Global: Future of Energy Demand Series

Outlook for Air Travel - Cautious Refining, Selective Airlines and Positive 2021 Oil

We are introducing a new series called the "Future of Energy Demand", with global, cross-capital and cross-sector views on different slices of the energy pie, leveraging the expertise of our macro and micro research teams. Over time, we will look to provide thoughts across a variety of topics that impact demand end markets and non-traditional energy spaces including, but not limited to: Renewables, Industrials/Materials, Autos, Agribusiness, Consumer and Technology.

In our inaugural report, we look at the future of air travel and the impact on Airlines, Refiners and the Oil Commodity. Inside, you will see the commodity insights from Damien Courvalin and team, who maintain a bullish 2021 oil view in part driven by improving - although still below normal - jet demand. Catherine O'Brien weighs in with a global update on Airlines, where the team is selective, with a preference for domestic-exposed airlines (Buy **JBLU, ALK**, **LUV**) versus long-haul/international (Sell **HA, Singapore Airlines**). Lastly, Nikhil Bhandari, Neil Mehta and Geydar Mamedov highlight a more cautious sector view despite a multi-year demand recovery given new capacity additions, weak crude differentials and consensus earnings risk. Top refining/integrated Sells include: **XOM**, **HSE**, **PBF**, **CVI**, **S-Oil**, **MOL** and **Thai Oil.**

Neil Mehta
+1(212)357-4042 | neil.mehta@gs.com
Goldman Sachs & Co. LLC

Damien Courvalin
+1(212)902-3307 |
damien.courvalin@gs.com
Goldman Sachs & Co. LLC

Catherine O'Brien
+1(212)357-8285 |
catherine.m.obrien@gs.com
Goldman Sachs & Co. LLC

Nikhil Bhandari
+65-6889-2867 | nikhil.bhandari@gs.com
Goldman Sachs (Singapore) Pte

Vinit Joshi
+91(22)6616-9158 | vinit.joshi@gs.com
Goldman Sachs India SPL

Callum Bruce
+1(212)902-3053 | callum.bruce@gs.com
Goldman Sachs & Co. LLC

Carly Davenport
+1(212)357-1914 |
carly.davenport@gs.com
Goldman Sachs & Co. LLC

Michael Hinds
+1(212)357-7528 |
michael.hinds@gs.com
Goldman Sachs & Co. LLC

Geydar Mamedov
+7(495)645-4041 |
geydar.mamedov@gs.com
OOO Goldman Sachs Bank

Brian Singer, CFA
+1(212)902-8259 | brian.singer@gs.com
Goldman Sachs & Co. LLC

Michele Della Vigna, CFA
+44(20)7552-9383 |
michele.dellavigna@gs.com
Goldman Sachs International

Ben Hartwright, CFA
+852-2978-0953 |
ben.hartwright@gs.com
Goldman Sachs (Asia) L.L.C.

Joyce Koltisko
+1(212)902-1912 |
joyce.koltisko@gs.com
Goldman Sachs & Co. LLC

Kathryn Buda
+1(801)212-7824 |
kathryn.buda@gs.com
Goldman Sachs & Co. LLC

Summary

- **Jet and air travel could face significant cyclical challenges over the next year.** We continue to see jet fuel as the weakest part of the crude demand picture in the near-term.
- **That said, we expect jet passenger traffic will normalize to 2019 levels by 2023.** We do not believe that jet fuel demand has peaked and see jet as an area of long-term demand growth in this decade.
- **Damien Courvalin outlines a case to be positive on 2021 oil.** Despite near-term challenges for jet, we are constructive on 2021 oil prices as the global economy- and especially jet demand- improve as vaccines become available and crude supply continues to surprise to the downside, particularly in non-OPEC.
- **Catie O'Brien and the global airline team are selective on equities despite**

an improving demand outlook. The team has a preference for domestic-exposed airlines including **LUV, JBLU** and **ALK**. The global team makes the case that international/long-haul exposed carriers are more at risk including Sell-rated **HA** and **Singapore Airlines**.

- **Nikhil Bhandari, Neil Mehta and Geydar Mamedov are still cautious on the Refining macro.** While the team expects global oil demand to recover, they have concerns about weak crude differentials, capacity additions and consensus risk. We highlight a number of Sell ratings among integrated oils and refiners, including **XOM, Husky, PBF, Thai Oil, S-Oil, CVI** and **MOL**. In the near-term, weakness in jet fuel should weigh on diesel margins contributing to lower US earnings estimates for 2021. We continue to see value in non-refining refiners including **Reliance** in Asia, **MPC/PSX** in the US and **Neste** in Europe.

Commodities Research: Despite below-normal jet demand in 2021, we are still positive on oil

Authors: Damien Courvalin, Callum Bruce and Michael Hinds

Question: What have we seen real-time for jet fuel demand globally? Any interesting dispersion regionally?

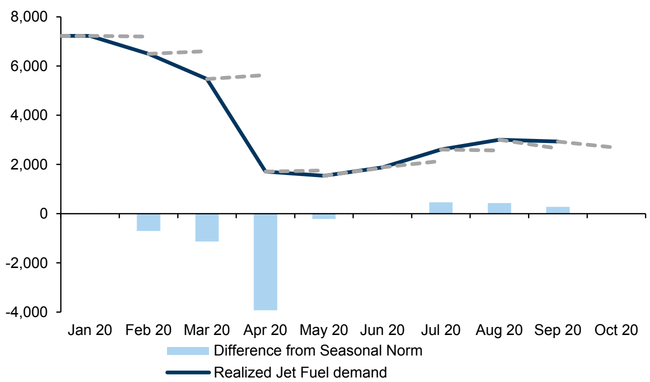
We estimate that global jet fuel demand has recovered to 3.7 mb/d over the past week, from a low of 2.2 mb/d in April. This is still 4.0 mb/d lower than September 2019 demand levels but down less than 0.1 mb/d from August 2020 demand, a much smaller decline than the typical seasonal fall of 0.3 mb/d. International travel remains the most depressed, still down 62% vs. last year. Notably, domestic travel is now only down 34% globally although there remain notable geographical disparities, with China's domestic demand fully recovered to Sep-19 levels, while the US (down -50% yoy) and particularly Europe (-58% yoy) still lagging, given the disparate travel restrictions across countries of the Union. On the positive side, air cargo has shown strong signs of normalization with IATA data showing cargo tonne kilometers had already rebounded to just down -13% yoy in July when passenger was still down 67% yoy.

Question: What is your view of the 2021 recovery of jet fuel?

The absence of a vaccine(s) and the associated international travel restrictions remain the largest headwinds to a normalization in jet fuel, in our view. We therefore expect that the potential availability of a vaccine(s) next year could be the necessary catalyst for a greater recovery in jet fuel demand. In line with our economists, we expect this to occur through 2Q21 and expect global jet demand to increase by 3.9 mb/d from current levels by next summer. Demand should still remain 0.7 mb/d short of the summer 2019 levels as we assume that corporate travel – which accounts for c.30% of miles traveled – will lag this recovery on greater use of video conferencing. Importantly, if a vaccine(s) are effective and widely available and airline capacity is not permanently reduced, we see upside risk to our end-2021 jet demand forecast (which remains 1 mb/d lower than our pre-COVID expectations) given the pent-up demand for consumer travel.

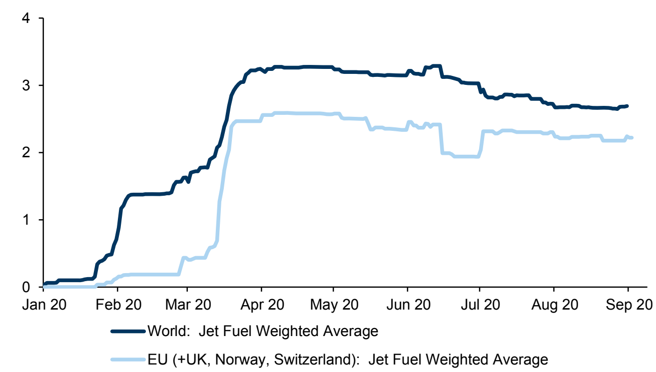
Please note that our jet fuel demand numbers are consistent with our equity analyst's lower seat utilization figures below. This reflects our inclusion of more resilient cargo, private, and military jet demand beyond just commercial planes, as well as the fact low flight seat utilization has a negligible effect on fuel consumption. Specifically, while Catherine O'Brien sees US commercial PSMs down c.30% in 2021 vs 2019, we expect jet fuel down c.15% with global commercial jet demand down a bit over 20%. Lower utilization covers more than half of this delta, with the remainder due to divergences in US and RoW dynamics. For reference, demand is roughly split into 75% of scheduled commercial flights, 10% of cargo flights, 5% of private and charter flights, and 10% military.

Exhibit 1: Jet demand remains depressed but continues to improve more than seasonal patterns
Global jet fuel demand (kb/d)



Source: OAG, JODI, IEA, Goldman Sachs Global Investment Research

Exhibit 2: Travel restrictions between countries reflect the highest headwind to jet fuel demand, the lack of international travel recovery
Oxford Lockdown index, sub-component C8: "International travel controls". Country index weighted by each country's international jet fuel demand



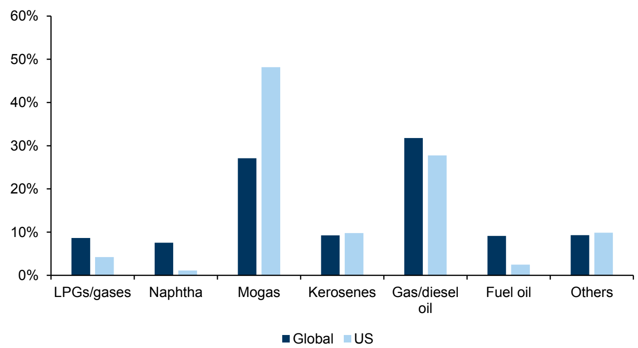
Source: OAG, Oxford COVID-19 Government Response Tracker, Goldman Sachs Global Investment Research

Question: Put jet fuel demand into a global context. How important is it for Refiners and the global oil price?

Jet fuel demand matters to global oil market as it represented 7.5 mb/d (7.5%) of expected 2020 total demand pre-COVID. The hit to jet demand has further been outsized relative to other transportation fuel, with gasoline and diesel demand now still down c.8% vs. jet fuel's 60% collapse. To put into perspective, we believe an immediate normalization in jet demand would bring oil prices to $65/bbl six months earlier than our base-case of 3Q21 (based on our quantitative models for both timespreads and long-dated oil prices, and given current supply expectations).

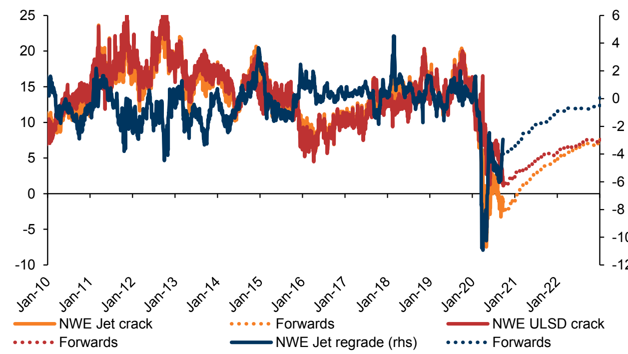
Because jet fuel is a direct refinery output – containing no biofuels nor blended NGLs – its importance to refiners is even greater, representing 9% of total refinery output. Based on regional refinery yields, we estimate the weakness in current jet cracks (their price premium to Brent prices) is responsible for 21% of the $6/bbl discount of current Brent based complex refining margins to their long-run average of $4.2/bbl after factoring in slate and freight. On the positive side, refiners have once again demonstrated their flexibility, reducing their jet yield significantly, to a record low of 3.5% from 11% pre-COVID in the US for example. This admittedly is weighing on distillate cracks, as extra jet and kerosene is blended mostly into heating oil and gasoil with some molecule streams additionally being redirected to gasoline blending, VLSFO, and even petchems (in that order). We believe it will therefore take a recovery in jet demand for distillate cracks to be able to recover from their depressed levels.

Exhibit 3: Jet accounts for 9% of global refinery yields with slightly more importance in the US
Refinery yields by product (2017 IEA Annual data)



Source: IEA, Goldman Sachs Global Investment Research

Exhibit 4: Low flying demand is pushing jet into the distillate oil pool, weighing on distillate cracks and refining margins
NW Europe jet and ULSD cracks (USD/bbl, lhs) as well as regrade (jet fuel less ULSD, USD/bbl, rhs)

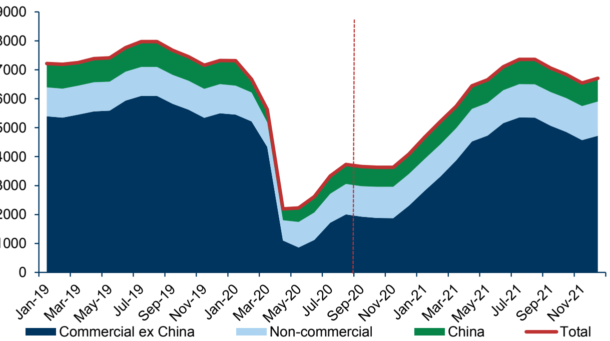


Source: Platts, Goldman Sachs Global Investment Research

Question: What is the Goldman Sachs 2020 and 2021 demand view and how dependent is it on vaccine timing?

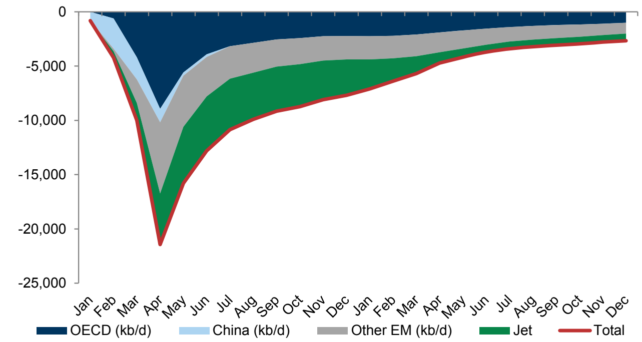
We estimate global oil demand of 93.3 mb/d in mid-September, still down c.8.5 mb/d vs. pre-COVID expectations. Looking forward, we expect a further 1.8 mb/d increase in demand from Sep-20 to Dec-20, first and foremost due to seasonality with cold weather typically leading to a 1 mb/d increase in demand; second, due to the restocking expected by our economists which appears to have started. This leaves us only expecting a 0.8 m/d recovery in transportation demand from the COVID-19 shock over the next quarter. For next year, we expect an acceleration in demand gains through 2Q21 as vaccines become increasingly available. Specifically, we expect demand to rise by 3.7 mb/d from January to August next year and to reach end-2019 levels by late next year. A slow or lack of progress in developing a vaccine would be a downside risk to this estimate, although we would still monitor the impact on demand gains as treatments improve and increased adoption of protective measures such as masks occur.

Exhibit 5: We expect that the potential availability of a vaccine(s) could accelerate the recovery in jet demand next year
kb/d



Source: OAG, JODI, IEA, Goldman Sachs Global Investment Research

Exhibit 6: Jet fuel makes up the bulk of the current demand loss
Impact on global oil demand from Covid-19 (kb/d, vs pre-Covid expectations)



Source: OAG, Google, Apple, IEA, National sources, Goldman Sachs Global Investment Research

Question: What underpins your more constructive view on crude from here? Where should investor focus be regarding both Libya and OPEC+ risks?

Demand improvements and low upstream capex should continue to normalize the excess in inventories accumulated through the COVID-19 demand shock and the brief OPEC price war. We expect this normalization to be completed by next summer, allowing for first higher OPEC+ production from its current high level of spare capacity. Second, we expect that short-cycle capex – shale and brownfield – will need to rise to help keep the market balanced in 2H21. Importantly, the lack of investor interest for the upstream sector, the depreciation in the USD that our strategists forecast and the rising focus on ESG are all headwinds to higher capex spending, leaving for a higher cost of capital – and hence a higher required long dated oil price – for such activity to restart. We currently base case Libyan production rising by more than 400 kb/d into year-end – a similar pace to the 2014 and 2016 restarts – with slower incremental gains next year, we will monitor the potential impact on upside risks if non-compliance in the UAE and Iraq were to occur.

Question: Given this oil outlook, do you believe it makes sense for Airlines to be hedging out the oil curve?

Yes, we believe airlines should take advantage of depressed forward oil prices to hedge with our Brent prices at $65/bbl by 3Q21 vs. current market forwards of $45/bbl. Key for airlines to hedge now will however be (1) their financial ability to enter into swaps or spend premium on upside options based protection given their increased leverage, and (2) the still uncertain pace of demand recovery and hence their still uncertain hedge coverage ratios given the virus risks heading into the winter.

Question: How do you expect Refiners will adjust from a commodity perspective to the changing demand environment in 2021?

Refiners face a challenging short, medium, and long-term outlook. This starts with COVID-19 but was already set to occur, in our view, due to excess refining capacity in coming years. Crude backwardation – which OPEC+ is targeting, tighter US crude differentials as well as structural demand destruction/electrification should be additional medium term challenges. We believe some refining capacity will have to close, yet announcements so far have been mostly temporary in nature, and we estimate c.2 mb/d of excess capacity needed to close permanently in order to return utilization rates to their to pre-virus level. We expect these closures will be focused in developed regions with declining oil demand as they make way for new projects built in the demand centers in Asia as well as the Middle East. We believe refiners will further need to adjust their yields to target products with more resilient demand such as petchem/LPGs/naphtha, lubricants/bitumen, low sulfur fuel oils, and then motor gasoline (in that order). Refineries with integrated petchem plants are therefore better placed, weighing in turn on transportation fuel margins. Reformers and coking units are likely to see larger utilization drops than FCCs and hydrocrackers.

Airlines: We are selective still, with a preference for US domestic vs. international-exposed equities

Author: Catherine O'Brien

Question: What is your outlook for air miles traveled over the next several years? When do we get back to 2019 levels?

We currently do not expect to see traffic (a measure of demand, or one passenger-filled seat, flown one mile on a unit basis) for the US carriers to recover to 2019 levels until 2023, with 2021 and 2022 ~30% and just over 10% below 2019 levels, respectively (see Exhibit 7). Globally, the International Air Transport Association ("IATA") does not expect traffic to recover to 2019 levels until 2024. Turning back to the US, as we expect planes to remain less full than pre-COVID-19 levels for the next several years, we are forecasting that capacity (a measure of supply, or one seat, flown one mile on a unit basis) will recover slightly more quickly to 2019 levels. Our current expectation is that 2021 and 2022 capacity will be closer to 25% and 5% below 2019 levels, with 2023 capacity 3% above 2019.

Our view that planes will remain less full over the next several years is due shorter-term to measures taken by airlines to limit seats available to book for social distancing and longer-term because of the relatively high fixed cost nature of the airline business model, as airlines add capacity back to cover these fixed costs (i.e. labor, fleet ownership costs, interest expense, etc.). On the latter point, management teams across our airlines coverage are currently in the process of assessing fleet and labor reductions to better match supply to demand, which should boost load factors compared to current levels (a measure of how full a plane is). That said, we believe that supply over the short- to medium-term will not be matched to demand to the same extent seen pre-COVID-19 in order to keep infrastructure in place to capture the demand rebound over the medium- to longer-term.

Question: Are there regions where you are more or less constructive on the demand

path?

Most regions are currently seeing demand for air travel down significantly from a year ago, with the domestic Chinese market seeing the largest rebound to-date by a significant degree (down just 20% year-over-year as of early August vs. global traffic in July down 80%; see Exhibit 8). Underlying these trends, shorter-haul travel within regions has been recovering more quickly than longer-haul international trips. While the data we have to track real-time demand trends in the US does not break out domestic vs. international trips, airline management teams have noted that the recovery thus far has been primarily driven by domestic travel in addition to short-haul international leisure trips to destinations such as Mexico. In China where we do have domestic and international data, in early August domestic demand had already recovered to down ~20% year-over-year, while international was still down close to 100%. We expect international travel demand will likely continue to recover at a slower pace than domestic as it usually entails longer-haul flights which some passengers may want to avoid as a precaution during the pandemic in addition to restrictions in place for cross-border travel by many governments around the world. For instance, the US currently has travel restrictions in place for 30 countries.

Looking forward, we believe demand by region will largely track in-line with the level of COVID-19 cases. Going back to demand in China, when domestic passengers were down ~20% year-over-year in early August, US passengers were down ~75%. We believe this divergence was driven by the equally different trends in incremental cases of COVID-19. Therefore, while the recovery in Europe was trending better than that seen in the US, the recent uptick in cases in Europe could lead to a reversal in traffic trends.

Question: Do you believe consumer and business behavior has structurally changed as a result of the pandemic?

We believe that while there will likely be a small portion of corporate travel that will not return to pre-COVID-19 levels, the majority of corporate travel will recover and leisure travel will recover completely over the next several years as there are already signs today of pent-up demand. Focusing on corporate travel, it remains anemic with several airline management teams noting volumes are down ~90% as of the past month. Therefore, it is difficult to extrapolate what the path to recovery could look like from the backdrop today. However, looking to past disruption to travel gives us confidence that we will see the majority of corporate travel recover. Looking at trends following September 11, 2001, passengers reached 2000 levels three years later with 2004 passengers 6% higher than 2000 levels. Of course, technology today presents alternative options to in-person meetings, however the concern in 2001 for corporate travelers was that increased security measures and time spent at airports would quell demand for shorter trips. Ultimately, we saw travelers return to pre-September 11, 2001 levels rather quickly.

Question: From an Energy perspective, how do you think about improving fuel efficiencies as a potential cost beneficiary?

For most of the US airlines we have under coverage, we expect to see moderate improvements in fuel efficiency each year as companies took delivery of new, more fuel efficient aircraft and retired older, less fuel efficient aircraft. We also expect this trend would be broadly the same across all airlines globally, occurring faster for airlines with higher fleet growth rates and more slowly for those primarily taking deliveries for replacement. Following the COVID-19-driven demand decline, several US airlines have opted to right-size fleets to demand by pulling forward aircraft retirements while also reducing near-term aircraft deliveries, but keeping the majority of 2020 – 2021 new aircraft deliveries intact.

On a global scale, per aircraft lessor AerCap, airlines have announced close to 1,000 aircraft retirements to-date. We are of the view there is likely upside to this figure as we expect demand to remain below pre-COVID-19 levels over the next several years. On the other side of the equation, while airlines globally have reduced 2020 – 2021 deliveries by ~30% (per our A&D teams' report linked here), there are still just over 1,200 deliveries scheduled for this period. As such, we expect a larger improvement in global airline fuel efficiency than we would have otherwise seen due to COVID-19 related fleet decisions.

To help quantify the impact of these fleet decisions, we look at an illustrative scenario analysis across various aircraft delivery scenarios for Delta in Exhibit 9 as Delta is one of the airlines to have announced aircraft retirements to-date. If the airline were to take no deliveries between now and the end of 2021, we calculate the impact of its announced retirements alone drives a 2% increase in fuel efficiency, all else equal. If Delta were to take 50% of its scheduled new aircraft deliveries, we calculate the company's fuel efficiency would improve by ~3%, all else equal.

Question: How are airlines adapting to the new near-term demand reality? What other adjustments do you expect them to make?

As noted above, global demand for air travel is down significantly, and as such, airlines are focused on mitigating cash burn. To achieve this, airlines have been proactive in trying to better match supply to demand and reduce cost structures accordingly. With respect to matching supply/demand, airlines have significantly reduced capacity, with the US airlines for example expected to cut capacity 60% year-over-year in 2020.

With materially reduced supply which in turn drives volume-related expenses lower, US airlines have also pursued a number of other cost-savings measures such as: reducing executive compensation; offering employees voluntary leave packages on both a temporary and permanent basis; reducing discretionary CAPEX where feasible; executing cash-accretive fleet adjustments (i.e. pushing out new deliveries, retiring older aircraft, putting aircraft into storage, pursuing sale-leaseback opportunities, etc.); and extending payment terms with airports, lessors, and other vendors.

Expanding on the above mentioned airline fleet decisions, in Exhibit 10 below we provide an illustrative scenario analysis showing what we believe to be the ***maximum*** capacity that could be produced by the US carriers in 2021 vs. 2019 based on announced aircraft retirements and a range of aircraft delivery scenarios. Based on this analysis, we estimate industry capacity in 2021 could be as high as 5% above 2019 levels assuming airlines take 100% of contractual deliveries. This 5% growth rate assumes that the Boeing 737 MAX is re-certified and that Southwest takes the full 48 maximum MAX aircraft discussed by management and that American/United receive the full contractual number of MAX deliveries per the latest filings, which we view as unlikely as there have been limited refinements to delivery schedules despite continued delays on re-certification. While the exhibit below shows what it would be possible for the airlines to produce from a capacity standpoint based on announcements on retirements to-date and the latest delivery schedules, we do not expect airlines to see capacity above 2019 levels in 2021 as we anticipate airlines will continue to adjust capacity plans to right-size to demand, whether it be taking less than 100% of contractual deliveries, retiring additional older aircraft, and/or continuing to keep under-utilized aircraft in storage. Furthermore, headcount reductions that have already occurred in addition to further headcount reductions announced by several airline management teams after restrictions on involuntary furloughs are lifted, when the current Payroll Support Program expires September 30, 2020, should put further downward pressure on the US airlines' ability to add capacity back. As noted above and shown in Exhibit 7, we are currently forecasting industry capacity in 2021 to be 23% below 2019 levels.

Question: What are your views on relative credit and balance sheet strength? Which companies are better positioned in this regard?

With respect to the US airlines, the industry has raised a significant amount of liquidity since the start of COVID-19 through various means (financing via the capital markets, government assistance, cost reductions, etc.) which has deescalated liquidity risk over the near- to medium-term, but impaired balance sheets remain a concern for investors longer-term. When demand begins to stabilize, we expect relative credit and balance sheet strength to come into heightened focus.

We highlight Buy-rated Southwest and Alaska as two airlines in our US coverage we view to be best-positioned from a liquidity/balance sheet strength perspective. Now the only airline in our coverage with an Investment Grade rating from all three credit rating agencies, Southwest continues to screen the best on a Net Debt/EBITDAR basis in each forecast year (2020-2025). Screening second best in most forecast periods is Alaska, a position we believe is not being reflected in its stock performance (ALK down 44% year-to-date, vs. LUV down just 29% and our airlines coverage ex-ALK down 47%). By 2022, we expect both Southwest and Alaska to have returned to relatively low, pre-COVID-19 levels of leverage with Southwest in a net cash position and Alaska levered 1.1x vs. 2019 levels of ~0.0x and 0.9x, respectively.

Question: How is the global team positioning among the Airlines in light of these views on the positive or negative side?

Across our US, Latin America, Europe/Russia, Australia/New Zealand, Asia/India, and Middle East airlines coverage, most stocks are rated Neutral/Sell by a small majority, with just under 40% of airlines under coverage Buy-rated. Our US airlines coverage universe has the largest proportion of Buy-rated stocks with 50% Buy-rated, followed by 44% Buy-rated in Asia/India, 33% Buy-rated in Europe/Russia, 25% Buy-rated in Latin America, and 0% Buy-rated in Australia/New Zealand and Middle East (ME only includes

Neutral-rated Air Arabia).

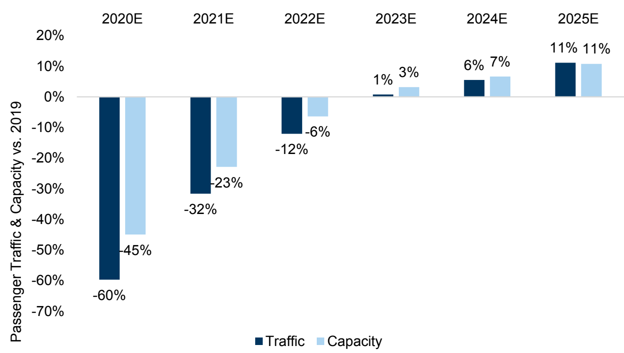
Overall, across our global airlines coverage there is a preference for companies with stronger balance sheets/better access to capital to weather what will likely be a volatile demand recovery. Additionally, having a network better positioned to recover more quickly due to geographical exposure or take share from weakened competitors is also preferred. Several Buy-rated stocks that fit these parameters throughout our global coverage include: Ryanair and Wizz Air in Europe; Alaska, JetBlue, and, Southwest in the US; and Air China, China Eastern, and China Southern in Asia.

Broadly speaking, for Sell-rated names across our global airlines coverage we are negative due to relatively worse network positioning, in addition to company specific issues we believe will further delay the return to pre-COVID-19 profitability. As noted above, we are of the view that long-haul, international traffic will take longer to recover than short-haul, domestic traffic. We highlight several Sell-rated stocks globally with relatively high exposure to long-haul, international markets: Hawaiian in the US (unique as its long-haul exposure is primarily leisure-focused); Lufthansa in Europe (also for its significant amount of corporate travel exposure); and Cathay Pacific and Singapore Airlines in Asia. For Hawaiian and Lufthansa, we expect preexisting competitive issues to be exacerbated by COVID-19. Southwest management has reiterated plans to enter Hawaiian's profitable inter-island market, making it a two-player market vs. a monopoly previously; therefore, with lower demand due to COVID-19 we believe the hit to Hawaiian's margin will be worse than pre-COVID-19 expectations. We expect Lufthansa's balance sheet impairment post-COVID-19 and its preexisting uncompetitive costs which may be exacerbated by a shrinking fleet will also impede its recovery.

Question: What is the biggest risk to positioning domestic over international among Airlines at this point?

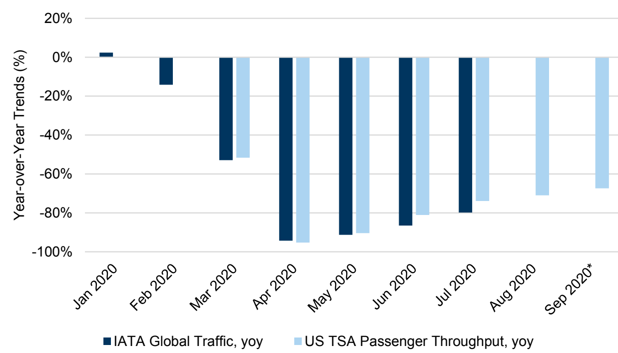
In our view, the biggest risk to positioning long domestic over international airlines would be if the demand recovery for international/corporate was much steeper than we are currently expecting. This would likely be a function of faster-than-expected herd immunity due to potential vaccine effectiveness or a step function improvement in the global number of incremental COVID-19 cases. We believe that stock performance will be influenced by the pace of each airline's return to pre-COVID-19 profitability. Therefore, based on our current expectations, airlines with historically larger exposure to international/corporate demand will see a slower profitability recovery as these airlines will likely not eliminate all of the infrastructure/associated costs required to serve these demand segments as they recover over the longer-term.

Exhibit 7: Traffic and Capacity Forecasts vs. 2019 Levels



Source: Goldman Sachs Global Investment Research

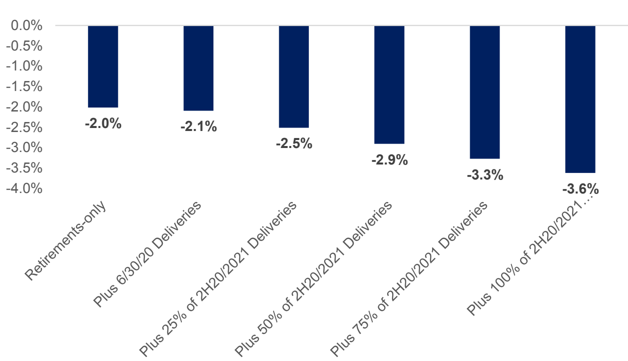
Exhibit 8: Global and US Traffic Trends: Jan - Sep 2020



*September data month-to-date through September 21, 2020.

Source: IATA, Transportation Security Administration (TSA), Goldman Sachs Global Investment Research

Exhibit 9: Delta Fuel Efficiency Scenario Analysis



Source: US Department of Transportation, Company filings, Goldman Sachs Global Investment Research

Exhibit 10: FY21 vs. FY19 Capacity Scenario Analysis

Based on announced aircraft retirements and potential deliveries

	FY21 vs. FY19 capacity under varying delivery assumptions			
	0%	25%	50%	100%
AAL	-8%	-5%	-3%	1%
DAL	-11%	-8%	-4%	3%
UAL	2%	4%	6%	10%
LUV	-1%	1%	3%	7%
ALK	-7%	-5%	-3%	1%
JBLU	1%	2%	4%	7%
HA	1%	2%	4%	7%
SAVE	7%	11%	15%	23%
ALGT	-7%	-4%	-1%	4%
Industry	-4%	-2%	1%	5%

Source: Company filings, OAG, Goldman Sachs Global Investment Research

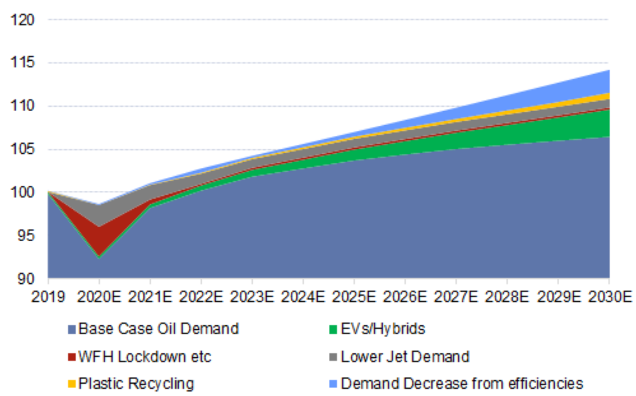
Refining: We maintain a cautious global view despite a demand recovery and see downside to consensus

Authors: Nikhil Bhandari, Neil Mehta and Vinit Joshi

Question: You have been cautious on refining supply and demand. How does the outlook for jet fuel fit into this view?

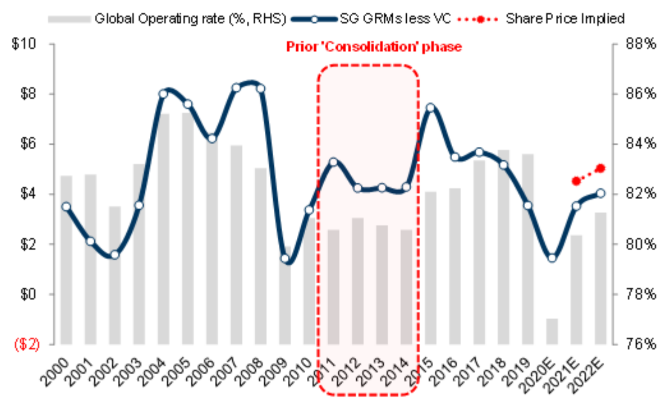
Our negative view on jet fuel demand is quite central to our negative view on refining. Jet fuel demand has been impacted the most from this crisis and is unlikely to return to 2019 levels at least before 2023 in our view as consumer confidence on flying may only gradually return while cost savings could drive structural impact to business travel. We bake in a structural impact of ~1 mn bpd for jet fuel demand due to lower business travel related demand. Thus overall refining demand normalizes only in 2022 which together with wave of mega capacities in Asia/Middle East would necessitate lower for longer margins to drive the necessary closures. A tight oil market in 2H20 from lower non OPEC non US supply could be another headwind for refiners due to tight differentials.

Exhibit 11: Our proprietary ROAD model now captures the structural impact to oil demand from WFH, lower business travel trends on top of other headwinds like EVs, plastics recycling
Oil demand under business as usual scenario vs base case, mn bpd



Source: IEA, Goldman Sachs Global Investment Research

Exhibit 12: We believe refining margins should stay below mid-cycle in medium term to incentivize the consolidation/closures in the industry, like we saw in 2011-14
Global utilization rates vs Singapore GRMs net of variable costs (VC), US$/bbl



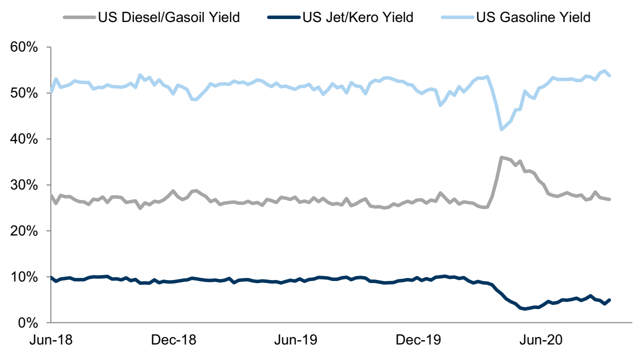
Note: Variable Costs (VC) comprises of (1) fuel and loss, (2) interest charge on working capital.

Source: Platts, BP, Company data, Goldman Sachs Global Investment Research

Question: How can refiners adjust their production to minimize jet fuel? Will this weigh on the diesel outlook?

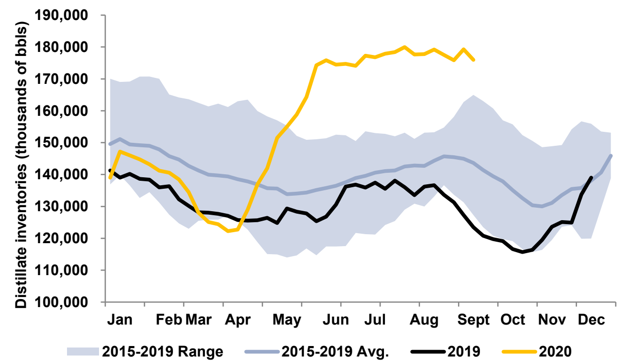
The co-product nature of the refining industry is at play during Covid. After a broad based decline in demand in 2Q, the recovery has been differentiated. Gasoline is recovering the fastest followed by diesel while jet fuel demand trends remain weak. Thus refiners focused on managing jet fuel inventories have increased yields for diesel which has led to higher land and floating inventories for diesel. Refiners in US and Asia have switched yield up to 5% toward diesel. Our analysis suggests that the supply/demand dynamics of light distillates (gasoline, naphtha) is relatively better versus middle distillates and we expect light distillate cracks to outperform cracks for middle distillates.

Exhibit 13: Refiners globally have shifted jet yield into diesel on weak aviation fuel demand
US refining yield



Source: EIA

Exhibit 14: Distillate inventories in the US remain well above 5 year average levels, which we expect to continue into 2021
US distillate inventories, k bbls

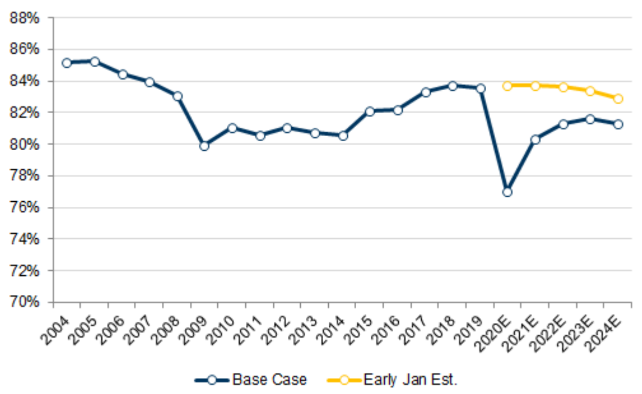


Source: EIA, Bloomberg, Goldman Sachs Global Investment Research

Question: How has COVID-19 and lost jet fuel impacted our supply/demand outlook? Will projects be delayed and capacity be retired?

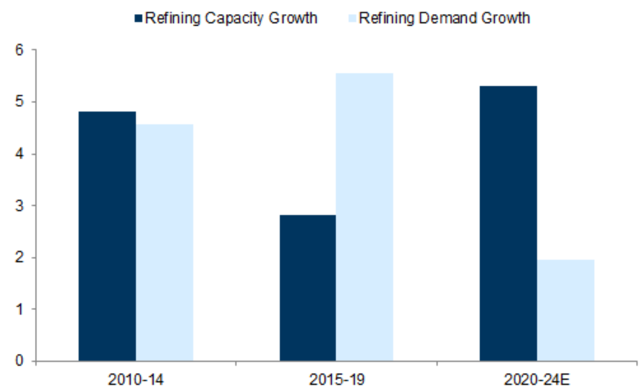
We believe we are entering into a period of consolidation for the refining industry where capacity rationalization in developed markets (DMs) will be required as supply growth is set to outperform demand over the next 5 years. We forecast global utilization rates to be 3% lower on average during 2021-24E relative to 2019, similar to levels seen during 2012-14. This is driven by a combination of (1) right shifting of demand growth from 2019 to 2022 due to Covid-19, (2) structural slow demand growth over the medium term driven by tightening C02 rules (especially in Europe) and (3) new mega refinery additions near demand centers. Thus capacity closures will be required to balance the market which in turn needs sustained weak margin signals. Refining capacities are typically long gestation projects and we see limited delays near term outside of what we have already baked in due to operational impact from Covid lockdowns. To become more constructive on refining we would need to see a combination of (1) sharp jet/diesel fuel demand recovery, (2) accelerated closure and (3) pertinent large new capacity addition delays, just one of these factors won't help.

Exhibit 15: Our global refining utilization rate expectations are below our prior expectations and 2019 levels as capacity adds have not been largely impacted by the demand shock in 2020
Global refining utilization rates



Source: BP, Goldman Sachs Global Investment Research

Exhibit 16: From 2020-2024, we forecast refining net capacity additions will outpace refinery demand growth, although we recognize more retirements could shift this data
Cumulative refining capacity growth vs refining demand growth, mn bpd



Our latest published estimates are from July 2020, we note a number of capacity closures and conversions have been announced in the interim

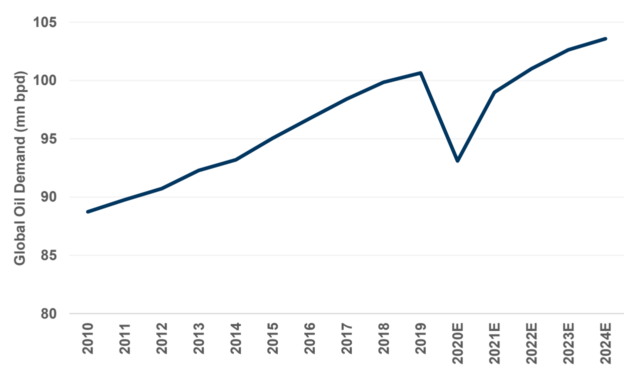
Source: BP, Goldman Sachs Global Investment Research

Exhibit 17: We note there have been a number of capacity closures and potential closures/conversions announced that could impact S/D balances going forward
Refinery capacity closure announcements

Company	Asset	Capacity (kbpd)	Notes
Confirmed			
MPC	Gallup	27	Indefinitely idled
MPC	Martinez	161	Idled, evaluating renewables conversion
Shell	Tabangao	110	Converting to import terminal
HFC	Cheyenne	52	Converting to renewable diesel
Total	Grandpuits	102	Bio plastics conversion
		452	
Under Assessment			
Company	**Asset**	**Capacity (kbpd)**	**Notes**
PSX	San Francisco	120	Renewables conversion pending FID
CVI	Wynnewood	73	Evaluating renewable diesel project
Refining NZ	New Zealand	135	Evaluating transition to import terminal
Gunvor Group	Antwerp	110	Considering mothballing
Neste	Naantali	58	Evaluating transition to terminal
Neste	Porvoo	103	Considering co-processing renewables
Viva Energy	Geelong	128	Considering long-term viability of asset
		727	

Source: Data compiled by Goldman Sachs Global Investment Research

Exhibit 18: We forecast global oil demand to recover back to 2019 levels by 2022 and to reach 99 mn bpd in 2021 on average
Global oil demand, mn bpd



Source: IEA, Goldman Sachs Global Investment Research

Question: We continue to recommend owning Diversified versus Merchant refining. What does this mean and how to express that globally?

In Asia, we remain cautious on pure play refiners and have a Sell rating on Thai Oil and S Oil. We prefer diversified refiners with exposure to (1) counter-cyclical gas station businesses (Buy **HPCL**, Buy **BPCL**) or (2) growing consumer and tech businesses (Buy on CL – **RIL**).

In the US, we prefer Buy-rated MPC (on CL), PSX, and PARR given exposure to non-refining businesses such as midstream, retail/marketing, and chemicals. We not only see value in the insulation these businesses provide in a volatile refining environment, but see underappreciation in the SOTP for the non-refining businesses that typically trade at a higher multiple versus refining. We recommend investors avoid select names in merchant refining, driving our Sell rating on **PBF** and **CVI**, as well as contributing to our Neutral ratings on **HFC** and **VLO**. We also highlight Sell-rated **XOM** and **Husky** as Sell-rated integrated oils with high refining exposure. We expect weaker refining margins, tight crude differentials, and regulatory risk to weigh on profitability for merchant refiners going forward. In Europe, we are still negative on **MOL**, but remain positive on a non-refining story, **Neste**, for renewable upside.

Exhibit 19: We highlight our global refining framework below

How to Invest in Global Refining Equities

CONCLUSION	SECTOR VIEW	STOCK IDEAS		
We expect gasoline margins to recover faster than distillates	Own gasoline exposure vs. high distillates exposure	Buy MPC (US)	Buy RIL (Asia)	Sell S-Oil (Asia)
We see value in non-refining segments	Own stocks with diversification into retail, midstream, renewables, telecom	Buy PARR (US)	Buy PSX (US)	Buy HPCL (Asia)
		Buy MPC (US)	Buy RIL (Asia)	Buy Neste (CEEMEA)
We still see EPS and dividend risks for select global refiners	Avoid stocks with consensus earnings risks in 2021	Sell MOL (CEEMEA)	Sell TOP (Asia)	Sell S-Oil (Asia)
				Sell PBF (US)
We see select refiners generating strong FCF amid 2021/ 22 macro recovery	Own FCF winners	Buy PSX (US)	Buy Tupras (CEEMEA)	Sell PBF (US)

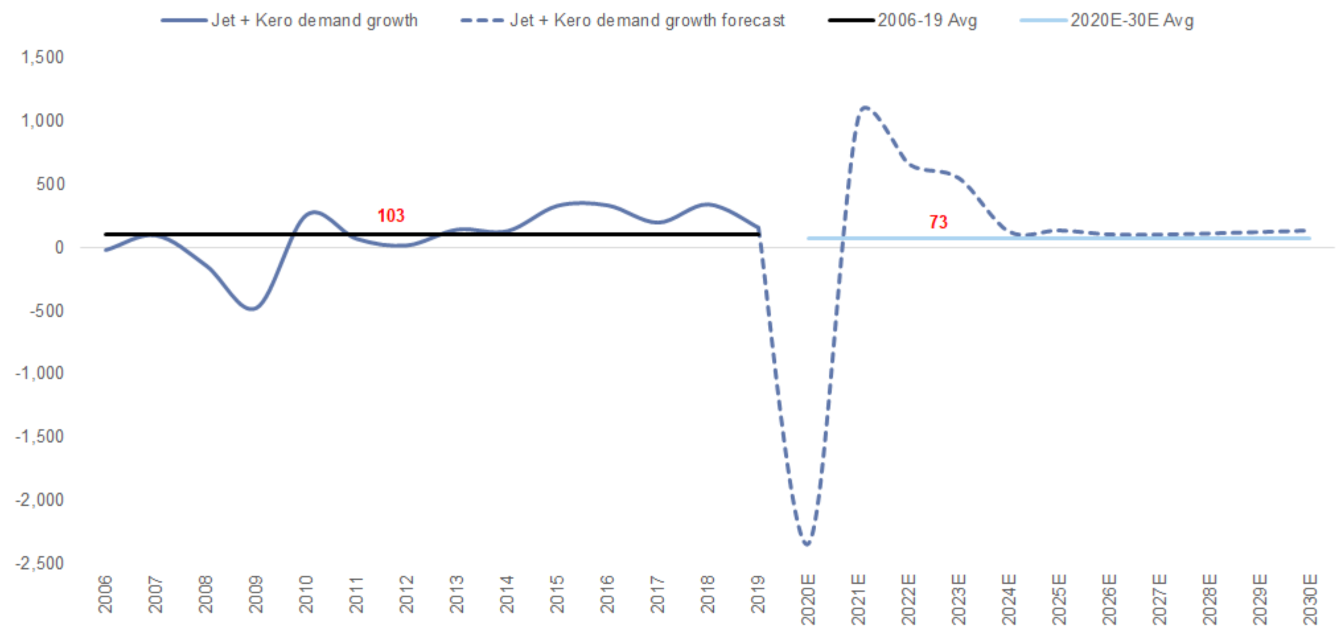
RIL and MPC on Regional Conviction List.

Source: Goldman Sachs Global Investment Research

Question: Long-term, what is our outlook for jet fuel demand over the next 10 years and what are the risks to this view? How do we account for improved efficiencies?

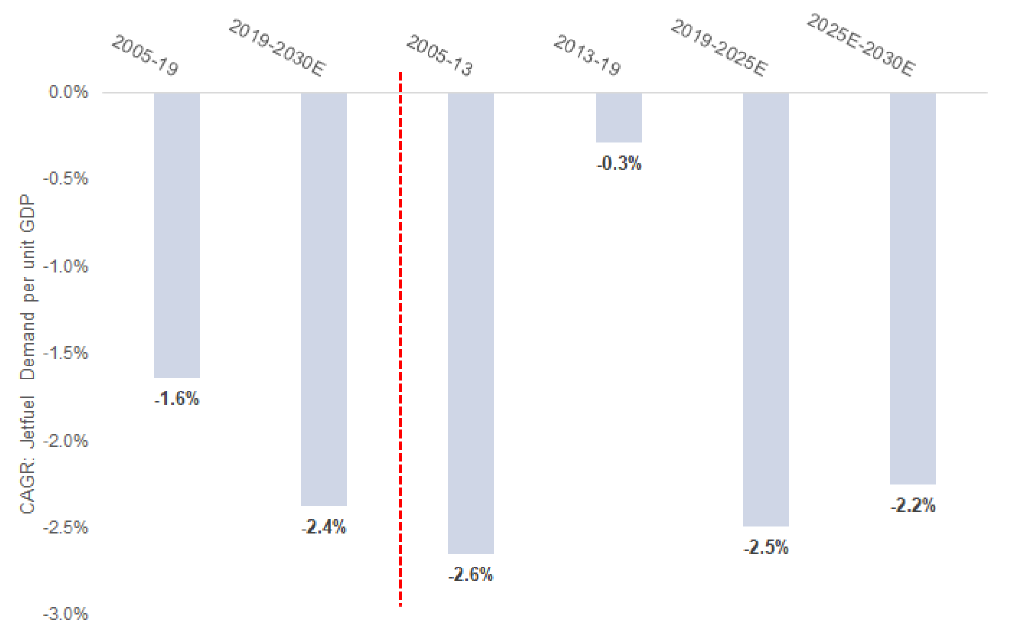
We expect jet fuel demand to return to 2019 levels in 2023. We bake in a structural impact of ~1 mn bpd for jet fuel demand due to lower business travel related demand. However, post-2023 we expect jet fuel demand to resume structural growth on an average of c.125 kbpd with growing business and leisure related demand, especially in China and India.

Exhibit 20: Global Jet Fuel (Jet + Kero) demand growth (kbpd YoY)



Source: IEA, Goldman Sachs Global Investment Research

Exhibit 21: Global Jet Fuel (Jet + Kero) demand per unit GDP CAGR



Source: IEA, Goldman Sachs Global Investment Research

Question: What is the outlook for key crude differentials and how does that fit into our Refining outlook?

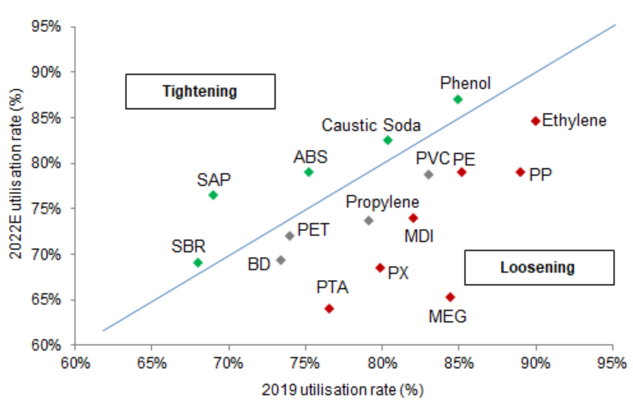
Crude differentials have been a key driver of refining profitability historically on a regional basis. US refiners saw an earnings tailwind from wide Brent-WTI and WTI-Midland spreads due to pipeline capacity constraints in 2012-14 and 2018-19. Similarly, Asia refiners' margins expanded in 2015-2017 as OPEC defended market share leading to a contango crude markets structure that has historically driven cheaper feedstock costs for Asian refiners. For global refiners broadly, we expect crude differentials to remain compressed relative to recent history given (1) lower US production levels, (2) more pipeline infrastructure built out in the US, (3) below normal levels of OPEC+ production given cuts, (4) lower Canada production given maintenance activity/curtailments, and (5) egress debottlenecking in Western Canada.

While we forecast 2021 crude differentials as wider versus spot levels for most crude grades, we still expect the crude spread environment to be less of a tailwind for refiners going forward than it has been over the last several years. On Brent-WTI in particular, we forecast 2020/2021 spreads to average $3/$3.5 per barrel. On Brent-Dubai, we expect spreads to remain tight within the $1-$2/bbl range as a majority of global refining capacity additions coming from Asia and the Middle East could provide support for stronger demand for Middle East crude.

Question: Does the Asia team continue to prefer owning Chemicals over Refiners in downstream or is that reflected in valuations?

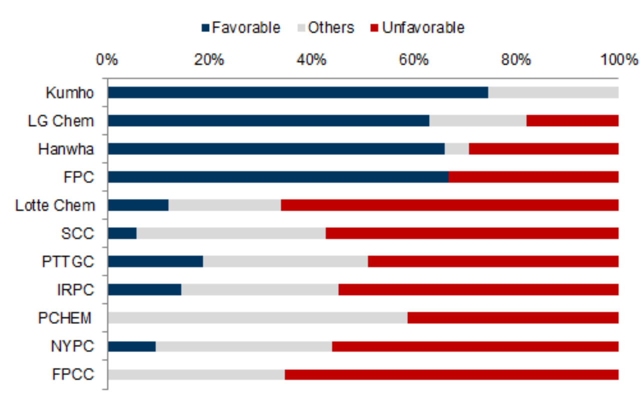
We selectively prefer chemical products with supply discipline which includes products like ABS, SAP, Caustic Soda. We remain cautious on olefin as 10 large crackers are schedule to start in China before end 2021 while cost curve tailwinds would reverse next year with our view of rising oil priced. Our analysis suggest market is pricing in above mid-cycle P/E spreads for 2021 on mid-cycle valuation multiples implying poor risk reward returns to own olefin exposed equities. As a result, we remain Sell on PTTGC, PCHEM, IRPC and FPCC. We prefer companies that offer higher quality of earnings, either through exposure to products with supply discipline or diversification into secular growing businesses (e.g., EV battery). Our Buy rated names include LG Chem, Kumho Petrochem and Formosa Plastics.

Exhibit 22: We prefer commodity chemicals with supply discipline in the medium term (e.g., ABS, Caustic Soda, SAP, SBR, Phenol)
Global commodity chemicals' utilization rate (%)



Source: IHS, Factiva, Company data, Goldman Sachs Global Investment Research

Exhibit 23: We prefer companies that offer higher quality of earnings, either through exposure to products with supply discipline (e.g., ABS, SAP, Caustic Soda) or diversification into secular growing businesses (e.g., EV battery)
Asia Chemicals earnings exposure to preferred and non-preferred products



Note: Favorable products incl. ABS, Caustic, Phenol, SBR, SAP; unfavorable products incl. PE, PP, MEG, PX.

Source: Company data, Goldman Sachs Global Investment Research

Question: What are we assuming for jet fuel crack spreads?

In the US, we assume jet fuel crack spreads in 2021/2022 remain at 55%/70% of the historical five-year average level. We expect margins to stay below normal until we see a recovery of jet fuel demand back to 2019 levels, which we currently expect in to occur in 2023. Quarter to date, Mid-Con jet fuel cracks have averaged under $5/bbl versus YTD levels of about $7/bbl and 2019 levels of $16/bbl. In Asia, we forecast jet fuel crack spreads of $4/$10/$12 per barrel in 2020/2021/2022 versus the five-year historical level of about $13/bbl.

Appendix

We update estimates and price targets across our refining coverage to reflect lower diesel, heating oil, and jet fuel crack spreads in 2020-2022, tighter WTI-WCS and LLS-Maya differentials, and higher RINs prices. Our price target changes are driven by our estimate changes and our valuation multiples are unchanged.

Exhibit 24: On average, we reduce our Refining coverage price targets by 10% largely on lower refining margin forecasts and higher RINs prices

Old versus New EPS and Price Targets

Estimate Change

		Old EPS			New EPS			$/Share Change		
		2020	2021	2022	2020	2021	2022	2020	2021	2022
Large Cap Refiners										
MPC	USD	($2.36)	$2.51	$4.07	($2.43)	$2.34	$4.00	($0.06)	($0.17)	($0.07)
PSX	USD	($0.71)	$3.93	$7.93	($0.79)	$3.57	$7.76	($0.09)	($0.36)	($0.17)
VLO	USD	($2.34)	$3.19	$5.93	($2.57)	$2.47	$5.49	($0.23)	($0.72)	($0.44)
Small/Mid Cap Refiners										
CVI	USD	($1.64)	$0.41	$1.26	($1.79)	$0.24	$1.22	($0.15)	($0.17)	($0.04)
HFC	USD	($1.32)	$0.50	$3.34	($1.46)	$0.21	$2.91	($0.14)	($0.29)	($0.43)
DK	USD	($2.78)	$0.29	$2.14	($2.93)	($0.14)	$1.76	($0.14)	($0.43)	($0.38)
PBF	USD	($8.53)	($1.18)	$2.37	($8.95)	($1.24)	$1.95	($0.42)	($0.06)	($0.42)
PARR	USD	($3.20)	$0.70	$1.65	($3.20)	$0.61	$1.62	$0.00	($0.09)	($0.03)
Refining MLPs										
CLMT	USD	($0.62)	$0.17	$0.54	($0.69)	$0.14	$0.51	($0.07)	($0.04)	($0.03)
Average $/sh Change								-$0.18	-$0.31	-$0.28

Target Change

		Price Targets		
		Old	New	% Chg
Large Cap Refiners				6 Month
MPC	USD	$42.00	$40.00	-5%
PSX	USD	$67.00	$63.00	-6%
VLO	USD	$54.00	$48.00	-11%
Small/Mid Cap Refiners				6 Month
CVI	USD	$13.00	$11.50	-12%
HFC	USD	$24.00	$21.00	-13%
DK	USD	$17.00	$15.00	-12%
PBF	USD	$7.00	$6.00	-14%
PARR	USD	$12.00	$11.50	-4%
Refining MLPs				6 Month
CLMT	USD	$2.75	$2.50	-9%
Average % Change				-10%

Source: Goldman Sachs Global Investment Research

Exhibit 25: We are cautious on Merchant Refiners (PBF, CVI, VLO, HFC) and more positive on Diversified Refiners (PARR, MPC, PSX)

Comp Analysis

Ticker	Rating	Price	Target	3Q2020 Annualized Yield	Return	Total Return	EV/EBITDA			P/E		FCF Yield			ND / EBITDA	
		9/23/20	6 Mo.	%	%		2020E	2021E	2022E	2021E	2022E	2020E	2021E	2022E	2020E	2021E
Large Cap																
MPC*	Buy	$28.73	$40	8.1%	39%	47%	10.5x	5.7x	5.2x	12.3x	7.2x	-1%	10%	12%	6.4x	3.5x
PSX	Buy	$52.63	$63	6.8%	20%	27%	21.0x	8.2x	5.4x	14.7x	6.8x	-2%	9%	14%	7.5x	3.0x
VLO	Neutral	$44.51	$48	8.8%	8%	17%	16.8x	6.5x	4.6x	18.1x	8.1x	-5%	6%	12%	5.8x	2.4x
Small/Mid Cap																
HFC	Neutral	$20.03	$21	7.0%	5%	12%	12.9x	7.3x	4.1x	NM	6.9x	-18%	-11%	15%	5.0x	3.2x
CVI	Sell	$12.57	$11.50	0.0%	-9%	-9%	22.1x	6.0x	4.2x	NM	10.3x	-22%	8%	19%	10.4x	2.8x
DK	Neutral	$10.65	$15	11.6%	41%	52%	25.3x	8.2x	5.5x	NM	6.1x	NM	18%	11%	17.3x	5.6x
PBF	Sell	$6.19	$6	0.0%	-3%	-3%	NM	6.2x	3.3x	NM	3.2x	-22%	-23%	25%	NM	5.1x
PARR	Buy	$7.32	$11.50	0.0%	57%	57%	NM	5.1x	3.4x	12.0x	4.5x	-21%	16%	34%	NM	3.1x
Refining MLPs																
CLMT	Neutral	$2.75	$2.50	0.0%	-9%	-9%	8.4x	5.7x	5.2x	NM	NM	NM	NM	NM	7.1x	4.8x
C-Corp Average				5.3%	20%	25%	18.1x	6.6x	4.4x	14.3x	6.6x	-13%	4%	18%	8.7x	3.6x
Buy-Rated Average				5.0%	39%	44%	15.7x	6.3x	4.6x	13.0x	6.2x	-8%	12%	20%	7.0x	3.2x

** Conviction List*

Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 26: Price target methodology and key risks

Company	Ticker	Rating	Target Price	Close Px. 23-Sep	Time Period	Methodology	Key Risks
US Refiners							
Calumet Specialty Products	CLMT	Neutral	$2.50	$2.75	6 month	5.75x EV/EBITDA	Upside/Downside: Operational issues, refining margins, interest rates and leverage
CVR Energy	CVI	Sell	$11.50	$12.57	6 month	SOTP, P/E	Upside: Refining margins, nitrogen prices and restructuring
Delek US Holdings	DK	Neutral	$15.00	$10.65	6 month	42.5% SOTP, 42.5% P/E, and 15% M&A	Upside/Downside: Refining margins, Midland spreads and M&A
HollyFrontier	HFC	Neutral	$21.00	$20.03	6 month	SOTP, P/E	Upside/Downside: Operational issues, refining margins, improving lubes environment
Marathon Petroleum	MPC	Buy*	$40.00	$28.73	6 month	SOTP, P/E	Downside: Refining margins, crude differentials, lower-than-expected synergy realization
Par Pacific Holdings	PARR	Buy	$11.50	$7.32	6 month	SOTP, P/E	Downside: Refining margins, crude differentials, lower-than-expected synergy realization
PBF Energy	PBF	Sell	$6.00	$6.19	6 month	SOTP	Upside: Operational issues, refining margins, M&A asset performance
Phillips 66	PSX	Buy	$63.00	$52.63	6 month	SOTP, P/E	Downside: Refining margins, operational issues and restructuring
Valero Energy	VLO	Neutral	$48.00	$44.51	6 month	SOTP, P/E	Upside/Downside: Refining margins, crude differentials, product margins, and capex levels

Source: Goldman Sachs Global Investment Research

Exhibit 27: Price target methodology and key risks for Asia refining coverage

	Ratings	Methodologies	Key risks
India			
Reliance	Buy*	SOTP	(-) Lower-than-expected refining/chemical margins, lower-than-expected ARPU, project delays and higher future capex.
HPCL	Buy	SOTP	(-) Higher-than-expected oil price, currency depreciation, lower-than-expected fuel retailing margins, weaker-than-expected refining margins and higher-than-expected cost/time amidst capex cycle.
BPCL	Buy	SOTP (15% M&A component weighting)	(-) Higher-than-expected oil price, currency depreciation, lower-than-expected fuel retailing margins, weaker-than-expected refining margins and slower-than-expected ramp-up of the new petchem plant.
IOC	Neutral	SOTP	(+/-) Lower/higher-than-expected oil price, currency appreciation/depreciation, higher/lower-than-expected fuel retailing margins, stronger/weaker-than-expected refining margins, stronger/weaker-than-expected petchem margins and faster/slower-than-expected ramp-up of new projects such as Haldia coker.
Korea			
SK Innovation	Neutral	SOTP	(+/-) Faster/slower-than-expected recovery of global GDP growth, higher/lower-than-expected OSP discount, faster/slower recovery of light distillate (gasoline/naptha) market, faster/slower-than-expected ramp-up in Chinese PX capacities, stronger/weaker downstream PET/Polyester demand, faster/later ramp-up of VRDS units, faster/slower-than-expected growth in EV penetration, higher/lower-than-expected metal prices (e.g. cobalt, nickel, lithium) for Energy (batteries), faster/slower-than-expected ramp-up of new EV battery plants.
GS Holdings	Neutral	P/B	(+/-) Substantial fluctuations in oil price, refining margins, forex, petrochemical spreads.
S-Oil	Sell	EV/EBITDA	(+) Higher-than-expected refining margins and/or chemical spreads, higher-than-expected utilization of ODC units.
ASEAN			
BCP	Neutral	SOTP	(+/-) Higher/lower-than-expected refining, marketing margins and/or oil prices.
Thai Oil	Sell	EV/EBITDA	(+) Higher-than-expected refining margins and/or chemical spreads.

* indicates stock is on regional conviction list

Source: Goldman Sachs Global Investment Research

Alaska (ALK): We are Buy-rated on ALK. Our $62, 12-month price target is based on a normalized P/E valuation methodology in which we are applying a 11x P/E multiple to our forward cycle (2021-2025) average EPS estimate. Key risks include: (1) slower-than-expected ramp up of merger synergies, (2) greater competitive capacity for markets in development.

Hawaiian (HA): We are Sell-rated on HA. Our $7, 12-month price target is based on a normalized P/E valuation methodology in which we are applying an 8x P/E multiple to our forward cycle (2021-2025) average EPS estimate. Key risks include: (1) greater competitive capacity offsets, (2) faster-than-expected ramp up in cost-cutting initiatives.

JetBlue (JBLU): We are Buy-rated on JBLU. Our $16, 12-month price target is based on a normalized P/E valuation methodology in which we are applying a 11x P/E multiple to our forward cycle (2021-2025) average EPS estimate. Key risks include: (1) further Airbus aircraft delivery delays, (2) greater competitive capacity in focus cities and markets in development.

Southwest (LUV): We are Buy-rated on LUV. Our $47, 12-month price target is based on a normalized P/E valuation methodology in which we are applying a 15x P/E multiple to our forward cycle (2021-2025) average EPS estimate. Key risks include: (1) Increased competitive capacity in key markets as a primarily domestic carrier, including the Hawaii market, (2) risk tied to the re-certification of the Boeing 737 MAX.

Delta (DAL): We are Neutral-rated on DAL. Our $38, 12-month price target is based on a normalized P/E valuation methodology in which we are applying a 9x P/E multiple to our forward cycle (2021-2025) average EPS estimate. Key risks include: (+) MRO business benefits from increased maintenance demand, (-) companies that Delta has an equity stake in for which the financials flow through the P&L (Aeromexico, Virgin Atlantic, etc.) face greater macro headwinds.

Lufthansa: We are Sell-rated, with a 12m, returns-based (EV/IC vs ROIC methodology) price target of €4.5. Key risks: better-than-expected cyclical demand growth, better non-fuel costs and lower capex. Other risks include favourable movements in fuel prices/FX.

Ryanair: We are Buy-rated with a 12m price target of €14 (EV/IC vs. ROIC methodology). Key risks: lower-than-expected traffic growth/fares, and structurally lower demand/higher costs related to the environment. Other risks include higher-than-expected non-fuel & fuel costs, capex.

Wizz Air: We are Buy-rated with a 12m price target of 4,143p (EV/IC vs. ROIC methodology). Key risks: lower-than-expected traffic growth/fares; structurally lower demand/higher costs related to the environment; exposure to FX (USD/EUR) and interest rate moves; higher-than-expected non-fuel & fuel costs.

Air China: We are Buy-rated and our 12-month EV/GCI-based price targets for A/H shares are Rmb8.80/HK$6.50, based on the average of 2020/21E EV/GCI and a multiple of 0.60x. For A-shares, our A-H premium is 54%. Key downside risks: (1) Worse-than-expected demand growth (e.g. a longer-than-expected Covid-19 impact), driving weaker pricing; (2) Lower-than-expected earnings at associate Cathay Pacific; (3) Faster-than-expected capacity growth, particularly in BDIA, which could pressure ticket prices in AC's main hub in Beijing; (4) Depreciation of the RMB versus the USD, which could impact costs such as fuel and interest expenses and cause FX losses; (5) Higher-than-expected oil prices, possibly driven by geopolitical tensions.

Cathay Pacific: We are Sell-rated and our 12-month EV/GCI-based price target is HK$5.00, based on the average of 2020/21E EV/GCI and a multiple of 0.49x. Key upside risks include: (1) Better-than-expected demand growth (e.g., a faster recovery from Covid-19); (2) Distress at competitors, combined with a traffic recovery, which could help strengthen Cathay's position in the Hong Kong market; (3) Better than expected cargo market; (4) Higher-than-expected earnings at associate Air China; and (5) Restructuring plan that helps the company position itself for a recovery, through potential cost savings, fleet rationalisation and liability restructuring.

China Eastern: We are Buy-rated and our 12-month EV/GCI-based price targets for A/H share are Rmb6.00/HK$3.80, based on 0.62x the average of 2020/21E EV/GCI. For A-shares, our A-H premium is 81%. Key downside risks: (1) Worse-than-expected demand growth (e.g. longer-than-expected Covid-19 impact), driving weaker pricing; (2) Higher-than-expected costs to move its main Beijing base to BDIA this year; (3) Depreciation of the RMB versus the USD, which could impact costs such as fuel and interest expenses and cause FX losses; (4) Higher-than-expected oil prices, possibly driven by geopolitical tensions.

China Southern: We are Buy-rated and our 12-month EV/GCI-based price targets for A/H share are Rmb7.35/HK$5.05, based the average of 2020/21E EV/GCI, with an EV/GCI multiple of 0.60x. For A-shares, our A-H premium is 66%. Key downside risks: (1) Worse-than-expected demand growth (e.g. longer-than-expected Covid-19 impact), driving weaker pricing; (2) Lower-than-expected ticket prices, caused by demand-supply dynamics or pricing strategies of the major airlines; (3) Higher-than-expected costs, particularly related to the move of its Beijing hub from Beijing Capital International Airport (BCIA) to BDIA; (4) Depreciation of the RMB versus the USD; (5) Higher-than-expected oil prices.

Singapore Airlines: We are Sell-rated and our 12-month EV/GCI-based PT is SG$3.05, based on 0.54X March 2021E EV/GCI. Key upside risks include: (1) Better-than-expected demand growth; (2) Better-than-expected cargo market; (3) Higher-than-expected oil prices, which would make SIA less disadvantaged vs. other airlines with lower hedging ratios; and (4) Cuts to fleet and capacity for SIA, which could help to reduce the capacity overhang driven by a slower recovery and reduce costs.

We are Buy-rated on Neste. We value the stock using a 50/50 blend of 11x 2021E EV/EBITDA and a 2% target 2021E dividend yield. Our 12-month price target is €48.0. Key risks: negative changes in the regulatory environment for renewables, lower refining/renewables margins, lower dividends and higher capex.

We are Sell-rated on MOL. We value the stock using a 50/50 blend of 3.5x EV/DACF and a 5% target dividend yield, applied to 50/50 blend of 2020/21E. Our 12-month price target is Huf1,650. Risks to our view include higher-than-expected production and utilization rates, oil prices and/or refining margins, and dividends.

We are Buy rated on Tupras. Our 12 month PT is TRY110. We value the stock using a 50/50 blend of 6.5x EV/EBITDA and 13% target dividend yield, applied to average 2021 EBITDA and DPS. Key risks: weaker refining margins, lower dividends, lower utilisation rates, and negative changes in the Turkey macro environment.

Disclosure Appendix

Reg AC

We, Neil Mehta, Catherine O'Brien, Nikhil Bhandari and Vinit Joshi, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

We, Damien Courvalin, Callum Bruce and Michael Hinds, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

Unless otherwise stated, the individuals listed on the cover page of this report are analysts in Goldman Sachs' Global Investment Research division.

GS Factor Profile

The Goldman Sachs Factor Profile provides investment context for a stock by comparing key attributes to the market (i.e. our coverage universe) and its sector peers. The four key attributes depicted are: Growth, Financial Returns, Multiple (e.g. valuation) and Integrated (a composite of Growth, Financial Returns and Multiple). Growth, Financial Returns and Multiple are calculated by using normalized ranks for specific metrics for each stock. The normalized ranks for the metrics are then averaged and converted into percentiles for the relevant attribute. The precise calculation of each metric may vary depending on the fiscal year, industry and region, but the standard approach is as follows:

Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

Financial Returns and Multiple use the Goldman Sachs analyst forecasts at the fiscal year-end at least three quarters in the future. Growth uses inputs for the fiscal year at least seven quarters in the future compared with the year at least three quarters in the future (on a per-share basis for all metrics).

For a more detailed description of how we calculate the GS Factor Profile, please contact your GS representative.

M&A Rank

Across our global coverage, we examine stocks using an M&A framework, considering both qualitative factors and quantitative factors (which may vary across sectors and regions) to incorporate the potential that certain companies could be acquired. We then assign a M&A rank as a means of scoring companies under our rated coverage from 1 to 3, with 1 representing high (30%-50%) probability of the company becoming an acquisition target, 2 representing medium (15%-30%) probability and 3 representing low (0%-15%) probability. For companies ranked 1 or 2, in line with our standard departmental guidelines we incorporate an M&A component into our target price. M&A rank of 3 is considered immaterial and therefore does not factor into our price target, and may or may not be discussed in research.

Quantum

Quantum is Goldman Sachs' proprietary database providing access to detailed financial statement histories, forecasts and ratios. It can be used for in-depth analysis of a single company, or to make comparisons between companies in different sectors and markets.

Disclosures

Pricing information

Air Arabia (AED1.11), Air China (H) (HK$5.06), Alaska Air Group Inc. ($35.70), Banco Comercial Portugues (€0.08), Bharat Petroleum (Rs377.25), CVR Energy Inc. ($12.74), Cathay Pacific (HK$5.34), China Eastern Airlines (A) (Rmb4.90), China Eastern Airlines (H) (HK$3.21), China Southern Airlines (A) (Rmb5.80), China Southern Airlines (H) (HK$4.04), Exxon Mobil Corp. ($34.32), Formosa Plastics (NT$78.00), GS Holdings (W30,300), Hawaiian Holdings Inc. ($12.40), Hindustan Petroleum (Rs172.40), Husky Energy Inc. (C$3.20), IRPC PCL (Bt2.00), Indian Oil Corp. (Rs71.95), JetBlue Airways Corp. ($11.30), Kumho Petro Chemical Co. (W95,200), LG Chem (W611,000), Lufthansa AG (€7.29), PBF Energy Inc. ($6.20), PTT Global Chemical (Bt39.75), Par Pacific Holdings ($6.84), Phillips 66 ($52.85), Reliance Industries (Rs2,181.15), Ryanair (€11.36), S-Oil Corp. (W50,300), SK Innovation (W138,500), Southwest Airlines Co. ($36.86), Thai Oil (Bt33.00) Wizz Air Holdings (3,096p), MOL (HUF1,552.00), Hindustan Petroleum (Rs172.40), Neste OYJ (€47.30), Singapore Airlines (S$3.39) and Tupras (TRY79.80)

Financial advisory disclosures

Goldman Sachs and/or one of its affiliates is acting as a financial advisor in connection with an announced strategic matter involving the following company or one of its affiliates: Reliance Industries Limited

The rating(s) for MOL, Neste OYJ and Tupras is/are relative to the other companies in its/their coverage universe:

Gazprom, Gazprom Neft, Lukoil, MOL, Motor Oil, Neste OYJ, Novatek, OMV Petrom SA, PKN, Romgaz, Rosneft, Surgutneftegaz, Tatneft, Tupras

The rating(s) for Reliance Industries, Reliance Industries (GDR), S-Oil Corp. and Thai Oil is/are relative to the other companies in its/their coverage universe:

Bangchak Corp PCL, Bharat Petroleum, GS Holdings, Hindustan Petroleum, Indian Oil Corp., Reliance Industries, Reliance Industries (GDR), S-Oil Corp., SK Innovation, Thai Oil

The rating(s) for Singapore Airlines is/are relative to the other companies in its/their coverage universe:

Air China (H), BOC Aviation Ltd., COSCO SHIPPING Holdings (H), Cathay Pacific, China Eastern Airlines (H), China Southern Airlines (H), ComfortDelGro, Singapore Airlines

The rating(s) for CVR Energy Inc., Calumet Specialty Products Partners, Delek US Holdings, HollyFrontier Corp., Marathon Petroleum Corp., PBF Energy Inc., Par Pacific Holdings, Phillips 66 and Valero Energy Corp. is/are

relative to the other companies in its/their coverage universe:

CVR Energy Inc., Calumet Specialty Products Partners, Canadian Natural Resources Ltd., Cenovus Energy Inc., Chevron Corp., ConocoPhillips, Delek US Holdings, Exxon Mobil Corp., HollyFrontier Corp., Husky Energy Inc., Imperial Oil Ltd., Kosmos Energy Ltd., MEG Energy, Marathon Petroleum Corp., PBF Energy Inc., Par Pacific Holdings, Phillips 66, Suncor Energy Inc., Valero Energy Corp.

The rating(s) for Alaska Air Group Inc., Delta Air Lines Inc., Hawaiian Holdings Inc., JetBlue Airways Corp. and Southwest Airlines Co. is/are relative to the other companies in its/their coverage universe:

AerCap, Air Lease Corp, Alaska Air Group Inc., Allegiant Travel Company, American Airlines Group, Delta Air Lines Inc., Fly Leasing Ltd, Hawaiian Holdings Inc., JetBlue Airways Corp., SkyWest Inc., Southwest Airlines Co., Spirit Airlines Inc., United Airlines Holdings

Company-specific regulatory disclosures

Compendium report: please see disclosures at https://www.gs.com/research/hedge.html. Disclosures applicable to the companies included in this compendium can be found in the latest relevant published research

Distribution of ratings/investment banking relationships

Goldman Sachs Investment Research global Equity coverage universe

	Rating Distribution			Investment Banking Relationships		
	Buy	Hold	Sell	Buy	Hold	Sell
Global	47%	36%	17%	65%	58%	54%

As of July 1, 2020, Goldman Sachs Global Investment Research had investment ratings on 3,015 equity securities. Goldman Sachs assigns stocks as Buys and Sells on various regional Investment Lists; stocks not so assigned are deemed Neutral. Such assignments equate to Buy, Hold and Sell for the purposes of the above disclosure required by the FINRA Rules. See 'Ratings, Coverage universe and related definitions' below. The Investment Banking Relationships chart reflects the percentage of subject companies within each rating category for whom Goldman Sachs has provided investment banking services within the previous twelve months.

Price target and rating history chart(s)

Compendium report: please see disclosures at https://www.gs.com/research/hedge.html. Disclosures applicable to the companies included in this compendium can be found in the latest relevant published research

Target price history table(s)

S-Oil Corp. (010950.KS)

Date of report	Target price (W)
26-Jul-20	48,000
01-Jul-20	50,000
27-Apr-20	45,000
20-Apr-20	47,000
30-Mar-20	46,000
08-Mar-20	70,000
04-Dec-19	110,000
23-Oct-19	96,000
08-Oct-19	97,000
24-Jul-19	88,000
15-Jul-19	85,000
26-May-19	87,000
24-Apr-19	94,000
19-Mar-19	96,000
24-Feb-19	114,000
28-Jan-19	105,000
09-Dec-18	115,000

Regulatory disclosures

Disclosures required by United States laws and regulations

See company-specific regulatory disclosures above for any of the following disclosures required as to companies referred to in this report: manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/co-managed public offerings in prior periods; directorships; for equity securities, market making and/or specialist role. Goldman Sachs trades or may trade as a principal in debt securities (or in related derivatives) of issuers discussed in this report.

The following are additional required disclosures: **Ownership and material conflicts of interest:** Goldman Sachs policy prohibits its analysts, professionals reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage. **Analyst compensation:** Analysts are paid in part based on the profitability of Goldman Sachs, which includes investment banking revenues. **Analyst as officer or director:** Goldman Sachs policy generally prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director or advisor of any company in the analyst's area of coverage. **Non-U.S. Analysts:** Non-U.S. analysts may not be associated persons of Goldman Sachs & Co. LLC and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with subject company, public appearances and trading securities held by the analysts.

Distribution of ratings: See the distribution of ratings disclosure above. **Price chart:** See the price chart, with changes of ratings and price targets in prior periods, above, or, if electronic format or if with respect to multiple companies which are the subject of this report, on the Goldman Sachs website at https://www.gs.com/research/hedge.html.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, except to the extent already made above pursuant to United States laws and regulations. **Australia:** Goldman Sachs Australia Pty Ltd and its affiliates are not authorised deposit-taking institutions (as that term is defined in the Banking Act 1959 (Cth)) in Australia and do not provide banking services, nor carry on a banking business, in Australia. This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act, unless otherwise agreed by Goldman Sachs. In producing research reports, members of the Global Investment Research Division of Goldman Sachs Australia may attend site visits and other meetings hosted by the companies and other entities which are the subject of its research reports. In some instances the costs of such site visits or meetings may be met in part or in whole by the issuers concerned if Goldman Sachs Australia considers it is appropriate and reasonable in the specific circumstances relating to the site visit or meeting. To the extent that the contents of this document contains any financial product advice, it is general advice only and has been prepared by Goldman Sachs without taking into account a client's objectives, financial situation or needs. A client should, before acting on any such advice, consider the appropriateness of the advice having regard to the client's own objectives, financial situation and needs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests and a copy of Goldman Sachs' Australian Sell-Side Research Independence Policy Statement are available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Brazil:** Disclosure information in relation to CVM Instruction 598 is available at https://www.gs.com/worldwide/brazil/area/gir/index.html. Where applicable, the Brazil-registered analyst primarily responsible for the content of this research report, as defined in Article 20 of CVM Instruction 598, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** Goldman Sachs Canada Inc. is an affiliate of The Goldman Sachs Group Inc. and therefore is included in the company specific disclosures relating to Goldman Sachs (as defined above). Goldman Sachs Canada Inc. has approved of, and agreed to take responsibility for, this research report in Canada if and to the extent that Goldman Sachs Canada Inc. disseminates this research report to its clients. **Hong Kong:** Further information on the securities of covered companies referred to in this research may be obtained on request from Goldman Sachs (Asia) L.L.C. **India:** Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (India) Securities Private Limited, Research Analyst - SEBI Registration Number INH000001493, 951-A, Rational House, Appasaheb Marathe Marg, Prabhadevi, Mumbai 400 025, India, Corporate Identity Number U74140MH2006FTC160634, Phone +91 22 6616 9000, Fax +91 22 6616 9001. Goldman Sachs may beneficially own 1% or more of the securities (as such term is defined in clause 2 (h) the Indian Securities Contracts (Regulation) Act, 1956) of the subject company or companies referred to in this research report. **Japan:** See below. **Korea:** This research, and any access to it, is intended only for "professional investors" within the meaning of the Financial Services and Capital Markets Act, unless otherwise agreed by Goldman Sachs. Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (Asia) L.L.C., Seoul Branch. **New Zealand:** Goldman Sachs New Zealand Limited and its affiliates are neither "registered banks" nor "deposit takers" (as defined in the Reserve Bank of New Zealand Act 1989) in New Zealand. This research, and any access to it, is intended for "wholesale clients" (as defined in the Financial Advisers Act 2008) unless otherwise agreed by Goldman Sachs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests is available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Russia:** Research reports distributed in the Russian Federation are not advertising as defined in the Russian legislation, but are information and analysis not having product promotion as their main purpose and do not provide appraisal within the meaning of the Russian legislation on appraisal activity. Research reports do not constitute a personalized investment recommendation as defined in Russian laws and regulations, are not addressed to a specific client, and are prepared without analyzing the financial circumstances, investment profiles or risk profiles of clients. Goldman Sachs assumes no responsibility for any investment decisions that may be taken by a client or any other person based on this research report. **Singapore:** Further information on the covered companies referred to in this research may be obtained from Goldman Sachs (Singapore) Pte. (Company Number: 198602165W). **Taiwan:** This material is for reference only and must not be reprinted without permission. Investors should carefully consider their own investment risk. Investment results are the responsibility of the individual investor. **United Kingdom:** Persons who would be categorized as retail clients in the United Kingdom, as such term is defined in the rules of the Financial Conduct Authority, should read this research in conjunction with prior Goldman Sachs research on the covered companies referred to herein and should refer to the risk warnings that have been sent to them by Goldman Sachs International. A copy of these risks warnings, and a glossary of certain financial terms used in this report, are available from Goldman Sachs International on request.

European Union: Disclosure information in relation to Article 6 (2) of the European Commission Delegated Regulation (EU) (2016/958) supplementing Regulation (EU) No 596/2014 of the European Parliament and of the Council with regard to regulatory technical standards for the technical arrangements for objective presentation of investment recommendations or other information recommending or suggesting an investment strategy and for disclosure of particular interests or indications of conflicts of interest is available at https://www.gs.com/disclosures/europeanpolicy.html which states the European Policy for Managing Conflicts of Interest in Connection with Investment Research.

Japan: Goldman Sachs Japan Co., Ltd. is a Financial Instrument Dealer registered with the Kanto Financial Bureau under registration number Kinsho 69, and a member of Japan Securities Dealers Association, Financial Futures Association of Japan and Type II Financial Instruments Firms Association. Sales and purchase of equities are subject to commission pre-determined with clients plus consumption tax. See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Ratings, coverage universe and related definitions

Buy (B), Neutral (N), Sell (S) -Analysts recommend stocks as Buys or Sells for inclusion on various regional Investment Lists. Being assigned a Buy or Sell on an Investment List is determined by a stock's total return potential relative to its coverage universe. Any stock not assigned as a Buy or a Sell on an Investment List with an active rating (i.e., a stock that is not Rating Suspended, Not Rated, Coverage Suspended or Not Covered), is deemed Neutral. Each region's Investment Review Committee manages Regional Conviction lists, which represent investment recommendations focused on the size of the total return potential and/or the likelihood of the realization of the return across their respective areas of coverage. The addition or removal of stocks from such Conviction lists do not represent a change in the analysts' investment rating for such stocks.

Total return potential represents the upside or downside differential between the current share price and the price target, including all paid or anticipated dividends, expected during the time horizon associated with the price target. Price targets are required for all covered stocks. The total return potential, price target and associated time horizon are stated in each report adding or reiterating an Investment List membership.

Coverage Universe: A list of all stocks in each coverage universe is available by primary analyst, stock and coverage universe at https://www.gs.com/research/hedge.html.

Not Rated (NR). The investment rating and target price have been removed pursuant to Goldman Sachs policy when Goldman Sachs is acting in an advisory capacity in a merger or strategic transaction involving this company and in certain other circumstances. **Rating Suspended (RS).** Goldman Sachs Research has suspended the investment rating and price target for this stock, because there is not a sufficient fundamental basis for determining, or there are legal, regulatory or policy constraints around publishing, an investment rating or target. The previous investment rating and price target, if any, are no longer in effect for this stock and should not be relied upon. **Coverage Suspended (CS).** Goldman Sachs has suspended coverage of this company. **Not Covered (NC).** Goldman Sachs does not cover this company. **Not Available or Not Applicable (NA).** The information is not available for display or is not applicable. **Not Meaningful (NM).** The information is not meaningful and is therefore excluded.

Global product; distributing entities

The Global Investment Research Division of Goldman Sachs produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce research on industries and companies, and research on macroeconomics, currencies, commodities and portfolio strategy. This research is disseminated in Australia by Goldman Sachs Australia Pty Ltd (ABN 21 006 797 897); in Brazil by Goldman Sachs do Brasil Corretora de Títulos e Valores Mobiliários S.A.; Ombudsman Goldman Sachs Brazil: 0800 727 5764 and / or ouvidoriagoldmansachs@gs.com. Available Weekdays (except holidays), from 9am to 6pm. Ouvidoria Goldman Sachs Brasil: 0800 727 5764 e/ou ouvidoriagoldmansachs@gs.com. Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by either Goldman Sachs Canada Inc. or Goldman Sachs & Co. LLC; in Hong Kong by Goldman Sachs (Asia) L.L.C.; in India by Goldman Sachs (India) Securities Private Ltd.; in Japan by Goldman Sachs Japan Co., Ltd.; in the Republic of Korea by Goldman Sachs (Asia) L.L.C., Seoul Branch; in New Zealand by Goldman Sachs New Zealand Limited; in Russia by OOO Goldman Sachs; in Singapore by Goldman Sachs (Singapore) Pte. (Company Number: 198602165W); and in the United States of America by Goldman Sachs & Co. LLC. Goldman Sachs International has approved this research in connection with its distribution in the United Kingdom and European Union.

European Union: Goldman Sachs International authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority, has approved this research in connection with its distribution in the European Union and United Kingdom.

General disclosures

This research is for our clients only. Other than disclosures relating to Goldman Sachs, this research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. The information, opinions, estimates and forecasts contained herein are as of the date hereof and are subject to change without prior notification. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Other than certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgment.

Goldman Sachs conducts a global full-service, integrated investment banking, investment management, and brokerage business. We have investment banking and other business relationships with a substantial percentage of the companies covered by our Global Investment Research Division. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (https://www.sipc.org).

Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients and principal trading desks that reflect opinions that are contrary to the opinions expressed in this research. Our asset management area, principal trading desks and investing businesses may make investment decisions that are inconsistent with the recommendations or views expressed in this research.

The analysts named in this report may have from time to time discussed with our clients, including Goldman Sachs salespersons and traders, or may discuss in this report, trading strategies that reference catalysts or events that may have a near-term impact on the market price of the equity securities discussed in this report, which impact may be directionally counter to the analyst's published price target expectations for such stocks. Any such trading strategies are distinct from and do not affect the analyst's fundamental equity rating for such stocks, which rating reflects a stock's return potential relative to its coverage universe as described herein.

We and our affiliates, officers, directors, and employees, excluding equity and credit analysts, will from time to time have long or short positions in, act as principal in, and buy or sell, the securities or derivatives, if any, referred to in this research.

The views attributed to third party presenters at Goldman Sachs arranged conferences, including individuals from other parts of Goldman Sachs, do not necessarily reflect those of Global Investment Research and are not an official view of Goldman Sachs.

Any third party referenced herein, including any salespeople, traders and other professionals or members of their household, may have positions in the products mentioned that are inconsistent with the views expressed by analysts named in this report.

This research is not an offer to sell or the solicitation of an offer to buy any security in any jurisdiction where such an offer or solicitation would be illegal. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients. Clients should consider whether any advice or recommendation in this research is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice. The price and value of investments referred to in this research and the income from them may fluctuate. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. Fluctuations in exchange rates could have adverse effects on the value or price of, or income derived from, certain investments.

Certain transactions, including those involving futures, options, and other derivatives, give rise to substantial risk and are not suitable for all investors. Investors should review current options and futures disclosure documents which are available from Goldman Sachs sales representatives or at https://www.theocc.com/about/publications/character-risks.jsp and https://www.fiadocumentation.org/fia/regulatory-disclosures_1/fia-uniform-futures-and-options-on-futures-risk-disclosures-booklet-pdf-version-2018. Transaction costs may be significant in option strategies calling for multiple purchase and sales of options such as spreads. Supporting documentation will be supplied upon request.

Differing Levels of Service provided by Global Investment Research: The level and types of services provided to you by the Global Investment Research division of GS may vary as compared to that provided to internal and other external clients of GS, depending on various factors including your individual preferences as to the frequency and manner of receiving communication, your risk profile and investment focus and perspective (e.g., marketwide, sector specific, long term, short term), the size and scope of your overall client relationship with GS, and legal and regulatory constraints. As an example, certain clients may request to receive notifications when research on specific securities is published, and certain clients may request that specific data underlying analysts' fundamental analysis available on our internal client websites be delivered to them electronically through data feeds or otherwise. No change to an analyst's fundamental research views (e.g., ratings, price targets, or material changes to earnings estimates for equity securities), will be communicated to any client prior to inclusion of such information in a research report broadly disseminated through electronic publication to our internal client websites or through other means, as necessary, to all clients who are entitled to receive such reports.

All research reports are disseminated and available to all clients simultaneously through electronic publication to our internal client websites. Not all research content is redistributed to our clients or available to third-party aggregators, nor is Goldman Sachs responsible for the redistribution of our research by third party aggregators. For research, models or other data related to one or more securities, markets or asset classes (including related services) that may be available to you, please contact your GS representative or go to https://research.gs.com.

Disclosure information is also available at https://www.gs.com/research/hedge.html or from Research Compliance, 200 West Street, New York, NY 10282.