



COMMERCIAL MARKET OUTLOOK 2021–2040



Executive Summary	3
Foreword	4
Commercial Passenger Demand	5
Airline Networks and Business Models	8
Air Cargo and Freightler Outlook	10
Commercial Fleet and Deliveries	14
Services Market Overview	17
Appendix	18



20-Year Market Demand



*Does not include China



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For 60 years, Boeing has produced our Commercial Market Outlook (CMO), where we leverage our team's deep aviation market experience and comprehensive analysis to share a long-term forecast and perspective on the aviation industry's future.

The 2021 CMO is particularly relevant as the aviation community emerges from one of the most challenging periods in more than a century of commercial flight. While current market conditions remain dynamic, the past year has proven that when there is confidence in the health and safety of air travel, and when conditions allow governments to reopen borders, demand is resilient. People around the

globe look to air travel to help them connect with loved ones, conduct business face to face and explore new places. Despite the uncertainty of the past 18 months, commercial air travel continues to play a fundamental role as the backbone of global transport.

While Boeing, along with our global community, continues to watch and adapt to near-term market dynamics, this year's outlook shows that the aviation industry has made important progress toward recovery. It also reinforces our confidence in the industry's resilience, as we projected and ultimately experienced following previous crises such as 9/11 (2002 CMO) and the Global Financial Crisis

(2009 CMO). Time and again, this market outlook has provided a reliable perspective as we consider decades of industry evolution and global growth.

Boeing continues to partner with our customers, suppliers and the aviation community, working toward a full recovery in commercial aviation. We believe that CMO 2021 insights into the future of air travel will support our stakeholders' plans for recovery and long-term sustainable growth in our industry.

Economic recovery laying the foundation for passenger traffic to bounce back

A year and a half after declaration of the global COVID-19 pandemic, the aviation industry is still very much shaped by countermeasures aimed at fighting back renewed waves of infection. Globally, new cases are registering in the hundreds of thousands per day, but highly effective vaccines have started to pave the way out of a state of repeating cycles of restrictions. Vaccines enable a careful lowering of barriers to economic activity, as well as domestic and international travel. Importantly, whenever and wherever restrictions are lifted, travel recovers quickly. That has been the case in places like China, Russia, the US and Europe.

The main reason for the quick response to lower restrictions is that economic fundamentals remain largely intact. The global economy in aggregate has recovered to pre-crisis levels of gross domestic product (GDP) in 2Q 2021. Consumers in large economies are ready to spend the savings they accumulated during times in which many activities were off limits. And governments continue to be supportive, both on the monetary and fiscal side. Estimates put countries that represent over 50% of global GDP back above 4Q 2019

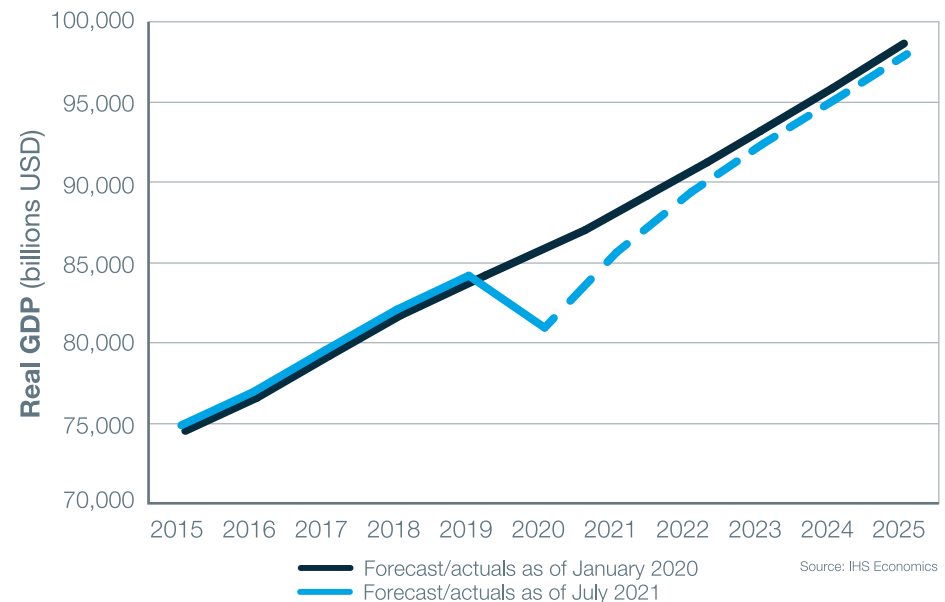
levels after 2Q 2021; about 80% will be there at the end of the year. Regional divergence remains, and a relationship to the speed and depth of vaccine roll-outs is visible. Advanced economies have begun reopening based on broad availability of vaccines. Some emerging and developing markets have also seen the virus under enough control to open at least domestic economies. Most are also now accelerating their vaccine campaigns despite challenges and longer timelines. Given this development, current COVID-19 outbreaks delay the recovery, but they don't prevent it.

While there are some lasting impacts on the economy and there will be some friction in allocating resources during the recovery, in sum, they are not nearly as disruptive as what was observed after the global financial crisis. COVID-19 is an external shock that disrupts but does not break the main economic model that drove the pre-crisis expansion. Some adjustments during the pandemic, such as deep and rapid technology adoption across the economy, might even benefit overall productivity.

For our long-term outlook, it is imperative to not lose sight of those economic fundamentals. They remain crucial drivers even as COVID-19 countermeasures are currently the primary constraint on air travel. The pandemic will eventually recede and barriers will fall. Traffic levels will move closer to what economic fundamentals would predict.

Looking out to 2025, GDP will be more than 15% larger than in 2019 and GDP per capita will have risen around 10%. There will be more economic activity and higher global incomes. This global economy will need increased connectivity and participation, which will ultimately drive a return of traffic growth towards its long-run trend.

Global GDP forecast to return to pre-crisis trend by mid-decade



Passenger demand forecasting – the fundamentals

Beyond the near-term crisis and recovery, there are many factors that can influence the performance of air travel. Generally, these factors can be grouped into one of three categories: economic activity, ease of travel and local market factors.

Economic activity is relatively easy to quantify. Metrics used for modeling can include GDP, GDP per capita or international trade.

Ease of travel can include the availability of direct and high-frequency routings, the price of travel, experiential attributes of the journey including

ground transport and security queues. More recently, it includes quarantine and testing requirements. Ease of travel generally improves over time.

Local market factors, such as bilateral air service agreements, may have a strong influence on ease of travel. When such factors are present, forecasting air transport demand requires more judgment than when the same factors are absent. Therefore, we use expert opinion as an input to our forecast, alongside the statistical techniques that form the backbone of our analysis.

Long-term passenger traffic outlook remains steady

While the disruption to the world and our industry from COVID-19 has been massive, the long-term demand drivers remain fundamentally unchanged.

Outside of a few enthusiasts, people do not travel by air simply for the sake of doing so. Travel is motivated by other desires, such as to complete a business deal; to meet with distant colleagues; to visit with families and friends; to experience different places and cultures; or just to relax at a pleasant location. Demand for air transportation is, therefore, a derived demand—a service that is consumed as an intermediate good, as people drive towards the final goods that are the true motivations for travel.

Demand for those final goods has not fundamentally changed due to COVID-19 and its variants: business

still needs to be conducted; families still wish to reunite; vacations are still aspired to. We therefore view the current crisis, though unprecedented in its magnitude, as not changing fundamentals in the long-term market for air transportation.

To emphasize this continuity, we are stating this year's forecast growth rates from a 2019 base year. In those terms, we predict average traffic growth of 4% over the 21 years to 2040. This number is the same as what we published in our prior forecast. It reflects our confidence that the fundamental need for air transport in a modern, globalized world has not changed.

Long-term growth in the short-haul market

Historically, short-haul travel has been stimulated through improved offerings such as new direct routings and lower fares via low-cost carriers. That trend is expected to continue, particularly within emerging markets, where large shares of the population have not flown before. In our forecast, travel within regions accounts for more than half of industry total growth requirements, with intra-China travel alone accounting for 17% of new capacity produced by the industry.

Asia continues to rise

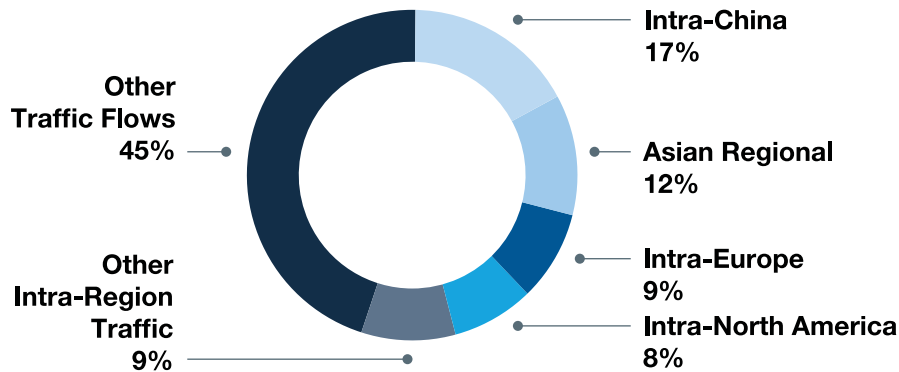
Our forecast calls for Asian carriers to continue gaining share in the global market, led in particular by carriers in China, South Asia and Southeast Asia. This growth will be supported by the development of short-haul traffic in the carriers' home regions, in addition to share gains in long-haul markets, which have historically seen a higher share of capacity flown by airlines domiciled in the US, Europe or the Middle East.

Long-haul travel to return

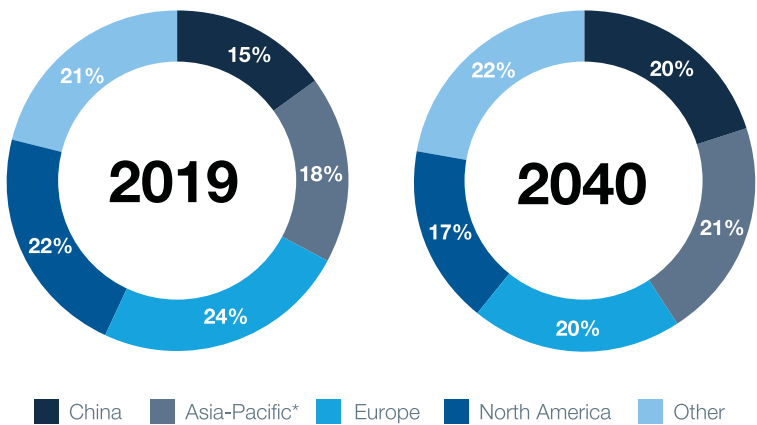
Long-haul travel is currently suppressed because it is largely international travel, and international borders are subject to movement controls, quarantines and testing requirements. The various requirements change frequently, adding uncertainty to the prospect of international travel that also reduces near-term demand.

A key assumption in our forecast is that the pandemic will not last forever—it will eventually be beaten, and the restrictions and requirements will no longer be necessary. At that point, we expect to see a surge of pent-up demand for long-haul travel similar to the current dynamics in some short-haul markets, as travelers look to recover postponed visits, vacations and other trips followed by a return to long-term fundamentals.

Forecast shares of traffic growth, by flow



Shares of passenger traffic, by region



*Does not include China

Since the onset of the COVID-19 pandemic in early 2020, airlines have adjusted their networks to meet rapidly changing market needs. In addition to the sharply reduced demand environment, compliance with frequently shifting and varying governmental health guidance and regulatory constraints, such as border closures and travel restrictions, have dramatically increased airlines' requirements for real-time planning and capacity adjustments.

Domestic and short-haul networks lead recovery

Due to wide-ranging virus testing requirements and varying rates of vaccine distribution, international passenger traffic remains at roughly 20% of 2019 levels. In contrast, domestic operations reached just over 75% of 2019 levels by mid-year 2021, driven largely by the United States, China, as well as intra-Europe. Lower travel restrictions within countries have increased ease of travel in these markets relative to international flows. Rebounding domestic travel volumes indicate resilient demand for air travel once COVID-19 health concerns begin to recede and governments are able to ease travel restrictions.



Low-cost carriers leading recovery, network airlines to follow as long-haul and premium traffic recover

Historically, low-cost carriers have led air service recovery out of market downturns, as their point-to-point structure allows quick market entry, and the lower-cost service they provide is particularly appealing coming out of economic downturns. We expect this recovery to follow that same historical pattern. Network airline recoveries typically lag low-cost

carriers, as the long-haul and premium traffic segments typically recover a bit later. Current market dynamics suggest a similar recovery pattern once COVID-19 concerns abate. As airlines emerge from the pandemic, we anticipate some current network trends to persist in the short and medium term, but pre-pandemic

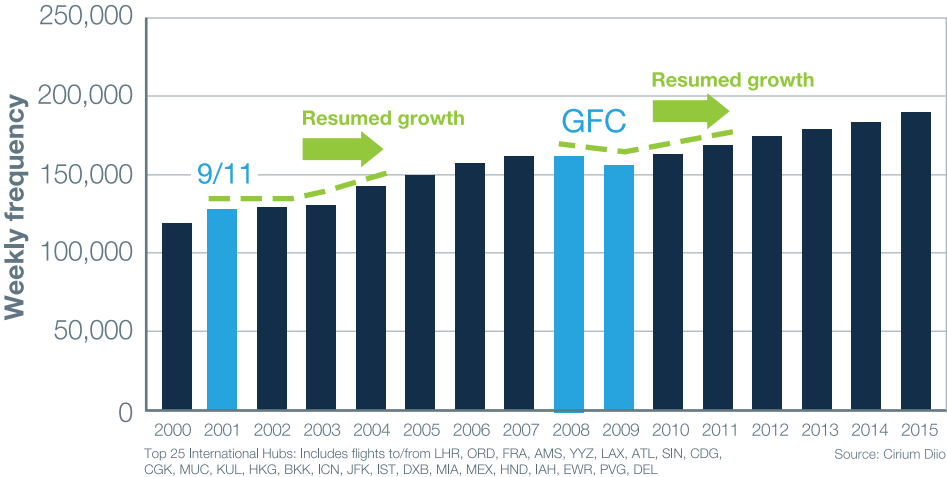
drivers and trends are expected to prevail in the longer term. Low-cost carriers will continue adding and removing routes at a fast pace, and generally emerge more quickly due to the earlier recovery of domestic, regional and leisure travel that their business model typically targets. Network carriers, which provide high connectivity via hub-and-spoke

operations, will resume and rebuild their networks as long-haul travel returns to pre-pandemic levels. Regardless of the airline network structure, airlines will shape their fleet strategies to build network flexibility, maximizing capability while minimizing risk and cost, and improving efficiency and sustainability.

Low-cost carriers have expanded networks through the past two major crises



Hub networks have been resilient



Air cargo markets seeing strong demand due to both cyclical and structural market dynamics

Unprecedented long-haul passenger network reductions impacting air cargo capacity

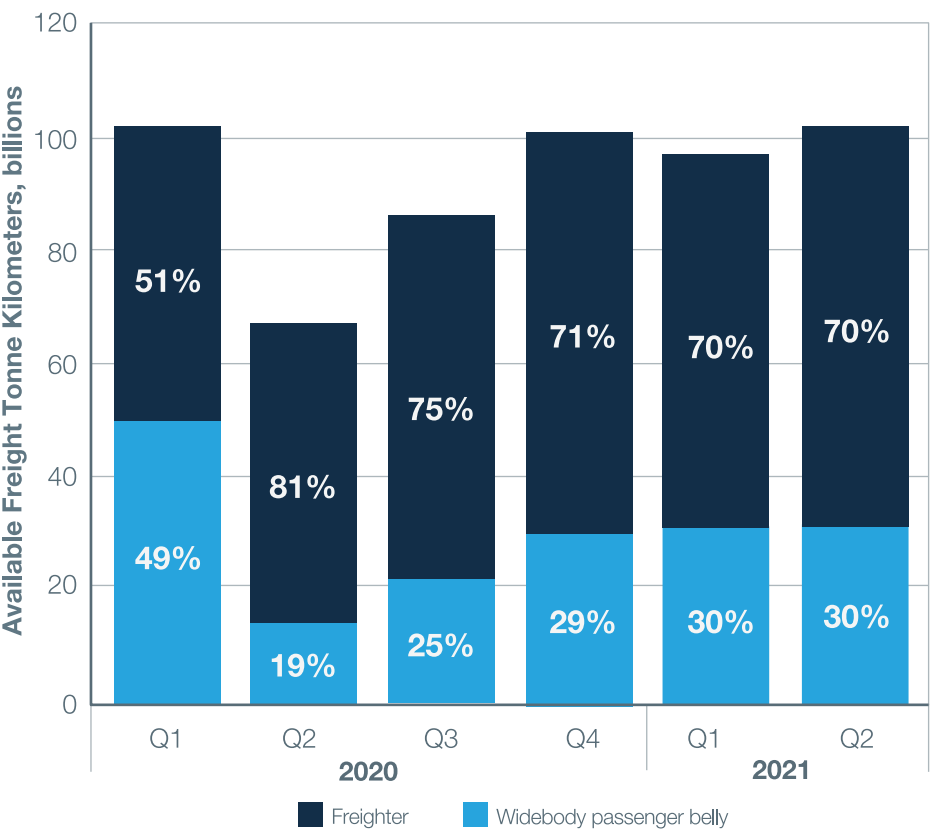
Prior to the pandemic, nearly 50% of worldwide air cargo was transported via widebody passenger lower cargo holds. This capacity virtually disappeared in March 2020 as passenger widebody service was suspended worldwide. Subsequently, passenger widebody lower hold capacity has recovered to about half of pre-pandemic levels.

Freighter operators responded to the pandemic disruption by operating above normal utilization levels, delaying freighter retirements and bringing new and parked airplanes into the fleet to fill the lower cargo hold shortfall. In addition, with high air cargo yields and greatly reduced long-haul international networks, conditions have been favorable for many airlines

to use passenger widebody fleets for cargo-only operations to generate much-needed cash flow and industry capacity. These “freighters” have taken up some of the capacity shortfall and, even in some cases, have generated quarterly profits for carriers despite minimal passenger operations.

Through June 2021, air cargo traffic has surpassed 2019 levels by 11% and 2020 levels by 24%. Capacity is still lower than 2019 levels at -13% as the increase in dedicated freighter capacity, increased utilization and load factors, plus freighter operations have not overcome the loss of passenger widebody lower hold capacity. As a result, yields and revenues worldwide are up over 70% compared to 2019.

Global air cargo capacity has shifted decidedly to dedicated freighters since pandemic onset



Sources: BR&T-E ADAPT/FlightRadar24, Boeing analysis

Near-term supply chain disruptions and shifting consumer needs boost air cargo demand

Adding to air cargo capacity challenges, rapidly shifting demand dynamics have boosted the value of air cargo. Early in the pandemic, air cargo served the urgent needs to transport medical supplies around the world. Shifts in consumer demand further complicated supply chains as pandemic lockdowns initially resulted in demand for consumer products increasing disproportionately to spending for leisure, travel and services.

More recently, industrial production reductions made early in the pandemic have been reversed, and air cargo has been a key tool to address supply chain recoveries. For example, automobile manufacturers reduced production plans early in the pandemic only to see demand recover quickly. This led to acute shortages of semiconductor chips, which have grown to more than 30% of an automobile’s value.

Near-term air cargo and freighter dynamics



Maritime transport sector highly disrupted since the early months of the pandemic

The pandemic and significant and sudden changes in consumer demand have also challenged the container shipping sector—the maritime transport option that most directly competes with air cargo. This has been amplified as the world economy began recovering.

Containership operators have experienced crew shortages as COVID-19 lockdowns, and the ability to move crews to support their operations, were compromised. Shipping containers required to support East Asia to North America and Europe were in short supply due to heavily directional trade flow. Containerships were also backed up at US West Coast ports as dock workers shortages from the pandemic significantly slowed capability to unload ships. Air cargo is a tool for lead time recovery for delayed production when supply chain challenges arise.

These maritime challenges and resulting lower available capacity have boosted demand for air cargo. In addition, they have caused the price multiple of maritime transport versus air cargo transport to shrink by about 50% of typical multiples. This has made air cargo a more attractive transport option, in relative terms, despite constrained air cargo capacity.

Growth of e-commerce boosting both near- and long-term demand prospects

E-commerce has been robust during the past several years, growing at double-digit rates prior to the pandemic, as consumers have become attracted to the ease and convenience of online shopping. This trend was already leading to air cargo growth opportunities pre-pandemic, particularly in the express carrier segment. Online shopping accelerated after the pandemic began by providing the additional benefit of reducing virus risk for shoppers.

Express carriers in particular have benefited from this shift in shopping habits, as their business model can accommodate customer requirements for speed and real-time package tracking for consumers. General cargo carriers also benefit as both end-user demand and intermediate transport often travels on freighters for highly time-sensitive and high-value commodities. Growth of existing and new entities in e-commerce transport segments, and their strategies around air and shipping transport, will be key drivers in the trajectory of air cargo demand supporting future growth.

Long-term air cargo and freighter dynamics



Global supply chain strategies play a key role in longer-term air cargo networks

A topic of debate in recent years, as geopolitical tensions and trade disputes have percolated around the world, has been the trajectory of globalization and impact on global supply chains. Air cargo, in freight tonne kilometer terms, is highly sensitive to global industrial production volumes and manufacturing supply chains around the world.

As with many other trends, the COVID-19 pandemic has intensified the discussions around global supply chain strategies. It is too early to determine the impact of specific changes in global supply chains, particularly as those changes take multiple years to implement into manufacturing processes around the world. However, early indications point to diversification of supply chains. As a result, the forecast assumes that we see potential shifts in specific destinations, but not fundamental macro demand changes to global supply chains served by air and the air cargo networks that supply them globally.

2021–2040 Air cargo traffic and freighter fleet forecast

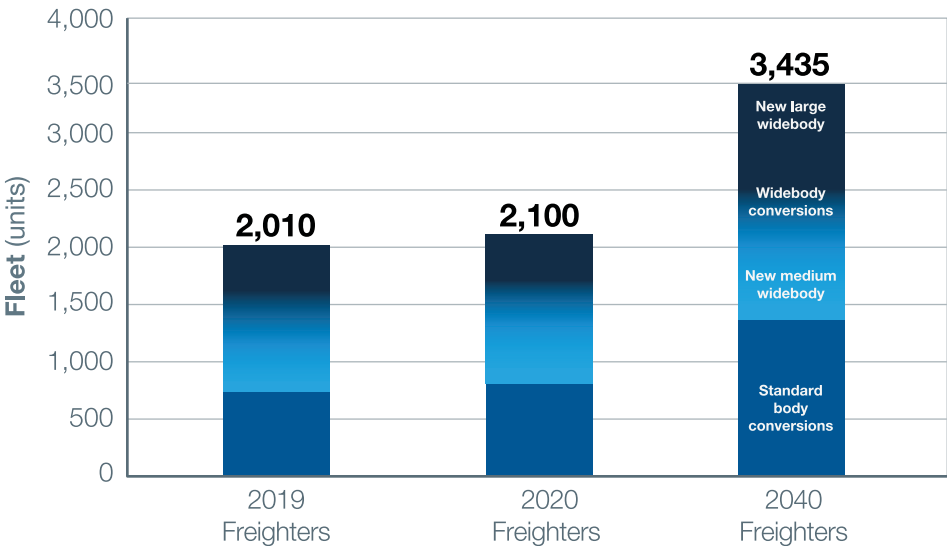
The CMO 2021 freighter fleet forecast incorporates near-term cyclical disruptions and long-term structural impacts we anticipate will impact air cargo markets. This assumes the current dynamics of constrained widebody passenger belly capacity will dissipate into the long term, and air cargo will then reflect market dynamics closer to those seen in the years prior to the COVID-19 pandemic.

Our 20-year traffic growth (2021–2040) is forecast to be 4.6%, reflecting low base year effects due to the pandemic-induced traffic reduction estimated at 9% in 2020. The 21-year traffic growth, using 2019 as a baseline, remains at our previous growth forecast of 4.0% (2020–2039).

In 2040, the world’s freighter fleet will grow from ~2,000 units in 2019 to ~3,400 units, an increase of 70% over the pre-pandemic fleet. This long-term fleet growth will be powered by GDP growth, industrial production and replacement demand. Near-term air cargo market demand has been boosted by increased e-commerce, supply chain disruptions, severe maritime interruptions, economic recovery and the previously mentioned widebody passenger capacity loss. This boost is reflected in total air freighter unit demand that sees somewhat higher demand in the first decade of the forecast.

Freighter fleet to grow by more than 1,300 units by 2040

Fleet grew in 2020 by nearly 100 units due to COVID-19 surge



This photo was taken before Boeing implemented COVID-19 pandemic safeguards.

Pandemic continues to impact first decade of forecast, long-term outlook resilience

CMO 2021 shows the global forecast is playing out largely as Boeing projected in 2020: demand for domestic air travel is leading the recovery, with intra-regional markets expected to follow as health and travel restrictions ease, followed by long-haul travel’s return to pre-pandemic levels by 2023 to 2024. These disruptions in traffic have a marked impact on airplane deliveries and the in-service fleet. In the immediate wake of the pandemic, airlines responded to the unprecedented decline in demand by reducing flying substantially, often grounding entire fleets. Many older, less efficient fleet types will not return.

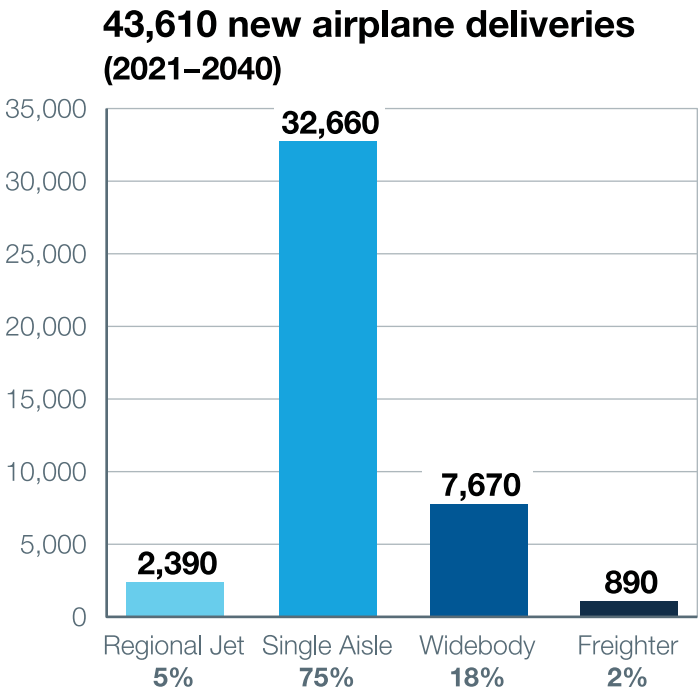
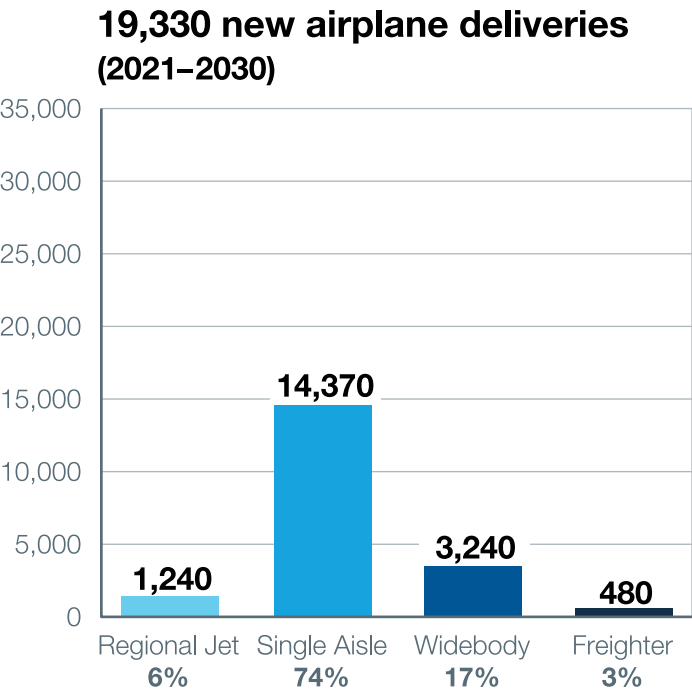
These dynamics have had a major impact on the CMO forecast. In the 10-year forecast, the impact of the pandemic is still apparent, with forecast deliveries down 7% overall from the CMO 2019 forecast. The decline is deeper for widebody airplanes, down almost 10%. In the 20-year forecast, the pandemic disruption to the single-aisle market is largely absorbed, and deliveries and fleet approach the long-term trend. The pandemic’s impact on the widebody market is still apparent in our 20-year forecast, with widebody deliveries down 8% from the 2019 CMO.

Over the 20 years of the forecast, airlines will need over 43,000 airplanes valued at \$7.2T to meet the needs of the market. This will result in growth of the in-service fleet at an annual rate of 3.1%, with the number of airplanes in service increasing to over 49,000. Over the next 10 years, airlines will take delivery of over 19,000 airplanes valued at \$3.2T. The fleet will grow by 2.9% per year, and the number of airplanes in service will increase to over 35,000.

Single-aisle passenger airplanes command the largest share of new deliveries at 75%, with airlines needing more than 32,000 in the next 20 years. These new airplanes will continue to enable growth for low-cost carriers and will provide required replacements for older, less-efficient airplanes. In addition, more than 7,000 new widebody airplanes will be delivered, which will allow airlines to serve new

and existing markets—passenger and cargo—more efficiently than in the past.

In 2021 to 2030, the single-aisle share of new deliveries is 74%, with airlines requiring over 14,000 of these single-aisle airplanes, as well as over 3,000 widebody airplanes.



Single-aisle airplanes make up the majority of the global market

Today, single-aisle airplanes comprise nearly 64% of the global passenger jet fleet. In the next 10 years, this share will increase to over 68%, or more than 24,000 passenger airplanes. This increasing trend continues over the 20 years of the forecast with single-aisle airplanes reaching over 34,000 airplanes by 2040, almost 70% of the fleet.

A number of factors drive the global demand for new single-aisle airplanes. Due to their size and flexibility, single-aisle airplanes are a fundamental business strategy of the rapidly growing low-cost carriers, as well as airlines operating in emerging markets around the world. There is strong replacement demand in the well-developed aviation markets,

where there are large fleets of older airplanes. The three largest regional markets for new single-aisle airplanes are Asia-Pacific, Europe and North America, which account for over 80% of global low-cost carrier capacity, both in 2019 and throughout the forecast period. In addition, over 80% of all single-aisle deliveries for both the 10-year and 20-year forecasts will be to these regions.

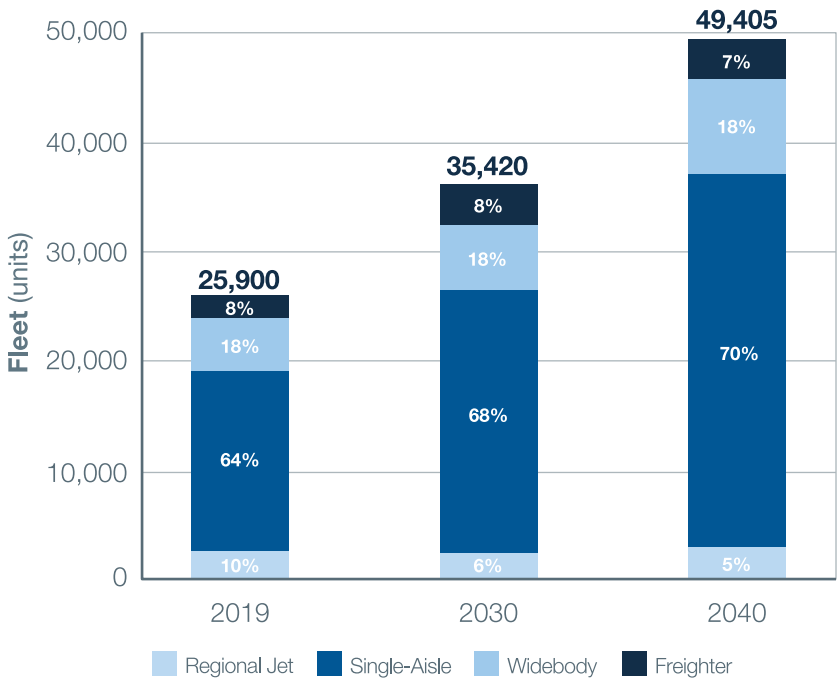
Due to the pandemic disruption and its impact on the 2020 in-service fleet, we have chosen to use the year-end 2019 in-service fleet as the base for fleet growth calculations in CMO 2021. This means that when Compound Annual Growth Rates (CAGR) are provided, the computation is an 11-year CAGR from 2019 to 2030, where we would normally quote a 10-year rate, and a 21-year CAGR from 2019 to 2040, where we would normally provide a 20-year rate. Delivery statistics reflect the 20-year period from 2021 to 2040, as they have historically.

New technology, more fragmentation in the widebody market

Passengers typically prefer the convenience of nonstop flights, and as regulation of airline service in international markets has relaxed, long-haul markets have become increasingly fragmented. New, more efficient widebody airplanes serve an increasing number of long-haul city pairs. This rising market fragmentation is boosting demand for smaller widebody passenger airplanes.

Even as smaller widebody airplanes open new nonstop markets to service, the large end of the widebody market remains important. New, efficient, larger widebody airplanes find application in markets where there is very high demand for travel, where premium service is paramount, where global superconnector airlines operate, where airports are especially congested and where there are airspace constraints. These effects are compounded in the many long-haul markets where time differences between cities restrict the marketable time windows for flight departures.

Single aisle share of fleet rising



Relentless drive for efficiency, sustainability goals drive airplane replacement demand

Fuel consumption is a large share of airlines’ operating costs and, as a result airlines have relentlessly focused on increasing both fuel and operating efficiencies for decades. Globally, the industry has reduced fuel consumption by half over the last 25 years in terms of traffic carried measured in revenue passenger kilometers. And, the industry has committed to continuing to focus on this important area.

Over the course of the forecast, contributions to improving industry sustainability will come from many dimensions. Airline operations, new airplane technologies and development in sustainable aviation fuels will all play a role. The 2021 CMO incorporates our assessment of developments in these factors as they stand today in terms of overall passenger travel demand as well as airline fleet renewal choices and options.

At the outset of the pandemic, airlines quickly grounded many entire airplane fleets, as the economic penalty from operating a severely reduced schedule with a large variety of airplane types was very high. Once grounded, the additional cost of returning a fleet to service, in addition to the higher

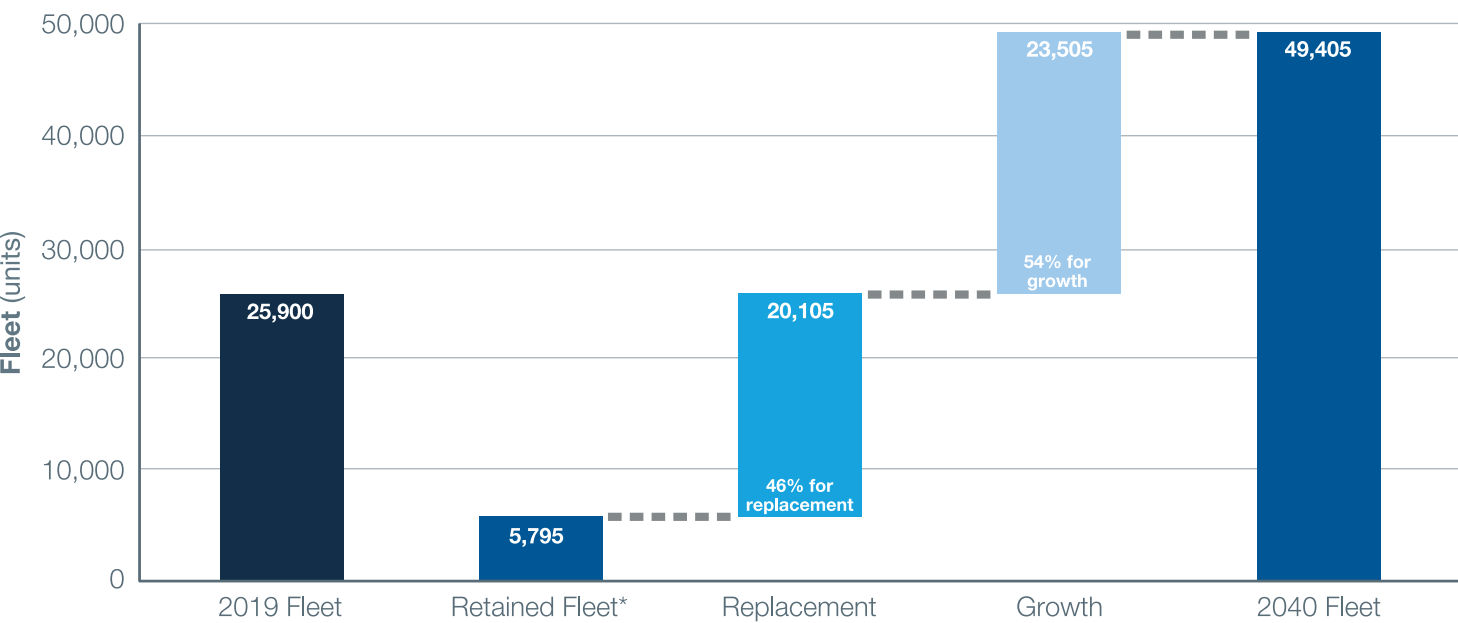
operating costs of older, out-of-production models, means that many of these less-efficient fleets will not return to service. This replacement dynamic will be a key contributor to the industry’s progress toward its sustainability goal.

This spike in retirements has created a temporary dislocation in the retirement/replacement balance that can be seen in the share of 10-year deliveries for

replacement. For the passenger fleet, replacement demand represents 54% of projected new deliveries vs. the long-term average 46% anticipated in CMO 2019, pre-pandemic. Or to put it another way, roughly 40% of the pre-pandemic passenger fleet is forecast to be replaced by 2030. Many of these passenger fleet retirements will be converted to freighters, substantially reducing the age and improving the efficiency of the global freighter fleet.

Over the 20-year forecast, the early-retirement shock works through the system and the retirement/replacement cycle returns to long-term balance with a more “normal” 46% of both passenger and freighter deliveries for replacement and 54% for growth. The fleet in 2040 will consist of 20,105 airplanes replacing airplanes currently in the fleet, 23,505 providing for system growth and 5,795 retained from the 2019 fleet.

Delivering sustainable growth, ~80% fleet renewal over next 20 years



*Includes 2020 deliveries

After years of growth and profitability, the aviation industry kicked off a new decade with a pandemic that resulted in one of the worst shocks our industry has ever faced. Moving into 2021, the commercial aftermarket recovery is making progress since the COVID-19 crisis hit, and the underlying long-term fundamentals for growth remain strong. However, the shape of the recovery is volatile with continued liquidity pressures, competition for talent and the drive for operational efficiencies.

Commercial aviation services market segments in the forecast are grouped by function: corporate overhead; marketing and planning; flight operations; maintenance and engineering; and ground, station, and cargo operations. While these segments are diverse in terms of sales, activity scope, capital intensity and competitive environment, we expect growth to generally track fleet growth rates. Our 2021 20-year global forecast for commercial aviation services is \$9.5 trillion.

The aviation industry has proven resilient time and again as it withstood major external and macroeconomic shocks. This is driven by global commerce, people’s desire to travel, visit family and friends, explore the world and build relationships. While difficult in the near-term, operators who emerge from market downturns have historically resumed their growth trajectory through collaboration, adaptation and innovation. As with previous downturns, operators are expected to emerge from the pandemic with updated business models that enable more sustainable and profitable growth. While COVID-19 brought disruption to business practices and shifted demand, it’s important to remember the resiliency of this market and the significance of servicing the industry.

The global fleet has seen continual renewal over many decades. Today, operators are actively flying their most efficient and right-sized aircraft to fit adjustments made to their schedules and routes. Amid managing customer needs coming through the pandemic, service providers are investing in

training, digital capabilities and infrastructure upgrades to support the changes brought about from the pandemic.

Service providers are considering business models that match the current environment. As operators become more resourceful, parts pooling programs have increased in popularity. These types of

arrangements can be less costly because operators don’t have to maintain their own inventory of spares. Contract terms between service providers are becoming more flexible in order to minimize risk, and outsourcing and partnership activities as a result of right-sizing to a new operational size is giving their customers the flexibility to ride out the downturn without additional measures.



*Does not include China

Forecast on a page

Commercial airplanes

Region	Asia-Pacific Detail						North America	Europe	Middle East	Latin America	Russia and Central Asia	Africa	World
	Asia-Pacific	China	Southeast Asia	South Asia	Northeast Asia	Oceania							
Economic Growth (GDP)	3.7%	4.4%	3.9%	4.9%	1.0%	2.3%	2.1%	1.4%	2.8%	2.4%	2.1%	3.0%	2.7%
Airline Traffic Growth (RPK)	5.0%	5.4%	5.5%	6.9%	1.7%	3.0%	2.7%	3.1%	4.1%	4.8%	2.9%	5.4%	4.0%
Airline Fleet Growth	4.2%	4.4%	5.0%	6.6%	1.2%	1.9%	1.7%	2.7%	4.1%	3.4%	2.5%	3.6%	3.1%
DELIVERIES (2021–2040)													
Regional Jet	400	360	20	<10	10	10	1,610	60	40	10	230	40	2,390
Single Aisle	13,460	6,490	3,600	2,110	720	540	6,350	7,100	1,570	2,290	1,150	740	32,660
Widebody	3,500	1,650	770	290	580	210	790	1,460	1,320	220	140	240	7,670
Freighter	285	200	25	10	50	<5	410	85	70	10	20	10	890
Total	17,645	8,700	4,415	2,410	1,360	760	9,160	8,705	3,000	2,530	1,540	1,030	43,610
2019 FLEET													
Regional Jet	150	60	<10	10	50	30	1,890	240	30	80	190	130	2,710
Single Aisle	5,720	3,050	1,140	590	560	380	4,080	3,690	660	1,200	770	400	16,520
Widebody	1,800	620	430	90	540	120	700	980	740	150	140	150	4,660
Freighter	350	200	30	10	80	30	940	310	80	110	160	60	2,010
Total	8,020	3,930	1,600	700	1,230	560	7,610	5,220	1,510	1,540	1,260	740	25,900
2040 FLEET													
Regional Jet	480	390	30	<10	40	20	1,610	60	60	30	340	130	2,710
Single Aisle	13,740	6,700	3,440	2,260	800	540	7,030	6,890	1,750	2,580	1,390	980	34,360
Widebody	3,770	1,730	870	330	610	230	1,000	1,690	1,570	340	210	320	8,900
Freighter	1,160	810	100	70	140	40	1,195	500	150	145	155	130	3,435
Total	19,150	9,630	4,440	2,660	1,590	830	10,835	9,140	3,530	3,095	2,095	1,560	49,405

NOTE: Growth rates are calculated from 2019–2040

Commercial services

Commercial services		Asia-Pacific Detail											
Region	Asia-Pacific	China	Southeast Asia	South Asia	Northeast Asia	Oceania	North America	Europe	Middle East	Latin America	Russia and Central Asia	Africa	World
PERSONNEL DEMAND													
Pilots	231,000	123,000	43,000	36,000	19,000	10,000	130,000	115,000	54,000	38,000	25,000	19,000	612,000
Technicians	249,000	127,000	55,000	33,000	23,000	11,000	132,000	112,000	51,000	37,000	25,000	20,000	626,000
Cabin Crew Members	339,000	161,000	77,000	44,000	40,000	17,000	170,000	178,000	91,000	51,000	33,000	24,000	886,000
Total	819,000	411,000	175,000	113,000	82,000	38,000	432,000	405,000	196,000	126,000	83,000	63,000	2,124,000
SERVICES													
Services Market Size (\$B)	\$3,745	\$1,800	\$790	\$435	\$555	\$165	\$2,070	\$1,895	\$740	\$535	\$320	\$235	\$9,540

APPENDIX

Passenger traffic flows between regions

COMMERCIAL MARKET OUTLOOK 2021–2040

Traffic Flow (RPKs in billions)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2030	2040	2019–2040 Annual Growth
Africa-Africa	48.7	51.1	54.5	53.7	56.6	59.2	62.9	65.4	67.2	71.1	21.8	146.3	266.8	6.5%
Africa-Europe	135.5	134.1	140.4	140.4	146.5	153.2	153.8	163.9	175.1	184.4	50.1	264.8	395.5	3.7%
Africa-Middle East	36.4	39.4	48.6	50.8	53.7	59.5	62.5	66.2	69.0	69.5	15.7	123.1	228.8	5.8%
Central America-Central America	31.3	32.2	33.8	36.5	38.7	42.5	48.7	51.9	55.2	59.6	33.9	83.1	104.3	2.7%
Central America-Europe	73.8	73.7	78.3	82.1	87.4	95.3	104.8	112.3	114.3	115.5	32.9	164.2	231.4	3.4%
Central America-North America	112.7	114.5	132.0	138.3	153.0	170.1	180.5	190.7	197.5	201.2	74.9	288.9	444.1	3.8%
Central America-South America	18.3	19.2	23.2	28.5	30.8	34.2	35.5	37.1	39.9	39.5	9.5	63.0	118.2	5.4%
China-China	335.4	380.1	411.3	460.8	509.2	564.7	629.8	715.1	800.7	838.5	585.7	1646.3	2654.1	5.6%
China-Europe	82.1	94.2	96.7	96.9	105.2	121.1	132.9	141.7	153.7	169.0	27.8	269.7	406.6	4.3%
China-Middle East	19.2	21.8	26.4	30.0	34.5	37.7	43.9	47.7	50.7	53.2	9.1	120.1	238.3	7.4%
China-North America	71.4	85.4	87.1	89.5	98.1	107.5	119.1	132.0	140.9	140.6	12.3	205.8	307.3	3.8%
China-Northeast Asia	51.8	51.5	60.9	60.7	66.2	73.0	81.0	78.6	80.3	87.6	9.6	118.7	167.3	3.1%
China-Oceania	27.4	31.4	34.1	35.0	37.7	44.3	55.4	66.8	72.6	69.3	9.7	105.4	163.5	4.2%
China-Southeast Asia	54.7	63.0	73.8	82.5	89.4	109.9	127.0	144.4	166.0	173.4	22.7	340.5	554.1	5.7%
Europe-Europe	640.2	659.5	676.6	714.0	760.3	796.8	859.4	930.6	982.5	1044.9	314.2	1514.8	2073.9	3.3%
Europe-Middle East	143.8	153.3	178.0	196.8	210.9	242.5	260.1	280.2	300.3	314.0	71.0	429.6	617.3	3.3%
Europe-North America	418.6	430.2	432.9	441.8	462.7	475.0	499.7	537.9	579.2	620.5	161.6	824.6	1054.7	2.6%
Europe-Northeast Asia	64.3	63.8	75.9	74.3	77.8	81.3	78.4	81.3	89.6	96.1	16.4	100.9	120.5	1.1%
Europe-Russia & Central Asia	55.3	67.3	75.2	84.0	86.7	78.9	74.2	87.7	104.3	117.1	36.0	130.5	151.3	1.2%
Europe-South America	82.9	89.8	99.6	102.4	102.1	104.4	107.4	112.1	122.4	133.6	25.4	172.5	280.7	3.6%
Europe-South Asia	53.8	54.1	53.9	56.4	57.2	57.5	58.3	60.9	67.2	58.6	16.3	96.2	152.2	4.6%
Europe-Southeast Asia	97.1	100.4	106.6	105.3	108.0	111.3	111.8	115.3	123.9	128.2	22.6	154.5	207.4	2.3%
Middle East-Middle East	77.9	82.4	76.5	86.3	91.7	102.2	116.1	120.4	122.1	121.5	49.2	203.4	300.8	4.4%
Middle East-North America	45.7	50.3	57.1	63.2	73.7	88.3	98.8	100.9	96.2	96.7	27.1	141.5	213.4	3.8%
Middle East-Oceania	24.5	26.7	31.4	33.3	36.1	37.4	41.5	47.8	49.4	46.6	10.0	62.6	92.6	3.3%
Middle East-Russia & Central Asia	11.3	14.1	16.1	19.0	20.6	19.6	19.2	23.4	29.9	29.4	6.2	43.5	64.9	3.8%
Middle East-South Asia	75.1	83.0	87.3	95.1	100.5	114.4	129.8	140.8	144.0	140.5	43.3	273.2	448.9	5.7%
Middle East-Southeast Asia	56.3	61.3	66.4	79.0	89.4	97.6	109.0	118.0	119.6	118.6	31.8	202.2	304.8	4.6%
North America-North America	946.3	976.3	984.7	998.4	1029.9	1077.7	1120.1	1164.7	1229.2	1286.0	524.3	1676.1	2207.4	2.6%
North America-Northeast Asia	128.4	135.4	149.0	150.4	154.0	160.5	168.2	178.4	178.3	180.0	50.7	194.7	219.2	0.9%
North America-Oceania	34.9	38.3	40.3	43.1	43.3	48.3	53.4	55.1	58.5	58.8	8.8	78.9	102.9	2.7%
North America-South America	60.9	66.7	72.0	79.2	82.7	86.9	83.2	85.6	90.0	84.9	16.0	134.2	214.2	4.5%
Northeast Asia-Northeast Asia	84.6	81.9	92.6	103.9	107.6	112.5	116.8	123.3	126.9	122.5	57.5	137.8	152.1	1.0%
Northeast Asia-Southeast Asia	79.6	92.3	104.9	113.3	124.2	134.6	143.9	159.7	179.6	203.3	30.5	272.9	415.4	3.5%
Oceania-Oceania	78.4	83.8	92.0	99.0	100.0	102.8	105.3	106.0	105.5	105.9	32.7	139.4	185.4	2.7%
Oceania-Southeast Asia	61.1	66.9	71.5	77.8	83.2	80.0	83.5	86.1	89.2	90.5	9.2	131.2	186.7	3.5%
Russia & Central Asia-Russia & Central Asia	87.6	103.1	107.1	118.3	125.3	138.1	134.9	148.3	158.3	170.9	132.1	250.2	329.5	3.2%
South America-South America	115.8	134.4	141.9	147.4	155.7	159.1	156.8	161.6	172.8	176.4	66.0	306.6	528.2	5.4%
South Asia-South Asia	49.5	58.6	63.8	68.1	71.4	79.2	97.0	114.4	130.5	135.5	60.8	308.5	595.2	7.3%
Southeast Asia-South Asia	28.5	29.2	34.0	36.2	38.4	40.4	44.6	50.7	53.5	54.5	7.2	123.0	230.8	7.1%
Southeast Asia-Southeast Asia	113.1	130.7	145.1	166.6	176.9	194.0	212.3	228.2	238.3	241.2	114.5	529.4	947.3	6.7%
Rest of World	124.4	136.9	151.4	159.9	168.9	170.9	183.0	202.3	232.7	256.5	55.4	386.4	559.9	3.8%
Grand Total	4938.7	5262.2	5585.0	5898.0	6246.0	6664.5	7104.3	7635.3	8157.4	8506.2	2912.5	12959.2	19238.1	4.0%



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