Energy Tidbits

December 25, 2022

Produced by: Dan Tsubouchi

Big Potential for Increased Chevron Venezuela Oil Production From 8,700 Wells Identified as Remedial Candidates

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. Argus reports Chevron identifies 8,700 wells that need ~$500k/well remedial work to become operational ie. Low hanging fruit to increase oil production without drilling a single new well. (Click Here)

2. TC Energy says PHMSA has approved restart of Affected Segment to Cushing (Click Here)

3. China looks to be moving quickly to herd immunity ie. sets up Q2 oil demand recovery (Click Here)

4. Cold across the US today, but warmer than normal forecast to end Dec led to weak HH prices this week. (Click Here)

5. It's been a month and still no word on BC's very close to being a deal done with BlueBerry First Nations. (Click Here)

6. Hope everyone has a Merry Christmas!

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].

Dan Tsubouchi
Chief Market Strategist
dtsubouchi@safgroup.ca

Ryan Dunfield
CEO
rdunfield@safgroup.ca

Aaron Bunting
COO, CFO
abunting@safgroup.ca

Ryan Haughn
Managing Director
rhaughn@safgroup.ca

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YoY storage at -45 bcf YoY deficit

Natural Gas – Natural gas draw of -87 bcf, storage now -45 bcf YoY deficit

The YoY deficit widened from -18 bcf YoY for Dec 9 to -45 bcf YoY as of Dec 16. A widening of the gas storage deficit should be expected, even with the continued shut-in of Freeport LNG, given Dec 2021 was the #1 hottest Dec in the last 127 years. T he EIA reported a -87 bcf draw (-92 bcf expectations) for the Dec 16 week, which was a smaller draw vs the 5-yr average of a -124 bcf draw, but larger than last year's draw of -55 bcf. Storage is 3.325 tcf as of Dec 16, with a now YoY deficit of -45 bcf YoY vs -18 bcf YoY deficit last week and is +22 bcf above the 5-year average vs -15 bcf below last week. Below is the EIA's storage table from its Weekly Natural Gas Storage Report [LINK].

Figure 1: US Natural Gas Storage

	Stocks billion cubic feet (Bcf)				Historical Comparisons			
					Year ago (12/16/21)		5-year average (2017-21)	
Region	12/16/22	12/09/22	net change	implied flow	Bcf	% change	Bcf	% change
East	789	822	-33	-33	810	-2.6	796	-0.9
Midwest	974	1,002	-28	-28	966	0.8	951	2.4
Mountain	178	186	-8	-8	190	-6.3	188	-5.3
Pacific	186	203	-17	-17	249	-25.3	267	-30.3
South Central	1,199	1,199	0	0	1,155	3.8	1,102	8.8
Salt	340	337	3	3	333	2.1	317	7.3
Nonsalt	858	862	-4	-4	821	4.5	785	9.3
Total	3,325	3,412	-87	-87	3,370	-1.3	3,303	0.7

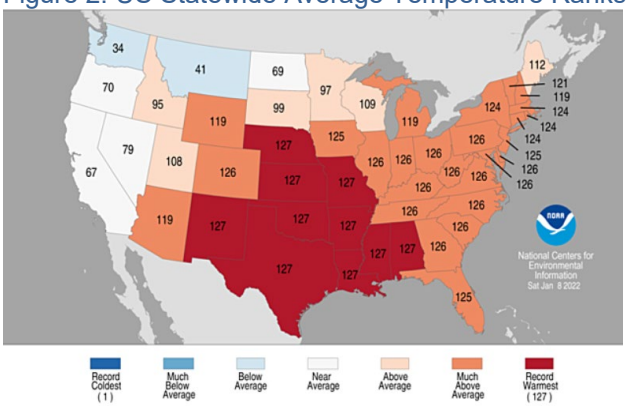
Source: EIA

Dec 2021 was the hottest on record

Natural Gas – Dec 2021 was the #1 hottest Dec in the last 127 years

As noted above, we should see a widening of the YoY deficit in storage in Dec even with Freeport LNG still shut-in driven by the fact that Dec 2021 were very hot. Our Jan 16, 2022 Energy Tidbits memo noted NOAA's recap of Dec 2021 climate that showed Dec 2021 was the hottest Dec in the last 127 years. [LINK]. The average temperatures across all Lower 48 states was 39.3 degrees F, 6.7 degrees F above the 20th century average for December. Below is NOAA's map for the state average temperature ranks for Dec 2021.

Figure 2: US Statewide Average Temperature Ranks December 2021



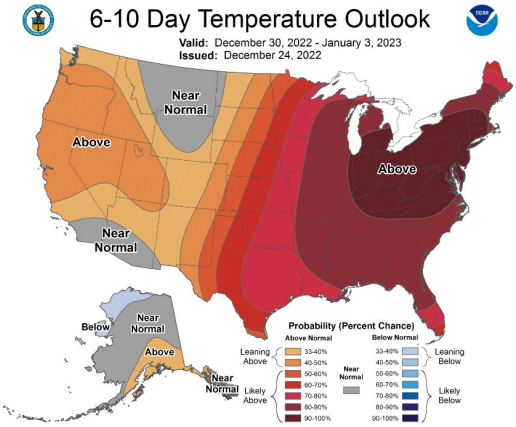
Source: NOAA

NOAA 6-10 & 8-14 day temp outlook

Natural Gas – NOAA expects very warm temps in US to end 2022/start 2023

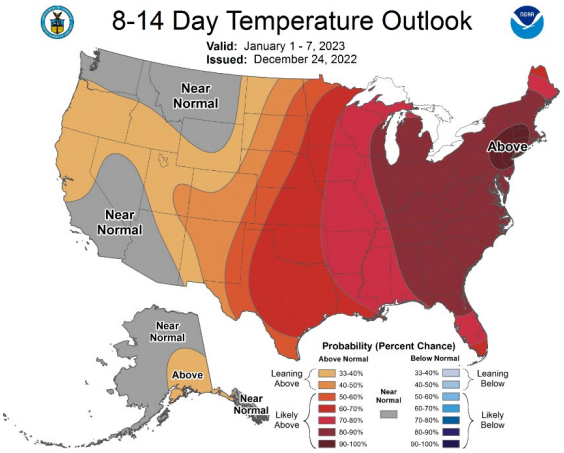
Yesterday, we tweeted [LINK] "*Here's why HH #NatGas closed at $5.08 Fri despite brutal cold and blizzards hammering the US this weekend. @NOAA updated 6-10, 8-14 day outlook - It's supposed to turn very warm thru the populous east half of US. #OOTT*". Our tweet inlcuded NOAA's yesterday's updated 6-10 day and 8-14 day outlook that run up thru Jan 7. And NOAA is calling for much warmer than normal temperatures acorss the eastern half ot he US and warmer than normal over most of the western US. Below are NOAA's 6-10 day and 8-14 day temperature outlooks as of yesterday afternoon.

Figure 3: NOAA 6-10 day temperature outlook as of Dec 24



Source: NOAA

Figure 4: NOAA 8-14 day temperature outlook as of Dec 24



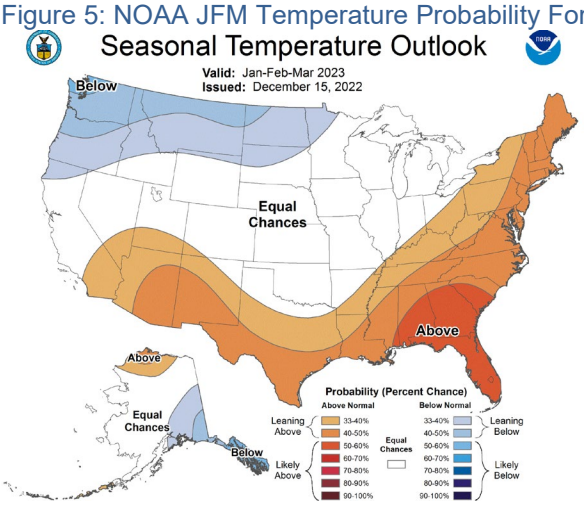
Source: NOAA

NOAA forecasts a warm JFM

Natural Gas – NOAA expects warmer than normal end to winter

Last Thursday, NOAA issued its updated seasonal outlook for US temperatures, which is their rolling 3-month forecasts beginning with JFM. [LINK] Weather forecasts are far from 100%, but they do impact tone on natural gas until we see different weather developing. Overall, the NOAA is forecasting a warmer than normal JFM, which, if accurate, will have a negative impact on weather related natural gas demand. Below is the new NOAA temperature probability map for JFM.

Figure 5: NOAA JFM Temperature Probability Forecast

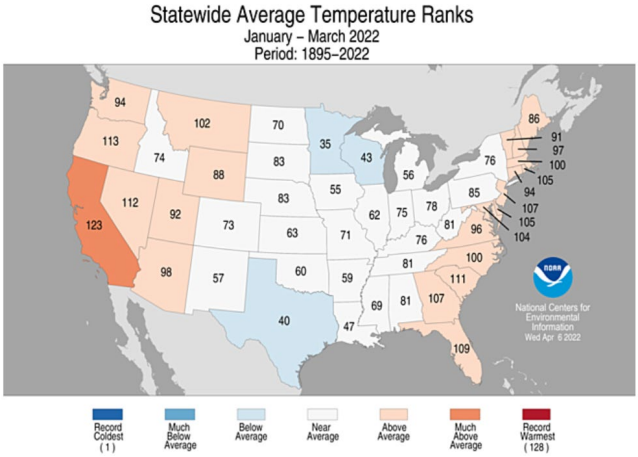


Source: NOAA

Last Jan/Feb/Mar 2022 was mostly normal, 45th warmest in 128 years

The new NOAA seasonal outlook for end of winter JFM isn't great for natural gas demand and looks to be worse than JFM 2022 for weather driven natural gas demand. NOAA's recap of JFM 2022 [LINK] was that it was what they called normal, being the 45th warmest in the last 128 years. JFM 2022 was similar in being warm along the east coasty, and normal to cold in the Great Lakes/Midwest. But JFM 2022 was different in the Western 1/3 was very warm (vs normal to cold this year) and Texas (SW) that was very cold vs expectations for wary warm this year. Overall, it looks like JFM 2023 will be a little warmer than DJM 2022.

Figure 6: US Statewide Average Temperature Ranks JFM 2022



Source: NOAA

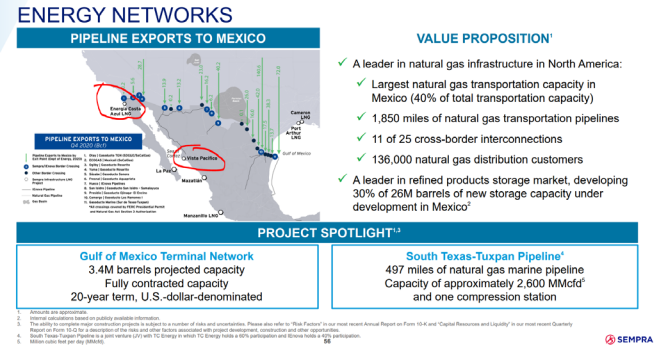
Natural Gas – Sempra gets okay to export more Permian natural gas via Mexico

Sempra approved for re-export of US natural gas

We believe an overlooked major natural gas factor for the US in the 2020s is the increasing demand of Mexico for Permian natural gas for domestic consumption and also for transit via re-exporting via Mexico LNG export terminals on the Pacific Coast ie. Permian natural gas will be in demand for much more than Gulf Coast LNG exports. Yesterday, we tweeted [LINK] "*Overlooked positive for US #NatGas for 2020s, not just Gulf Coast LNG demand. 12/03: @TCEnergy increasing MEX pipeline imports from Permian to add 3 bcf/d by 2030. 12/22: @SempraInfra gets @ENERGY okay to re-export up to 2.3 bcfd of US #NatGas, key supply will be Permian. #OOTT."* On Thursday, Sempra Infrastructure announced [LINK] it received US Dept of Energy approval to re-export US LNG/natural gas from it's Mexico Pacific Coast LNG projects. Sempra said "*Under the permits granted by DOE, Vista Pacifico LNG is authorized to re-export up to 200 billion cubic feet per year (Bcf/yr) of LNG from U.S.-sourced natural gas from the project under development in Topolobampo, Sinaloa, Mexico to any country with which the United States does not have an FTA requiring national treatment for trade in natural gas. Vista Pacifico LNG is projected to be a mid-scale facility with approximately 3.5 million tons per annum (Mtpa) of export capacity. Sempra Infrastructure is advancing the development of Vista Pacifico LNG in collaboration with Mexico's Federal Electricity Commission (CFE), as previously announced. The DOE also increased the authorized export volumes of ECA LNG Phase 2, permitting it to re-export up to 636 Bcf/yr of LNG from U.S.-sourced natural gas from the proposed project in Ensenada, Baja California, Mexico to non-FTA nations. Both permits are applicable for the period beginning on the date of first commercial re-export through December 2050. The proposed ECA LNG Phase 2 is expected to be comprised of two trains and one LNG storage tank and produce approximately 12 Mtpa of export capacity. ECA LNG Phase 1 received non-FTA export authorization in 2019 and is currently under construction with commercial operations expected in 2025."* This means Sempra has approval to re-export up to 2.3 bcf/d of US natural gas from these two terminals. Sempra doesn't say the supply is expected to come from the Permian, rather it says "*ECA LNG is anticipated to be the first export terminal to*

connect the abundant natural gas supplies of the U.S. Western States to Baja California — and ultimately high-demand Asian markets." And Sempra's pipelines are set up to deliver primarily from the Permian. Our Supplemental Documents package includes the Sempra release.

Figure 7: Sempra pipeline exports to Mexico



Source: Sempra Investor Day 2021

What if TC is right that Mexico attracts +3 bcf/d of Permian by 2030?

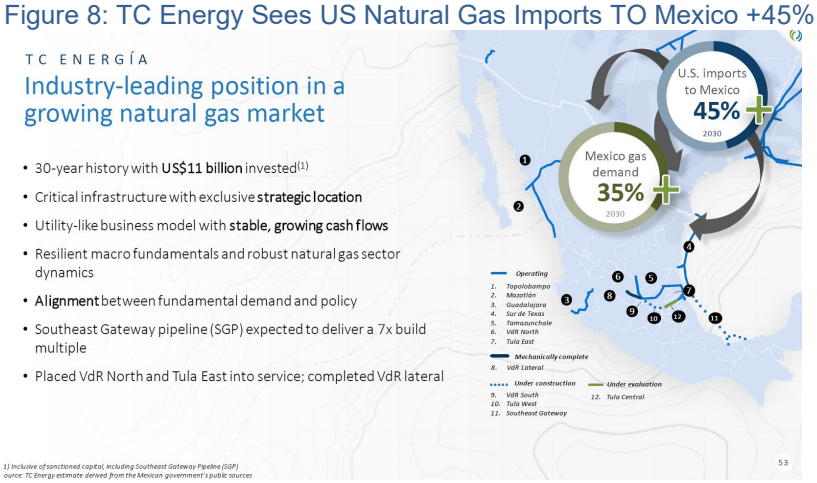
Our Sempra tweet yesterday noted TC Energy's view that there will be an additional 3 bcf/d of Permian natural gas pipeline demand from Mexico to 2030. Here is what we wrote in our Dec 18, 2022 Energy Tidbits "*It won't affect stock trading, but for those that look at capital allocation on a mid to long 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."*

TC Energy sees Permian natural gas +3 bcf/d to Mexico by 2030

Here is what we wrote in our Dec 4, 2022 Energy Tidbits. "*One overlooked upside to US natural gas in the 2020s is that the growth Mexico infrastructure projects are starting to kick in. Yesterday, we tweeted [LINK] "Positive for US #NatGas for 2020s. It's not just increasing #LNG exports, it's also Mexico. Mexico #NatGas demand from*

9 bcfd to 12 bcfd in 2030. @TCEnergy expects MEX #NatGas pipeline imports from Permian +45% from 6 bcfd in 2022 to 9 bcfd by 2030. #OOTT." The growth in Mexico natural gas demand is a big plus to the Permian. For the last few years, every time we write on Mexico's natural gas production, we say it is still stuck below 5 bcf/d and that any increase in Mexico natural gas demand has to be met by increasing natural gas or LNG imports. For the past 5+ years, other than a few months, Mexico gas production was below 5 bcf/d. Mexico's natural gas demand growth and growing infrastructure was one of the key growth themes at TC Energy's investor day on Tuesday. Mgmt's slide deck included the below slide and mgmt said "We expect Mexican natural gas demand to increase by 3% per year across the country from 9 Bcf to 12 Bcf in 2030, with strategic government projects creating over 1 Bcf a day of incremental gas demand in the southeast alone by 2025. Now given Mexico's limited natural gas production, this increase in demand will likely be served by supplies in the U.S. and more specifically the Permian as we believe Mexican imports from the Permian are likely to increase by 45% from 6 Bcf a day in 2022 to 9 Bcf by 2030."

Figure 8: TC Energy Sees US Natural Gas Imports TO Mexico +45% to 2030



Source: TC Energy

Natural Gas – Freeport LNG doesn't anticipate restart until 2nd half of Jan

Another delay to Freeport LNG restart

On Friday, we tweeted [LINK] "*Count on Friday before Xmas press releases to be something negative. "#FreeportLNG now does not anticipate commencing the initial restart of its liquefaction facility until the second half of January 2023". #OOTT #NatGas."* This looks to be over a month later than their previous formal statements for a mid-Dec restart. (ii) On Friday, Freeport LNG provided an update [LINK] on when they "*anticipate*" to restart. Freeport LNG said *"As of December 23rd, the reconstruction work necessary to commence initial operations is substantially complete, and the company is submitting responses to the last remaining questions included in the Federal Energy Regulatory Commission's December 12 data request. Given the time needed for the regulatory agencies to review the company's responses and to seek any necessary clarification, Freeport LNG now does not anticipate*

commencing the initial restart of its liquefaction facility until the second half of January 2023." (ii) Here is what we wrote in our Dec 4, 2022 Energy Tidbits. "*A 2-week delay to Freeport LNG restart now end of Dec. On Thursday, we tweeted [LINK] "Another delay for #FreeeportLNG restart. now end Dec instead of mid Dec. if they do a train by train restart, then hitting ~2 bcf/d is likely not until later Jan. thx @SStapczynski @David_Stringer. #OOTT #NatGas." (i) On Thursday, Bloomberg reported "Freeport LNG expects to restart its Texas plant around year-end and is continuing to work to obtain necessary clearances, co. spokesperson Heather Browne said in an emailed statement. * "Based upon current progress, and subject to us continuing to meet necessary regulatory requirements, we now anticipate that the restart of our liquefaction facility to be achieved around year-end," Browne said * NOTE: The new timeline is as much as 2 weeks later than outlined in a statement last month, when co. said it was aiming to start "initial production" in mid-Dec. with full operations." (ii) Our tweet noted that the expectation is that the restart is on a train by train basis, which is why we expect it will likely take most of the month to go from zero to ~2 bcf/d.*" Our Supplemental Documents package includes Freeport LNG's Dec 23 release.

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

Where is BC/Blueberry First Nations deal?

It's been a month and no one should be surprised that it's been another week and it's now Christmas, but we haven't seen any announcement of a BC deal with the Blueberry First Nations? We recognize that most took the BC Government at their word, but it's been 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 probably too late to save most of winter drilling season

Last week's (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, last week, and even worse now that it's Christmas, New Year's is next weekend, it really puts a big problem for winter drilling season. w Years. Drilling always declines over Xmas, but there are logistics to get drilling cranked up. And even if there is a deal done just after Jan 1, 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 have pointed 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 – Mexico's natural gas production still stuck below 5 bcf/d, +2.0% YoY

Mexico natural gas still stuck below 5 bcf/d

On Friday, Pemex reported [LINK] its oil and gas data for November. Pemex reported natural gas production of 4.845 bcf/d, which was +2.0% YoY and +1.0% MoM. But the story for Mexico natural gas remains unchanged – for the past 5 years, an ongoing theme of the Mexican energy sector, has been their inability to grow domestic natural gas production. Other than a few months, Mexico's natural gas production has been stuck below 5 bcf/d since Sept 2017. 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. And as noted earlier, TC Energy sees big growth in US natural gas pipeline exports to Mexico. Pemex does not provide any commentary along with its production data. Below is our ongoing table of Pemex reported monthly natural gas production.

Figure 9: Mexico Natural Gas Production (bcf/d)

Natural Gas Production bcf/d	2016	2017	2018	2019	2020	2021	21/20	2022	22/21
Jan	6.162	5.326	4.910	4.648	5.005	4.848	-3.1%	4.713	-2.8%
Feb	6.122	5.299	4.853	4.869	4.942	4.854	-1.8%	4.646	-4.3%
Mar	6.030	5.383	4.646	4.857	4.946	4.839	-2.2%	4.766	-1.5%
Apr	5.921	5.334	4.869	4.816	4.827	4.671	-3.2%	4.740	1.5%
May	5.841	5.299	4.827	4.841	4.460	4.730	6.1%	4.702	-0.6%
June	5.881	5.253	4.840	4.843	4.754	4.727	-0.6%	4.744	0.4%
July	5.785	5.216	4.856	4.892	4.902	4.725	-3.6%	4.815	1.9%
Aug	5.686	5.035	4.898	4.939	4.920	4.656	-5.4%	4.796	3.0%
Sept	5.619	4.302	4.913	5.017	4.926	4.746	-3.7%	4.798	1.1%
Oct	5.583	4.759	4.895	4.971	4.928	4.718	-4.3%	4.795	1.6%
Nov	5.515	4.803	4.776	5.015	4.769	4.751	-0.4%	4.845	2.0%
Dec	5.380	4.811	4.881	5.024	4.846	4.697	-3.1%		

Source: Pemex

Natural Gas – Long-term LNG deal, NextDecade/Galp sign a 20-year deal for 0.13 bcf/d

Another long term LNG deal

There haven't been many long-term LNG deals over the past six months because most, if not all the available long term LNG supply available before 2025 was locked up in the July 2021 to July 2022 rush. Rather, the long-term deals now being done are for long term supply starting in 2026 or late. On Tuesday, NextDecade and Galp announced their new agreement which will span 20 years and ship 0.13 bcf/d with expected first shipments not yet announced [LINK]. NextDecade is targeting a final investment decision on its first three trains during Q1/23 with more decisions to be made at a later date. Matt Schatzman, CEO of NextDecade's Chairman and CEO explains *"we are honored to have Galp, one of Portugal's largest energy companies and a key player in the Iberian Peninsula, as our customer. We look forward to helping Galp, as well as other European companies and their customers, meet their energy needs by offering a lower-cost, reliable source of LNG with lower carbon-intensity."* Sempra Infrastructure is a US-based energy company with a focus on sustainable LNG and carbon capture solutions. Galp is a multinational energy company headquartered in Portugal. Our Supplemental Documents package includes the news release.

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

Our March 13, 2022 Energy Tidbits memo noted that Europe LNG buyers were starting 9 months behind the wave of Asian LNG buyers who started to lock up long term LNG supply starting in July 2021. The LNG supply crunch is not a 2022 development. Rather, it was clear in H1/21 that there was a major sea change in LNG outlook. We turned very bullish on LNG outlook for the 2020s once

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

There have been 12.84 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 12.84 bcf/d of long term LNG deals since July 1, 2021. 64% 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 10: Long Term LNG Supply Deals since July 1, 2021

Long-Term LNG Buyer Deals Since July 1, 2021							
Date	Buyer	Seller	Country	Volume	Duration	Start	End
			Buyer / Seller	(bcf/d)	Years		
Asian LNG Deals							
Jul 7, 2021	CNOOC	Petronas	China / Canada	0.30	10.0	2022	2032
Jul 9, 2021	CPC	QatarEnergy	Taiwan / Qatar	0.16	15.0	2022	2037
Jul 9, 2021	Guangzhou Gas	BP	China / US	0.13	12.0	2022	2034
Jul 12, 2021	Korea Gas	QatarEnergy	Korea / Qatar	0.25	20.0	2025	2045
Sep 29, 2021	CNOOC	QatarEnergy	China / Qatar	0.50	15.0	2022	2037
Oct 7, 2021	Shenzhen	BP	China / US	0.04	10.0	2023	2032
Oct 11, 2021	ENN	Cheniere	China / US	0.12	13.0	2022	2035
Nov 4, 2021	Unipec	Venture Global LNG	China / US	0.46	20.0	2023	2043
Nov 4, 2021	Sinopec	Venture Global LNG	China / US	0.53	20.0	2023	2043
Nov 5, 2021	Sinochem	Cheniere	China / US	0.12	17.5	2022	2040
Nov 22, 2021	Foran	Cheniere	China / US	0.04	20.0	2023	2043
Dec 6, 2021	Guangdong Energy	QatarEnergy	China / Qatar	0.13	10.0	2024	2034
Dec 8, 2021	S&T International	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 10, 2021	Suntien Green Energy	QatarEnergy	China / Qatar	0.13	15.0	2022	2037
Dec 15, 2021	SPIC Guangdong	BP	China / US	0.03	10.0	2023	2033
Dec 20, 2021	CNOOC Gas & Power	Venture Global LNG	China / US	0.26	20.0	2023	2043
Dec 29, 2021	Foran	BP	China / US	0.01	10.0	2023	2032
Jan 11, 2022	ENN	Novatek	China / Russia	0.08	11.0	2024	2035
Jan 11, 2022	Zhejiang Energy	Novatek	China / Russia	0.13	15.0	2024	2039
Feb 4, 2022	CNPC	Gazprom	China / Russia	0.98	30.0	2023	2053
Mar 24, 2022	Guangdong Energy	NextDecade	China / US	0.20	20.0	2026	2046
Mar 29, 2022	ENN	Energy Transfer	China / US	0.36	20.0	2026	2046
Apr 1, 2022	Guangzhou Gas	Mexico Pacific Ltd	China / Mexico	0.26	20.0	n.a.	n.a.
Apr 6, 2022	ENN	NextDecade	China / US	0.20	20.0	2026	2026
Apr 22, 2022	Kogas	BP	Korea / US	0.20	18.0	2025	2043
May 2, 2022	Gunvor Singapore Pte	Energy Transfer LNG	Singapore / US	0.26	20.0	2026	2046
May 3, 2022	SK Gas Trading LLC	Energy Transfer LNG	Korea / US	0.05	18.0	2026	2042
May 10, 2022	Exxon Asia Pacific	Venture Global LNG	Singapore / US	0.26	n.a.	n.a.	n.a.
May 11, 2022	Petronas LNG	Venture Global LNG	Malaysia / US	0.13	20.0	n.a.	n.a.
May 24, 2022	Hanwha Energy	TotalEnergies	Korea / France	0.08	15.0	2024	2039
May 25, 2022	POSCO International	Cheniere	Korea / US	0.05	20.0	2026	2036
June 5, 2022	China Gas Holdings	Energy Transfer	China / US	0.09	25.0	2026	2051
Jul 5, 2022	China Gas Holdings	NextDecade	China / US	0.13	20.0	2027	2047
Jul 20, 2022	PetroChina	Cheniere	China / US	0.24	24.0	2026	2050
Jul 26, 2022	PTT Global	Cheniere	Thailand / US	0.13	20.0	2026	2046
Jul 27, 2022	Exxon Asia Pacific	NextDecade	Singapore / US	0.13	20.0	2026	2046
Sep 2, 2022	Woodside Singapore	Commonwealth	Singapore / US	0.33	20.0	2026	2046
Nov 21, 2022	Sinopec	QatarEnergy	China / Qatar	0.53	27.0	2026	2053
Total Asian LNG Buyers New Long Term Contracts Since Jul/21				**8.16**			
Non-Asian LNG Deals							
Jul 28, 2021	PGNiG	Venture Global LNG	Poland / US	0.26	20.0	2023	2043
Nov 12, 2021	Engie	Cheniere	France / US	0.11	20.0	2021	2041
Mar 7, 2022	Shell	Venture Global LNG	US / US	0.26	20.0	2024	2044
Mar 16, 2022	NFE	Venture Global LNG	US / US	0.13	20.0	2023	2043
Mar 16, 2022	NFE	Venture Global LNG	US / US	0.13	20.0	2023	2043
May 2, 2022	Engie	NextDecade	France / US	0.23	15.0	2026	2041
May 17, 2022	PGNiG	Sempra Infrastructure	Poland / US	0.40	20.0	n.a.	n.a.
May 25, 2022	RWE Supply & Trading	Sempra Infrastructure	Germany / US	0.67	15.0	n.a.	n.a.
Jun 9, 2022	Equinor	Cheniere	Norway / US	0.23	15.0	2026	2041
Jun 21, 2022	EnBW	Venture Global LNG	Germany / US	0.20	20.0	2026	2046
Jun 22, 2022	INEOS Energy	Sempra Infrastructure	UK / US	0.21	20.0	2027	2047
Jun 22, 2022	Chevron	Venture Global LNG	US / US	0.26	20.0	n.a.	n.a.
Jun 22, 2022	Chevron	Cheniere	US / US	0.26	15.0	2027	2042
Jul 12, 2022	Shell	Mexico Pacific Ltd	US / Mexico	0.34	20.0	2026	2046
Jul 13, 2022	Vitol	Delfin Midstream	US / US	0.07	15.0	n.a.	n.a.
Aug 9, 2022	Centrica	Delfin Midstream	UK / US	0.13	15.0	2026	2041
Aug 24, 2022	Shell	Energy Transfer	US / US	0.28	20.0	2026	2046
Oct 6, 2022	EnBW	Venture Global LNG	Germany / US	0.26	20.0	2022	2042
Dec 6, 2022	ENGIE	Sempra Infrastructure	France / US	0.12	15.0	n.a.	n.a.
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				**4.68**			
Total New Long Term LNG Contracts since Jul/21				**12.84**			
*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 – How much can Iran's gas turbines save Russia LNG?

Can Iran save Russia LNG?

There is potentially a significant LNG market development that didn't any attention – Iran is going to supply gas turbines to Russia. On Tuesday, Bloomberg reported *""Russian companies are interested in cooperation with Iranian partners in the area of transfering gas turbines technologies and setting up their joint production in Russia," Energy Minister Nikolai Shulginov said in a statement."* We couldn't find any reliable information comparing Iran's gas turbines to Baker Hughes giant gas turbines. But we have to believe Iran's gas turbines are more powerful than Russia's gas turbines and, if so, would suggest Iran's gas turbines will be able to increase the LNG capacity assuming the gas turbines can be worked into the existing LNG projects. We have to believe they would be able to work into the projects. And then the question is when can they be worked into the LNG projects ie. Can they be worked into the under construction Arctic LNG 2 project (see below).

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

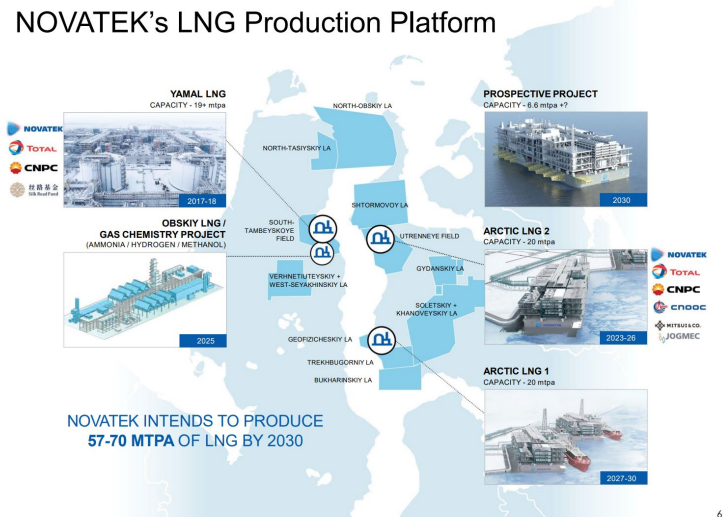
Baker Hughes pulling out of Russia and not putting its giant gas turbines in Russian LNG projects is a significant global LNG event. This is why Iran's gas turbines should be followed. Here is what we wrote in last week's (Dec 18, 2022) Energy Tidbits memo. "*We are still surprised that most don't seem 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 11: 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".*

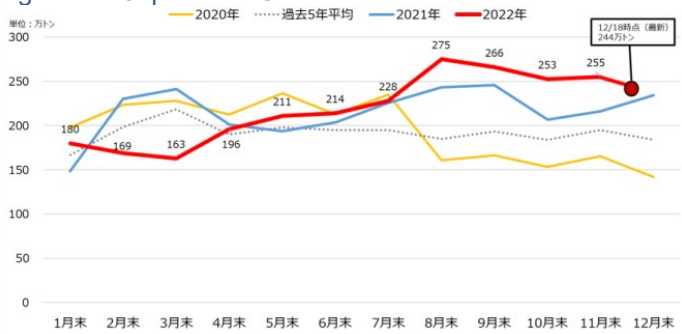
Natural Gas – Japan's LNG stocks down -9.0% WoW to 117 bcf

Japan LNG stocks -9.0% 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 18 were ~117 bcf -9.0% WoW from Dec 11 of 129 bcf but above the 5-yr average of 112 bcf. Below is the LNG stocks graph from the METI weekly report.

Figure 12: Japan's LNG Stocks



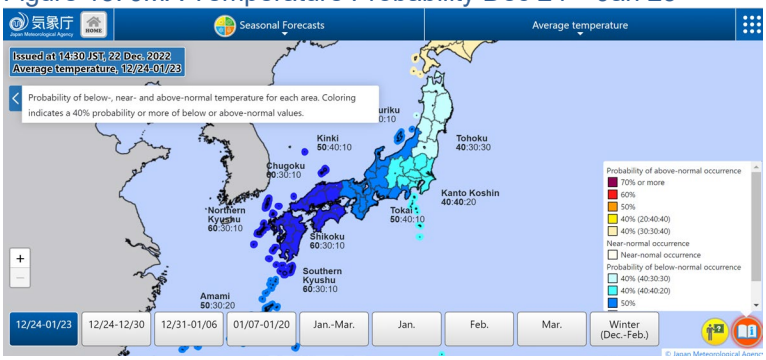
Source: METI

Natural Gas – Japan still expects a very cold end to Dec and start to Jan

We have been noting how Japan changed their weather forecasts. At the end of Oct, Japan expected a cold Dec, but changed that in Nov and early Dec to a warmer Dec. Last week the temperature flipped back from expectations for a warmer than normal Dec to a very cold end to Dec. Every Thursday, the Japan Meteorological Agency provides an updated 30-day temperature probability outlook. The new weekly JMA forecast has no change from last week and still calls for a very cold end to December and beginning of January. Below is the JMA's Dec 22 updated 30-day outlook. [LINK]

Japan temperature outlook

Figure 13: JMA Temperature Probability Dec 24 – Jan 23



Source: Japan Meteorology Agency

Natural Gas – Washington Post "no conclusive evidence" RUS blew up Nord Stream

Washington Post on Nord Stream

It probably makes sense why there hasn't been any recent uproar on blaming Russia for the explosions on Nord Stream. On Wed, we tweeted [LINK] ""*no conclusive evidence RUS was behind the attack on the #NordStream pipeline" explains recent silence on blaming RUS. Is RUS just good at disguising it, or Who Dunnit? regardless, reminds of risk to thousands of miles of underwater pipelines, communication cables, etc.#OOTT."* The Washington Post doesn't say Russia didn't do it, rather there isn't evidence at this point to say Russia did it. The Washington Post [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. Some went so far as to say they didn't think Russia was responsible. Others who still consider Russia a prime suspect said positively attributing the attack — to any country — may be impossible. In the months after the explosions, which resulted in what was probably one of the largest-ever single releases of methane gas, investigators have combed through debris and analyzed explosives residue recovered from the bed of the Baltic Sea. Seismologists have pinpointed the timing of three explosions on Sept. 26, which caused four leaks on the Nord Stream 1 and 2 pipelines. No one doubts that the damage was deliberate. An official with the German government, which is conducting its own investigation, said explosives appear to have been placed on the outside of the structures. But even those with inside knowledge of the forensic details don't conclusively tie Russia to the attack, officials said, speaking on the condition of anonymity to share information about the progress of the investigation, some of which is based on classified intelligence. "Forensics on an investigation like this are going to be exceedingly difficult," said a senior U.S. State Department official."* Our Supplemental Documents package includes the Washington Post report.

Natural Gas – Qatar warns EU on "global energy policy and security"

Qatar's warning to EU

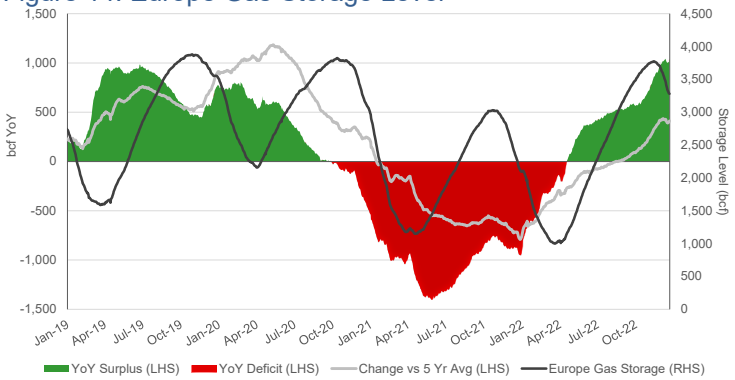
There was a reminder that energy supply is a two-way street. The EU and US can ban supply and the energy suppliers can cut off supply or at least imply that supply could be cut off. Last Sunday, the Telegraph [LINK], and others similarly, reported ""*Qatargate" sent shockwaves through the EU after Belgian police raids found at least £1.3m in cash that is suspected to have been used by Doha to buy influence in Brussels. Four people, including European Parliament vice-president Eva Kaili, a Greek MEP, were charged with "criminal organisation, corruption and money laundering". Qatar condemned the Belgian investigation and warned the parliament ban would "negatively" impact energy supplies. Many European countries have turned to Qatar for supplies of liquefied natural gas (LNG) to replace supplies of Russian gas after Vladimir Putin's illegal invasion of Ukraine. "The decision to impose such a discriminatory restriction that limits dialogue and cooperation on Qatar before the legal process has ended will negatively affect regional and global security cooperation, as well as ongoing discussions around global energy poverty and security," a Qatari diplomat said. "We firmly reject the allegations associating our government with misconduct," the diplomat said and added: "Qatar is an important supplier of LNG to Belgium." 'Preconceived prejudices against Qatar'.*

Natural Gas – Europe storage is now +26.56% YoY ie. 83.02% full vs 56.46%

Europe storage now 83.02% full

The cold burst that hit a lot of Europe didn't last too long, but it wasn't as warm as it was in Nov. Europe gas storage started the winter 17.86% YoY, but the warm November drove storage to its YoY surplus of 26.56%. Last winter began (Nov 1/21) with gas storage at 77.14% capacity, down 18.52% YoY. The YoY deficit has turned to surplus after months of the deficit tightening. This winter (Nov 1/22) began with gas storage at 94.94% capacity, up 17.86% YoY. Thanks to the warm weather and US LNG, storage as of Dec 21 is at 83.02%, which is +26.56% greater than last year levels of 56.46% and are +10.32% above the 5-year average of 72.70%. Below is our graph of Europe Gas Storage Level.

Figure 14: Europe Gas Storage Level



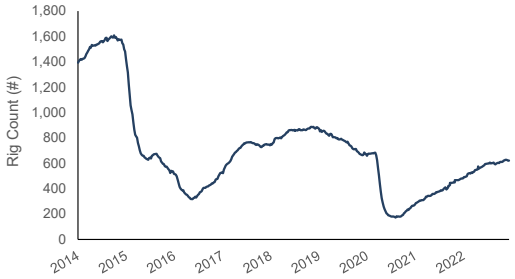
Source: Bloomberg

Oil – US oil rigs up +2 rigs to 622 oil rigs on Dec 22

US oil rigs up WoW

Baker Hughes released its weekly North American drilling activity data on Thursday. 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, its more likely to have declines. Plus, the extreme cold forecast in the Bakken and overnight freeze temperatures in Texas/Oklahoma will be causing some rig moves and frac spared moves delays especially given it is Xmas. This week US oil rigs were up +2 rigs at 622 oil rigs. The big change came from the smaller basins which decreased -2 rigs this week. The Permian and Granite Wash both added +2 rigs this week. US oil rigs hit a 15-week low of 591 on September 9. US oil rigs are still +443 oil rigs since the Covid Sept 17, 2020 oil rigs of 179 oil rigs. And US oil rigs are +147 oil rigs YoY. US gas rigs were up +1 WoW at 155 gas rigs.

Figure 15: Baker Hughes Total US Oil Rigs



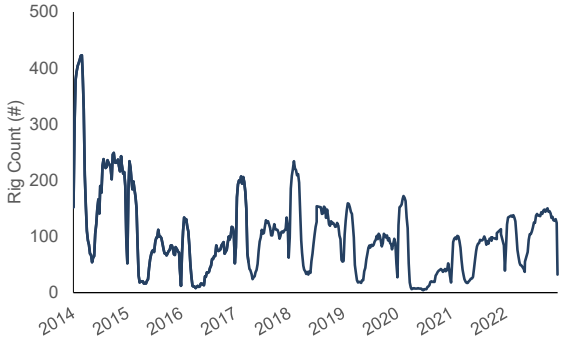
Source: Baker Hughes

Oil – Total Cdn rigs down -103 WoW to 96 total rigs, +6 rigs YoY

Cdn rigs -103 WoW

Cdn rig activity has moved into its traditional Xmas big crash down thru New Year. Total Cdn rigs were -103 to 96 rigs as of Dec 22, 2022. Cdn oil rigs were -92 to 32 oil rigs. Cdn gas rigs were -11 to 64 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 large decline is no surprise. Total rigs are now +14 vs the comparable Covid period of 82 rigs on Dec 23, 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 -7 YoY to 32 oil rigs and Cdn gas rigs are +13 to 64 gas rigs.

Figure 16: Baker Hughes Total Canadian Oil Rigs



Source: Baker Hughes

Oil – US weekly oil production flat at 12.1 mmb/d

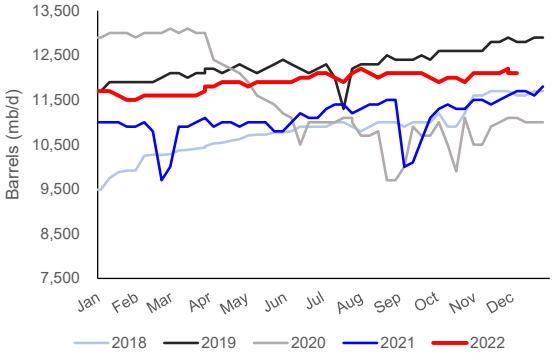
Please note that next week's numbers should be lower due to the blizzard impact in Noth Dakota and we expect to also see some impact in Permian due to the cold weather. The EIA estimates US oil production was flat WoW at 12.1 mmb/d for the week ended Dec 16. US oil production, based on the weekly estimates, 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 flat WoW at 11.7 mmb/d this week and Alaska was flat WoW at 0.4 mmb/d. US oil production is up +0.500 mmb/d YoY at 12.1 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				

Source: EIA

Figure 18: US Weekly Oil Production



Source: EIA, SAF

Oil – North Dakota Oct oil production slightly down MoM

North Dakota oil production

Please note that North Dakota will be showing a drop in oil production in Dec data due to the blizzard and cold, when that is reported on in two months. After a bounce back month, North Dakota Oct oil production was down MoM and remains back at March 2022 levels. On Monday afternoon, the North Dakota Industrial Commission posted its Director's Cut, which includes October oil and natural gas production data [LINK]. The NDIC reported North Dakota October oil production was 1.120 mmb/d, which was up 0.8% YoY, but slightly down MoM vs September production of 1.121 mmb/d. This was again a critical month for North Dakota oil production given North Dakota seemed surprised by July and Aug production numbers not being higher, but September came in higher. NDIC estimated well completions were 54 in October, down from 81 in September. So it's positive that oil production was up MoM, but there are still reminders that the Bakken will be challenged for any significant growth. Our Supplemental Documents package includes excerpts from the Director's Cut.

Figure 19: North Dakota Oil Production By Month

(b/d)	2017	2018	2019	2020	2021	2021/2020	2022	2022/2021
Jan	981,380	1,179,564	1,403,808	1,430,511	1,147,377	-19.8%	1,088,613	-5.1%
Feb	1,034,248	1,175,316	1,335,591	1,451,681	1,083,554	-25.4%	1,089,091	0.5%
Mar	1,025,690	1,162,134	1,391,760	1,430,107	1,108,906	-22.5%	1,122,640	1.2%
Apr	1,050,476	1,225,391	1,392,485	1,221,019	1,123,166	-8.0%	900,597	-19.8%
May	1,040,995	1,246,355	1,394,648	859,362	1,128,042	31.3%	1,059,060	-6.1%
June	1,032,873	1,227,320	1,425,230	893,591	1,133,498	26.8%	1,096,783	-3.2%
July	1,048,099	1,269,290	1,445,934	1,042,081	1,076,594	3.3%	1,072,632	-0.4%
Aug	1,089,318	1,292,505	1,480,475	1,165,371	1,107,359	-5.0%	1,075,307	-2.9%
Sept	1,107,345	1,359,282	1,443,980	1,223,107	1,114,020	-8.9%	1,121,063	0.6%
Oct	1,183,810	1,392,369	1,517,936	1,231,048	1,111,910	-9.7%	1,120,940	0.8%
Nov	1,194,920	1,375,803	1,519,037	1,227,138	1,158,622	-5.6%		
Dec	1,182,836	1,402,741	1,476,777	1,191,429	1,144,999	-3.9%		

Source NDIC, NDPA

Last week's blizzard knocked off >300,000 b/d of North Dakota oil production

Last week's (Dec 18, 2022) Energy Tidbits memo warned that the weather would cause production interruptions. North Dakota oil production will be hit in Dec and likely also Jan from the blizzard that hit last week and the cold weather. (i) On Monday we tweeted [LINK] *"North Dakota #Oil production down >300,000 b/d due to bizzard. Cold temps + Xmas break will keep some wells down to Jan. No frac/completions for ~10 days means Jan #Oil production also hit. Thx @KFYRTV. #OOTT".* (ii) On Monday, KFYR TV (Bismarck) reported [LINK] "*During his latest Director's Cut report, Department of Mineral Resources Director Lynn Helms estimated that the state is losing at least 300,000 barrels of oil produced a day due to several blizzards last week. The cold temperatures, combined with the upcoming holiday season, could keep some wells down until next year. "Once a well goes down in this weather, it can be extremely challenging to get that pumping unit running again and get all the equipment and pumps warm again so that you can maintain production," said Helms."* (ii) One other factor that will impact Jan oil production is fracking/completion work is delayed. In the NDIC Monthly update, they wrote "*The number of active completion crews increased to 20 before the blizzard, but there was no completion activity last week and very little is expected this week*." No completions for call it 10 days or more means that Jan will be impacted. (iii) Later in the memo, we note how Cdn crude by rail will be impacted by the -25c temperatures. This will also apply to North Dakota crude-by-rail in Dec. Plus it takes time to catch up from any delays.

Reminder North Dakota natural gas production is also hit

Please remember that if the Blizzard knocks off >25% of North Dakota oil production, it should mean that >25% of North Dakota natural gas production will also be hit. North Dakota's natural gas production is almost all associated natural gas produced in oil wells that produce oil, associated natural gas NGLs. That means a Bakken oil well going down means that any associated natural gas with that well will be down.

Oil – North Dakota crude by rail down MoM to 66,358 b/d in Oct

North Dakota CBR down MoM in October

Note our comments above and later that crude-by-rail in Dec will be hit by the extreme cold. The North Dakota Pipeline Authority posted its monthly update "*December 2022 Production & Transportation"* [LINK]. Please note that we always go to the backup excel sheets from the North Dakota Pipeline Authority for more detailed numbers of crude by rail out of North

Dakota. The NDPA Monthly Update (graph below) report only provides rounded numbers, and these rounded numbers are not accurate enough to match the graphs. In the backup excel, the NDPA estimates crude by rail in Oct was a low of 51,358 b/d and a high of 81,358 b/d for an average of 66,358 b/d. This is below the Sept average of 83,300 b/d and below the Aug average of 68,611 b/d. Below is a chart from the NDPA monthly update showing the crude by rail volumes since 2014. Our Supplemental Documents package includes excerpts from the NDPA monthly update.

Figure 20: Estimated North Dakota Rail Export Volumes

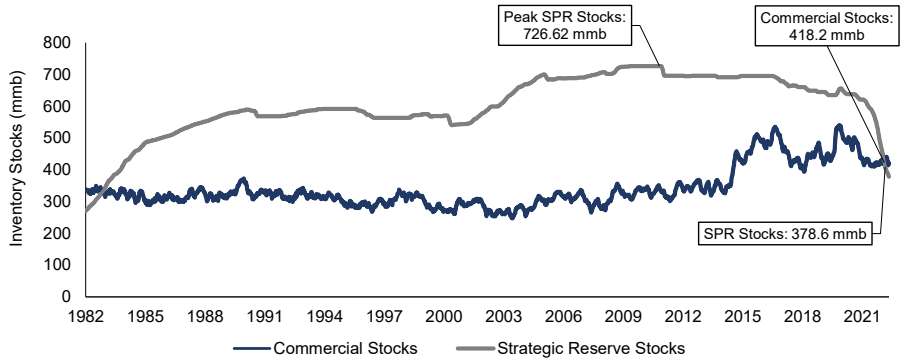
Source: North Dakota Pipeline Authority

Oil – US SPR reserves now -39.6 mmb lower than commercial crude oil reserves

SPR reserves remain lower

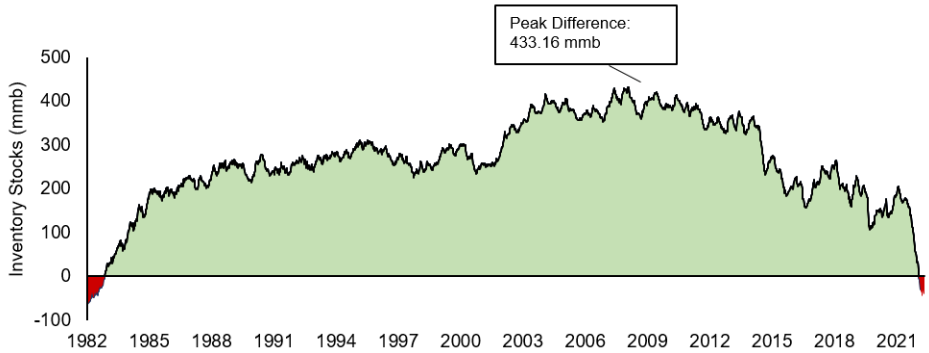
Oil in US Strategic Petroleum Reserves (SPR) moved below total US commercial crude oil reserves in the Sept 16 week for the first time since 1983, with the deficit narrowing this week. The EIA's new weekly oil data for Dec 16 has SPR reserves at 378.6 mmb vs commercial crude oil reserves at 418.2 mmb. The below graphs highlight the difference between commercial and SPR stockpiles.

Figure 21: US Oil Inventories: Commercial & SPR



Source: EIA

Figure 22: US Oil Inventories: SPR less commercial



Source: EIA

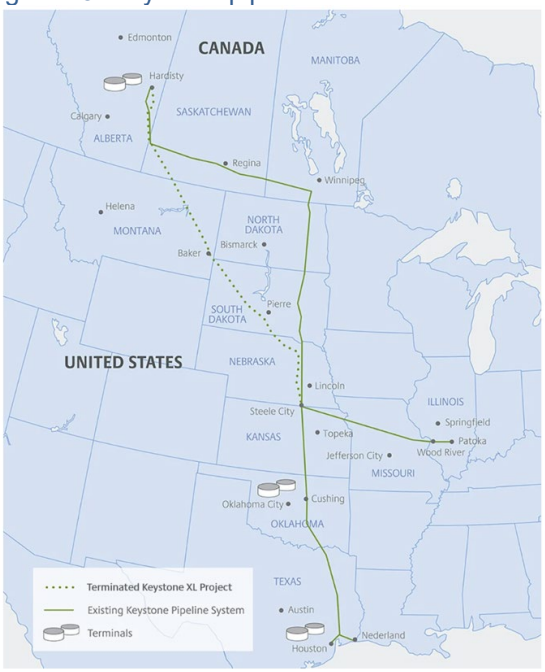
Oil – TC Energy says PHMSA approved restart plan of Affected Segment

PHMSA approves Keystone restart

On Friday morning (9:30am MT), TC Energy announced [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.*" We were concerned on the risk for a longer shutdown given the prior GAO report on Keystone's prior pipeline leaks. There has still been no formal indication from TC Energy on how much is being shipped thru the unaffected portion of Keystone to Patoka (Illinois) or what volumes they expect to start with on the Affected Portion. Sellside comments indicate that they are moving >300,000 b/d on the Unaffected Portion. For the restart of the Affected Portion, as a reminder, our Dec 11, 2022 Energy Tidbits memo highlighted PHMSA's corrective action order that wrote "*Operating Pressure Restriction. TC Oil must reduce and maintain a twenty percent (20%) pressure reduction in the actual operating pressure along the entire length of the Affected Segment such that upon restart the operating pressure along the Affected Pipeline will not exceed eighty percent (80%) of the actual operating pressure in effect at the failure location, immediately prior to the failure on December 7, 2022.*" Last week's (Dec 18, 2022) Energy Tidbits memo noted our view that, after reading the GAO July 2021 report on

prior Keystone spills, we have to wonder if there is the risk that the restart of the Affected Segment won't be raised back above the 80% limit at restart.

Figure 23: Keystone pipeline



Source: TC Energy

Source: TC Energy

Oil – Cdn oil differentials basically flat at $27.50

WCS less WTI differentials

It's been a rocky last few weeks for Cdn oil differentials with the Keystone shut-in, expectations for less of an impact, then moving to uncertainty for a return, and finally last week when there was an actual partial restart of the Unaffected portion. Last week, saw a narrowing of the WCS-WTI differential by $2 to narrow from $30 to $28 as of the close Friday Dec 16. The differential was basically unchanged to close this week at $27.50. For perspective, a year ago, the WCS-WTI differential was $15.00. Below is Bloomberg's current WCS–WTI differential as of Friday Dec 23 close.

Figure 24: WCS less WTI oil differentials up to Dec 23 close

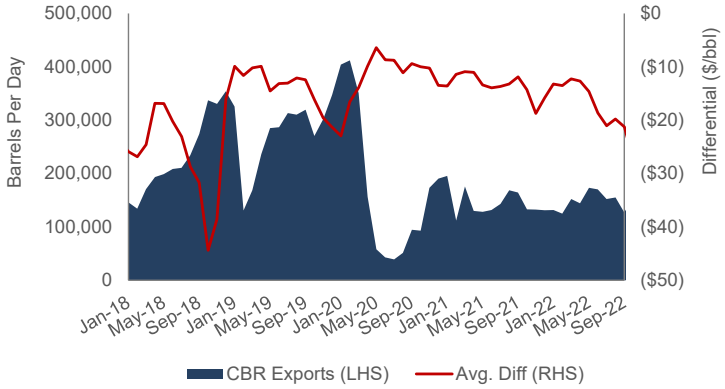
Source: Bloomberg

Oil – Cdn crude by rail exports at 155,741 b/d in October, up +17.4% YoY

Cdn crude by rail exports

Note that when the Dec crude by rail data gets reported in a couple months, there will likely be some impact from the very cold temperatures in late Dec. The Canadian Energy Regulator (successor to NEB) reported Canadian crude by rail exports were up +28,681 b/d MoM in October to 155,741 b/d vs 127,060 b/d in September [LINK]. This puts October export volumes at +23,072 b/d YoY (+17.4%) vs October 2021 of 132,669 b/d. CBR volumes are +116,874 since the Covid July 2020 bottom of 38,867 b/d. October WCS-WTI differentials decreased to -$27.49, and a decrease YoY provides economic deterrent to ship Cdn crude by rail into US markets. Below is our graph of Cdn crude by rail exports compared to the WCS–WTI differential.

Figure 25: Cdn Crude by Rail Exports vs WCS Differential



Source: Canadian Energy Regulator, Bloomberg

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

Crude-by-rail hit by cold

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 26: Excerpts CN Tipping Point video

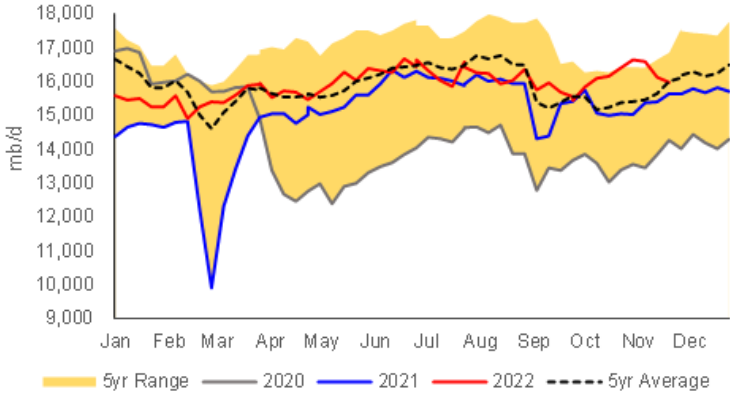
Source: CN

Oil – Refinery inputs -0.150 mmb/d WoW to 15.976 mmb/d

Refinery inputs down 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 decrease 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 Wednesday, the EIA released its estimated crude oil input to refinery data for the week ended Dec 16. The EIA reported crude oil inputs to refineries down -0.150 mmb/d WoW to 15.976 mm/d, which is +0.158 mmb/d YoY from 15.818 mmb/d for the week ended Dec 17, 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 +0.968 mmb/d to 20.924 mmb/d, and Motor gasoline was up +0.459 mmb/d at 8.714 mmb/d from 8.255 mmb/d last week. The 4-week average for Motor Gasoline was down -0.643 mmb/d YoY to 8.411 mmb/d.

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



Source: EIA

Oil – Chevron CEO's on why California's price gouging refiner penalty won't work

California wants to cap refiner margins

Chevron CEO Mike Wirth had some great simple comments on how any business responds to higher or lower taxes. He was on Fox Business and was asked about California's recent price gouging penalty. Fox asked "*You're one of the largest refiners in the state of California right now, for example. And California is proposing higher taxes. They want a windfall tax. They want a penalty put on oil companies if you're making excess margins. Tell me what kind of impact something like that has on people's ability or willingness to invest in energy to result in that balanced strategy that you refer to.*" Wirth's common sense answer was ""*Typically, if you want less of something you raise taxes on it. If you want more something, if you want more supply of gasoline, you don't raise taxes on it and discourage people from investing in bringing more supplies to the market. So, these policie"s haven't worked in the past. They won't work today."*

California's proposed "price gouging penalty" on refiners

Here is what we wrote in our Dec 11, 2022 Energy Tidbits on the California refiners tax. "*California proposes "price gouging penalty" as way to cap refiner margins*
On Monday night, we tweeted [LINK] "California follows RUS oil price cap approach to propose to cap refiner margins Bill 2(c) would give "CA authority to order that refinery maintenance & turnarounds be rescheduled in specific circumstances.." Will this just lead to higher for longer CA #Gasoline prices?" Governor Newsom had just announced [LINK] "Governor Newsom Unveils Price Gouging Penalty on Big Oil's Excessive Profits to Protect Californians from Being Ripped Off." And "The proposal introduced today by Senator Skinner comes as the California Legislature is assembling in a special session called by the Governor to pass a price gouging penalty. The Legislature will also consider efforts to empower state agencies to more closely review gas costs, profits and pricing as well provide the state with greater regulatory oversight of the refining, distribution and retailing segments of the gasoline market in California. The proposal would discourage oil refiners from fleecing Californians by making it unlawful to charge excessive profits – excessive refiner margins would be punishable by a civil penalty from the California Energy

Commission (CEC). The amount of the maximum margin and the amount of the penalty will be determined through the legislative process. Any penalties collected by the penalty will go to a Price Gouging Penalty Fund and then given back to Californians." We reviewed the proposed legislation and it would give California the ability to set what it deems to be the appropriate gasoline refining margin ie. a price cap on refiner margins. The clause writes "(1) (A) On and after the effective date of this section, the maximum gross gasoline refining margin shall be ____ cents per gallon." In theory, it should be like a price cap and work. California will set what they view as a reasonable maximum refining margin that should provide sufficient return for the refinery to operate. That is the in theory part."

Occidental CEO's said California's proposed refiners tax was "ridiculous"

Here is what we wrote in our Dec 11, 2022 Energy Tidbits on Occidental CEO Vicki Hollub's response to the California refiners tax. "*On Tuesday, Bloomberg reported "Occidental Petroleum CEO Vicki Hollub says plans by California lawmakers to consider levying penalties on the oil industry for high profits are "ridiculous." "I think too many of the politicians just don't understand the industry. They don't understand any industry," Hollub says at WSJ's CEO Council Summit. California lawmakers opened a special session yesterday to consider an annual maximum profit margin for oil refiners and other measures. Hollub adds that politicians don't understand the basics of economics and supply-and-demand."*

Oil – US "net" oil imports down -1.092 mmb/d WoW to 1.459 mmb/d

US "net" oil imports down WoW

US "NET" imports were down -1.092 mmb/d to 1.459 mmb/d for the Dec 16 week. US imports were down -1.048 mmb/d to 5.819 mmb/d. US exports were up +0.044 mmb/d to 4.360 mmb/d. The WoW decrease in US oil imports was driven mostly by Top 10 with a decrease of -0.857 mmb/d. Some items to note on the by country data. (i) Canada was down this week 0.729 mmb/d to 3.066 mmb/d. (ii) Saudi Arabia was up 0.196 mmb/d to 0.513 mmb/d this week. (iii) Colombia was down -0.177 mmb/d WoW to 0.71 mmb/d. (iv) Ecuador was down this week -0.087 mmb/d to 0.070 mmb/d. (v) Iraq was down -0.055 mmb/d to 0.227 mmb/d. (vi) Mexico was up +0.030 mmb/d to 0.632 mmb/d.

Figure 28: US Weekly Preliminary Oil Imports by Major Countries

(thousand b/d)	Oct 14/22	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	WoW
Canada	3,372	3,483	3,410	3,235	3,076	3,844	3,354	3,423	3,795	3,066	-729
Saudi Arabia	230	325	533	519	211	685	338	274	317	513	196
Venezuela	0		0	0	0	0	0	0	0	0	0
Mexico	747	509	748	503	528	495	300	585	602	632	30
Colombia	214	215	218	341	143	170	290	292	248	71	-177
Iraq	130	220	134	503	141	385	363	252	282	227	-55
Ecuador	134	201	0	102	101	42	242	159	157	70	-87
Nigeria	29	42	81	119	181	43	50	159	171	136	-35
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	4,856	4,995	5,124	5,322	4,381	5,664	4,937	5,144	5,572	4,715	-857
Others	1,052	1,185	1,081	1,132	1,178	1,399	1,100	868	1,295	1,104	-191
Total US	5,908	6,180	6,205	6,454	5,559	7,063	6,037	6,012	6,867	5,819	-1,048

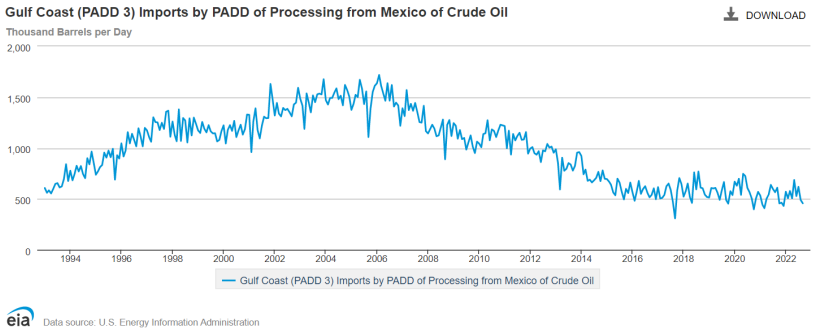
Source: EIA

Oil – A key 2023 oil theme is Mexico should significantly reduce oil exports in 2023

Mexico reducing oil exports

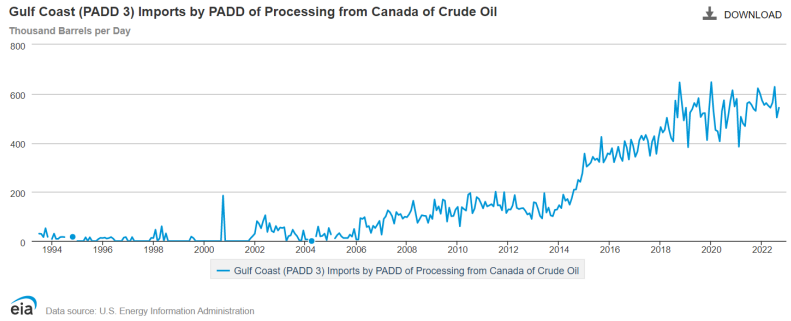
Yesterday, we tweeted [LINK] "*Key #Oil theme for 2023 - Mexico refines more oil in its plan to cut exports to zero! Positive to Cdn oil ie. less MEX oil to Gulf Coast. AMLO: Olemeca refinery to hit 170 kbd July 1, full 340 kbd Sept 15. In Nov, Pemex exported 894 kbd incl 499 kbd to Gulf Coast. #OOTT.*" One of our key oil themes for 2023 is that Mexico expects to cut oil exports down to zero over the next 12 to 18 months. This was supposed to be happening around now, but the big delay and cost overruns at the new Olemeca (Dos Bocas) refinery pushed that back a year. The stoppage of oil exports wasn't just Olemeca it was the capital put into trying to improve operations to more consistent refinery production at its existing refineries. Our tweet referenced the AMLO tweets on how Olemeca should refine 170,000 b/d July 1, and then an additional 170,000 b/d on Sept 15. AMLO's goal has been to eliminate all Mexico oil exports by adding the new Olemeca refinery and putting capital to increase the capacity utilization of Pemex's existing refineries. And by the added and improved refinery utilization, Mexico could then be able to process all Mexico oil production and therefore eliminating exports. And if Mexico eliminates oil exports, it is a positive for Cdn oil going to the Gulf Coast (PADD 3). Below are the EIA current graphs showing Gulf Coast (PADD 3) oil imports from Mexico and Canada.

Figure 29: Gulf Coast PADD 3 crude oil imports from Mexico



Source: EIA

Figure 30: Gulf Coast PADD 3 crude oil imports from Canada



Source: EIA

Oil – Pemex oil production still stuck around 1.7 mmb/d, and partners flat at 72,000 b/d

Pemex Nov oil 1.706 mmb/d

On Friday, Pemex released its November production for its interests, it was 1.706 mmb/d of oil, which is basically unchanged for the last several months. Pemex has been unable to grow its own oil production. And the 3rd party non-Pemex oil production in Mexico is basically flat at 72,000 b/d in November and has averaged ~70,000 b/d for YTD November 30. As a result, total Mexico oil production (Pemex and non-Pemex) was 1.778 mmb/d for November and 1.761 mmb/d for YTD November 30. Below is our chart tracking Pemex oil production.

Figure 31: Pemex (Excl 3rd Party) Mexico Oil Production

Oil Production (thousand b/d)	2015	2016	2017	2018	2019	2020	2021	2022	22/21
Jan	2,251	2,259	2,020	1,909	1,623	1,724	1,651	1,705	3.3%
Feb	2,332	2,214	2,016	1,876	1,701	1,729	1,669	1,684	0.9%
Mar	2,319	2,217	2,018	1,846	1,691	1,745	1,697	1,696	-0.1%
Apr	2,201	2,177	2,012	1,868	1,675	1,703	1,693	1,686	-0.4%
May	2,227	2,174	2,020	1,850	1,663	1,633	1,688	1,690	0.1%
June	2,247	2,178	2,008	1,828	1,671	1,605	1,698	1,702	0.2%
July	2,272	2,157	1,986	1,823	1,671	1,595	1,701	1,707	0.4%
Aug	2,255	2,144	1,930	1,798	1,683	1,632	1,657	1,691	2.1%
Sept	2,271	2,113	1,730	1,808	1,705	1,643	1,709	1,685	-1.4%
Oct	2,279	2,103	1,902	1,747	1,655	1,627	1,692	1,698	0.4%
Nov	2,277	2,072	1,867	1,697	1,696	1,633	1,691	1,706	0.9%
Dec	2,275	2,035	1,873	1,710	1,706	1,650	1,694		

Source: Pemex

Oil – Mexico exports 0.894 mmb/d of oil in November

Pemex Nov oil exports

On Friday, Pemex posted its oil exports for November, which were 0.894 mmb/d, down -12.7% YoY from 1.025 mmb/d in Nov 2021, and down -7.9% MoM from 0.971 mmb/d in Oct 2022. Oil exports can normally vary +/- 1.0 mmb/d, but the decline may be different this time as petroleum products production was up ie. Mexico refined more of its oil. Mexico oil exports to US were 0.499, which is below its YTD average of approx. 0.65 mmb/d. Below is our table of the Pemex oil export data.

Figure 32: Pemex Mexico Oil Exports

Oil Exports (thousand b/d)	2016	2017	2018	2019	2020	2021	21/20	2022	22/21
Jan	1,119	1,085	1,107	1,071	1,260	979	-22.3%	832	-15.0%
Feb	1,241	1,217	1,451	1,475	1,093	1,006	-8.0%	925	-8.1%
Mar	1,062	1,001	1,176	1,150	1,144	925	-19.1%	905	-2.2%
Apr	1,081	1,017	1,266	1,023	1,179	923	-21.7%	1,024	10.9%
May	1,204	958	1,222	1,205	1,062	1,031	-2.9%	965	-6.4%
June	1,098	1,157	1,110	995	1,114	1,106	-0.7%	1,029	-7.0%
July	1,146	1,255	1,156	1,079	1,051	1,173	11.6%	1,062	-9.5%
Aug	1,261	1,114	1,181	1,082	1,190	1,099	-7.6%	915	-16.7%
Sept	1,425	1,159	1,206	995	1,023	983	-3.9%	1,022	4.0%
Oct	1,312	1,342	1,027	963	908	935	3.0%	971	3.9%
Nov	1,273	1,388	1,135	1,114	1,171	1,025	-12.5%	894	-12.8%
Dec	1,115	1,401	1,198	1,115	1,243	1,037	-16.6%		

Source: Pemex

Mexico had its best month for producing petroleum products

One of our oil big oil themes for 2023 is that Mexico expects to cut oil exports down to zero over the next 12 to 18 months. This was supposed to be happening around now, but the big delay and cost overruns at the new Dos Bocas refinery pushed that back a year. The stoppage of oil exports wasn't just Dos Bocas, it was the capital put into trying to improve operations to more consistent refinery production at its existing

refineries. There isn't any disclosure on the improved operations at existing refineries, but the Pemex data for Nov seems to support that is happening. On Friday, Pemex reported Pemex reported refined petroleum products production of 1.001 mmb/d in Nov, which was the first time over 1 mmb/d since at least 2017. It's too early to assume that it's all upward and onward, because there have been months close to 1 mmb/d. But it is definitely something we will want to watch to see if it can be maintained.

Huge Venezuela production upside

Oil – Huge Chevron Venezuela oil production capacity without drilling a single well

There was an overlooked Argus report on Wed [LINK] "*High hurdles to grow Chevron's Venezuela oil output*." It was likely overlooked for the title of the report. (i) But, yesterday, we tweeted [LINK] "*Tip of the Iceberg! Chevron VEN Nov production is ~90,000 b/d, 1,400 wells, ~65 b/d ave well. Note 👇category 2: ~8,700 wells need ~$0.5 mm/well to become operational. At 65 b/d ave = ~550,000 b/d capacity add without drilling one well. Thx @ArgusMedia Carlos Camacho! #OOTT."* (ii) The Argus report reminds of the huge near term upside For Chevron to add production in Venezuela without 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 viabl*e". 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 countr*y". This is where something like diesel power generation comes into play. The reality is that reliable power is something that is also involved in the above categories. Our Supplemental Documents package includes the Argus report.

Oil – Colombia oil production still below pre-Covid, Oct was 0.759 mmb/d

Colombia October oil & gas production

The concern remains that the recent election of Colombia President Petro means that Colombia oil production isn't likely to grow on a sustained basis. Colombia oil production remains stuck and really hasn't moved in the last two years and is still below pre-Covid levels despite stronger oil prices. On Reuters reported 2 Colombia oil production in October was +0.5% MoM to 0.757 mmb/d vs 0.753 mmb/d in Sept. Reuters also reported "N*atural gas output in October was 947 million cubic feet per day, the ministry said, down 16% from production of 1.13 billion cubic feet per day in the same month in 2021."* Our Supplemental Documents package includes the Reuters report.

Figure 33: Colombia Oil Production

mmb/d	2015	2016	2017	2018	2019	2020	2021	21/20	2022	22/21
Jan	1.036	0.986	0.860	0.860	0.899	0.884	0.745	-15.7%	0.740	-0.7%
Feb	1.030	0.955	0.864	0.823	0.893	0.878	0.746	-15.1%	0.740	-0.8%
Mar	1.023	0.917	0.804	0.856	0.885	0.857	0.745	-13.0%	0.751	0.8%
Apr	1.029	0.915	0.857	0.865	0.891	0.796	0.745	-6.4%	0.751	0.8%
May	1.027	0.904	0.851	0.866	0.895	0.732	0.703	-3.9%	0.746	6.1%
June	1.010	0.888	0.857	0.864	0.892	0.730	0.694	-4.9%	0.752	8.4%
July	0.947	0.843	0.856	0.860	0.869	0.735	0.731	-0.5%	0.748	2.3%
Aug	0.968	0.827	0.858	0.866	0.883	0.742	0.748	0.8%	0.749	0.1%
Sept	1.009	0.859	0.851	0.869	0.879	0.749	0.744	-0.7%	0.753	1.2%
Oct	1.005	0.846	0.864	0.879	0.883	0.751	0.740	-1.5%	0.757	2.3%
Nov	0.990	0.855	0.851	0.883	0.880	0.761	0.747	-1.9%		
Dec	0.999	0.837	0.870	0.889	0.882	0.759	0.745	-1.8%		

Source: Bloomberg, Colombia Ministry of Mines and Energy, Reuters

Oil – Norway November oil production of 1.740 mmb/d, down -0.5% MoM

Norway oil production

The Norwegian Petroleum Directorate released its November production figures [LINK] of 1.740 mmb/d of oil, which is +0.5% YoY but down -0.5% MoM from October of 1.749 mmb/d. November production was down -8.7% (-0.165 mmb/d) from the forecast amount of 1.905 mmb/d. The NPD does not provide any explanations for the MoM changes. The theme for Norway through 2021 was that Norway oil production returned to growth because of the Johan Sverdrup oil field, and tax breaks from the government allowing increased capex in the energy sector. Norway oil production was still expected up modestly in 2022.

Figure 34: Norway November 2022 production

		Oil mill bbl/day	Sum liquid mill bbl/day	Gas MSm³/day	Total MSm³ o.e/day
Production	**November 2022**	**1.740**	**1.946**	**346.4**	**0.656**
Forecast for	November 2022	1.905	2.164	352.8	0.697
Deviation from forecast		-0.165	-0.218	-6.4	-0.041
Deviation from forecaset in %		-8.7 %	-10.1 %	-1.8 %	-5.9 %
Production	October 2022	1.749	1.970	349.4	0.663
Deviation from	October 2022	-0.009	-0.024	-3	-0.007
Deviation in % from	October 2022	-0.5 %	-1.2 %	-0.9 %	-1.1 %
Production	November 2021	1.732	1.972	346.3	0.660
Deviation from	November 2021	0.008	-0.026	0	-0.004
Deviation in % from	November 2021	0.5 %	-1.3 %	0 %	-0.6 %

Source: Norwegian Petroleum Directorate

Oil – Novak: Russia may cut 500-700,000 b/d in Jan

Russia could cut 500-700,000 b/d in Jan

The big oil news on Friday was that Russia is saying they are ready to reduce production in Jan by 500,000 to 700,000 b/d. On Friday, we tweeted [LINK] "*Russia ready to cut production Jan 1. #Novak "We are ready to partially reduce production. I assess the risks, when we are at the beginning of next year, we may have a reduction of about 500-700 thousand barrels per day". #OOTT."* TASS wrote [LINK] "*Novak noted that Russia is ready to reduce oil production in 2023, but will not trade on the terms of the oil price ceiling. "We are ready to partially reduce production. I assess the risks, when we are at the beginning of next year, we may have a reduction of about 500-700 thousand barrels per day, which is about 5-7% for us. This is a small amount, but, nevertheless, such risks exist," the deputy prime minister said, adding that it is unacceptable for Russia to become dependent on decisions taken by unfriendly countries."* Our Supplemental Documents package includes the TASS report.

Oil – Novak: Russia to produce 9.84 to 10.04 mmb/d in 2023 below quota of 10.478

Russia to produce 9.84 to 10.04 mmb/d in 2023

Earlier this morning, TASS reported on comments from deputy prime minister Novak. Novak basically says Russia oil production will be less and will be less than the recently reduced OPEC+ quota levels. At the recent Oct OPEC+ meeting, Russia's quota was reduced from 11.004 mmb/d to 10.478 mmb/d. TASS wrote ""*I do not rule out risks of production decline in certain periods in 2023. We will probably reduce it by 7-8% at the peak. Nevertheless, we will produce at least 490-500 mln metric tons over the year. Still, I reiterate much will depend on logistics," the official noted."* This would be equal to 9.84 to 10.04 mmb/d, or well below the reduced OPEC+ quota. Our Supplemental Documents package includes the TASS report.

Oil – Novak: Russia will not sell petroleum products to price cap countries

Russia on petroleum products sales

The other reminder from Novak's Friday comments was, no surprise, that Russia's ban to supply countries/legal entities that support the Russia price cap is supplying both oil and petroleum products. TASS wrote "*"As for the price ceiling, a presidential decree is being prepared now, it has already been practically agreed upon and is on the way out. Within the framework of this decree, there will be a ban on the supply of oil and petroleum products to those countries and those legal entities that will require in contracts compliance with the price ceiling imposed by the European Union," he said."* And "*According to Novak, Russia does not*

accept sanctions on the energy industry, interventions lead to a shortage of resources in the energy market and rising prices. "We do not accept any interference in energy markets, in general, in market instruments in general. Because in fact, this will only lead to risks, to a shortage of resources in the energy market, to an increase in prices," he said.

Oil – Putin's decree on Russia response to price cap is coming Mon/Tues

Putin to sign decree

It's taken a few weeks, but, on Monday, Putin is supposed to sign the formal decree on Russian's response to the US/EU price cap on Russian oil. On Thursday, TASS reported [LINK] on comments by Putin to reporters on Thursday. TASS's story "*We will unite the people and 'crack' Patriot missiles: what Putin told reporters*", included Putin on price caps "*On response to price caps. A decree on Moscow's response to the price cap on Russian oil will be signed "on Monday or Tuesday." The price cap itself won't harm Russia but it paves the way for the destruction of the global economy. The European Union's move to cap gas prices will also lead to nothing good. If the decision affects Gazprom's contracts, the need will arise to think about whether it is worth it to implement them."*

Oil – Congress can help speed up Ukraine's victory over Russia

Zelensky speech to congress

We were like many and watched Zelensky's address to the Congress/Senate on Wed night. Post the midterms, the big question is how will a Kevin McCarthy led Republican slim majority House affect Biden's financial support to Ukraine. There is no question Zelensky sees the changed House leadership and that is why he made his first tip out of Ukraine since the war to address the House/Senate. Bloomberg posed a transcript and a couple quotes show how Zelensky is trying to address the US support. Zelensky said "*"I would like to thank you, thank you very much, thank you for both financial packages you have already provided us with and the ones you may be willing to decide on. Your money is not charity. It's an investment in the global security and democracy that we handle in the most responsible way,"* and "*Russia could stop its aggression, really, if it wanted to, but you can speed up our victory. I know it, and it will prove to any potential aggressor that no one can succeed in breaking national borders, no one committing atrocities and reigning over people against their will. It would be naive to wait for steps towards peace from Russia, which enjoys being a terrorist state."*

> **Remember Zelensky's Feb 25 quote on not leaving Ukraine**
> This was Zelensky's first trip outside Ukraine. And don't forget when the Russian bombing of Kiev started, the US wanted to get Zelensky out of Kiev for safety reasons. We suspect that the vast majority of leaders would have taken the US up on their offer. But not Zelensky wo had the famous Feb 25 quote "*The fight is here; I need ammunition, not a ride."* Gotta give him credit!

Oil – Saudi Energy Minister says OPEC+ to remain pro-active & pre-emptive

Saudi Energy Minister Abdulaziz

Saudi Energy Minister Abdulaziz wanted to remind oil markets that OPEC+ is going to remain pro-active and pre-emptive, and also that he has been right on his call on oil demand. On Tuesday, Saudi Press Agency posted its short interview with Abdulaziz. We tweeted [LINK] "*Two reminders from "The Man" Saudi Energy Minister Abdulaziz They have been right on their demand outlook moreso than #IEA #EIA. "#OPEC+ has no choice but to remain pro-active and pre-emptive..." As he always says, he is attentive to the market! #OOTT."* (i) He made a point of reminding that OPEC+ isn't political in its market assessment/actions, and also that they have been right. He also takes some veiled shots at IEA and EIA saying

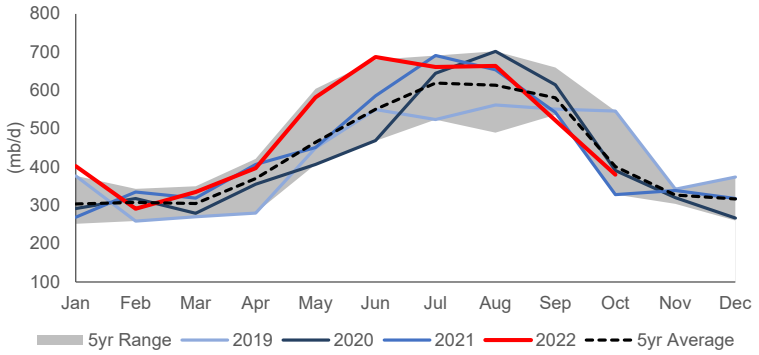
"*There is also inherent serious inaccuracy in some forecasts. OPEC+ has maintained its demand figures for 2021 while some others have grossly and consistently underestimated historical and current demand resulting in discrepancies often referred to as "the puzzle of the missing barrels", and they were eventually forced to resolve these discrepancies in early 2022 by adjusting demand upwards. It would not come as a surprise if the issue of missing barrels reemerges in early 2023, keeping up with the same pattern of underestimating demand yet again in 2022.*" (ii) But the big reminder is how he is always attentive to the market. Abdulaziz said "*In face of a wide range of uncertainties, OPEC+ has no choice but to remain pro-active and pre-emptive and this is not an easy task especially that the market has the tendency to overreact to news in both directions and we have seen many ill-advised interventions in energy markets."* Our Supplemental Documents package includes the Saudi Press Agency report.

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

Saudi to have more oil for export

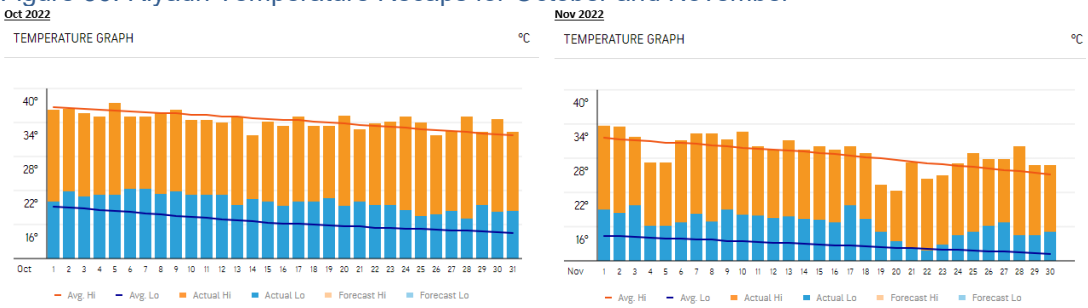
The key theme for the next few months is that Saudi will be able to export more oil as it uses less oil for electricity as the peak hot summer months are over. Oil used for electricity declined to 380,000 b/d in Oct. A reminder a normal peak to trough decline of ~400,000 b/d. Saudi used 142,000 b/d less oil MoM in Oct for electricity ie. volumes freed up for export or to add to inventories. If Saudi sees the normal seasonal decline of ~400,000 b/d, it should mean Saudi's oil exports shouldn't decline anywhere near as much as their new lower quotas. Saudi's OPEC quota is: Aug 11.004 mmb/d. Sept 11.030 mmb/d. Oct 11.004 mmb/d. Nov/Dec 10.478 mmb/d. There is one additional wildcard that isn't in the JODI data but could lead to more Saudi oil for export -the JODI data doesn't include how much fuel oil Saudi imports and we saw reports in Q2 that Saudi was importing some Russian fuel oil via Fujairah terminal. The JODI data for Saudi Arabia oil supply and demand for October was updated on Monday. Saudi used less oil for electricity in October vs September. This is attributed to the cooler temperatures experienced throughout October. October saw varying temperatures that were close to the higher average range for most of the month. It is important to note that November experienced colder temperatures than October and colder means less air conditioning/electricity demand. October was 380,000 b/d (vs October 2021 of 328,000 b/d) and September was 522,000 b/d (vs September 2021 of 543,000 b/d). Below are the AccuWeather Temp maps for Riyadh for September and October. Careful they are different scales but look for oil for electricity to decrease as we move out of peak season.

Figure 35: Saudi Arabia Direct Use of Crude Oil For Electric Generation



Source: JODI

Figure 36: Riyadh Temperature Recaps for October and November



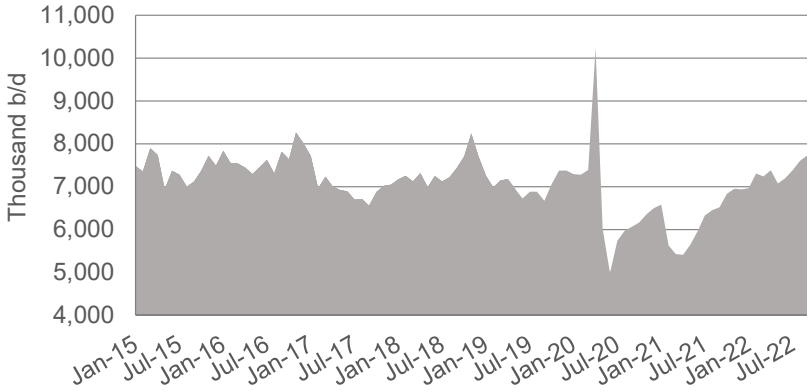
Source: AccuWeather

Oil – Saudi oil exports up 52,000 b/d to 7.773 mmb/d in October

Saudi oil export data for Oct

The less use of oil for electricity meant that there was more oil for export even in a month where Saudi oil production was down. Saudi oil production in Oct was down -84,000 b/d MoM to 10.957 mmb/d. But there were additional oil volumes freed up for export or to add to inventory with Saudi direct use of oil for electricity down -142,000 b/d MoM, and Saudi refinery intake of oil down -14,000 b/d MoM. Saudi oil exports used part of these freed up volumes and were up +52,000 b/d MoM. Saudi oil production in Oct was 10.957 mmb/d, a little above quota of 11.004 mmb/d. Saudi oil exports were +52,000 b/d MoM to 7.773 mmb/d in Oct 2022.

Figure 37: Saudi Arabia oil exports (mb/d)



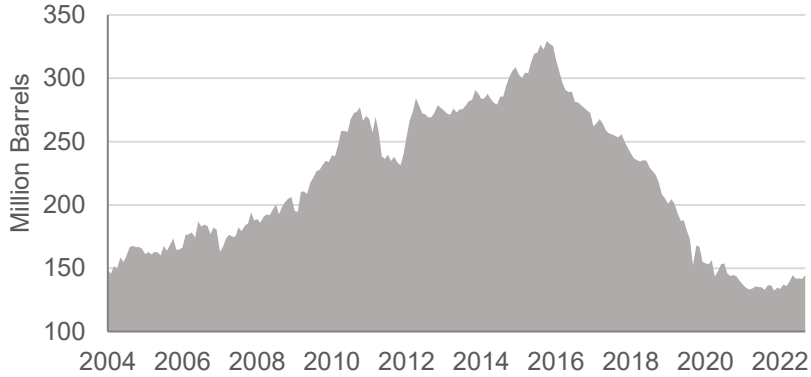
Source: JODI

Oil – Saudi oil inventories increased MoM, up +3.917 mmb barrels MoM

Saudi oil inventory data

JODI doesn't provide data for Saudi fuel oil imports, but, based on the math, we would assume that there were Saudi fuel oil imports in October. The JODI data also reported Saudi oil inventory increased +3.917 mmb MoM to 148.661 mmb at Oct 31. As noted above, there additional oil barrels freed up from less oil used for electricity and less oil input to refineries. This provided the oil for increased oil exports and increase oil for inventories. Inventories are now above the recent high of 144.4 mmb at May 31, but still remain at relatively low levels staying below 150 mmb.

Figure 38: Saudi Arabia Crude Oil Inventories (mmb)



Source: JODI

Oil – Wonder what Iran is getting from Russia for drones and gas turbines

How is Russia paying back Iran?

Iran is looking like it is stepping up to supply Russia with two essential items that it needs – drones for attacking Ukraine and gas turbines to increase LNG capacity. These are two critical items for Russia. We have to wonder what is Russia giving back to Iran that Iran doesn't have and critically needs? Wonder what Israel thinks when they see the drones and

now gas turbines? We have to believe there are concerns on nuclear assistance or even Wagner mercenaries in areas of Iran's interest. It just can't be something simple, which means we have to keep Russia/Iran on our watch list.

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

Libya oil production stable at ~1.2 mmb/d

We have to give the Libya National Oil Corporation credit that it's been able to keep oil production pretty stable right around 1.2 mmb/d. On Thursday, the Libya National Corporation posted on its Facebook [LINK] a short update on oil production. The Google Translate was "*Crude oil production reached 1,230,000 barrels, and condensate production reached 57,000 barrels during the past 24 hours."* The other benefit of stable oil production is that Libya oil exports continue to be strong. On Thursday, Bloomberg reported "*Libya plans to export 32.03m bbl or 1.03m b/d of crude in December, according to loading program seen by Bloomberg. * Compares with 29.58m bbl or 986k b/d in November."*

Libya's postponed elections were one year ago on Dec 24, 2021

For the past couple months, Haftar has been trying to get some momentum for protests and more. We had thought he might have had success in riling up people coming up to the 1-year anniversary of the last minute postponed Dec 24, 2021 presidential and parliamentary elections. Especially since there has been no idea when those elections will be held. These elections were supposed to be the key to moving ahead in a united Libya.

Haftar speech last night, didn't call for separation, last chance to have election

Haftar made a big speech last night. Unfortunately, we couldn't find an English transcript of what he said. (i) The Tripoli based Libya Observer reported [LINK] that Haftar backed away from a rumored call for separation. Rather, they wrote "*In his speech Saturday, Haftar announced what he called a "last chance" to draw up a roadmap that includes holding elections. He stressed the need for a fair distribution of oil revenues without marginalization of any region, remarking that "only the Libyans are able to solve their problem and establish a unified Libyan state."* (ii) Haftar's call for elections was the common reporting from all stories. Libya Review report "*Haftar: Libya's Unity 'Red Line'*" wrote "*During his speech on the occasion of the 71st anniversary of Libya's independence, he confirmed that, "the LNA General Command announces a final opportunity through which a roadmap is drawn, and elections are held." "Libya is still one and indivisible," warning "those who try to harm it," Haftar noted. "We recall that we are the first to call for free, fair, and transparent elections, and the United Nations Support Mission in Libya (UNSMIL) must shoulder its responsibility to solve the Libyan crisis," Haftar confirmed. "We stress the necessity of the equitable distribution of oil revenues, without marginalization," he pointed out. "The Libyans are the only ones capable of solving their problems, and reaching a single unified Libyan state. There must be tolerance and a renunciation of violence. Religious and media discourse must be changed to unify the ranks of the Libyan nation. We call on all cities and regions of western Libya to a Libyan-Libyan dialogue, and to reunite the people," the LNA Commander stated."* Our Supplemental Documents package includes the Libya Review report. [LINK]

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

Key oil call for 2023

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, and probably everyone else, believes there will be a big quick jump up in China oil 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 jump in mobility, industry and activity post herd immunity. 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. On Friday, 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.*"

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."

Pfizer's "What is herd immunity?"

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

Oil – China stampeding to herd immunity, 248 million got virus in 1st 20 days of Dec

China rushing to herd immunity

WOW is exactly what we thought when we saw the Bloomberg report on China's huge ramp up in Covid. As noted above, we believe the key oil call for 2023 is China moving to herd immunity in Q1? Because if they do get to herd immunity in Q1/23, there should be a big jump up in oil demand in Q2/23. And based on the reports, it looks like they will be getting there pretty early in Q1/23. Everyone has seen the reports on how Covid was rapidly

spreading across China, but the rate is probably faster than most expect. Early Friday morning, we tweeted [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. If accurate, the infection rate would dwarf the previous daily record of about 4 million, set in January 2022. Beijing's swift dismantling of Covid Zero restrictions has led to the unfettered spread of the highly contagious omicron variants in a population with low levels of natural immunity. More than half the residents of Sichuan province, in China's southwest, and the capital Beijing have been infected, according to the agency's estimates."* There is more in the Bloomberg report. Our Supplemental Documents package includes the Bloomberg report.

Oil – Mobility indicators, rapid China Covid spread is winning vs travel reopening

China mobility falls with rapid Covid spread

It was the same story this week as last with respect to vehicle mobility indicators in China. (i) On Tuesday, we tweeted [LINK] "*China rapid spread of Covid is winning the fight VS it's relaxation of Covid restrictions for travel. "road mobility weak in December, falls below April levels". Still feels like China moving to some measure of herd immunity as early as Q1? Thx @BloombergNEF Wayne Tan. #OOTT."* BloombergNEF posted its Oil Indicators Weekly on Tuesday, which highlighted an update on China vehicle mobility indicators for Dec data up until Dec 19. BNEF had two data graphics on China's city-level road congestion, one with the subtitle "*Road mobility falters after initial boost*" and the second with the subtitle "*Road mobility weak in December, falls below April levels*". The subtitles say it all. A couple weeks ago, China moved to relax Covid restrictions and testing, including Covid restrictions on cross region travel. So, in theory, that should have been a big reopening push. And it was, to some degree, but then the expected rapid rise in Covid happened and that has led to negative road mobility indicators. It seems that, at least for now as Covid rips thru China, the rapid spread of Covid is carrying the day as the key factor hurting the China reopening. (ii) On Thursday, we tweeted [LINK] "*Key oil call for 2023. Is China moving to herd immunity in Q1? If so, fits 👇 12/14 @michaelwmuller "J" shape recovery in China transportation fuels. Traffic in China's biggest cities crashed as its "abrupt end to Covid Zero sparks outbreaks nationwide" Thx @hongjinshan #OOTT."* Bloomberg reported "*Traffic in China's biggest cities has dropped to the lowest since the Lunar New Year break in the early part of the year as the country's abrupt end to Covid Zero sparks outbreaks nationwide. A measure of congestion levels across 15 major cities is 45% below January 2021, the benchmark used in an index compiled by BloombergNEF based on Baidu Inc. traffic data."* Our Supplemental Documents package includes the two BNEF graphics and the Bloomberg traffic down 45% report.

Figure 39: China's city-level road congestion

In the spotlight

China's city-level road congestion

Road mobility weak in December, falls below April levels

- Table to the left are the monthly congestion levels in 2022, indexed to the average daily peak congestion levels **in January 2021** for each respective city.
- Table to the right are the monthly congestion levels in 2022, indexed to the average daily peak congestion levels **in the same month last year** for each respective city.
- Three-color scale conditional formatting is set to red = 0, white = 100 and green = 200. It is possible for congestion levels to hit 'zero'.

Indexed to January 2021 = 100

	Jan 22			Apr			Jul					Dec
China-15	93	86	96	90	102	129	111	112	138	103	95	80
Beijing	106	89	110	94	35	104	144	145	171	107	78	33
Chengdu	99	81	117	108	118	130	94	85	75	104	94	76
Chongqing	97	81	96	95	106	117	98	61	130	86	31	37
Dongguan	75	75	73	90	129	134	103	110	140	120	135	125
Guangzhou	93	85	110	77	125	148	119	143	161	110	56	63
Ningbo	108	104	139	104	163	185	147	146	186	124	144	146
Qingdao	69	50	49	71	92	110	91	109	106	96	80	69
Shanghai	95	84	60	29	36	117	114	152	200	110	166	118
Shenzhen	86	76	68	137	176	166	125	151	149	140	175	147
Shijiazhuang	363	324	309	284	339	353	301	253	222	285	107	114
Suzhou	108	57	91	64	135	153	119	130	155	119	145	114
Tianjin	65	84	78	100	88	132	87	93	82	138	124	75
Wuhan	101	75	114	100	127	132	111	98	132	72	83	67
Xi'an	54	131	106	112	133	122	92	93	143	90	112	121
Zhengzhou	66	83	79	65	62	102	79	83	95	47	33	65

Indexed to same month last year = 100

	Jan 22			Apr			Jul					Dec
China-15	93	138	68	63	82	108	96	106	87	89	80	61
Beijing	106	136	70	57	24	70	108	125	85	83	67	21
Chengdu	99	146	82	73	99	108	87	79	54	102	96	61
Chongqing	97	130	89	81	96	105	89	66	89	83	29	31
Dongguan	75	166	59	62	92	134	87	86	92	97	96	111
Guangzhou	93	179	83	53	97	174	101	106	98	85	48	48
Ningbo	108	191	98	79	139	166	122	106	125	97	102	107
Qingdao	69	98	42	53	79	97	80	113	79	104	79	72
Shanghai	95	138	41	21	30	100	107	135	125	97	125	90
Shenzhen	86	131	48	94	134	134	96	102	84	103	113	95
Shijiazhuang	363	134	74	80	117	127	117	109	56	96	44	28
Suzhou	108	96	70	53	120	137	124	139	123	108	127	86
Tianjin	65	120	55	75	70	106	83	87	47	112	88	55
Wuhan	101	131	70	68	101	103	100	115	77	63	72	49
Xi'an	54	174	63	64	98	96	85	97	96	83	92	129
Zhengzhou	66	134	70	60	73	116	69	153	79	51	40	59

Source: BloombergNEF calculations based on Baidu data. Note: Data up to ***December 19, 2022.***

Source: BloombergNEF

Figure 40: China's Traffic Slows

Source: BloombergNEF

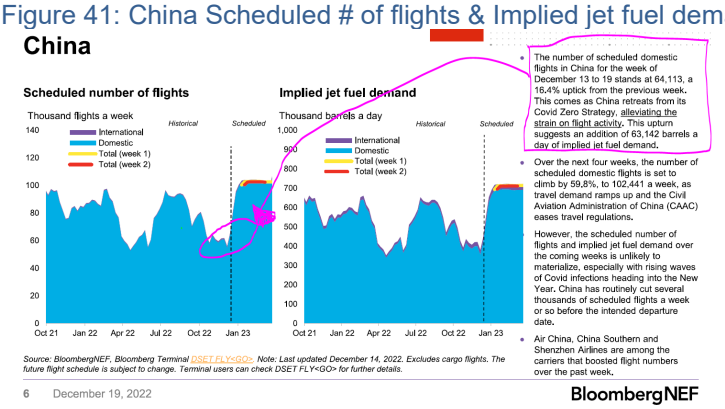
Oil – Chinese domestic flights; +16.4% WoW with cross region travel relaxation

Scheduled China air flights

The reports out of China continue to be how Covid is spreading and how people are staying at home and that is being reflected in mobility indicators ie. the rapid Covid spread is winning out versus the relaxation of travel restrictions across regions. The relaxation of travel restrictions led to an increase of scheduled domestic flights, but the question will be is that sustainable with the increasing Covid. On Monday, we tweeted [LINK] "*China's cross regional travel reopened, but will #Covid outbreak stall out schedules domestic flights? Flights Dec 13-19 +16.4% WoW. Dec 6-12 -9.7% WoW. Nov 29-Dec 5 +0.5% WoW. Nov 22-28 +3.5% WoW. Nov 15-21 -2.7% WoW. Nov 8-14 -5.3% WoW. Thx @BloombergNEF Claudio Lubis. #OOTT,"* We have to believe the next couple weeks will be key. The Dec 13-19 increase makes sense as it was the start of relaxation of cross regional travel restrictions. However, with the big ramp up in Covid, we have to wonder how much near term growth is there on a sustainable basis. But there is a wildcard in that travel for Chinese new year is to start in the next 2-3 weeks. BNEF estimates scheduled domestic airflights were +16.4%

WoW for the Dec 13-19 week, which followed the -9.7% WoW for the Dec 6-12 week. Below is the BloombergNEF graph from its Aviation Indicators Weekly report.

Figure 41: China Scheduled # of flights & Implied jet fuel demand Dec 13-19 week



Source: BloombergNEF

Oil – Vortexa crude oil floating storage 79.11 mmb as of Dec 23, +10.77 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 weeks Vortexa estimates posted on Bloomberg on Dec 17 at 10am MT. (i) As of 10am MT yesterday, Bloomberg posted Vortexa crude oil floating storage estimate for Dec 23 at 79.11 mmb, which is +10.77 mmb WoW vs upward revised Dec 16 of 68.34 mmb. Note Dec 16 of 68.34 mnmb was revised +2.99 mmb vs 65.35 mmb originally posted on Bloomberg at 10am on Dec 17. (ii) It looks like the originally posted 65.35 mmb as of Dec 16 was an aberration and not the start of a trend. Recall the 65.35 mmb was the lowest since March 27, 2020. It was revised up to 68.34 mmb, and then this week is coming in at 79.11 mmb. So it looks like it, at least for now, an aberration. We still wonder how the increasing number of unaccounted for dark tankers has to be causing problems for tanker trackers. (iii) This week, all the revisions for the last several weeks were upward revisions, whereas last week had downward revisions for the last several weeks. The revisions from the estimates posted yesterday at 10am MT vs the estimates posted on Bloomberg at 10am on Dec 17 are as follows: Dec 16 revised +2.99 mmb. Dec 9 revised +5.57 mmb. Dec 2 revised +0.20 mmb. Nov 25 revised +2.49 mmb. Nov 18 revised +1.36 mmb. Nov 11 revised +1.30 mmb. Nov 4 revised +1.67 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 marginally to approx. 87.4 mmb (was 86.8 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 23 estimate of 79.11 mmb is -141.23 mmb vs the post-Covid peak on June 26, 2020 of 220.34 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 23 estimate of 79.11 mmb is +27.62 mmb vs pre-Covid Dec 23, 2019 of 51.49 mmb. Dec 23 estimate of 79.11 mmb is -9.12 mmb YoY vs Dec 24, 2021 of 88.23 mmb. (viii) Below are the last several weeks of estimates posted on Bloomberg as of 10am on Dec 24, 10am on Dec 17 and 10am on Dec 10.

Figure 42: Vortexa Floating Storage posted on Bloomberg Dec 24 at 10am MT

Source: Bloomberg, Vortexa

Figure 43: Vortexa Estimates Posted Dec 24 10am MT, Dec 17 10am MT, Dec 10 10am MT

Posted 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

Dec 10, 10am MT

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

Source: Bloomberg, Vortexa

Bloomberg Oil Demand Monitor

Oil – Bloomberg Oil Demand Monitor: Expected 2023 recovery, but risks remain

We recommend reading the Bloomberg Terminal Oil Demand Monitor for a good recap of key oil demand indicators around the world. 2023 is set to be a rebound year for oil demand, although its not likely the rebound is quick. Again, the term “finely-balance” is used, repeating the OPEC MOMR as there is not much room for error. The “progressive reopening” of China’s economy and the Russian sanctions could lead to an oil price spike in early 2023. In the shorter-term India continues to be the fastest-growing oil market as demand in China is subject to easing of Covid as potential virus flare-ups remain a lingering threat. With headwinds global demand is set to grow by a 1.3 mmb/d YoY in 2023, as the impact of recovery in China likely to be offset by economic challenges in the US and Europe. China’s strict Covid-Zero policy easing has yet to translate into more road activity; among 13 major world cities regularly tracked each Monday morning by the Oil Demand Monitor, only two showed congestion marginally above 2019 levels. China combined domestic and

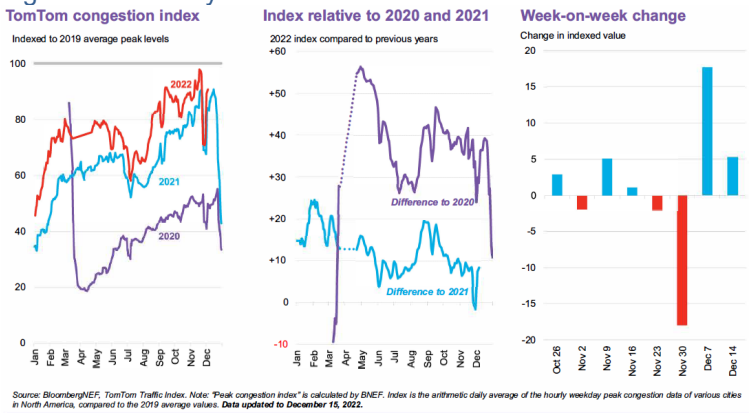
international travel is up both MoM and YoY, but is still below 2019 by 21%, compared to more than 30% in early November. Our Supplemental Documents package includes the Bloomberg Oil Demand Monitor.

Oil – US strong TomTom mobility indicator, but below average implied gas volumes

US oil indicators weekly

In the BloombergNEF US Oil Indicators Weekly report we continue to see the same signals from the indicators for US gasoline consumption from BloombergNEF US Oil Indicators Weekly. Mobility indicators like TomTom data point to more US driving, but the EIA gasoline supplied data to intermediaries point to below average gasoline consumption. The issue is much like this summer where many mistook the EIA gasoline supplied data as representing gas station sales, when it doesn't. The EIA gives their estimate for gasoline supplied to intermediaries. BloombergNEF's US Oil Indicators Weekly report showed a strong TomTom mobility indicator. The mobility data seems logical as the YoY comparable in TomTom congestions narrowed in May/June when gas prices went over $5, followed by a widening as gas prices dropped. The TomTom indicators look strong, having rebounded off of the usual Thanksgiving dip in activity. And, the implied gasoline demand shows something different. BNEF had a couple of key messages. "*Gasoline demand on a four-week rolling basis rose for the first time in five weeks but remains at a 20-year seasonal low, excluding 2020. Inventories shrugged off demand gains with a sixth straight build of more than 2 million barrels"* Our Supplemental Documents package includes excerpts from the BloombergNEF report.

Figure 44: Mobility Indicators



Source: BloombergNEF

Oil – November truck tonnage fell 2.5% MoM, up 0.8% YoY

Truck tonnage index +0.8% YoY in November

A soft freight season in the US led to a demand for truck haulage down in November vs strong August and September numbers. Truck tonnage was down 2.5% in November which means back-to-back negative months after two months of positive numbers. It is worth noting that the index fell by 4.6% from April to July and numbers are still not quite back to the levels observed in 2020. The American Trucking Association released its seasonally adjusted Truck Tonnage Index for November on Tuesday [LINK]. October observed a 2.5% decrease MoM from October, after decreasing 1.2% last month. Chief Economist Bob Costello noted, "*for-hire truck tonnage saw the largest single monthly decrease in November since the start*

of the pandemic and a total drop of 3.7% in October and November". The index is up 0.8% YoY from November 2021, with a fifteenth consecutive YoY gain. Trucking serves as a barometer of the U.S. economy, representing 72.2% of tonnage carried by all modes of domestic freight transportation, including manufactured and retail goods. Trucks hauled 10.93 billion tons of freight in 2021. Motor carriers collected $875.5 billion, or 80.8% of total revenue earned by all transport modes. Our Supplemental Documents package includes the ATA release.

Figure 45: Truck Tonnage Index

Source: ATA

Oil – Italy back to pre-Covid oil consumption

Italy oil consumption

We aren't believers that peak oil demand is likely to hit before 2030 unless the world moves to a sustainable period of very high oil prices. On Wed, we tweeted [LINK] *"#PeakOilDemand is probably a reality if #Oil is $120. But likely not so if oil is <$100. Italy #Oil consumption in Nov 2022 above pre-Covid. YTD Nov 30/2022 is catching up, but still a little below pre-Covid given $120 oil prices earlier in 2022. Thx @GioSalzanoWire. #OOTT."* Bloomberg reported Italy's consumption in Nov, which is back above pre-Covid levels. To be fair, it was basically there a year ago. But, YTD Nov 30, 2022 is not yet back to pre-Covid YTD Nov 30, 2019. Below is the table we created from the Bloomberg data.

Figure 46: Italy oil consumption

Italy Oil Consumption			
	000's metric tons	million b/d	YoY %
Nov 2022	4,916	1.20	3.1%
Nov 2021	4,770	1.17	13.7%
Nov 2020	4,195	1.02	-12.2%
Nov 2019	4,778	1.17	
YTD Nov 30/22	53,603	1.08	6.3%
YTD Nov 30/21	50,403	1.01	9.8%
YTD Nov 30/20	46,045	0.92	-16.8%
YTD Nov 30/19	55,174	1.11	
Source: Bloomberg code ITOCTOT			

Source: Bloomberg

Figure 47: Truck Tonnage Index

Source: ATA

Oil & Natural Gas – Waiting to see how much was shut down by cold weather

Cold weather impacted most of US

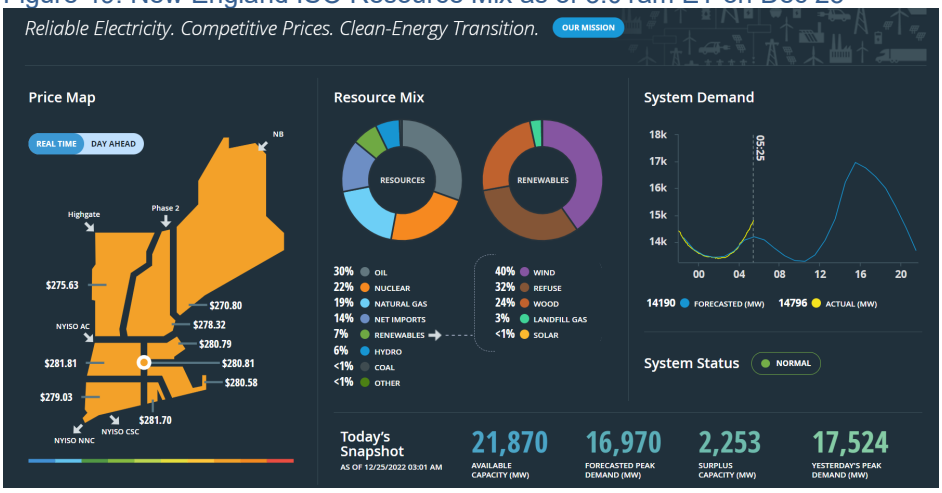
Last week's (Dec 18, 2022) Energy Tidbits memo noted that there will the extreme cold across many oil and gas regions will hit oil and gas production. It's not like hurricanes, when the DOE posts updates on how much production is shut in. Rather, other than North Dakota, it is generally just reports of individual companies and those tend to be reporter comments and not company releases. Earlier in the memo, we noted the reporting that blizzard and cold in North Dakota knocked off more than 300,000 b/d of oil production and will also hit associated natural gas production. And we noted how the cold weather has to impact crude by rail. We don't have any estimate of the impact on Oklahoma, Texas, Louisiana, Appalachian oil and gas, but there will be impacts. We also saw reports of several Gulf Coast refineries being interrupted this week. We may not have any formal or quasi-formal estimates, but wanted to remind that there will be impacts on more than North Dakota.

Energy Transition – Renewable is not all clean, includes burning waste and garbage

Burning wood and waste

One of the energy headlines coming out of the power challenges in New England this weekend is how oil is supplying 30% of the power mix with the criticism on how New England should have made natural gas available to its customers. There was one other overlooked part of the ISO New England power mix [LINK] – how burning wood and garbage are big parts of their clean energy transition. The ISO New England home page is titled *"Reliable Electricity, Competitive Prices, Clean Energy Transition"* and then includes the below resource mix. We downloaded the Resource Mix as of 5:30am MT and the ISO New England resource mix is only as of 3:01am ET, which is means there is no solar in the middle of the night. ISO New England has 7% renewables, but that renewables piece includes 31% refuse and 23% wood. Refuse is their burning of waste and wood is their burning of wood.

Figure 49: New England ISO Resource Mix as of 3:01am ET on Dec 25



Source: New England ISO

Energy Transition – Granholm makes a huge pivot on fossil fuels/energy transition

Granholm's big pivot on fossil fuels

We continue to believe the best prediction for 2023 is the same as we had for 2022 – leaders have to realize that the energy transition aspiration isn't working, the energy transition will take longer, cost more money and be a bumpy/rocky road. It's a set up for energy crisis for many years to come. And it means oil and natural gas will be needed for longer. It's why we are reposting the item from last week's (Dec 18, 2022) Energy Tidbits memo. Here is what we wrote "*We didn't see Biden shoot down a huge Energy Secretary Granholm speech on Wed that has This is a huge speech unless Biden shoots it down as it has major implications for energy for 2020s/2030s because of two apparent major assumption changes to the Biden Energy Transition approach - adding renewables doesn't replace fossil fuels, or only replaces a small portion of fossil fuels, and the energy transition needs fossil fuels for longer if it wants to have energy security, economics security and climate security. Granholm also is rewriting history by her new messaging on how the Biden Administration has a "managed" transition. (i) We had a 4-part tweet [LINK] "WOW! @SecGranholm is latest to come out of closet on the need for a managed #EnergyTransition to have energy, economic, climate security. Fits 👇12/09/21 #2022Predictions tweet. A return to #EnergySecurity = #Oil #NatGas #LNG strong thru 2030. #OOTT 1/4." [LINK] "Major assumption changes for #Oil #NatGas in Biden "managed" transition. @SecGranholm "further ahead, this transition hinges, I think you all agree, on making sure it's done well, making sure we acknowledge that fossil fuel is not going to go away anytime soon" #OOTT 2/4." [LINK] "Renewables don't replace #FossilFuels, rather expand the energy supply pie. @SecGranholm "there is a moment for diversification at hand right now. Our energy security, and when I say diversification I'm talking about expanding and growing the pie on this... " 3/4 #OOTT" [LINK] ""... our energy security, our economic security, our climate security, I think all compel us to meet our needs today but then expand, invest in a widening array of energy sources." See 👇SAF Group transcript 4/4. #OOTT." (ii) We didn't see Biden shoot down this speech or the concepts that point to a major pivot to finally admitting, but not directly saying, the Energy Transition plan wasn't working and that it needs fossil fuels for much longer. (iii) Timing makes sense. Mid-terms*

are over. They and everyone understands the risk for Europe Energy Crisis is even worse in 2023 than in 2022, and the last thing they want to do wait until the 2024 election cycle to make this type of change. And they are doing it without saying it's a change. (iv) Biden has been committed to a "managed" energy transition. This is one of their new messages. What they are doing now is part of the commitment Biden has had to a managed energy transition. Remember, if you say it enough, people will believe it. But this is more than messaging. It gives them some cover to do things they wouldn't do pre-midterms. (v) They admit no agreement with industry on production and refining issues. This is carefully drafted ie. having "productive" conversations on production and refining issues means they speak but don't agree and no clear view they will ever agree. But it sounds like progress. Productive isn't progress to any meeting of the minds. (vi) "Managed" energy transition. Careful drafting. Granholm notes how industry has noted the risk of too fast a transition could have unintended consequences. She then says "This has got to be done in a smart and thoughtful way in partnership". It infers a lot more than she actually says, which is why we think it's test marketing. Now, they wouldn't test market if they weren't leaning this direction. But what we would expect that in the future, it will move from industry has noted the risk to something more like "we" have noted the risk of moving too fast. Regardless, the setup is par of a clear message that the energy transition isn't ready for prime time. (vii) Note she is embracing the what industry has been saying- need energy security for economic security and climate security. (viii) Big concept that they don't say directly but is inferred – fossil fuels don't get replaced by renewables, or only a small portion of fossil fuels. This is a huge shift as most just assume add renewable capacity and eliminate fossil fuel capacity on a 1-for-1 basis. Fossil fuels are needed for longer. It's not so much she says not going to eliminate the use of fossil fuels. Rather she says about how the need is to expand the energy supply pie ie. don't stop what the industry is doing with fossil fuels today, but expand to add renewables. This expanding the pie is a clear messaging this isn't a replacement process, it's an additive process. This is a key concept. Granholm said "That's the now, but further ahead, this transition hinges, I think you all agree, on making sure it's done well, making sure we acknowledge that fossil fuel is not going to go away anytime soon, but that there is a moment for diversification at hand right now. Our energy security, and when I say diversification, I'm talking about expanding and growing the pie on this. our energy security, our economic security, our climate security, I think all compel us to meet our needs today but then expand, invest in a widening array of energy sources. We need this industry to play a lead role developing, deploying these additional resources"(ix) Also a specific shout out on the need for natural gas. This is another big pivot. Our Supplemental Documents package includes the transcript we made of Granholm's comments.

Granholm's huge pivot fits our #1 prediction for 2022

Here is also what we wrote in our Dec 18, 2022 Energy Tidbits. "*Throughout 2022, we have seen political and business leaders step back from their actions that the energy transition plan was working. The beauty is they have the cover to blame it on Russia/Ukraine and, no question, that has had a big impact. But this was happening a year ago. It really started with Macron on the eve of COP26. In 2022, we are seeing leaders not want to directly say it isn't working, but they will craftly draft their messages (as Granholm did this week) that clearly show a huge pivot in their view on the Energy Transition. This fits our #1 prediction for 2022. Our Dec 12, 2021 Energy Tidbits memo was titled "Time for 2022 Predictions: Our #1 is More Leaders Have a*

#MacronMoment & Admit Energy "Transition" Needs Changes". Here is what we wrote a year ago "It's December and so analysts will soon be coming out with 2022 predictions, so we thought we would beat them with one of our main 2022 predictions. On Thursday, we tweeted [LINK] "Time for #2022Predictions. My #1 is more #EnergyTransition #NetZero leaders come out of closet, have a #MacronMoment ie. have "transition" not self inflicted shortage so 2021 energy crisis isn't every year. A return to #EnergySecurity = #Oil #NatGas #LNG strong thru 2030. #OOTT." This should not surprise readers as we have been noting the start of energy transition leaders starting to admit, in a politician's manner, that the energy transition isn't working as per aspirations and energy costs will be a lot higher than aspired. We have said for years that the energy transition will happen, but it will take longer, be bumpy road and cost more than the aspirations. Last week's (Dec 5, 2021) Energy Tidbits wrote on the ADNOC CEO speech There was much more in the speech, which is why we tweeted [LINK] "If more leaders have a "Macron Moment" in 2022, maybe COP28 UAE in 2023 can be catalyst for getting down to work on practical, commercial, sustainable energy solutions: pro climate/pro growth? See SAF Group transcript of @SultanAhmedalj8 #ADIPEC keynote. #EnergyTransition #OOTT." We do wonder if we will see more world leaders accept that the energy transition isn't working according to their aspirations and that there is an increasing risk of a decade of energy crisis like seen in Europe in H2/21 unless the world puts in an achievable energy transition plan." We think COP26 will turn out to be turning point, but a turning point to force energy transition leaders into changing their plan. It why we think we will more of the energy transition leaders come out of the closet and admit this in 2022. But what got us to tweet this week was after seeing Saudi Aramco CEO Nasser speech at the WPC in Houston. Nasser said "There is one more thing that can no longer remain unsaid. A majority of key stakeholders agree with these realities as much as they believe in addressing climate change. We know this, because they say so in private. They should say it publicly too. I understand their dilemma. Publicly admitting that oil and gas will play an essential and significant role, during the transition and beyond, will be hard for some." So our #1 2022 Prediction is that we will see leaders come out of the close and admit, in a politician's way, that the energy transition plan needs to be changed. The key result will be that fossil fuels are needed for way longer and the outlook for oil, natural gas and LNG will be stronger thru 2030 and beyond."

A #MacronMoment can take three forms

Also from our Dec 12, 2021 Energy Tidbits was "*We use the term "Macron Moment" and the #MacronMoment as when an energy transition leaders come to the realization that the energy transition will take longer, be bumpy and cost more ie. it just won't be ready for prime time and they need to change their plans on how quickly they get rid of oil and natural gas. We are already seeing politicians start to publicly have a #MacronMoment but, so far, it has come in three forms of admission as noted below."*

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

Also from our Dec 12, 2021 Energy Tidbits was "*We aren't picking on Macron, but he recently said it the clearest when he warned the energy transition aspiration has to be modified/reduced or else there will be years of an energy crisis. And, even more importantly, he wants to bring a more pragmatic Energy Transition plan to the EU. On Nov 9, we tweeted [LINK] on Macro's address to the nation [LINK] that closed with his call for a more practical approach to the CO2 emissions and one that will include Europe. Macron said "But France will not be strong alone. With the European Union:➔ We will be able to build a credible strategy for reducing our CO2 emissions, compatible with our industrial and technological sovereignty." The Macron release had at the bottom a reminder "Next January, it is a new model of investment and growth that the President will defend with the French presidency of the Council of the European Union." The day before COP26 started, we tweeted [LINK] on Macron's comments to the FT [LINK] that was a clear view on higher fossil fuel prices for the foreseeable future. Macron said "on demand for fossil fuels isn't going away for the foreseeable future. Macron said "What is happening now is ironic, because we are building a system where in the medium and long term fossil energy will cost more and more, that's what we want [to fight climate change]." he said." Japan is another calling for a pragmatic time frame ie a change in the plan."*

Second, Japan says must have a "pragmatic time frame" for decarbonization

Also from our Dec 12, 2021 Energy Tidbits was "*No one should is surprised to see how Japan says their #MacronMoment. They don't say it isn't working, they don't say energy costs are way higher than expected. But they do clearly make the point. They say it important to have a pragmatic time frame for decarbonization. That sounds like Japan-speak for the energy transition aspirations plan isn't working and needs to be changed. On November 9, Japan and the IEA issued a press release and we tweeted [LINK] "Today's Japan "go slow" getting rid of #Oil #NatGas fits Japan's Nov 9 on acceleration of decarbonization that must have "the importance of measures with pragmatic time frame". Japan is having a "Macron Moment". See Nov 9 tweet [LINK] #OOTT." On Nov 9, we tweeted [LINK] on Japan's release [LINK] on its conference with IEA Executive Director Faith Birol. Japan wrote "The two sides also exchanged views on acceleration of decarbonization efforts following COP26, and shared the importance on measures with pragmatic time frame based on individual circumstances that each countries face including its renewable energy potentials". A pragmatic time frame or a go slow process, whatever you want to call it, it means the same thing – Japan doesn't want to get rid of fossil fuels too quickly."*

Third, US doesn't say it isn't working, just higher energy costs for yrs to come

Also from our Dec 12, 2021 Energy Tidbits was how Granholm previously illustrated another way to say the energy transition wasn't working as planned – it was costing a lot more. We then wrote "*US Energy Secretary Granholm has shown the third way of admitting the energy transition plan isn't working. She doesn't say specifically the energy transition plan isn't working or needs to be changed. She just avoids saying that. But she puts on the record that high energy costs are here for years. No one ever heard the Biden sales pitch on accelerating the push to Net Zero and reducing emissions including the warning that this will mean higher energy prices are here for*

years. That wasn't in the sale pitch. Here is what we wrote in our November 14, 2021 Energy Tidbits "Last week's (November 7, 2021) Energy Tidbits noted Biden seemed to also acknowledge a longer life for oil and natural gas. On Oct 31, we tweeted [LINK] "Is #Biden following #Macron & finally realizing demand for #Oil #NatGas is going to be more for 2020s than in his #NetZero aspiration? Oops, cancel #KeystoneXL, do zero to support US oil supply growth, etc. 2020s will be very good for #Oil #NatGas prices & #OPEC+. #OOTT." Biden wasn't as direct as Macron the week before on demand (see our Oct 31, 2021 Energy Tidbits), but seemed to be acknowledging demand for oil isn't going away as fast as he had planned. And, as everyone now knows, supply has been hurt by lack of oil investment so its sets up the tighter oil market for the 2020s. In his closing G20 press conference, Biden said "Well, on the surface, it seems like an irony, but the truth of the matter is — you've all known; everyone knows — that the idea we're going to be able to move to renewable energy overnight and not have — from this moment on, not use oil or not use gas or not use hydrogen is just not rational." Energy Secretary Granholm was on MSNBC Morning Joe on Monday. We tweeted [LINK] on her comments and noted she that US/Can voters weren't warned in the recent elections that the Energy Transition will happen but will lead to higher prices on oil, natural gas and electricity for years to come. We created a transcript of her saying "So the long term strategy is that. and yes we have a short term cost issue because the economy is still coming back on . we have a supply, demand that does not, the supply doesn't meet the demand. that is an issue we are going through. The president is all over this both in the short term and in the long term."

Big redemptions in active Cdn equity funds

Capital Markets – IFIC: Big acceleration in redemptions in Cdn active equity funds

One of the big Cdn equity stories in 2022 continues to play out – the massive net redemptions from active Cdn equity fund manager's balanced and equity mutual funds, which is a huge change from the massive net sales into balanced and equity mutual funds. On Wednesday, we tweeted [LINK] "*WOW! @IFIC balanced & equity mutual funds net sales/redemptions data. YTD 11/30/22 net REDEMPTIONS of $30.4b. YTD 11/30/21 net SALES $98.4b. YoY diff is -$128.8b!! Makes #Oil #NatGas stocks big outperformance vs TSX and oil prices even more impressive. #OOTT.*" On Tuesday the IFIC (Investment Funds Institute of Canada) reported [LINK] mutual funds and ETF sales for Nov. IFIC reported net redemptions for mutual funds balanced funds were $5.07b (vs $5.66b in Oct and $4.99b in Sept) and YTD Nov 30 of $25.030b. IFIC reported net redemptions for mutual funds equity funds were $3.01b in Nov (vs $1.89b in Oct and $2.89b in Sept) and YTD Nov 30 of $5.40b. The change vs 2021 is huge. YTD Nov 30, net redemptions in balanced funds and equity funds was $30.4b, which is a YoY crashing of $128.8b vs YTD Nov 30, 2021 that saw net sales in balanced funds and equity funds of $98.4b. Our Supplemental Documents package includes the IFIC release.

Figure 50: Cdn mutual fund net sales/net redemptions ($ millions)

to October 2022. ETFs recorded net sales of $4.2 billion in November 2022.

Mutual Fund Net Sales/Net Redemptions ($ Millions)*

Asset Class	Nov. 2022	Oct. 2022	Nov. 2021	YTD 2022	YTD 2021
Long-term Funds					
Balanced	(5,066)	(5,660)	4,402	(25,030)	61,718
Equity	(3,014)	(1,967)	2,523	(5,400)	36,640
Bond	(1,104)	(1,662)	655	(11,536)	15,806
Specialty	(17)	(2)	418	1,196	5,595
Total Long-term Funds	(9,201)	(9,291)	7,998	(40,770)	119,759
Total Money Market Funds	551	1,189	(503)	5,384	(7,600)
Total	(8,650)	(8,102)	7,495	(35,387)	112,159

Source: IFIC

Capital Markets – USDA consumer price index for food +10.6% YoY in November

USDA consumer price index for food

The USDA's official food price data keeps going up, but we continue to believe it is nowhere as much as what Americans feel when they go to the grocery stores in the US. This feels like what we heard in summer 2021 about inflation being transitory, the real food price increases that people pay at the grocery store are way higher than the consumer price index for food. The USDA posted its consumer price index for food data for November on Thursday [LINK], which is +0.2% MoM and +10.6% YoY, compared to September at +10.9%; while it is up over 10%, it still seems very low. Whenever we ask US friends what they think their grocery bills have increased YoY, we have never heard anyone say something like 11% YoY. Rather, most tend to think up at least 20%. The +10.6% YoY is for the overall food price index, which has a relative weighting for the various food categories. Some of the YoY % increases that just don't sound anywhere near reality are fats/oils +21.8% YoY, poultry +13.1% YoY, fresh fruits & vegetables +9.7% YoY, and eggs +49.1% YoY. We wonder what their forecasts are used for as they forecast overall food price escalation of 3.5% to 4.5% for 2023.

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

@Energy_Tidbits on Twitter

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

LinkedIn – Look for quick energy items from me on LinkedIn

Look for energy items on LinkedIn

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

Misc Facts and Figures.

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

Steelers Franco Harris passes away before Immaculate Reception anniversary

Pittsburgh Steeler Hall of Famer Franco Harris passed away on Dec 20 at the age of 72. And prior to his passing, one of the big NFL Network big stories was that Dec 23, 2022 was the 50th anniversary of the most famous NFL play of all time – the Immaculate Reception. It was 50 years ago that Franco Harris made the Immaculate Reception on the last play of the game to give the Steelers a 13-7 win over the Raiders in an AFC divisional playoff game. There weren't as many cameras covering the game 50 years ago and without the high def camera. So there has always been a debate if Harris caught the ball before it hit the turf, or just after. The other reminder from this timing is that this was divisional playoff weekend, AFC/NFC championships on Dec 31, and then the Super Bowl two weeks later on Jan 14. Whereas today is week 16 with 17 and 18 to come, and the Super Bowl not until Feb 12, 2023. For those that have never seen this classic play, here is the [LINK].

Figure 51: Franco Harris, The Immaculate Reception Dec 23, 1972

Source: NFL

Kudos to Lions Head Coach Dan Campbell

Detroit Lions won again yesterday to improve to 8-7, after winning 6 of their last 7 games. And they control their playoff destiny. And there is Head Coach Dan Campbell has been moving up in the running for coach of the year. But the reason we mention Campbell is that we saw a great ESPN report "*Six stories that explain Lions coach Dan Campbell*" [LINK] that explain more about him and not his coaching. One of the stories was on Detroit Lions linebacker coach Kelvin Sheppard. Campbell's comments remind me of what I have seen over my career in what top leaders do in building lasting top franchises. Leaders are great coaches and communicate, and focus on the important things that drive top performance and not the trivial things If they are building franchises and not teams that have great moments or bursts that aren't sustained so they only have a few good games or one

fluke season. The Campbell story is about Sheppard who was conscious of his hair given "*he realized not many Black coaches were rocking tattoos and dreadlocks, like was, across the league. Sheppard thought he had to change his look to be accepted."* ESPN concluded "*I felt like it was important to say, 'Man, if you want to look that way, you should look that way,' because ultimately, especially in our business, you know what matters? It's the way you coach. It's the way you coach and the way you communicate," Campbell said, lightly beating his hands on the table for emphasis. "Not the way your freakin' hair looks. And so, that's why it was important to me because if we're going to get hung up on the way somebody looks, we've got issues."* Kudos to Coach Campbell for focusing on the traits on what makes a good coach and not his appearance. Our Supplemental Documents package includes the ESPN report.