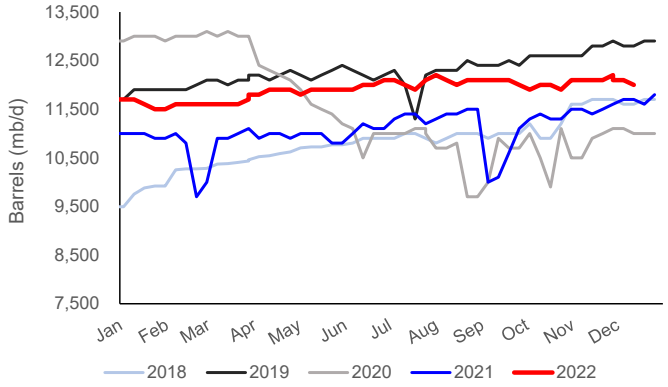
ended Dec 23. US oil production, based on the weekly estimates, has been mostly range bound between 11.9 to 12.1 mmb/d since the 2nd week of May. But broke above 12.1 mmb/d to 12.2 mmb/d two weeks ago for the first time since it touched 12.2 mmb/d in the 1st week of August. Lower 48 production was down -0.2 mmb/d WoW to 11.5 mmb/d this week and Alaska was up +0.1 nnm/d WoW to 0.5 mmb/d. US oil production is up +0.200 mmb/d YoY at 12.0 mmb/d but is still down significantly at -1.1 mmb/d since the 2020 peak of 13.1 mmb/d on March 13.

Figure 17: EIA's Estimated Weekly US Oil Production

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

Source: EIA

Figure 18: US Weekly Oil Production



Source: EIA, SAF

Oil – EIA Form 914: Oct oil prod +0.747 mmb/d YTD, +431,000 b/d vs weekly estimates

EIA Form 914 October

There were two key takeaways from the EIA's weekly US oil production data for Sept – the actuals were 431,000 b/d more than the weekly estimates, and Sept is now +747,000 mmb/d YTD. There was a big MoM increase in US oil production in Oct. The EIA released its Form 914 data [LINK] on Friday, which is the EIA's "actuals" for October US oil and natural gas production. (i) Form 914 estimates total US oil production is up +69,000 b/d MoM to 12.381 mmb/d in October. The actuals for October were 431,000 b/d higher than the EIA's weekly

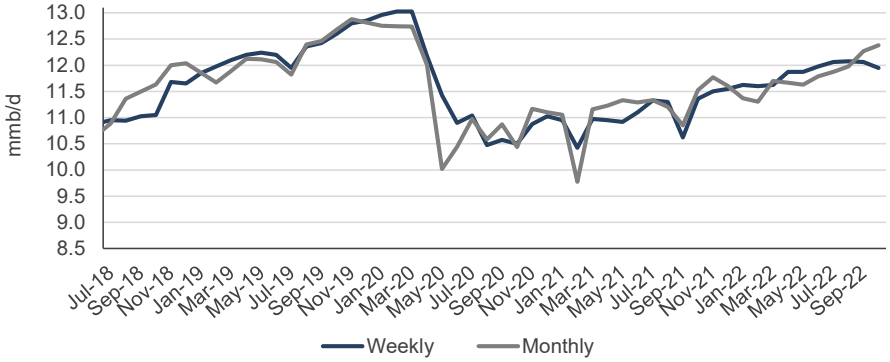
estimates that worked out to just over 11.950 mmb/d. September actuals were adjusted higher to 12.268 mmb/d from 12.312 mmb/d in last months Form 914. (ii) One of the growing questions has been how much US oil will grow in 2022. October actuals are 12.381 mmb/d or +747,000 b/d more than Dec 2021; this is higher than September actuals were +678,000 b/d more than the year end Dec 2021 average of 11.634 mmb/d.

Figure 19: EIA Form 914 US Oil Production

State	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	12,002	12,312	12,381		
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 20: EIA Form 914 US Oil Production vs Weekly Estimate



Source: EIA

Oil – Declining average oil production per well in North Dakota

Maturing Bakken oil wells

For the past few months, we have been highlighting how North Dakota oil production levels vs producing wells show the Bakken is a mature oil basin. There are record number of producing wells but not record oil production. As a result, the average production rate per producing well is declining. On Wed, we tweeted [LINK] our latest update "*Increasing # well completions will be needed to keep Bakken #oil flat, let alone grow. Best indicator for "Mature" Bakken is average #Oil rate per producing well keeps declining. See 👇SAF Group table of NDIC data. #OOTT.*" Our tweet included the below table that we created of the North Dakota Industrial Commission monthly Director's Cut official data for North Dakota oil production. We only went back to Oct 2016 and calculated an average oil production rate per producing well. The peak average per well rate was 93.9 b/d per producing well in Oct 2019, it has decreased each year and, in Oct 2022, is 33% lower at 63.0 b/d average per producing well.

Figure 21: North Dakota Oil Production For Oct from 2016 thru 2022

	Production b/d	# Producing Wells	Ave Prod/Well
Oct-22	1,120,940	17,787	63.0
Oct-21	1,111,910	17,163	64.8
Oct-20	1,222,871	15,512	78.8
Oct-19	1,517,796	16,157	93.9
Oct-18	1,391,877	15,344	90.7
Oct-17	1,185,499	14,250	83.2
Oct-16	1,043,207	13,457	77.5

Source NDIC

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

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

production. The Bakken isn't viewed as a huge growth area, but still it is viewed as growth area. We will need to North Dakota oil production in Sept and Ot at least jump back to June levels And unless we see that jump back up in oil production, we have to believe four consecutive months of data would raise concerns. It looks like September could be a big month for North Dakota oil production."

Oil – North Dakota again lowers its forecast for 2022 exit & 2023 oil production

North Dakota lowers its oil production forecast

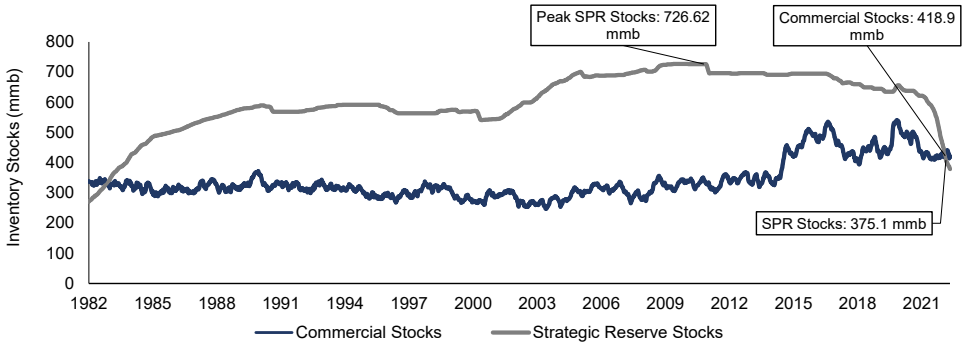
It may not be a confirmation that the Bakken is maturing, but North Dakota has lowered its forecast for 2022 exit oil production again, this time down to 1.1 mmb/d vs its July forecast of 1.3 mmb/d. (i) On Wednesday, we tweeted [LINK] "*North Dakota lowers its 2022 exit rate and 2023 forecast again. See 👇 07/20: exit 2022 of 1.3 mmbd. 08/17: 2023 of 1.2 mmbd. 12/27: current (exit 2022) 1.1 mmbd, next year should be "pretty flat". #OOTT."* (ii) In July North Dakota forecast 2022 exit around 1.3 mmb/d. Here is part of what we wrote n our July 24, 2022 Energy Tidbits. "*This week the Williston Herald [LINK] report had a number of good insights that aren't in the monthly Director's Cut report. (i) 2022 exit +2% YoY to ~1.3 mmb/d. The Williston Herald wrote ""We anticipate that June will show a full recovery from that and that July is actually going to show a significant increase in production, so we are marching towards that maybe 2 percent production increase of rate year, which should put us in the neighbourhood of 1.3 million a day by year-end. I think that's kind of what the target is for industry."* (iii) In Aug, North Dakota forecast 2023 production 1.2 mmb/d. Here is part of what we wrote in our Aug 21, 2022 Energy Tidbits. "*This week the Williston Herald [LINK] report had a number of good insights that aren't in the monthly Director's Cut report. (i) Helms is projecting production to grow to 1.2 mmb/d within the next year and to 1.4 mmb/d by end of 2020s. When asked about peak production, Helms stated "no, we really believe that within the next year, production is going to grow to 1.2 million barrels a day. And looking a little bit further out, we think by the end of the 2020s, we can achieve and sustain 1.4 million barrels a day. So it's a slow growth curve."* (iii) Current Bakken production is 1.1 mmb/d. On Tuesday, KFVRTV (Bismarck) reported [LINK] "*2022: North Dakota oil and gas production growth slower than expected. The Bakken saw very slow growth in oil and gas production this past year. The region was rebranded as "Mature" by top operators in February, meaning they expected flat production going forward. Currently, the Bakken produces 1.1 million barrels per day, which was lower than the 1.2 million operators had hoped for by the end of the year. "Significant players in North Dakota's production are talking one or two percent growth next year, so pretty flat," said Lynn Helms, North Dakota Department of Mineral Resources Director*." Our Supplemental Documents package includes the KFVR-TV report, and our writeups from our July 24, 2022 and Aug 21, 2022 Energy Tidbits memos.

Oil – US SPR reserves now -43.8 mmb lower than commercial crude oil reserves

SPR reserves remain lower

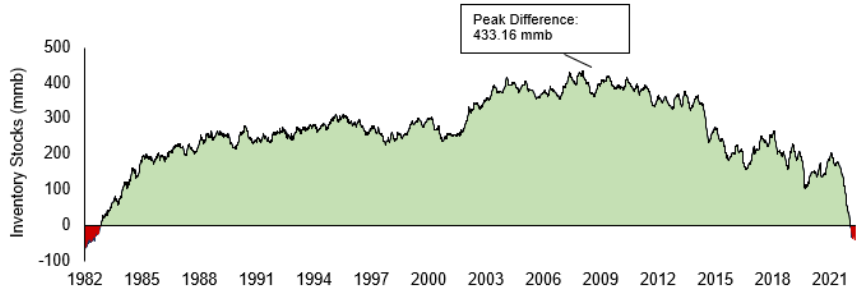
Oil in US Strategic Petroleum Reserves (SPR) moved below total US commercial crude oil reserves in the Sept 16 week for the first time since 1983, with the deficit narrowing this week. The EIA's new weekly oil data for Dec 23 has SPR reserves at 375.1 mmb vs commercial crude oil reserves at 418.9 mmb. The below graphs highlight the difference between commercial and SPR stockpiles.

Figure 22: US Oil Inventories: Commercial & SPR



Source: EIA

Figure 23: US Oil Inventories: SPR less commercial



Source: EIA

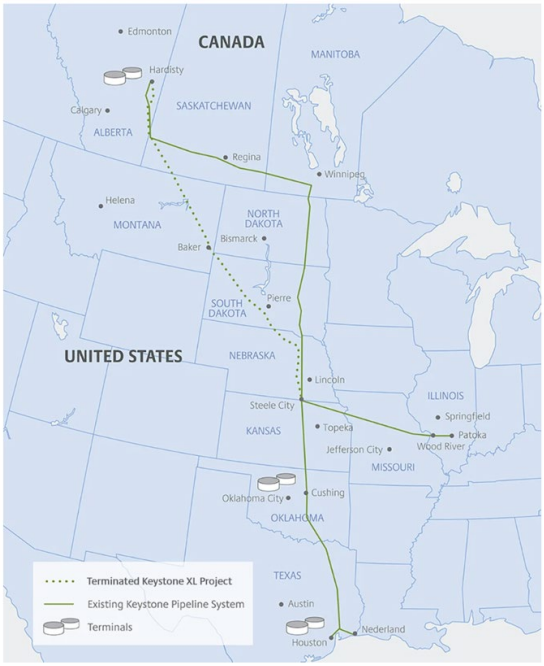
Oil – TC Energy Affected Segment of Keystone restarted on Thurs

Keystone Affected Segment has restarted

Last week's (Dec 25, 2022) Energy Tidbits memo highlighted TC Energy's Dec 23 announcement [LINK] "*The U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA) has approved our Restart Plan for the Cushing segment. We will be commencing activities to support the safe restart of the segment, including rigorous testing and inspections, and this will take several days."* That was good news as we had worried about a longer time to restart. On Thurs, TC announced the Affected Portion had restarted, but so far, hasn't said at what volumes. We tweeted [LINK] "*Positive for Cdn oil diffs. @TCEnergy says #Keystone returned to service today, Affected Segment will operate under plans approved by PHMSA.Assume mean per* 👇 *@PHMSA_DOT 12/09 restart limited to 80% of operating pressure at time of leak. #OOTT."* TC wrote [LINK] "*After completing repairs, inspections and testing we proceeded with a controlled restart of the Cushing Extension, safely returning the Keystone Pipeline to service today. The Cushing Extension will operate under plans approved by the U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA). The Keystone Pipeline System is now operational to all delivery points. As always, we continue to monitor the system 24/7 as we deliver the energy customers and North Americans rely on. The pipeline system will operate with additional risk-mitigation measures, including reduced operating pressures. We maintain our commitment to our ongoing safety-*

led response and will fully remediate the incident site. We will share the learnings from the investigation as they become available."

Figure 24: Keystone pipeline



Source: TC Energy

Source: TC Energy

Oil – Cdn oil differentials basically flat WoW at $27.75

WCS less WTI differentials

It's been a rocky month for Cdn oil differentials with the Keystone shut-in, expectations for less of an impact, then moving to uncertainty for a return, then some narrowing last week with the partial restart with the UnAffected Portion, but then this week no real change despite TC announcing the Affected Portion had been restarted. Last week, the WCS-WTI differential was $27.50 on Dec 23 close, and was basically unchanged this week to close at $27.75 on Dec 30. For perspective, a year ago, the WCS-WTI differential was $13,75 to close 2021 on Dec 30, 2021. Below is Bloomberg's current WCS–WTI differential as of Friday Dec 30 close.

Figure 25: WCS less WTI oil differentials including Dec 30 close

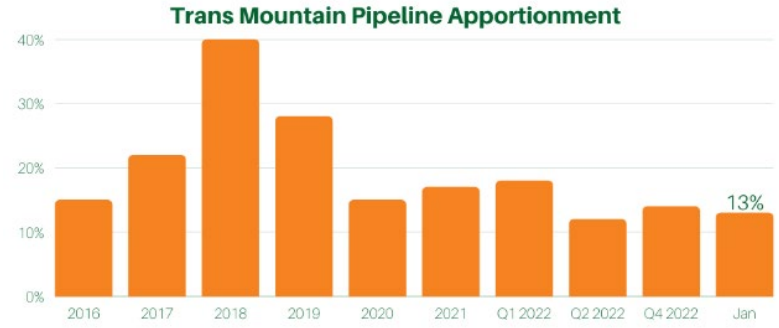
Source: Bloomberg

Oil – Trans Mountain apportioned by 13% for Jan

Trans Mountain apportionment

On Wed, Trans Mountain released an update [LINK] on its capacity for the month of January. Total system nominations are apportioned by 13% for Jan (Dec was 17%, Nov was 15%), meaning 13% of demand for the pipeline exceeds its capacity. Trans Mountain reminds that it has been running at full capacity and has seen regular monthly apportionment for over a decade ie, the clear sign for a need for expansion. The Trans Mountain apportionment update also includes its standard bit of an apportionment 101. Trans Mountain wrote "*When a pipeline experiences significant and prolonged apportionment like in the case of the existing Trans Mountain Pipeline, it's one signal that more capacity is needed. Apportionment can bring with it a discounting of prices as producers compete to sell what they can through the pipeline before having to use another pipeline or other modes of transport to another, less profitable market. It can also mean the buyers at the end of the pipeline are forced to source their shortfall of supply from alternate, less desirable sources.*" Below is a chart which shows the average apportionment since 2016. Our Supplemental Documents package includes the Trans Mountain release.

Figure 26: Trans Mountain Pipeline Apportionment



Source: Trans Mountain Pipeline

Oil – CP liquefied petroleum gas rail tanker crash/fire on Dec 1 in SE Sask

CP LPG tanker fire

We missed seeing the CP rail tanker carrying liquefied petroleum gas crash and fire on Dec 1 near Macoun in SE Sask. It wasn't specific, but we would assume the LPG tankers were

likely carrying propane or butane. On Dec 2, CKOM radio (Saskatoon) reported [LINK] "*The cleanup of a train derailment near the village of Macoun continued Friday as investigators try to find out what caused a fiery scene. CP Rail says two train cars carrying liquefied petroleum gas caught fire after multiple cars came off the tracks Thursday at around 10 a.m. near the village northwest of Estevan. The rail company says its hazardous materials experts were on the scene with local emergency crews to assess the damage."* We have not been able to find any reports on the cause of the derailment/fire. Yesterday, we checked the Transportation Safety Board of Canada for any update on their investigation. There hasn't been any update posted since their Dec 1 Deployment notice [LINK] "*TSB is deploying a team of investigators to the site of a derailment near Macoun, Saskatchewan. Winnipeg, Manitoba, 1 December 2022 — The Transportation Safety Board of Canada (TSB) is deploying a team of investigators following the derailment of a Canadian Pacific freight train that occurred earlier today near Macoun, Saskatchewan. The TSB will gather information and assess the occurrence."* So, at least so far, there doesn't appear to be any reporting of the cause of the derailment/fire.

Figure 27: CP Rail derailment/fire of tankers carrying LPG on Dec 1, 2022

Source: CKOM radio

It wasn't quite to -25c Tipping Point when trains speed, length/weight lowered

As noted above, we haven't been able to find any cause for the CP LPG derailment and fire. Nor have we been able to find the train's operating at that time of the derailment. It was cold in Macoun on Dec 1, but not quite to the -25c, which is the rail companies consider the Tipping Point for what they call severe winter weather conditions. The AccuWeather recap of Dec daily temperatures for Macoun [LINK] high/lows were -13/-20c for Nov 30, -10/-19c for Dec 1, and -11/-28c for Dec 2. CP's 2022-2023 Winter Contingency Plan Report [LINK] highlights its approach to safety under severe winter weather conditions. CP writes "*Certain severe winter weather conditions require adjustments to our operations to maintain safety, which is foundational to everything we do at CP. For example, when temperatures drop below negative 25 degrees Celsius, a train's speed, length and weight must be reduced.*

These necessary operational changes unavoidably lower overall system velocity, which reduces the supply chain's shipping capacity."

Below Tipping Point -25c across AB/Sask will lead to less crude-by-rail volumes

Here is what we wrote in last week's (Dec 25, 2022) Energy Tidbits memo on trains operating below -25c. "*It's been brutally cold across western Canada and that has to be hitting crude by rail volumes or, for that matter, all rail volumes. On Wed, we tweeted [LINK] " -25c is Tipping Point for "effects that cold weather can have on tracks, locomotives & railcars" ie. all AB/Sask. Must watch 👇 @CNRailway Tipping Point video. Shorter, slower trains for crude-by-rail. Plus increased risks in multiple ways #OOTT [LINK]." It was colder than =25c throughout AB/Sask this week, which means rail volumes will be hit. Most aren't aware that -25c is what CN calls the Tipping Point for cold weather. The easy impacts are that crude-by-rail b will be going slower than normal, there will be less tankcars per train so shorter trains with slower speeds. And there is the a big wildcard that the extreme cold brings higher risks to breakdowns and accidents. There is an excellent CN video here [LINK] that goes thru the Tipping Point and the increased risks in multiple ways to rail transport. It's an eye opener. Here the first part of the text that accompanies the graphics in the video "Rail and wheels in -25C. Stress on Rail. Rail fractures. High impact on rail and wheel. Air brakes in -25C. Freezing of hoses. Air leakage and loss of air pressure. Impaired functionality. Locomotive failure in -25C. Increase in locomotive failure. Train length in -25C. Shorter treains = accumulation of idle cars….":*

Figure 28: Excerpts CN Tipping Point video

Source: CN

Oil – Quebec court says CP is not liable in the 2013 Lac-Megantic railway disaster

CP not liable in Lac-Megantic disaster

On Dec 15, CTV News (Montreal) reported [LINK] "*A Quebec Superior Court judge says Canadian Pacific Railway is not liable in the 2013 Lac-Megantic, Que., railway disaster that killed 47 people. Justice Martin Bureau ruled Wednesday that the actions the railway company was accused of are not the direct, immediate and logical cause of the damages suffered by the victims of the tragedy. Bureau says the fault for the disaster lies with the train conductor, Thomas Harding, and with Montreal Maine and Atlantic Railway Limited -- Harding's employer and owner of the runaway train. Canadian Pacific is the only company accused of responsibility in the derailment that did not participate in a $430-million settlement*

fund for victims, which was created as part of a class-action lawsuit involving almost 4,000 people. The company maintained it bore no responsibility for the disaster because the train was not operated by CP employees or travelling on CP tracks when it derailed. On July 6, 2013, an unmanned train carrying crude oil and owned by MMA roared into Lac-Megantic and derailed, with its cargo exploding and decimating part of the downtown core and killing 47 people." This was the massive crude-by-rail disaster that destroyed Lac-Megantic and killed 47 people. We reviewed the summary findings of the Quebec Superior Court opinion at [LINK]. Our Supplemental Documents package includes excerpts from the opinion.

Figure 29: Lac Megantic, July 9, 2013, two days after crude-by-rail massive fire

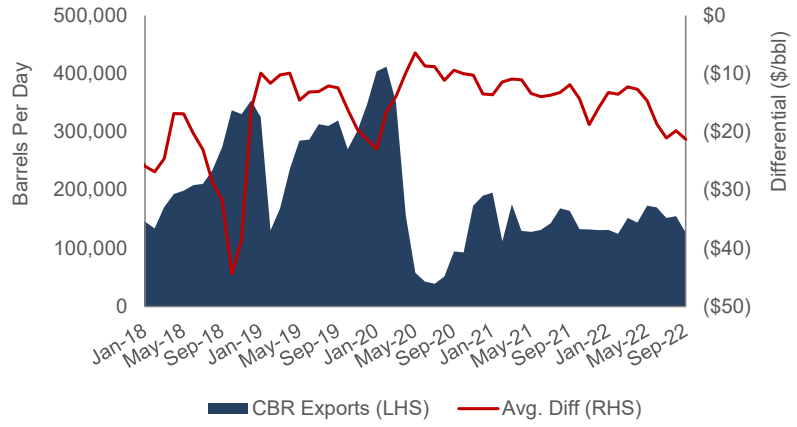
Source: CTV

Oil – Cdn crude by rail imports to Gulf Coast up 12.5% YoY to 72,000 b/d

The EIA posted its monthly "U.S. Movements of Crude Oil by Rail" [LINK] on Friday, which also had good insights on Cdn crude by rail. Canadian CBR volumes to PADD 3 (Gulf Coast) were 72,000 b/d in October, which is up 18,000 b/d MoM from September, and up 8,000 b/d YoY vs October 2021. There was a slight upward revision of +14,000 b/d in to September's data. Below is our graph of Cdn CBR exports to the Gulf Coast.

Cdn CBR imports to Gulf Coast up 8,000 b/d YoY

Figure 30: Canada CBR Exports to US Gulf Coast vs WCS Differential



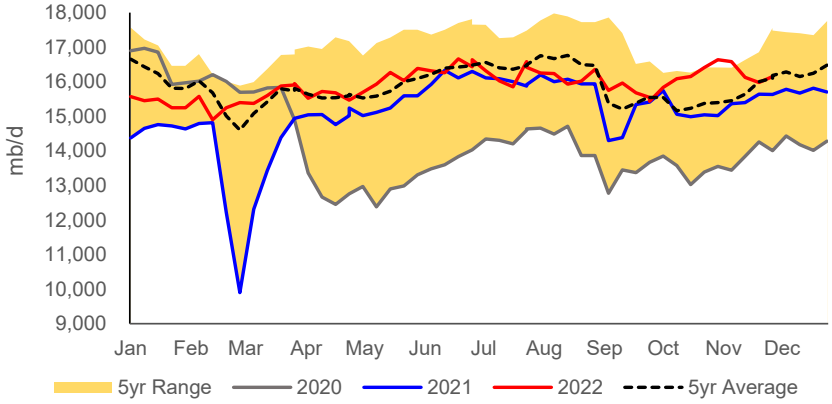
Source: EIA, Bloomberg

Oil – Refinery inputs +0.173 mmb/d WoW to 16.149 mmb/d

Refinery inputs up WoW

November and December are typically months that see increasing crude oil inputs to refineries following the fall refinery turnaround seasonal as refiners push to produce more winter fuels. But there can always be down weeks within this normal seasonal trend. This week saw a slight increase to inputs into refineries. 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 Thursday, the EIA released its estimated crude oil input to refinery data for the week ended Dec 23. The EIA reported crude oil inputs to refineries up +0.173 mmb/d WoW to 16.149 mm/d, which is +0.446 mmb/d YoY from 15.703 mmb/d for the week ended Dec 24, 2021. Note last year's week ended Dec 17, refineries saw a ramp up to produce winter fuels before refineries go into the turnaround in Q1 to switch to more summer fuels. Total products supplied (i.e., demand) increased WoW, up +1.898 mmb/d to 22.822 mmb/d, and Motor gasoline was up +0.613 mmb/d at 9.327 mmb/d from 8.714 mmb/d last week. The 4-week average for Motor Gasoline was down -0.623 mmb/d YoY to 8.663 mmb/d.

Figure 31: US Refinery Crude Oil Inputs (thousands b/d)



Source: EIA

Oil – Suncor sees late Q1 for full capacity at 98,000 b/d Commerce City refinery

Suncor Commerce City refinery is down

On Wednesday, Suncor announced that "*due to the extreme and record-setting weather impacting much of the United States, including Denver, Colorado, Suncor's Commerce City refinery experienced date in the days leading up to December 24th, 2022.*" [LINK] EIA records report Commerce City East and Commerce City West have a combined capacity of 103,000 b/d per calendar day. Suncor said "based on our current assessment we anticipate a progressive restart of the facility with a return to full operations expected to be completed by late Q1 2023.

Oil – US "net" oil imports up 1.328 mmb/d WoW to 2.787 mmb/d

US "net" oil imports up WoW

US "NET" imports were up 1.328 mmb/d to 2.787 mmb/d for the Dec 23 week. US imports were up 0.433 mmb/d to 6.252 mmb/d. US exports were down -0.895 mmb/d to 3.465

mmb/d. The WoW increase in US oil imports was driven mostly by Top 10 with an increase of 0.852 mmb/d. Some items to note on the by country data. (i) Canada was up this week 0.438 mmb/d to 3.504 mmb/d. (ii) Saudi Arabia was down -0.040 mmb/d to 0.473 mmb/d this week. (iii) Colombia was up 0.282 mmb/d WoW to 0.353 mmb/d. (iv) Ecuador was up this week 0.204 mmb/d to 0.274 mmb/d. (v) Iraq was up 0.062 mmb/d to 0.274 mmb/d. (vi) Mexico was down -0.051 mmb/d to 0.581 mmb/d.

Figure 32: US Weekly Preliminary Oil Imports by Major Countries

(thousand b/d)	Oct 21/22	Oct 28/22	Nov 4/22	Nov 11/22	Nov 18/22	Nov 25/22	Dec 2/22	Dec 9/22	Dec 16/22	Dec 23/22	WoW
Canada	3,483	3,410	3,235	3,076	3,844	3,354	3,423	3,795	3,066	3,504	438
Saudi Arabia	325	533	519	211	685	338	274	317	513	473	-40
Venezuela		0	0	0	0	0	0	0	0	0	0
Mexico	509	748	503	528	495	300	585	602	632	581	-51
Colombia	215	218	341	143	170	290	292	248	71	353	282
Iraq	220	134	503	141	385	363	252	282	227	289	62
Ecuador	201	0	102	101	42	242	159	157	70	274	204
Nigeria	42	81	119	181	43	50	159	171	136	66	-70
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	4,995	5,124	5,322	4,381	5,664	4,937	5,144	5,572	4,715	5,540	825
Others	1,185	1,081	1,132	1,178	1,399	1,100	868	1,295	1,104	712	-392
Total US	6,180	6,205	6,454	5,559	7,063	6,037	6,012	6,867	5,819	6,252	433

Source: EIA

Oil – Pemex increasing crude oil input at existing refineries

Pemex refineries operating better

There two somewhat offsetting international oil trends to impact Cdn oil differentials in 2023. On the negative side, it's the increasing Venezuela oil production and exports to the Gulf coast. On the positive side, it's Mexico ramping up their domestic refinery processing capacity via the new Olmeca (Dos Bocas) refinery and improving capacity utilization at existing refineries as Mexico's moves to its goal to eliminate oil exports. On Wed, Bloomberg noted how the existing refineries are increasing their crude oil processing ie. less oil for export. Bloomberg wrote "*Mexico's state oil company Pemex processed 873.3k b/d crude in November, up 8% from the previous month and 19% higher from a year earlier as the country seeks to produce more fuels domestically, according to data on the company's website. * Utilization rate was 54%, above the 50% mark for the first time since August * Tula operated at 73% of capacity while Minatitlan ran at 45% * NOTE: Mexico's six refineries have capacity to process 1.627m b/d, according to Pemex.*"

Oil – Chevron starting Venezuela oil imports, increasing supply without drilling

US oil imports from Venezuela

US imports of Venezuela oil are starting to happen again, just over a month after the Nov 26 approval of a license for Chevron to increase Venezuela oil production and resume US oil imports of Venezuelan oil. We recognize that there was a lot of skepticism that Chevron could generate any quick increase Venezuela production without drilling and get Venezuelan oil imports into the Gulf Coast (PADD 3), but it looks to be happening. On Friday, we tweeted [LINK] "*Chevron increasing VEN #Oil production without drilling a well & exports to PADD 3. 1st tanker of VEN oil to hit US in ~4 yrs. 1st tanker of US #Naptha to VEN to blend with extra heavy to increase oil to flow ie. just blending, no new wells needed. Thx @mariannaparraga! #OOTT.*" Our tweet referenced the Reuters report [LINK] "*Chevron sending two oil tankers to Venezuela under U.S. approval*" because Reuters reported on two tankers. One tanker was loading Venezuelan crude oil to bring to the Gulf Coast. This makes sense given the reports a month ago that there was ~1.7 mmb of oil ready to be exported to the US and that this

would start to hit the Gulf Coast around the end of Dec. The other tanker had reportedly loaded over 0.6 mmb of naptha in Houston to take to Venezuela so it could be used to blend with Venezuela heavy to get to a pipeline spec oil for flowing. Our Supplemental Documents package includes the Reuters report.

Nov 26, Chevron got US license to restart Venezuela production & import to US

Here is what we wrote in our Nov 27, 2022 Energy Tidbits. "*Yesterday, we tweeted a few times on the big breaking oil news that the Office of Foreign Assets (Treasury Department) issued General License No. 41 that authorizes Chevron to restart its operations with PDVSA in Venezuela. [LINK]. It is very important to read the license because it allows Chevron to basically do what it needs to do to ramp up its production and import Venezuela oil to Chevron refineries in the Gulf Coast. This includes items like bringing in the necessary goods and services, including needed diluent and condensate, to increase its production and oil to the Gulf Coast. Politics aside, this is a significant negative to Cdn oil differentials as Chevron ramps up production and brings Venezuela oil to its Gulf Coast refinery. More Venezuela oil to the Gulf Coast is expected to hurt Cdn oil differentials. (i) Our first tweet was [LINK] "Negative to Cdn #Oil differentials, puts at risk Cdn oil to PADD 3. #Chevron can export needed diluent to blend w/ VEN heavy & import oil to CVX refineries, 350 kbd Pascagoula. Automatically renews on 1st day of mth & valid for 6 mths therefrom. #OOTT [LINK]." (ii) Our second tweet was [LINK] "Here's why letting #Chevron restart in Ven puts Cdn #Oil differentials at risk in 2023. See linked 👇03/22/22 tweet. CVX reportedly told Biden Admin could double VEN 800,000 b/d production "within months". Thx @cmatthews9 @Jose_deCordoba. #OOTT." Note that we would expect the limited conditions of General License 41 do not allow for a near term doubling of Venezuela oil production, but an increase of even 100,000 or 200,000 b/d would be significant to Cdn oil as these incremental barrels will come into PADD 3. Certain things will happen quickly such as what will Chevron being able to bring stable diluent/condensate for immediate blending opportunities, and bring diesel for providing needed power to drive operations. Diluent and diesel can have a quick impact. We were linking to the below item on Chevron's reportedly saying they could double production. (iii) Our third tweet [LINK] was a reply to a tweet that said "this is a real problem for WCS". Our reply was "key is US allows CVX to buy & import into VEN goods or inputs needed to produce, repair, service, export crude, health/safety of operations incl diluents, condensates, petroleum or natural gas products. ie. spend/do what they need to do. #OOTT". The license is basically saying o Chevron do what you have to do and get what you have to get to increase production and exports. This will not be like Venezuela trying to increase production without diluent, without equipment, without people, etc. This is why we believe it is important to read the license. Supplemental Documents package includes the Office of Foreign Assets General License 41.*"

Chevron bringing diluent and diesel should have a quick impact

The Reuters report noted the tanker bringing US Naptha to Venezuela. This is a significant impact and need in Venezuela. Here is another item from our Nov 27, 2022 Energy Tidbits. "*We recognize that the vast majority of the quick views on Chevron's return are to not expect any response for a long time. We reiterate its*

worth reading the details of the license. There are items that should have a quick impact on production and exports, in particular diluent for blending and diesel to provide power. Our view is unchanged from what we wrote in our March 27, 2022 Energy Tidbits – we believe Venezuela could double its production in a matter of a year or two with access to equipment, people, diluent, diesel, etc. As noted above, we expect there will very quick production gains from items such as the ability for Chevron to bring stable flows of diluent, condensate and diesel to Venezuela. We have seen over the past year how Venezuela production increased in great part to getting diluent from Iran. Diluent is needed to blend with the Venezuela extra heavy oil to make it moveable via pipeline. A steady access to diluent would be a key factor to increasing Venezuela oil production. Diesel will also be a quick impact. Plus reliable power, oil and gas operations need power and Venezuela has been hit for several years with power outages and unreliable power. Bringing in diesel and generators to provide power can have a very quick impact Plus recall the reports from a couple years ago on how some PDVSA oil workers were selling their tools so they could put food on the table. We suspect there are hundreds of wells that are shut-in because of a pump jack went down and there are no replacement parts. We suspect there are hundreds of wells that could use workovers, they need equipment parts, tools to service and people. These are a just a few of the likely reasons why it's likely that Venezuela could double its oil production within a reasonably short period. Venezuela was double current production 4 years ago."

Chevron reportedly said could double Venezuela's 800,000 b/d within months

Our Nov 26, 2022 tweet referenced Chevron's comments from March. Here is what we wrote in our March 27, 2022 Energy Tidbits memo. "*On Tuesday, we tweeted [LINK] on the WSJ report "Chevron, Waiting It Out in Venezuela, Tells U.S. Now Is the Time to Pump Oil Company pledges to make up for fall in Russian exports". [LINK]. Chevron reportedly is telling the administration they can double Venezuela's oil production within months. The WSJ wrote "For months, Biden administration officials snubbed top executives and lobbyists for Chevron Corp. who had pressed officials in Washington to ease sanctions so the company could boost production in Venezuela, where the U.S. has banned such activities since 2019. Then Vladimir Putin invaded Ukraine. Now the Biden administration is listening closely to Chevron, say people familiar with the conversations, which says it can help double Venezuela's 800,000 barrels-a-day production within months. That could replace the loss of roughly 700,000 barrels a day the U.S. was importing from Russia before it attacked Ukraine. And it could help lower gasoline prices—a major concern for the Biden administration in a tough election year." Our Supplemental Documents package includes the WSJ report.*

Huge Chevron Venezuela oil production capacity without drilling a single well

Chevron CEO has said they aren't planning to drill in the first six months, which is why we think most didn't see any Venezuela oil barrels into the Gulf Coast. We have had a different view from the start – we believe there are multiple items Chevron can do to increase oil production and supply for export without drilling a well Here is what we wrote in last week's (Dec 25, 2022) Energy Tidbits memo. "*There was an overlooked Argus report on Wed [LINK] "High hurdles to grow Chevron's Venezuela*

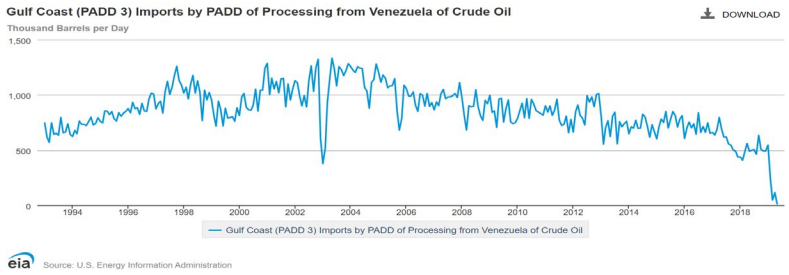
oil output." It was likely overlooked for the title of the report. (i) But, yesterday, we tweeted [LINK] "Tip of the Iceberg! Chevron VEN Nov production is ~90,000 b/d, 1,400 wells, ~65 b/d ave well. Note 👇category 2: ~8,700 wells need ~$0.5 mm/well to become operational. At 65 b/d ave = ~550,000 b/d capacity add without drilling one well. Thx @ArgusMedia Carlos Camacho! #OOTT." Note there were comment on how many of these 1,400 wells were shut-in because they were marginal wells. We disagree with that view. This wasn't the number of wells that were uneconomic, rather this the number of wells being classified as worthy of spending approx. $0.5mm to restore. And we tweeted [LINK] "*should have added. doubt Chevron would put non-producing wells that had been producing at low rates into Category 2 wells that are worthy of spending ~$500k per well remedial work if it was to only get the well back to low stripper well type production rates. #OOTT." (ii) The Argus report reminds of the huge near term upside For Chevron to add production in Venezuela without drilling one well. (iii) Recall that the US only gave a waiver for six months. It s a rolling six-month waiver as the current month ends so it's basically saying to Chevron you have six months from today, but no guarantee for longer. This lack of visibility beyond the six-month window is why Chevron CEO said they aren't planning to do any drilling within six months. Rather working to move the existing oil in inventory and do some well reworking. (iv) Chevron's go-slow plan looks to add >110,000 b/d in the next six months in the Occiente basin. I think most refer to it as the Oriente Basin. Production was 150,000 b/d early this year and is down to 90,000 b/d in Nov. Argus reports "An internal Chevron plan to increase Venezuelan oil production to 200,000 b/d by mid-2023 relies on efforts to rehabilitate some 18,000 wells in various states of disrepair in the country's once-prolific Occidente region". This addition makes sense given the rolling six-month term and what we call the go-slow plan. (v) Adding >110,000 b/d by mid-203 is the Tip of the Iceberg. (vi) We believe Chevron could crank up to add another 200,000 b/d by end of 2023, and a further 200,000 b/d or likely a lot more in 2024. We don't think it's unreasonable to see this up at 500,000 b/d to 1,000,000 b/d in two years if Chevron moves from a go-slow to a get-at-it plan. And this is without drilling one new well. This Argus report shows these elements. (vii) There is so much low-hanging fruit to Chevron to grow Venezuela oil production without drilling any wells. It's all existing wells that need some sort of work or power. (viii) Remember, this is apart from the previously reported 1.79 mmb of oil in storage ready for export. (ix) Argus reporting on an internal Chevron plan. Says "Occidente" region was 150,000 b/d earlier in 2022, but is now down to 90,000 b/d in Nov. Says there are 18,000 wells in total. But only 1,400 producing wells, that is ~65 bpd per well on average. Remember, this is in an industry starved for capital, equipment and basic operating efforts. The question is how much would these 1,400 producing wells be producing with proper maintenance, etc? we suspect a lot more than 65 bpd, would guess something over 100 bpd on average. Category 1 is producing wells. ~7% or 1,400 wells producing oil "but many at decline rates". As noted, these are on average producing 65 bpd. They don't say it, but these heavy oil wells are all likely now or soon to be candidates to reworking so we would expect also some upside here to effectively hold production if not increase. Category 2 is the huge low hanging fruit with "About 8,700 wells fall into Category 2, which includes non-operating wells that may just need minor work to become operational. These wells may need around $500, 000 each in new*

investment to be viable, according to sources familiar with the field." If we use the current producing average of 65 bpd, that is ~550,000 b/d of incremental production capacity for $4.35 billion. That assumes the 65 b/d average. Is it reasonable to assume the average as these are wells that down for some reason? If Chevron is prepared to spend $500,000 per well, it's safe to say these aren't stripper wells that produce a very low amount of production. Rather, we can't believe Chevron would put in this category any wells that aren't capable of a decent level of production and we suspect much more than the average well of 65 b/d. Again, this is not drilling, rather we expect well cleanouts, reworking, etc. If use 100 bpd, that is 870,000 bpd of incremental production capacity. Category 3 "are more than 7,900 wells that need between $5mn-$6mn of investment each to be commercially viable". We are not clear what is required here. Plus upside from wells that don't fit in to category, 1, 2 or 3. Argus notes 'Hundreds of wells in the PdV report are reportedly shut down just for a lack of reliable electricity, which plagues many parts of the country". This is where something like diesel power generation comes into play. The reality is that reliable power is something that is also involved in the above categories. Our Supplemental Documents package includes the Argus report."

A return of Venezuela is negative for Cdn differentials

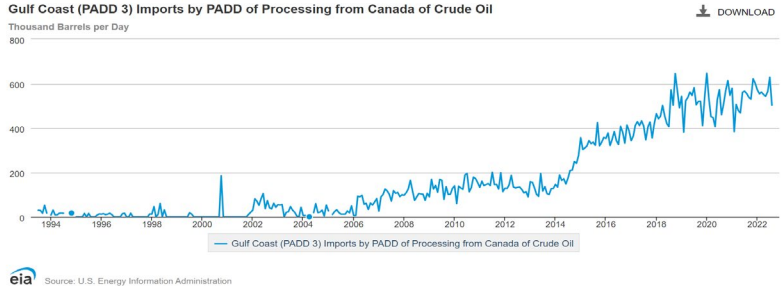
Our Nov 26, 2022 tweet reminded that more Venezuela oil to the Gulf Coast is a negative to Cdn oil differentials. Our tweet included the below EIA crude oil imports in PADD 3 (Gulf Coast) graphs, which remind how Cdn heavy/medium crude was able to penetrate PADD 3 (Gulf Coast) because there was a need with declining Mexico and Venezuela crude oil. Conversely, if Venezuela increases, it will mean more Venezuela crude to the Gulf Coast and less need/increased pressure on Cdn differentials.

Figure 33: Gulf Coast PADD 3 Crude Oil Imports From Venezuela



Source: EIA

Figure 34: Gulf Coast PADD 3 Crude Oil Imports From Canada



Source: EIA

Especially since Chevron has 460,000 b/d of refining capacity in Gulf Coast

Our Nov 26, 2022 tweets also reminded that Chevron has its 350,000 Pascagoula refinery that could take Venezuelan crude oil. The General License 41 says "*Sale to, exportation to, or importation into the United States of petroleum or petroleum products produced by the Chevron JVs, provided that the petroleum and petroleum products produced by the Chevron JVs are first sold to Chevron;"* Chevron has two refineries in the Gulf Coast, one of which would take Venezuelan crude. (i) Pascagoula (Mississippi) refinery. [LINK] "*Chevron's Pascagoula Refinery processes 350,000 barrels (14.742 million gallons) of crude oil a day - an amount equivalent to the size of a football field covered to a depth of 41 feet. Chevron Pascagoula Refinery is primarily a fuels refinery, in that we mainly manufacture motor gasoline, about 130,000 barrels per day (BPD); jet fuel, 50,000 BPD; and diesel fuel, 68,000 BPD. Our other products include fuel oils such as Liquefied Petroleum Gas (LPG), aviation gasoline, petroleum coke and sulfur."* (ii) Pasadena Refinery (Texas) processes light sweet crude so would not process Venezuelan crude. [LINK] "*From gasoline, gasoline components, and distillate oils, to fuel gas and liquefied petroleum gas, the Chevron Pasadena Refinery manufactures products people use every day. Capable of processing up to 110,000 barrels of crude oil per day, we refine 100 percent Texas light, sweet crude, including Chevron-produced oil from the Permian Basin."*

Oil – Venezuela opposition votes Guaido out as leader & to end his interim govt

Opposition votes Guaido is out

Maduro must be loving it to see his opposition no longer as united and voting, on Friday to end Juan Guaido's leadership and to eliminate the interim government he has led. It has to add uncertainty on how the opposition can rally together to form a strong united front like they were a few years ago. Guaido's interim government has been steadily losing international support from the more than 60 countries that recognized his government as the legitimate Venezuela government, but that number is down to a handful led by the US. WSJ also reported "*Mr. Guaidó, 39 years, will continue to head both Venezuela's opposition congress and the interim government until Jan. 5, when his movement's duties will be divided up. The opposition said it would create a new committee to oversee Venezuelan state assets that came into its control—including U.S. refiner Citgo Petroleum Corp. as well as gold bullion at the Bank of England—and are being targeted by creditors looking to seize them. Meanwhile, a special panel made up of political representatives will work on negotiations that the*

opposition is preparing with the Maduro regime, with the hopes of organizing free and fair elections in 2024." Our Supplemental Documents package includes the WSJ report. [LINK]

Oil – No big surprises from Putin's New Year's address

Putin's New Year's address

Putin made his New Year's address yesterday and his speech's primary focus was on justifying/supporting the special military operations in Ukraine. Here are some of the general energy items from his speech. (i) Re Ukraine, fighting for the historical territories. Putin said "*This is what we are fighting for today, protecting our people in our historical territories in the new regions of the Russian Federation. Together, we are building and creating. Russia's future is what matters the most. Defending our Motherland is the sacred duty we owe to our ancestors and descendants. The moral and historical truth is on our side. This is what we are fighting for today, protecting our people in our historical territories in the new regions of the Russian Federation*. (ii) Nothing specific on energy, but Putin spoke generally on sanctions "*Russia has been living under sanctions since the events in Crimea in 2014, but this year, a full-blown sanctions war has been unleashed against us. Those who started it expected our industry, finances and transport to collapse and never recover. This did not happen, because together we created a reliable margin of safety. We have been taking steps and measures towards strengthening our sovereignty in a vitally important field, in the economy."* Our Supplemental Documents package includes the Putin address.

Oil – multiple oil and gas views from Novak's Xmas interview

Russia to produce 9.84 to 10.04 mmb/d in 2023

Last week's (Dec 25, 2022) Energy Tidbits highlighted a couple Novak oil views that were in small TASS reports last Sunday morning. TASS didn't post the full interview until Sunday night. There were a number of oil and gas insights from Novak. (i) Russia producing around 10 mmb/d ie. less than OPEC+ quota. At the recent Oct OPEC+ meeting, Russia's quota was reduced from 11.004 mmb/d to 10.478 mmb/d. Novak said *"If we talk about the oil industry, then at the peak, in March-April, we saw a drop in production by about 1.2 million barrels per day. However, then the energy industry recovered from the shock of the beginning of the year. Our companies have built new logistics chains for the sale of oil and petroleum products and in May-June restored production to the levels of January-February, which remain now - about 10 million barrels per day."* (ii) 2023 production 9.84 to 10.04 mmb/d. Novak said "*I do not rule out that in 2023 there will be risks of a decrease in production in certain periods. Perhaps at the peak we will reduce it by 7-8%. However, in the whole year we will produce at least 490-500 million tons. But, I repeat, much will depend on logistics*." That is equal to 9.84 to 10.04 mmb/d. (iii) Take about 4 months to narrow discount. Novak believes the big discount of Russian oil prices will normalize like it did in the summer. Novak said "*However, it is obvious that our product is in demand in the international market. Of course, the routes are lengthening, so the discount has become higher than a month ago. We observed the same situation in March-April, when the discount increased sharply, and then halved within about four months. This time the situation will be similar, and I think that the disparity will be smoothed out after the stabilization of new logistics chains." "I think a few months. Last time, it took about four months to stabilize the new supply chains, this time it will be about the same."* (iv) Will increase oil exports if can't export petroleum products. Novak said "*We have calculated different scenarios, including maintaining the current ratio of oil exports, production and refining. If there are problems with the sale of petroleum products, oil refining in some volume can be replaced by additional volumes of oil exports*." (v) Serious problems in 5-10 yrs for oil and gas shortages. Novak said "*Many Western oil and gas companies are already*

wary of all these processes and withdraw funds in the form of dividends instead of investments. In the future, this will lead to the fact that as a result of a decrease in the volume of energy investments in the EU, there will be a shortage, the world will face a deficit and a new round of crisis." TASS follows up asking how soon can this happen. Novak says "*In the medium term. Within 5-10 years, the world will face serious problems. This will affect Europe the most, as they have reduced imports of Russian gas and are now focusing on LNG and the growth of their own production, which briefly occurred in Norway and the UK. However, resources there are very limited, and this increase will not be long-term. If we talk about LNG, then there are also no guarantees. With increased consumption in the Asia-Pacific region, Europe will also inevitably face a deficit*." There are other items from the interview. Our Supplemental Documents package includes the TASS interview. [LINK]

Oil – Waiting on details for Putin's decree on Russia response to price caps

Putin signs response to price caps

Last week's (Dec 25, 2022) Energy Tidbits memo noted how, on Dec 20, TASS reported [LINK] Putin signed the decree on retaliatory measures. TASS reported "*The decree will be valid until July 1, 2023. The ban on the supply of oil and petroleum products from the Russian Federation will be in force from February 1, 2023. The President banned the supply of oil and petroleum products from the Russian Federation to those who prescribe a price ceiling in contracts. Putin also banned the supply of oil to foreign buyers if the contract uses a mechanism for fixing the marginal price. The supply of Russian oil and petroleum products to countries that have introduced a price ceiling will be possible only on the basis of Putin's special decision."* On Thurs, Interfax reported that Russia Deputy Minister Novak saying the details for the decree are to be posted in the next few days. Interfax wrote "*The procedure for compliance with and implementation of the decree of the President of the Russian Federation on retaliatory measures to the introduction of a ceiling on prices for Russian oil and oil products will be published immediately after the New Year holidays, Deputy Prime Minister Alexander Novak told reporters. "Now we are preparing the procedure for implementing the presidential decree. It will be released in the coming days, respectively, immediately after the holidays. In this order , the mechanism for monitoring and implementing the decree will be prescribed, and (it will be - IF) considered at the working group that was created by the president on this issue," Novak said."*

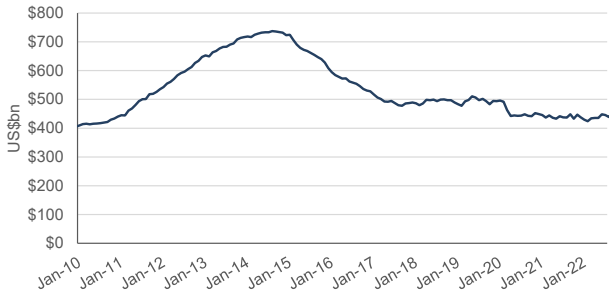
Oil – Saudi nest egg, increase in net foreign assets in November

Saudi net foreign assets

We continue to see key financial reasons why Saudi Arabia is going to do all it can to maintain high oil prices for the foreseeable future. And we continue to believe the #1 financial theme for Saudi Arabia in the 2020s will be their continued, and likely increasing, use of Other People's Money as they try to transition their country to MBS's Vision 2030. We believe this has been obvious with how Saudi Arabia's net foreign assets dropped by about $300 billion over seven years. We are surprised that markets and oil watchers didn't seem to pay attention to the Saudi net foreign assets data ie. what we call their nest egg to help them thru the Energy Transition. Saudi net foreign assets have dropped by $285.2b in the last 8 years, from is peak of $737.0b on Aug 31, 2014 to $451.8b on Nov 30, 2022. That is an average of $3.0b per month for the last 8 years. Oil prices were softening at the end of Nov, but Brent was ~$91 for the month, yet Saudi Arabia's net foreign assets on November 30 were up $7.3b MoM to $451.8b vs $444.5b in October. Saudi Arabia is far from going broke but there has been a huge decline in the last 8 years, but it is still a very big nest egg. This net foreign asset depletion is why we have been highlighting that the primary financial theme for Saudi

Arabia in the 2020s is getting Other People's Money (OPM) to fund as much of their Vision 2030 as possible. And no question, accessing OPM has helped to slow down and temporarily pause the decline in net foreign assets. Saudi Arabia's central bank (SAMA) doesn't provide explanations for the monthly swings. Saudi net foreign assets on November 30 of $451.8b are up $4.9b YoY from $446.9b at November 30, 2021. We believe the $285.2b drop in net foreign assets is why there has been such a big push in the last few years to get OPM so Saudi doesn't keep depleting its nest egg. And why we call this the #1 financial theme for Saudi Arabia in the 2020s – the increasing use of Other People's Money. And not just in Saudi Aramco, although we do expect to see more equity and bond sales from Aramco. Below is our graph of Saudi Arabia net foreign assets updated for the November 30 data.

Figure 35: Saudi Arabia Net Foreign Assets



Source: Bloomberg

Oil – No big surprises in Xi's new year's address

Xi's New Year's address

Xi gave his new year's address to the nation. There were no big surprises. A few of the energy linked items were. (i) Covid – no details. Xi said "*we have adapted our COVID response in light of the evolving situation to protect the life and health of the people to the greatest extent possible. Officials and the general public, particularly medical professionals and community workers, have bravely stuck to their posts through it all. With extraordinary efforts, we have prevailed over unprecedented difficulties and challenges, and it has not been an easy journey for anyone. We have now entered a new phase of COVID response where tough challenges remain. Everyone is holding on with great fortitude, and the light of hope is right in front of us. Let's make an extra effort to pull through, as perseverance and solidarity mean victory."* (ii) Economy. Nothing specific, rather Xi said "*The Chinese economy enjoys strong resilience, tremendous potential and great vitality. The fundamentals sustaining its long-term growth have remained strong. As long as we stay confident and strive for progress while maintaining stability, we will realize the goals we have set*." (iii) Seemed to take a shot at younger people to get in line. Xi said "*Going forward, China will be a country that has great expectations of its younger generation. A nation will prosper only when its young people thrive. For China to develop further, our young people must step forward and take on their responsibilities. Youth is full of vigor and is a source of hope. Youngsters should keep their country in mind, cultivate keen enterprise, and live youth to the fullest with great drive, to prove worthy of the times and the splendor of youth."* Our Supplemental Documents package includes the transcript of Xi's address.

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

Key oil call for 2023

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

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

The reason why we have been highlighting the herd immunity focus is because of the Dec 15 comments from Vitol. Here is what we wrote in our Dec 18, 2022 Energy Tidbits memo. "*Great food for thought on China's Covid relaxation from Mike Muller (Head, Vitol Asia) in his monthly appearance on the Gulf Intelligence Daily Energy Markets podcast on Thursday. [LINK]. (i) China is clearly relaxing its Covid restrictions with the key assumption that Omicron version of Covid is not anymore deadly than the flu. And Muller notes that Covid is spreading quickly. So is China effectively moving to herd immunity strategy near term by letting the less deadly Covid version spread quickly? If so, it means that the next few months should see choppy, up and down non-broad recovery, But if China gets to herd immunity, does it set up "J" shaped recovery in Q2/23? (ii) Early Thursday morning, we tweeted [LINK] "Nike swoosh or J shaped recovery in China demand transportation fuels. See 👇Vitol @michaelwmuller inbound international air travel to China as soon as Q2. Freedom of travel + population less scared of Virus = China move faster to herd immunity. @sean_evers @CrystolEnergy. #OOTT." (iii) Our tweet included the transcript we made of Muller's comments. Items in "italics" are SAF Group created transcript. 14:40 min mark. "Covid headlines out of China have all been rather constructive of late. There are clear signs that public policy has shifted towards no longer Zero tolerance and restrictive measures and a realization, that's probably guided by their chief medical scientists, that this particular variation of Omicron that is running thru the population a lot faster, I think if you just go through the small sample of my own colleagues in China, many of them have it right now, they all know somebody n their family or in their close circle of friends that has it and that's across three different cities. So it looks like China is in the process of becoming self immunized if you like by a more liberal policy of allowing the virus to spread in a way that is reasonably contained." 15:50 min mark. "there is a lot more freedom of movement. There has not yet been an edict from central government that the grand migrations for Chinese*

New Year, where you can get half a billion people getting on trains, cars, public buses and going to their families at Chinese New year is going to be discouraged as was the case for the last two cycles. Chinese New Year falls early and this is going to start around January 7/8. Air travel is up, public transport is being made free of charge in certain cities. China Eastern came out with a headline today they have 1,380 scheduled domestic flights that compares to five hundred and forty odd flights on the first of December. The population of China seems less scared of the Virus than was the case just a few weeks ago, and self-immunizing in a way that might happen a lot faster than we think". 17:15 min mark. ".. and, as such, it stands a reasonable chance of not suffering the same toll that was the case in many other large countries. So with that degree of confidence in the economy, we have colleagues in China suggesting that international inbound air travel in China could be a reality as soon as Q2 next year, which was not in most people's balances in supply demand predictions going forward. So that gives you a bit of a Nike swoosh or "J" shaped sort of view on demand for transportation fuel in China, notably jet fuel which is the big absent portion of the oil demand barrel. And has people getting quite bulled up for the second half of next year, if not somewhat sooner. But in the near term, of course, one has to be cautious because the public has been conditioned to self-isolate themselves and to avoid getting this virus if they can."

Oil – China stampeding to herd immunity, major cities have hit peak Covid cases

China rushing to herd immunity

Last week's (Dec 25, 2022) Energy Tidbits memo noted our Dec 23 tweet [LINK] "*WOW! China racing to herd immunity. @business "as many as 248 mm people or nearly 18% of the population likely contracted the virus in 1st 20 days of Dec". Thx @business John Liu. Fits 👇12/15 Vitol @michaelwmuller on J shaped recovery in China #oil demand as soon as Q2. #OOTT,"* Bloomberg wrote "*Nearly 37 million people in China may have been infected with Covid-19 on a single day this week, according to estimates from the government's top health authority, making the country's outbreak by far the world's largest. As many as 248 million people, or nearly 18% of the population, likely contracted the virus in the first 20 days of December, according to minutes from an internal meeting of China's National Health Commission held on Wednesday, confirmed with people involved in the discussions."* We recognize there isn't any real formal data, but it certainly seems like China is running fast to peak Covid cases and herd immunity. On Thurs, we tweeted [LINK] "*China moving quickly to herd immunity. Covid cases peaked in most populous cities Beijing #2 w/ 21 mm, Tianjin #4 w/ 14 mm. Chengdu #7 w/ 9 mm. Fits 👇12/15 tweet @vitolnews @michaelwmuller J shaped recovery in CN demand #Oil transportation fuels as soon as Q2. #OOTT."* Note that this morning, Our tweet attached a People's Daily (communist party media) Thurs report [LINK] "*Wu Zunyou, chief epidemiologist at the Chinese Center for Disease Control and Prevention, said at a news briefing that outbreaks in cities like Beijing and Tianjin as well as Chengdu, Sichuan province, have peaked. Increased movement during the Spring Festival travel rush and circulation of other respiratory diseases will make the situation more challenging, he said*." Earlier today, we tweeted [LINK] how the Guangzhou (#5 with 14mm) also reached peak Covid "*Covid peaked in most populous cities Beijing #2 w/ 21 mm, Tianjin #4 w/ 14 mm. Guangzhou #5 w/ 14 mm. Chengdu #7 w/ 9 mm*." Our tweet attached Sina Finance report today [LINK] "*Guangzhou: The epidemic has peaked and is expected to enter the end of the epidemic before the Spring Festival. On January 1, the reporter learned from the Guangzhou Municipal Health Commission that after a high plateau period of more than a week, since*

December 23, the number of fever outpatient visits in the city began to fall from a high level, and the number of single-day visits dropped from 560,000 at the peak to 19,000." Our Supplemental Documents package includes the People's Daily report and the Sina Finance report..

Oil – China looks to be quickly reopening in areas that have seen Covid peaks

China reopening

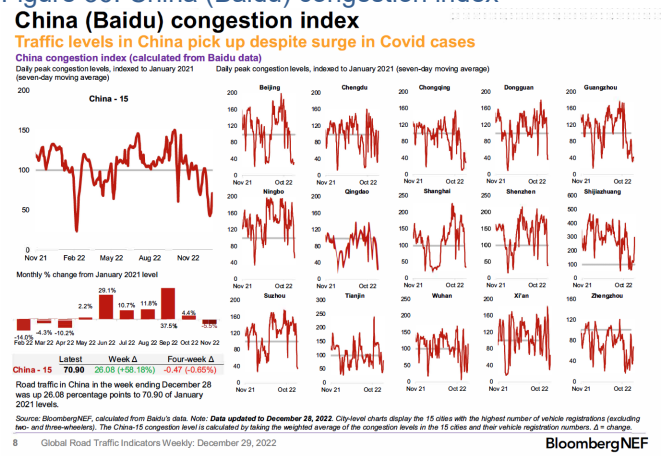
We have been watching to see if China would be reacting like other countries that hit herd immunity to see if people would quickly get out and about in a reopening just like seen in all other countries that reopened after reaching herd immunity. And the reports seem to confirm that China is quickly reopening in areas that have reached peak Covid cases. Yesterday, we tweeted [LINK] "*China moving quickly to herd immunity. Covid peaked in Beijing = immediate ramp up in getting back out to restaurants, malls, cinemas & travel. Fits 👇12/15 tweet @vitolnews @michaelwmuller J shaped recovery in CN demand #Oil transportation fuels as soon as Q2. #OOTT."* Our tweet attached reports yesterday on People's Daily and Global Times on the quick reopening in Beijing. Some of the People's Daily comments were "*In Beijing, hordes of people crowded outside restaurants in commercial districts, waiting for seats during peak hours. Popular diners have posted over 80 percent of customer traffic compared with regular times, with some even seeing a full house. The same thing goes for cinemas. Cinema staff confirmed that attendance at some movie theaters in Beijing has returned to 75 percent of the regular level. The cinemas are expected to witness more moviegoers with New Year's Day and the Spring Festival holiday approaching. The consumption recovery momentum is further boosted by the ice-snow industry boom in the first snow season after the Beijing 2022 Olympic Winter Games concluded. Data from online travel service provider Trip.com Group shows that reservations for hotels related to skiing venues in Beijing surged 99 percent week on week from Dec. 19 to 23.*" Our Supplemental Documents package includes the People's Daily and Global Times reports.

Oil – A data blip? China road traffic +26% WoW for week ended Dec 28

China road traffic +26% WoW

Based on what has happened in China since our Thurs tweet, it looks like it's more than a data blip. But, on Thursday, we tweeted [LINK] "*A data blip? or is china moving faster to herd immunity so more who just had weak Covid are getting out and driving? China road traffic for week ending 12/28 was +26.08% to 70.90 of Jan 2021 levels. Thx @BloombergNEF Philip Geurts, Caudio Lubis, Wayne Tan #OOTT."* We were surprised by the BNEF China mobility data in its Global Road Traffic Indicators Dec 29. Given the huge increases in Covid cases, we weren't expecting to see a WoW increase in China road traffic. BNEF reported "*Road traffic in China in the week ending December 28 was up 26.08 percentage points to 70.90 of January 2021 levels."* Prior to this, China's road traffic was weakening with the ramp up in Covid in Dec. All the reports continue to say covid is spreading at fast rates across China. There are a range of estimates for when China will hit peak Covid cases (most seem to be in early Jan) and then reach herd immunity. But we haven't seen any forecasts that call for herd immunity until sometime after Jan. This brings up the question – was this a data blip or one-off data point or is this the start of some sort of trend, even if modest. When we saw the data, it reminded us of what happened in North America when there weren't travel restrictions and people had gone thru mild Covid – they got out and about. Maybe if this doesn't turn out to be a one-off data blip, this is part of the reason that people in areas that have had mild covid are getting out and about. Our Supplemental Documents package includes the two BNEF graphics from our tweet.

Figure 36: China (Baidu) congestion index



Source: BloombergNEF

Oil – Will others follow Morocco in banning travelers from China?

Morocco bans travelers from China

Prior to yesterday, we had only seen reports of countries like US, Italy, Japan, etc requiring mandatory Covid testing for any travelers from China. But that changed yesterday. We tweeted [LINK] "*Who will follow Morocco in banning travelers coming from China? Or will thers follow US, Italy, Japan, etc in just doing mandatory testing for any travelers from China? Thx @MoroccoWNews. #OOTT."* Note this is all travelers, regardless of nationality, coming from China. Our tweet linked a Morocco World News Dec 31 report [LINK] "*Morocco to Ban Travelers Coming from China Starting January 3. All travelers arriving from China, regardless of their nationalities, will be banned from entering Morocco starting January 3."*We can't help wonder what is going to happen with international air travel, certainly at least with China, now that China is opening up inbound and outbound international air travel. On Thurs, we tweeted [LINK] "*What will countries do as Chinese New Year travel approaches? China may be opening in and out international travel, but what will others do? only testing? 1st 2 flights into Milan with mandatory testing had 38% and 52% positive testing. #OOTT."* Our concern is that the first wave of countries moving to requiring negative Covid tests for air travelers from China. On Wed, the US moved to put in negative test requirements. Italy had done so earlier this week. But what caught our attention were the reports that the first two Chinese flights into Milan that required testing had 38% and 55% testing positive for Covid. We can't help believe the number of countries requiring tests is going to grow extremely fast. But our big worry is that the Italy data on the high % having Covid will lead Italy and other countries to do more than just require negative tests. We have to believe this could put a pause or slowdown in international air travel to and from China. The countries requiring mandatory testing keep increasing. How can others in the EU not at least move to the same standard as some of their EU members like Italy? Yesterday afternoon, as expected, Canada announced it was also implementing negative test requirement for travelers from China to follow the US lead. Have to believe Mexico will soon follow given their border dealings with the US. The question is will others follow Morocco in banning travelers from China? Our Supplemental Documents package includes the Morocco World News report.

Will mandatory masks on airplanes soon come back?
Yesterday afternoon's Canada announcement [LINK] on the negative test requirements for travelers from China also included the statement "*While not mandatory, all travellers are strongly recommended to wear well-constructed and well-fitted masks during their travel on planes and in airports, or other crowded indoor settings."* We won't be surprised to see a return to mandatory mask wearing on Canadian air flights if there is any big jump up in Covid cases in Canada.

Oil – Vortexa crude oil floating storage 93.49 mmb as of Dec 30, +4.76 mmb WoW

Vortexa crude oil floating storage

We are referencing the Vortexa global crude oil floating storage data posted on the Bloomberg terminal as of 10am MT yesterday. Note that these estimates get revised over the course of the week and the revisions can go back months. We do not check daily for the revisions, so our comments on the new estimates are compared to the prior week's Vortexa estimates posted on Bloomberg on Dec 24 at 10am MT. (i) As of 10am MT yesterday, Bloomberg posted Vortexa crude oil floating storage estimate for Dec 30 at 93.49 mmb, which is +4.76 mmb WoW vs upwardly revised Dec 23 of 88.73 mmb. Note Dec 23 of 88.73 mmb was revised +9.62 mmb vs 79.11 mmb originally posted on Bloomberg at 10am on Dec 24. (ii) It looks like the low Dec 16 was an aberration and not the start of a trend. Yesterday, Dec 16 was posted at 66.10 mmb, which is essentially unchanged since it was first estimated at 65.35 mmb on Dec 17. It's a low number and looks to be standing out as an aberration. We still wonder how the increasing number of unaccounted for dark tankers has to be causing problems for tanker trackers. (iii) There were only two larger revisions to the past several weeks as most are only smaller revisions. The revisions from the estimates posted yesterday at 10am MT vs the estimates posted on Bloomberg at 10am on Dec 24 are as follows: Dec 23 revised +9.62 mmb. Dec 16 revised -2.24 mmb. Dec 9 revised -0.65 mmb. Dec 2 revised -0.08 mmb. Nov 25 revised -2.20 mmb/. Nov 18 revised -5.46 mmb. Nov 11 revised -1.14 mmb. (iv) There is still a wide range of floating storage for the past several weeks, but a simple average for the past seven weeks is increased to approx. 89.5 mmb (was 87.4 mmb). (v) Also remember Vortexa revises these weekly storage estimates on a regular basis and we do not track the revisions through the week. (vi) Dec 30 estimate of 93.49 mmb is -126.91 mmb vs the post-Covid peak on June 26, 2020 of 220.40 mmb. (vii) 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 30 estimate of 93.49 mmb is +41.40 mmb vs pre-Covid dec 30, 2019 of 52.09 mmb. Dec 30 estimate of 93.49 mmb is +7.59 mmb YoY vs Dec 31, 2021 of 85.90 mmb. (viii) Below are the last several weeks of estimates posted on Bloomberg as of 10am on Dec 31, 10am on Dec 24 and 10am on Dec 17.

Figure 37: Vortexa Floating Storage posted on Bloomberg Dec 31 at 10am MT

Source: Bloomberg, Vortexa

Figure 38: Vortexa Estimates Posted Dec 31 10am MT, Dec 24 10am MT, Dec 17 10am MT

Posted Dec 31, 10am MT

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

Dec 24, 10am MT

Date	Last Px
Fr 12/23/2022	79111
Fr 12/16/2022	68337
Fr 12/09/2022	94117
Fr 12/02/2022	90397
Fr 11/25/2022	103.708k
Fr 11/18/2022	98330
Fr 11/11/2022	77867
Fr 11/04/2022	90147
Fr 10/28/2022	98760
Fr 10/21/2022	87871
Fr 10/14/2022	86443

Dec 17, 10am MT

Date	Last Px
Fr 12/16/2022	65351
Fr 12/09/2022	88547
Fr 12/02/2022	90188
Fr 11/25/2022	101.218k
Fr 11/18/2022	96973
Fr 11/11/2022	76573
Fr 11/04/2022	88482
Fr 10/28/2022	99988
Fr 10/21/2022	89570
Fr 10/14/2022	87538
Fr 10/07/2022	81918

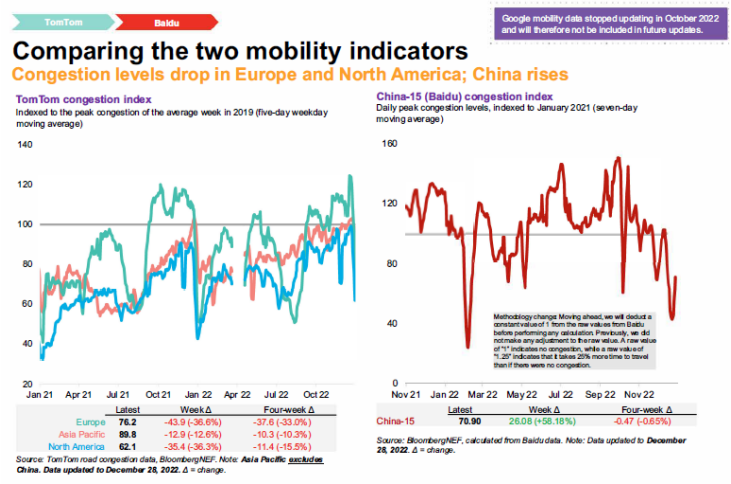
Source: Bloomberg, Vortexa

Oil – Mobility indicators, all major regions fall, except China

All major mobility indicators fall WoW

We like to review the BloombergNEF weekly indicators reports as they provide updates on WoW changes, but also remind that WoW changes do not necessarily mark a trend. On Thursday, BloomergNEF posted its Global Road Traffic Indicators which included a WoW decrease in mobility across the globe, with the exception of China. This should come as no surprise as the holiday season typically brings a decrease in congestion levels. Over the previous weeks TomTom trends moved lower relative to 2019, but all of the three major regions decreased 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 -36.6%, Asia Pacific down -12.6%, and North America down -36.3% from last week. Europe and North America are bullish and subject to drivers responding to rising cost, including high gasoline prices. Our Supplemental Documents package includes excerpts from the BNEF Global Road Traffic Indicators report.

Figure 39: BloombergNEF Mobility Indicators



Source: BloombergNEF

Oil & Natural Gas – Dallas Fed Survey, costs rose for eight consecutive quarter

Dallas Fed quarterly energy Survey

One of our favorite quarterly reports is the Dallas Fed quarterly energy survey posted this week [LINK]. The survey provides a good window into what the US oil and gas sector is thinking about prices, activities and issues. It's a must read. It is important to remember that the data for this survey was collected December 7-15 from a total of 152 firms, 97 E&P and 55 oilfield services. Even though optimism waned in the new survey, it is possibly higher today. WTI rose from $72.01 to $77.28 and Henry Hub from $5.72 to $6.43 as the survey was being conducted. (i) The headlines were similar to last quarters report on the expansion in oil and gas activity, cost pressures building, and supply-chain delays persist. (ii) Activity shrunk slightly compared to last quarter, the Dallas Fed wrote "*The business activity index—the survey's broadest measure of conditions facing Eleventh District energy firms—remained positive but fell to 30.3 in the fourth quarter from 46.0 in the third*" (iii) Six-month outlooks declined overall, with the operating-margin index remaining positive and slightly increased from 25.4 last quarter to 25.9. After a jump in the uncertainty index last month, it jumped again from 35.7 to 40.1 suggesting that uncertainty became much more pronounced this quarter. (iv) On average, respondents expect a West Texas Intermediate (WTI) oil price of $84 per barrel by year-end 2023; responses ranged from $65 to $160 per barrel. Survey participants expect Henry Hub natural gas prices of $5.64 per million British thermal units (MMBtu) at year-end. For reference, WTI spot prices averaged $73.67 per barrel during the survey collection period, and Henry Hub spot prices averaged $5.93 per MMBtu. (v) One big red flag in the survey was the rising costs for the eighth straight quarter with indexes near historical highs. The Dallas Fed wrote "*Firms reported rising costs for an eighth consecutive quarter, with the indexes remaining elevated. However, the rate of those increases has slowed. Among oilfield services firms, the input cost index was 61.8 versus 83.9 last quarter. Among E&P firms, the finding and development costs index was 52.5, a modest decline from 64.7 last quarter. Additionally, the lease operating expenses index dropped 22 points to 48.4.*" (vi) We are interested in the respondents answer to special survey questions. When asked, 64% of the firms participating in the survey believe their firms capital spending will

increase in 2023, with 39% of that being only a slight increase. 32% of participants said that cost-inflation and/or supply-chain bottlenecks will be the biggest drag on production growth; with 27% stating a maturing asset base the cause of production drag. Of all the large firms surveyed, 35% state that they will reduce their greenhouse has emissions by 10 percent and of the small firms, 10% stated they plan to reduce their emissions by more than 10%. Our Supplemental Documents package includes excerpts from the Dallas Fed survey.

Energy Transition – Toyota CEO & Maine, EVs to take longer to become mainstream

Toyota & Maine on EVs

We probably shouldn't be surprised that most overlooked the WSJ's Monday opinion piece "*Not So Fast on Electric Cars"* [LINK] because it raised doubts/questions on EV success from Toyota and the State of Maine. On Monday, we tweeted [LINK] "*1/2. EVs to take longer to replace ICE. Headline "I think BEVs are just going to take longer to become mainstream than the media would like us to believe" @ToyotaMotorCorp CEO. @AllysiaFinley also reports at 32F, typical winter day in much of US, Tesla 3 that in ideal ..#OOTT"* and [LINK] *"2/2. ...conditions can go 282 miles between charges will make it only 173 miles. Imagine if the 100 million Americans who took to the road over the holidays were driving electric cars. How many would have been stranded as temperatures plunged. #OOTT."* (i) Toyota CEO Akio Toyoda says what most auto manufacturers are afraid to say on EVs penetration rate. WSJ wrote "*Toyota CEO Akio Toyoda recently caused the climate lobby to blow a fuse by speaking a truth about battery electric vehicles that his fellow auto executives dare not. "Just like the fully autonomous cars that we were all supposed to be driving by now," Mr. Toyoda said in Thailand, "I think BEVs are just going to take longer to become mainstream than the media would like us to believe." He added that a "silent majority" in the auto industry share his view, "but they think it's the trend, so they can't speak out loudly.*" (ii) Maine reminds of the reality check shortfall of EVs for those that have winter temperatures and don't have 21.5C (70F) temperature for calculating the expected battery range for EVs. Rather, being at freezing temperature of 0C (32F) has a big impact on range loss for EVs. WSJ wrote "*Maine notes in a plan submitted to the Federal Highway Administration this summer that "cold temperatures will remain a top challenge" for adoption, since "cold weather reduces EV range and increases charging times." When temperatures drop to 5 degrees Fahrenheit, the cars achieve only 54% of their quoted range. A vehicle that's supposed to be able to go 250 miles between charges will make it only 135 miles on average. At 32 degrees—a typical winter day in much of the country—a Tesla Model 3 that in ideal conditions can go 282 miles between charges will make it only 173 miles. Imagine if the 100 million Americans who took to the road over the holidays were driving electric cars. How many would have been stranded as temperatures plunged? There wouldn't be enough tow trucks—or emergency medics—for people freezing in their cars."* Our Supplemental Documents package includes the WSJ opinion piece.

Energy Transition – Ford F-150 Lightning price is +40% since May 2021 $39,974 price

Ford F-150 Lightning base price +40%

Somehow electric car and truck manufacturers have to get the price down if they want to attract broader buying from middle and lower income households. The purchase cost is just too high. And the challenge is that their attempts to make price competitive models is running headfirst into critical metals cost escalation. A good example is Ford, who made huge news when it announced the pricing of its F-150 Lightning electric pickup truck in May 2021 would start with a base price of $39,974. It was their way of positioning the Lightning as comparable prices to regular ICE pickup trucks. We suspect very few, if any, actually got

a Lightning under $40,000. It wasn't Ford's fault that there were dealer adjustments. Our Jan 2, 2022 Energy Tidbits noted "*However, reports now are emerging about dealers' "market adjustments." According to Sam Alexander's video, the Koons Ford Falls Church dealer in Virginia sent an email to reservation holders, which says that to be among the 25 priority orders, there will be a $30,000 "market adjustments" on the MSRP price. The other customers (non-priority) will have to pay $10,000 more. Not only that, any customer who placed an order will have to agree to a $5,000 non-refundable deposit."* Regardless of the dealer adjustments, the base price of the F-150 is now up 40% since May 2021. On Dec 16, CNBC reported [LINK] "*Ford Motor has once again increased the starting price of its electric F-150 Lightning, citing higher raw material costs for the pickup truck.*
The new price of the F-150 Lightning Pro, an entry-level model meant for commercial and business customers, will be $55,974 — up nearly 8%, or $4,000, from previous pricing and a 40% increase from the original pricing of $39,974 announced in May 2021. A Ford spokeswoman in an emailed statement Friday said the company adjusts vehicle pricing "as a normal course of business due to rising material costs, market factors, and ongoing supply chain constraints." Ford initially made waves when it announced the starting price for the Lightning would be about $40,000, making it more affordable than many EVs on the market. Wall Street praised the vehicle, and it was a major boost for the company at that time."
Reminder, this is the base price.

Energy Transition – US facing challenge in getting local approvals for onshore wind

Onshore wind local approvals

There was a good reminder NY Times report on the challenge facing getting local approvals for the huge ramp up in onshore wind required for the Biden renewable energy plan. It reminds of the challenges that Europe has been facing. Wind farms aren't in cities, so it's the rural areas that will be expected to approve wind farms. On Thurs, the NY Times report "*The U.S. Will Need Thousands of Wind Farms. Will Small Towns Go Along?*" noted what was happening in the move to get approval for an Apex Clean Energy wind project, Goose Creek Wind, in Illinois. Most of the objections are well known such as depressing land values, aerial seeding problems, drainage patterns disrupted, loss of view, etc. Loss of view is huge to anyone who has a great view. We aren't saying who is right or wrong, but rather as it impacts the energy call. This is another reminder that NIMBY issues are also impacting wind and solar projects, no different than NIMBY has impacted nuclear, oil, natural gas, etc. And NIMBY issues mean that the speed of onshore wind development won't be as fast as the aspirations and that means there will inevitably be a longer than aspired need for fossil fuels. Our Supplemental Documents package includes the NYT report.

TotalEnergies, challenge for wind/solar is getting timely approvals

Europe has been dealing with this challenger to get local approvals for years. Here is what we wrote 15 months ago in our Oct 3, 2021 Energy Tidbits memo. "*We believe one of the many overlooked assumptions on the energy transition is that the pace of acceleration of wind and solar generation isn't really held back by approval process. This was another of the direct insights from the Q&A portion of the TotalEnergies investor day was that getting approvals is a real problem for wind and solar. On Tuesday, we tweeted [LINK] "NIMBY is why #EnergyTransition will take way longer. @PPouyanne stresses challenge to get approvals for assumed massive immediate ramp up in #Wind #Solar power. Its why #NatGas will be needed for power & be stronger thru 2020s & beyond. Lots in @TotalEnergies investor day.*

#OOTT." We weren't kidding, there were many sector and commodity insights from the investor day. In the Q&A, mgmt was asked about overcoming local opposition to wind and solar projects in France. Pouyanne gave a lengthy answer and linked the answer to the solar and wind needing large amounts of land to produce energy. Later in the memo, we include the TotalEnergies graph on this point. Pouyanne's answer noted the problem isn't only in France, they see it in Germany, Italy and Spain. And he said "The problem is not only in France. I think by the way you have issues with communities because it's a question again of land use. In fact, you have competition for use, and you have people." And "So I'm not surprised, and it's why I was insisting that it's a question of scarcity above surface for renewables. So that has to be taken into account. I read there was a study. It's an interested study, which has been published in Italy by the Ambrosetti Foundation. We try to translate this. The target that the European Commission has assigned by 2030, 40% of renewable in our mix in terms of. they made a study how long could it take to get through all the administrative process to build such capacities? And is the answer in this study by Ambrosetti, it's not 2030, but 2043 [ph] There is a message there to policymakers, I think to everybody. If, and that I think that's very good this exercise. I mean this willingness of Europe to go for 55% by 2050 -- to 2030, sorry because it raised many issues. It puts the people in front of the reality. How do we do that? And if yes. If we want to reach 40% of renewable in our mix, we need to build massive renewable for the next 10 years. And we need to have the land, and we will need to have the administrative process going through. And that's true that in our democracies, which is good, that makes raise questions. I think there is only way to think to that, which will oblige governments to plan properly like I think the French government begins to think to that."

Onshore wind potential is likely a reason why investors buy rural land

The New York Times report reminded of an item that doesn't seem to get much attention – the high percentage of rural lands owned by non-locals ie. investors The New York Times wrote "*Adding to her frustration is the fact that about 70 percent of the landowners who have agreed to let Apex put turbines on their property live outside Piatt County. "They don't live here, so they're not impacted," Ms. Gallagher said as she tended to her cattle before heading to yet another hearing."* The local farmers warn that the wind farms depress land values. If so, then that creates the opportunity for investors less focused on items like a view, rather they are focused on returns. We suspect that for these city owners of rural land, the approval becomes more of a straight economic equation. And the annual lease payments probably go a long way to covering carrying costs.

Capital Markets – Oil & gas stocks massively outperform index & oil/gas prices

Great year for oil and gas stocks

Warm weather in Dec in most major oil and gas consuming regions of the world led to a weak end in 2022 to oil and gas prices. But, even still, 2022 was year when oil and gas stocks massively outperformed other sectors, broad indexes and oil and gas commodity prices. Yesterday, we tweeted [LINK] "*Massive outperformance from #Oil #NatGas stocks in 2022 vs indexes and vs oil/gas prices. Dow -8.8% Nasdaq -33.1% TSX -8.7% WTI +7.0% HH +18.6% AECO +17.4% TSX composite oil & gas E&P +53.7% Exxon +80.3% CNQ +43.6% CVE +70.1% IMO +44.6% SU +35.7% Cdn mid cap E&P +56.0% #OOTT."* We ran out of space in

our tweet or would have included Cdn small cap E&P +74.1%, Cdn international E&P +78.2%, Cdn oilfield service co's +53.3%. Our Supplemental Documents package includes our SAF Group Daily Commodities & Stock Trading Recap for the close on Dec 30.

Capital Markets – Resume embellishment is still fine in politics, but not in business

Resume embellishment is still thriving in politics

It's hard to imagine how a business executive wouldn't be terminated with cause or there wouldn't be big public/shareholder rage if the executive embellished his credentials, let alnoe do what Rep-elected Geoge Santos did on his background. There is zero tolerance. But not so for politics. And we would have thought it was tougher to embellish resumes on college and employment in today's world than it was in the pre internet era so we were surprised to see the NY Post report [LINK] "*Liar Rep.-elect George Santos admits fabricating key details of his bio*." There were many items, but two that have been seen on resumes are college degrees or lack thereof, and where someone worked. NY Post wrote "*Santos confessed he had "never worked directly" for Goldman Sachs and Citigroup, chalking that fib up to a "poor choice of words." The 34-year-old now claims instead that a company called Link Bridge, where he worked as a vice president, did business with both of the financial giants. "I will be clearer about that. It was stated poorly," Santos said of the lie. At Link Bridge, Santos said, he helped make "capital introductions" between clients and investors, and Goldman Sachs and Citigroup were "LPS, Limited Partnerships" that his company dealt with. He also admitted that he never graduated from any college, despite previously claiming to have received a degree from Baruch in 2010. Long Island Rep.-elect George Santos admitted to The Post that he lied about details of his life while campaigning. "I didn't graduate from any institution of higher learning. I'm embarrassed and sorry for having embellished my resume," he said. "I own up to that … We do stupid things in life."*

Demographics – Home Depot Co-Founder unloads on socialism & the woke people

Home Depot Co-founder

Home Depot Co-founder Bernie Marcus caused many of "The Wok People" to wake up and respond to his criticism of socialism and "The Wok People". On Wed, the FT posted a report on its video interview with Marcus. The world is changing and not everything will be good or bad in a world that is never perfect. The investment business is, to a great degree, shielded from a lot of what Marcus sees. Everyday there is a new scorecard of how you are doing and compensation is linked to results and performance and not to being in a job. But Marcus unloads on big time. FT writes "*The list of potential obstacles to entrepreneurial success in the US today is long, according to Bernie Marcus, co-founder of Home Depot: human resources executives, government bureaucrats, regulators, socialists, Harvard graduates, MBAs, Harvard MBAs, lawyers, accountants, Joe Biden, the media and "the woke people". "Thanks to "socialism", he says, "nobody works. Nobody gives a damn. 'Just give it to me. Send me money. I don't want to work — I'm too lazy, I'm too fat, I'm too stupid.'" "In resisting attempts to "woke" him, as he puts it, he sticks to the Milton Friedman-inspired line that "the role of a business is to sell a product and make a profit", which lets it employ people and help customers. "The whole idea that a business is set up for social purposes doesn't make sense to me," he says."* Our Supplemental Documents package includes the FT report.

Energy Tidbits – Thank you for your support of Energy Tidbits and tweets

Thank you to readers!

We were able write Energy Tidbits memos every weekend this year, but that isn't the norm. Rather, our target is to post Energy Tidbits memos on Sundays for at least 48 to 50

weekends per year. As I put on the cover page, I started Energy Tidbits in 1999 to help institutional investors with their perspective to oil and gas. I knew a number of PMs from my then prior role as an Cdn E&P executive and asked several experienced PMs what they were missing from the sellside research. The common answer was that they didn't need another supposed expert for an oil call or a natural gas call and that sellside analysts forget that the big picture is what sets up the investment thesis for markets and the sector and what they were missing was help in putting their big picture together for oil and natural gas. That was the objective then and still today. Its why I want to thank readers for suggestions on items to include in Energy Tidbits, blogs and tweets – those suggestions help me improve the quality of the work. I really want to thank everyone for their support for the Energy Tidbits for the past 23 years. Thank you! Please send us an email for our index of all items included in the Energy Tidbits memos in 2022 that can be searched to quickly look up memos for specific subjects.

@Energy_Tidbits on Twitter

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

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

Look for energy items on LinkedIn

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].

Misc Facts and Figures.

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

Respected oilman, Daryl Birnie, passed away

Nothing worse than turning your phone on after a plane flight seeing a message pop up from a missed phone call from someone I haven't spoken to in years and instinctively know the reason why the call. Sad news to hear that Daryl Birnie, a long time oilman passed away on Dec 24. He was a very successful and respected oilman who I had the honor of working with from 1985 to 1988 at Dome Canada/Encor and then working for him from 1988 thru 1995 when he was CEO at intermediate producer, Mark Resources. Prior to being a CEO, he had a very successful career leading exploration teams in finding oil and gas going back to when he was a geophysicist at Amoco Canada to an executive at Voyager Petroleum where he worked with famed oilman, Earl Joudrie as CEO. When Earl came to Dome Canada to be CEO in March 1985, he brought Daryl as SVP Exploration. Daryl then became CEO of Mark Resources in 1987 and he was an excellent leader. Everyone knew he

was good at how find and produce oil and gas and exploration was the key in the 80s, but what made him different was that he actually cared about his people and had the touch in knowing how to deal with people and build teams of people united in their approach and goal. People skills seem to be less important today in the world of direct messaging, but that wasn't the case in the 80s and 90s. I was lucky to have had the opportunity to work with him, for him and have him as a life-long friend.

Canadian singer legend Ian Tyson passed away

Another sad passing was Canadian singer/songwriter legend Ian Tyson passed away on Thurs at the age of 89. In the 80's/90s, one of the toughest Stampede tickets to get were tickets for the nights that Ian Tyson played at the Petroleum Club. Thanks to my then boss, Daryl Birnie, I was able to nab a primo table for 8 just off the dance floor on two Ian Tyson's nights every year for several years. It certainly wasn't like Cowboys but it was the event back then, especially for those who two-stepped. Anyone who know Ian Tyson's songs knows they were meant for two-stepping.

Pele passed away

How could I not mention Pele's passing on Thursday at the age of 82. The world was different 50 years ago, and Pele became the most recognized athlete in the world at a time of TV and radio. Pele stood alone at the top of his sport for a long time for being the most talented and also a consistent winner of team championships. That is not common on team sports, but when it happens, like Pele, or Wayne Gretzky or Michael Jordan, those names are never disputedi. Unfortunately, I didn't get the bug for football/soccer until the late 70s so that meant I missed the chance to see Pele live when he brought North American attention to football when he joined the New York Cosmos. My first Cosmos game was in 1979, so saw other soccer legends like Carlos Alberto, Fanz Beckenbauer, and Giorgio Chinaglia, but didn't get to see Pele. But the good news is that we saw a lot of Pele highlights during the just finished World Cup tv coverage.

Calgary-based Swimco back in business after going bankrupt during pandemic

It was great to see the CBC dec 28 report [LINK] "*Calgary-based Swimco back in business after going bankrupt during pandemic. Swimwear retailer now operating 2 physical locations along with online hub. Swimwear retailer opened two physical locations on Boxing Day after going bankrupt amid the pandemic." "It comes more than two years after the company went bankrupt, closing all of its locations across Canada after 45 years in business. At its peak, the Swimco had 25 stores across Canada."* Many oil people from 1975 knew of Swimco as it was started by Corinne Forseth as her spouse Ray Forseth was a very well known Dome Petroleum landman/executive in Dome Petroleum's heyday. And a lot of the oil industry community were loyal customers because of Roy. It was also a great story on how "*In 1968 Corinne Forseth's daughter could not find a swimsuit to match her team mates on the Barracudas swim team. Her efforts to locate that swimsuit resulted in the beginning of a mail order swimwear business that helped families find matching swimwear for their children in swim programs across western Canada. In 1975, Swimco was born*." Our Supplemental Documents package includes the Swimco history.