



# Air traffic in Germany

Mobility Report 2020

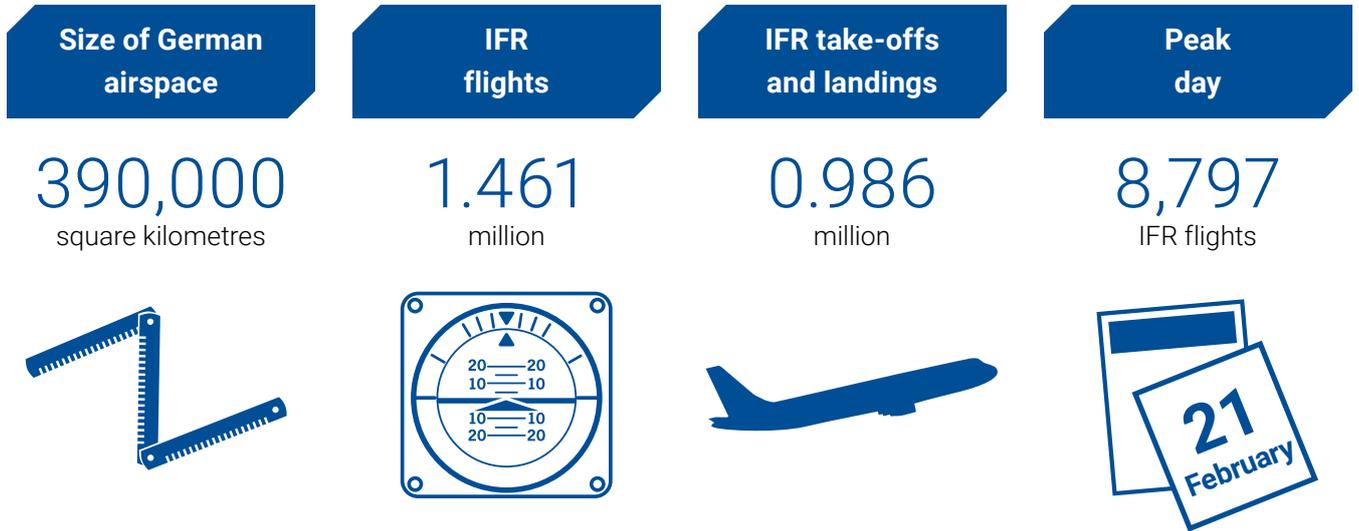


**DFS** Deutsche Flugsicherung



# The year 2020

Air traffic in German airspace

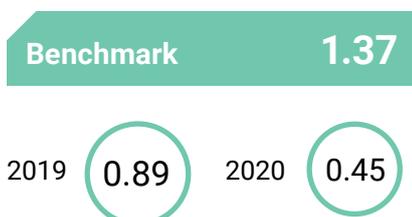


Safety

**Infringements of separation (en-route)** Per 1 million flight hours (RAT ABC)



**Infringements of separation (terminal)** Also includes runway incursions per 100,000 aircraft movements (RAT ABC)



Punctuality

**ATFM delay en-route** Delay per flight in minutes (ATC-related)

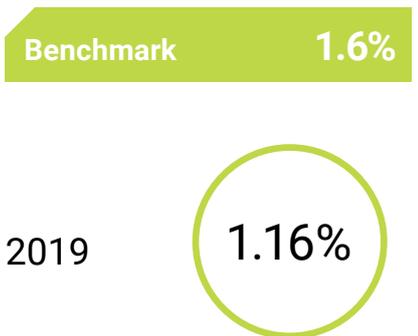


**ATFM delay arrival** Delay per flight in minutes (ATC-related)



Environment

**Horizontal flight efficiency** Deviation from the direct route



# A year of negative records

The history of aviation has long been one of growth. The year 2020 was another record year – but in the negative sense.

In the year of the COVID-19 pandemic, DFS registered a total of 1.46 million take-offs, landings and overflights under instrument flight rules (IFR). This was the lowest level since DFS was established in 1993 and triggered a shift of focus. In one fell stroke, the delays caused by the traffic growth of the past were no longer an issue and the focus shifted to the significance of air transport itself. Air transport not only guarantees people's mobility, but above all it safeguards the supply of important goods. Air navigation services are critical to any country's infrastructure and DFS, with its approximately 5,400 staff members, is ready for the comeback after the pandemic. In this year's Mobility Report, we present you with one perspective on the state of the aviation industry in 2020.





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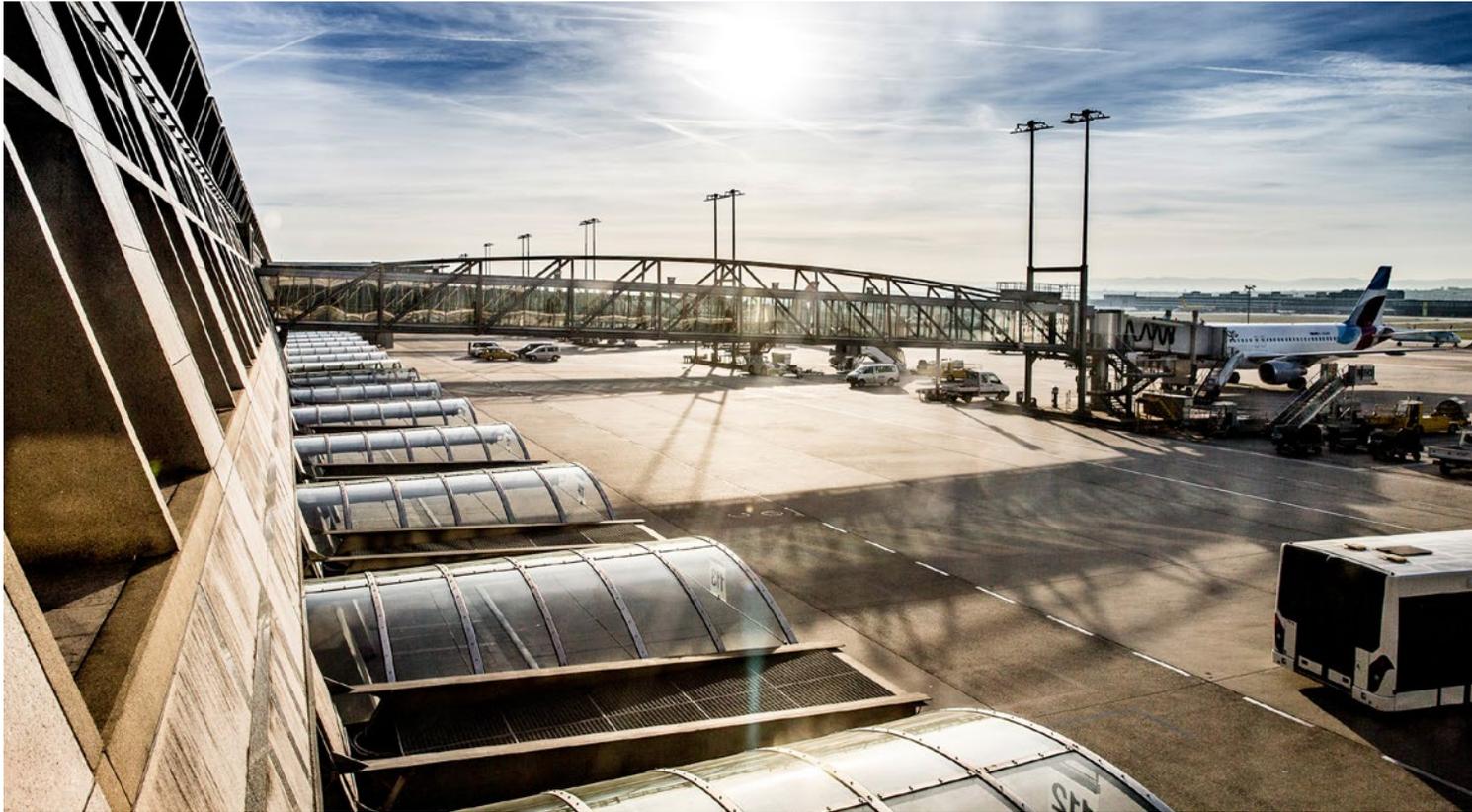
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## 2020 – A bleak year for aviation

Germany has one of the busiest and most complex airspaces in the world. Ordinarily. However, in 2020, a year dominated by coronavirus, traffic volumes fell to pre-1989 levels.

The year 2020 brought with it an unprecedented challenge for all players in the aviation industry. Since spring 2020, the COVID-19 pandemic has had a firm grip on the world, with public life and travel severely restricted almost everywhere. The year had started completely normally. While a lockdown had already brought air traffic in China to a virtual standstill, German aviation started the year with only minor restrictions. In the first quarter, only a slight decline in controlled flights was observed in Germany, which, according to the International Air Transport Association (IATA), was at least partly due to the restrictions on aviation in Asia. In mid-March, however, the lockdown followed in Germany, too. Air

traffic in Germany, as well as in neighbouring European countries, came to a standstill.

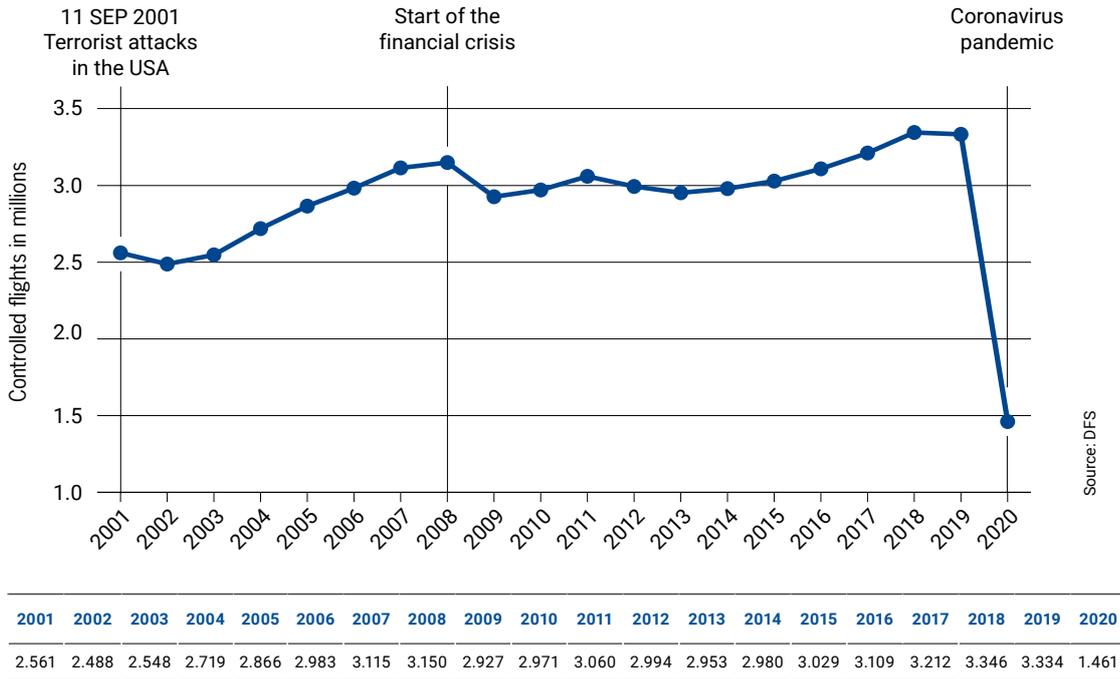
This development is reflected in the number of aircraft movements. In German airspace, a total of 1.46 million flights under instrument flight rules (IFR) were recorded in 2020, 56.2 percent fewer than in the previous year. The first quarter accounted for almost half of the traffic volume with around 609,000 flights. The second quarter was the weakest, with just 149,000 flights. On 12 April, the busiest day of the year, only 756 flights were logged across Germany – the same number of aircraft movements Düsseldorf Airport normally records on a single day. In the third and fourth



**56.2**  
PERCENT

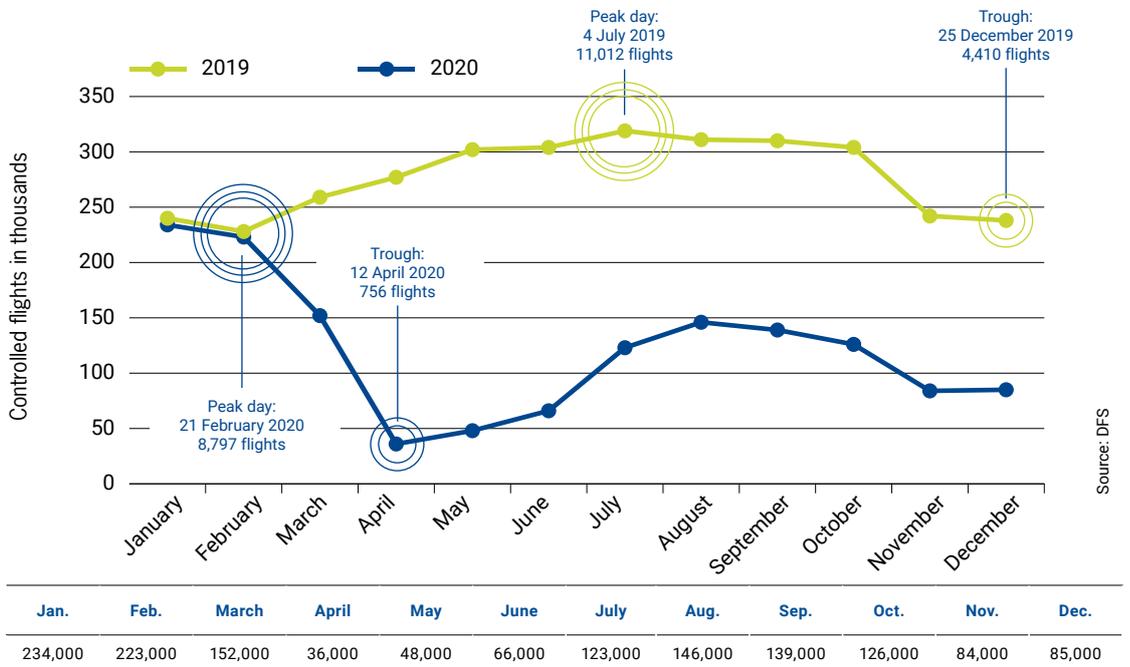
fewer flights  
than in the  
previous year  
were logged  
in Germany.

### Traffic over the long term



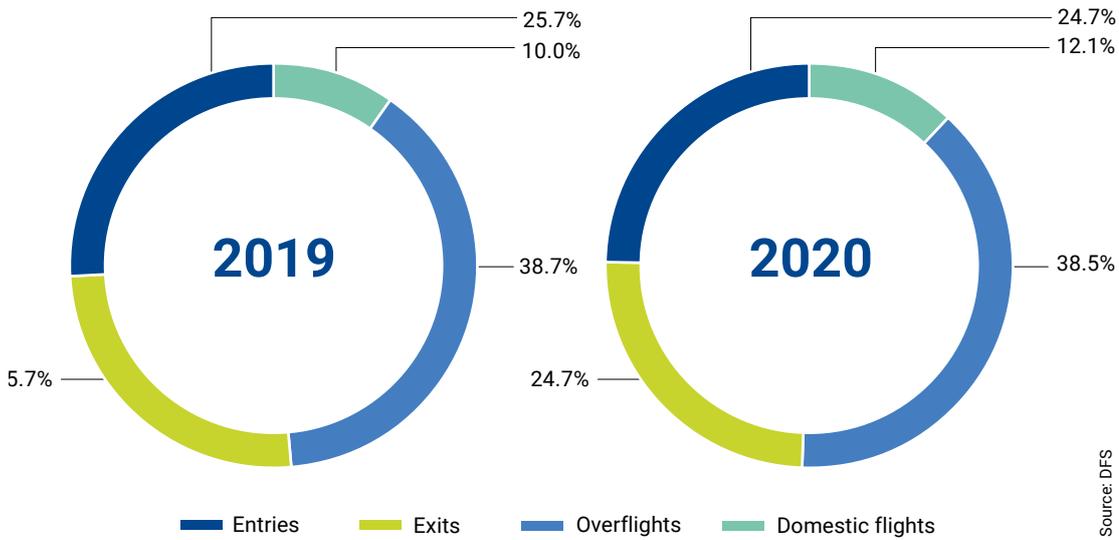
In 2020, air traffic controllers handled 1,460,768 flights under instrument flight rules in German airspace, a decrease of 56.2 percent over the previous year. This meant traffic volumes fell below the level of 1989.

### Traffic by month



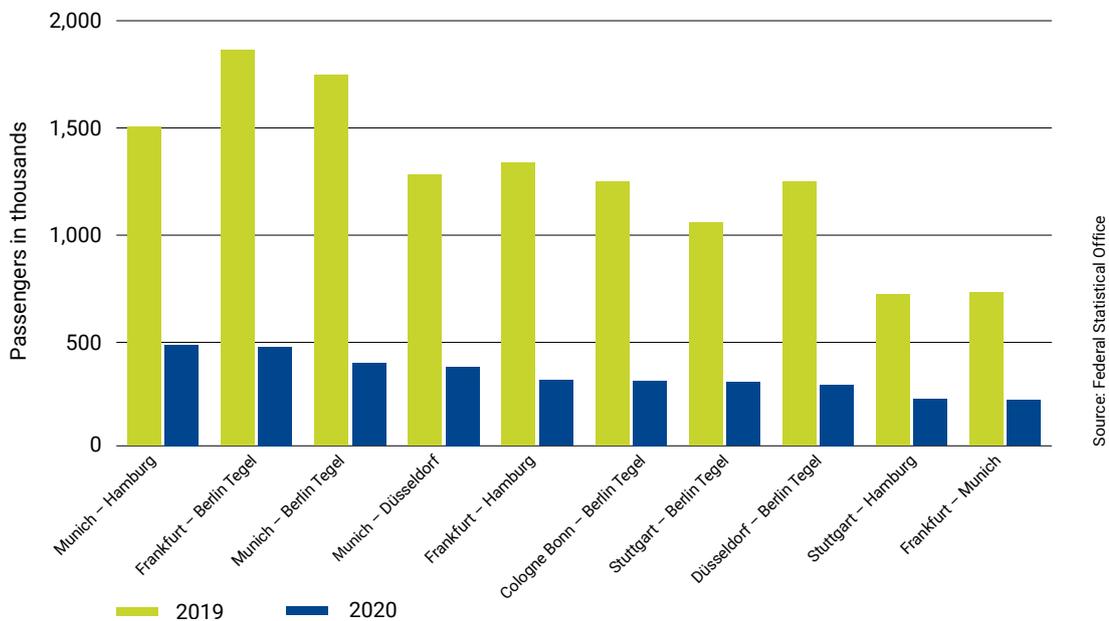
With just under 457,000 controlled flights in January and February, the year 2020 started normally. After the outbreak of the COVID-19 pandemic, traffic volumes in German airspace declined massively. The trough was reached in spring. With around 36,000 controlled flights, April was the weakest month of the year.

## Traffic segments



For the first time in a long time, the share of domestic flights rose year on year. The share of entries and exits, on the other hand, decreased.

## Main domestic connections



According to the German Federal Statistical Office, only 4.97 million passengers travelled on a domestic route in 2020. In 2020, the routes Hamburg-Munich, Frankfurt-Berlin Tegel and Munich-Berlin Tegel remained the ones with the most passengers. This chart is based on the last known destination of the passengers – feeder flights to a hub airport were therefore not taken into account.

quarters, the number of recorded IFR flights increased slightly again, but still remained far behind the figures of the previous year.

The reason for this dramatic drop in flight numbers was the measures taken to protect against the COVID-19 pandemic. The number of tourist trips declined sharply due to stringent restrictions and, in many places, the quarantine requirements on entry. In addition, many companies replaced business trips with video conferencing to protect their workers. Demand was reduced even more by the dynamic course of the pandemic, which hindered reliable planning on the part of airlines and passengers. In addition, there was the fear of catching the disease despite all the protective measures on board aircraft.

This was noticeable in a shift in traffic segments. In contrast to previous years, the share of domestic flights in overall traffic increased in 2020. In total, 12.1 percent of all flights logged over Germany took place within Germany, which is 2.1 percentage points more than in the previous year. The share of entries and exits, on the other hand, decreased by one percentage point each to 24.7 percent, while the share of overflights remained stable at 38.5 percent.

Such declines could also be seen in 2020 at the 16 designated international airports in Germany where DFS operates. Across the board, all airports recorded sharp declines in the number of take-offs and landings compared with the previous year. Munich (minus 65.2 percent), Düsseldorf (minus 65.1 percent) and Berlin Tegel (minus 68.6 percent) airports reported the largest losses. There is an easy explanation for the heavy losses at Berlin Tegel Airport, however. After the opening of Berlin's new airport in the state of Brandenburg, Tegel closed its doors at the beginning of November. Since then, all

flights to Germany's capital have been handled at Berlin Brandenburg Airport (BER).

Leipzig Halle Airport stood out from the crowd, recording only 17.5 percent fewer take-offs and landings compared with the previous year. The reason for this is that Leipzig Halle is a major cargo airport and air freight has not been as badly affected by the crisis as passenger traffic. The decline at Erfurt Weimar Airport was also below average at 23.1 percent. This, however, was due to the fact that traffic at the airport had already slumped in 2019 following the bankruptcy of the carrier Germania and the decline in 2020 no longer had such a strong impact. In addition, Airbus used the airport as a parking area for undelivered aircraft, which generated take-offs and landings.

Overall, aircraft movements at the designated international airports decreased by 58.7 percent over the previous year. The picture was somewhat better at the regional airports in Germany. Here, the decline was 35.5 percent. The outlier was Mönchengladbach Airport, which recorded growth of 7.6 percent due to an increasing number of business aircraft and a maintenance company stationed at the airport.

In contrast to civil air traffic, the number of military aircraft movements was only slightly below the previous year's level at around 42,000. The German Air Force took advantage of the traffic situation resulting from the pandemic as there was space in the sky for exercises that could not have taken place under normal conditions without massive restrictions for civil aviation.



# 985,842

take-offs and landings were recorded at German airports.

## IFR take-offs and landings at Germany's international airports

	2016	2017	2018	2019	2020	Change in %
Berlin Schönefeld	94,886	99,870	100,778	90,124	34,963	-61.2
Berlin Tegel	184,974	173,045	186,535	192,958	60,498	-68.6
BER	-	-	-	-	8,324	-
<i>Berlin in total</i>	<i>279,860</i>	<i>272,915</i>	<i>287,313</i>	<i>283,082</i>	<i>103,785</i>	<i>-63.3</i>
Bremen	32,861	30,246	31,198	29,984	15,187	-49.3
Dresden	22,727	21,450	22,233	20,707	8,773	-57.6
Düsseldorf	216,875	220,904	218,204	225,440	78,647	-65.1
Erfurt Weimar	4,907	5,455	5,502	4,704	3,618	-23.1
Frankfurt	462,742	475,365	511,844	513,722	212,334	-58.7
Hamburg	151,785	153,931	148,853	149,239	60,144	-59.7
Hannover	61,797	62,401	65,928	64,781	27,367	-57.8
Cologne Bonn	135,391	139,760	142,870	142,117	79,810	-43.8
Leipzig Halle	61,488	65,963	74,736	75,432	62,222	-17.5
Munich	391,521	401,728	410,242	414,068	144,268	-65.2
Münster Osnabrück	16,808	18,223	19,359	18,939	10,525	-44.4
Nürnberg	49,495	53,074	54,149	49,417	20,205	-59.1
Saarbrücken	9,285	8,787	9,119	7,988	4,062	-49.1
Stuttgart	118,918	117,939	128,194	132,669	49,980	-62.3
<b>Total</b>	<b>2,016,460</b>	<b>2,048,141</b>	<b>2,129,744</b>	<b>2,132,289</b>	<b>880,927</b>	<b>-58.7</b>

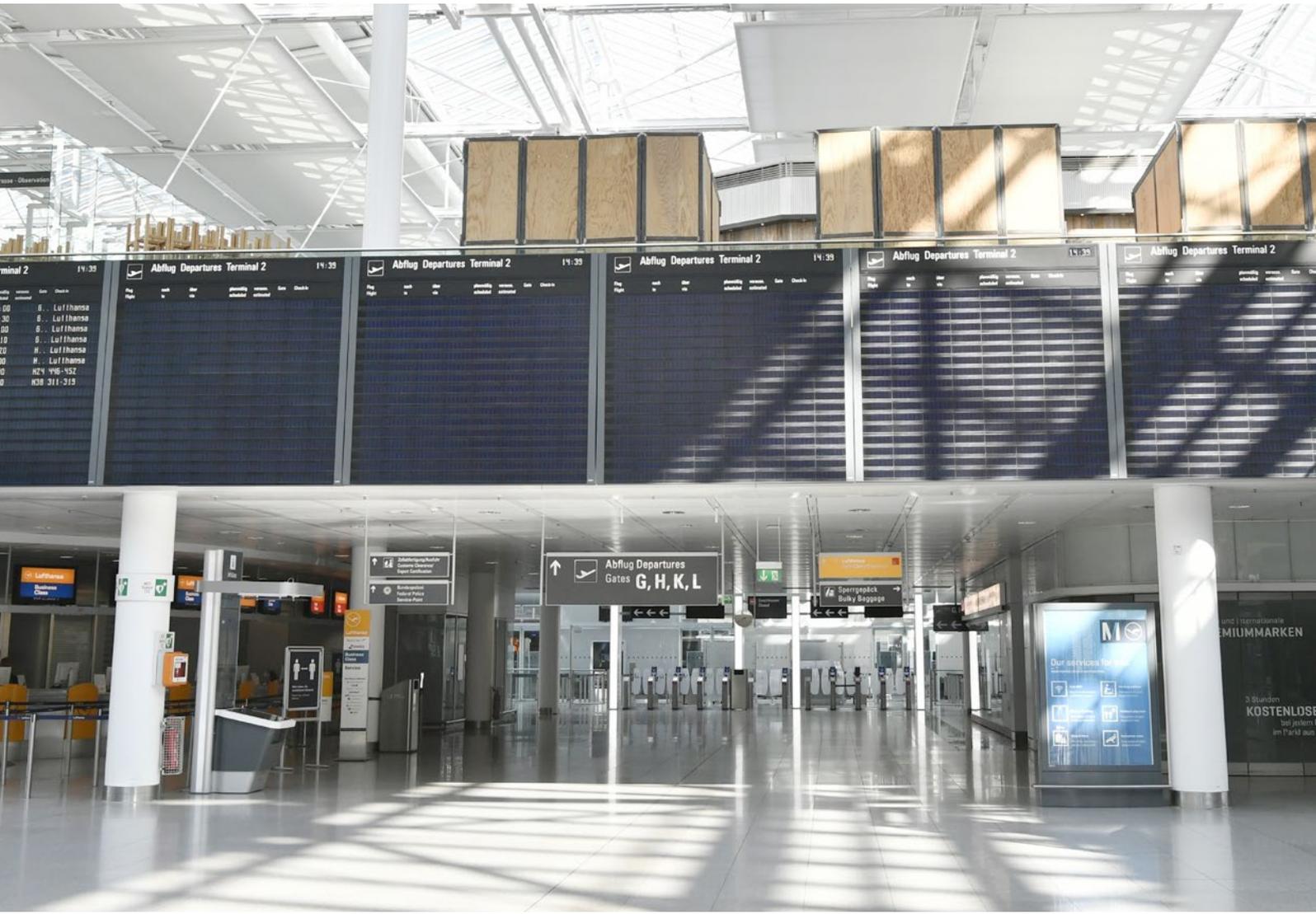
## IFR take-offs and landings at Germany's regional airports

	2016	2017	2018	2019	2020	Change in %
Augsburg	6,516	7,049	6,920	7,402	6,846	-7.5
Braunschweig	10,471	9,784	9,747	9,198	5,421	-41.1
Dortmund	19,262	20,220	22,523	24,270	16,297	-32.9
Friedrichshafen	10,109	9,919	10,237	10,795	4,400	-59.2
Hahn	20,634	20,662	19,459	16,196	11,081	-31.6
Heringsdorf	982	838	892	990	550	-44.4
Hof Plauen	1,313	1,488	1,435	1,506	1,313	-12.8
Ingolstadt Manching	5,529	5,669	5,482	5,074	2,825	-44.3
Karlsruhe Baden-Baden	12,707	13,016	12,383	12,469	8,344	-33.1
Kassel Calden	3,792	4,342	4,674	4,839	3,822	-21.0
Lahr	1,493	1,543	1,504	1,581	1,219	-22.9
Lübeck Blankensee	2,284	1,922	2,742	2,859	2,424	-15.2
Mannheim	6,591	6,460	6,767	6,648	4,714	-29.1
Memmingen	10,541	11,681	13,802	15,103	9,687	-35.9
Mönchengladbach	5,072	6,025	6,594	6,479	6,973	7.6
Niederrhein	12,714	13,066	11,995	9,315	3,515	-62.3
Paderborn Lippstadt	12,666	12,805	14,114	13,295	5,623	-57.7
Rostock Laage	6,866	7,880	9,795	8,587	4,856	-43.4
Schwerin Parchim*	1,320	1,056	527	24	0	-100.0
Westerland Sylt	5,359	5,717	6,088	5,925	5,005	-15.5
<b>Total</b>	<b>156,739</b>	<b>161,147</b>	<b>167,681</b>	<b>162,558</b>	<b>104,915</b>	<b>-35.5</b>

The number of take-offs and landings fell sharply at both international and regional airports. These tables are based on all take-offs and landings under instrument flight rules (IFR).

\* Flight operations were discontinued in 2019.

# \_Air transport sector\_



# Wanderlust curbed

Spain remained the most popular destination for travellers from Germany in 2020. In second place came Turkey, which ousted Italy from second place for the first time.

As traffic volumes declined in a year dominated by coronavirus, so did the number of international trips. Only 26.4 million passengers took off from Germany to other countries in 2020 – almost 75 percent fewer than in the previous year.

Despite the decline, Spain remained the most popular destination for travellers from Germany. Despite the mask requirement and quarantine, 3.4 million passengers travelled to the country, almost 78 percent fewer than in the previous year. Turkey was in second place with around 2.1 million passengers. It relegated Italy to third place, which had previously been the second favourite destination. Only 1.7 million travellers flew to Italy, more than 78 percent fewer than in the previous year. One reason for this was the severe course of the coronavirus pandemic in

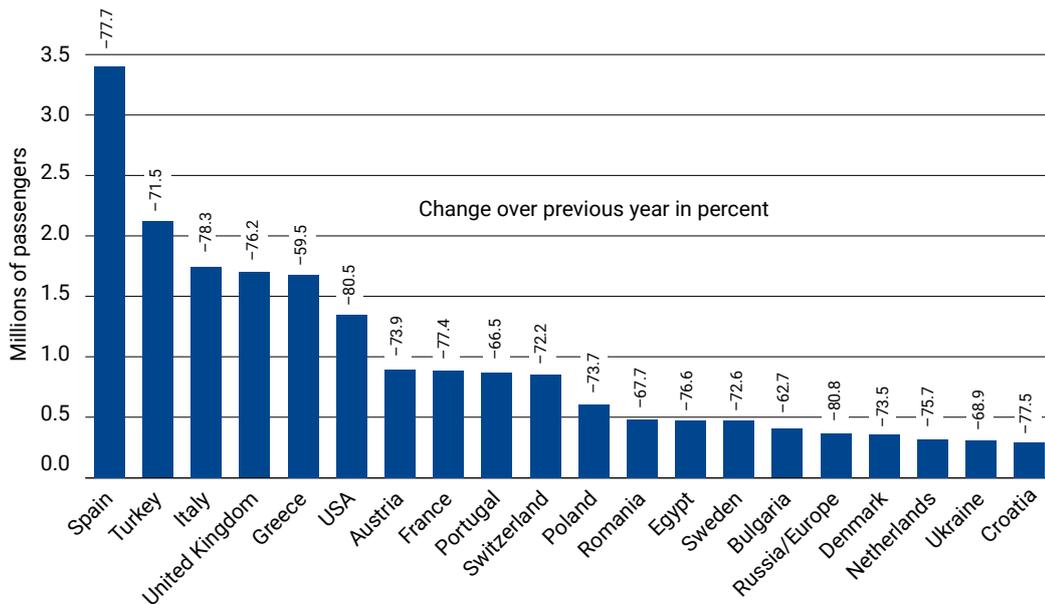
northern Italy in early 2020. The biggest slump was experienced by destinations outside the EU. The number of travellers to Russia fell by around 81 percent, closely followed by the United States, which imposed an entry ban on travellers from Europe at the beginning of 2020 to contain the pandemic.

The smallest decrease was recorded on routes from Germany to Greece. Around 1.7 million passengers travelled from Germany to Greece in 2020, almost 60 percent fewer than in the previous year. After Greece, Bulgaria (minus 63 percent), Portugal (minus 67 percent) and Romania (minus 68 percent) are the countries with the lowest losses among the top 20.



**3.3**  
MILLION  
passengers flew to Spain – a drop of more than 11 million.

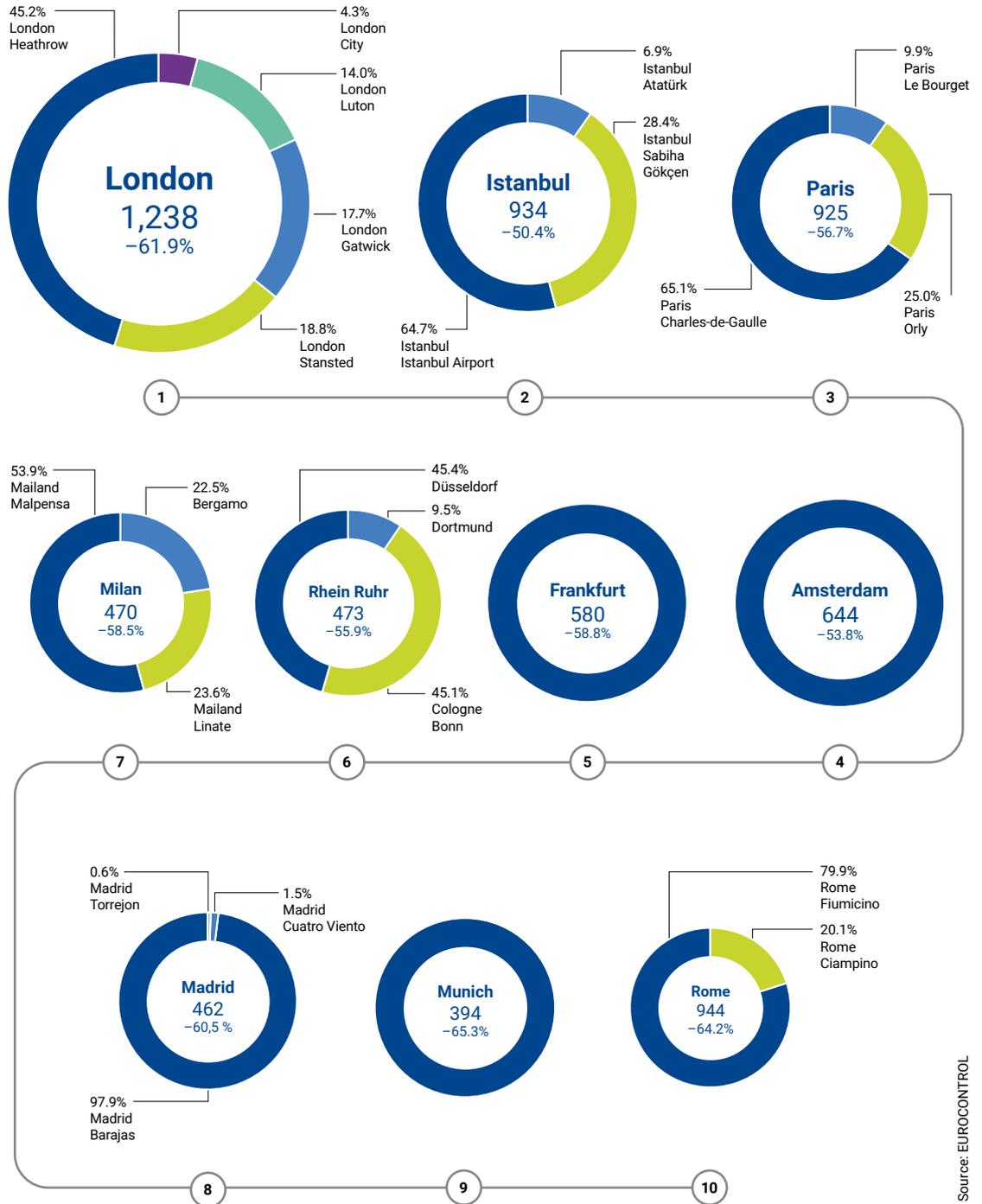
## Top 20 destinations



Source: Federal Statistical Office

For the first time in years, the number of people travelling abroad from Germany decreased. In total, only 26.4 million passengers took off from Germany to foreign destinations, almost three quarters fewer than in the previous year. The decline affected all top 20 destinations, so there was little change in the order.

## European metropolitan airports



Source: EUROCONTROL

Even in a year marked by crisis, London remained the undisputed metropolitan airport in Europe. On average, 1,238 flights a day took off or landed at the five airports around the British capital. Istanbul airports' catchment area ranked in second place. It pushed the three Paris airports into third place. Airports with more than one aircraft movement per day under instrument flight rules were taken into account.



## Passengers grounded

Strict travel restrictions, uncertainties in holiday planning and the fear of infection kept people from flying in 2020. All these factors are reflected in the passenger numbers and load factors.

Never before in the history of civil aviation have passenger numbers collapsed as dramatically as in 2020. In 2019, around 4.5 billion passengers around the world travelled by air, while in 2020, this figure was only 1.8 billion – a decline of 60 percent. The number of passenger-kilometres, the distance travelled multiplied by the number of passengers, also decreased by around 66 percent over the previous year.

It was not only the absolute number of passengers that declined sharply in 2020. The capacity offered by airlines, as measured by number of available seat-kilometres, also fell according to the International Air Transport Association (IATA). The same was true for the

load factor. It declined significantly, following many years when airlines had been able to increase their utilisation rates.

This trend was also evident at German airports. In 2019, the load factor came in at an average of just under 80 percent. In 2020, the average value was just over 58 percent. As in previous years, international flights had a significantly better load factor (61.3 percent) than domestic flights. Here, on average, just over half of all seats were occupied, as reported by the German Federal Statistical Office. These figures refer to the available seats. Kilometres travelled are not taken into account, unlike in the IATA statistics.



# 60

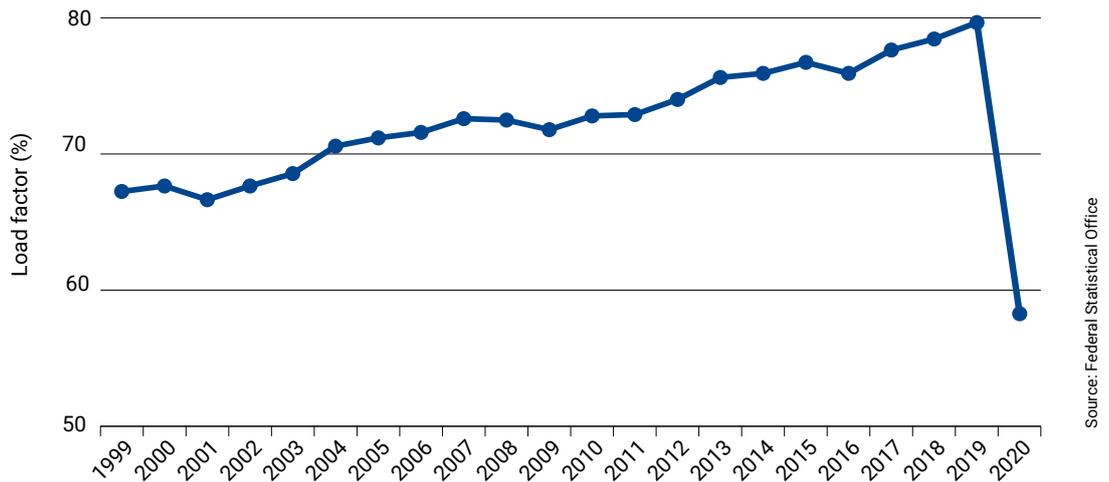
**PERCENT**

– the drop in load factor of aircraft in Germany.

The busiest connections in 2020 were to Hurghada in Egypt, where an average of around 84 percent of the seats were occupied. Flights to Heraklion, the primary airport on Crete, were in second place with a load factor of around

81 percent. In third place was a destination that, unlike Heraklion and Hurghada, is not a classic tourist destination: Pristina, Kosovo. Flights to the capital of Kosovo were around 77 percent full on average.

## Load factor



The load factor of aircraft taking off and landing at German airports fell below the 1992 level in 2020. Just six out of ten seats were occupied on average. This figure applies to the total number of flights. At 52.3 percent, domestic flights had a significantly lower load factor.

## Destinations with the best load factor



The load factor on international flights fell significantly in 2020. It was highest for flights to Hurghada, where on average 83.6 percent of all seats were occupied. Overall, the load factor for flights abroad rose to 61.3 percent. These figures reflect flight destinations with over 500 flights per year.

The number of passengers on domestic flights fell by 74 percent. However, this did little to change the ranking of the busiest flight connections: Hamburg-Munich, Frankfurt-Tegel and Munich-Tegel remained the connections with the most passengers in 2020, with the Hamburg-Munich route overtaking the Tegel connections in the ranking. The reason for this is that all air traffic to the capital has been handled at the new Berlin Brandenburg Airport (BER) since November 2020. The large European airports serving metropolitan areas also saw changes as a result of the COVID-19 pandemic. Amsterdam and Paris Charles-de-Gaulle airports displaced Frankfurt as Europe's busiest airport in 2020. Despite the crisis, there were on average around 644 take-offs and landings a day in Amsterdam. In Paris, there were 603, in Frankfurt only 580. There were also changes in the ranking

of European metropolitan regions with more than one airport in 2020. London remained the undisputed number one in Europe with 1,238 aircraft movements at its five airports. Istanbul, however, with its three airports and an average of 934 aircraft movements per day, displaced Paris (925 aircraft movements) from second place.



## A simple matter of supply and demand

Air freight offers a glimmer of hope in a crisis. Declines were moderate, and growth was seen in isolated cases.

Air freight volumes also declined in 2020. Around 4.7 million tonnes of freight and mail were transported by air in Germany in 2020, 3.4 percent fewer than in 2019. Compared to passenger numbers, however, this decline was marginal.

an increase in capacity of almost 20 percent was achieved in this segment by increasing the frequencies of all-cargo aircraft and converting passenger aircraft to freighters, this could not compensate for the loss of capacity due to the reduced supply of belly cargo.

Unlike in previous years, however, the decline in freight volumes was not due to a weakening global economy and a lack of demand. In 2020, supply was the limiting factor in air freight growth. Usually, a large part of air freight is transported in the belly hold of passenger aircraft. However, as the supply of passenger flights was severely limited in 2020, the supply of available cargo space in the belly hold of passenger aircraft also declined.

Overall, global freight traffic declined by 10.6 percent, according to IATA. Air freight in South America was the most affected by the pandemic. The number of freight tonne-kilometres in 2020 decreased by 21.3 percent over the prior year. Africa, on the other hand, recorded 1 percent more freight tonne-kilometres, and North America 1.1 percent, according to IATA.

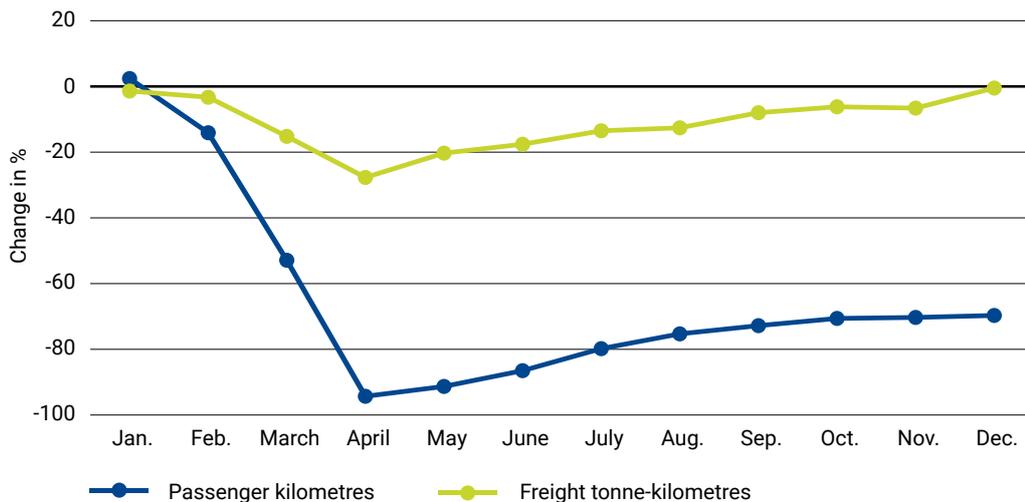
At the peak of the travel restrictions in April 2020, available belly cargo capacity decreased by almost 80 percent, according to International Air Transport Association (IATA) data. Although



**10.6**  
PERCENT

– the decline in freight tonne-kilometres. Compared to passenger numbers, however, this decline was marginal.

### Freight and passenger traffic

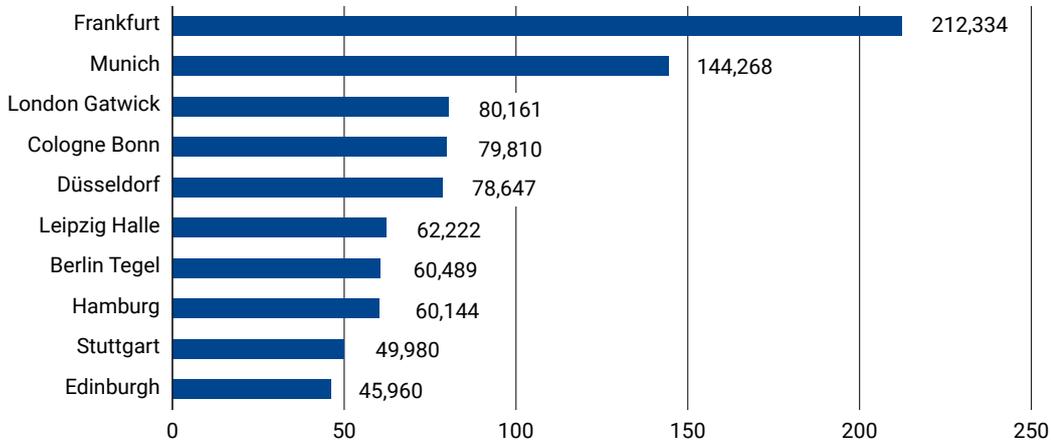


Source: IATA

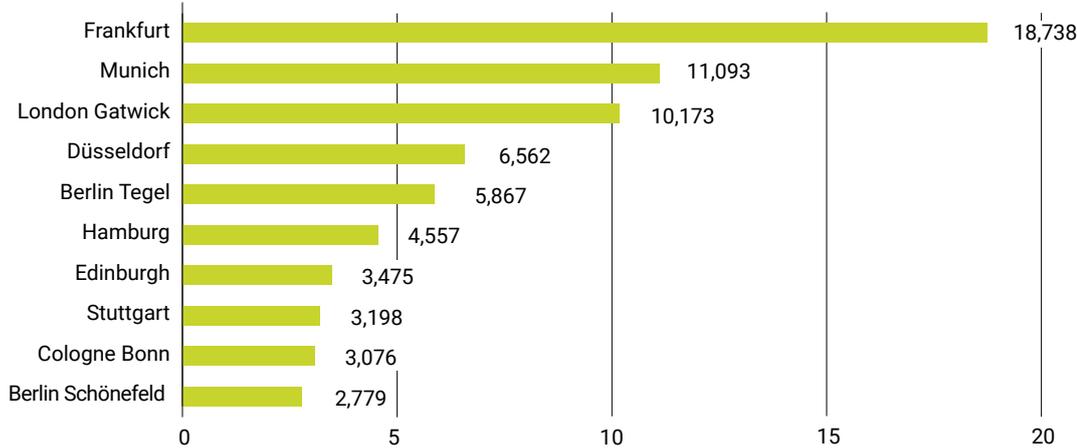
Air freight offered a bright spot for the industry. Demand exceeded supply, and in some parts of the world the number of freight tonne-kilometres actually increased. One major reason was the COVID-19 pandemic. Online shopping is booming, and medical supplies, such as masks and respirators, are also being transported by air.

## The DFS Group and the largest airports where it operates

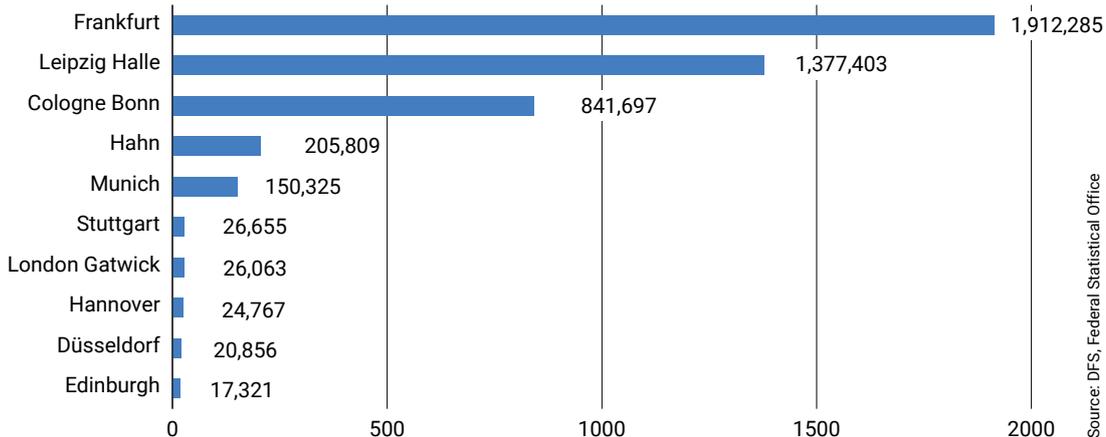
### Top 10 for number of flights (IFR arrivals and departures)



### Top 10 for number of passengers (millions)



### Top 10 for freight volume (tonnes)



Source: DFS, Federal Statistical Office

Only about 1.2 million take-offs and landings were logged in 2020 at the airports where DFS and its subsidiaries provide air traffic control – about half as many as in the previous year.



## Safety first

The safety record of the aviation industry remained exemplary even during the biggest crisis in its history. The numbers demonstrate that flying is still the safest way to travel.

One constant in the aviation industry, even in turbulent times, is safety. In 2020, around 1.8 billion people worldwide arrived safely at their destinations according to the International Civil Aviation Organisation (ICAO). The number of people who have experienced a plane crash is infinitesimal. Worldwide, 121 people were killed in accidents involving commercial aircraft in 2020. This is the second year in a row that the number of fatalities in global air traffic has halved.

These statistics are based on all commercial flights with a take-off weight of more than 5.7 tonnes. By way of contrast, according to the German Federal Statistical Office, 2,724 people died in road traffic in Germany alone in 2020 – more than 20 times as many as in global air traffic. The number of aircraft accidents also fell sharply in 2020 due to the decline in traffic. In 2020, only 19 accidents were logged, 96 fewer than in the previous year.



Most fatalities in 2020 were caused by the crash of a Pakistan International Airlines A320 near Karachi Airport. The accident killed 97 people.

Even if accidents like this one attract the attention of the media, the risk of being involved in an aircraft accident remains very low. There is currently less than one accident per million flights, i.e. a probability of 0.86. Statistically speaking, a single passenger would have to make around 1.2 million air journeys to be involved in an aircraft accident just once.

At first glance, it seems logical that a decrease in traffic would lead to a higher level of safety. But this is not necessarily the case – neither for aircraft crews, nor for the air traffic controllers who monitor air traffic. Less traffic means less practice. Air traffic controllers, in particular, are trained to work with a high level of concentration under a full workload and a high level of stress. To prevent a drop in performance levels or inattention as a result of the low traffic volumes, DFS has taken extensive countermeasures. This includes training sessions in the simulator as well as regular briefings, classes and workshops.



**1.8**  
**BILLION**  
passengers  
reached their  
destinations  
safely in 2020.

## Best keep your distance

Maintaining distance to each other is one of the most important coronavirus rules on the ground. And the key to safety in air traffic.



46

### INFRINGEMENTS OF SEPARATION

with DFS involvement were registered in German airspace in 2020.

The safety of air traffic has always been the top priority for DFS. Air traffic controllers at DFS make sure that aircraft never come too close to each other in the air or on the ground. During a flight, aircraft must maintain vertical separation of 1,000 feet (about 300 metres) at all times. Horizontally, the distance is even greater. Depending on the size of the aircraft and the phase of flight, a minimum distance of three to eight nautical miles must be maintained (5.6 to 14.8 kilometres). The distances are deliberately large as very high speeds are reached in flight.

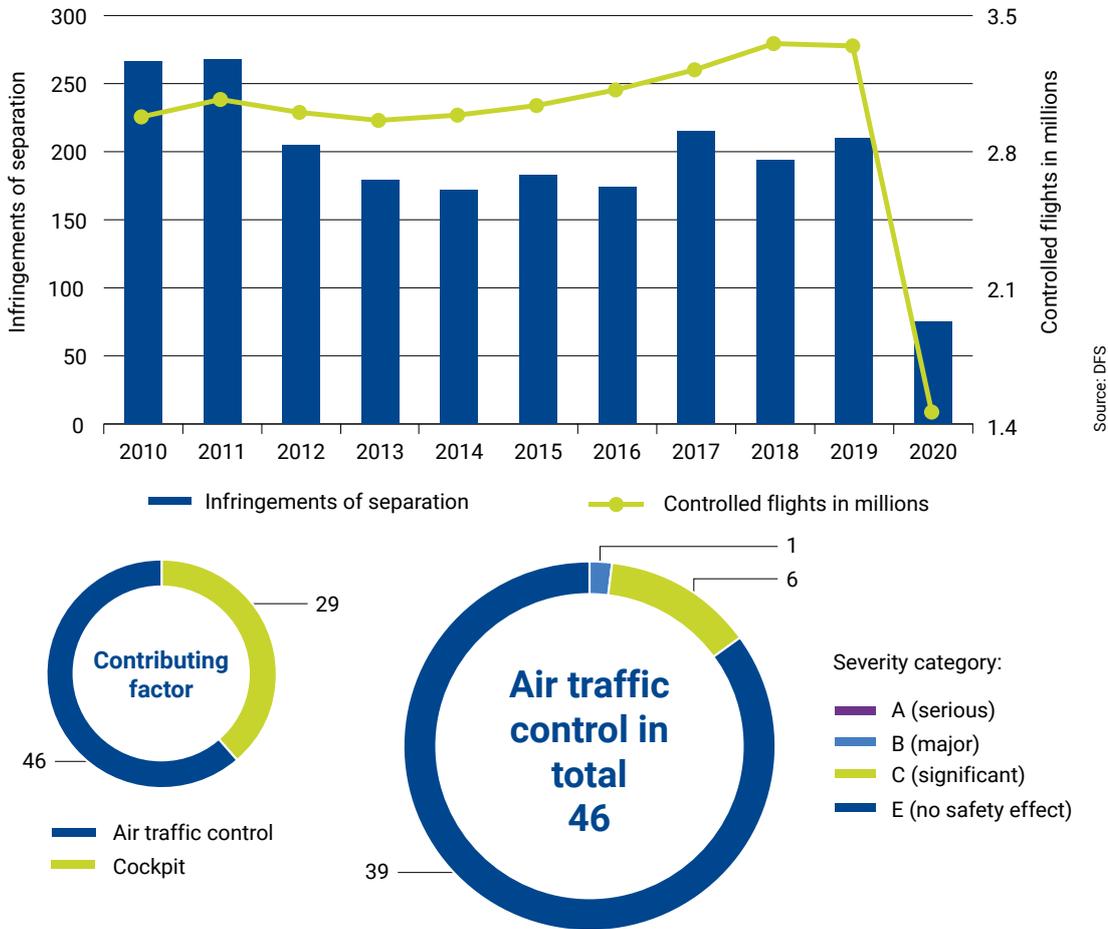
DFS ensures that the prescribed separation minima are observed at all times. If this does not happen, it is called an infringement of

separation. All cases in which the separation minima are not maintained are immediately registered and analysed internally. DFS has been using a standardised EU-wide system for assessing infringements of separation since 2015. This Risk Analysis Tool (RAT) was introduced to better compare the level of safety in different EU countries. For this purpose, the system distinguishes between four different severity categories: serious, major, significant and no safety effect.

DFS Safety Management analyses all registered infringements of separation and assigns them to one of these four categories. Through the in-depth analysis and subsequent determination



## Infringements of separation



Source: DFS

An infringement of separation occurs when the distance between two aircraft is less than prescribed. In 2020, only 75 infringements of separation were documented in German airspace – DFS was involved in 46 of these. According to the preliminary figures, the majority were not safety-related.

of the severity level, it is possible for Safety Management to identify and eliminate risks and sources of danger at an early stage.

Due to the decline in traffic, there was more room in German airspace in 2020 for the first time in many years. This is also noticeable in the infringements of separation registered by DFS. After 210 infringements of separation in 2019, only 75 cases were recorded in 2020. DFS was a contributing factor in 46 of these (2019: 153). However, as in the past, only a small percentage

of these had an appreciable effect on safety. Of the 46 cases, 39 infringements of separation were not safety-related at all. Six cases were classified as “significant” and only one as “major”. As in previous years, not a single case belonged to the “serious” category in 2020.



## On earth as it is in heaven

DFS ensures safety not only in German airspace. Air traffic controllers at the 16 designated international airports in Germany also ensure that there is sufficient separation on the ground.

**2** out of **3**  
**RUNWAY**  
**INCURSIONS**  
involved the  
cockpit crew.

Maintaining distance is everything. This applies in the air. And on the ground. Here, too, minimum distances between aircraft must be maintained. DFS monitors compliance with these minimum distances at the 16 international airports in Germany. For each aircraft that takes off or lands, a safety area is defined which neither other aircraft nor

vehicles and persons may occupy. If anything enters this safety area, this constitutes a runway incursion.

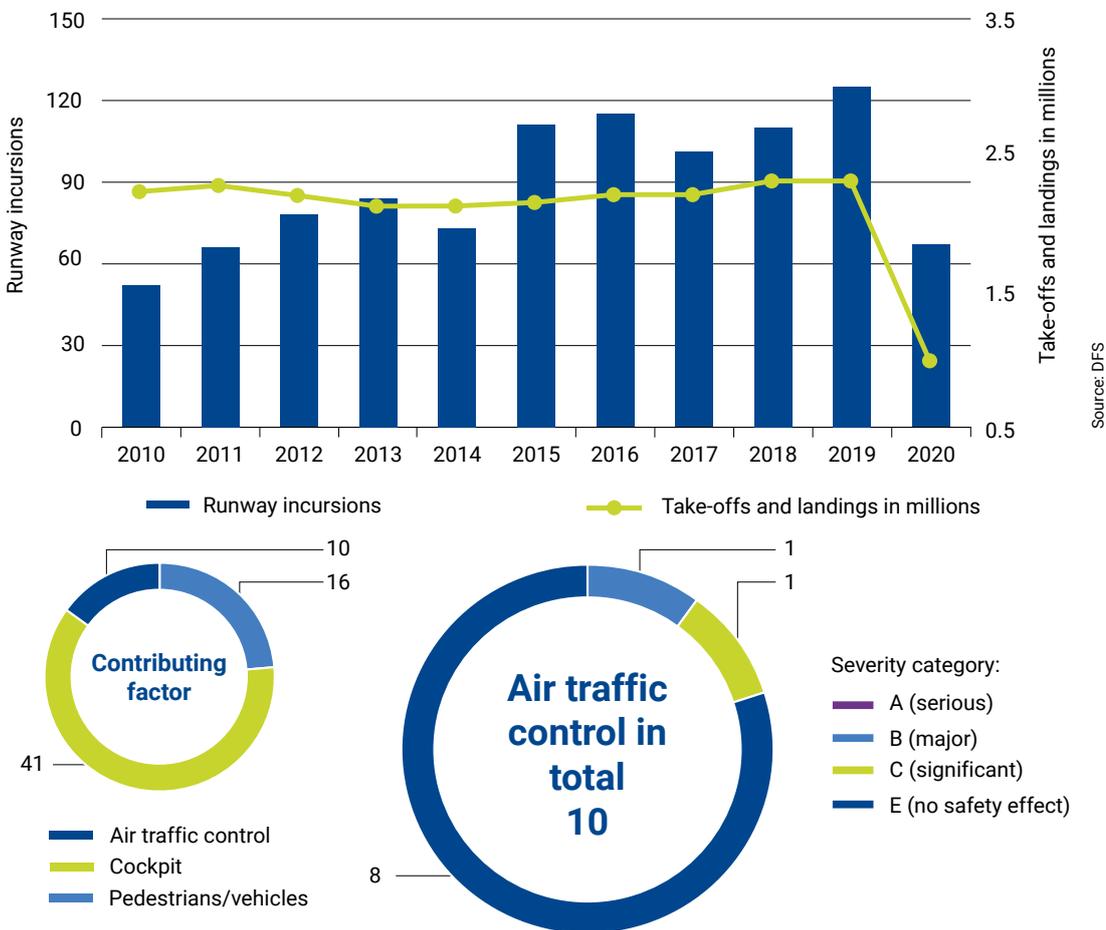
Just like the infringements of separation, runway incursions are also registered, investigated and classified into severity categories by DFS Safety Management. The RAT system,

which is standardised throughout Europe, is also used for this purpose.

The number of runway incursions also reflected the decline in traffic in 2020. With a total of approximately 881,000 take-offs and landings, DFS recorded 67 such incidents, which is 58 fewer than in the previous year. In 41 cases, cockpit crews were the contributing factor; 16 cases were due to pedestrians or vehicles. Of the ten runway incursions in which

air traffic control was the contributing factor, only one was classified as “major” and another as “significant”. The remaining cases were not safety-related. As in previous years, not a single case belonged to the “serious” category.

### Runway incursions



On the ground, too, minimum distances need to be maintained: In the protected area of a surface designated for the take-off and landing of aircraft, the presence of other aircraft, vehicles or people is not allowed. If it does happen, this is called a runway incursion. Every runway incursion is recorded and analysed. In 2020, there were 67 runway incursions, ten of which involved DFS. Only two cases were safety-related.

# Small aircraft, big trouble

In 2020, DFS logged fewer reports of interference caused by drones at airports in Germany than in previous years.

Based on current estimates, there are more than one million drones in Germany, the majority of which are in the hands of private users. The risk that their users – unknowingly or, in individual cases, even intentionally – will interfere with civil air traffic with their unmanned aircraft systems (UAS) is therefore high. If a pilot feels threatened by a drone or if tower controllers detect a drone in a danger zone, this is referred to as an interference.

Such incidents also occurred last year, despite a significant decrease in traffic volume. A total of 92 obstructions caused by drones were reported in German airspace in 2020 (2019: 125). Disruptions due to laser glare in German airspace amounted to 209 (2019: 362). The number of incidents has thus decreased – but not as much as air traffic as a whole.

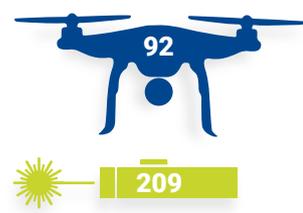
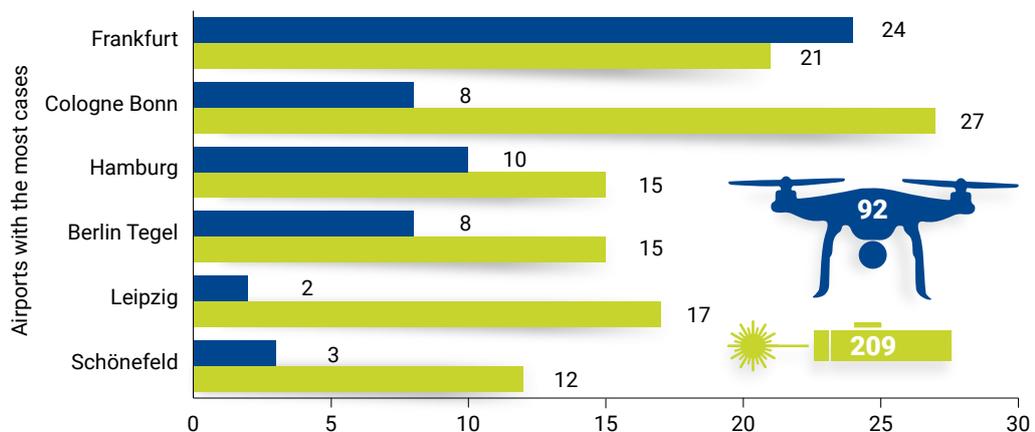
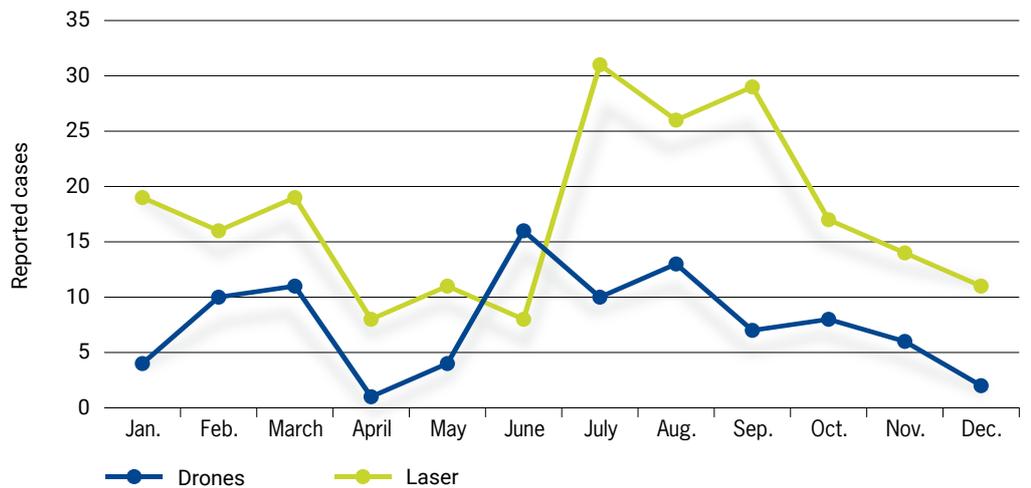


**209**

**CASES OF LASER GLARE**

were reported to DFS controllers in 2020. 92 cases – the number of obstructions caused by drones.

**Disruptions caused by drones and laser glare**



Despite the sharp decrease in the number of flights, the number of obstructions caused by drones and laser glare did not decrease at the same rate. Most disruptions were logged at Frankfurt Airport. Any obstruction caused by drones or laser pointers is reported to the relevant police authority.

Source: DFS



## Less traffic, improved punctuality

Less traffic means less congestion. The low volume of traffic in the skies over Europe significantly reduced the number of delays in 2020.

In recent years, the aviation industry had enjoyed steadily rising traffic volumes. This positive trend had a downside, however. As the number of flights increased, so too did the delays. Only a package of countermeasures and the joint effort of airlines, airport operators and air navigation service providers were able to break the trend in 2019. In 2020, we experi-

enced the flipside of this phenomenon. Now the massive drop in traffic is causing major problems for all partners, but at least they have one worry off their minds: Delays have decreased massively, too.

In 2020, just under 78 percent of all flights reached their destination on time, and more



**77.8**  
PERCENT

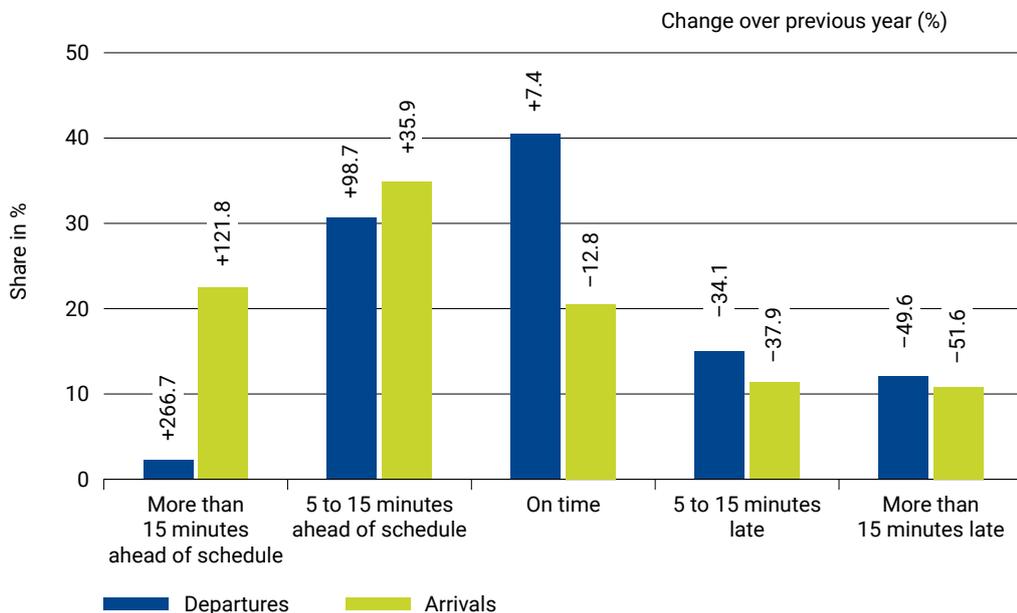
of all flights  
reached their  
destinations  
on time.

than half of all flights even arrived earlier than planned. The extent of each delay also almost halved within a year. On average, each flight had a delay of 7.4 minutes at take-off in 2020, which is 5.6 minutes fewer than in 2019. Of these, an average of 2.8 minutes was due to knock-on delays, i.e. delays that develop from previous delays.

The high proportion of security-related delays is striking. Their share of total delays increased at the European level from 3.5 percent in 2019 to 9.4 percent in 2020. The reason for this is presumably the complicated entry regulations and the prolonged clearance processes due to protective measures that have been in place in many places since the beginning of the COVID-19 pandemic.

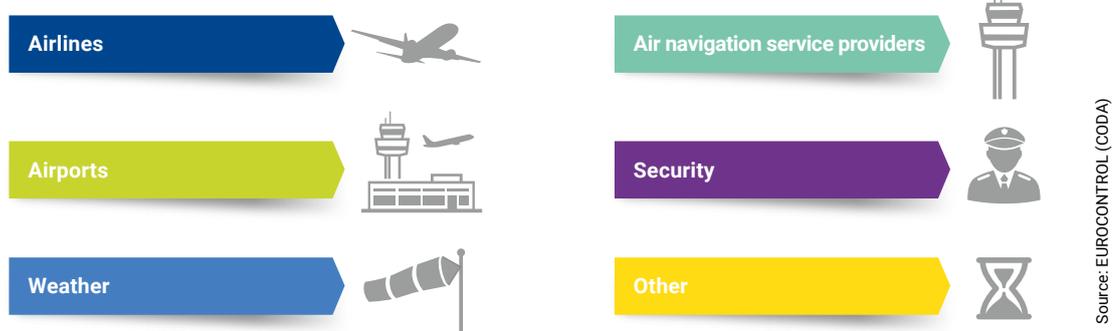
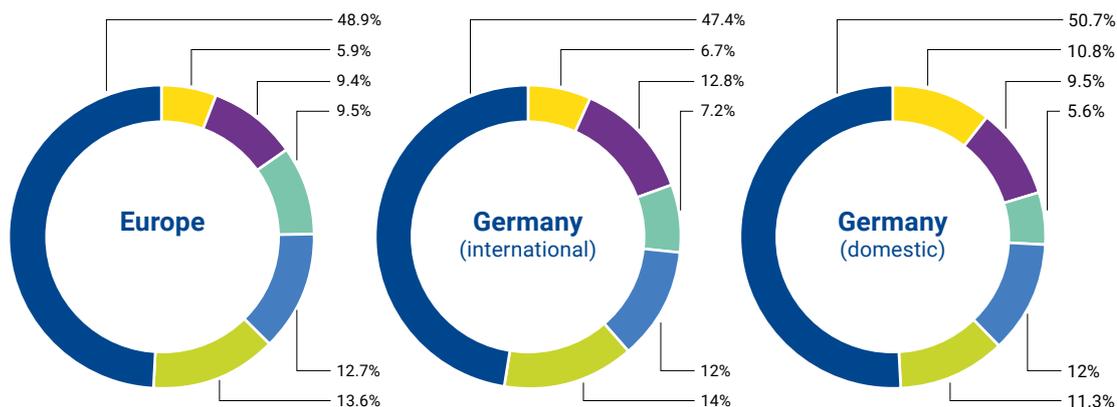
There are many reasons for delays in aviation. Weather, technical problems or problems with aircraft handling can upset the often tightly timed flight schedules. The main cause of delays in 2020 remained the airlines. Around half of all delays were attributed to them. This is the result of the analyses presented at regular intervals by EUROCONTROL's Central Office for Delay Analysis (CODA). The analyses are based on reports from pilots, who assign each delay to one or more causes.

## Punctuality in Europe



Due to the massive decline in traffic, delays played hardly a role in 2020. Three quarters of all flights arrived on time or even earlier than scheduled. Nevertheless, the year was not entirely without delay. For example, delays in handling caused take-offs and landings to be late.

## Causes of delays – departures



London Heathrow	
Airlines	65.4%
Airports	16.5%
En-route	1.7%
Other	2.5%
Security	7.0%
Weather	6.9%

Frankfurt	
Airlines	49.8%
Airports	19.0%
En-route	2.4%
Other	7.2%
Security	14.0%
Weather	7.6%

Istanbul Airport	
Airlines	52.8%
Airports	16.0%
En-route	1.3%
Other	2.5%
Security	6.7%
Weather	20.6%

Madrid Barajas	
Airlines	53.8%
Airports	16.7%
En-route	11.5%
Other	2.8%
Security	9.0%
Weather	6.2%

Paris Charles-de-Gaulle	
Airlines	57.1%
Airports	10.8%
En-route	6.5%
Other	2.2%
Security	21.7%
Weather	1.7%

Amsterdam	
Airlines	53.2%
Airports	26.4%
En-route	6.5%
Other	2.4%
Security	6.5%
Weather	5.0%



## More scope for new approaches

Protecting the environment and curbing noise pollution are important corporate objectives for DFS. The company used the drop in traffic during the pandemic to test new, environmentally friendly flight procedures.

DFS guides aircraft to their destinations safely and punctually. Its controllers select the most direct route feasible as this saves time and fuel. This is a challenge in the busy German airspace. Under normal conditions, with more than three million aircraft movements per year and up to 11,000 flights per day, it is simply impossible for every flight to reach its destination without deviating slightly from the shortest route. But 2020 was anything but normal, with traffic volumes falling by more than half.

This was also noticeable in the route efficiency, the comparison of the distance travelled with the direct route from point to point. In 2019, the average route deviation was only 1.2 percent. In 2020, this value declined even further. The actual distance flown deviated from the ideal route by just 0.9 percent, equivalent to around 2.9 kilometres. By way of comparison, Frankfurt Airport's western runway is four kilometres long.

Fuel-saving approaches could also be offered significantly more often than under normal circumstances thanks to the drop in traffic in 2020. But that is not all. DFS also used the low-traffic period to make targeted improvements that will pay off in the future. Together with airlines, air navigation service providers and airports, it has developed new, more environmentally friendly flight procedures.

### More direct routings

Like a motorway network, the airspace over Europe has a network of airways over which aircraft are routed in an orderly and expeditious manner. However, there are reasons why aircraft do not always reach their destination by the most direct route. These include restricted military areas or natural obstacles that must be flown around.

Together with the air navigation service providers from France, Belgium, Luxembourg, the Netherlands, Switzerland and the Maastricht Upper Area Control Centre (MUAC), DFS was able to take advantage of the low traffic volume in 2020 to remove some of these obstacles on a trial basis. In the course of a project on improving environmental performance for airspace users, military airspaces, among others, were made available for the flexible use by civil aircraft. Such civil-military cooperation has been the practice in Germany since DFS was founded in 1993. This is not necessarily the case in other countries.

The project also optimised the flight routes over the Alps. As a result, there were significantly fewer deviations from the ideal route in the airspaces of all partner organisations. Now, the partners want to try to introduce some of the trialled changes permanently as traffic numbers recover. For this project, DFS and its partners received the Air Traffic Management Award in the category Research, Innovation and Environment 2020.

### Less fuel, less noise

The aim of DFS is to reduce fuel consumption and the generation of carbon dioxide, on the one hand, as well as lower noise emissions, on the other. These two goals are not always easy to reconcile, because environmentally friendly routes are not automatically low-noise ones. Especially in the vicinity of an airport, it is often necessary to deviate from the shortest route in order to protect residents from aircraft noise as much as possible.

However, there are procedures that serve both climate and noise protection goals. This includes the EFP approach procedure, which DFS developed in spring 2020 together with Lufthansa in a record time of five weeks. Under this efficient flight profile (EFP) procedure, pilots are cleared for a continuous descent at their discretion up to 200 nautical miles from the airport, which means a continuous descent from the cruising level in upper airspace to the airport.

The aim of the approach procedure is to enable as continuous and trouble-free a descent as possible. This can reduce fuel consumption and carbon dioxide emissions and, near airports, noise. The more directly and steeply an aircraft descends, the less engine power is required. In addition, a steeper approach allows the aircraft to remain at cruising level for longer, which further reduces fuel consumption. According to its own figures, Lufthansa was able to save about 4,200 tonnes of jet fuel in this way from June to December 2020.

This was made possible through close consultation among the control centres whose airspace is crossed on the way, as well as with the pilots in the cockpit. Both DFS and Lufthansa aim to maintain this approach procedure as far as possible, even when traffic rebounds. It lowers costs for the airlines, reduces carbon dioxide emissions and makes a positive contribution to environmental protection.



2.9

**KILOMETRES**

is the average deviation from the most direct route per flight.

### Less noise for residents

Another project to avoid emissions, which entered the test phase at Frankfurt Airport in 2020, is known as segmented approach. This approach procedure has already been used for several years during the night hours to relieve noise for residents in densely populated cities such as Mainz, Offenbach and Hanau, which are located on the extended centreline of the runways. Now, in cooperation with Fraport, Frankfurt Airport’s operator, and Lufthansa, daytime operation is being tested.

In a conventional approach, aircraft descend along the extended centreline of the runway for about 40 kilometres before the touchdown zone. This final approach with the aid of the instrument landing system is a standardised procedure worldwide which delivers higher capacity, especially during busy periods. The segmented approach now means you can deviate from this straight line and guide aircraft along a much shorter and direct route to the runway. As this is a satellite-based

procedure, the specified approach route can be followed very precisely. This results in less dispersion, which has a positive effect on noise emissions.

The reduced traffic volume due to the COVID-19 pandemic now means the segmented approach could be tested in regular operations as well. Following the test phase, its feasibility will be analysed on the basis of the data collected as traffic volumes rise. DFS aims to continue offering the segmented approach during the day for approaches to Frankfurt Airport.

### En-route flight efficiency



Source: DFS

In order to minimise the impact on the environment and avoid delays, air traffic controllers guide aircraft as directly as possible to their destination. Due to the decline in traffic, this effort paid off particularly successfully in 2020. The average deviation from the ideal route was only 2.9 kilometres.



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