IN-DEPTH

Air traffic control delays in Europe

An overview of the economic consequences

December 2025

Air Traffic Flow Management (ATFM) delays in Europe have grown sharply over the past decade, far outpacing traffic growth. Financially, the impact is considerable. ATFM delays have cost airlines and passengers an estimated EUR 16.1 billion since 2015, of which over 70% is linked to capacity shortages and staffing issues. Moreover, the distribution of delays and costs is highly concentrated. A small number of ANSPs, particularly DSNA and DFS, account for more than half of the total impact. This concentration suggests that targeted improvements in a few key areas should be prioritized to deliver meaningful benefits.

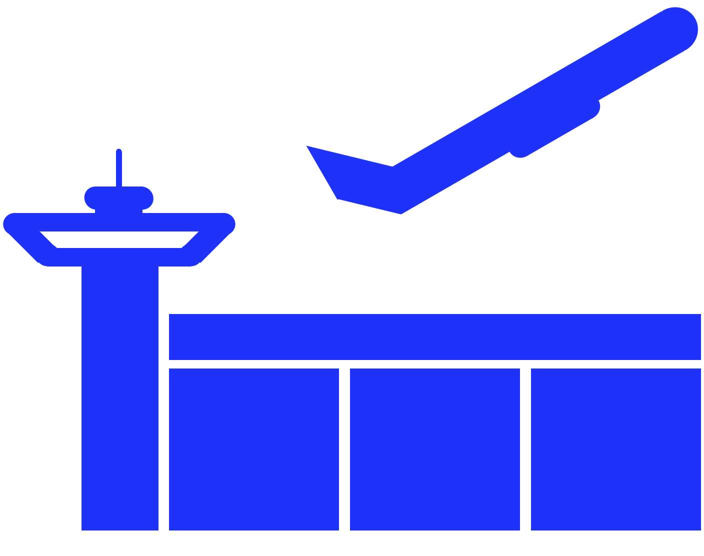

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Table 1 List of Acronyms

Acronym	
ACC	Area Control Centers
ANSP	Air Navigation Service Providers
ASMA	Arrival Sequencing and Metering
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATFM	Air Traffic Flow Management
CAGR	Compound annual growth rate
CRSTMPI	ATFM delay caused by a reason within control of the ANSP (C – ATC Capacity, R – ATC Routing, S – ATC Staffing, T – ATC Equipment, M – Airspace Management, P – Special Event, I – ATC Industrial Action)
IFR	Instrument Flight Rules
NBV	Net book value

Table 2 List of ANSPs

ANSP name	Country
ALBCONTROL	Albania
ANS CR	Czech Republic
ARMATS	Armenia
Austro Control	Austria
Avinor	Norway
AZANS	Azerbaijan
Belaeronavigatsia	Belarus
BHANSA	Bosnia & Herzegovina
BULATSA	Bulgaria
Croatia Control	Croatia
Cyprus DCA	Cyprus
DFS	Germany
DHMI	Türkiye

DSNA	France
EANS	Estonia
ENAIRE	Spain
ENAV	Italy
Fintraffic ANS	Finland
HASP	Greece
HungaroControl	Hungary
IAA	Ireland
ISAVIA	Iceland
LFV	Sweden
LGS	Latvia
LPS SR	Slovakia
LVNL	Netherlands
MATS	Malta
M-NAV	North Macedonia
MOLDATSA	Moldova
MUAC	MUAC
NATS	UK
NAV Portugal	Portugal
Naviair	Denmark
Oro Navigacija	Lithuania
PANSA	Poland
ROMATSA	Romania
SAKAERONAVIGATSIA	Georgia
Skeyes	Belgium
Skyguide	Switzerland
Slovenia Control	Slovenia
SMATSA	Serbia & Montenegro
UkSATSE	Ukraine

Table 3 ATFM Delay codes

Delay code[1]	Delay Cause	Considered in control of ANSP?
A	Accident/Incident	No
C	ATC Capacity	Yes
D	De-icing	No
E	Aerodrome Services Disruption	No
G	Aerodrome Capacity	No
I	Industrial Action (ATC)	Yes
M	Airspace Management	Yes
N	Industrial Action (non-ATC)	No
NA	Not regulated/Not specified	No
O	Other	No
P	Special Event	Yes
R	ATC Routing	Yes
S	ATC Staffing	Yes
T	Equipment (ATC)	Yes
V	Environmental Issues	No
W	Weather	No

[1] https://ansperformance.eu/reference/dataset/airport-arrival-atfm-delay/

Introduction

The aviation ecosystem is supported by a range of entities that work together to provide a safe, timely, and reliable service to the passengers. Air Traffic Control (ATC) is an essential part of the ecosystem and it plays a key role in ensuring that air transport remains not only the fastest but also the safest way to move people and goods around the globe.

ATC is a service provided to airlines, and airlines pay for each flight that traverses the airspace in question. Airlines, in turn, operate complex networks with often very short turnaround times between flights. It is in the airlines' self-interest to maximize aircraft utilization and manage their schedules as planned. Any deviations have a direct impact on passengers and can affect the airlines' profitability and reputation. Delays add costs related to managing passenger options, aircraft, and crews as disruptions ripple and cascade through the network.

Airlines in Europe[2] have been exposed to significant delays in recent years, many of which are caused by a range of factors within the control of Air Navigation Service Providers (ANSP). This document focuses on quantifying the magnitude of unplanned tactical delays caused by ATFM (Air Traffic Flow Management) and the associated costs.

The airspace within which commercial aviation operates is managed by Air Navigation Service Providers (ANSP), which operate Area Control Centers (ACC). Each ACC oversees an airspace that consists of a finite number of elementary sectors, and each sector is managed by one or two controllers, responsible for the sequencing and spacing of aircraft within that sector. Sectors have a defined capacity, typically measured in terms of occupancy count (the maximum number of aircraft occupying the sector at any given time) or entry count (the maximum number of aircraft entering the sector within a given time period). If the planned traffic is significantly lower than the capacity of the elementary sector, neighboring sectors can be combined to create a larger sector (with its own capacity metrics).

Sectors can also be combined because the ANSP does not have sufficient air traffic control officers (ATCOs) available on duty to manage all the available sectors. In other situations, traffic flows can exceed the capacity of all available elementary sectors. In such cases, aircraft have to be delayed to ensure that safety is preserved. Staffing and investment planning are closely linked to traffic forecasts for each airspace area. Importantly, geopolitical developments, such as the war in Ukraine, can displace entire traffic flows, resulting in a noticeable change in demand levels experienced by the specific ANSP and ACC concerned. It is also worth noting that a small amount of delay is acceptable, as a significant level of oversupply of capacity is not considered to be cost-effective.

Delays are caused by many actors and circumstances. In this paper, we focus on air traffic control-related delays, as captured through the ATFM delay reporting. Delays not caused by ANSP (such as weather) are excluded from the analysis. As such, only the following codes have been included: ATC Capacity (C), ATC Routing (R), ATC Staffing (S), ATC Equipment (T), Airspace Management (M), Special Event (P), and ATC Industrial Action (I). Collectively, we refer to these ANSP-controllable codes as CRSTMPI codes.

An unplanned delay incurred on the day of operation is classed as a tactical delay. There are also strategic delays, which involve adding a buffer to flight schedules to accommodate minor operational disruptions. While in the long term, operational disruptions cause airlines to add buffers to their flight schedules, in this paper, we focus on unplanned tactical delay costs caused by ATFM delays. Finally, we do not include in this study the costs caused by flight cancellations that have their origin in Industrial Action.

[2] Of which IATA has 144 members in continental Europe and 92 in the European Union.

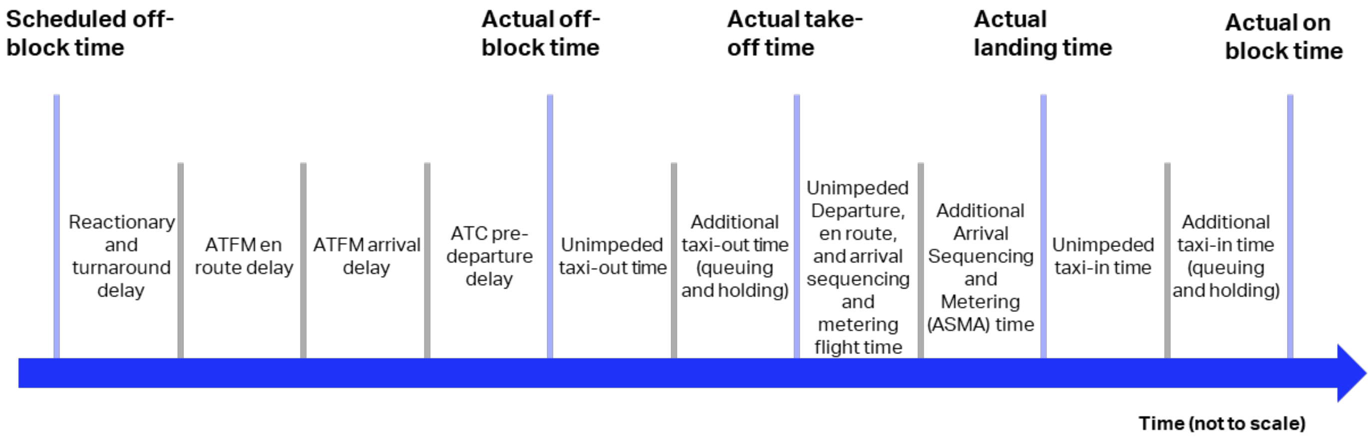
How delays have evolved

Types and causes of delay

Flight delays occur for a number of reasons and during different phases of flight: before takeoff, while taxiing, during the flight, or even after landing, when waiting for an arrival gate.

While nobody can control the weather, operational issues on the airline side can cause delays, such as aircraft shortages or groundings. At the airport, queues for check-in and security can disrupt boarding, and insufficient ground handling capacity can contribute to turnaround delays. Delays can also stem from air traffic control (ATC), and are reported in terms of total minutes incurred at various flight stages (Chart 1).

Chart 1: Flight progress and delay occurrence stages



Source: IATA Sustainability & Economics, adapted from Eurocontrol

Delay occurring while the aircraft is still on the stand:

- Reactionary and turnaround delay occur, e.g., when the aircraft arrives late from a previous flight, or when the loading of passengers or cargo takes longer than anticipated. Reactionary and turnaround delays affect the readiness of the flight for departure.

- Once the flight is ready for departure, but still on the stand, it must request a push-back clearance from ATC. Clearance is usually available immediately, but there are situations where the ATCO informs pilots that they must wait, and this tends to be for the following reasons:

    - There is congestion in the airspace, and the en-route ATCOs somewhere along the flight path do not have the capacity to accept the flight in question. In this case, an en-route ATFM delay is incurred.

    - Congestion at the destination airport, making it preferable that the flight is held on the stand, rather than in a holding pattern on arrival at the destination airport. In this case, an ATFM arrival delay is incurred.

    - There is congestion at the departure airport, and the flight must wait to allow other aircraft on the apron to clear the way. This is categorized as ATC pre-departure delay, which category can also include delay related to the availability of ground handling equipment (push-back).

Delay occurring after push back, but prior to take off:

- Once the aircraft is pushed back, it must taxi to the runway threshold, and this will take several minutes ("unimpeded taxi-out time"). On occasion, the aircraft will be required to hold at certain positions, for example, to make way for other aircraft or to wait for an ATC clearance. This delay is classed as "additional taxi-out time".

Delay occurring during flight:

- Upon departure, aircraft proceed to the destination in accordance with the filed flight plan. On occasion there may be some deviations, e.g., weather events or unforeseen airspace congestion.

- Delays during the flight phase tend to occur in the arrival phase, where aircraft can be asked to join a holding pattern and then be sequenced for the arrival at the airport. Such cases are mostly related to runway and apron capacity constraints.

Delay occurring after landing:

- As with the taxi out phase, upon landing the aircraft must taxi to the stand, and this of course will take several minutes ("unimpeded taxi-in time"). However, on occasion the aircraft will be required to hold, e.g. to wait for the stand to be vacant. This delay is classed as "additional taxi-in time".

The size of the problem

European overview

ATFM delays create costs for airlines and, importantly, their passengers. Over the years, the problem of such delays has grown in Europe. In 2015, the region saw 9.9 million flights and 14.2 million minutes of ATFM delay,[3] rising to 10.5 million flights in 2024 and 30.4 million minutes of delay. In other words, while traffic gained 6.7% over the period, ATFM delays swelled by 114%.

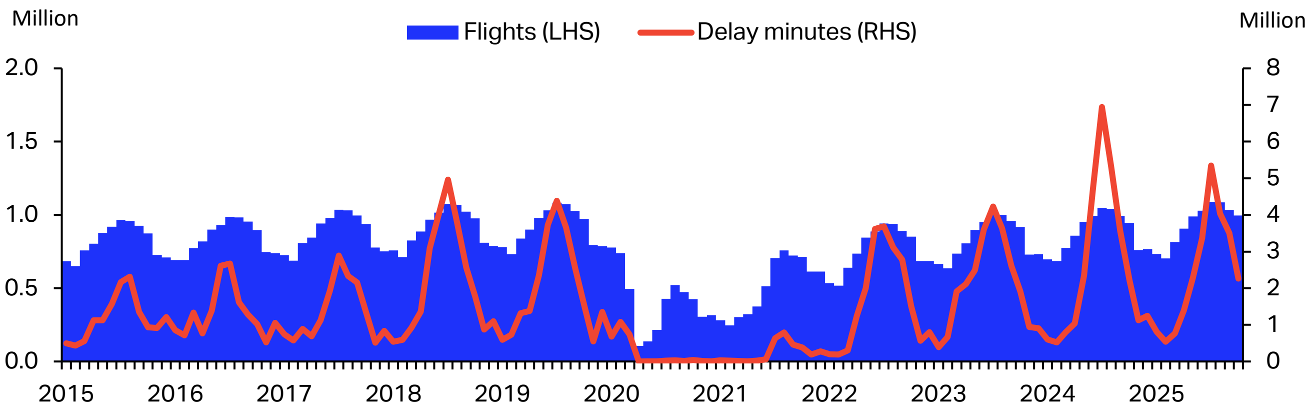
The seasonality of delays has become more pronounced (red line in Chart 2). European travel peaks in summer and so do ATFM delays. In 2024, 38.3% of all ATFM delays were incurred in July and August, up from 31.5% in 2015. This is greater than the share of annual flights in these two months at 19.9% in 2024 and 19.5% in 2015. The seasonal increase in delays suggests that ANSPs have struggled to provide sufficient airspace capacity at times when demand is highest.

Delays decreased somewhat in 2025 compared to 2024, largely thanks to improved staffing levels, enhanced coordination, additional network management measures, and better weather conditions. However, in the first 10 months of 2025, the overall ATFM delay recorded reached 24.3 million minutes, more than doubling 2015 delays of 12.1 million minutes during the same months, while traffic was only 11.1% higher.

Unsurprisingly, delays were the lowest in 2020 and 2021, when the pandemic resulted in traffic dropping to 45% and 56% of the 2019 level, respectively.

[3] En route and arrival ATFM delay, all causes

Chart 2: Monthly number of flights and ATFM delay minutes, January 2015 – October 2025

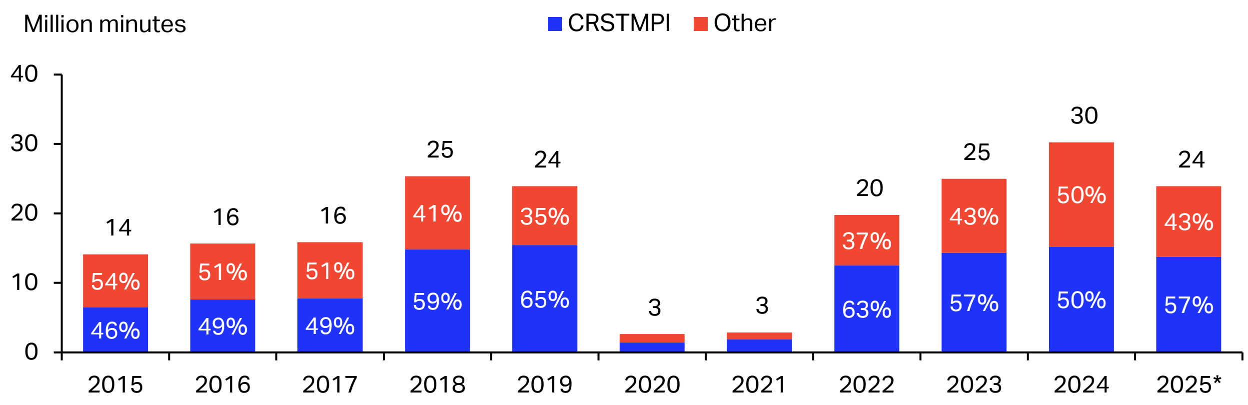


Source: IATA Sustainability and Economics, Eurocontrol
Note: Data represents Eurocontrol Member States Area

The causes and duration of delays

To address the issue of ATFM delays, we must dig deeper into its causes. ANSPs report the cause and the category of delay to Eurocontrol. If there are multiple causes, the event will be reported only under the dominant cause. That practice does affect the data, with some categories likely being over-reported and others under-reported. The yearly share of delay within the ANSP control (referred to as CRSTMPI delay) ranged between 46-65% between 2015 and 2025 (Chart 3).

Chart 3: ATFM delay minutes by type of delay, CRSTMPI versus Other, 2015 – October 2025

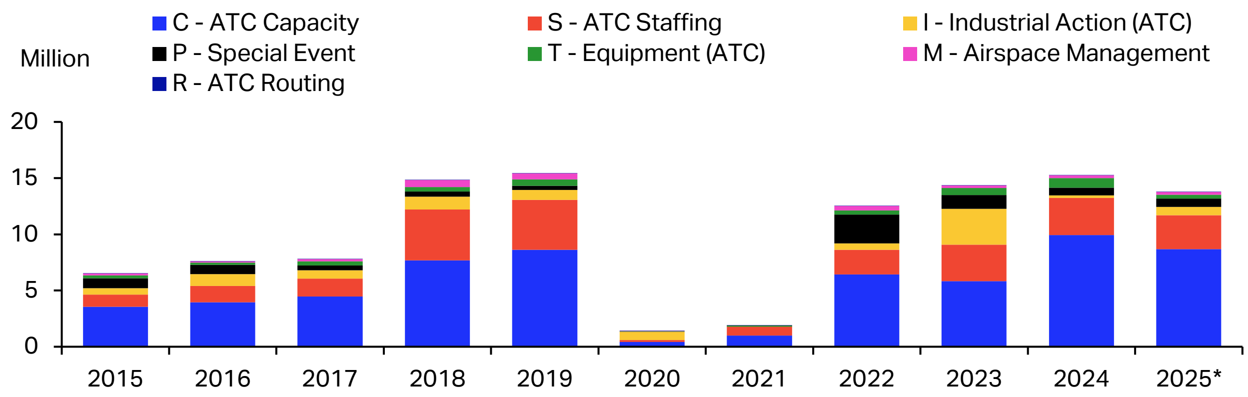


Source: IATA Sustainability and Economics, Eurocontrol
Note: Data represents Eurocontrol Member States Area excl. Oceanic ACCs. *2025 data includes Jan-Oct.

Of all ANSP-controllable delays, ATC staffing and capacity issues were the most prevalent causes, responsible for 87% of ANSP-controllable delays in 2024 (Chart 4). Capacity-related disruptions increased by 179.7% and staffing-related delays by 201.7% since 2015, during which period traffic grew by a mere 6.7%.

ATC Industrial Action and strikes have become more prevalent in recent years, accounting for 8.8% of overall ANSP-caused delays from 2015 to October 2025. As many as 9.8 million minutes' worth of delays were caused by ATC strikes over the decade.

Chart 4: Total CRSTMPI ATFM delay by regulation reason, 2015-October 2025



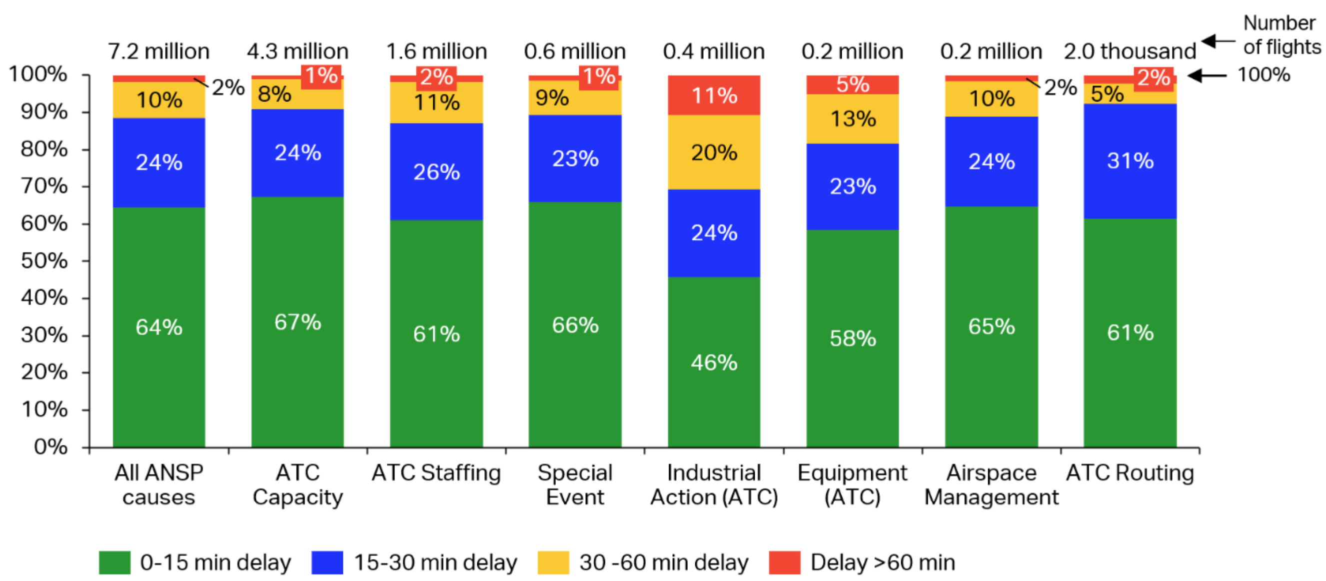
poSource: IATA Sustainability and Economics, Eurocontrol
Note: Data represents Eurocontrol Member States Area excl. Oceanic ACCs. *2025 data includes Jan-Oct

Across ANSP-induced causes, 64% of delays were within the 0 –15-minute range (Chart 6). In fact, across all causes, 46% to 67% of the delayed aircraft only saw a small disruption. This of course is a positive sign, as shorter delays are the easiest to recover from operationally and also have the lowest cost impact. ATC Industrial Action saw 46% delays in this category, while most such delays cause longer disruptions.

Delays of 15 – 30 minutes typically accounted for between 23% and 31% total disruption across all CRSPTMI causes.

Longer delays of 30 – 60 minutes and those exceeding 60 minutes were less frequent. ATC Industrial Action was the most disruptive, with 20% of such delays lasting 30 – 60 minutes and 11% exceeding an hour. ATC Equipment-related issues also stand out as these generated 13% of delays in the 30 – 60-minute range and 5% of those longer than 60 minutes. Clearly, technical failures tend to lead to longer-lasting disruptions than capacity or routing problems.

Chart 5: Number of delayed flights by delay cause, share of length of delay, 2015 – October 2025

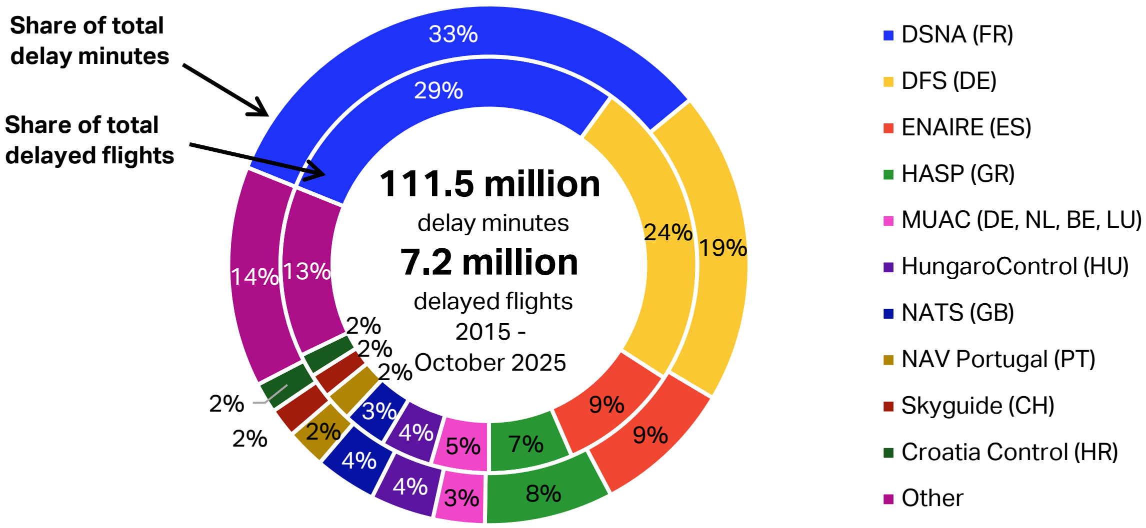


Source: IATA Sustainability and Economics, Eurocontrol.
Note: Data represents Eurocontrol Member States Area excl. Oceanic ACCs.

Share of delays by ANSP

A total of 7.2 million flights were delayed due to ANSP underperformance between 2015 and October 2025, impacting approximately 1.1 billion passengers[4]. These flights incurred over 111 million minutes of delay, of which 33% were caused by DSNA, the French ANSP. Germany's ANSP, DFS, originated the second-most delays at 19% of total minutes, and was responsible for 24% of all delayed flights over the period. DSNA and DFS alone were responsible for over 50% of total delays since 2015. Moreover, 10 of 39 ANSPs generated 87% of all delays, showing that European airspace capacity challenges are a major issue that is caused by a select few.

Chart 6: Share of total delayed minutes and total delayed flights by ANSP, CRSTMPI, 2015 to October 2025



Source: IATA Sustainability and Economics, Eurocontrol.
Note: Data represents Eurocontrol Member States Area excl. Oceanic ACCs.

[4] Assuming an average European load factor and aircraft size in 2024.

The cost of delay

Where do the costs come from?

It is unambiguously in the airlines' self-interest to avoid delays, if not out of concern for the passengers, then certainly for profit reasons, as every minute of delay adds to airlines' costs. Tactical disruptions can happen in any flight phase and the related costs vary significantly, depending on the length of delay, and whether it is incurred "at-gate", during taxi, en-route, or during arrival management. In general, delay costs are incurred through:

- Costs related to passengers and passenger care:
  - Time lost for passengers has a value. According to Eurocontrol, personal travel has a time value of money of EUR 22.34 per hour, while business travel EUR 54.56 per hour.[5]
  - Airline costs related to passenger care include rebooking in case of missed connections, hotel accommodation, food and beverage costs, and compensation.
  - Airlines' brand value can also be impaired if it becomes associated with frequent and significant delays. The airline can face a decline in demand if passengers switch to more punctual airlines.
- Fuel: operational disruption can result in increased fuel burn, in particular if delay is incurred in the en-route or arrival phases of flight.
- Maintenance: an extension of the operating time of the aircraft also has an impact on the maintenance requirements. While most maintenance costs are fixed per cycle, there is a variable portion, which relates to every marginal minute of operation.
- Crew: an extension of the block time has an impact on crew costs. Although not all delays will directly translate into crew pay, they will still have an impact on the available duty hours for remaining flights. This is particularly relevant in cases of long delays, where crews reach their duty-time limit and a relief crew is required to operate the remaining flight legs of the day.
- Reactionary: where the late arrival of the delayed aircraft results in delay of further flights, creating extra passenger and crew costs in the subsequent flight legs.

Generally, longer delays have higher per-minute delay costs than shorter delays, driven by passenger costs and reactionary delays.

ATFM delays result almost exclusively in at-gate delays. Since very little fuel is burnt at this stage of operations, tactical delay costs mainly include crew, maintenance and passenger costs. As such, at-gate delays tend to be the least costly.

Quantifying the cost

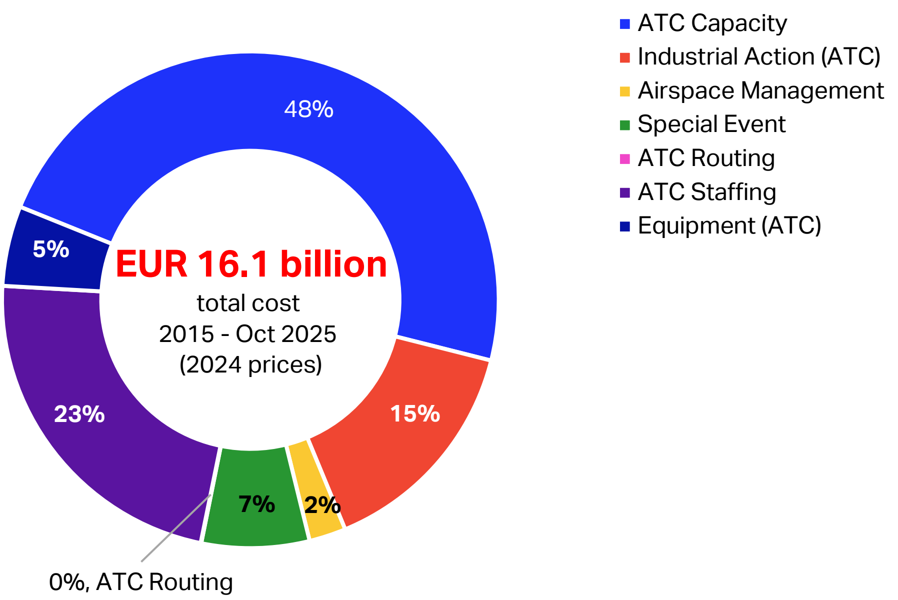
As discussed above, the costs that need to be taken into account when quantifying the overall impact of delays are the cost of the fleet, fuel, crew, maintenance, passenger care, and value of time.[6] Furthermore, the actual duration of the delay,[7] type, and point of origin will also impact the costs.

[5] https://ansperformance.eu/economics/cba/standard-inputs/latest/chapters/passenger_value_of_time.html
[6] For more information on the analytical approach please see the annex
[7] The work accounts for the fact that longer delay results in non-linearly higher costs

ANSP service provision issues have resulted in EUR 16.1 billion in passenger and airline costs over the period 2015-October 2025 (in 2024 prices). Nearly half, 48%, of the cost of delay is attributed to ATC capacity[8] shortages, followed by 23% related to staffing shortages (Chart 7). Disruptions that are generated by ATC Industrial Action represented 15% of the total cost across the period, at EUR 2.4 billion, although such action only made up 8.8% of total delay minutes. This higher cost is explained by the longer average duration of 27.5 minutes, compared to an overall average delay of 15.4 minutes over the past decade.

Of the EUR 16.1 billion delay costs, EUR 9.7 billion were costs to the airlines, while the remaining EUR 6.4 billion related to the value of passengers' lost time.

Chart 7: Total ANSP-caused cost of delay, 2015 to October 2025, in 2024 prices

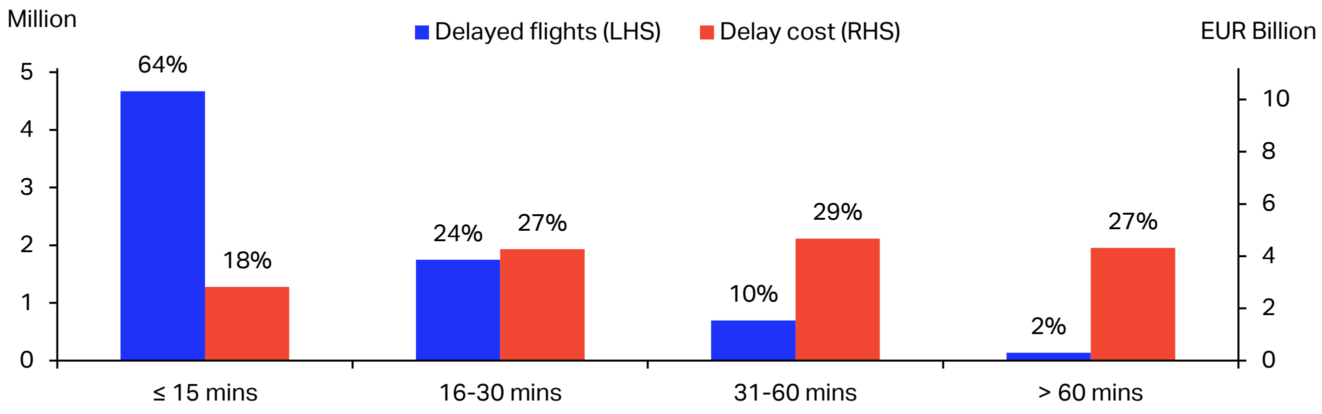


Source: IATA Sustainability and Economics.
Note: Data represents Eurocontrol Member States Area excl. Oceanic ACCs.

A total of 4.7 million flights, equal to 64% of all delayed flights between 2015 and October 2025, were delayed by 15 minutes or less, generating 18% and EUR 2.8 million of the total costs of delay (Chart 8). At the other end of the spectrum, we find 2% of all delayed flights in the over-60 minutes category, making up as much as 27% of the total costs of delay.

[8] Please note that "Airspace Capacity" delays may also be incurred when the ANSP does not have a sufficient pool of controllers to open the required number of sectors. The "Staffing" code is normally used when there are short-term staffing shortages, for example, due to sickness.

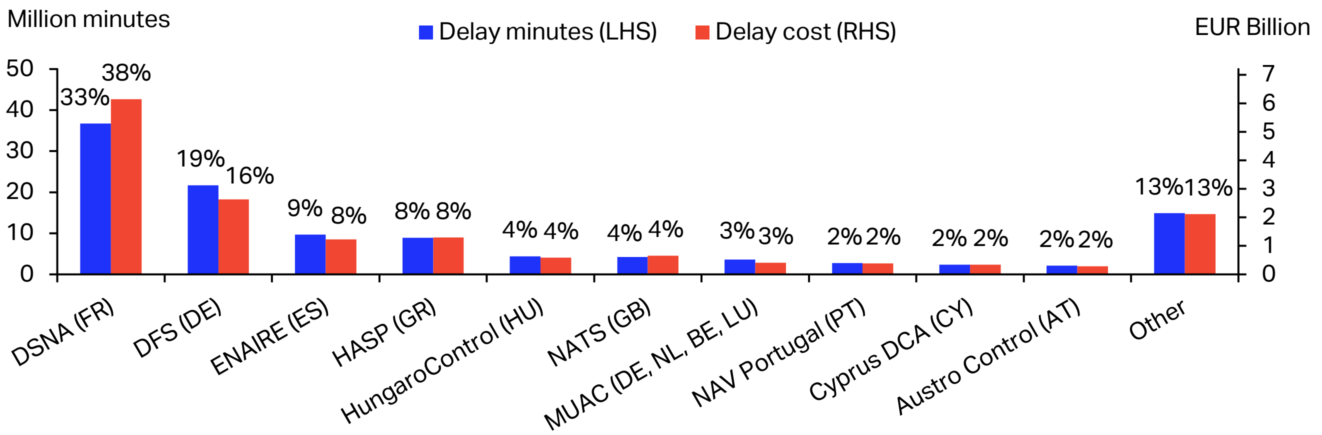
Chart 8: Distribution of delayed flights and associated costs by delay duration, % share, 2015- October 2025



Source: IATA Sustainability and Economics, Eurocontrol.
Note: Data represents Eurocontrol Member States Area excl. Oceanic ACCs.

The French ANSP accounted for 33% of delay minutes but a disproportionately higher 38% of delay costs across Europe. The German ANSP, on the other hand, caused 19% of the delay minutes but only 16% of the costs, indicating that they generated delays of shorter duration. A more detailed look at selected performance and operational indicators is presented in the subsequent section. Ten ANSPs accounted for 87% (over EUR 14.0 billion) of all delay costs during this period.

Chart 9: ANSPs with the highest total CRSTMPI ATFM delay and costs, % share, 2015-October 2025

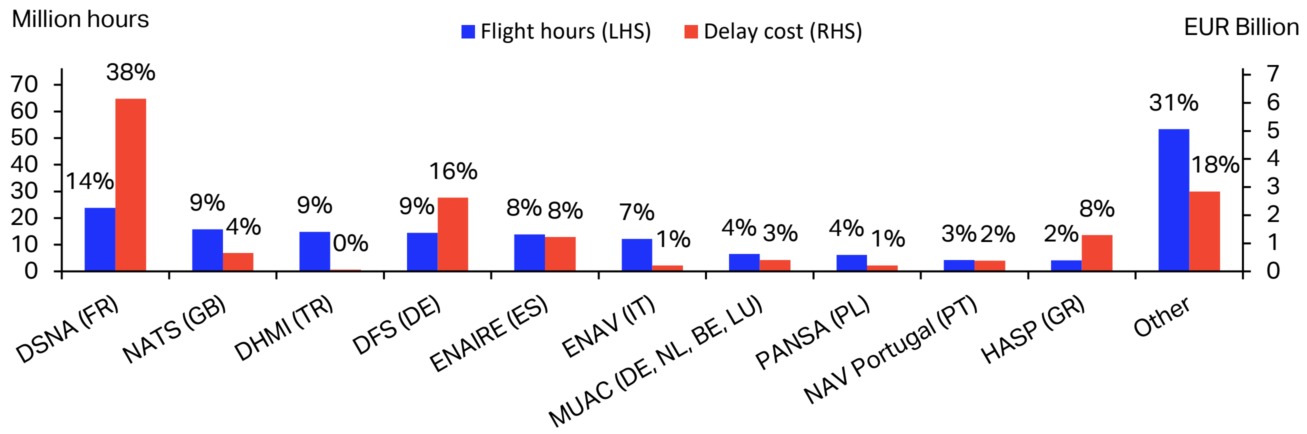


Source: Eurocontrol
Note: Data represents Eurocontrol Member States Area excl. Oceanic ACCs.

Of course, many of the ANSP that frequently cause delays are those controlling large and busy airspaces. Nevertheless, ANSPs such as NATS, DHMI and ENAV, all controlled a significantly higher share of flight hours than their share of delay costs (Chart 10).

The most constraining large ANSP is DSNA, which controls 14% of total flight hours while incurring as much as 38% of delay costs. DFS also causes disproportionately high delay costs, at 16%, compared to its 9% share of flight hours.

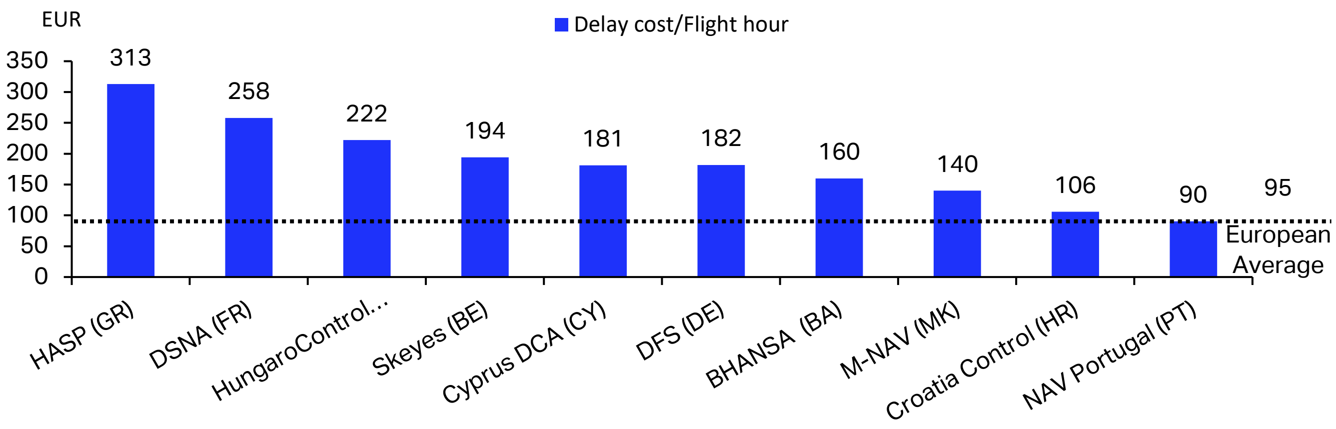
Chart 10: ANSPs with the highest total controlled flight hours and caused delay costs, % of total, 2015-October 2025



Source: IATA Sustainability and Economics, Eurocontrol
Note: Data represents Eurocontrol Member States Area excl. Oceanic ACCs.

Looking at the ratio between delay costs and the total controlled flight hours puts HASP (the Greek ANSP) in the lead with EUR 313 of caused delay costs per controlled flight hour, followed by DSNA at EUR 258 and HungaroControl at EUR 222 (Chart 11). While the European average was around EUR 95 delay costs per flight hour, there were also 15 ANSPs with a ratio lower than EUR 10.[9]

Chart 11: The 10 ANSPs with the highest delay costs per controlled flight hour, 2015-October 2025



Source: IATA Sustainability and Economics, Eurocontrol
Note: Data represents Eurocontrol Member States Area excl. Oceanic ACCs.

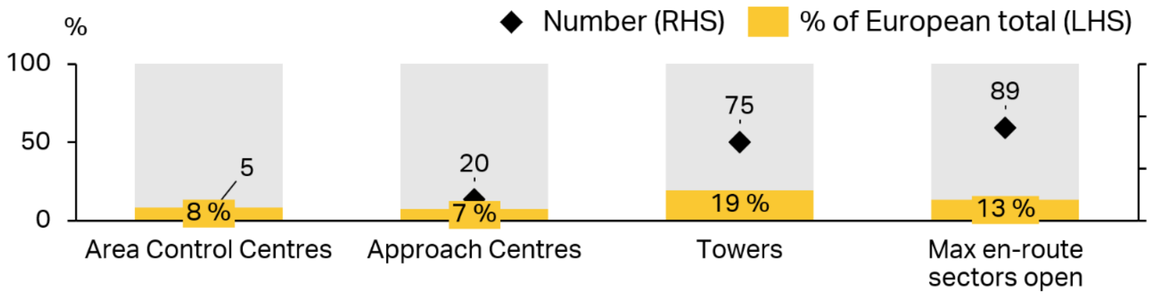
[9] Please note that this is an average cost of flight delay per all flight hours flown, also those which were not delayed. This is not a representation of average cost per hour or minute of delay.

Spotlight: ANSPs generating the most delays

DSNA (France)

100% government owned

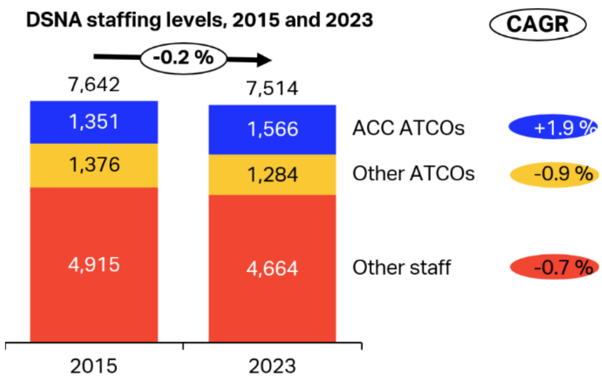
OPERATIONAL OVERVIEW

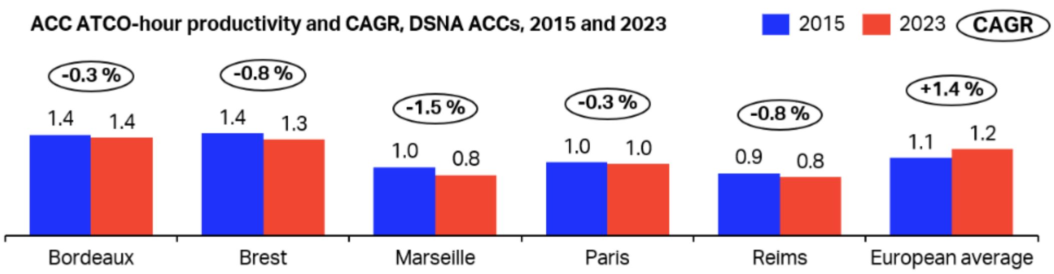


STAFFING METRICS

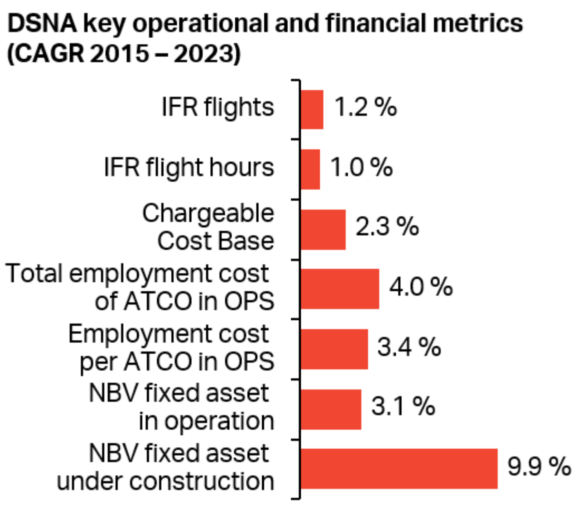
Key insights:

- ACC ATCO staffing increased 16% over the period, equivalent to a 1.9% CAGR.
- Total staff decreased slightly (-2%), suggesting overall workforce optimization).
- In the equivalent period total IFR flights increased by 10% (1.2% CAGR) and total IFR flight hours by 9% (1.0%)
- As a result, ATCO hour productivity declined in all ACCs.
- The organization maintains roughly 14–16% of Europe's total in these categories.





FINANCIAL & COST METRICS



Key insights:

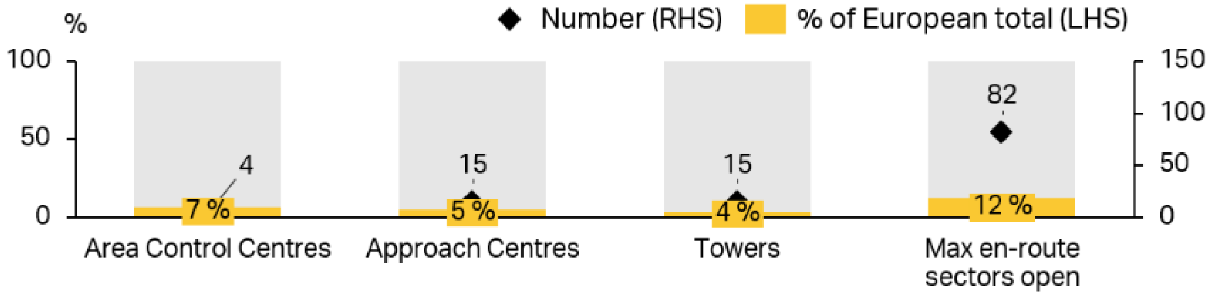
- DSNA is currently heavily investing into its infrastructure – NBV of assets under construction increased from EUR 180 million in 2015 to EUR 363 million in 2023 (112% total increase)
- Assets in operations increased from EUR 594 million in 2015 to EUR 761 million in 2023 (28% increase)
- Employment cost per ATCO in OPS increased by 31% between 2015 and 2023, at a CAGR of 3.4%
- The unit rate charged remained stable, at EUR 70 in 2015 and EUR 71 in 2024. The increase in cost was absorbed by an increase in traffic flow.
- DSNA generated EUR 6.1 billion in cost of delay to passengers and airlines between 2015 and October 2025.

Source: IATA Sustainability and Economics, Eurocontrol.

DFS (Germany)

LLC 100% government owned

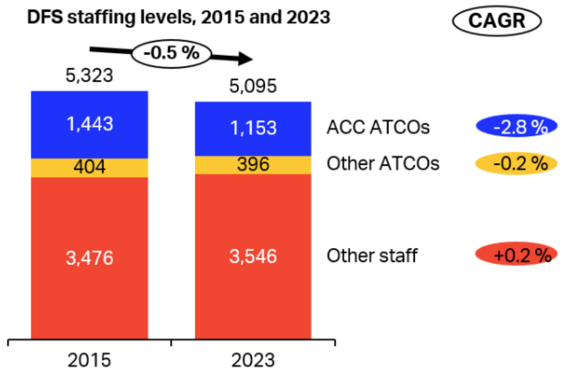
OPERATIONAL OVERVIEW

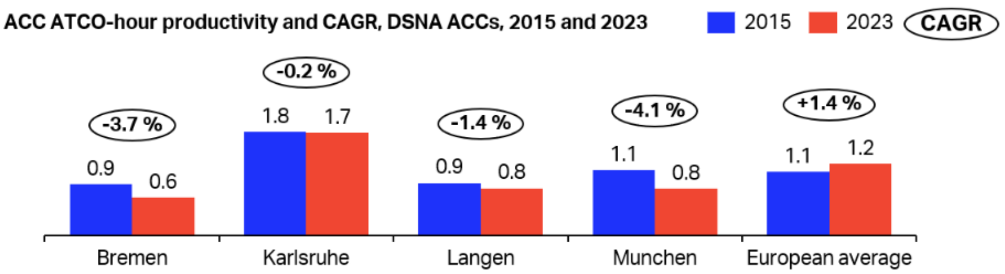


STAFFING METRICS

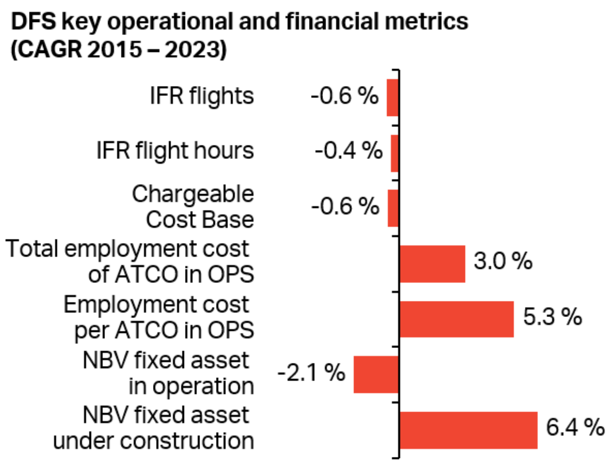
Key insights:

- ACC ATCO staffing decreased by 16% over the period, equivalent to a -2.8% CAGR.
- In contrast, non-ATCO staff numbers increased by 0.2% CAGR.
- In the equivalent period total IFR flights decreased by 5% (-0.6% CAGR) and total IFR flight hours by 3% (-0.4%)
- ATCO flight hour productivity declined across all ACCs. This is because despite a 20% drop in ACC ATCO numbers, a 4% decline in ACC flight hours controlled, ATCO hours on duty have increased by an incredible 8%. This means that not only has productivity dropped, but it has also been achieved through high levels of overtime.





FINANCIAL & COST METRICS



Key insights:

- As DFS traffic fell over the period, so did the chargeable cost base.
- What is particularly surprising is the CAGR increase in employment cost per ATCO in ops, an average 5.3% from EUR 209 thousand in 2015 to EUR 316 thousand in 2023. This over 51% total increase is likely a sign of a high operational reliance on controller overtime.
- DFS NBV of assets under construction is relatively low, at EUR 12 million in 2023.
- Assets in operations decreased from EUR 744 million in 2015 to EUR 627 million in 2023 (16% decrease).
- DFS generated EUR 2.6 billion in cost of delay to passengers and airlines between 2015 and October 2025.

Source: IATA Sustainability and Economics, Eurocontrol.

Conclusion

ATFM delays in Europe have grown significantly over the past decade, creating operational challenges and substantial costs for airlines and passengers. A total of 7.2 million flights were delayed due to ANSP-caused delays, impacting approximately 1.1 billion passengers between 2014 and October 2025. While traffic increased by only 6.7% between 2015 and 2024, ATFM delays rose by 114%, indicating that the issue stems primarily from structural constraints rather than demand alone. Seasonal peaks, particularly in July and August, have become more pronounced, suggesting that airspace capacity provision has not kept pace with periods of high demand. Although 2025 saw some improvement thanks to better staffing, coordination, and favorable weather, delays remain well above historical levels, pointing to the need for corrective actions.

The main drivers of delays are clear: ATC capacity limitations and staffing shortages account for the majority of ANSP-controllable delays, while ATC Industrial Action has a disproportionate impact due to its longer duration and higher associated costs. Technical failures, while less common, also tend to cause extended disruptions.

Financially, the impact is considerable. ATFM delays have cost airlines and passengers an estimated EUR 16.1 billion since 2015, of which over 70% is linked to capacity shortages and staffing issues. ATC Industrial Action accounts for 15% of total costs, although its share of delays is limited to 8.8%. Moreover, the distribution of delays and costs is highly concentrated. A small number of ANSPs, particularly DSNA and DFS, account for more than half of the total impact. This concentration suggests that targeted improvements in a few key areas could deliver meaningful benefits.

Looking ahead, addressing ATFM delays will require a balanced and collaborative approach. Investments in ATC capacity and workforce resilience remain essential, alongside modernization of infrastructure to reduce technical vulnerabilities. Delivering on the investment and staffing levels agreed to during airspace user charges consultation processes remains vital. Enhanced cross-border coordination and dynamic capacity management could help mitigate seasonal peaks, while constructive social dialogue and contingency planning are key to minimizing the impact of ATC Industrial Action.

Appendix: Methodology

- The cost quantification is anchored in the research undertaken by the University of Westminster, which is the most comprehensive study on the topic in the literature.
- The University of Westminster captures delay costs by aircraft type (15 aircraft, including narrowbodies, widebodies, regional jets and turboprops) and delay duration intervals (9 duration intervals from 5 to 300 minutes). Cost components include costs of fleet, fuel, crew, maintenance and passenger (soft and hard) costs. Low, base and high scenarios are explored. The above analysis uses the base scenario. Total delay costs per delay are capped at 5h or 300 minutes of delay.
- The assessment also accounts for the current ratios of movements, depending on aircraft type. Based on OAG data for departures in Europe, the share of these four categories has been calculated: Narrowbodies (75%), Widebodies (7%), Regional Jets (10%), Regional Turboprops (8%).
- Delay costs and aircraft type share data have been combined to provide a single representative weighted average of costs across delay intervals.
- In this analysis, the University of Westminster cost estimates are brought to a 2024 cost base using Eurostat's Harmonised Index of Consumer Prices (HICP)
- Building on the delay duration interval work undertaken by the University of Westminster, this assessment uses a different average per-minute delay cost for the following intervals: 0 to 15 minutes, 15 to 30 minutes delay, 30 to 60 minutes delay, and delay of above 60 minutes.
- Information on volume of delay and number of delay flights is sourced and calculated based on data from Eurocontrol.
- In addition to airline costs, the assessment includes passenger value of time cost calculations.
- The scope of the assessment covers Eurocontrol Member States, en-route and arrival ATFM delay for years 2015 to October 2025. Oceanic operations are excluded.