Performance Review Board Monitoring Report 2024

The monitoring is complemented by a Digital dashboard, including a detailed analysis per Member State.

October 2025

REMARKS FROM THE CHAIR

The annual monitoring report for 2024 comes at a time when the Performance Review Board, appointed by the Commission in September 2025, is beginning the mandate. I would like to welcome my colleagues within the Board and extend my thanks to the previous Performance Review Body for its extensive contribution to the field of air traffic management performance over the last eight years.

The new arrangement sees the group of experts become a board. Naturally, the ways of working will change compared to the previous eight years and I look forward to working with my fellow PRB colleagues and the European Commission to define our working arrangements under the SES II+ legislation. We will publish further information about this in the coming months, but one of our guiding principles is to work closely with stakeholders, particularly our colleagues at National Supervisory Authorities, on performance of the industry.

During this time of transition, this version of the report was developed by the PRB secretariat and provides the findings of the performance in 2024 but does not yet provide conclusions and recommendations. The PRB and I will draw them in the coming weeks and publish an update later in 2025. However, it remains important to highlight several of the key performance outcomes observed in 2024:

- Traffic increased in 2024, approaching the levels seen in 2019 before the COVID-19 pandemic. Many Member States see traffic levels significantly above pre-pandemic levels, whereas some (those mainly proximate to Ukraine and Russia) remain below.
- Nine ANSPs did not achieve the RP3 targets for the effectiveness of safety management, moreover rates of runway incursions and separation minima infringements increased.
- The geopolitical situations in Ukraine and the Middle East and the high levels of delay continue to impact on environmental performance, with en route flight efficiency remaining well in excess of the Union-wide targets.
- The high levels of delay observed in 2022 and 2023 further increased in 2024 to over two minutes per flight. These delays are driven by a lack of capacity in some Member States with air navigation service providers struggling to recruit sufficient numbers of air traffic controllers to meet demand. Capacity shortfalls need to be addressed to reduce the costs of delay incurred by airspace users and to drive performance to achieve the Union-wide targets.
- Cost-efficiency targets have been met also in 2024. As for the previous years, 2024 was also characterised by a significantly higher actual inflation than planned, leading to substantial inflation adjustments being charged to airspace users.

2024 is the final year of RP3. The first monitoring report for RP4, to be published in September next year, will monitor performance of the new indicators included within the Regulation and under the performance plans approved. There remain several Member States with performance plans currently under revision, and the PRB looks forward to working with the Commission and NSAs to ensure robust plans are in place at the earliest opportunity.

On behalf of all the PRB members, I would like to thank the PRB secretariat for its invaluable help in preparing this report. I would also like to thank our colleagues from European Aviation Safety Agency (EASA) and from EUROCONTROL, namely the Aviation Transformation Directorate and its Aviation intelligence Unit as well as the Network Management Directorate for their contributions.

PRB Chair

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1 INTRODUCTION

1 The PRB Annual Monitoring Report 2024 analyses the performance of the air navigation services of the Single European Sky (SES) in 2024 against targets which were revised following the COVID-19 pandemic and the related traffic restrictions that heavily impacted European and global aviation. 2024 was the fifth and last year of the third reference period (RP3).

2 For this version of the monitoring report, the Safety annex (i.e. previous Annex I) and the investments report (i.e. previous Annex II) are now presented within the digital dashboard. The web-based dashboard is now including the full granularity of the data. The dashboard can be accessed at http://www.sesperformance.eu.

3 This monitoring report is complemented by the updated report on the traffic light system, which compares the environmental performance of Member States to previous years using the performance metrics included in the Regulation.

4 For the Annual Monitoring Report 2024, the PRB used data provided and verified by the Member States, the Performance Review Unit of Eurocontrol (PRU), the Network Manager (NM), and the European Union Aviation Safety Agency (EASA).

5 This version of the report was developed by the PRB secretariat and does not include the executive summary, and the conclusions and recommendations. The Performance Review Board will publish them later in 2025.

2 TRAFFIC SITUATION IN 2024

- IFR movements in 2024 were lower than both the STATFOR October 2021 base forecast and the 2019 actual values (-3.9% and -4.0% respectively).
- En route service units in 2024 were +1.9% higher than the determined service units, and +5.5% above the 2019 actual values.
- Service units are increasing at a higher rate than IFR traffic.

2.1 IFR movements

6 A total of 9.6 million IFR movements were managed within the SES airspace in 2024. This represents an increase of +5.2% compared to 2023, reaching 96% of the levels of 2019.

7 The STATFOR October 2021 base forecast envisaged 10 million IFR movements in 2024.[1] While traffic grew compared to 2023, ANSPs managed -3.9% fewer movements than forecasted for the year 2024 (Figure 1).

8 IFR movements grew faster in the first half of the reference period (+23% in 2021 and +52% in 2022) as post-COVID-19 rebounds, while such growth slowed down in 2023 (+9.3%), and 2024 (+5.2%). Despite this, IFR moments at the end of RP3 are still -4.0% lower than 2019 levels. The actual traffic confirms that the STATFOR October 2021 base forecast was accurate: At Union-wide level, the actual flights have been close to the base forecast in 2022, 2023 and 2024, although at slightly lower levels.

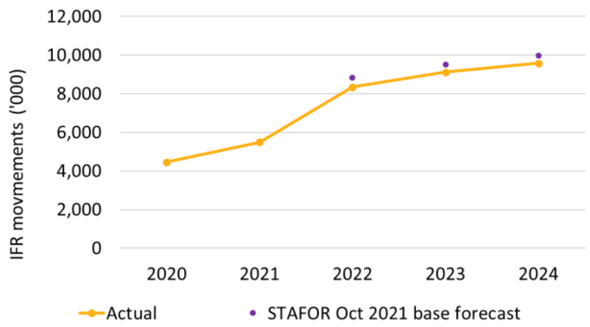

Figure 1 – Actual Union-wide IFR movements compared to the STATFOR October 2021 forecast (source: PRB elaboration on STATFOR forecast).

2.2 Service units

9 Service units are a measure of traffic calculated using the maximum take-off weight and distance flown by aircraft and form the basis for air navigation charges.

10 In 2024, 132 million en route service units were recorded, an increase of +7.5% compared to 2023. In 2019, prior to the pandemic, 125 million were recorded, meaning that the en route service units in 2024 reached 106% of the 2019 level.

11 At Union-wide level, the en route actual service units were +1.8 higher than the determined service units (129 million service units) in 2024 (Figure 2). Actual service units have also been higher than planned in 2022 (+3.8%), and 2023 (+1.2%).

12 Service units grew faster in the first half of the reference period (+27% in 2021, and +62% in 2022), while the growth slowed down in 2023 (+13%), and 2024 (+7.5%). Contrarily to IFR movements, service units at the end of RP3 exceed 2019 amounts (+5.5%).

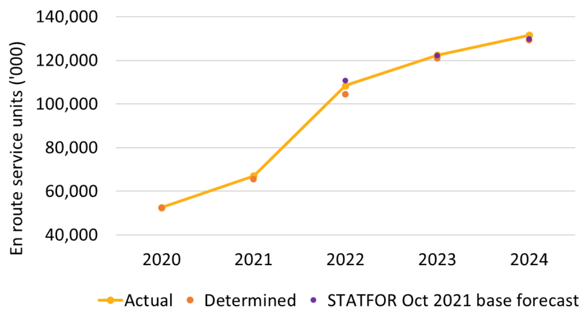

Figure 2 – Actual Union-wide en route service units compared to the STATFOR October 2021 forecast (source: PRB elaboration on STATFOR forecast).

[1] The final STATFOR forecast prior to the start of 2022 and the most used forecast within the performance plans.

3 SAFETY

- 27 ANSPs achieved the EoSM targets on all Management Objectives for RP3 in 2024.
- Nine ANSPs have not achieved the target for RP3.
- Both runway incursions and separation minima infringements rates increased in 2024, with separation infringements peaking at their highest level during the RP3 period.
- Only 12 ANSPs reported using some form of automated safety data recording systems for occurrences.

3.1 Effectiveness of safety management

13 Safety is monitored through one key performance indicator (KPI): The effectiveness of safety management (EoSM) of the ANSPs.[2] The EoSM key performance indicator is composed of the following safety Management Objectives (MOs):

- Safety policy and objectives;
- Safety risk management;
- Safety assurance;
- Safety promotion; and
- Safety culture.

14 The EoSM for ANSPs is based on a set of 28 questions to determine the minimum level of maturity for each Management Objective. The answers are provided by the ANSPs and verified by the NSAs. For each objective, the maturity level achieved is determined by the lowest maturity level of any question allocated to a Management Objective. In addition to the minimum level achieved for a Management Objective, an EoSM score is calculated.[3]

15 The applicable EoSM targets are defined for the end of the reference period (2024) with intermediate levels for each year of RP3. In 2024, 27 out of 36 ANSPs achieved the RP3 targets reaching a minimum of maturity level D in safety risk management and a minimum of maturity level C in all other Management Objectives. Figure 3 shows the aggregated results at Union-wide level.

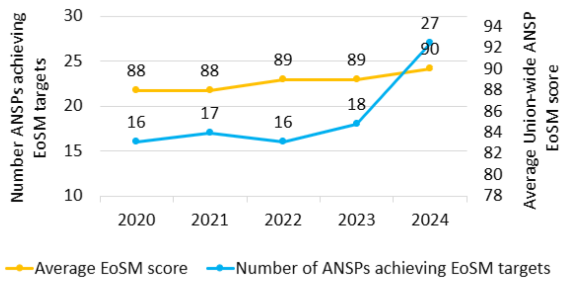

Figure 3 – Number of ANSPs achieving their targets during the RP3 along with their EoSM score (source: PRB elaboration).

16 Between 2023 and 2024, ten ANSPs improved their minimum maturity level for at least one Management Objective, thereby achieving the RP3 targets. These ANSPs are Airnav Ireland, Austro Control, Croatia Control, Fintraffic, NAV Portugal, PL Bydgoszcz, ROMATSA, Slovenia Control, ACR, and AFAB. Among the nine ANSPs that did not achieve the RP3 target: Two ANSPs (ANA LUX and DSNA) showed improvement in at least one Management Objective; three ANSPs (HASP, NAVIAIR, and Skyguide) recorded no change in their performance; and four ANSPs (Avinor, DCAC Cyprus, MUAC, and skeyes) experienced a decline in performance compared to 2023.

17 According to the performance plans, all 36 ANSPs had planned to reach the RP3 targets in 2024. However, nine ANSPs were unable to achieve these targets. Specifically, 15 ANSPs aimed to meet the target in the Safety Risk Management area during the final year of RP3; however, only nine succeeded in doing so (Figure 4, next page). For the other Management Objectives, only minor improvements were observed, with just one additional ANSP reaching the target Level C. Five ANSPs (Avinor, DCAC Cyprus, DSNA, MUAC, and

[2] The PRB monitors 36 ANSPs. This number includes 28 main en route ANSPs plus MUAC, SKYWAY, ANA Lux, three further Swedish ANSPs, and two further Polish ANSPs.

[3] Each of the 28 questions in the EoSM questionnaire can score from one (level A) up to four (level D). The sum of the scores is then normalised between 0 and 100 (maximum). The score gives an indication of how many areas (questions) the ANSPs need to improve.

skeyes) remain below the target, recording level B in at least one Management Objective.

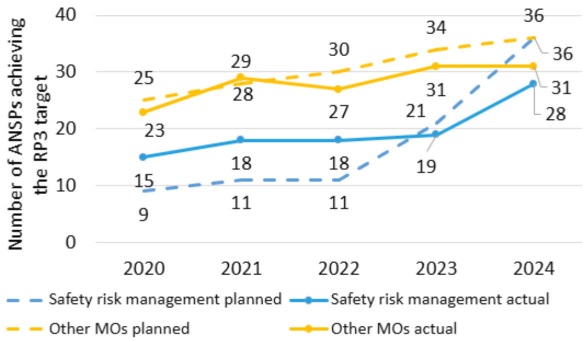

Figure 4 – Actual versus planned number of ANSPs achieving the level of the EoSM targets for RP3 in 2024 (source: PRB elaboration), showing that the ANSPs are behind on their planned improvements.

18 Eight out of the nine ANSPs that have not achieved the RP3 targets need to make improvements in Safety Risk Management. ANA LUX needs to improve the performance related to two questions and Skyguide only related to one question in Safety Risk Management. Three ANSPs (HASP, NAVIAIR, and DSNA) require improvement on all three questions under this Management Objective (as indicated in navy blue in Figure 5). Moreover, in addition to the necessary improvements in Safety Risk Management, DCAC Cyprus and skeyes need to improve in one other Management Objective, while DSNA and Avinor need to improve in two additional Management Objectives (both for Safety Culture and Safety Promotion). MUAC has to improve three questions in Safety Culture.

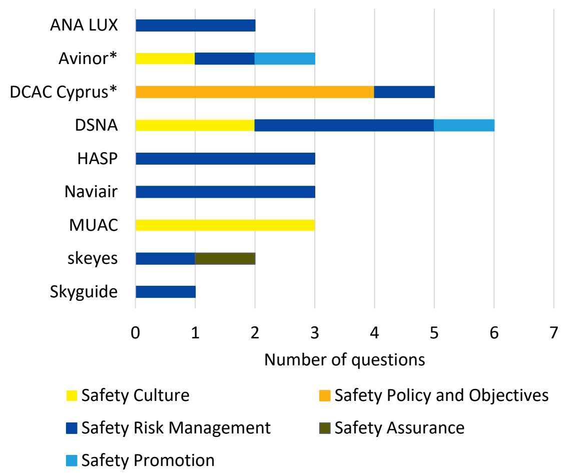

Figure 5 – Number of questions per specific Management Objectives ANSPs need to improve to achieve the EoSM targets (source: PRB elaboration), showing that eight ANSPs did not meet the targets by 2024. "" indicates ANSPs downgrading compared with 2023.*

19 Three ANSPs have a greater challenge when entering RP4:

- DSNA achieved the RP3 targets in 2022; however, its performance has since deteriorated, with three Management Objectives now falling below the RP3 targets. In 2024, DSNA showed only a slight improvement in one of the assessed questions. The NSA noted concerns regarding DSNA's performance, which had not met the RP3 targets and may face difficulties in achieving the targets in the upcoming reference period. In response, the NSA implemented a corrective action plan addressing the RP3 targets, and additional activities have been initiated to support the transition to the EoSM RP4 questionnaire and to ensure alignment with the RP4 targets.
- DCAC Cyprus has yet to achieve the target for Safety Policy and Objectives, and its situation has further deteriorated in Safety Risk Management compared to 2023, primarily due to staffing issues. The NSA expressed concerns regarding DCAC Cyprus's performance and has urged the ANSP to expedite the implementation of corrective actions. DCAC Cyprus needs to resolve the issue of accountability and have the appropriate authority signing the existing Safety Policy.
- Avinor achieved the RP3 targets in 2021; however, its performance has since deteriorated particularly in the Safety Risk Management component in 2022, and in the Safety Promotion component, which fell below RP3 targets in 2023. This downward trend continued into 2024, affecting the Safety Culture component. Avinor has stated that this deterioration does not compromise overall safety levels, attributing the decline to reduced administrative resources rather than operational shortcomings. Nevertheless, immediate corrective actions may be necessary. Avinor should prioritise the recovery of its safety performance by allocating appropriate resources to restore and enhance the maturity of its Safety Management System (SMS) to meet the RP3 targets. This may also be related to an interdependent pressure where Avinor needs to further examine the allocation of resources.

20 For ANA LUX, HASP, NAVIAIR, skeyes, and Skyguide the Safety Risk Management component remains a significant stumbling block. This

component, which requires a higher level of maturity than the other management objectives, continues to present difficulties across these service providers. In particular HASP and NAVIAIR still need to demonstrate improvement across all three assessment questions related to Safety Risk Management. Focused efforts and targeted actions are needed to address these gaps and progress toward full compliance with the RP3 objectives. The PRB recommends the ANSPs to conduct an analysis of the resources available.

21 The NSAs in seven Member States (Cyprus, Denmark, France, Latvia, Lithuania, Luxembourg, and Switzerland) have expressed concerns regarding the ability of their ANSP to meet the safety performance targets, either in the upcoming year or over the course of the next reference period. In response, these NSAs have reported the establishment of Corrective Action Plans, outlining specific measures aimed at achieving the expected maturity level by the end of 2025. Additionally, reinforced monitoring mechanisms have been put in place by the NSAs to ensure progress. Looking ahead to the evolving requirements under RP4, some NSAs have also developed dedicated safety programs, detailing the necessary steps for the full enhancement of the organisations' SMS. In identifying weakness and corresponding corrective actions, it is acknowledged that those organisations have nonetheless displayed a level of maturity and self-awareness that will assist them to meet future challenges.

3.2 Occurrences

22 In addition to the EoSM, two performance indicators (PIs) related to occurrences are monitored at Union-wide level (Figure 6, next page):

- The rate of runway incursions (RIs), which describes the total number of RIs with a safety impact that occurred at regulated airports in a Member State, divided by the total number of IFR and VFR airport movements.
- The rate of separation minima infringements (SMIs), which describes the total number of SMIs with a safety impact that occurred within the airspace of all air traffic service units in a Member State.

23 In preparation of the Member States providing their monitoring report, EASA would extract the information needed to calculate the safety performance indicators (PIs) from the occurrences reported in the European central repository (ECR), which are then sent to Member States for verification and elaboration in their performance maintenance recorders. However, in RP3, EASA has not been able to extract data from the ECR to provide information to compute the PIs. This is due to the overall poor quality of the data uploaded to the ECR: A significant part of occurrences extracted from the ECR did not contain the information needed to calculate the two monitoring indicators.[4] Member States are mandated by regulation 376/2014 to apply the European risk classification scheme when assessing incidents reported.[5] It appears from the ECR occurrence data and the monitoring reports that there is a lack of/incorrect/inconsistent application of the classification scheme across Member States.

24 From the data submitted in the monitoring reports, in 2024, both the rate of runway incursions (RIs) and separation minima infringements (SMIs) increased compared to 2023 (Figure 6).[6] A significant rise in SMIs was observed between 2023 and 2024, with the total number of occurrences increasing from 1,072 to 1,468(+36%). This result is driven by six Member States: France, Greece, Italy, Norway, Poland, and Spain. France recorded a striking +96% increase with no specific justification provided, while Spain reported a +33% increase.[7] The rate of SMIs involving air navigation service (ANS) contribution, also increased from 5.1 to 6.7 occurrences per 100,000 flight hours between 2023 and 2024.

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[4] Specifically risk assessment and ANS contribution - "ATM involvement" in the occurrence taxonomy.

[5] Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007 Text with EEA relevance

[6] Comparison of occurrence rates between RP2 and RP3 should be treated with caution as RP3 introduced changes that meant less occurrences are expected to be reported with the same performance. Currently, only occurrences with a safety impact are reported.

[7] Spain changed its classification methodology in 2024, adopting the Risk Analysis Tool (A, B, and C occurrences) instead of the previous European risk classification scheme, which might have influenced the reported occurrences.

25 Regarding runway incursions, there was also an increase in the absolute number of occurrences—from 496 in 2023 to 563 in 2024, representing a +13% increase. The rise in the number of occurrences can be attributed to Italy (+56%), Norway (+83%), Poland (+78%), and Spain (+21%). When considering only RIs with ANS contribution, the rate increased from 0.7 to 0.9 occurrences per 100,000 flight movements over the same period.

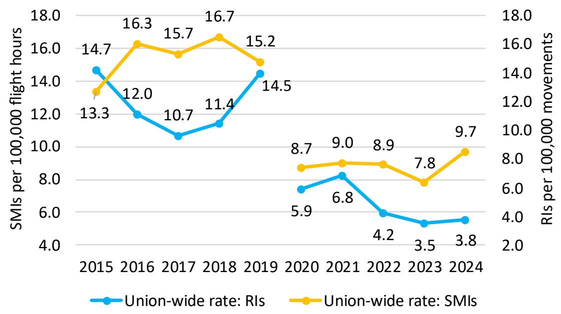

Figure 6 – Union-wide occurrences rate for separation minima infringement (SMI) and runway incursions (RIs) in the period 2015 to 2024 demonstrating an increase of the SMIs rate from 7.8 to 9.7 and the Ris rate from 3.5 to 3.8 (source: PRB elaboration). Some years do not include data from all Member States as the corresponding monitoring reports did not provide the information required.

26 Four ANSPs (HungaroControl, Airnav Ireland, Slovenia Control, and Oro Navigacija) reported the use of additional safety indicators beyond the mandatory requirements. These include a combination of maturity-based indicators (e.g. SMS maturity levels) and occurrence-based indicators (e.g. ATM system incidents or airspace infringements).

3.3 Automated safety data recording systems

27 The use of automated safety data recording systems by ANSPs as an element of their safety risk management framework is a performance indicator that measures how systematic automated safety reporting is in various Member States.

28 In 2024, 12 ANSPs reported using some form of automated safety data recording systems for recording separation minima infringement occurrences (ANS CR, Croatia Control, DSNA, HungaroControl, LGS, MUAC, LVNL, Oro Navigacija, SDATS, LPS, Skyguide, and ENAIRE). Of these, only four ANSPs—ANS CR, Croatia Control, LGS, and ENAIRE—also reported using automated systems to record runway incursions. Despite these efforts, the uptake of automated recording tools has seen only marginal improvement during RP3. Notably, no additional ANSPs introduced the use of such tools in 2024 compared to 2023.

4 ENVIRONMENT

- The 2024 Union-wide KEA performance target was not achieved by 0.56 percentage points (2.96% compared to a target of 2.40%).
- Three Member States achieved their reference values in 2024: Malta, Norway, and Portugal.
- 25 Member States did not achieve their reference values in 2024, the same number as in 2023.
- KEP and SCR improved further in 2024, however remained worse than in 2021.
- Terminal and ground environmental performance (additional ASMA and AXOT time) deteriorated by 5.7%, nevertheless remaining better than the 2019 pre-COVID-19 pandemic levels.
- The share of flights completing a CDO approach remained stable year-on-year, above the 2019 pre-COVID-19 pandemic levels.

4.1 En route performance

Flight efficiency of the actual flight path

29 Environmental performance is measured through one KPI: Horizontal en route flight efficiency of the actual flight path (KEA). KEA measures the additional distance flown in addition to the great circle distance. Additional distance flown is impacted by the trajectory planned by airspace users and by airspace restrictions and ATM measures including air traffic flow management (ATFM)-related restrictions to reduce delay. The higher the KEA value, the worse the performance.

30 While the ongoing impact of airspace closures caused by Russia's war of aggression against Ukraine contributed to the Union-wide target not being achieved in 2024 (Table 1), there are other contributing factors including the effects of delay on en route flight efficiency. Eurocontrol estimated that closures of airspace due to the war of aggression added 0.29 percentage points to KEA in 2024, indicating that capacity constraints and network inefficiencies persisted and played a role in missing the targets. Moreover, the PRB estimates that delay in excess of the Union-wide capacity targets contributed approximately 0.24 percentage points to the Union-wide KEA performance in 2024.

31 The impact of the capacity shortfall (0.24 percentage points) and airspace closures (0.29 percentage points) were not the only reasons for not achieving the Union-wide KEA target. The Union-wide target would still have been missed by 0.03 percentage points when accounting for these issues. However, this gap between the target and the actual performance has reduced since 2023 by 0.09 percentage points. As highlighted in earlier monitoring reports, this demonstrates that ANSPs and Member States must continue taking immediate action and implement initiatives, including cross border Free Route Airspace where applicable, to improve horizontal flight efficiency and to focus on the interdependency between the environment and capacity KPAs by resolving capacity bottlenecks.

Environmental performance 2024		
	Union-wide target	Achieved performance
KEA actual horizontal flight efficiency	2.40%	2.96%

Table 1 – Comparison of 2024 Union-wide environment targets and actual environment performance.

32 The shortfall between actual-KEA and the Union-wide target of 0.56 percentage points in 2024 is less than observed in the last two years (Figure 7, next page). Union-wide KEA performance has been consistent between 2022 to 2024, despite being affected by continued Russia's war of aggression against Ukraine and the geopolitical situation in the Middle East.

33 The PRB estimates that over 46 million kilometres of additional distance were flown in 2024 as a result of missing the Union-wide target by 0.56 percentage points. Despite a marginal improvement of KEA compared to 2023, excess fuel burn increased in 2024 because of increased traffic. The excess fuel burn in 2024 equates to approximately

205 million kilograms of fuel or some 646 million kilograms of CO_2.[8]

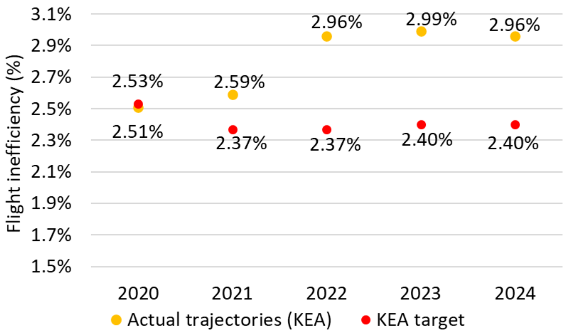

Figure 7 – KEA performance over the past five years (source: PRB elaboration).

34 Russia's war of aggression against Ukraine and the geopolitical situation in the Middle East have had a direct impact on the performance of KEA, and in particular on those in the vicinity. Such an impact is outside of the control of those affected. Therefore, when assessing ANS performance in the environment KPA, the PRB also takes the change in the shortest constrained route (SCR) into account. If KEA degrades, but SCR improves or remains stable, then this is a positive outcome.

35 In 2024, three Member States achieved their KEA targets, and each by a considerable margin. These are the same Member States that achieved their targets in 2023.

- Malta achieved a KEA of 1.49% (0.31 p.p. better than the target of 1.80%).
- Norway achieved a KEA of 1.33% (0.22 p.p. better than the target of 1.55%).
- Portugal achieved a KEA of 1.61% (0.19 p.p. better than the target of 1.80%).

36 Conversely, 25 Member States did not achieve their targets, the same number as the last two years (2022 and 2023):

- Four Member States were within 0.2 percentage points of their targets: Austria, Croatia, Denmark, and Switzerland. The SCR for three of these Member States remained stable compared to 2023. For Denmark, SCR improved from 2.29% to 2.13%.
- 12 Member States missed their targets by between 0.2 and 1 percentage point: Belgium, Czech Republic, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Slovenia, Spain, and Sweden. Despite missing their KEA targets, the SCR improved for Belgium, Czech Republic, France, Germany, Greece, Hungary, Ireland, Italy, and the Netherlands. These Member States enabled shorter routes within their airspace compared to 2023. For Slovenia and Spain, the SCR degraded compared to 2023. For Sweden, SCR remained stable.
- The remaining nine Member States missed their targets by more than one percentage point. Eight of these states are geographically located near Russia, Ukraine, or Belarus and have had the effective usage of their airspace disrupted: Bulgaria, Estonia, Finland, Lithuania, Latvia, Poland, Romania, and Slovakia. Among this group, Estonia's, Latvia's, Lithuania's and Poland's performance has improved (both KEA and SCR) compared to 2023. In addition, Cyprus similarly missed its target due to inability to optimise traffic flows reflecting the geopolitical development in the region.

Flight efficiency of the flight plan and route network

37 In addition to measuring horizontal flight efficiency, two performance indicators help to explain Union-wide environmental performance: SCR and the planned horizontal flight efficiency (KEP):

- SCR indicates the shortest available routes that could have been planned by airspace users considering airspace constraints (e.g. activation of temporary segregated military training areas or RAD restrictions).
- KEP indicates the efficiency of the routes planned by airspace users.

38 These performance indicators do not directly relate to fuel burn or CO_2 but help to explain the constraining factors that limit horizontal flight efficiency. SCR is relevant because environmental performance correlates with traffic levels and available capacity and SCR considers the available airspace (including capacity) and restrictions in the flight planning stage. It reflects the options airspace users had when planning their flights. KEP measures the efficiency of the routes planned by airspace users according to their own planning tools and criteria.

[8] Fuel burn and CO_2 emissions are calculated based on the following conversion factors: 1 km = 0.53996 Nautical Mile; 1 Nautical Mile = 1/7.3 minutes; 1 minute = 60 kg fuel; 1 kg fuel = 3.15 kg CO_2.

39 KEP and SCR improved in 2024, however remain worse than 2021 figures (Figure 8). This deterioration can be attributed to the ongoing disruption caused by the closure of Ukrainian, Russian, and Belorussian airspace. The slight improvement could be due to the airspace effectively adjusting to account for the new restrictions to routes. The gap between KEP and SCR has decreased each year since 2020 demonstrating that airspace users are planning routes increasingly closer to the shortest route available.

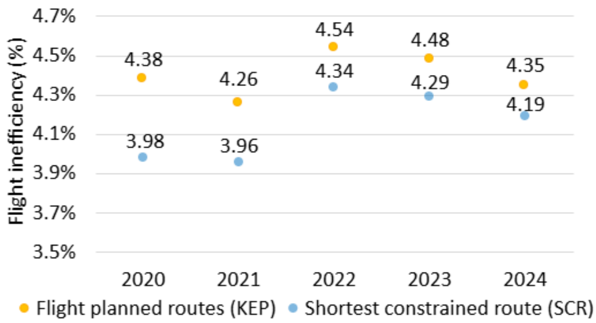

Figure 8 – KEP and SCR performance over the past five years (source: PRB elaboration).

4.2 Additional time spent taxiing out and holding in terminal airspace

40 Member States are required to report data for the additional time flights spent in terminal airspace and taxiing out at airports with more than 80,000 IFR movements and those included in the performance plans on a voluntary basis. The indicators measured are: Additional taxi-out time (AXOT), and additional arrival sequencing and metering (ASMA) time.[9]

41 Flights spent on average an additional 1.24 minutes in the arrival sequencing and metering area and 2.67 minutes of additional taxi out time in 2024. Combined, this shows a +5.7% increase in the total additional time compared to 2023, and a total increase of 44.8% compared to 2020 (Figure 10). However, 2024 represents a 12.7% improvement compared to 2019 (value of 4.48 minutes per flight for total additional time) (Figure 9).Figure 9

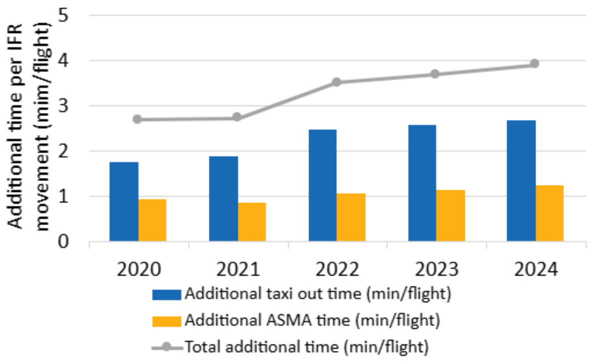

Figure 9 – Union terminal environmental performance (source: PRB elaboration), showing that additional ASMA times and performance in 2024 worsened compared to 2023.

4.3 Continuous descent operations

42 Member States are required to report the proportion of approaches applying Continuous Descent Operations (CDO) for airports with more than 80,000 IFR movements and for those included in the performance plans on a voluntary basis. This performance indicator measures how efficiently aircraft approach airports, as optimum decent profiles reduce fuel burn and emissions. Several factors influence such operations, including weather, terminal area congestion, aircraft characteristics, restrictions for reduction of noise and airspace design.

43 Overall, the share of flights achieving a CDO reached 33.5% in 2024, presenting an improvement of 0.5 percentage points when compared to 2023 (33.0%). The share of flights completing a CDO approach remained more consistent throughout the year than in 2023, despite the number of IFR flights increasing over the summer months (Figure 10, next page).

44 Maintaining the proportion of flights achieving a CDO throughout 2024 shows that the arrival operations of airports and ANSPs have been resilient and have continued to cope well with the challenges posed by increasing traffic.

[9] AXOT: The difference between the actual taxi-out time of a flight and a statistically determined unimpeded taxi-out time (based on taxi-out times in periods of low traffic demand). Additional ASMA time: The difference between the actual ASMA time of a flight and a statistically determined unimpeded ASMA time (based on ASMA times in periods of low traffic demand).

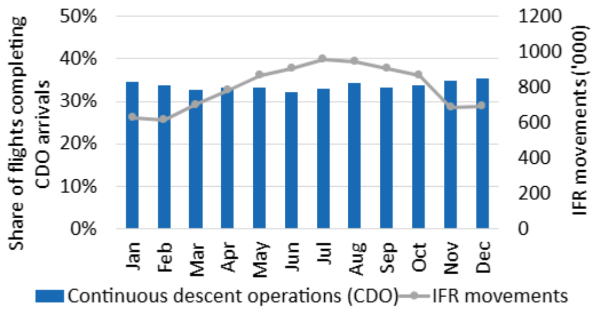

Figure 10 – Share of arrivals applying continuous descent operations (source: PRB elaboration), showing improving relation between the traffic increase and the deterioration of the CDO procedures.

45 Overall, performance in the terminal area for 2024 has not improved compared to 2023 and as previously noted by the PRB, Members States need to alleviate airport disruption and improve terminal environmental performance in line with the expected growth in traffic.

4.4 Results of the Traffic Light System

46 The Traffic Light System presents the information relating to environmental performance captured within the Regulation in a simplified manner, to foster a wider discussion on how the environmental performance of ATM can be improved.[10] A detailed description of the Traffic Light System, including its methodology and results are presented in a separate report published alongside this annual monitoring report.

47 The results from the Traffic Light System are presented in Figure 11 (next page). In 2024, the Union-wide environmental performance deteriorated due to factors including a lack of capacity and the continued impact of Russia's war of aggression against Ukraine and geopolitical situation in the Middle East.

48 The results of the Traffic Light System for 2024 show that six Member States are in the green category (three in 2023), 17 Member States are in the amber category (18 in 2023), and five Member States are in the red category (seven in 2023).

49 Denmark, Estonia, Ireland, Latvia, and Lithuania show the greatest improvement in the Traffic Light System score, driven mainly by their terminal scores, and strong KEA performance for Denmark. However, none of the five Member States met their KEA target. Conversely, Cyprus, Hungary, and Portugal show the greatest deterioration in environmental performance. For Hungary this is primarily due to the impact of airspace disruption caused by Russia's war of aggression against Ukraine, which has seen re-routings of flights – mostly from the Middle East and Asia – from Baltic and Northern Europe towards South-Eastern Europe, lengthening the trajectory flown and increasing their KEA value. For Cyprus, this is due to inability to optimise traffic flows reflecting the geopolitical development in the region. In relation to Portugal, the main factor is deteriorating terminal performance.

50 The Traffic Light System of 2024 shows an overall deterioration of terminal environmental performance, where the greatest deterioration of the AXOT score is seen in Italy, the Netherlands, and Portugal, while for the ASMA score, the greatest deterioration is seen in Czech Republic, Malta and Portugal. Finally, Cyprus, Finland and Portugal have the highest deterioration in CDO scores.

51 Malta, Norway, and Portugal are the only Member States that have met their KEA targets in 2024. Of these three, Norway remains in the green zone, whilst Malta stays in the amber zone. Portugal stays in the red zone as its performance degraded compared to 2023.

[10] The indicators included in the Traffic Light System are en route horizontal flight efficiency (KEA), additional taxi-out time (AXOT), additional time spent in the terminal manoeuvring area (ASMA), and percentage of flights performing continuous descent operations (CDO) as per the Regulation.

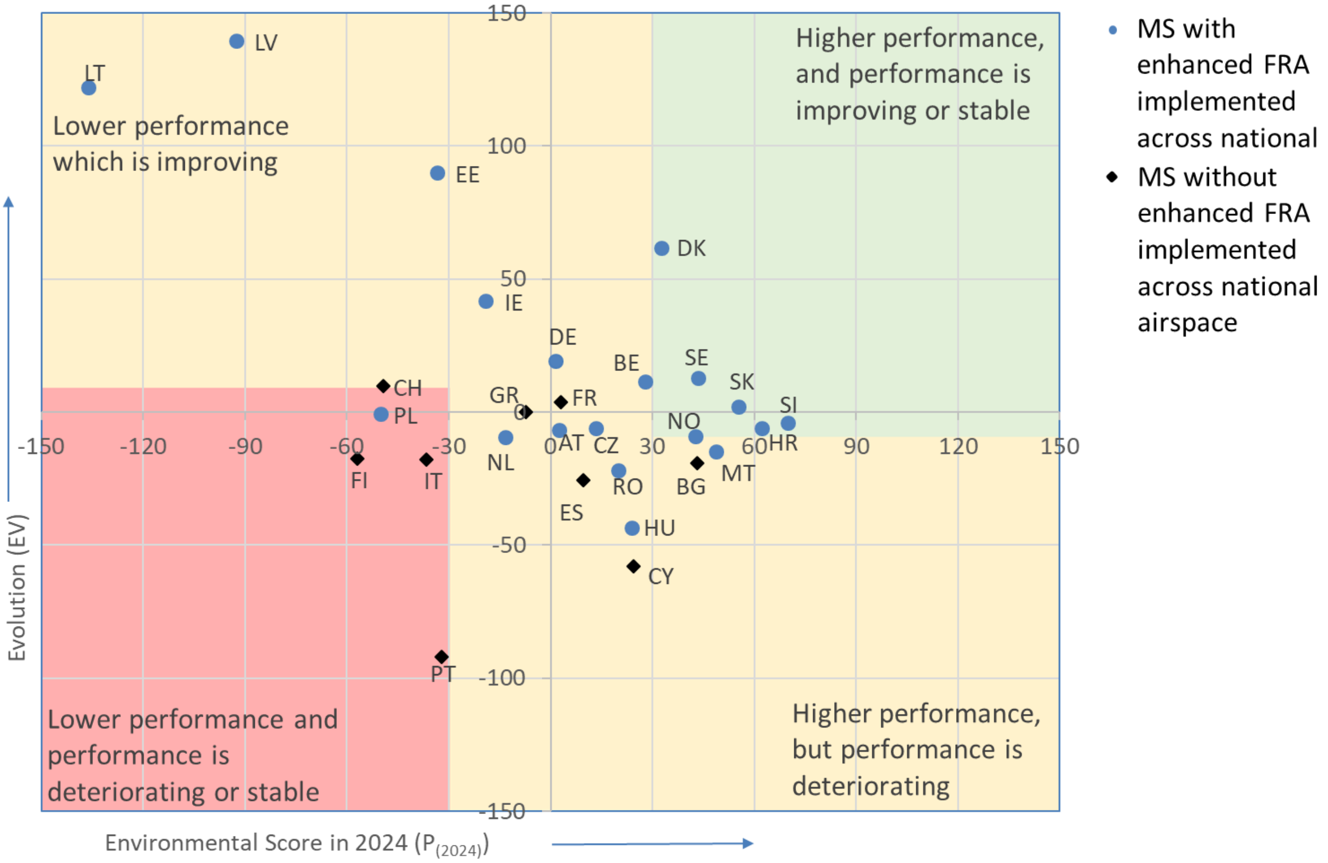

Figure 11 – Results from the 2024 Traffic Light System.

5 CAPACITY

- En route ATFM delays increased to 2.19 minutes per flight in 2024 compared to 1.84 minutes per flight in 2023, driven mostly by ATC Capacity and ATC Staffing issues and adverse weather. Disruptions impacted network performance less than previous year.
- Terminal capacity performance continued to deteriorate with delay increasing to 0.93 minutes per flight in 2024 compared to 0.83 minutes per flight in 2023, with the majority of delays being due to weather, staffing issues, and non-ATC related airport capacity problems.
- Delays due to adverse weather were exceptionally high in 2024, highlighting the importance of co-operation between ANSPs and the NM to mitigate weather-related impacts in the future.

5.1 En route capacity

52 En route capacity is monitored by one KPI: The average en route air traffic flow management (ATFM) delay generated by en route area control centres (ACC).

53 In 2024, the Union-wide target for capacity was not achieved, mainly because some ANSPs could not accommodate the increase of IFR movements and the unusually high weather-related delays. Average en route ATFM delay was 2.19 minutes per flight (after post-ops adjustments), 1.69 minutes per flight higher than the Union-wide target (Table 2).

En route capacity performance (min/flight) 2024		
	Union-wide target	Achieved performance
Average en route ATFM delay per flight	0.50	2.19

Table 2 – Comparison of 2024 Union-wide en route capacity target and actual capacity performance (minute per flight) after the NM post-operations delay attribution process.

54 The traffic demand in 2024 approached pre-COVID-19 pandemic levels. En route ATFM delay per flight in 2024 was 35% higher (worse) than in 2019, while the number of IFR movements in 2024 was still 4% below 2019 levels. While acknowledging that there were network-level non-ATC disruptions in 2024, the overall capacity performance was disappointing and showed that some ANSPs in key areas did not sufficiently improve capacity provision and resolve well-known constraints before the traffic recovery.

55 Compared to 2023, total delay increased by +25% to 20.9M minutes, while there were +5.2% more IFR movements. Average delay per flight increased from 1.84 min/flight in 2023 to 2.19 min/flight in 2024. The main cause of delay in 2024 was lack of ATC capacity, followed by weather and ATC Staffing (Figure 12).

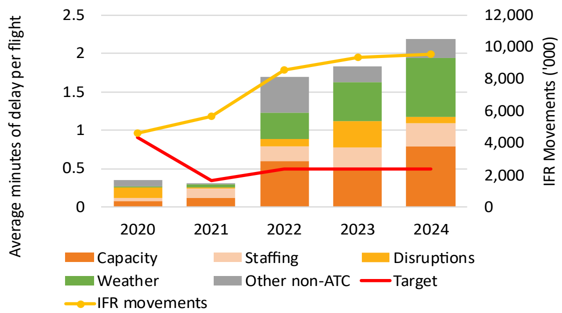

Figure 12 – En route ATFM delays by delay cause and year since 2020 (source: PRB elaboration), showing that delay per flight continued to increase in 2024 compared to previous years.

56 In 2024, large majority of the delays were accumulated during the summer season (Figure 13, next page). During June, July, and August 2024 there was an average of 4.77 minutes of delay per flight, reaching peak levels in the RP3 period. However, compared to the previous year, delay levels between January and May showed an improvement, mainly due to the lack of ATC disruptions that heavily impacted network performance in 2023 during the same period. The main causes of delays overall in 2024 were a lack of ATC capacity, weather (together representing 71% of all delays at 1.55 minutes per flight), and ATC staffing (representing over 14% of all yearly delays, at 0.30 minutes per flight).

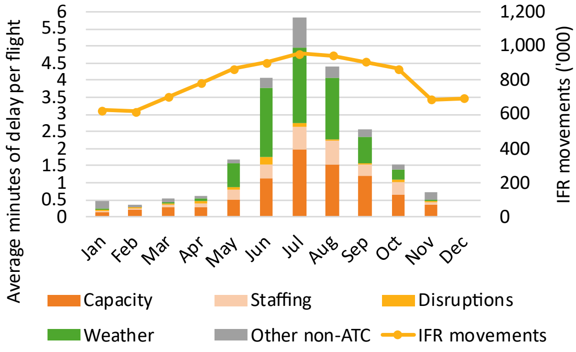

Figure 13 – Average monthly en route ATFM delay per delay codes and instrument flight rule flights (source: PRB elaboration), showing the record high delays in July and that the majority of the delays in 2024 were generated during the summer season.

57 The average delay per delayed flight also shows a slight growth compared to last year (Figure 14). Figure 14 – Average delay per delayed flight value, instrument flight rule flights and flights realising delays (source: PRB elaboration), showing a slight increase in the average delay per delayed flights value in comparison to 2023.The Union-wide delay per delayed flight equals 16.57 minutes per delayed flight in 2024 (+1% compared to 2023). 12% of the total flights were delayed in 2024, and 4.5% of the flights exceeded more than 15 minutes of delay. Only a low percentage of the IFR flights were affected by en route ATFM delays, resulting in highly concentrated delays, which negatively impact network performance. More evenly distributed delays would be more optimal and improve network stability and predictability.

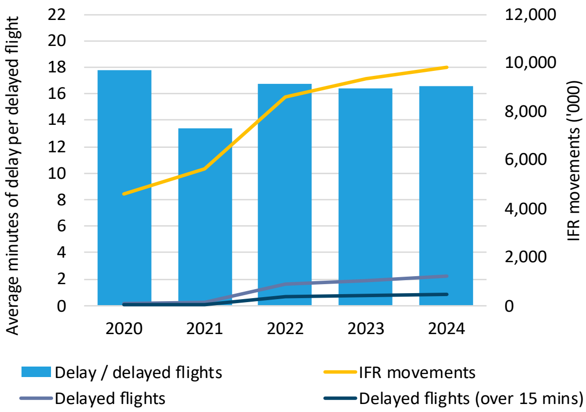

Figure 14 – Average delay per delayed flight value, instrument flight rule flights and flights realising delays (source: PRB elaboration), showing a slight increase in the average delay per delayed flights value in comparison to 2023.

58 The distribution of delayed flights per duration of delay in 2024 was slightly worse compared to 2019 and 2023; the share of flights which suffered delays longer than 15 minutes equals to 39% in 2024, 2 percentage points more than both in 2019 and 2023 (Figure 15). The increased share of delays longer than 15 minutes shows a slight deterioration in network resilience compared to 2023.

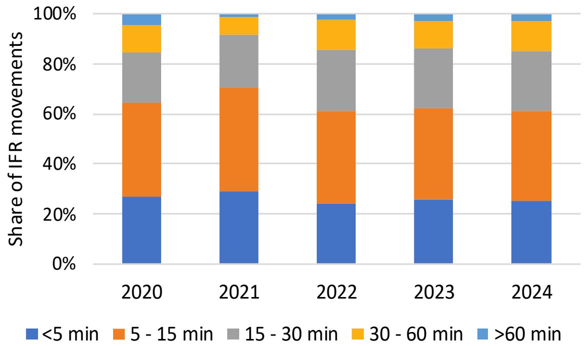

Figure 15 – The share of delayed flights that experienced a delay, ranging from less than 5 minutes to more than 60 minutes (source: PRB elaboration), showing that the share of longer delays exceeds 2023 levels.

59 Several ACCs registered a significant increase in delays:

- In Germany, delays increased by 44% in Langen, from 0.23 to 0.34 min/flight, mainly driven by ATC Capacity and Staffing issues and poor weather conditions.
- In Hungary, delays in Budapest ACC significantly increased by +168%, from 1.02 to 2.73 min/flight, due to the lack of ATC Capacity, adverse weather conditions, and the additional complexity related to the Ukrainian situation.
- In Spain, delays significantly increased in Sevilla, Barcelona, Palma and Canarias ACCs. Sevilla registered an increase of +210% from 0.40 to 1.25 min/flight, Barcelona saw an increase of +97% from 0.51 to 1.01 min/flight. Delays in Palma increased by 497% from 0.06 to 0.35 mins/flight and in Canarias by +73% from 0.21 to 0.37 min/flight. The main driver of delays was the lack of ATC Capacity in all cases.
- In Croatia, Zagreb ACC saw a major increase of 234% in delays, from 0.50 to 1.66 min/flight, mostly due to adverse weather and ATC Capacity.
- In Italy, delays in Milano and Roma ACCs increased significantly, and Padova ACC also saw an increase in en route delays. Roma registered a +3114% increase from 0.02 to 0.76 min/flight, mainly due to ATC Capacity and

weather, Milano registered a +137% increase from 0.21 to 0.49 min/flight, mostly related to weather. Delays in Padova increased by +104% from 0.11 to 0.22 mins/flight, due to adverse weather conditions.

- In Austria, delays in Vienna ACC significantly increased by +272%, from 0.16 to 0.58 min/flight, mostly due to adverse weather conditions.
- In Greece, Athinai-Macedonia ACC saw an increase of +17% in en route delays from 0.88 to 1.02 min/flight, mostly related to ATC Staffing issues.
- In Switzerland, delays in Zurich ACC increased by +107% from 0.24 to 0.49 min/flight, and Geneva ACC by +232% from 0.11 to 0.37 min/flight. In both ACCs, delays were driven by weather, ATC disruptions and minor ATC Capacity issues.

60 Some of the ACC's performance improved:

- In Germany, delays in Munich ACC and Bremen ACC decreased, and Karlsruhe also saw a minor improvement. Delays declined in Bremen from 0.66 to 0.40 min/flight, in Munich from 1.18 to 0.48 min/flight, and in Karlsruhe from 1.64 to 1.59 min/flight.
- In France, performance at Paris, Marseille, Brest, and Reims ACCs improved significantly. Delays in Paris decreased from 1.58 to 0.64 min/flight, in Marseille from 2.04 to 1.30 min/flight, in Reims from 1.42 to 1.22 and in Brest from 0.64 to 0.49 min/flight.
- In Portugal, Lisboa ACC registered a decrease of delays from 0.53 to 0.42 min/flight.

61 As the major system implementations in recent years led to the improvement of capacity performance at the relevant ACCs, the PRB expects that the benefits of new system implementations at ACCs in 2024 will continue to have a positive impact in the coming years. However, even though the relevant ACCs faced significantly less disruptions after the implementations, most of them still struggled with the provision of sufficient capacity and generated relatively high delays in 2024.

62 Compared to the previous year, 2024 shows a different picture regarding en route capacity performance. Even though the negative impact of disruptions (being one of the main drivers of delays in 2023) was successfully mitigated, the share of delays related to ATC Capacity, ATC Staffing, and Weather increased significantly, as did the share of long ATFM delays and average delay per delayed flights as well, when compared to 2023. As a result, the overall average en route ATFM delay in 2024 was a record high in RP3.

63 ANSPs along key traffic axes experienced strong traffic growth, which, combined with the yet unresolved shortages of air traffic controllers and the additional disruptions due to weather, led to the high delays. ANSPs will have to focus on delivering continuous, year-on-year improvements in their capacity performance and working together at the network level to address the situation. These improvements should be implemented at an accelerated pace to ensure the effective mitigation of the factors impacting network performance negatively.

5.2 Terminal capacity

64 Terminal capacity is monitored by one key performance indicator at the local level, which is the average airport arrival ATFM delay.

65 In 2024, the average Union-wide airport arrival ATFM delay increased by 12% to 0.93 minutes per flight compared to 2023 (Table 3). The top 20 busiest airports experienced a +6% increase in IFR arrivals on average, compared to 2023. Together with the increase in traffic, all these airports, except Frankfurt, Paris (Orly), Copenhagen, Brussels, and Stockholm airports also registered an increase of arrival ATFM delays in 2024.

Terminal delay performance (min/flight)					
	2020	2021	2022	2023	2024
Airport arrival ATFM delay per arrival	0.27	0.24	0.52	0.83	0.93

Table 3 – Airport arrival ATFM delay per arrival showing a 12% deterioration in 2024 compared to 2023.

66 Airport arrival ATFM delay in 2024 exceeded the airport arrival ATFM delay level of 2019 (0.84 min/flight in 2019, 0.93 min/flight in 2024). The monthly distribution of airport arrival ATFM delay in 2024 and the causes behind the delays are shown in Figure 16 (next page). Weather and

other non-ATC issues accounted for most of the delays throughout 2024. The majority of the airport arrival ATFM delay was generated between May and November and as in last year, unusually high delays can be observed in May and between September and November 2024. Delays in that period were generated by a small number of airports (e.g. Athens, Amsterdam, Frankfurt, Barcelona), which faced disruptions (e.g. technical failures), staffing, weather, or capacity issues. The emerging pattern of uncharacteristically high delays before and after the summer months negatively affects both network resilience and the predictability of network performance.

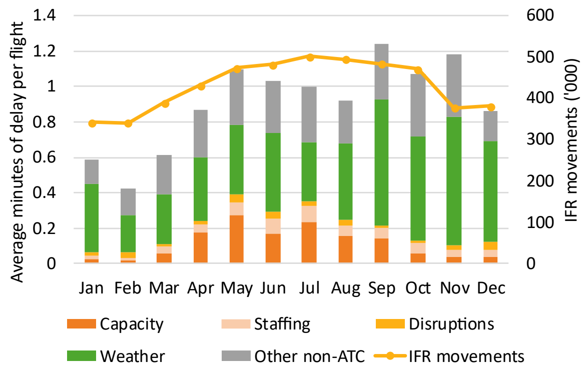

Figure 16 – Average airport arrival ATFM delay per delay codes, compared to instrument flight rule arrivals (source: PRB elaboration), showing weather and other non-ATC issues being the main drivers of delays during most of 2024.

67 When compared to 2023, the share of arrival ATFM delays related to ATC capacity and staffing issues remained stable at 19%, the share of delays related ATC disruptions decreased to 3% from 11%, while the share of other non-ATC related delays decreased to 29% from 32%. The share of delays due to adverse weather shows a significant increase to 49% from 38%.

5.3 Gate-to-gate delay analysis

68 A gate-to-gate analysis that combines ATFM delays with other delay types and other sources of flight time extensions demonstrates the overall impact on performance. Three performance indicators defined in the Regulation are used to illustrate gate-to-gate delays:

- All cause pre-departure delays, including ATFM delays discussed in sections 5.1 and 5.2 (i.e. en route ATFM delays and airport arrival ATFM delays);
- Additional taxi-out time; and
- Additional time spent in terminal area on arrival (Arrival Sequencing and Metering Area).

69 The results for these performance indicators for 2023 and 2024 are shown in Table 4. On average, airspace users were delayed by 23.01 minutes per flight in 2024, out of which 3.12 minutes were caused by en route and airport ATFM regulations (i.e. the delays assessed under the Regulation and counted within all causes departure delay group).

Gate-to-gate delay performance (min/flight)		
	2023	2024
All cause departure delay per departure	19.23	18.77
Additional taxi-out time per departure	2.81	2.91
Additional ASMA time per arrival	1.21	1.33
Total	**23.25**	**23.01**

Table 4 – Values of gate-to-gate delay components in 2023 and 2024. Gate-to-gate performance improved compared to 2023.

70 Additional taxi-out time and ASMA time increased by +4% and +10%, respectively in 2024 compared to 2023. All cause departure delay in 2024 decreased by -2%. Overall, gate-to-gate delay performance in 2024 shows a slight improvement of -1% in comparison to 2023.

5.4 Capacity-related measures taken by ANSPs

71 Capacity performance in 2024 shows that several ANSPs could not offer sufficient capacity to meet the growing traffic demand. At the same time, NSAs reported measures to recruit more ATCOs, implement changes in the airspace structures and sectorisation, and cooperate with the NM:

- One Member State indicated ATM system upgrades as capacity enhancement measures;
- Four Member States reported measures related to changes in the rostering schemes or other changes in the working arrangements of ATCOs;

- One Member State reported more intensive coordination with military stakeholders as a means to improve capacity performance;
- Two Member States reported the implementation of a complexity tool;
- Seven Member States reported the implementation of measures to reorganize airspace or to optimise sectorisation and associated procedures;
- Two Member States reported the implementation of enhanced weather management procedures.

72 Member States reported that ANSPs recruited and trained 5.8% (488 FTEs) fewer ATCOs than planned in the performance plans. A total of 7,937 ATCOs in OPS FTEs at the end of the year were recorded, representing a +0.5% increase compared to the 7,895 FTEs in 2023. The gap in the recruitment and training of ATCOs of 2023 failed to be reduced in 2024 and will have to be closed in RP4 in order to resolve staffing issues.

73 Of the seven ANSPs (DSNA, DFS, HungaroControl, ENAIRE, ENAV, Croatia Control, and HASP) which have generated 90% of all en route ATFM delay minutes, only ENAIRE and Croatia Control has increased the number of ATCOs in OPS FTEs (by 3.9% and 4% respectively) compared to 2023. Unless ANSPs, with the help of the Member States, find ways to improve the recruitment and training processes of ATCOs and ensure a steady increase of controllers, the delay situation in Europe will continue to deteriorate, even with new systems and tools.

74 The ongoing implementation of new ATM systems in Munich ACC, Paris ACC, and Marseille ACC had a negative impact on network performance and caused notable delays this year. The PRB expects further capacity improvements from these implementations in the coming years. Additionally, some ACCs that have recently implemented major system upgrades are currently working on airspace redesign, potentially resulting in further improvements of their capacity performance in the future.

5.5 *Evolution of operational efficiency of ANSPs*

75 Since 2021, the PRB has monitored additional operational aspects of capacity performance using the following indicators:

- The number of maximum sectors open at any given time by an ANSP, indicating the theoretical maximum capacity in terms of the number of sectors;
- The sum of sector-opening hours, indicating the capacity that has been provided by the ANSPs over a period; and
- The ratio of the number of ATCOs in OPS FTEs and the maximum sectors open at any given time.

76 After a continuous increase from 2021, the number of maximum sectors open at any given time reached 487 in 2024, passing 2019 levels (107%) for the first time in RP3. The sum of sector-opening hours over the year also increased to 2,455 thousand hours, 99% of 2019 figures. Despite sector openings being nearly identical as 2019 levels and traffic demand still being at 96% of 2019, more delays were generated in 2024. This may be due to the impact of adverse weather and the lack of ATC Capacity in network bottlenecks. Table 5 (next page) shows the evolution of capacity provision.

77 The comparison of sector numbers and sector-opening hours between 2019 and 2024 indicates that there may be capacity reserves in the network. Delays would be reduced if these resources can be allocated to help constrained areas. Additionally, ANSPs were able to handle more traffic demand per sector-opening hour in 2024 than in 2023, indicating an improvement in sector capacities and/or better sector productivity.

Indicators of capacity provision	2019	2021	2022	2023	2024
Sum of maximum sectors open	455 (100 %)	376 (83%)	434 (95%)	455 (100 %)	487 (107%)
Sum of sector-opening hours (000')	2,469 (100 %)	1,844 (75%)	2,272 (91%)	2,407 (97%)	2,455 (99%)
IFR movements (000')	9,961 (100 %)	5,471 (55%)	8,303 (83%)	9,075 (91%)	9,546 (96%)

Table 5 – Indicators of capacity provision from 2019 to 2024 (source: PRB elaboration on DDR AIRAC datasets). IFR movements are shown for context. Figures in brackets show values compared to 2019 as percentages. Sector hours are close to, while the number of maximum sectors open exceeds 2019 levels. IFR movements were 4% lower.

78 The ratio of ATCO FTEs to the sum of maximum sectors open indicates the operational efficiency of ANSPs, as it shows how many controllers are required to offer one sector of capacity.[11]

79 Table 6 shows that the number of ATCO FTEs required to operate one sector decreased by more than one FTEs/sector compared to 2023, and also being slightly lower than in 2019. The yearly ratios indicate a slightly improving tendency of operational efficiency of ANSPs during the RP3 timeframe.

ATCO FTEs per the sum of maximum sectors open				
2019	**2021**	**2022**	**2023**	**2024**
17.41	20.77	18.45	17.35	16.29

Table 6 – Number of ATCO FTEs required to maintain one sector, based on the maximum number of sectors open (source: PRB elaboration on DDR AIRAC datasets and annual monitoring reports). Operational efficiency improved in 2024, surpassing 2019 levels, due to an increase in the number of maximum sectors open.

80 ANSPs had more sectors open compared to 2023, while the number of IFR movements increased, and the number of ATCO FTEs also saw an increase of 0.5%. As a result, ANSPs reached a slightly better operational efficiency level as attained in 2019; where the improvement in operational efficiency was achieved by a reduction in ATCO numbers rather than an increase in the number of available sectors.

81 The PRB's analysis indicates that capacity provision and operational efficiency of ANSPs improved once again after 2023, surpassing 2019 levels. While this is positive, delays in 2024 were significantly higher than in 2019, with still fewer IFR movements (although traffic growth in 2024 was uneven across the network, with key areas experiencing traffic above 2019 levels).

5.6 Capacity incentive schemes

82 Based on the parameters defined by the Member States in their performance plans and their respective 2024 performance in en route capacity, 12 ANSPs are subject to financial penalties. Another nine ANSPs are subject to financial bonuses.[12]

83 The total amount of bonuses equals 3.5M€, corresponding to 243,023 minutes of en route ATFM delay (avoided), while total penalties amount to 24.6M€, corresponding to 12,176,947 minutes of en route ATFM delay (in excess). Therefore, the average value of one minute of avoided delay below the target is 14.36€, whereas the average value of one minute of delay more than the target is 2.02€.

84 Similarly, for terminal capacity, based on the parameters defined in the performance plans, six ANSPs are subject to a financial penalty and four ANSPs receive a financial bonus. Though ANS Czech Republic would be entitled for a bonus based on their terminal capacity performance, the Czech Republic decided to support civil aviation and not to apply the bonus.

85 The total bonuses amount to 1.2M€, corresponding to 86,307 minutes of avoided delay, whereas the sum of penalties is 2.8M€, corresponding to 655,434 minutes of excess delay. Thus, the average value of one minute of delay below the target

[11] This indicator is not used for benchmarking of ANSPs but rather to observe the evolution of performance over time.

[12] The analysis of the incentive schemes in this report is based on the calculations of the PRB, using the parameters from the approved RP3 performance plans, the notified pivot values, and the actual delay figures.

is 13.36€, while the average value of one minute of delay more than the target is 4.32€.

86 As already indicated in the previous monitoring reports, the capacity incentive schemes are financially imbalanced: One minute of en route ATFM delay above the target (penalty) was worth seven times less than one minute of avoided delay (bonus). It is clear that the parameters set by some Member States are neither efficient nor effective in steering behaviours towards the provision of capacity.

6 COST-EFFICIENCY

- In 2024, the Union-wide en route actual unit cost (AUC) was -5.8% lower than the determined unit cost (DUC).
- En route actual costs were -4.1% below determined costs, while actual service units were +1.8% higher than the determined service units.
- The en route actual unit cost for airspace users (AUCU) was +5.6% higher than the DUC (nominal), mainly due to the application of the 2024 inflation adjustment (where the weighted average actual index was +13% above the determined figure).

6.1 En route Union-wide year-on-year change of the average determined unit cost (DUC)

87 The Union-wide cost-efficiency target is the year-on-year variation of the Union-wide en route determined unit cost (DUC), starting from the 2019 baseline value.

88 The 2024 actual unit cost (AUC) variation from the 2019 baseline (-7.2%) is better than the variations derived from the Union-wide targets (+4.0%) and the RP3 performance plans (-1.5%). The resulting AUC (46.62€$_{2017}$) is -5.8% lower than the Union-wide DUC from the RP3 performance plans (49.47€$_{2017}$) (Table 7).[13]

En route Union-wide cost-efficiency performance 2024			
	Union-wide target	DUC	AUC
Union-wide DUC/AUC (€$_{2017}$)	52.23	49.47	46.62
Variation from the 2019 baseline	+4.0%	-1.5%	-7.2%

Table 7 – Comparison of 2024 Union-wide cost-efficiency target, determined, and actual performance.

89 The 2024 Union-wide AUC was better than the en route cost-efficiency target due to a combination of lower actual costs and higher service units than planned (Table 8):

- Lower costs: The aggregated results show that Member States decreased actual costs by -261M€$_{2017}$ (-4.1%) compared to the determined costs for en route charging zones. This decrease is mainly attributable to negative exceptional costs for Sweden (-185M€$_{2017}$).[14] When excluding them, total costs were -76M€$_{2017}$ lower than planned (-1.2%).[15] This difference is mainly attributable to significantly lower than planned staff costs and depreciation (-72M€$_{2017}$ and -64M€$_{2017}$ respectively), partially compensated by higher than planned costs of capital (+25M€$_{2017}$).
- Higher traffic: The actual 2024 service units at Union-wide level were +1.8% higher than the determined service units for the year.

En route Union-wide cost-efficiency performance 2024			
	Determined	Actuals	Difference
Costs (B€$_{2017}$)	6.4	6.1	-4.1%
Costs (B€)	7.0	7.3	+5.2%
Service units	129M	132M	+1.8%

Table 8 – Actual 2024 costs and service units compared to plan (at Union-wide level).

90 In terms of traffic, the comparison between actual and planned service units showed significant variations between Member States: En route service units were higher than planned for 19 charging zones, with notable differences in Croatia (+35%), Hungary (+22%), and Bulgaria (+22%), while for the remaining 10 charging zones the number of actual service units was below the plan, with the largest differences observed in Estonia (-39%),

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[13] The sources of the data for the monitoring of cost-efficiency are the following: The 2024 NSA monitoring reports and the en route and terminal reporting tables as submitted by the Member States in June 2025. These are complemented with the NSA Report on the verification of cost risk sharing for 2024 submitted in September 2025 for the cost exempt of the ANSPs.

[14] Sweden recorded -185M€$_{2017}$ due to a one-time effect on pension costs resulting from increased interest rates that reduced the pension debt.

[15] When excluding the negative exceptional costs recorded for Sweden, the 2024 Union-wide AUC equals 48.03, -2.9% lower than the DUC.

Finland (-36%), and Poland (-25%). These large differences are due to the fact that the performance plans were adopted before Russia's war of aggression against Ukraine.

91 In terms of costs, 14 Member States incurred lower actual en route total costs than planned, with 9 of them by more than -5%. The Member States with the largest percentage reduction in actual costs were Sweden (-76%), Malta (-26%) and Greece (-18%).[16] Five Member States - Belgium-Luxembourg, Denmark, Netherlands, Spain Continental, and Switzerland - increased actual costs by +5% or more compared to determined (+6.6% for Belgium-Luxembourg, +10% for Denmark, +5.3% for the Netherlands, +7.3% for Spain Continental, and +24% for Switzerland).

92 The revenue gap due to COVID exceptional measures amounts to 5.7B€$_{2017}$ for en route charging zones, of which 1.5B€$_{2017}$ have already been recovered (737M€$_{2017}$ in 2023, and 743M€$_{2017}$). The remaining en route revenue gap amounts to 4.2B€$_{2017}$, and will be recovered over the five years of RP4.[17]

6.2 *Differences in inflation between actual and determined*

93 Although the difference between the actual and determined inflation rates for 2024 (+0.9 p.p. on average) was not as significant as in the previous years of RP3, it contributed to further increase the weighted cumulative difference between actual and planned inflation indexes to +13% in 2024, with seven Member States reporting differences exceeding +20%: Estonia (+30%), Hungary (+29%), Czech Republic (+26%), Poland (+23%), Slovakia (+23%), Bulgaria (+21%), and Croatia (+21%). As a result, the Union-wide actual costs were higher in nominal terms compared to determined (+5.2%), while lower in real terms (-4.1%).

94 This discrepancy suggests that ANSPs' costs are not keeping pace with inflation. As already indicated in the 2022 monitoring report, this difference may be due to i) a disconnect between ANSPs' costs and general inflation trends; and/or ii) potential biases in the inflation index used, which may not accurately reflect the ANSPs' cost nature. The NSAs should conduct a thorough analysis of the actual cost increases experienced by ANSPs to ensure that airspace users are not overcharged through the inflation mechanism laid out in Article 26 of the Regulation. This analysis should focus on identifying which costs have increased due to inflation and those that have not. Based on this analysis, NSAs should calculate the appropriate portion of the inflation adjustment that reflects the real cost increases and require the reimbursement to airspace users, as done in respect of 2023 by several Member States. Additionally, NSAs must ensure that there is no double counting of inflation between the inflation adjustment and the amounts claimed in the cost risk sharing mechanism.

6.3 *Cost differences in Member States with approved capacity deviation plan for RP3*

95 In their submitted performance plans, 11 Member States initially presented a deviation from the criteria to achieve capacity targets (criterion d) i) of Section 1.4 of Annex IV of the Regulation). This deviation was considered justified for five Member States. Out of these, two Member States reported lower actual costs compared to planned for 2024: Czech Republic (-7.1M€$_{2017}$, or -6.2%) and Portugal (-3.6M€$_{2017}$, or -2.5%). Three Member States reported higher actual costs compared to planned for 2024: Hungary (+2.3M€$_{2017}$, or +2.0%), Poland (+2.9M€$_{2017}$, or +1.5%) and Slovakia (+2.1M€$_{2017}$, or +3.7%).

96 None of the five Member States achieved the 2024 en route capacity target. Since 2021, the five Member States have underspent -168M€$_{2017}$ (-6.7% on average) compared to the planned total costs: Czech Republic (-43M€$_{2017}$, or -9.9%), Hungary (-26M€$_{2017}$, or -6.1%), Poland (-72€$_{2017}$, or -9.5%), Portugal (-17M€$_{2017}$, or -3.1%), and Slovakia (-10M€$_{2017}$, or -4.9%).

97 This cost evolution raises concerns, as there is little evidence, to date, that the additional funds allocated to address capacity deviations have been effectively utilised to resolve the associated issues. For instance, apart from Slovakia, the relevant Member States have consistently failed to

[16] For Sweden, the difference is due to the lower pension debt resulting from the higher interest rates. This is recorded under the exceptional items because this does not reflect a genuine cost reduction but a future pension obligation.

[17] The amount presented includes 88M€$_{2017}$ of revenue gap for Norway, which will be financed by the Norwegian State and as a result will not be charged to the users.

achieve the planned number of ATCOs each year since 2021.

98 The deviations in cost-efficiency targets were permitted contingent upon the implementation of specific planned measures. While the PRB acknowledges the challenges faced by ANSPs in fully implementing the approved measures, airspace users should not bear these costs without commensurate improvements in capacity. For this reason, the PRB took into consideration the implementation of the RP3 performance plans when assessing the RP4 plans and recommends the NSAs concerned to submit a detailed report of planned capacity-related measures implemented during RP3. Should some of the RP3 planned measures not be implemented, the NSAs should ensure the reimbursement to airspace users of investment related amounts and consider requiring the reimbursement of other amounts received by ANSPs for measures not implemented.

6.4 Verification of cost eligibility

99 The NSAs must ensure the eligibility of the costs charged as part of the cost base for air navigation charges: In Article 15(2) of Regulation (EU) 550/2004, the Member States/ANSPs are only allowed to include items in their cost base (determined costs) which are related to eligible air navigation services and facilities.

100 As mentioned in the PRB Chair letter to the NSAs on 2nd December 2022, costs relating to U-space and to ANS provision in third countries are not eligible for inclusion in the cost base. In addition, the costs relating to these services should be identified separately in the ANSPs' accounts.

101 In the monitoring reports, the NSAs were requested to report the findings of their verifications of actual costs, and where applicable, the corrections made to the actual costs following this verification. Four NSAs reported that they are still in the process of verifying costs (Bulgaria, Poland, Romania, and Spain). Five NSAs reported corrections made to the actual costs after verification (Cyprus, Finland, Germany, Malta, and Sweden). No corrections were reported by the remaining NSAs.

102 Two NSAs (Lithuania and Slovakia) reported that the costs for non-ANS activities or ANS provided to third countries have been presented separately in the ANSPs accounts as required in Article 12(3) of Regulation 550/2004. Three NSAs (Italy, Spain, and Germany) are still conducting verifications. One NSA (Poland) did not provide sufficient information. Finally, most NSAs (23) reported that they had verified that such costs had been excluded from the en route cost base. The Member States concerned should take immediate action to enforce the application of Article 12(3) of Regulation 550/2004 and that the NSAs concerned provide more detailed information on their oversight activities regarding the compliance of cost eligibility.

6.5 En route costs by cost entity

103 This section analyses actual and determined 2024 costs for the individual entities defined in the performance and charging scheme (ANSPs, MET, NSA, and Eurocontrol). A summary of the results is presented in Table 9 (next page).

104 The Union-wide en route actual costs for 2024 amounted to 6.1B€$_{2017}$. 89%, or 5.4B€$_{2017}$, of these costs were attributable to the ATSPs/CNSPs. Their actual costs were -4.6% below the determined costs (5.7B€$_{2017}$). When excluding the negative exceptional costs for Sweden, actual costs were -1.2% below the determined costs.

105 The costs for the MET providers for the year 2024 amounted to 184M€$_{2017}$, or 3.0% of the Union-wide en route total actual costs. Actual MET costs were -6.2% below the determined values (197M€$_{2017}$).

106 NSAs' 2024 costs were 125M€$_{2017}$, equivalent to 2.0% of the Union-wide en route total actual costs. Actual NSA costs were +4.5% above the determined values (119M€$_{2017}$). Under the Regulation, NSAs' costs are not corrected for inflation for charging purposes. If they were corrected for inflation, the actual NSAs' costs would be -7.2% below the determined values.

107 Eurocontrol's actual 2024 costs reported by the SES States amounted to 369M€$_{2017}$, representing 6.0% of the Union-wide en route total actual costs.[18] 30M€$_{2017}$ have been deducted from Eurocontrol's actual costs due to a one-time adjustment related to unspent credits used by Eurocontrol for Connecting Europe Facility (CEF) projects in 2022.

[18] The actual Eurocontrol costs for 2024 are based on the provisional figures made available by Eurocontrol in May 2025.

Comparison of 2024 actual and determined en route costs by entity				
	Actual costs (M€$_{2017}$)	Determined costs (M€$_{2017}$)	Difference (M€$_{2017}$)	Difference (%)
Union-wide total costs	**6,132**	**6,394**	**-262**	**-4.1%**
ATSP/CNSP	5.455	5,709	-255	-4.5%
MET	184	197	-12	-6.2%
NSA	125	119	+5	+4.5%
Eurocontrol	369	369	-0.3	+0.1%

Table 9 – Comparison of 2024 actual and determined en route costs by entity (source: PRB elaboration).

108 Eurocontrol's actual costs were -0.1% lower than determined values presented in the performance plans (369M€$_{2017}$) mainly because, as for the NSAs, determined and actual costs are not corrected for inflation in accordance with the Regulation. If they were corrected for inflation, the Eurocontrol actual costs would be -11% below the determined values.[19]

6.6 En route costs by cost category

109 This section analyses actual and determined costs for 2024 across the main cost categories. A summary of the results is presented in Table 10 (next page). Detailed information by Member State is provided in the dashboard.

Staff costs

110 Union-wide en route actual staff costs for 2024 amounted to 3.9B€$_{2017}$, -1.8% below the determined costs (4.0B€$_{2017}$). The actual pension costs (which are included in the staff costs) summed to 687M€$_{2017}$, -4.7% lower than the determined values (721M€$_{2017}$).

111 At Member State level, the results show significant variation. Germany shows the greatest disparity between planned and actual staff costs in absolute values (-74M€$_{2017}$, or a -10% gap). Other Member States with significant underspends were Italy (-35M€$_{2017}$), France (-23M€$_{2017}$), and Greece (-17M€$_{2017}$). On a percentage basis, Member States with the largest percentage gap between planned and actual staff costs in en route charging zone were Finland (-19%), Malta (-17%), and Estonia (-17%). Denmark (+10M€$_{2017}$, or +21%) reported a substantial increase in staff costs beyond what was planned. Sweden recorded an increase of +22M€$_{2017}$, or +18%, which should be considered in conjunction with the significant negative exceptional item relating to pension costs, leading to an overall decrease relating to staff costs of -156%.

112 At the Union-wide level, actual ATCO FTEs were -5.8% lower than planned. At Member State level the results varied significantly ranging from -39% for Greece to +8.9% for Spain. Many ANSPs with lower actual ATCO FTEs than planned have not met their capacity targets and have generated significant delays for airspace users. The NSAs should put in place measures to ensure that ANSPs implement the relevant ATCO recruitment they committed to in their performance plans to improve capacity performance.

Other operating costs

113 Union-wide en route actual other operating costs for 2024 amounted to 1.4B€$_{2017}$, in line with the determined costs. Italy reported the highest underspend compared to the plan (-23M€$_{2017}$), followed by Czech Republic (-4.6M€$_{2017}$), Cyprus (-3.8M€$_{2017}$), Croatia (-4.3M€$_{2017}$), Greece (-3.2M€$_{2017}$), and Malta (-3.1M€$_{2017}$). The Member States with the highest overspend in other operating costs compared to plan are Switzerland (+20M€$_{2017}$), the Netherlands (+14M€$_{2017}$), Germany (+10M€$_{2017}$), Sweden (+3.9M€$_{2017}$), France (+2.7M€$_{2017}$), and Norway (+1.3M€$_{2017}$).

114 When analysing the percentage difference, 10 Member States reported underspending by more

[19] The determined Eurocontrol costs presented in the RP3 performance plans were based on Eurocontrol's budgets established in 2021 and in 2022.

than 5% of the determined costs, with Malta (-39%), Czech Republic (-19%), Croatia (-16%), and Italy (-15%) being the largest. At the other end of the spectrum, Switzerland presented the largest overspend (+57%).

Depreciation costs

115 Union-wide actual en route depreciation costs for 2024 amounted to 724M€$_{2017}$, or -8.1% below the determined costs (788M€$_{2017}$). In terms of absolute values, Germany, which underspent -18M€$_{2017}$ (-20% of determined values), showed the largest variation between determined and actual depreciation.

116 When analysing the percentage difference, 19 Member States were more than 5% below their determined costs. Greece (-86%), Malta (-48%), Norway (-25%), and Estonia (-21%) reported the largest percentage underspend for en route charging zone, while Latvia (+42%) reported the largest percentage overspend.[20]

Cost of capital

117 Union-wide en route actual cost of capital for 2024 amounted to 276M€$_{2017}$, some +10% above the determined costs (250M€$_{2017}$), with significant variation at Member State level. Spain Continental was the largest contributor to this difference, with +10M€$_{2017}$ more than planned (+39%). Italy (+7.8M€$_{2017}$), the Netherlands (+7.4M€$_{2017}$) and Norway (+5.7M€$_{2017}$), are other examples of large differences. 12 Member States reported actual cost of capital at least 5% higher than the determined values for en route charging zone, while 13 Member States reported at least 5% lower than the determined. Greece (-75%), Germany (-39%), Austria (-29%), and Finland (-27%) were the Member States showing the largest lower actual cost of capital compared to plan.

118 The difference was mainly attributable to higher actual interest rates on debt than foreseen in the performance plans (on average +0.6 percentage points), while the total asset base was +6.5% higher than determined and the gearing of the ANSPs remained overall in line with the performance plans.

Exceptional costs

119 Union-wide en route exceptional costs for 2024 amounted to -180€$_{2017}$, corresponding to a decrease of -152M€$_{2017}$ below the determined costs of -28M€$_{2017}$. The main contributor to the difference was Sweden (-185M€$_{2017}$), due to a one-time effect on pension costs resulting from increased interest rates that reduced the pension debt.

Comparison of 2024 actual and determined en route costs by cost category				
	Actual costs (M€$_{2017}$)	Determined costs (M€$_{2017}$)	Difference (M€$_{2017}$)	Difference (%)
Union-wide total costs	**6,132**	**6,394**	**-262**	**-4.1%**
Staff costs	3,930	4,001	-72	-1.8%
Other operating costs	1,401	1,401	-0.4	0.0%
Depreciation costs	724	788	-64	-8.2%
Cost of capital	276	250	+25	+10%
Exceptional costs	-180	-28	-152	548%
Costs for exempted VFR flights	19	20	-0.6	-3.3%

Table 10 – Comparison of 2024 actual and determined en route costs by cost category (source: PRB elaboration).

[20] As reported by the NSA, the overspent is related to the commissioning of investments that had been delayed since 2020.

6.7 Costs related to investments

120 The costs related to investments include cost of capital, depreciation costs, and leasing costs for new and existing investments. The costs relate to the investment plans which are included in the performance plans.

121 The en route and terminal actual costs for investments in 2024 amounted to 1.1B€$_{2017}$. Member States spent -88M€$_{2017}$ (-7.2%) less than determined (1.2B€$_{2017}$).[21] The gap was due to different payment cycles, postponements, and/or delays in investments. There was significant variation between Member States (e.g. Greece -88%, Malta -47%, Germany -23%, Slovakia +21%). The digital dashboard provides a detailed analysis at Union-wide level and per ANSP of the costs related to investment.

122 When considering the data submitted in the NSA reports on the verification of cost risk sharing for 2024 (September 2025), the difference to be reimbursed to airspace users via cost risk sharing mechanism, in accordance with Article 28 of the Regulation equals -88M€ (of which -51M€ for en route and -37M€ for terminal charging zones).[22]

6.8 Actual unit cost incurred by users (AUCU)

123 The actual unit cost incurred by users (AUCU) is calculated separately for en route and terminal as the sum of the determined unit costs and the adjustments stemming from the year divided by the actual traffic. The AUCU expressed in nominal terms and in local currency for each Member State is detailed in the digital dashboard. In this section, the Union-wide AUCU is presented in nominal euros.

124 The AUCU, in a specific year, can be interpreted as the "true" unit cost of the service from the airspace users' point of view. It reflects the price per service unit that is charged *in fine* to users for the services provided in the year. It includes the determined cost of the specific year and "anticipates" the costs/reimbursements related to the adjustments incurred during that year that would be charged or reimbursed in future years' unit rates in accordance with Article 25(2) of the Regulation.

125 The Union-wide en route and terminal AUCU for the year 2024 are shown in Table 11. The true cost per en route service unit in 2024 was +5.6% (or +2.98€) higher than the DUC, and the true cost per terminal service unit in 2024 was -5.2% (or -10.38€) lower than the DUC. The main difference for en route stems from the inflation adjustment, while from other revenues and the inflation adjustment for terminal.[23]

	Actual Unit Cost for Users 2024 (nominal €)	
	En route	Terminal
DUC	53.43	198.02€
Inflation adj.	+5.12	+20.48€
Cost exempt cost risk sharing[24]	-1.12	-6.41
Traffic risk sharing adj.	-0.12	+6.16
Traffic adj. (costs)	-0.10	+0.06
Financial incentives	-0.14	-0.19
Modulation of charges	0	-0.23
Cross-financing	0	0
Other revenues	-0.66	-22.68
Application lower unit rate	-0.002	-7.57
Total adj.	+2.98 (+5.6%)	-10.38 (-5.2%)
AUCU	56.41	187.64

Table 11 – 2024 Union-wide actual unit cost incurred by users (AUCU) (source: PRB elaboration).

[21] En route actual 942M€$_{2017}$, en route determined 994M€$_{2017}$. Terminal actual 185M€$_{2017}$, terminal determined 220M€$_{2017}$. According to the monitoring reports submitted by the Member States, the total actual costs of investments for 2024 were 1.1B€$_{2017}$, -88M€$_{2017}$ (or -7.2%) lower than determined (1.2B€$_{2017}$).

[22] As of the date of this report's publication, the NSA of Malta has not submitted their reports on the verification of cost risk sharing for 2024. Consequently, the data presented in the paragraph does not reflect the adjustments that may arise from Malta's cost risk sharing mechanism.

[23] Data regarding cost exempt from cost risk sharing (items of Article 28(3)) are based on the NSA Report on the verification of cost risk sharing submitted in September 2025.

[24] Items of Article 28(3).

6.9 Regulatory result

126 The PRB calculates, for each monitoring period, the “regulatory result”. This corresponds to the revenues (or losses) generated by the activities of a specific year that exceed (or are lower than) the direct and indirect operating costs of an ANSP and so provides for a reasonable return.

127 The notion of regulatory result focuses on the ANSP results stemming from the ANS activity in the year. It is therefore different from the net accounting profit disclosed in ANSPs financial statements. In addition, it does not consider any opportunity cost. The regulatory result, when expressed as a percentage of revenue, can be equated to a “margin” generated by the ANSP with respect to the activity of the year, but it is not comparable to the margin that would be calculated straight from an ANSP’s financial statements. For each ANSP, the regulatory result is calculated as the sum of the embedded monetary value of the return on equity (RoE), the cost risk sharing result (including the inflation adjustments), the traffic risk sharing, and the incentive scheme (Table 12). The regulatory result for each ANSP is detailed in the dashboard. In this section, for the sake of consolidation at Union-wide level, it is presented in nominal 2024 euros.

128 The Union-wide en route regulatory result for 2024 is 295M€, representing 4.3% of the total yearly revenues (Table 12). The cost sharing component of the regulatory result, which accounts for 100M€ (34% of the total 2024 result), was strongly influenced by the significant inflation adjustment recorded by most ANSPs.

129 Six ANSPs recorded negative en route regulatory results in 2024: Skyguide (-44M€, or -25% of the yearly revenues), LVNL (-25M€, or -13%), NAVIAIR (-11M€, or -13%), PANSA (-9.6M€, or -4.4%), LFV (-5.8M€), skeyes (-4.3M€, or -2.8%). The ANSPs with the highest regulatory result were: ENAV (+116M€, or +18%), DSNA (+71M€, or 5.1%), DFS (+31M€, or 3.5%), and HASP (+25M€, or 14%). When presented as percentage of the yearly revenues, the ANSPs showing the highest values are: MATS (32%), EANS (19%), and ENAV (18%).

	2024 en route regulatory result (M€)
Gain/loss ANSPs cost risk sharing	135
Gain/loss ANSPs traffic risk sharing	23
Gain/loss ANSPs incentives	-19
ANSPs actual embedded RoE	195
Regulatory result	**334**

Table 12 – 2024 Union-wide regulatory result (source: PRB elaboration).

130 When divided by the actual service units, the (unit) regulatory result is directly comparable with the AUCU. The regulatory result per actual en route service unit was equal to 2.25€ in 2024, which means that 4.0% of the true cost of the service was related to the “margin” generated by the ANSPs with respect to their 2024 activities.

131 Cumulatively, for RP3, ANSPs recorded a total en route regulatory result of 2.0B€, representing +6.4% of the cumulative revenues over the five-year period. 15 ANSPs had a cumulative regulatory result exceeding 9% of total revenues, with BULATSA (18%), EANS (15%), and ENAV (15%) showing the highest percentages. The NSAs should ensure that any excessive regulatory result is either reinvested to improve the quality of services delivered to airspace users or reimbursed to them.

7 CIVIL-MILITARY COOPERATION

- The availability of military airspace for civil operations remains consistently high but the airspace users do not efficiently use the available options.
- Airspace overbooking reflects ASM strategic effectiveness, with signs of gradual improvement.
- The implementation of interoperable ASM systems at military units can further enhance the performance of the ATM network.
- The military activities continue to have only a minimal impact on air traffic delays.

7.1 Overall situation

132 Regional conflicts and geopolitical instabilities continued to impact airspace usage in several Member States, triggering a sharp rise in military traffic and the daily activation of segregated areas. Several Member States (e.g. Poland, Hungary, Lithuania, and Latvia) report substantial impacts on airspace availability and sector capacity.

133 Changes in airspace organisation and regional conflicts have added complexity, reduced flexibility and predictability in managing civil air traffic, and demanded additional civil-military coordination efforts. In this regard, some Member States reported a degradation in performance caused by intensive military exercises and poor coordination with non-national military actors.

7.2 Implementation of Flexible Use of Airspace

134 The performance of ATM in Europe also depends on the efficient use of the airspace, which is facilitated by optimised and efficient civil-military cooperation, notably through the implementation of the Flexible Use of Airspace (FUA) concept. The concept aims to accommodate all airspace users' requirements to the maximum possible extent through collaborative airspace use planning (AUP).[25]

135 All Member States have reported via current Local Single European Sky Implementation reports (LSSIP), full implementation of FUA, except for Malta that is excluded from the requirement. The situation regarding the deployment of airspace management (ASM) technical systems has sightly evolved compared to the previous years. Most of the Member States (Figure 17) use or are implementing the Eurocontrol-developed and the NM-supported free software tool LARA (Local and Sub-regional airspace management support system) that conforms to the regulatory requirements related to the application of FUA. However, the implementation of adequate supporting systems, as required by Article 5(3) of Regulation 2150/2005, remains an ongoing issue. As in the previous years, based on the NSA reports, the level of utilisation of ASM tools at military units is not uniform nor always interoperable, which could reduce the expected performance within the European ATM Network (e.g. by not being able to provide ASM data in real time as required by the Regulation).

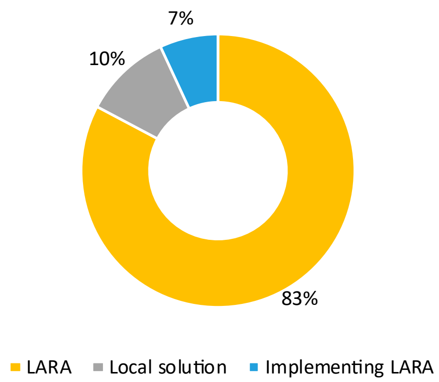

Figure 17 – Implemented airspace management (ASM) support systems (source: PRB elaboration on LSSIP data).

7.3 Monitoring the civil-military cooperation

136 The Regulation identifies three performance indicators to monitor the use of and impact of airspace reservations (Annex I, Section I, 2.2 c, d, and e):

- The effective use of reserved or segregated airspace (ERSA), calculated as the ratio between time initially requested for an airspace allocation and actual use of that time, as reported to the Network Manager;
- The rate by which airspace users can plan their flights via available airspace structures[26]

[25] The airspace planning process is described in detail here.
[26] Conditional routes (CDR) and restricted or segregated airspace (RSA).

to fly the shortest route while considering the airspace the military has released (RAI); and

- The rate by which airspace users are actually using the available airspace structures also considering the airspace the military has released (RAU).

137 The Regulation also establishes a key performance indicator for the monitoring of the capacity KPA that provides an indicative value to use if the ASM delay cause is considered:

- The average minutes of en route ATFM delay per flight attributable to air navigation services (ASM delay causes).
- All indicators are calculated and monitored both at local and at Union-wide levels.

138 The Regulation does not establish targets for the civil-military cooperation but encourages Member States to add a military dimension in local performance plans (Article 8(4)). To date, no Member State has developed such targets.

7.4 Use of reserved airspace

139 Reserved airspace can hinder efficient flight route planning. The European network provides two different reserved airspace-crossing options in FRA and non-FRA airspace. While in non-FRA airspace traffic uses conditional routes (CDR) to transit military reservations, in FRA, a reserved volume of airspace could be transited at any point. The availability of the crossing options is measured via a rate of conditional routes availability (RoCA) and a rate of airspace availability (RoAA). Due to the differences in both concepts, the indicators must be analysed separately for FRA and non-FRA.

140 The data provided by the NM reveals a generally modest to positive trends in airspace availability and utilisation, but with significant variations among Member States. Both RoCA and RoAA values maintain stable around 95%. Actual interest and use of available airspace is measured via RAI and RAU indicators, respectively for FRA and non-FRA airspace (Figure 18 and Figure 19).

141 Within non-FRA airspace the CDRs remain available, but underutilised. The stable/slight decrease in RAI and RAU (Figure 18) suggests incremental awareness, but structural reliance on business-preferred alternate routing and operational habits. Most airspace users did not flight-plan on available CDRs despite potential benefits.

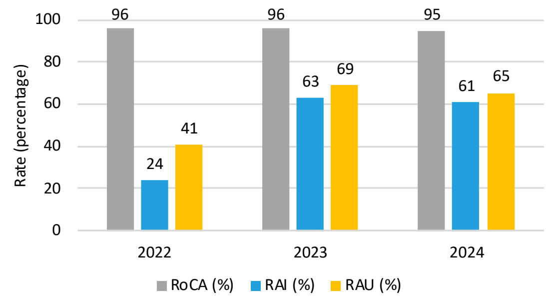

Figure 18 – The rate of availability (RoCA), planning (RAI), and using (RAU) the available conditional routes CDR for flight planning (source: PRB elaboration on NM data).

142 In FRA airspace, all indicators show high structural availability (RoAA) but modest and stable actual civil use for planning and actual flight operations (Figure 19).

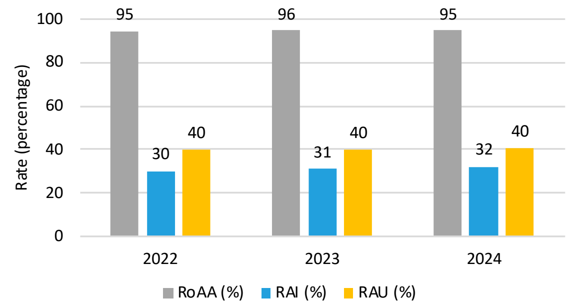

Figure 19 – The rate of availability (RoAA), planning (RAI), and using (RAU) the available restricted and segregated airspace for flight planning (source: PRB elaboration on NM data).

143 RAI and RAU values in both FRA and non-FRA airspace remained flat or slightly declined. This points to a lack of dynamic access to route options that would allow business-optimal trajectories (user-preferred routing). Despite regulatory support and high levels of structural availability, the system does not yet make full operational use of released military airspace. Airspace users are not benefiting from optimally efficient routes. It is unclear if this lack of optimisation is due to safety concerns.

144 As in the previous years, airspace users are defaulting to conservative or predetermined routings, even when other options exist. Improvements in dynamic ASM data sharing, airspace user awareness, and flight planning behaviour might be needed to bridge the gap between availability and actual utilisation.

145 Reserved airspace must be used efficiently to justify any restriction it can impose on other users' flight planning. The effective use of reserved airspace is monitored via the ERSA indicator that

primarily measures how effectively airspace is allocated and used (Figure 20). The higher the value is, the more successful the military is in estimating its airspace needs. As calculated by the Network Manager, the Union-wide ERSA slightly decreased to 90%. In 2024, airspace utilisation effectiveness measured by Member States improved from 59% (2023) to 62% (2024). Member States' values indicate that airspace overbooking is still present, impacting airspace availability for flight planning. However, compared to the previous years, fewer Member States provided data regarding the allocated and used hours.

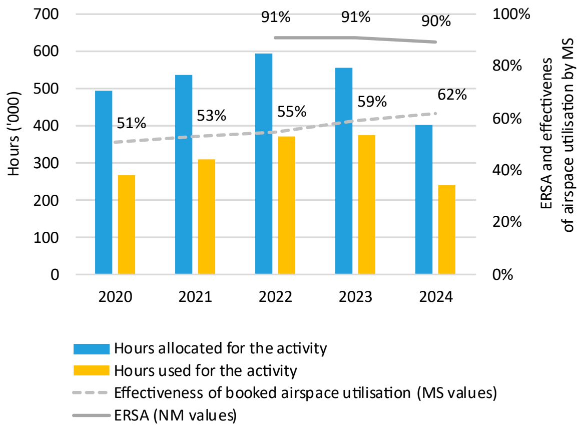

Figure 20 – Number of hours of airspace initially reserved for the Military versus actual hours used (source: PRB elaboration), indicating the rate of use is improving.

7.5 Delays caused by military activities

146 Military activity is often quoted as a source of delays. The overall ratio of delays attributable to the ASM and military activities compared to other causes remains below 2.5% (Figure 21) for the last five years. In 2024, the value of ASM-related delays decreased to 0.9%, despite growing traffic levels.[27]

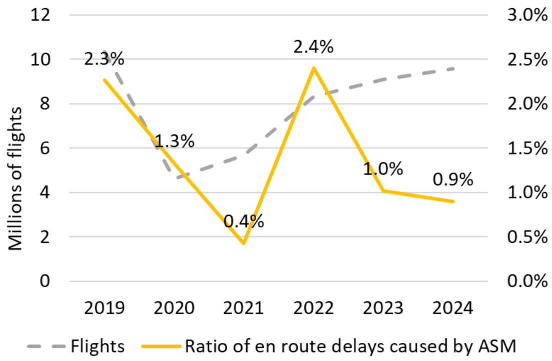

Figure 21 – Ratio of ATFM en route delays attributable to ASM activities (source: PRB elaboration).

[27] Such impact may be slightly higher, given that some of the military activities may be recorded as special event or routing related categories. A detailed analysis is not possible due to a lack of data.

8 NETWORK FUNCTIONS FRAMEWORK FOR MONITORING THE NETWORK MANAGER FUNCTION

- The Network Manager has achieved the safety RP3 targets already in 2023.
- The environment target was not achieved in 2024, largely driven by the continued impact of Russia's war of aggression against Ukraine and a lack of en route capacity.
- Measures initiated by the Network Manager saved 11% of en route ATFM delays, achieving the 2024 target.
- The Network Manager's approved 2024 budget is -11% lower than the cost-efficiency target in the Network Manager's performance plan.

8.1 Framework for monitoring the Network Manager function

147 The legal framework governing the activities of the Network Manager (NM) for its task within the Single European Sky is defined in Commission Implementing Regulation (EU) 2019/123. The Regulation tasks the Commission with approving the Network Performance Plan (Article 19) and with monitoring the performance of the network functions as well as assessing whether the performance targets contained in the Network Performance Plan are met (Article 37(2)). The PRB is assisting the Commission in this task (Article 3(k)). This chapter summarises the results of this monitoring.

148 All data used for this monitoring is provided to the PRB by the NM and is endorsed by the Network Management Board. As in the previous years, the PRB requested and received additional data from the NM to better understand the impact of the NM's actions.

8.2 Safety

Effectiveness of safety management

149 The safety key performance indicator for the NM is the level of the effectiveness of safety management (similar to the effectiveness of safety management KPI described for ANSPs).

150 The NM planned to achieve level C or above in all Management Objectives other than safety risk management by 2023. For safety risk management, the NM planned to achieve level D in 2024. In 2024, the NM achieved level D in safety policy and objective and in safety risk management and level C for all other Management Objectives. The maturity levels have been verified by EASA. Consequently, NM has achieved the RP3 targets one year before the end of the reference period.

Over-deliveries of aircraft into regulated sectors

151 In addition to the KPI relating to the effectiveness of the safety management systems, the NM is required to collect data on the over-delivery of aircraft into sectors, where ATFM regulations are applicable. This indicator is a measure of the extent to which (number of flights) the capacity limits are exceeded for a sector where ATFM regulations are imposed.

152 The NM reported that the over-delivery indicator increased from 9.3% in 2023 to 10.4% in 2024 (Figure 22, next page). The most notable rise occurred in en route regulation during the June–August period, with levels returning to those last seen in 2017–2019. Not only did the rate increase during this period, also the number of time intervals with over-deliveries was higher. Among the ACCs with a high number of regulations, Karlsruhe, Zagreb, and Vienna experienced a marked increase in the OVD indicator in 2024 compared to both 2023 and 2019.

153 The NM has, over the years, implemented various actions and initiatives to reduce volatility and improve flight planning (e.g. to remove Yo-Yo flights plans and flight plans with sharp turn angles) and keep airborne flights as close as possible to the flight plan. The objective is to reduce the need for airborne changes to reduce time deviations from the plan and to capture all the flights in regulations as early as possible). The NM should work to further enhance the initiatives, together with relevant stakeholders, to contain and where possible reduce over-deliveries.

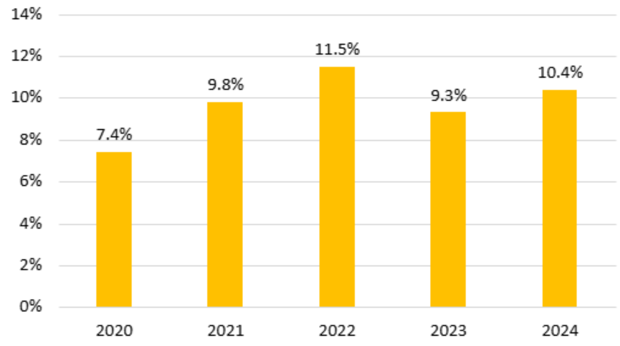

Figure 22 – Percentage of over-deliveries since 2020 (source: PRB elaboration), showing that performance degraded between 2023 and 2024.

8.3 Environment

154 The environment KPI for the NM measures the efficiency of the European route network and how airspace users plan their routes in terms of horizontal flight efficiency (i.e. KEP, which is similar to the environment performance indicator for Member States).

155 The KEP target in 2024 was not achieved, with a value of 4.59% compared to a target of 3.73% (Figure 23). This deficit was largely driven by the continued impact of Russia's war of aggression against Ukraine.

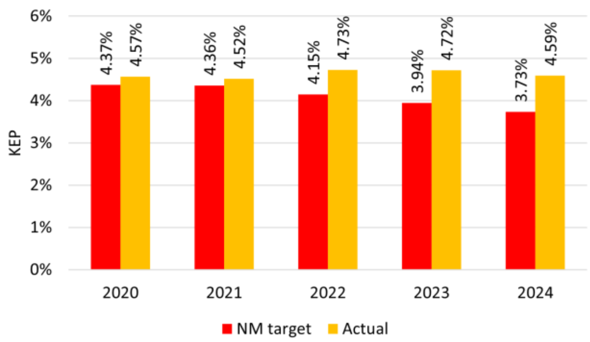

Figure 23 – Network Manager KEP target and performance achieved, showing the 2024 target was not achieved by 0.86 percentage points.

156 The inefficiency of the route network design (RTE-DES) improved to 1.64% with a reduction of 0.15 percentage points compared to 2023. The NM notes that the SCR improved by 0.10 percentage point in 2024 achieving the value of 1.64%.

157 The additional information provided by the NM to the PRB regarding the Group Re-Routing Tool noted the difficulty of measuring the actual impact of the tool. However, it is estimated that the acceptance of rerouting proposals worsened to 2.8% in 2024.[28] The number of proposals offered decreased from 1000k to 840k. Although fewer flights were proposed, the NM noted that work is ongoing to improve the process and tools to generate route proposals for airlines. This collaboration with airlines and ANSPs continues to support fuel and cost saving, as well as enhancing network predictability and operational efficiency. In its 2022 monitoring report, the PRB concluded that further cooperation is necessary to fully realise the potential benefits highlighted by the NM. Achieving this should remain a key objective for the NM.

8.4 Capacity

158 There are two KPIs in the performance area of capacity for the NM:

- The share of en route ATFM delay savings due to collaborative decision making (CDM) network procedures, and Network Manager Operations Centre (NMOC) actions.[29]
- The percentage of arrival ATFM delay savings from the collaborative decision-making network procedures and NMOC actions.

159 Table 13 (next page) shows the capacity performance achieved by the NM in 2024. The NM achieved both the target on en route ATFM delay savings and the target on arrival ATFM delay savings.

160 The total number of en route ATFM delay minutes increased further once again after 2023. The NM contributed to saving 11% of the total en route ATFM delay, saving 2.8 million minutes of delay, slightly more than in 2023. While the total amount of delay minutes saved increased, the percentage value was lower compared to 2023 by 0.9 percentage points.

[28] The NM states the acceptance rate is an under-estimation. Analysis performed by the NM shows a much higher uptake rate, which is not captured because of the strict mechanism of matching the route proposal with the new filed flight plan following the proposal.

[29] The Network Manager stated that delay savings were calculated conservatively and take into account rerouting proposals and NMOC direct action (i.e. forced overrides of ATFM regulations).

Network Manager capacity KPI targets and actual values in 2024		
	Target	Actual
Percentage of en route ATFM delay savings	10.0%	11%
Percentage of arrival ATFM delay savings	5.0%	9.6%

Table 13 – Comparison of capacity KPI targets and actual performance of the Network Manager.

161 Despite the actions carried out by the NM, actual values of the key network performance indicators show a further deterioration of performance in 2024 compared to 2023. The NM also noted that volatility was highest in the network in the past seven years. The key drivers behind the deterioration were the high traffic growth at some ACCs, the structural lack of capacity, the under delivery of the capacity planned in the NOP, and the increased complexity of the network. On the better side, the average daily percentage of ATFM regulations with less than 200 minutes of ATFM delay decreased slightly compared to 2023, and the average proportion of weekend ATFM delays remained stable. The values of the network performance indicators are shown in Table 14.

Network Manager capacity PIs, actual values in 2024 and in 2023		
	2024	2023
Number of flights with ATFM delay greater than 15 minutes	6.4%	5.7%
Avg. daily percentage of ATFM regulations with less than 200 minutes of delay	45%	49%
Average proportion of weekend ATFM delays	33%	32%

Table 14 – Network performance indicators, actual values in 2024 and 2023. Source: Network Manager Annual Report.

8.5 Cost-efficiency

162 The cost-efficiency performance indicator for monitoring is the actual unit cost for the execution of the NM tasks. The indicator is calculated as the ratio of actual costs to service units at the level of the geographical area where the Network Manager executes its tasks.

163 The NM's approved 2024 budget (141M€$_{2017}$) is -18M€$_{2017}$ (-11%) lower than the planned costs (158M€$_{2017}$).[30] The actual en route service units for the Network area in 2024 (182.3M) is +18M (+11%) higher than the planned services units (164.5M) (based on STATFOR May 2021 base forecast). The actual inflation index (128) was +14 percentage points (or +12%) higher than the determined inflation index used in the NM's performance plan (114).

164 As a result, the actual unit cost in 2024 for the Network Manager was 0.77€$_{2017}$, which is -20% lower than the determined unit cost (0.96€$_{2017}$) (Table 15).

[30] In 2022, the NM implemented a new methodology regarding the internal tax on remuneration, a change that occurred after the approval of the performance plan. This approach led to a reduction of the nominal costs planned in the performance plan, with a decrease of -13M€ (or -6.6%) for 2023 and -15M€ (or -7.5%) for 2024. The determined costs referenced in this report are adjusted to accommodate the revised approach.

Network Manger cost-efficiency KPI 2024		
	Performance plan	Actual
Unit cost of the Network Manager tasks (€$_{2017}$)	0.96	0.77

Table 15 – Comparison of cost-efficiency KPI and actual performance of the Network Manager.

165 The NM reported several measures to improve its cost-efficiency. In 2024 the estimated impact of these measures amounted to 15M€ in nominal terms (or 11M€$_{2017}$ in real terms). These measures included i) stopping flight plan processing at the IFPU (integrated initial flight plan processing system unit); ii) stopping the duplication of IT; iii) consolidating data centres and cloud services; iv) hiring at lower entry grades (admin reform); v) extension of Infrastructure monitoring within existing cost base; vi) growth of Data Services within existing cost base; vii) review and enhanced management of largest IT contracts.

166 Regarding the investments, the NM reported one investment (iNM) that was above the 5M€ of asset value. The reported actual 2024 CAPEX of this project amounts to 84M€, which is +80% compared to the planned (47M€).

9 INTERDEPENDENCIES BETWEEN KEY PERFORMANCE AREA

- Member States confirmed in their performance plans that retaining safety levels has priority over other performance areas and that the changes planned during RP3 should not degrade safety.
- Lagging performance indicators (RIs and SMIs) show positive developments over RP3 until 2023 but increased in the last year of RP3.
- The PRB estimated that 0.24 percentage points of the increase in KEA was the consequence of the increased delays in 2024.
- In 2023 ANSPs provided capacity at similar cost compared to 2019.

9.1 Interdependencies relating to the safety KPA

167 To ensure the safety of services provided by ANSPs, the Commission Implementing Regulation (EU) 2017/373 defines the safety management system that ANSPs must have in place (safety policies and objectives, safety risk management, safety assurance and safety promotion) and the processes ANSPs need to apply when changing the functional system.[31]

168 Compliance with these regulatory requirements should ensure that safety levels are not compromised when implementing changes to airspace, staffing, or ATM functional systems.

169 In addition, ANSPs are required by Commission Implementing Regulation (EU) 2017/373 to define and monitor safety performance through indicators. The EoSM also requires definition of safety indicators to monitor safety performance for the maturity level set as the RP3 target level. As only four ANSPs reported the use of additional safety indicators (in addition to those prescribed by the performance and charging regulation), the use of indicators to monitor the interdependency between the Safety KPA and other KPAs may be limited currently, or at least not reported.

170 The prescribed indicator on RIs has improved over RP3, i.e. rate has been decreasing up to 2023 but increased in 2024. The rate remains below the rate when starting RP3. The SMIs rate was also decreasing through the RP3 period but rose sharply in 2024 to a rate higher than it was when starting RP3. Automated Safety Data Recording Systems have provided useful information when deployed as an internal monitoring and learning tool and are ideally suited to the monitoring of RI and SMI events.

171 At the end of RP2, only three ANSPs were unable to achieve the RP2 target maturity (LGS, LFV and CYATS). At the end of RP3, the number of ANSPs unable to achieve the target equals eight. It is recognised that RP3 was challenging for many reasons: Dramatically fluctuating traffic numbers and shifts of the traffic flows caused by the Russia's war of aggression against Ukraine, the geopolitical situation in the Middle East, the multi-facetted impact of the COVID-19 pandemic and that the Safety KPI, EoSM, was made more challenging for RP3. The growing (high) number of ANSPs not achieving the RP3 target poses the question if interdependencies have been properly managed. The challenges listed above required significant resources be reallocated across all KPAs. The fact that so many ANSPs were unable to meet their planned-for targets may indicate that the interdependencies created by the challenges were too great for the organisations to resolve, that the internal processes required to address the reallocation of resources were not sufficiently elastic to meet the challenges.

172 Therefore, contingency resources allocated to Safety maturity of the management systems may have been insufficiently provided for in the performance plans or it was not possible for such an adjustment that would permit the required progress towards the targets. Regardless, the ANSPs and Member State authorities who acknowledged the risk that they may not meet the targets, and implemented corrective actions to address the issues should be commended as they have taken active steps to address weaknesses.

[31] Commission Implementing Regulation (EU) 2017/373 laying down common requirements for providers of air traffic management (air navigation service and other air traffic management network functions and their oversight).

9.2 Interdependencies between the environment and capacity KPAs

173 The previous PRB Annual Monitoring Report highlighted that Russia's war of aggression against Ukraine and the higher en route ATFM delay observed in 2023 (compared to previous years) contributed to significantly worsen horizontal flight efficiency. In 2024, the capacity target has not been achieved with the gap between actual performance and the target increasing. In 2024, en route ATFM delay reached 2.19 minutes of delay per flight, 1.69 minutes above the target; a deterioration of 0.35 minutes compared to 2023.

174 Russia' s war of aggression against Ukraine, the geopolitical situation in the Middle East, and capacity not meeting the traffic demand have all contributed to missing the KEA target by 0.56 percentage points.

175 Based on the outcome of the interdependency study, the PRB estimates that 0.24 percentage points of the value of KEA is caused by the deterioration in the capacity KPA beyond the Union-wide target.[32,] In terms of fuel burn, this equates nearly to 87M kg of excess fuel burnt or 273M kg of excess CO_2 compared to what would be expected if the Union-wide targets were achieved.

176 This interdependency highlights the impact that the lack of capacity has on ATM performance and the importance of ensuring the provision of capacity, in a timely manner, to match traffic demand.

9.3 Interdependencies between the capacity and cost-efficiency KPAs

177 Since the Annual Monitoring Report 2021, the PRB has monitored the interdependency between cost-efficiency and capacity by examining the ratio of capacity provided to the costs associated with providing this capacity. The capacity provided is measured as the sum of sector-opening hours in a year, while costs are measured as the actual en route total costs for the same year. Table 16 shows an improvement in this metric in 2024 compared to 2023 and 2019. The operational efficiency of Area Control Centres improved, with this indicator for the first time better than 2019. This indicator cannot be considered in isolation and should be viewed in the context of other factors such as the delay situation. The average en route ATFM delay was record high in 2024 in the past 15 years, 30% higher than in 2019, thus incurring additional costs to airspace users. It is not clear if and when ANSPs will be able to translate operational efficiency into improved capacity performance.

Evolution of Union-wide actual costs per sum of sector-opening hours		
2019	2023	2024
2,538	2,548€$_{2017}$/h	2,498€$_{2017}$/h

Table 16 – Union-wide total costs per sum of sector-opening hours of 2024 compared to 2023 and 2019. (source: PRB elaboration on DDR AIRAC datasets and monitoring data). There was an improvement compared to both 2023 and 2019 levels.

178 Another key aspect of the interdependency between capacity and cost-efficiency is how investments in ATM systems and other elements of the infrastructure contribute to capacity provision. ANSPs continued to invest into ATM system upgrades and new system implementations, as well as additional ATCO tools to improve capacity performance. While some of these investments had visible benefits in terms of increased sector capacities, the full benefit of these cannot be realised until the shortage of ATCOs is also resolved.

179 The PRB reiterates its view that NSAs should require all system transitions are accompanied by an appropriate capacity study, a process to estimate anticipated benefits, and subsequent monitoring to identify, quantify and report on the actual benefits achieve.

[32] Calculated by taking the difference between the actual performance and the target (1.69) and multiplying by the impact that PRB study calculated each minute of en route ATFM delay per flight has on horizontal flight efficiency (0.14). 1.69 x 0.14 = 0.24 percentage point increase in horizontal flight efficiency as a result of 1.69 minutes of additional delay per flight compared to the Union-wide target. The report can be consulted here.

10 CONCLUSIONS AND RECOMMENDATIONS

180 This version of the report was developed by the PRB secretariat and does not include the executive summary, and the conclusions and recommendations. The Performance Review Board will publish them later in 2025.