PRB | Performance review body of the single european sky

Traffic Light System for Environmental Performance

Modelling approach to assess environmental performance using the performance indicators established within the Single European Sky

The 2021 monitoring consists of six reports:

1. PRB Monitoring Report 2021
2. **Traffic light system for environmental performance**
3. Annex I – Member States' factsheets
4. Annex II – Member States' detailed analysis for experts
5. Annex III – Safety report
6. Annex IV – Investments report

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1 ABOUT THE DOCUMENT

1 The PRB Monitoring Report 2021 examines the performance of air navigation services (ANS) in Member States of the Single European Sky (SES). The SES area comprises EU Member States plus Norway, and Switzerland (hereafter referred to as Member States).

2 The PRB Annual Monitoring Report 2021 is complemented by one additional report and four annexes to the Union-wide report with a detailed analysis of performance at local levels:

- Traffic light system for environmental performance (this document);
- Annex I – Member States' factsheets (produced by the PRB);
- Annex II – Member States' detailed analysis for experts (produced by Eurocontrol);
- Annex III – Safety report (produced by EASA); and
- Annex IV – Investments report (produced by the PRB).

3 This "Traffic light system for environmental performance" simplifies the presentation of the information related to environment performance captured within the Commission Implementing Regulation (EU) 2019/317 (hereafter the Regulation).[1] The objective is to identify trends, where performance varies and facilitate discussions on the reasons for such variation and how to make improvements.

4 Aviation can and must contribute to reducing global CO_2 output. Policy makers and stakeholders have made commitments to reach ambitious goals in the coming years. The European Green Deal requires EU Member States to reduce greenhouse gas emissions by 55% before 2030, a goal to which the aviation industry must contribute.[2]

5 There are many initiatives to reduce CO_2 output across the aviation value chain. Airlines contribute by renewing/updating their fleets and using sustainable fuel. Their contribution is assessed regularly, identifying best performers and potential for improvement. The same holds true for airports. However, the understanding of environmental performance of air traffic management has been less prominent.

6 The Commission has encouraged the PRB to present its findings regarding environmental performance of Member States and ANSPs in a simplified way to foster a wider discussion on how the environmental performance of air traffic management can be improved. The present document is the result of this work, presenting a traffic light system (TLS) for environmental performance of air traffic management.

7 Developing such a system may be seen to over simplify a complex issue. Taking this into account, in this document the PRB explains how it calculated the scoring. The discussion about the traffic light system should focus on how it can be used to alert each Member State to the performance in their airspace and to highlight areas where the ANSP(s) can improve the environmental performance, not on any shortcomings which any traffic light system inherently may have.

8 Not all factors are within the control of Member States and ANSPs. Environmental performance can be impacted by the choices of airspace users, airspace restrictions or network measures. However, there are actions ANSPs can take, such as implementing free route airspace (FRA) or airspace management to improve environmental performance. The implementation of FRA varies considerably between Member States, for example, by flight levels, times of day it is operational, and whether it operates across national boundaries. Given such complexities, the traffic light system focusses on the actual performance from 2015 to 2021 and compares the output of the indicators established in the Regulation within the environment KPA rather than considering specific actions taken to influence environmental performance.

[1] Commission Implementing Regulation (EU) 2019/317 of 11 February 2019 laying down a performance and charging scheme in the single European sky.
[2] Compared to 1990 levels.

2 THE TRAFFIC LIGHT SYSTEM COMPLEMENTING THE MONITORING OF THE PRB

2.1 Current measures of performance

9 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 minimise excess fuel burn.

10 The Union-wide targets set for horizontal flight efficiency acknowledge that zero deviation is not possible or desirable, because external factors (such as meteorological conditions, airspace closures because of military activities, and other technical restrictions) influence the actual routes flown. These factors are considered in the targets. Other external factors include the decisions taken by airspace users, which may be influenced by the factors above as well as route charges. In its monitoring, the PRB determines how Member States contribute to achieving the Union-wide targets for horizontal flight efficiency.

11 Member States could also implement a financial incentive for achieving the environmental targets in RP3. No Member State has done so. The lack of such may be because there is no obligation to do so and that not all elements of horizontal en route flight efficiency are within the control of those being incentivised.

12 In addition to the en route phase, it is important to consider the environmental impact of other stages of the flight. The traffic light system includes phases of flight for which data is reported annually.

2.2 Principles of the traffic light system

13 The PRB has defined key principles which underpin the traffic light system. The traffic lights system:

- Is based on available data for KPIs and PIs reported under the Regulation;
- Covers gate-to-gate flight stages as far as the above-mentioned data allows;
- Captures evolution in performance and ensures that changes in performance of a Member State are reflected in the scores achieved;
- Analyses environmental performance of Member States by comparison and identifies potential for improvement;
- Reflects performance compared to the expected contribution to the Union-wide targets, where possible; and
- Is based, as far as possible, on a Member State and ANSP's ability to influence performance.

2.3 Geographical scope

14 The traffic light system uses the same geographical scope as the Annual Monitoring Report of the Performance Review Body (the Member States of the Single European Sky, which includes the 27 Member States of the European Union plus Norway and Switzerland).

2.4 Years covered

15 The traffic light system includes data from 2015 until 2021. The data between 2015 and 2019 is based on the reporting under RP2 of the performance and charging scheme. From 2020 it is based on the data reported in RP3. The impact of the assessment spanning two reference periods with different scopes is discussed in Section 3.4, which describes the methodology for calculating the annual performance.

3 METHODOLOGY

3.1 Chosen indicators

16 The indicators used for the traffic light methodology are those defined by the Regulation (Annex I, Section I, Parts 2.1 and 2.2).

17 The methodology includes three main phases of flight when assessing environmental efficiency: En route, arrival terminal area and airport surface movements during the taxi-out phase.

En route – horizontal flight efficiency

18 The only environment key performance indicator (i.e. with targets) within the Regulation compares the flown route with the shortest (great-circle) route.

19 ANSPs influence the environmental efficiency of a flight by working with the Network Manager to define the route structure and by applying restrictions to manage the airspace. Measures to ensure routes are as direct as possible include implementing free route airspace, reducing airspace restrictions, and working closely with the military to release segregated areas when not used by the military.

20 Horizontal flight efficiency is also influenced by the choices of airspace users, such as avoiding higher cost charging zones, and actions taken elsewhere in the network, such as airspace restrictions in adjacent airspace and congestion. For simplicity, the traffic light system assumes that the shortest route is preferred by airspace users. With fuel costs being high and with the cost of compensating CO_2 output, it is likely that fuel burn plays an important role in airspace users' route planning.

Airport surface movement – additional taxi-out time

21 The main performance indicator related to airport surface movement is the additional time spent in the taxi-out phase measured as the average additional time beyond an unimpeded reference time. Whilst there can be delays during taxi-in, these are less common and are less influenced by ANSPs directly.

22 Additional taxi-out time is a proxy for excess fuel combustion caused by delays whilst taxiing-out to the runway. There are procedures and technologies (including departure management within the context of Airport Collaborative Decision Making) that reduce queuing for departure. Taxi-out queuing can be influenced by such procedures and technologies and is therefore included in the traffic light system. Other measures, such as single engine taxiing, or towing with electric tugs, can further reduce fuel burn in this phase of operation but are not included in this PI.

Terminal manoeuvring area – additional ASMA time

23 The additional time an aircraft spends in the arrival sequencing and metering area (ASMA) 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.

24 The time an aircraft spends within this radius is influenced by ATM and non-ATM related parameters including airborne holding, airspace design, noise restrictions, aircraft-related restrictions, and airport configuration. It can also be influenced by how closely the airport is operating to its maximum runway capacity.

25 Given that ATM-related actions can reduce the additional time spent in this phase of flight it is included in the traffic light system.

Vertical flight efficiency

26 Data is not currently available to assess the vertical efficiency of flights within en route airspace. However, the percentage of flights performing continuous descent operations (CDO) is available and estimates vertical flight efficiency within the terminal area on arrival.

27 It is not always possible to fly CDOs for operational reasons, however flight efficiency can be improved by air traffic management enabling more aircraft to minimise level flight within the terminal area.

3.2 Indicators not included

28 The PRB has not included performance indicators relating to the flight efficiency of the planned trajectory and the shortest constrained route.

29 The set of environmental indicators demonstrates how efficient the route network is and whether

airspace users are planning their routes to minimise flown distance.

30 The PRB's opinion is that Member States and ANSPs influence the actual trajectory (KEA) more than the planned trajectory and SCR (which is demonstrated by KEP being substantially higher than KEA for each year of RP2 and RP3).[3]

3.3 Weighting the indicators

31 The methodology developed considers the available data and applies a weighting to define the overall score of the Member State. Two main factors justify this approach:

- The amount of fuel burnt differs across each phase of flight; and
- Fuel efficiency varies between phases of flight, with operational and technical aspects such as the route flown and flight level contributing differently to the efficiency. The weightings of the metrics within the traffic light system account for these differences and provide a balanced overall assessment of performance.

32 The weightings applied are based on the European Aviation Environmental Report published by EASA, which provides the percentage of excess CO_2 generated by the phases of flight and vertical profile of flights.[4]

33 The weightings from the EASA report are used to apportion the total contribution across the four elements of flight efficiency within the Regulation: En route horizonal (hereafter KEA), horizontal during arrival (hereafter ASMA), vertical during descent (hereafter CDO), and taxi-out time (hereafter AXOT) (Table 1, section 3.5).

3.4 Annual performance

34 The first measure to compare the result is based on the performance of each Member State in the year of observation. The PRB applied statistical analyses to compare the performance of Member States for each of the four elements of environmental performance:

- KEA: Local reference values, provided by the Network Manager, define how each Member State should contribute to achieving the Union-wide environment.[5] There are also targets set within the performance plan. The PRB compared the actual performance of KEA for each year to the reference value defined by the Network Manager.[6]
- CDO, ASMA, and AXOT: No targets or reference values are set within the performance and charging scheme or performance plans to enable a comparison with actual performance. The values of these were compared to the average across all Member States to generate a standardised score.

35 The method for calculating the performance (P) of the year is the weighted sum of the standardised value of each indicator for the year. The equation for the performance of Member State (i) in the year (t) is:

$$P_{i(t)}=w_1Z_{1i(t)} + w_2Z_{2i(t)}+w_3Z_{3i(t)} + w_4Z_{4i(t)}$$

where w are the weightings applied to the indicators (Table 1, section 3.5), and Z are the standardised indicators.[7] The resulting values are plotted on the x axis of the traffic lights graph (Figure 1, next page), with the higher the value the better the performance compared to the sample.

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[3] KEP was 4.74% in 2016, reducing to 4.26 in 2021; SCR was 4.28% in 2016, reducing to 3.96% in 2021; and KEA was 2.84% in 2016, reducing to 2.59% in 2021.

[4] European Aviation Environmental Report 2019, EASA.

[5] For RP2 the reference values were for each functional airspace block rather than per Member State. Therefore, for 2015 – 2019 the traffic light system assesses FAB performance, with each Member of the FAB achieving the same score for performance of en route horizontal flight efficiency. For RP3 (2020 onwards) reference values and performance are reported per Member State.

[6] The PRB uses the reference values in the traffic light system rather than the targets within the performance plans to avoid less ambitious targets leading to an over optimistic view of performance.

[7] This formula is used to standardise the results of the indicators that are expressed in different units: $Z_{1i(t)}= \frac{x_{1i(t)}-\bar{x}_{1(t)}}{\sigma_{1(t)}}$

where:

$x_{1i(t)}$ = the observed value of the indicator (1) for Member State (i) (in the case of KEA this is the actual KEA value minus the reference value) in year (t)

$\bar{x}_{1(t)}$= the mean value of the sample for the indicator (1) in year (t)

σ= the standard deviation of the sample in year (t).

3.5 *Capturing the evolution of performance*

36 The evolution of performance is calculated by comparing the standardised year-on-year performance from 2015 to 2021. The equation for calculating the evolution of performance (EV) for Member State (i) in year (t) is:

$$EV_{i(t)} = w_1 e_{1i} + w_2 e_{2i} + w_3 e_{3i} + w_4 e_{4i}$$

where w are the weightings applied to the indicators (Table 1, next page), and e are the standardised evolutions of the indicators.[8]

37 This value is plotted on the y axis of the traffic light graph (Figure 1).

38 The presentation of the results shows that the Member States improving their performance at national level appear above the x axis (0 value). If they are degrading, they are below the x axis (0 value).

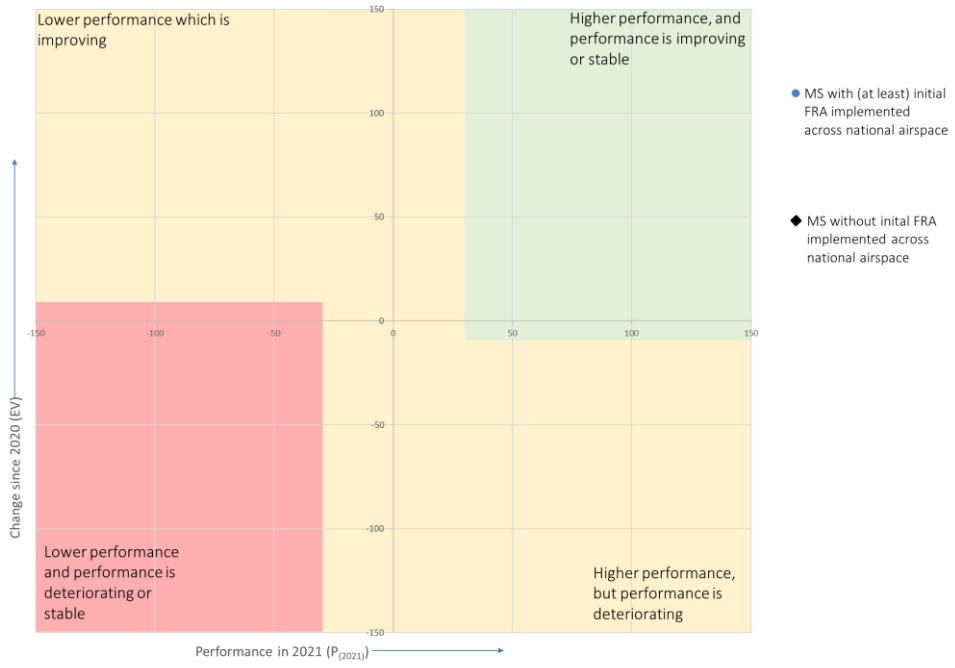

Figure 1 – Traffic lights graph.

[8]The standardised evolution of the indicators is calculated as the difference between years of the standardised by a base year :

$e_{1i} = \frac{x_{1i(t)} - x_{1i(t-1)}}{\sigma_{(base)}}$

where:

$x_{1i(t)}$= the observed value of the indicator (1) for Member State (i) (in the case of KEA this is the actual KEA value minus the reference value) in year (t);

$x_{1i(t-1)}$ = the observed value of the indicator (1) for Member State (i) (in the case of KEA this is the actual KEA value minus the reference value) in year (t-1); and

$\sigma_{(base)}$= the standard deviation of the sample in the baseline year (2021).

	Taxi-out (w_1)	Vertical during climb	Horizontal during en route (w_2)	Vertical during cruise	Horizontal during arrival (w_3)	Vertical during descent (w_4)	Taxi-in
Excess CO_2*	*9%*	*1%*	*36%*	*15%*	*23%*	*10%*	*5%*
Relevant metrics in the performance and charging scheme	AXOT	n.a.	KEA	n.a.	ASMA	CDO	n.a.
Value applied in the traffic light system[9]	12%		46%		29%	13%	

*Table 1 - Mapping of RP3 performance metrics relative to each gate-to-gate flight phase (source: EASA European Aviation Environmental Report – PRB elaboration). * The total is not equal to 100% due to rounding.*

39 It is not possible to compute the evolution of performance for 2015 or 2020:

- For 2015 there is no data in 2014 to compare with; and
- For 2020, a comparison with 2019 is not possible because of the change in the regulatory framework between RP2 (FAB reference values) and RP3 (national reference values).

40 The colour allocated to Member States for 2015 and 2020 is, therefore, based only on the annual performance and does not consider the evolution of performance.

3.6 Forming bands for categorisation

41 The standardised and weighted scores demonstrate the following main outcomes:

- Member States with a positive score show strong performance. Given the weightings applied to the indicators (46% for KEA), it is likely that the Member States will have achieved their local reference value for horizontal en route flight efficiency in the year; and
- Member States with a negative score show lower levels of performance and it is unlikely that the local reference value for horizontal en route flight efficiency will have been achieved in the year (unless other areas of performance are particularly poor and outweigh the strong contribution from en route performance).

42 The PRB has defined thresholds for the red, amber, and green categories based on the score and on the evolution over time.[10]

43 Each coloured band has a threshold for the standardised score in the year and for the evolution:

- Green: The Member State shows good levels of performance and the score is improving or stable.
  The PRB has chosen a standardised score of 30 or more and a change of not less than -10 for the green category. The allowance of -10 for the evolution in performance is to account for high performing Member States who may have perturbations in performance and for whom it may be difficult to continually improve.
- Amber: Performance levels between the red and green categories. There are three reasons why a Member State is in the amber category:
  i. Good performance levels, but has shown significant degradation (bottom right quadrant). This is to highlight potential concern and to help ensure that the degradation does not persist.
  ii. Average performance that may be stable, improving or degrading (central area).
  iii. Lower performance, but showing significant improvement (top left quadrant).
- Red: The Member State shows lower levels of performance and the score is degrading or stable.
  The PRB has chosen a standardised score of -30 or less and a change of not more than 10 for the red category. The threshold of 10 is to account for those Member States with low performance, where the slight improvement

* The total is not equal to 100% due to rounding.
[9] The contributions were normalised to include only the KPIs and PIs within the performance and charging scheme.
[10] With the exception of 2015 and 2020 for which comparisons with the previous year are not possible.

over time is not yet a clear indication of a positive trend in performance and further improvement is required to move colour categories.

44 The results of the traffic light system are presented in two ways. The first is to plot the outcome of the scores defined on Figure 1 (Section 3.5).

45 The second presentation of the results is a scorecard for each Member State. It defines the scores calculated for each Member State based on the value of the score for KEA, CDO, AXOT, and ASMA and their weighted sum in the current and previous years. The scorecard also presents the observed trend over the years.

46 The PRB notes the importance of recognising the steps taken to implement projects to improve environmental performance. Therefore, contextual information relating to the implementation of FRA and flexible use of airspace is included within the scorecards. The contextual information describes the implementation of FRA, beginning with initial FRA and including any cross-border activities. It also includes the level of application of flexible use of airspace including levels of FUA to be implemented to support efficient use of the airspace.

47 The scorecard for each Member States is presented at the end of this report.

4 INITIAL RESULTS

48 The initial results of the traffic light system are shown in Figure 2. These results are presented to facilitate a discussion about the variation in performance and how to improve rather than to highlight shortcomings of specific Member States. The presentation of the results also highlights the Member States that have implemented initial free route airspace (by the colour of the data points).

49 The results of the traffic light system show that:

- Nine Member States are in the green category;
- Nine Member States are in the amber category; and
- 10 Member States are in the red category.

50 By the end of 2021, only four Member States (Cyprus, France, Spain, and Switzerland) had yet to implement initial FRA across their national airspace. It will be interesting to observe how the environmental performance of these Member States evolves once FRA has been implemented.

51 There are three Member States that have improved their traffic light system score in 2021 but remain amber. These Member States (Austria, Bulgaria, and Romania) could progress to the green category with further improvement, but Romania and Bulgaria, in particular, are likely to be impacted by the Russia's war of aggression against Ukraine.

52 Estonia, Hungary, and Slovenia should all achieve the green category if they can reverse the degradation in their score in 2022.

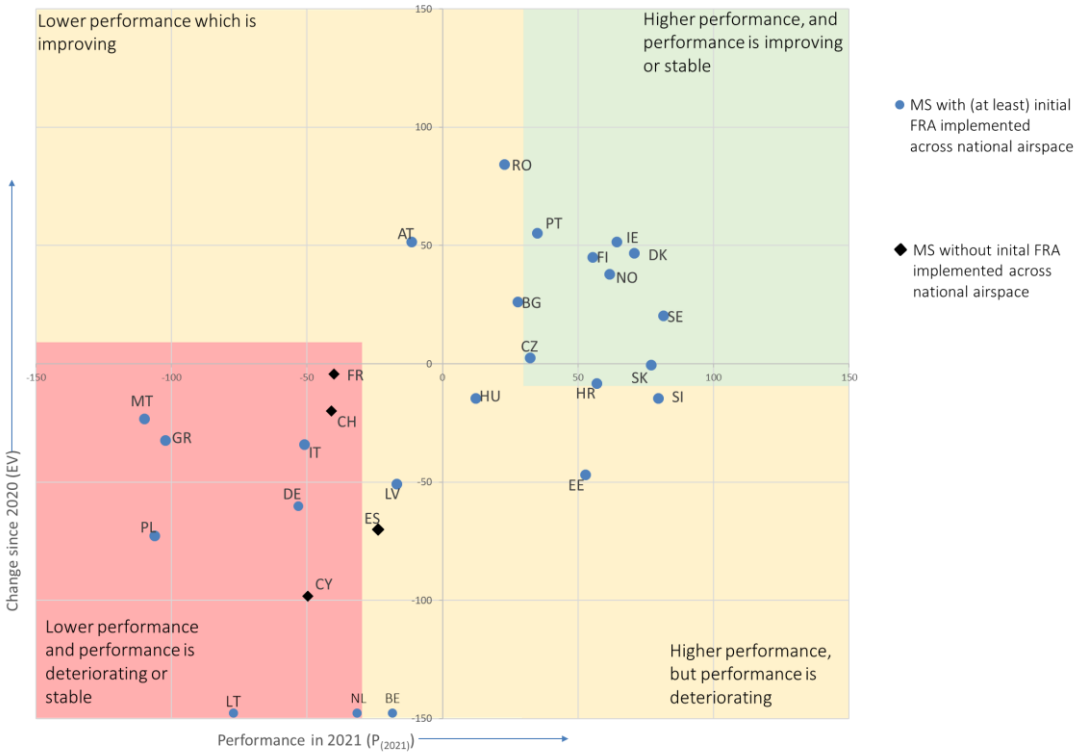

Figure 2 - Results of the traffic light system, showing 10 Member States in the red category, nine in the green, and the remainder amber.[11]

[11] The values for NL and BE must be treated with caution. In 2020, the score was very positive following a shift in the reference values between the FAB and national level.

5 THE LIMITATIONS

53 The PRB has developed this initial methodology to assess environment performance at national level through the indicators included within the Regulation and to present it in a clearer and more accessible manner for discussion.

54 The following limitations have been identified, which will require further consideration in the ongoing development of the PRB's monitoring activities:

- The traffic light system is currently limited to the KPIs and PIs established in the performance and charging scheme of the Single European Sky.
- The assignment of the color category is based on judgement rather than legal or empirical certainty.
- The shift in the regulatory framework between RP2 and RP3 makes longer term comparisons difficult and masks differences in performance across the FAB for RP2, which is then resolved in 2020 and 2021 when the reference values per Member State are used. This limitation leads to some significant changes in scores for certain Member States between the end of RP2 and the first year of RP3. Despite this, to enable the traffic light system to include values for 2015 and 2020, the evolution of performance is excluded from the calculation of the colour for these years.
- The traffic light system does not provide the specific drivers of performance or the reasons for attaining the given level of performance, or how to improve it. The scores are driven by the values of the PIs and KPIs rather than actions taken to influence flight efficiency. Therefore, the result of the KPIs and PIs will include elements that are outside of the control of the Member State and ANSP. However, the objective is to facilitate discussion and highlight potential issues and to develop potential solutions.
- Using reference values for KEA within the performance plan as a benchmark may be seen to be punitive on those with already good KEA performance, as it will be more challenging for them to further reduce their inefficiency. Whereas those that are currently less efficient may have a greater scope for improvement.[12]
- The traffic light system does not account for or reflect the interdependencies between key performance areas, notably capacity and cost-efficiency (route charges). This is particularly the case where flights re-route around congested areas to avoid ATFM restrictions. This can push the route deviations into (and reduce KEA performance in) neighboring airspace. The PRB is investigating how best to consider this within the assessment of performance.

55 The PRB explains the choices made and the impact of those choices, but further discussions should be held to better refine the methodology with other stakeholders in the industry.

[12] The PRB will consider whether changing to a relative comparison between the actual performance and the reference value rather than an absolute comparison would resolve this issue.

6 CONCLUSION

56 This initial traffic light system is a simplified way to assess and communicate the environmental performance within the performance and charging scheme of the Single European Sky.

57 The categorisation of environmental performance as presented in this report facilitates a discussion about the environmental performance of air traffic management and provides leverage to call for improvement.

58 A more refined categorisation could include additional data sources. It is an initial methodology to begin discussions with the wider industry, particularly Member States, ANSPs, and the Network Manager regarding how to use the data already collected to present performance and drive improvements.

59 The methodology also highlights that the data collected already covers many elements of environmental performance of air traffic management in each of the three phases of flight included. It also highlights the challenges of distilling this information into a gate-to-gate measure of performance. Providing a more consolidated gate-to-gate view is a priority for assessing environmental performance of air traffic management in Europe.

60 Additional KPIs for measuring environmental performance would allow Member States, ANSPs, as well as the Commission, to define more targeted measures.

61 The methodology does have limitations and the PRB will work to improve the traffic light system. Potential improvements include accounting for deviations caused by ATFM restrictions or route charges where these can be identified to better account for the interdependencies between capacity, cost-efficiency, and the environment KPA.

A. MEMBER STATE SCORECARDS

Reader's guide

62 It is highly recommended that users to read the entirety of this report before interpreting the results in the below scorecards.

63 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.

64 The **traffic lights** span over each year of RP2 and RP3 and have been determined based on the methodology defined in section 3.

65 The **2021 performance scores** are not absolute values, but are the standardised scores obtained based on the methodology defined in Section 3.4. A score of zero represents the average of the series for 2021.

66 The **contextual factors** include qualitative information on the status of free route airspace and flexible use of airspace implementation. This information is extracted from the 2021 Member State Local Single Sky Implementation Plans (LSSIPs).[13]

Austria

Member State	*Main ANSP(s)*	RP2 / RP3	*Trend*
Austria	***Austro Control***	*2015* *2016* *2017* *2018* *2019* *2020* *2021*	▲

2021 performance scores

- **Taxi-out** -0.56 — *Worse than SES average*
- **En route** 0.79 — *Better than average deviation from NM reference value*
- **CDO** -0.82 — *Worse than SES average*
- **ASMA** -1.04 — *Worse than SES average*

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Austria, with ATS in place within FIR Wien below FL095 for NON RNAV equipped flights.
- Cross-border FRA with Slovenia, Croatia, Bosnia & Herzegovina, Serbia and Montenegro.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- LARA is planned to be implemented in mid-2023.
- Adaptation of ASM and ATC systems for automatic ASM data exchanges under consideration.

Belgium

Member State	*Main ANSP(s)*	RP2 / RP3	*Trend*
Belgium	***skeyes, MUAC***	*2015* *2016* *2017* *2018* *2019* *2020* *2021*	▼

2021 performance scores

- **Taxi-out** 0.53 — *Better than SES average*
- **En route** -0.68 — *Worse than average deviation from NM reference value*
- **CDO** -1.58 — *Worse than SES average*
- **ASMA** 0.91 — *Better than SES average*

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented at MUAC.
- Cross-border FRA with DK-SE FAB (as well as the Netherlands and Germany by extension of MUAC).
- Future implementations of cross-border FRA are considered with Germany (DFS), France, and the UK.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- The connection between LARA and FDPS for Belgium has been completed.
- Enhanced Civ/Mil ASM procedures are due in 2026.
- Improved use of the route network as a result of FUA enhancement are due in 2026.

[13] https://www.eurocontrol.int/service/local-single-sky-implementation-monitoring

Bulgaria

Member State: Bulgaria

Main ANSP(s): BULATSA

RP2 / RP3: 2015 (green) 2016 (orange) 2017 (green) 2018 (orange) 2019 (red) 2020 (orange) 2021 (orange)

Trend: ▬

2021 performance scores

- Taxi-out -0.14 — Worse than SES average
- En route -0.08 — Worse than average deviation from NM reference value
- CDO 0.52 — Better than SES average
- ASMA 0.91 — Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Bulgaria.
- Cross-border FRA with Romania, Hungary, Slovakia. Extension to Moldova, Poland and Lithuania planned for 2022.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- Gradual implementation of A-FUA functionalities is planned from 2022 until 2026.
- LARA operational. BULATSA AMC sends AUP/UUP daily.

Croatia

Member State: Croatia

Main ANSP(s): Croatia Control

RP2 / RP3: 2015 (orange) 2016 (orange) 2017 (orange) 2018 (green) 2019 (orange) 2020 (green) 2021 (green)

Trend: ▲

2021 performance scores

- Taxi-out 1.16 — Better than SES average
- En route 0.92 — Better than average deviation from NM reference value
- CDO -0.19 — Worse than SES average
- ASMA 0.11 — Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Croatia.
- Cross-border FRA with Bosnia & Herzegovina, Serbia and Montenegro from FL205 up to FL660.
- Extensions according to ERNIP Part II will be implemented from 2022 until 2026.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- LARA B2B connection with NM to be completed in 2022.
- Implementation activities of ASM and A-FUA are almost completed.
- Implementation of interoperability of ASM with NM expected by end of 2022.

Cyprus

Member State: Cyprus

Main ANSP(s): DCAC Cyprus

RP2 / RP3: 2015 (orange) 2016 (red) 2017 (orange) 2018 (red) 2019 (orange) 2020 (orange) 2021 (red)

Trend: ▼

2021 performance scores

- Taxi-out N.A. — Not reported
- En route -1.22 — Worse than average deviation from NM reference value
- CDO 0.49 — Better than SES average
- ASMA N.A. — Not reported

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	✔	-

- FRA has been initiated in coordination with NM, implementation expected end of 2022.
- Cross-border FRA will be planned with a new ATM system. With a target end date of 2025.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- Implementation of A-FUA is ongoing. To be completed in 2024.
- LARA is deployed in DCAC. Full operational capability planned for end 2022.

Czech Republic

Member State: Czech Republic

Main ANSP(s): ANS CR

RP2 / RP3: 2015 (orange) 2016 (orange) 2017 (orange) 2018 (orange) 2019 (orange) 2020 (orange) 2021 (green)

Trend: ▲

2021 performance scores

- Taxi-out -0.25 — Worse than SES average
- En route 0.60 — Better than average deviation from NM reference value
- CDO -0.89 — Worse than SES average
- ASMA 0.68 — Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in the Czech Republic.
- Cross-border FRA with Bulgaria, Hungary and Romania will be implemented in 2023 and with Slovakia, Poland and Lithuania in 2024.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Planned

- Currently, no detailed objectives. Target date set for end of December 2022.

Denmark

Member State: Denmark | **Main ANSP(s):** NAVIAIR | **Trend:** ▲

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

2021 performance scores

Taxi-out	0.15	Better than SES average
En route	0.70	Better than average deviation from NM reference value
CDO	0.77	Better than SES average
ASMA	0.60	Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA implemented in Denmark from FL285.
- Cross-border FRA with Estonia, Iceland, Ireland, Latvia, Norway, Sweden and the UK (Borealis FRA). Further FRA with MUAC and Germany,

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Operational

- Optimisation of FUA will be done in 2022-2026.
- ASM capabilities are adopted in Denmark.
- LARA is implemented. Release of restricted airspaces information is exchanged tactical via UUP.

Estonia

Member State: Estonia | **Main ANSP(s):** EANS | **Trend:** ▼

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

2021 performance scores

Taxi-out	1.14	Better than SES average
En route	-0.03	Worse than average deviation from NM reference value
CDO	1.07	Better than SES average
ASMA	0.91	Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Estonia from FL095 to FL660.
- Cross-border FRA with Denmark, Finland, Iceland, Ireland, Latvia, Norway, Sweden and UK (Borealis FRA).

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- LARA is implemented for EANS. FINEST LARA will be implemented in 2022.
- Common ASM system with FINEST CROSS BDRY service is planned. Target date set for end 2022.

Finland

Member State: Finland | **Main ANSP(s):** Fintraffic ANS | **Trend:** ▲

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

2021 performance scores

Taxi-out	-0.91	Worse than SES average
En route	0.84	Better than average deviation from NM reference value
CDO	1.46	Better than SES average
ASMA	0.30	Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Finland from FL095 to FL660.
- Cross-border FRA with Denmark, Estonia, Iceland, Ireland, Latvia, Norway, Sweden and UK above FL285 (Borealis FRA).

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- FINEST LARA will be implemented in 2022.
- ASM and A-FUA are planned to be fully deployed by end of 2022.

France

Member State: France | **Main ANSP(s):** DSNA | **Trend:** ▬

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

2021 performance scores

Taxi-out	-0.07	Worse than SES average
En route	-0.35	Worse than average deviation from NM reference value
CDO	-1.83	Worse than SES average
ASMA	0.03	Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	✔	-

- H24 FRA is implemented in Bordeaux, Brest and Paris ACC from FL195+. FRA implementation in all cells to be completed by 2025.
- FRA according to IR CP1 is complete.
- Cross-border FRA projects are planned for 2025.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- FUA improvement is planned from 2022 until 2026.
- Migration of LARA on NewPENS network is in progress. Target date set for December 2022.

Germany

Member State	Main ANSP(s)	RP2 / RP3	Trend
Germany	***DFS, MUAC***	2015 2016 2017 2018 2019 2020 2021	▬

2021 performance scores

- Taxi-out **-0.40** — Worse than SES average
- En route **0.54** — Better than average deviation from NM reference value
- CDO **-1.69** — Worse than SES average
- ASMA **-1.77** — Worse than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Germany.
- FRA cells EDMM East (FL245-285), EDMM South (FL245-315), EDWW East (FL245-285) are still pending.
- Cross-border FRA with DK-SE FAB (as well as the Netherlands and Belgium by extension of MUAC).

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- ASM and A-FUA will be fully deployed by end of 2022.
- The automatic ASM data exchange between the ASM system and ATC system will not be available before end of 2026.

Greece

Member State	Main ANSP(s)	RP2 / RP3	Trend
Greece	***HASP***	2015 2016 2017 2018 2019 2020 2021	▬

2021 performance scores

- Taxi-out **-0.86** — Worse than SES average
- En route **-0.92** — Worse than average deviation from NM reference value
- CDO **0.21** — Better than SES average
- ASMA **-1.80** — Worse than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	✔	-

- FRA implementation in Greece is ongoing. Night FRA is implemented.
- Cross-border FRA operations are planned. Target date end of 2025.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implemented

- Civ/mil coordination improvements integration of future civ/mil airspace structures' requirements are planned from 2022 until 2026.
- LARA to be implemented from 2022 until 2025.

Hungary

Member State	Main ANSP(s)	RP2 / RP3	Trend
Hungary	***HungaroControl***	2015 2016 2017 2018 2019 2020 2021	▬

2021 performance scores

- Taxi-out **0.92** — Better than SES average
- En route **0.16** — Better than average deviation from NM reference value
- CDO **-0.54** — Worse than SES average
- ASMA **0.03** — Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- FRA is implemented in Hungary from FL095 to FL660.
- Cross-border FRA with Slovakia and Romania.
- Planned FRA with Moldova, Poland, Lithuania and Ukraine by 2024.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- LARA is implemented.
- MATIAS ATC system has been upgraded to support real time airspace status data. Target date end of 2022.

Ireland

Member State	Main ANSP(s)	RP2 / RP3	Trend
Ireland	***IAA ANSP***	2015 2016 2017 2018 2019 2020 2021	▲

2021 performance scores

- Taxi-out **0.48** — Better than SES average
- En route **0.87** — Better than average deviation from NM reference value
- CDO **0.52** — Better than SES average
- ASMA **0.41** — Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- FRA is implemented in Ireland from FL075.
- Cross-border FRA with Cross-border FRA with Denmark, Estonia, Iceland, Finland, Latvia, Norway, Sweden and UK (Borealis FRA). Planned to complete FRA with parts of Scottish FIR in 2025.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- LARA is implemented in partnership with UK.
- A-FUA full operational capability to be achieved with UK-IRL FAB LARA in 2022.

Italy

Member State: Italy | **Main ANSP(s):** ENAV | **Trend:** —

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

2021 performance scores

- Taxi-out -1.14 — Worse than SES average
- En route 0.22 — Better than average deviation from NM reference value
- CDO -0.28 — Worse than SES average
- ASMA -1.50 — Worse than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- FRA is implemented in Italy from FL305.
- Cross-border FRA implementation is being coordinated with neighbouring countries.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- A-FUA concept implementation is ongoing.
- LARA fully implemented and able to provide continuous exchange of information between. Automatic exchange will be deployed.
- ASM and ATC systems integration under investigation.

Latvia

Member State: Latvia | **Main ANSP(s):** LGS | **Trend:** —

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

2021 performance scores

- Taxi-out -1.90 — Worse than SES average
- En route -0.46 — Worse than average deviation from NM reference value
- CDO 0.73 — Better than SES average
- ASMA 0.60 — Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- FRA is implemented in Latvia from FL095.
- Cross-border FRA with Denmark, Estonia, Iceland, Ireland, Finland, Norway, Sweden and UK (Borealis FRA).

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- A-FUA implementation is ongoing.
- LARA runs in pre-operational mode and inter-operability with NM will be analysed only once fully operational.

Lithuania

Member State: Lithuania | **Main ANSP(s):** SE Oro Navigacija | **Trend:** ▼

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

2021 performance scores

- Taxi-out 1.69 — Better than SES average
- En route -2.38 — Worse than average deviation from NM reference value
- CDO 1.01 — Better than SES average
- ASMA N.A. — Not reported

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Lithuania from FL095 to FL660.
- Cross-border FRA planned to be operational with Poland in 2022. Consideration with other neighbors to follow.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 2	Operational	Implementing

- A-FUA implementation is ongoing.
- LARA deployed and integrated.

Malta

Member State: Malta | **Main ANSP(s):** MATS | **Trend:** ▼

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

2021 performance scores

- Taxi-out 0.85 — Better than SES average
- En route -2.95 — Worse than average deviation from NM reference value
- CDO 0.69 — Better than SES average
- ASMA 0.22 — Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- FRA is implemented in Malta from FL195.
- Cross-border FRA planned with Italy in 2024.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
N/A	Not planned yet	N/A

- A-FUA not yet planned to be implemented in Malta.

The Netherlands

Member State: The Netherlands | **Main ANSP(s):** LVNL, MUAC | **Trend:** ▼

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

2021 performance scores

Taxi-out	-0.97	Worse than SES average
En route	0.27	Better than average deviation from NM reference value
CDO	-0.88	Worse than SES average
ASMA	-0.70	Worse than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in the Netherlands (MUAC).
- Cross-border FRA with Denmark and Sweden (as well as the Belgium and Germany by extension of MUAC).
- Future implementations of cross-border FRA are considered with Germany (DFS), France, and the UK.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
N/A	Operational	Operational

- LARA is implemented (MUAC), not deemed applicable to LVNL.
- Due to security limitations, exchange of data between the MOD and NM is not possible. In the future, LVNL will provide the required data to NM.

Norway

Member State: Norway | **Main ANSP(s):** Avinor ANS | **Trend:** ▲

RP2: 2015 2016 2017 2018 2019 2020 | RP3: 2021

2021 performance scores

Taxi-out	-2.11	Worse than SES average
En route	1.11	Better than average deviation from NM reference value
CDO	2.21	Better than SES average
ASMA	0.56	Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Norway.
- Cross-border FRA with Denmark, Estonia, Iceland, Ireland, Latvia, Finland, Sweden and UK (Borealis FRA).
- Local FRA implementation published at a lower limit of FL135/FL195.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- A-FUA implementation is ongoing. Target date in 2025.
- LARA is implemented. Integration with ATM system planned with iTEC deployment / FAS programme.

Poland

Member State: Poland | **Main ANSP(s):** PANSA | **Trend:** ▬

RP2: 2015 2016 2017 2018 2019 2020 | RP3: 2021

2021 performance scores

Taxi-out	-0.84	Worse than SES average
En route	-1.30	Worse than average deviation from NM reference value
CDO	0.38	Better than SES average
ASMA	-1.42	Worse than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- FRA is implemented in Poland from FL095 to FL660.
- Cross-border FRA with Lithuania planned in 2022, Slovakia, Sweden in 2023, Czech Republic and Ukraine in 2024.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- A-FUA to be operational in 2022.
- Drafting of operational procedures and development of Local ASM systems support have started. ASM tool support planned between 2022-2026.

Portugal

Member State: Portugal | **Main ANSP(s):** NAV Portugal | **Trend:** ▲

RP2: 2015 2016 2017 2018 | RP3: 2019 2020 2021

2021 performance scores

Taxi-out	-0.05	Worse than SES average
En route	0.95	Better than average deviation from NM reference value
CDO	0.69	Better than SES average
ASMA	-0.58	Worse than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- FRA is implemented in Portugal above FL245.
- Cross-border FRA planned with Spain in 2023.
- Contacts have established with FABEC on the extension of FRA to Brest ACC.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- A-FUA implementation is ongoing. Target date in 2025.
- LARA is operational.
- Interoperability between ASM support systems to facilitate cross border operations not yet planned.

Romania

Member State: Romania

Main ANSP(s): ROMATSA

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

Trend: ▲

2021 performance scores

Taxi-out	-0.09	Worse than SES average
En route	0.22	Better than average deviation from NM reference value
CDO	0.15	Better than SES average
ASMA	0.41	Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Romania.
- Cross-border FRA with Bulgaria, Hungary, Slovakia. Extension planned to Moldova, Poland and Lithuania in 2022, Czech Republic in 2023 and Ukraine in 2024.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- A-FUA to be fully operational in 2022.
- LARA is implemented.
- Real time ASM in place.

Slovakia

Member State: Slovakia

Main ANSP(s): LPS SR

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

Trend: ▲

2021 performance scores

Taxi-out	2.01	Better than SES average
En route	0.16	Better than average deviation from NM reference value
CDO	0.01	Better than SES average
ASMA	1.56	Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Slovakia.
- Cross-border FRA with Hungary, Romania and Bulgaria.
- Extension planned to Moldova, Poland and Lithuania in 2022, Czech Republic in 2023 and Ukraine in 2024.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- A-FUA implementation is ongoing. Target date in 2022.
- ASM-ATC system data exchange implementation is ongoing.

Slovenia

Member State: Slovenia

Main ANSP(s): Slovenia Control

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

Trend: ▼

2021 performance scores

Taxi-out	0.69	Better than SES average
En route	0.73	Better than average deviation from NM reference value
CDO	-0.82	Worse than SES average
ASMA	1.67	Better than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA implemented in Slovenia.
- Cross-border FRA with Austria, Croatia, Bosnia & Herzegovina, Serbia and Montenegro.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- A-FUA to be fully operational by end of 2023.
- Slovenia will rely on NM applications and system capabilities.

Spain

Member State: Spain

Main ANSP(s): ENAIRE, FerroNATS

RP2: 2015 2016 2017 2018 2019 | RP3: 2020 2021

Trend: ▬

2021 performance scores

Taxi-out	-0.19	Worse than SES average
En route	-0.05	Worse than average deviation from NM reference value
CDO	-0.33	Worse than SES average
ASMA	-0.51	Worse than SES average

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	✔	-

- H24 FRA only available in Madrid FIR, implementation is ongoing and planned to enter into service in 2025.
- Full cross-border FRA with Portugal planned by 2025.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- LARA is deployed in several civil and military locations.
- ASM and A-FUA procedures are jointly coordinated by ENAIRE and Spanish Air Force.

Sweden

Member State	Main ANSP(s)	RP2 / RP3	Trend
Sweden	***LFV***	2015 2016 2017 2018 2019 2020 2021	▲

2021 performance scores

- **Taxi-out** 1.24 — *Better than SES average*
- **En route** 0.57 — *Better than average deviation from NM reference value*
- **CDO** 0.49 — *Better than SES average*
- **ASMA** 1.18 — *Better than SES average*

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	-	✔

- H24 FRA is implemented in Sweden.
- Cross-border FRA with Denmark, Estonia, Iceland, Ireland, Latvia, Norway, Finland and UK (Borealis FRA). Further FRA with Germany.
- FRA is published from FL285-660 at highest point.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- LARA to be implemented in 2022.
- NM airspace management systems are used.

Switzerland

Member State	Main ANSP(s)	RP2 / RP3	Trend
Switzerland	***skyguide***	2015 2016 2017 2018 2019 2020 2021	▬

2021 performance scores

- **Taxi-out** -0.39 — *Worse than SES average*
- **En route** 0.76 — *Better than average deviation from NM reference value*
- **CDO** -1.54 — *Worse than SES average*
- **ASMA** -1.77 — *Worse than SES average*

Contextual factors (2021)

Initial Free Route Airspace:

Planned	Implementing	Operational
-	✔	-

- FRA in Switzerland to be fully operational in 2022.
- Cross-border FRA with Germany planned in 2022, France and Italy in 2023.

Flexible Use of Airspace:

Level	FUA status	Advanced FUA
Level 3	Operational	Implementing

- A-FUA to be fully operational in 2024.
- LARA to be implemented in 2024.

B. GLOSSARY OF ABBREVIATIONS

Abbreviation	Definition
ACC	Area Control Centre
A-FUA	Advanced Flexible Use of Airspace
AMC	Airspace Management Cell
ANSP	Air Service Navigation Provider
ASM	Airspace management
ASMA	Additional Time in Terminal Airspace
ATC	Air Traffic Control
ATS	Air Traffic Services
AUP/UUP	Airspace Use Plan/ Updated Airspace Use Plan
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
LARA	Local and sub-regional airspace management support system
MATIAS	Integrated ATM system of HungaroControl
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