JANUARY 2021 FDITION

ENKON OIL AND GAS NEWSLETTER





Welcome to the Enkon Insights Newsletter

Every month, we feature three fulllength articles, share critical stories in oil and gas commodities, and break down key trends.

Have opinions? Want to talk shop? Need more insights? Drop us a line:

info@enkonenergy.com

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Key Energy Mkt Dashboards

World LNG Supply-Demand balance: tightening again?

2020 was a *wild* year for U.S. LNG, with COVID in the spring; mass cancellations and disruptive hurricanes in the summer from hell; and, finally, surging JKM prices that have hit all-time highs in the new year. Perhaps the most important trend at the time slipped below the radar, however: several overseas projects have faced cancellation or severe schedule delays, potentially creating a window of market undersupply from 2022-2024. There's been some talk that this year could see another wave of LNG FIDs. We're still highly skeptical. Even though the probability of greenfield projects achieving FID is much higher than last brownfield LNG projects will reach completion. Existing terminals, not new projects, will benefit if world LNG supply-demand balances tighten over the next 3-4 years.

A Supply-Side Story

International LNG project faced schedule delays or cancellation in 2020, just like their U.S. counterparts. Total's ~26 MTPA Mozambique LNG project, already under construction, is confronting major challenges as an insurgency physically threatens its facility and personnel. The insurgency also threatens to derail Exxon's planned ~15 MTPA Rovuma terminal. Other projects, such as LNG Canada, are having their own difficulties meeting schedule and cost goals. In our project-by-project review of domestic and international LNG projects in late December 2020, we found significant schedule slips and cancellations. We now project that the domestic and international liquefaction players will only add ~31 MTPA of capacity from 2021 -2024. Schedule delays and robust LNG demand, particularly in NE Asia, may lead to a "window" of excess demand in the market.

LNG demand largely robust to COVID, but threatened by coal and batteries

2020 world LNG demand was buffeted by COVID, but it proved much more resilient than demand for other commodities, especially oil. We currently project that world LNG demand will grow by ~3.5-4.5% per year, but acknowledge significant uncertainty around this estimate. As we've written before, future LNG demand will largely be determined by markets in the Indo-Pacific, especially China and India. These countries have several alternatives to LNG, including domestic natural gas production, coal, wind, solar, imported pipeline natural gas (PNG), and expanding LNG/natural gas storage. We've recently put together a comprehensive assessment of LNG dynamics

and LNG demand in the Indo-Pacific. For our view on Indo-Pacific LNG demand, drop us a line at in-fo@enkonenergy.com

Implications for U.S. LNG projects

Somewhat counterintuitively, surging LNG prices do not necessarily benefit LNG projects hoping to receive FID. There is a significant lag between FID and first gas (typically at least 4 years, but usually closer to 6 years), so any project commissioned today would probably not produce LNG until 2026 or 2027, after we believe the market will be oversupplied again. Furthermore, sky-high LNG prices could deter coal-to-gas switching in key Asian markets, stifling future demand. We still believe that only brownfield and quasi-brownfield projects (such as Cheniere's Corpus Christi Stage III) will ultimately receive FID approvals.

Greenfield projects are better positioned than they were six months ago, but they still face an uphill climb to reach FID. Tellurian's rising stock price is drawing attention across the industry, and its dauntless co-founder, Charif Souki, is on a press offensive, including at Platts. Sempra is attempting to finance its Port Arthur expansion through a sale of its infrastructure assets. But until we see cold, hard proof of signed offtaker contracts, we won't have believe that any greenfield projects will clear the commercial, financial, and ESG hurdles to FID.

If LNG markets are tight for the next few years, existing terminals, particularly Cheniere's Sabine Pass and Corpus Christi terminals, will be the primary beneficiaries in the U.S. LNG complex. Cheniere's FOB sales model is well-positioned to capitalize if JKM spot cargoes continue to clear \$10/MMBtu in the winter season. Still, LNG markets are nothing if not exciting. LNG in 2021 could prove to be a rollercoaster again.



"While we acknowledge that most consumers only look at the sticker price and aren't conducting discounted cash flow analysis when purchasing vehicles, these decisions matter at the margins. Perhaps more importantly, an unsustainable increase in oil prices would likely drive investment to EVs."

Crude Oil News:

<u>Texas Deepwater Oil Terminal</u> <u>Achieves VLCC Milestone</u>

ExxonMonil invests \$240 million in Baton Rouge refinery

<u>U.S. imports no Saudi crude for first</u> <u>time in 35 years</u>

Saudis with surprise output cut

China 2020 crude throughput rises 3% to 13.51 mil b/d, Dec at 14.19 mil b/d

Autos 2021: an inflection point for oil demand?

While the last year suffered from a lack of demand, 2021 may be a year of elevated demand and constrained capacity. We think 2021 could be an especially important year for automobiles and future oil demand. Electric vehicle (EV) adoption could accelerate this year amid flush consumer balance sheets, "revenge" consumption from individuals who've spent a year in quarantine or quasi-quarantine, and increasingly competitive EV sticker prices. Furthermore, if OPEC+ continues to constrain crude production and lift crude and gasoline prices, consumers could hasten the transition from internal combustion engines to EVs. This year could see an inflection in developed world oil demand due to EV uptake.

"V-shaped recovery" likely, not certain

Most macroeconomic forecasts suggest that U.S. annual GDP growth will surge in 2021, after COVID is suppressed. Goldman Sachs now projects 2021 annual GDP growth of 6.4%, which would represent the fastest pace for the U.S. economy since 1984, when it grew 7.2%. The GS estimate may be more aggressive than other forecasts: The Conference Board projects a 2021 annual expansion of 3.6% in its base case scenario, but up to 6.1% 2021 annual growth in its "upside forecast."

The macroeconomy will continue to depend on COVID-19 transmission and vaccination dynamics. If vaccines (especially the single-dose Johnson & Johnson vaccine) pass scrutiny from U.S. regulators, growth could top even optimistic estimates. Conversely, however, future mutations of the COVID-19 virus could, in a worst-case scenario, defeat existing vaccines. Most public health experts are optimistic about the vaccines' ability to defeat the virus and any mutations, however, so we are generally optimistic about 2021 economic growth, barring new information about new, more dangerous strains of COVID or other risks.

Assuming that 2021 world GDP growth is strong, what are the implications for auto and energy markets?

Capacity constraints and the oil market

Many analysts suspect that 2021 will see more robust inflation due to robust demand and constrained capacity as supply chains struggle to rebound from a COVID-stricken world. Indeed, <u>car manufacturers are already confronting a global semiconductor shortage</u>. Barring resolution of these supply chain issues, the auto market could become much tighter later this year – but it's not clear whether EV or internal combustion cars would be disproportionately harmed by a semiconductor shortage.

Similarly, a sharp rise in oil prices is not out of the question. OPEC+ is already restricting output; it may feel even more emboldened if U.S. crude production does not return despite WTI prices returning to the low \$50s (as of this writing). With OPEC+ producers' budgets under severe strain from the COVID demand shock and the devastating Saudi-Russian price war earlier in the year, OPEC+ would love to see high prices again.

There's a significant probability, in our view, that OPEC+ will overzealously restrict supply, substantially raising oil prices and encouraging consumer EV adoption. OPEC and OPEC+ have severely miscalculated before: the cartel arguably overproduced in the late 1990s; exacerbated the run-up to the 2008 financial crisis by constricting supply for too long; and, more recently, fought two disastrous price wars against U.S. tight oil in 2014-2016 and again in early 2020. OPEC+ could miscalculate again in 2021, lifting crude prices to unsustainable levels and accelerating the transition to EVs. While we acknowledge that most consumers only look at the sticker price and aren't conducting discounted cash flow analysis when purchasing vehicles, these decisions matter at the margins. Perhaps more importantly, an unsustainable increase in oil prices would likely drive investment to EVs.

Investors are already flocking to the EV sector. Tesla stock is skyrocketing and its CEO, Elon Musk, has become the world's richest person. Hyundai and Apple – yes, iPhone Apple – have confirmed discussions about partnering to build EVs. Amazon has also entered the EV market through its tie-in with EV automaker Rivian. We'll discuss EV consolidation more in a future issue, but we suspect that the auto sector could eventually be dominated by non-traditional automakers such as Tesla, Apple, and Amazon. Surging oil prices would tempt these giants to accelerate their EV plans.

Macroeconomic growth, oil dynamics, and structural changes could accelerate EV adoption in 2021

Electric vehicles could be on the right side of every trend this year. If economic growth accelerates to 4% growth or higher, consumers resume big-ticket purchases, oil prices rebound or even surge, and the EV-friendly Biden administration incentivizes uptake through EV vehicle charging stations and incentive programs, 2021 could be a perfect storm for EV adoption. We'll discuss the implications of EV adoption on total crude and crude products demand in a future article.

US Wind Generation

Not as exciting as solar, or as established as oil and gas, onshore and offshore wind tends to receive relatively little attention from the energy sector. That may be changing. Wind energy capacity expansions could pick up substantially in the early 2020s, particularly in the Midwest and Northeast as offshore wind becomes more viable in the Great Lakes and the North Atlantic. In this article we discuss US wind energy history, fundamentals, and possible trajectory.

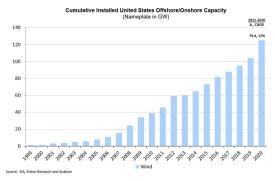
A very short history of US Wind Energy

For an excellent, fulsome, and entertaining history of the US wind energy, we strongly recommend Russell Gold's Superpower. The American wind industry began from very humble roots – even very eccentric roots. In its infancy, the industry was populated by "hippies," according to some of its early proponents: New York "city activists" built a slapdash wind turbine on the roof of an 11th Street apartment. Later, more professional and organized investors recognized the economic potential of the technology in the early 2000s, with 2001 proving to be a critical year, as the industry completed its first year of incremental capacity in excess of 1 GW.

US Wind Generation (continued)

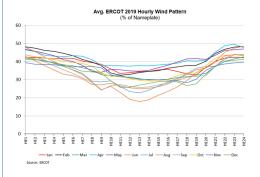


By 2020, the US had completed nearly 125 GW of total wind capacity installations, with an estimated 21 GW added in 2020.



US wind fundamentals

Most US wind energy is produced in Wind Alley: in western and northern Texas, up through the Plains States (the Global Wind Atlas/World Bank Group provides an excellent resource for mean wind speed, a key variable for a project's viability). Like oil and gas, onshore projects have historically offered much lower complexity and costs than offshore projects (although that may be changing, as discussed below). Wind energy, like other renewable sources, is also highly intermittent, with wind production generally highest in the evenings. Finally, wind generation seasonal patterns vary according to location, although wind production is generally lower in the summer in many key markets, including Texas.



Important wind trends: transmission lines, offshore, and we're going to need a bigger blade

Ultra-high voltage direct current (UHVDC) lines are often required to efficiently move generation from wind (and solar) generation in less populous areas to consumers in distant consumption centers. There are currently few UHVDC lines in the United States, although we expect more of them. While alternating current (AC) lines are generally most efficient transporting over short distances, wind producers in, say, western Oklahoma need UHVDC lines to reach major consumer markets in Texas, California, and the Midwest. We suspect UHVDC lines will be a major trend in 2021.

Speaking of the Midwest, we are keeping a close eye on "offshore" wind developments in the Great Lakes. As Midwestern states attempt to diversify from coal, the most polluting hydrocarbon, wind energy (and natural gas) is an obvious alternative.

Mitsubishi is investing in Great Lakes offshore wind, while the "Icebreaker" project in Ohio will have major implications for other freshwater wind turbines. We expect 2021 to be a very important year for Great Lakes wind energy.

Finally, just as oil companies improve efficiency through economies of scale and contiguous acreage, wind turbine producers are attempting to optimize wind performance by constructing super-massive blades. GE's new Haliade-X wind turbine stands at over 800 feet tall; the diameter of its rotating blades exceeds 700 feet. Wind turbine technology is relatively mature and has shown less dramatic levelized cost of electricity (LCOE) improvement than solar. Nevertheless, technology and innovation may drive wind LCOE even lower in future years.

But what about batteries?

In the long-term, interday and long-duration battery storage technology is the most important obstacle to wind and solar adoption. We strongly suspect that battery R&D will receive major cash infusions, however. Battery technology is a priority for the Biden administration, the business community is intrigued by the technology, and a bipartisan group of legislators view it as a crucial element in US-China strategic competition. We'll discuss batteries more in a future issue. In the nearterm, however, wind energy's 2021 prospects are extremely bright.

"Wind energy, like other renewable sources, is also highly intermittent, with wind production generally highest in the evenings. Finally, wind generation seasonal patterns vary according to location, although wind production is generally lower in the summer in many key markets, including Texas."

NGLs News:

Howard Energy Partners to Acquire Refinery Services Facility in Corpus Christi

Ethane-Fueled Plant Planned for North

New gas processing plant finished west of Williston

Blue Rhino Files for Bankruptcy

LNG News:

DOE streamlines approvals for shortterm LNG exports, eyeing spot market

Next U.S. LNG Exporter Says Project Ahead of Schedule

<u>China's natural gas demand set to hit</u> <u>new record</u>

China Pipeline Giant to Buy Kunlun
Assets for \$6.3 Billion

Commodity Outlook (90 days out)



Vaccines, COVID, and energy

The COVID picture is somewhat ambiguous for the United States and energy demand in developed markets. The United States and other countries may not be able to rely on herd immunity from infection, as public health experts maintain that infection from earlier strains do not prevent reinfection from some of the more newer, more transmissible strains. This new dynamic could severely delay herd immunity, particularly in countries with limited vaccinations.

There appears to be <u>very good news on vaccination immunity</u>, however. Public health experts believe that the Pfizer and Moderna vaccines (and other vaccines) confer protection from disease and transmission. Therefore, these vaccines could reduce hospitalizations *and* spread, helping to crush the pandemic.

The world is waiting and watching for the results from the Johnson & Johnson vaccine trials. If the J&J vaccine receives regulatory approval, the United States could obtain herd immunity from vaccination as soon as April or May.

Oil Market Movers:

Crude markets are going to be highly unpredictable this year, as a wide range of outcomes is possible. On the supply side, OPEC+ is indicating a willingness (desperation?) to restrain production and prices. As we wrote above, it's easy to see how prices could sharply increase if demand comes roaring back.

But demand is dependent on COVID dynamics, which are extremely difficult to predict and vary from market to market. We suspect that developed markets could show higher y-o-y crude demand growth than their developing counterparts due to better vaccine access. On the other hand, developing countries' relatively young populations may be able to resume pre-COVID growth even without vaccines.

We see signs that U.S. refineries are beginning to tick up run rates in anticipation of a post-vaccination demand uptick. Some trends seem likely to continue, however, crimping demand. Work-from-home is likely hear to stay for significant swathes of the economy, probably reducing vehicle-miles-traveled and gasoline consumption.

Jet fuel demand is likely to rebound significantly in 2021, but perhaps not as much as many hope. Even if the US achieves domestic herd immunity through vaccination by, say, May, most countries will not. With new—and potentially more dangerous—strains emerging seemingly by the week, international travel will likely remained highly circumscribed. It also seems likely that the US will adopt mandatory two-week quarantines for passengers of inbound flights.

Finally, according to Baker Hughes, oil-directed rig counts rose by nearly 60 rigs since November, to a total of 287 rigs as of January 15th. Over the same period, however, crude production has been largely flat, according to the EIA. There may be an issue somewhere in the data — or well productivity may be declining.

LNG Market Movers:

This is just about as good as it gets for LNG exporters, particularly Cheniere's spot cargoes. U.S. LNG volumes and prices are at or near all-time highs, and, as we wrote above, there is a possibility of a multi-year "window" of a tight market due to international project delays.

Still, it's not all roses for LNG. Some international liquefaction capacity may be coming back online: Australia LNG recently experienced an outage, and we suspect that some of the less visible/transparent LNG exporters cut back on export volumes and may have even shut in. High LNG prices might tempt some of the marginal international players to resume/increase production. We're going to keep tracking this story.

Furthermore, we haven't heard of any additional commercial agreements between would-be US LNG exporters and international counterparts. As the Rio Grande/ Engie breakup proved, the EU will be very alert to emissions going forward, potentially limiting future US LNG contracting opportunities.

NGL Market Movers:

We've seen strong ethylene demand as units return from unplanned maintenance and the start of first ethane exports from the new ET Orbitz terminal last week; prices have been rising amid record inventory levels. We expect ethane to trade under 25 cpg for Jan/Feb but we believe it will likely approach 30 cpg by the end of 1Q2021 as USGC inventory is worked through.

In propane markets, outdoor dining demand has contributed to propane product supplied rising to its highest level in over a decade. Over the next few weeks, exports could come under pressure from freight costs and higher domestic demand on a predicted polar vortex, however.

Finally, butane prices fell significantly amid easing USGC logistics constraints and rising exports. We believe there is fundamental support for nC4 to trade ~70-85% of WTI in 1Q2021 and maintain C5+ will trade between 80-90% in the same period.

Natural Gas Market Movers:

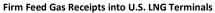
LNG markets are running at full-tilt, but natural gas prices remain stuck. This partly reflects high inventories amid COVID-suppressed demand, but also because of a relatively moderate winter. We're going to continue keeping a close eye on Gulf Coast storage levels.

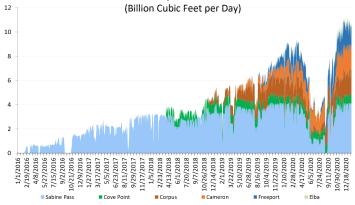
"On the demand side, it is simply too early to say how consumers and businesses will adjust in a post-vaccine (and possibly post-COVID) world. We suspect that work-fromhome will become a permanent feature in most developed economies, including the United States."

Photos from Wikimedia Commons:

<u>Matthew Smith; Basile Morin; RegionalQueenslander</u>

Key Market Dashboards

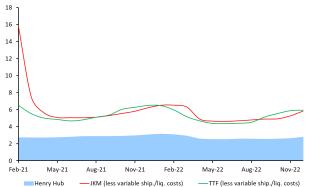




Boom times for U.S. LNG feed gas flows - but shoulder season will prove

Jan-19

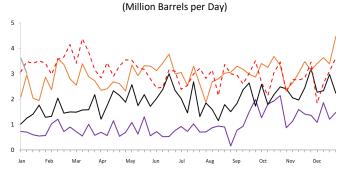
LNG Netbacks to U.S. (on Cash Basis) (\$/MMBtu)



Netbacks remain strongly positive, even amid COVID outbreaks in NE Asia

U.S. Crude Oil Exports

instructive



Crude exports remain relatively strong but may face pressure amid more transmissible strains overseas and freight rates—vaccination and domestic production key

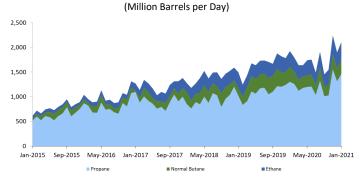
Brent-WTI Spread (\$/Barrel) Futures

Brent-WTI spread is projected to rise gradually, but overseas COVID dynamics could pressure Brent

Jan-21

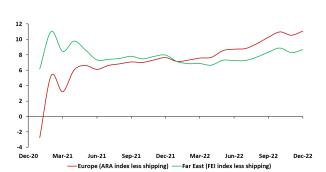
Jan-20

U.S. NGL Product Exports



U.S. LPG exports remain above levels required to balance the domestic market, but freight rates and domestic draws could pressure exports

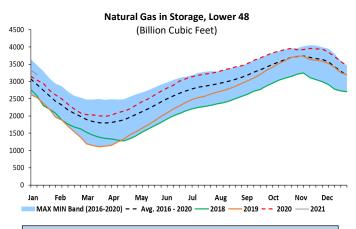
International Propane Netbacks (to Mt. Belvieu) (Cents Per Gallon)



Asian demand remains very strong. Will a lack of freight capacity pressure netbacks more than expected?

Key Market Dashboards





4000 - 3500 - 3000 - 2500 - 2000 - 1500 - 10

4500

European Storage

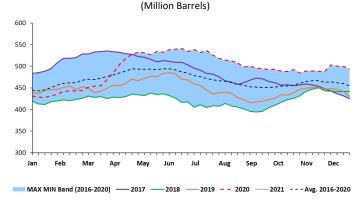
(Billion Cubic Feet)

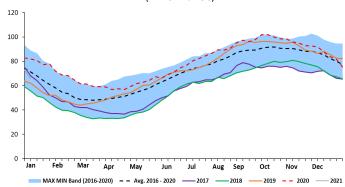
LNG exports are close to capacity levels but inventories remain relatively high amid sluggish demand

Nord Stream 2 will have major impact on US LNG exports and is worth watching closely in 2021

U.S. Crude Oil Commercial Storage Inventory





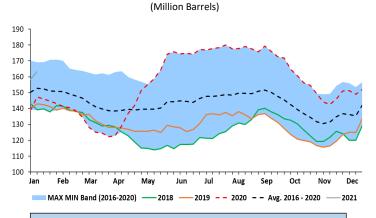


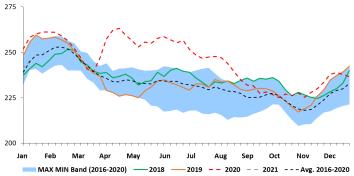
Will capital return to the shale patch in 2021? Inventories are close to 5-year highs

U.S. propane inventories starting to feel pressure

U.S. Diesel Storage Inventory

U.S. Gasoline Storage Inventory (Million Barrels)





Refineries have enthusiastically cut diesel production. That may be changing as vaccines likely to boost post-COVID demand

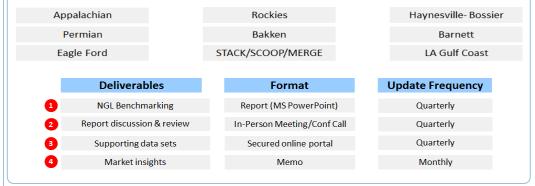
Gasoline inventories are close to 5-yr averages; refineries/consumers likely to ramp up gasoline production and consumption, respectively

Our Subscription Product Offerings

Regional NGL Benchmarking & Outlook

(Research, intelligence and insights into Supply, Logistics, Pricing, Disposition and Outlook)

Each quarter, Enkon provides clients a unique, bottom-to-top analysis of NGL supply, logistics, pricing, netbacks, product disposition and outlook for eight NGL producing basins in the U.S. The granularity of the analysis makes this product unique. The analysis identifies NGLs (by purity product) produced at each of the ~700 U.S. gas processing plants as the building block of the analysis to quantify asset utilizations across the midstream value chain.



U.S. Gulf Coast Liquid Cavern Storage Benchmarking (Research, intelligence and insights into NGL, Olefins, Refined Product Cavern Storage)

Once a year, Enkon provides clients a one-of-a-kind, comprehensive lay-of-the-land and granular benchmarking for ~250 non-crude liquid-hydrocarbon salt cavern storage wells in Texas and Louisiana. The report provides regional analysis of cavern storage capacity versus brine pond capacity in each of the dome locations. The report also identifies product storage in each of the cavern wells along with historical product injection, withdrawal, inventory and cavern utilization.

Texas Cavern Coverage		
Barbers Hill (Mont Belvieu)	Hull	
Stratton Ridge	Spindletop	
Markham	Fannett	
Clemens	Sour Lake	
Pierce Junction	Boiling	
West/Panhandle Texas	Fast Teyas	

Louisiana Cavern Coverage		
Sulphur	Bayou Choctow	
West Hackberry	Napoleonville	
Arcadia	Sorrento	
Pine Prairie	Venice	
Anse La Butte	Section 28	

Regional Fractionation and NGL Export Terminal Benchmarking & Outlook

Each quarter, Enkon provides clients a provide a historical benchmarking and comprehensive outlook of Y-grade NGLs in the U.S. Gulf Coast with the objective of quantifying incremental need for fractionation capacity in various locations in US Gulf Coast, namely Mont Belvieu, Sweeny and Louisiana, and adequacy of NGL export capacity in the USGC and Northeast.

North America LNG Export Project Benchmarking & Outlook (Research, and insights into U.S. Liquefaction Projects)

Each quarter, Enkon undertakes an exhaustive review of over 24 post and pre-FID North American LNG export terminals; summarizing the North American LNG export terminal landscape, LNG nameplate capacity and feed gas forecasts, key market trends, and a competitive assessment of pre-FID North American terminals. For each project, we report terminal attributes, commercial models, key regulatory milestones, risk assessments, and, for existing terminals, historical feed gas receipts (by pipeline), and estimated weighted average landed cost of feed gas into the terminal.



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