PRB | Performance review body of the single european sky

2022 Traffic Light System for Environmental Performance

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1 ABOUT THE DOCUMENT

1 The traffic light system for environmental performance (Traffic Light System) forms part of the PRB annual monitoring process. This report presents the results of the Traffic Light System for the year 2022, including the details of the methodology, and the scorecards, which visualise the 2022 environmental performance of Member States. The report is accompanied by a common response document which considers the feedback received from the Member States on a previous draft.

2 The Traffic Light System presents the information relating to environment performance captured within the Commission Implementing Regulation (EU) 2019/317 (hereafter the Regulation) in a simplified manner.[1] It rates the performance of the horizontal flight efficiency for each Member State against the Union-wide targets and assesses the performance in the terminal zone and taxi-out phases of operation.[2]

3 The objective of the Traffic Light System is to alert each Member State to environmental performance and to highlight areas where ANSP(s) can potentially improve. [3] This is a useful tool to promote discussion, notwithstanding its limitations (outlined in the previous report).[4]

4 Following the European Green Deal, all EU Member States are required to reduce greenhouse gas emissions by 55% before 2030, a goal to which all sectors of the economy must contribute, including the aviation industry.[5] While the contribution of airlines and airports towards CO_2 emissions reduction is regularly assessed, the understanding of environmental performance of air traffic management has been less prominent.

5 Not all factors are within the control of Member States and ANSPs. Environmental performance can be impacted by the choices of other stakeholders, such as airspace users, the Network Manager and airports, and even by geopolitical factors. However, there are actions ANSPs can take, such as implementing free route airspace (FRA) or changes to airspace management to enable improvements in environmental performance.

6 The Traffic Light System focusses on the actual environmental performance from 2016 to 2022 and compares the output of the indicators within the environment Key Performance Area (KPA) established in the Regulation rather than considering specific actions taken to influence environmental performance. Additional details on the methodology can be found in Section A.

[1] Commission Implementing Regulation (EU) 2019/317 of 11 February 2019 laying down a performance and charging scheme in the Single European Sky.
[2] Horizontal flight efficiency is the main parameter retained by the Regulation to measure the impact of air traffic management on the environmental performance of flights.
[3] It is not in the scope of the Traffic Light System to quantify the excess emissions attributable to ANS.
[4] Refer to Section 5 of the PRB 2021 monitoring: Traffic light system for environmental performance for more detail regarding the known limitations of the Traffic Light System.
[5] Compared to 1990 levels.

2 THE TRAFFIC LIGHT SYSTEM

2.1 Current measures of performance

7 The horizontal en route flight efficiency is defined as a deviation from the shortest route (measured as the great-circle distance). Focusing on the shortening of the horizontal route, the target aims to minimise extra miles flown and excess fuel burn.

8 The Union-wide targets set for en route horizontal flight efficiency (KEA) acknowledge that zero deviation is not possible or desirable, because external factors (such as meteorological conditions and airspace circumnavigation due to military activities) influence the actual routes flown. These factors are considered in setting the targets. These and other external factors are taken into consideration by airspace users when making decisions of the routes to be flown. In its Annual Monitoring, the PRB reports on how Member States contribute to achieving the Union-wide targets for horizontal flight efficiency.

9 Member States can implement financial incentives for achieving the environmental targets in reference period 3 (RP3) but are under no obligation to do so. To date, no Member State has implemented any such incentive arrangement; perhaps because some elements of horizontal en route flight efficiency lie outside the control of those being incentivised.

10 In addition to the en route phase, the Traffic Light System considers the other phases of the flight for which data is reported annually. This enhances the scope of the Traffic Light System to provide a broader coverage of performance.

2.2 Principles of the Traffic Light System

11 The PRB has defined the following key principles which underpin the Traffic Light System:

- To cover gate-to-gate flight stages as far as possible based on available data for KPIs (Key Performance Indicators) and PIs (Performance Indicators) reported under the Regulation;
- To analyse environmental performance of Member States by comparing their own performance and identifying potential for improvement;
- To assess performance compared to the expected contribution to the Union-wide targets for KEA, where possible; and
- To consider, as far as possible, a Member State's and an ANSP's ability to influence performance.

2.3 Geographical scope

12 The Traffic Light System uses the same geographical scope as the PRB Annual Monitoring Report (i.e. the Member States of the Single European Sky, which includes the 27 Member States of the European Union plus Norway and Switzerland).

2.4 Data used

13 The Traffic Light System includes data from 2016 to 2022. The data between 2016 and 2019 is based on the reporting under RP2 of the performance and charging scheme.[6] From 2020 it is based on the data reported in RP3. The impact of the assessment spanning two reference periods with different scopes was discussed in the Traffic Light System report for 2021.[7]

14 For the 2022 Traffic Light System report, the PRB used data on en route horizontal flight efficiency (KEA), additional taxi-out time (AXOT), additional time spent in the arrival sequencing and metering area (ASMA) and on the percentage of flights performing continuous descent operations (CDO) published by Eurocontrol.[8]

15 Additionally, the PRB has made use of the free route airspace and flexible use of airspace implementation data provided by the Eurocontrol's NMD/INF Planning and Support Unit and by the SESAR Deployment Manager (SDM).

[6] Commission Implementing Decision of 11 March 2014 setting the Union-wide performance targets for the air traffic management network and alert thresholds for the second reference period 2015-19 Text with EEA relevance.
[7] In summary, direct comparisons cannot be made between the two reference periods. For more details, see PRB 2021 monitoring: Traffic Light System for environmental performance.
[8] Ansperformance.eu.

3 RESULTS FOR 2022

16 The results of the Traffic Light System for 2022 are shown in Figure 1 (next page). These results are presented to facilitate discussions about the variation in performance of specific Member States. More in-depth analysis on the performance of each Member State will be included in the PRB Annual Monitoring Report for 2022.

17 The results also include information on the Member States that have implemented enhanced free route airspace (indicated by the colour and shape of the data points).

18 Building on the 2021 report, this report includes a Union-wide assessment to highlight the trends of environmental performance for each indicator analysed at European level (see next section).

3.1 Union-wide assessment

19 In 2022, the Union-wide environmental performance has deteriorated. The results of the Traffic Light System (Figure 1, next page) show that:

- Two Member States are in the green category;
- 19 Member States are in the amber category; and
- Seven Member States are in the red category.

20 This overall decline in performance compared to 2021 is likely due to factors including the impact of Russia's war of aggression against Ukraine and issues resulting from a lack of capacity.[9]

21 Traffic in Europe has increased in 2022 reaching 83% of the 2019 levels. Despite the lower levels of traffic compared to pre-COVID19, the Union-wide KEA performance target of 2.37% has not been met and overall performance has deteriorated to a KEA of 2.96%.

22 As a consequence of Russia's war of aggression against Ukraine, Baltic (plus Poland) and Northern European Member States have seen a loss in overflights from Middle Eastern and Asian traffic, which has rerouted via South-Eastern Member States.[10]

23 In addition to the challenges of airspace closures and subsequent traffic rerouting, the network in Europe observed high air traffic flow management delays caused, in part, by the reappearance of capacity constraints associated with the increase in traffic (but that have been known about since 2018).[11]

24 In addition to the deterioration of KEA, Member States have also experienced an overall deterioration of terminal environmental performance in 2022 compared to 2021. In most European airports there has been an increase in additional time in the arrival sequencing and metering area (ASMA) and taxi-out time (AXOT) compared to 2021 in addition to a reduction in the percentage of arrivals performing CDOs.[12] The results of AXOT, ASMA and CDO had varying impacts on the traffic lights of individual Member States and this is further analysed in the following paragraphs.

[9] See Table 1 for more details.
[10] Eurocontrol 7-year forecast 2023-2029 (March 2023).
[11] Eurocontrol analysis paper: 2022 – The year European aviation bounced back (December 2022). Additional analysis will follow in the PRB's Annual Monitoring Report of 2022.
[12] The combined AXOT and ASMA times show an increase of +28% compared to 2021. For details, refer to the PRB's Annual Monitoring reports.

Figure 1 – Results of the Traffic Light System 2022, showing seven Member States in the red category, two in the green, and the remainder amber. Arrows indicate that a Member State's performance score is outside of the limits of the chart (source: PRB elaboration).

3.2 Member State results

25 From Figure 1, three performance observations emerge:

- Two Member States have significantly improved their environmental performance (Cyprus and Malta);
- 20 Member States have either remained stable or performance has deteriorated (Austria, Belgium, Bulgaria, Czech Republic, Croatia, Denmark, France, Germany, Greece, Hungary, Italy, the Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and Switzerland); and
- Six Member States have significantly degraded performance (Estonia, Finland, Latvia, Lithuania, Ireland, and Poland).

26 In 2021, Cyprus, France, Spain, and Switzerland had not implemented initial FRA in their national airspace. By the end of 2022, all Member States had implemented initial FRA across their national airspace and 19 Member States had implemented enhanced FRA (noting that implementation is mandated by the end of 2025).

27 Cyprus and Malta have improved their environmental performance, particularly in KEA, and are now in the green area. For Malta, this may partially result from the extension of FRA at the end of 2021.[13]

28 In total, 11 Member States have improved their KEA score. In addition to Malta and Cyprus (as mentioned above), Belgium, Bulgaria, France, Greece, Hungary, Italy, the Netherlands, and Spain have also displayed an improvement in KEA scores. The KEA score has deteriorated for more than half of Member States with Estonia, Finland, Latvia, Lithuania, and Poland showing the highest deterioration being directly impacted by the effects of Russia's war of aggression against Ukraine.

[13] The lower limit of FRA was extended from FL315 to FL195. It is worth noting, that the implementation of FRA varies considerably between Member States, for example, by flight levels, times of operation, and cross-border operations.

29 Ireland has had the highest deterioration in ASMA followed by Portugal and Sweden, while Hungary, Germany, and Austria, in contrast, have the most significant improvement in their respective scores. Cyprus and Lithuania did not report their ASMA times for 2022.[14]

30 For CDOs, Bulgaria, Ireland, and Norway show the most marked deterioration. By contrast, Estonia and Latvia showed the most significant improvement in their respective scores.

31 Ireland showed the highest deterioration in AXOT score followed by Denmark and Greece while Latvia showed the highest improvement in their respective scores. As in the case of additional ASMA time, Cyprus and Lithuania did not report their AXOT times for 2022 (see footnote 14).

32 Table 1 (next page) presents the Traffic Light System scores of 2021 and 2022 for each Member State which are accompanied by a commentary on the main drivers for the change in the performance evolution.

[14] According to the Regulation, airports below 80,000 IFR movements average during the 2016-2018 period are not monitored.

Member State	2021	2022	Main changes to performance scores in 2022
Austria			KEA score is better than SES average but has deteriorated compared to 2021. While ASMA score, which is similar to SES average, improved.
Belgium			KEA score is similar to SES average and ASMA score is better than SES average. KEA improved significantly compared to 2021 while ASMA score has deteriorated.
Bulgaria			KEA score is similar to SES average and improved compared to 2021.
Croatia			KEA score is better than SES average but deteriorated compared to 2021.
Cyprus			KEA score is better than SES average and improved significantly compared to 2021.
Czech Republic			KEA and ASMA scores are similar to SES average but deteriorated compared to 2021.
Denmark			KEA score is better than SES average, while ASMA score is similar to SES average. Both have deteriorated compared to 2021.
Estonia			KEA score is worse than SES average and deteriorated significantly compared to 2021.
Finland			KEA score is worse than SES average and deteriorated significantly compared to 2021.
France			KEA score is similar to SES average and improved compared to 2021.
Germany			ASMA score is similar to SES average and improved significantly compared to 2021.
Greece			KEA score is similar to SES average and improved significantly compared to 2021.
Hungary			AXOT and ASMA scores are better than SES average. ASMA score has improved while CDO deteriorated compared to 2021.
Ireland			AXOT and ASMA scores are worse than SES average and have deteriorated significantly compared to 2021.
Italy			KEA score is similar to SES average and has improved compared to 2021.
Latvia			KEA and AXOT scores are worse than SES average. KEA deteriorated significantly while AXOT score improved compared to 2021.
Lithuania			KEA score is worse than SES average and has deteriorated significantly compared to 2021.
Malta			KEA score is better than SES average and improved significantly compared to 2021.
The Netherlands			KEA score is similar to SES average and improved compared to 2021.
Norway			KEA score is better than SES average but has deteriorated compared to 2021.
Poland			KEA and ASMA scores are worse than SES average but have improved compared to 2021.
Portugal			ASMA score is worse than SES average while KEA score is better than SES average. Both have deteriorated compared to 2021.
Romania			KEA, ASMA and AXOT scores are similar to SES average. KEA has deteriorated compared to 2021 while ASMA and AXOT scores have improved.
Slovakia			KEA score is similar to SES average and has deteriorated compared to 2021.
Slovenia			KEA score is similar to SES average while AXOT is better than SES average. KEA score has deteriorated compared to 2021 while AXOT score has improved.
Spain			KEA score is better than SES average and has improved compared to 2021.
Sweden			KEA score is similar to SES average while ASMA score is better than SES average. Both have deteriorated compared to 2021.
Switzerland			KEA score is similar to SES average but has deteriorated compared to 2021.

Table 1 – Summary of Traffic Light System scores for Member States – 2021 and 2022 – and commentary (source: PRB elaboration).

4 CONCLUSION

33 The 2022 Traffic Light System results reflect a Union-wide deterioration of environmental performance resulting from factors such as Russia's war of aggression against Ukraine, and capacity-related issues. These are analysed in more detail in the PRB Annual Monitoring Report 2022.[15]

34 **Conclusion 1**: 2022 sees two Member States with a green traffic light colour, 19 Member States with an amber colour while seven Member States have a red colour.

35 Compared to 2021, 15 Member States have changed their traffic light colour (ten of which moved to amber).[16] The majority of Member States' are concentrated in the middle, amber area of the chart (Figure 1), indicating that most Member States have similar trends in performance.

36 **Conclusion 2**: In 2022, KEA deteriorated to a value of 2.96% compared to 2.59% in 2021. This increase is mainly due to (1) the impact of Russia's war of aggression against Ukraine, which has caused rerouting of flights – mostly from the Middle East and Asia – from Baltic and Northern Europe towards South-Eastern Europe, lengthening the trajectory flow; and (2) capacity constraints within the network such as ATC capacity, ATC strikes, ATM systems implementation, summer season traffic, and other non-ATC constraints (e.g. staff shortages at European airports).[17]

37 Given that the en route phase is the most intense stage of the flight in respect to CO_2 emission, most Member States' environmental performance has been negatively affected by the deterioration in KEA scores from 2021 to 2022.

38 **Conclusion 3**: The overall terminal environmental performance at European airports has deteriorated. The highest deterioration of AXOT is seen in Denmark, Greece, and Ireland, while for ASMA, the highest deterioration is seen in Ireland, Portugal, and Sweden. Finally, Bulgaria, Ireland, and Norway have the highest deterioration in CDOs.

[15] A detailed analysis can be found in the PRB's Annual Monitoring report of 2022.
[16] Two from amber to green, seven from green to the amber, two from green to red, three from red to amber and one from amber to red. See Table 1 for details.
[17] A detailed analysis can be found in the PRB's Annual Monitoring report of 2022.

A. METHODOLOGY

Changes to the methodology

39 The methodology and approach of the Traffic Light System remain largely unchanged from the previous report published in 2022.[18]

40 As noted in the previous report, the use of reference values for KEA included in the performance plan as a benchmark may have a disproportionate impact on those with a relatively small KEA value. To deal with this potential impact, the calculation related to the KEA has been updated. The previous methodology compared the actual KEA and the KEA reference value:

$$actual\ KEA\ value - KEA\ reference\ value$$

41 The update allows for a relative comparison for 2022 between the actual performance and the reference value:[19]

$$\frac{actual\ KEA\ value - KEA\ reference\ value}{KEA\ reference\ value}$$

This update led to limited changes in the scores computed in the previous report. The affected Member States are: Cyprus (from red to amber), France (from red to amber), the Netherlands (from red to amber), and Latvia (from amber to red).

42 In this report, the weightings of excess CO_2 generated by the phases of flight have been updated following the publication of the EASA European Aviation Environmental report of 2022 (more details in the next sections and in Table 2).

Indicators included

43 The indicators used for the Traffic Light System methodology are those defined by the Regulation (Annex I, Section I, Parts 2.1 and 2.2, and Section 2, Parts 2.1 and 2.2).

44 The methodology underlying the Traffic Light System considers the three main phases of flight when assessing environmental efficiency: En route, arrival terminal area, and airport surface movements during the taxi-out phase.

45 The indicators included in the Traffic Light System are:[20]

- En route horizontal flight efficiency (KEA): The only environment key performance indicator (i.e. with targets) within the Regulation is the horizontal en route flight efficiency of the actual flight trajectory, which compares the flown route with the shortest (great-circle) route.[21]
- Airport surface movement – additional taxi-out time (AXOT): The additional time spent in the taxi-out phase measured as the average additional time beyond an unimpeded reference time, estimated for each stand-runway combination.
- Additional time spent in the terminal manoeuvring area (ASMA): The additional time an aircraft spends in the arrival sequencing and metering area is an estimation of the horizontal flight efficiency within the arrival phase of flight. It is the average additional time beyond the unimpeded transit time for an aircraft within a given radius of the airport.
- Percentage of flights performing continuous descent operations (CDO): Estimates vertical flight efficiency within the terminal area on arrival.

Indicators not included

46 The PRB has not included performance indicators relating to the flight efficiency of the planned trajectory (KEP) and the shortest constrained route (SCR), which are used for monitoring purposes and do not have a target. Acknowledging the limitations related to the KEA indicator, the PRB will continue to consider how the indicators underpinning the Traffic Light System can be improved.

Weighting the indicators

47 The performance observed for each of these indicators is weighted to reflect the inefficiency observed for each phase of flight. The weightings

[18] PRB 2021 monitoring: Traffic light system for environmental performance.
[19] KEA local reference values, provided by the Network Manager, define how each Member State should contribute to achieving the Union-wide environment value.
[20] Refer to PRB 2021 monitoring: Traffic light system for environmental performance for more detail regarding the rationale for including these indicators in the Traffic Light System.
[21] KEA is the only indicator with targets, while AXOT, ASMA and CDO do not have any target.

applied are based on the European Aviation Environmental Reports published by EASA.

48 The weightings have been updated to consider the latest published data by EASA. This provides the percentage of excess CO_2 generated by the phases of flight and vertical profile of flights.[22] The weightings of EASA's report published in 2019 have been used for the year 2016 – 2018, whilst the weightings of EASA's report published in 2022 have been applied to the years 2019 – 2022 (Table 2, next page).

Annual performance

49 The first output measure is based on the performance of each Member State in the year of observation (2022). The PRB applied statistical analyses to compare the performance of Member States for each of the four elements of environmental performance (KEA, CDO, ASMA, and AXOT).[23]

50 The resulting values are plotted on the x axis of the traffic lights graph (Figure 2), where the higher the value the better the performance compared to the average of the sample.

Capturing the evolution of performance

51 The evolution of performance (EV) is calculated by comparing the standardised year-on-year performance. This value is plotted on the y axis of the traffic light graph (Figure 2). Member States improving or keeping their high performance stable at national level appear above the x axis (0 value). If they are degrading or keeping the low performance stable, they are below the x axis (0 value).

52 It is not possible to compute the evolution of performance for 2020 as a comparison with 2019 is not appropriate given the change in the regulatory framework between RP2 (FAB reference values) and RP3 (national reference values). The colour allocated to Member States for 2020 is, therefore, based only on the annual performance.

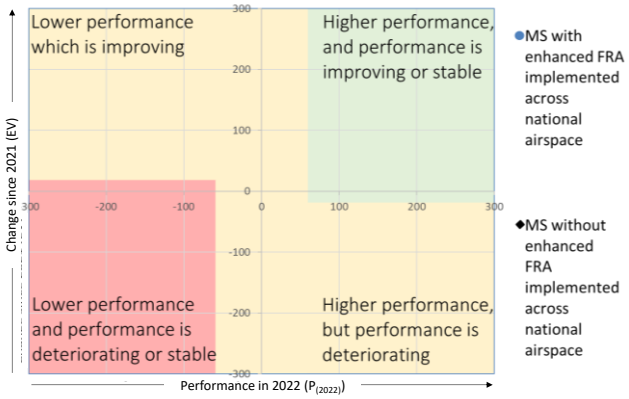


Figure 2 – Traffic lights graph (source: PRB elaboration).

[22] European Aviation Environmental Report 2019 and 2022, EASA.
[23] Refer to PRB 2021 monitoring: Traffic Light System for environmental performance for more detail regarding the statistical analysis undertaken to calculate annual performance and evolution of performance.

Flight phase		Taxi-out (AXOT) (w_1)	Vertical during climb	Horizon-tal during en route (KEA) (w_2)	Vertical during cruise	Horizon-tal during arrival (ASMA) (w_3)	Vertical during descent (CDO) (w_4)	Taxi-in
Excess CO_2*	2019	*9%*	*1%*	*36%*	*15%*	*23%*	*10%*	*5%*
	2022	*7%*	*1%*	*41%*	*16%*	*20%*	*10%*	*3%*
Relevant metrics in the performance and charging scheme		AXOT	n.a.	KEA	n.a.	ASMA	CDO	n.a.
Value applied in the Traffic Light Sys-tem[24]	2019	12%		46%		29%	13%	
	2022	9%		52%		26%	13%	

Table 2 – Mapping of RP3 performance metrics relative to each gate-to-gate flight phase (source: EASA European Aviation Environmental Report 2022 – PRB elaboration). The total is not equal to 100% due to rounding. W= weighting.*

[24] The contributions were normalised to include only the KPIs and PIs within the performance and charging scheme.

B. MEMBER STATES SCORECARDS

Reader's guide

53 This section provides the Member States' scorecards that visualise the 2022 performance based on the items listed below.

54 The **main ANSP(s)** are those known to provide a significant amount of air navigation services (en route and terminal) within the Member State concerned.

55 The **traffic lights** cover years from 2016 to 2022 and have been determined based on the methodology in the 2021 Traffic Light System report, with some minor updates to the methodology highlighted in the previous sections.

56 The **2022 performance scores** are represented with a coloured dot. These scores are not based on absolute values, but on the standardised scores obtained based on the methodology defined in Section 3.4 of the 2021 Traffic Light System report. A score of zero represents the average of the series for 2022 for AXOT, ASMA, and CDO, while KEA is compared to the average deviation from the Network Manager reference value. The colours have been assigned according to the standard deviation for each indicator, with the amber band being 0.5 standard deviations either side of the mean for the indicators and the standard deviation for the overall score being 25.52.

57 The **performance of 2021 and 2022** graph represents the weighted scores of years 2021 and 2022 based on the methodology defined in the 2021 Traffic Light System report. The performance in 2021 is indicated with a blue rhombus, while 2022 performance is indicated with a bar. A grey rhombus indicates that a Member State has not reported the indicator.

58 The free route airspace table represents the implementation status and gives more details on FRA, airspace management (ASM), and advanced flexible use of airspace (A-FUA).[25] A checkmark indicates that the corresponding item has been implemented, a cross means that the item is yet to be implemented.[26]

59 This report makes use of the following definitions from the SDM Deployment Program (2022):

- **Initial FRA**: FRA implementation with some limitations, for example laterally and vertically or during specific time periods; and
- **Enhanced FRA:** it eliminates the structural limitations that are permissible for Initial FRA in terms of timing limitations (night FRA, weekend FRA, seasonal FRA) and lateral and vertical limitations including the link with Terminal areas (TMA) and cross-border FRA, which is implemented with at least one neighbouring State.[27]

60 The box at the bottom of the scorecard includes a brief qualitative analysis on the 2022 performance scores, on the 2021 and 2022 performance graph and, finally, an explanation on reasons for improvement/degradation of the scores, where possible.[28]

[25] Based on the requirements set out in the CP1 Regulation.
[26] This information has been provided by Eurocontrol's Local Single Sky Implementation monitoring team and the SESAR Deployment Manager.
[27] Where possible, based on the data available.
[28] The qualitative information has also been provided by the Member States monitoring reports and has been included only for those Member States which present a deterioration in the scores.

Austria

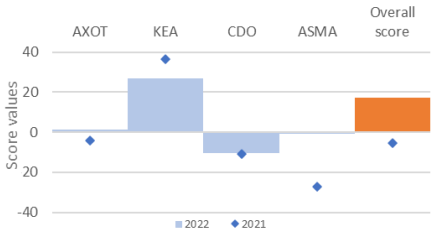
Member State	ANSPs
Austria	***Austro Control***

RP2: 2016 2017 2018 2019 | RP3: 2020 2021 2022

2022 performance scores

- AXOT — Similar to SES average
- KEA — Better than average deviation from NM reference value
- CDO — Worse than SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	GND – FL660
Cross-border	✔	Croatia, Montenegro, Serbia, Slovenia SECSI FRA (Albania and North Macedonia)
ASM and A-FUA	✔	

In 2022, the overall performance of Austria is similar to the SES average. Compared to 2021, the KEA score deteriorated, and, according to the NSA, it is mainly due to route extensions as a result of Ukrainian, Belorussian and Russian airspace restrictions. However, it remains better than the average deviation from the NM reference value. AXOT and ASMA time scores also improved, while the CDO score remained roughly the same.

Belgium

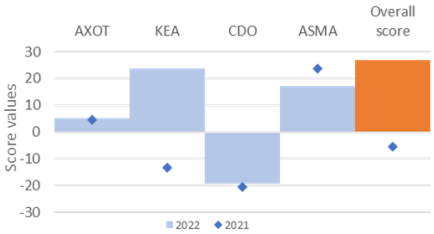
Member State	ANSPs
Belgium	***skeyes, MUAC***

RP2: 2016 2017 2018 2019 | RP3: 2020 2021 2022

2022 performance scores

- AXOT — Better than SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Worse than SES average
- ASMA — Better than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL245 – FL660
Cross-border	✔	Denmark, Sweden Planned for France, Germany, United Kingdom
ASM and A-FUA	✔	

In 2022, the overall performance of Belgium is better than the SES average. Compared to 2021, the KEA score improved, while ASMA time scores deteriorated. The CDO and AXOT scores remained at similar levels.

Bulgaria

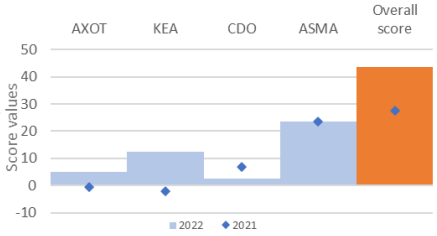
Member State	ANSPs
Bulgaria	***BULATSA***

RP2: 2016 2017 2018 2019 | RP3: 2020 2021 2022

2022 performance scores

- AXOT — Better than SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Similar to SES average
- ASMA — Better than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL175 – FL660
Cross-border	✔	Hungary, Moldova, Romania, Slovak Republic Planned for Czech Republic
ASM and A-FUA	✔	

In 2022, the overall performance of Bulgaria is better than the SES average. Compared to 2021, the KEA and AXOT time scores improved, however the CDO score deteriorated and ASMA time score remained at similar levels.

Croatia

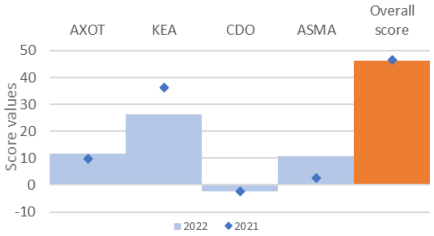
Member State	ANSPs
Croatia	***Croatia Control***

RP2: 2016 2017 2018 2019 | RP3: 2020 2021 2022

2022 performance scores

- AXOT — Better than SES average
- KEA — Better than average deviation from NM reference value
- CDO — Similar to SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	FL205 – FL660
Cross-border	✓	Albania, Austria, Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia, Slovenia Planned for Czech Republic, Italy
ASM and A-FUA	✓	

In 2022, the overall performance of Croatia is better than the SES average. Compared to 2021, the KEA score deteriorated, however remaining better than the average deviation from the NM reference value. The ASMA time score improved, while the CDO and AXOT time scores remained at similar levels.

Cyprus

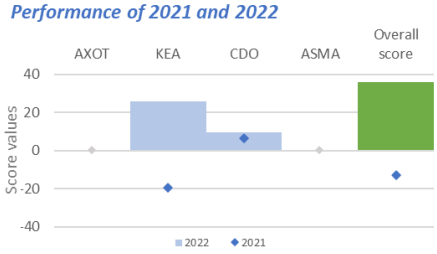
Member State	ANSPs
Cyprus	***DCAC Cyprus***

RP2: 2016 2017 2018 2019 | RP3: 2020 2021 2022

2022 performance scores

- AXOT — N.A. — Not reported
- KEA — Better than average deviation from NM reference value
- CDO — Better than SES average
- ASMA — N.A. — Not reported

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✗	FRA H 24/7 - yet to be implemented
Flight level	✗	FL205 to FL660 - yet to be implemented
Cross-border	-	No plans for cross-border application
ASM and A-FUA	✓	

In 2022, the overall performance of Cyprus is better than the SES average. Compared to 2021, the KEA and CDO scores improved, while the AXOT and ASMA times have not been reported by Cyprus for 2022.

Czech Republic

Member State	ANSPs
Czech Republic	***ANS CR***

RP2: 2016 2017 2018 2019 | RP3: 2020 2021 2022

2022 performance scores

- AXOT — Similar to SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Worse than SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022

Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	FL095 – FL660
Cross-border	✓	Slovakia Planned for Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Lithuania, Moldova, Romania, Slovenia
ASM and A-FUA	✓	

In 2022, the overall performance of Czech Republic is similar to the SES average. Compared to 2021, KEA score deteriorated, and, according to the NSA, it is mainly due to route extensions as a result of Ukrainian, Belorussian and Russian airspace restrictions. The AXOT and ASMA times improved, while the CDO score remained at similar levels.

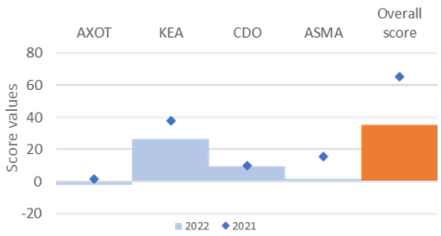
Denmark

Member State	ANSPs	RP2 / RP3
Denmark	***NAVIAIR***	2016 2017 2018 2019 2020 2021 2022

2022 performance scores

- AXOT — Similar to SES average
- KEA — Better than average deviation from NM reference value
- CDO — Better than SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL285 – FL660
Cross-border	✔	Germany, Norway, Sweden
ASM and A-FUA	✔	

In 2022, the overall performance of Denmark is better than the SES average. Compared to 2021, the KEA score deteriorated, however remaining better than the average deviation from the NM reference value. The ASMA time score deteriorated as well, while the CDO and AXOT time scores remained at similar levels.

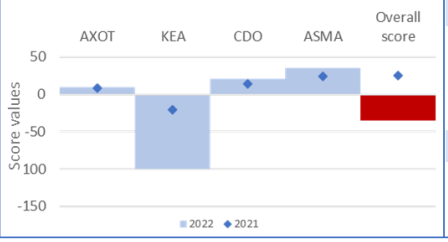
Estonia

Member State	ANSPs	RP2 / RP3
Estonia	***EANS***	2016 2017 2018 2019 2020 2021 2022

2022 performance scores

- AXOT — Better than SES average
- KEA — Worse than average deviation from NM reference value
- CDO — Better than SES average
- ASMA — Better than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL095 – FL660 (excl. Tallin TMA and Helsinki TMA)
Cross-border	✔	Finland, Latvia, Sweden
ASM and A-FUA	✔	

In 2022, the overall performance of Estonia is worse than the SES average. Compared to 2021, the KEA score deteriorated, and, according to the NSA, it is mainly due to route extensions as a result of Ukrainian, Belorussian and Russian airspace restrictions. The CDO and ASMA time scores improved, while the AXOT time score remained at similar levels.

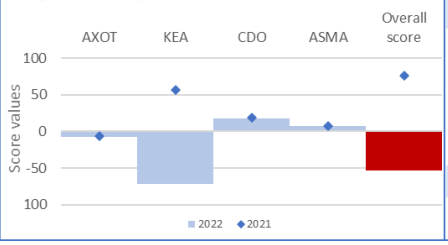
Finland

Member State	ANSPs	RP2 / RP3
Finland	***Fintraffic ANS***	2016 2017 2018 2019 2020 2021 2022

2022 performance scores

- AXOT — Worse than SES average
- KEA — Worse than average deviation from NM reference value
- CDO — Better than SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL095 – FL660
Cross-border	✔	Estonia, Latvia, Norway, Denmark and Sweden FL285 to FL660 Planned for United Kingdom, Iceland
ASM and A-FUA	✔	

In 2022, the overall performance of Finland is worse than the SES average. Compared to 2021, the KEA score deteriorated, and, according to the NSA, it is mainly due to route extensions as a result of Ukrainian, Belorussian and Russian airspace restrictions. The CDO, AXOT and ASMA times scores remained at similar levels.

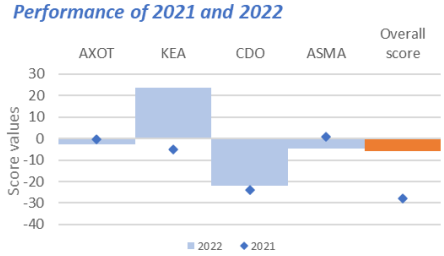
France

Member State	ANSPs	RP2 2016	2017	2018	2019	RP3 2020	2021	2022
France	DSNA	●	●	●	●	●	●	●

2022 performance scores

- AXOT — Similar to SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Worse than SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	FL195 +
Cross-border	✗	Planned for Maastricht UAC, Switzerland
ASM and A-FUA	✓	

In 2022, the overall performance of France is similar to the SES average. Compared to 2021, the KEA score improved despite the fact that environmental performance of 2022 remained at similar levels to 2021. The CDO, AXOT and ASMA time scores remained at similar levels.

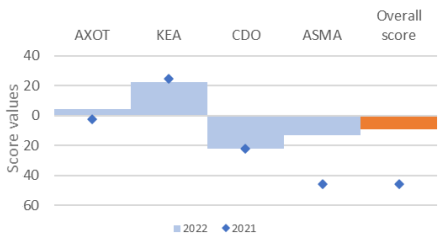
Germany

Member State	ANSPs	RP2 2016	2017	2018	2019	RP3 2020	2021	2022
Germany	DFS, MUAC	●	●	●	●	●	●	●

2022 performance scores

- AXOT — Similar to SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Worse than SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	FL245 – FL660
Cross-border	✓	Austria, Denmark, Sweden, Switzerland Planned for Maastricht UAC
ASM and A-FUA	✓	

In 2022, the overall performance of Germany is similar to the SES average. Compared to 2021, the ASMA time score improved, while the AXOT time, KEA and CDO scores remained at similar levels.

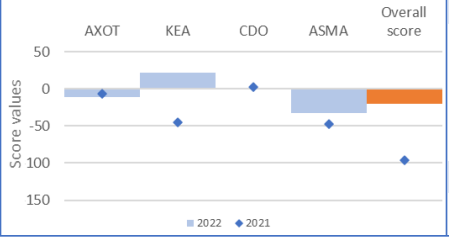
Greece

Member State	ANSPs	RP2 2016	2017	2018	2019	RP3 2020	2021	2022
Greece	HASP	●	●	●	●	●	●	●

2022 performance scores

- AXOT — Worse than SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Similar to SES average
- ASMA — Worse than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	Night FRA implemented
Flight level	✓	FL305 – FL660
Cross-border	✗	Planned for Albania, Austria, Bosnia and Herzegovina, Croatia, Cyprus, Italy, Malta, North Macedonia, Serbia, Slovenia
ASM and A-FUA	✓	

In 2022, the overall performance of Greece is similar to the SES average. Compared to 2021, the KEA and ASMA time scores improved while the AXOT time and CDO scores remained at similar levels.

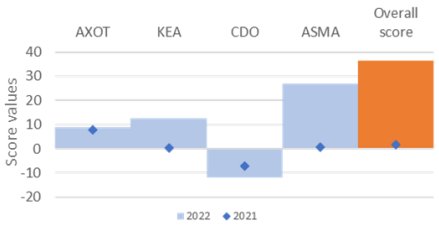
Hungary

Member State	ANSPs	RP2 2016	2017	2018	2019	RP3 2020	2021	2022
Hungary	***HungaroControl***	●	●	●	●	●	●	●

2022 performance scores

- AXOT — Better than SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Worse than SES average
- ASMA — Better than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL095 – FL660
Cross-border	✔	Bulgaria, Lithuania, Moldova, Poland, Romania, Slovak Republic Planned for Czech Republic, Ukraine
ASM and A-FUA	✔	

In 2022, the overall performance of Hungary is better than the SES average. Compared to 2021, the KEA, AXOT and ASMA time scores improved, while the CDO score deteriorated.

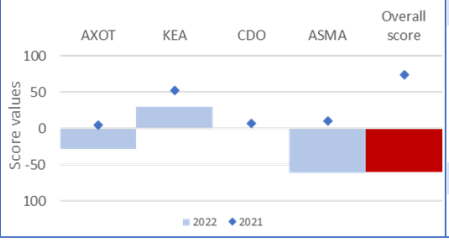
Ireland

Member State	ANSPs	RP2 2016	2017	2018	2019	RP3 2020	2021	2022
Ireland	***AirNav Ireland***	●	●	●	●	●	●	●

2022 performance scores

- AXOT — Worse than SES average
- KEA — Better than average deviation from NM reference value
- CDO — Similar to SES average
- ASMA — Worse than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL075 – FL660
Cross-border	✔	United Kingdom Planned for Denmark, Estonia, Finland, Iceland, Latvia, Norway, Sweden
ASM and A-FUA	✔	

In 2022, the overall performance of Ireland is worse than the SES average. Compared to 2021, the KEA, AXOT and ASMA time scores deteriorated, while the CDO score remained at similar levels. Despite the fact that Ireland met the 2022 environment KPI target, its KEA score in TLS deteriorated. According to the NSA, the AXOT time increased due to the redevelopment of ground infrastructure at Dublin airport.

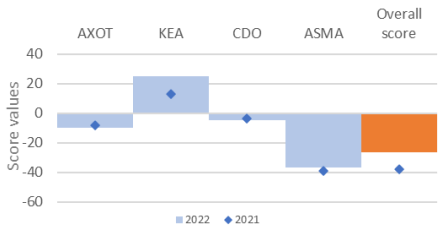
Italy

Member State	ANSPs	RP2 2016	2017	2018	2019	RP3 2020	2021	2022
Italy	***ENAV***	●	●	●	●	●	●	●

2022 performance scores

- AXOT — Worse than SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Similar to SES average
- ASMA — Worse than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL305 – FL660
Cross-border	✘	Planned for Austria,Bosnia and Herzegovina, Croatia, Malta, Montenegro, Serbia, Slovenia
ASM and A-FUA	✔	

In 2022, the overall performance of Italy is worse than the SES average. Compared to 2021, the KEA, ASMA and AXOT time scores improved, while the CDO score remained at similar levels.

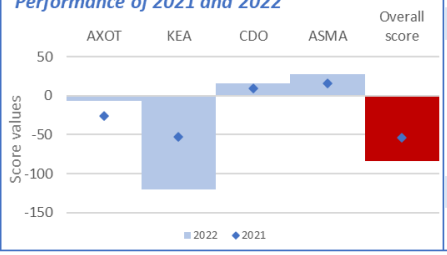
Latvia

Member State	ANSPs	RP2 / RP3
Latvia	***LGS***	2016 2017 2018 2019 2020 2021 2022

2022 performance scores

- AXOT — Worse than SES average
- KEA — Worse than average deviation from NM reference value
- CDO — Better than SES average
- ASMA — Better than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	FL095 – FL660
Cross-border	✓	Estonia, Finland, Norway, Sweden Planned for Iceland, Ireland, United Kingdom
ASM and A-FUA	✓	

In 2022, the overall performance of Latvia is worse than the SES average. Compared to 2021, the KEA score deteriorated and, according to the NSA, it is mainly due to route extensions as a result of Ukrainian, Belorussian and Russian airspace restrictions. The CDO, AXOT and ASMA time scores improved.

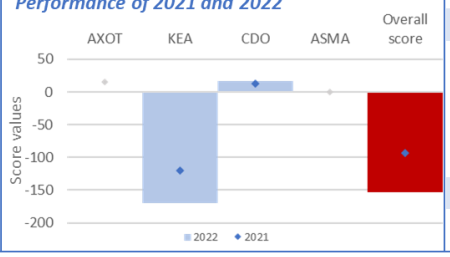
Lithuania

Member State	ANSPs	RP2 / RP3
Lithuania	***SE Oro Navigacija***	2016 2017 2018 2019 2020 2021 2022

2022 performance scores

- AXOT — N.A. (Not reported)
- KEA — Worse than average deviation from NM reference value
- CDO — Better than SES average
- ASMA — N.A. (Not reported)

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	FL095 – FL660
Cross-border	✓	Poland Planned for Estonia, Finland, Latvia and Norway
ASM and A-FUA	✓	

In 2022, the overall performance of Lithuania is worse than SES average. Compared to 2021, the KEA score deteriorated, and, according to the NSA, it is mainly due to route extensions as a result of Ukrainian, Belorussian and Russian airspace restrictions. The CDO score has remained at similar levels while the AXOT and ASMA scores have not been reported in 2022.

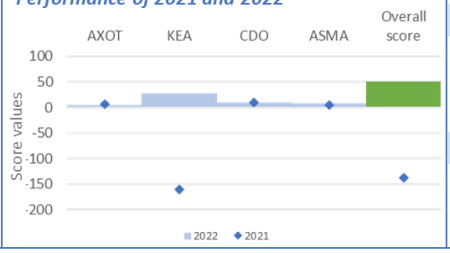
Malta

Member State	ANSPs	RP2 / RP3
Malta	***MATS***	2016 2017 2018 2019 2020 2021 2022

2022 performance scores

- AXOT — Similar to SES average
- KEA — Better than average deviation from NM reference value
- CDO — Better than SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	FL195 – FL660
Cross-border	✗	Planned for Italy
ASM and A-FUA	✓	

In 2022, the overall performance of Malta is better than the SES average. Compared to 2021, the KEA score improved, while the CDO, AXOT and ASMA time scores remained at similar levels.

The Netherlands

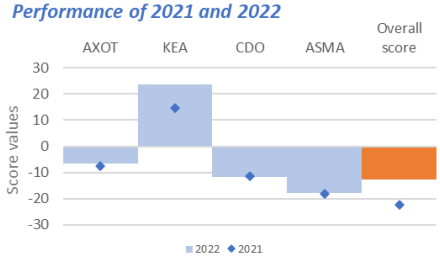
Member State	ANSPs
The Netherlands	***LVNL, MUAC***

RP2: 2016 (AXOT), 2017 (KEA), 2018 (CDO), 2019 (ASMA) — RP3: 2020, 2021, 2022

2022 performance scores

- AXOT — Worse than SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Worse than SES average
- ASMA — Worse than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL245 – FL660
Cross-border	✔	Denmark, Sweden Planned for France, Germany, United Kingdom
ASM and A-FUA	✔	

In 2022, the overall performance of the Netherlands is similar to the SES average. Compared to 2021, the KEA score improved, while the CDO, AXOT and ASMA time scores remained at similar levels. According to NSA, the degradation of the actual KEA value was due to weather effects in combination with maintenance at Schiphol Airport.

Norway

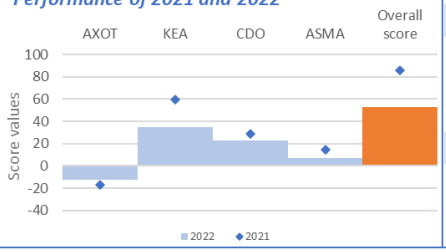
Member State	ANSPs
Norway	***Avinor ANS***

RP2: 2016 (AXOT), 2017 (KEA), 2018 (CDO), 2019 (ASMA) — RP3: 2020, 2021, 2022

2022 performance scores

- AXOT — Worse than SES average
- KEA — Better than average deviation from NM reference value
- CDO — Better than SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	No limitation
Cross-border	✔	Denmark, Finland, Sweden
ASM and A-FUA	✔	

In 2022, the overall performance of Norway is better than the SES average. Compared to 2021, the KEA, CDO and ASMA time scores deteriorated while AXOT time score improved. Despite the fact that Norway met the 2022 environment KPI target, its KEA score in TLS deteriorated.

Poland

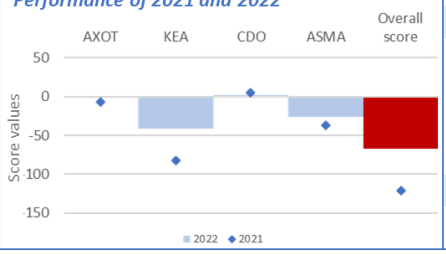
Member State	ANSPs
Poland	***PANSA***

RP2: 2016 (AXOT), 2017 (KEA), 2018 (CDO), 2019 (ASMA) — RP3: 2020, 2021, 2022

2022 performance scores

- AXOT — Similar to SES average
- KEA — Worse than average deviation from NM reference value
- CDO — Similar to SES average
- ASMA — Worse than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL095 – FL660
Cross-border	✔	Lithuania Planned for Denmark, Lithuania, Slovakia, Sweden, Ukraine
ASM and A-FUA	✔	

In 2022, the overall performance of Poland is worse than the SES average. Compared to 2021, the KEA score improved and is better than the average deviation from the NM reference value. The CDO, AXOT and ASMA time scores remain at similar levels.

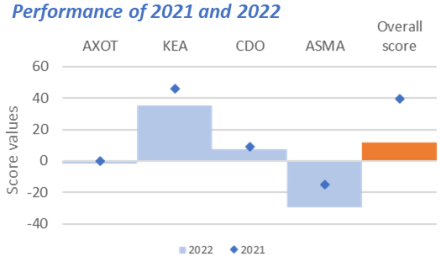
Portugal

Member State	ANSPs	RP2 2016	2017	2018	2019	RP3 2020	2021	2022
Portugal	***NAV Portugal***	●	●	●	●	●	●	●

2022 performance scores

- AXOT — Similar to SES average
- KEA — Better than average deviation from NM reference value
- CDO — Better than SES average
- ASMA — Worse than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL245 – FL660
Cross-border	✖	Planned for Morocco and Spain
ASM and A-FUA	✔	

In 2022, the overall performance of Portugal is similar to SES average. Compared to 2021, the KEA and ASMA scores deteriorated, while the CDO and AXOT time scores remained at similar levels. Despite the fact that Portugal met the 2022 environment KPI target, their KEA score in TLS deteriorated. However, it remains better than the average deviation from the NM reference value.

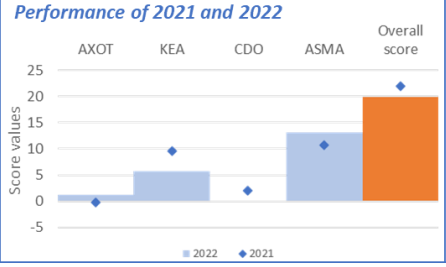
Romania

Member State	ANSPs	RP2 2016	2017	2018	2019	RP3 2020	2021	2022
Romania	***ROMATSA***	●	●	●	●	●	●	●

2022 performance scores

- AXOT — Similar to SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Similar to SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL105 – FL660
Cross-border	✔	Bulgaria, Hungary, Moldova, Slovakia Planned for Czech Republic
ASM and A-FUA	✔	

In 2022, the overall performance of Romania is similar to SES average. Compared to 2021, the KEA score deteriorated and, according to the NSA, it is mainly due to route extensions as a result of Ukrainian, Belorussian and Russian airspace restrictions. The CDO scores deteriorated as well, while AXOT and ASMA time scores improved.

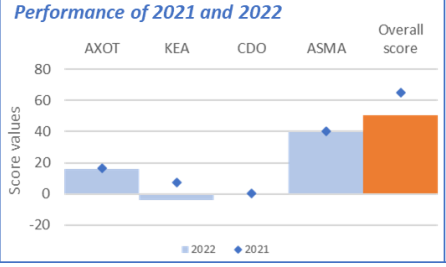
Slovakia

Member State	ANSPs	RP2 2016	2017	2018	2019	RP3 2020	2021	2022
Slovakia	***LPS SR***	●	●	●	●	●	●	●

2022 performance scores

- AXOT — Better than SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Similar to SES average
- ASMA — Better than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL245 – FL660
Cross-border	✔	Bulgaria, Hungary, Poland, Romania Planned for Czech Republic
ASM and A-FUA	✔	

In 2022, the overall performance of Slovakia is better than the SES average. Compared to 2021, the KEA score deteriorated, and, according to the NSA, it is mainly due to route extensions as a result of Ukrainian, Belorussian and Russian airspace restrictions. The CDO, AXOT and ASMA time scores remained at similar levels.

Slovenia

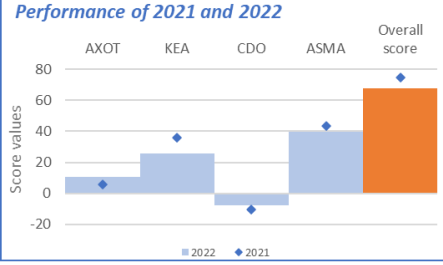
Member State	ANSPs
Slovenia	***Slovenia Control***

RP2: 2016 (●) 2017 (●) 2018 (●) 2019 (●) — RP3: 2020 (●) 2021 (●) 2022 (●)

2022 performance scores

- AXOT — Better than SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Worse than SES average
- ASMA — Better than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	GND – FL660
Cross-border	✓	Albania, Austria, Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia, Serbia Planned for Czech Republic and Greece
ASM and A-FUA	✓	

In 2022, the overall performance of Slovenia is better than the SES average. Compared to 2021, the KEA and ASMA time scores deteriorated, while the CDO and AXOT time scores improved.

Spain

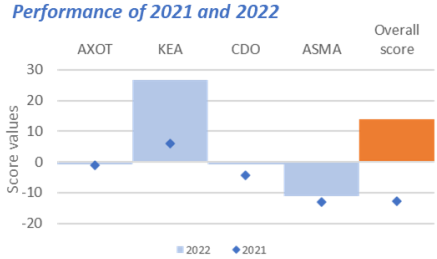
Member State	ANSPs
Spain	***ENAIRE***

RP2: 2016 (●) 2017 (●) 2018 (●) 2019 (●) — RP3: 2020 (●) 2021 (●) 2022 (●)

2022 performance scores

- AXOT — Similar to SES average
- KEA — Better than average deviation from NM reference value
- CDO — Similar to SES average
- ASMA — Similar to SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	Canarias from FL305 - FL660. Madrid from FL245 - FL660. Barcelona from FL245 - FL660
Cross-border	✗	Planned for Morocco and Portugal
ASM and A-FUA	✓	

In 2022, the overall performance of Spain is similar to SES average. Compared to 2021, the KEA, CDO and ASMA scores improved, while the AXOT time score remained at similar levels.

Sweden

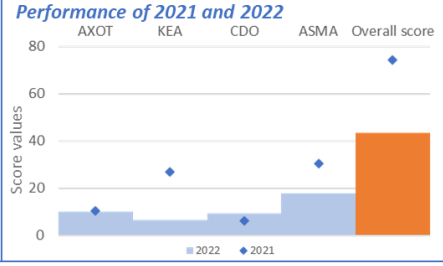
Member State	ANSPs
Sweden	***LFV***

RP2: 2016 (●) 2017 (●) 2018 (●) 2019 (●) — RP3: 2020 (●) 2021 (●) 2022 (●)

2022 performance scores

- AXOT — Better than SES average
- KEA — Similar to average deviation from NM reference value
- CDO — Better than SES average
- ASMA — Better than SES average

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✓	H 24/7
Flight level	✓	FL285 – FL660
Cross-border	✓	Denmark, Estonia, Finland, Germany, Latvia, Maastricht UAC, Norway Planned for Lithuania and Poland
ASM and A-FUA	✓	

In 2022, the overall performance of Sweden is better than the SES average. Compared to 2021, the KEA score deteriorated and, according to the NSA, it is mainly due to route extensions as a result of Ukrainian, Belorussian and Russian airspace restrictions. The ASMA time score deteriorated as well, while the CDO score improved and the AXOT time score remained at similar levels.

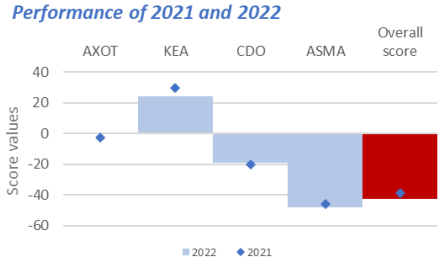
Switzerland

Member State	ANSPs	RP2 / RP3
Switzerland	***skyguide***	2016 (●) 2017 (●) 2018 (●) 2019 (●) 2020 (●) 2021 (●) 2022 (●)

2022 performance scores

- **AXOT** ● — *Similar to SES average*
- **KEA** ● — *Similar to average deviation from NM reference value*
- **CDO** ● — *Worse than SES average*
- **ASMA** ● — *Worse than SES average*

Performance of 2021 and 2022



Free Route Airspace		
Implementation of initial FRA	✔	H 24/7
Flight level	✔	FL195 – FL660
Cross-border	✔	Germany Planned for France
ASM and A-FUA	✔	

In 2022, the overall performance of Switzerland is worse than the SES average. Compared to 2021, the KEA score deteriorated, while the CDO, AXOT and ASMA time scores remained at similar levels.

C. GLOSSARY OF ABBREVIATIONS

ACC	Area Control Centre
A-FUA	Advanced Flexible Use of Airspace
AMC	Airspace Management Cell
ANSP	Air Service Navigation Provider
ASM	Airspace management
ASMA	Arrival Sequencing and Metering Area
ATC	Air Traffic Control
ATS	Air Traffic Services
AUP/UUP	Airspace Use Plan/ Updated Airspace Use Plan
AXOT	Additional time in taxi-out
CDO	Continuous Descent Operations
CP1	Common Projects 1
CROSS BDRY	Cross boundary
ERNIP	European Route Network Improvement Plan
FAS programme	Future ATM system
FDPS	Flight Data Processing System
FIR	Flight Information Region
FL	Flight Level
FRA	Free Route Airspace
FUA	Flexible Use of Airspace
KEA	Horizontal flight efficiency of the actual trajectory
MOD	Ministry of Defence
NewPENS	New Pan-European network service
NM	Network Manager
RNAV	Method of navigation which permits the operation of an aircraft on a desired flight path
RP	Reference period
SDM	SESAR Deployment Manager