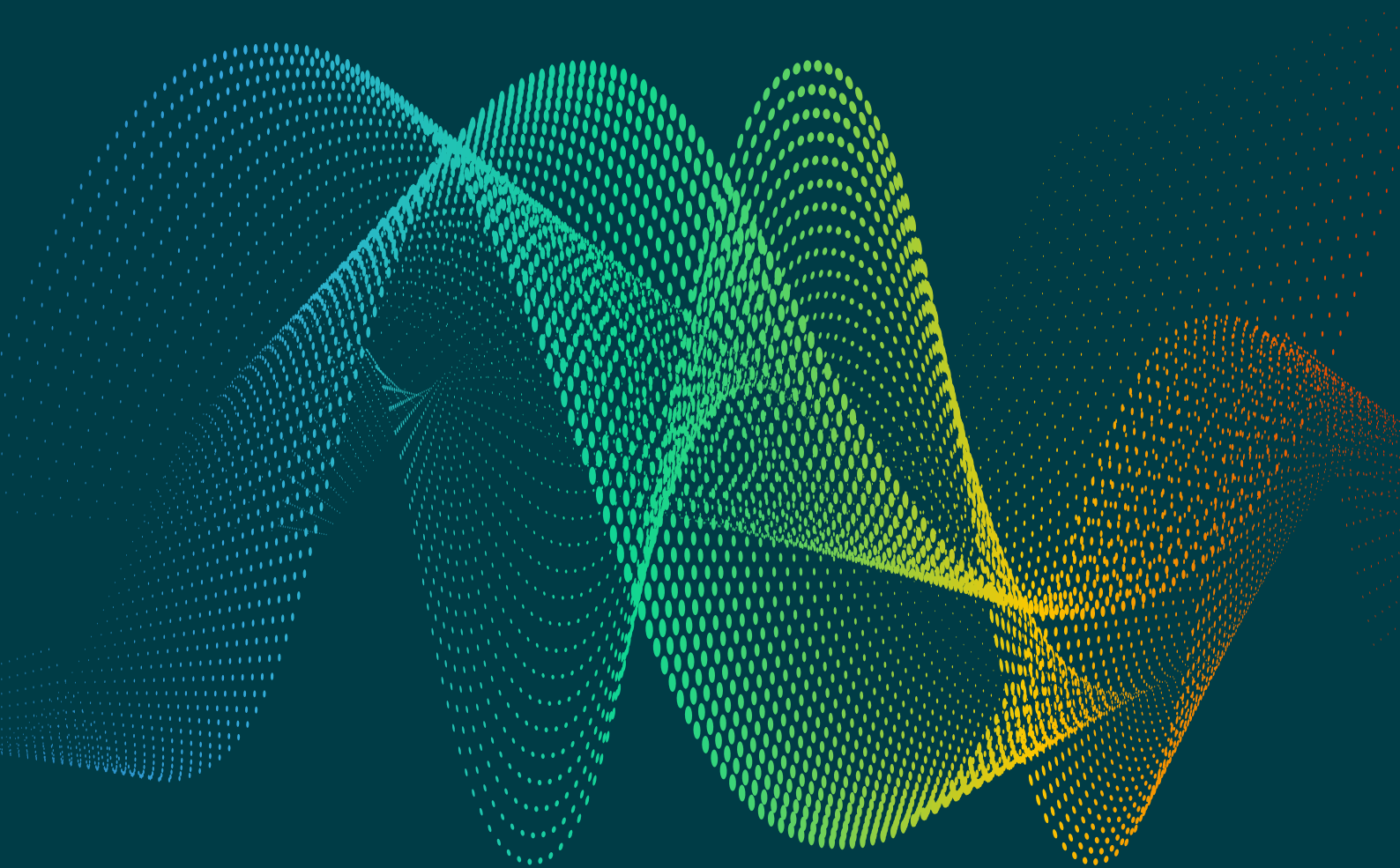




POST-COVID
RECOVERY
ENERGY MONITOR

Alternative Metrics for Real-Time Assessment of Jet Fuel Demand





An International Energy Forum Report | 30 June 2021

Written and produced by:

Leila Benali leila.benali@ief.org

Allyson Cutright allyson.cutright@ief.org

Key findings:

- **Jet fuel accounts for the lion's share of missing oil demand on a percentage basis.** At the beginning of 2Q21, it remained ~40% (~2.9 mb/d) below pre-COVID levels while total oil demand was only ~6% below pre-pandemic levels. Our analysis of leading indicators combined with JODI data imply jet fuel demand improved in May and the first half of June, but remains 30% below 2019 levels. Recovering demand in the US and Europe in recent weeks more than offset declines in and from/to India and China.
- **Return of international travel remains the main wildcard** as governments are racing to ease policies in preparation for the summer tourist season. Travel and tourism industry accounted for 10.4% of global GDP in 2019. Pent-up demand, eased restrictions, and extra savings could pave way for upside summer demand surprise, but uncertainties and new outbreaks will temper gains:
 - **International bookings** remained stagnant at just 20% of pre-crisis levels at end-April 2021, but this is changing quickly (e.g., US international bookings jumped 13% from April to May).
 - **Domestic travel bookings** at the end of April increased to 74% of pre-COVID levels (vs. 10% in April 2020) and are expected to recover to >95% by end-year, according to the International Air Transport Association (IATA).
 - As expected, given the increase in global goods trade and e-commerce, **global air cargo travel** reached a record high in April 2021 (12% above pre-pandemic levels). Asia-North America lanes saw the largest growth (+27% vs. April 2019 in cargo tonne-km) while Latin American lanes remain contracted by 30%.
- **Jet fuel demand is unlikely to return to pre-COVID levels until 2023 or beyond** due to a slower return of long-haul flights, accounting for 30% of aviation fuel demand. India and regions with low vaccination rates are the most affected and expected to be slower in rebounding. In parallel, calls for grants supporting sustainable fuels and other voluntary measures to reduce aviation emissions such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) are intensifying in the US and Europe.

- **Recovery is uneven across geographies**, favoring countries with high vaccination rates or low mortality, as all face the difficult trade-off of reviving the economy and managing covid-related deaths. Virus mutations and unequal vaccination rollout are resulting in renewed and extended cross-border travel restrictions. Travel corridors opened across limited destinations where infections are contained, where countries have coordinated policies, and/or limited to vaccinated populations.
 - The largest jet fuel consumer, the US, was back to ~69% of pre-COVID levels in April. Flight and passenger statistics imply a continued increase in May and early-June to nearly 80% pre-COVID levels. Airlines are expected to increase domestic capacity to 90% of 2019 levels this summer.
 - JODI data shows China's jet fuel demand above pre-COVID levels during 4Q20 and again in February and April 2021. In early-May, domestic airline capacity was ~20% above 2019 levels while international continued to lag at ~80% below pre-COVID levels. However, aviation traffic slowed in late-May/early-June as outbreaks of the delta variant of COVID-19 drove renewed travel restrictions in Guangzhou and Shenzhen.
 - European aviation activity increased toward 50% of pre-COVID levels in early-June after stagnating at just 20-40% of pre-pandemic levels earlier this year. Countries are racing to ease policies in time for summer travel season (last year, Germany's Minister of Foreign Affairs dubbed this a "shallot race"), implying a quick and strong rebound in jet fuel. Conversely, it could cause another surge of COVID cases and result in more stringent policies this fall in countries where vaccination rates lag. Intra-Europe airline capacity is scheduled to increase to 70% this summer from 31% in 1Q21.
 - Indian jet fuel demand neared 70% of pre-COVID levels in February 2021, before a surge in the delta variant of COVID-19 caused renewed lockdowns and demand to fall back toward 28% of pre-pandemic levels in May. Concerns about the delta and delta plus variants are affecting many major travel lanes.
 - Only a few countries in Latin America report jet fuel demand data in JODI. Brazil, Mexico, and Chile jet fuel demand were at 50-55% of pre-pandemic levels in April. June's scheduled flights to the Caribbean were ~33% below 2019 levels. Meanwhile, flights scheduled between the US and Mexico in May were back at pre-COVID levels.

Global oil demand collapsed by ~25% in “black April” to levels unseen in 18 years. Transportation demand was disproportionately impacted with jet fuel alone collapsing by >70%. Contrary to other transportation fuels where the ensuing recovery has been spectacular, the ‘last mile’ for jet fuel remains particularly slow and uneven. This report is the second in the IEF’s “Post-COVID Recovery Energy Monitor” series and complements the April’s assessment on gasoline and diesel. This time, the leading indicators for jet fuel demand will focus on flight and passenger data trackers. We combined JODI Oil Database with EuroControl, IATA, ICAO, government issued statistics, and Oxford’s COVID-19 Government Response Tracker.

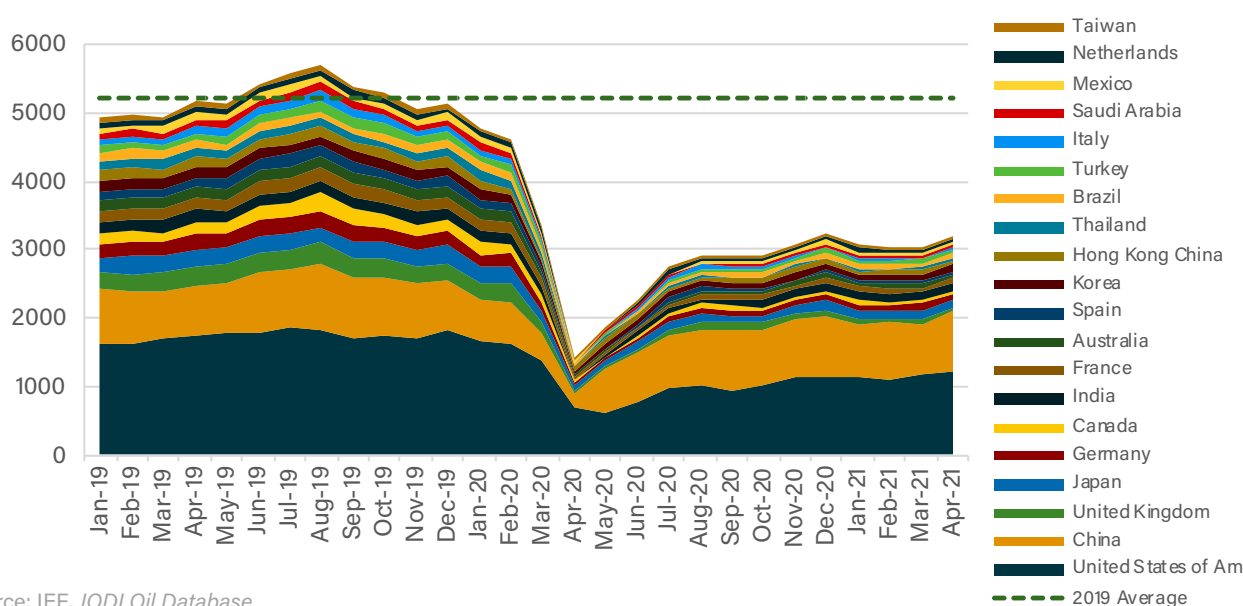
A significant factor in jet fuel demand recovery is the reemergence of long-haul flights, more than 30% of fuel used in aviation. New and extended border restrictions will slow jet fuel demand recovery. Conversely, successful vaccination rollouts, virus containment, coordinated policies and travel corridors will spur jet fuel demand.

JODI data shows jet fuel demand in April at ~60% of pre-COVID levels

As of June, the JODI Oil Database shows April jet fuel demand data for 41 of 117 reporting countries and an additional 9 countries reported kerosene demand (which includes jet-kerosene fuel). In 2019, kerosene fuel demand averaged ~7.9 mb/d with >7.2 mb/d consumed in the aviation sector. Within JODI, the largest consumers that regularly report total kerosene demand, but not jet fuel, include China, Brazil, and Saudi Arabia. However, these three countries combined consume <100 kb/d for non-aviation related uses. The largest consumers of kerosene ex-jet fuel (e.g., Japan, Indonesia, India, and UK) report jet fuel as a separate line item within JODI.

In this report, the IEF uses jet fuel where data is available and total kerosene for the countries where data is unavailable. Countries that regularly report JODI data account for nearly 85% of global jet fuel demand. The IEF estimates global jet fuel demand was ~4.3 mb/d in April, up 125% from April 2020, but still ~40% below 2019 levels.

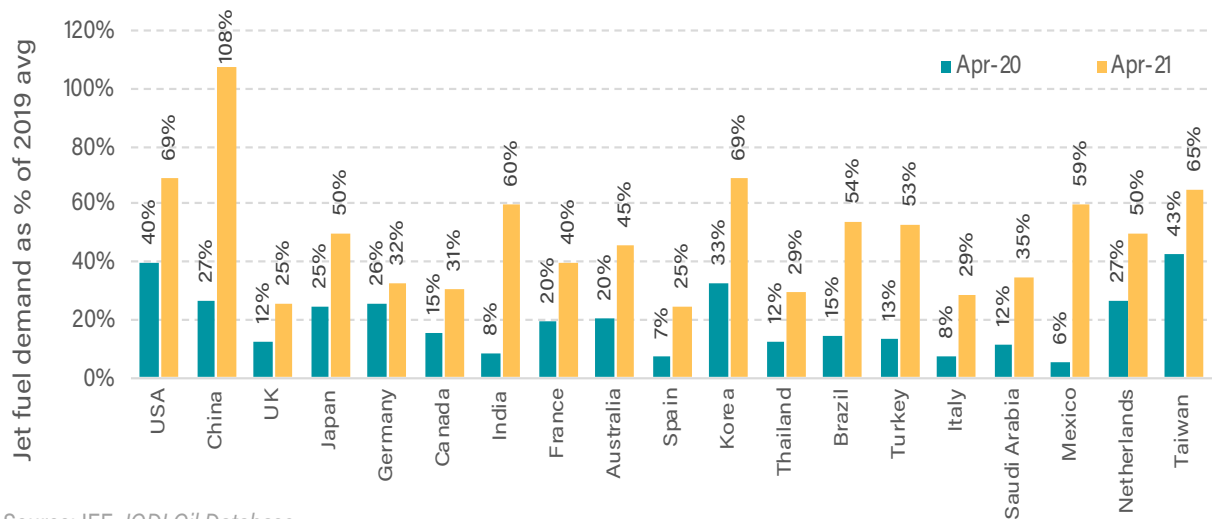
JODI Demand Data for Largest 20 Jet Fuel Demand Markets



Source: IEF, JODI Oil Database

JODI data reveals that despite localized COVID outbreaks, China is leading the recovery with jet fuel demand already back to pre-COVID levels mainly led by domestic travel, since international flights remaining >80% below pre-COVID levels. Meanwhile, much of European jet fuel demand remained at just 20-40% of pre-COVID levels prior to summer reopening. Only a few Latin American countries report jet fuel demand to JODI, but their latest demand data is 45-55% below pre-COVID levels. EIA suggests a continued acceleration of US jet fuel demand in recent weeks to nearly 80% of pre-COVID levels, up from 69% in April according to JODI.

Jet Fuel Demand Recovery Across Key Demand Markets



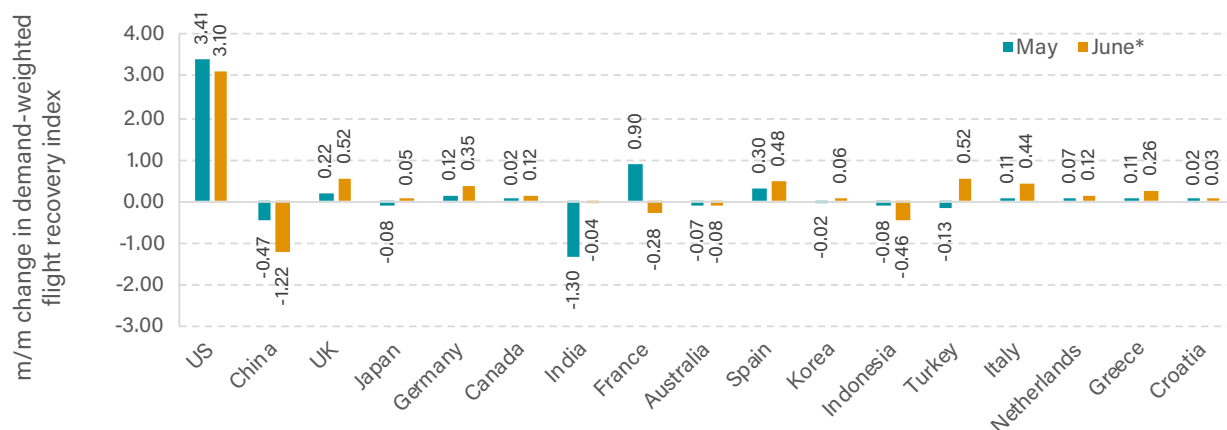
Source: IEF, JODI Oil Database

Flight trackers show uneven improvement in jet fuel demand in May and early-June

The IEF combined flight data, passenger throughput statistics, and flight schedules from a variety of government sources, airport statistics and publicly available information to create a simple country-level index for aviation sector recovery in 40 countries, representing ~70% of total jet fuel demand. There is a strong correlation in many of the country-level flight recovery indexes and historical JODI jet fuel demand data.

Additionally, the IEF calculated a demand-weighted average air mobility index for the 40 countries by weighing each countries' flight recovery index by its share of the aggregate 2019 jet fuel demand. The air mobility index in June reached its highest since February 2020 at 61. The index has increased by nearly 50% since December. The significant increased demand in the US in both May and June more than offset declines in India and China.

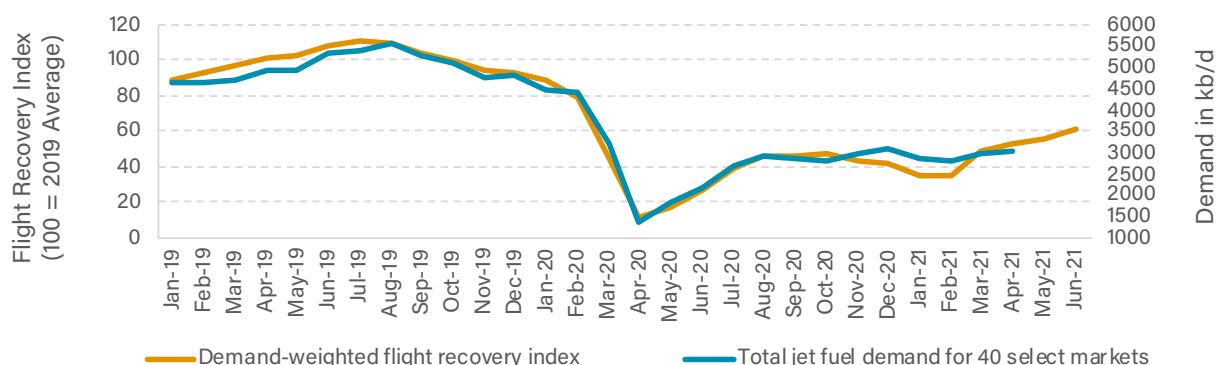
Month-to-Month Change in Demand-Weighted, Country-Level Flight Recovery Index in May and June 2021



*June 1-16

Source: IEF, TSA, EuroControl, IATA, Airport Statistics, India's Directorate General of Civil Aviation, Japan's Civil Aviation Bureau, China's Civil Aviation Administration, Statistics Canada

Jet Fuel Demand and Demand-Weighted Flight Recovery Index for 40 Countries



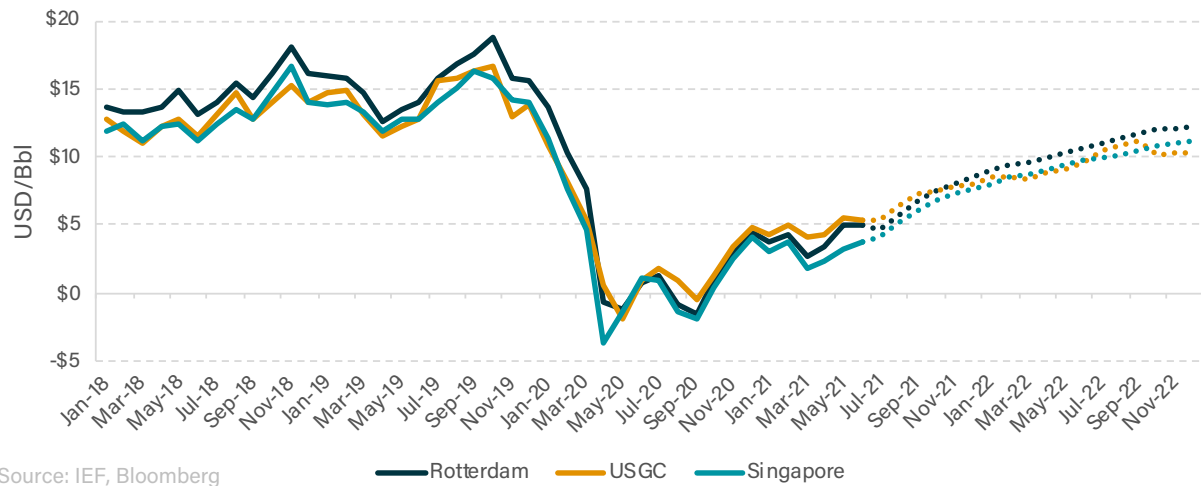
Source: IEF, JODI Oil Database, EuroControl, TSA, Airport Statistics, India's Directorate General of Civil Aviation, Japan's Civil Aviation Bureau, China's Civil Aviation Administration, Statistics Canada

Jet fuel cracks in US Gulf Coast and NW Europe rose to 14-month highs in May, but futures curves indicate it could take multiple years to reach pre-pandemic levels

Jet fuel margins against Brent collapsed from ~\$15/bbl pre-pandemic into the negatives following last spring and late-summer's COVID outbreaks. Since then, cracks have struggled to top \$5/bbl. As of mid-June, Singapore cracks remain lower than Rotterdam and US Gulf Coast due to the collapse in Indian demand and weakening in other Asia Pacific countries. Futures curves indicate that jet fuel margins will continue to slowly rise over the next 18+ months but remain ~33% below pre-COVID levels at the end of 2022. This corresponds with the industry and market expectation that, while demand is improving, jet fuel demand will likely continue to remain below pre-COVID levels for 2-3 more years due to uneven-vaccine rollout, new virus variants, and potentially some structural changes to business operations. IATA's most recent aviation outlook shows a return to pre-COVID levels in

2023. Meanwhile, BloombergNEF forecasts a full return in 2024. Similarly, EUROCONTROL shows flights in the region returning to 2019 levels by 2024 in their most optimistic scenario.

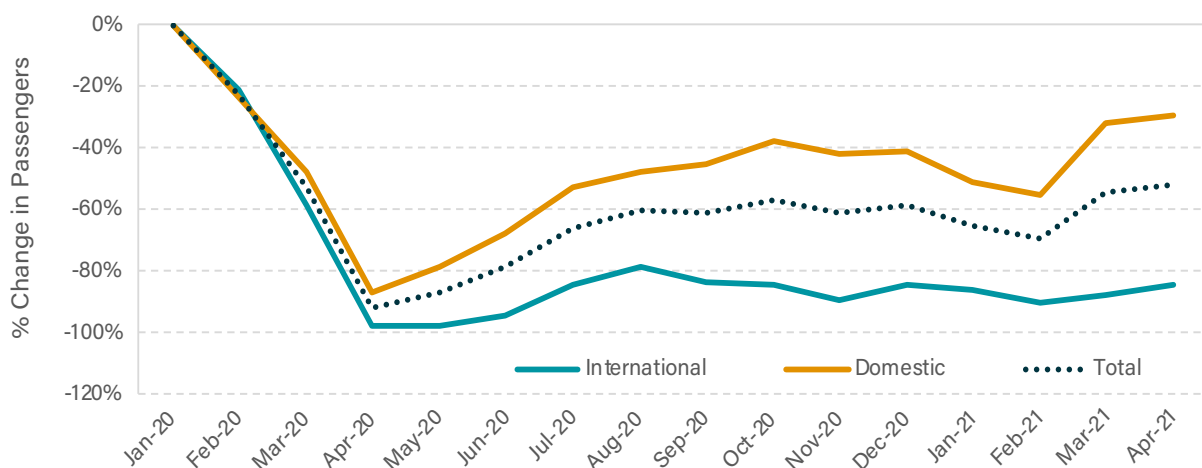
Jet Fuel Crack Spreads vs. Brent (June 17, 2021)



Domestic demand has driven jet fuel recovery thus far, but international trips should rise this summer with ongoing ‘shallot race’¹

At the end of April, daily bookings for domestic travel jumped to 74% of pre-crisis levels compared to 44% of pre-crisis levels at the beginning of 2021, illustrating a strong appetite for travel as restrictions ease. Daily bookings for international travel have been stagnating at ~80-90% below pre-crisis levels since last summer. However, this should begin to rise in coming months as strict travel restrictions are easing in selected European tourist destinations.

Change in International and Domestic Flight Passengers vs. 2019



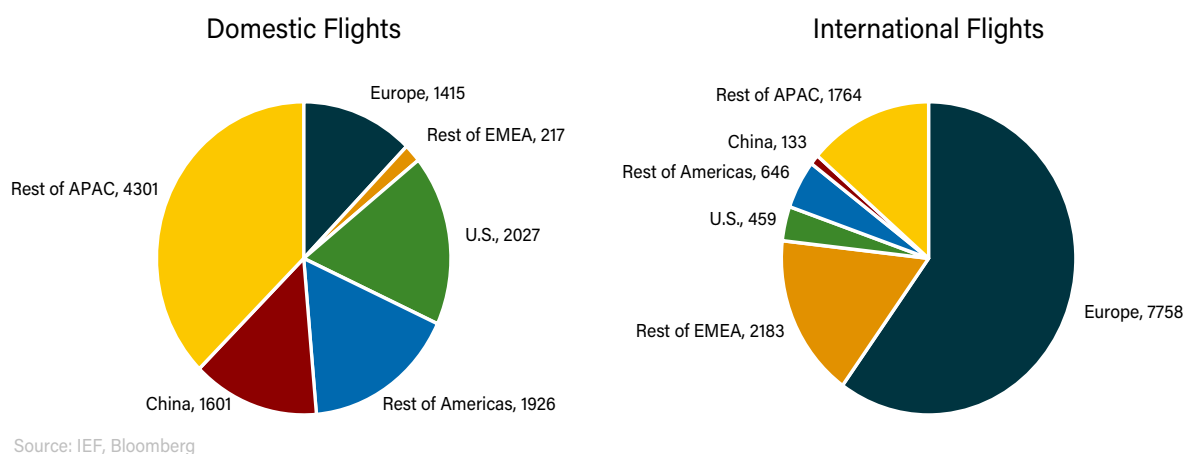
¹“La course à l'échalote” (or literally ‘the shallot race’ to label a futile competition) was used by the German Minister of Foreign Affairs to denounce some European countries’ race to hastily deconfine on time for the summer tourism season last year.

Currently, domestic and international flights are scheduled to pick-up at a similar pace over the next 12 weeks with each adding ~12,000 daily flights by end-August, according to BloombergNEF data. Domestic flights will be near pre-COVID levels by end-August and international flights will be at ~50% of pre-crisis levels, barring schedule adjustments and cancellations.

More importantly, these expectations depend heavily on a relaxation of travel guidelines in major Asian, Middle Eastern and European destinations, in addition to the US.

Most of the increase in scheduled domestic flights over the next 12 weeks come from Asia Pacific (excluding China) and the US. Meanwhile, the rise in scheduled international flights is driven by Europe. With Greece, Spain, and Portugal lifting a large share of travel restrictions, it remains to be seen whether other European destinations will follow suit, and whether the existing openings will not be re-tightened. The other emerging trend to boost tourism is the so-called vaccine tourism (UAE for international tourism or Indonesia for national tourism).

Increase in Daily Scheduled Flight Departures by Region: End-August 2021 vs Early-June 2021

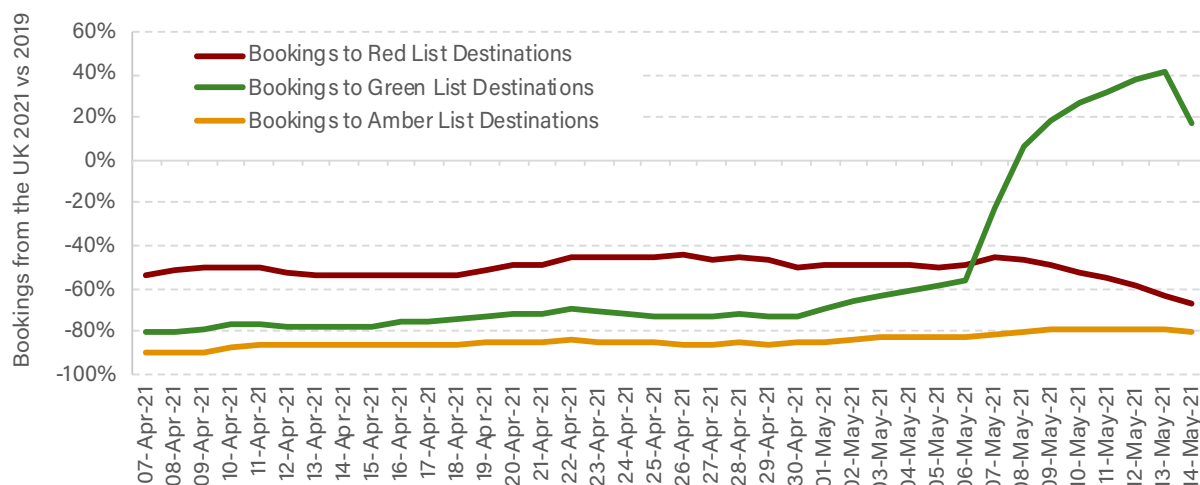


Pick-up in international travel is a summer wildcard as tourists navigate maze of color-coded country lists

International passenger traffic remained ~80% below pre-COVID levels in April 2021 and the IATA expects it to remain >65% below 2019 levels in the second half to 2021. Countries are eager to safely reopen, and eased policies are more likely as vaccinations increase and/or death rates decline.

Pent-up demand will lead to one-off sharp increase in bookings. This is already occurring in countries that have announced limited easing of restrictions. For example, on May 7th the UK announced a "green list" of 12 countries/territories where travel was allowed without the requirement to quarantine upon return and leisure bookings to these locations jumped to >40% above pre-COVID levels in the following week. However, the situation is still fluid as France announced the UK will not be put on its red list because of occurrences of the delta variant, but rather would face "tougher sanitary measures."

Leisure Flight Bookings from the UK to Select Destinations (2021 vs 2019, 7-day moving average)



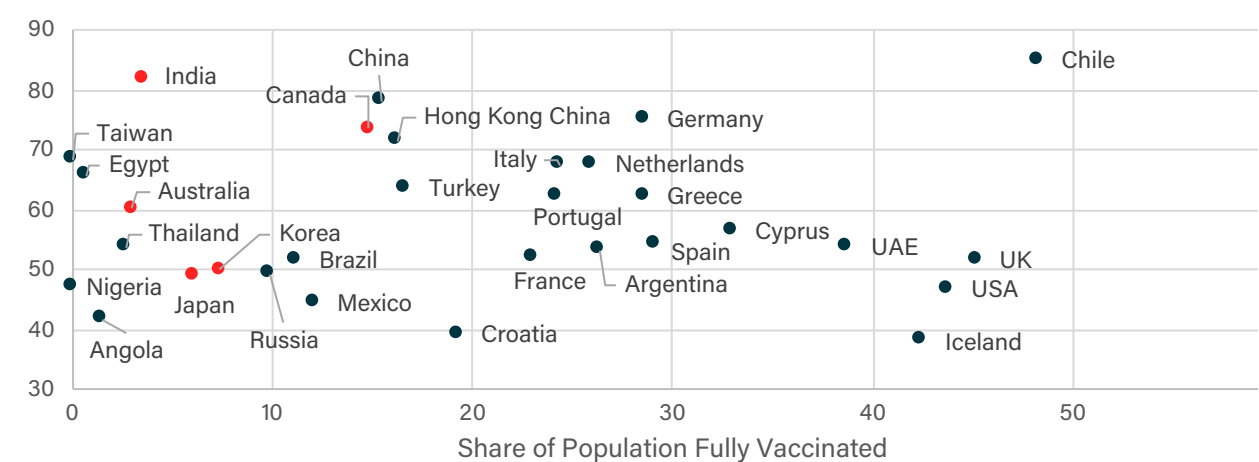
New travel corridors are opening between countries with relaxed restrictions. Croatia is currently open to tourists, requiring only proof of vaccination or a negative COVID-19 test. Delta and United are scheduled to operate 59 flights total to Dubrovnik from the US in July and August, compared with zero in the summer of 2019. Similarly, Greece announced in April a list of countries for which the quarantine requirement is lifted. American Airlines, Delta, and United have now scheduled 448 flights to Athens in July and August – up 45% from the same period in 2019.

The trans-Tasman bubble agreement between Australia and New Zealand on April 18th spurred a similar increase in flight options. Air New Zealand, and the Qantas Group are now offering more than an average 420 weekly flights. Qantas Group is now operating at 83% of pre-COVID capacity compared to 3% prior to April 18th. New Zealand customs data shows an average of 380 people per day entered the country in March, but following the trans-Tasman agreement, arrivals jumped to >3,000 per day.

Airlines and consumers will continue to react quickly to changing COVID-related policies. If borders continue to open this summer, pent-up demand, and desire to travel will result in a rebound in jet fuel consumption. Consumers globally have stockpiled an extra \$5.4 trillion in savings since the beginning of the pandemic, according to estimates by Moody's. Savings have been highest in developed countries, in particular North America and Europe. The extra savings, pent-up demand, high vaccination rates, and easing government restraints could all lead to a stronger-than-expected rebound in jet fuel demand during the summer.

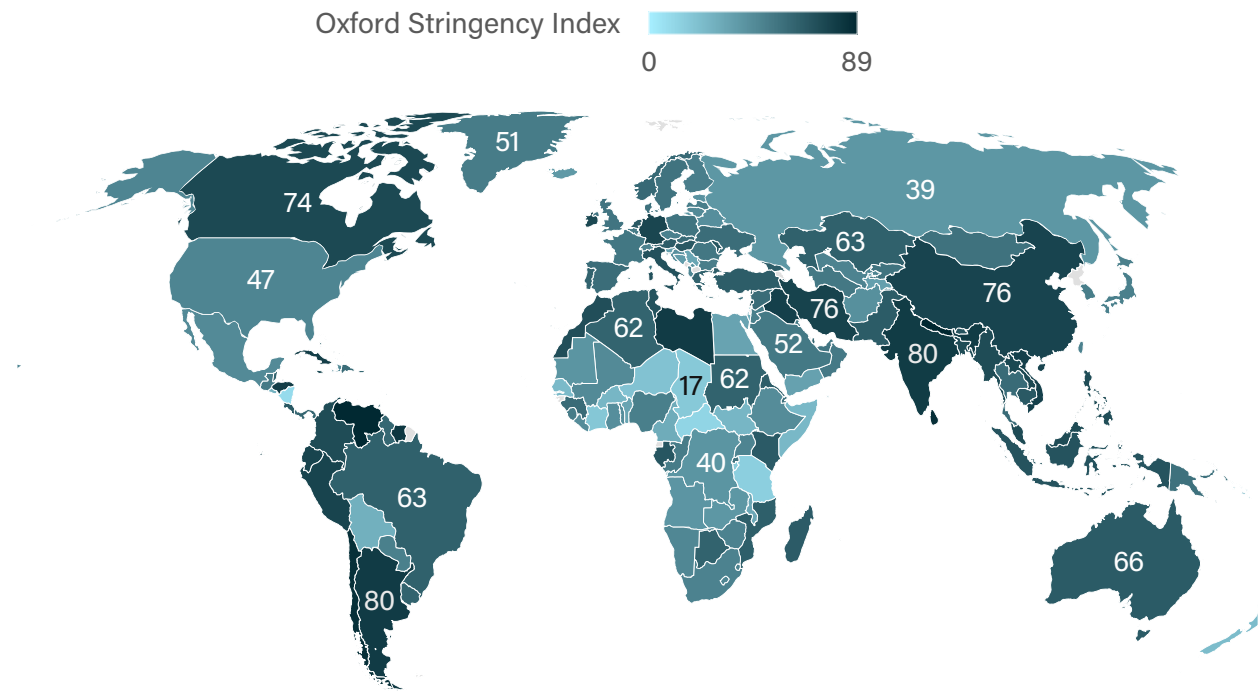
However, while there are encouraging signs from the US and Europe, rising COVID-cases and new variants could just as quickly stunt demand. The World Health Organization currently lists four variants of concern and seven variants of interest. India's flights quickly collapsed from ~70% of pre-COVID levels to 28% of pre-pandemic levels following a surge in the delta variant mutation. China suspended direct flights from Portugal for two weeks (and will then re-open to only one flight per week) after seven COVID cases were detected on a flight in mid-May. China also cancelled hundreds of flights from Shenzhen airport in mid-June after one employee tested positive for the delta variant. Countries with delayed vaccinations (e.g., Japan, Korea, India, Canada, and Australia – highlighted in the chart below) or elevated deathrates are all likely to maintain stricter border restrictions for longer.

Share of Population Vaccinated and Oxford Stringency Index (as of June 16, 2021)



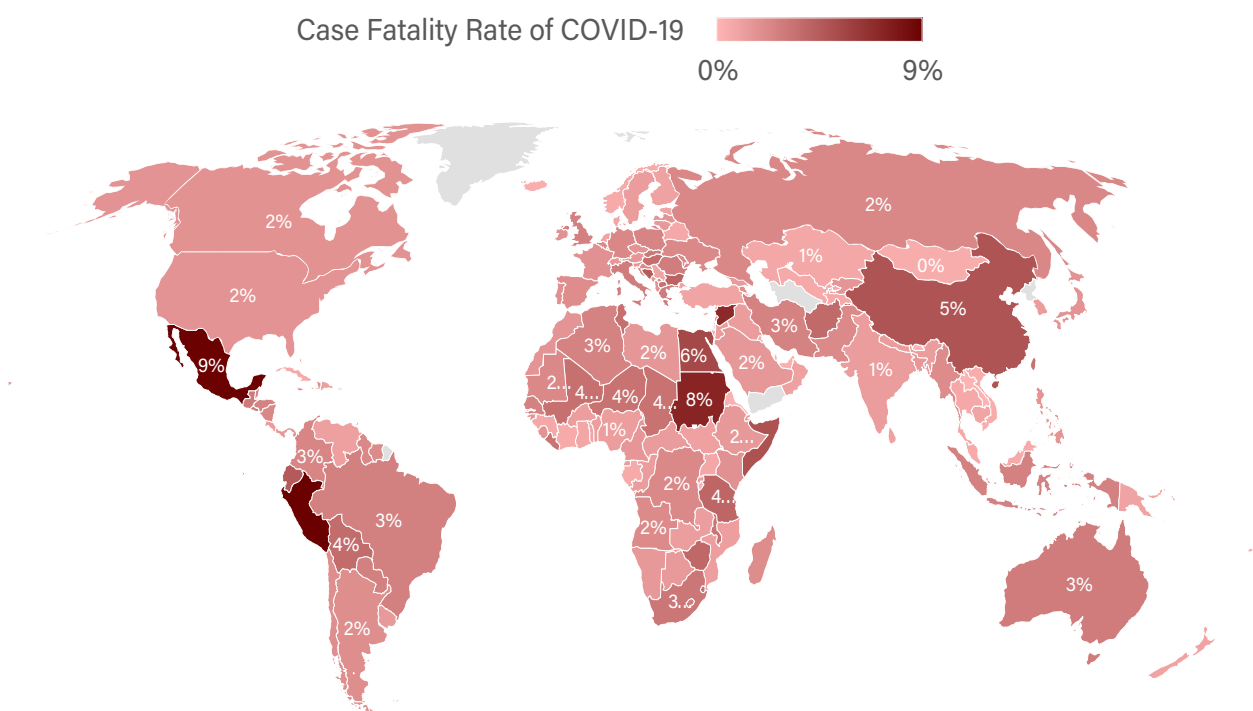
Source: IEF, Oxford Government Response Tracker, OurWorldinData

Oxford COVID-19 Government Response Stringency Index (as of June 16)



Source: IEF, Oxford COVID Government Response Tracker

Ratio of COVID-Related Fatalities to Confirmed Cases (as of June 16, 2021)

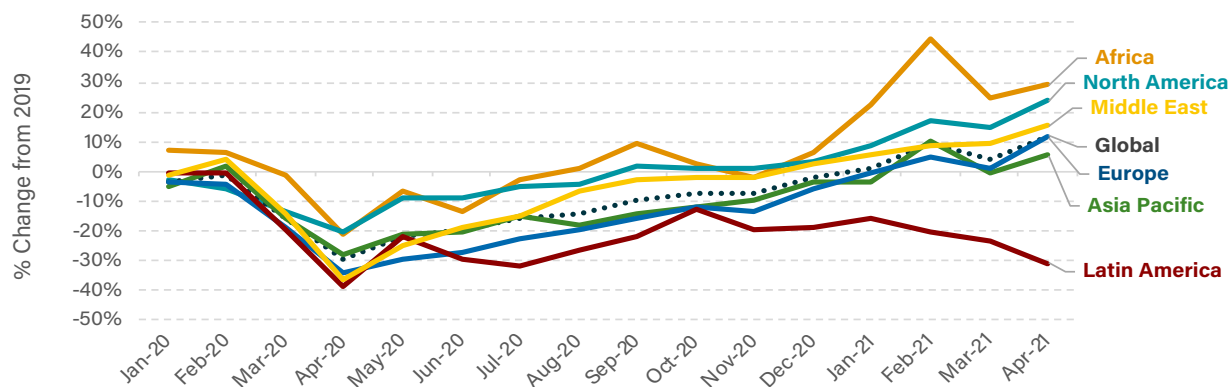


Source: IEF, OurWorldinData

Cargo has outperformed the passenger business throughout the crisis

Global cargo volumes exceeded pre-COVID levels through the first four months of the year and reached a record high in April amid an improving macroeconomic environment. On a regional basis, Africa, North America and the Middle East have exceeded pre-pandemic levels in recent months while Latin America has been a notable laggard. The near-term outlook for cargo remains positive due to the ongoing economic recovery. The ISM Report on Business estimates new export orders grew in May for a 12th consecutive month, which would continue to support cargo. Cargo declined only 9% in 2020 (vs. a ~70% drop in passenger flights) and is expected to grow by 13% in 2021, according to IATA.

Regional International CTKs Compared to the Same Month in 2019



Source: IEF, IATA

Top 10 jet fuel consuming countries: demand & flight recovery index

Below we break down recent trends in demand for the top 10 jet fuel consuming countries, which represent >55% of global jet fuel demand.

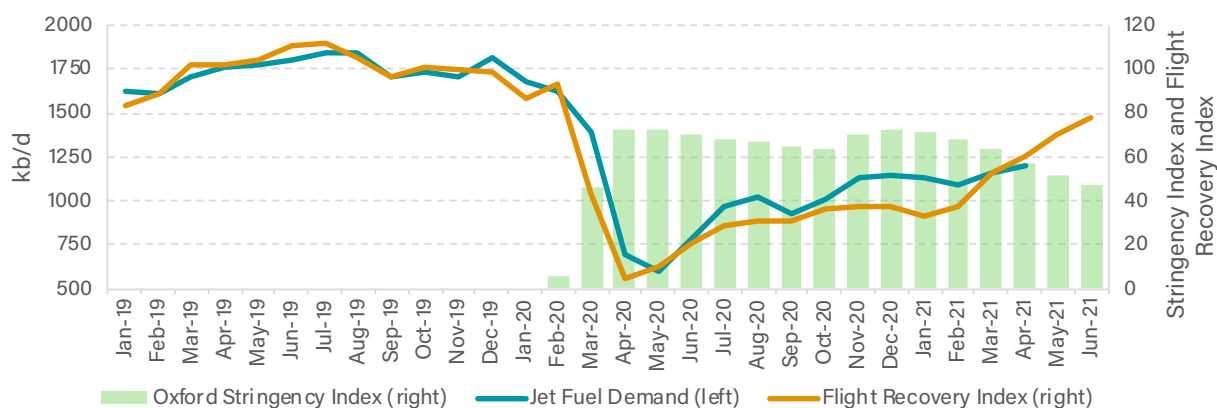
United States (1.74 mb/d jet fuel demand in 2019): JODI Oil Database shows US jet fuel demand reached 1.21 mb/d in April, ~0.54 mb/d (~31%) below pre-COVID levels. Since April, aviation activity has picked up momentum as a larger share of the population becomes vaccinated, domestic sites re-open and governments have eased travel restrictions. TSA recorded more than 2.1 million travelers on June 20th, the highest daily throughput since the first week of March 2020 and 23% below the same day in 2019. Scheduled domestic flights could reach nearly 90% of pre-COVID levels by late-summer.

The US accounted for >11% of long-haul flights in 2019. The eight most popular international travel destinations in 2019 included Mexico, Canada, UK, Italy, France, Dominican Republic, Spain and Germany. Half of those destinations just reopened to vaccinated US residents as of June.

In May and June, four of top ten global international air routes either started or ended in the US (and were all to/from Latin America). Yet, overall, US international travel in May remained >40% below pre-COVID levels.

Weekly EIA data and our flight recovery index indicate a pick-up in both domestic and international travel has likely spurred US jet fuel demand toward 1.3 mb/d in May and 1.4 mb/d in June– to 25% and 20% below 2019 levels.

United States: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index



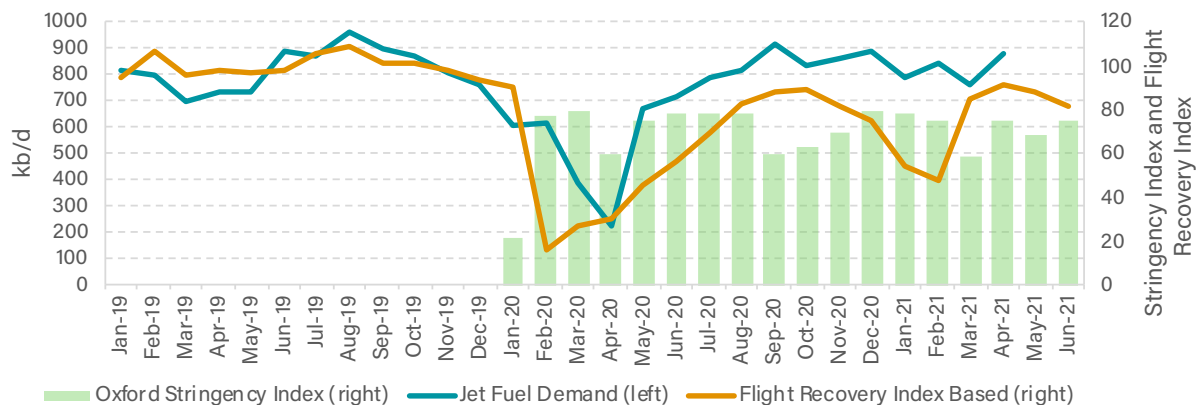
Source: IEF, JODI Oil Database, TSA, Airport Statistics, Oxford Government Response Tracker

China (0.82 mb/d kerosene fuels demand in 2019): China reports total kerosene demand to JODI Oil Database and does not break out jet-kerosene. However, only ~40 kb/d of kerosene is used outside the aviation sector. JODI reported total kerosene demand reached 883 kb/d in April, ~20% above the same period in 2019. This was driven by robust return of domestic travel. Domestic flights exceeded pre-COVID levels by >20% in early-May, before localized outbreaks of the delta COVID variant caused

renewed lockdowns in Guangzhou and Shenzhen.

While the domestic market is booming, international flights remain ~80% below pre-COVID levels due to continued strict border restrictions. Oxford's stringency index remains >65, but this may fall as vaccinations ramp-up. In mid-June, 16% of the population were fully vaccinated against COVID.

China: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index

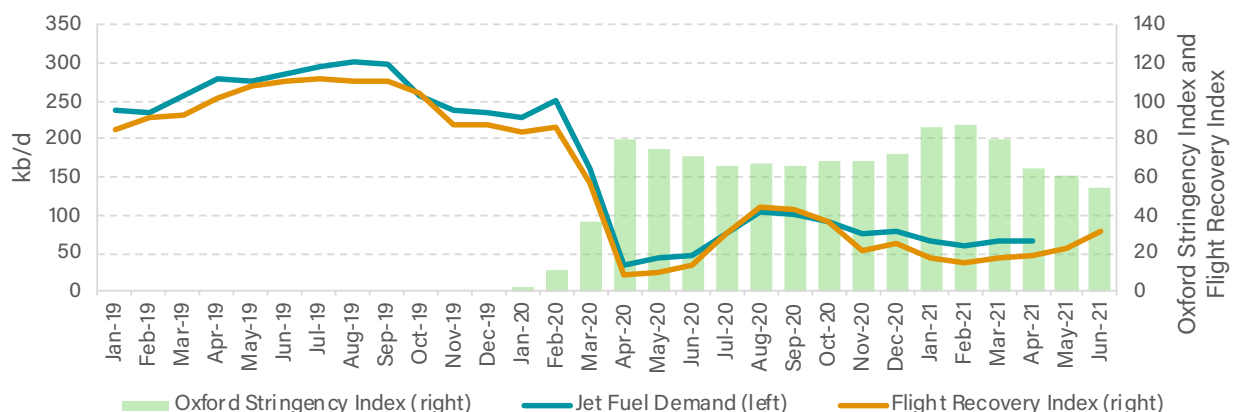


Source: IEF, JODI Oil Database, China's Civil Aviation Administration, Oxford Government Response Tracker

United Kingdom (0.27 mb/d jet fuel demand in 2019): The UK consumed 68 kb/d of jet fuel in April, 75% below 2019 levels. The flight recovery was stagnant at ~20 through May, but turned higher in June with the new 'traffic light' system permitting residents to travel to 12 'green' countries and forgo quarantine upon returning to the UK. International bookings to 'green' countries exceeded pre-COVID levels in the weeks following the release of the permitted travel list.

Oxford's stringency index has fallen for four consecutive months from 88 in February to 54 in mid-June. Over the same period, total vaccinations administered per 100 people increased from 15 in early-February to 107 in mid-June.

United Kingdom: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index

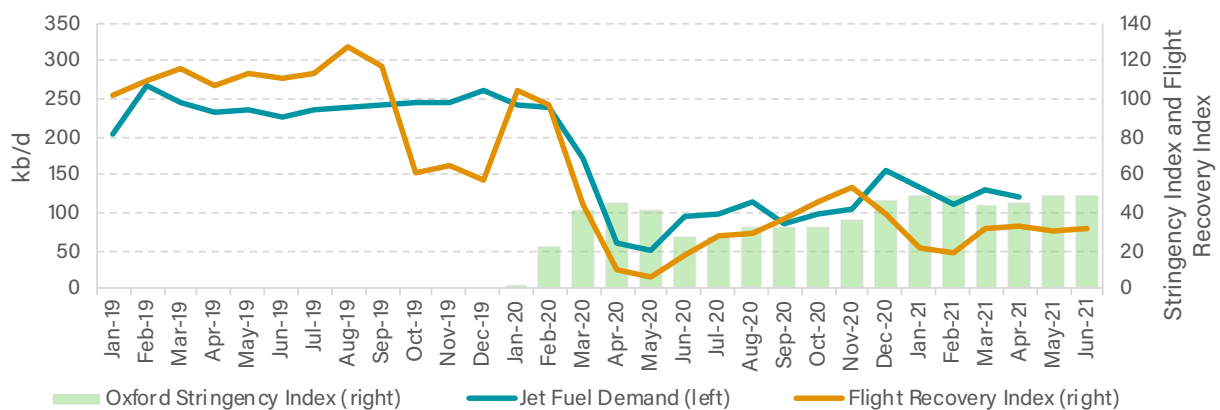


Source: IEF, JODI Oil Database, EUROCONTROL, Oxford Government Response Tracker

Japan (0.24 mb/d jet fuel demand in 2019): JODI Oil Database shows jet fuel demand in Japan was 50% below pre-COVID levels in April. The flight recovery index implies demand has since plateaued, but may increase in coming weeks. Japan's largest two carriers, ANA and JAL, ramped-up domestic capacity to near-or-above 60% in early-summer from <40% in February. The airlines expect to return to late-2020 highs this year if COVID cases do not surge again.

However, only 6% of the population is fully vaccinated as of mid-June. Another increase in COVID cases could easily cause jet fuel demand to retreat.

Japan: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index

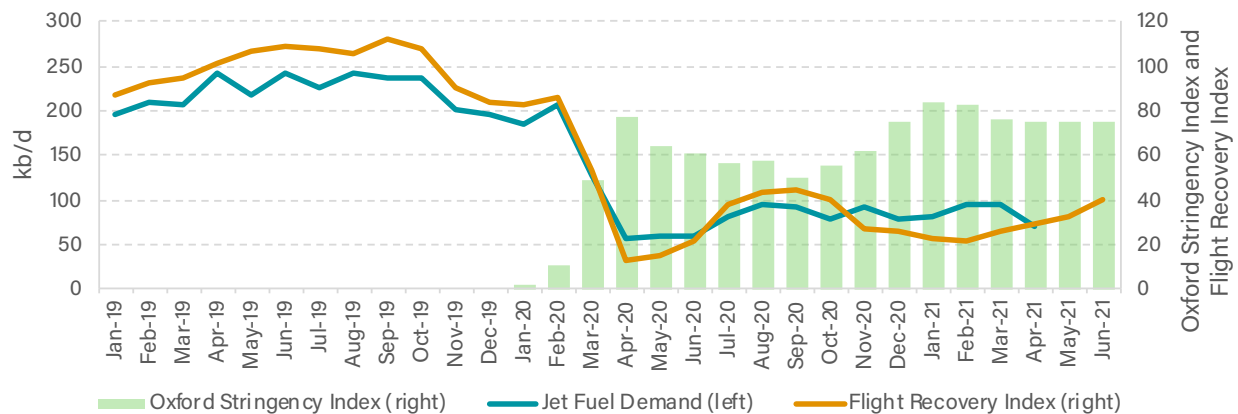


Source: IEF, JODI Oil Database, Japan's Civil Aviation Bureau, JAL, NAA, Oxford Government Response Tracker

Germany (0.22 mb/d jet fuel demand in 2019): German jet fuel demand in April averaged 68% below pre-COVID levels. The flight recovery index has increased from 29 in April to 40 in mid-June, implying a pick-up in demand. Germany remains one of the more closed EU countries for foreign travelers, staying away from the "shallot race" and only allowing visitors to enter under a ban exemption or from within the EU/Schengen Area where there is low COVID infection rates and no virus mutations. While Spain, Italy, and others have announced reopening to vaccinated foreign visitors, on May 23rd, Germany added the UK to the list of banned high-risk countries, regardless of passenger vaccination status.

Domestic pandemic restrictions were eased slightly at the end of May. Vaccination doses administered reached 76 per 100 people at mid-June vs. 35 at end-April. Only 29% of the population is fully vaccinated.

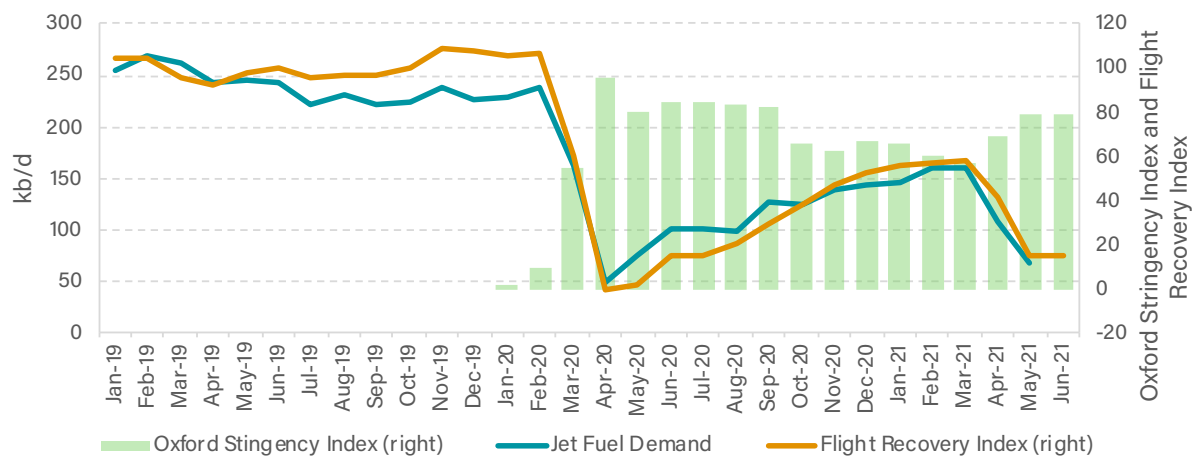
Germany: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index



Source: IEF, JODI Oil Database, EUROCONTROL, Oxford Government Response Tracker

India (0.18 mb/d jet fuel demand in 2019): Jet fuel demand in India rose to 67% of pre-COVID levels in March before collapsing to 28% of pre-pandemic levels in May with the surge in COVID cases. The flight recovery index implies demand remained flat in early-June. Many of the countries that had bi-lateral travel agreements with India have temporary banned flights (including Australia, Canada, US, UAE, and UK). By mid-June, vaccinations administered per 100 people had only reached 19.

India: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index

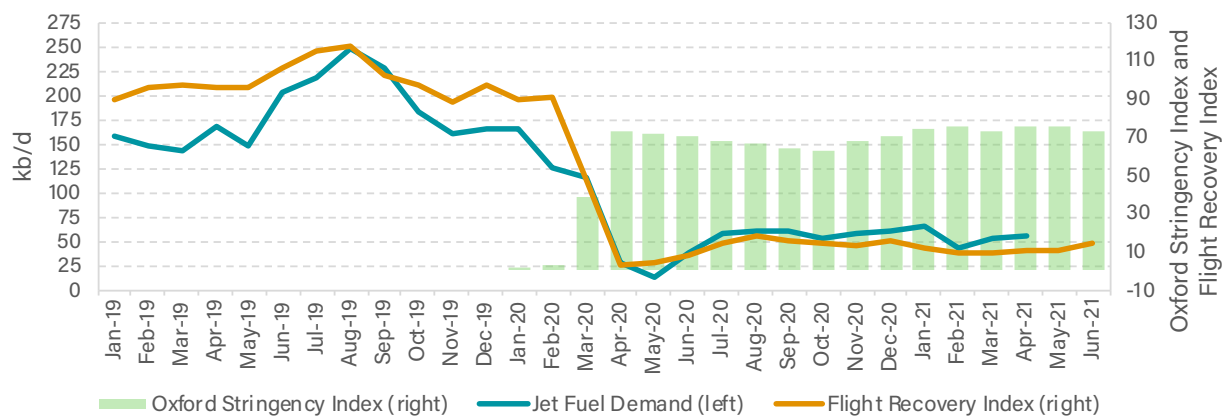


Source: IEF, JODI Oil Database, India's Directorate General of Civil Aviation

Canada (0.18 mb/d jet fuel demand in 2019): JODI Oil Database shows jet fuel demand in Canada was still 70% below pre-COVID levels in April. Strict border policies have stunted jet fuel demand. The flight recovery index has remained stagnant over the past couple months, implying little progress in jet fuel demand recovery.

On May 20th, another one-month extension of the border closure between the US and Canada was announced. Flights between the US and Canada are at just 5% of what they were pre-COVID. More than two thirds of all tourists in Canada in 2019 were from the US and they injected \$8.7 billion into the local economy. Prime Minister Trudeau has said he would like to relax some of the restrictions once ~75% of the population has received one dose and 20% are fully vaccinated. As of mid-June, ~15% of the population was fully vaccinated and 51% partially vaccinated.

Canada: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index

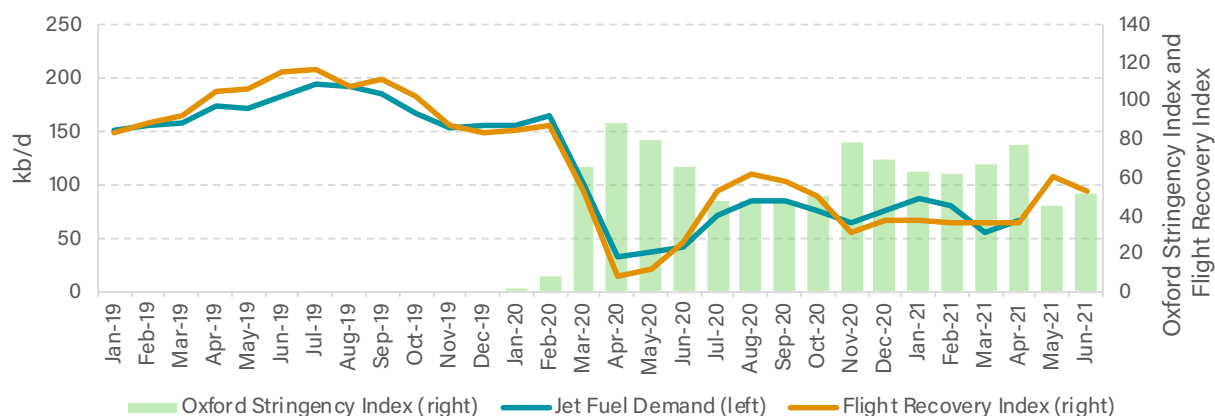


Source: IEF, JODI Oil Database, Statistics Canada, Oxford Government Response Tracker

France (0.17 mb/d jet fuel demand in 2019): Jet fuel demand in France stood at only 40% of pre-COVID levels in April. The flight recovery index shows a sharp recovery in May and slight decline in the first-half of June. Domestic restrictions eased in mid-May and international travel restrictions eased on June 9. Air France plans to increase capacity from 40% in May to 65% in July and August when it will also resume long-haul commercial flights to Asia Pacific and the Middle East.

By mid-June, vaccine doses had been administered to 69 per 100 people, up from 33 at the end of April.

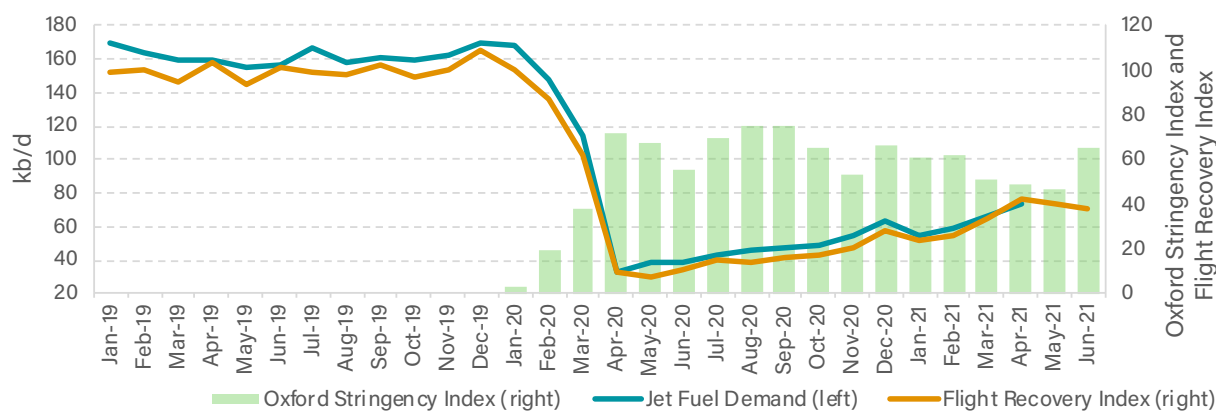
France: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index



Source: IEF, JODI Oil Database, EUROCONTROL, Oxford Government Response Tracker

Australia (0.16 mb/d jet fuel demand in 2019): JODI Oil Database shows jet fuel was at 45% of pre-COVID levels in April. The flight recovery index increased by 9 pts in April as the new flight bubble with New Zealand helped spur demand. However, a spike in the kappa variant of COVID in late-May, closed some routes to Melbourne/Victoria. Australia's vaccination rate remains low at just 24 doses administered per 100 people and only 3% fully vaccinated.

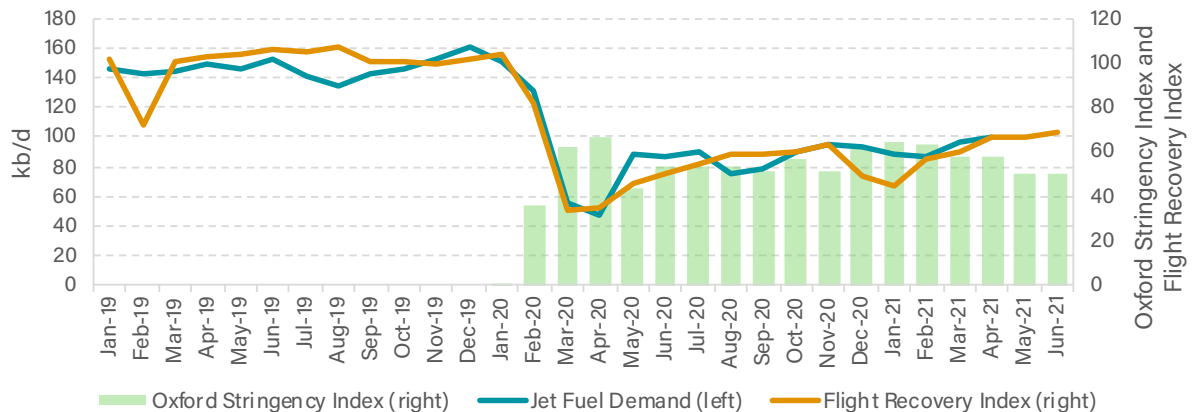
Australia: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index



Source: IEF, JODI Oil Database, Australia BITRE, Oxford Government Response Tracker

Korea (0.15 mb/d jet fuel demand in 2019): Jet fuel demand in Korea was at 69% of pre-COVID levels in April. The travel recovery index has remained largely flat since April. On June 9th, the country announced it will accelerate travel bubble talks with Singapore, Taiwan, and Thailand to allow quarantine-free travel for those who are fully vaccinated from as early as July. Over 80% of departures from Korea is typically focused on the Asia-Pacific region. Travel bubbles would help spur jet fuel demand recovery. Vaccines have been administered to 32 per 100 people and 7% are fully vaccinated.

Korea: Jet Fuel Demand, Flight Recovery Index & Oxford Government Policy Stringency Index



Source: IEF, JODI Oil Database, Airport Statistics, Oxford Government Response Tracker

Conclusion: Pent-up demand, eased restrictions, and extra savings could pave way for upside summer demand surprise, but uncertainties and new outbreaks will temper gains

Recovery will continue to be uneven and likely favor countries with high vaccination rates or low mortality, as countries face the difficult trade-off of reviving the economy and managing COVID-related deaths. In parallel, calls for grants supporting sustainable fuels and other voluntary measures to reduce aviation emissions such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) are intensifying in the US and Europe. Airlines are hoping to benefit from post-COVID recovery stimulus plans. The preliminary summer flight schedule suggests strong gains in US and Asian domestic markets and international European markets. However, this could change rapidly following a change in policy in response to new outbreaks or successful vaccination programs. Non-traditional flight and passenger data can help in monitoring the aviation sector's response to government policies and consumer demand in real-time. The IEF will continue to monitor and report on transportation fuel demand's recovery during these uncertain times and explore the use of non-traditional metrics.

Summary Table of Jet Fuel Demand, COVID Lockdown Policy Stringency, and Vaccinations

| Countries in JODI Oil | 2019 Total Product Demand (kb/d) | 2019 Jet Fuel Demand (kb/d) | 2020 Jet Fuel Demand Low (kb/d)* | 2020 Jet Fuel Demand Low* | April 2021 Jet Fuel Demand† | April Jet Fuel as a % of 2019 Avg | Max Oxford Stringency | April 2021 Oxford Stringency | June 1-16, 2021 Oxford Stringency | % Population Fully Vaccinated (as of June 16) |
|-----------------------|----------------------------------|-----------------------------|----------------------------------|---------------------------|-----------------------------|-----------------------------------|-----------------------|------------------------------|-----------------------------------|---|
| Albania | N/A | N/A | N/A | N/A | N/A | N/A | 90 | 57 | 46 | 12% |
| Algeria | N/A | N/A | N/A | N/A | N/A | N/A | 92 | 78 | 62 | N/A |
| Angola | 88 | 6 | 1 | 20-Apr | 6 | 109% | 91 | 58 | 39 | 2% |
| Argentina | 627 | 35 | 3 | 20-Apr | N/A | N/A | 100 | 76 | 80 | 8% |
| Armenia | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Australia | 1088 | 162 | 32 | 20-Apr | 73 | 45% | 78 | 49 | 66 | 3% |
| Austria | 278 | 21 | 2 | 20-Apr | 6 | 27% | 82 | 78 | 65 | 26% |
| Azerbaijan | 106 | 10 | 3 | 20-Jun | 8 | 78% | 96 | 72 | 69 | 10% |
| Bahrain | 33 | 1 | 1 | 20-May | N/A | N/A | 79 | 56 | N/A | 52% |
| Bangladesh | N/A | N/A | N/A | N/A | N/A | N/A | 94 | 84 | 72 | 3% |
| Barbados | N/A | N/A | N/A | N/A | N/A | N/A | 89 | 71 | 63 | 22% |
| Belarus | 178 | 4 | 1 | 20-Dec | N/A | N/A | 43 | 43 | N/A | 4% |
| Belgium | 660 | 37 | 17 | 20-Apr | 27 | 71% | 81 | 69 | 51 | 29% |
| Belize | N/A | N/A | N/A | N/A | N/A | N/A | 85 | 54 | 62 | 5% |
| Bermuda | N/A | N/A | N/A | N/A | N/A | N/A | 96 | 73 | 47 | 57% |
| Bolivia | N/A | N/A | N/A | N/A | N/A | N/A | 96 | 27 | 28 | 5% |
| Brazil | 2385 | 120 | 18 | 20-Apr | 60 | 50% | 81 | 67 | 63 | 11% |
| Brunei Darussalam | 16 | 2 | 0 | 20-Jun | 0 | 14% | 58 | 41 | 41 | 3% |
| Bulgaria | 253 | 5 | 2 | 20-Apr | 3 | 53% | 73 | 52 | N/A | 10% |
| Canada | 2385 | 181 | 13 | 20-May | 56 | 31% | 75 | 75 | 74 | 15% |
| Chile | 367 | 28 | 2 | 20-Jun | 16 | 55% | 88 | 82 | 85 | 48% |
| China | 13743 | 820 | 221 | 20-Apr | 883 | 108% | 82 | 75 | 76 | 16% |
| Colombia | N/A | N/A | N/A | N/A | N/A | N/A | 91 | 82 | 72 | 8% |
| Costa Rica | 50 | 5 | 0 | 20-Jun | N/A | N/A | 81 | 62 | 67 | 15% |
| Croatia | 71 | 4 | 0 | 20-May | 1 | 18% | 96 | 51 | 42 | 19% |
| Cuba | N/A | N/A | N/A | N/A | N/A | N/A | 100 | 80 | 78 | 7% |

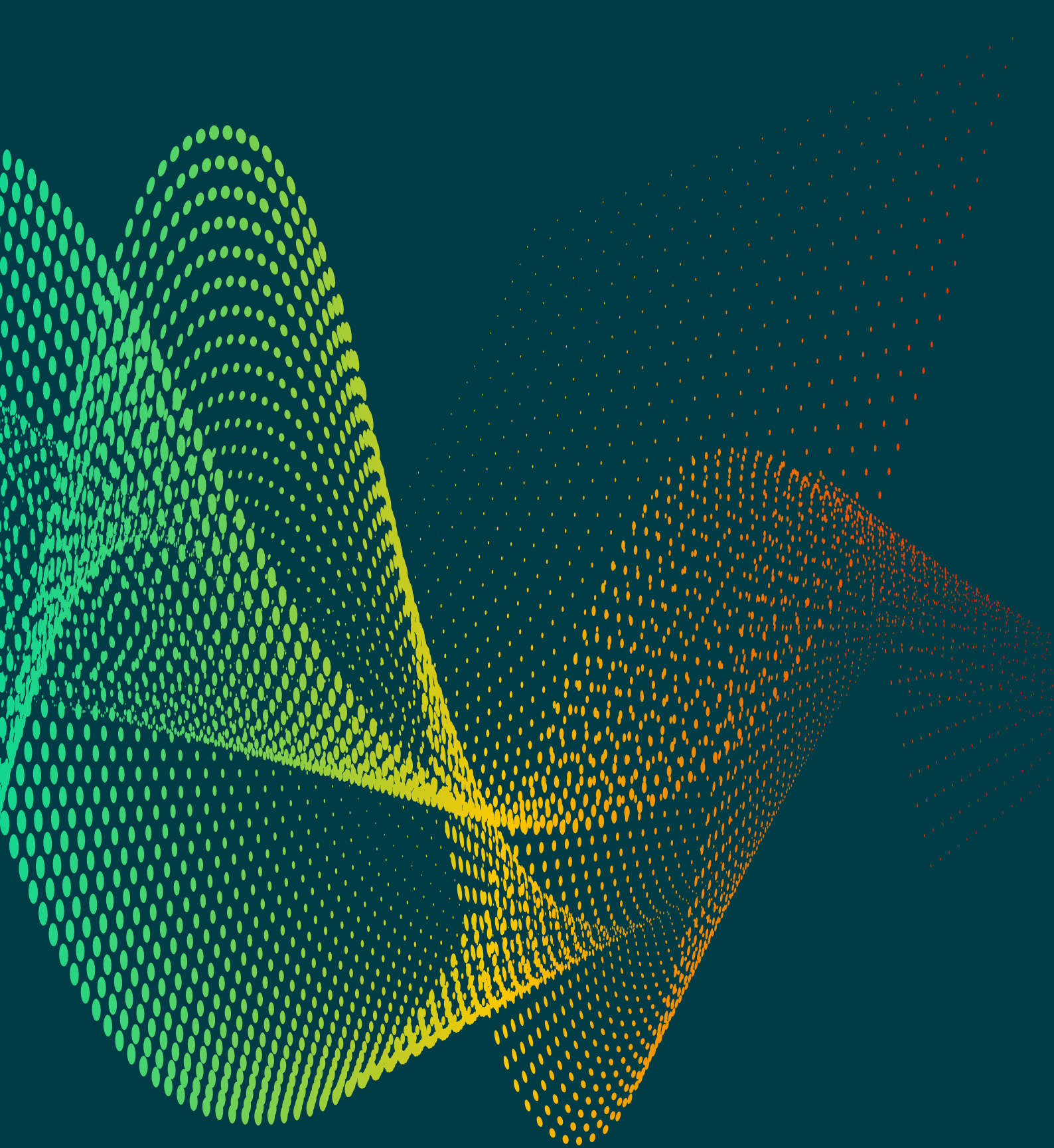
| | | | | | | | | | | |
|---------------------|------|-----|-----|--------|-----|-----|-----|-----|-----|-----|
| Cyprus | 54 | 7 | 1 | 20-May | 1 | 19% | 94 | 70 | 56 | 33% |
| Czech Republic | 221 | 10 | 1 | 20-May | 2 | 24% | 82 | 66 | 49 | 22% |
| Denmark | 165 | 23 | 3 | 20-Jun | 6 | 28% | 72 | 64 | 56 | 27% |
| Dominican Republic | N/A | N/A | N/A | N/A | N/A | N/A | 100 | 69 | 57 | 21% |
| Ecuador | 272 | 10 | N/A | N/A | N/A | N/A | 94 | 68 | N/A | 6% |
| Egypt (Arab Rep.) | 694 | 29 | 8 | 20-Jul | 18 | 59% | 84 | 51 | 33 | 1% |
| El Salvador | N/A | N/A | N/A | N/A | N/A | N/A | 100 | 28 | 27 | 16% |
| Equatorial Guinea | 5 | 1 | 0 | 20-May | N/A | N/A | N/A | N/A | N/A | 8% |
| Estonia | 27 | 2 | 1 | 20-May | N/A | N/A | 78 | 61 | 41 | 25% |
| Eswatini | N/A | N/A | N/A | N/A | N/A | N/A | 90 | 60 | 47 | N/A |
| Finland | 183 | 20 | 4 | 20-Apr | 4 | 21% | 68 | 52 | 50 | 14% |
| France | 1696 | 170 | 33 | 20-Apr | 68 | 40% | 88 | 77 | 53 | 23% |
| Gabon | 12 | 1 | N/A | N/A | N/A | N/A | 84 | 69 | 68 | 1% |
| Gambia | N/A | N/A | N/A | N/A | N/A | N/A | 83 | 40 | 39 | 0% |
| Georgia | 30 | 2 | 1 | 20-Apr | N/A | N/A | 100 | 65 | 65 | 2% |
| Germany | 2491 | 221 | 57 | 20-Apr | 71 | 32% | 85 | 75 | 75 | 29% |
| Greece | 307 | 31 | 4 | 20-Jun | N/A | N/A | 89 | 83 | 62 | 29% |
| Grenada | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 9% |
| Guatemala | 106 | N/A | N/A | N/A | N/A | N/A | 966 | 50 | 52 | 1% |
| Guyana | N/A | N/A | N/A | N/A | N/A | N/A | 87 | 60 | 60 | 12% |
| Haiti | N/A | N/A | N/A | N/A | N/A | N/A | 94 | 35 | 44 | N/A |
| Honduras | 38 | N/A | N/A | N/A | N/A | N/A | 100 | 82 | 79 | 1% |
| Hong Kong China | 419 | 144 | 56 | 20-Aug | 57 | 39% | 71 | 71 | 71 | 16% |
| Hungary | 182 | 6 | 1 | 20-Apr | 1 | 17% | 80 | 71 | N/A | 45% |
| Iceland | 15 | 5 | 0 | 20-Jul | 0 | 5% | 66 | 55 | 38 | 43% |
| India | 4803 | 179 | 14 | 20-Apr | 107 | 60% | 100 | 71 | N/A | 4% |
| Indonesia | 1601 | 106 | 12 | 20-May | 22 | 21% | 80 | 69 | 69 | 4% |
| Iran (Islamic Rep.) | N/A | N/A | N/A | N/A | N/A | N/A | 81 | 81 | 76 | 1% |
| Iraq | 690 | 5 | 2 | 20-Apr | 3 | 60% | 96 | 73 | 77 | 1% |
| Ireland | 159 | 23 | 3 | 20-Apr | 5 | 21% | 91 | 82 | 74 | 20% |
| Italy | 1257 | 105 | 8 | 20-Apr | 30 | 29% | 94 | 81 | 70 | 24% |
| Jamaica | 32 | N/A | N/A | N/A | N/A | N/A | 87 | 74 | 72 | 1% |
| Japan | 3793 | 240 | 51 | 20-May | 119 | 50% | 51 | 45 | 49 | 6% |

| | | | | | | | | | | |
|---|------|-----|-----|--------|-----|-----|-----|-----|-----|-----|
| Kazakhstan | N/A | N/A | N/A | N/A | N/A | N/A | 92 | 65 | 63 | 8% |
| Korea | 2792 | 146 | 48 | 20-Apr | 101 | 69% | 82 | 58 | 50 | 7% |
| Kuwait | 279 | 17 | N/A | N/A | N/A | N/A | 100 | 70 | 51 | 1% |
| Latvia | 38 | 3 | 0 | 20-May | 1 | 24% | 69 | 56 | 50 | 24% |
| Libya | N/A | N/A | N/A | N/A | N/A | N/A | 100 | 80 | N/A | N/A |
| Lithuania | 65 | 3 | 1 | 20-Jun | 1 | 37% | 87 | 53 | 44 | 31% |
| Luxembourg | 64 | 12 | 10 | 20-Jul | 11 | 88% | 80 | 48 | 45 | 29% |
| The former Yugoslav Rep. of Macedonia | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Malaysia | 59 | N/A | N/A | N/A | N/A | N/A | 81 | 60 | 73 | 5% |
| Malta | N/A | 3 | 1 | 20-Jul | N/A | N/A | 87 | 72 | 54 | 62% |
| Mauritius | 1824 | N/A | N/A | N/A | N/A | N/A | 97 | 94 | 72 | 16% |
| Mexico | 21 | 84 | 5 | 20-Apr | 47 | 55% | 82 | 45 | 44 | 12% |
| Moldova | N/A | 1 | N/A | N/A | 0 | 28% | 87 | 63 | 68 | 5% |
| Morocco | N/A | N/A | N/A | N/A | N/A | N/A | 94 | 75 | N/A | 21% |
| Myanmar | N/A | N/A | N/A | N/A | N/A | N/A | 86 | 78 | 72 | 2% |
| Nepal | 966 | N/A | N/A | N/A | N/A | N/A | 96 | 33 | 89 | 2% |
| Netherlands | 181 | 83 | 22 | 20-Apr | 42 | 50% | 82 | 74 | 66 | 26% |
| New Zealand | N/A | 33 | 7 | 20-Apr | 12 | 35% | 96 | 22 | 22 | 7% |
| Nicaragua | N/A | 0 | 0 | 20-May | N/A | N/A | 24 | 14 | 8 | N/A |
| Niger | 487 | N/A | N/A | N/A | N/A | N/A | 61 | 33 | 19 | 0% |
| Nigeria | 252 | 23 | 8 | 20-May | 17 | 74% | 86 | 47 | 50 | 0% |
| Norway | N/A | 18 | 4 | 20-Apr | 4 | 24% | 80 | 70 | 59 | 26% |
| Oman | 55 | N/A | N/A | N/A | N/A | N/A | 100 | 79 | 52 | 4% |
| Panama | 26 | N/A | N/A | N/A | N/A | N/A | 94 | 67 | 61 | 11% |
| Papua New Guinea | N/A | 2 | 1 | 20-Jun | N/A | N/A | 84 | 65 | 56 | N/A |
| Paraguay | N/A | N/A | N/A | N/A | N/A | N/A | 94 | 62 | 49 | 3% |
| Peru | 466 | N/A | N/A | N/A | N/A | N/A | 96 | 80 | 76 | 7% |
| Philippines | 705 | 50 | 3 | 20-Apr | N/A | N/A | 100 | 76 | 72 | N/A |
| Poland | 250 | 23 | 3 | 20-Apr | 8 | 33% | 83 | 74 | 55 | 28% |
| Portugal | N/A | 34 | 2 | 20-Apr | 9 | 25% | 88 | 70 | 62 | 24% |
| Qatar | 238 | N/A | N/A | N/A | N/A | N/A | 86 | 82 | 61 | 43% |
| Romania | N/A | 3 | 0 | 20-Jul | 1 | 25% | 87 | 63 | N/A | 22% |

| | | | | | | | | | | |
|---------------------------------|-------|------|-----|--------|------|-----|-----|----|-----|-----|
| Russian Federation | 2268 | N/A | N/A | N/A | N/A | N/A | 87 | 39 | 39 | 10% |
| Saudi Arabia | N/A | 103 | 12 | 20-Apr | 36 | 35% | 94 | 54 | 52 | N/A |
| Singapore | 89 | N/A | N/A | N/A | N/A | N/A | 77 | 51 | 58 | 34% |
| Slovakia | 51 | 1 | 0 | 20-May | 0 | 22% | 87 | 71 | N/A | 22% |
| Slovenia | N/A | 1 | 0 | 20-May | 0 | 45% | 90 | 72 | 35 | 27% |
| South Africa | 1308 | 15 | N/A | N/A | N/A | N/A | 88 | 48 | 48 | 1% |
| Spain | N/A | 149 | 10 | 20-Apr | 37 | 25% | 85 | 69 | 57 | 29% |
| Sudan | N/A | N/A | N/A | N/A | N/A | N/A | 92 | 50 | 62 | 0% |
| Suriname | 323 | N/A | N/A | N/A | N/A | N/A | 100 | 71 | 81 | 5% |
| Sweden | 221 | 23 | 3 | 20-Jun | 6 | 27% | 69 | 66 | 55 | 23% |
| Switzerland | N/A | 40 | 4 | 20-Apr | 13 | 32% | 73 | 56 | 48 | 29% |
| Syria (Arab Rep.) | N/A | N/A | N/A | N/A | N/A | N/A | 87 | 56 | 58 | N/A |
| Taiwan | 975 | 70 | 30 | 20-Apr | 46 | 65% | 74 | 25 | N/A | 0% |
| Tajikistan | 1165 | N/A | N/A | N/A | N/A | N/A | 67 | 34 | 35 | 0% |
| Thailand | N/A | 123 | 13 | 20-May | 36 | 29% | 77 | 52 | 58 | 3% |
| Trinidad/ Tobago | N/A | N/A | N/A | N/A | N/A | N/A | 91 | 65 | N/A | 2% |
| Tunisia | 96 | 6 | 0 | 20-Apr | N/A | N/A | 91 | 59 | 69 | 3% |
| Turkey | 1026 | 118 | 19 | 20-May | 62 | 53% | 87 | 80 | 65 | 17% |
| Ukraine | 228 | N/A | N/A | N/A | N/A | N/A | 89 | 68 | 57 | 1% |
| United Arab Emirates | N/A | N/A | N/A | N/A | N/A | N/A | 90 | 55 | 54 | 64% |
| United Kingdom | 1598 | 267 | 33 | 20-Apr | 68 | 25% | 88 | 65 | 54 | 45% |
| United States of America | 20540 | 1742 | 596 | 20-May | 1206 | 69% | 75 | 57 | 47 | 44% |
| Uruguay | 40 | N/A | N/A | N/A | N/A | N/A | 87 | 74 | 62 | 37% |
| Venezuela | N/A | N/A | N/A | N/A | N/A | N/A | 91 | 87 | 88 | 1% |
| Vietnam | N/A | N/A | N/A | N/A | N/A | N/A | 96 | 56 | 77 | 0% |

*Italicized numbers reflect total kerosene fuel due to absent jet-kerosene data

Source: IEF, JODI Oil Database, Oxford COVID-19 Government Response Tracker, and OurWorldinData



POST-COVID
RECOVERY
ENERGY MONITOR

Alternative Metrics for Real-Time Assessment of Energy Demand



ief.org