Energy Tidbits

Oct 17, 2021

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Bullish for Oil & Natural Gas for 2020s, China Says "Supply Shortage is The Biggest Energy Insecurity"

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. China says "*energy security is related to development security and national security*" and "*supply shortage is the biggest energy insecurity.*"
2. UK Treasury reportedly warns higher taxes will be needed "throughout" the Energy Transition.
3. BlackRock CEO "*We are fooling ourselves if we believe by restricting supply with our traditional hydrocarbon companies, that only raises energy costs, which we're witnessing now".*
4. IEA's World Energy Outlook 2021 highlights risk to oil supply from low oil investment.
5. Another Asian LNG buyer moves to lock in long term LNG supply, this time ENN from Cheniere.
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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Natural Gas – Natural gas injection of 81 bcf, storage now -501 bcf YoY deficit

YoY storage at -501 bcf YoY deficit

The EIA reported a 118 bcf injection (vs 71 bcf injection expectations) for the Oct 8 week, which was above the 5-yr average injection of 79 bcf, and above last year's injection of 46 bcf. Storage is 3.369 tcf as of Oct 8, decreasing the YoY deficit to -501 bcf, from 532 bcf last week and storage is 174 bcf below the 5-year average vs 176 bcf below last week. Below is the EIA's storage table from its Weekly Natural Gas Storage Report [LINK].

Figure 1: US Natural Gas Storage

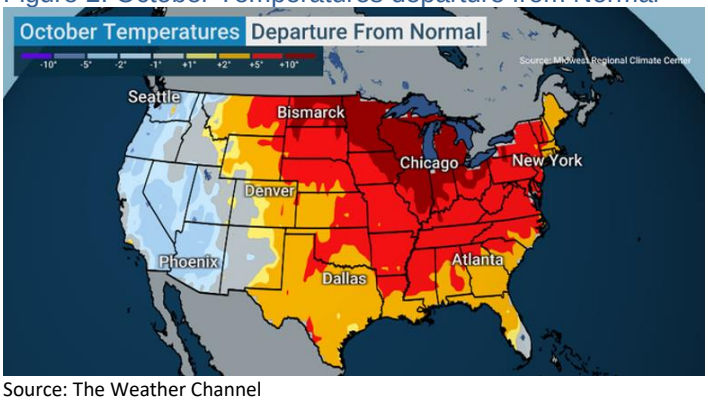
	Stocks billion cubic feet (Bcf)				Historical Comparisons: Year ago (10/08/20)		5-year average (2016-20)	
Region	10/08/21	10/01/21	net change	implied flow	Bcf	% change	Bcf	% change
East	834	810	24	24	906	-7.9	876	-4.8
Midwest	997	971	26	26	1,078	-7.5	1,020	-2.3
Mountain	210	206	4	4	240	-12.5	217	-3.2
Pacific	251	248	3	3	320	-21.6	303	-17.2
South Central	1,079	1,054	25	25	1,325	-18.6	1,126	-4.2
Salt	269	259	10	10	366	-26.5	283	-4.9
Nonsalt	810	795	15	15	959	-15.5	843	-3.9
Total	3,369	3,288	81	81	3,870	-12.9	3,543	-4.9

Source: EIA

Declining YoY storage deficits with a warm Oct

The YoY storage deficit is still -501 bcf with just over 3 weeks to go until the start of the winter natural gas season. Its shoulder season and the temperatures in the US have been such that there was less temperature impact pulling on natural gas. October typically represents the shoulder season where weather is not generally hot enough to utilize air conditioning nor cold enough to ramp up the heat – its time to leave the windows open. But despite the weather, the YoY gas storage deficit only dropped from -575 bcf on Sept 24 to -501 bcf as of Oct 8. The key reason why the deficit narrowing has been less than prior years is the ramp up in US LNG exports, which should be up approx. 3 bcf/d YoY in October. But leave the windows temperatures are expected to continue in October.

Figure 2: October Temperatures departure from Normal



Source: The Weather Channel

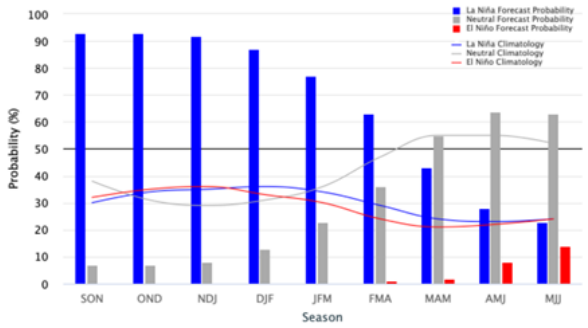
Natural Gas – 100% probability for La Nina/Neutral for winter season

100% La Nina/Neutral conditions winter season

The CPC/IRI released its updated monthly El Nino/La Nina outlook, which is issued on the 2nd Thurs of every month [LINK]. Its October and we are now close to winter and the El

Nino/La Nina focus turns to the peak winter period of Dec/Jan/Feb. In the past month, La Nina conditions have emerged as indicated by below average sea surface temperatures. The concern is always if its an El Nino winter that bring the risk (not 100% though) of a warm winter. Whereas most associate La Nina winters with the probability for a colder winter, although that is also far from 100% correlations as noted in the below email. This new probability forecast is 87% La Nina (was 72%), 13% Neutral (was 27%) and 0% El Nino (was 1%).

Figure 3: Early-Oct NOAA El Nino/La Nina Outlook



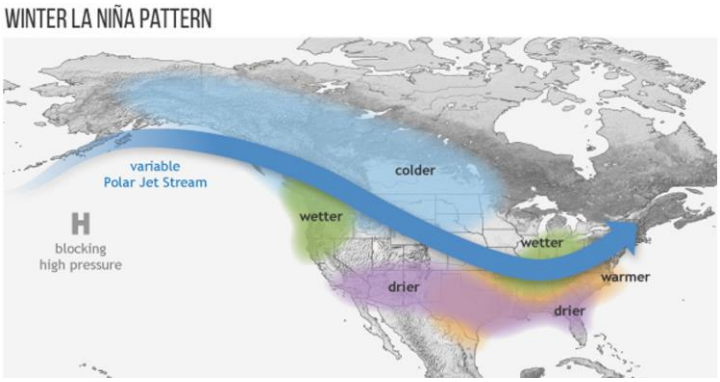
Source: NOAA

Natural Gas – Typical La Nina winter temperatures

Typical La Nina winter

No surprise that the forecasts for winter, such as AccuWeather's for Canada this week, are calling for a colder than normal winter in the US Midwest, Plains and in western Canada. Its because of the La Nina conditions for the winter. That is the normal expectations. On July 27, 2021, NOAA updated its "*How El Nino and La Nina affect the winter jet stream and U.S. climate*" [LINK], which included the below graphic for a typical La Nina winter. NOAA wrote "*These maps illustrate the typical impacts of El Niño and La Niña on U.S. winter weather. During La Niña, the Pacific jet stream often meanders high into the North Pacific and and is less reliable across the southern tier of the United States. Southern and interior Alaska and the Pacific Northwest tend to be cooler and wetter than average, and the southern tier of U.S. states—from California to the Carolinas—tends to be warmer and drier than average. Farther north, the Ohio and Upper Mississippi River Valleys may be wetter than usual. During El Niño, these deviations from the average are approximately (but not exactly) reversed".* Our Supplemental Documents package includes the NOAA blog.

Figure 4: Typical Winter La Nina Pattern



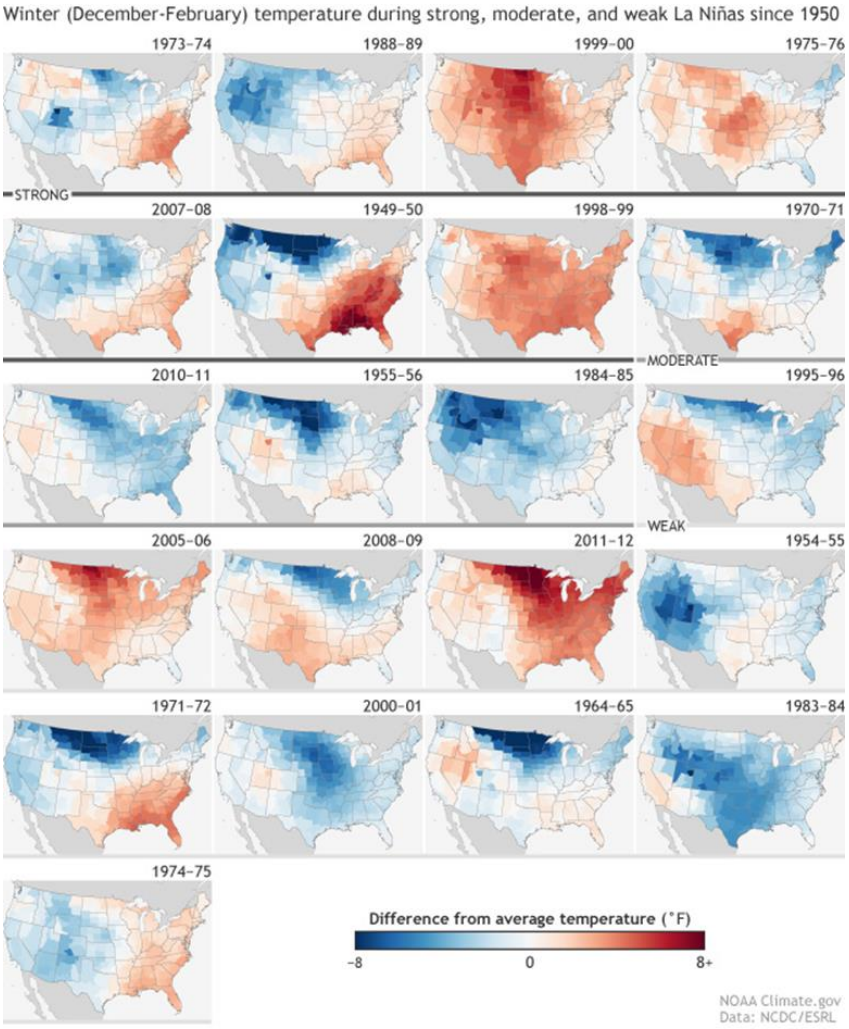
Source: CPC

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

La Nina winters are unpredictable

La Nina winters are more often normal to colder than normal than a warmer winter. But we 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 5: Winter (Dec-Feb) Temp in Strong, Moderate And Weak La Ninas 1950 - 2017



Source: CPC

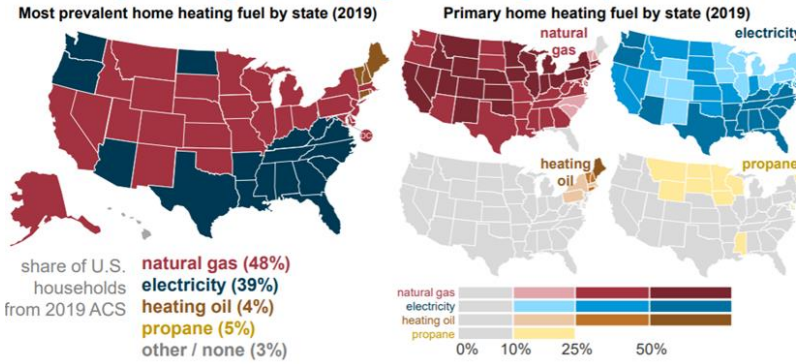
Natural Gas – 48% of US Homes are heated with natural gas

YoY storage at -501 bcf YoY deficit

The EIA released its Winter Fuel Outlook on Monday [LINK] and the headline from the report was that Americans are facing much higher home heating bills no matter where they are living. The outlook also some good reference data such as the below chart that shows home heating by fuel. The EIA estimates 48% of US homes are heated by natural gas. The EIA forecasts price increases for natural gas to increase by 50% if winter temperatures are 10%

below average, 30% if temperatures are consistent with the average, and 22% if temperatures are 10% above average. Other forms of energy used for generating heat are expected to see similar price increases with the colder weather expected this winter. The 41% of households generating electricity with electricity will 6% more, 15% more in a colder winter and 4% more if warmer. The 5% of homes using heat will see 54% increase in expenses in average temperatures, 94% more in a colder winter and 29% more if warmer. The 4% of households using heating oil will spend 43% more in average temperatures, 59% more in colder weather and 30% more in warmer weather. Below is a graphic depicting the percentage of homes generating heat with a respective fuel source. Our Supplemental Documents package includes excerpts from the EIA Winter Fuels Outlook.

Figure 6: Regional Concentration of Winter Fuels in US



Source: EIA

Natural Gas – AccuWeather expects lower temperatures for Canadian winter

AccuWeather Canadian winter forecast

This week, AccuWeather posted is winter 2021-22 forecast for Canada [LINK] which is calling for average to slightly below average temperatures this winter. This forecast follows the NOAA forecast that also predicts La Nina to be very prevalent in causing stormy conditions in the pacific northwest and create polar vortex conditions in the Midwest. This forecast expects La Nina to play a significant roll with increased storms and snow along the Pacific coast and into the Canadian Rockies. The prairie provinces can expect significantly colder temperatures with the chance of a polar vortex potential prominent in the forecast. The east coast is expected to have above average temperatures this winter, though is still likely to have abundant snowfall. Ontario is expected to have normal temperatures this winter.

Figure 7: AccuWeather Winter 2021/2022 Forecast Map

Source: AccuWeather

Natural Gas – EIA forecasts US gas production growth in 2022

EIA sees U.S. gas production +3.86 bcf/d YoY in 2022

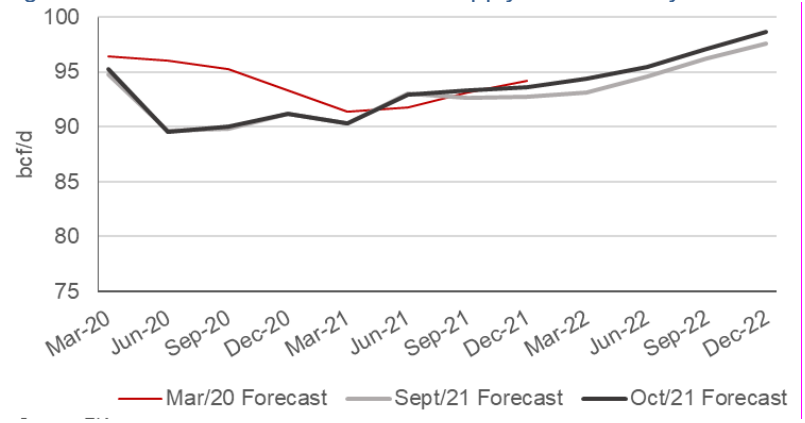
No surprise that, with continued stronger than expected natural gas prices, the EIA increased its US natural gas production forecasts. However, what is different this time is that the increase isn't from associated natural gas from oil plays but from dry gas plays. The EIA released its monthly Short Term Energy Outlook October 2021 [LINK]. The EIA revised up both it's 2021 and 2022 forecasts for US natural gas production. (i) EIA forecasts that US natural gas production will be up +2.09 bcf/d from the Q4/19 peak of 96.60 in Q4/22. (ii) EIA revised down the second quarter of 2021 with upward trends continuing in the second half of the year. US 2021 natural gas production forecast to average 92.54 bcf/d (up from 92.18 bcf/d previously). (iv) 2022 US natural Gas is forecasted to average 96.4 bcf/d (95.4 bcf/d previously), up 3.3.86 bcf/d YoY. (v) The EIA wrote, "*we estimate dry natural gas production averaged 93.3 Bcf/d in the United States during the third quarter of 2021—up from 91.6 Bcf/d in in the first half of 2021. Production in the forecast rises to an average of 94.0 Bcf/d during the winter, and averages 96.4 Bcf/d during 2022, driven by natural gas and crude oil prices, which we expect to remain at levels that will support enough drilling to sustain production growth.*" Our Supplemental Documents package includes excerpts from the EIA STEO.

Figure 8: EIA STEO US Natural Gas Supply Forecasts by Forecast Month

bcf/d	Q1/19	Q2/19	Q3/19	Q4/19	2019	Q1/20	Q2/20	Q3/20	Q4/20	2020	Q1/21	Q2/21	Q3/21	Q4/21	2021	Q1/22	Q2/22	Q3/22	Q4/22	2022
Oct 2021	89.8	91.26	93.77	96.6	92.86	95.29	89.57	89.99	91.14	91.5	90.3	92.89	93.32	93.65	92.54	94.38	95.41	97.12	98.69	96.4
Sept 2021	90.01	91.57	94.01	96.58	93.06	94.8	89.68	89.83	91.15	91.36	90.3	93.05	92.64	92.7	92.18	93.17	94.54	96.25	97.59	95.4
Aug 2021	90.01	91.57	94.01	96.58	93.06	94.79	89.68	89.83	91.15	91.35	90.29	92.49	92.67	93.11	92.15	93.34	94.15	95.51	96.47	94.88
July 2021	90.01	91.57	94.01	96.58	93.06	94.79	89.68	89.83	91.15	91.35	90.31	92.88	93.17	93.8	92.55	93.65	94.1	95.16	95.82	94.69
June 2021	90.01	91.57	94.01	96.58	93.06	94.79	89.68	89.83	91.15	91.35	90.53	92.26	92.63	93.26	92.18	93.13	93.48	94.31	94.81	93.93
May 2021	90.01	91.57	94.01	96.58	93.04	94.79	89.68	89.83	91.15	91.35	90.09	90.75	91.34	92.03	91.06	91.97	92.54	93.60	94.36	93.12
Apr 2021	90.01	91.57	94.00	96.58	93.04	94.79	89.68	89.83	91.18	91.36	90.82	90.90	91.59	92.31	91.41	92.23	92.75	93.76	94.39	93.29
Mar 2021	90.01	91.57	94.00	96.58	93.04	94.79	89.68	89.82	91.08	91.34	90.50	91.04	91.71	92.13	91.35	91.87	92.25	93.28	93.90	92.83
Feb 2021	90.01	91.57	94.00	96.58	93.04	94.79	89.68	89.82	90.89	91.29	90.88	90.17	90.40	90.54	90.50	89.95	90.18	91.41	92.26	90.96
Jan 2021	90.01	91.57	94.00	96.58	93.04	94.79	89.67	89.87	88.73	90.76	87.48	87.54	88.54	89.11	88.17	88.54	88.86	90.17	91.02	89.66
Dec 2020	90.01	91.57	94.00	96.58	93.04	94.79	89.67	89.72	89.36	90.88	87.65	87.25	88.13	88.61	87.91					
Nov 2020	90.01	91.57	94.00	96.58	93.06	94.85	89.73	90.14	89.29	90.99	87.50	87.10	88.16	88.86	87.91					
Oct 2020	90.01	91.57	94.00	96.58	93.06	94.48	89.44	89.81	88.86	90.64	86.56	86.02	87.04	87.58	86.81					
Sept 2020	89.32	90.50	92.98	95.97	92.21	94.48	89.50	88.44	87.14	89.88	85.67	85.87	87.07	87.73	86.59					
Aug 2020	89.32	90.50	92.98	95.97	92.21	94.48	89.20	86.27	84.73	88.65	83.21	82.93	84.35	85.55	84.02					
July 2020	89.32	90.50	92.89	95.97	92.21	94.50	89.91	87.27	85.37	89.24	83.48	83.25	84.53	85.63	84.23					
June 2020	89.32	90.50	92.98	95.97	92.21	94.47	90.60	87.95	85.66	89.65	83.96	84.44	85.75	87.34	85.39					

Source: EIA STEO

Figure 9: EIA STEO US Natural Gas Supply Forecasts By Forecast Month



Source: EIA STEO

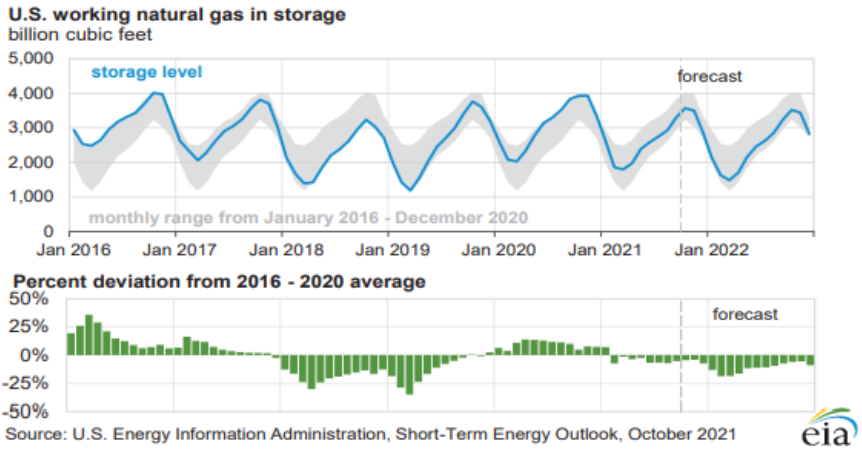
Natural Gas – EIA forecasts Nov 1/21 storage to be -359 bcf YoY

EIA STEO storage forecast

The EIA STEO also forecasts storage to start the winter. It is a more relevant forecast number when we are 3 to 6 months out from Nov 1 as it gives a look ahead Nov 1 storage

estimate based on the STEO's natural gas supply and demand forecasts. However, this close to Nov 1, its less of a key number. Regardless, the EIA Oct STEO also revised lower its forecast for US gas storage to start the winter. The Oct STEO forecasts Nov 1, 2021 storage at 3,600 bcf, which would be 180 bcf below the 5 yr 2016-2020 average and 333 bcf lower YoY. The Sept STEO forecast was 3,598 bcf. This YoY -333 bcf deficit compares to the -501 deficit as of Oct 8. There would have to be big reduction in YoY storage to get to that point.

Figure 10: EIA STEO forecast US gas storage



Source: EIA

Natural Gas – What level of security will Total need to restart Mozambique LNG?

Mozambique security update

On Thursday, the Club of Mozambique reported [LINK] on the Mozambique security situation following the >4 hr Wednesday meeting of the military leaders of the forces of Mozambique, Rwanda and the Southern African Development Community (SADC) on the security situation and "*to coordinate in the fight against violent extremism*." Our first impression on the report is that it sounds positive, 100% of known rebel bases have been eliminated and they have sent the rebels fleeing to the jungle. If the report had stopped there, we would be saying this looks like the setup for TotalEnergies to do what they hope – resume construction in 2022 so they can have first LNG in 2026. But then the report added *""We still continue to find the theatre of operations complex, as we still have areas where the enemy, in groups of six, seven or eight people attack, burning villages and killing defenceless citizens. So, as long as this situation prevails, we cannot consider the theatre of operations free from the enemy."* And "*The commander of the Mozambican army admitted that the war could "take a year, two years, three years*". We have to believe if the military had just told TotalEnergies the first part, TotalEnergies would probably be getting people planning on a restart of construction. But we just don't think TotalEnergies wants to start up and then stop again. And we have to wonder if the last comments from the Mozambique commander at least stop TotalEnergies from getting the team getting ready to start construction in early 2022. We suspect they will need to have a little more comfort. So the question will be what level of security they will need. Our Supplemental Documents includes the Club of Mozambique report.

TotalEnergies is hoping to restart Mozambique LNG construction in 2022

Our Oct 3, 2021 Energy Tidbits highlighted the TotalEnergies 2-day investor outlook that included their longer term outlook, which had to include what are they now assuming for first LNG cargoes from Mozambique LNG. We have been highlighting

how the entry of Rwandan troops has been the key driver for pushing out the rebels and re-establishing security in the LNG centered northern regions. Prior to then, TotalEnergies had not provided a restart date. But at the investor outlook, they presented their long term outlook including first Mozambique LNG in 2026. That is two years later than the original start year of 2024 but one year later in their revised timing before the force majeure. In their prepared remarks, mgmt said "*This forecast of upstream production in 2026 includes Mozambique LNG production only in 2026. This relies on the assumption that the project activity will review in 2022."* No surprise there were a number of questions on this assumption. And mgmt did caution *"You know that we do not control all the situation, a security situation in Cabo Delgado. This would impact the '26 target by $500 million"* ie. a 1 year delay in Mozambique from this assumption reduces 2026 cash flow by $500 million. In the Q&A, mgmt seemed to exercise caution on this assumption. Mgmt replied "*We have some -- there are some positive evolutions on the ground, but it has to be consolidated. There is a war. So we will not -- what we will not do on Mozambique is remobilizing to remobilize. That's clear. So if we are not able to remobilize beginning next year, then the delay in Mozambique LNG this $500 million could go to 27%."* We still believe TotalEnergies wants to avoid what happened in Dec 2020 thru March 2021. Recall, previously that, in Dec 2020, TotalEnergies had shut down development for 3 months due to the security risk and then had restarted on Wednesday, March 24, 2021. Then there were 3 days of violence and attacks followed, and TotalEnergies suspended operations on the Saturday and started to pull all staff out of Mozambique. That was when construction stopped and then a month later TotalEnergies declared force majeure. At that time, we thought TotalEnergies would want to have a longer period (ie. 6 months or so) of perceived security/stability before agreeing to restart. As of our 7am MT news cut off, we have not seen any TotalEnergies comment on the Club of Mozambique report this week. So at least for now, TotalEnergies is hopeful that construction restart can happen in early 2022. Our Supplemental Documents package includes the TotalEnergies LNG slide noting the Mozambique delay and their long term cash flow slide that shows 2026 is up because of Mozambique.

Reminder Mozambique LNG delays are 5 bcf/d, not 1.7 bcf/d Total Phase 1

We think it is important to note that the delays to TotalEnergies Mozambique Phase 1 are more than just a delay to the 1.7 bcf/d Phase 1, its actually a delay of 5 bcf/d. This was the reason why, on April 28 2021, we posted a 7-pg blog "*Multiple Brownfield LNG FIDs Now Needed To Fill New LNG Supply Gap From Mozambique Chaos? How About LNG Canada Phase 2?*" [LINK] We thought, and still think, there has been a major change to the outlook for LNG supply in the 2020s and one that is still being overlooked – there is a big new LNG supply gap starting around 2025 that is hitting faster and bigger than anyone expects. We saw Total's April 27, 2021 announcement of force majeure at its Mozambique Phase 1 LNG of 1.7 bcf/d was much more significant that viewed. We just didn't see market focused on the fact that this situation backs up an additional 3.3 bcf/d of LNG supply that is also being counted on in all LNG supply forecasts. Total's Phase 2 of 1.3 bcf/d was to follow, and Exxon's Rozuma Phase 1 of 2.0 bcf/d was originally expected to go FID in 2019 but is now not expected to have a FID decision until 2022 at the earliest. Mozambique is considered a premium LNG supply region for Asia and is in LNG supply forecasts. Total's original in service for Phase 1 is 2024. We had been warning that Mozambique has a major LNG market impact and its why we posted the April 28 blog. Our blog reminds that even if Total makes a restart development

decision in 12 months, it will take months just to get back to where they left off including rehiring services so any return to where they were in the construction process is at least more likely 18 months at a minimum. This is going to create a bigger and sooner LNG supply gap and the reality is that the only projects that can step up in any reasonable time frame will be brownfield LNG projects. Its why we also said what about LNG Canada Phase 2. There is much more in the 7-pg blog. Our Supplemental Documents package includes our April blog.

Natural Gas – Qatar says its maxed out on LNG volumes right now

Qatar is maxed out on LNG supply

LNG buyers have been locking up more long term LNG deals with Qatar, but also been asking for short term deliveries. However, Qatar is saying they can't do any more right now and are maxed out on LNG supply. There just isn't surplus LNG around the world. On Monday, Bloomberg reported "*Qatar, the world's biggest exporter of liquefied natural gas, said it's "unhappy" prices are so high but is producing at maximum capacity. The comments from Energy Minister Saad Al-Kaabi on Monday come amid a crisis in gas markets, with prices rocketing as supply fails to keep up with soaring demand. Although Qatar is spending billions of dollars to increase output, it has said it will struggle to boost production in the near term. "We are maxed out," Al-Kaabi said at an event in Doha, adding that volumes are currently around 80 million tons a year. "We're just consistent, we're producing what we can." The Persian Gulf state has the world's lowest production costs thanks to an abundance of easy-to-extract gas, most of it contained in the giant North Field that extends into Iran. Al-Kaabi reiterated the schedule for a planned expansion of North Field output, despite calls for an earlier ramp-up. Qatar aims to increase LNG output by around 50% by 2027, a project that will cost almost $30 billion."*

Natural Gas – Another Asian LNG buyer (ENN) locks up long term LNG (Cheniere)

ENN signing long term LNG deal

We continue to believe the best validation of a pending LNG supply gap in the 2020s is that more Asian LNG buyers are moving to lock up long term LNG supply thru the 2020s. The latest to do so is China's ENN in the new deal with Cheniere [LINK]. This 13-year deal sees ENN purchasing 0.12 bcf/d from Cheniere on a free board basis, with the purchase price indexed to the Henry Hub plus a fixed liquefication fee. While it is a modest amount purchased, it represents the first deal with the potential to establish an ongoing relationship over time. ENN Energy Holdings is one of the largest gas distribution companies in China; it owns 239 city-gas projects and has a connectible population of 117 million people. Cheniere's CEO commented "*this SPA underscores the strength of the global LNG market today, particularly in China, and highlights Cheniere's role as a leading global LNG supplier, tailoring solutions to help meet the long-term energy needs and environmental goals of our customers. The SPA also further advances Cheniere's commercial momentum and marks another milestone in our efforts to contract our LNG capacity on a long-term basis in anticipation of an FID of Corpus Christi Stage 3, which we expect will occur next year".* Our Supplemental Documents package includes the Cheniere release.

Asian LNG buyers abruptly change and lock in long term supply

We don't think anyone could have predicted the JKM spot price rise in the past four months but, we have been highlighting the key indicator of LNG supply/demand tightness in the 2020s – Asian LNG buyers are now rushing to lock up long term supply. On July 14, 2021 we posted our 8-pg "*Asian LNG Buyers Abruptly Change and Lock in Long Term Supply – Validates Supply Gap, Provides Support For Brownfield LNG FIDs".* Here is an excerpt from the blog "*The last 7 days has shown there is a sea change as Asian LNG buyers have made an abrupt change in their LNG contracting and are moving to lock in long term LNG supply. This is the*

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

Natural Gas – Reuters major Chinese LNG buyers look to lock in long term US supply

Major Chinese LNG buyers looking for supply

It sounds like there is much more to come on China LNG buyers locking in long term LNG supply. And it looks like these discussions have picked up in line with what we noted in our above July 14, 2021 8-pg blog "*Asian LNG Buyers Abruptly Change and Lock in Long Term Supply – Validates Supply Gap, Provides Support For Brownfield LNG FIDs".* No one should be surprised by the Reuters Exclusive report on Friday "*Major Chinese energy companies are in advanced talks with U.S. exporters to secure long-term liquefied natural gas (LNG)supplies, as soaring gas prices and domestic power shortages heighten concerns about the country's fuel security, several sources said. At least five Chinese firms, including state major Sinopec Corp and China National Offshore Oil Company (CNOOC) and local government-backed energy distributors like Zhejiang Energy, are in discussions with U.S. exporters, mainly Cheniere Energy (LNG.A) and Venture Global, the sources told Reuters*". Reuters also noted "*Talks with U.S. suppliers began early this year but speeded up in recent months amid one of the biggest power-generating, heating fuel crunch in decades".* Our Supplemental Documents package includes the Reuters report.

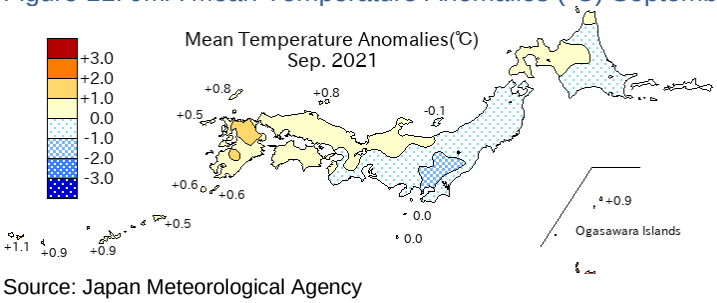
Natural Gas – Japan had lower temperatures and sunshine duration in September

A cool and cloudy Sept in Japan

It was a good July and August for natural gas consumption in Japan, but Sept was not a strong end to summer from a temperature perspective. The Japan Meteorological Agency posted its monthly climate anomaly recap for Japan for September [LINK]. September was a month of relatively average temperatures, with the southeast and northeast regions experiencing slightly below average temperatures. The JMA wrote, "*Northern Japan was frequently covered by high pressure systems. Monthly sunshine durations were significantly above normal on the Sea of Japan side of northern Japan (the longest on record for September since 1946) and above normal on the Pacific side of northern Japan. Monthly precipitation amounts were below normal in northern Japan. Monthly sunshine durations*

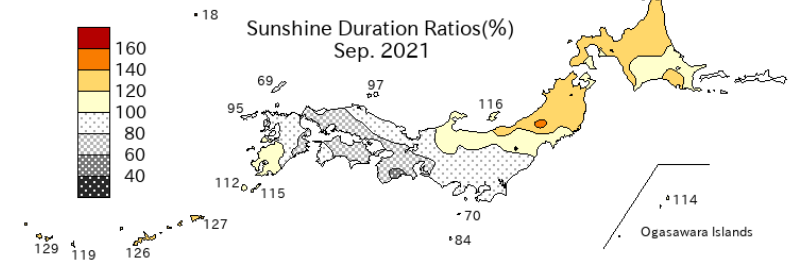
were below normal in western Japan and on the Pacific side of eastern Japan due to cloudy and rainy weather conditions brought by the fronts and Typhoon Chanthu until mid-September. In Okinawa/Amami, monthly mean temperatures and monthly sunshine durations were significantly above normal due to high pressure systems that often covered the region." October has started off with above average temperatures but are expected to cool as the month persists. Below are the JMA temperature and sunshine duration maps for September.

Figure 11: JMA Mean Temperature Anomalies (◦C) September 2021



Source: Japan Meteorological Agency

Figure 12: JMA Sunshine Duration Ratio (%) September 2021



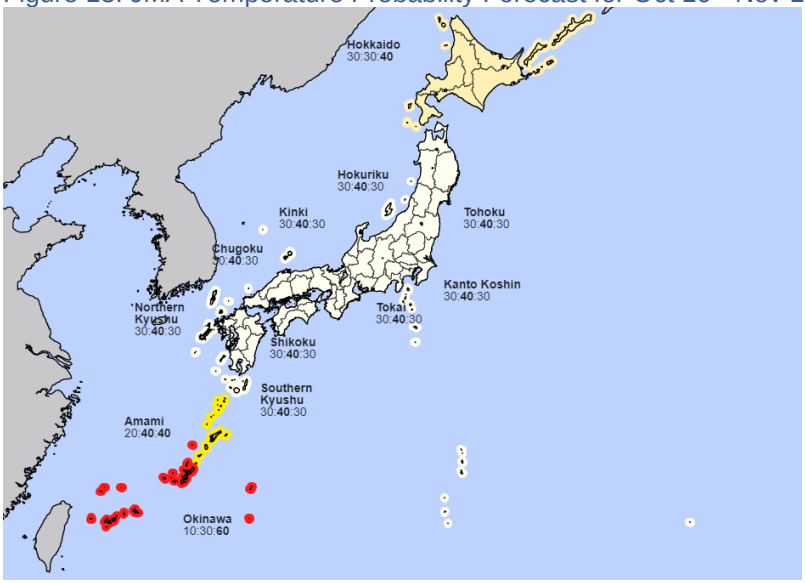
Source: Japan Meteorological Agency

Natural Gas - Also no major weather natural gas demand pull in Japan to mid Nov

Japan shoulder season

This is shoulder season for natural gas demand in Japan and it looks like there won't be any major natural gas demand pull over the next month due to weather in Japan. Japan is expected to experience average temperatures for the remainder of October and into November. After the next few days, AccuWeather is calling for daily highs in the low 20s and night lows in 10 to 15C range. So it looks like not hot enough or cold enough for any significant natural gas demand pull. The Japan Meteorological Agency issued its updated month ahead weather forecast for Oct 16 – Nov 15 on Thursday [LINK], which calls for average weather in central Japan with above average temperatures in the north and south. The southern islands have a high chance of being above seasonal norms. Below is the current JMA forecast for Oct and into early Nov.

Figure 13: JMA Temperature Probability Forecast for Oct 16 - Nov 15



Source: Japan Meteorological Agency

Natural Gas – Novak says Nord Stream 2 is ready to begin deliveries

Nord Stream 2 is readying to go

We continue to believe that a number of decisions/actions are being held up by COP-26 that runs Oct 31-Nov 12, especially those actions that might rile up the climate change/energy transition side. Governments will do all they can to not announce or agree to something that would look bad on them in the global spotlight at COP26. Its why, on Thursday, we tweeted [LINK] "*Can EU policymakers withstand public & some members pressure on record #NatGas prices & wait until after #COP26 ends Nov 12 before seeing if they want to give in & try to force #NordStream2 final approvals? Novak reminds it is ready for operation in the coming days. #OOTT*". The energy crisis in the UK and Europe has reached mainstream media and not just business news. And we are seeing cracks among EU countries on how to deal with the high natural gas and electricity prices. But there would be a lot of ridicule on the UK and EU if they did anything controversial like try to speed up approvals of Nord Stream 2. Its why we think its unlikely that any potential move to publicly accelerate Nord Stream 2 approvals isn't likely until after COP-26. On Thursday, Russia and Novak reminded the EU that relief to the natural gas crisis can be had with the approvals of Nord Stream 2. TASS reported "*Nord Stream 2 has been completed. Commissioning and filling of the pipe with the required technological amount of gas are underway. And I believe that it will be ready for operation in the coming days, in order to launch it, "Novak said. At the same time, he noted that the further situation with the operation of the pipeline depends on the European regulator. Commercial gas supplies via Nord Stream 2 may begin immediately after obtaining permission from the regulator, the Deputy Prime Minister stressed, adding that supplies also depend on applications from European consumers*." Our Supplemental Documents package includes the TASS report.

Figure 14: Nord Stream 2, 5.3 bcf/d capacity

Source: Nord Stream 2

Former Shell Exec Wetselaar's excellent LNG insights

Natural Gas – Thank you to Ex-Shell Wetselaar for Europe storage significance

Prior to this year, there was almost no one focused on the significance of Europe gas storage levels as a key indicator of LNG and global natural gas markets. In the 21 years of writing this memo, I rarely note a specific oil & gas company executive for coming up with an energy insight that totally changed the way I analyze a commodity and, more importantly, the capital allocation opportunities. Its why I want to give a shout out to Maarten Wetselaar on the announcement he is leaving Shell after 25 years to become CEO of Cepsa (Spain). I have probably mentioned his name dozens of times since I featured his insight in a blog after seeing his comment in a Bloomberg terminal video of an Australia presentation. Every since then, I have used Europe gas storage as the best indicator for the strength and near term direction for LNG markets. We first highlighted this key concept over 4 years ago. On Sept 20, 2017, we posted two related blogs. The first blog was "*Shell: "Every LNG Cargo That Could Technically Be Produced In This World Has Been Produced And Has Found A Well Paying Customer"*, and the second linked blog was "*China's Plan To Increase Natural Gas To 10% Of Its Energy Mix Is A Global Game Changer Including For BC LNG*". The concept of the blogs was that the market was understating the fall LNG 2017 market strength, China being serious about increasing natural gas, and the surprising market strength would lead to a BC LNG FID in 2018 ie. LNG Canada. I never would have called for the surprising FID on LNG Canada Phase 1 if I hadn't thought about Wetselaar's Europe gas storage concept. LNG markets were much stronger in the summer of 2017 than the market realized. And Wetselaar's explaining the concept of Europe gas storage was the ah-ah moment. As soon as we heard it, we knew it made sense. And when you look at the Europe gas storage utilization for this winter, it fits to the thesis Wetselaar first outlined in Aug 2017. Long term readers of Energy Tidbits know we think the best insights from companies comes from Q&A, not the slide decks, and that was particularly so in this case. Here is what we wrote in Sept 20, 2017 blog "*The key data support to Wetselaar is that NW Europe storage is not seeing surplus LNG cargos looking for a home. In the Q&A, Wetselaar said the data support for his comment that the market is absorbing all of the new LNG supply is to look at NW Europe storage. Wetselaar did not use the description dumping ground, but it is the right term. Webster's defines "dumping ground" as "a place to which unwanted people or things are sent". He noted that if LNG was in oversupply, there would be surplus LNG cargos looking for a home and these surplus LNG cargos would find their way to NW Europe storage. Shell is not seeing any YoY increase in NW Europe storage. Hence, he is firm in his view that*

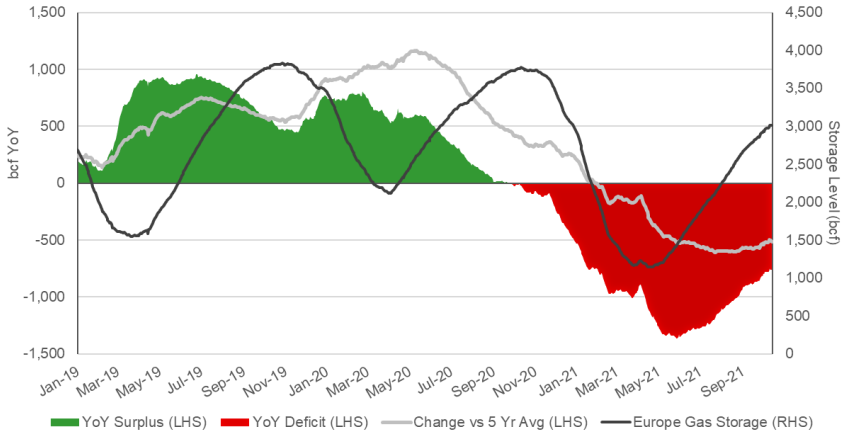
demand was absorbing all the new LNG supply in 2017. We pasted the NW Europe storage data into the below graph and it shows exactly what Wetselaar said – the monthly YoY changes in storage do not show increases in the net storage withdraw/injections, which implies that there isn't any dumping of surplus LNG cargos in NW Europe storage. We have not been following NW Europe natural gas storage, but now have it on our regular data check list because of Wetselaar's comments." So our thanks to Wetselaar for the best LNG insight. Our Supplemental Documents package includes our Sept 20, 2017 Shell blog and our other Sept 20, 2017 blog on China being a game changer for natural gas.

Natural Gas – Europe storage 77.04% full vs 5 year average of 91.02%

Europe gas storage 77.04% full; lowest levels in a decade

Its been a good last few weeks for refilling Europe natural gas. Its still far below normal levels but has been improving. Europe inventories are at their lowest level in more than a decade. The set up for winter natural gas prices continues to look extremely bullish. The key indicator for winter Europe natural gas prices, and global LNG prices is Europe storage. Europe gas storage started the winter (Nov 1) at basically full levels at 94.66% and had dropped by 65.77% to be 28.89% at Apr 1. This 65.77% decline since Nov 1, compares to the 5 yr average that would be down 53.99% in the same period or to last winter that was only down 43.29% in the same period. Europe storage levels bottomed in late Apr at 29%, which was the lowest level since Apr 2018. Storage as of Oct 14 is 77.04%, which is -18.20% less than last year levels of 95.24% and are -13.98% below the 5-year average of 91.02%. Europe storage levels over the next few weeks will be the key item to watch for indications on LNG markets going into the winter. Below is our graph of Europe Gas Storage Level.

Figure 15: Europe Gas Storage Level



Source: Bloomberg

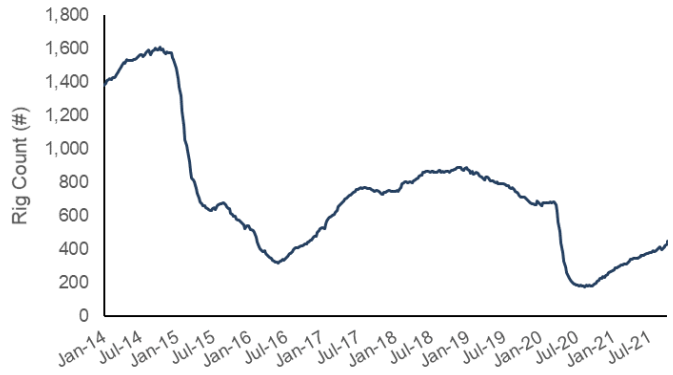
Oil – US oil +12 WoW at 445 oil rigs

US oil rigs +12 WoW

Baker Hughes released its weekly North American drilling activity data at 11am Friday. This week US oil rigs were up +12 rigs WoW at 445 rigs. Oil rigs are +273 off the bottom of 172 in Aug14/2020 week. No surprise, the Permian was +3 for the consecutive week as it is the oil basin expected to drive growth. With oil prices up 69% so far this year and expectations that consumers will switch to oil products with high gas prices, producers are increasing active rigs to boost production to accommodate demand. US oil rigs hit their 2020 peak at 683 on March 13 and have since fallen by 238 to 445 oil rigs (-36.6%). The biggest contributor to the decrease is the Permian being down 152 oil rigs from the March 13, 2020 peak (-36%), although we are seeing it continue to ramp up slightly. Also note the Bakken is down 29 oil

rigs to 23 active oil rigs (-55.8% from March 13, 2020). Below is our graph of US oil rigs since 2020, which highlights the big decreases in Permian and Bakken oil rigs.

Figure 16: Baker Hughes Total US Oil Rigs



Source: Baker Hughes

Oil – Frac spreads +5 to 268 as of Oct 15

Frac spreads +5 to 268

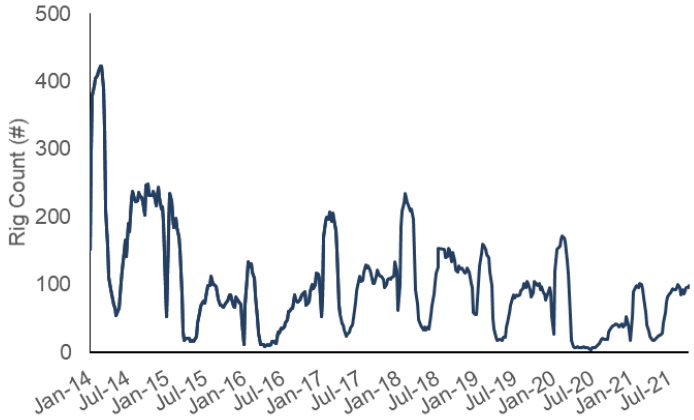
Mark Rossano (C6 Capital Holdings) provided his US frac spread recap for week ended Oct 15 on the Primary Vision network. The YouTube video is at [LINK]. US frac spreads were +5 to 268 for the week ended Oct 15. Activity is picking up in most of the smaller basins. Right now there are only three smaller basins without a frac spread but that should change as move into the end of Oct. Stills on track for frac spreads to hit his targett of 275 by the end of Oct, if not, then in early Nov. Rossano highlighted the opportunity for US LNG exporters to try to increase spot LNG sales, which means that there should be good support for spreads in the Haynesville. He also been expecting to see rigs increase to support frac sprad activity, and that is happening now.

Oil – Total Cdn rigs +1 to 168 total rigs and +88 rigs YoY

Cdn rigs +1 WoW

Total Cdn rigs were +1 this week to 168 total rigs. Cdn oil rigs were +3 at 98 rigs. Cdn gas rigs were -2 to 70 gas rigs. Total rigs are now +151 since the June 26, 2020 all-time low. We have been expecting a ramp up with the normal Aug/early Sept pause comes to an end. Cdn drilling has recovered YoY, a year ago Cdn oil rigs were 40 and Cdn gas rigs were 40 for a total Cdn rigs of 80, meaning total Cdn rigs are +88 YoY and total rigs are up +25 vs 2019.

Figure 17: Baker Hughes Total Canadian Oil Rigs



Source: Baker Hughes

US oil production up WoW

Oil – US weekly oil production up +0.100 mmb/d WoW at 11.4 mmb/d

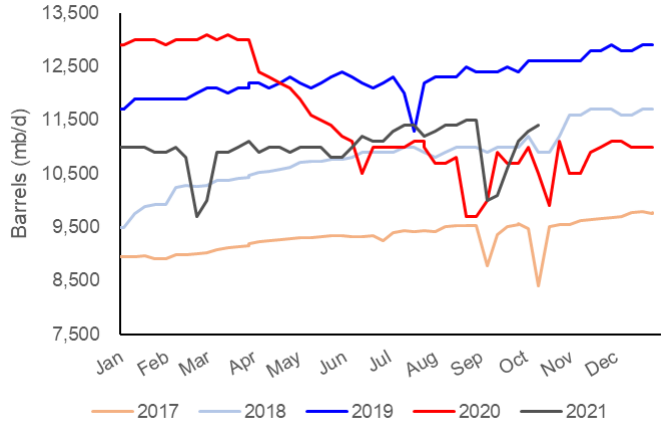
US oil production was up +0.100 mmb/d to 11.4 mmb/d for the Oct 8 week, driven by Lower 48 production that remained flat WoW at 10.900 mmb/d. Hurricane Ida decimated U.S. crude production, as output fell by -1.500 mmb/d last month, the biggest weekly drop in EIA data going back nearly four decades. Production continued to return as Gulf platforms resume operations and mend facility damage caused by Ida; most notably Shell's Olympus platform came back online this week. Oil Inventories increased for the first time in 8 weeks by 6.1 mmb. US oil production is up YoY at +0.900 mmb/d, and is down significantly at -1.7 mmb/d since the 2020 peak of 13.1 mmb/d on March 13. The EIA DPR has the effectively flat expectations for Sept/Oct for the major shale/tight oil plays.

Figure 18: 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						

Source: EIA

Figure 19: US Weekly Oil Production



Source: EIA, SAF

Oil – EIA STEO expecting sustained production growth to Q4/22

EIA forecasts US 2022 oil exit at 11.96 mmb/d

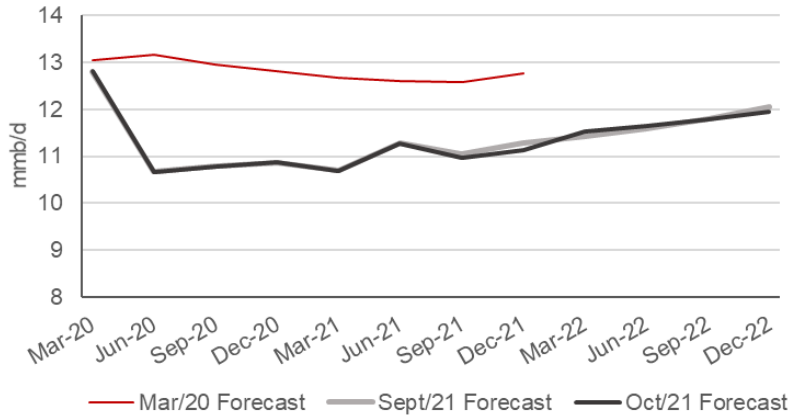
The EIA STEO received some attention for its forecast for US oil growth in in 2022. (i) There was no change to the historical 2019 oil production of 12.29 mmb/d and 2020 at 11.28 mmb/d, down 1.01 mmb/d YoY. (ii) Full year 2021 is decreased by +0.06 mmb/d vs September STEO to 11.02 mmb/d, which is down -0.26 mmb/d YoY from 2020. (ii) The EIA forecasts a shift back to YoY growth in 2022 with production averaging 11.73 mmb/d, +0.71 mmb/d YoY (was 11.72 mmb/d previously), with Q4/22 production of 11.96 mmb/d, is still down -0.92 mmb/d from Q4/19. (iv) In the US oil production commentary, the EIA wrote *"we forecast 2021 production will average 11.0 million b/d, increasing to 11.7 million b/d in 2022 as tight oil production rises in the United States. Growth will come as a result of operators increasing rig counts, which we expect will offset production decline rates."*

Figure 20: Estimated US Crude Oil Production By Forecast Month

EIA Estimated US Crude Oil Production By STEO Forecast Month																				
EIA STEO Forecast Month																				
(million b/d)	Q1/19	Q2/19	Q3/19	Q4/19	2019	Q1/20	Q2/20	Q3/20	Q4/20	2020	Q1/21	Q2/21	Q3/21	Q4/21	2021	Q1/22	Q2/22	Q3/22	Q4/22	2022
Oct-2021	11.80	12.15	12.31	12.88	12.29	12.81	10.67	10.79	10.87	11.28	10.69	11.28	10.98	11.13	11.02	11.54	11.64	11.78	11.96	11.73
Sept 2021	11.80	12.15	12.31	12.88	12.29	12.81	10.67	10.79	10.87	11.28	10.69	11.28	11.06	11.28	11.08	11.42	11.58	11.81	12.06	11.72
Aug 2021	11.80	12.15	12.31	12.88	12.29	12.81	10.67	10.79	10.87	11.28	10.69	11.22	11.26	11.30	11.12	11.46	11.62	11.86	12.11	11.77
July 2021	11.83	12.13	12.25	12.78	12.25	12.75	10.81	10.81	10.90	11.31	10.70	11.20	11.17	11.34	11.10	11.54	11.72	11.95	12.20	11.85
June 2021	11.83	12.13	12.25	12.78	12.25	12.75	10.81	10.81	10.90	11.31	10.70	11.04	11.17	11.38	11.08	11.55	11.67	11.88	12.05	11.79
May 2021	11.83	12.13	12.24	12.78	12.25	12.75	10.81	10.81	10.90	11.31	10.65	10.97	11.12	11.34	11.02	11.51	11.68	11.96	12.21	11.84
Apr 2021	11.83	12.13	12.24	12.78	12.25	12.75	10.81	10.81	10.90	11.31	10.75	10.93	11.13	11.35	11.04	11.54	11.74	11.99	12.18	11.86
Mar 2021	11.83	12.13	12.24	12.78	12.25	12.75	10.81	10.81	10.87	11.31	10.79	11.06	11.27	11.46	11.15	11.67	11.84	12.16	12.41	12.02
Feb 2021	11.83	12.13	12.24	12.78	12.25	12.75	10.81	10.81	10.89	11.31	10.98	10.91	11.00	11.18	11.02	11.30	11.38	11.61	11.83	11.53
Jan 2021	11.83	12.13	12.24	12.78	12.25	12.75	10.81	10.81	10.81	11.29	11.06	11.03	11.07	11.25	11.10	11.32	11.37	11.52	11.74	11.49
Dec 2020	11.83	12.13	12.24	12.78	12.25	12.75	10.81	10.80	10.99	11.34	11.02	11.00	11.09	11.29	11.10					
Nov 2020	11.83	12.13	12.24	12.78	12.25	12.75	10.81	10.93	11.07	11.39	11.06	10.97	11.08	11.28	11.10					
Oct 2020	11.83	12.13	12.24	12.78	12.25	12.75	10.82	11.02	11.22	11.45	11.07	11.00	11.05	11.22	11.09					
Sept 2020	11.83	12.13	12.24	12.78	12.25	12.75	10.81	10.91	11.08	11.38	10.96	10.97	11.08	11.32	11.08					
Aug 2020	11.83	12.13	12.24	12.78	12.25	12.75	10.57	10.79	10.96	11.26	11.00	10.99	11.16	11.40	11.14					
July 2020	11.81	12.10	12.23	12.78	12.23	12.74	11.41	11.29	11.10	11.63	11.02	10.93	10.97	11.13	11.01					
June 2020	11.81	12.10	12.23	12.78	12.23	12.74	11.65	11.13	10.74	11.56	10.71	10.83	10.80	11.02	10.84					

Source: EIA STEO

Figure 21: Estimated US Crude Oil Production By Forecast Month



Source: EIA STEO

Oil – North Dakota August oil and natural gas production up MoM

North Dakota production up MoM

On Wednesday afternoon, the North Dakota Industrial Commission posted its Director's Cut, which includes August oil and natural gas production data [LINK]. The headline on the Aug numbers was that North Dakota Aug oil production was 1.107 mmb/d, which was up 2.84% MoM but from July 2021 production of 1.077 mmb/d. YoY production decreased -5% from August 2020 production of 1.165 mmb/d. North Dakota August natural gas production was up MoM. Our Supplemental Documents package includes excerpts from the Director's Cut.

Figure 22: North Dakota Oil Production By Month

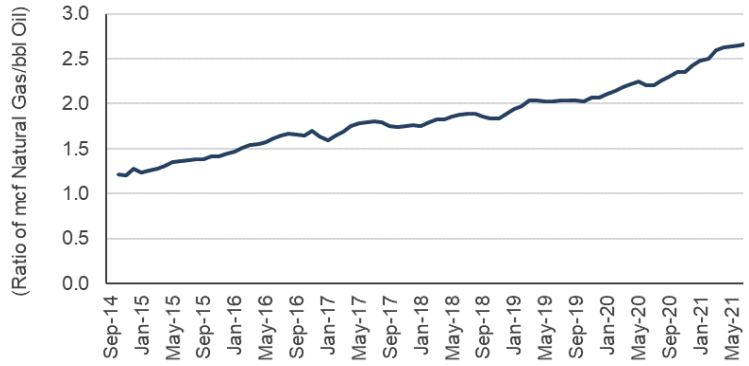
(b/d)	2016	2017	2018	2019	2020	2020/2019	2021	2021/2020
Jan	1,122,462	981,380	1,179,564	1,403,808	1,430,511	1.9%	1,147,377	-19.8%
Feb	1,119,092	1,034,248	1,175,316	1,335,591	1,451,681	8.7%	1,083,554	-25.4%
Mar	1,111,421	1,025,690	1,162,134	1,391,760	1,430,107	2.8%	1,108,906	-22.5%
Apr	1,041,981	1,050,476	1,225,391	1,392,485	1,221,019	-12.3%	1,123,166	-8.0%
May	1,047,003	1,040,995	1,246,355	1,394,648	859,362	-38.4%	1,128,042	31.3%
June	1,027,131	1,032,873	1,227,320	1,425,230	893,591	-37.3%	1,133,498	26.8%
July	1,029,734	1,048,099	1,269,290	1,445,934	1,042,081	-27.9%	1,076,594	3.3%
Aug	982,011	1,089,318	1,292,505	1,480,475	1,165,371	-21.3%	1,107,216	-5.0%
Sept	971,760	1,107,345	1,359,282	1,443,980	1,223,107	-15.3%		
Oct	1,043,693	1,183,810	1,392,369	1,517,936	1,231,048	-18.9%		
Nov	1,034,484	1,194,920	1,375,803	1,519,037	1,227,138	-19.2%		
Dec	942,322	1,182,836	1,402,741	1,476,777	1,191,429	-19.3%		

Source NDIC, NDPA

North Dakota gas-oil ratio increases as Bakken matures

One of the long-term trends that we have been highlighting for all of the US tight/shale oil plays that produce associated natural gas and NGLs is that, over time, the percentage of natural gas increases in the production. This is the case for all the oil plays with associated natural gas, not just the Bakken. We see this clearly in North Dakota where the gas-oil ratio continues to increase. The gas-oil ratio in August was 2.67, vs August 2020 of 2.26, August 2019 of 2.04, August 2018 of 1.89, and August 2017 of 1.79. Below is our running graph of North Dakota gas-oil ratio updated for the new NDIC August production data.

Figure 23: North Dakota Gas-Oil Ratio



Source: NDIC, NDPA

Oil – North Dakota crude by rail up MoM to 163,984 b/d in August

North Dakota CBR up in August

The North Dakota Pipeline Authority also posted its monthly update "*August 2021 Production & Transportation*" [LINK]. Please note that we always go to the backup excel sheets from the North Dakota Pipeline Authority for more detailed numbers of crude by rail out of North Dakota. The NDPA Monthly Update (graph below) report only provides rounded numbers, and these rounded numbers are not accurate enough to match the graphs. In the backup excel, the NDPA estimates crude by rail in August was a low of 148,984 b/d and a high of 178,984 b/d for an average of ~163,984 b/d. This is up from July low of 131,224 b/d to high of 161,224 b/d for an average of ~146,224 b/d. Note that July's numbers were revised up 4,192 b/d. Below is a chart from the NDPA monthly update showing the crude by rail volumes since 2013. Our Supplemental Documents package includes excerpts from the NDPA monthly update.

Figure 24: Estimated North Dakota Rail Export Volumes

Source: North Dakota Pipeline Authority

Oil – White House now working on logistics of moving oil/gasoline around the US

White House new focus is logistics

We saw aa new White House focus this week on what they are doing, other trying to support US oil production growth, to try to increase supply. Its almost like a parlour game where the challenge is to make up any suggestion except support US oil production growth, which is a reminder of what Biden administration wants to do.. On Thursday, White House spokesperson Psaki was asked that with oil north of $80, are there any "new" steps Biden is looking at to deal with this. Was the reporter trying to get her to say encourage US oil

production? We don't know but he asked for any "new" steps. Psaki had her standard reply that they continue to press OPEC on increasing supply. But then she said "*But part is also a logistics issue of being able to move supply around the country and that's something that we're also looking into options on."* There are three ways to move oil and gasoline around the country – pipelines, rail and trucks. Needless to say there were numerous tweets on what about pipelines, but we also not the item from last week's (Oct 10, 2021) Energy Tidbits memo on the shortage of tank truck drivers. So how does the Biden administration hope to logistically move more oil and gasoline around the country. There is a shortage of tank truck drivers and they can't drive more hours in a day. It takes years to build a pipeline. The only possible solution is by rail. But rail doesn't deal with the critical last mile to get it to the consumer, so back to tank truck drivers. It will be interesting to see if this idea just fades away. Our Supplemental Documents package includes the transcript Q&A excerpt on this.

US has a petroleum tank truck driver shortage

Last week's (Oct 10, 2021 Energy Tidbits) memo highlighted that the US petroleum tank truck driver shortage got worse during Covid, no different than the UK truck driver shortage. Even before Covid, this was an increasing risk to the oil industry with an aging workforce in the petroleum trucking sector. The National Tank Truck Carriers released August data that gave insight to the current climate US petroleum truck drivers. The Covid-19 pandemic has exacerbated the pre-existing issues. Our October 3 Energy Tidbit noted, *"there was already a retirement issue affecting the trucking industry before Covid. But this attrition of drivers issue should get a bigger boost than normal/expected because of the high percentage of older drivers. Older drivers are not going to be different than older people and see higher risk to getting Covid. And older drivers are the biggest percentage of truck drivers. It means that the retirement issue will get worse."* 80% of all US petroleum track drivers are over the age of 45 and 23% are over 55. There has been a substantial decrease in the number of drivers since 2016, down 23.3% and an 11% reduction ion total loads hauled. The NCCT reports that for every 9 job postings, there is only 1 hire; this in comparison to blue collar positions that observe a 1:1 ratio of job postings to positions filled. DMV and driving school closures created a void of new drivers while certifications required, and the marred image of the trucking lifestyle continue to be barriers to entry. Our Supplemental Documents package includes the NCCT report.

Oil – Enbridge asking for court delay after Canada invokes 1977 treaty on Line 5 fight

1977 pipeline treaty with US

In response to last weeks announcement that Canada was formally invoking a 1977 treaty with the US over the Line 5 pipeline, Enbridge Inc lawyers pressed a federal judge to delay Michigan's legal challenge to the pipeline [LINK]. Canadian officials invoked the 44-year-old treaty to trigger negotiations with the US administration about the pipeline project. The treaty was intended to be utilized to avert threats to energy supplies in both Canada and the US. Attorneys from Dickson Wright PLLC noted *"here, the state's lawsuit has directly affected the interests of the United States in a foreign relations matter subject to resolution under a treaty designed specifically to protect energy security in both nations. Its beyond dispute that the Michigan's claims have directly and significantly affected U.S. foreign relations with Canada, making removal appropriate."* Below is our October 10 Energy Tidbit in which we first noted the Canadian government invoking the 1977 Treaty.

Liberals finally invoke 1977 treaty with US on Line 5 fight

Last week's (Oct 10, 2021) Energy Tidbits noted our view that finally Canada decided to invoke the 1977 treaty on Line 5. Last week, we wrote "*After seeing the Globe and Mail report "Canada formally invokes 1977 treaty with U.S. in stalemate over Line 5*

pipeline" [LINK] especially after seeing the headline say "formally" invokes. we couldn't help tweeting [LINK] "Better late than never but why did it take 4 months or more? Finally #Liberals invoking 1977 treaty re #Line5 stalemate. 1977 treaty was set up specifically so municipal/state govts couldn't do what MI is trying to do. Thx @stevenchase. #OOTT". We just can't believe the Liberals didn't do this in May. We also retweeted our May 2, 2021 tweet [LINK] "#Line5. wonder if @JustinTrudeau @SeamusORegan have been pushing @POTUS to honor US/Can 1977 Transit Pipelines treaty to squash @GovWhitmer attempt to shutdown $ENB Line 5 by May 12? #OOTT". We have to wonder where Line 5 would be if Liberals had done this five months ago. Regardless, our tweet included excerpts from the 1977 treaty "TRANSIT PIPELINES: Agreement Between the United States of America and Canada. Signed at Washington January 28, 1977" " "ARTICLE III. 1. No public authority in 'the territory of either Party shall impose any fee, duty, tax or other monetary ·charge, either directly or indirectly, on or for the use of any Transit Pipeline unless such fee, duty, tax or other monetary charge would also be applicable to or for the use of similar pipelines located within the jurisdiction of that public authority. 2. No public authority in the territory of either Party shall impose upon hydrocarbons in transit any import, export or transit fee, duty, tax or other monetary charge. This paragraph shall not preclude the inclusion of hydrocarbon throughput as a factor in the calculation of taxes referred to in paragraph 1." Line 5 is a pipeline that was in place in 1977 and therefore covered by the treaty. "

Who, Where, What gets impacted by a Line 5 shut down

For the past 15 months, we have included the reminder on who gets hit by a Line 5 shut down. We first tweeted on June 19, 2020 [LINK] on the impact "*A weekend must read, Enbridge "impact of a Line 5 shutdown" is excellent recap of who, where, what gets hit by Line 5 shut down*." It includes tidbits such as "*Line 5 supplies 65% of propane demand in Michigan's Upper Peninsula, and 55% of Michigan's statewide propane needs*." There would also be a big impact on refineries to the east "*Refineries served by Enbridge in Michigan, Ohio, Pennsylvania, Ontario and Quebec would receive approximately 45% less crude from Enbridge than their current demand."* There was a good map that shows how Line 5 fits into other Enbridge pipelines delivering oil to places like Imperial's Sarnia and Nanticoke refineries in Ontario. Our Supplemental Doc1uments package includes the "impact of a line 5 shutdown" brief. [LINK]

Oil – Covid outbreaks in oil sands facilities unchanged at 6 Sept 30

Covid in oil sands

As of our 7am MT news cut off, Wood Buffalo has not posted a Covid-19 update for oil sands facilities. The last posted update is their Oct 5 Covid-19 update [LINK]. Versus their prior Sept 30 update, the number and names of oil sands facilities on the Covid outbreak list are unchanged. The 6 outbreak oil sands facilities are: CNRL Albian, CNRL Horizon, CNRL Kirby Jackfish, MEG Christina Lake, Suncor Firebag and Suncor Fort Hills.

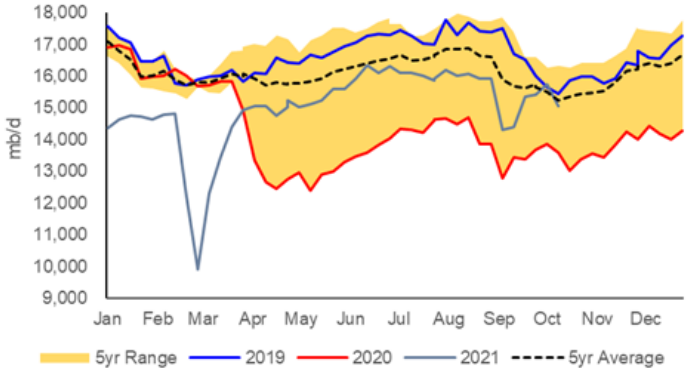
Oil – Refinery inputs -0.684 mmb/d YoY at 15.061 mmb/d

Refinery inputs down WoW

This week we saw a shift towards normal seasonal trends in crude inputs to refineries. Refineries continue to recover from the impacts of Covid and Hurricane Ida, though we observed inputs decrease slightly as the maintenance season begins to kick in.as is normal for October. There was a slight decrease in refinery inputs as refineries across the US engage in their seasonal maintenance. Crude inputs to refineries were down -0.684 mmb/d this week to 15.061 mmb/d, and are +1.484 mmb/d YoY. Refinery utilization was down to 86.7%, which is still +9.6% YoY. Total products supplied (i.e., demand) was down -1.651

mmb/d to 19.875 mmb/d. Motor gasoline was down -0.241 at 9.186 mmb/d from 9.427 mmb/d last week. Gasoline supplied, a proxy for demand, was down last week, which should be expected with high retail gas prices and end of the summer driver season. Below is our graph of crude inputs to US refineries and our graph of US motor gasoline supplied.

Figure 25: US Refinery Crude Oil Inputs (thousands b/d)



Source: EIA, SAF

Oil – US "net" oil imports down -441 mmb/d WoW at 3.480 mmb/d

US "net" oil down WoW

US "NET" imports were down -1.441 mmb/d to 3.480 mmb/d for the Oct 8 week. US imports were down -1.041 mmb/d to 5.994 mmb/d. US exports were up +0.400 mmb/d to 2.514 mmb/d. The WoW decrease in US oil imports was driven by US's top 10 imports by country were down -0.486 mmb/d from Top 10. Some items to note on the by country data. (i) Canada was down this week by +0.598 mmb/d to 3.441 mmb/d, which is now ~0.252 mmb/d below the average levels in Jan/Feb of 2020. (ii) Saudi Arabia was down 0.318 mmb/d to 0.304 mmb/d this week. (iii) Colombia was up 0.382 mmb/d to 0.382 mmb/d. (iv) Ecuador increased imports this week, up +0.149 mmb/d. (v) Iraq was up +157,000 b/d to 188,000 b/d. (v) Venezuela remained at 0 due to US sanctions. (vi) Mexico was down by -336,000 b/d to 0.316 mmb/d.

Figure 26: US Weekly Preliminary Oil Imports by Major Countries

US Weekly Preliminary Crude Imports By Top 10 Countries (thousand b/d)	July 30/21	Aug 06/21	Aug 13/21	Aug 20/21	Aug 27/21	Sept 03/21	Sept 10/21	Sept 17/21	Sept 24/21	Oct 1/21	Oct 8/21	WoW
Canada	3,228	3,371	3,057	3,555	3,612	3,580	3,200	3,143	3,034	4,039	3,441	-598
Saudi Arabia	351	302	363	286	345	296	369	399	561	622	304	-318
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0
Mexico	634	601	629	595	674	372	538	835	764	652	316	-336
Colombia	141	293	143	370	71	145	0	212	255	0	382	382
Iraq	82	120	150	77	174	106	50	42	0	31	188	157
Ecuador	46	150	197	261	195	0	174	102	235	59	208	149
Nigeria	212	150	214	95	43	116	82	95	64	133	211	78
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	4,694	4,987	4,753	5,239	5,114	4,615	4,413	4,828	4,913	5,536	5,050	-486
Others	1,738	1,409	1,597	918	1,226	1,195	1,348	1,637	1,639	1,499	944	-555
Total US	6,432	6,396	6,350	6,157	6,340	5,810	5,761	6,465	6,552	7,035	5,994	-1,041

Source: EIA, SAF

Oil – OPEC forecast demand doesn't include current natural gas to oil switching

OPEC MOMR for Oct

OPEC released its Monthly Oil Market Report at 5am MT on Wed morning. (i) We tweeted [LINK] on the biggest surprise in the OPEC forecast – they didn't increase demand for the switching we are seeing to petroleum products from record high LNG and natural gas prices. In the last few weeks, all the analysts have increased near term oil demand by 0.5 to 1.0 mmb/d for this switch. We tweeted "I*CYMI, Most #Oil demand forecasts assume record high*

#NatGas #LNG prices leads to switchng to heating and fuel oil ie. near term boost of 0.5 to 1 mmb/d. #OPEC's MOMR only notes it as a potential upside. #OOTT." (ii) There was a downward revision in 2021 oil demand growth by 0.2 mmb/d to +5.8 mmb/d YoY and 2021 average of 96.60 mmb/d is still well below pre-covid 2019 of 99.76 mmb/d. (iii) No change in oil demand growth in 2022 remaining at +4.2 mmb/d YoY. This brings the 2022 demand average is now 100.76 mmb/d, up -0.08 mmb/d from last months forecast of 100.83 mmb/d, slightle below pre-pandemic levels; Q4/22 now forecasts 102.93 mmb/d well above Q4/19 demand of 100.79 mmb/d. OPEC wrote "f*or 2022, the oil demand outlook takes into consideration an increase of 4.2% in economic activity with COVID-19 pandemic-related risks well managed due to higher vaccination rates and better treatment. In terms of products, gasoline and diesel are estimated to increase the most, supported by an ongoing recovery in mobility and improving industrial activity."* (iv) OPEC Sept production per "secondary sources" was up + 0.486 mmb/d to 27.328 mmb/d, revised from the Aug report of 26.657 mmb/d. Reminder that OPEC+ agreed to a +0.4 mmb/d MoM in Sept. There were only small revisions to Aug; the biggest revision came from Saudi Arabia +0.051 mmb/d. Nigeria was up +0.156 mmb/d to 1.451 mmb/d; Iran remained flat at 2.468 mmb/d. Venezuala flat at 0.527 mmb/d, holding steady over 0.5 mmb/d in 2021. (v) Minor changes to Non-OPEC supply growth for 2021 and 2022 now at 62.98 mmb/d. Key non-OPEC supply growth areas for 2021 are Canada +0.31 mmb/d YoY, Russia +0.19 mmb/d YoY, China + 0.15 mmb/d, Brazil +0.05 mmb/d, and Norway +0.07 mmb/d YoY. Key YoY growth areas for 2022 are Russia at +1.00 mmb/d, US +0.83 mmb/d, Brazil + 0.23 mmb/d, Norway +0.18 mmb/d Canada +0.17 mmb/d. (vi) The other big positive in the OPEC outlook is OECD commercial oil stocks for Aug estimates 131 mmb below 2015-2019 average. Our Supplemental Documents package includes the OPEC MOMR.

Oil – IEA OMR: increased demand while OECD stocks at lowest levels since 2015

Bullish IEA OMR

The IEA released its monthly Oil Market Report for October at 2am MT Thursday. They only release very limited public info and Bloomberg only provided tables and reporting on some items rather than their normal detailed report. (i) We tweeted [LINK] "*Multiple bullish #Oil items in @IEA OMR. Demand +170 kb/d in 21, +210 kb/d in 22, over >pre-Covid in 22. largest 3Q21 refined product draw in 8 yrs. OECD industry stocks in Sept at lowest level since Mar 2015. Spare oil capacity <4 mb/d by 2Q22. #OPEC loving this forecast #OOTT."* This was a bullish OMR. (ii) The IEA did what OPEC didn't do a day earlier in its MOMR, the IEA increased its 2021 and 2022 demand growth for the forced switching from high natural gas/LNG prices to petroleum products. The IEA wrote "*"the ongoing energy crisis has prompted a switch to oil that could boost demand by 500 kb/d compared with normal conditions. This contributed to an upward revision to our 2021 and 2022 forecast, by 170 kb/d and 210 kb/d respectively. Global oil demand is now forecast to rise by 5.5 mb/d in 2021 and 3.3 mb/d in 2022 when it reaches 99.6 mb/d, slightly above pre-Covid levels."* The IEA further warns that higher energy prices are adding inflationary pressures which could lead to lower industrial activity and a slowdown in economic recovery. (iii) Non-OPEC supply growth was revised down slightly with 0.1 mmb/d reductions to both 2021 and 2022. The limited public detail in the report doesn't split out the Americas; overall, America's supply was unchanged at 24.1 mmb/d in 2021 and 25.4 mmb/d in 2022. (iv) Another bullish oil outlook was the IEA forecasts global spare capacity to be less than 4 mmb/d by 2022 and the capacity is held primarily in Saudi Arabia, the UAE and Kuwait. The IEA wrote, "*with OPEC+ currently on track to pump 700 kb/d below the call for its crude during 4Q21, inventories will continue to decline. As the bloc ramps up production, its spare capacity will dwindle. Compared with a cushion of 9 mb/d in 1Q21, effective spare capacity could fall below 4 mb/d by 2Q22 and be concentrated in only a few Middle Eastern countries, although supply is expected to exceed demand. Shrinking global spare capacity underscores the need for*

increased investments to meet demand further down the road." (v) OPEC September production up +0.34 mmb/d MoM. Bloomberg wrote "*In Africa, Nigeria boosted production by 30k b/d to 1.27m b/d, while Angolan output slid 20k b/d to 1.11m b/d -- 240k b/d lower than its quota -- due to maintenance."* The MoM increase would have been +0.26 mmb/d based on estimates from last month for August production; IEA revised August production to 26.81. The major difference in OMR at 27.15 vs OPEC MOMR at 27.33 is Nigeria which had +30,000 b/d to 1.27 mmb/d in September; MOMR had Nigeria at 1.45 mmb/d (vi) On refined products draw the IEA wrote *"implied 3Q21 refined product balances show the largest draw in eight years, which explains the strong increase in refinery margins in September despite significantly higher crude prices."* (vii) Another bullish oil outlook was the IEA estimate on OECD oil stocks. The IEA saw a draw of 28 mb in August stocks to 2,824 mb, 162 mb below the 5-year average; preliminary September data notes Europe and Japan show on-land stocks fell by 23 mb. Crude oil held and floating oil decreased by 8 mb in August. The IEA call on Sept preliminary stocks noted, *"Preliminary data shows OECD industry stocks fell 23 mb in September to stand 210 mb below their five-year average and at their lowest level since March 2015."* (viii) Call on OPEC crude for 2022 was revised to 27.5 mb form 27.2 mmb/d; 2021 saw a call to 27.4 mmb/d from 27.2 mmb/d. Our Supplemental documents package includes the IEA release and the Bloomberg report.

Figure 27: IEA Global Demand Forecast By OMR Report Month

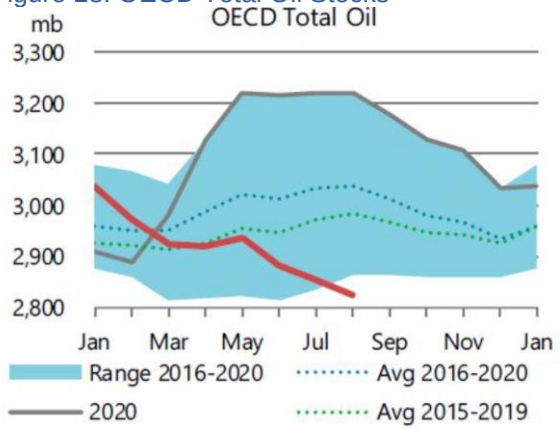
mmb/d	2019	2020	20-19	Q1/21	Q2/21	Q3/21	Q4/21	2021	21-20	Q1/22	Q2/22	Q3/22	Q4/22	2022	22-21
Oct 21	99.7	91.0	-8.7	93.4	95.2	97.8	98.9	96.3	5.3	98.6	99.1	100.5	100.2	99.6	3.3
Sep 21	99.7	91.0	-8.7	93.4	95.1	97.2	98.8	96.2	5.2	98.2	98.9	100.3	100.7	99.5	3.3
Aug 21	99.7	91.0	-8.7	93.4	94.9	97.4	98.9	96.2	5.2	98.0	98.8	100.1	100.2	99.3	3.1
July 21	99.7	91.0	-8.7	93.6	94.7	98.1	99.4	96.4	5.4	98.2	98.7	100.3	100.6	99.5	3.1
June 21	99.7	91.0	-8.7	93.3	94.9	98.0	99.3	96.4	5.4	98.3	98.6	100.3	100.6	99.5	3.1
May 21	99.7	91.0	-8.7	93.1	94.6	98.3	99.6	96.4	5.4	-	-	-	-	-	-
Apr 21	99.7	91.0	-8.7	93.7	95.1	98.3	99.5	96.7	5.7	-	-	-	-	-	-
Mar 21	99.7	91.0	-8.7	93.9	95.0	97.8	99.2	96.5	5.5	-	-	-	-	-	-
Feb 21	99.6	91.0	-8.6	93.7	94.9	97.9	99.2	96.4	5.4	-	-	-	-	-	-
Jan 21	99.9	91.2	-8.7	94.1	95.2	98.1	99.0	96.6	5.4	-	-	-	-	-	-
Dec 20	99.9	91.2	-8.7	94.7	95.4	98.0	99.2	96.9	5.7	-	-	-	-	-	-
Nov 20	99.9	91.3	-8.6	94.9	95.8	98.4	99.1	97.1	5.8	-	-	-	-	-	-
Oct 20	99.9	91.7	-8.2	95.6	96.1	98.2	98.8	97.2	5.5	-	-	-	-	-	-

Source: IEA, SAF

IEA's OECD Total Oil Stocks graph says it all

We don't have access to the IEA's Oil Market Report so rely on their press release and the great job Bloomberg does in providing the detailed numbers and reports. Fortunately, John Kingston at FreightWaves tweeted [LINK] "*This is a chart of total #oil stocks in OECD nations just published by @IEA. The red line is the current level of stocks. The blue area is the range the last five years. It doesn't really need any additional commentary; the picture very much is worth a thousand words*." The IEA chart is as of the end of August and is a very bullish chart. But its even better in September, which is why we We retweeted adding "*Thx @JohnHKingston for this bullish Aug oil stocks chart. Plus @IEA says Sept is even better, preliminary data shows OECD industry stocks fell 23 mb in Sept to stand 210 mb below their 5-yr average & at their lowest level since March 2015. #OOTT".*

Figure 28: OECD Total Oil Stocks



Source: IEA via FreightWaves

Saudi expects continued OPEC+ increases

Oil – Saudi expects OPEC+ to add +400,000 b/d for the next four months

On Thursday, TASS reported on comments by Saudi Energy Minister Abdulaziz at the International Forum "Russian Energy Week" in Moscow. Abdulaziz gave a pretty clear description of where Saudi Arabia sees oil markets (a very balanced market for oil stocks at year end), what they expect OPEC+ will be doing (continuing their +400,000 b/d increase for the next four months, but a reminder that 2022 has some risks (a build in stocks). TASS reported "*According to him, the oil reserves of the OECD countries, the level of which OPEC + is guided by in its actions, really decreased compared to the 2020 crisis year. "And we think that by the end of this year we will see a very balanced situation*." And "*The minister also added that the OPEC + countries can continue to increase oil production by 400 thousand bpd per month "in the next four months."* And "*And if you look at 2022, you will see a lot of excess stocks.*" Our Supplemental Documents package includes the TASS report.

Gotta love Abdulaziz response to US ask of OPEC to increase oil exports

We are fans of Saudi Energy Minister Abdulaziz for the amazing job he has done in leading oil markets to where we are today and also for his colorful commentary. Its why we call him the most interesting man in the world. All the world has heard about from the US over the past month is how they keep calling their OPEC country friends and ask them to increase oil exports. On Thursday, we saw the first Saudi Energy Minister public response to these requests. Even though it was specifically addressed to the US, it was clear it was to the US. TASS reported "*The oil market may be balanced by the end of 2021 after the pandemic crisis, but there are risks of overproduction of oil as early as 2022. This opinion was expressed by the Minister of Energy of Saudi Arabia, Prince Abdel Aziz bin Salman. According to him, the oil reserves of the OECD countries, the level of which OPEC + is guided by in its actions, really decreased compared to the 2020 crisis year. "And we think that by the end of this year we will see a very balanced situation. <u>But it is important to always look a little further than the tip of your nose.</u> And if you look at 2022, you will see a lot of excess stocks," he said, noting that "such arithmetic consists of data from eight independent sources."*

Later on Thursday, White House said still pressing OPEC for more oil

Keep in mind that Abdulaziz comments were made in Moscow and hours before the daily White House briefing. And they went out quick on Twitter so the White House

had to know this. Regardless at the afternoon White House briefing, White House spokesperson Psaki was asked "Jen, the president has been trying to go back to increase supply in the past. Oil prices have been north of $80 a barrel. Are there any steps that he's looking at, new steps to try to deal with some of these energy issues?" Psaki replied "*Well, first, the president is very focused on this. He has asked his team about it. There are a number of people, senior members of the White House team from the NSC, from the NEC working on this issue every single day. I would say that part is a supply issue, which is why you asked me about OPEC. That's something we continue to press them on.*"

Oil – Sounds like still be awhile until Iran is ready to rejoin JCPOA negotiations

IRNA on JCPOA negotiations

We recognize that we are seeing mixed signals sourced to Iran as to when they will re-enter JCPOA negotiations. Some are tweets by Iranian MPs but, at least as of this morning, we will tend to go with the IRNA report "*Iran assessing how to enter nuclear talks*" posted at 2:29am MT [LINK]. IRNA is the official news agency for Iran. The IRNA reports seem to suggest it will still be awhile before Iran is ready for the next round of Vienna talks. IRNA reported on comments from the Spokesman for Parliament's presiding board Nezamoddin Mousavi following the closed briefing session with Iran's Foreign Minister Hossein Amirabdollahian. IRNA reported "*On the talks to lift illegal sanctions imposed by the US, the lawmaker said that Iran has adopted various strategies in this regard, including negotiations with three European counties as mediator and then talks with 5+1 (6 world powers) that led to the 2015 Joint Comprehensive Plan of Action (JCPOA), informally known as Iran nuclear deal. Iran needs to more carefully review past models for negotiations and then choose one for the upcoming talks, he noted. He said that Iran would adopt the best model chosen through collaboration between the administration, the Parliament, and the agencies concerned in accordance with the policies formulated by Supreme Leader of the Islamic Revolution Ayatollah Seyyed Ali Khamenei.*"

Oil – Will the Libya Dec 24 election be the catalyst for a split up?

Libya Dec 24 election

There are many reports on what is going on in Libya and they all seem to point a lot of internal conflicts/disagreements. No one seems to be in agreement on who does what and when. After reading a Libya Herald report "*Libya on brink of another west-east split and unravelling of LPDF's Road Map?"* [LINK], we tweeted [LINK] "*Is the real question, what happens AFTER the #Libya Dec 24 election? Will both the east (incl Haftar) & west be committed to unified Libya? @libyaherald report shows lots of issues from the east. In Sept 2020, #Oil production was <200,000 b/d #OOTT."* The Libya Herald reported the 10-point statement froom Hussien Gatrani, Deputy Prime Minister of Libya's Government of National Unity (GNU). The Libya Herald noted that Al-Gatrani, who hails from the east, was issuing the televised statement in front of a gathering of Libya's eastern based (Barqa/Cyrenaica) Deputy Ministers, Ministers and mayors in Benghazi. So he was preaching to the converted. Regardless, he is listing a lot of grievances from the East. Its why we think the real question will be what happens after the Dec 24 election? Will both the east (including Haftar) and the west accept the election results and move forward under a united Libya? Or will the country go back into an east vs west conflict? We don't believe oil markets are reflecting the potential of the Dec 24 election being the catalyst to a return to Libya pre Q4/20. Our Supplemental Documents package includes the Libya Herald report.

Oil – IEA new forecasts for peak oil demand and oil demand in 2030 and 2050

IEA long term oil demand outlook

As expected, the IEA's new World Energy Outlook 2021 pointed a bullish view for oil and natural gas. As we have been noting, we have seeing a clear shift in IEA Executive Director Birol's messaging on how fast the world reduces its use of fossil fuels. Last week's (Oct 10,

2021) Energy Tidbits wrote on Platts comments from a Birol interview. And we said Birol is like a politician so they start to change their messaging and then that will eventually turn into a revised forecast/outlook. Platts reported Birol saying "*However, our analysis shows that although the COVID-19 crisis caused a historic decline in global oil demand, it's not necessarily a lasting one,"* and *"If we don't see additional major policy changes from governments and more rapid changes in behavior, then global oil demand is set to increase for several more years to come*." At that time, we tweeted [LINK] ""*If we don't see additional major policy changes from governments and more rapid changes in behavior, then global oil demand is set to increase for several more years to come" says @fbirol. seems @IEA's reality case is #PeakOil demand is around 2030. Thx @SPGlobalPlatts #OOTT."* Birol is very much like a politician so couldn't help teasing out his new forecast. The new IEA WEO forecasts oil demand in 2030 and 2050 compared to 2019. The IEA forecasts three scenarios – Stated Policies, Announced Pledges and Sustainable Development. Note the IEA says "*There are also references to the Sustainable Development Scenario (SDS), which, like the NZE, achieves key energy-related United Nations Sustainable Development Goals related to universal energy access and major improvements in air quality, and reaches global net zero emissions by 2070 (with many countries and regions reaching net zero much earlier). The Announced Pledges and New Zero Emissions by 2050 scenarios are introduced for the first time this year.Zero Emissions. Peak oil demand is probably sometime after 2030 in Stated Policies, just before 2030 in Announced Pledges, and has probably already happened in Net Zero Emissions*." This suggests SDS is not as aggressive as NZE.

Figure 29: IEA's World Energy Outlook Oil Demand Forecast

Table A.8: Oil demand (mb/d)

	Historical			Stated Policies		Announced Pledges		Sustainable Development	
	2010	2019	2020	2030	2050	2030	2050	2030	2050
World	86.7	96.6	87.9	103.0	103.0	96.1	76.7	87.6	47.0
North America	22.2	22.7	20.1	21.3	16.7	18.0	7.7	17.7	6.8
United States	17.8	18.4	16.4	17.4	13.4	14.7	5.4	14.6	5.4
Central and South America	5.5	5.5	5.0	5.4	6.0	4.8	4.0	4.5	2.4
Brazil	2.3	2.4	2.3	2.4	2.5	1.9	1.1	1.9	1.0
Europe	13.9	13.0	11.9	10.4	6.4	9.0	3.6	8.7	2.2
European Union	10.6	9.7	8.9	7.4	4.1	6.2	1.4	6.2	1.3
Africa	3.3	4.0	3.6	5.1	8.4	5.0	7.9	4.6	4.3
Middle East	6.6	7.4	6.7	8.2	10.2	8.2	10.2	7.2	6.1
Eurasia	3.2	3.8	3.7	4.4	4.5	4.4	4.5	4.0	2.6
Russia	2.6	3.1	3.0	3.5	3.1	3.5	3.1	3.2	2.0
Asia Pacific	25.0	32.0	30.8	38.5	38.8	37.8	30.1	33.0	17.2
China	8.8	13.1	13.3	15.7	13.4	15.7	6.4	13.6	5.9
India	3.3	4.8	4.4	7.2	9.2	7.2	9.2	6.0	4.1
Japan	4.2	3.4	3.1	2.8	1.8	2.4	0.8	2.4	0.8
Southeast Asia	4.0	5.1	4.7	6.6	7.7	6.6	7.6	5.6	3.2
International bunkers	7.0	8.3	6.1	9.6	11.9	8.9	8.8	7.9	5.4

Source: IEA

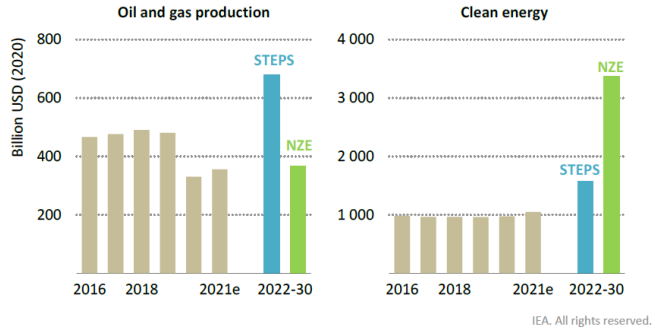
Oil – IEA's outlook is very bullish for oil prices under all scenarios

IEA highlights lack of oil spending

One key takeaway from the IEA World Energy Outlook 2021 is that it is very bullish to oil and natural gas prices for the 2020s. We tweeted [LINK] "*Here's why #Oil #NatGas prices will be way stronger for 2020s/2030s if world doesn't abruptly pivot to cutting demand to reach #NetZero. @IEA says O&G capex is at #NetZero demand levels, nowhere close to level needed for stated & announced policies demand. Good for #OPEC. #OOTT.* The IEA WEO included the below graph and notes that the level of oil and gas capex is only sufficient to about the level of annual capex needed to produce the amount of oil in the Net Zero

Emissions case and is about 1/3 the level of capex to produce the oil in the Stated Policies case. In other words, capital is nowhere near sufficient to hit the IEA's world oil production forecasts. And, at best, the level of capex is sufficient to hit the IEA's Net Zero Emissions production forecasts, which means it should be sufficient to hit the Sustainable Development Scenario that forecast oil production, versus the 2019 baseline, is down 10.1 mmb/d by 2030 and by 49.9 mmb/d by 2050. It looks very bullish for oil prices in the 2020s.

Figure 30: IEA WEO Investment in oil and gas production and clean energy



Notes: 2021e = estimated values for 2021. See Annex C for definition of clean energy.

Source: IEA

Figure 31: IEA's World Oil Production Forecast

Table A.7: Oil production (mb/d)

	Historical			Stated Policies		Announced Pledges		Sustainable Development	
	2010	2019	2020	2030	2050	2030	2050	2030	2050
World supply	85.5	97.9	91.3	103.0	103.0	96.1	76.7	87.6	47.0
Processing gains	2.2	2.4	2.1	2.6	3.0	2.4	2.3	2.2	1.4
World production	83.4	95.5	89.2	100.4	99.9	93.7	74.4	85.4	45.6
Conventional crude oil	66.8	65.1	59.6	64.1	61.2	59.9	46.6	53.6	25.1
Tight oil	0.7	7.7	7.3	10.6	10.9	9.8	7.8	8.7	6.4
Natural gas liquids	12.7	18.1	18.1	20.4	21.4	19.3	17.2	18.6	11.7
Extra-heavy oil & bitumen	2.6	3.8	3.3	4.1	5.0	3.8	2.3	3.5	2.2
Other	0.6	0.8	0.9	1.2	1.4	0.9	0.5	1.0	0.2
Non-OPEC	50.1	60.5	58.3	63.8	56.2	59.1	39.1	53.6	25.9
OPEC	33.3	35.0	30.9	36.6	43.7	34.6	35.4	31.7	19.6
North America	14.2	24.7	23.8	27.7	23.2	25.2	15.6	23.7	13.3
Central and South America	7.4	6.3	5.9	7.9	10.9	7.5	6.2	6.7	3.4
Europe	4.4	3.6	3.8	3.2	1.6	2.9	0.7	2.6	0.7
European Union	0.7	0.5	0.5	0.4	0.3	0.3	0.1	0.3	0.1
Africa	10.2	8.5	7.0	6.9	7.3	6.5	4.1	6.0	3.4
Middle East	25.4	30.2	27.7	34.0	39.7	32.1	34.3	29.3	17.9
Eurasia	13.4	14.6	13.4	14.4	12.5	13.9	10.2	11.9	5.1
Asia Pacific	8.4	7.7	7.5	6.2	4.7	5.6	3.2	5.1	1.9
Southeast Asia	2.6	2.3	2.1	1.4	0.9	1.4	0.8	1.3	0.4

Source: IEA

Vortexa floating storage

Oil – Vortexa est 97.41 mmb at Oct 15, +14.42 mmb vs original Oct 8 estimate

Note that we are referencing the Vortexa global crude oil floating storage data posted on the Bloomberg terminal as of 7:45pm MT yesterday. Note that these estimates often get revised over the weekend, and then again for the next week. There were big revisions this week vs the estimates posted as of Oct 8. Vortexa crude oil floating storage as of Oct 15 is 97.41

mmb, which is -3.7 mmb WoW vs Oct 8 of 101.06 mmb. However there were massive revisions to the last few weeks of data. Last Saturday, Oct 8 was estimated at 82.99 mmb, and that is hugely different from the 101.06 mmb for Oct 8 on Bloomberg last night. Oct 1 also had a big revision. Last Saturday, it was posted at 99.17 mmb, whereas last night it was posted at 109.39 mmb. Oct 15 of 97.41 mmb is above the recent June 25 trough of 78.78 mmb. Note the June 25 trough was revised up from last Saturday's estimate of 75.63 mmb. Oct 15 of 97.41 mmb is down 123.44 mmb from the June 26, 2020 peak of 220.85 mmb. Note this peak was revised up from last Saturday's estimate of 218.36 mmb. Oct 15 of 97.41 mmb is up vs pre-Covid of 52.29 mmb o Oct 14, 2019.. Below is the Bloomberg graph of the Vortexa data back to Oct 14, 2019 as posted on the Bloomberg terminal at 7:45pm MT yesterday.

Figure 32: Vortexa Floating Storage Oct 15, Posted on Bloomberg 7:45pm MT Sat

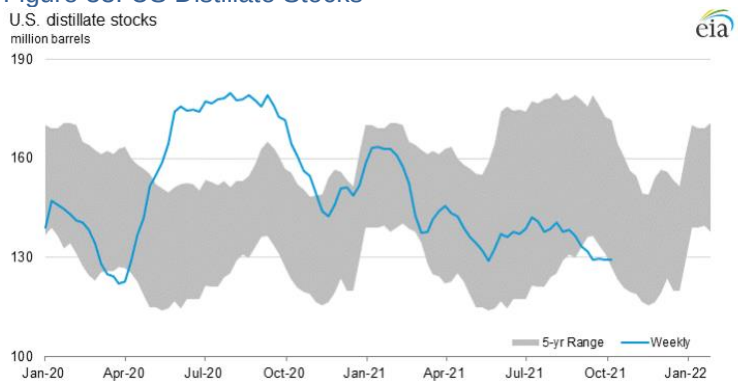
Source: Bloomberg, Vortexa

Oil – Low distillates stocks, reminder 76% are used for transportation

Low distillate stocks in US

The EIA released their This Week in Petroleum Weekly report on Thursday [LINK], and it highlighted low distillate stocks in the US heading into winter. Distillate fuel oil is a general classification for one of the petroleum fractions produced in the distillation process. They include diesel fuels and fuel oils, and are used in many trucks, railway, and agricultural machinery. Distillates are primarily used in transportation with 76% of sales used on highway, railroads, and vessel bunkering. Distillates used in heating of residential, commercial, and industrial facilities make up only 12% of the total market. Stocks are below the 5-year average at 130 mmb, and with winter draws typically beginning at the end of the month, prices can be expected to increase.

Figure 33: US Distillate Stocks



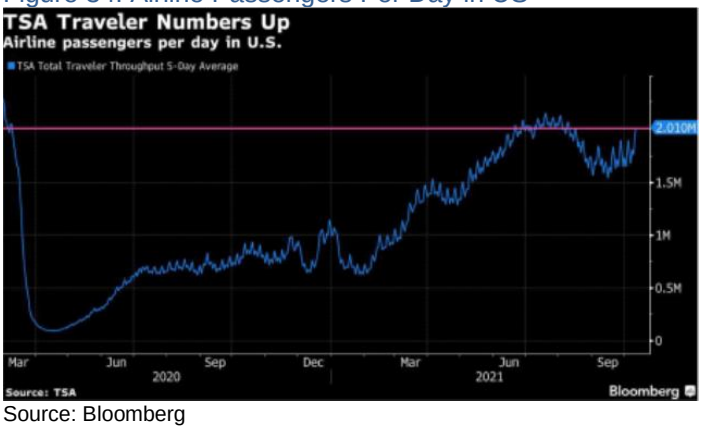
Source: EIA

Oil – Bloomberg Oil Demand Monitor, US air travel nears 2019 levels

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. US air travel has gradually recovered over the past few weeks and nears pre-pandemic levels, while airlines in Europe continues to be well below 2019 levels. The 5-day average showed airport turnstiles surpassed 2-million passengers per day for the first time since mid August. Jet fuel demanded, often a volatile measure, was just 4.6% below 2019. Around the world flights are still down 20%, according to data for the week ended Oct 11. The US, Mexico, and India all increased their seat capacity while China remains at the top with the highest global seat capacity. City congestion was up in Rome +54% MoM, with traffic taking an additional 64 minutes for what would normally be a 60-minute trip on empty roads. London and Paris congestion levels were also up +16% and + 9% relative to the same week in 2019. Toll road volumes in Europe were down as the driving season comes to an end, while volumes in Brazile, Chile and Mexico were all up. Oil market analysts expect that demand in Asia will be boosted due to the high natural gas prices that are forcing consumers and power producers to use alternative fuel sources. Estimates of up to 500,000 bbl/d of extra oil demand as per Facts Global Energy. US refinery utilization is up MoM across the board, as was expected as Gulf Coast facilities continue to increase output after Hurricane Ida and the scheduled maintenance season comes to an end. Our Supplemental Documents package includes the Bloomberg Oil Demand Monitor.

Figure 34: Airline Passengers Per Day in US



Source: Bloomberg

Oil – Road traffic activity holding despite high fuel prices

Congestion levels remain high despite cost of fuel

It appears drivers around the world remain committed to driving, despite the inflated global fuel prices. On Wednesday, Bloomberg released commentary from their TopLive coverage of EIA weekly oil inventory data. In an excerpt they noted that global road traffic continues to hold up, despite the high fuel prices and the peak of summer driving season ending. Based on BloombergNEF calculations on congestion data, aggregated road traffic in the first week of October saw gains in all tracked regions outside of China. We tweeted [LINK] *"Global road traffic activity holding up despite high fuel prices & end of peak summer season. Other than China that was hit by Golden Week holiday. Imagine the boost to #Oil when things get back to normal. Thx @BloombergNEF Danny Adkins #OOTT."* While traffic levels in most regions remain below pre pandemic levels, driving activity around the globe continues to be resilient to rising fuel prices. .

Figure 35: Peak Congestion Index

Source: Bloomberg

Oil & Natural Gas – China says "supply shortage is the biggest energy insecurity"

Supply shortage is the biggest energy security

On Tuesday, we tweeted [LINK] "*Must read. Bullish for #Coal #NatGas #Oil. Not just for this winter, China changing 5-yr plan to improve energy security. Increase coal generation, strengthen construction NatGas & Oil storage capacity. Develop new timetable/roadmap to reach carbon peak #OOTT #EnergyTransition*." China made a change in energy policy statement and we had to tweet as soon as we saw it on Tuesday morning. The China govt statement was titled "*Li Keqiang presided over a meeting of the National Energy Commission, emphasizing on ensuring stable energy supply and safety, enhancing the ability to support green development and Han Zheng attended the meeting*". [LINK] This is a relatively short, but a must read. The guiding principle to energy and climate change is "*Li Keqiang pointed out that energy security is related to development security and national security. my country is still a developing country, and development is the foundation and key to solving all problems."* Its all about ensuring energy security. And China said "*Supply shortage is the biggest energy insecurity*." And "*Aiming at the endowment of coal-based energy resources, the layout of coal production capacity should be optimized, advanced coal-fired power should be constructed rationally according to development needs, and backward coal-fired power should be eliminated in an orderly manner. Increase domestic oil and gas exploration and development, actively develop shale gas and coalbed methane, and carry out diversified international oil and gas cooperation. Strengthen the construction of gas and oil storage capacity, promote the large-scale application of advanced energy storage technology, and continuously enrich the insurance tools for safe energy supply."* And on the energy transition, China is going to look at a revised timetable for when it reaches peak carbon. China wrote "*To advance the realization of the "dual carbon" goal in a scientific and orderly manner, long-term arduous efforts must be made. It is necessary to take into account the recent situation of dealing with the contradiction between power and coal supply and*

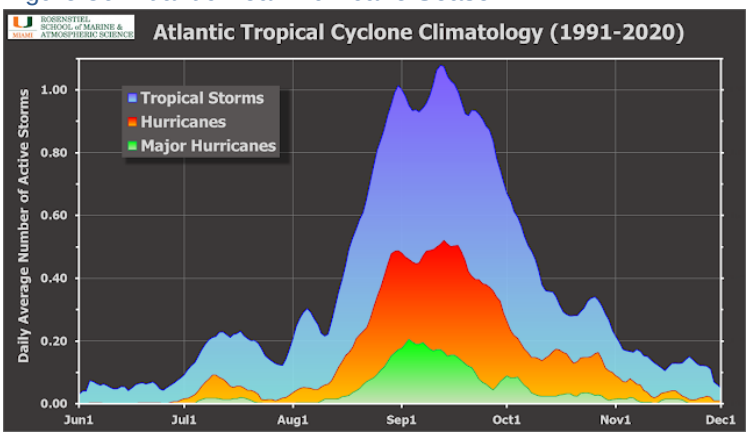
demand, in-depth calculations and demonstrations, and study and put forward the timetable and roadmap of the steps to reach the peak of carbon." There is more in the statement. Our Supplemental Documents package includes the China statement.

Oil & Natural Gas – Now past the historical peak of Atlantic hurricane season

Just past the peak of Atlantic hurricane season

The Atlantic hurricane season is not done, but we are now past the normal peak hurricane activity period, which generally runs from mid-Aug thru mid-Oct. There is always the chance for a hurricane, but it is a low probability. Our Sept 19, 2021 Energy Tidbits memo ine new Brian McNoldy (University of Miami's Rosenstiel School of Marine and Atmospheric Science) blog "*When is the peak of hurricane season?"* [LINK]. He included the below graph based on the new normal 30-year period of 1990 – 2020. McNoldy wrote "*one common metric would be the daily average of named storm (NS) activity. Using the new 1991-2020 "climate normal", that peaks on September 12th, with a secondary peak on August 31st. But the daily average of major hurricanes peaks on September 3rd, and one might argue that those are much less prone to being over/under counted and are definitely more impactful when close to land."* McNoldy's graph also reminds that we may be past the absolute normal peak, but we are still in the very active part of the Atlantic hurricane period thru mid-Oct.

Figure 36: Atlantic Peak Hurricane Season



Source: Brian McNoldy, University of Miami's Rosenstiel School of Marine and Atmospheric Science

Oil & Natural Gas – Putin reminds Northern Sea Route is the shortest sea route

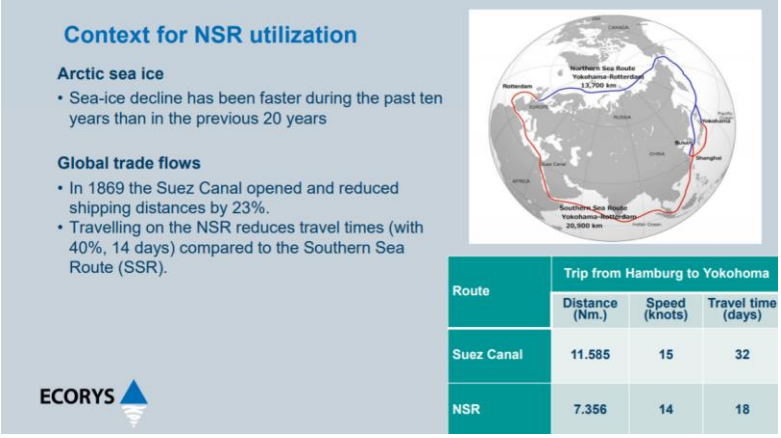
Northern Sea Route is fastest passage

There should be no surprise that Putin's Cot 14 speech to UN transport conference highlighted Russia's Northern Sea route. Putin confirmed that Russia has been transporting cargoes along the unique route and believes the role of the passage will continuously grow as the needs to ship goods between east and west along the shortest and most cost-effective route grows; specifically; with the industrial growth of the Asia Pacific region and the changing climate. Putin said *"we intend to increase freight traffic along the entire 10,500 km Northern Sea Route multiple times over, build infrastructure, including for reliable communications and navigation, and promote port development. We are also working hard to develop the nuclear-powered icebreaking fleet of Russia. In the process, we are inviting all interested partners, including our Chinese friends, to use more actively the opportunities of the Northern Sea Route for expanding trade transactions with Europe."* Putin concluded his comments on this topic by inviting all interested parties, with emphasis on China, to use more actively the opportunities the Norther Passage presents in expanding trade.

Russia's Northern Sea Route shortens shipping time by 14 days

Our June 20, 2021 Energy Tidbits was our last reminder on the Northern Sea route but our primary highlighting this year was in our April 4, 2021 Energy Tidbits at the time of the Suez Canal shutdown. The Northern Sea route is a much sorter and faster sea route. Time is money and this is a huge savings in time and cost even if there could be added insurance costs in the northern route. This was very topical as at the time of writing the Evergiven was stuck, blocking the Suez Canal. We noted that we had to believe that the Suez Canal stoppage got shippers thinking more about the utilization of Russia's Northern Sea Route. We also noted in our Jan 24, 2021 Energy Tidbits that Russia would be attempting the earliest ever LNG shipment to Asia through the Northern Sea Route in May, as the transit season is getting longer for the NSR. The NSR is a much shorter route from Europe to Asia than through the Suez, with a trip from Hamburg to Yokohoma taking 14 days less using the NSR and is ~4,000 Nm shorter. Below is a good graphic from the ECORYS discussion paper at the International Transport Forum. [LINK]

Figure 37: Suez Canal vs. Northern Sea Route



Source: International Transport Forum, ECORYS

Energy Transition – BlackRock energy transition leads to higher energy prices

BlackRock on restricting capital to hydrocarbons

Better late than never is the old expression that applies to what we are seeing from the early pushers of the Energy Transition such as BlackRock CEO Larry Fink. BlackRock held its Q3 call on Wed. Everyone in capital markets knows that he has been the most vocal and prominent on the financial side driving forward the Energy Transition. So the changing view on the impact of the Energy Transition for the past few months is significant as he is at least now trying to identify the Energy Transition isn't going on time, is bumpy and now, will cost more. We couldn't help tweeting [LINK] ""*We are fooling ourselves if we believe by restricting supply with our traditional hydrocarbon companies, that only raises energy costs, which we're witnessing now" says $BLK CEO. #Oil #NatGas CEOs wish he had said this 1, 2 yrs ago before capital was squeezed off. #OOTT*". (i) Inflationary pressures from the Energy Transition. Why doesn't he simply say energy is going to cost more and more under the Energy Transition. This is the new messaging that everyone has to start to reflect. And one we didn't hear a year ago. But, especially with the UK/Europe energy crisis, it now looks like confession time. We can't help but be annoyed at how the energy transition leaders didn't say this to people before. We wonder how the population would feel if they had been told a couple years ago or a year ago, remember if we do this energy transition, the cost of your energy bills are likely to be double or triple in the future. In his prepared remarks, CEO Fink

said "*Inflationary trends are appearing more than transitory, reflecting structural changes, including a shift from consumerism to job creation, rising wage growth and the energy transition. As I said in a speech to the G20 in July, society needs to rapidly invest in innovation to offset inflationary pressures associated with the transition to a net zero economy*." (ii) To use Fink's words, it looks like the Energy Transition leaders fooled themselves. In the Q&A, Fink highlighted that restricting supply to traditional hydrocarbon companies only raises energy costs. Surely, every oil person is shaking their head and saying Duh. Fink replied "*We're going to be fooling ourselves to getting to a net-zero world if we're only asking public companies. We are fooling ourselves if we believe by restricting supply with our traditional hydrocarbon companies, that only raises energy costs, which we're witnessing now. And that is creating not a just transition, which I spoke about in my last two CEO letters. So we have to be vocal. We have to be forceful about it."* Our Supplemental Documents package includes excerpts from the BlackRock Q3 call transcript.

Energy Transition – UK Treasury: will need higher taxes throughout the Energy Transition

UK Treasury says higher taxes are needed

We may not be getting a public acknowledgement or confession from the UK government on the costs of the Energy Transition, but at least we are now seeing leaded documents that are indicating the Energy Transition will require higher taxes throughout the Energy Transition. But these are leaked documents so they will somehow be messaged as being a scenario or something because we just can't see Boris Johnson coming out to say they will have higher taxes throughout the Energy Transition. We have to give governments credit on how they have been able to get the strong support for the Energy Transition without providing any support for their messaging that the Energy Transition won't lead to higher energy costs. Earlier today, we tweeted [LINK] ""*investment required to decarbonise the UK economy is uncertain", may need more tax revenue "throughout the transition" per leaked UK Treasury report. Thx @tobyhelm https://twitter.com/tobyhelm/status/1449666091228274695 . Don't know or don't want to say like @POTUS, #OOTT #EnergyTransition".* The Guardian reported [LINK] on "*confidential documents leaked to the Observer.*" The documents were from internal Treasury department documents, and included a number of expected items. (i) "*The investment required to decarbonise the UK economy is uncertain*". Clearly, the leaked documents did not include any estimates of the cost of decarbonization. We have trouble believing there isn't some sort of estimate, that no one in government thought they should know some idea of what this would cost. Its why we wonder is they can't say, or won't say. (ii) Tax increases *"throughout the transition*". If they don't have a forecast for the cost of the Energy Transition, then this statement is even more scary – that they know they will need to raise taxes throughout the transition ie. it will always cost more. The Guardian reported "On the fiscal implications, the documents say the cost of moving towards net zero could mean tax rises because of "the erosion of tax revenue from fossil fuel-related activity". They say: "*The government may need to consider changes to existing taxes and new sources of revenue throughout the transition in order to deliver net zero sustainably, and consistently with the government's fiscal principles."* Our Supplemental Documents package include the Guardian report.

Biden's team also wouldn't say how much the Energy Transition will cost

Our tweet this morning on the Guardian report also linked to our June 23 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*". 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*". Here is what we wrote in the June 27 memo. "*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."

Its understandable, but a little scary that Biden has no idea what it will cost

Here is another excerpt from our June 27, 2021 Energy Tidbits. "*The clear reminder from the Granholm comments is that the Biden administration has no idea how much this energy transition will cost the US, who will be required to pay up to get there and what it means to the cost of energy relative to today. No one can or at least should not disagree with the ambition to reduce global emissions. But it is a little scary to be committed to a path with no idea of what it costs. Maybe this is okay for the US, but think about how countries in the world can commit to a similar path? Maybe there is an estimate but the only reason we can think she would not disclose it is if it was very high. But, if we take her at face value, there isn't one and, to be fair to Granholm and the Biden administration, any estimate of how much it will cost to get to carbon neutral would require many far from confident assumptions. Just think about the comments from John Kerry (that he tried to backtrack) that half of the ability to get there will come from technologies still to be developed. So what could Granholm assume?"*

Energy Transition – Putin reminds it was an electricity shortage, not natural gas

Putin says it was an electricity shortage

Putin continues to put forward Russia's view that Europe's energy crisis was caused by an electricity shortage and not a natural gas shortage. On Wednesday, we tweeted [LINK] "*"the rise in #NatGas prices in Europe was the result of a shortage of electriicty, and not vice*

versa" & no such crisis when #Nuclear/#Coal were in the lead says Putin. Data shows EU replaced 24/7 baseload coal/nuclear with intermittent #Wind #Solar in last decade. #OOTT" TASS reported earlier on Putin's comments at Russian Energy Week [LINK]. TASS wrote ""*The rise in gas prices in Europe was the result of a shortage of electricity, and not vice versa. And there is no need, as they say, to shift from a sore head to a healthy one, as we say, and as some of our partners are trying to do," the head of state said. The Russian President noted that over the past decade, systemic flaws have been built into the European system step by step. "It was they who led to a large-scale market crisis in Europe. Let me remind you that while nuclear and gas generation were in the lead, there were no such crises, they had nowhere to come from," he said*." Putin didn't say it the way we do, but the concept is still the same – replacing baseload nuclear and coal with intermittent wind and solar means that whenever supply/demand gets tight, there is the likelihood of spikes and shortages.

Replacing 24/7 baseload with renewable = price spikes

We continue to be the Energy Transition is Not Ready For Prime Time and that this means continued energy price spikes and shortages when supply/demand isn't aligned close to perfectly – there is very little surplus energy available on short notice. On Aug 6, 2021, we tweeted [LINK] "*Positive to #NatGas #LNG in 2020s. OECD's steady replacement of 24/7 #Coal #Nuclear baseload with variable #Renewable means OECD #Electricity prices spike/shortage risk when supply/demand gets tight. China/India just increase coal. #Electricity will cost more in #EnergyTransition".* The reality is that the OECD countries are leading in the push to Net Zero, whereas China, India and others are still a long way away from reaching their peak in carbon emissions. Over the last decade, the bp data shows that the OECD countries policy push to reduce coal and nuclear power has worked, and their policy push to increase renewables has also worked. As a results, over the last decade, the reduction in electricity generated in OECD from traditional baseload 24/7 coal and nuclear electricity generation has basically been offset by increase in unpredictable and not 24/7 electricity generation from wind and solar. Taking 24/7 baseload power out means that whenever supply/demand is tight, the swings are huge and that is what we are seeing this summer. Our Supplemental Documents package includes the detailed bp table showing electricity generation by fuel by region and is worth a look

Energy Transition – High electricity prices send UK rail freight operators back to diesel

More electricity to diesel switching

There are a wide range of being seen from high natural gas and electricity prices on shutdowns. However, the challenge comes from essential services that have to be keep operating, especially those critical to the supply chain. This week, we saw the impact of more than a doubling of electricity prices on UK freight by rail. Freightliner of Genesee and Wyoming Corporation, has been the first to react to these high costs, and has chosen to temporarily replace their electric freight service with a diesel hauled service [LINK]. Freightliner is the largest UK freight operator of electric locomotives and has sought to deploy more electric traction on routes to reduce carbon emissions. The scenario of using diesel as a cheaper alternative has been met with resistance by environmentalists; with the remaining fleet of power installations running close to capacity, there are few options to alleviate the inflated costs. Freightliner commented, *"we regret that we have taken the decision to temporarily withdraw our electric locomotives from service. However, nobody benefits when such sharp spike in charges leads to low-carbon, electric locomotives being parked-up in yards. We will continue to work with Network Rail and with Government to find a resolution that, in the short term, enables us to reinstate electric services, and, in the longer term, aligns*

charges and incentives with Government objectives. Such alignment will enable further investments in low-carbon traction, deliver greater modal shift from road to rail and support the country's journey to net zero." Unions have been quick to criticize the government for promoting the use of "dirty" diesel fuels, especially with the upcoming UN climate conference in Glasgow at the end of the month. An RMT executive noted that the transition should be welcomed as the UK is already grappling with the truck haulage shortage that threatens to create further supply chain issues leading to the holiday season. Our Supplementals Documents package includes the FreightLiner report.

Energy Transition - Clairvant 2G biofuels are profitable w/ legislated 2x price of 1G

2G biofuels

On Friday, there was a good example of why the Energy Transition will be moving forward, but also why it will lead to significantly higher energy costs. The newest 2G biofuel plant will be more profitable than a 1G biofuel plant because they will have a legislated price that is 2 times higher. Yesterday, we tweeted [LINIK] "*1/2. Why 2G #Biofuels will be profitable & why energy costs are going way higher under #EnergyTransition. #Clariant CEO on Podari biofuels from straw "We expect double the price to first generation," That's "simply because it's legislated," he said. Thx @RefinedRachel #OOTT."* On Friday, Clarian AG announced the completion of construction at its Cellulosic Ethanol plant in Podari, Romania. [LINK]. The plant is a 2nd Generation (2G) biofuels plant that will turn wheat and barley straw into biofuels. The announcement and slide deck don't have anything that would give a sense of the economics of the 2G biofuels but, fortunately, Bloomberg reported on the press conference. Bloomberg wrote that the Clariant will "*make so-called advanced biofuels, which use agricultural waste or non-edible crops to make fuels that can be blended into gasoline and diesel. That's environmentally better than so-called first-generation ethanol currently on the market, which is made from foodstuffs like sugar or corn. The carbon savings from the new approach will make ethanol that's more profitable compared with existing processes, Clariant Chief Executive Officer Conrad Keijzer said on a conference call. "We expect double the price to first generation," he said. That's "simply because it's legislated," he said."* So twice the price of 1G biofuels makes it profitable, but somehow that cost has to work its way into the cost of energy. Our Supplemental Documents package include the Bloomberg report and excerpts from the Clariant slide deck.

TotalEnergies invested a lot of money in 2G without success

We had a second tweet on Saturday on this subject [LINK] "*2/2. Recall @TotalEnergies @PPouyanne "we have invested a lot of money like other players to try to make what we call the 2G, 2g-generation biofuels to become a reality without a lot of success, to be honest". #EnergyTransition is happening but will be very expensive. #OOTT".* In the Q&A from TotalEnergies recent investor day, mgmt was asked about biofuels, and CEO Pouyanne replied "*Helle, it's a very good question for me. It's why, by the way we have probably increased as well in our scenario what I call the hydrogen-based liquids either [?] fuel, synthetic fuels because it's very true. Maybe our own experience. you know we have suffered a little. I will come back on it with the [?] and I think it's not only the end, the soybean tomorrow, I think in Europe. So my view is that -- and you also know that in our industry, we have invested a lot of money like other players to try to make what we call the 2G, 2g-generation biofuels to become a reality without a lot of success, to be honest. So in my view, there will be, of course I would say the biofuels are immediately available. So we can begin to make, for example, sustainable aviation fuels with biofuels. I have a first generation or even what I call some wasted animal fats or used cook oil, but there will be a limit to that. Obviously in this type of feedstock, which is quite limited, in fact, on the planet."*

Straw has a relatively low energy content measured by volume

There was a good Max Planck Society 2020 report "*Fuel from Straw and Stubble"* [LINK] that had a key warning about 2G biofuels. They wrote "*The process does, however, pose a logistical challenge: due to its relatively low energy content as measured by volume, enormous amounts of biomass are required to keep a production plant running at full capacity. This requires countless truck deliveries to bring sufficient straw and other biomass from the field to the production plant."*

Energy Transition – WHO adds its voice to get rid of coal movement

WHO wants coal gone

On Monday, the World Health Organization posted its "*COP26 Special Report on Climate Change and Health: The Health Argument for Climate Action*". We read the report and tweeted [LINK] "*No doubt on @WHO position, "burning of fossil fuels is killing us", want absolute end to #FossilFuel subsidies, complete phase out of #Coal in OECD by 2030, non-OECD by 2040, effective taxation needed, "pricing the negative health & economic externalities" from #FossilFuel. #OOTT".* No question, the priority for WHO is to phase out coal as quickly as possible. WHO wrote "*1) Phase out polluting fossil fuels. The combustion of fossil fuels causes large environmental, health, and economic damage, and is a major contributor to air pollution, which kills 7 million people every year(87). This air pollution includes short-lived climate pollutants (SLCPs), such as black carbon, methane, and ground-level ozone, which also threaten human health. The science is unequivocal that the burning of fossil fuels leads to air pollution deaths (88,89). Governments need to end all support for fossil fuel energy, both domestically and abroad, in line with the long-term objectives of the Paris Agreement and best available science (90). This should include an absolute end to fossil fuel subsidies by 2025 and the complete phase out of coal - the most polluting and harmful of fossil fuels - by 2030 in OECD countries at the very latest, and by 2040 in non-OECD countries. At the same time governments should significantly increase investments in energy efficiency and renewable energy, ensuring an inclusive and just transition (91,92). In addition to a rapid phase out of fossil fuel subsidies, effective taxation is needed. Pricing the negative health and economic externalities from burning fossil fuels can help ensure the transition to an energy system that protects and improves climate and health."* Our Supplemental Documents package includes excerpts from the WHO report.

Energy Transition - Everyday California costs are going higher in Energy Transition

California banning gas lawn and leaf blowers

We realize the Energy Transition is happening but we have said it will take longer, be a bumpy road and cost more than expected. And we don't believe people realize how the Energy Transition will hit their pocket books on an everyday basis. This is not a huge example, but its indicative of how everyday costs are going up in California. Yard work and landscaping is about to get more expensive as California is moving to prohibit the sale of new gas-powered lawn mowers, leaf blower and chain saws by 2024 with a new bill signed by the Governor Newsom on Oct 9 [LINK]. The law requires that new small motor equipment being used for landscaping to be net zero emissions; essentially, all gas-powered landscaping machines are to be battery powered or or operate by plug in. The LA Times noted California has set aside $30 million to assist the landscaping professionals in the transition from gas powered equipment to zero emission, but also notes there are approx. 50,000 small business impacted so that works out to $600 per business on average. And the LA Times also notes the cost of this new equipment is expected to be of issue, as the article states, "*a gas-powered commercial riding lawn mower costs $7,000 to $11,000, but its zero-emission equivalent costs more than twice that amount."* The ability to power this equipment will also be of issue with representatives claiming crews will need to carry between 30 and 40 fully charged batteries to have the power required for a full day's work. An industry representative

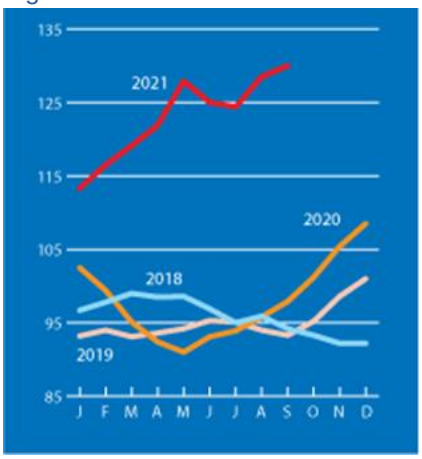
remarked "t*hese companies are going to have to completely retrofit their entire workshops to be able to handle this massive change in voltage so they're going to be charged every day."* Our Supplemental Documents package includes the Los Angeles Times article.

Capital Markets – FAO Food Price Index +32.8% YoY, continues to reach new heights

FAO Food Price Index continues to reach new heights

We are surprised that the stress of the big increase in food prices doesn't get more attention. Our Sept 26, 2021 Energy Tidbits noted the USDA Food Price Index and how we were surprised by the lower than what we expected on food price escalation. We titled that item "food price escalation seems way less in the US vs Alberta". Food prices are a big element of inflation but are at the core of the problems for much of the world's population. These problem is only getting worse when looking at the global impact. The United Nations' Food and Agriculture Organization released their monthly Food Price Index results last Thursday [LINK]. The FAO Food Price Index (FFPI) averaged 130.0 points in September, which was 1.5 points (+1.2%) higher than August and up 32.1 points (+32.8%) YoY. The latest rise of the FFPI was largely driven by higher prices of most cereals (+2.0% MoM; +27.3% YoY) and vegetable oils (+1.7% MoM; +60% YoY). Dairy and sugar prices were also firmer at +1.5% MoM (15.6% YoY) and +0.5% MoM (+53.5% YoY), respectively. Most would expect meat to be the big price increase, however the meat price sub-index remained virtually unchanged MoM but its +26.3% YoY. While this is not a direct indicator to oil, markets are certainly turning to inflation risk. Our Supplemental Documents package includes the UN release.

Figure 38: FAO Food Price Index



Source: UN Food & Agriculture Organization

Demographics - Lower income Americans have been hard hit by Covid

Low-income Americans most affected by Covid

We all know the analysis is true when it says that the higher income and wealthy were not hurt financially by Covid and the vast majority emerged wealthier. But this is clearly not the case for lower income people. The NPR conducted a study that analyzed household experiences in America during the Delta variant outbreak as the pandemic continues to persist and impact the daily lives of most households across the country. The report raises important concerns about the limited financial resources of many US households. The main findings of the report are as follows: 38% of households across the US reported facing serious financial problems in the past few months. An income divide, in those facing serious financial problems was identified as 59% of households earning less than $50,000 per year reported financial difficulties, while only 18% of those earning greater than $50,000 reported having financial difficulties. Financial problems are still cited by 67% of households who

indicated they have received financial assistance from the government. This is of great interest as both the federal and state government have appropriated billions of dollars in relief to protect vulnerable Americans, and other reports suggesting the poverty rate has declined. Many US households lost their savings during the pandemic with 19% of all households reporting the loss of all savings. This leaves many Americans without anything to fall back on should the difficulties persist. Our Supplemental Documents package includes excerpts from the NPR study.

Demographics – Calgary ranked #49 in the world's top cities

Calgary ranked #49 in the world's top cities

We were a little surprised by the relative ranking of the Cdn cities in the new "The World's 100 Best Cities" [LINK], a ranking and analysis provided by Resonance. London is the #1 city in the world in the "The World's 100 Best Cities The ranking evaluates each qualifying city across the six pillars of place equity: Place, Product, Programming, People, Prosperity, and Promotion. The performance of the Top 100 cities in the report were summarized in radar charts. Each hexagon in the radar chart represents a category of a city's competitive identity. At the top of the list, London was ranked #1, with Paris #2, New York #3, Moscow #4, and Dubai #5, rounding out the top five. Toronto was the highest rated Canadian city at #18, followed by Vancouver #46, Montreal #48 and finally Calgary which was ranked #49. We were surprised that Vancouver was so much lower than Toronto. Below is a table ranking the top 20 cities.

Figure 39: Top 20 World Cities

Rank	City	Place	Product	Programming	People	Prosperity	Promotion
1	London	35	2	1	3	8	2
2	Paris	8	3	4	26	6	3
3	New York	8	3	4	26	6	1
4	Moscow	2	1	5	15	25	16
5	Dubai	1	92	44	1	37	4
6	Tokyo	17	7	2	133	4	30
7	Singapore	33	27	23	10	12	6
8	Los Angeles	26	17	20	28	43	5
9	Barcelona	5	12	8	60	141	15
10	Madrid	11	24	7	37	63	11
11	Rome	4	20	6	137	81	8
12	Doha	48	103	228	11	1	115
13	Chicago	98	8	12	52	21	13
14	Abu Dhabi	20	116	219	1	5	61
15	San Francisco	27	23	21	9	20	27
16	Amsterdam	47	13	15	33	13	31
17	St.Petersburg	6	11	16	16	158	73
18	Toronto	131	18	34	4	35	28
19	Sydney	38	51	39	7	59	24
20	Berlin	187	14	13	51	112	18

Source: Resonance

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.

Finally, put my order in for Original Anchor Bar Buffalo Wing Sauces

There must be some reason for the timing, but i saw a handful of shout outs on various TV clips/reports (mostly on sports) for Buffalo's Anchor Bar. The Anchor Bar is the undisputed creator of Buffalo Wings. The Anchor Bar [LINK] says "The Story of a Buffalo Classic. *On a Friday night in 1964, Dominic Bellissimo was tending bar at the now famous Anchor Bar Restaurant in Buffalo, NY. Late that evening, a group of Dominic's friends arrived at the bar with ravenous appetites. Dominic asked his mother, Teressa, to prepare something for his friends to eat. They looked like chicken wings, a part of the chicken that usually went into the stock pot for soup. Teressa had deep fried the wings and flavored them with a secret sauce. The wings were an instant hit and it didn't take long for people to flock to the bar to experience this new taste sensation. From that evening on, Buffalo Wings became a regular part of the menu at the Anchor Bar*." Its pretty impressive when a modest neighbourhood restaurant creates a dish that becomes world famous. I figured after all these shout outs, its time to order some of their wing sauce.