Energy Tidbits

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Negative Tone to US NatGas Prices Thru Yr-end **If** Forecasts Are Right for Much Warmer Than Normal December

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 and not just a specific company results. Our target is to write on 48 to 50 weekends per year and to post by noon mountain time on Sunday.

This week's memo highlights:

1. Russia Deputy Energy Minister "*the quality of oil produced in Russia will deteriorate in 10 years to such an extent that almost all of it will pass into the category of hard-to-recover*" (Click Here)

2. US and Iran hold to their JCPOA positions so a no return to JCPOA outcome starts to gain momentum (Click Here)

3. Looking like a negative tone to US natural gas prices thru year-end **if** forecasts are right for a much warmer than normal Dec (Click Here)

4. Trans Mountain expects to restart today at some undisclosed partial capacity (Click Here)

5. Japan's strategic energy plan "*no compromise is acceptable to ensure energy security, and it is the obligation of a nation to continue securing necessary resources*" (Click Here)

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

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

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Table of Contents

Natural Gas – Natural gas draw of 59 bcf, storage now -375 bcf YoY deficit

US natural gas storage is starting winter 210 bcf lower YoY. The EIA reported a 59 bcf draw (vs 57 bcf draw expectations) for the Nov 26 week, which was below the 5-yr average draw of 44 bcf, and below last year's draw of 1 bcf. Storage is 3.564 tcf as of Nov 26, increasing the YoY deficit to -375 bcf, from 320 bcf last week and storage is 58 bcf below the 5-year average vs 58 bcf below last week. The EIA STEO estimates Nov 30/21 storage at 3,547.1 bcf, which is 385 bcf lower YoY vs 3,932 bcf at Nov/20. Below is the EIA's storage table from its Weekly Natural Gas Storage Report [LINK].

YoY storage at -375 bcf YoY deficit

Figure 1: US Natural Gas Storage

	Stocks billion cubic feet (Bcf)				Historical Comparisons: Year ago (11/26/20)		5-year average (2016-20)	
Region	11/26/21	11/19/21	net change	implied flow	Bcf	% change	Bcf	% change
East	867	889	-22	-22	934	-7.2	875	-0.9
Midwest	1,043	1,066	-23	-23	1,124	-7.2	1,058	-1.4
Mountain	206	210	-4	-4	240	-14.2	218	-5.5
Pacific	263	262	1	1	318	-17.3	300	-12.3
South Central	1,185	1,197	-12	-12	1,324	-10.5	1,198	-1.1
Salt	335	338	-3	-3	366	-8.5	338	-0.9
Nonsalt	851	859	-8	-8	958	-11.2	860	-1.0
Total	3,564	3,623	-59	-59	3,939	-9.5	3,650	-2.4

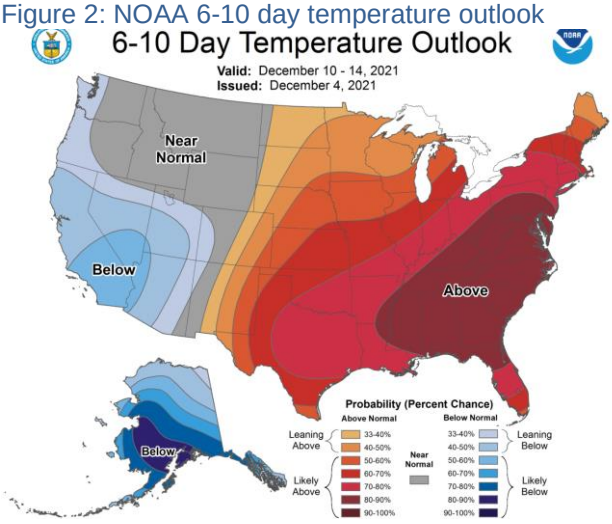
Source: EIA

Natural Gas – Continued near term negative to HH with warm Dec temp forecast

It is looking like a set up for US natural gas prices to stay low thru year end **if** near term weather forecasts hold. Earlier this morning, we Its been a bad last week for HH gas prices and the tone should stay to the negative with the continued forecasts for December to be much warmer than normal. Below are NOAA's most recent (yesterday) 6-10 day [LINK] and 8-14 day [LINK] temperature probability forecast maps..

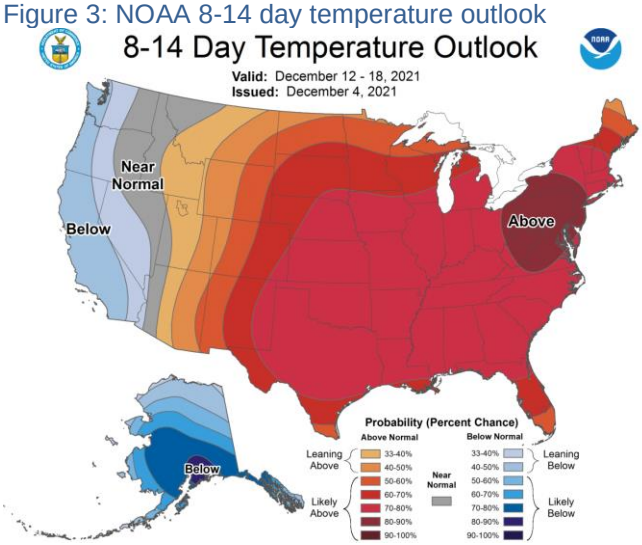
Warm December temperature forecast

Figure 2: NOAA 6-10 day temperature outlook



Source: NOAA

Figure 3: NOAA 8-14 day temperature outlook



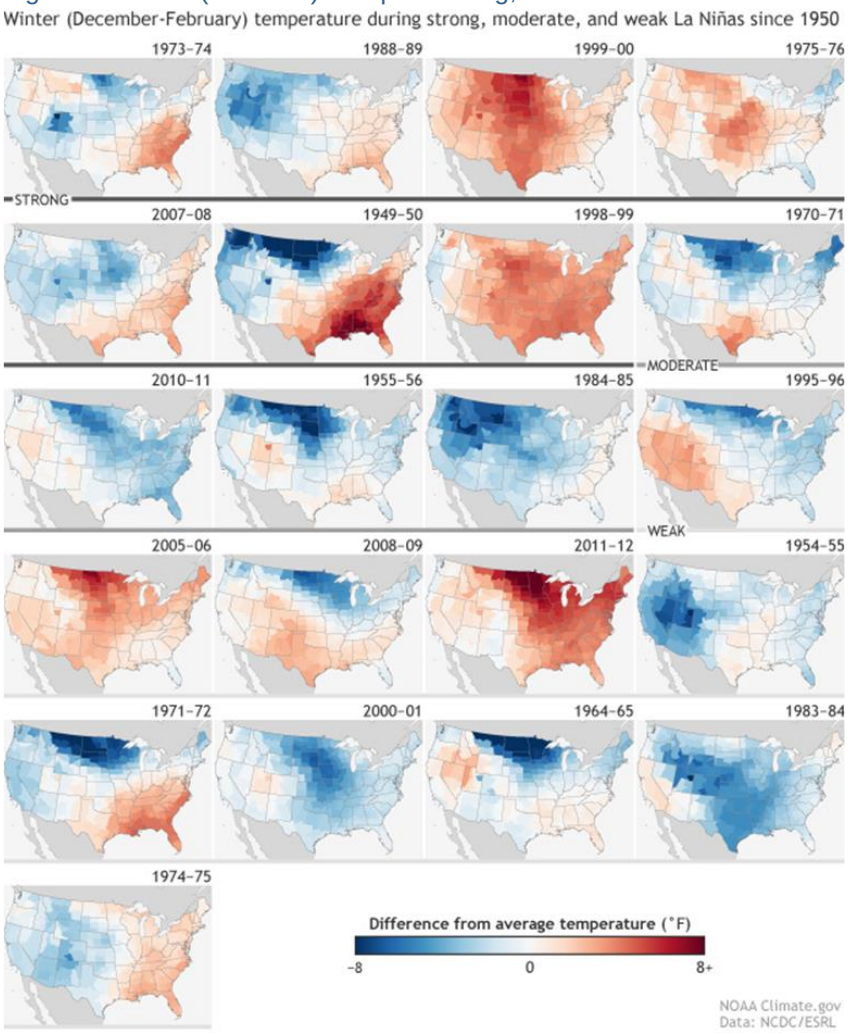
Source: NOAA

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

La Nina winters are unpredictable

Its been a brutal last week for US natural gas prices. On Wednesday, we tweeted [LINK] "*No one can miss the #NatGas HH price crash this week with @NOAA forecasts for a warm Dec. Also reminds that not all #LaNina winters are cold. #OOTT".* The vast majority of pre winter forecasts worked from it being a La Nina winter and that was more likely to be colder than normal. Every month, we include our reminder that La Nina winters may be more often normal to colder than normal than a warmer winter. But we always remind of a Oct 6, 2017 NOAA brief *"Temperature patterns during every La Niña winter since 1950"*, which looked at all La Nina winters from 1950 thru 2016/17, classified them as strong, moderate or weak La Ninas, and then showed the average winter (Dec thru Feb) temperature map. We checked this weekend and the link still works [LINK]. The bottom line is that it may slightly favor a normal to colder than normal winter, but there have some been near record high temperature La Nina winters. Below is the NOAA graphic.

Figure 4: Winter (Dec-Feb) Temp in Strong, Moderate And Weak La Ninas 1950 - 2017



Source: CPC

Natural Gas – US Sept gas production down 0.6 bcf/d MoM, +4.4 bcf/d YoY

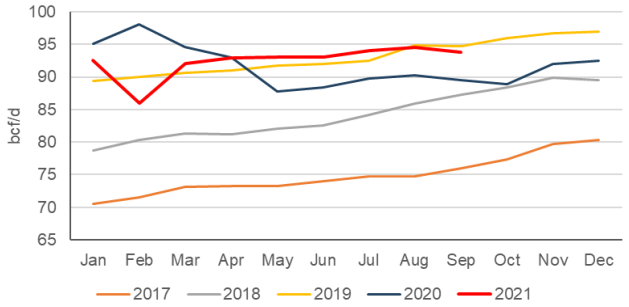
EIA released its Natural Gas Monthly on Tuesday, [LINK], which includes its estimates for "actuals" for September gas production. US gas production in September was 93.8 bcf/d, down slightly MoM from August of 94.4 bcf/d and up 4.4 bcf/d YoY. Note that August's data was revised downwards by 0.7 bcf/d. July (+0.2 bcf/d) also had a revision. As expected, Hurricane Ida's landfall led to a temporary halt in production. There continues to be a YoY surplus of +4.4 bcf/d and +4.2 bc/f for the month of September and August, respectively. September production is down 1.961 bcf/d since the Dec/19 peak of 97 bcf/d and still 0.8 bcf/d below March 2020 of 94.6 bcf. Our Supplemental Documents package includes excerpts from the EIA Natural Gas Monthly.

Figure 5: US Dry Natural Gas Production

bcf/d	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Jan	56.0	60.0	66.0	65.3	66.8	73.4	73.6	70.6	78.7	89.4	95.1	92.8
Feb	57.2	58.8	67.0	65.4	68.4	73.8	77.3	71.5	80.4	90.0	98.1	86.3
March	57.3	61.5	65.0	65.3	68.9	74.1	73.8	73.2	81.3	90.6	94.6	92.3
Apr	57.6	62.3	64.8	66.1	70.5	75.2	73.7	73.3	81.2	91.0	92.9	93.3
May	58.0	62.4	65.0	65.9	70.2	74.1	72.9	73.3	82.1	91.7	87.8	93.1
June	57.2	62.1	64.6	65.8	70.5	74.0	72.2	74.0	82.5	92.0	88.4	93.3
July	58.2	62.5	66.3	67.1	72.0	74.2	72.8	74.7	84.2	92.5	89.8	93.8
Aug	58.9	63.2	66.0	66.9	72.4	74.3	72.2	74.7	85.9	94.8	90.2	94.4
Sept	59.1	63.1	66.4	66.8	72.4	74.7	71.7	76.0	87.3	94.7	89.5	93.8
Oct	60.1	65.1	66.5	67.0	73.1	74.2	71.4	77.3	88.4	96.0	88.9	
Nov	60.1	65.9	66.6	67.7	72.6	73.9	72.0	79.8	89.9	96.7	92.0	
Dec	61.0	65.6	66.0	66.5	73.2	73.9	71.2	80.4	89.5	97.0	92.5	
Average	58.4	62.7	65.9	66.3	70.9	74.2	72.9	74.9	84.3	93.0	91.6	

Source: EIA

Figure 6: US Dry Natural Gas Production



Source: EIA

Natural Gas – US LNG exports down marginally MoM at 9.5 bcf/d in September

US September LNG exports -0.1 bcf/d MoM

The big driver to stronger US natural gas prices has been the ramp up in US LNG exports, which are up ~7 bcf/d over he past 3 years. This is over 2.5 tcf a year of added gas demand. On Tuesday, the EIA Natural Gas Monthly reported "actuals" for US LNG exports were 9.5 bcf/d in September, which is up +4.5 bcf/d YoY and down -0.1 bcf/d from August of 9.6 bcf/d. After recording record highs in the first half of 2021, exports decreased in September as production has also declined up slightly. The EIA expects exports will remain "at high levels" for the remaining months of 2021. Note our table rounds to one decimal and the actual is 9.493 bcf/d for September. Below is our table of EIA's monthly LNG exports.

Figure 7: US LNG Exports (bcf/d)

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

Source: EIA

Natural Gas – US pipeline exports to Mexico -0.29 bcf/d MoM to 5.9 bcf/d in September

US September pipeline exports to Mexico -0.29 bcf/d MoM

The EIA Natural Gas Monthly also provides its "actuals" for gas pipeline exports to Mexico, which were 5.9 bcf/d in September, which was -0.1 bcd/f YoY and decreasing from last month +0.29 bcf/d from August of 6.2 bcf/d. Mexico natural gas production remains stuck below 5 bcf/d and the completion of new pipeline infrastructure such as the Wahalajara system [LINK] increases US penetration further into Mexico. Below is our table of the EIA's monthly gas exports to Mexico.

Figure 8: US Pipeline Gas Exports To Mexico (bcf/d)

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

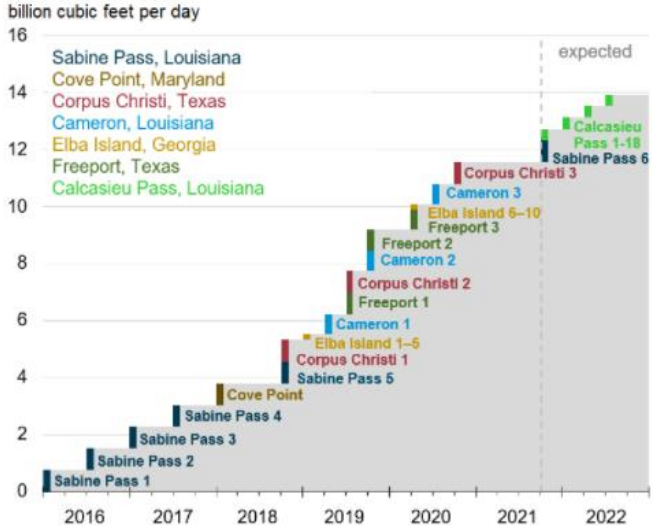
Source: EIA

Natural Gas – US to have greatest LNG export capacity by 2022

US to be #1 exporter of LNG in 2022

We have been highlighting the significance of the start up of Sabine Pass LNG Train 6 and the Calcasieu Pass LNG as critical items for strength to 2022 HH gas prices as these two projects will add >700 bcf draw on US natural gas supply to export markets. This is incremental demand to in 2022. These two projects were the feature of the EIA's analysis this week. On Thursday, the EIA released their Natural gas Weekly update [LINK], which highlighted the completion of US export facilities that will expand US LNG export capacity to be the largest in the world in 2022. Since LNG exports began in 2016, the US has expanded to become the third largest exporter of LNG, behind Australia and Qatar. With the completion of new LNG trains at Sabine Pass and LNG and Calcasieu Pass LNG scheduled for 2022, the US will move to be the largest exporter in the world. The completion of the Sabine Pass LNG Train 6 will add 0.76 bcf/d of peak capacity, with the first cargoes from this facility expected to begin before the end of the year. The optimization of both the Sabine Pass LNG and Corpus Christi LNG terminals will lead to an average LNG production of 261 bcf combined from the two facilities. The new export facility at the Calcasieu Pass in Louisiana consists of 9 blocks with a total of 18 liquefication units for a combined capacity of 1.6 bcf/d. All units are expected to be operational by the fall of 2022 with first LNG production beginning before the conclusion of 2021. The EIA wrote," *We estimate that as of November 2021, existing U.S. LNG nominal baseload liquefaction capacity was 9.5 Bcf/d and peak capacity was 11.6 Bcf/d (which includes uprates to LNG production capacity at Sabine Pass and Corpus Christi). By the end of 2022, U.S. nominal capacity will increase to 11.4 Bcf/d and peak capacity to 13.9 Bcf/d across 7 LNG export facilities and 44 liquefaction trains, including 16 full-scale, 18 mid-scale, and 10 small-scale trains at Sabine Pass, Cove Point, Corpus Christi, Cameron, Elba Island, Freeport, and Calcasieu Pass."* The Golden Pass LNG facility is expected to be completed by 2024 and will bring the US total LNG export capacity to 16.3 bcf/d. In addition, FERC has approved 10 US LNG export projects and capacity expansions at 3 existing LNG terminals that will total an additional 25 bcf/d of capacity. Below is a chart of US export LNG capacity by project. Our Supplemental Documents package includes the EIA report.

Figure 9: US LNG Export Capacity by Project



Source: EIA

Natural Gas – Cheniere's new long term 11-yr LNG sales deal with Engie (France)

Cheniere 11-yr deal with Engie

We wouldn't have seen this item if we hadn't been on Le Monde looking for more on Macron's comments on the JCPOA. On Friday, Le Monde reported "*Energy: Engie's discreet gas agreement in the United States. The former GDF Suez has entered into a contract to import liquefied natural gas with the company Cheniere Energy extending until 2032, without first informing the government*." [LINK] We missed this and checked Cheniere's website on Friday and there was no mention of this deal. Note that this deal was supposedly agreed to in June. However, on November 11, Platts reported [LINK] "*Cheniere to supply LNG from Texas export facility under new deal with France's Engie. Previously undisclosed 11-year agreement signed in June. Up to 1.2 million mt/year to be delivered FOB: US DOE letter. Cheniere Energy reached a medium-term supply deal over the summer with French utility Engie tied to the US LNG exporter's Corpus Christi Liquefaction terminal in Texas, according to a recently released letter to the US Department of Energy that was previously filed under seal."* Our Supplemental Documents package include the Platts November 11 report.

Asian (and Europe) LNG buyers abruptly changed to lock up long term LNG

Long term LNG deals are a great validation to the buyer concern on LNG supply thru 2030 and also critical for independent LNG suppliers like Cheniere to go FID on LNG supply projects. On July 14, we posted our 8-pg blog "*Asian LNG Buyers Abruptly Change and Lock in Long Term Supply – Validates Supply Gap, Provides Support For Brownfield LNG FIDs*.' Our blog only said "Asian" LNG buyers because Cheniere and Engie had not released this deal. The overview paragraph for the July 14 blog was "*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 July 14 blog.

Natural Gas – Cheniere expects next FID (Corpus Christi 3) by mid 2022

Cheniere FID CC 3 by mid 2022

We couldn't find any Bloomberg video clip of their interview with Cheniere Chief Commercial Officer Anatol Feygin on Thurs. Unfortunately, there was only a brief report on the interview. No one should be surprised Feygin highlighted the strong set up for LNG markets for the 2020s, which sets up Cheniere's expected FID of its Corpus Christi Stage 3 by mid-2022. Note this expectation is in line with Cheniere's prior comments. Bloomberg wrote "*Cheniere expects to make final investment decision on the Corpus Christi Stage 3 project by mid-2022 or earlier, Chief Commercial Officer Anatol Feygin said in an interview on the sidelines of the World LNG Summit in Rome. * Following recent deals, the project still needs to sell 1-2m tons/year of LNG before FID can be reached * Prices and market volatility have improved dealmaking for long-term contracts * "What's played out in the market, and specifically with the recent Cheniere successes and our counterparties, we have moved faster than we expected six months ago".* Our Supplemental Documents package includes the Bloomberg report.

Cheniere CEO sees LNG supply/demand imbalance happening now

On November 10, Cheniere CEO Jack Fusco was on CNBC Worldwide Exchange and commented on the sudden LNG demand increase in Asia [LINK]. When we saw the interview, we tweeted [LINK] *"#LNGSupplyGap. Originally thought the LNG supply/demand imbalance would be in 2023 but its happening now says @Cheniere CEO Fusco to @SullyCNBC a few minutes ago. Not the exact quote but close enough. #OOTT #NatGas".* We didn't have our PVR on so had to wait until CNBC posted the clip and then were able to create the below transcript of Fusco's key comments. But CNBC's Brian Sullivan asked if he had ever scene a period with demand this strong, Fusco commented, *"No, this is the first time we've seen this type of demand pull, which is why prices in Asia and in Europe are 300% more than they were a year before. So we, we always knew that the energy transition was going to be a long road. That it was going to take everything to make it happen. It's going to take natural gas, wind, solar, eventually hydrogen or some other technology that we just don't even know about, yet. So we were expecting demand growth in liquefied natural gas. Our estimates were that we would see this type of supply and demand imbalance sometime in 2023, and its actually happened now, I think a lot of that is just pure economic recovery, some weather, and maybe not so good planning by*

some of the countries for what their energy needs were going to be." Governments around the world have underestimated the crucial role of natural gas in the transition to net zero. Fusco noted at the end of the interview, particularly in Asia, countries have switched back to coal to produce electricity, further setting back the transition to net zero and delaying the development of the natural gas infrastructure necessary for the energy transition.

Natural Gas –McDermott press released its Net Zero LNG Construction study for Shell

McDermott's Net Zero LNG construction study for Shell

We probably wouldn't have given second thought to the McDermott Monday press release [LINK] "*McDermott Completes Net Zero LNG Construction Study for Shell*" if we hadn't just posted our 11-pg Nov 23 blog "*LNG Supply FIDs Starting to Happen, Does Shell Need to Get LNG Canada Phase 2 FID in the Queue To Protect Its Brownfield Advantages?"* McDermott wrote "*McDermott recently completed a liquefied natural gas (LNG) construction study identifying tangible reduction pathways toward net-zero construction emissions on behalf of Shell Global Solutions International B.V*." However, we just can't help wonder if it is linked to a potential near term move for Shell to look at FID on LNG Canada Phase 2 of ~1.8 bcf/d capacity. Our blog noted that the LNG market is there and we think they have to do it soon if they want to get in the queue for the global supply chain and to have what we call a continuous construction cycle to retain services and try to minimize brownfield costs. And we also look for signaling of upcoming action. Our blog noted the Shell CEO showcasing LNG Canada when he didn't have to do so. Maybe the McDermott release is a coincidence or maybe just perfect timing if Shell wants to be moving on a FID soon? Recall a week ago, there was a press release on how Woodfibre awarded an EPFC contract to McDermott. We went thru the McDermott press releases for the past two years and McDermott tends to press release when they win some work so we wanted to see when they were awarded this Net Zero LNG contract. We didn't see any press release saying they won this Shell assignment. There was a different McDermott release on Shell but not linked to this Net Zero LNG study. It doesn't make sense that this assignment wasn't significant to press release when they were hired by Shell to do this study, but it is significant enough to do a press release on completions. Hmmm. Lastly, it was interesting to see McDermott say they "recently" completed this study for Shell. If this was a press release they needed to do for materiality or consistency of disclosure, why did they wait for some period and now decide to put out that they "recently" did this? It just seems like inconsistent disclosure. Maybe it is a coincidence, but it just feels like a press release McDermott wanted to get out for some reason. Our Supplemental Documents package includes the McDermott release.

Does LNG Canada need to get Phase 2 FID in the queue?

On November 23, we posted our new 11-pg blog "*LNG Supply FIDs Starting to Happen, Does Shell Need to Get LNG Canada Phase 2 FID in the Queue To Protect Its Brownfield Advantages?* Here is the intro paragraph on the blog. "*Asian LNG buyers and now LNG suppliers are responding to the abrupt change in LNG supply/demand outlook in April. Unplanned delays to the start up of 5.0 bcf/d of Mozambique LNG put a major hole in all LNG supply plans/forecasts for the 2020s creating a new and larger LNG supply gap. This first drove Asian LNG buyers to abruptly pivot to lock in stable long term LNG supply and now, LNG suppliers are taking FIDs (ie. Woodside on Scarborough yesterday) and looking at the next round of potential FIDs on both brownfield and greenfield LNG projects to fill that gap. This increase is happening at a time of increasing competition/demand for global fabricators, metals, and services that are also being impacted by the general global supply chain stresses. There has been no chatter that Shell will be considering FID on the brownfield LNG Canada Phase 2 (capacity 1.8 bf/d). But, unfortunately for*

LNG Canada Phase 2 or any major industrial project, these global/domestic stresses reduce the time to think about any FID. We think this means the timing is likely in the next few months for Shell to look at FID on LNG Canada Phase 2 if it wants to get in the queue to ensure it can maintain its brownfield cost advantages. LNG markets have seen the cost and timing advantages of a continuous construction cycle ie. like Cheniere does at Sabine Pass LNG. By now, we mean within the next few months, and not the next year. Any FID is a major undertaking and far from certain especially for a leader in the Energy Transition like Shell. But, we think the answer to the question is more likely a Yes, than a No. And if so, it would be huge for the value of Canadian natural gas." Our Supplemental Documents package includes the 11-pg blog.

Seems like Shell CEO has been showcasing LNG Canada. Hmmm!

Our blog introductory paragraph posted above did not include a section from our blog on Shell CEO van Beurden's comments in October. Shell has given no formal indications of looking at FID, but it feels like Shell's CEO has been showcasing LNG Canada for some reason. Phase 1 at 1.8 bcf/d is a big LNG project but it seemed like van Beurden's showcasing of LNG Canada was disproportionate if it was only going to be Phase 1. Hmmm! One example was in the Q&A of the Q3 call Oct 29, van Beurden is asked if putting the emissions targets out there has any implications to grow the LNG business or does that imply a shift from equity volumes to be an offtaker for LNG. Van Beurden replied "*But on your other point, the LNG plants, yes, indeed, I do have a -- and sort of quantum of automations. And of course, the ones we operate, which are quite a few actually come onto our account. So we've been very clear that if we want to build new LNG plants, that better come with very competitive carbon footprints on the operational side. And we have to find ways to offset this and offset not with nature based solutions, but offset it with savings elsewhere. So I've been very clear with our organization. If we are to do another energy brands, say for instance in Canada, it needs to come either without emissions or you need to find a way to reduce emissions elsewhere, because we are on a trajectory to bring down our emissions to net zero by 2050*". We don't think van Beurden had to include his "for instance in Canada" in his response. It just seemed to be another example of van Buerden showcasing LNG Canada as a place for future growth in equity LNG volumes.

An LNG Canada Phase 2 FID would be huge to Cdn natural gas valuations

We spoke to a number of Cdn natural gas producers and investors on our blog and the one thing everyone agrees on is that an LNG Canada Phase 2 FID would be very big to Cdn natural gas. Here is what we put in our blog. "*An LNG Canada Phase 2 would be a huge plus to Cdn natural gas. LNG Canada Phase 1 is a material natural gas development as its 1.8 bcf/d capacity represents approx. 20 to 25% of Cdn gas export volumes to the US. The EIA data showed US pipeline imports of Cdn natural gas as 6.83 bcf/d in 2020, 7.36 bcf/d in 2019, 7.70 bcf/d in 2018, 8.89 bcf/d in 2017, 7.97 bcf/d in 2016, 7.19 bcf/d in 2015 and 7.22 bcf/d in 2014. An LNG Canada Phase 2 FID would be a huge plus for Cdn natural gas. It would allow another ~1.8 bcf/d of Cdn natural gas to be priced against pricing points other than Henry Hub. It would provide demand offset versus Trudeau if he moves to make electricity "emissions free" and not his prior "net zero emissions". Both Asian LNG buyers and LNG suppliers are making big capital commitments to secure long term LNG supply. The LNG outlook has changed and COP26 did not disrupt this outlook. An FID for LNG Canada Phase 2 would provide big support to Cdn natural gas for the back half*

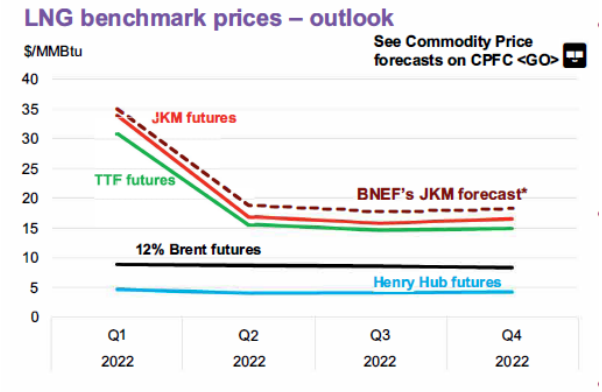
of the 2020s. And perhaps if LNG Canada is exporting 3.6 bcf/d to Asia from two phases, it could help flip Cdn natural gas to a premium vs US natural gas especially if Biden is successful in reducing US domestic natural gas consumption for electricity. We think the next few months are likely the right time for Shell to look at FID for LNG sCanada Phase 2 as, in a world of increasing supply chain shortfalls, they need to make sure they can commit to fabricators, services and trades for a continuous construction cycle to maintain brownfield costs and time to completion ie. a Cheniere type advantage. Who knows what Shell will decide, CEO van Buerden's recent showcasing of LNG Canada reminds us what happened in 2018 ahead of the LNG Canada Phase 1 FID. Just imagine the future value of Cdn natural gas if there is visibility for 3.6 bcf/d of Western Canada natural gas to be exported to Asia."

Natural Gas – BloombergNEF forecasts JKM $35 in Q1, $18.90 in Q2

BloombergNEF Global LNG Monthly

On Friday, BloombergNEF posted its Global LNG Monthly, which was subtitled "*Supply crunch fears for peak winter*". The report is really a recap of LNG markets in November and a look at December. However, BloombergNEF built in its work from Europe Gas Monthly on its gas storage forecast that "*winter-end gas storage reaching dangerously low levels on supply crunch*". For China, BloombergNEF sees "*China gas balance: gas balance may be more pronounced in January".* For Japan, BloombergNEF says "*Japan LNG demand: Coal outages and delays in nuclear restart put pressure on existing LNG supply".* BloombergNEF wrote this before this week's Chevron Gorgon LNG and Shell Prelude FLNG unplanned interruptions, but wrote "*Global LNG supply: Indonesia and Brunei further tighten Southeast Asian supply."* The one full year forecast item is LNG prices and BloombergNEF forecasts JKM prices about $2 higher than the JKM futures. Note BloombergNEF said they will not be posting a Global LNG Monthly in January. Our Supplemental Documents package includes excerpts from the BloombergNEF Global LNG Monthly.

Figure 10: BloombergNEF JKM price forecast vs futures and TTF



$/MMBtu	BNEF JKM forecast	JKM futures	TTF	12% Brent
1Q 2022	35.0	33.9	30.8	8.9
2Q 2022	18.9	16.9	15.6	8.7
3Q 2022	17.8	15.8	14.6	8.6
4Q 2022	18.2	16.5	14.9	8.4

*Source: BloombergNEF, Bloomberg Terminal, NYMEX, ICE. Note: *See forecast methodology in the Appendix.* ***Futures curves are as of Nov. 29, 2021.***

Source: BloombergNEF

Natural Gas – Chevron Gorgon LNG Train 3, Shell Prelude FLNG unplanned shutdown

More unplanned Australia LNG shut downs

These aren't expected to be material or long lasting LNG supply interruptions, but the there were two unplanned LNG supply interruptions in offshore Northwest Australia. (i) Chevron Gorgon LNG Train 3 with capacity of 0.7 bcf/d. Last week's (Nov 28, 2021) Energy Tidbits memo noted the restart of Gorgon LNG Train 1 following an unplanned interruption of approx. 1 week. Train 1 had been been temporarily shut down production after finding a small leak on piping associated with the facilities dehydration unit. Chevron commented *"Production at Gorgon LNG Train 1 has resumed following the completion of repair work on piping associated with the dehydration unit. "Chevron worked systematically to safely address the issues and maintain natural gas to our customers and the Western Australian domestic market."* Chevron has also noted that an investigation is underway to determine the cause of the leak. On Thursday, Platts reported [LINK] *"Following the successful repair and restart of Gorgon LNG Train 1, we have commenced the controlled shutdown of LNG Train 3 to undertake repairs on piping associated with the dehydration unit," the spokesperson said in the statement. The work is being guided by information gathered during the repair and restart of Train 1, a source said. The impacted unit removes water from the gas stream as part of the LNG conversion process."* (ii) Shell Prelude FLNG with capacity of 0.5 bcf/d. On Friday, Argus reported [LINK] "*Shell has suspended production at the 3.6mn t/yr Prelude floating LNG offshore Western Australia after a fire broke out at the facility on 2 December. Smoke detected in an electrical utility area triggered the automatic fire detection and management systems on board the Prelude facility in the Browse basin at around 11pm Australian Western Standard Time (03:00 GMT) on 2 December, a Shell spokesperson told Argus. "The incident resulted in the loss of main power and the facility is currently operating on back-up diesel generators," the spokesperson said. "While work is underway to restore main power, production on Prelude has been suspended temporarily." The spokesperson did not comment on the estimated downtime of the project."* Earlier this morning, we retweeted [LINK] reports from Bloomberg and the Western Australian [LINK] that point to the shutdown not being resolved for a week or more or at least until Shell has both primary and reliable backup power in place. The Western Australian reported "*Shell is using helicopters and ships to evacuate about 150 crew from its giant Prelude floating LNG vessel 475 kilometres from Broome due to continued power failures since a fire on Thursday night. Workers have been left without communication to home and intermittent lighting, plumbing and air conditioning after first the main steam power generation system tripped and then backup diesel generators proved unreliable after a shutdown in response to the fire*." We don't often hear about backup diesel generators not being reliable. We wouldn't expect to see Shell restart until it has both primary power and some reliable backup power source. We have to believe Shell's basic safety procedures require both primary and backup power. Our Supplemental Documents package includes the Platts Gorgon report and the Argus Prelude report.

Unplanned LNG supply interruptions have helped make this tight LNG market

On Nov 23, we posted an 11-pg blog "*LNG Supply FIDs Starting to Happen, Does Shell Need to Get LNG Canada Phase 2 FID in the Queue To Protect Its Brownfield Advantages?*" that reminded how unplanned LNG supply interruptions from in-service LNG supply projects have helped created the current tight LNG market. And the problem is that, unlike oil, there aren't strategic LNG reserves to draw upon in the event of a supply interruption. Our blog noted a few examples of unplanned supply interruptions. (i) Equinor's Melkoeya 0.63 bcf/d in Norway was shut down for 18 months due to a fire. A massive fire led to the Sept 28, 2020 shutdown of the 0.63 bcf/d Melkoeya LNG facility in Norway. The original restart date was Oct 1, 2021 but that was revised to March 31, 2022 with the caveat "there is still uncertainty related to how the Covid-19 development will impact the project progress." (ii) Algeria's 0.5

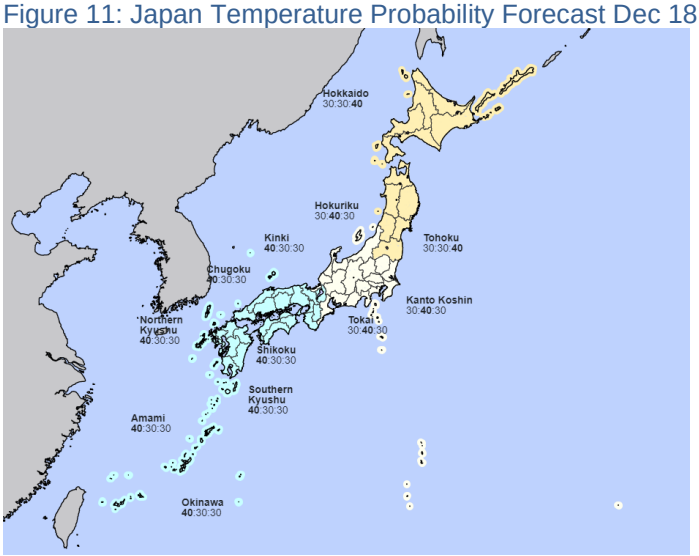
bcf/d Skikda LNG Plant had an unplanned 8-week shut down due to failure of gas turbine control mechanism. Skikda also had an unplanned 6-mnth shut down in 2020. (iii) Petronas Bintulu LNG in Malaysia, there have been multiple reports that Petronas has been seeking approval for the cancellation of some winter cargoes due to upstream natural gas quality issues. (iv) Chevron Gorgon LNG. This was the high profile unplanned outages that caused each of the three trains to have unplanned repairs staring in H1/20. Even another one last week. On Nov 16, Reuters reported ""Train 1 was shut down due to a small gas leak," the spokesperson said, adding that it was too early to tell how long the unit would be down. "We are preparing plans for investigation and repairs." The leak was detected on piping associated with the dehydration unit on Train 1 and the unit was shut down as a precautionary measure. As of this morning, still no word on how long it will be down. The three trains have a total capacity of ~2.3 bcf/d. Gorgon produced ~2.3 bcf/d in 2019 but was down to 2.0 bcf/d in 2020. (v) Last November, the 1.03 bcf/d Qatargas LNG Train 1 had a 3-week unplanned shut down for a compressor repair. (vi) There have been many more LNG supply interruptions or reduced LNG cargoes from in-service LNG supply projects, whether it be from hurricanes, or production issues at Chevron Wheatstone or, even yesterday Bloomberg reported that the 0.9 bcf/d capacity Brunei LNG export project "requested to reduce volumes for winter delivery to long-term buyers due to an upstream natural gas production issue, according to traders with knowledge of the matter."

Natural Gas – Japan forecasts warm start to December then turning colder mid month

Japan warm to start Dec

The Japan Meteorological Agency posts its weekly temperature probability forecast for the next 4 weeks on Thursday mornings. [LINK]. The new forecast continues to push back the onset of the colder weather, this time until mid December. Below is the JMA forecast for the last two weeks of the forecast period (Dec 18 – Dec 31) and it expects to see warmer than normal temperatures in the first half of December, with the last 2 weeks dropping to normal and below average.

Figure 11: Japan Temperature Probability Forecast Dec 18 – Dec 31



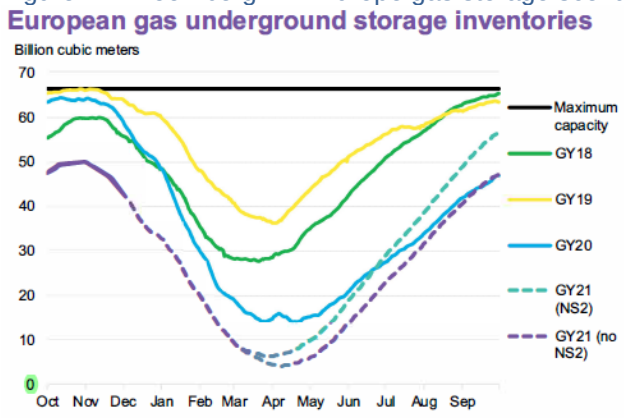
Source: Japan Meteorological Agency

Natural Gas – BNEF No Nord Stream leaves gas storage "dangerously low"

BloombergNEF's Europe Gas Monthly

Europe better hope it's a mild winter or else it could get really ugly for natural gas. On Thursday, BloombergNEF posted one of our favorite monthly reports – Its Europe Gas Monthly that was subtitled "*Winter Warning Signs. Gas inventories forecast to reach critically low : levels without delayed Nord Stream 2 pipeline".* BloombergNEF's summary was "*The European gas market will need a combination of warmer-than average weather, further price rises or first flows from the Nord Stream 2 pipeline to make it through the upcoming winter, according to BloombergNEF forecasts. Our current estimate, based on 10-year average weather and current prices, and without Nord Stream 2, predicts storage will end the winter season at a critically low 4.4 billion cubic meters. On top of stronger-than-expected November storage withdrawals, we revised our forecasts for Russian gas and LNG supply down while demand is proving surprisingly resilient at current price levels."* BloombergNEF also wrote "*However, given how low European inventories might be then it seems increasingly likely that some sort of approval, likely partial and with conditions, might have to be manufactured."* Our Supplemental Documents package includes excerpts from the BloombergNEF Europe Gas Monthly.

Figure 12: BloombergNEF Europe gas storage scenarios



Source: BloombergNEF. Note: Gas year is a 12-month period starting from October, for example, gas year 2020 starts from October 1, 2020. NS2 is Nord Stream 2.

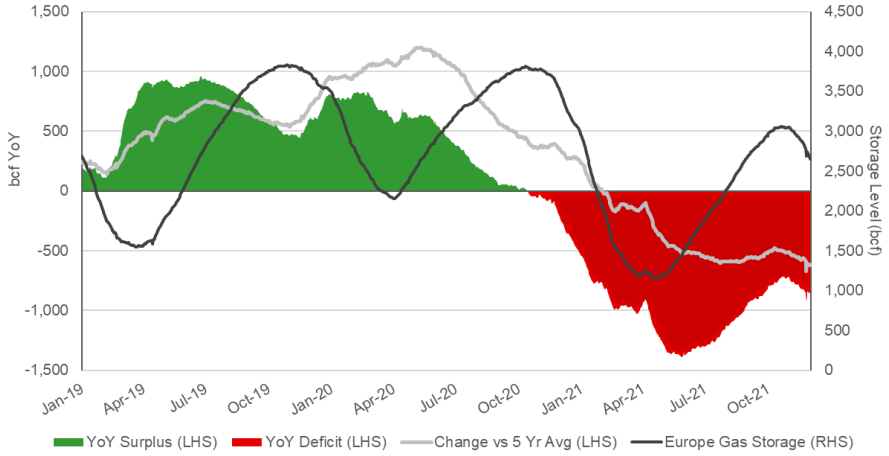
Source: BloombergNEF

Natural Gas – Europe storage 67.24% full vs 5 year average of 83.87%

Europe gas storage 67.24% full

The YoY Europe storage gap has widened a little bit so far in this winter natural gas season. Draws to European gas storage units continued this week. It was a larger draw and marked the sixth consecutive week of draws, indicating winter is underway. Europe inventories are at their lowest level at this time of the year in more than a decade. Europe gas storage started last winter (Nov 1/20) at basically full levels at 94.66% and had dropped by 65.77% to be 28.89% at Apr 1/21. Europe storage levels bottomed in late Apr at 29%, which was the lowest level since Apr 2018. This winter began (Nov 1/21) with gas storage at 77.14% capacity, down 18.52% YoY. The YoY deficit has widened since Nov 1. Storage as of Dec 2 is 67.24%, which is -19.82% less than last year levels of 87.06% and are -16.63% below the 5-year average of 83.87%. The set up for winter natural gas prices continues to support strong winter natural gas prices. Below is our graph of Europe Gas Storage Level.

Figure 13: Europe Gas Storage Level



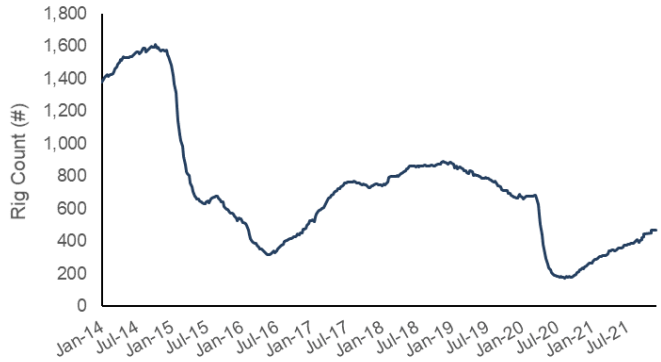
Source: Bloomberg

Oil – US oil flat WoW at 467 oil rigs

US oil rigs flat WoW

Baker Hughes released its weekly North American drilling activity data on Friday. This week US oil rigs were flat WoW at 467 rigs. Oil rigs are +295 off the bottom of 172 in Aug14/2020 week. Permian was up this week and is the oil basin expected to drive growth. We expect that US rigs have reached their peak with the typical decline occurring after Thanksgiving weekend. Oil prices dipped last week giving further support to our expectation that consumers will switch to oil products due to high gas prices; producers are increasing active rigs to boost production to accommodate demand and to rebuild DUCs inventory. US oil rigs hit their 2020 peak at 683 on March 13 and have since fallen by 216 to 467 oil rigs (-32%). The biggest contributor to the decrease is the Permian being down 135 oil rigs from the March 13, 2020 peak (-32%), although we are seeing it continue to ramp up slightly. Below is our graph of US oil rigs since January 1, 2014.

Figure 14: Baker Hughes Total US Oil Rigs



Source: Baker Hughes

Oil – US frac spreads down 3 to 271 as of week ended Dec 3

Frac spreads down 3 to 271

As noted last week, Mark Rossano (C6 Capital Holdings) did not have his normal YouTube US frac spread video due to US Thanksgiving. Rossano's weekly US frac spread recap for week ended Dec 3 on the Primary Vision network is found at [LINK]. He said that US frac spreads were down 3 to 270 for the week ended Dec 3. The down 3 is versus 274 last week

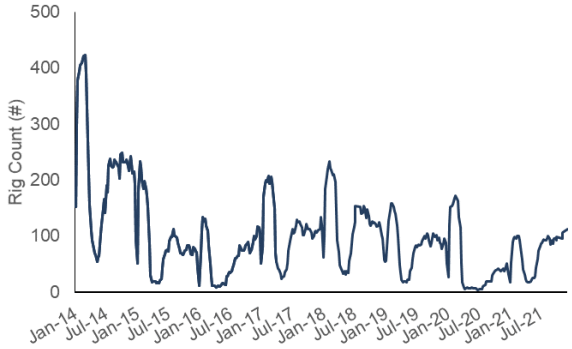
(when there wasn't a YouTube video), and not the 270 for the week ended Nov 19. The declines were in smaller basins, whereas the larger basins were stable. Typically either last week or this week is the top in frac spreads before we see the normal seasonal decline from Thanksgiving thru year end. He expects that US frac spreads could drop another 20 or so spreads drop off in this normal seasonal decline. And then, there is typically a strong snapback by the 2nd week of Jan

Oil – Total Cdn rigs +9 to 180 total rigs and +78 rigs YoY

Cdn rigs +9 WoW

Total Cdn rigs were up +9 this week to 180 total rigs. Cdn oil rigs were +7 at 113 rigs. Cdn gas rigs were increased +2 at 67 gas rigs; we have been expecting an increase as the typical seasonal run up towards Christmas before dropping over the holidays. We expect rigs to increase for another week or two. Total rigs are now +163 since the June 26, 2020 all-time low. Cdn drilling has recovered YoY, a year ago Cdn oil rigs were 40 and Cdn gas rigs were 62 for a total Cdn rigs of 102, meaning total Cdn rigs are +78 YoY and total rigs are up +42 vs 2019.

Figure 15: Baker Hughes Total Canadian Oil Rigs



Source: Baker Hughes

Oil – US weekly oil production up at 11.6 mmb/d

US oil production up WoW

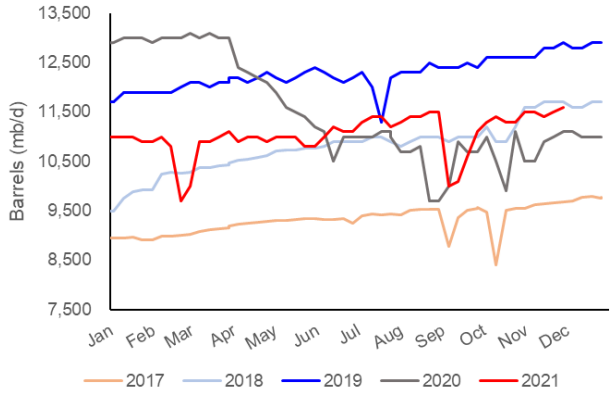
US oil production are back to pre-Hurricane Ida levels. Weekly production in the US was up this week at 11.6 mmb/d for the week ended Nov 26. Lower 48 production drove total production, flat from last weeks level at 11.1 this week; Alaska saw a slight 0.05 mmb/d increase as refineries conclude their maintenance season. US oil production is up YoY at +0.500 mmb/d and is still down significantly at -1.6 mmb/d since the 2020 peak of 13.1 mmb/d on March 13. The EIA DPR has expectations of a slight increase for Nov/Dec for the major shale/tight oil plays.

Figure 16: EIA's Estimated Weekly US Oil Production

	Week 1		Week 2		Week 3		Week 4		Week 5	
Year-Month	End Date	Value	End Date	Value	End Date	Value	End Date	Value	End Date	Value
2019-Jan	01/04	11,700	01/11	11,900	01/18	11,900	01/25	11,900		
2019-Feb	02/01	11,900	02/08	11,900	02/15	12,000	02/22	12,100		
2019-Mar	03/01	12,100	03/08	12,000	03/15	12,100	03/22	12,100	03/29	12,200
2019-Apr	04/05	12,200	04/12	12,100	04/19	12,200	04/26	12,300		
2019-May	05/03	12,200	05/10	12,100	05/17	12,200	05/24	12,300	05/31	12,400
2019-Jun	06/07	12,300	06/14	12,200	06/21	12,100	06/28	12,200		
2019-Jul	07/05	12,300	07/12	12,000	07/19	11,300	07/26	12,200		
2019-Aug	08/02	12,300	08/09	12,300	08/16	12,300	08/23	12,500	08/30	12,400
2019-Sep	09/06	12,400	09/13	12,400	09/20	12,500	09/27	12,400		
2019-Oct	10/04	12,600	10/11	12,600	10/18	12,600	10/25	12,600		
2019-Nov	11/01	12,600	11/08	12,800	11/15	12,800	11/22	12,900	11/29	12,900
2019-Dec	12/06	12,800	12/13	12,800	12/20	12,900	12/27	12,900		
2020-Jan	01/03	12,900	01/10	13,000	01/17	13,000	01/24	13,000	01/31	12,900
2020-Feb	02/07	13,000	02/14	13,000	02/21	13,000	02/28	13,100		
2020-Mar	03/06	13,000	03/13	13,100	03/20	13,000	03/27	13,000		
2020-Apr	04/03	12,400	04/10	12,300	04/17	12,200	04/24	12,100		
2020-May	05/01	11,900	05/08	11,600	05/15	11,500	05/22	11,400	05/29	11,200
2020-Jun	06/05	11,100	06/12	10,500	06/19	11,000	06/26	11,000		
2020-Jul	07/03	11,000	07/10	11,000	07/17	11,100	07/24	11,100	07/31	11,000
2020-Aug	08/07	10,700	08/14	10,700	08/21	10,800	08/28	9,700		
2020-Sep	09/04	10,000	09/11	10,900	09/18	10,700	09/25	10,700		
2020-Oct	10/02	11,000	10/09	10,500	10/16	9,900	10/23	11,100	10/30	10,500
2020-Nov	11/06	10,500	11/13	10,900	11/20	11,000	11/27	11,100		
2020-Dec	12/04	11,100	12/11	11,000	12/18	11,000	12/25	11,000		
2021-Jan	01/01	11,000	01/08	11,000	01/15	11,000	01/22	10,900	01/29	10,900
2021-Feb	02/05	11,000	02/12	10,800	02/19	9,700	02/26	10,000		
2021-Mar	03/05	10,900	03/12	10,900	03/19	11,000	03/26	11,100		
2021-Apr	04/02	10,900	04/09	11,000	04/16	11,000	04/23	10,900	04/30	10,900
2021-May	05/07	11,000	05/14	11,000	05/21	11,000	05/28	10,800		
2021-Jun	06/04	11,000	06/11	11,200	06/18	11,100	06/25	11,100		
2021-Jul	07/02	11,300	07/09	11,400	07/16	11,400	07/23	11,200	07/30	11,200
2021-Aug	08/06	11,300	08/13	11,400	08/20	11,400	08/27	11,500		
2021-Sep	09/03	10,000	09/10	10,100	09/17	10,600	09/24	11,100		
2021-Oct	10/01	11,300	10/08	11,400	10/15	11,300	10/22	11,300	10/29	11,500
2021-Nov	11/05	11,500	11/12	11,400	11/19	11,500	11/26	11,600		

Source: EIA

Figure 17: US Weekly Oil Production



Source: EIA, SAF

Oil – EIA Form 914 September actuals up vs weekly production estimates

EIA Form 914 September

The EIA released its Form 914 data [LINK] on Tuesday, which is the EIA's "actuals" for September US oil and natural gas production. Form 914 shows September production of 10.809 mmb/d, down from August production of 11,189 mmb/d after being revised up +48,000 b/d, and up -0.061 mmb/d YoY from September 2020 of 10.870 mmb/d. Three key items to highlight. (i)The actuals for September were below the weekly estimates, and -359,000 b/d below the weekly estimates that are noted in our Energy Tidbits memos. The actuals are also 0.24 mmb/d higher than the EIA STEO October had for September. (ii) This is the fourth consecutive month with YoY increases, and we expect to see this continue through the remainder of the year. (iii) On the back of the strengthening oil prices, we believe that Septembers decrease in production was a function of the on-going depletion of DUC

inventory wells, rather than new drilling, which requires ramp-up time to translate increasing rigs into actual oil production; the landfall of Hurricane Ida knocking of GoM production also played a significant factor in Septembers decline. Other specific state info: Alaska and Texas had the largest MoM increase, both up +21,000 and +87,000 respectively; North Dakota was up +8,000 b/d to 1.099 mmb/d, remaining the # 3 producer for the second consecutive week. ND is still 5,000 b/d below Jan levels, meaning it has still not fully recovered from the February freeze-out. The September actuals were 359,000 b/d above the weekly estimates average of 10.450 mmb/d for September, decreasing for the third consecutive month.

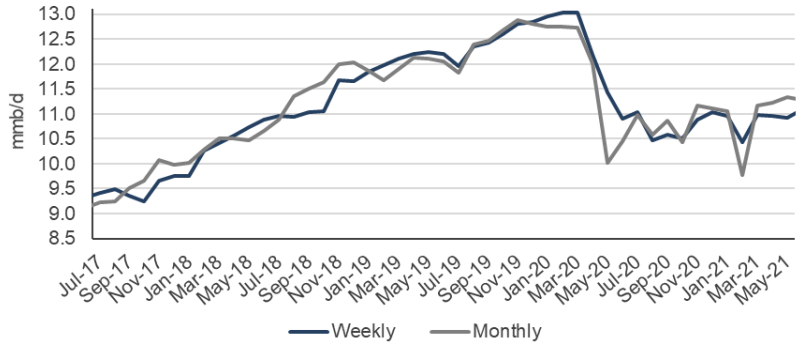
Figure 18: EIA Form 914 US Oil Production

thousand barrels per day

State	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2021	11,056	9,773	11,160	11,230	11,334	11,288	11,330	11,189	10,809			
2020	12,785	12,826	12,816	11,911	9,711	10,420	10,956	10,558	10,868	10,413	11,121	11,084
2019	11,848	11,653	11,899	12,125	12,141	12,179	11,896	12,475	12,572	12,771	12,966	12,910
2018	9,996	10,276	10,461	10,493	10,424	10,628	10,888	11,373	11,422	11,488	11,868	11,924
2017	8,873	9,109	9,168	9,103	9,184	9,110	9,246	9,245	9,516	9,659	10,077	9,979
2016	9,201	9,063	9,088	8,871	8,832	8,672	8,660	8,688	8,542	8,802	8,901	8,814
2015	9,382	9,504	9,582	9,658	9,474	9,358	9,446	9,409	9,480	9,400	9,332	9,275

Source: EIA

Figure 19: EIA Form 914 US Oil Production vs Weekly Estimates



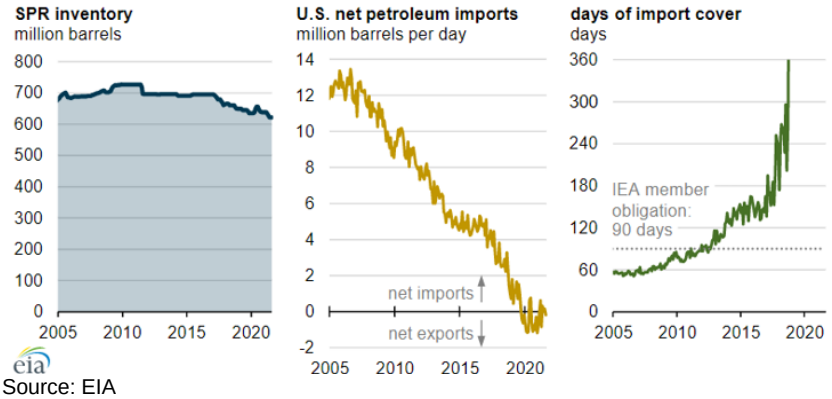
Source: EIA

Oil – EIA reminds congress approved massive SPR drawdowns in 2028 thru 2031

EIA on congress approved SPR draws

On Monday, the EIA posted a good reminder blog of how the recently approved Infrastructure Investment and Jobs Act included provisions for massive reductions to the Strategic Petroleum Reserve in fiscal years 2028 through 2031. Most were getting tired or lost in all the changes that were being put in that act to get it approved. The EIA reminds that the Act had major reductions to the SPR. The EIA wrote "*On Tuesday, November 23, the White House announced plans to make 50 million barrels of crude oil available to the market through a combination of exchanges and accelerating previously announced sales. With these sales and several other legislated drawdowns, SPR inventories could decline from 618 million barrels (as of October 1, 2021) to about 314 million barrels by the start of the 2032 fiscal year, the lowest level since March 1983. The Infrastructure Investment and Jobs Act, passed earlier this month, includes a provision to draw down 87.6 million barrels of crude oil from the U.S. Strategic Petroleum Reserve (SPR) in fiscal years (FY) 2028 through 2031."* Our Supplementals Documents package includes the EIA blog post.

Figure 20: SPR Inventories and Net Petroleum Imports



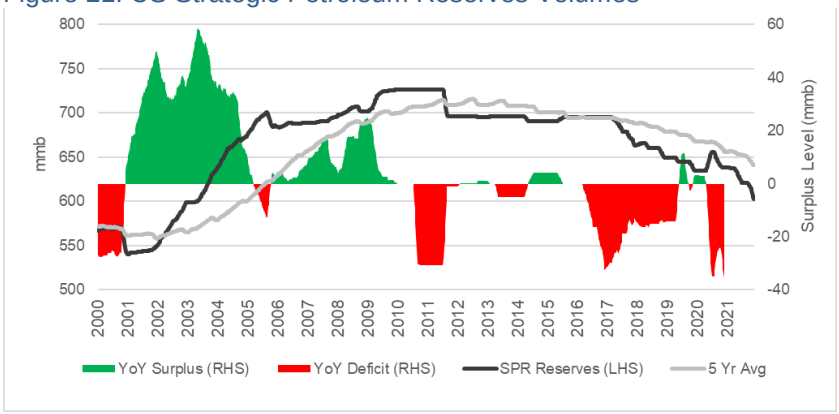
Source: EIA

Oil – US Strategic Petroleum Reserves are down 18.746 mmb over past 12 weeks

As a reminder, every week, the EIA posts both the WoW changes in commercial crude oil stocks and in Strategic Petroleum Reserves. The market focus is on changes in commercial crude oil stocks. What some overlook is that the changes in commercial crude stocks effectively build in the impact of changes in the SPR as that oil flows into the US oil supply system. The impact of weekly changes in commercial crude inventories is the net result of weekly changes in US supply and consumption. In the last 12 weeks, US SPR is down 18.746 mmb from 621.302 mmb on Sept 3 to 602.556 mmb on Nov 26. Below is our running chart of SPR reserves.

US SPR down 18.746 mmb since Sept 3

Figure 21: US Strategic Petroleum Reserves Volumes



Source: EIA

Oil – Michigan Governor abandoned federal court case against Enbridge

It wasn't a huge surprise to see Michigan Attorney General Nessel's statement [LINK] ""*I fully support the Governor in her decision to dismiss the federal court case and instead focus on our ongoing litigation in state court. The state court case is the quickest and most viable path to permanently decommission Line 5. The Governor and I continue to be aligned in our commitment to protect the Great Lakes and this dismissal today will help us advance that goal."* We tweeted [LINK] "*Looks like Michigan feels the sports analogy "home court advantage" is the place to fight the fight to shut down $ENB #Line5. #OOTT* ". Michigan isn't stopping yet its fight to shut down Line 5, but believes the better place to fight is in Michigan state courts and not US federal courts.

Michigan Gov. abandons federal court case

Oil – Enbridge to come up with modified agreement for new mainline contracts

Enbridge to come back on mainline tariffs

Last week's (November 28, 2021) Energy Tidbits memo highlighted the CER denying the implementation of Enbridge's revised shipper contracting for volumes on its mainline oil pipeline. After we posted our memo, Enbridge released [LINK] that it reviewed the CER decision and "*Enbridge will initiate, in consultation with its stakeholders, a process to negotiate toward a go-forward Mainline commercial framework. Elements of the process will include: • Enbridge will re-engage with stakeholders, to receive input on key objectives and variables that are important in considering the future commercial framework, the current industry outlook and desire for future expansion of the Mainline; and • Enbridge will explore, with stakeholders, alternatives that may include: a modified and extended CTS agreement, a new incentive rate-making agreement, or a COS rate-making structure. Any negotiated settlement would require CER approval before implementation. In parallel with negotiations of a potential negotiated settlement, Enbridge will prepare a COS application for the Canadian Mainline, which will be filed with the CER if Enbridge, after consultation with stakeholders, concludes that an agreement to continue with incentive rate making is not achievable. Enbridge expects the preceding steps to begin in the coming weeks, although the negotiating process may take through 2022. We expect the subsequent CER review and decision process to conclude in 2023.* Our Supplemental Documents package includes the Enbridge release.

Oil – Trans Mountain plans to safely restart this afternoon

Trans Mountain update

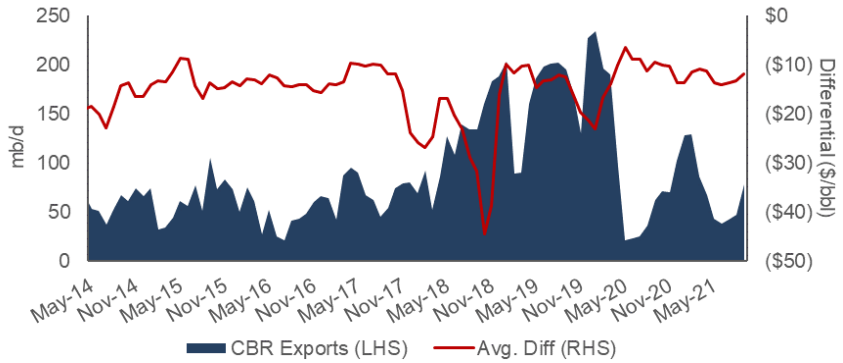
Yesterday afternoon, we tweeted [LINK] on Trans Mountain's press release [LINK] "*Following the precautionary shutdown of the Trans Mountain Pipeline as a result of heavy rains and flooding, Trans Mountain plans to restart the pipeline tomorrow."* And "*Subject to CER concurrence and final repair work, the restart will take place during daylight hours tomorrow and the pipe will be closely monitored by our teams in the field and technology systems operated by our Control Centre. Emergency management teams and equipment remain staged in key areas with booms proactively deployed in the unlikely event of a release.*" Our tweet noted that there was no indication of the expected throughput volumes on restart or any estimate for when Trans Mountain would expect to ramp up throughput back to full volumes. Regardless, the restart is a relief and a positive for Cdn heavy/medium crude oil. Our Supplemental Documents package includes the Trans Mountain updates.

Oil – Cdn crude by rail imports to Gulf Coast up 10,000 b/d YoY in September to 78,000 b/d

Cdn crude by rail imports to Gulf Coast up 31,000 b/d YoY

The EIA posted its monthly "U.S. Movements of Crude Oil by Rail" [LINK] on Tuesday, which also had good insights on Cdn crude by rail. Canadian CBR volumes to PADD 3 (Gulf Coast) were 78,000 b/d in September, which is up 31,000 b/d MoM from August, and up 41,000 b/d YoY vs August 2020. There were no revisions to last months data. Tighter YoY WCS to WTI differentials were the key factor in the low crude by rail volumes since December. Below is our graph of Cdn CBR exports to the Gulf Coast.

Figure 22: Canada CBR Exports to US Gulf Coast vs WCS Differential



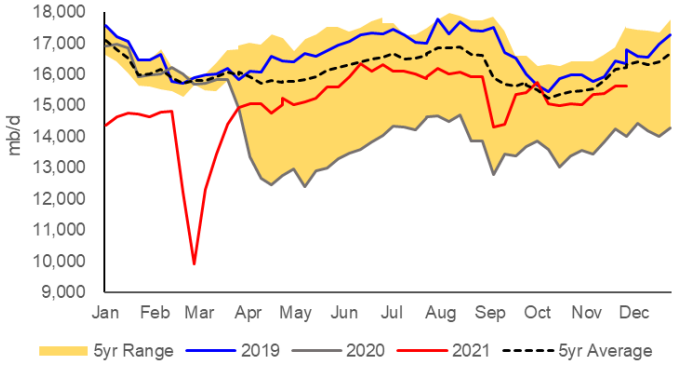
Source: EIA, Bloomberg

Oil – Refinery inputs -0.009 mmb/d YoY at 15.631 mmb/d

Refinery inputs down WoW

Refineries saw a slight decline in inputs since the steady recovery from the impacts of Covid, Hurricane Ida and normal seasonal maintenance; we observed inputs decrease as refineries progress through the regular seasonal decline in refinery utilization after American Thanksgiving weekend. Crude inputs to refineries were down +0.009 mmb/d this week to 15.631 mmb/d and are +1.619 mmb/d YoY. Refinery utilization was up +0.2% to 88.8%, which is still +10.1% YoY with the maintenance season coming to an end across the nation. Total products supplied (i.e., demand) was down -1.530 mmb/d to 20.222 mmb/d. Motor gasoline was down -0.536 at 8.796 mmb/d from 9.334 mmb/d last week. Gasoline supplied, a proxy for demand, was down last week. Gasoline stockpiles are at their lowest levels with demand for gasoline at a 4-week high. The four-week average of production supplied decreased to 9.158 mmb/d, up from last year.

Figure 23: US Refinery Crude Oil Inputs (thousands b/d)



Source: EIA

Oil – US "net" oil imports up 0.69 mmb/d WoW at 3.900 mmb/d

US "net" oil up WoW

US "NET" imports were up 0.69 mmb/d to 3.900 mmb/d for the Nov 26 week. US imports were up +0.168 mmb/d to 6.604 mmb/d. US exports were up +0.099 mmb/d to 2.704 mmb/d. The WoW decrease in US oil imports was driven by US's top 10 imports by country were up +0.480 mmb/d from Top 10. Some items to note on the by country data. (i) Canada was up this week by +0.214 mmb/d to 3.773 mmb/d, which is now ~0.140 mmb/d above the average levels in Jan/Feb of 2020. (ii) Saudi Arabia was up 7,000 b/d to 0.475 mmb/d this week. (iii) Colombia was up +0.073 mmb/d to 0.214 mmb/d. (iv) Ecuador decreased imports this week,

down 0.037 mmb/d to 0.112 mmb/d. (v) Iraq was up +90,000 b/d to 221,000 b/d. (v) Venezuela remained at 0 due to US sanctions. (vi) Mexico was up by 197,000 b/d to 0.657 mmb/d.

Figure 24: US Weekly Preliminary Oil Imports by Major Countries

	Sept 17/21	Sept 24/21	Oct 1/21	Oct 8/21	Oct 15/21	Oct 22/21	Oct 29/21	Nov 5/21	Nov 12/21	Nov 19/21	Nov 26/21	WoW
Canada	3,143	3,034	4,039	3,441	3,254	3,472	3,685	3,550	3,429	3,559	3,773	214
Saudi Arabia	399	561	622	304	319	336	397	598	453	468	475	7
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0
Mexico	835	764	652	316	462	631	439	365	499	460	657	197
Colombia	212	255	0	382	211	141	71	121	302	141	214	73
Iraq	42	0	31	188	239	155	187	51	42	131	221	90
Ecuador	102	235	59	208	0	222	92	117	103	149	112	-37
Nigeria	95	64	133	211	137	0	64	64	1	68	4	-64
Kuwait	0	0	0	0	0	0	0	0	0	0	0	0
Angola	0	0	0	0	0	0	0	0	0	0	0	0
Top 10	4,828	4,913	5,536	5,050	4,622	4,957	4,935	4,866	4,829	4,976	5,456	480
Others	1,637	1,639	1,499	944	1,203	1,297	1,237	1,242	1,362	1,460	1,148	-312
Total US	6,465	6,552	7,035	5,994	5,825	6,254	6,172	6,108	6,191	6,436	6,604	168

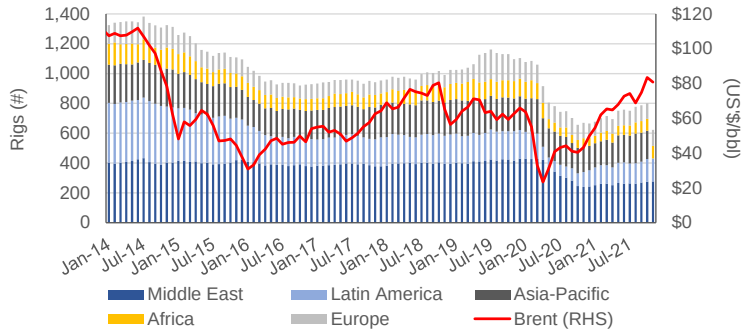
Source: EIA, SAF

Oil – Baker Hughes International rigs +17 MoM to 817 rigs in November

International rigs +17 MoM

Baker Hughes posted its monthly update to international rigs on Friday. There were no major surprises as we continue to see international rigs increase. This is consistent from the industry outlooks from the recent oilfield service Q3 calls. One of the common themes from the calls was strong growth in Latin America and that shows up in the Baker Hughes updated international rig counts for November released on Friday. As expected, Baker Hughes reported an increase from last month's count. International activity had been increasing with stronger oil and gas prices. November is up +22% YoY, but still down 25% vs November 2019. Total international rigs increase 17 MoM to 817 in November. The MoM rig count is as followed: Asia-Pacific +5, Africa +5, Europe +3, Latin America +3, and the Middle East +1. The rig count in Latin America was driven by +2 rig increase in Argentina, +3 increase for both Ecuador and Colombia, bringing the respective nations back to their pre-Covid levels. Brazil remained flat at 11 rigs and are focused in offshore operations. Saudi Arabia decreased by -8 while Kuwait and Egypt drove growth in the Middle East. China offshore was up +4 rigs in November. Below is our graph of international rigs by region and avg monthly Brent price.

Figure 25: Baker Hughes International Rig Count and Brent Price



Source: Baker Hughes, Bloomberg

Oil – Colombia Oct oil production was basically flat MoM at 0.740 mmb/d

Colombia oil production in October was basically flat MoM at 0.740 mmb/d vs 0.744 mmb/d in Sept. On Tuesday, Colombia Ministry of Mines and Energy released its October oil and gas production data [LINK]. The Columbian Ministry of Mines and Energy reported "*Regarding oil production, in October 2021 it was 740,265 barrels a day, a slight decrease of 0.5%*

compared to the data reported during September 2021 (744,173 bpd). With respect to the production of October 2020 (751,374 bpd), a drop of 1.48% was registered." Colombia does not provide any detailed explanation of the factors impacting oil production but noted several properties that experienced electrical, mechanical and public order failures. Colombia also noted that YTD Oct 31 oil production averaged 0.734 mmb/d, down 6.52% YoY from 0.785 mmb/d in the same period 2020. Note that Colombia wants to attract more capital to its oil sector. Our Sept 26, 2021 Energy Tidbits highlighted that week's FT report [LINK], that Colombia's ANH is making changes to the production contracts for Columbia's 2021 licensing round to try to encourage more bidding. The changes are not viewed as material but are viewed as being small positives with minor changes to prequalification and contract terms. FT reported that the new tweaks include the rules for companies to prequalify and the contract terms have been reviewed to improve the 2021 process to attract new investments in both exploration and production. Below is our table of Colombia monthly oil production. Our Supplemental Documents package includes the Google Translate version of the Colombia release.

Figure 26: Colombia Oil Production

million b/d	2015	2016	2017	2018	2019	2020	20/19	2021	21/20
Jan	1.036	0.986	0.860	0.860	0.899	0.884	-1.7%	0.745	-15.7%
Feb	1.030	0.955	0.864	0.823	0.893	0.878	-1.6%	0.746	-15.1%
Mar	1.023	0.917	0.804	0.856	0.885	0.857	-3.1%	0.745	-13.0%
Apr	1.029	0.915	0.857	0.865	0.891	0.796	-10.6%	0.745	-6.4%
May	1.027	0.904	0.851	0.866	0.895	0.732	-18.2%	0.703	-3.9%
June	1.010	0.888	0.857	0.864	0.892	0.730	-18.2%	0.694	-4.9%
July	0.947	0.843	0.856	0.860	0.869	0.735	-15.4%	0.731	-0.5%
Aug	0.968	0.827	0.858	0.866	0.883	0.742	-15.9%	0.748	0.8%
Sept	1.009	0.859	0.851	0.869	0.879	0.749	-14.8%	0.744	-0.7%
Oct	1.005	0.846	0.864	0.879	0.883	0.751	-14.9%	0.740	-1.5%
Nov	0.990	0.855	0.851	0.883	0.880	0.761	-13.5%		
Dec	0.999	0.837	0.870	0.889	0.882	0.759	-14.0%		

Source: Bloomberg, Colombia Ministry of Mines and Energy

Oil – Brazil October oil production of 2.777 mmb/d, down -3.3% YoY and -7.4% MoM

We have been highlighting our view that one of the 2021/2022 positives to oil is the likelihood that Brazil disappoints on its production growth targets. This has, at least so far, unfolded in 2021 as October oil production was down -3.3% YoY and -7.4 MoM. And recall that Brazil has been expected to have oil growth in both 2021 and 2022. The main factors attributing to the drop in production were scheduled maintenance stoppages in Brazil's Stationary Production Units in the Buzos and Tupi fields. On Dec 2, ANP reported Brazil oil production of 2.777 mmb/d, which is down -3.3% YoY and -7.4% MoM from 2.798 mmb/d in September. Our Supplemental Documents package includes the ANP update. [LINK].

Brazil oil production down -7.4% MoM

Oil – Russia crude production ~48,000 b/d above their November quota

Russian November oil production increased slightly for the third consecutive month with companies increasing output under the OPEC+ deal. On Friday, Bloomberg reported Russian crude and condensate production in November was about 10.89 mmb/d, up 50,000 b/d or 1.04% from October production. The official Russian data doesn't split out crude vs condensate, but if Russia's condensate production is in line with September, about 910,000 b/d, crude output would be 9.96 mmb/d, ~48,000 b/d above their November quota. Russia's compliance remained at 92% in November, lowering their rate among other OPEC+ producers. Russia has agreed to raise its output by 100,000 b/d each month starting in August, along with the rest of the alliance's agreement to return 400,000 b/d of supply to the market each month.

Russia production up MoM

Oil – Russia says in 10 yrs "*almost 100% of production will be hard-to-recover*"

Russia on future of its oil reserves

We continue to believe that a bullish mid term support for stronger oil prices is the quality of Russia oil reserves. And this is especially so if oil demand isn't going to crash in the 2020s as many had hoped prior to COP26. Our concern on the quality of Russia's oil reserves is based on Russia's consistent clear statements that much of its oil reserves today are not profitable at $50 and the quality of oil is going to significantly deteriorate over the 2020s. Its also we are surprised that markets never seem to pay attention to comments from Russia's #2 energy minister – Pavel Sorokin, Deputy Head of Russia Ministry of Energy. On Nov 24, he made similar comments as he has in the past on the quality of Russia's oil reserves. We watched and very few gave attention to his comments. TASS reported [LINK] *"The quality of oil produced in Russia will deteriorate in 10 years to such an extent that almost all of it will pass into the category of hard-to-recover, that is, the cost of its production will be significantly higher than traditional reserves. Pavel Sorokin, Deputy Head of the RF Ministry of Energy, said this at the conference "Technological Development of the Oil and Gas Industry of the Russian Federation". "On the horizon of ten years, almost 100% of production will be hard-to-recover," he said. Sorokin recalled that the deterioration of reserves means the need to stimulate oil production in Russia, as well as geological exploration."* Our Supplemental Documents package includes the TASS report.

On Sept 2, Sorokin said 50% of Russia oil reserves are not profitable at $50 oil

Here is what we put in our Sept 5, 2021 Energy Tidbits memo on Sorokin's comments on Sept 2, 2021. In that memo, we wrote "*We will ask the same rhetorical question as we did in our Jan 31, 2021 Energy Tidbits – imaging what markets would say if Exxon were to come out in their year end reporting and say only 50% of its existing oil reserves are profitable at $50? On Thursday, we tweeted [LINK] "Only half of Russia's #Oil reserves are profitable at $50 says Deputy Energy Minister Sorokin. Fits Jan 27 linked tweet. Bullish for mid/long term oil prices. Detailed comment in SAF Group Jan 27, 2021 Energy Tidbits memo". There was a typo in the tweet as we should have said the Jan 31, 2021 Energy Tidbits memo that was titled "Russia Says Increasing Water Cut, Deteriorating Development, Etc Mean Only 36% of Its Oil Reserves are Profitable." This week, Russia's Deputy Energy Minister Sorokin came out with almost identical comment as he did on Jan 27, 2021 saying "even in our current structure of reserves, a significant part of it is unprofitable at a price of $50 – about half there. There is a very large layer of opportunities for working with the current resource base: with small fields, with depleted, with tailing assets, with deeper and more difficult layers. What you need to concentrate on". Sorokin's Jan 27 comments were basically overlooked as they were only in the TASS Russian news version. But we thought then and still think know that this is a significant admission from Russia as to the mid/long oil supply and we believe a bullish comment for oil in the 2020s. One difference is that Sorokin gave much more insight into the uneconomic oil reserves in his Jan 27 comment in Russia. Below is what we wrote in our Jan 31, 2021 Energy Tidbits on his comments. Our Supplemental Documents package includes the TASS Sept 2 report on Sorokin's comments."*

Jan 31, 2021 Energy Tidbits, Sorokin said 64% of oil reserves not profitable

Here is what we wrote in our Jan 31, 2021 Energy Tidbits memo on Sorokin's Jan 27 comments. "*Imagine what markets would say if Exxon were to come out in their year end reporting and say that 64% of its existing oil reserves are not profitable at >$50 oil. The stock would be creamed as markets would think Exxon wouldn't have oil growth potential and its oil production had likely peaked. This is what Russia said this week for their oil reserves. We were surprised by a TASS Russian news story on*

Wed morning and would have thought it was a fake if it wasn't on TASS as we would never have thought Russia's #2 oil official (after Novak) would be saying what he did. We tweeted [LINK] "1/2. must read, bullish for oil @tass_agency story "only 36% of oil reserves in Russia are profitable". multiple indicators of maturing oil supply ie. deeper, smaller pools, etc. Effectively says RUS has more or less reached peak oil supply unless #Oil prices are higher #OOTT .." and [LINK] "2/2. surprising RUS lays this out, but fits to Novak's Dec comments and why they would want higher oil prices for 2020s sooner. see SAF Group blog Russia Says its a Price Taker at $45 in 2021, May Be the New Strategy Needed for OPEC+ to Fix Post Covid OIl Prices For 2020s. #OOTT". TASS wrote "Only 36% of 30 billion tons of oil reserves in Russia are profitable, which is associated with the deterioration of development conditions and a drop in the quality of reserves, writes the Deputy Minister of Energy of the Russian Federation Pavel Sorokin in an article for the Energy Policy magazine. "According to the data of the inventory of the economics of field development, carried out on behalf of the Russian government, out of 30 billion tons of recoverable oil reserves in Russia, only 36% is profitable in the current macroeconomic conditions. This is due to the deterioration of development opportunities: an increase in water cut, the need to permeability and compartmentalization of reservoirs, withdrawal into marginal zones and strata with small thicknesses, and so on, "Sorokin explained." This is significant, Sorokin is basically saying Russia has more or less reached peak oil supply, or at least peak oil supply unless prices are going higher. Maybe there is some growth but Russia has to first arrest declines. This is very different than what we see in the Middle East. Russia is saying its maturing oil production/reserves base needs higher oil prices as its oil base is maturing and they are going after smaller pools (higher cost per barrel), deeper zones (higher costs per barrel) and need new technology (we wonder if this means shale, although Putin has been negative). And also very different than Saudi Arabia. Their costs are going up to, but they aren't saying their oil production/reserves needs higher oil prices to be economic. Rather they and others like we saw with Kuwait this week need higher oil prices to balance their govt budget. They don't say they need higher oil prices to develop its oil reserves. One reminder, producing oil reserves isn't like drinking a glass of water, where you turn the cup down and the water flows out at the same rate until the glass is empty. As oil reserves produce more from a reservoir that is economic today, the oil recovery rate declines over time and the future barrels become more expensive to produce. This is more than food for thought. If peak oil demand isn't here until 2030, then its bullish for oil post Covid. Even if oil demand only recovers to pre Covid, its bullish or at least supportive of higher prices. Our Supplemental Documents package includes the Google Translate version of the TASS Russian story."

Oil – OPEC+ reconfirms July 18 production plan to add 400,000 b/d in Jan

OPEC+ sticks to July 18 plan

Once again, Saudi Energy Minister Abdulaziz surprised the market. Up until the morning of the meeting, the expectation was that OPEC+ would likely pause its planned +400,000 b/d increase for Jan. OPEC+ certainly had rationale for a pause with already seeing travel restrictions from the emergence of Omicron and the added oil barrels onto the market with the Biden led release of strategic oil reserves. We tweeted [LINK] *#OPEC to keep +400,000 b/d for Jan, but "Agree that the meeting shall remain in session pending further developments of the pandemic and continue to monitor the market closely and make immediate adjustments if required". #OOTT* It doesn't often happen, but OPEC said the meeting will remain in session, which means they have effectively left the meeting open while they assess the further developments of the pandemic and monitor the market to make any adjustments

as required. OPEC stated, "*Reconfirm the production adjustment plan and the monthly production adjustment mechanism approved at the 19th ONOMM and the decision to adjust upward the monthly overall production by 0.4 mb/d for the month of January 2022, as per the attached schedule."* [LINK]. Our Supplemental Documents package includes the OPEC+ Dec 2 release.

Figure 27: OPEC+ Cut Schedule

OPEC (mmb/d)	Reference Level Production	March 2021	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sept 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	May/22 per July/21 Agreement -	Change in Ref. Level Post May/22	EIA STEO 2022E Production Avg
Algeria	1,057	876	876	887	898	912	922	932	942	952	962	972	1,057	-	n.a.
Angola	1,528	1,267	1,267	1,283	1,298	1,319	1,334	1,348	1,363	1,377	1,392	1,406	1,528	-	n.a.
Congo	325	269	269	273	276	281	284	287	290	293	296	300	325	-	n.a.
Equatorial G.	127	105	105	107	108	110	111	112	114	115	116	117	127	-	n.a.
Gabon	187	155	155	157	159	161	163	165	166	168	170	172	187	-	n.a.
Iran	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Iraq	4,653	3,857	3,857	3,905	3,954	4,016	4,060	4,104	4,149	4,193	4,237	4,281	4,803	150	n.a.
Kuwait	2,809	2,329	2,329	2,358	2,387	2,425	2,452	2,478	2,505	2,532	2,558	2,585	2,959	150	n.a.
Libya	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Nigeria	1,829	1,516	1,516	1,535	1,554	1,579	1,596	1,614	1,631	1,649	1,666	1,683	1,829	-	n.a.
Saudi Arabia*	11,000	8,119	8,119	9,232	9,347	9,495	9,600	9,704	9,809	9,913	10,018	10,122	11,500	-	n.a.
UAE	3,168	2,626	2,626	2,659	2,692	2,735	2,765	2,795	2,825	2,855	2,885	2,916	3,500	332	n.a.
Venezuela	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total OPEC	26,683	21,119	21,119	22,396	22,673	23,033	23,287	23,539	23,794	24,047	24,300	24,554	27,815	1,132	24,390
OPEC vs. ref.	**0**	**-5,564**	**-5,564**	**-4,287**	**-4,010**	**-3,650**	**-3,396**	**-3,144**	**-2,889**	**-2,636**	**-2,383**	**-2,129**	**0**	**0**	**-2,293**

*Saudi Arabia quota for Feb-Apr 2021 includes voluntary 1mmb/d cut; May-July includes wind down of voluntary cut

Non-OPEC	Reference Level Production	March 2021	April 2021	May 2021	June 2021	July 2021	August 2021	Sept 2021	Oct 2021	Nov 2021	Dec 2021		May/22 per July/21 Agreement -	Change in Ref. Level Post May/22	EIA STEO 2022E Production Avg
Russia	11,000	9,249	9,379	9,418	9,457	9,495	9,495	9,495	9,495	9,913	10,018	10,122	11,500	500	n.a.
Kazakhstan	1,709	1,437	1,457	1,463	1,469	1,475	1,475	1,475	1,475	1,540	1,556	1,572	1,709	-	n.a.
Oman	883	732	732	741	750	762	762	762	762	796	804	812	883	-	n.a.
Azerbaijan	718	595	595	603	610	620	620	620	620	647	654	661	718	-	n.a.
Malaysia	595	493	493	499	506	514	514	514	514	537	542	548	595	-	n.a.
Bahrain	205	170	170	172	174	177	177	177	177	185	187	189	205	-	n.a.
Sudan	75	62	62	63	64	65	65	65	65	68	69	69	75	-	n.a.
South Sudan	130	108	108	109	110	112	112	112	112	117	118	119	130	-	n.a.
Brunei	102	85	85	86	87	88	88	88	88	92	93	94	102	-	n.a.
Total Non-OPEC	15,417	12,931	13,081	13,154	13,227	13,308	13,308	13,308	13,308	13,895	14,041	14,186	15,917	500	n.a.
Non-OPEC vs. ref.	**0**	**-2,486**	**-2,336**	**-2,263**	**-2,190**	**-2,109**	**-2,109**	**-2,109**	**-2,109**	**-1,522**	**-1,376**	**-1,231**	**0**	**0**	**n.a.**
Total OPEC+	42,100	34,050	34,200	35,550	35,900	36,341	36,595	36,847	37,102	37,942	38,341	38,740	43,732	1,632	n.a.
OPEC+ vs ref.	**0**	**-8,050**	**-7,900**	**-6,550**	**-6,200**	**-5,759**	**-5,505**	**-5,253**	**-4,998**	**-4,158**	**-3,759**	**-3,360**	**0**	**0**	**n.a.**

Source: OPEC

Oil – What was the US side deal to get Saudi, others to keep the +400,000 b/d

What did US offer OPEC?

Up until the morning of the OPEC+ ministerial meeting on Thursday was on the likelihood that OPEC+ would pause their scheduled +400,000 b/d increase for January. Markets were convinced of this especially with the Omicron emergence leading to the start of travel restrictions and analyst estimating that demand would be hit by Omicron. But that started to change in the hours ahead of the meeting. On Thursday, we tweeted [LINK] on a potential explanation from RBC's Helima Croft, who wrote "*And yet we believe that non-market factors likely played a role in today's decision and perhaps there will be a geopolitical pay off coming for staying the oil course. We will be closely watching in the coming weeks whether the US provides further assistance to Saudi Arabia to help bolster their defenses against missile and drone attacks emanating from Yemen. Maybe there will be more high-level meetings between Saudi and US officials, potentially involving the Saudi crown prince*". We tweeted "*Great thought from @CroftHelima "And yet we believe that non-market factors likely played a role in today's decision and perhaps there will be a geopolitical pay off coming for staying the oil* course." ie. what did US offer to get KSA & others to keep +400 kpd in Jan? #OOTT." That's the question what did US offer to get this done? As Helima Croft, we shall see.

Saudi media didn't report on MBS meeting with US envoy Hochstein

Helima Croft's last potential of maybe a high level meeting including the Saudi crown prince is one that we think is likely. Biden has refused to meet with MBS. Croft didn't mention this, but there was some press coverage this week that point to MBS being annoyed about this lack of face to face with Biden. On Tuesday, Bloomberg reported "*U.S. Moves to Cool Tensions With Saudis Over Oil Prices*" and "*Amos Hochstein, the top American energy diplomat, held meetings this week with officials in the Middle East, including Saudi Energy Minister Prince Abdulaziz bin Salman on Tuesday. "We discussed areas where the U.S. and Saudi Arabia can partner to invest in the energy transition and collaborate to build a 21st century clean energy architecture," Hochstein said."* We didn't see anyone report of something that pointed

to MBS being annoyed on this report. We always look for both sides of the story and checked the Saudi Press Agency (official news agency for Saudi Arabia) and key Saudi media (Saudi Gazette, Arab News and Al Arabiya) for their take on the meeting. Interestingly, the Saudi Press Agency reported on other MBS meetings on Monday and Tuesday but they made no mention of the Hochstein meeting, nor did the other Saudi media. None even reported on such a meeting. Hochstein is pretty far down the ladder from Biden, Harris and even Blinken. The lack of reporting makes us think that a MBS Biden meeting might be in the cards sometime.

Oil – Saudi Aramco raises OSP for Jan

Aramco raises Jan OSP

Earlier this morning, Saudi Aramco posted its official selling prices for Jan, which sees solid MoM increase for its January prices in the key markets. The raising of oil prices may surprise some, but it is consistent with Saudi Aramco CEO's view of oil demand. Bloomberg reminded that "*Saudi Arabia sends more than 60% of its crude exports to Asia, with China, South Korea, Japan and India being the biggest buyers. Aramco's official selling prices, or OSPs, serve as a bellwether for oil markets and often lead the pricing trend in the region. Most Middle Eastern countries set monthly prices as a premium or discount to a benchmark."* And "*The company raised its key Arab Light grade for customers in Asia by 60 cents from December to $3.30 a barrel above a benchmark."* Our Supplemental Documents package includes the Saudi Aramco OSP schedule as posted by Bloomberg.

Oil – No movement in either US or Iran on JCPOA positions

No US or Iran movement on JCPOA

We recognize the JCPOA commentary is all on Iran walking back on where the parties got to on the 6th round with their view that everything is a draft until a deal is done. However, we think the interpretation is that both the US and Iran have not moved from their initial big picture views – Iran wants the US to remove all sanctions and to do so first, whereas the US will only remove the sanctions it sees as consistent with the JCPOA. (i) Earlier this morning, we tweeted [LINK] on yesterday's US State Dept briefing on the 7th round negotiations. The US reiterated they are prepared to resume mutual compliance with the JCPOA and that they are prepared to lift all the sanctions that the US see are consistent with the deal. The big issue for Iran is sanctions as the US put many more on than just the sanctions the US sees are consistent with the JCPOA. The US says that if Iran wants more, they should say they want a different deal. The US says no idea when there will be restart of negotiations. The US says time is shortening for a deal and used a phrase we don't recall hearing before "*the time that the JCPOA has for still remaining a viable deal is inversely proportional to the speed with which Iran advances its nuclear program*". There are a number of good quotes. (ii) Earlier this morning, we tweeted [LINK] "*Iran's response just now to US #JCPOA briefing. Bagheri_Kani reiterates its position US was the party that left JCPOA so it was up to US to take the first step. will someone blink? or are they going back to pre JCPOA? #OOTT*." Iran made sure it restated its position this morning that the US must remove all the sanctions and it must do so first. MEHR news reported "*Iran's chief negotiator at the Vienna talks Ali Bagheri Kani reiterated that Tehran will not back down from its demands in the Vienna talks to make sure the removal of the US oppressive sanctions against the Iranian nation. Iran will not back down from its demands for removal of the sanctions in the process of the reoperation of the 2015 nuclear deal, Ali Bagheri Kani said in an interview with the Italian news agency ANSA recently. Given that it was the United States that withdrew from the agreement in 2018, so it has to take the first step, the Iranian diplomat added*." Our Supplemental Documents package includes quotes from the US State Dept briefing, IRNA and MEHR reporting on Bagheri Kani's comments this morning.

Oil – Iran says explosion over Natanz were a test of its defense system

Explosion over Natanz

The issue for Iran is that they can't stop people talking about explosions so can only try to get their message out on what caused the explosion. On Saturday night (local time), there was an explosion in the sky over the city of Badroud, which is near the nuclear site in Natanz. Iran has uranium enrichment facilities in Natanz that have had attacks including the April explosion that damaged some of the underground centrifuges and the mysterious fire in July 2020 that Iran called sabotage. Iran's PressTV reported [LINK] "*Following reports of a large explosion that was heard in the central city of Natanz, Iran's air defense force says it fired missiles to test rapid reaction force. Natanz air defense commander confirmed the report about the test fire of the missiles in the sky above Natanz, where a nuclear site is located, but emphasized that there is nothing to worry about. The commander added that such exercises are carried out in a completely safe zone in full coordination with the integrated air defense network to assess the systems located in the area. No damage was reported, according to initial investigations, the commander noted. Meanwhile, an informed local source told IRNA that the blast in the desert area of Natanz city has nothing to do with nuclear facilities and caused no damage. The unnamed source said the missile was fired in a safe zone 20km from Natanz to test air defense."*

Oil – Japan still hasn't disclosed any details on its strategic oil reserves release

Still no details on Japan oil release

On Friday, Reuters reported [LINK] on comments from Japan's industry minister Koichi Hagiuda on Japan's release of strategic oil reserves as part of the Biden led release. Hagiuda may have spoke on the release but gave no update on the vague original commitment. Reuters wrote "*Japan's government said last week that it will release "a few hundred thousand kilolitres" in response to a U.S. request, though the details were still being worked out as it would entail some switch in the composition of the types of oil held in the national reserve. "There is no change in our plan of releasing oil from reserves, as the sale will be done as a change in the type of oil, which we had planned to do," Hagiuda said on Friday. "As for the timing of the release, we will continue to make preparations while keeping a close eye on developments in the international energy market," he said*." .

Oil – Shell CEO demand for oil & gas is not declining, its going up, tight market ahead

Shell sees tight oil & gas market ahead

There were interesting comments from Shell CEO van Beurden this week as he looks ahead to the oil and gas markets in the 2020s. Shell is one of the supermajor leaders in the energy transition, but benefits from the high oil, natural gas and LNG prices providing huge cash flows to fund shareholder returns and its energy transition. What is interesting is van Beurden saying that there is a tight oil and natural gas market ahead (ie. stronger for longer oil and natural gas prices) but it isn't changing their energy transition strategy. Bloomberg reported that Shell is committed to shrinking its traditional hydrocarbon business and pursue investment in clean energy. We tweeted [LINK] *""we have a very tight market coming up, demand for oil & gas is not declining with that @IEA outlook. As a matter of fact, it is going up" says @VanBeurdenShell . #Omicron may be hitting #Oil today, but supply/demand fundamental will rule the day for 2020s. thx @lc_hurst . #OOTT.´* JP Morgan forecasts that oil prices will reach $150 in 2023 due to a lack of OPEC+ spare capacity. The IEA forecast for oil demand has it increasing through 2023. Bloomberg noted "*Shell will "enjoy" the benefits of a rising market, so it can return more money to shareholders and fund its energy transition strategy, but that doesn't mean it will increase spending on fossil fuels."* Our Supplemental Documents package includes the Bloomberg report.

Oil – Vortexa est 73.08 mmb at Dec 3, note big upward revision to Nov 26 estimates

Vortexa floating storage

Note that we are referencing the Vortexa global crude oil floating storage data posted on the Bloomberg terminal as of 3pm MT yesterday and that these estimates often get revised over

the weekend, and then again for the next week. Note we do not check daily for the revisions so our comments are compared to the Nov 26 and 19 estimates that were posted on Sat Nov 27 at 3pm MT. It was another week of significant revisions to the prior week estimates. However, we think the key trend is that, at 73.08 mmb, crude oil floating storage is lower than it was when OPEC+ started to increase oil production in June. As of 3pm MT Sat, Bloomberg has posted Vortexa crude oil floating storage as of Dec 3 is estimated at 73.08 mmb, which is down 14.59 mmb WoW from the upwardly revised Nov 26 estimate of 87.67 mmb. As has been seen in the last few weeks, there was a large upward revision to the Nov 26 estimate. Last Sat at 3pm MT, it was estimated at 77.28 mmb, which 10.39 mmb lower than today's 3pm MT revised estimate of 87.67 mmb. There was only a marginal revision to the Nov 19 data. Last Sat at 3pm MT, it was estimated at 98.58 mmb, which is only marginally lower than today's 3pm MT estimate of 99.23 mmb. Dec 3 estimate of 73.08 mmb is down 150.66 mmb verus the June 26, 2020 peak of 223.74 mmb. Dec 3 estimate of 73.08 mmb is +24.36 mmb vs the pre-Covid of 48.72 mmb at of Dec 2, 2019. Below is the Bloomberg posted Vortexa crude oil floating storage data for the past two years as was posted yesterday at 3pm MT.

Figure 28: Vortexa Floating Storage Dec 3, Posted on Bloomberg 3pm MT Sat

Source: Bloomberg, Vortexa

Oil – Bloomberg Oil Demand Monitor, Covid measures in Europe reduce traffic

Bloomberg's Oil Demand Monitor

We recommend reading the weekly Bloomberg terminal Oil Demand Monitor for a good recap of key oil demand indicators around the world. Covid-19 continues to plague Europe as countries implement measures to stem the spread of the new variant. Austria began a full national lockdown on Nov 22 and road traffic all but disappeared. Congestion remains high in other parts of the continent with London, Rome and Paris still above 2019 levels. UK road fuel demand has stabilized at -9% below 2019 levels following the late September surge in price. Spain and Portugal demand for gasoline in October was above 2019 levels as November data is not yet available. The US had similar demand, 1.4% above 2019 levels. The US announcement of a release from the SPR and the announcement of the Omicron variant rocked oil markets last week; oil prices plunged after a sell off that Goldman and Sachs deemed "overeactive", though the combination of both events is expected to have an impact on the OPEC+ meeting scheduled for Thursday. Air travel recovered in China by 8% this week to 13.7 million seats, improving the global deficit to 26% below 2019 levels from 27% last week. Seat capacity in Europe remains mixed, with Spain and the UK improving WoW and France and Germany both declining WoW. From 2019, Mexico has the smallest deficit of 1.5%, followed by the U.S., India and China at 10.3%, 12.5% and 13.4%, respectively. Refinery utilization in the US was down 0.7% from 2019 levels at 88.6%, up

WoW; both US East and Midwest refineries are above 2019 levels. Our Supplemental Documents package includes the Bloomberg Oil Demand Monitor.

Figure 29: Austria Roadway Congestion

Source: Bloomberg

Oil – Caixin PMI for Oct is down at 49.9 after last month 50.6.

Caixin PMI down in Nov

On Tuesday night, we tweeted [LINK] on the just released Caixin China Manufacturing PMI data for November. We tweeted "*#Caixin China PMI just out. Nov 49.9 vs est 50.5 vs Oct 50.6, Sept 50.0 & Aug 49.2. "index plunged into contractionary territory for the 2nd time since April 2020" says Caixin sr Economist. Thx @IHSMarkitPMI #OOTT".* IHS highlighted that the index, in November, plunged into contractionary territory for the second time since April of 2020. Covid-19 cases surged in November and the resurgence caused demand to decline; the Caixin China General Manufacturing PMI data decreased to 49.9 in November (vs estimate of 50.5) from 50.6 in October. Despite the decline in supplier performance, the incidence od delays were at their lowest levels since March. We recommend reading the short release as opposed to just seeing the headlines as there is more color on China. The press release said *"manufacturing sector remained stable overall in November. Increased downward pressure and easing inflationary pressure were prominent features of the economic situation. From late October to mid November, there were sporadic new Covid outbreaks in several Chinese regions, which had a negative impact on the economy and particularly supressed the demand side. After the shortage of power was alleviated, the supply side began to recover. But due to weak demand, the supply recovery was limited, and the foundation of the recovery was not solid. The government's measures to stabilize commodity supplies and prices began to bear fruit, which significantly eased cost pressures on manufacturing enterprises."* The job market continued to retract and remained in negative territory for the fourth consecutive month. Our Supplement Documents package includes the Caixin release. [LINK]

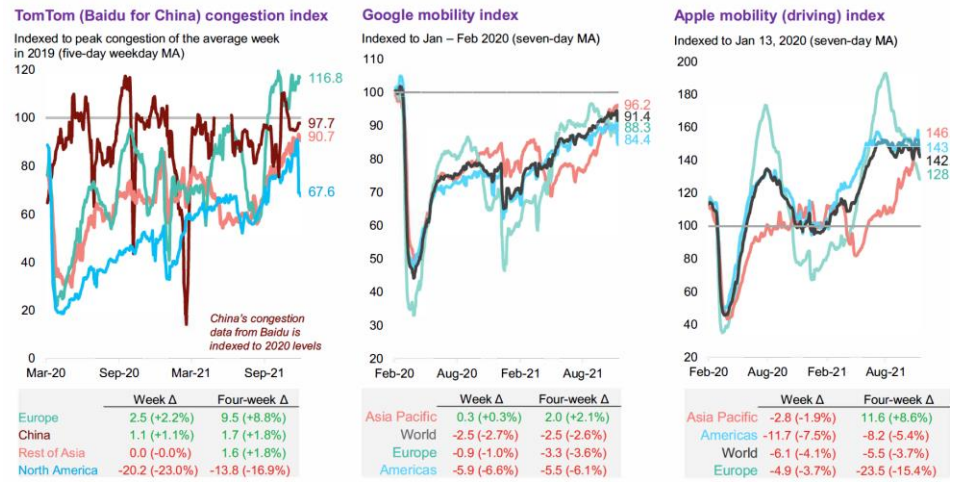
Oil –BNEF global road traffic indicators – Europe facing headwinds

BNEF global road traffic indicators

On Thursday, BloombergNEF posted "*Covid-19 Indicators: Global Road Traffic*". We tweeted [LINK] "*Good recap of global road traffic indicators, but some uncertainty/headwinds ahead until better understanding of #Omicron impact. Thx @BloombergNEF @WayneTanMing #OOTT #Oil."* The oil demand story has been road driven. BloombergNEF did warn "*Road congestion levels face headwinds on virus resurgence*" as they look forward, but the reality is that the road congestion levels in Europe have been strong. BloombergNEF wrote "*Road traffic in European cities increased by 2.5 percentage points to 116.8% of previrus levels."* China has been stricter on domestic travel whenever there are Covid cases and that is

reflected in the traffic congestion. BloombergNEF wrote "*Aggregated traffic congestion levels for Asian cities excluding China were flat at 90. 7% of pre-virus levels week-on-week. They are up 1.6 percentage points over the past four weeks. In China, road traffic rose by 1.1 percentage points to 97.7% of 2020 levels (calculated based on Baidu's data).*" For Canada, BloombergNEF wrote "*Congestion in Canadian cities remained close to normal.*" For the US, Bloomberg wrote "*Congestion in North America sank significantly below normal due to the Thanksgiving holiday in the U.S.",* but in looking at the week before comps, it looks like most of the US cities were showing congest below pre-Covid levels. Our Supplemental Documents package includes excerpts from the BloombergNEF report.

Figure 30: Comparing the three mobility indicators



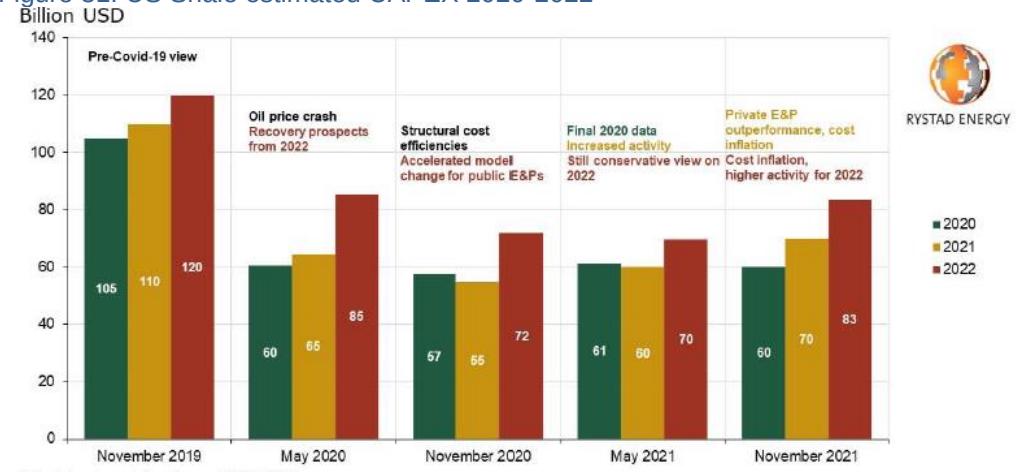
Source: BloombergNEF

Oil & Natural Gas – Rystad sees US shale capex +19.4% YoY in 2022

Shale CAPEX to increase in 2022

We are fans of the Rystad Energy public blogs because they always include data and numbers that provide the basis for their views. On Wednesday, they posted a blog that said *"US shale expenditure is projected to surge 19.4% next year, leaping from an expected $69.8 billion in 2021 to $83.4 billion, the highest level since the onset of the Covid-19 pandemic and signaling the industry's emergence from a prolonged period of uncertainty and volatility*." A key to their forecast is their expectation for public operators to step it up in 2022. Rystad also wrote "*Of the expected year-on-year increase, service price inflation alone is set to add $9.2 billion, with increased activity chipping in $8.6 billion. These increases will be partially offset by $4.2 billion in savings from efficiency gains. Efficiency gains are expected to be driven predominantly by further adoption of simul-fracs. Despite the sizeable annual spending growth, the 2022 total will still end up well below the level forecast for 2022 before the pandemic took hold*." In terms of basin activity, it looks like a bit of a catch up trade with stronger YoY increases coming from basins that didn't has much activity growth in 2021. Eagle Ford, Niobrara and Anadarko regions are expected to beat nationwide average spending growth due to higher rig activity expansion in recent months Rystad did not provide their production growth forecasts associated with the capex increases, but we expect that will come out in the future. Our Supplemental Documents package includes the Rystad blog. [LINK]

Figure 31: US Shale estimated CAPEX 2020-2022



Source: Rystad

Oil & Natural Gas – CAPP's Frequently Use Statistics is a good reference guide

CAPP's oil & gas stats sheet

We recommend adding to reference libraries the CAPP (Canadian Association of Petroleum Producers) "*Frequently Used Statistics*" [LINK]. It's a good 2-pager to use for looking for key Canadian oil and gas statistics. Some examples. YTD split of Cdn oil production of 4.677 mmb/d among oil sands 3.038, WCSB conventional & C5+ 1.364 mmb/d and East Coast 0.274 mmb/d. YTD split of Cdn natural gas production of 15.7 bcf/d between Alberta 9.9 bcf/d, BC 5.6 bcf/d and some rounded out numbers. Cdn crude oil imports in 2020 of 489,000 b/d split Atlantic Canada 287,000 b/d, Quebec 170,000 b/d and Ontario 32,000 b/d. Atlantic is all via ships. Our Supplemental Documents package includes the CAPP 2-pager.

Oil & Natural Gas – Updated EIA Saudi Arabia country brief

EIA's country brief on Saudi Arabia

We continue to recommend adding the EIA's country analysis briefs to reference libraries as good quick references, in this case its new EIA country executive summary [LINK] on Saudi Arabia. Saudi Arabia is one of the best know oil exporting countries in the world and has significant influence over oil markets as a leading member of OPEC. Saudi Arabia holds 15% of the world's proved oil reserves, is the largest exporter of crude oil in the world, boasting the world's largest production capacity of nearly 12 mmb/d. Saudi Arabia's total oil production was down from the 2018 of 12.1 mmb/d to average 9.2 mmb/d in 2020. The first half of 2021 had an average of 8.5 mmb/d as a result of a commitment to OPEC+ to make voluntary cuts of 1 mmb/d in wake of oversupply and falling global oil demand resulting from the pandemic. Saudi Arabia and OPEC + announced incremental increases to production in July of 2021. At the end of 2019, Saudi Arabis and Kuwait agreed to restart production in the Partial Neutral Zone after a 5-year shutdown, and production coming back online in the Wafra and Al-Khafji fields. Saudi Arabia primarily exports Petroleum products to Asia (77%) and Europe (10%); other regions that import Saudi crude include Africa and the Middle East. Saudi Arabia is the largest consumer of oil in the Middle East, consuming 2.9 mmb/d of petroleum and crude products in 2020. Higher consumption of fuel oil for the power sector offset the declines in the consumption of gasoline and jet fuel during the pandemic. Saudi Arabia has proved natural gas reserves of 333 tcf as of January 2021. Saudi Arabia's dry natural gas production increased 10% since 2010, exceeding 4 tcf for the first time in 2020. Saudi Aramco commissioned the Fadhill natural gas processing plant in 2019 that began processing natural gas in non-associated field in the country's eastern regions. Saudi Arabia does not import or export its natural gas and all-natural gas consumption is met by domestic

production. Saudi Arabia's eastern and central regions rely on natural gas for power generation while the western and southern regions primarily rely on petroleum liquids due to a lack of pipeline capacity from the eastern gas fields. Our Supplemental Documents package includes the EIA brief.

Oil & Natural Gas – third most active hurricane season comes to an end

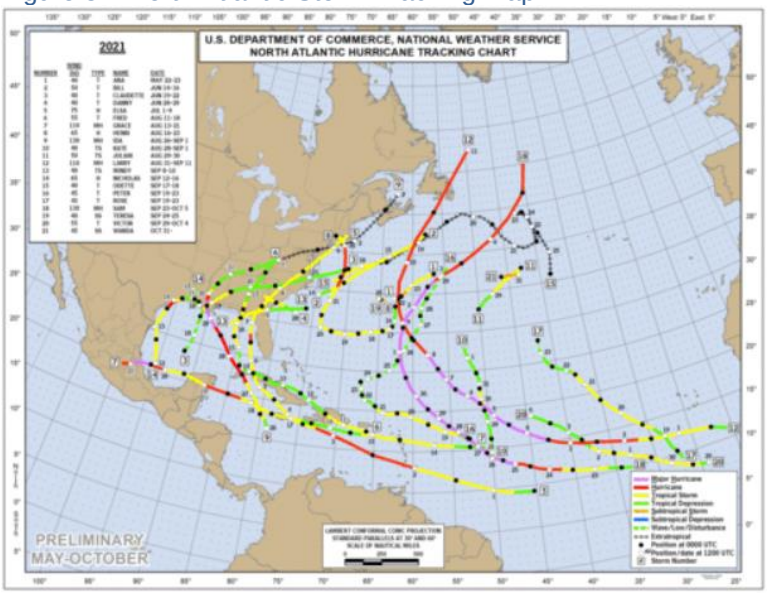
3rd most active hurricane season

2021 was the third most active hurricane season on record and it officially came to an end on November 30. This year's Hurricane season saw 21 named storms with 7 experiencing winds of 74 mph and 4 major storms experiencing winds of greater than 111 mph. From an oil and gas perspective, there wasn't as many hurricanes that came into the GoM. This marks the sixth consecutive year of above average Atlantic hurricane season. According to NOAA [LINK], scientists attribute the above average activity to the warm phase of the Atlantic Multidecadal Oscillation that began in 1995 and favors stronger and longer lasting storms. This season's storms began early and quickly ramped up in intensity with the first named storm forming before the official start of the season in June 1. Of the 21 storms , 8 made landfall with 4 being classified as a category 3 or higher. NOAA noted *"Climate factors, which include La Niña, above-normal sea surface temperatures earlier in the season, and above-average West African Monsoon rainfall were the primary contributors for this above-average hurricane season."* Our Supplemental Documents package includes the NOAA recap.

Oil & Natural Gas – Puerto Rico tends to be the marker for GoM hurricane risk

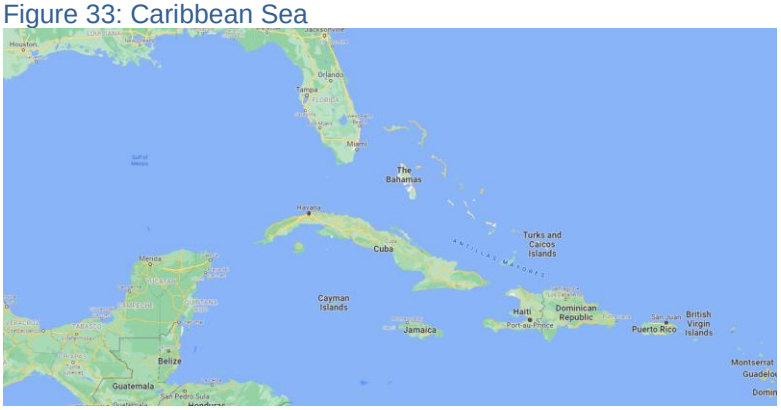
Is normally not a perfect correlation but the 2021 Atlantic hurricane season was for the early indicator for risk to the GoM oil and gas being if the tropical storm/hurricane hits north of Puerto Rico or not. This year, all the storms/hurricanes that were north of Puerto Rico went into the Atlantic and all that were south of Puerto Rico went into the GoM. Below is NOAA's 2021 tracking map.

Figure 32: North Atlantic Storm Tracking Map



Source: National Hurricane Center

Figure 33: Caribbean Sea



Source: Google Maps

Energy Transition – Japan no compromise on energy security ie. need oil, natural gas

Japan no compromise on energy security

On Thursday, we tweeted [LINK] "*"Is Japan having a "Macron Moment"? Govt "officials have been quietly urging trading houses, refiners & utilities to slow down their move away from #FossilFuels". Supports #Oil #NatGas #LNG to be stronger thru 2030. Thx @SStapczynski @Inajima17 #OOTT #EnergyTransition."* We use the term a "Macron Moment" as when leaders realize the energy transition isn't working as hoped and Japan doesn't want to risk getting rid of oil and natural gas. And in Japan's case, it isn't a question of slowing down how quickly they get rid of oil and natural gas. Rather, it's they are going to add more oil and natural gas. Don't forget Japan imports basically all of its energy other than nuclear power. Bloomberg reported "*Government officials have been quietly urging trading houses, refiners and utilities to slow down their move away from fossil fuels, and even encouraging new investments in oil-and-gas projects, according to people within the Japanese government and industry, who requested anonymity as the talks are private. The officials are concerned about the long-term supply of traditional fuels as the world doubles down on renewable energy, the people said."* And "*Japan's Ministry of Economy, Trade and Industry declined to comment directly on whether it is encouraging industries to boost investment in upstream energy supply, and instead pointed to a strategic energy plan approved by Prime Minister Fumio Kishida's cabinet on October 22. That plan says "no compromise is acceptable to ensure energy security, and it is the obligation of a nation to continue securing necessary resources." That latest strategy calls for the share of oil and natural gas produced either domestically or under the control of Japanese enterprises overseas to increase from 34.7% in fiscal year 2019 to more than 60% in 2040."* Our Supplemental Documents package includes the Bloomberg report.

Japan says must have a "*pragmatic time frame*" for decarbonization

This is not new for Japan, and it really fits what Japan press released on November 9. On Thursday, 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. Our Supplemental Documents package includes the Japan/IEA Nov 9 press release.

"Macron Moment" is when leaders say can't get rid of fossil fuels too quickly

We use the term a "Macron Moment" when 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 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. Our Supplemental Documents package includes the FT Macron report from Oct 30.

Energy Transition – Adnoc CEO, need pro climate/pro growth energy solutions

Adnoc CEO on energy transition

We got a chance to listen to the full Adnoc CEO al-Jaber keynote address on Nov 15 to open ADIPEC. There were a lot of coverage, including our Nov 21, 2021 Energy Tidbits memo, on al-Jaber's "*If we are to successfully transition to the energy system of tomorrow, we cannot simply unplug from the energy system of today. We cannot just flip a switch," he said. "While the world has agreed to accelerate the energy transition, it is still heavily reliant on oil and gas. As economies bounce back from the Covid-19 pandemic at the fastest rate in 50 years, demand has outpaced supply and after almost a decade of underinvestment in our industry the world has sleepwalked into a supply crunch. It is time to wake up*." 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. Al Jaber makes a number of comments such as "*if the world is to resolve the dilemma of the energy transition, the solutions will be found where the energy expertise exist. That means, that means that we, in our industry, have a phenomenal, huge opportunity in front of us. Rewiring the energy system is a multi-trillion dollar business opportunity that it good for the climate, good for humanity, and good for sustainable economic growth. These are fundamental reasons why we, in the United Arab Emirates, are excited about hosting COP28 in 2023. We will make this forum a catalyst for practical, commercial, sustainable energy solutions. Solutions that are both pro climate and pro growth. Solutions that come from our*

industry and, of course, beyond our industry." There was more in the speech. Our Supplemental Documents package includes the transcript we made of his key comments.

Energy Transition – IMF's $12-18b for climate mitigation & adaptation excl transition $

IMF cost for climate change

We are still surprised that there isn't any real uproar against energy transition leaders like US and Canada for not providing any indication of how much it will cost for the energy transition. These governments have lots of estimates of the impact of not getting rid of fossil fuels but aren't prepared to disclose what their internal estimates are for the cost of the energy transition. On Friday, we almost got the IMF's estimate but only got a partial estimate. Yesterday morning, we tweeted [LINK] "*#EnergyTransition will cost big $$. Note #IMF definitions below. @KGeorgieva $6-10T for mitigation of emissions plus $6T for adaptation this decade. That's before she incl the big number, the $ trillions needed for transition to a low-carbon economy. Thx @andrea_shalal #OOTT."* On Friday, Reuters interviewed IMF Managing Director Georgieva. We listened to the interview [LINK] and made a transcript of the key sections. Georgieva was asked on what will be the trillions of dollars need to fund climage finance. She replied "aid " *"let me first praise the World Bank and the Multi Lateral Development Banks for stepping up. they all have significantly increased their financing for mitigation, adaptation and transition. this being said, we need not billions, we need trillions. Our assessment is between 6 and 10 trillions for mitigation action in this decade. About 6 trillion, this is [UN's?] assessment for adaptation in this decade*." Our tweet noted Georgieva only provided the trillions for "mitigation" and "adaptation" and not the costs for the "transition to a low-carbon economy". Our Supplemental Documents package includes the transcript we made of the Q&A.

IMF defines "mitigation" "adaptation" "transition to a low-carbon economy"

When we heard the IMF comments, it jumped out to us that Georgieva put cost estimates for mitigation and adaptation so we had to look to see how the IMF defines the climate change fight. It was easy to find, we just went to their "The IMF and Climate Change" page [LINK] The IMF divides their policy into three buckets. "Mitigation: includes their "*advice on measures to contain and reduce emissions through policies—such as increasing carbon taxes, reducing fuel subsidies and improving regulation*." "Adaptation' includes is their '*guidance on building financial and institutional resilience to natural disasters and extreme weather events, and infrastructure investments to cope with rising sea levels and other warming-related phenomena*." "*Transition to a low-carbon economy*" includes '*updates to financial sector regulation to cover climate risks and exposure to "brown" assets, as well as measures to help countries diversify economies away from carbon intensive industries while mitigating the social impact on affected communities*." Our Supplemental Documents package includes the IMF climate policy summary.

Is $23 trillion the Biden cost estimate to decarbonize the US?

The US has not come out with an estimate of how much it will cost to decarbonize the US even when grilled in a Senate committee hearing. However, we recently wondered if Energy Secretary Granholm made a slip of the tongue. In our November 14, 2021 Energy Tidbits memo we wrote "*We have to wonder if Energy Secretary Granholm revealed the mysterious Biden US. On Monday, Granholm was on MSNBC Morning Joe and we tweeted [LINK] "#CleanEnergy sector is a $23T sector by 2030 says @SecGranholm to @morningmika. Is $23T the #Biden cost estimate for US to be carbon neutral that she wouldn't say in June to @SenJohnKennedy? See SAF June 27 Energy Tidbits. #EnergyTransition will cost big big money. #OOTT". To date, we are not aware of Granholm ever providing an estimate for how*

much it will cost to decarbonize the US. The only dollar figures she kind of admitted to was something less than hundreds of trillions, but something in the trillions. On Morning Joe, she threw out the "clean energy sector is a $23 trillion sector by 2030". Probably doesn't mean much to most but she didn't give details on what she meant by the $23 trillion. But to have a number like $23 and not $20 or $25 or $30 would seem to suggest that there is some specific number out that is $23 trillion. Maybe its some economist forecast for the value of the clean energy sector. But we also have to wonder if it's the Biden estimate of the cost of the energy transition. We made a transcript of here comments and she said "Mika, the clean energy sector is a $23 trillion sector by 2030, $23 trillion. And that means for us, are we going to stand by and allow other countries to do it or are we going to get into the game. This bipartisan infrastructure bill allows us to get in the game. To be able to build those products here. Stamp them made in America. Use them here, export them. 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."

In June, Granholm wouldn't say how many $trillions to decarbonize the US

Our June 27, 2021 Energy Tidbits memo was titled "*Biden Either Doesn't Estimate or Won't Say How Many $ Trillions To Get US to Carbon Neutral*". Granholm testified that week at a Senate committee meeting, and we wrote "*We think Energy Secretary Granholm may have inadvertently taken away the credibility for the Biden administration to shoot down any views that the energy transition will make energy very expensive in the future. We recognize that Senate and House hearings with Biden cabinet members, in this case Energy Secretary Granholm, are basically used by the questioners to make their political point. However, in this case, we tweeted on an exchange between Rep Senator Kennedy and Granholm. Kennedy's problem is that the Biden's push to reduce emissions won't mean much if China and India don't similarly step up. But linked to that was the exchange that caused us to tweet [LINK] "US can't control what CN IN actually spend to be #CarbonNeutral, but politics aside, shouldn't #Biden admin have a rough estimate of how many $trillions to get US to carbon neutral? How can anyone say #EnergyTransition won't cost more? #NatGas #OOTT". The exchange starts with Kennedy asking Granholm how many trillions it will cost to get the world to carbon neutral, she doesn't have a number, he asks hundreds of trillions and she replies "it would be a lot, for sure" with a smile. We don't think we are been bias by saying most people think she is a well liked person and we suspect she probably that might be enough to change questions. However, it was Kennedy so he comes back asking how much the energy department thinks it will cost to make the US carbon neutral? Granholm replies, "again, it would be a lot", Kenney asks "hundreds of trillions?", Granholm "I don't know about hundreds of trillions but it would a lot of money", Kennedy "it'd be in the trillions", Granholm "Yes", Kennedy "mid trillions?", Granholm "I don't know". We recognize Kennedy is trying to play at gotcha you in getting Granholm to commit to an estimate but, the more we thought about it, we thought it was a good question – shouldn't the Biden administration have some even really rough idea of what they think it will cost? Because without some rough cost with many unproven assumptions, how can they continue to argue that estimates or even calls that the energy transition will be expensive are incorrect or based on old thinking? Didn't Granholm take away their credibility to say that in the future. The gotcha you question may not have worked*

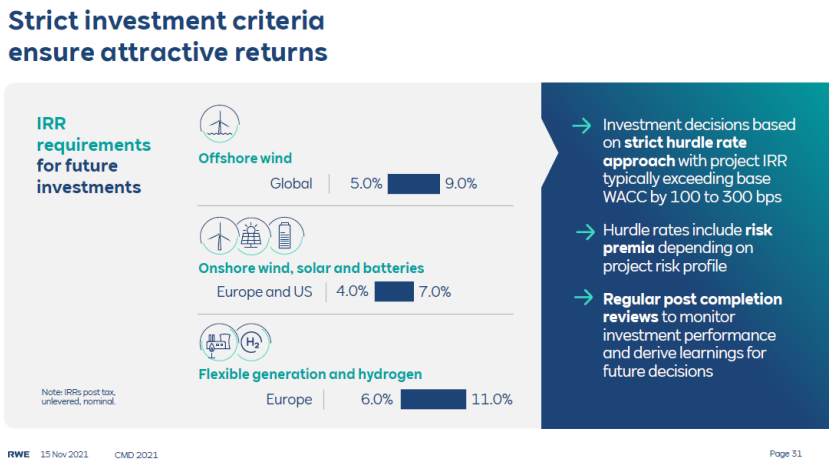
the way Kennedy wanted, but really did work in a different way. Our Supplemental Documents package includes the transcript of the Kennedy/Granholm exchange.

Energy Transition – RWE likely bid ~5% IRR for its offshore Denmark wind concession

RWE wins offshore Denmark wind concession

We give credit for the major wind players providing their expected IRRs on their major wind projects. They don't hide the fact that bidding for major offshore wind projects is competitive and IRRs are low, at least relative to the IRRs in oil, natural gas and LNG projects. On Wednesday, RWE announced they were the winner in a competitive bid for a concession for a 1,000-megawatt wind farm off the Danish coast. RWE wrote "*RWE forges ahead with its growth in offshore wind: As announced by the Danish Energy Agency (Energistyrelsen) today, the German-based energy company was awarded the concession for the offshore wind project Thor. With a planned capacity of around 1,000 megawatts (MW) Thor will be Denmark's largest offshore wind farm to date. The wind farm will be built off the Danish west coast and is scheduled to reach full operation in 2027. Once fully operational, Thor would be capable of producing enough green electricity to supply the equivalent of around 1.4 million Danish households*." RWE did not disclose the IRR for the Thor project. But this was a competitive bidding as it is a big offshore project so we suspect the bidding was aggressive and it likely means RWE bid something close to the bottom IRR of their 5% to 9% range that they outlined at their recent Nov 15 Capital Markets Day. Below is the TWE slide from Nov 15. Our Supplemental Documents package includes the RWE release and two slides from the Nov 15 Capital Markets Day.

Figure 34: RWE Offshore Wind IRR requirements 5% to 9%



Source: RWE

Exxon's lower emission initiatives have "strong double-digit returns'

RWE's likely ~5% IRRs for winning the Thor concession are a fraction of the returns Exxon expects in its "*lower-emission initiatives*". On Wednesday, Exxon had its corporate plan update presentation that spoke to their approach to lower-emission initiatives. Exxon has indicated they were staying away from wind and solar due to the low returns. On Wednesday, Exxon said "*We plan to invest $15 billion over the next six years on lower-emission initiatives, reflecting the growing portfolio of attractive opportunities and the increased support we are seeing from private and public investment, partnership opportunities, and policies. Our near-term projects are focused where supportive policies are in place and are expected to generate strong*

double-digit returns. Longer term, we are seeding investments and working with stakeholders and potential partners to advance large-scale carbon capture and storage hub projects that will be well positioned as policy evolves."

Energy Transition – Pres Biden vs Carter on their energy policy

Biden vs Carter energy policies

It really doesn't impact today's energy call, but there was an interesting Washington Post report posted on the Bloomberg terminal ""*Joe Biden Is Avoiding Jimmy Carter's Biggest Blunder*". Washington Post wrote "*With gasoline prices up about 60 percent over last year, many are worrying that we're returning to the 1970s, when Americans faced their first full-blown energy crisis. There was a "panic at the pump" and elsewhere as food and transport prices soared. So what is President Biden going to do? The answer is, whatever it takes. That means releasing reserves — as he did last week — along with browbeating oil companies and pressuring petroleum producers abroad. The United States is not going to "stand by idly and wait for prices to drop on their own. Instead, we're taking action," the president proclaimed. Such moves reflect his political effort to balance the urgent need for bold environmental legislation with being responsive to the needs of working-class families — and making sure Americans know that he cares. In taking this approach, Biden seems to be learning from the mistakes that hurt President Jimmy Carter."* Carter took over in 1976 and had to get the US going on reducing is oil consumption. Washington Post wrote "I*n response, Carter urged Americans to sacrifice, and led by example. He turned down White House thermostats and addressed the American public wearing a cardigan sweater to keep warm. When an oil shock hit in 1979 in response to the Iranian Revolution, he famously asked Americans to stop driving so much as the solution to high prices at the pump."* We think there is a huge fundamental difference between Joe Biden and Jimmy Carter on their respective energy policies. Carter put in energy policies to get the US to change because they had to reduce oil dependence in response to how the US and the world got their economies hammered when the Arab Oil Embargo cut off oil supplies to the US and the US had a real shortage of gasoline. Not a shortage because a lack of tank car drivers, but no oil for no refineries so a shortage of gasoline. Whereas Biden's energy policy isn't in response to a shortage, its in response to his trying to eliminate fossil fuels from US consumption. Biden is not doing what Carter tried to do and reduce demand, he is just trying to make gasoline more affordable. Biden keeps asking OPEC+ to produce and export more oil but, at the same time, continues to make it tougher for US oil supply growth and imports of Cdn oil via pipeline. Oil prices are the biggest component of gasoline prices and he is actually help provide expectation for higher oil prices in the 2020s. Our Supplemental Documents package includes the Bloomberg Washington Post report.

Capital Markets – Several oil & gas co's added to TSX Composite Index for Dec 20

Oil& Gas added to TSX Composite Index

On Friday afternoon, we tweeted [LINK] on the then just issued S&P TSX press release of the quarterly changes to the TSX Composite Index. The additions are effective Monday December 20. As expected, there were several energy companies added to the TSX Composite Index including Advantage "AAV", Baytex "BTE", Energy Fuels "EFR", Freehold Royalties "FRU", Peyto "PEY", Paramount "POU", Secure "SES", Topaz "TPZ" and Tamarack "TVE". Our Supplemental Documents package includes the S&P TSX release. [LINK]

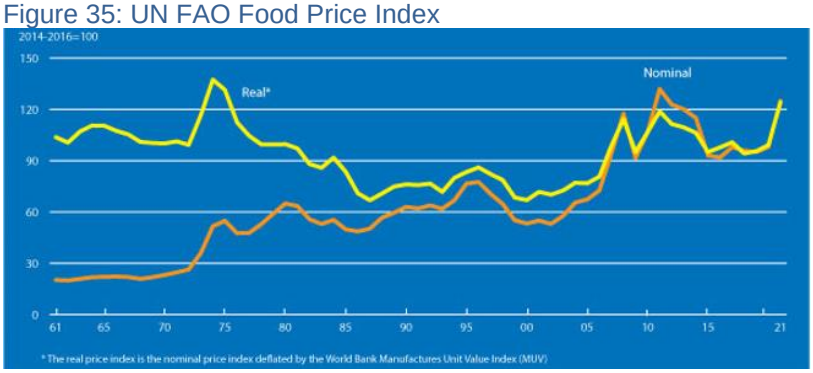
Capital Markets – UN FAO Food Price Index hits highest levels since June 2011

Nearing record high food prices

We have highlighted before how global food prices are going up at multiples higher than US food prices. And there are global concerns that food prices are going to keep higher in 2022 in part of items how high natural gas prices are leading to a massive escalation in ammonia prices that have to flow thru to food prices or lesser harvests. Our fear is that we will keep seeing the same headlines for many months to come. The headline we see each month from

the UN FAO Food Price index is the same as last month – the new highest food price since July 2011. On Thursday, the UN posted its monthly update of its FAO Food Price Index [LINK] titled "*The FAO Food Price Index at its highest since July 2011*." Note this is on a Real price basis. The FFPI averaged 134.4 points for Nov 2021, which was +1.2% MoM and +27.3% YoY. All food categories are up big YoY, but led by Cereal Price Index that was +3.1% MoM and +23.2% YoY and Dairy Price Index that was +3.4% MoM and +19% YoY. The Vegetable oil Index was down marginally atter a record high register last month. Below is the all time FFPI graph. Our Supplemental Documents package includes the UN FAO Food Price Index update.

Figure 35: UN FAO Food Price Index



Source: UN

Capital Markets – Home real estate remains strong in Canada cities

Strong Cdn home real estate market

Canada continues to see the same positive home value trends as in the US. And that is evident in the November home sales data in key Canadian cities. (i) Greater Toronto Area (GTA) realtors had reported that 9,017 homes were sold in November which was +3.3% YoY, while the number of new listings were down by 13.2% YoY with double digit declines for low rise home types and condominium apartments. GTA realtors reported [LINK] that the supply gap is tightening and their must be government action to address the growing demand in the market. (ii) Vancouver noted a similar trend with total home sales of 3,428 in November, up 11.9% YoY though was a slight decrease from October. [LINK] The total number of new listings were down 35.7% YoY and noted an 11.1% decrease from October. (iii) Calgary reported 2,110 home sales in November, just shy of the record month set in 2005. [LINK]. The number of new listings for November totalled 1,989 units, causing the sales to listing ration to surpass 100%. While it is typical for new listings to decline at the time of year, sales typically follow; instead, sales in Calgary have remained consistent since August.

Demographics – Inflation hitting lower income American families

Inflation hits lower income harder

No one should be surprised buy the Gallup survey this week that highlights how inflation hits lower income American families harder than other income group. On Thursday, Gallup released a survey [LINK] of how inflation is impacting American families. 45% of Americans have reported financial hardships that have been triggered by increasing prices, with 10% indicating it as a serious threat to their standard of living. Lower income families have been hit the hardest with 70% of those making less than $40,000 per year indicating financial hardship. 28% of lower income Americans describe the hardship they are experiencing as severe and that it is affecting their ability to maintain their current standard of living. 54% of Americans without a college degree indicated that price increases have affected their standard of living compare with 30% of college educated Americans. As rising prices are expected top persist, more Americans are expected to report hardship, with the most vulnerable likely to be the hardest hit.

Demographics – Europe and Asia dominate top 20 most expensive cities to live

EIU 2021 cost of living index

The cost of living continues to increase around the world due to supply chain blockages and evolving consumer demand. The Economist Intelligence Unit (EIU) released a report on Wednesday [LINK], that assessed the world's most expensive cities. Tel Aviv, Israel topped the list and noted a sharp rise on the index at 106; this was attributed to increases in grocery and transport prices. The index is benchmarked against prices in New York City; some countries with stronger exchange rates appear more expensive on the list. Paris and Singapore tied for second spot with an index rating of 104. Zurich was #4 and Hong Kong was #5 with Index scores of 103 and 101 respectively. New York was the most expensive US city at the #6 most expensive in the world; Los Angeles was the only other American city in the top 10 at #9. Prices did not increase everywhere, economies towards the bottom of the index had prices that stagnated or fell, partly due to the weakening of their currency against the US dollar. The EIU commented on the data, *"Although most economies across the world are now recovering as Covid-19 vaccines are rolled out, many major cities are still seeing spikes in cases, leading to social restrictions. These have disrupted the supply of goods, leading to shortages and higher prices. Over the coming year, we expect to see the cost of living rise further in many cities as wages increase in many sectors. However, we are also expecting central banks to raise interest rates, cautiously, to stem inflation. So the price increases should start to moderate from this year's level."* We recognize that the index takes into account a number of factors but, from a business travel perspective, we are surprised that Paris is that much higher than cities like Geneva and Tokyo.

Figure 36: Top 20 Most Expensive Cities

Rank	City	EIU Index Score	Population	Avg Income (USD)
1	Tel Aviv	106	4.1	$71,790
2	Paris	104	11.1	$43,755
2	Singapore	104	5.9	$68,838
4	Zurich	103	1.4	$130,030
5	Hong Kong	101	7.6	$74,106
6	New York	100	8.2	$98,873
7	Geneva	99	0.6	$125,964
8	Copenhagen	97	1.4	$91,357
9	Los Angeles	96	3.9	$90,337
10	Osaka	94	19.2	$54,629
11	Oslo	93	1.1	$88,328
12	Seoul	92	9.9	$60,491
13	Tokyo	91	37.4	$73,268
14	Vienna	90	1.9	$37,968
14	Sydney	90	4.9	$92,629
16	Melbourne	89	5.0	$84,321
17	Helsinki	88	1.3	$67,777
17	London	88	9.4	$84,942
19	Frankfurt	87	0.8	$84,145
19	Shanghai	87	26.3	$61,333

Source: EIU

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.

50th anniversary of Brian's Song, a sports classic movie

We have noted Brian's Song before as one of the best all-time sports movies. Nov 30 was the 50th anniversary of when it played on Nov 30, 1971 as the old days ABC Movie of the Week. Yes a movie made for TV. Wikipedia describes it "*recounts the details of the life of Brian Piccolo (played by James Caan), a Chicago Bears football player stricken with terminal cancer after turning pro in 1965, told through his friendship with Bears teammate Gale Sayers (Billy Dee Williams). Piccolo's and Sayers' sharply differing temperaments and racial backgrounds made them unlikely to become as close friends as they did, including becoming the first interracial roommates in the history of the National Football League, and the film chronicles the evolution of their friendship, ending with Piccolo's death in 1970*." It was the rare instance of a movie for TV that ultimately went to the theatres because it was so popular. The NFL was slow to integrate and, pre merger, the old AFL like teams like today's Chiefs and Raiders were faster to add African American players in the 60s. Even still, the percentage was extremely low. It's part of the magic of the Piccolo/Sayers relationship – they were the first interracial roommates in the NFL. It is a classic NFL movie, not so much for the football, but the story.

There are "reasons guys" and "results guys" in football

I recognize that sports and business are very different, but a lot of sports lessons are conceptually similar to business lessons. I couldn't help but think of one of my old hockey coaches when I heard Scott Pioli on the replay of Good Morning Football on Tues. Pioli is a well known/respected former NFL player personnel executive with the Patriots, Chiefs, Falcons, and Giants.. Pioli was asked about how players today will go thru their physical bumps & bruises ahead of a game vs what old school Bill Parcells (former Giants/Patriots head coach believed. Pioli "*if a player was talking about injuries, he was trying to do one of two things. He was either trying to protect himself in case he failed. So if he didn't play well, of course he didn't play well because there was an injury. But if he played injured and he was successful, then he was some sort of super hero and he was bigger and better than the rest of the team. And separating himself from the rest of the team. It was something Parcells really didn't like because it was about the individual trying to protect himself or elevate themself*". If you gave an excuse for something, my old hockey coach would say excuses are for losers, work harder and don't screw up. Perhaps the best descriptions came from one of my SAF Group partners telling me on University of Calgary Dinosaurs offensive coordinator Pat Sheahan's thesis on excuses. He used to play for Sheahan when he was head coach at Queen's. Queen's has always been one of the top Cdn university football teams and they had finished a so so season.

Coach Sheahan says to the players at the season ending meeting something like there are reasons guys and results guys, are you going to give reasons why you didn't achieve your goals or are you going to get results. Which do you want to be?

Memphis Grizzlies beat the Oklahoma City Thunder by 73 points

We couldn't help note the NBA headline from Thursday night of the most lopsided NBA game in history, when the Memphis Grizzlies beat the Oklahoma City Thunder by 73 points in a 152-79 win. We wondered about the most lopsided games in other pro sports. NHL, on Jan 23, 1944, the Detroit Red Wings beat the New York Rangers 15-0. That one isn't necessarily a surprise as WWII took away a lot of players in all North American sports. NFL, there were two 59-0 wins with Los Angeles Rams beating the Atlanta Falcons in 1976 and the New England Patriots beating the Tennessee Titans in 2009.