PRB | Performance review body of the single european sky

PRB Monitoring Report 2018

Annex I - Union-wide Detailed Analysis for Experts

The 2018 monitoring consists of five reports:

- PRB Monitoring Report 2018
- **Annex I – Union-wide detailed analysis for experts**
- Annex II – Member States' detailed analysis for experts
- Annex III – Safety Report
- Annex IV – CAPEX Report

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Performance Review Body of the Single European Sky | Rond-Point Schuman 6, 6th Floor, Office 411, B-1040 Brussels
Office Telephone: +32 (0)2 234 7824 | regula.dettling-ott@prb.eusinglesky.eu / prb-office@prb.eusinglesky.eu | webgate.ec.europa.eu/eusinglesky

PRB Performance review body of the single european sky

Table of Contents

List of figures

List of tables

1 Introduction and Context

1.1 About this document

1 The PRB Monitoring report 2018 provides analysis of the performance achieved by Member States of the Single European Sky (SES), covering the fourth year (2018) of the second Reference Period (RP2), which runs for five years from 2015 to 2019.

2 In 2018, the PRB Monitoring Report is supported by four Annexes to provide detailed analysis of performance:

- PRB Monitoring Report 2018
- **Annex I – Union-wide Detailed Analysis for Experts**
- Annex II – Member States' detailed analysis for experts
- Annex III – Safety Report
- Annex IV – CAPEX Report

3 This document is the Union-wide Detailed Analysis for Experts and is a collaboration between the Performance Review Unit (PRU), the European Union Aviation Safety Agency (EASA) and the Performance Review Body (PRB). For consistency and to enable comparison across monitoring reports, the graphs presented in the report are in line with those in previous reports.

4 New sections provide insight into the drivers of performance in 2018, taking into account the recommendations of the PRB in 2017.

5 The data used in the report was submitted by the Member States and Eurocontrol or is in the public domain. It is published on the ESSKY (European Single Sky) web platform or on the Performance Dashboard hosted by Eurocontrol. The Dashboard provides reports and data on the performance of all Air Navigation Service Providers (ANSPs) belonging to the SES. It can be accessed at http://www.eurocontrol.int/prudata/dashboard.

6 The analysis for 2018 refers to performance in the airspace shown in Figure 1, which is the geographical scope of the Union-wide targets for RP2. The geographical scope covers the airspace controlled by the States which are part of the Single European Sky area since the start of RP2 (28 EU Member States, the airspace controlled by Norway and Switzerland in the ICAO EUR region, as well as the Canaries Flight Information Region (FIR) (Spain), Bodø FIR (Norway) and NOTA/SOTA (UK-IRE)). It corresponds to the nine functional airspace blocks shown in Figure 1.

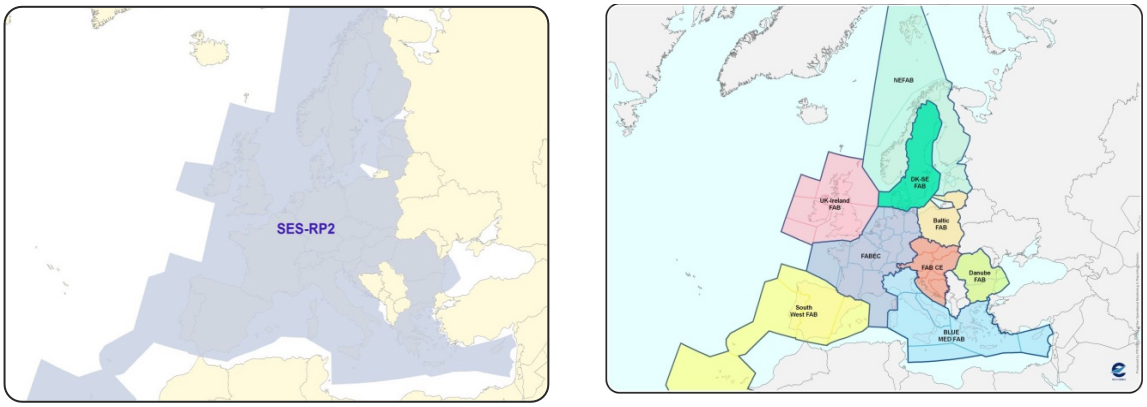


Figure 1 - RP2 Geographical scope (left) and Functional Airspace Blocks (right).

7 According to the legal framework applicable for RP2, monitoring covers four Key Performance Areas (KPAs): safety, environment, capacity and cost-efficiency.[1] The performance indicators with Union-wide and/or local targets are referred to as the Key Performance Indicators (KPIs), while those established for monitoring purposes are referred to as Performance Indicators (PIs). These are shown in blue in Table 1.

(= Target = Monitoring)	Union-wide	FAB	National
Safety KPIs (blue) & PIs			
Effectiveness of Safety Management (EoSM)	Target	Target	Monitoring
Application of severity classification scheme (RAT methodology)	Target	Target	Monitoring
Just Culture (JC)		Target	Monitoring
Application of automatic data recording		Monitoring	Monitoring
Level of occurrence reporting		Monitoring	Monitoring
Separation Minima Infringements (SMI)		Monitoring	Monitoring
Runway Incursions (RI)		Monitoring	Monitoring
ATM-Specific Occurrences (ATM-S)		Monitoring	Monitoring
Airspace Infringements (AI)		Monitoring	Monitoring
Environment KPIs (blue) & PIs			
Average horizontal en route flight efficiency (actual trajectory)	Target	Target	
Average horizontal en route flight efficiency (flight plan trajectory)	Target		
Effectiveness of booking procedures for flexible use of airspace (FUA)	Monitoring		Monitoring
Rate of planning of conditional routes (CDRs)	Monitoring		Monitoring
Effective use of conditional routes (CDRs)	Monitoring		Monitoring
The additional time in taxi-out phase			Monitoring
The additional time in terminal airspace (ASMA)			Monitoring
Capacity KPIs (blue) & PIs			
Average minutes of en route air traffic flow management (ATFM) delay attributable to air navigation services (ANS)	Target	Target	
Average minutes of arrival ATFM delay attributable to terminal ANS	Monitoring		Target
The adherence to ATFM slots			Monitoring
The average minutes of air traffic control (ATC) pre-departure delay.			Monitoring
Cost-efficiency KPIs (blue) & PIs			
Average Determined Unit Cost (DUC) for en route ANS	Target		Target
Average Determined Unit Cost (DUC) for terminal ANS			Target
Costs of Eurocontrol	Monitoring		

Table 1 - RP2 (Key) Performance indicators.

1.2 The SES Performance Scheme

8 The legal basis for monitoring the performance of the air traffic management in the SES area during RP2 is defined in Article 11 of Regulation (EC) No 549/2004 (the Framework Regulation) and specified in Article 3 of Implementing Regulation (EU) No 390/2013 (the Performance Scheme Regulation).

[1] Commission Implementing Regulation (EU) No 390/2013, Commission Implementing Regulation (EU) No 391/2013

9 In addition, the States are regulated by Articles 12, 14, 15 and 16 of Regulation (EC) 550/2004 (the Service Provision Regulation) and Implementing Regulation (EU) No 391/2013 (the Charging Scheme Regulation).

10 The binding Union-wide targets and the associated alert thresholds were published by the Commission for RP2 in Implementing Decision (EU) 132/2014 of 11 March 2014.

11 The monitoring of performance assesses whether Member States implement the performance plans and meet the binding targets therein. The targets for Member States are set under the SES Performance Scheme at Union-wide and/or at local (national, FAB or charging zone) levels. Local targets for each KPI, and for each year of RP2, were defined by the National Supervisory Authority (NSA) in the Performance Plan of each Functional Airspace Block (FAB) at the start of the reference period. Local targets must be consistent with the Union-wide targets. The Performance Plans may also include additional PIs and associated targets set by the NSA.

12 In 2016, Malta, Poland and Bulgaria requested the Commission to revise their RP2 en route cost-efficiency targets for the years 2018 to 2019. The monitoring for these three States considers the amended Performance Plan (Commission Implementing Decision (EU) 2017/2376 of 15 December 2017).

13 In 2017, Romania, Portugal and Denmark submitted a request to the Commission to revise their RP2 en route cost-efficiency targets for the years 2018 and 2019. Denmark subsequently withdrew the request. Romania and Portugal revised their performance plans; the data thus refers to the revised Performance Plan (Commission Implementing Decision (EU) 2018/1782 of 15 November 2018 as amended by Commission Implementing Decision (EU) 2018/2021 of 17 December 2018).

14 The data for Blue Med FAB uses the capacity targets for RP2 – the Commission Implementing Decision concerning the consistency of Blue Med FAB's capacity targets with the Union-wide targets was adopted by the Commission in 2019 but has not been published.[2]

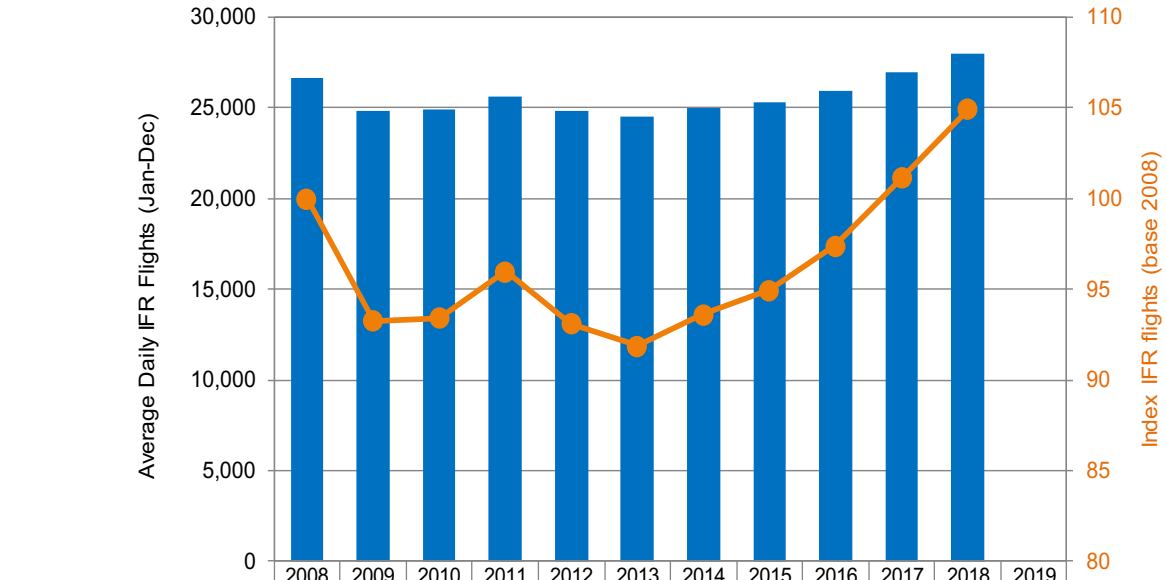
15 The National Supervisory Authorities provide an annual report on their monitoring of the Performance Plans. The Commission may issue decisions on the inconsistency of performance achievement in relation to performance targets through various legal instruments upon the review, monitoring and benchmarking of these reports.

1.3 Air Traffic in 2018

16 IFR (Instrument Flight Rules) traffic (Average daily IFR flights in the SES RP2 area) increased for the fifth year in a row in 2018 (+3.7% compared to 2017), as shown in Figure 2.

17 The Union-wide average masks variations in terms of traffic growth between FABs. Danube FAB and Baltic FAB had the highest growth (both +9.9%), followed by FAB Central Europe (+7.3%), Blue Med FAB (+7.1%) and South-West FAB (+5.3%).

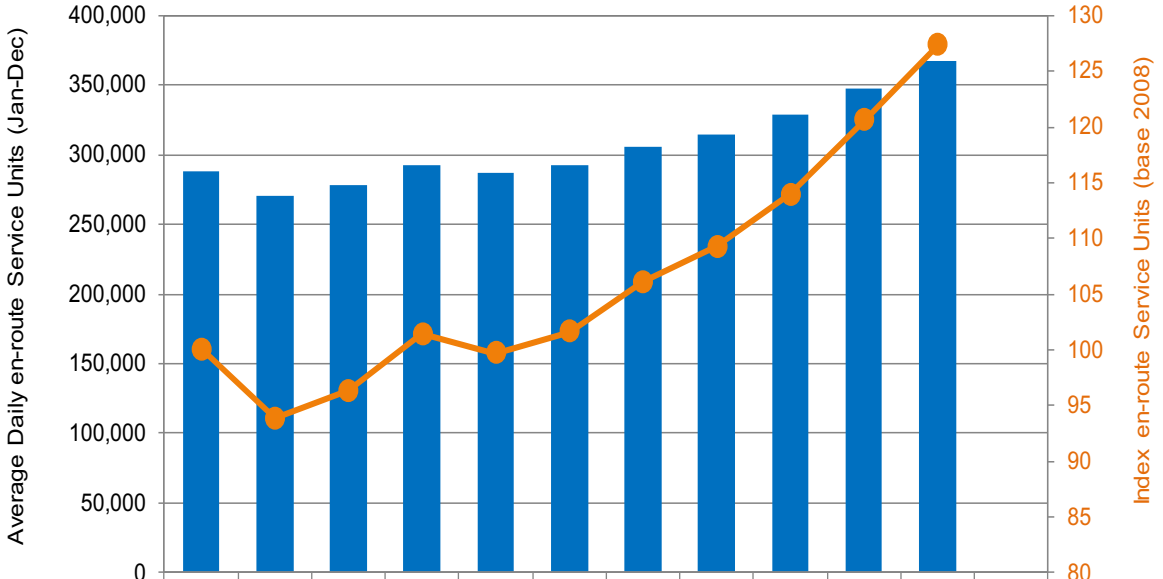
[2] Commission Decision C(2019) 3502 of 15 May 2019.



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Average Daily IFR Flights	26,668	24,874	24,918	25,595	24,827	24,508	24,966	25,321	25,972	26,980	27,987	
% Change		-6.7%	0.2%	2.7%	-3.0%	-1.3%	1.9%	1.4%	2.6%	3.9%	3.7%	
Traffic index (2008)	100.0	93.3	93.4	96.0	93.1	91.9	93.6	95.0	97.4	101.2	104.9	

Figure 2 - Traffic 2008-2018 (SES RP2 area).

18 Average daily en route Service Units (TSUs) in the RP2 area continued to grow faster than flights in 2018 (+5.6% vs. 2017, +27.3% vs. 2008), as shown in Figure 3. En route service units grew faster than IFR flights due to the trend for longer flights using heavier aircraft.



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Avg. Daily	288,405	270,573	277,796	292,495	287,378	292,959	305,946	315,050	328,437	347,744	367,168	
% Change		-6.2%	+2.7%	+5.3%	-1.7%	+1.9%	+4.4%	+3.0%	+4.2%	+5.9%	+5.6%	
Index (base 2008)	100	93.8	96.3	101.4	99.6	101.6	106.1	109.2	113.9	120.6	127.3	

Figure 3 - En route service units 2008-2018 (SES RP2 area).

2 Union-wide Performance in 2018

19 Table 2 and Table 3 show the Union-wide performance in 2018 against the targets for the Key Performance Areas of Safety, Environment, Capacity, and Cost-efficiency.

Safety KPI (union-wide)	2018						
	EU Target Level	Achieved levels					Actual vs target
		A	B	C	D	E	
Effectiveness of Safety Management (EoSM)							
Member States (all objectives) - # States on a minimum level	C	1	18	11			✗
ANSP – Safety Culture # ANSPs on a minimum level	C	-	-	5	23	3	✓
ANSP – Other Objectives # ANSPs on a minimum level	D	-	-	11	20	-	✗

Table 2 - Actual performance at Union-level (2018) – Safety.

20 **Safety**: Union-wide, 37% (11 out of 30) of the Member States reached the 2019 target for the EoSM, while 63% (19 out of 30) need to improve one or more areas in 2019 to reach the targets. All air navigation service providers (ANSPs) reached the 2019 target in safety culture, and 65% (20 out of 31) reached the target for the other management objectives.

21 A full analysis of the safety KPA including Risk Analysis Tool (RAT) application, safety culture and an analysis of the Effectiveness of Safety Management (EoSM) for each management objective is provided in Annex III (Safety Report).

KPI (union-wide)	2018		
	EU Target	Performance	Actual vs target
ENVIRONMENT[3]			
KEP (horizontal en route flight efficiency – planned route)	4.27%	4.71%	✗
KEA (horizontal en route flight efficiency – flown route)	2.69%	2.83%	✗
CAPACITY			
Average en route air traffic flow management (ATFM) delay per flight (Minutes)	0.5	1.83	✗
COST-EFFICIENCY			
Average Union-wide determined unit cost for en route air navigation services (Real terms €$_{2009}$)	51.00	45.43	✓

Table 3 - Actual performance at Union-level (2018).

22 **Environment**: Member States missed the Union-wide targets for environmental performance in 2018, measured by the deviation (in %) of the planned and actual routes against the optimal routing (KEP and KEA) in 2018. The performance improved slightly compared to 2017, with 0.02% for

[3] According to the regulatory framework, Member States need to reach the targets for KEA and KEP in 2019 only. Nevertheless, indicative target values have been provided for the intermediate years.

the planned routes (KEP) (from 4.73% to 4.71% of excess horizontal flying) and worsened slightly 0.02pp for the actual routes flown (KEA) (from 2.81% to 2.83% of excess horizontal flying).

23 **Capacity**: Member States missed the Union-wide targets for en route ATFM delay (0.5 minutes per flight) in 2018 by achieving 1.83 minutes per flight. Compared to 2017, the average en route ATFM delay per flight significantly increased from 0.94 minutes in 2017 to 1.83 minutes in 2018. Therefore, the capacity target has not been met in any year of RP2, including 2018.

24 **Cost-efficiency**: Member States reached the cost-efficiency targets in 2018. At Union-wide level, the actual en route unit cost (45.43€$_{2009}$) was -10.9% lower than the en route Union-wide target (51.00€$_{2009}$) and -9.8% lower than the aggregated Performance Plans determined unit cost (50.38€$_{2009}$). The actual (overall) en route costs were -1.1% (-67.2M€$_{2009}$) lower than the determined (overall) costs (6,153.5M€$_{2009}$). As traffic in 2018 was higher than planned, the total service units (TSUs) were also +9.7% higher than planned. As far as terminal cost-efficiency is concerned, the Union-wide actual terminal unit costs (153.13€$_{2009}$) were -4.4% lower than planned in the RP2 Performance Plans. This results from the combination of higher than planned terminal navigation service units (TNSUs, due to higher traffic and larger aircraft) (+8.6%) and higher than planned terminal costs (+3.8%, or +40.8 M€$_{2009}$).

3 Local level performance in 2018

25 This section shows the FAB-wide performance in 2018 against the targets (and reference values where appropriate) for the Key Performance Areas of Safety, Environment, Capacity, and Cost-efficiency. The table indicates how each FAB contributed to Union-wide performance in 2018.

26 **Safety**: In only one FAB (UK-Ireland FAB) has both the Member States and the ANSPs achieved the 2019 EoSM targets (targets are set at a national level). Table 4 shows the minimum EoSM achieved in each Member State.

27 UK-Ireland FAB is also the only FAB where all Member States are at or above the target. ANSPs in all FABs have achieved the 2019 target on Safety Culture, while ANSPs in five out of nine FABs have achieved the 2019 target for other management objectives. The Safety targets for RP2 were only set for 2019 and a full analysis of the KPA, including the RAT application and EoSM scores for each management objective and safety culture is provided in Annex III.

EoSM minimum level for FABs	Minimum EoSM level for a State		Minimum EoSM level for ANSPs (Safety Culture)		Minimum EoSM level for ANSPs (other MOs)	
Baltic FAB	B	✗	C	✓	C	✗
Blue Med FAB	B	✗	C	✓	C	✗
Danube FAB	B	✗	D	✓	D	✓
DK-SE FAB	B	✗	D	✓	C	✗
FAB CE	B	✗	C	✓	D	✓
FABEC	A	✗	C	✓	D	✓
NEFAB	B	✗	C	✓	D	✓
SW FAB	B	✗	D	✓	C	✗
UK-Ireland FAB	C	✓	D	✓	D	✓

Table 4 - Actual performance at FAB-level (2018) – Safety.

28 **Environment**: One FAB (SW FAB) met the horizontal en route flight efficiency target for 2018.[4] Two FABs showed an improvement compared to 2017: NEFAB and UK-Ireland FAB.

2018	Entity	Reference Value	Performance	Actual vs. target
KEA (horizontal en route flight efficiency – flown route)	Baltic	1.44%	1.72%	✗
	Blue Med	2.62%	2.91%	✗
	Danube	1.46%	1.82%	✗
	DK-SE	1.20%	1.21%	✗
	FAB CE	1.90%	1.95%	✗
	FABEC	3.14%	3.25%	✗
	NEFAB	1.29%	1.31%	✗
	SW FAB	3.57%	3.36%	✓
	UK-IRE	3.18%	3.63%	✗

Table 5 - FAB-level view of Environment KPA (2018).

[4] The horizontal en route flight efficiency is excess distance flown as a percentage of the great circle distance.

29 **Capacity**: Only three (out of nine) FABs (Baltic, DK-SE and NEFAB) achieved their FAB-level targets in 2018.

2018	Entity	Ref. Value	PP Target	Performance	Actual vs. target
En route ATFM delay Avg. en route air traffic flow management (ATFM) delay per flight (minutes)	Baltic	0.22	0.22	0.22	✓
	Blue Med	0.18	0.24	0.35	✗
	Danube	0.05	0.03	0.08	✗
	DK-SE	0.09	0.09	0.04	✓
	FAB CE	0.29	0.28	0.82	✗
	FABEC	0.42	0.42	2.14	✗
	NEFAB	0.13	0.13	0.03	✓
	SW FAB	0.30	0.30	0.64	✗
	UK-IRE	0.26	0.26	0.28	✗

Table 6 - FAB-level view of Capacity KPA (2018).

30 Further detail of the performance at local level is provided in Table 7 below, which shows the performance at State level within each FAB for the Environment and Capacity targets indicated in their Performance Plans. At a local level, arrival delay is also targeted in accordance with the Performance Scheme Regulation.

31 En route capacity targets are not set at State level but rather at FAB level. Nonetheless, some FABs allocated national targets in the FAB performance plans. Those that did not allocate targets, have a "N/A" indicated in the table below. Luxembourg meanwhile has its upper airspace controlled by Maastricht Upper Area Control Centre (MUAC) and this did not have explicit targets.

FAB	State	KEA	En route delay			Arrival delay		
		Actual	Target	Actual		Target	Actual	
Baltic	Lithuania	1.94%	0.04	0.00	✓	0.00	0.01	✗
	Poland	1.69%	0.23	0.25	✗	0.04	0.32	✗
Blue Med	Cyprus	4.22%	1.50	1.10	✓	N/A	0.82	
	Greece	2.18%	0.60	0.53	✓	0.10	1.47	✗
	Italy	3.16%	0.11	0.03	✓	0.41	0.12	✓
	Malta	1.29%	0.02	0.00	✓	0.10	0.01	✓
Danube	Bulgaria	2.01%	0.06	0.00	✓	0.00	0.00	✓
	Romania	1.67%	0.00	0.12	✗	0.00	0.20	✗
DK-SE	Denmark	1.13%	N/A	0.01		0.11	0.06	✓
	Sweden	1.24%	N/A	0.04		0.35	0.41	✗
FAB CE	Austria	2.21%	0.19	0.54	✗	1.27	0.49	✓
	Croatia	1.53%	0.21	0.60	✗	0.05	0.00	✓
	Czech Rep.	2.35%	0.10	0.38	✗	0.40	0.11	✓
	Hungary	1.46%	0.04	0.39	✗	0.05	0.03	✓
	Slovakia	2.18%	0.11	0.21	✗	0.00	0.00	✓
	Slovenia	1.72%	0.23	0.01	✓	0.00	0.05	✗

FAB	State	KEA	En route delay			Arrival delay		
		Actual	Target	Actual		Target	Actual	
FABEC	Belgium	3.88%	N/A	0.88		N/A	0.60	
	France	3.38%	0.39	1.80	✗	0.60	0.40	✓
	Germany	2.85%	N/A	1.65		0.65	0.45	✓
	Luxembourg					0.47	0.09	✓
	Netherlands	2.97%	N/A	0.20		2.00	2.19	✗
	Switzerland	4.48%	0.23	0.31	✗	2.35	1.54	✓
NEFAB	Estonia	1.33%	0.12	0.10	✓	0.00	0.00	✓
	Finland	0.95%	0.08	0.00	✓	0.14	0.37	✗
	Latvia	1.28%	0.04	0.04	✓	0.04	0.07	✗
	Norway	1.42%	0.08	0.00	✓	0.60	0.26	✓
SW FAB	Portugal	1.78%	0.14	0.19	✗	0.60	2.38	✗
	Spain	3.79%	0.27	0.60	✗	0.80	1.51	✗
UK-IRE	Ireland	1.26%	0.14	0.00	✓	0.20	0.23	✗
	UK	4.07%	0.23	0.28	✗	0.78	1.24	✗

Table 7 - State-level view of Environment and Capacity KPA (2018).

32 **Cost-efficiency**: The Performance and Charging Schemes have been designed to ensure that the cost-efficiency targets are directly used in the calculation of en route and terminal unit rates together with adjustments related to the various features of the scheme (such as inflation, traffic risk, cost risk, incentives, etc.).

33 Many Member States show actual costs below their targets. However, this is not necessarily positive. It means that the ANSP of that Member State did not invest the money it got from airspace users. This is highly concerning if the same Member State is unable to provide sufficient capacity, causing substantial delays which airlines have to pay. Conversely, showing higher actual costs than determined is not necessarily a negative result. It may indicate that the respective ANSP in 2018 invested more than planned to compensate for under-investments in the preceding years and thus contributing to improve capacity. In order to understand the above results of 2018, it is important to take into account the drivers behind a deviation, as reported by Member States. Details of these can be found in Section 7 and in Annex II – Member States' detailed analysis for expert.

34 In addition to the regulated cost-efficiency KPIs of the Performance Regulation, this report also examines the Actual Unit Cost for airspace Users (also referred to as the "true cost for users"), presented in Section 7. This gives a better reflection of the cost-efficiency performance from an airspace user's point of view since it reflects the adjustments relating to 2018 activities that will be charged or reimbursed to users in future years. Note that the "true cost" for users is different from the cost charged.

4 Safety

35 In RP2, there are Union-wide targets for the following Safety KPIs (SKPIs):

- SKPI 1: The Effectiveness of Safety Management (EoSM);
- SKPI 2: The application of the severity classification based on the Risk Analysis Tool (RAT) methodology
- SKPI3: the level of just culture (JC).

36 The EoSM SKPI is assessed at two levels: at a State level, the capability of authorities to manage the State Safety Programme (SSP) whenever it is in place and, at a service provision level, the service provider's capability to manage an effective Safety Management System (SMS).

37 The application of the severity classification based on the RAT methodology SKPI aims at measuring to what extent the RAT methodology has been applied to assign severity levels to reported ATM incidents by the ANSPs and the Member States.

38 In addition to the Union-wide targets, SKPI 3 sets local targets for the level of Just Culture. This SKPI measures the level of presence and corresponding level of absence of Just Culture at State and at ANSP level (FAB target). The main objective of the indicator is to identify possible obstacles and impediments to the application of Just Culture at State and ANSP level.

39 The Performance and Charging Regulation introduced three additional Safety Performance Indicators (SPIs) without targets and for monitoring purposes. These are as follows:

- SPI 1: The application by the air navigation service providers of automated safety data recording systems where available, which shall include, as a minimum monitoring of separation minima infringements (SMI) and runway incursions (RI). SPI 1 aims at measuring if ANSPs use these tools in a Just Culture environment to improve the information and analysis by the organisations' SMS).
- SPI 2: The reporting by the Member States and air navigation service providers on the level of occurrence reporting, on an annual basis, aiming at measuring the level of reporting and addressing the issue of improvement of reporting culture; and
- SPI 3: The number of, as a minimum, separation minima infringements, runway incursions, airspace infringements, and ATM-S at all air traffic services units.

40 An overview of all safety indicators in RP2 was presented in Table 1. Their associated targets are shown in Table 8 and Table 9 below. Occurrences may occur on the ground or whilst aircraft are airborne and for the safety KPA, these are monitored separately as shown in Table 9.

Level of Effectiveness of Safety Management (EoSM)		2015	2016	2017	2018	2019
State level	Union-wide target					C
ANSP level	Union-wide target for Safety Culture Management Objective (MO)					C
	Union-wide target for all other MOs also related to safety					D

Table 8 - RP2 targets for Effectivenss of Safety Management; for RP2, there is only one target for the end of the period to assess the Effectiveness of Safety Managment.

		2015	2016	2017	2018	2019
Ground Score (ANSP level)						
Union-wide targets	Safety Minima Infringements			⩾80%		100%
	Runway Incursions			⩾80%		100%
	ATM-S			⩾80%		100%
Overall Score (State level)						
Union-wide targets	Safety Minima Infringements			⩾80%	⩾80%	⩾80%
	Runway Incursions			⩾80%	⩾80%	⩾80%
	ATM-S			⩾80%		100%

Table 9 - RP2 targets for application of the severity classification based on the Risk Analysis Tool (RAT) methodology.

4.1 Accidents and Serious Incidents

41 The data presented in this section relates to accidents and serious incidents, either:

- Related to ANS: The ANS system may not have contributed to a given occurrence, but it may have a role in preventing similar occurrences in the future, or
- With an ANS contribution: At least one ANS factor was in the causal chain of events leading to an occurrence, or at least one ANS factor potentially increased the level of risk, or it played a role in the occurrence encountered by the aircraft.

42 It is important to note that the PRB monitors the application of the RAT to severity classification and does not monitor accidents directly. These are monitored by EASA.

43 Figure 4 shows the number of accidents and serious incidents between 2009 and 2018, (defined by ICAO Annex 13 and assigned to an occurrence by a European Accident Investigation Authority) that are related to the provision of ANS, alongside a rate calculated using the number of flight hours performed within the EU. These cover the Single European Sky States only.

44 During the period monitored (2009 – 2018), two out of twenty-three accidents were fatal, with no fatal accidents since 2012. In 2018, four ATM-related non-fatal accidents were recorded. Of the five accidents recorded in 2017 and 2018, only two were ANS related however as EASA points out in their report, ANS may nevertheless have a role in preventing future accidents also where these are not specifically ANS related.

45 The figure shows a decreasing trend in the number of accidents and serious incidents per million flight hours since 2010. The trend shows a tendency to level out in the latter part of the period.

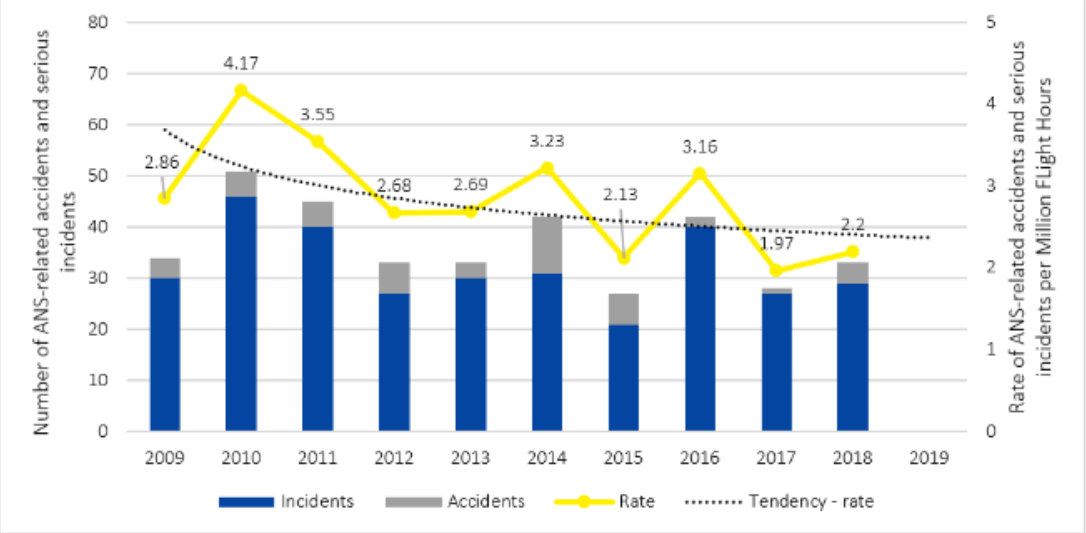


Figure 4 - ANS related accidents and serious incidents (2009-2018).

46 Figure 5, below, shows accidents and serious incidents with ANS contribution identified by States in their investigations. The rate of accidents and serious incidents per million flight hours since 2010 with ANS contribution, while fluctuating, shows a clear downward trend, reaching the lowest level in 2018. Only one accident in 2018 had an ANS contribution.

47 Overall, while some caution should be taken as the number of observations are small, this suggests that the ANSPs are managing major risks related to their service and are continuing to improve.

48 A detailed analysis of ANS accidents and serious incidents is available in Annex III – Safety report.

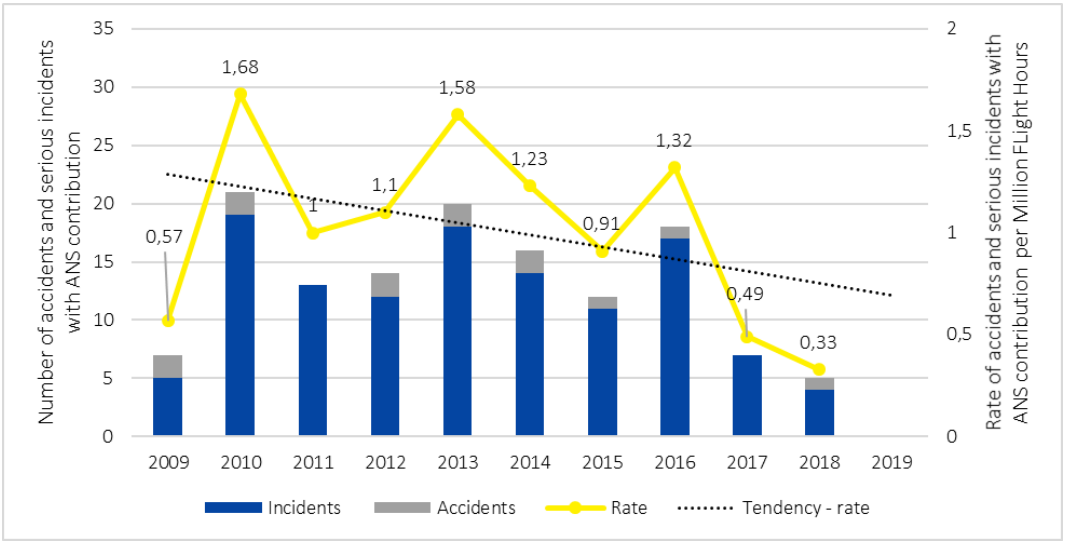


Figure 5 - ANS contribution accidents and serious incidents (2009-2018).

4.2 *Effectiveness of Safety Management*

49 All 30 States and 31 ANSPs, including Maastricht Upper Area Control Centre (MUAC), filled in the questionnaires used for the measurement of the EoSM SKPI in accordance with Acceptable Means

of Compliance for the Implementation and Measurement of Safety Key Performance Indicators[5] . EASA has verified the responses of all States while the responses of the ANSPs have been verified by the State Competent Authorities.

50 The following paragraphs summarise the analysis of the EoSM results provided by the States and ANSPs with Figure 6 and Figure 7 showing the EoSM results of States and ANSP respectively in 2018. In the figures, the bar chart shows the EoSM score achieved (against the left axis) and the markers show the minimum EoSM level(s) achieved against the target(s) (right axis).

51 Between 2016 and 2017, the number of Member States with a minimum level below the target did not improve. Between 2017 and 2018, Member States have improved the effectiveness of their safety management with six additional Member States reaching the target level for RP2 in 2018. The number of States with a minimum level of A has been reduced from four to one in 2018 and the number of States still below the RP2 target decreased from 26 in 2017 to 19 in 2018.

52 The detailed data shows that there have been improvements in the level achieved on all management objectives (MOs) with the average score of the EoSM for States increasing from 63 in 2017 to 66 in 2018. The MO of Safety Policy and Objective and Safety Culture will require the most attention in the future, as eight and fifteen States, respectively, did not achieve the target level C in 2018. Many States still below target have only few areas (one or two) to improve before they can achieve the target, while some States (in general those with a score below 60, in particular Bulgaria, Hungary and Portugal) need to improve in several areas.

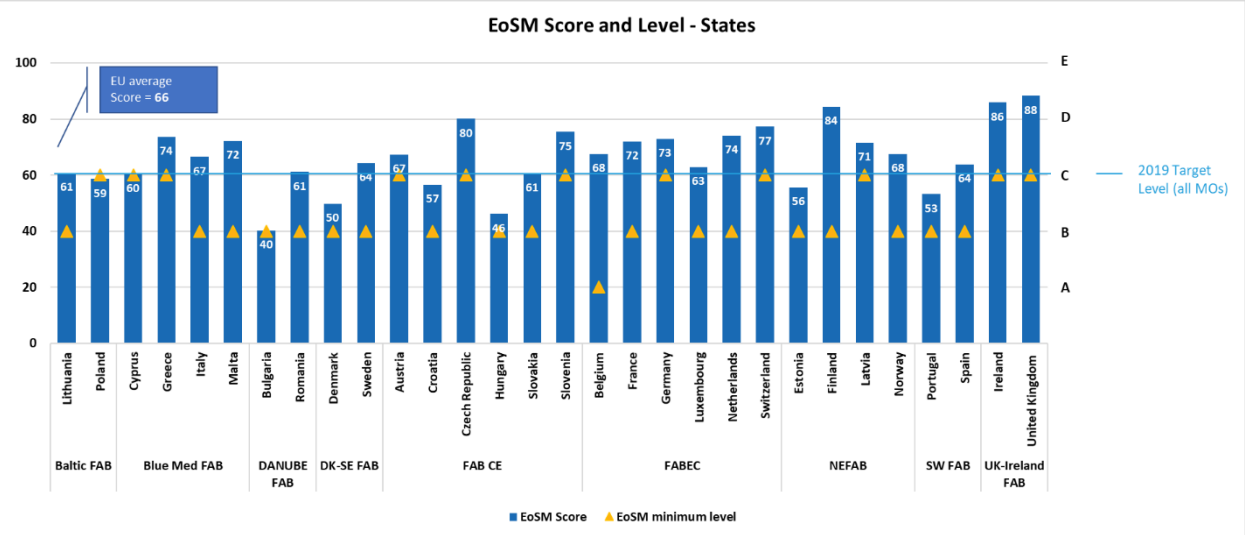


Figure 6 - 2018 Effectiveness of Safety Management for States.

53 Despite the improvement on the EoSM, it remains unlikely that all Member States will reach the target at the end of RP2, in particular those Member States needing to improve in several areas and such improvement measures are likely to be needed to be implemented beyond RP2.

54 Since the SKPI is not retained for RP3, the sufficiency of the safety management applied by the State will be monitored by EASA.

55 Figure 7 shows the EoSM results of ANSPs in 2018. During 2018, the ANSPs only marginally improved their average score on the effectiveness of their safety management from 82 in 2017 to 83 in 2018. The minimum effectiveness score by an individual ANSP in 2018 is 59, up from 45 in 2017.

[5] EASA Decision No 2011/017/R, amended by EASA Decision No 2014/035/R and EASA Decision No 2015/028/R.

56 The number of ANSPs with a minimum level below the target remain at the same level as in 2017 (except for one), which discontinues the downwards trend seen up to and including 2017. 20 ANSPs out of 31 achieved the 2019 EoSM target in 2018 (19 in 2017), i.e. level D, for all other MOs (the four EoSM MO other than Safety Culture). All ANSPs achieved the target for the safety culture objectives.

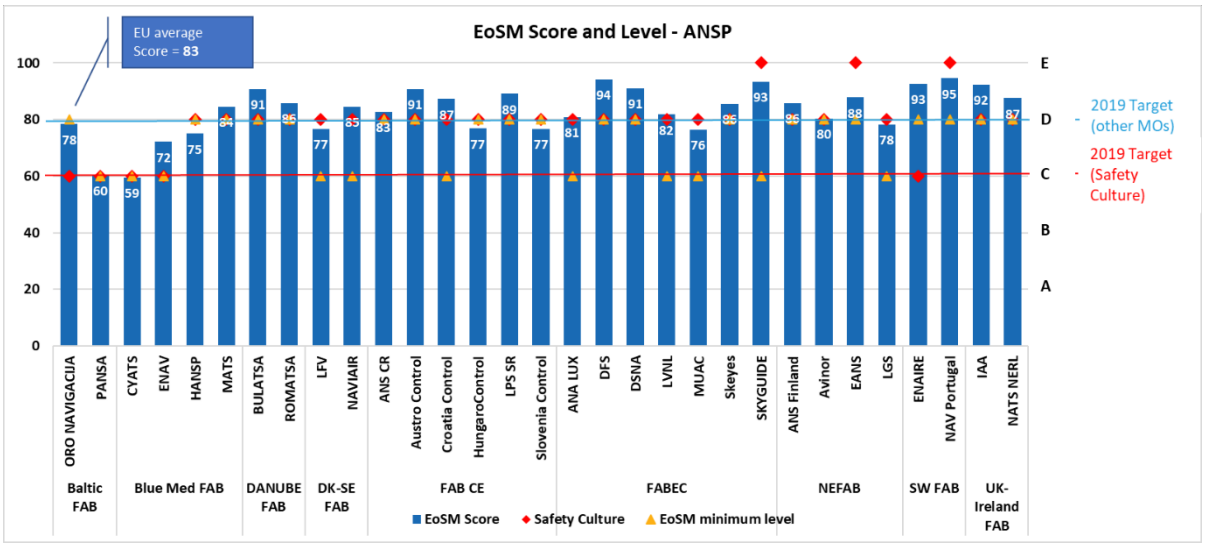


Figure 7 - 2018 Effectiveness of Safety Management for ANSPs.

57 The detailed data shows that while the average EoSM score improved and while some ANSPs improved their scores significantly, the improvements for the ANSPs in general is minor. This is likely a result of many ANSPs already being at a high level with reduced scope for further improvement. Data shows a deterioration of the minimum EoSM level in two MOs: Safety Policy and Objective (ANSPs below the target increasing from six to seven) and Safety Risk Management (increasing from three to four). PANSA (Poland) and CYATS (Cyprus) are those ANSPs with most need for improvements to reach the target level D on other EoSM objectives, the other ANSPs below the target in general having one or two areas to improve. For those ANSPs needing to improve in many areas, the PRB is concerned about whether they will achieve the RP2 target by the end of 2019.

58 More detailed results of the EASA EoSM review for each State are available in the EASA Safety Report (Annex III).

4.3 Application of RAT Methodology

59 In accordance with Commission Implementing Regulation (EU) No 390/2013, States are required to report the proportion of Separation Minima Infringements (SMIs), Runway Incursions (RIs) and ATM Specific Occurrences (ATM-S), for which the severity classification was assessed using the RAT methodology. The level of application of the RAT is shown in Table 9. Data concerning the verification of the RAT application is based on preliminary 2018 information (collected at the end of April 2019), and the data submitted by the States in their Monitoring Reports of June 2019, later updated during August 2019. Updates may occur during September 2019, after which the dashboard will be updated with final 2018 data.

60 The Annual Summary Template (AST) reporting mechanism is still used as the main vehicle for reporting the application of severity classification using the RAT methodology.

61 During RP2, several changes have been introduced to the monitoring of the application of the RAT methodology for deriving the severity for the reported occurrences: The RAT methodology is only

mandatory for deriving the severity of A, B and C reported Separation Minima Infringements and Runway Incursions and AA, A, B and C severity for ATM-S and Commission Implementing Regulation (EU) No 390/2013 (hence, including the use of the RAT Methodology) may not be applicable at airports and traffic units with less than 70,000 IFR movements per year.

62 As shown in Figure 8, from the Union-wide perspective, and taking all occurrences reported collectively into account, the application of RAT worsened for Runway Incursion (RI) Ground and Overall and improved for ATM-Specific. Targets for 2017, as per Commission Implementing Decision (EU) 2014/132/EU, were achieved in 2018. The SMI Overall and RI Overall applied by NSAs achieved the target set by 2019, whilst the RAT applicability to the RI Ground applied by ANSPs need the most improvement to achieve the target for 2019 and has shown a downwards trend over RP2.

63 It is worth noting that the number of ANSPs/NSAs achieving the 2017 target has increased. Detailed results of the RAT methodology application at State level are available in Annex III – Safety report.

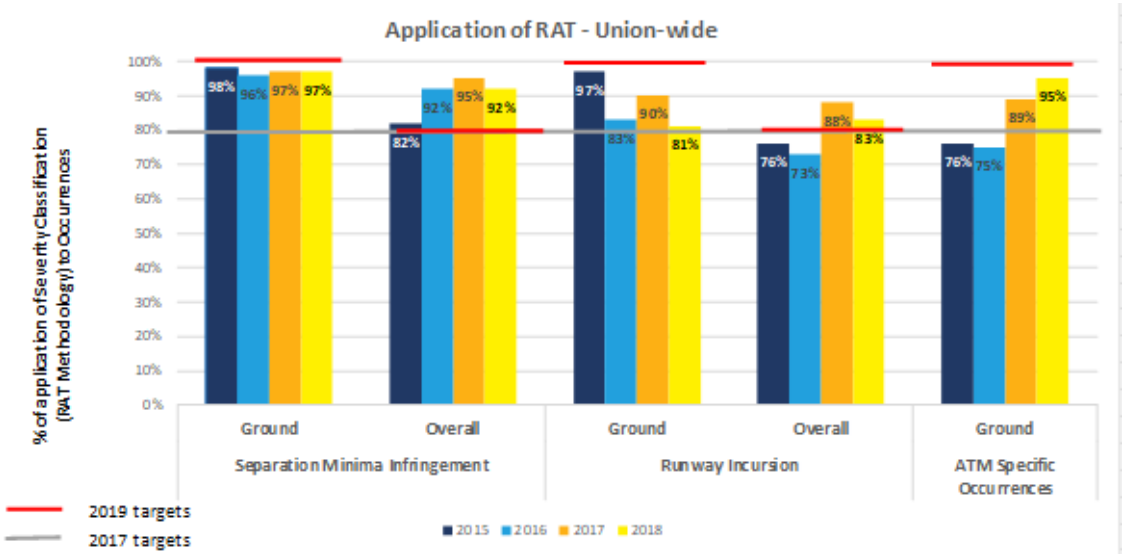


Figure 8 - 2018 severity assessment using RAT methodology (Union-wide).

4.4 Just Culture

64 The Safety Key Performance Indicator (SKPI) on Just Culture is based on the responses given to the self-assessment questionnaires for both States and ANSPs, as defined under Commission Implementing Regulation (EU) No 390/2013. The questionnaires are included in the Accepted Means of Compliance / Guidance Material developed by EASA under the rulemaking procedure and adopted as a Decision of the EASA Executive Director. For RP2, FABs were expected to set Just Culture local targets – in accordance with Commission Implementing Regulation (EU) No 390/2013.

65 Based on the review of the 2018 FAB Monitoring Report, it appears that there is no harmonised approach to the implementation of Just Culture. Some FABs have confirmed a common approach has been defined at State and/or ANSP level (Blue Med, DK-SE FAB, FABCE, FABEC & UK-IE FAB, SW FAB (ANSP only) and NEFAB (ANSP only)), made a commitment to apply the Just Culture principles and to work together on Just Culture issues. In some case, no progress is reported on improvements to be implemented. Others have not established a common approach (Baltic FAB and Danube FAB) but may have national improvements under implementation. For several FABs, even

those reporting to have a common approach, possible areas of improvement were not identified for either the State or ANSP level and no progress has been reported.

66 When compared with 2017, very little has changed and further work is needed in the area of improving Just Culture. Being an essential pre-requisite for any achievements for the European wide safety improvements, improving the level of Just Culture is important.

4.5 *Other Safety Performance Indicators*

67 Other safety indicators are monitored, among which is highlighted by the number of occurrences reported. The most informative information that can be derived from this safety PI is linked to the evolution of the metrics across years.

68 Table 10 lists the evolution of the total number of occurrences at Union-wide level over RP2. It shows that the total number of occurrences increased between 2017 and 2018 for all types of occurrences, but only marginally for SMIs. The increase should be read carefully and not correlated immediately with greater or lower levels of safety of the services as there are additional factors that may influence its evolution, e.g. the level of traffic, improvement/deterioration in the reporting culture, or change of interpretation of occurrence definitions or applicability within the Performance Scheme.

Type of occurrence		2015	2016	2017	2018	variation 2017 to 2018
Reported occurrences Union-wide	Separation Minima Infringements	2,290	2,231	2,284	2,294	↔ 0%
	Runway Incursion	1,024	1,099	940	1,075	↑ 14%
	Airspace Infringements	4,041	4,838	4,620	4,873	↑ 5%
	ATM-Specific	15,111	14,089	14,664	15,576	↑ 6%

Table 10 - Union-wide number of high and low severity reported occurrences.

69 Similar to previous years, the percentage of high-severity occurrences by type of occurrences observed in each FAB differ significantly (Table 11). The FABs being over or below the interquartile range in previous years in terms of reporting rates are, in general, the same. Exceptions are for DANUBE FAB, which shows reporting rates at the lower range in three of four areas and FABEC and NEFAB show reporting rates at the higher range in three of four areas.

70 The data available provides no clear reason for differences observed.

71 There were substantial changes, both increases and decreases, in the number of occurrences reported for FABs.

72 Table 11 shows the largest decreases and increases in type of occurrences and the related FAB.

Type of Occurrence	2017		2018	
Changes in number of occurrences 2017 to 2018	Largest decrease from 2016	Largest increase from 2016	Largest decrease from 2017	Largest increase from 2017
SMI	UK-Ireland FAB 215 (-29%)	DK-SE FAB 55 (+25%)	FABEC 1.116 (-7%)	Baltic FAB 54 (+54%)
RI	UK-Ireland FAB 60 (-70%)	Baltic FAB 44 (+159%)	Danube FAB 7 (-42%)	NEFAB 209 (+67%)
AI	NEFAB 260 (-70%)	Baltic FAB 103 (+415%)	FABCE 243 (/-52%)	Baltic FAB 227 (+120%)
ATM-S	Baltic FAB 105 (-44%)	BlueMed FAB 310 (+184%)	DK-SE FAB 535 (-43%)	NEFAB 1.467 (+46%)

Table 11 - The largest decreases and increases in type of occurrences and the FAB to which these relate.

73 Table 12 shows the development over RP2 in the reported occurrences for four selected FABs. Additional indicators and analysis are available in Annex III – Safety report.

Change in number of occurrences reported		2015 to 2016	2016 to 2017	2017 to 2018	Average
FABEC	RI	+11%	-11%	+17%	+6%
	SMI	-10%	9%	-7%	-3%
	AI	-12%	-17%	-25%	-18%
	ATM-S	-7%	-1%	2%	-2%
Baltic FAB	RI	-15%	159%	-34%	37%
	SMI	59%	-24%	54%	30%
	AI	-79%	415%	120%	152%
	ATM-S	151%	-44%	37%	48%
FABCE	RI	7%	-33%	-15%	-14%
	SMI	21%	-12%	28%	12%
	AI	22%	-6%	-52%	12%
	ATM-S	52%	36%	48%	45%
NEFAB	RI	-10%	12%	67%	23%
	SMI	-7%	-15%	7%	-5%
	AI	155%	-70%	63%	49%
	ATM-S	-37%	22%	46%	10%

Table 12 - Changes to FAB number of reported occurrences per type per year.

74 There may be many reasons for the evolution in the reported occurrences in each FAB/State and because they have not been identified in the NSA Monitoring Reports they cannot be determined with certainty. Consequently, it is not known whether a large increase during one year (like 120% increase in the number of Airspace Infringements for the Baltic FAB) or the increase in the Airspace Infringements over RP2 for the Airspace Infringements for the Baltic FAB) relates to a safety issue or other factors.

75 The PRB (and EASA) encourages NSAs and ANSPs to investigate further these changes in order to confirm that the increased occurrence reports are not a result of a change in the safety risks of their services. The PRB has initiated some initial work to assess whether the data available shows factors which could indicate an increased risk and thus cater for further, detailed analysis.

76 With regard to the use of automated safety occurrences recording systems, ten States have reported that their ANSPs were using such tools in 2018, one up compared with 2017. Out of these States, nine of them collect information about Separation Minima Infringements, whilst one collects information on both Separation Minima Infringements and Runway Incursions. In general, it must be concluded that automated safety data reporting tools are not widely used by the ANSPs.

4.6 Other safety-relevant areas

4.6.1 Cyber security

77 From a safety perspective, major disruption of ATS, potentially affecting several ANSPs and network functions simultaneously, is significant. As digitalisation and virtualisation of the ATM functional systems are introduced, the risk that a disruption of services will have a wider effect. One source of disruption is cyber security attacks. Events have shown that criminals are increasingly willing to use cyber security attacks to disrupt public affairs and core business services.

78 The effectiveness of cyber security management will become equally important as the effectiveness of safety management systems to ensure aviation safety and security in the future. Cyber security requires a higher degree of a cooperative approach as the weakest point will determine the

overall effectiveness of the protection provided. Sharing information on attempts to penetrate security mechanisms will be essential to effectively defer attacks and limit the consequences.

79 As a key element to retaining a high level of aviation safety, the PRB is monitoring the safety regulatory developments related to cyber security as well as other initiatives taken by the industry, including a maturity assessment principle developed by Eurocontrol. As an important step, EASA published a proposal for provisions for the management of information security risks covering all aviation domains[6], which complements the current EU regulatory framework[7]. The PRB considers that the PRB monitoring of safety performance needs to be extended to also cover the maturity of the cyber security management of the organisation within the remit of the PRB performance monitoring.

4.6.2 Unmanned Aircraft Systems (UAS)

80 All available studies indicate that the use of Unmanned Aircraft Systems (UAS) will increase significantly over the coming years. The Wise Person Group's report on the future of the Single European Sky[8] highlighted that "Large numbers and a wide diversity of vehicles are likely to be operating in the airspace in the future, ranging from drones at both low and high level, and other new types of aircraft. It will be a significant challenge to integrate all new entrants safely into the ATM system" and EASA notes that the Agency will further intensify the work on RPAS (civil drones) in order to deliver an efficient regulatory system for this emerging technology. Regulation (EU) 2018/1139[9] already includes essential requirements for unmanned aircraft (Annex IX of the Regulation) including among others requirements for the organisation to implement and maintain a management system to manage safety risks and to establish an occurrence reporting system, as part of the safety management system, in order to contribute to the continuous improvement of safety. The regulatory framework was further enhanced by the issuance of Regulations (EU) 2019/945[10] and 2019/947[11] in March and May 2019, further detailing requirements to UAS and for operation of unmanned aircraft. In addition, the Commission has initiated work to define an institutional and regulatory framework for a competitive U-space services market and how drones need to be operated in the European airspace among others to enable more complex and longer distance operations.

81 From a PRB perspective, increasing use of UAS in more complex and far away operations, provide several challenges:

- The disruption from UAS being operated, unauthorised, close to infrastructure causing disruption of traffic controlled by traditional ATC.

[6] EASA, Notice of Proposed Amendment 2019-07, Management of information security risks, RMT.0720, dated 27th May 2019.
[7] E.g. complements Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union (the NIS Directive).
[8] Page 9 of the report of the Wise Persons Group on the future of the Single European Sky, April 2019.
[9] Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91.
[10] Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (https://eur-lex.europa.eu/eli/reg_del/2019/945/oj).
[11] Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (https://eur-lex.europa.eu/eli/reg_impl/2019/947/oj).

- The use of data driven digital systems, devised to provide fully automated services to feed highly automated aircraft operations increasing automation and introduce new/different safety risks.
- How safely to integrate UAS and monitor that acceptable level of safety is achieved.
- Ensuring that the 'users pay' principle applies to drone operators, covering the costs of ANSPs and safety authorities when operating drones.

82 The PRB considers that the increased use of UAS may require a different approach to safety performance monitoring. Safety risks and causes of risk may change, requiring the indicators / proxies as currently specified in the Performance Scheme Regulation to evolve to effectively set targets and monitor safety levels. The PRB intends to monitor the development of the regulatory system and consider how UAS operations could/should be integrated into safety performance monitoring.

5 Environment

5.1 Environment PIs and KPIs

83 Commission Implementing Regulation (EU) 390/2013 defines two KPIs for horizontal en route flight efficiency at Union-wide level:

- **KEA:** The average horizontal en route flight efficiency of the actual trajectory (flown route), and;
- **KEP**: The average horizontal en route flight efficiency of the last filed flight plan trajectory (planned route).

84 For local target-setting and performance monitoring, only the KEA is defined as a KPI for horizontal flight efficiency at FAB level.

85 The Performance Regulation defines additional performance indicators (PI) related to the booking procedures for flexible use airspace (FUA) and the planning and use of Conditional Routes (CDRs) which are monitored at Union-wide and national level.

86 The Regulation further defines additional performance indicators (PI) related to the operational performance at and around airports, to be monitored at both European and local levels (i.e. national level with a breakdown at airport level). From this group, the following PIs are monitored at local level:

- additional time in the taxi-out phase;
- additional time in the terminal airspace.

87 The targets and achievements for the environment KPIs are shown in Table 13.

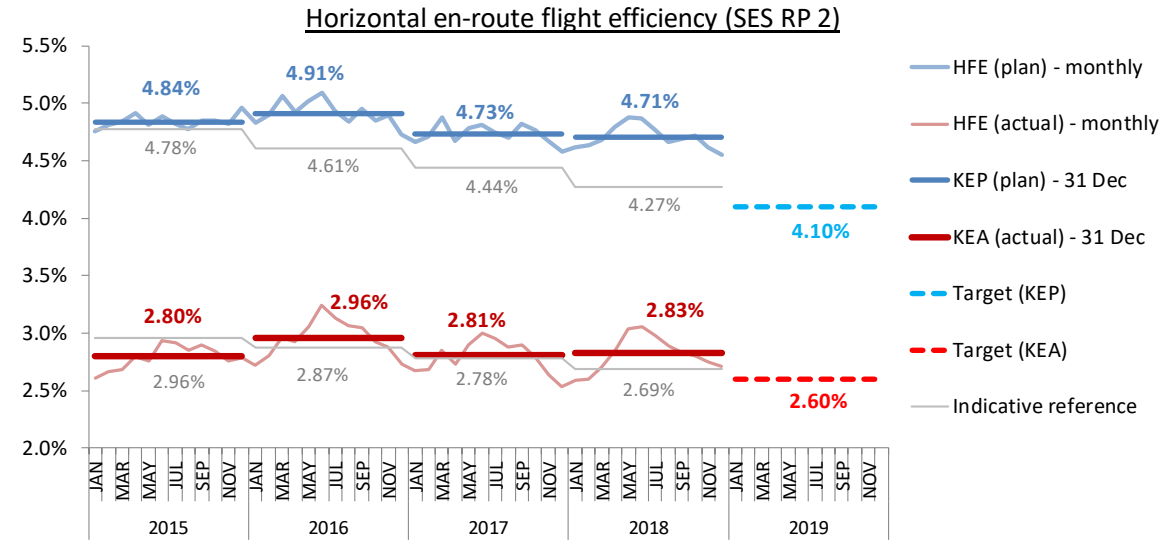
5.2 Horizontal en route Flight Efficiency

88 Table 13 lists the planned route (KEP) and flown route (KEA) results for the Network Manager (NM) (Union-wide level).

Area	Indicator		2015	2016	2017	2018	2019
SES RP2	KEP	Target	4.78%	4.61%	4.44%	4.27%	4.10%
		Actual	4.84%	4.91%	4.73%	4.71%	---
	KEA	Target	2.96%	2.87%	2.78%	2.69%	2.60%
		Actual	2.80%	2.96%	2.81%	2.83%	---

Table 13 - KEP & KEA Performance at Union-wide level.

89 At Union-wide level, KEP performance slightly improved in 2018, while KEA performance slightly deteriorated (in both cases by 0.02 percentage points). The indicative target for 2018 in the SES area was missed by 0.44 percentage points for KEP and by 0.14 percentage points for KEA.



Source: EUROCONTROL, Performance Review Unit

Figure 9 - Evolution of Horizontal En route Flight Efficiency indicators.

90 The measurement of KEP and KEA includes the interface component, which is the additional distance due to entry and exit points. As highlighted by the Network Manager (NM) in the European Route Network Improvement Plan (ERNIP), this issue will require particular attention to improve the KEA performance and collaboration between Members States as national FRA projects are implemented. Details per FAB are provided in the remarks in the local level view of the 2018 Annual Monitoring Report (Annex II - Member States' detailed analysis for experts).

91 Table 14 provides the performance achieved by the FABs and NM (SES Area) as measured by the KEA indicator.

92 In terms of FAB environmental performance, SW FAB, which had already met their targets between 2015 and 2017, also met the targets in 2018. Two of the nine FABs, namely NEFAB and UK-IRE, registered an improvement in performance with respect to 2017. In the case of NEFAB, the improvement was more than the planned annual improvement.

FAB	2012	Improvement 2012-2019		2015	2016	2017	2018	2019
Baltic	1.61%	0.25%	Target	1.50%	1.47%	1.44%	1.40%	1.36%
			Actual	1.60%	1.68%	1.63%	1.72%	---
Blue Med	3.02%	0.57%	Target	2.78%	2.70%	2.62%	2.54%	2.45%
			Actual	2.80%	3.17%	2.82%	2.91%	---
Danube	1.69%	0.32%	Target	1.55%	1.50%	1.46%	1.41%	1.37%
			Actual	1.26%	1.60%	1.62%	1.82%	---
DK-SE	1.20%	0.01%	Target	1.20%	1.20%	1.20%	1.20%	1.19%
			Actual	1.18%	1.20%	1.18%	1.21%	---
FAB-CE	2.13%	0.32%	Target	1.99%	1.94%	1.90%	1.85%	1.81%
			Actual	1.91%	1.97%	1.91%	1.95%	---
FABEC	3.56%	0.60%	Target	3.30%	3.22%	3.14%	3.05%	2.96%
			Actual	3.34%	3.40%	3.23%	3.25%	---
NEFAB	1.44%	0.22%	Target	1.35%	1.32%	1.29%	1.26%	1.22%
			Actual	1.40%	1.72%	1.58%	1.31%	---
SW FAB	4.27%	0.99%	Target	3.85%	3.71%	3.57%	3.43%	3.28%
			Actual	3.39%	3.49%	3.25%	3.36%	---
UK-IRE	3.64%	0.65%	Target	3.36%	3.27%	3.18%	3.09%	2.99%
			Actual	3.47%	3.85%	3.70%	3.63%	---
SES area			Target	2.96%	2.87%	2.78%	2.69%	2.60%
			Actual	2.80%	2.96%	2.81%	2.83%	---

Table 14 - KEA (flown route) - Performance by FAB.

5.3 *Effective Use of Conditional Routes*

93 The impact of aviation on the environment and, more specifically, flight efficiency is a high priority for airspace users and at a political level. Optimisation of routes has been a key challenge for all parties involved in air traffic management, be it to save time, cost and fuel burn, be it to make better use of airspace available for civil aviation. As the discussion about the environmental impact of aviation intensifies, all stakeholder will have to cooperate with respect of optimising the routes. There is still a lot to be done.

94 The use of military airspace is one of the core issues with respect to improving environmental performance and capacity. The PRB notes that it still does not have sufficient visibility of available data to develop an action plan for improving the optimum use of available airspace. The release of available airspace and the timely and efficient reporting of the demand for airspace are both required to establish procedures ensuring that environmental performance and capacity requirements are optimised.

95 Stakeholders are invited to provide data on Effective Use of Conditional Routes via the template supplied as part of the Annual Monitoring Report process. For 2018, only one State out of the 30 that are subject to RP2 monitoring provided the relevant data, which appears inconsistent with when compared with Member State plans for the implementation of Free Route Airspace.

96 At the 23rd meeting of the Network Operations Team (NETOPS) 28 February – 1 March 2019, the Network Manager, as part of the report from the Airspace Management Sub-Group (ASM-SG/61), presented the proportion of:

- flight planning to use conditional routes (CDRs[12]) as the Rate of Aircraft Interested (RAI), and;
- flights that used CDRs as the Rate of Actual Use (RAU)

97 The evolution of the Rate of Aircraft Interested (RAI) and Rate of Actual Use (RAU) indicators during RP2 is shown in Figure 10.

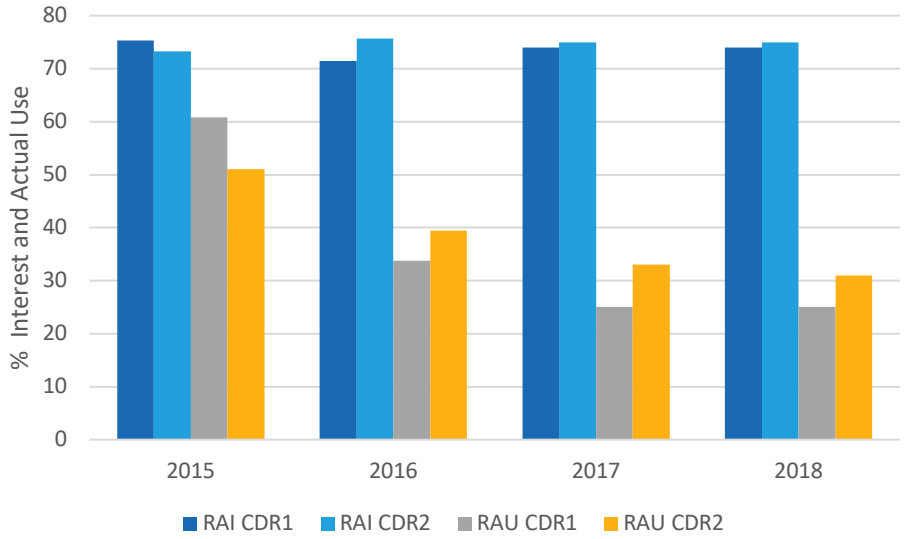


Figure 10 - Evolution of Rate of Aircraft Interested RAI and RAU Rate of Actual Use indicators during the RP2 period (based on data provided by the NM)

98 The usage of conditional routes (CDRs) is much lower than the rate of interest (RAI). The PRB does not have the data available to assess the causes of this or its impact on performance. Stakeholders and the aviation community need to pay particular attention to this in order to improve performance and reduce the impact on the environment.

99 The NM noted that the changes to the methodology for calculating the Rate of Interest and Rate of Usage indicators mean that data before 2017 cannot be compared with that from 2017 onwards.[13] The NM also reported that the expansion of Free Route Airspace was making conditional routes (CDR) increasingly redundant, which is reflected in a tendency to use them less often.

5.4 *Effective Booking Procedures*

100 Annex II - Member States' detailed analysis for experts, which reports on the local level view for each State, presents information on effective booking procedures.

101 Analysis shows that the use of reserved/segregated airspace compared to the amount of time it was booked, ranges from 23% to 100%. Nine States report higher values than in 2017, while thirteen report lower values. In total, five States did not provide any information.

102 Stakeholders (civil and military ANSPs) have not described how this indicator impacts ANS performance. In addition, no information was provided on operational steps taken to influence the local indicator. One State (Norway) reported that the indicator rose from 55% in 2017 to 58% in 2018

[12] There are two types of CDRs reported on:
- CDR1 - Permanently Plannable CDR routes are available for flight planning during times published in the relevant national Aeronautical Information Publication (AIP)
- CDR2 - Non-Permanently Plannable CDR routes may be available for flight planning. Flights may only be planned on a CDR2 in accordance with conditions published daily in the Conditional Route Availability Message

[13] Changes were made by the NM "to align it with the methodology in place for Free Route Airspace".

due to revised military booking procedures and focus on effective use of airspace but did not detail any operational steps that could be beneficial to other stakeholders.

103 The value of the indicator showing the share of restricted/segregated airspace that was not required and was released with at least 3 hours' notice ranges from <1% to 15%. Ten States reported no change from 2017, while four States reported a decrease in the value compared to 2017; five States reported an increase in the value compared to 2017.

104 Article 3(c) of the Flexible Use of Airspace Regulation (Commission Regulation (EC) 2150/2005) states that the airspace reservation for exclusive or specific use of categories of users shall be of a temporary nature, applied only during limited periods based on actual use and released as soon as the activity having caused its establishment ceases.

105 Since it is mandatory to cancel airspace reservations as soon as the activity causing its establishment ceases, military (and civil) stakeholders are obliged to notify airspace users about the release of the airspace, to free up capacity and provide more route options.

106 Instead of monitoring a cancellation of airspace reservations up to three hours after the requirement or use has ceased, it would be more effective to monitor the civil-military coordination process within the State to ensure that the legal obligations under the flexible use of airspace (FUA) Regulation are being fulfilled.

5.5 *Civil-Military coordination*

107 The applicable regulation[14] requires Member States to plan for the flexible use of airspace describing how civil military cooperation supports the increase of capacity whilst paying due regard to military mission effectiveness. Given this legal requirement the PRB notes the lack of data for assessing how the Performance Plans are translated into operations.

108 The FAB monitoring templates requested FABs and States to provide information on how capacity was increased through cooperation and coordination between civil and military stakeholders.

109 Similar to previous years, although several FABs and States reported on existing civil-military arrangements, States providing information on how civil-military cooperation and coordination have actually increased capacity is the exception rather than the rule.

110 The PRB has engaged with a range of stakeholders and is aware that there is a wealth of data available relevant to civil – military coordination and the overall impact on the performance scheme. The PRB has not been able to gain the necessary visibility of this to fully support monitoring activities.

5.6 *Application of the Flexible Use of Airspace*

111 NSAs are required to provide information on how the Flexible Use of Airspace concept is applied by the national/FAB authorities to optimise the use of airspace for both civil and military airspace users.[15]

112 Paragraph 1.2 of the same Regulation requires NSAs to submit their yearly survey on the application of the FUA concept.

[14] Article 11.3.(f) of Commission Implementing Regulation (EU) 390/2013 mandates Member States to include in their Performance Plans a description of the civil-military dimension of the plan describing the performance of flexible use of airspace application in order to increase capacity with due regard to military mission effectiveness.
[15] Annex V paragraph 1.1(j) of Commission Implementing Regulation (EU) 390/2013

113 The FAB monitoring template requested FABs and States to provide information on how the States review their application of FUA to ensure they are providing the optimum benefit for airspace users.

114 Again, as for the years before, the absence of information from Member States about how they review the effectiveness of applying the FUA concept to provide the optimum benefit for both civil and military airspace users has to be highlighted.

115 The reporting by the States on this subject is inconsistent and varied and the annual review processes on the application of FUA by the States appears to be absent in general.

116 The PRB recommends NSAs to enforce the regulatory requirements to enable effective monitoring but also to highlight to service providers the importance of FUA to deliver optimum results.

5.7 Additional Time in Taxi-out Phase and Terminal Airspace (ASMA)

5.7.1 Airport Operator Data Flow

117 The transition from RP1 to RP2 resulted in an increase in the number of airports subject to Commission Implementing Regulation (EU) 390/2013 from 77 to 174 in 2016 including the alignment of airports subject to the Performance and Charging Regulations.

118 This poses a data quality assurance problem:

- There have been a number of airports subject to RP1 that have not established full compliance with the reporting requirements under RP1; and
- the integration of additional airports subject to RP2. Consequently, the operational data flow for performance monitoring at airports is not yet fully implemented.

119 To cope with the number of airports and ensure quality of the reporting, technical processes and organisational measures have been established and are maintained by the Performance Review Unit (PRU). The PRU is in contact with the identified reporting entities to establish the data flow and ensure compliance with the associated data specification. In case of major non-compliance or non-responsiveness by the identified reporting entity, the PRU liaises with the respective authorities.

120 While the reporting situation is steadily improving, it must be noted that for some of the airports included to the RP2 Performance Plans, the level of knowledge about the allocation and the resulting reporting requirements is low. Work is ongoing to establish and implement the regular data reporting for these airports and respective results will be available in the following years.

121 The status of the implementation of the airport operator data flow[16] can be derived from Table 15, which summarises the reporting situation at the end of 2018. For the computation of additional taxi-out time, data is available for 65 of the 174 airports (37.4%). For the calculation of additional arrival sequencing and metering area (ASMA) time, the share is slightly higher with 39.1% (68 airports).

122 Additional taxi-out time is a proxy for the average departure runway queuing time on the outbound traffic flow, during congested periods at airports, while ASMA is the difference between the actual ASMA transit time and the unimpeded ASMA time calculated for non-congested conditions.

[16] Operational ANS performance data at airport level is published (i.e. airports with valid data) if the data provider successfully established the compliance with the airport operator data flow and not more than 2 months of data are missing per year.

123 Airport operators are encouraged to establish the data flow to help the industry to assess whether the high-level goals of the Single European Sky are being achieved.

124 Based on the monitoring results available, the PRB estimated that carbon dioxide emissions have grown by 6% due to additional taxi out time and fallen by 6.2% due to less time spent holding n terminal airspace compared to 2017.[17]

125 Without complete information it is not possible to say whether current airport performance is supporting the achievement of the high-level goals.

5.7.2 Monitoring at National level

126 Given the incomplete status of the airport data collection, it was not possible to calculate at Union-wide level the indicator for the average additional time in the taxi-out phase and terminal airspace.

127 At national level, results are considered valid when the data is deemed to be of the quality required to calculate the indicator for at least 10 of the 12 months of the year. In 2018, this was the case for 13 States for additional taxi-out time and 14 for ASMA additional time. The national average will be strongly driven by the achieved performance at the major airport(s) in any given State.

128 In 2018, as in 2017, the highest **additional taxi-out times** were observed at London Heathrow airport (9.04 minutes per departure), followed by London Gatwick (8.37 min), Rome Fiumicino (7.19 min), and Dublin (7.11 min).

129 The highest average **additional times in the terminal airspace** (ASMA) in 2018 were observed at London Heathrow (7.66 minutes per arrival), followed by London Gatwick (3.90 min), Dublin (3.10 min) and Lisbon (2.95 min).

130 Table 15 provides an overview of additional taxi-out and ASMA time at national level in 2018. More information at airport level is available in the local level view part of the Annual Monitoring report or on the dashboard.[18] A table showing the evolution of additional taxi-out time and ASMA time over the RP2 period is included in the Annex II - Member States' detailed analysis for experts.

[17] Calculated using Albatross World Airports and Suppliers Database to estimate the number of movements at each airport and EUROCONTROL CBA Edition 8.0 to estimate the fuel burn per minute during taxiing and holding.
[18] http://www.eurocontrol.int/prudata/dashboard.

FAB	State	# air-ports	Additional taxi-out time			Additional ASMA time		
			Min per de-parture	Valid air-ports	% valid	Min per arrival	Valid air-ports	% valid
Baltic	Lithuania	4		0			0	0.0%
	Poland	15		1	6.7%		1	6.7%
Blue Med	Cyprus	2		0			0	0.0%
	Greece	1	2.62	1	100%	1.18	1	100%
	Italy	5	4.56	5	100%	1.52	5	100%
	Malta	1	2.12	1	100%	0.90	1	100%
Danube	Bulgaria	1	1.81	1	100%	0.30	1	100%
	Romania	2		1	50.0%		1	50.0%
DK-SE	Denmark	1	3.00	1	100%	1.02	1	100%
	Sweden	1	2.66	1	100%	1.17	1	100%
FAB CE	Austria	6		1	16.7%		1	16.7%
	Croatia	1	1.12	1	100%	0.36	1	100%
	Czech Rep.	4		1	25.0%		1	25.0%
	Hungary	1	1.42	1	100%	0.73	1	100%
	Slovakia	1		0		0.20	1	100%
	Slovenia	3		1	33.3%		1	33.3%
FABEC	Belgium	5		2	40.0%		2	40.0%
	France	60		5	8.3%		5	8.3%
	Germany	16		15	87.5%		15	87.5%
	Luxembourg	1	1.46	1	100%	0.56	1	100%
	Netherlands	4		1	25.0%		1	25.0%
	Switzerland	2	3.27	2	100%	2.38	2	100%
NEFAB	Estonia	2		1	50.0%		1	50.0%
	Finland	1	3.10	1	100%	1.05	1	100%
	Latvia	3		1	33.3%		1	33.3%
	Norway	4		1	25.0%		3	75.0%
SW FAB	Portugal	10		2	20.0%		2	20.0%
	Spain	5	3.71	5	100%	1.63	5	100%
UK-IRE	Ireland	3		2	66.7%		2	66.7%
	UK	9	5.83	9	100%	3.55	9	100%
Union-wide		**174**		**65**	**37.35%**		**68**	**39.1%**

Table 15 - Additional Taxi-Out time & Additional ASMA time - (2018) National Level.

6 Capacity

6.1 Presentation of the Capacity Performance Indicators and Key Performance Indicators

131 The KPI used for Union-wide en route capacity is the average minutes of en route air traffic flow management (ATFM) delay per flight attributable to ANS.

132 As far as local target setting is concerned, Commission Implementing Regulation (EU) 390/2013 defines two KPIs, namely:

- average minutes of en route ATFM delay per flight at FAB level, with a breakdown monitored for reasons of transparency at the most appropriate level; and
- average minutes of arrival ATFM delay per flight attributable to terminal and airport ANS and caused by landing restrictions at the destination airport. In this case, it is at national level, with a breakdown at airport level for monitoring purposes.

133 The Regulation also defines a number of Performance Indicators (PI) related to the operational performance of ANS at and around airports, monitored at both European and local levels (i.e. national level with a breakdown at airport level).

- the arrival ATFM delay is monitored at national level;
- the adherence to ATFM slots;
- the average minutes of ATC pre-departure delay.

134 The European Commission accepted the revised capacity en route targets for Blue Med FAB in Commission Decision C(2019) 3502 of 15 May 2019. In accordance with Article 16 of the Regulation, the revised en route capacity targets apply retroactively as from the first day of the reference period.

6.2 En route ATFM Delays: Union-wide

135 Figure *11* shows the average en route ATFM delay by cause for the RP2 area, between 2008 and 2018, according to the delay-cause attribution provided by the NM. The Union-wide en route capacity target for RP2 is 0.5 minute per flight (RP2 area, all delay reasons, all years during RP2).

136 In 2018, the Union-wide target was not achieved, similarly to 2015, 2016 and 2017 as shown in Table 16 below. For 2018, the average en route ATFM delay was 1.83 minutes per flight.

	2015	2016	2017	2018	2019
Union-wide target	0.5	0.5	0.5	0.5	0.5
Actual performance	0.76	0.91	0.94	1.83	
Difference	+0.26	+0.41	+0.44	+1.33	
Performance vs target	×	×	×	×	

Table 16 - En route ATFM Delay Performance at Union-wide level.

137 The cost to airspace users of this **additional** delay (1.33 minutes per flight) is estimated at 1,350 M€ (calculated: (1.33 x 10.2M (annual number of flights)) x 100€).[19]

138 The NM Annual Report 2018 on NM Performance in RP2 summarises "The high levels of demand, a major drop in capacity at two centres in the core area (Karlsruhe UAC and Marseille ACC) and a

[19] Standard Inputs for EUROCONTROL Cost Benefit Analyses - Edition 8.

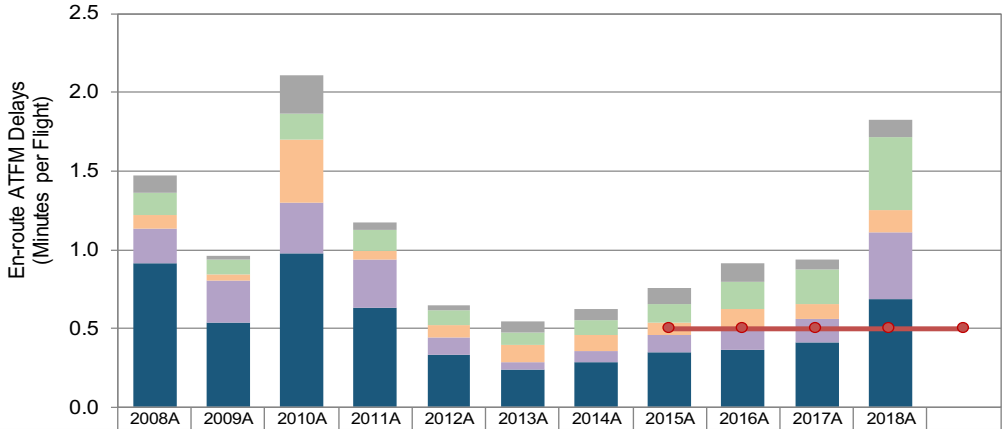
record number of adverse weather events and industrial actions severely disrupted the network in 2018."

139 The NM Annual Report reviews the attributed causes of delays: "ATC capacity, en route weather and ATC staffing were the main causes of en route ATFM delay. Weather and staffing more than doubled compared to 2017. Delays attributed to disruptions and events had the highest increase with delays increasing more than 2.5 times."

140 Karlsruhe and Marseille combined caused 36% of all en route ATFM delays. Limited capacity, recurrent staffing issues and disruptions impacted operations, including neighbouring ACCs. Maastricht, Reims, Brest and Vienna ACCs were the other centres with ATFM delay above 2,000 minutes per day.

141 The NM Annual Report recalls the remedial measures implemented in anticipation of the expected capacity shortfall, which involved the Network Manager working with individual ANSPs to divert demand from risk areas such as Karlsruhe UAC to reduce the capacity bottlenecks (the 4ACC initiative).

142 The NM Annual report 2018 states "NM and affected ANSPs prepared for the capacity issues at Karlsruhe well ahead of summer.[20] The 4ACC initiative implemented a large set of measures aimed at diverting demand from risk areas. The 4 ACC initiative was initiated by the NM, with the aim of establishing a common plan for four en-route centres (NATS in London, DSNA in Reims, EUROCONTROL's Maastricht UAC and DFS's Karlsruhe UAC) in order to manage the optimisation of the available capacity across the core area and critical part of the European ATM network. Demand effectively decreased by more than 2% on the UAC. Nevertheless, en route delay at [Karlsruhe] UAC reached 3.18 minutes per flight in the summer. Moreover, aircraft flew at suboptimal flight levels with a cost impact on operators."



	2008A	2009A	2010A	2011A	2012A	2013A	2014A	2015A	2016A	2017A	2018A	
Other [all other codes]	0.11	0.02	0.25	0.04	0.03	0.07	0.07	0.11	0.12	0.06	0.11	
Weather [W,D]	0.14	0.10	0.17	0.14	0.10	0.08	0.10	0.11	0.17	0.22	0.46	
ATC disruptions [I,T]	0.09	0.04	0.40	0.06	0.08	0.11	0.10	0.08	0.12	0.10	0.14	
ATC Staffing [S]	0.22	0.27	0.32	0.30	0.12	0.05	0.07	0.11	0.13	0.15	0.43	
ATC Capacity [C]	0.91	0.54	0.97	0.63	0.33	0.24	0.29	0.35	0.37	0.41	0.68	
EU-wide target								0.50	0.50	0.50	0.50	0.50
Total	1.48	0.96	2.11	1.17	0.65	0.55	0.63	0.76	0.91	0.94	1.83	

Figure 11 - Average en route ATFM Delay in RP1 and RP2.

[20] https://www.eurocontrol.int/publication/network-manager-annual-report-2018

143 Further details of major capacity constraints are provided in the local level view part of this PRB Monitoring Report 2018.

144 The latest version of the Network Operations Plan (NOP) 2019-2024 (June 2019 edition), contains a prediction of the expected delay in light of the latest capacity plans proposed by ANSPs and the expected traffic. The network en route delay forecast, for all causes of delay, for 2019 has risen from 1.01 minutes per flight in last year's NOP to 4.15 minutes per flight. The Network Manager forecasts that this could be reduced to 2.43 minutes per flight following implementation of enhanced NM/ANSPs Network Measures for Summer 2019 – see section 10.3 of the NOP 2019-2024.

145 It is therefore evident that the capacity plans contained within the NOP are inconsistent with the required en route capacity target of 0.5 minute per flight for the remainder of RP2.

6.3 En route ATFM Delays: Local level (FAB)

146 The local (FAB) targets for en route capacity are as adopted in the relevant FAB Performance Plans. Each FAB was provided with a reference value (that would ensure consistency with the Union-wide target) for each year of RP2, as published in the Network Operations Plan (NOP).

147 Only three of the nine FABs achieved their en route capacity targets. Unlike for the other FABs, the actual IFR traffic of those three FABs was mostly at or below the STATFOR Baseline scenario with exception to the Baltic FAB that experienced traffic increase to values between STATFOR Baseline and High in 2018. Two of these FABs provided a positive contribution to network performance by achieving a more stringent capacity performance than their respective reference values.

FAB	Reference Value	FAB Target	Actual Performance	Performance vs target
Baltic	0.22	0.22	0.22	✓
Blue Med	0.18	0.24[21]	0.35	✗
Danube	0.05	0.03	0.08	✗
DK-SE	0.09	0.09	0.04	✓
FAB CE	0.29	0.28	0.82	✗
FABEC	0.42	0.42	2.14	✗
NEFAB	0.13	0.13	0.03	✓
SW FAB	0.30	0.30	0.64	✗
UK-IRE	0.26	0.26	0.28	✗

Table 17 - En route ATFM Delay Performance by FAB (2018).

148 Six FABs achieved neither their FAB targets nor their respective reference values: Blue Med FAB, Danube FAB, FAB CE, FABEC, SW FAB and UK-IRE FAB.

149 A comparison between the actual yearly traffic levels forecasted by STATFOR forecasted traffic for each of the individual year scenarios (7yr IFR movements Feb 2014) when the FAB performance plans were being developed is presented in Table 18.

[21] Revised Blue Med FAB targets for RP2 were approved by the SSC.

FAB	2015	2016	2017	2018
Baltic	Below low traffic scenario	Between baseline and low		Between baseline and high
Blue Med[21]	Between baseline and high	Between baseline and low	Between baseline and high	
Danube	Above high traffic scenario			
DK-SE	Below low traffic scenario		Between baseline and low	
FAB CE	Above high traffic scenario	Between baseline and high		
FABEC	Between baseline and high traffic scenario			
NEFAB	Below low traffic scenario			Between baseline and low
SW FAB	Above high traffic scenario			
UK-IRE	Between baseline and high	Above high traffic scenario		

Table 18 - Comparison of actual traffic with STATFOR.

150 Danube FAB and SW FAB have encountered traffic levels greater than forecasted for each year of RP2. UK-IRE FAB has experienced traffic levels greater than forecasted for three years in RP2 (2016, 2017 and 2018). FAB CE has experienced traffic levels greater than forecasted in 2015.

151 All other FABs have experienced traffic levels that were in between STATFOR Baseline and STAFOR High scenarios such as UK-IRE (2015), FABEC (during all years), FABCE (2016-2018), Blue Med (2015, 2017 and 2018) or below the STATFOR Baseline such as NEFAB and DK-SE (at all times) and Baltic FAB (2015 – 2017) scenarios from the STATFOR IFR forecast prior to the submission of the FAB performance plans.

FAB	2015	2016	2017	2018
Baltic	✓	✗	✓	✓
Blue Med[21]	✗	✓	✗	✗
Danube	✓	✓	✓	✗
DK-SE	✓	✓	✓	✓
FAB CE	✓	✓	✓	✗
FABEC	✗	✗	✗	✗
NEFAB	✓	✓	✓	✓
SW FAB	✗	✗	✗	✗
UK-IRE	✓	✗	✓	✗

Table 19 - Achievement of en route capacity target during RP2 by FAB.

152 The local level view part of this report presents analysis of individual FAB performance and further analysis of capacity performance at State level.

6.4 En route Capacity Incentive Schemes

153 The annual monitoring reports received from each FAB contained information on the results of the incentive schemes applied upon the en route ATFM delay per flight and Arrival ATFM delay per flight during 2018.

154 During 2018, five ANSPs overachieved the targeted capacity performance levels, which resulted in an aggregated additional receipt in the form of a bonus from airspace users of more than 8 M€ (ANS Finland, Bulatsa, ENAV, Avinor, Oro Navigacija).

155 Ten ANSPs did not achieve targeted performance levels that resulted in aggregated financial penalties equivalent to 13.9 €M (ANS CR, Austrocontrol, Croatia Control, DFS, DSNA, EUROCONTROL (MUAC), HungaroControl, LPS SR, NATS and skeyes).

156 Eleven ANSPs achieved capacity performance within a dead-band of neither penalty nor bonus (DCAC, EANS, IAA, LFV, LGS, LVNL, Naviair, PANSA,Romatsa, Skyguide and Slovenia Control].

157 SW FAB reported that the results of their incentive scheme (ENAIRE and NAV Portugal) were pending and would be provided in October 2019.

158 The remaining two ANSPs were not subject to an incentive scheme (MATS, HANSA).

159 Cyprus reported that they had changed the incentive scheme in accordance with an agreement between Cyprus and the Commission in December 2018. Notwithstanding the reported agreement, Cyprus advised that the State will not apply any bonus for 2018 en route capacity performance. The PRB has not received details about the revised incentive scheme being applied by Cyprus.

160 It is noted that, despite the BlueMed FAB report advising that the BlueMed en route capacity targets were significantly revised for the remainder of RP2, the local incentive targets for Italy were not changed.

161 The local level view part of this report (Annex II) contains further information and analysis for each en route capacity incentive scheme applied during 2018.

6.5 Positive Contribution to Network Performance

162 Three of the nine FABs met the en route capacity targets provided in their respective RP2 FAB Performance Plan for 2018: DK-SE FAB and NEFAB even surpassed the target values.

163 The positive contribution made by these FABs has provided a marginal impact (1/100 min) to the Union-wide en route capacity performance and to airspace users in general.

164 If the FABs that exhibited a capacity performance surpassing their FAB target had simply achieved their FAB target, the Union-wide en route capacity performance would have been an average delay of 1.84 minutes per flight, instead of 1.83 minutes per flight.

165 Comparing the 2018 results with 2017, the figures show that in 2017, the positive contribution from a few Member States was considerably greater, accounting for 0.10 minutes instead of 0.01 minutes in 2018. This indicates that fewer FABs have capacity buffers that are able to reduce the overall level of delay in the system.

6.6 Capacity planning during RP2

166 The lack of capacity in certain areas in 2018 caused considerable problems in Europe. The PRB thus assessed available data to better understand why certain Area Control Centres were able to provide the capacity which they had planned in 2014 and why others failed to comply with their own plans.

167 The PRB has compared the capacity profiles published in the Network Operations Plan in 2014 with the capacity provided in 2018. A number of the ACCs, including Karlsruhe, Marseille and Maastricht, did not provide the capacity in 2018 that they had planned in the Network Operations

Plan in 2014. This has, in addition to other factors, contributed to delays well in excess of the reference values for the related FAB.

168 There are also examples of ACCs, such as Ljubljana, that offered less capacity in 2018 than was planned in the Network Operations Plan for 2014 but who did not produce delays. This demonstrates that capacity planning and the provision of capacity are complex areas with many variables and influences. Member States must carefully consider the provision of capacity to help ensure that the needs of the network are met. ANSPs must work closely with the Network Manager to update and adjust these plans and adapt over time, as necessary, to provide sufficient capacity whilst avoiding unnecessary costs.

6.7 *Arrival ATFM Delay – National Target Setting and Actual Performance*

169 In 2018, the Union-wide average for arrival ATFM delay (all delay causes) continued to increase from 0.74 minutes per arrival in 2017 to 0.78 minutes in 2018. Arrival ATFM delay are regulations that are attributable to terminal/airport air navigation services and caused by landing restrictions at the destination airport.

170 The increase in average airport arrival ATFM delay in 2018 was due to an increase in aerodrome capacity delays (ATC and non-ATC related) and weather attributed airport ATFM delays.

Airport arrival ATFM delay per arrival	2015	2016	2017	2018	2019
Actual performance	0.64	0.67	0.74	0.78	
# airports	173	174	174	174	

Table 20 - Airport arrival ATFM delay - Union-wide level.

171 The majority of States established a national target on arrival ATFM delay in their RP2 Performance Plans. The targets were required to be consistent with the historic performance at national level considering a movement-related weighting for the respective airports included in the performance scheme.

172 Table 21 shows the performance observed in 2018 (all delay-causes) in terms of achieving the national targets and associated breakdowns. Cases for which no national target (all causes) has been established, or where the actual observed performance exceeds the established target, are highlighted.

173 A number of SES States have augmented the national target on arrival ATFM delay with a respective 'CRSTMP target'.[22] The latter is an instrument for the application of the incentive scheme and regulated under Commission Implementing Regulation (EU) 391/2013.

FAB	State	Airport arrival ATFM delay per arrival (2018)			
		National Target	Actual (all causes)		
Baltic	Lithuania	0.00	0.01	✘	Military activities
	Poland	0.04	0.32	✘	*Delays at Warsaw due to capacity shortage associated to high traffic growth and weather*

[22] ATFM delay to which a flight is subjected is defined to have as cause the most penalizing ATFM regulation. Causes related to air traffic service provision and/or special activities comprise: C – ATC Capacity, R – ATC Routing, S – ATC Staffing, T – Equipment (ATC), M – military activity, and P – special event. Under the Charging Regulation391/2013, States may exclude specific delay causes for the application of the respective incentive scheme.

FAB	State	Airport arrival ATFM delay per arrival (2018)			
		National Target	Actual (all causes)		
Blue Med	Cyprus	none	0.82	✗	*No national target specified*
	Greece	0.10	1.47	✗	*Capacity-related delays at Athens airport associated to high traffic growth*
	Italy	0.41	0.12	✓	
	Malta	0.10	0.01	✓	
Danube	Bulgaria	0.00	0.00	✓	
	Romania	0.00	0.20	✗	*Some airport capacity-related delays at Bucharest/ Otopeni*
DK-SE	Denmark	0.11	0.06	✓	
	Sweden	0.35	0.41	✗	Weather related delays at Stockholm Arlanda airport and disturbances in Swedavia´s IT network.
FAB CE	Austria	1.27	0.49	✓	
	Croatia	0.05	0.00	✓	
	Czech Rep.	0.35	0.11	✓	
	Hungary	0.05	0.03	✓	
	Slovakia	0.00	0.00	✓	
	Slovenia	0.00	0.05	✗	
FABEC	Belgium	none	0.60	✗	*No national target specified*
	France	0.60	0.40	✓	
	Germany	0.65	0.45	✓	
	Luxembourg	0.47	0.09	✓	
	Netherlands	2.00	2.19	✗	*Weather and capacity-related delays at Amsterdam*
	Switzerland	2.35	1.54	✓	
NEFAB	Estonia	0.00	0.00	✓	
	Finland	0.14	0.37	✗	
	Latvia	0.04	0.07	✗	*Capacity-related delays at Riga airport associated to high traffic growth*
	Norway	0.60	0.26	✓	Weather related delays
SW FAB	Portugal	0.60	2.38	✗	*Unexpected traffic growth associated with lack of aerodrome capacity in Lisbon and weather events in Porto*
	Spain	0.80	1.51	✗	*Weather-related delays and capacity issues mainly at Barcelona and Palma airports*
UK-IRE	Ireland	0.20	0.23	✗	
	UK	0.78	1.24	✗	*Unexpected traffic growth associated with bad weather conditions*

Table 21 - Arrival ATFM Delay - Targets and Observed Performance (2018).

6.8 Incentive Schemes on National Target on Arrival ATFM Delay

174 As part of the RP2 Performance Plan assessment, compliance issues with respect to the establishment of a national target on arrival ATFM delay and a respective incentive scheme were identified by the PRB of the time. States commented on the identified issues with no final decision by the European Commission. The general comments made in the previous Annual Monitoring Reports for the years 2015, 2016 and 2017 concerning the compliance of the individual incentive schemes still apply.

175 The lack of compliance resulted in a non-uniform application of national targets and in some instances only applied to a subset of airports or delay causes. In some instances, no target was set at the airport level.

176 The local level view part of this PRB Monitoring Report identifies for each SES Member State whether a national target has been established, with the associated breakdown to the respective airport, and to what extent an incentive scheme has been established and applied.

6.9 Adherence to ATFM Slots and Pre-departure Delay

177 Table 22 shows the ATFM slot adherence and the ATC pre-departure delay at national level in 2018. A set of tables is included in Section 11 (Additional data) of this report showing the evolution of ATFM slot adherence and ATC pre-departure delay over the RP2 period.

FAB	State	# airports	ATFM slot adherence	ATC pre-departure delay		
			% of regulated flights departing within the 15 min ATFM window	Min per departure	Valid airports	Valid data (%)
Baltic	Lithuania	4	93.0%		0	0.0%
	Poland	15	95.8%		1	6.7%
Blue Med	Cyprus	2	84.1%		0	0.0%
	Greece	1	90.7%		0	0.0%
	Italy	5	94.5%		4	80%
	Malta	1	95.2%	0.28	1	100%
Danube	Bulgaria	1	97.9%	0.15	1	100%
	Romania	2	92.6%		1	50%
DK-SE	Denmark	1	98.1%	0.14	1	100%
	Sweden	1	97.2%	0.07	1	100%
FAB CE	Austria	6	96.2%		1	16.7%
	Croatia	1	91.9%	0.09	1	100%
	Czech Rep.	4	94.3%		1	25.0%
	Hungary	1	93.3%	0.20	1	100%
	Slovakia	1	97.6%		0	0.0%
	Slovenia	3	95.5%		1	33.3%
FABEC	Belgium	5	94.5%		2	40.0%

FAB	State	# air-ports	ATFM slot adherence % of regulated flights departing within the 15 min ATFM window	ATC pre-departure delay Min per departure	Valid air-ports	Valid data (%)
	France	60	86.9%		2	3.3%
	Germany	16	94.6%		9	56.3%
	Luxembourg	1	82.3%	0.09	1	100%
	Netherlands	4	95.5%		0	0.0%
	Switzerland	2	93.6%	0.82	2	100%
NEFAB	Estonia	2	96.8%		1	50.0%
	Finland	1	92.6%	0.38	1	100%
	Latvia	3	96.0%		1	33.3%
	Norway	4	98.6%	0.11	4	100%
SW FAB	Portugal	10	93.3%		2	20.0%
	Spain	5	95.2%		4	80%
UK-IRE	Ireland	3	96.2%		1	33.3%
	UK	9	94.7%		7	77.8%
Union-wide		**174**	93.6%		**52**	**30%**

Table 22 - ATFM Slot Adherence & ATC Pre-Departure Delay (2018) National Level.

178 In 2018, the level of ATFM slot adherence was above 90% in 27 of the 30 States, and between 80% and 90% in the rest, showing a very good compliance at Union level (93.6%).

179 As was the case in previous years of RP2, the reporting of average ATC pre-departure delay was limited due to ongoing data issues (lack of proper data provision through APDF implementation, data quality, etc.), particularly at smaller airports. At national level, results are only published if all airports are considered valid. As a result, the indicator could only be computed for 10 of the 30 States in 2018. Overall, there was no substantial ATC-related pre-departure delay across Europe in 2018, although the situation is deteriorating along RP2.

6.10 Post-ops adjustments

180 In order to provide a better understanding of network constraints by identification of the right ATFM delay cause category, the Network manager has introduced an improved post-operations adjustment process, approved in May 2019, which allows operational stakeholders to notify national and European authorities of problems related to air traffic flow management delay measurement, classification and assignment. It also includes the option to reassign delay to a third party.

181 The main output of post-operations adjustment process is a separate performance dataset, which includes the approved changes. The dataset is available for performance scheme and local management reporting

182 Requests for the post-operations adjustments approved by NM in 2018 resulted in total reduction of 3577 minutes in en route ATFM delay for all flights in the SES RP2 Performance Area. This only marginally reduced the KPI in terms of average minutes of en route ATFM delay per flight attributable to ANS by 0.0004 mins per flight. The adjustments resulted as well in changes in delay-cause categories values for 2018 as described further.

Table 23 below provides information on the post-operations adjustment reductions in 2018 approved by NM. The largest reductions were made in cause-delay groups related to Industrial action, Weather and ATC Staffing.

Delay cause Category	Reduction (min)
I - Industrial Action (ATC)	62,742
P - Special Event	1,117
R - ATC Routing	22
S - ATC Staffing	15,729
T - Equipment (ATC)	883
W – Weather	48,282

Table 23 -Post-operations adjustment reductions in 2018 approved by NM.

183 Table 24 provides information on where the deductions were re-allocated as increases in 2018, approved by NM. The largest increases were made in cause-delay groups related to ATC Capacity and Other.

Delay cause Category	Increase (min)
A - Accident/Incident	161
C - ATC Capacity	58,528
D - De-icing	0
E - Equipment (non-ATC)	0
G - Aerodrome Capacity	1,018
M - Airspace Management	184
N - Industrial Action (non-ATC)	332
O – Other	64,633
V - Environmental Issues	342

Table 24 - Post-operations adjustment increase in 2018 approved by NM.

184 The PRB believes there is value in this service provided by the Network Manager but highlights that there could be further underlying factors fully not accounted for i.e. re-allocation of delays that were incurred due to an issue originating elsewhere and the mis-allocation of delay codes by the flow management position controller that is not verified by the Network Manager.

7 ATCO productivity

185 This section was developed by the PRB and does not represent the views of any other organisation involved in developing this document.

186 The 2014 NOP[23] contains the following list of principal causes behind the lack of capacity provided within the ANSPs' local capacity plans:

- Inflexible use of staff;
- Low sector capacities;
- Delayed installation or underperforming ATM systems;
- Lack of flexibility in sector configurations and opening schemes;
- Training for new ATM systems;
- Lack of ATCO recruitment;
- Lack of weekend and winter capacity.

187 Most reasons relate to staffing i.e. training, recruitment, rostering, sharing and flexibility of the work force whilst ATM systems are also cited as reasons for lacking capacity.

188 Providing air navigation services is a human resource intensive activity. Staffing is, by a considerable margin, the dominant cost involved in providing these services, as illustrated by Figure 12 which shows the cost breakdown for 2017.[24]

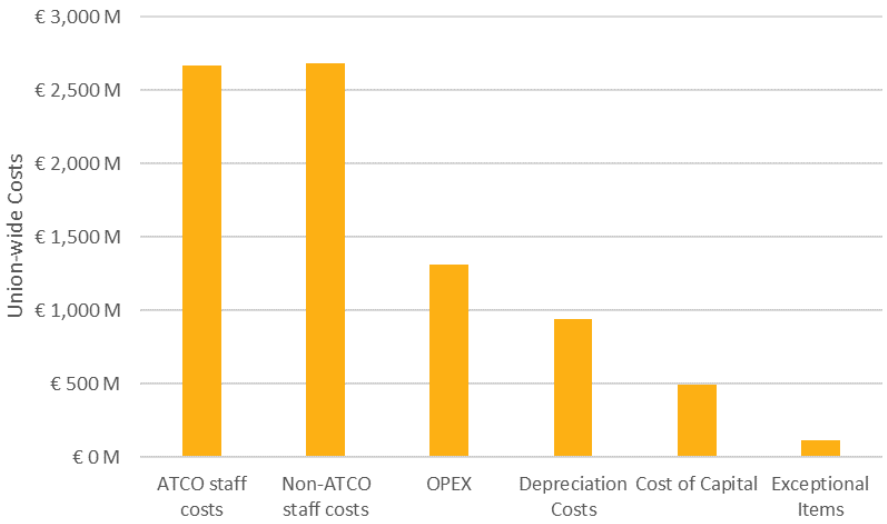


Figure 12 - EU-wide costs associated with air navigation services. Source: ACE benchmarking reports

189 Despite the critical role of staffing within ANS and significant portion of the cost base it accounts for, it is surprising that comprehensive staffing data is only available two years after the close of a year i.e. the ACE Benchmarking Report published in 2019 contains information for 2017.

190 Inevitably this makes it more difficult for National Supervisory Authorities and others, including the Commission and the PRB to understand and react to key issues that could be identified much

[23] European Network Operations Plan 2014-2018/19, Eurocontrol
[24] Produced using data from the ATM Cost Effectiveness (ACE) Benchmarking Report 2017.

earlier. It is crucial that staffing data is shared more freely and frequently so that that performance can be reviewed more effectively.

7.1 Analysis of ATCO Productivity

191 ATCO Productivity is a measure of the output of the air navigation services per unit of input. Within the ACE Benchmarking reports, output is defined as the number of composite flight-hours[25] managed per hour of an ATCOs working time in operations (the input).

192 Figure 13 shows the productivity change between 2016 and 2017 for Single European Sky States.[26]

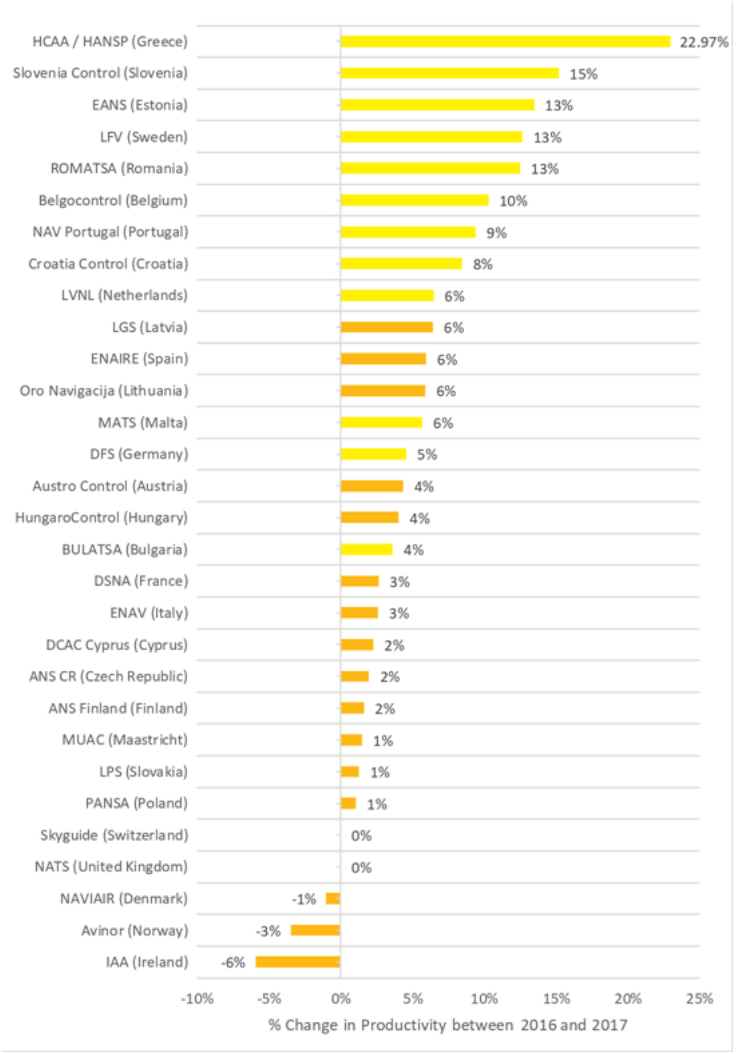


Figure 13 - Change in productivity between 2016 and 2017. The orange bars indicate increases in productivity that are lower than the traffic increase, where the yellow bars highlight changes that are greater than the traffic effect alone.

193 For air navigation services, productivity is likely to be higher when the system (traffic demand) is busy. Delays are generated when the system becomes too busy (i.e. demand exceeds capacity). Therefore, higher productivity of ATCOs is not always a positive outcome because even with higher productivity delays can still increase where capacity is not matched to demand.

[25] Composite flight hours is an indicator combining the two separate output measures for en-route (flight hours) and terminal ANS provision (IFR movements) by weighting these output measures by their respective average cost of the service for the Pan-European system (see https://ansperformance.eu/definition/composite-flight-hour/)

[26] Produced using data from ACE Benchmarking Report 2017. Is said above already.

194 The analysis highlights the importance of improving ATCO productivity in a way that is sustainable. Increasing productivity through greater traffic must be balanced by ensuring that sufficient capacity is provided to minimise delay. This requires ANSPs to focus on both increasing capacity to manage traffic growth. ANSPs must consider resources (number of ATCO-hours), technology, sector opening hours and staff rostering to overcome the most common reasons for the lack of capacity.

8 Cost-efficiency

EN ROUTE ANS COST-EFFICIENCY

8.1 Presentation of the en route Cost-efficiency KPI and targets

195 Commission Implementing Decision (EU) 2014/132 of 11 March 2014 sets the Union-wide targets for the cost-efficiency Key Performance Area covering RP2 (i.e. the period 2015-2019). These targets, as shown in Table 25, are expressed in average DUC for en route ANS and correspond to an average DUC decrease of -3.3% p.a. between 2014 (starting point based on the RP1 determined costs (DCs) for 2014 i.e. 58.09 €$_{2009}$) and 2019.

Cost-Efficiency Union-wide targets	2015	2016	2017	2018	2019
Real en route Determined Unit Costs (in €$_{2009}$)	56.64	54.95	52.98	51.00	49.10

Table 25 - En route cost-efficiency targets for RP2 (EC Decision).

196 The aggregation of the individual national cost-efficiency targets for the 30 SES States that corresponds to 30 en route charging zones (CZ) (Belgium and Luxembourg share one CZ and Spain has two CZs) is shown in Table 26. It results in an average DUC decrease of - 3.4% p.a. between 2014 (starting point based on the RP1 Determined Costs (DCs) for 2014 i.e. 58.09 €$_{2009}$) and 2019.

197 Table 26 also shows that the aggregation of the local cost-efficiency targets reported in the RP2 Performance Plans (PPs) are lower than the Union-wide targets in 2015 (-2.3%), 2016 (-2.0%), 2017 (-1.0%), 2018 (-1.2%) and 2019 (-1.0%).

Cost-Efficiency data from Performance Plans	2015P	2016P	2017P	2018P	2019P
Real en route Determined Unit Costs (in €$_{2009}$)	55.33	53.86	52.47	50.38	48.61
Difference between Determined Unit Costs and EC Decision on Union-wide targets	-2.3%	-2.0%	-1.0%	-1.2%	-1.0%

Table 26 - En route cost-efficiency targets for RP2 as per aggregation of adopted national targets (SES level).

198 In 2016, Malta, Poland and Bulgaria requested the Commission to revise their RP2 en route cost-efficiency targets for the years 2018 to 2019. The assessment for these three States is based on the amended Performance Plan (Commission Implementing Decision (EU) 2017/2376 of 15 December 2017). In 2017, Romania, Portugal and Denmark submitted a request to the European Commission to revise their RP2 en route cost-efficiency target DUC for the years 2018 to 2019. Denmark subsequently withdrew the request. This report includes the amended targets for Romania and Portugal as reflected in the revised Performance Plan.[27]

[27] Commission Implementing Decision (EU) 2018/1782 of 15 November 2018 as amended by Commission Implementing Decision (EU) 2018/2021 of 17 December 2018.

8.1.1 *Actual 2018 Unit Cost vs. DUC in Performance Plans*

199 In order to allow consolidation at Union-wide level and to ensure consistency with Commission Implementing Decision (EU) 2014/132 on setting Union-wide targets for RP2, as well as with the DCs provided in the adopted PPs, costs are expressed in real terms (€$_{2009}$ prices).

200 The actual costs for 2017 presented in this Monitoring Report differ from the figures published in the Monitoring Report 2017, mainly because several States updated the actual costs exempted from cost sharing. The respective numbers are updated in this report.

201 Figure 14 summarises the situation in 2018. It shows that the Union-wide actual en route unit cost (45.43€$_{2009}$) was 9.8% lower than planned in the RP2 PPs (50.38€$_{2009}$). This is because in 2018 actual en route costs were 1.1% (-67.2M€$_{2009}$) lower than the DCs reported in the PPs (6,153.5M€$_{2009}$), while the actual number of total service units (TSUs) were 9.7% higher than planned. In addition, the Union-wide actual en route unit cost (45.43€$_{2009}$) was 10.9% lower than the Union-wide target for 2018 (51.0€$_{2009}$), which was adopted by the Commission in 2014 ().

202 When comparing with the plan, if the actuals are lower the numbers are highlighted in red in the following figures.

203 The graph in the figure shows the en route determined costs, actual en route costs and, planned TSUs and actual TSUs indexed to 2015, while the bars show the actual and determined unit costs.

Actual unit cost vs. DUC in adopted Performance Plans

SES States - Data from RP2 Performance Plans	2015D	2016D	2017D	2018D	2019D
En-route costs (EUR2009)	6 235 113 277	6 195 878 072	6 164 525 008	6 153 524 516	6 059 092 064
Total en-route Service Units	112 687 532	115 027 116	117 494 197	122 148 732	124 649 261
Real en-route unit costs per Service Unit (EUR2009)	**55.33**	**53.86**	**52.47**	**50.38**	**48.61**

SES States - Actual data from Reporting Tables	2015A	2016A	2017A	2018A	2019A
En-route costs (EUR2009)	6 079 182 547	6 060 358 280	6 002 727 481	6 086 284 260	
Total en-route Service Units	114 994 014	120 135 471	126 856 192	133 959 583	
Real en-route unit costs per Service Unit (EUR2009)	**52.87**	**50.45**	**47.32**	**45.43**	

Difference between Actuals and Planned (Actuals vs. PP)		2015	2016	2017	2018	2019
Real en-route costs (EUR2009)	in value	-155 930 730	-135 519 792	-161 797 527	-67 240 256	
	in %	-2.5%	-2.2%	-2.6%	-1.1%	
Total en-route Service Units	in value	2 306 482	5 108 355	9 361 996	11 810 851	
	in %	2.0%	4.4%	8.0%	9.7%	
Real en-route unit costs per Service Unit (EUR2009)	**in value**	**-2.47**	**-3.42**	**-5.15**	**-4.94**	
	in %	**-4.5%**	**-6.3%**	**-9.8%**	**-9.8%**	

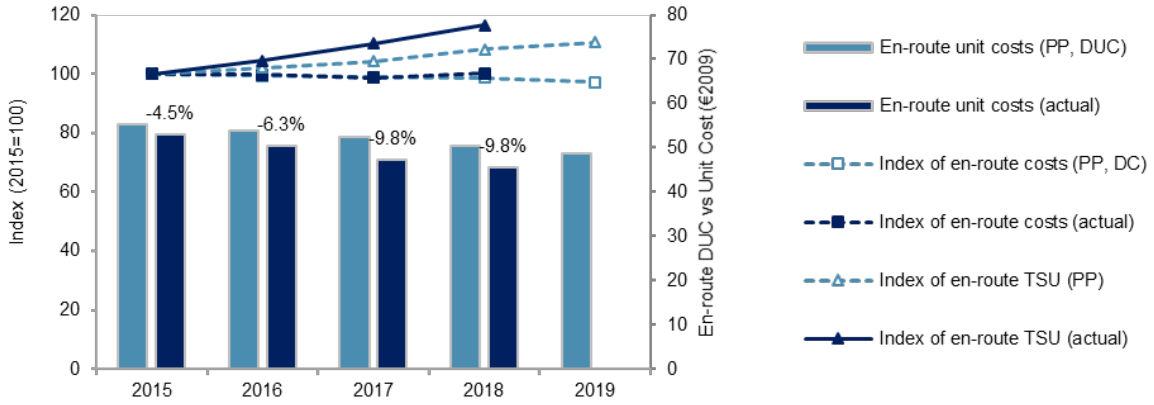


Figure 14 - En route unit cost (actual vs. Performance Plans).

204 The overall average variation of en route unit cost observed at Union-wide level (-9.8%) masks different situations across the 30 en route CZs as shown in Figure 15.

205 In 2018, the actual en route unit cost was lower than planned for 26 CZs. For 17 of these CZs, this is due to the combination of lower actual costs with higher traffic volumes than expected. Belgium and Luxemburg reduced their costs by the equivalent reduction in traffic, so that the actual unit cost is the same as planned.

206 In contrast, the 2018 actual en route unit cost was higher than the DUC provided in the RP2 PPs for three CZs (Portugal +7.2%, Malta +4.6 and Sweden +0.5%). For Portugal this results from the combination of slightly lower than planned TSUs (-1.0%) and higher than planned en route costs in real terms (+6.1%, or +7.2M€$_{2009}$). The main driver for Malta is higher costs than planned (+4.8% or 0.9 M€2009) while the traffic was almost the same as planned (+0.2%). In the case of Sweden, the higher-than-expected actual traffic compared to the planned (+12.7%) was not enough to compensate the significant deviation on the en route actual costs versus planned (+13.3% or +21.8M€$_{2009}$).

207 For the three states, the main driver for higher costs than planned was due to ANSPs' higher staff costs and in the case of Sweden and Portugal more concretely higher staff costs related to pensions.

Figure 15 - 2018 actual unit cost vs. PP by charging zone.

208 Figure 15 shows that actual traffic was higher than planned for 27 CZs and slightly lower for three States: Italy (-1.3%), Portugal (-1.0%) and Belgium & Luxemburg (-0.2%). 17 of these CZs achieved

lower costs than planned and nine were able to offset the increase in costs by the increase in traffic. For example, although the actual costs were +4.8% above planned in Hungary, traffic was +31.9% higher than planned, leading to an actual unit cost -20.6% lower than planned.

209 Concerning the States with lower traffic than planned, Italy managed a cost reduction higher than the decrease in traffic. This results in actual unit cost lower than planned. Belgium and Luxemburg reduced their costs equally to traffic reduction, so that the actual units cost is the same as planned.

210 More details on the deviation between the DUC and actual en route unit cost for 2018 at CZ level are available in the local level view part of the 2018 Annual Monitoring Report.

8.1.2 Actual 2018 traffic vs. TSUs in Performance Plans

211 In 2018, Union-wide actual total service units were +9.7% higher than planned in the adopted Performance Plans (i.e. still within the ±10% alert threshold at system level).

212 At State level, as shown in Figure 15, all States remained above the -10% threshold, while 12 CZs experienced a traffic increase above the +10% threshold. From those 12, four were above +20%: Hungary (+31.9%), Cyprus (+27.4%), Greece (+24.7%) and Spain Continental (+21.2%).

213 For the year 2019, as shown in Figure 16 below, the STATFOR February 2019 traffic outlook for the rest of RP2 remains significantly above the forecasts of the PPs. It must be noted that if any of the three scenarios of STATFOR February 2019 forecasts materialise, the traffic will be substantially higher than planned for the rest of RP2 (2019). The traffic is expected to greatly exceed the ±2% dead-band foreseen in the traffic risk-sharing mechanism. In fact, it would exceed the 10% alert threshold in any of the three scenarios. (see chapter 10 Alert Thresholds).

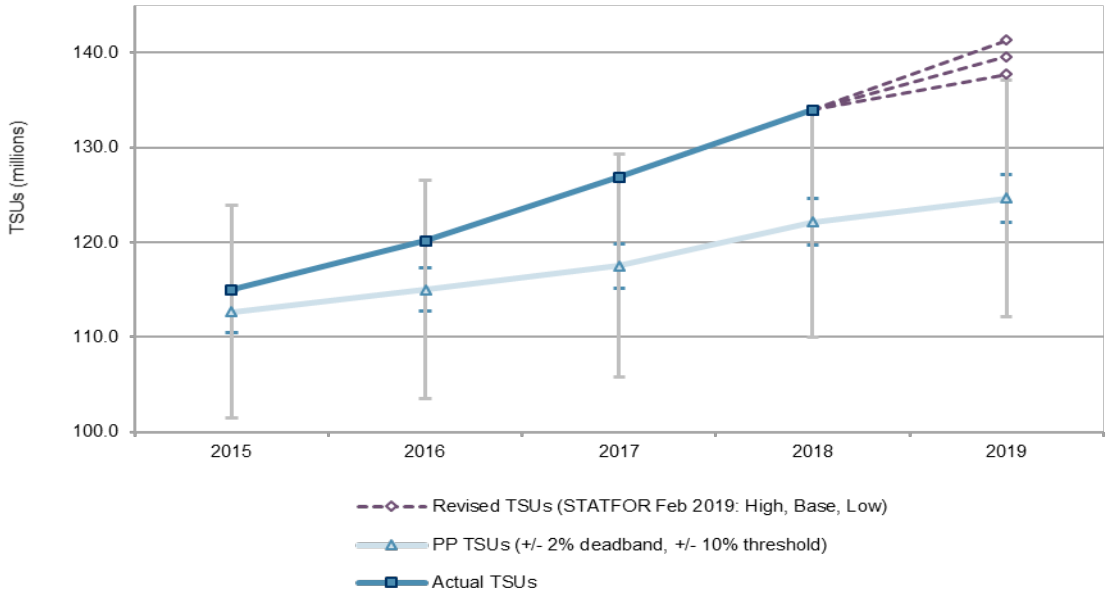


Figure 16 - En route traffic monitoring (Actual 2015-2019 TSUs compared to PPs, SES level).

8.1.3 Traffic risk-sharing mechanism

214 The traffic risk-sharing arrangements provided in Commission Implementing Regulation (EU) No 391/2013 foresee that ANSP's additional (or lost) revenue (in respect of determined cost) due to the difference between the actual and the planned TSUs is shared with airspace users as follows:

- If the difference in terminal service units (TSUs) falls within the dead-band of ± 2%, the additional (or lost) revenue in respect of Air Traffic Service Provider (ATSP) determined costs (DCs) is fully retained (or borne) by the ATSP concerned;
- If the difference in TSUs falls outside the threshold of ± 10%, the additional (or lost) revenue in respect of ATSP DCs is fully reimbursed (or charged) to the airspace users;
- If the difference in TSUs falls between the dead-band of ± 2% and the threshold of ±10%, the additional (or lost) revenue in respect of ATSP DCs is shared between the ATSPs (30%) and the airspace users (70%).

215 This mechanism is presented in Figure 17. It shows that revenues due to traffic variation between +/-2% are fully retained/borne by the ANSP whilst between +/-2% and +/-10% the ANSP can keep a maximum of 30% of additional revenue or bear at least 30% of the loss. Beyond the 10% limits all additional/lower revenue is fully recovered or reimbursed to airspace users.

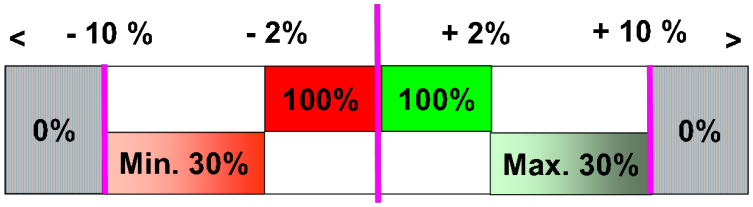


Figure 17 - Traffic risk-sharing mechanism for the ATSPs.

216 The DCs of the other entities such as NSAs, EUROCONTROL and MET Service Providers (which represent some 10% of the total DCs (6.08B€$_{2009}$) at Union-wide for 2018) are not subject to traffic risk-sharing and are fully reimbursed (or charged) to the airspace users, irrespective of traffic evolution.

217 The additional revenues resulting from the application of the traffic risk sharing mechanism amounted to 603.6M€$_{2009}$ in 2018. This additional revenue arising from the deviation between actual and planned traffic are shared between States/ANSPs and airspace users according to the traffic risk sharing mechanism described above.

218 Figure 18 shows the proportion of revenues eligible and ineligible for the traffic-risk sharing mechanism to be reimbursed to airspace users. In 2018, 71.8% of the additional revenues are distributed to airspace users, i.e. 58.6% relating to cost subject to traffic risk sharing (353.9M€$_{2009}$) and 13.2% relating to costs not subject to traffic risk sharing (79.5M€$_{2009}$). 28.2% of the additional revenues are retained by States/ATSPs (170.2 M€$_{2009}$, comprising of 165.8 M€$_{2009}$ for the main ATSPs and 4.4 M€$_{2009}$ for the other ATSPs).

219 This situation is significantly different from the situation in RP1 when actual traffic was consistently lower than planned in the PPs. Figure 16 shows that, conversely, actual traffic has exceeded that envisaged in the performance plans for the whole of RP2 and was close to the +2% dead-band in 2015.

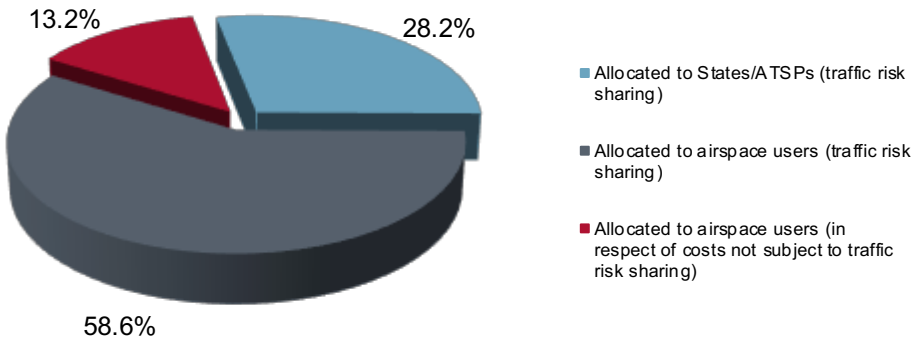


Figure 18 - Outcome of the 2018 traffic risk-sharing mechanism.

8.1.4 Actual 2018 En route Costs vs. Costs in Performance Plans

220 At Union-wide level, actual 2018 en route costs were -67.2M€$_{2009}$ (i.e. -1.1%) lower than the DCs provided in the RP2 PPs.

221 Figure 19 provides a breakdown of this variation for each type of entity considered in the en route CZs (main ATSPs, other ANSPs, the MET service providers and the NSAs/EUROCONTROL).[28] From these -68.6M€$_{2009}$, -40M€$_{2009}$. corresponds to the (main) ATSPs.

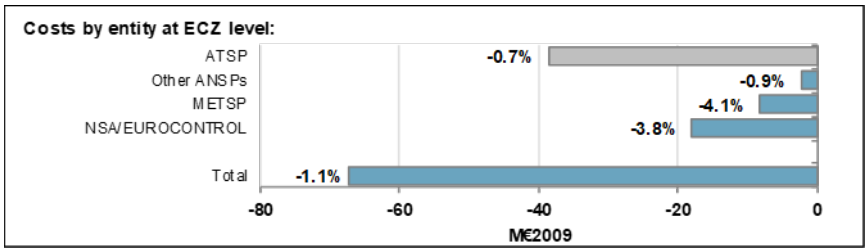


Figure 19 - 2018 actual en route costs compared to PPs by entity (SES level).

222 As shown in Figure 19, actual en route costs in 2018 were lower than planned for the main ATSPs (-0.7% or -38.6M€$_{2009}$), the NSA/EUROCONTROL (-3.8% or -18.1€$_{2009}$) the MET service providers (-4.1% or -8.3M€$_{2009}$) and the other ATSPs (-0.9% or -2.3M€$_{2009}$). Due to their relative size in the CZs in terms of costs, most of the deviation observed for the total en route ANS costs (-38.6M€$_{2009}$) is due to the main ATSPs (i.e. the main designated ATSP subject to traffic risk-sharing arrangements).

223 Figure 20 presents for each en route CZ the variation between actual costs and determined costs in 2018.

224 As shown in Figure 20, actual costs were higher than planned for 12 Charging Zones. One of these had a significant deviation above +10.0%:

- Sweden had a deviation of +13.3% or +21.8M€$_{2009}$. The higher than planned en route costs in real terms were mainly driven by higher actual costs for the main ATSP, namely LFV (+11.2%, or +14.9M€$_{2009}$) and for the other ANSPs (+58.6%, or +4.3M€$_{2009}$). The main driver for the higher actual costs for LFV were higher-than-planned staff costs (+15.7%, or

[28] For the purposes of this analysis, the main ATSPs' actual costs are aggregated from the monitoring reports produced at CZ level. For a few ATSPs, the analysis at State level is adjusted to take into account reporting issues or special circumstances. These adjustments are systematically explained in the local level view part of this 2018 Annual Monitoring Report.

+14.5 M€$_{2009}$). This is due to higher pension costs driven by a lower discount rate than assumed in the PP. The difference between the actual and planned pension costs is reported as costs exempted from cost-sharing.

225 Figure 20 shows that actual costs were lower than planned for 19 Charging Zones. Two of these had a significant deviation of -10% and -9.9%:

- Greece had a deviation of -9.9% or -13.9 M€$_{2009}$, HCAA, the Greek ANSP, (-10.2% or -12.6M€$_{2009}$) being the major contributor to the observed difference. According to the additional information included in the June 2019 en route reporting tables, this results from the combination of:
  - lower staff costs (-4.9%, or -4.7M€$_{2009}$);
  - significantly lower other operating costs (-23.3%, or -4.4M€$_{2009}$), due to lower *"travel expenses, repair, maintenance and utilities costs"*;
  - lower depreciation costs (-22.9%, or -1.1M€$_{2009}$); and
  - lower cost of capital (-63.4%, or -2.4M€$_{2009}$), reflecting "*the implementation of the investment plan*" and a significantly lower than planned total asset base (-63.4%, or -27.1M€$_{2009}$). Based on the information provided in the Blue Med FAB Monitoring Report 2018, the actual capex for HCAA in 2018 was -81.2% lower than planned in PP, in nominal terms.
- Italy had a deviation of -10.0% or -61.6M€$_{2009}$. The lower than planned en route costs in real terms were mainly driven by lower actual costs for the main ATSP, ENAV, (-9.5%, or -48.3M€$_{2009}$). According to the additional information included in the June 2019 en route Reporting Tables, this results from a combination of:
  - lower staff costs (-4.4%, or -12.5M€$_{2009}$) as a result of "*management actions put in place already from the beginning of RP2, actions of which the positive effects also continue in 2018. Up to 2018, the total FTEs of the Company are -353 compared to the FTEs planned in the Performance Plan. About 10% of such reduction is related to the downsizing of the number of executive profiles. A significant part of such reduction is also related to the increase of the early retirement rate and to the rationalisation of the administrative staff allocated to the different sites of the Company"; much lower other operating costs (-27.3%, or -22.4M€$_{2009}$), according to the additional information this is "mainly attributable to a reduction of costs for utilities and operational telecommunications (as combined effect of the improved economic conditions obtained in the renegotiation phase of the contract for E-Net services and the replacement of analogic devices with digital ones), of costs for rent (with the termination of rental contracts for additional premises and the simultaneous shift of staff to the new offices owned by the Company at the Rome Ciampino ACC), as well as a general reduction in support activities*";
  - lower depreciation costs (-8.0%, or -7.3M€$_{2009}$) due to the "cost containment actions put in place in the first three years of the Reference Period (2015-2017). In fact, the Company has obtained a reduction on costs for the implementation activities of plants and equipment for air traffic control from the supplier companies"; and
  - much lower cost of capital (-11.7%, or -6.2M€$_{2009}$) resulting from the combined effect of a lower than planned actual asset base and higher than planned average rate of cost of capital. Concerning the latter, the higher than planned weighted average cost of capital results from a different gearing between equity and debt compared to the plan (actual capital entirely financed through equity, whereas the share of financing through debt was planned in the PP).

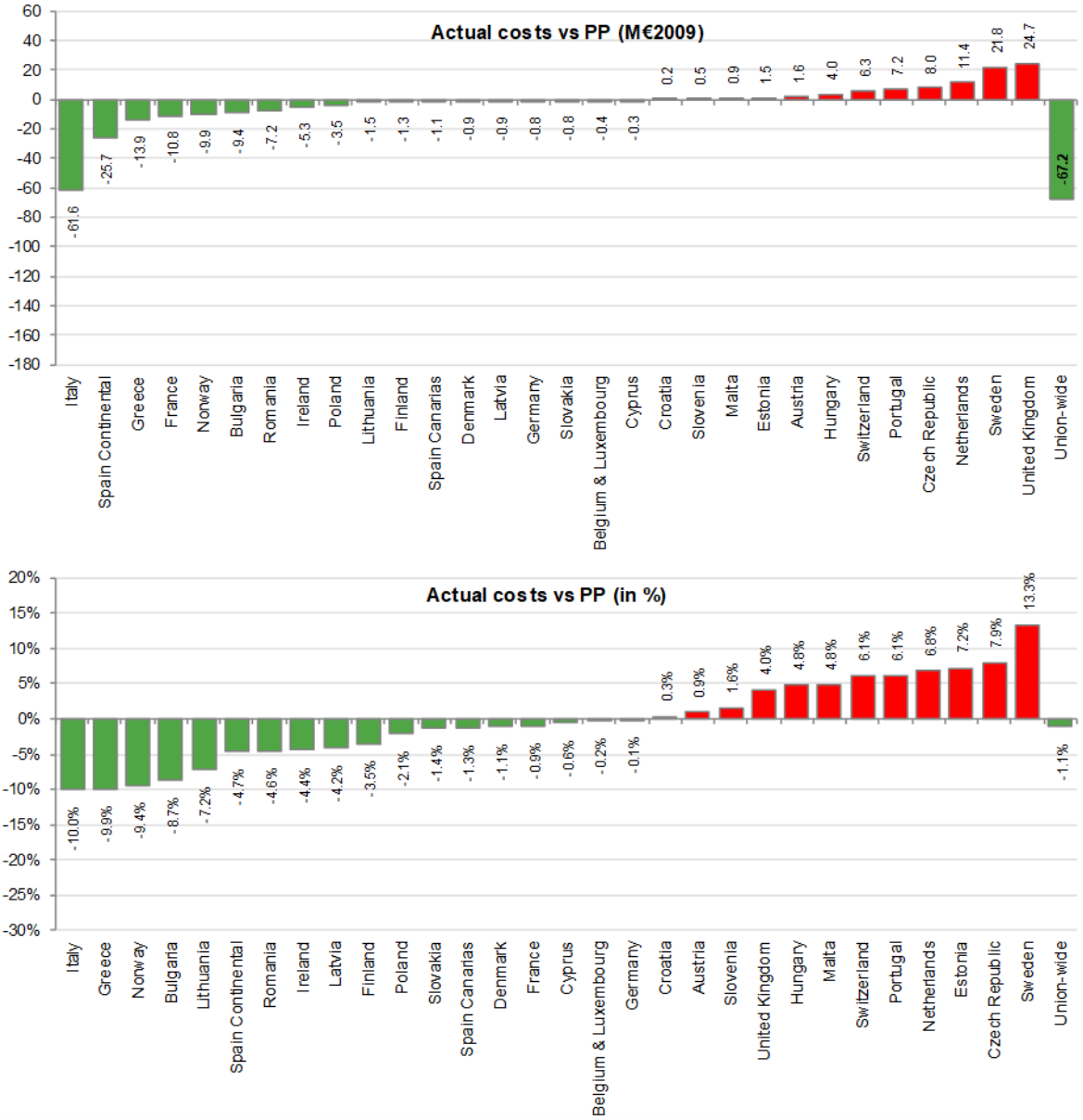


Figure 20 - 2018 actual en route costs compared to PPs by CZs (SES level).

226 Figure 21 shows that the actual en route costs for the main ATSPs' were lower than planned in 2018 (-38.6M€$_{2009}$). This results mainly from a combination of:

- higher staff costs (+0.5% or +17.4M€$_{2009}$);
- lower other operating costs (-4.4% or -38.8M€$_{2009}$);
- lower depreciation costs (-5.0% or -36.2M€$_{2009}$) and
- higher costs of capital (+3.3% or +10.6M€$_{2009}$).

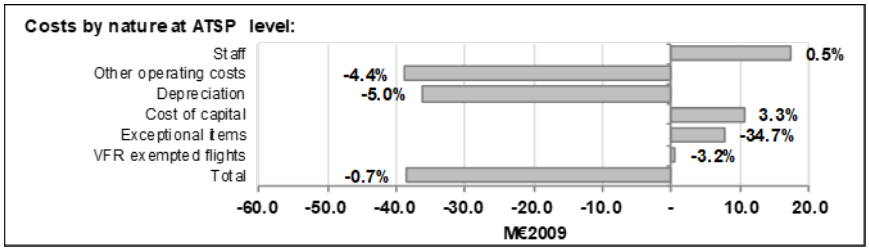


Figure 21 - 2018 actual ATSPs en route costs compared to PPs by nature (SES level).

227 A large proportion of the +17.4M€$_{2009}$ deviation between the actual and planned staff costs is due to the ANSPs of two States:

- NATS (United Kingdom) with +13.1%, or +30.2M€$_{2009}$, as indicated in the Additional Information to the June 2019 en route Reporting Tables, mainly due to *"more operations staff required due to higher levels of traffic and higher levels of ATCO trainees recruitment together with more staff/hours required for SESAR systems implementations"*; and
- Austrocontrol (Austria) with +8.9%, or +9.2M€$_{2009}$, as indicated in the Additional Information to the June 2019 en route Reporting Tables mainly due to *"ATCO build up for the coming years and staff costs have been impacted by changed actuarial parameters and mortality tables which for some parts according to the regulation are not costs exempted and therefore had to be included in actual costs"* ;

228 A large portion of the -39.2M€$_{2009}$ deviation between the actual and planned other operating costs is due to the ANSPs of two States:

- DFS (Germany) with -26.1%, or -19.6M€$_{2009}$, as indicated in the Additional Information to the June 2019 en route Reporting Tables, *"lower costs for consulting fees and travel expenses. Maintenance costs for buildings and technical systems also decreased, as well as costs for electricity and heating. In addition, there is the effect of the low inflation of the past years. Contrary effects are higher costs for staff recruitment, such as the selection process at DLR (Deutsches Zentrum für Luft- und Raumfahrt) and marketing measures to activate suitable applicants for the following year";* and
- ENAV (Italy) with -27.3%, or -22.4M€$_{2009}$, as indicated in the Additional Information to the June 2019 en route Reporting Tables this is *"mainly attributable to a reduction of costs for utilities and operational telecommunications (as combined effect of the improved economic conditions obtained in the renegotiation phase of the contract for E-Net services and the replacement of analogic devices with digital ones), of costs for rent (with the termination of rental contracts for additional premises and the simultaneous shift of staff to the new offices owned by the Company at the Rome Ciampino ACC), as well as a general reduction in support activities";*

229 Depreciation costs are also significantly lower than planned (-5.0% or -36.2M€$_{2009}$). This is mainly due to (1) the postponement or delays in capital expenditures (CAPEX), (2) delays in entry into service of the purchased equipment, and (3) in some cases the non-realisation of planned CAPEX (see

point 313). The postponement of capital expenditures (CAPEX) that was observed during the RP1 period could have been triggered to adjust to lower than expected traffic volumes (-4.9% TSUs over the whole RP1 period), but this should not be the case in RP2 where traffic is higher than planned.

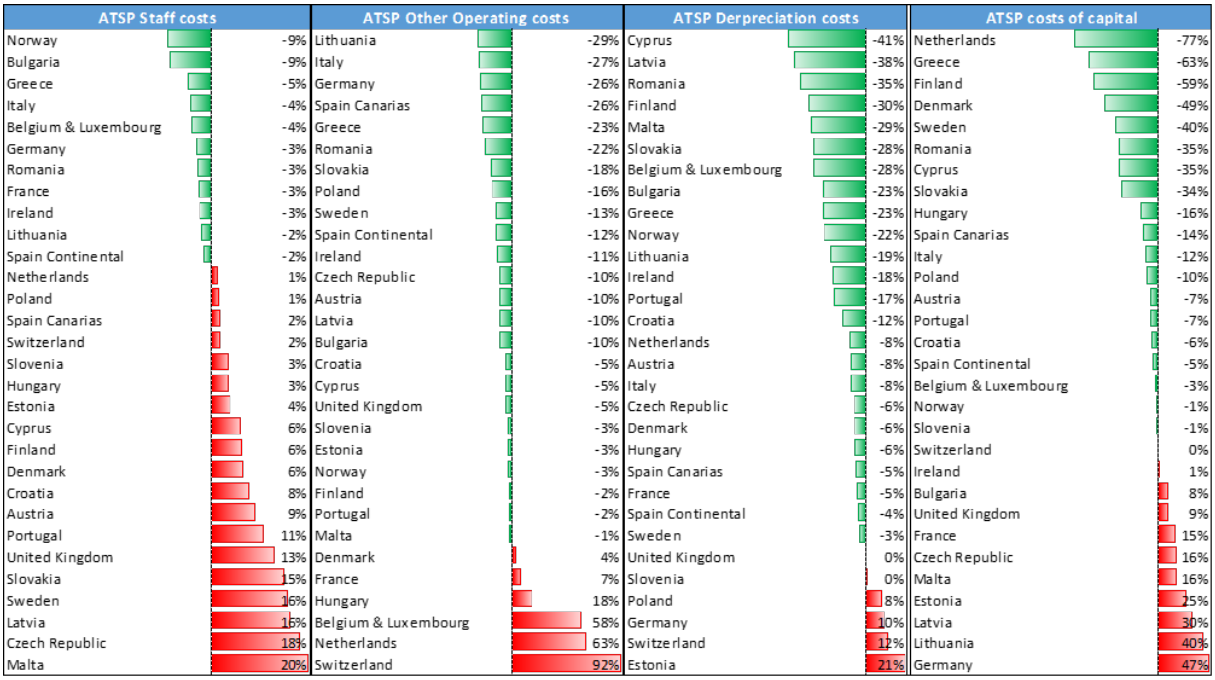


Figure 22 - 2018 actual ANSPs en route costs compared to PPs by nature.

230 Details of the main drivers underlying the deviation between actual and determined costs for each of these cost categories are available at charging zone level in the Annex II, of this Monitoring Report 2018.

8.1.5 Cost-sharing mechanism

231 The cost-sharing mechanism as stipulated in the Charging Scheme Regulation means that the difference between the determined costs set in the adopted Performance Plans and the actual costs for the year shall be borne (in case of higher costs) or retained (in case of lower costs) by the States/ATSPs, except for the costs items exempted from this mechanism (listed in Figure 23).

232 At Union-wide level, actual 2018 en route costs were -68.6M€$_{2009}$ (i.e. -1.1%) lower than the DCs provided in the RP2 PPs.

233 The difference between the DCs set in the adopted PPs and the actual costs for the year shall be borne (in case of higher costs) or retained (in case of lower costs) by the (main) ATSPs

234 The costs exempted from cost-sharing are taken into account in the calculation of the ATSP net gain for the 2018 en route activity, which is presented in Section 7.2. This monitoring report takes into account the States' submissions on costs exempted from cost-sharing, as reported in the June 2019 reporting tables for the purposes of en route charges. These amounts, to be recovered from (+) or reimbursed to (-) airspace users, will be eligible for carry-over to the following reference period(s), if deemed eligible by the Commission.

En-route costs exempted from cost sharing					
Estimates ('000 €2009)		2015	2016	2017	2018
by item	Pension	33 714	19 579	43 793	45 498
	Interest rates on loans	-2 173	-3 693	-5 060	-862
	Taxation law	-9 717	-10 877	-11723	-12 905
	New cost item required by law	511	-8	1012	2 121
	International agreements	-5 906	-5 607	-20 116	-29 993
by entity	ATSP	22 195	4 233	27 525	31760
	Other ANSP	0	2 157	2 643	2 514
	METSP	-11	-39	-46	-48
	NSA/EUROCONTROL	-5 755	-6 957	-22 217	-30 367
Total costs exempted from cost sharing		16 429	-606	7 905	3 858
to be recovered from (+) or reimbursed to (-) users if eligible after EC verification					

Figure 23 - En route costs exempted from cost-sharing (SES level). Negative values are shown in red.

235 Figure 23 above shows that the net amount of en route costs exempted from cost-sharing in 2018 is +3.9M€$_{2009}$ (to be reimbursed to airspace users). The costs exempted from cost-sharing reported by main ATSPs amount to +31.8M€$_{2009}$ (to be recovered from airspace users). This figure is significantly impacted by the following combined effects: both Sweden's main ATSP costs exempted from cost-sharing (+15.8M€$_{2009}$) and Austria's (+17.0M€$_{2009}$) were related to pension costs; France's (-12.4M€$_{2009}$) were related to pension costs (-11.5M€$_{2009}$) and interest rates on loans (-0.9M€$_{2009}$); and Spain's (-10.9€$_{2009}$) were related to changes in the taxation law. Costs exempted from cost-sharing reported by MET service providers (-0.05M€$_{2009}$) and the NSAs/EUROCONTROL (-30.4M€$_{2009}$) are negative (indicating reimbursement to the users).

8.2 ATSP Overall economic surplus generated from the en route activity

236 The analysis of the overall economic surplus generated from the en route activity by an ATSP can be broken down in two main elements:

- the net ATSP gain/loss from en route activity related to the traffic/cost risk sharing mechanisms and;
- the estimated surplus embedded in the cost of capital charged to airspace users through the DCs (adopted PPs) vs the actual estimated surplus embedded in the cost of capital.

237 The estimated economic surplus is a useful tool to monitor the financial strength of the ATSPs as it measures the excess revenue generated beyond the performance plan and therefore surplus to requirements.

238 The concept of estimated economic surplus is different from the net accounting profit disclosed by the ATSPs in their financial statements. The latter includes revenues and costs relating to the provision of terminal ANS and other activities (e.g. consultancy services), which are not financed through user charges, as well as revenues and costs pertaining to other years of activity. Therefore, it is not comparable with the notion of economic surplus, which only considers the excess revenue gained due to the risk sharing mechanisms rebates and cost of capital differences between determined and planned.

8.2.1 Air Traffic Service Provider (ATSP) Net Gain for the 2018 En route Activity

239 The (main) en route ATSP is the most significant contributor to a State's en route costs and is the main entity subject to the cost and traffic risk-sharing mechanisms. The analysis of the net ATSP gain/loss focuses on the ATSP en route activity for 2018. The cash flow position and the liquidity balance at the end of the year were not considered in this analysis as both are impacted by the charging mechanism, whereby the eligible under-recoveries (for traffic, etc.) are to be recovered in year N+2 or later.

240 The analysis of the main ATSPs in each Member State in 2018 shows that, at Union-wide level, a net gain of 232.1 M€$_{2009}$ was generated on the en route activity (see Figure 24). This result is due to the combination of three distinct elements:

- a net gain resulting from the traffic risk-sharing mechanism of +165.8 M€$_{2009}$ for the (main) ATSPs. It is important to note that this is a completely different situation compared to RP1 when actual traffic was consistently lower than planned in the PPs, which resulted in a net loss for the main ATSPs. Additionally, it can be noted that during the previous RP2 years the difference between actual and planned traffic has been higher each year (+2.0%, +4.4%, +8.0% and +9.7% in 2015, 2016, 2017 and 2018 respectively), while the corresponding net gain has also increased significantly. The net gain resulting from the traffic risk-sharing mechanism was +31.7 M€$_{2009}$ in 2015, +97.6 M€$_{2009}$ in 2016, +154.6 M€$_{2009}$ in 2017 and +165.8 M€$_{2009}$ in 2018 (i.e. a fivefold increase from 2015);
- a gain resulting from the cost-sharing mechanism of +70.4 M€$_{2009}$, corresponding to (i) the difference between actual 2018 costs and the determined costs from the adopted PPs for the (main) ATSPs (+40.0 M€$_{2009}$), and (ii) reported amounts for costs exempt from cost-sharing (+31.7 M€$_{2009}$);
- a net loss resulting from the financial incentive mechanism relating to capacity performance amounting to -4.1 M€$_{2009}$.

Focus on the main ATSPs: Net ATSP gain/loss on en-route activity				
Cost sharing ('000 €2009)	**2015**	**2016**	**2017**	**2018**
Determined costs for the main ATSPs (PP) - based on planned inflation	5 289 228	5 225 457	5 249 455	5 233 089
Actual costs for the main ATSPs	5 147 242	5 093 510	5 109 924	5 194 465
Difference in costs: gain (+)/Loss (-) retained/borne by the main ATSPs	141986	131946	139 530	38 624
Amounts excluded from cost sharing to be recovered from (+) or reimbursed to (-) users	22 195	4 233	27 525	31760
Gain (+)/Loss (-) to be retained by the main ATSPs in respect of cost sharing	**164 181**	**136 179**	**167 056**	**70 385**
Traffic risk sharing ('000 €2009)	**2015**	**2016**	**2017**	**2018**
Difference in total service units (actual vs PP) %	2.0%	4.4%	8.0%	9.7%
Determined costs for the main ATSPs (PP) - based on actual inflation	5 319 561	5 314 633	5 316 694	5 269 263
Gain (+)/Loss (-) to be retained by the main ATSPs in respect of traffic risk sharing	**31 689**	**97 558**	**154 580**	**165 789**
Incentives ('000 €2009)	**2015**	**2016**	**2017**	**2018**
Gain (+)/Loss (-) to be retained by the main ATSPs in respect of incentives (bonus/penalty)	**9 708**	**3 158**	**2 961**	**-4 108**
Net ATSP gain(+)/loss(-) on en-route activity ('000 €2009)	**205 578**	**236 895**	**324 597**	**232 065**

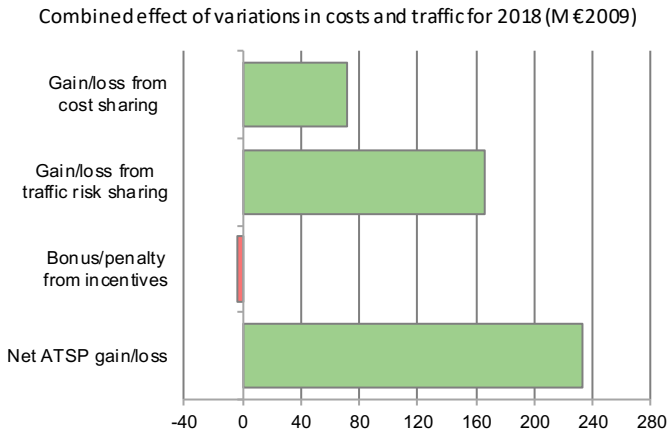


Figure 24 - Net gain/loss on 2018 en route activity for the (main) ATSPs (SES level).

241 The penalty, in respect of capacity and environment incentives (-4.1 M€$_{2009}$), reflects that:

- for 16 en route main ATSPs, the actual capacity performance in 2018 remains within the dead-band of the capacity incentive mechanism, there are therefore no bonuses or penalties for these CZs;
- for the majority of ATSPs eligible for a bonus or penalty, the amount of bonus or penalty in respect of capacity incentives is significantly lower than 1% of en route revenues;
- five en route main ATSPs generated bonuses for a total amount of 7.5 M€$_{2009}$; and
- nine en route main ATSPs reported penalties (-11.6 M€$_{2009}$ in total).

242 Figure 25 shows the bonus/penalties for each main 30 ATSP. The bonuses that are above or equal to 1% of the en route revenues (based on the ATSP chargeable unit rate in 2018 times the actual TSUs) for three ANSPs are: ENAV 1.1%, ANS Finland 1.0% and Avinor 1.0%.

243 The inclusion of these bonuses in the chargeable cost bases is being assessed by the European Commission.

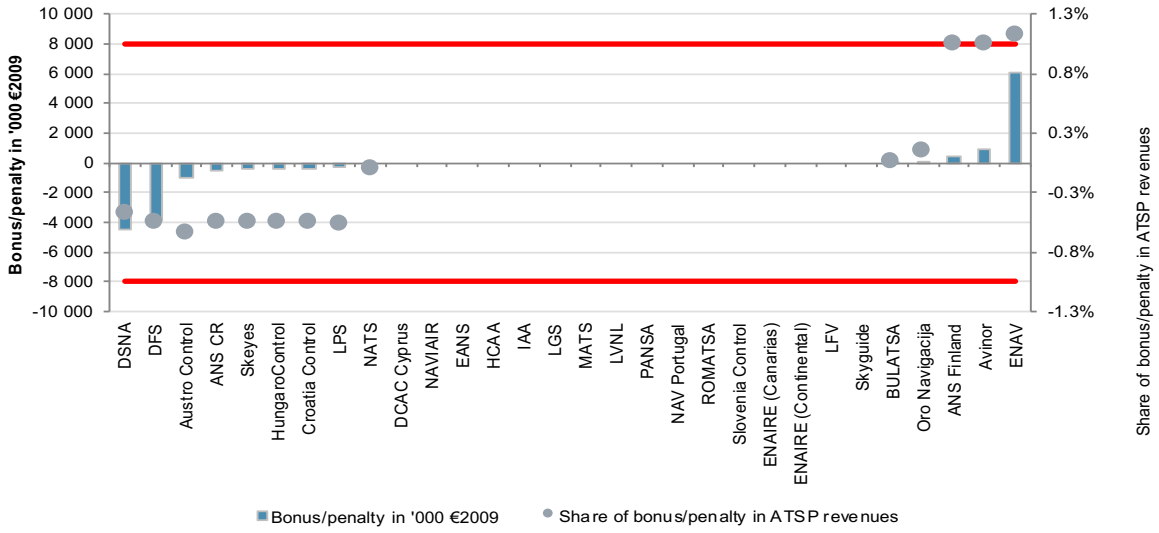


Figure 25 - En route gain (+)/loss(-) to be retained by the main ATSPs. The red lines show the regulated limit of the impact.

8.2.2 *Actual ATSP 2018 Estimated surplus already embedded in the cost of capital vs. in Performance Plans*

244 The estimated surplus already embedded in the cost of capital represents the return on equity (RoE) that the main ATSPs (equity holders) expect to get back in return for investing in the provision of air navigation services. It is calculated as the multiplication of (i) the estimated proportion of financing through equity (in %), (ii) the RoE pre-tax rate (in %) and (iii) the total asset base.

245 The overall estimated en route surplus embedded in the determined cost of capital is estimated at 256.1 M€$_{2009}$ for the 29 main ATSPs (see column 2018D in Figure 26). This figure is based on a planned asset base amounting to some 5,980 M€$_{2009}$, of which 59.6% is financed through equity at an average (pre-tax) RoE rate of 7.2%.

246 Based on the information reported by the States, the actual estimated surplus for the en route activity in 2018 amounts to 517.5 M€$_{2009}$ (see column 2018A in Figure 26). This figure comprises the surplus embedded in the actual cost of capital (285.4 M€$_{2009}$) and the net gain/loss generated in respect of the en-route activity in 2018 (232.1 M€$_{2009}$, see Figure 19). This figure is based on an actual asset base amounting to some 5,900 M€$_{2009}$, of which 64.7% is financed through equity at an average (pre-tax) RoE rate of 9.3%.

247 The actual estimated surplus for the en route activity in 2018 (285.43 M€$_{2009}$) is higher that the planned (256.1 M€$_{2009}$). This indicates that, from the point of view of the main ATSPs, the actual rate of return of the asset base that has been earned is higher than the expected return planned in the Performance Plan (i.e. the main ATSPs have earned 29.33 M€$_{2009}$ more than planned due to the surplus embedded in the cost of capital). This is due to an actual total asset base higher than planned but mainly, due to an actual equity proportion (64.7%) higher than planned (59.6%).

8.2.3 Actual ATSPs overall economic surplus vs. in Performance Plans

248 This analysis estimates the "overall economic surplus" as the surplus embedded in the cost of capital (return on equity) in the Performance Plans compared to the actuals added to the net ATSP gain/loss on en route activity based on actual data.

249 The estimated surplus at Union-wide level represents 9.5% of 2018 en route revenues, which is higher than planned in the PPs (4.9%). This corresponds to an (weighted average) ex-post actual RoE of 13.0%, which is also higher than planned in the PPs (7.2%). This indicates that the main ATSPs have earned 250.01 M€$_{2009}$ more than planned comprised in the overall economic surplus in 2018.

250 The actual estimated surplus includes the amounts reported for costs exempted from cost-sharing for main ATSPs (i.e. 31.8 M€$_{2009}$) in 2018 (as discussed in Section 7.2.1). These amounts to be recovered from (+) or reimbursed to (-) the airspace users will be eligible for carry-over to the following reference period(s), if allowed by the Commission. Should these costs be deemed not eligible by the Commission, the actual estimated surplus in 2018 would be lower (i.e. 485.6 M€$_{2009}$, compared to 517.5M€$_{2009}$).

Focus on the main ATSPs: En-route ATSP estimated surplus *

* This calculation of the economic surplus retained by the main ATSPs is based on the determined RoE and on hei information provided in the Reporting Tables. This is different from the accounting profit /loss reported in the P&L accounts of the ATSP.

ATSP estimated surplus ('000 €2009) from RP2 Performance Plans	2015D	2016D	2017D	2018D
Total asset base	6 321 739	6 208 733	6 132 025	5 980 428
Estimated proportion of financing through equity (in %)	55.9%	57.2%	58.6%	59.6%
Estimated proportion of financing through equity (in value)	3 534 295	3 551 321	3 595 444	3 564 812
Estimated proportion of financing through debt (in %)	44.1%	42.8%	41.4%	40.4%
Estimated proportion of financing through debt (in value)	2 787 444	2 657 412	2 536 581	2 415 615
Cost of capital pre-tax (in value)	330 739	328 002	336 148	324 000
Average interest on debt (in %)	3.1%	3.1%	3.0%	2.8%
Interest on debt (in value)	86 205	81 236	77 349	67 914
Determined RoE pre-tax rate (in %)	6.9%	6.9%	7.2%	7.2%
Estimated surplus embedded in the cost of capital for en-route (in value)	244 534	246 767	258 799	256 087
Overall estimated surplus (+/-) for the en-route activity	**244 534**	**246 767**	**258 799**	**256 087**
Revenue/costs for the en-route activity	**5 289 228**	**5 225 457**	**5 249 455**	**5 233 089**
Estimated surplus (+/-) in percent of en-route revenues	**4.6%**	**4.7%**	**4.9%**	**4.9%**
Estimated ex-ante RoE pre-tax rate (in %)	**6.9%**	**6.9%**	**7.2%**	**7.2%**

ATSP estimated surplus ('000 €2009) based on actual data from Reporting Tables	2015A	2016A	2017A	2018A
Total asset base	6 356 267	6 338 468	6 077 412	5 901 476
Estimated proportion of financing through equity (in %)	58.5%	58.4%	63.3%	67.4%
Estimated proportion of financing through equity (in value)	3 718 580	3 703 737	3 848 179	3 975 228
Estimated proportion of financing through debt (in %)	41.5%	41.6%	36.7%	32.6%
Estimated proportion of financing through debt (in value)	2 637 687	2 634 731	2 229 232	1 926 247
Cost of capital pre-tax (in value)	333 180	325 105	316 958	334 631
Average interest on debt (in %)	2.7%	2.5%	1.8%	2.6%
Interest on debt (in value)	72 290	66 744	40 360	49 172
Determined RoE pre-tax rate (in %)	7.0%	7.0%	7.2%	7.2%
Estimated surplus embedded in the cost of capital for en-route (in value)	260 890	258 362	276 599	285 459
Net ATSP gain(+)/loss(-) on en-route activity	205 578	236 895	324 597	232 065
Overall estimated surplus (+/-) for the en-route activity	**466 468**	**495 257**	**601 196**	**517 524**
Revenue/costs for the en-route activity	**5 352 820**	**5 330 405**	**5 434 521**	**5 426 530**
Estimated surplus (+/-) in percent of en-route revenues	**8.7%**	**9.3%**	**11.1%**	**9.5%**
Estimated ex-post RoE pre-tax rate (in %)	**12.5%**	**13.4%**	**15.6%**	**13.0%**

Figure 26 - Estimated surplus for en route activity for the (main) ATSPs at Union-wide level.

251 The overall estimated surplus at Union-wide level (517.5M€$_{2009}$, or 13.0% of en route revenues) masks different situations amongst the 29 main en route ATSPs. Figure 27 shows that in 2018, 22 ATSPs have increased their estimated surplus (as a proportion of revenues) compared to the amounts embedded in the determined cost of capital.

252 Figure 27 also shows that three main ATSPs (Nav Portugal, LVNL and Skyguide) have incurred losses and show a negative actual estimated surplus on their en route activity in 2018:

- for Nav Portugal (Portugal, -2.2% of estimated surplus of en route revenues compared to +5.6% as planned in the PP), this is mainly due to a loss of -3.7 M€$_{2009}$, arising from the cost-sharing and a loss from the traffic risk sharing -1.0 M€$_{2009}$;
- for LVNL (Netherland, -3.5% of en route revenues compared to 0.0% as planned in the PP since there is not estimated surplus embedded in the cost of capital for en route), this is mainly due to a loss of -9.7 M€$_{2009}$ arising from the cost-sharing mechanism due to much higher other operating costs (+62.6% or 13.0M€$_{2009}$) not compensated by the gain arriving from the traffic risk-sharing mechanism (+5.3M€$_{2009}$); and
- for Skyguide (Switzerland, -3.5% of en route revenues compared to +2.1% as planned in the PP), this is mainly due to a loss of -8.8M€$_{2009}$ arising from the cost-sharing mechanism since Skyguide had substantially higher other operating costs than planned (+91.9%).

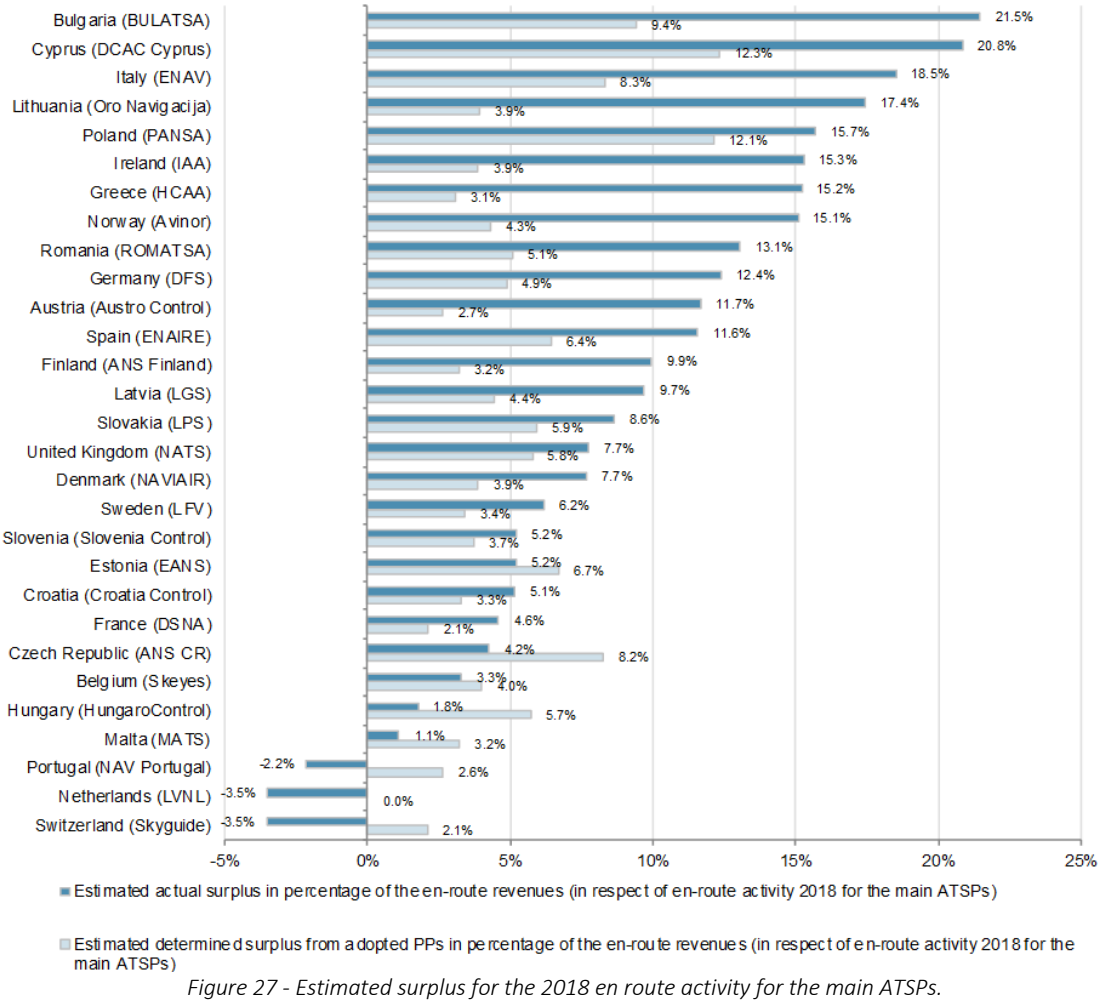


Figure 27 - Estimated surplus for the 2018 en route activity for the main ATSPs.

253 Figure 27 shows that for 12 ATSPs, the estimated surplus in 2018 represented more than 10% of their en route revenues and for two of them it exceeded 20%:

- for BULATSA (Bulgaria, 21.5% compared to 9.4% as planned in the PP), this is mainly due to a gain of +8.3M€$_{2009}$ arising from the cost-sharing mechanism since BULATSA achieved substantially lower cost than planned (-8.9%). It must be noted than in 2016 Bulgaria revised their RP2 en route cost-efficiency targets for the years 2017 to 2019.
- for DCAC Cyprus (20.8% compared to 12.3% as planned in the PP), the main driver for the actual estimated surplus is the net gain of +3.1M€$_{2009}$ arising from the cost-sharing mechanism. Meanwhile, the actual estimated surplus embedded in the cost of capital (+2.8M€$_{2009}$) was significantly lower than planned (+4.3M€$_{2009}$) due to much lower than planned total asset base (-35.4%);

254 More details on the main ATSPs' economic surplus, for each State, are available in Annex II.

255 The actual economic surplus of Member States in 2018 being far above the planned values is considered as a useful measure of the excess revenues generated by ANSPs. A high economic surplus (generated by most ANSPs) may not necessarily be negative since these may be due to the traffic/cost risk sharing mechanisms and dependent on market conditions.

256 However, where capacity issues are prevalent, the excess revenues should be re-invested to provide an improved service for airspace users.

8.3 En route 2018 Actual Costs for Airspace Users

257 This Section presents the actual en route cost for airspace users in respect of ANS activities in 2018 (also referred to as the "true cost for users"). The "true cost" for users is different from the cost charged during the year due to the adjustments foreseen in the SES Performance scheme and Charging Regulation.

258 In this context, the "true costs" are a better reflection of the cost-efficiency performance from an airspace user's point of view. This section attempts to quantify the "true costs" in respect of ANS activities carried out in 2018 which comprise:

- the amounts that have been charged to the users through the 2018 unit rates; and
- the different adjustments relating to 2018 activities, which will be charged or reimbursed to users in two years' time.

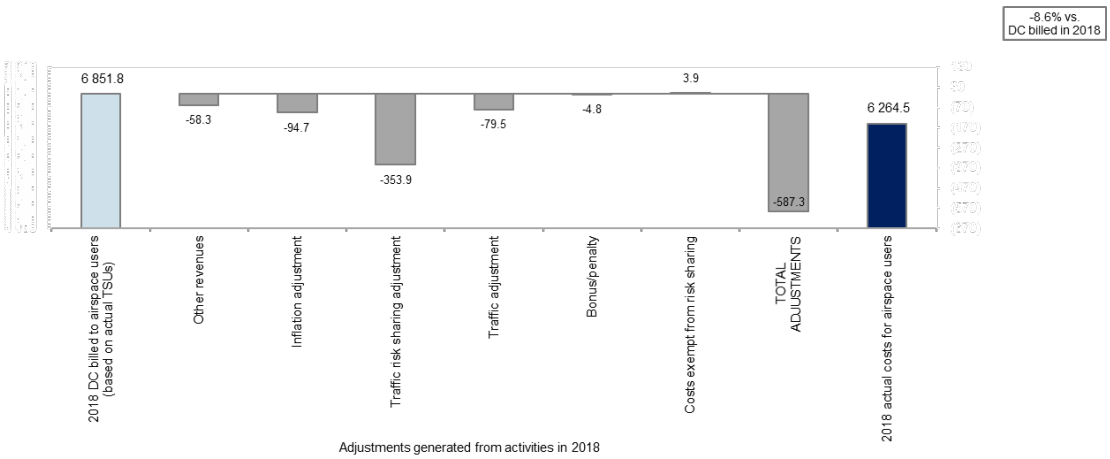


Figure 28 - Actual costs for users in respect of the 2018 en route activity (in M€$_{2009}$).

259 The calculation of the "true costs" for users does not include the impact of the risk associated with exchange rates linked to the billing of the chargeable unit rate. The unit rate charged to airspace users is established in national currency but billed in Euros using the current exchange rate. In case of exchange rate fluctuations, the actual costs paid by airspace users will be higher or lower than planned.

260 Figure 28 shows that the actual costs incurred by airspace users in respect of activities performed in 2018 (6,264.5M€$_{2009}$) were -8.6% (-587.3M€$_{2009}$) lower than the DCs billed based on actual TSUs (6,851.8M€$_{2009}$).

261 At Union-wide level, TSUs were +9.7% higher than planned. For 25 CZs, the difference between actual and planned TSUs fell outside the ±2% dead-band of the traffic risk-sharing mechanism. The net effect of these deviations between actual and planned TSUs is a reimbursement (-353.9 M€$_{2009}$) to airspace users.

262 Since, at a Union-wide level, traffic was higher than planned, the traffic adjustments relating to costs not subject to traffic risk-sharing also resulted in a forthcoming reimbursement (-79.5 M€$_{2009}$) to airspace users.

263 A deduction of -58.3M€$_{2009}$ was accounted for under other revenues. In most en route charging zones, either no other revenues or small amounts of other revenues were deducted from the determined costs. However, a few CZs have reported other revenues contributing to an impact at a Union-wide level. This is especially the case for:

- Spain Continental and Spain Canarias (-16.3 M€$_{2009}$);
- Croatia (-7.7 M€$_{2009}$) corresponding to the revenues from service provision in the airspace of Bosnia and Herzegovina; and
- France (-10.6 M€$_{2009}$) reflecting reimbursements from the SESAR Joint Undertaking, revenues from commercial activities (mostly originated from the Aeronautical Information Service, responsible for the publication of aeronautical information), and the co-financing of major programs by EC grants (Connecting Europe Facility funds).

264 For the majority of CZs (Belgium-Luxembourg, Bulgaria, France, Norway and Poland being the only exceptions), the actual inflation index in 2018 was lower than planned in the PPs. The overall net effect of inflation adjustments at CZ level is a forthcoming reimbursement (-94.7 M€$_{2009}$) to airspace users.

265 At system level, the overall result of these incentive mechanisms amounts to a bonus of -4.8 M€$_{2009}$ to be charged to airspace users, if deemed eligible after assessment by the EC. This amount differs from the -4.1 M€$_{2009}$ shown in Figure 24 as it is calculated at State level and not only for the main ATSPs.

266 Finally, a net amount of +3.9 M€$_{2009}$ has been reported as costs exempt from cost-sharing at Union-wide level. It is important to note that at CZ level, costs exempt from cost-sharing are amounts to be reimbursed to airspace users in the majority of cases. However, Sweden (+15.5 M€$_{2009}$) and Austria (+15.8 M€$_{2009}$) reported exceptionally high amounts to be charged to airspace users, both related to pension costs for its main ATSP. These costs will be eligible for carry-over (charged/reimbursed to airspace users) to the following reference period(s), if deemed eligible by the Commission. The +3.9 M€$_{2009}$ amount differs from the +31.8 M€$_{2009}$ of Figure 24 as in this case it is calculated at State level and not only for the main ATSPs.

8.4 Presentation of the Terminal Cost-efficiency KPI

267 Although there are no Union-wide cost-efficiency targets for terminal ANS, 2018 is the fourth year in which terminal ANS cost-efficiency performance has been monitored according to the requirements of Article 18 of the Commission Implementing Regulation (EU) No 390/2013.

268 The terminal cost-efficiency KPI is the result of the ratio between the determined costs and the forecast terminal navigation service units (TNSUs) contained in the PPs. Each State has adopted local cost-efficiency targets at terminal charging zone (TCZ) level for RP2 with the same risk-sharing arrangements than for en route except that traffic risk-sharing exemptions can apply for TCZs including airports with less than 225,000 movements.

269 A total of 38 TCZs have been reported (generally one per State, but two TCZs have been reported for Italy, France, Poland, United Kingdom and five for Belgium) covering a total of 174 airports.

270 The two TCZs reported by UK have been excluded from the Union wide analysis for the following reasons:

- information relating to UK TCZ B (nine airports) should be reported to the EC on a confidential basis in accordance with the requirements related to market conditions and;
- UK TCZ C (London Approach) is not directly comparable with other TCZs since the service provided is of a hybrid nature, making the transition between en route and terminal services for the five London Airports (which are also part of TCZ B).

271 It should be noted that the 2018 cost-efficiency monitoring analysis for UK TCZ C is available in the accompanying CZ view shown in the local level view part of the 2018 Annual Monitoring Report.

272 Table 27 presents the aggregation of the terminal DUCs reported by the States (excluding UK) for all years of RP2.

Cost-Efficiency Data from Performance Plans	2015P	2016P	2017P	2018P	2019P
Real terminal Determined Unit Costs (in €$_{2009}$)	180.83	174.35	165.78	160.14	156.19

Table 27 - Terminal DUCs for RP2 as per aggregation of PPs (SES level).

273 In 2016, Malta requested the Commission to revise their RP2 terminal DUC for the years 2017 to 2019. The figures for this State show the amended Performance Plan (Commission Implementing Decision (EU) 2017/2376 of 15 December 2017). In 2017, Romania and Portugal submitted a request to the European Commission to revise their RP2 terminal cost-efficiency targets DUC for the years 2018 to 2019. This report includes the amended figures for these States as reflected in the revised Performance Plan (Commission Implementing Decision (EU) 2018/2021 of 17 December 2018).

8.4.1 Actual 2018 Terminal Unit Cost vs. DUC in Performance Plans

274 In order to ensure consistency with the DCs provided in the adopted PPs and to allow consolidation at Union-wide level, actual terminal costs are expressed in real terms (€$_{2009}$ prices).

275 Figure 29 shows that, in 2018, the Union-wide actual terminal unit cost (153.13€$_{2009}$) was -4.4% lower than planned in the RP2 PPs. This variation results from the combination of higher than planned TNSUs (+8.6%) and higher than planned terminal costs (+3.8%, or +40.8 M€$_{2009}$).

276 It is the second time, taking in to account RP1 and RP2, that the total terminal air navigation service actual costs were higher than planned, i.e. +2.1% or +21.9M€$_{2009}$ in 2017 and +3.8% or +40.8 M€$_{2009}$ in 2018. Neither en route nor terminal had shown higher actual costs than planned in any of the years of RP1 and RP2 (2015 and 2016). In absolute terms, most of the deviation observed is due to two TCZ (Germany with +30.8 M€$_{2009}$ and The Netherlands with +10.0 M€$_{2009}$).

Actual unit cost vs. DUC in adopted Performance Plans						
SES States - Data from RP2 Performance Plans		**2015D**	**2016D**	**2017D**	**2018D**	**2019D**
Terminal costs (EUR2009)		1 117 713 492	1 103 962 617	1 066 100 758	1 064 115 512	1 059 985 630
Total terminal Service Units		6 181 013	6 331 707	6 430 770	6 645 093	6 786 564
Real terminal unit costs per Service Unit (EUR2009)		**180.83**	**174.35**	**165.78**	**160.14**	**156.19**
SES States - Actual data from Reporting Tables		**2015A**	**2016A**	**2017A**	**2018A**	**2019A**
Terminal costs (EUR2009)		1 084 292 299	1 096 452 312	1 088 023 758	1 104 896 907	
Total terminal Service Units		6 318 950	6 621 834	6 890 820	7 215 315	
Real terminal unit costs per Service Unit (EUR2009)		**171.59**	**165.58**	**157.89**	**153.13**	
Difference between Actuals and Planned (Actuals vs. PP)		**2015**	**2016**	**2017**	**2018**	**2019**
Real terminal costs (EUR2009)	in value	-33 421 193	-7 510 304	21 923 000	40 781 395	
	in %	-3.0%	-0.7%	2.1%	3.8%	
Total terminal Service Units	in value	137 937	290 127	460 050	570 222	
	in %	2.2%	4.6%	7.2%	8.6%	
Real terminal unit costs per Service Unit (EUR20(in value		**-9.24**	**-8.77**	**-7.89**	**-7.00**	
	in %	**-5.1%**	**-5.0%**	**-4.8%**	**-4.4%**	

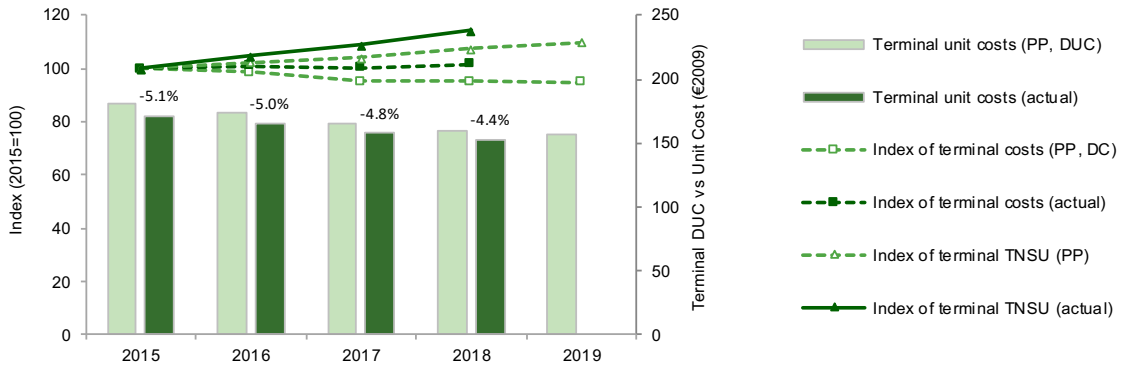


Figure 29 - Terminal costs, traffic and unit costs (actual vs. Performance Plans, SES level).

277 The overall deviation of terminal unit costs observed at Union-wide level (-4.4%) masks different situations across the 36 TCZs as shown in Figure 30.

278 Actual terminal unit costs were lower than planned in 21 TCZs out of 36, in ten cases with a combination of lower actual costs and higher traffic compared to RP2 PPs. Among these 21 TCZs, six managed to achieve reductions in the terminal DUC of more than -20.0% and two of more than -30%, Latvia (-38.7%) and Greece (-34.3%).

279 For 15 TCZs, actual unit costs were higher than planned, and for three of them higher by +10.0% or more: Belgium Oostende-Brugge (+23.9%), Germany (+11.6%) and Portugal (10.5%). For Belgium Oostende-Brugge, the higher unit cost is due to significantly lower traffic compared to the forecast used in the PPs (-26.1%), for the other two CZs, the higher unit cost is due to substantially higher actual costs than planned.

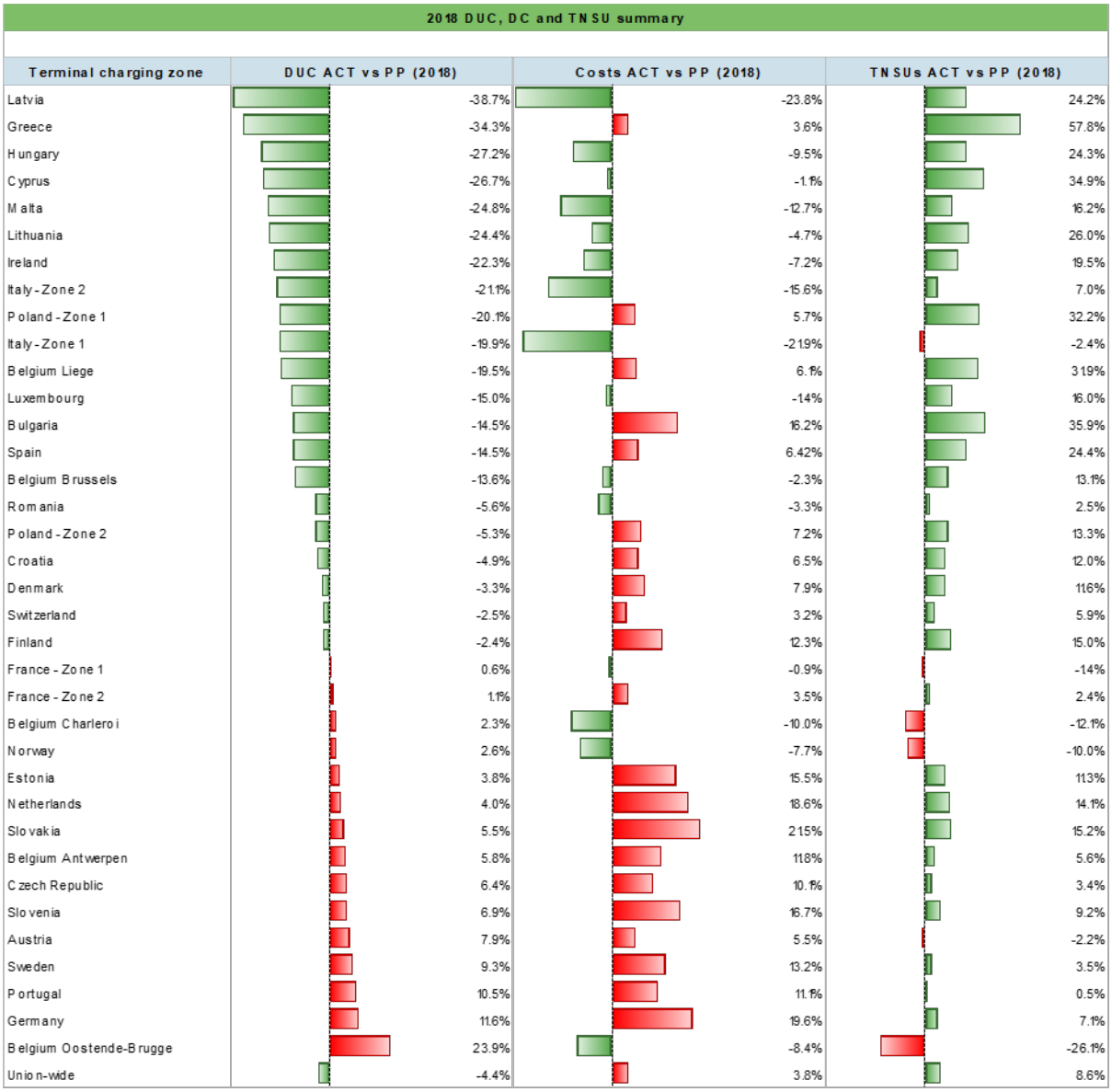


Figure 30 - 2018 TANS actual costs vs. PP at State level.

280 For six TCZs, the actual number of TNSUs was lower than planned in the RP2 PPs, and two of them had traffic levels that fell below the -10% alert threshold, Belgium Charleroi (-12.1%) and Belgium Oostende-Brugge (-26.1%). It is worth noting that these TCZ were not subject to Terminal Navigation Charges (TNC) since terminal ANS costs were 100% subsidised by the State or regional authorities in 2018.

281 For 20 TCZs, the actual numbers of TNSUs compared to the numbers planned in the RP2 PPs were higher than +10%, exceeding the alert threshold. Significant deviations above +30% were observed for Greece (+57.8%), Cyprus (+34.9%), Bulgaria (+35.9%), Poland - zone 1 (+32.2%), and Belgium Liege (+31.9%).

282 More details on the deviation between the DUC and actual en route unit cost for 2018 at TCZ level are available in the local level view part of this 2018 Monitoring Report.

8.4.2 Actual 2018 traffic vs. TNSUs in Performance Plans

283 Figure 31 shows that the TNSU forecasts used in the PPs are consistently below the actual values and below all scenarios of the STATFOR forecast (February 2019) for the rest of RP2 (2019). Indeed, if any of three STATFOR 2019 scenarios materialise, the traffic is expected to exceed the ±2% dead-band foreseen in the traffic risk-sharing mechanism and in the high case would exceed by +10% in the year 2019, which means that all the extra revenue beyond this point will be returned to airspace users. However, only 18 out of the 36 original TCZ apply traffic risk-sharing.

284 Similar to the situation for en route traffic, the actual terminal traffic over RP2 is expected to be higher than the forecasts provided in the PPs, based on current projections at a Union-wide level. This implies additional revenues for the States/ATSPs and amounts to be reimbursed to airspace users according to the traffic risk-sharing adjustments.

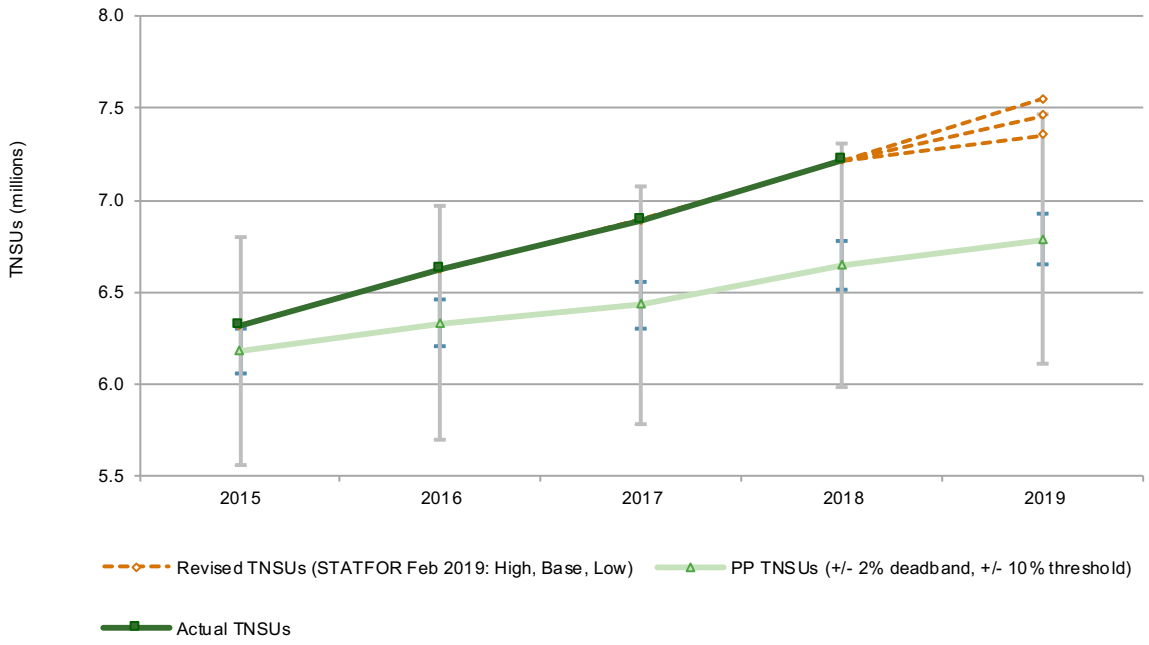


Figure 31 - Terminal traffic monitoring (SES level).

8.4.3 Actual 2018 en route costs vs. Costs in Performance Plans

285 Figure 32 shows that at SES level actual terminal costs were lower than planned for the MET service providers (-8.3% or -3.6 M€$_{2009}$) and the NSAs (-6.9% or -0.8 M€$_{2009}$). On the other hand, the terminal cost for the main ATSPs were higher (+4.5% or 45.1€). Due to their relative size in the CZs, most of the deviation observed for the total terminal ANS costs (+3.8% or +40.7 M€$_{2009}$) was due to the main ATSPs.

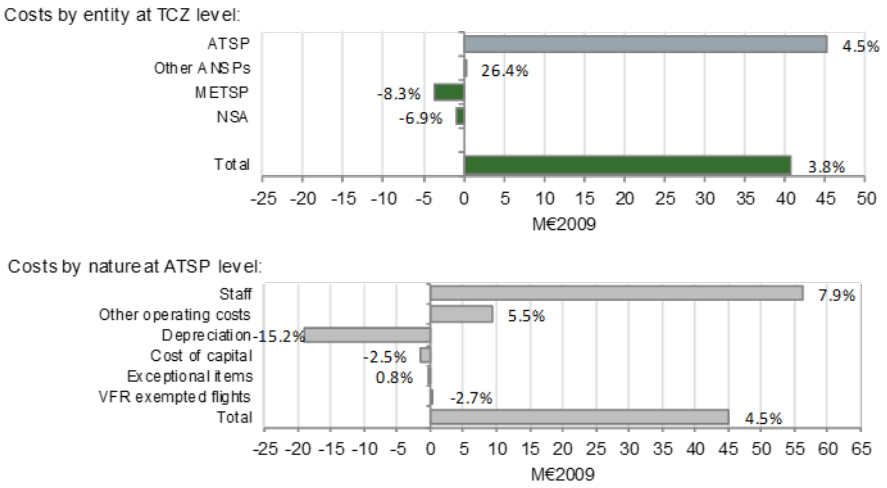


Figure 32 - 2018 actual terminal costs compared to PPs (SES level).

286 Figure 32 also shows that the observed higher actual costs compared to the DCs for the main ATSPs masks different situations across different costs categories in 2018. The main driver is higher staff costs (+7.9% or +56.2 M€$_{2009}$) and higher operational costs (+5.5% or 9.3 M€$_{2009}$) partially compensated by lower depreciation costs (-15.2% or -19 M€$_{2009}$) and lower cost of capital (-2.5% or -1.5 M€$_{2009}$).

287 Details on the main drivers underlying the deviation between actual and determined costs for each of these cost categories are available at TCZ level in the local level view part of this 2018 Annual Monitoring Report.

288 Figure 33 presents the variation for each TCZ between actual costs and determined costs.

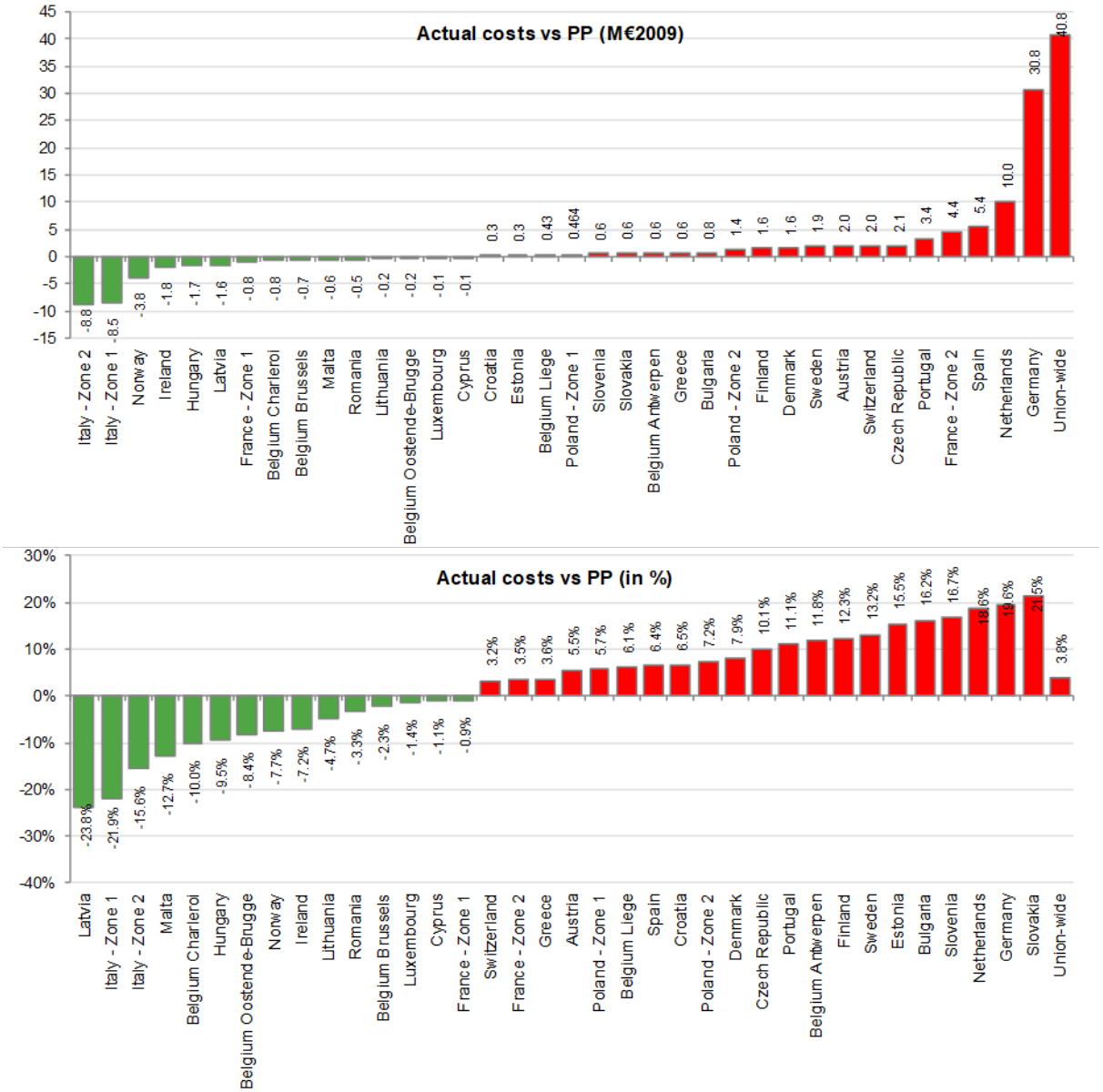


Figure 33 - 2018 actual terminal costs compared to PPs (SES level)

289 As shown in Figure 33, actual costs were higher than planned for 21 CZs. 11 of these states had an observed deviation above 10% and three of them above 18%: Slovakia (+21.5%), Germany (+19.6%) and The Netherlands (18.6%).

290 Figure 33 shows that actual costs were lower than planned for 15 CZs. Four of these CZs had an observed deviation above -10% and two of them above -20%: Latvia (-23.8%) and Italy Zone 1 (-21.9%).

8.5 ATSPs 2018 Overall Terminal Economic Surplus generated from Terminal activity

291 Although 30 main ATSPs reported information relating to terminal ANS in 2018, the analysis presented hereafter focuses on 28 ATSPs in order to take into account the specificities of some TCZs:

- Actual data for the ATSPs operating in UK TCZ B (mainly NERL) are not publicly available (should be reported to the European Commission on a confidential basis as terminal ANS are provided on a contractual basis – see paragraph 270).

- In Cyprus and at four Belgian regional TCZs, terminal ANS is 100% subsidised by the States/Regions.
- In Sweden, no capital-related costs (depreciation and cost of capital) are reported for the main ATSP (LFV) in the terminal reporting tables since these costs are fully borne by the airport operator (Swedavia) that owns the CNS infrastructure used by LFV to provide terminal ANS services. For monitoring purposes, the overall estimated terminal surplus for ATSPs (LFV and Swedavia) is considered.
- From 2015 to 2019 the Federal Republic of Germany is strengthening the equity position of DFS with an overall contribution of 601.9 M€. In the RP2 Reporting Tables the above amounts are recorded as negative exceptional costs for charging purposes in the Route and Terminal Charging documents on an annual basis. Therefore, this reporting reduces the determined costs charged to the users and the corresponding DFS ANS revenues. However, the negative exceptional item is also included as part of actual costs reported in the Reporting Tables (R.T.). Therefore, this generates a difference between the DFS accounting profit and the Monitoring economic surplus results. An alternative surplus calculation taking in to account this subject is shown in the German local view 2018 monitoring report.
- From 2017, France and Poland have two terminal CZ, but only one single ATSP each (DSNA and PANSA respectively) and Italy from 2015 (ENAV). Therefore, the ATSP surplus is calculated by taking into account both CZs for each state.

292 In the cases mentioned above, the notion of economic surplus is either not appropriate, or to be interpreted with caution. NERL, DCAC and Skeyes (except for its activity in Brussels TCZ) have therefore been excluded from the analysis presented below.

293 Figure 34 presents: i) the net gain retained by the main ATSPs in 2018 as a result of the variations in costs and traffic, as well as the bonus from capacity incentives (see left-hand side); and ii) the overall estimated surplus when adding to this net gain the return on equity embedded in the cost of capital (see right-hand side).

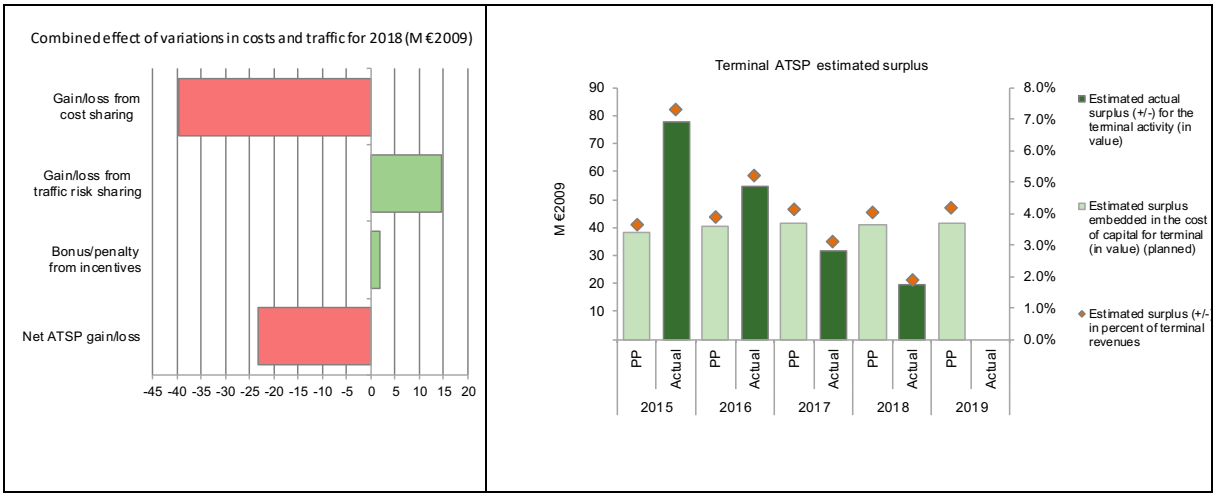


Figure 34 - Estimated surplus for 2018 terminal ANS activity at Union-wide level (SES level).

294 In 2018, the main ATSPs collectively generated a net loss of -23.3 M€$_{2009}$ on the terminal activity. This is a combination of three elements:

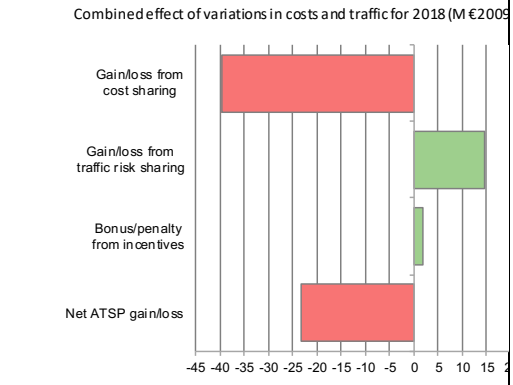
- a loss of -39.7 M€$_{2009}$ arising from the cost-sharing mechanism;

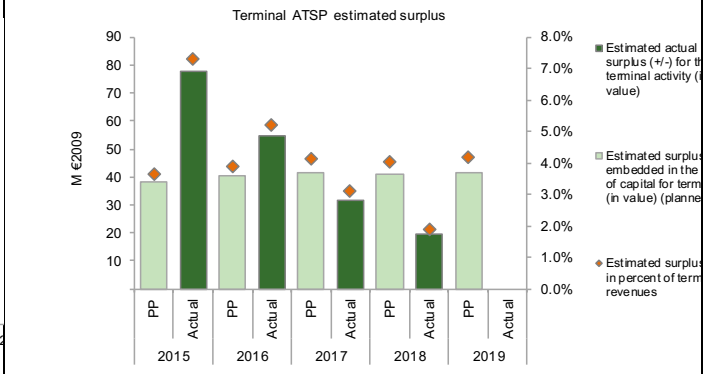
- a gain of +14.6 M€$_{2009}$ arising from the traffic risk-sharing mechanism (applied in 18 out of 36 TCZs included in this analysis); and
- a gain of +1.8 M€$_{2009}$, corresponding to a bonus from the capacity incentive mechanism.

295 Five ATSPs (Avinor, DFS, Skyguide, ENAV and LVNL) reported a bonus for their operational performance in 2018 (for an overall amount of 2.0 M€$_{2009}$) and three ANSPs (ANS Finland, LGS and PANSA) reported a penalty (for an overall amount of 0.2 M€$_{2009}$).

296 The inclusion of these incentives in the chargeable cost base is still being assessed by the European Commission.

297 Ex-post, the overall estimated surplus taking into account the net loss from the terminal activity mentioned above (-23.3 M€$_{2009}$) and the surplus embedded in the actual cost of capital (42.8 M€$_{2009}$) amounts to 19.5 M€$_{2009}$ (1.9% of the 2018 terminal revenues, see right-hand side of





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299 *Figure 34*). At Union-wide level, the resulting ex-post rate of return on equity (RoE) is 2.9%, which is lower than the 6.4% planned in the PPs. Many Terminal Control Zones are very small (for RP2 123 out of 174 airports were below the 70,000 threshold of air transport movements per year) and in many cases the asset base reported for the Terminal Control Zone is also very small. The Return on Equity expressed in terms of percentage should therefore be interpreted with caution since relatively high/low values do not necessarily reflect very large gains/losses in absolute values.

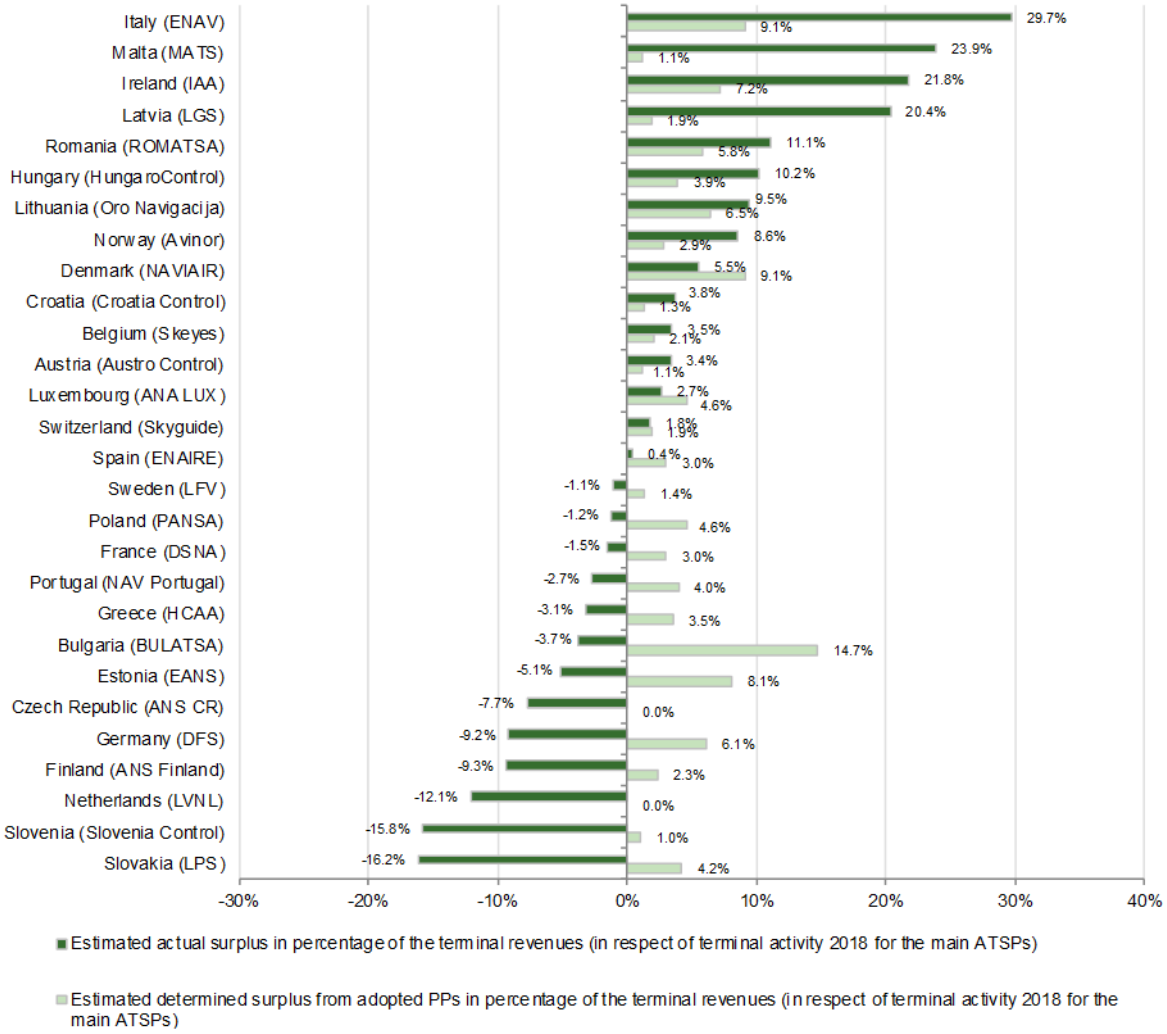

Figure 35 - Estimated surplus for the 2018 terminal activity at (main) ATSPs level.

300 Figure 35 shows that seven ATSPs achieved a higher actual estimated surplus than planned. This is particularly the case for the four ATSPs operating in Italy, Malta, Ireland and Latvia, where the overall estimated surplus exceeds 20% of ATSPs' revenues. All these ATSPs achieved lower costs than planned. On the other hand, Figure 35 also shows that 13 ATSPs incurred an estimated economic loss in their terminal activity during 2018. More details can be found in Annex II – Member States' detailed analysis for experts.

8.6 Terminal 2018 Actual Costs for Airspace Users

301 This section analyses the actual terminal costs for airspace users in respect of ANS activities in 2018 (also referred to as the "true cost for users") in the same way as is done for en route ANS.

302 Figure 36 shows that the actual costs incurred by airspace users in respect to activities performed in 2018 (935.9 M€$_{2009}$) are -18.7% (-215.9 M€$_{2009}$) lower than the DCs billed based on actual TNSUs (1,151.7 M€$_{2009}$).

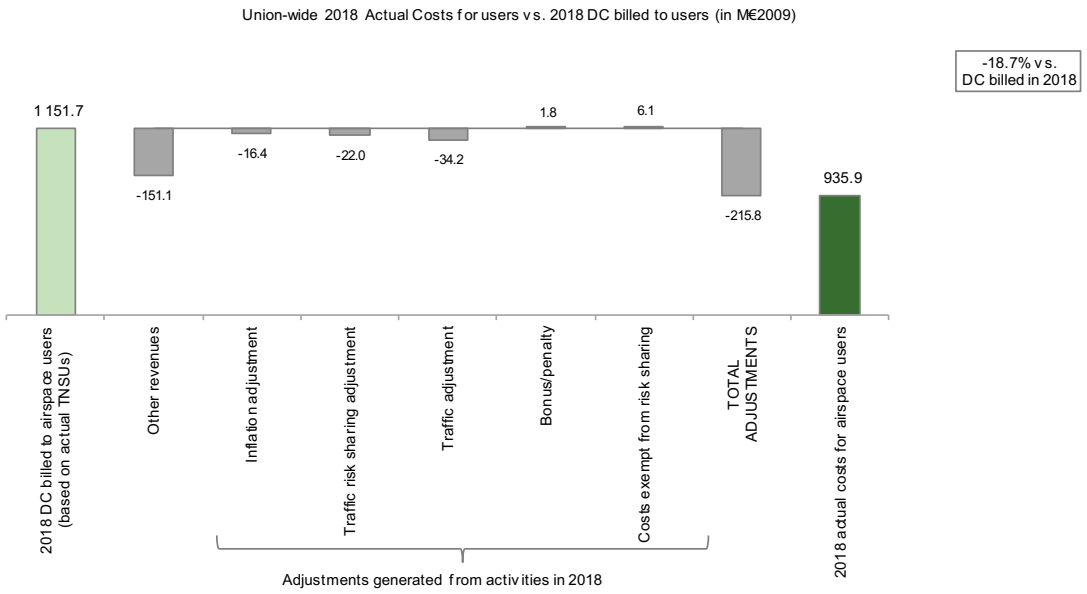

Figure 36 - Union-wide 2018 actual costs for users vs. 2018 DCs billed to users (in M€$_{2009}$).

303 The most important factor contributing to the observed difference is the deduction of - 151.1 M€$_{2009}$ of other revenues. In most TCZs, there are either no or only small amounts of other revenues deducted from the determined costs. However, circumstances in a few TCZs have a large impact at Union-wide level. This is especially the case for:

- Spain (-63.0 M€$_{2009}$) reflecting the fact that terminal ANS costs are partially financed by two elements: 1) revenues from agreements with the airport manager regarding aerodrome service provisions for all airports in the CZ and 2) ENAIRE commercial income (publications, and minor consulting activities);
- Belgium (-28.6 M€$_{2009}$ in total for the five TCZs) where the financing of TANS in 2018 was partly (Brussels airport) or fully (regional airports) subsidised by the State or regional authorities;
- Cyprus (-7.5 M€$_{2009}$) where terminal ANS was free of charge for the airspace users in 2018 since TANS costs were 100% subsidised by the State; and
- France (-25.2 M€$_{2009}$) reflected reimbursements from the SESAR Joint Undertaking, revenues from commercial activities, and the co-financing of major programs by Commission grants (Connecting Europe Facility funds).

304 For the majority of States the actual inflation index in 2018 was lower than planned. The overall net effect of inflation adjustments at State level is a reimbursement (-16.4 M€$_{2009}$) to airspace users.

305 Traffic risk-sharing applies to 18 TCZs out of the 36 included in this monitoring report. In these TCZs, the net effect of differences between actual and planned TNSUs is a reimbursement (-22.0 M€$_{2009}$) to airspace users. Since traffic was in general higher than planned, the traffic adjustments relating to costs not subject to traffic risk-sharing is again a forthcoming reimbursement (-34.2 M€$_{2009}$) to airspace users.

306 Five ATSPs (Avinor, DFS, Skyguide, ENAV and LVNL) reported a bonus for their operational performance in 2018 (for an overall amount of 2.0 M€$_{2009}$) and three (Finavia, LGS and PANSA) reported

a penalty (for an overall amount of 0.2 M€$_{2009}$). The inclusion of these bonuses in the chargeable cost bases will be assessed by the European Commission.

307 Finally, +6.1 M€$_{2009}$ costs exempt from cost-sharing were reported. These costs will be eligible for carry-over (reimbursed to airspace users) to the following reference period(s), if deemed eligible by the European Commission.

8.7 Gate-to-Gate ANS DCs Monitoring

308 As shown in Table 28, actual gate-to-gate ANS costsat Union-wide level in 2018 were -0.4% lower than planned in the adopted PPs (7,191 M€$_{2009}$ compared to 7,217 M€$_{2009}$) due to a combination of lower en route costs and higher terminal costs. [29]

2018 Gate-to-gate ANS actual costs vs. PP						
SES States - Data from RP2 Performance Plans		**2015D**	**2016D**	**2017D**	**2018D**	**2019D**
Real en-route costs (determined costs 2015-2019) - (in EUR2009)		6 235 113 277	6 195 878 072	6 164 525 008	6 153 524 516	6 059 092 064
Real terminal ANS costs - (in EUR2009)		1 117 713 492	1 103 962 617	1 066 100 758	1 064 115 512	1 059 985 630
Real gate-to-gate ANS costs - (in EUR2009)		7 352 826 769	7 299 840 689	7 230 625 766	7 217 640 028	7 119 077 694
Share of en-route costs in gate-to-gate ANS costs		**84.8%**	**84.9%**	**85.3%**	**85.3%**	**85.1%**
SES States - Actual data from Reporting Tables		**2015A**	**2016A**	**2017A**	**2018A**	**2019A**
Real en-route costs - (in EUR2009)		6 079 182 547	6 060 358 280	6 002 727 481	6 086 284 260	
Real terminal ANS costs - (in EUR2009)		1 084 292 299	1 096 452 312	1 088 023 758	1 104 896 907	
Real gate-to-gate ANS costs - (in EUR2009)		7 163 474 846	7 156 810 592	7 090 751 239	7 191 181 167	
Share of en-route costs in gate-to-gate ANS costs		**84.9%**	**84.7%**	**84.7%**	**84.6%**	
Difference between Actuals and Planned (Actuals vs. PP)		**2015**	**2016**	**2017**	**2018**	**2019**
Real gate-to-gate costs (EUR2009)	in value	-189 351 923	-143 030 096	-139 874 527	-26 458 861	
	in %	-2.6%	-2.0%	-1.9%	-0.4%	
En-route share	in p.p.	0.1 p.p.	-0.2 p.p.	-0.6 p.p.	-0.6%	

Table 28 - 2018 gate-to-gate ANS actual costs vs. PPs (SES level) Negative figures are highlighted in red and reflect lower than planned actual values.

309 The actual proportion of en route in total ANS costs (84.6%) is in line with the proportion planned in the PPs (85.3%). This indicates that, at system level, there is no noticeable reallocation of costs from en route to terminal ANS.

8.8 CAPEX Monitoring

310 The objective of the following section is to present the information provided by the NSAs in their 2018 NSA Monitoring Reports in relation to the ANSPs' investments. Full detailes are provided in Annex IV – CAPEX report.

311 Table 29 shows the aggregation of the national data from the RP2 National Performance Plans related to the ATSPs' total CAPEX, main CAPEX and real gate-to-gate ANSP costs compared with the actual data from the NSA Monitoring Reports. The planned and actual CAPEX data are taken as they are from the NSA Monitoring Reports and presented both in nominal and real terms (i.e. €$_{2009}$).

312 Note: The Actual data for Total CAPEX have been updated for all years (2015-2018), with an average yearly increase of 78M€ with respect to what It was initially reported in the NSA Monitoring reports of previous years due to a new retroactive Capex reporting of France.

[29] UK TCZs were excluded from this analysis in order to ensure consistency with previous sections.

313 Table 29 shows that in 2018 the actual total CAPEX was 1,042 M€$_{2009,}$ +8.9% higher than planned in the PP (957 M€$_{2009}$).

314 The difference confirms a trend already observed for 2017 (see table 29), that Member States are closing the gap between planned and actual capital expenditures. In 2015, CAPEX compared to planned was -21.4% lower, in 2016, they were -13.0% lower and in 2017, there was almost no difference between actual and planned.

315 Over the first 4 years of RP2, 7.0 % (i.e. 282.5 M€$_{2009}$) of capital expenditure (CAPEX) planned in the RP2 Performance Plans have not materialised (i.e. have been cancelled and/or postponed). However, the related planned costs (depreciation and cost of capital) were included in the determined costs and therefore have been (or are being) charged to airspace users. Member States should take into account these investment costs which were charged but not spent in their Performance Plans for RP3 (2020-2024) in order to avoid double charging.

Data from RP2 national performance plan	2015P	2016P	2017P	2018P	2019P	RP2P
Total CAPEX (in M €2009)	**1017.76**	**1064.03**	**1032.67**	**957.05**	**819.19**	**4890.70**
Main CAPEX (in M €2009)	725.84	789.06	760.89	664.75	541.07	3481.60
% Main into Total CAPEX	71.3%	74.2%	73.7%	69.5%	66.0%	71.2%
Real gate-to-gate ANSP costs (in M €2009)	**6498.11**	**6419.50**	**6413.42**	**6397.57**	**6297.97**	**32026.56**
% of CAPEX into Real gate-to-gate ANSP costs	15.7%	16.6%	16.1%	15.0%	13.0%	15.3%
Actual data from Reporting Tables	2015A	2016A	2017A	2018A	2019A	RP2A
Total CAPEX (in M €2009)	**800.45**	**921.06**	**1025.07**	**1042.44**		
Main CAPEX (in M €2009)	**515.44**	**626.93**	**688.83**	**673.89**		
% Main into Total CAPEX	64.4%	68.1%	67.2%	64.6%		
Real gate-to-gate ANSP costs (in M €2009)	**6315.51**	**6283.07**	**6299.27**	**6403.80**		
% of CAPEX into Real gate-to-gate ANSP costs	12.7%	14.7%	16.3%	16.3%		
Actuals vs Planned in absolute value & percentage	2015	2016	2017	2018	2019	RP2
Total CAPEX (in M €2009)	-217.31	-142.97	-7.60	85.39		
Total CAPEX (in %, for M €2009)	**-21.4%**	**-13.4%**	**-0.7%**	**8.9%**		

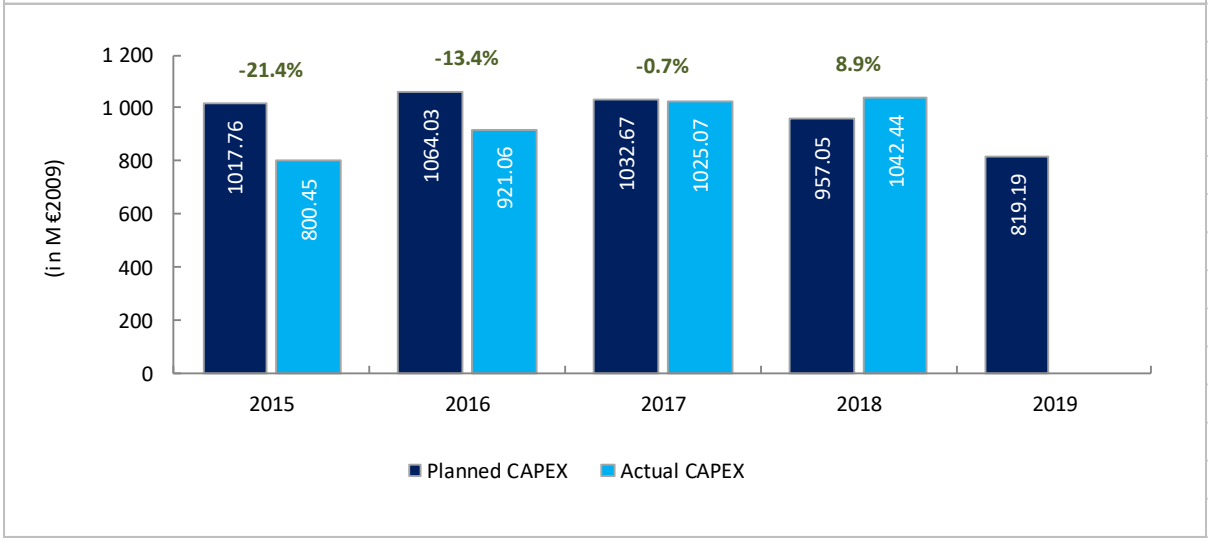

Table 29 - 2018 gate-to-gate ATSP actual CAPEX vs. PPs (SES level).

9 Network Performance Plan

9.1 Safety

316 The safety key performance indicators for the Network Manager (NM) as defined in the NPP cover:

- Minimum Level of the Effectiveness of Safety Management (EoSM as for ANSP);
- The percentage of application of the severity classification based on the Risk Analysis Tool (RAT);
- Top 5 Operational safety risks and priorities (Network operational safety risks).

317 For the EoSM, the NM scored 73 out of 100 and achieved the target level in Safety Culture (achieved level D with target level C) and Safety Risk Management (achieved the target level D). In the three other management objectives (Safety Policy & Objectives, Safety Assurance and Safety Promotion), the NM still needs to improve in a few areas to improve the level from the achieved level C to the target D.

318 The NM reported that RAT methodology was applied 100% of AA/A, B or C ATM-s occurrences, thus achieving the 2019 target. These figures have not been verified by either EASA or EUROCONTROL/DPS (note that NM does not report its occurrences to AST)

319 The NM are actively managing the top five network operational safety risks.

9.2 Environment

320 In addition to the KEP and KEA indicators, which are KPIs, the NM has four PIs: the KEP and KEA indicators for the entire NM area (as opposed to the SES area), the NM added value in achieving the flight planning target, and the route extension due to en route design.

321 The two horizontal flight efficiency PIs for the entire NM area are highly correlated to the two corresponding KPIs. They are defined for different areas and therefore do not necessarily follow the same evolution.

322 Regarding the KEP value defined for the entire NM area, similarly to the result achieved for the SES area, the target was missed (by 0.60 percentage points – a performance of 4.59% compared with a target of 3.99%).

323 Regarding the KEA value defined for the entire NM area, similarly to the result achieved for the SES area, the target was not met (by 0.11 percentage points – 2.80% vs 2.69%).

324 Regarding the NM added value in achieving the flight planning target, the NM reports that “while the NM proposals are meeting the objectives, the acceptance rate remains low”.

325 The route extension due to en route design improved by 0.07 percentage points, reaching 2.29% (compared to a target of 2.48%).

9.3 Capacity

326 Average en route ATFM delay in the SES RP2 area in 2018 was 1.83 minutes per flight (up from 0.94 minutes per flight in 2017), which means that the Union-wide capacity target of 0.5 minutes was not achieved.

327 The NM, in the NM Annual Report, provided the following overview of capacity performance:

328 ATC capacity, en route weather and ATC staffing were the main causes of en route ATFM delay. Weather and staffing more than doubled compared to 2017. Delays attributed to disruptions and events had the highest increase with delays increasing more than 2.5 times. The NM Annual Report also provided details on capacity performance at individual ACCs:

- 29 ACCs had higher delays than the local reference values that sum together to achieve the Union-wide target of 0.5 minutes per flight;
- 26 ACCs had higher delays than forecasted in the NOP 2018-2019/22.

329 Marseille ACC was heavily impacted by industrial action at the beginning of the summer. 19 strike days with severe ATFM impact, including one national strike, were recorded in the ACC. The industrial actions led to significant drops in the capacity offered by the ACC. Only 10 sectors an hour were open during the strike days (vs a maximum of 27 sectors in the same days with no strikes, later in the summer). The neighbouring ACCs were confronted with a significant increase in demand due to these strikes, especially in the case of Reims.

330 From July onwards, normal operations in Marseille were affected by insufficient capacity, with the ACC delivering fewer sectors compared to those opened in the previous year (Figure 25), which were already fewer than 2016. If in 2017, the eastern sectors concentrated most of the staffing issues, in 2018 the reduction in sectors was extended to the western sectors, which opened 1 to 2 fewer sectors. The overall drop was especially noted from 12h onwards until the evening, with bigger impact on weekends. NM did not receive reliable sector opening plans for the NOP.

331 Karlsruhe UAC had 3.18 minutes per flight of en route delay in the summer, double of last year and above the planned NOP delay forecast (2.37 minutes per flight). The 4ACC initiative was successful in reducing the demand in Karlsruhe UAC. Summer traffic decreased by 2.1%, which helped to mitigate the staffing shortage at the UAC. However, aircraft flew at sub-optimal flight levels, leading to a cost impact on operators.

332 The announced staffing issues in Karlsruhe UAC were reflected in a significant drop in sector numbers compared to 2017 – 5 to 6 fewer sectors during core hours. The gap in sectors was less significant during first-rotation and late evenings. The number of open sectors was aligned with the plans declared in the NOP. As a result of the sector shortage, capacity and staffing delays were very high during every day of the week, with a daily peak at around 12h.

333 As in 2017, the share of regulations applied on elementary sectors (vs. collapsed sectors) was only 25% compared to almost 50% in 2016 (the last year without staffing issues in Karlsruhe)

334 Brest ACC had 1.36 minutes per flight of en route delay in the summer, an increase of 30% compared to 2017 and above the NOP predicted delay (0.72 minute per flight) - but still below 2016 levels. Summer traffic increased 1.8% - slower growth when compared to last year's 8%.

335 Capacity and staffing delays occurred every day of the week and were especially high on Saturdays. Delay peaked at noon, evening and to a lesser extent, during the first rotation hours. The latter period recorded an increase in sector numbers compared to the previous year. Nevertheless, the rest of the day had fewer sectors than 2017 and fewer than those declared in the NOP.

336 Maastricht UAC had 1.22 minutes per flight of en route delay by the end September, an increase of 17% compared to 2017 but below the NOP summer forecast for the year (1.51 minutes per flight). Traffic remained at 2017 level but evening traffic was higher, especially on the weekend.

337 Capacity and staffing delays in the UAC were especially high on weekends, from Friday evening to Sunday. The periods from 12h to 16h on Saturdays and the evenings on Fridays and Sundays were the most critical periods in the UAC. Overall, the number of open sectors were lower or similar to

2017. However, during certain periods (e.g. Sunday evenings) the UAC provided more capacity than initially planned. About 41% of ATFM regulations were applied on elementary sectors during the summer months (vs 61% in 2017).

338 Reims ACC had 1.93 minutes per flight of en route delay – five times more delay than 2017, and considerably more than the NOP summer forecast (0.47 minute per flight). Traffic increased by 3.5%, partly driven by re-routed flights due to Marseille ACC strikes.

339 Capacity and staffing delays were high from Friday to Monday. The ACC delivered more sectors than the previous year. The average sector schemes were below the NOP plans on certain periods but the same or above during the hours of peak demand. Nevertheless, considering the traffic increase, Reims FMP has indicated that the capacity offered was at least three sectors short during peak hours on weekends.

340 Vienna ACC had 1.46 minutes per flight of en route delay in the summer, three times the figure of the previous summer and well above the NOP forecast (0.33 minute per flight). Summer traffic recorded high growth - above 7%.

341 The capacity issues and the difficult weather situation (weather delay accounted for more than 60% of the ACC's delay) explain the worsening of the ACC performance. Capacity and staffing delays occurred mostly during weekends and on Wednesdays. Overall, average opening scheme was below 2017 figures and the NOP plan.

9.4 *Cost-efficiency*

342 The Network Management Board endorsed at its 20th meeting the NM 2018 Budget, after the Single Sky Committee gave its positive opinion during SSC/66 on 24-25 October 2017. It was thereafter approved by the Eurocontrol Permanent Commission through the Provisional Council.

343 The 2018 total actual NM costs outturn is reported to amount to 183,796K€ (in nominal terms) which is -16.6% lower than planned (or -36.6M€) in the approved NPP (220,360K€). The NPP cost-efficiency target has therefore been met in 2018 and for the fourth year in a row (see Table 30 - Total NM RP2 costs forecast profile and actual *costs* below).

	NPP FORECASTS RP2				
NM Cost forecast (nominal, '000€)	*2015 F*	*2016 F*	*2017 F*	*2018 F*	*2019 F*
Grand Total	*216 810*	*217 045*	*218 126*	*220 360*	*223 561*
	Monitoring RP2 Actual costs				
NM Cost actual (nominal, 000€)	**2015 A**	**2016 A**	**2017 A**	**2018 A**	2019 A
Grand Total	**213 908**	**206 600**	**197 627**	**183 796**	
% deviation Actual vs. Forecast	-1.3%	-4.8%	-9.4%	-16.6%	

Table 30 - Total NM RP2 costs forecast profile and actual costs.

344 NM reports on a range of measures during the execution of the budget in 2018 to stay within the approved cost base, including "throttling the procurement plans and slowing down recruitments. The budget situation was challenging mainly due to the transition cost of contract renewals. Unlike in 2017, staff costs did not exceed the planned cost in 2018". (see also the breakdown of NM total costs in the table below):

				RP2 PLANNED COSTS PROFILE from NPP				
NM Costs (nominal, 000€)	2012 A	2013 A	2014 E	2015 F	2016 F	2017 F	2018 F	2019 F
1 1a Staff Remuneration	90 858	86 332	87 848	91 883	93 189	94 725	96 360	98 927
1 2 Operating	48 748	50 57	55 161	45 609	44 693	43 656	43 873	43 366
1 3 Depreciation	8 722	7 756	4 296	3 587	3 521	3 996	4 773	5 158
1 4 Cost of capital	478	344	283	252	381	441	473	487
1 1a Staff Receipts	-962	-952	-934	-974	-1 005	-1 025	-1 046	-1 087
1 2 Other Receipts			-1 136	-1 140	-1 393	-1 643	-1 643	-1 643
1 2 Sales of services UPP	-1 101	-3 415	-1 624	-913	-839	-842	-848	-848
1 2 Sales of services UPP Overhead	-330	-1 024	-488	-273	-252	-252	-254	-254
Indirect Costs	43 923	41 884	43 656	41 767	41 323	41 045	40 338	41 064
Future (net) Costs Total	190 336	130 925	187 062	179 798	179 618	180 101	182 026	185 170
Costs of the Past	39 181	37 361	38 507	37 012	37 427	38 025	38 334	38 391
Grand Total	229 517	168 286	225 569	216 810	217 045	218 126	220 360	223 561

	Monitoring RP2 Actual costs				
NM Costs (nominal, 000€)	2015 A	2016 A	2017 A	2018 A	2019 A
Staff Remuneration	94 449	95 012	94 436	88 806	
Operating	42 068	43 214	40 043	31 555	
Depreciation	2 556	1 525	429	340	
Cost of capital	84	32	28	5	
Staff Receipts	-1 048	-1 117	-1 125	*	
Other Receipts	0	-1 111	-2 711	**	
Sales of services UPP	-1 240	-1 659	-669	**	
Sales of services UPP Overhead	0	0	0	**	
Indirect Costs	41 037	34 508	31 622	31 361	
Future (net) Costs Total	177 906	170 404	162 052	152 067	
Costs of the Past	36 002	36 196	35 575	31 728	
Grand Total	213 908	206 600	197 627	183 796	

Table 31 - Breakdown of total NM RP2 cost forecasts and actual.

10 Alert Thresholds

10.1 Presentation of the Alert Thresholds

345 Article 19 of the Commission Implementing Regulation (EU) 390/2013 defines specific mechanisms to handle exceptional situations occurring in Reference Periods. These "alert mechanisms" can be triggered in Reference Periods at both Union-wide level and local level when unforeseeable circumstances occur that are both insurmountable and beyond the control of the States, ANSPs and NM or when alert threshold(s) are reached at EU level.

346 Two traffic alert thresholds, one at Union-wide level and one at local level, were defined in Commission Implementing Decision 2014/132 of 11 March 2014 setting the Union-wide performance targets and alert thresholds for RP2.

- A deviation over a calendar year by at least 10% of actual traffic expressed in en route service units compared to the Union-wide planned figure (112,884,000 in 2018) defined in the Annex of the aforementioned Commission Decision;
- A deviation over a calendar year by at least 10% of actual traffic expressed in service units compared with forecasts set out in the respective Performance plans at local level.

10.2 Union-wide Level

347 From the 2018 traffic data, the traffic alert threshold of ±10% was reached at Union-wide level. As shown on Figure 37, actual en route Service Units in 2018 were +18.7% higher than the planned 2018 value in Annex I of Commission Implementing Decision 2014/132. This situation is because Union-wide targets for RP2 have been based on the STATFOR low case scenario (September 2013).

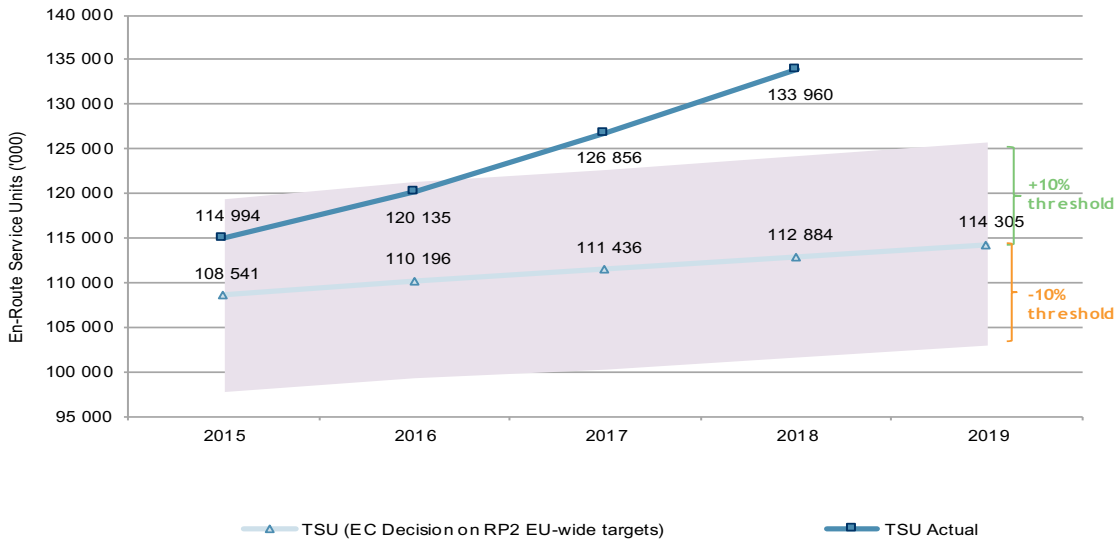

Figure 37 - En route service units at Union-wide level.

10.3 Local Level

348 According to Article 19(3) of the Commission Implementing Regulation (EU) 390/2013, States may decide to apply different alert thresholds at local level than for the Union-wide level. In this case,

they shall describe and justify these thresholds in their Performance Plan. So far, no States decided to use a different alert threshold. Therefore, the same threshold (±10% compared to the traffic forecasts contained in each Performance Plan) applies to all the en route CZs.

349 Figure 38 presents the proportional difference between actual and planned en route service units for each CZ in 2018.

Figure 38 - 2018 En route actual service units versus PP by charging zone.

350 Figure 38 shows that 12 CZs experienced service unit increases above the +10% threshold: Hungary (+31.9%), Cyprus (+27.4%), Greece (+24.7%), Spain Continental (+21.2%), Spain Canarias (+16.3%), Switzerland (15.1%), United Kingdom (+13.3%), Germany (12.8%), Sweden (+12.7%), Finland (11.5%), the Netherlands (+11.4%) and Lithuania (11.3%). On the other side, no States were below the -10% threshold.

351 Important note: In 2016, Malta, Poland and Bulgaria requested the Commission to revise their RP2 en route cost-efficiency targets for the years 2018 to 2019. The figures for these three States show the amended Performance Plan (Commission Implementing Decision (EU) 2017/2376 of 15 December 2017). In 2017, Romania, Portugal and Denmark submitted a request to the European Commission to revise their RP2 en route cost-efficiency target DUC for the years 2018 to 2019. Denmark, subsequently withdrew the request. This report includes the amended figures for these two States as reflected in the revised Performance Plan (Commission Implementing Decision 2018/2021 of 17 December 2018)

352 Based on the traffic risk-sharing mechanism defined in the Commission Implementing Regulation (EU) 391/2013, if traffic is below -10% (or respectively above +10%), all losses exceeding -10% traffic (or respectively all gains exceeding +10% traffic) may be recovered from (or shall be returned to) airspace users through an adjustment of the chargeable unit rate in N+2.

11 Additional data

		Additional taxi-out time (min/dep)				Additional ASMA time (min/arr)			
FAB	**State**	**2015**	**2016**	**2017**	**2018**	**2015**	**2016**	**2017**	**2018**
Baltic	Lithuania	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Poland	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Blue Med	Cyprus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Greece	1.16	1.31	1.89	2.62	0.82	1.10	0.88	1.18
	Italy	n/a	4.11	4.01	4.56	n/a	1.10	1.12	1.52
	Malta	n/a	n/a	1.75	2.12	0.46	0.67	0.79	0.90
Danube	Bulgaria	1.32	1.41	2.03	1.81	0.36	0.45	0.38	0.30
	Romania	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DK-SE	Denmark	1.92	2.32	1.91	3.00	1.48	1.56	2.11	1.02
	Sweden	1.59	2.08	2.11	2.66	1.37	1.18	1.20	1.17
FAB CE	Austria	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Croatia	n/a	n/a	n/a	1.12	n/a	n/a	n/a	0.36
	Czech Republic	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Hungary	1.11	1.39	1.29	1.42	0.59	0.94	1.43	0.73
	Slovakia	n/a	n/a	n/a	n/a	0.64	0.31	0.32	0.20
	Slovenia	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FABEC	Belgium	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	France	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Germany	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Luxembourg	n/a	n/a	2.25	1.46	0.50	0.61	0.82	0.56
	Netherlands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Switzerland	2.91	3.11	3.38	3.27	2.77	2.58	2.34	2.38
NEFAB	Estonia	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Finland	1.97	2.80	2.86	3.10	1.06	0.98	1.08	1.05
	Latvia	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Norway	n/a	n/a	n/a	n/a	1.82	n/a	n/a	n/a
SW FAB	Portugal	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Spain	3.40	3.72	3.53	3.71	1.38	1.67	1.73	1.63
UK-Ireland	Ireland	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	United Kingdom	5.06	5.54	5.59	5.83	4.01	n/a	n/a	3.55

Table 32 - Additional taxi-out time & Additional ASMA time (2015-2018) National Level

		Arrival ATFM Delay (min/arr)							
		2015		2016		2017		2018	
FAB	State	National target	Actual (all causes)	National target	Actual (all causes)	National target	Actual (all causes)	National target	Actual (all causes)
Baltic	Lithuania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Poland	0.04	0.04	0.04	0.21	0.04	0.14	0.04	0.32
Blue Med	Cyprus	n/a	0.09	n/a	0.51	n/a	0.93	n/a	0.82
	Greece	0.10	0.06	0.10	0.26	0.10	0.65	0.10	1.47
	Italy	0.41	0.57	0.41	0.13	0.41	0.22	0.41	0.12
	Malta	0.10	0.01	0.10	0.01	0.10	0.01	0.10	0.01
Danube	Bulgaria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Romania	0.00	0.00	0.00	0.34	0.00	0.31	0.00	0.20
DK-SE	Denmark	0.11	0.03	0.11	0.03	0.11	0.03	0.11	0.06
	Sweden	0.35	0.07	0.35	0.22	0.35	0.12	0.35	0.41
FAB CE	Austria	1.88	0.79	1.29	0.72	1.28	0.81	1.27	0.49
	Croatia	0.05	0.01	0.05	0.00	0.05	0.00	0.05	0.00
	Czech Republic	0.25	0.04	0.30	0.01	0.35	0.07	0.40	0.11
	Hungary	0.05	0.00	0.05	0.00	0.05	0.03	0.05	0.03
	Slovakia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Slovenia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
FABEC	Belgium	n/a	0.89	n/a	0.73	n/a	0.60	n/a	0.60
	France	0.60	0.34	0.60	0.59	0.60	0.48	0.60	0.40
	Germany	0.65	0.33	0.65	0.45	0.65	0.44	0.65	0.45
	Luxembourg	0.48	0.11	0.49	0.08	0.48	0.05	0.47	0.09
	Netherlands	2.00	2.91	2.00	2.00	2.00	3.21	2.00	2.19
	Switzerland	2.18	2.48	2.35	1.78	2.18	1.33	2.35	1.54
NEFAB	Estonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Finland	0.13	0.55	0.13	0.27	0.14	0.26	0.14	0.37
	Latvia	0.04	0.00	0.04	0.01	0.04	0.00	0.04	0.07
	Norway	0.60	0.37	0.60	0.44	0.60	0.38	0.60	0.26
SW FAB	Portugal	0.60	0.60	0.60	0.63	0.60	1.08	0.60	2.38
	Spain	0.80	0.62	0.80	0.89	0.80	0.98	0.80	1.51
UK-Ire-land	Ireland	0.18	0.14	0.18	0.15	0.20	0.08	0.20	0.23
	United Kingdom	0.87	0.95	0.78	1.19	0.78	1.37	0.78	1.24

Table 33 - Arrival ATFM Delay - Targets and Observed Performance (2015-2018) National Level.

		ATFM slot adherence				ATC pre-departure delay (min/dep)			
FAB	**State**	**2015**	**2016**	**2017**	**2018**	**2015**	**2016**	**2017**	**2018**
Baltic	Lithuania	91.0%	91.2%	92.3%	93.0%	n/a		n/a	n/a
	Poland	94.0%	94.6%	95.5%	95.8%	n/a		n/a	n/a
Blue Med	Cyprus	84.8%	81.0%	82.5%	84.1%	n/a		n/a	n/a
	Greece	91.3%	91.3%	91.2%	90.7%	0.54	0.75	0.67	n/a
	Italy	92.9%	93.4%	94.1%	94.5%	n/a	1.39	1.2	n/a
	Malta	95.1%	96.3%	95.5%	95.2%	0.08	0.16	0.17	0.28
Danube	Bulgaria	98.8%	98.8%	99.0%	97.9%	0.04	0.03	0.08	0.15
	Romania	93.6%	91.8%	91.6%	92.6%	n/a		n/a	n/a
DK-SE	Denmark	95.9%	97.9%	98.2%	98.1%	0.03	0.07	0.09	0.14
	Sweden	96.9%	95.4%	97.5%	97.2%	0.04	0.09	0.12	0.07
FAB CE	Austria	87.1%	93.2%	94.3%	96.2%	n/a		n/a	n/a
	Croatia	89.7%	89.9%	88.7%	91.9%	n/a		n/a	0.09
	Czech Republic	94.2%	94.9%	94.5%	94.3%	n/a		n/a	n/a
	Hungary	94.3%	93.8%	93.1%	93.3%	0.13	0.11	0.25	0.2
	Slovakia	98.0%	97.2%	97.6%	97.6%	n/a		n/a	n/a
	Slovenia	94.5%	96.3%	94.7%	95.5%	n/a		n/a	n/a
FABEC	Belgium	92.6%	93.5%	94.8%	94.5%	n/a		n/a	n/a
	France	85.8%	85.3%	85.9%	86.9%	n/a		n/a	n/a
	Germany	93.3%	93.3%	93.5%	94.6%	n/a		n/a	n/a
	Luxembourg	82.6%	82.9%	82.6%	82.3%	0.02	0.01	0.04	0.09
	Netherlands	88.1%	89.8%	88.6%	95.5%	n/a		n/a	n/a
	Switzerland	91.8%	92.2%	93.4%	93.6%	1.23	0.80	0.7	0.82
NEFAB	Estonia	92.2%	91.3%	55.3%	96.8%	n/a		n/a	n/a
	Finland	89.0%	88.3%	91.2%	92.6%	0.15	0.18	0.34	0.38
	Latvia	95.5%	94.5%	95.8%	96.0%	n/a		n/a	n/a
	Norway	98.2%	98.1%	98.1%	98.6%	0.04	0.05	0.09	0.11
SW FAB	Portugal	89.3%	90.0%	91.8%	93.3%	n/a		n/a	n/a
	Spain	94.5%	93.9%	94.2%	95.2%	0.41	0.49	0.61	n/a
UK-Ireland	Ireland	96.9%	95.7%	94.8%	96.2%	n/a		n/a	n/a
	United Kingdom	90.7%	91.8%	93.5%	94.7%	n/a		n/a	n/a

Table 34 - ATFM Slot Adherence & ATC Pre-Departure Delay (2015-2018) National Level.