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**COMMISSION STAFF WORKING DOCUMENT**

**on the ex-post evaluation of the Single European Sky Performance and Charging Schemes in Reference Period 1 and first year of Reference Period 2.**

{SWD(2018) 63 final}

## 1. ABBREVIATIONS

Abbreviation	Meaning
ANS	air navigation service
ANSP	air navigation service provider
ASMA	arriving sequencing and metering area
ATC	air traffic control
ATFM	air traffic flow management
ATM	air traffic management
AUC-U	actual unit cost for users
CAPEX	capital expenditure
CRCO	Central Route Charges Office (Eurocontrol)
DUC/DUR	determined unit cost/determined unit rate
EASA	European Aviation Safety Agency
EoSM	effectiveness of safety management
FAB	functional airspace block
FIR	flight information region
KEA	<u>K</u> PI for average horizontal <u>E</u> n route flight efficiency of the <u>A</u> ctual trajectory
KEP	<u>K</u> PI for average horizontal <u>E</u> n route flight efficiency of the last filed flight <u>P</u> lan
KPA	key performance area
KPI	key performance indicator
NCP	NSA coordination platform
PP	performance plan
NSA	national supervisory authority
OPC	open public consultation
PI	performance indicator
PRB	Performance Review Body
PRU	Performance Review Unit (Eurocontrol)
RP1	reference period 1 (2012-2014)
RP2	reference period 2 (2015-2019)
SES	single European sky
SESAR	single European sky ATM research
SSC	Single Sky Committee
TANS	terminal air navigation service
TMA	Terminal Manoeuvring Area

## 2. INTRODUCTION

The **purpose** of this evaluation is to assess the impact, effectiveness and scope of the Single European Sky (SES) performance and charging schemes in 2012-2015. The schemes apply to **air navigation services (ANSs)**, which encompass a wide range of services provided to air traffic in all phases of operation, from flight preparation to landing. They are detailed in the following **implementing acts**<sup>1</sup>:

- Commission Implementing Regulation (EU) No 390/2013 laying down a performance scheme for ANSs and network functions (the Performance Regulation); and
- Commission Implementing Regulation (EU) No 391/2013 laying down a common charging scheme for ANSs (the Charging Regulation).

The scope of this evaluation does not include the basic SES legislation<sup>2</sup>, but a description of the wider SES policy framework is provided in Section 2.1.

In line with the ‘**better regulation**’ principles, the evaluation seeks to assess whether the objectives of the schemes have been met and identify potential areas for improvement. This will be fed into the revision of the schemes for Reference Period 3 (starting in 2020). This evaluation complements with more detailed analysis the "Report from the Commission to the European Parliament and the Council on the progress of the Single European Sky during the 2012-2014 period" which was adopted on 16 December 2015<sup>3</sup>.

The **main topics** addressed by the evaluation are the **effectiveness efficiency, relevance, coherence, and EU added-value** of the schemes, including an assessment of the set-up of the Performance Review Body (PRB) appointed by the Commission to assist it in the implementation of the performance scheme.

The **evaluation criteria** include:

- the results delivered by the schemes as regards ANS:
  - capacity;
  - cost-efficiency;
  - environmental impact; and
  - safety levels;

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<sup>1</sup> Prior to the application of the current acts (1 January 2015, although some provisions of Regulations (EU) No 390/2013 and (EU) No 391/2013 applied as from the entry into force of the Regulations on 29 May 2013), the schemes were set out in Commission Implementing Regulations (EU) No 691/2010 and (EC) No 1794/2006.

<sup>2</sup> SES basic legislation:

- Regulation (EC) No 549/2004 (the framework Regulation);
- Regulation (EC) No 550/2004 (the service provision Regulation);
- Regulation (EC) No 551/2004 (the airspace Regulation); and
- Regulation (EC) No 552/2004 (the interoperability Regulation).

<sup>3</sup> [COM\(2015\)663final](#)

- efficiency of implementation (benefits compared with costs);
- the relevance of the schemes to the needs of aviation and their consistency with EU aviation and transport policy;
- the added value of the EU approach compared with what would have been achieved with local initiatives;
- the quality of the data used to support the measurement of performance in the schemes, and related processes; and
- the effectiveness of the PRB set-up.

The **geographical scope** of the schemes is the SES area, i.e. the 28 EU Member States, Switzerland and Norway<sup>4</sup>.

### 3. BACKGROUND TO THE INITIATIVE

#### 3.1. Original objectives and context

The **ANSs** that are subject to the schemes consist of the services provided to air traffic during all phases of operations, in particular air traffic management (ATM) and related technical services.

ANSs are financed by **charges** paid by airspace users and provided in Europe by (in most cases, fully state-owned) monopoly service providers. The monopoly service provision and the absence of competition require appropriate economic regulation.

As ANSs are provided mainly at national level, Europe's ATM sector remains **fragmented** and is less efficient than it could be. **ANS costs have an impact on the competitiveness of European airspace users.** Depending on their business model<sup>5</sup>, the direct costs they bear for ANSs represent between 6 % and 20 % of their total operating costs, excluding fuel. In addition, they also bear the costs of delays and flight inefficiency (longer routes).

The SES performance and charging schemes were set up in order to improve ATM performance in the light of the '**aspirational goals**' of the SES<sup>6</sup>. They involve setting Union-wide and national/functional airspace block (FAB)<sup>7</sup> performance targets to be met by ANS providers (ANSPs) over fixed reference periods. The PRB was established in 2010 to support the Commission in this area.

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<sup>4</sup> Norway participated in the schemes on a voluntary basis in RP1.

<sup>5</sup> Business models were clustered into 4 groups: full service/scheduled airlines, low cost/low fare airlines, hybrid (scheduled/low cost) and other (leisure, cargo...)

<sup>6</sup> SES aspirational goals:

- triple airspace capacity;
- improve safety performance by a factor of 10;
- reduce environmental impact by 10 %; and
- reduce the cost of ATM services to airspace users by 50 %.

Source: European Commission, *SES FAQs* (11 October 2012).

<sup>7</sup> A FAB is a geographical grouping of airspaces across states;  
[http://ec.europa.eu/transport/modes/air/single-european-sky/functional-airspace-blocks-fabs\\_en](http://ec.europa.eu/transport/modes/air/single-european-sky/functional-airspace-blocks-fabs_en)

In RP1 (2012-2014), Union-wide performance targets were set in key performance areas (KPA): environment, capacity and cost-efficiency. In addition, **safety** performance was monitored to ensure that high safety levels are maintained or improved. The plan was that the targets would lead to **more direct routes** (less fuel burn and less CO<sub>2</sub>) and services delivered with **fewer and shorter delays** and in a more **cost-efficient** manner.

The complementary charging scheme<sup>8</sup> aims to establish a level and transparent playing field for charges and supports the performance scheme through mechanisms that encourage higher performance (cost- and risk sharing, incentives, charge modulation, etc.).

The schemes fit into the **wider policy framework of the SES**, which was launched in the 2000s. The **SES I** regulatory package brought ATM under EU competence in order to reduce the fragmentation of European airspace and increase its capacity. In 2009, the second SES package (**SES II**) changed the focus **from capacity to performance** in general.

The other components of the SES institutional landscape also have a role to play in performance, as follows:

- FABs are airspace blocks based on operational requirements and established regardless of state boundaries, where the provision of ANSs and related functions are performance-driven and optimised. The aim is to foster cooperation among ANSPs within each FAB;
- the Network Manager (NM) is the body designated by the Commission to perform network functions so as to allow optimum use of airspace in the SES and ensure that airspace users can operate preferred trajectories;
- SESAR (SES ATM research) is the technological pillar of the SES. It aims to improve ATM performance by modernising and harmonising ATM systems through the development and deployment of innovative technological and operational ATM solutions; and
- the European Aviation Safety Agency (EASA), which was established in 2004, saw its competences extended under SES II to aerodrome safety, ATM safety and the provision of ANSs.

### 3.2. Intervention logic

Following the introduction of SES in 2004, it became clear that the mechanisms for **managing ATM performance** were not sufficient to drive the necessary improvements across Europe. SES II was aimed at tackling this issue while addressing the **shortcomings** induced by the expected increases in air traffic. There was a need to:

- improve safety levels in parallel with increasing traffic;
- better align the route network with European traffic in order to improve sustainability;

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<sup>8</sup> See Annex 4 for an overview of the mechanisms of the charging scheme.

- ensure that capacity keeps pace with increasing demand;
- improve cost-efficiency; and
- reduce airspace fragmentation.

The **underlying problems** that were identified at that time were:

- a lack of capacity combined with ageing technologies and the absence of long-term capacity planning;
- the fact that ANSs are provided by entities under monopoly conditions;
- the fragmented management of airspace resulting from the provision of ANSs on a national basis;
- the lack of a consistent safety approach; and
- labour and social issues, such as the impact of new technologies and more flexible working schemes transforming working conditions requires effective social dialogue<sup>9</sup> to improve service continuity in few Member States<sup>10</sup>.

Acknowledging that some of these problems require a distinct and complementary response of an operational or technological nature, EU intervention aimed more specifically to address the inadequate approach to performance and the need for economic regulation of a monopolistic industry. Its purpose was to give a common direction by setting performance objectives that are consistent across the SES area and are managed in a transparent and independent way, involving all actors in a common process. This process, set out in the **Performance Regulation**, involves the Commission and the Member States setting targets at EU and local levels, and overseeing performance achievements. The provisions of the schemes ensure that the local (binding) targets are consistent with the EU-wide targets. They also lay down ANSPs' obligations and arrangements for consultation between the stakeholders, i.e. airspace users (the recipients of the services), the industry providing the services, military authorities and staff organisations.

**Binding targets** are established to:

- improve the quality of service (i.e. capacity, measured in flight delay);

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<sup>9</sup> Social dialogue is essential in ATM due to the demanding working conditions required to ensure service continuity and maintain safe operations while adapting dynamically to the traffic demand. The adoption of new technologies and more flexible working schemes is also transforming working conditions which requires the involvement of social partners. The social partners at EU level are cooperating to address these issues through joint tool boxes for social dialogue, 'Just Culture', etc.

<sup>10</sup> For example, in the area of capacity, the average delay per flight due to strike was 1.77 minutes in 2014 (i.e. 14% of total en-route delays). In terms of environmental impact, from January 2014 to December 2015, the additional distance flown in the European airspace due to strike amounted to 2.2 million kilometres. Overall between 2004 and 2016, a total cost of more than EUR 5.3 billion was incurred by airlines due to strikes in the EU. The rough estimate of the cost incurred by passengers for all delays in 2014 due to ATM strikes was around EUR 10 million. Source: COMMISSION STAFF WORKING DOCUMENT - Practices favouring Air Traffic Management Service Continuity – 8 June 2017

- reduce the environmental impact of flights (measured in flight extension as compared with an ideal trajectory);
- establish favourable conditions for the improvement of safety<sup>11</sup> (e.g. safety management systems); and
- improve cost-efficiency (measured in determined unit costs).

Details of the targets and the related indicators are provided in Section 2.3.

The **Charging Regulation** complements the Performance Regulation, defining common principles<sup>12</sup> at SES level for managing air navigation charges in full transparency, together with a set of mechanisms enabling risk-sharing between the service providers and users, and the application of local incentives (bonuses/penalties<sup>13</sup>).

Together, the schemes are aimed at gradually driving down the costs of service provision Union-wide, by defining binding targets for each reference period. These binding targets determining the (*fixed*) unit cost of ANSs, for both en route and terminal air navigation services, are set for each of the geographical charging zones. In this system, gains or losses compared to the target (expressed as the difference between planned and actual costs) accrue to or are borne by the service provider during the reference period. This is a major change from the previous charging system, in which *all* costs were charged to airspace users (full cost recovery). In the new system, ANS charges are pre-determined in the scheme; therefore the targets for cost-efficiency can be seen as achieved automatically. However, as a result of the incentives and risk-sharing mechanisms built into the schemes, adjustments are eventually applied to the predetermined charges on year n+2, which ultimately constitutes the actual cost incurred by airspace users.

The relationship between the objectives and the problems that the performance and charging schemes aim to address is summarised in the **intervention logic diagram** below.

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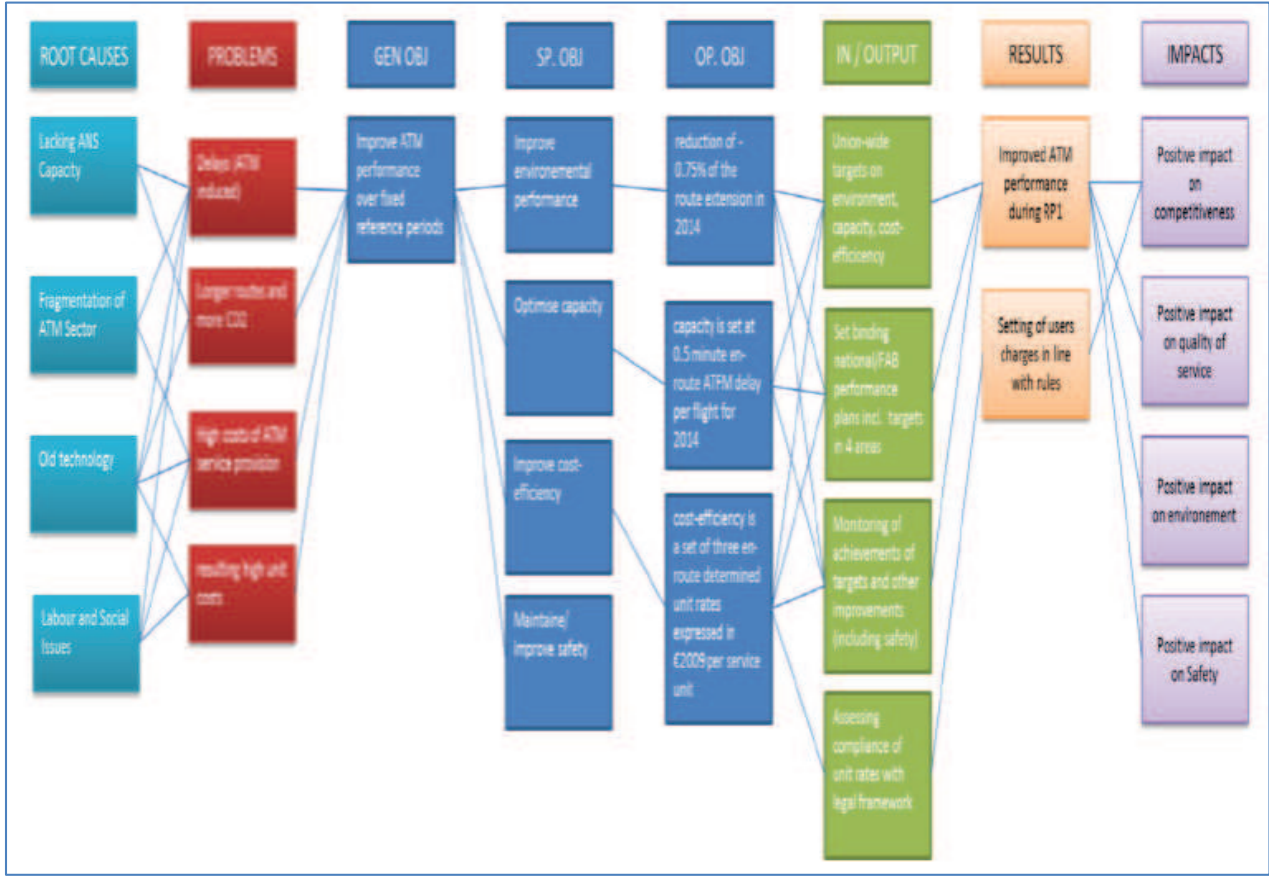
<sup>11</sup> Safety targets were not set in RP1, but introduced in RP2.

<sup>12</sup> See a chart describing the principles and mechanisms of the charging scheme in Annex 4.

<sup>13</sup> Incentives, some of financial nature, apply to air navigation service providers to support improvements in the provision of air navigation services, in the capacity and environment key performance areas. The SES framework regulation (Regulation (EC) No 549/2004) states that appropriate incentive schemes shall be adopted by the Member State(s). Therefore the incentives are set and monitored locally, but subject to stakeholder consultation and scrutiny at EU level to ensure consistency EU-wide ,



**Figure 1: Intervention logic**



**3.3. Baseline and RP1 performance targets**

For this *ex post* evaluation, **2009** was taken as the **baseline year** and the Union-wide targets for RP1 and RP2 were based on that year<sup>14</sup>. Multi-annual trends were also considered, comparing 2012-2015 with 2009-2011 or 2004-2011, in order to neutralise the effect of exceptional operational conditions.

The **RP1 performance targets**, set in a context of growing traffic (~+15 % forecast from 2009 to 2014), were aimed at improving capacity faster than traffic. The purpose was to reduce *en route* air traffic flow management (ATFM) delays<sup>15</sup> to ‘below the best-ever achieved levels’, with a target set at 0.5 min/flight to be achieved by 2014. Flight efficiency was also to improve faster than traffic in order to ensure the carbon neutrality of ANSs in RP1. Finally, costs were to be kept ‘nearly unchanged’, resulting in a significant decrease in unit costs (by approximately 13 % as compared with 2009)<sup>16</sup>.

<sup>14</sup> When the RP1 targets were set, 2009 was chosen as the baseline because of the availability of audited cost information prior to target setting.  
<sup>15</sup> ATFM delay is the average delay per flight attributable to ANSs; it is made up of *en route* and arrival delay.  
<sup>16</sup> Source: PRB 2014 Annual Monitoring Report – Vol. I, p. 63-64.



The schemes address the safety, capacity, environment and cost-efficiency KPAs, which are assessed according to key performance indicators (KPIs), with binding targets, and performance indicators (PIs), with a reporting requirement only, but no target.

Section 5.1 provides a description of the indicators and assesses the effectiveness of the schemes for each KPA. Table 1 gives an **overview**<sup>17</sup> of the KPIs and PIs used for each KPA, together with the EU-level targets in RP1 and RP2, and their baseline values in 2009. In the table:

- KPIs in place in RP1 are indicated in ‘***bold italic***’;
- KPIs introduced in RP2 are indicated in ‘*italic*’; and
- PIs are indicated in ‘regular’ font.

**Table 1: Main indicators and Union-wide targets**<sup>18</sup>

KPA/baseline	Indicators
<b>Safety</b> (baseline not applicable)	<i>Effectiveness of safety management</i> Application of ‘just culture’
<b>Capacity</b> (baseline 2009: 0.93 min/flight)	<b><i>En route ATFM delay per flight</i></b> Arrival ATFM delay per flight
<b>Environment</b> (baseline 2009: KEP 5.42 %)	<b><i>Horizontal flight efficiency</i></b> <sup>19</sup> – <i>Horizontal flight efficiency – ac</i>
<b>Cost-efficiency</b> (baseline 2011: DUR €59.97)	<b><i>Determined unit rates/costs (DUR/DUC for en route ANS)</i></b>

### 3.4. Methodological approach

The Commission contracted a consortium of consultancy firms (Ecorys, NLR, and Winsland) to provide assistance on the evaluation. The study was compiled between April 2016 and February 2017.

The methodological approach to the evaluation combined:

- desk research, analysing PRB and Eurocontrol reports and general ATM literature;
- field research, including an open public consultation and a stakeholder<sup>20</sup> survey between June and September 2016, combined with targeted interviews for more in-depth insights into specific issues;

<sup>17</sup> This overview shows the targets set at Union level. Additional targets set at local level (e.g. for arrival ATFM delay targets; terminal cost-efficiency targets at charging zone level, ‘just culture’) are not detailed in this study, but can be found in the supporting study.

<sup>18</sup> See Chapter 1 for a list of abbreviations.

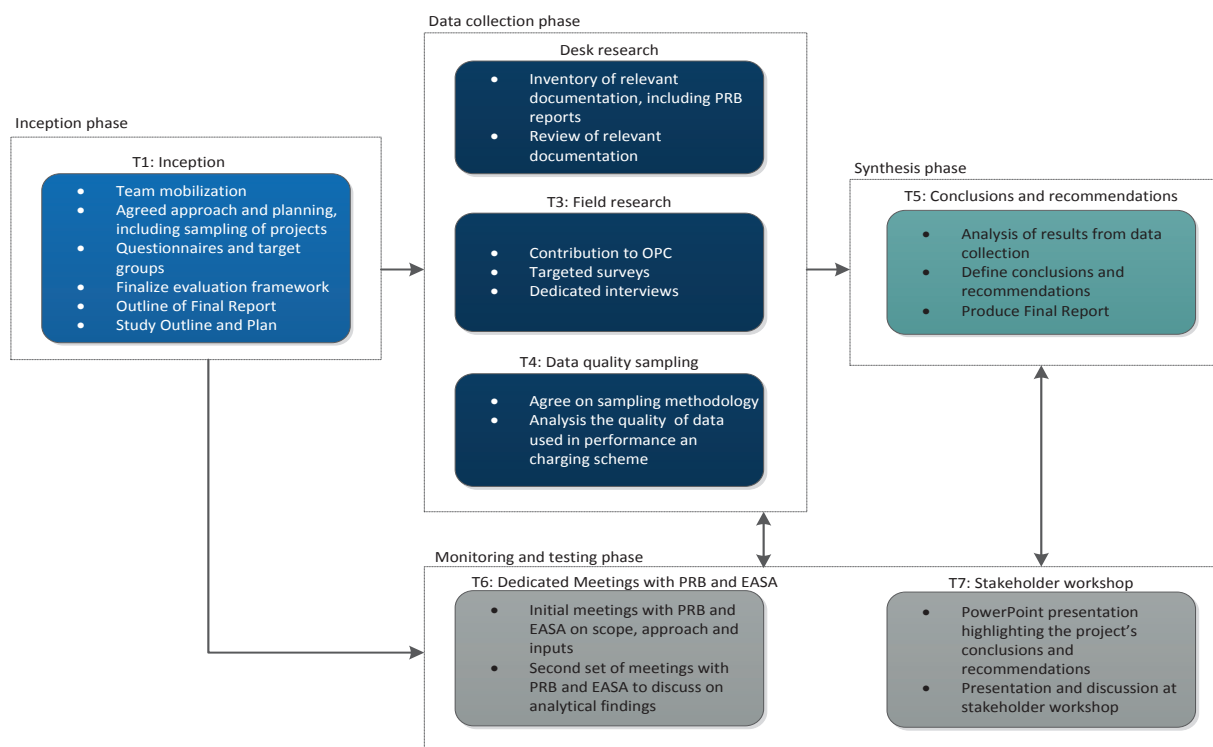
<sup>19</sup> The KEP and KEA assess the flight inefficiencies generated by ATM. The KEP measures the percentage of extension in respect of the planned trajectory (according to the most recent flight plan filed by the aircraft operator); and the KEA, the percentage of extension in respect of the trajectory actually flown.

<sup>20</sup> The stakeholders consulted in the study included the categories listed in Regulation (EC) No 549/2004 (air navigation service providers, airport operators, relevant airspace users or relevant groups representing

- validation exercises with the PRB and EASA; and
- a final stakeholder workshop with the national supervisory authorities (NSAs) and industry stakeholders (ANSPs and airspace users), where the findings of the studies were discussed.

The approach was divided into **seven principal tasks** (see Figure 2). More information on the stakeholder consultation is provided in Annex 2 (Synopsis Report) and the methodology and planning are further developed in Annex 3.

**Figure 2: Methodology**



Source: Ecorys

The PRB provided input in the course of the evaluation, in particular for the final analysis and recommendations. The PRB annual reports (four volumes: Union-wide overview, FAB/Member State view, capital expenditure and safety KPA) also provided valuable input.

In addition to the study, the Commission services considered various contributions from stakeholders, in particular lessons learnt from the NSA coordination platform (NCP), the Industry Consultation Body (ICB) and EASA, which provided additional expert insight for the evaluation of the schemes.

Complementary analyses were carried out and the recommendations of the study were put into the wider SES context.

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airspace users, military authorities, manufacturing industry and professional staff representative bodies) and the Member States (ministries of transport and national supervisory authorities),

### 3.5. Limitations of the evaluation

One of the main challenges was to determine the extent to which the observed changes could be attributed to the schemes or whether they would have occurred anyway. This applies particularly to **observed changes** in safety, environment, capacity and cost-efficiency performance.

To address this challenge, the study took a counterfactual approach, by identifying a sound pre-RP1 baseline (i.e. 2009–2012 performance data) across the four defined KPAs and trying to assess a ‘business as usual’ scenario. The baseline was then compared with the actual performance outcomes in RP1. However, given the limited availability of consistent data sets before RP1, this generated imprecisions for some indicators<sup>21</sup>.

Also, in order to avoid giving false causal explanations of observed improvements, it was necessary to identify the specific actions taken by ANSPs to achieve the performance targets. This was the subject of specific survey and interview questions. However, given the limited data availability, it was not possible to draw conclusions as to the strength of causal links, in particular for capacity and cost-efficiency.

Other limitations identified when addressing the evaluation questions related to **gaps in the evidence basis** (see Section 5):

- the impact of the schemes on capacity cannot be quantified in **isolation of confounding factors**, in particular traffic variations: it was therefore evaluated on a qualitative basis. The evidence of progress can be observed by comparing the delays achieved between two years of similar traffic, before and after the implementation of the schemes. For instance, the years 2012-2014 saw the lowest ATFM en route delays ever recorded (0.54 to 0.63 mn/flight) with traffic levels comparable to 2005/2006, when delays were around 0.9 to 1 mn/flight<sup>22</sup>;
- it is difficult to measure with any great certainty the **performance contribution of the schemes *per se***, in isolation from other SES instruments. The performance scheme acts as a catalyst for improvement as it defines the targets guiding the other SES instruments: Network Functions, SESAR programme, and FABs. In practice, the operational behaviour of ANSPs is influenced by all SES instruments, in particular the network functions<sup>2324</sup>, which define roles and responsibilities to optimise operations based on collaborative decisions. Therefore qualitative analysis is more relevant in this context, also when evaluating the efficiency of the schemes (Section 5.2) and EU added value (Section 5.5): the benefits should be taken with caution, and attributed to the SES framework in its entirety;

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<sup>21</sup> e.g. for the environment KPIs (see consulting study page 57) or for assessing fuel cost benefits to airlines as a result of reduced distance flown in RP1(see consulting study page 164).

<sup>22</sup> See Figure 4.

<sup>23</sup> Commission Regulation (EU) No 677/2011.

<sup>24</sup> Comments on the role of the Network Manager can be found in Section 5.1 Effectiveness, under Capacity and Environment (qualitative assessment).

- on the **efficiency of the schemes**, there was a lack of data for assessing costs incurred by stakeholders in relation to the schemes. The estimates must therefore be treated as average approximations. The assessment of benefits is also subject to the assumption that the schemes are enablers of the whole SES initiative;
- as regards the **coherent and satisfactory implementation of the schemes by all Member States**, it was not possible to carry out a detailed audit by Member State under this evaluation; and
- the **evaluation of EU added value** is constrained by the degree to which it is possible precisely to attribute benefits to the schemes (in isolation from other SES initiatives).

### 3.6. Critical assessment of the work carried out by the external contractor

Overall, the robustness of the conclusions and supporting data are in line with the Commission's services expectations. The approach presented by the contractor was considered suitable in the light of the questions to be addressed and the roadmap proposed a balanced mix of desk and field studies.

## 4. IMPLEMENTATION: STATE OF PLAY

All Member States implemented the schemes on time and **no infringement action** was taken. Member States established performance plans and set up monitoring and reporting mechanisms in line with their obligations under the schemes. The NSAs (established by the Member States under the SES framework Regulation) played a key role in establishing the schemes at local and FAB level. Cooperation among the NSAs was encouraged through an NSA coordination platform (NCP) performance working group established to facilitate the exchange of best practice and implementation of the schemes. The Commission, assisted by the PRB in its role as advisor, supported the NCP by providing guidance and consulting the NSAs on practical aspects of implementation.

The **monitoring arrangements** under the schemes contributed to effective and consistent implementation across Europe. Indeed the NSAs respected their reporting obligations towards the Commission, which contributed to reinforce their understanding of the local ANS delivery issues and their oversight capabilities, and enabled the building up of robust PRB monitoring reports at Union level. These reporting obligations are accompanied by full descriptions of the performance indicators, the related targets and the underlying processes. They include annual reporting by NSAs to the Commission and reporting by the Commission to the Single Sky Committee (SSC). The process is strengthened by the fact that the PRB advises the Commission on the whole cycle, from target-setting to results assessment. The effectiveness of the PRB is analysed in Section 5.1 (Q5).

**Some differences among Member States can be noted as regards the level of implementation.** For instance, only one Member State set up optional incentive

mechanisms<sup>25</sup> in RP1 and when these became mandatory in RP2 their scope and the detailed arrangements differed from one country to another. The resources of the NSAs and their range of skills are key factors determining their ability to monitor the implementation of the schemes and exercise all their powers. NSAs differ considerably in size, resulting in some divergence in the ‘maturity’ of implementation.

In economic terms, the **cost/benefit analysis (CBA)** of scheme implementation could not drill down to local level, as this would have required a highly complex analysis. However, as the overall CBA of the scheme is quite positive, it is assumed that benefits are perceptible at local level; this seems to be confirmed by the results of the consultation. The CBA is presented in Section 5.2 (Efficiency).

When it comes to **assessing results**, the monitoring mechanisms in the schemes provide a detailed view of progress on each KPA (safety, capacity, environment, cost-efficiency) and for the relevant geographical scope (Union level, FAB or Member State). This high degree of transparency is among the main benefits of the schemes and is recognised as such by the stakeholders. Improvements were recorded in each KPA, but were not always sufficient to achieve the Union-level or local targets. A summary of the results is presented in Section 5.1 (questions on effectiveness), including some high-level information on the geographical distribution. Details of achievements at Member State and FAB levels can be found in the PRB annual monitoring reports.

No unexpected results or ‘**knock-on effects**’ from the implementation of the schemes could be identified as such in other areas, beyond the scope of the schemes. However, some ANSPs may be tempted to react to a fall in revenue by postponing investments to protect their margins. This would impact the SESAR programme by delaying its deployment, which in turn would postpone necessary network capacity improvements in the medium term. This issue is investigated in Section 5.1 (Q1e). Possible side-effects within the scope of the schemes due to interdependencies between the KPAs are analysed in Section 5.4 (Coherence).

In summary, the **approach taken for this evaluation** is based on a comparison of the current state of play with the initial aims of the schemes:

- One of the main risks identified when the schemes were established was that economic regulation might be detrimental to **safety**; this was the reason for adding safety as a KPA. It is important to learn from experience in this respect (see Section 5.1);
- There is a strong focus on assessing the **schemes’ effectiveness** (see Section 5.1);
- When assessing the effects of economic regulation, as the interests of ANSPs and service users are naturally opposed, attention should be paid to **assessing the impacts for each stakeholder category**. This includes comparison with the situation prior to

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<sup>25</sup> In RP1, incentive mechanisms were voluntary in the areas of capacity and environment, while cost-efficiency incentives are built into the scheme and apply automatically to all Member States. In RP2 (2015), most Member States applied the incentives required by the Regulation.

the schemes and assessment of the economic impact of the schemes' adjustment mechanisms (see Sections 5.1 (Effectiveness) and 5.8 (Equity));

- Since the schemes are recent, a specific focus is required on identifying possible areas for **improvement/simplification in the implementation** of the schemes, in particular through stakeholder consultation; and
- Due to the cooperative nature of implementation, it is important to gauge the level of **stakeholder acceptance** of the principles of the schemes and the supporting arrangements. This encompasses the effectiveness of cooperation between the Commission and the Member States in the oversight of the schemes (see Sections 5.7 (Acceptance) and 5.1 (Q2)).

## 5. ANSWERS TO THE EVALUATION QUESTIONS

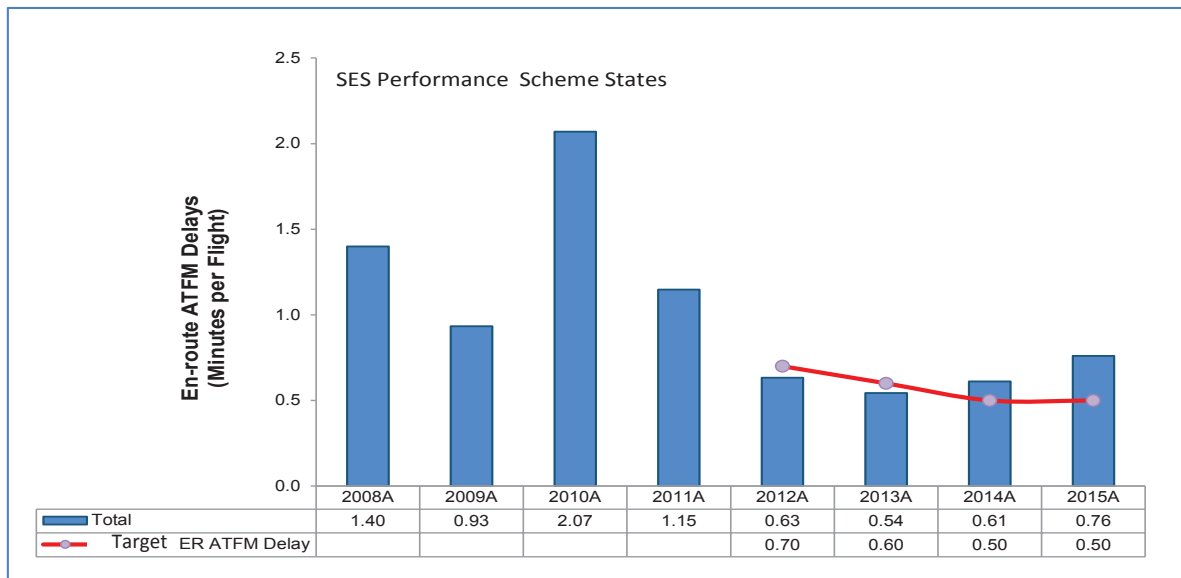
### 5.1. Effectiveness

#### *Q1.a. What effect on capacity was achieved in RP1?*

##### *Results and achievement of targets*

Capacity is measured with the proxy of ATFM *en route* delay per flight. It improved in the SES area over RP1-2 (2012-2015), without reaching the targets. As compared with the years immediately before RP1, the improvement is significant (Figure 3). However, this should be **put into the operational context**: 2010 and 2011 saw exceptional conditions (industrial action and controller shortage), while RP1 benefited from lower traffic than forecast when the RP1 targets were established, partly facilitating the achievement of the capacity targets.

**Figure 3: En-route ATFM delays (2008-2015)**



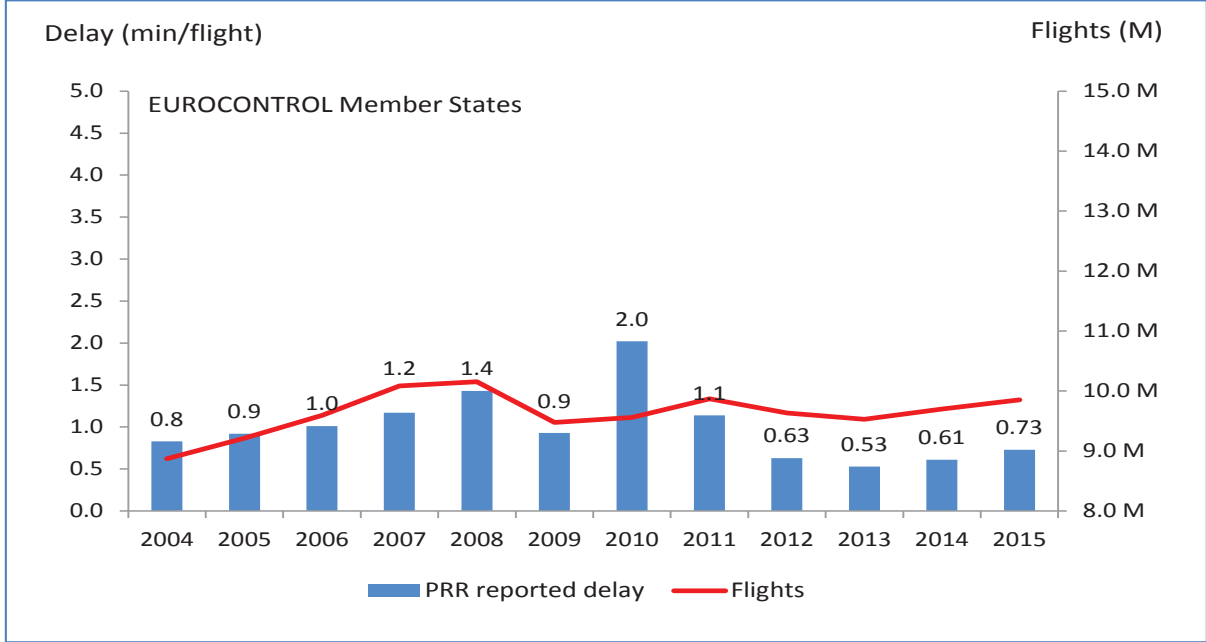
Source: PRB 2015 Annual Monitoring Report / Eurocontrol PRU data

As regards **trends over a longer period before RP1**, 2004-2011 saw an average *en route* delay of 1.2 min/flight, but the RP1-2 (2012-2015) average was 0.6 min/flight. This is shown



in Figure 4, which also highlights the strong correlation between delay and traffic. After neutralising the effect of the traffic, the positive trend can still be observed<sup>26</sup>. There are **no obvious causal factors** for this trend, other than the implementation of SES II, so this ~0.6 min/flight difference can be attributed to the performance scheme applying further pressure on delays and acting as a catalyst for change.

**Figure 4: En-route ATFM delays (2004–2015)**



In the period 2012-2015, en route ATFM delay was primarily caused by shortage of air traffic control (ATC) resources and related staffing issues (by on average 60%<sup>27</sup>). The contribution of ATC capacity/staffing issues to the total delay has decreased significantly since the years 2008-2011 where it was around 80%, demonstrating a constant improvement in the management of ATC capacity in line with air traffic demand<sup>28</sup>. In operational terms, delay savings may have been generated by the ANSPs investing in capacity ahead of demand and/or better utilisation of available capacity thanks to the network functions<sup>29</sup>, although the evaluation of the respective contributions of these influencing factors was not analysed.

<sup>26</sup> Data for Eurocontrol Member States: The magnitude of the impact of traffic on delays cannot be assessed with certainty, due to the likely influence of other factors. A simple method for neutralising the effect of traffic is to compare the delays achieved in 2012-2014 (the best levels ever achieved) with the years with similar traffic before the schemes were implemented (2005-2006). This shows a decrease in delays by more than one third (from 0.9 to 1 mn/flight to 0.54 to 0.63 mn/flight). Similarly, in 2016, Europe handled comparable traffic to 2008, with 35% less delay. This demonstrates the positive impact of the schemes, although this empiric method does not allow isolating precisely the influence of the traffic factor.

<sup>27</sup> With one exception in 2013, corresponding to the lowest recorded traffic during this period, when ATC capacity only represented 50% of total en route ATFM delays.

<sup>28</sup> As an example, in 2015, the delay causes for en route ATFM delay were: Capacity/staffing constraints (61%), Weather (14%), other ATC issues: technical, etc. (11%), other causes (14%)

<sup>29</sup> The assessment of the contribution of the Network Manager to performance was not in the scope of this study. However, it is likely to have contributed significantly to the capacity KPA as it has achieved its individual targets of delay savings every year of the 2012-2015, with a contribution estimated to 10% to 13% of the overall en route ATFM delay (source: NM Annual Reports).



Overall, however, mixed results were reported as regards the **degree to which the targets were achieved**: There were no Union-wide targets in 2012 and 2013 and the targets of 2014 and 2015 were not achieved.

### *Local analysis*

**At local level**, the reasons for the delay target not being met are down to a small number of ANSPs which dominate the shortfall in performance. In 2015, four of the nine FABs achieved their delay targets, three did not and two did not have targets accepted for RP2 at the time of writing this evaluation. *En route* delay was on the rise in 2015 and 2016, primarily due to capacity and staffing issues, but also industrial action and weather delays. The same three FABs missed their capacity targets in 2015.

### *Airports*

**At airport level**, ATFM arrival delay followed a similar pattern, with significant improvements in RP1 compared with the 2009-2011 average; the 2015 targets were not achieved.

### *Summary*

**ATFM delays decreased over RP1 (although less than expected)** and the schemes, acting as catalysts for change, contributed somewhat to this improvement. However, the increase in delays in 2015 and 2016<sup>30</sup> puts a question mark over the **sustainability of this achievement** in the long term. The root causes of this growing mismatch between available capacity and demand are not in the scope of this evaluation and deserve further analysis.

### *Q1.b. What effect on the environment was achieved in RP1?*

**Optimising flight trajectories** helps to reduce the environmental impact of air transport by saving fuel and reducing related emissions. Flight extension (due to the constraints imposed by ANSPs' decisions) is a proxy of the environmental impact of ANSPs. Under the performance scheme, it is measured with **two indicators**: the KEP, which assesses the inefficiency of the planned trajectory generated by ATM (according to the most recent flight plan filed by the aircraft operator); and the KEA, which assesses the inefficiency of the trajectory actually flown.

### *Results and achievement of targets*

Flight efficiency improved over the period (see Figure 5): the **KEP indicator** dropped steadily (from 5.15 % in 2012 and 5.11 % in 2013 to 4.90 % in 2014 and 4.84 % in 2015), without reaching the RP1/2015 targets and the corresponding indicative profile<sup>31</sup>.

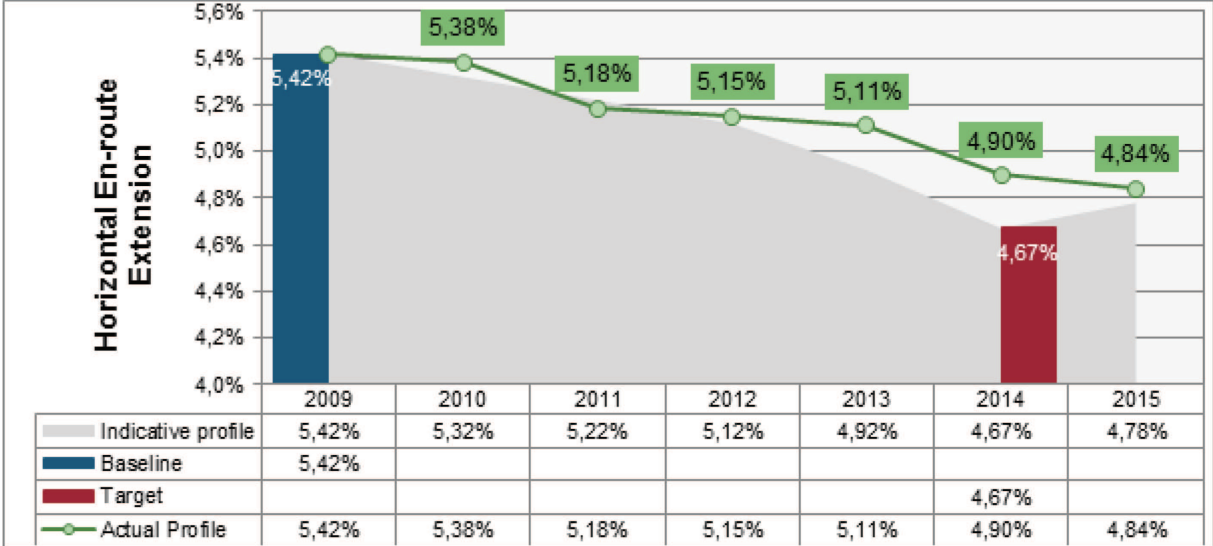
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<sup>30</sup> Based on the PRB Annual Monitoring Reports.

<sup>31</sup> i.e. planned yearly KEP values (end-of-period performance target and intermediate values).

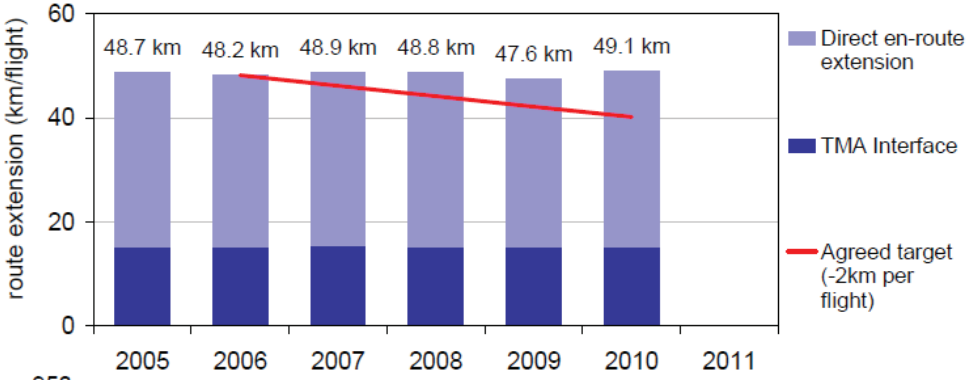
In 2015, new targets were introduced for the flight efficiency of the **actual trajectory (KEA)**, which is a better reflection of actual environmental impact. The Union-wide KEA target was met (2.80 % flight extension vs. a target of 2.96 %).

**Figure 5: Flight efficiency – target and performance (KEP)**



One-to-one **comparison** between these results and trends measured before the 2009 **baseline** is not possible due to technical differences in the measurement of the flight efficiency indicators. However, Eurocontrol reports for 2004-2009 show that flight efficiency was generally stable, despite agreed targets for gradual reduction. This is reflected in Figure 6. The only recorded improvements are related to *en route* network design.

**Figure 6: Horizontal flight extension, targets and TMA interface**



Source: [Eurocontrol Performance Review Report 2010]

**ANS environmental impact at airports**

ANS environmental impact has been measured in terminal areas only since 2015 using two performance indicators (i.e. monitoring values without targets). For the majority of the 22

major airports targeted in RP2, results are below desirable thresholds from an operational efficiency perspective. However, these findings should be tempered by the fact that the indicators are recent and not fully reflecting all dimensions of flight efficiency at airports.

### *Local analysis*

As regards performance at **local level**, most of the inefficiencies are concentrated in the core area<sup>32</sup>; this is logical, given the higher traffic density. Local differences require further analysis, but it is assumed that overall the improvements were due to a combination of:

- multiple operational initiatives (e.g. SESAR free route airspace projects);
- the airspace improvement projects carried out by the ANSPs; and
- the route network design function performed by the Network Manager.

### *Summary*

In the light of the progress made (as measured by the various indicators) and the trends recorded before RP1, it appears that **the performance scheme helped to improve flight efficiency** in 2012-2015. However, this view is not shared by all stakeholders<sup>33</sup>: in particular in the case of ANSPs, this may be explained by their reservations about the KEP indicator, over which they claim to have limited control, as trajectories also depend on flight planning by airlines<sup>34</sup>. Environmentally sub-optimal flight planning may be the result of multiple factors, such as economic imperatives (avoiding areas with high unit costs) and non-dynamic planning systems (unable to grasp the opportunities of direct routes when a military airspace is released).

Airspace users call for flight efficiency to be measured gate-to-gate, on the basis of fuel consumption for the entire flight (i.e. better integrated with the measures for terminal services).

#### *Q1.c. What effect on cost-efficiency was achieved in RP1?*

Cost-efficiency targets are **set on the basis of determined unit costs in real terms**. Charges are capped at their determined levels, so the cost-efficiency targets are met automatically by design (apart from permissible adjustments); Member States could not charge more than the determined unit costs. This is due to the key principle of the charging scheme: **cost-sharing**. Where actual costs fall below the determined costs established at the beginning of the period (e.g. due to additional efficiency measures), the difference accrues to the entity concerned. However, if actual costs exceed determined costs, the entity bears the excess.

There are **certain exceptions** to this rule and the charging scheme allows for some pre-defined **adjustments**, which are added to (or subtracted from) the determined costs to

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<sup>32</sup> Core area: central part of Western Europe, with the highest traffic density and operational complexity.

<sup>33</sup> A third of the respondents agreed with this statement in the survey during the supporting study.

<sup>34</sup> The KEP is based on the trajectory defined in the most recent flight plan filed by the airspace user, over which the ANSPs have limited control.

establish the annual charges. These adjustments take account of differences between forecast and planned inflation, or due to traffic risk-sharing, traffic variations, bonuses or penalties resulting from incentive schemes (mandatory only from RP2), legacy carry-overs, etc. Also, certain costs are exempt from the cost-sharing principle. In RP1, these were referred to as ‘uncontrollable costs’ and included variations in a defined category of costs that are deemed to lie beyond the control of the entity concerned and were not foreseen at the time the performance plans were adopted.

Altogether, such adjustments contributed to **charges that were higher than the determined unit costs in RP1 but, for the first year of RP2, adjustments were in favour of airspace users**. The unit costs actually incurred by airspace users in a given year (i.e. based on determined unit costs and allowable adjustments) are referred to as ‘true costs’. The differences between determined unit costs and actual unit costs incurred by airspace users or ‘true costs’ are shown in Table 2.

**Table 2: Cost-efficiency performance in RP1 and RP2 (first year), Union level (EUR<sub>2009</sub>)**

Union level	2012		2013		2014		2015	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual <sup>35</sup>
Union-wide target	57.88		55.87		53.92		56.64	
Aggregation of local targets (i.e. planned)	57.75	58.43 <sup>36</sup>	56.69	56.55	54.84	54.15	55.33	52.85
Actual unit cost for users (AUC-U) <sup>37</sup>	n/a	59.33	n/a	58.34	n/a	55.68	n/a	54.34

Source: PRB annual monitoring reports.  
n/a = not applicable.

The first conclusion that can be drawn is that **cost-efficiency improved in RP1**. The target in the first year of RP2 (2015) exceeded those for 2014, this was driven mainly by the traffic downturn in RP1 (i.e. the traffic forecast for 2015, which is the denominator for the calculation of targets, was lower, leading to a higher target value).

The second conclusion is that also the **‘true costs’ to airspace users fell over the period (2012-2015)**. However, they exceeded the established targets in RP1. In 2015, adjustments resulted in savings to airspace users. The Commission services may consider tracking the ‘true costs’ to airspace users through a new indicator in RP3.

**Some adjustments may still be deemed appropriate.** For example, given that a high proportion of ANS costs are fixed, the entities concerned have a limited margin to respond to variations in demand (traffic). Also, some additional costs relate to legacy carry-overs from before the implementation of the schemes; however, their impact is limited to the first two reference periods.

### ***Trend of total costs – impact of service units***

<sup>35</sup> Source: PRB 2015 Annual Monitoring Report.

<sup>36</sup> Actual costs as monitored by the PRB.

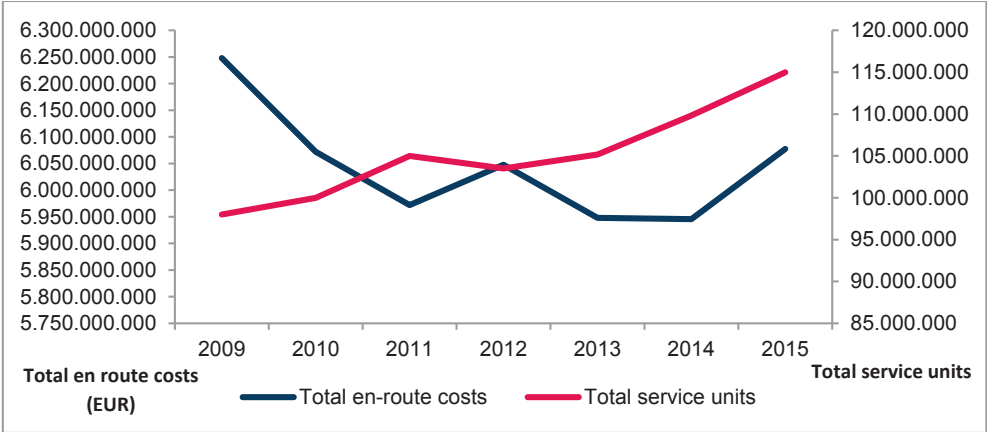
<sup>37</sup> The study took the value from Table 26 in the PRB 2014 Annual Monitoring Report (Vol I: Union-wide).

To put the results achieved in RP1 into perspective, over a six-year period (2009–2014) the ANSPs saw their total costs go down by about EUR<sub>2009</sub> 800 million, while handling almost 12 million more service units (measure of traffic). Given the EUR 150 million cost reduction achieved in 2012-2014, when there was an equal increase in traffic service units (six million more over three years), it can be concluded that the schemes did not accelerate the pace of cost-efficiency improvements. The large decrease just prior to RP1 could be interpreted as resulting from a combination of:

- an increase in traffic following the downturn of 2008-2009 (economic crisis); and
- the ANSPs anticipating the adoption of the performance and charging schemes, introduced under the Basic Regulation in 2009.

Analysis of 2015 results<sup>38</sup> compared with 2014 shows that little additional progress was made on cost-efficiency, since service units increased faster than costs (+4.7 % vs. +2.2 %).

**Figure 1: Total costs and service units**



Source: Ecorys, PRB annual reports.

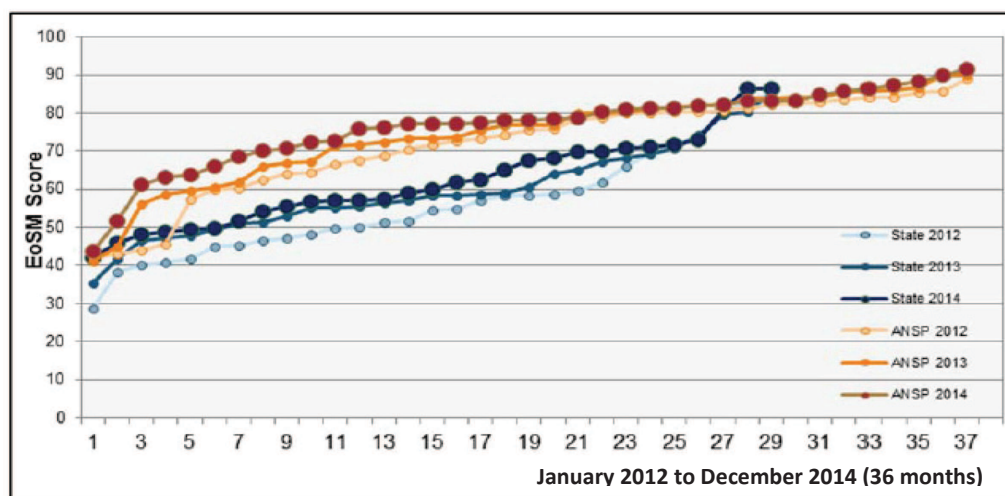
The third conclusion is that cost-efficiency improvements were moderate (actual unit costs incurred by users decreased by 8 % from 2012 to 2015) and are mostly attributable to traffic increase rather than to efforts to reduce ANS costs.

**Q1.d. Did safety levels improve in RP1? If so, could this be attributed to the SES performance scheme?**

Aviation safety performance can be described as the **probability of an accident**, with lower probability indicating better performance. Aviation accidents relating to ATM are rare, so monitoring them does not provide a reliable measure of aviation safety. Alternative indicators are required, which consider **factors that enable ‘safety’ performance** or **incidents that may act as precursors to accidents**. A set of these ‘leading indicators’<sup>39</sup> was established, including the measurement of the effectiveness of the safety management system (EoSM) of the ANSPs and NSAs.

<sup>38</sup> Targets in the first year of RP2 were higher than those for 2014, due to traffic forecast changes (see above).  
<sup>39</sup> See Ecorys study and PRB annual reports for details.

**Figure 8: EoSM scores<sup>40</sup> in RP1**



Source: PRB 2014 Annual Monitoring Report, Vol. I.

The choice of **safety PIs** in RP1 is considered reasonable: a well-established safety management system, a healthy safety culture and a good process for learning from past occurrences are essential enablers of safety performance.

**Performance on the safety PIs and KPIs improved continuously<sup>41</sup>** from the start of the performance scheme in 2012 to 2015. As pointed by most stakeholders, it appears that part of this improvement can be attributed to the scheme, but that there are also other drivers.

The **level of safety**, expressed as the number of serious incidents with ANS contribution, also improved during RP1. However, it is difficult to assess how much the scheme contributed to this, due to the loose links between leading indicators and safety outcomes.

A few stakeholders (spread across all stakeholder groups) consider that safety should not be a performance KPA, as it is a pre-requisite for air transport operations, which EASA is already responsible for monitoring. It is recognised that **the management and reporting of the KPIs may be simplified**, so as to avoid duplications, although safety should remain in the scheme as a counterbalance to the effects of targets for the other KPAs. The safety indicators should evolve in the light of the longer-term positive effects of organisations' investments to meet the performance indicators.

*Q1.e. What were the effects on investment activity in ATM infrastructure in RP1? Are there significant differences between investments planned in the performance plans and actual investments?*

A total of approximately €2.3 billion was invested in RP1. However, actual investments differed significantly from those set out in the national performance plans (PPs). At Union

<sup>40</sup> EoSM cumulated scores for ANSPs and Member States over 36 months, with geographical scope adjusted over time.

<sup>41</sup> With the exception of significant degradation of one ANSP's EoSM in 2015, for which corrective measures were taken.



level, significantly less was invested in RP1 than was planned: the shortfall was almost 25 % (about EUR<sub>2009</sub> 750 million) and eight Member States invested less than 50 % of the planned amounts. In the longer term, this **postponement or cancellation of investments** could have a negative impact on overall ANS performance, as investments are needed to modernise the current ATM system by upgrading capabilities and increasing capacity. The issues identified for RP1 persisted in 2015, with an average investment shortfall of 27 %.

Although the schemes do not allow for pre-financing of investments, allowances for cost of capital and depreciation are included in the costs ANSPs charge to airspace users. Currently, the schemes contain **no provisions** on how to return unrealised, but charged, investment costs. The charging principles of cost-reflectiveness, transparency and cost-efficiency should have dictated that costs related to unrealised capital expenditure (CAPEX) from RP1 were clearly considered in the investment planning for RP2.

CAPEX may be subject to **greater scrutiny** in the future to ensure that, when it is cancelled or postponed, any related allowances are treated accordingly and not used to increase profit margins. Guidance could be given to the NSAs to ensure consistent application of this principle. There is also room to **improve the tracking** of investment plans by national authorities.

**Q1.f. Did costs shift between regulated en route activities and unregulated terminal activities in RP1?**

The study found no evidence of substantial shifts from regulated *en route* activities to unregulated terminal activities in RP1. Full cost recovery applied for terminal air navigation services (TANSs) in all countries except France.

At Union level, terminal costs as a proportion of total ANSP costs fell slightly in RP1 and 2015 (to around 15 %), a trend that goes back to 2010. Between 2010 and 2014, actual TANS unit costs decreased even faster on average than actual *en route* ANS unit costs (by 3.6 %, as against 2.7 %, per year)<sup>42</sup>.

This was confirmed by most stakeholders consulted, including airspace users and most ANSPs and NSAs, who do not see potential shifts from terminal to *en route* costs as an issue.<sup>43</sup> However, there are significant differences among Member States in the allocation of costs between *en route* and terminal, and these may require more scrutiny in the future.

On the other hand, in many Member States, the cost-efficiency targets had a positive side-effect in terms of reducing terminal costs as well, due to the synergies in the ANS cost basis, as TANSs and *en route* ANSs are normally provided by the same ANSP.

**Q2. Were the objectives achieved? If not, what factors hindered the achievement of the objectives?**

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<sup>42</sup> Source: Eurocontrol, *Overview of terminal ANS cost-efficiency performance 2010-2019*.

<sup>43</sup> However, some stakeholders indicated during the interviews that they were aware of substantial proportions (20-30 %) of costs being shifted, although no evidence of such facts could be established.



The high-level objective of the schemes was to introduce performance as a driver for service provision from both a service-level and an economic perspective. Analysis of the effectiveness of the schemes (see above) indicates that **this objective can be considered to have been achieved**. In RP1, performance across all four KPAs improved measurably, albeit in a context of significantly lower traffic levels than planned. The lower traffic made it easier to achieve targets in the area of capacity and environment, but harder to achieve cost-efficiency targets.

The **results achieved by the schemes** in the various KPAs can be summarised as follows:

- **capacity:** the average delay declined from 1.2 min/flight in the period prior to RP1 (2004-2011), to an average of 0.6 min/flight in the evaluation period (2012-2015);
- **environment:** the average horizontal flight efficiency of last filed flight plan trajectory (KEP) amounted to 4.9 % in 2014, as compared with 5.4 % in 2009;
- **cost-efficiency:** the determined unit rate (DUR) was EUR<sub>2009</sub> 54.13 in 2014, as compared with EUR<sub>2009</sub> 63.70 in 2009; and
- **safety:** performance on the safety PIs has improved continuously since the start of the performance scheme.

However, while improvements as compared with the baseline prior to RP1 did materialise, they were not sufficient in most cases to **keep pace with EU-level targets**<sup>44</sup>.

The main **factors cited by stakeholders as having hindered their ability** to achieve the objectives of the schemes are:

- social and labour issues, and the resulting industrial actions<sup>45</sup>;
- the fact that current targets do not sufficiently account for interdependencies between objectives (i.e. failing to determine the right balance between the KPAs) and between different types of operators – a concern primarily raised by the NSAs;
- financial limitations – a concern primarily raised by the ANSPs;
- lack of political support from Member States (due to vested interests in ANSPs' results) – a concern raised by airspace users; and
- exogenous factors that affected cost-efficiency: the economic climate (i.e. the 2008 crisis) and the resulting traffic downturn.

The **target management process** itself includes mechanisms that hinder the objectives of the schemes:

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<sup>44</sup> See Union-wide targets on page 8. In all years of the considered period, the targets were met for flight efficiency (KEP/KEA) and for cost efficiency (by design) but they were not met for en-route capacity.

<sup>45</sup> In the public consultation, social and labour issues were most frequently named as the factor hindering the achievement of KPIs in capacity (by the majority of airspace users, many ANSPs and even one trade union) and in cost efficiency (by airspace users and ANSPs).

- **target-setting** is subject to political compromises (Member States have to agree on targets);
- the same argument applies to **target enforcement**: corrective measures for non-compliant Member States are subject to a majority vote;
- the final **agreement on national targets** takes too long and is not always finalised before the reference period commences. Given the long lead-time that the ANSPs require to implement changes, this may impact the effectiveness and credibility of the schemes;
- there is a **lack of flexibility in the target-setting** in the performance plans, resulting in targets that may over time lose touch with operational realities (e.g. traffic developments) and do not always address changes in local circumstances;
- the scheme does not integrate well with **FABs** and FAB targets are simple amalgams of national targets. The reality is that the KPAs are not directly managed by FABs and the FABs' influence on them is minimal. Setting FAB-level targets is thus of questionable value.

In summary, the study identified several issues which would require a specific attention due to their detrimental effect on the schemes:

- the difficulties of the NSAs for evaluating **interdependencies** when setting local targets. This could be addressed by sharing expertise and best practices with NSAs on target-setting, and by developing common knowledge capital on these matters, including benchmarking between ANSPs.
- the **political and social issues** mentioned above, requiring a proportionate response to their impact.
- The inefficiencies of the target setting mechanism and its dependence on the **accuracy of traffic forecasts**, for which technical solutions should be investigated.

*Q3. Are there other indicators that should have been used to measure or target performance improvement so as to achieve the objectives better?*

The study concluded that there appear to be few alternative methods that would significantly improve the scheme without introducing complexity or additional indicators. However, the following limited changes could be investigated, with a proportionate approach to avoid over-complicating the scheme:

- **environment KPA**: including a vertical flight efficiency indicator and/or time-based horizontal flight efficiency indicators (as time is a closer proxy to airspace user costs than distance) would improve the completeness of the current indicators;
- **safety KPA**: improving and simplifying the EoSM indicator, to reduce the reporting workload for NSAs, but not introducing targets for safety outcome-based

indicators<sup>46</sup>, as this is counterproductive and would put at risk the ‘just culture’<sup>47</sup> initiatives in place, potentially harming safety levels;

- **cost-efficiency KPA:** monitoring the ‘true cost’ for users, which includes adjustments, as this would better reflect the full economic impact of the regulation; introducing a total economic value indicator, which captures the quantifiable impacts of the other KPAs (e.g. fuel consumption and CO<sub>2</sub> emissions), although this may be complex and not achievable in the short term; and
- **capacity KPA:** including the percentage of flights delayed by >15 min to take better account of peak delays, or adding weighted delay indicators to target operationally critical (e.g. first rotation) flights. This would help in targeting the operational root causes of delay.

More in-depth analysis will be required in this area when developing the options for RP3, in order to consider all possible impacts of changes in indicators.

*Q4. Are actions at national and EU level organised so as to maximise their joint effects, e.g. by mobilising resources at national level supporting the implementation of the performance scheme (e.g. NSA working group)?*

The main finding on this question is that actions at national and EU level are **not systematically organised** so as to maximise their joint effects, but are dictated by growing requirements and shrinking resources. While there are some examples of NSA working groups on performance, for example, joint actions tend to be organised within the FAB structures. There are many FAB initiatives that provide some joint-effect benefits, but the majority do not focus directly on the performance and charging schemes.

Another more general observation, confirmed by ANSPs and NSAs, is that **NSAs are generally under-funded and lack sufficient resources and expertise** to implement the performance scheme. The scheme requires Member States to set up a proper NSA, but in practice some NSAs tend to resolve staffing issues by relying increasingly on ANSPs’ expertise, which jeopardises their independence.

It can be concluded that the asymmetry of information between ANSPs and NSAs and the under-resourcing of certain NSAs is not fully mitigated by the joint actions indicated by stakeholders.

*Q5. Was the PRB set-up in RP1 (designation of Eurocontrol’s Performance Review Commission as PRB, supported by Eurocontrol’s Performance Review Unit) effective in providing the Commission with independent advice in respect of its tasks under Article 3(3) of Regulation (EU) No 390/2013?*

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<sup>46</sup> i.e. occurrences of safety issues (incidents, etc.).

<sup>47</sup> "Just Culture" is a culture in which front-line operators and others are not punished for actions, omissions or decisions taken by them which are commensurate with their experience and training, but where gross negligence, wilful violations and destructive acts are not tolerated.

The PRB was first set up in late 2010 and **has been effective**<sup>48</sup> in providing the Commission with advice on all its tasks under Article 3(3) of the Performance Regulation. Its advice on target-setting for RP1 and RP2 was based on substantial analysis of historical data and comparisons with US performance. The work was robust in its range and depth, and subject to stakeholder consultation.

However, in 2015, the PRB draw the attention of the Commission and the SSC<sup>49</sup> to issues regarding the support from Eurocontrol, in particular its ability to act independently under the functional control of the PRB.

The Commission services concluded that the set-up of the PRB should be changed<sup>50</sup>. As of mid-2017, the PRB is constituted as an independent group of experts appointed directly by the Commission and supported by an external contractor, while Eurocontrol continues to provide performance data.

**Q6. *Did the quality of the data submitted in accordance with Annex V to Commission Implementing Regulation (EU) No 390/2013 and the Annexes to Commission Implementing Regulation (EU) No 391/2013 allow the Commission and the PRB to use it in a suitable way in RP1?***

The study combined investigations based on data sampling and thorough interviews with the actors involved in the process. It concluded that the data submitted in accordance with Commission Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013 and managed by Eurocontrol is of a **quality** that allowed the Commission and the PRB to use it in a suitable way in RP1.

The **accuracy of the data** was assessed as follows:

- The study estimated measurement errors for a sample of indicators (*en route* delay and horizontal flight efficiency). Fractional errors<sup>51</sup> in *en route* delay (typically <2 %) had a minor impact on the performance scheme;
- As regards the charging scheme, random errors are low<sup>52</sup>, but the main risk to accurate measurement is the extent to which NSA charging data can be reconciled with audited accounts<sup>53</sup>. This is considered to be the main limitation to the findings of the study; and
- Certain systematic errors were discovered and addressed through greater data consistency and validation checks. These appear to have been dealt with relatively quickly and did not have a material effect on the performance scheme.

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<sup>48</sup> See page 106 of the consulting study

<sup>49</sup> See page 106 of the consulting study

<sup>50</sup> See page 106 of the consulting study

<sup>51</sup> A fractional (or relative) error on an indicator is expressed as a percentage of the total value of the indicator.

<sup>52</sup> See page 110 of the consulting study

<sup>53</sup> See page 110 of the consulting study

The Commission services consider that the PRB may **continue periodically to scrutinise** the potential errors in data collection and handling. In RP3, the focus should be on identifying the possible impacts on the local incentives schemes, which are now more widely deployed, and providing the NSA concerned with advice as necessary. Another area of attention should be translating the operational data used by the NM into data tailored for the purpose of the performance and charging schemes.

*Q7. Were the handling of data, the data analysis, the data review and resulting findings effective?*

The study found that the handling of data (held by Eurocontrol), the data analysis, the data review and resulting findings were effective<sup>54</sup>. The study team made an in-depth assessment of the main data management processes: the handling of ATFM delay, flight efficiency (KEA) and airport data.

The processes for gathering and handling data appear robust:

- processes are documented in various forms;
- data gathering is supported by written guidance and coaching for data providers;
- a wide variety of error-checking and validation methods are used to ensure data accuracy;
- data gathering is by electronic means with good security management. Eurocontrol validates data on an ongoing basis; and
- several issues were detected and analysed, and recommendations made to DG MOVE.

*Q8. Did the data analysis take sufficient account of existing agreements of delegation of airspace in Europe, so that the results of cross-border activity were allocated correctly?*

The study estimates a small error bound for apportioning ATFM delay for service delegations (e.g. cross-border areas) across FABs in the measurement of delay for RP2. The variance is explained by measuring performance according to flight information region (FIR)<sup>55</sup> boundary (depending on national boundaries), whereas in RP1 it was measured on the basis of operational boundaries. Information on this was only available towards the end of the study period, so the study team made a rough estimate of the **size of error as <2 % of the total measured delay**.

It appears that the change in scope for apportioning ATFM delay (from operational to national borders) has an impact on some FAB/Member States' incentive schemes. This impact is expected to be limited (less than 2 % of the total delay measured Union-wide), as it will

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<sup>54</sup> See page 116 of the consulting study

<sup>55</sup> A FIR is a specified region of airspace in which a flight information service and an alerting service are provided. FIRs are linked to national airspace, i.e. the portion of the atmosphere controlled by a country above its territory.

mainly concern ANSPs that have delegated services beyond the borders of their FAB and for a substantial portion of their airspace. The Commission services intend to **ask the PRB for advice on this matter**. The proposed solution should be in line with the objectives of the SES, i.e. facilitating cross-border operations in order to reduce the fragmentation of ANSs and optimising their overall efficiency.

## 5.2. Efficiency

*Q9. Were the outputs and (expected) effects obtained at a reasonable cost? (This should include estimates of the costs at all levels: EU level (including PRB), national level (NSA costs, etc.), airspace users and other stakeholders participating in the scheme.)*

The benefits catalysed by the schemes **significantly outweighed the costs** over the period (2012-2015). In quantitative terms, the **benefits** are estimated at €3.4 billion, while the costs are put at €87 million.

The benefits consist of:

- delay reduction improvements for airspace users: €1.139 billion;
- delay reduction improvements for passengers: €771 million; and
- reduction of *en route* service provision costs for airspace users: €1.512 billion.

The benefits were quantified by comparing the values for delay and cost-efficiency<sup>56</sup> in RP1 with a **hypothetical baseline** trend in the absence of the schemes<sup>57</sup>. The baseline was the 2009-2011 average, which to a large extent excluded from the analysis the effects of preparations for RP1.

The benefits are considered to have been **catalysed** by the schemes, the operational realisation of which requires investments from ANSPs and contributions from other SES pillars such as the NM. In addition, there are benefits that have not been quantified (improved flight efficiency, increased transparency and uniformity in reporting on ATM performance).

The **costs** are primarily incurred by the EU budget, ANSPs and the NSAs<sup>58</sup>. There are some limitations in the cost assessment: it does not cover the work of the NM and the cost estimates for ANSPs and NSAs were based on a limited response in the survey. In mitigation, the draft findings were validated during the external workshop with stakeholders.

It appears that the system is complex and leads to a **high administrative burden**, in particular for the NSAs<sup>59</sup>; this needs to be addressed in RP3.

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<sup>56</sup> AUC-U or ‘true costs’ for the users (i.e. taking into account adjustments).

<sup>57</sup> See page 125 of the consulting study

<sup>58</sup> See page 124 of the consulting study

<sup>59</sup> As mentioned in Q10, the NSAs consider that their tasks related to target setting, yearly monitoring and reporting to the Commission are too time consuming. The evidence of this workload and possible simplifications could be subject to investigations in the RP3 impact assessment.



*Q10. Could the same results have been achieved with a system that is less complex and requires less intervention (less data, etc.), and thus at lower cost?*

There was no **evidence** to suggest that results of the same order of magnitude could have been achieved against much lower costs. Nevertheless, marginal system cost savings are possible.

The **benefits** catalysed by the performance and charging schemes (see Q9) stem primarily from cost-efficiency improvements and, to a lesser extent, from delay reductions. In addition, there have been benefits in the area of flight efficiency and more general benefits from increased transparency and uniform performance reporting which are difficult to quantify.

Although many stakeholders thought that the same results could have been achieved in the absence of the schemes (an opinion expressed primarily by ANSPs and NSAs, rather than airspace users), their only solid argument is that this could have been based on ongoing **customer dialogue**. The study team noted, however, that before the Regulations were implemented, such customer dialogue did not result in the same level of performance improvement. Also, airspace users indicate that, given the monopoly nature of service provision, customer dialogue does not automatically result in performance improvements, even given the targets in the current system. Stakeholders generally acknowledge the **EU added value** of the schemes (see Q16). The study team therefore concludes that it is difficult to see how the same results could have been achieved under a different system.

Most stakeholders stress the **complexity** of the current system in various areas: performance plan development and review, the reporting requirement and subsequent monitoring by the PRB, and the reporting and review of cost-efficiency data, including allowable adjustments.

Data **reporting, checking and monitoring** also represent a substantial workload. As explained under Q6-8, such controls are pre-requisites for ensuring data quality. There is no evidence that some KPIs or PIs are of limited value and could therefore be removed. The only clear area for simplification (as the stakeholder survey indicates) is avoiding **duplication** on various levels.

### **5.3. Relevance**

*Q11. Do the objectives of the scheme still correspond to the needs of the aviation sector and usefully complement EU aviation and transport policy in more general terms?*

It is generally agreed that the KPAs in the schemes broadly cover the needs of society and airspace users. The schemes constitute important elements of the SES initiative and complement other elements of EU aviation and transport policy, in that they **measure and drive operational performance**, whereas the other elements (e.g. SESAR, FABs, the NM and the NSAs) could be considered as **enabling practical performance improvements**.

However, the objectives under the schemes are **insufficient** to achieve the SES aspirational high-level goals: the targets set in the objectives for RP1 represented only one sixth of the SES high level goals for environment. In addition, they do not cover noise, vertical flight efficiency or flight time (as considered in SESAR). Also, they do not take account of the need



for more flexible ANSs, able to scale with volatile traffic demand, and the accuracy of delay predictions.

It appears that **ATM service defragmentation** and increased competition, as requested by the airlines to improve further the cost-efficiency and quality of service, cannot be addressed by the schemes alone, although it may be investigated how the schemes could better stimulate partial defragmentation through cross-border initiatives.

Some ANSPs and Member States indicate that the schemes focus on issues in the **core of congested European airspace** (lack of capacity, high unit costs, route extension), but not on issues that affect their own airspace.

In summary, it may be considered in RP3 to review the indicators to broaden their reach when relevant, while focusing their application primarily to the areas with most performance issues.

#### 5.4. Coherence

**Q12. Are the schemes coherent in that all procedures in the legislation contribute consistently to improving the overall performance of ANSs and network functions?**

The schemes are considered coherent in the sense that the processes (monitoring, reporting, setting targets, creating incentives, etc.) **consistently work towards the same high-level goals** and the two schemes are aligned accordingly. However, some issues are mentioned as regards the implementation of the various steps, in particular the process for managing targets (see Q2). Also, the reporting **timeline** for the NSAs is considered tight, a process which may be considered for revision in RP3, to allow more time for stakeholder consultation.

**Q13. Are the interdependencies between the four key areas in the scheme sufficiently acknowledged and addressed; if not, how could this be improved?**

It is generally agreed that there are interdependencies between the four KPAs. Under the Performance Regulation<sup>60</sup>, these should be taken into account in the drawing-up of performance plans. ANSPs and Member States expressed their concerns about interdependencies.

Like other service providers, ANSPs have to contend with a basic tension between **cost-efficiency and quality of service**. This partly explains their concerns regarding the interdependencies in the schemes. In ANSP operations, it is essential not to compromise on **safety standards**, which override other performance objectives such as cost-efficiency and capacity. The ANSPs did not report any issues in this respect. This can be explained by the fact that the safety indicators under the performance scheme relate to aspects of safety management (e.g. safety culture and the consistent application of risk assessment), rather than actual safety performance.

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<sup>60</sup> See recital 11, Article 11(e) and Annex II.

**NSAs pointed out that it was difficult to address interdependencies** in the performance plans, as no methodology had been developed for this purpose. It would not be possible to model a methodology at EU level, as decisions on service provision should continue to be taken, and their effects captured and managed, locally.

In some airports, under market conditions, interdependencies are established as a result of the fact that **TANSs are negotiated** with airspace users. Some stakeholders suggest that interdependencies in the schemes could be controlled better via this negotiation mechanism, but this model cannot be transposed easily to ANSs, which are delivered by monopolies.

It may be regarded as unfair that ANSPs that improve cost-efficiency may as a result obtain lower scores for flight efficiency (by attracting extended flights of airlines that seek the most economical routes), a pattern known as ‘**cost displacement**’. However, airlines should continue to be given a large degree of freedom to select routes on the basis of their preferences and according to their business model.

In conclusion, **some provision could be made in RP3 to support NSAs** with methodologies addressing interdependencies, but it is questionable whether additional constraints in the Regulation could bring about better control without introducing disproportionate complexity.

***Q14. Did all Member States and entities concerned implement the SES performance scheme in a coherent and satisfactory manner?***

Overall, the Member States implemented the performance scheme in a coherent manner. The indications are that they all implemented it in full, and allocated/executed the various tasks (reporting, monitoring, participating in consultations at EU level, discussing performance with the ANSPs and taking corrective measures).

Specific concerns relate *inter alia* to the **incentive schemes**, which Member States implemented differently in terms of scope and application. Only very few (20 %) opted to make use of the additional (optional) incentives<sup>61</sup>.

There are some concerns as to whether implementation is **satisfactory**. This is complicated, as it touches on several issues, including the administrative burden for Member States and their lack of resources. Some NSAs may not have all the enforcement powers they require or may not be in a position, due to resource shortages, to exercise these fully (see Q2).

***Q15. Are the provisions of Commission Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013, and the performance targets, coherent with, and do they complement (rather than duplicate), other EU initiatives with similar objectives?***

The schemes are coherent with EU aviation and transport policy and constitute important elements of the SES initiative. They are **complementary by design** with the other pillars of

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<sup>61</sup> In 2017, the Commission mandated a study assessing the use of optional incentives by the Member States. See: [Incentives study](#). Among the factors explaining the low in-take by the NSAs, the study pointed the lack of clarity in the policy of the objectives pursued by the incentives, and the lack of guidance materials at the attention of the NSAs.

the SES, as they measure and drive the operational and economic performance of the initiative, while other elements (e.g. SESAR, the FABs, the NM and the NSAs) could be considered as enabling the performance improvements in practice.

In general, stakeholders are **quite positive about the coherence** of the schemes with other EU initiatives. However, there are a few critical remarks which impact on the schemes could not be measured with certainty at this stage and which should be considered when developing the options for RP3. In particular, these concern:

- the balance between the additional complexity brought by FAB-level targets and their perceived added value;
- perceived duplications as regards data provision;
- coordination between EASA regulations and the performance scheme; and
- the difference between SESAR and the schemes as regards the gate-to-gate view.

## 5.5. EU added value

*Q16. What is the added value of the schemes, with target-setting at Union level, compared with what could have been achieved by Member States at national and/or regional level? Would it have been possible to achieve the same results without EU intervention (including the PRB)?*

Due to their binding nature, the schemes can be seen as 'catalysers' for the rest of the SES instruments. They provided added value compared with what could have been achieved at national or regional level, by accelerating the pace of change and creating a level playing field for ATM across Europe. This holds for all the KPAs. A majority of stakeholders<sup>62</sup> agree that the schemes were major factors in the improvements achieved for all of the KPAs, with the exception of safety.

As ATM is by nature a **cross-border activity**, it cannot be fully regulated at local level (e.g. environmental performance cannot be optimised if addressed locally and network effects have to be considered when managing capacity). Airspace users also clearly defended the need for gate-to-gate service levels and harmonisation across Europe.

EU intervention was instrumental in **improving transparency** in the way performance is managed Union-wide as it stimulated benchmarking among service providers. The **PRB** contributed to the EU added value by providing the Commission with independent and expert advice. Thanks to regular stakeholder consultations, the PRB also helped to improve the transparency of performance management.

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<sup>62</sup> A great majority of NSAs and ANSPs found the schemes useful and providing value at European level (primarily on cost efficiency, seen from the ANSPs). Airspace users see economic regulation via the schemes as the appropriate tool to address the monopoly position of the ANSPs, however not going far enough and pointing the vested interest of Member States. Staff associations are critical on the target-setting that they consider a political process in which airlines have too much influence, which results in unrealistic targets for cost efficiency, combined with more rigidity in operational decisions.

The Commission services share the opinion of the majority of stakeholders who consider the schemes as an **important step forward**. The schemes are providing considerable benefits (although airspace users might feel that these are not being delivered quickly enough and to the extent they hoped for).

## 5.6. Sustainability

*Q17. Will the effects last, in the medium or long term and over several reference periods, or is there a risk of achievements in one reference period being undermined by under-performance in a subsequent period?*

The performance outcomes achieved during a reference period are not likely to be undermined by under-performance in a subsequent period, except in the area of cost-efficiency, where traffic volume and costs are too variable to predict benefits in the long run.

More specifically:

- **safety** – as the mechanisms for harmonised safety assessment across Europe mature, they can be expected to be maintained into the future and produce stronger outcomes;
- **environment** – the achievements should endure, as they stem primarily from improved route efficiency impacting horizontal flight efficiency, in particular based on the SESAR free route airspace projects. However, this could be undermined by factors such as geopolitical issues closing airspace and noise issues requiring airspace changes;
- **capacity** – the achievements should endure, but as traffic grows there is an ongoing requirement for additional capacity and a worsening of bottlenecks in the gate-to-gate system. Capacity added in one reference period will not be lost, provided the ANSPs maintain existing assets and resources, invest in additional capacity, and adopt new technology and operational approaches to improve the productivity of assets and resources. SESAR projects may impact capacity as new procedures are brought into operation; and
- **cost-efficiency** – the achievements may not endure, if costs are strongly influenced by factors over which ANSPs have limited control, e.g. regulatory requirements impacting staffing or CAPEX, pension scheme valuations, interest rates.

*Q18. Are benefits shifted from one KPA to another within a reference period or between reference periods (interdependencies)?*

There is no evidence to suggest that there is a transfer of benefits from one KPA to another at European or national level.

However, **at national level**, there will be a need to balance the performance impacts of various options, particularly those relating to **cost-effectiveness and capacity**. This transfer in benefits between KPAs is part of the role of **ANSP management**, which is responsible for

addressing conflicting stakeholder requirements<sup>63</sup>. The data in performance plans does not provide sufficient detail to assess the transfer value (even if there were an agreed methodology for doing so).

Stakeholders<sup>64</sup> note that the interdependencies between the cost-efficiency and capacity KPAs, in particular, are complex and should be **analysed by operational and technical experts** before targets are finalised. Measures addressing this issue should be considered in RP3, for instance through knowledge-sharing initiatives in support of the NSAs.

## 5.7. Acceptability

*Q19. To what extent are the schemes accepted by stakeholders, in particular those listed in Article 10 of Regulation (EC) No 549/2004, and/or the general public?*

**The performance scheme is accepted by the stakeholders.** Although airspace users would like to have seen more pressure to obtain better results, they see **economic regulation as a necessary tool** to address the monopoly position of the ANSPs.

The four KPAs are widely accepted: stakeholders, including airlines, were invited to provide input on these KPAs from the design phase onwards. They remain part of the basic SES legislation and relevant for the aviation sector.

The Commission services and the PRB also **actively consulted stakeholders** in the course of their work to develop the Regulations and set EU-wide performance targets for RP1 and RP2. For instance, the Commission established an '**industry consultation body**' (ICB) to advise it on the implementation of the SES, to which ANSPs, associations of airspace users, airport operators, the manufacturing industry and staff representative bodies belong.

The study did not aim at the collection of stakeholders' opinions on the implications of the schemes on the **human dimension**, although it could note the active participation of social partners in multiple European fora and initiatives. Social and labour issues including working conditions are regularly discussed in the **European Sectoral Social Dialogue committee on civil aviation's sub-group on ATM**. In that context, the social partners<sup>65</sup> have in March 2016 promoted a joint initiative: the "Toolbox for Successful Social Dialogue in ATM", which purpose is to reduce the risk of conflicts by promoting a series of best practices. In complement, the **EGHD**<sup>66</sup>, a technical group made of ATM experts which was created in 2010, is in charge of discussing the human dimension of the SES. It provides advice to the Commission services on technical, operational and practical changes that affect staff, brought on by SESAR/new technologies and is also consulted on the evolution of the schemes.

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<sup>63</sup> Among the most obvious examples of conflicting stakeholder requirements, one could mention the tension between cost efficiency measures required by airspace users and staff working conditions. For instance the increasing need to adapt the delivery of capacity to peak hours (e.g. in some areas at week-ends and in summer) requires staff to work according to more constraining rostering schemes.

<sup>64</sup> The issue of interdependencies is primarily mentioned by ANSPs, followed by NSAs.

<sup>65</sup> ETF, ATCEUC, CANSO

<sup>66</sup> EGHD: Expert group on the human dimension of the SES (ETF, ATCEUC, CANSO IFATCA, IFAIMA, ECA, IFATSEA).

The study did not assess the acceptability of the schemes for the **general public** or passengers. Given how remote ANS operations are to these groups, they were not consulted in the survey.

## 5.8. Equity

### *Q20. How fairly are the effects resulting from the introduction of the schemes distributed across stakeholders and regions?*

Compared to the baseline (prior to RP1), both airspace users and ANSPs benefited from the implementation of the schemes: over the '2012-2015' period, the net economic benefit of the schemes is estimated at approximately € 2.7 billion for airspace users<sup>67</sup> and € 638 million for ANSPs<sup>68</sup>. Understandably, the benefits are significantly greater for airspace users than for ANSPs, given that the purpose of the schemes is to regulate monopoly service provision. Overall, the effects can therefore be considered as distributed fairly among stakeholders.

As airspace users operate in a competitive environment, it may be assumed that the benefits are to a large extent passed on to passengers<sup>69</sup>. Also, **passengers** gain significantly from delay reduction. This is what one would expect from economic regulation such as the performance and charging schemes.

Clearly, the **benefits for airspace users and passengers would have been greater** if the targets had been fully met. However, it should be noted that these concerns relate mainly to what could have been the ultimate benefit to users (as compared with the performance plans), rather than the benefits of the scheme in its current form (as compared with the baseline). Also, airspace users bear the risk of exchange rate fluctuations (but also the benefit if the rate develops to their advantage).

**From a geographical perspective, the spread of effects across KPAs varies quite widely depending on the Member State in question.** In RP1, only three Member States significantly improved horizontal flight efficiency at the same time as improving cost-efficiency and achieving 2014 capacity targets. Many Member States that improved cost-efficiency under-performed in the area of flight efficiency. Others in the core area consistently under-performed on both the capacity and cost-efficiency indicators<sup>70</sup>

Some stakeholders pointed that many of the current side-effects of the Regulations (i.e. large carry-overs for some ANSPs, discrepancy between cost-efficiency performance and the 'true cost for users', and conservative initial economic or traffic assumptions, which artificially inflate cost-efficiency performance during the assessment) could be overcome with **greater flexibility during the implementation of the schemes.**

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<sup>67</sup> Resulting from lower ATFM delays (average improvement of 0.6 min/flight compared to the years 2004-2011) and the implementation of the determined unit mechanism compared to full cost recovery.

<sup>68</sup> Resulting from cost reductions that are retained by the ANSPs under the cost-sharing mechanism

<sup>69</sup> This is an assumption, as the analysis of the impact on air fares was not in the scope of this study.

<sup>70</sup> However, no clear relationship could be established when analysing these variations across the various KPAs.



When introducing new measures in RP3, their economic impact on stakeholders should be assessed to ensure fair distribution of effects.

**Q21.** *What is the distributional effect between stakeholders of carry-overs (e.g. inflation adjustments, costs exempt from cost-sharing, traffic adjustments, etc. under the SES charging scheme)?*

At Union level, the (main) ANSPs generated a net gain of 429.1 million €<sub>2009</sub> in RP1 as a result of the carry-overs on en route activity, and a further 206.6 million €<sub>2009</sub> in 2015.

At Member State level, taking the adjustment mechanisms together, five ANSPs incurred a net loss in respect of the en route activities in RP1 for an aggregated amount of €93.3 million.

While true costs to airspace users in respect of the activities in RP1 fell by 6 % from 2012 to 2014, the additional amounts to be billed to them through future years' unit rates due to the adjustment mechanisms totalled €747.1 million (€282.2 million from 2012 activities, €303.3 million from 2013 and €160.6 million from 2014). By contrast, airspace users' actual costs in 2015 were lower than the determined costs billed on the basis of actual Terminal Service Units, which translates into forthcoming reimbursements to them of €143.9 million.

Airspace users point to the fact that their 'true costs' do not match the targets or reflect actual performance, and argue that they paid €1 billion more than provided for in the performance plans. This is in line with the current design of the schemes. The adjustment mechanisms are symmetrical and adjustments can be upward or downward.

The situation in 2015 differed significantly from that in RP1, when actual traffic remained lower than projected in the performance plans, contributing to losses from the application of the traffic risk-sharing arrangement. The other major difference observed in 2015 is due to the inflation adjustment: for most Member States, actual inflation was much lower than anticipated in the performance plans, so the inflation adjustment will result in a reduction of unit rates charged to airspace users in 2017.

## 6. CONCLUSIONS

The EU implemented the performance and charging schemes to improve the performance of ANS provision. The schemes introduced, *inter alia*, an independent PRB and binding performance targets that are set and monitored over cycles ('reference periods'). This resulted in more transparent ATM performance among stakeholders and more harmonised reporting of ATM performance. Consequently, the schemes enabled improved performance in EU ATM/ANS overall, but not to the degree that was hoped for, due to a variety of factors, including weaknesses in the target-setting process and enforcement, and insufficient staffing of the NSAs (see below).

In particular concerning capacity, it was not possible to isolate the positive influence of the traffic decrease registered in RP1 from the change in service providers' behaviour triggered by



the schemes. But it was consistently observed as from RP1, that the European ATM system was able to save one third of en route delays, for similar flight levels, compared to the period prior to RP1. Actual performance improvement also depends on other initiatives in the SES context (e.g. the Network Functions) and local actions, especially in the area of capacity and horizontal flight efficiency. The individual contributions of the various SES instruments could not be assessed in the analysis: the schemes should rather be seen as 'catalysts' of the SES to which they provide a strategic direction and a framework with targets.

The schemes are complex and entail significant reporting requirements. One can also note some weaknesses in implementation. These are addressed below and conclusions are drawn for each evaluation criterion.

### **6.1. Relevance**

The KPAs in the performance scheme (safety, environment, capacity and cost-efficiency) broadly cover the needs of society (timely and environment-friendly air transport) and airspace users (timely and efficient ANS provision).

### **6.2. Coherence**

In general, the scheme is consistent with other SES initiatives: SESAR, FABs, the NM and national approaches. The various steps in the cycle, from target-setting to review of reported data, are also generally coherent.

Nevertheless, one can note some weaknesses within the process steps and structures, in particular as regards the target management process and the reporting timelines.

NSAs are generally regarded as having insufficient expertise and resources to manage the scheme, and are hence overly reliant on ANSPs. This view is expressed by ANSPs, the PRB and the NSAs themselves.

Several stakeholders expressed concern that the schemes do not take sufficient account of the interdependencies between KPAs. In any industry, service providers have to strike a balance between costs, quality of service and safety. The current target-setting process under the schemes provides suitable autonomy in this respect. However, it is recognised that NSAs lack guidance and methodological support for dealing with independencies in their local target-setting role, and this affects harmonised implementation Union-wide.

### **6.3. Effectiveness of the schemes**

The aim of the schemes is to contribute to the sustainable development of the air transport system by improving the overall efficiency of ANSs across the KPAs, in line with the performance framework in the European ATM master plan and with due regard for overriding safety objectives. Considering the Regulations' objectives and the performance targets for the KPAs, it is concluded that, overall, the schemes have only partly achieved their stated objectives. Performance on all four KPAs improved measurably in the context of traffic levels that were significantly lower than anticipated in the national performance plans, and the

schemes contributed to this. Nevertheless, the targets for flight efficiency and capacity were not fully met.

## **Safety**

The rationale behind the selection of the current safety performance indicators is sound and the scheme has resulted in improvements in terms of focus on performance of the indicators. It is commonly admitted that the most appropriate way to monitor safety is through a balanced combination of outcome-based and leading indicators. However, the setting of targets for outcome-based safety indicators in the performance regulation is questionable, as it may be counterproductive and harm reporting levels and ‘just culture’ within the service providers. Thanks to improved focus, the performance scheme had a marginally positive influence on safety. While aviation safety performance at Union level is also monitored, controlled and improved by other mechanisms, the inclusion of safety in the scheme serves to counterbalance the effects of other KPAs.

Work on the performance scheme should involve strengthening, monitoring and assessing the role of safety as a constraint on the other KPAs. Such work would be specific to the scheme and not compete with, or duplicate, work on other European mechanisms.

Despite some difficulties with the existing safety performance indicators, significant effort has gone into them and they may have a longer-term positive effect on safety performance.

## **Environment**

Horizontal *en route* flight efficiency, the most relevant indicator for this KPA, has improved over the years, but not enough to meet the targets. The scheme has contributed to this, although ANSPs have limited control over this indicator. The indicators for the KPA do not cover all relevant environmental impacts, such as aircraft noise, TMA flight efficiency and speed, and vertical flight efficiency. Without generating over-complexity, a fine-tuning of the indicators might be considered, to improve accountability and add the vertical dimension. The level of ambition of this KPA should be re-assessed considering the societal priorities defined in the aviation policy, also bearing in mind the airspace users business need for cost efficient trajectories and the negative effect incurred by discrepancies in ANS charges.

## **Cost-efficiency**

Targets for cost-efficiency were met by design, as charges are set on the basis of determined unit costs as defined in the performance plans. In addition, it can be concluded that:

- cost-efficiency improved over RP1, as determined unit costs were driven down between 2012 and 2015;
- ‘true costs’ to airspace users fell steadily over the period; both determined unit costs and actual unit costs decreased.

Analysis of cost-sharing between ANSPs and airspace users at local and Union-wide levels produces contrasting results for RP1 and the first year of RP2. The aggregated targets set in the national performance plans were less ambitious than the Union-wide target agreed in the SSC in all years of RP1. The adjustment mechanisms overall favoured ANSPs in all years of RP1, but turned in favour of airspace users in 2015.

The study identified the following weaknesses in the system as regards cost-efficiency:

- Although the adjustments were justified at the time the schemes were set up, in RP3 there might be a need to reconsider them based on RP1 experience, and potentially consider tracking the ‘true costs’ to airspace users through a new indicator;
- The system may lead to unintended or undesired outcomes (e.g. in setting local targets and incentives). In the transition to a new reference period, specific attention should be paid to preventing cost shifts and ensuring that traffic assumptions for local target-setting are consistent with the Union-wide traffic forecast;
- Although the SES legislation requires ANSPs to submit annual audited financial statements to the NSAs, it is difficult to reconcile the audited accounts with the reporting tables under the charging scheme. Hence there is a risk that unaudited information is submitted; and
- More attention will have to be paid to the assessment of capital expenditure in the future, in particular through the SESAR deployment programme, to ensure that when it is cancelled or postponed, any related allowances are treated accordingly and not used to increase profit margins.

## **Capacity**

Prior to RP1, the 2004-2011 period saw average *en route* delays of 1.2 min/flight, but the average achieved in 2012-2014 was 0.6 min/flight. Although the traffic downturn recorded in RP1 contributed to this delay improvement, when comparing to previous years with similar levels of traffic, it appears that the overall handling of traffic improved, reducing *en route* delays. As there were no wide-scale operational or system changes to which the improvement might otherwise be attributed, so the primary reason for improved delay performance is likely to be the binding targets set in the performance scheme.

## **Suitability of indicators**

While the indicators for each KPA suffer from a number of shortcomings, there appear to be few alternatives that would significantly improve the scheme without introducing complexity or more indicators, which would run counter to the view among stakeholders that the scheme should be simplified.

## **PRB set-up**

The PRB carried out substantial analysis using historical data and comparisons with US performance as evidence for target-setting. The work was robust in its range and depth, and

subject to stakeholder consultation. The Commission accepted the PRB's advice on target-setting and performance turned out to be close to the targets, although the SSC lowered the cost-efficiency target in its final deliberations. The PRB can therefore be considered to have carried out its tasks effectively.

The PRB drew the Commission's and the SSC's attention to issues regarding the support from Eurocontrol, in particular whether it could act independently under the functional control of the PRB. This led the Commission to establish the PRB in a different form as of 2017 (experts appointed directly by the Commission and supported by a new contractor).

### **Data quality**

The data appears sufficiently accurate for the purposes of target-setting, approving performance plans, and monitoring. The study estimated measurement errors in the *en route* delay indicator (relative errors typically <2 %) which had a minor impact on performance measurement.

As regards the charging scheme, Eurocontrol quality checks appear to pick up random errors. The main risk to accurate measurement is the extent to which NSAs' charging data can be reconciled with audited accounts; this risk is to be mitigated.

### **6.4. EU added value**

The SES performance and charging schemes have provided added value compared with what could have been achieved at national or regional level. This holds for all KPAs, either because they enabled improvements that would not have taken place otherwise, or because they accelerated improvements that were set to be achieved anyway. Most stakeholders agree that the schemes were important contributors to the improvements achieved in all of the KPAs.

It is found the PRB was effective in improving transparency and providing the Commission with independent advice as a basis for target-setting.

### **6.5. Efficiency and equity**

Overall, the benefits to users and passengers in terms of reduced delays and improved cost-efficiency and flight efficiency significantly outweighed the costs of the system: the benefits are estimated at €3.4 billion for the evaluation period and the costs at €87 million. This does not mean that the system is fully efficient or that all the benefits accrue solely from the performance scheme; however, the scheme does act as a catalyst for improvement.

Stakeholders report the following weaknesses:

- duplications in different layers;
- a lack of (visible) impact of some PIs in the system, which still requires more precise reporting; and
- a heavy data submission and handling process.

Overall, the effects are distributed fairly among stakeholders, given that the purpose of the schemes is to regulate monopoly service provision.

#### **6.6. Sustainability**

The performance outcomes achieved during a reference period are not likely to be undermined by under-performance in a subsequent period. A possible exception relates to the cost-efficiency KPA, where the traffic volume and cost variables are such that it is difficult to predict whether benefits will be sustained in the long term. There is no evidence to suggest that there is a transfer of benefits from one KPA to another at European or national level. However, at national level, there will be a need to balance the performance impacts of various options, particularly those relating to cost-efficiency and capacity.

#### **6.7. Acceptability**

Stakeholders accepted the schemes and the four KPAs. Although airspace users would like to have seen more pressure to obtain better results, they see economic regulation as the appropriate tool to address the monopoly position of the ANSPs.

The distribution of effects among stakeholders has been presented above. The costs are borne to a large extent by Member States, ANSPs (which may include them in the charges to users) and the EU, while the benefits in terms of improved safety, cost-efficiency, delay reductions and flight efficiency accrue to users and ultimately to passengers.

## ANNEXES

### [Annex 1: Procedural information](#)

- **Lead DG: DG MOVE (Unit E.3)**
- **Work programme reference: 2016/MOVE/015**
- **Steering group**

The steering group was made of representatives from the Commission's Secretariat-General, DG MOVE, EASA, and the PRB chairman. DG GROW initially accepted the invitation to join the group, but were then unable to do so. The group met twice and had one conference call with the study team to discuss the methodology and outputs of the study. The quality assurance report was approved by correspondence.

- **External support**

The study was sub-contracted to a consortium of consultancy firms (Ecorys, NLR and Winsland) through DG MOVE's framework contract. The PRB members reviewed the draft conclusions during a workshop and provided expert advice. The support study is published on the Commission's website [here](#).

- **Organisation and timing**

- June 2015: development of the evaluation roadmap and the terms of reference of the contract
- 30 November 2015: launch of the call for tender (via the framework contract)
- 8 February 2016: designation of the consultancy firm
- 23 February 2016: signing of the contract
- 19 April 2016: inception report
- 13 July 2016: interim report 1
- 7 June-4 September 2016: open public consultation (OPC)
- 7 July-4 September 2016: stakeholder survey
- Summer 2016: stakeholder interviews
- September 2016: publication of OPC results
- 16 September 2016: interim report 2
- October 2016: intermediary reviews via conference calls with DG MOVE E.3 (including one with the steering group)
- 25 October 2016: meeting of the steering group (review of the interim reports)
- November 2016: validation meetings with stakeholders and expert groups:
  - October/November: various meetings with the PRB chair, EASA and the PRU;
  - 10 November: workshop for review of the draft results with the PRB and EASA;



- 17 November: stakeholder workshop with NSA and industry (ICB) representatives
- 7 December 2016: draft final report
- 22 December 2016: meeting of the steering group
- 18 January 2017: (revised) draft final report
- 7 February 2017: quality assurance report accepted by the steering group
- 9 February 2017: Commission acceptance of final report (final report full package – with complementary documents as per the contract – received on 20 February)
- January-March 2017: drafting of the Commission staff working document

- **Quality assurance**

The steering group reviewed the draft final report on 22 December 2017 and made the following (main) recommendations to the consulting team:

- produce a more concise and less technical executive summary;
- report on the problems encountered in the functioning of the PRB;
- clarify whether the 2 % (maximum) data inaccuracy mentioned in the study could have an impact on the performance results;
- clarify the conclusions concerning interdependencies between the KPAs;
- in the conclusions on the safety KPA, better reflect the findings of the stakeholder group led by EASA on the review of the safety KPIs to prepare for RP3; and
- provide recommendations on:
  - accelerating Union-wide/local target-setting;
  - addressing the FAB level in the process; and
  - simplifying the management of the schemes.

The steering group acknowledged receipt of the responses provided by the consortium on 18 January 2017 and approved the quality assurance report drafted by DG MOVE E.3 on 7 February 2017.

## Annex 2: Stakeholder consultation (SYNOPSIS REPORT)

### 1. Introduction

The performance and charging schemes regulate air navigation services (ANS) in the Single European Sky (SES) area. Regulation (EU) No 390/2013<sup>71</sup> lays down a performance scheme for air navigation services, and Regulation (EU) No 391/2013<sup>72</sup> a common charging scheme.

From May 2016 to April 2017 the European Commission Directorate-General for Mobility and Transport (DG Move) carried out an ex-post evaluation of the performance and charging schemes from 2012 to 2015<sup>73</sup>. The evaluation aimed to assess the implementation of the schemes, in line with the **'better regulation'** principles, and to identify failings that might give rise to improvements in next reference period.

The methodology<sup>74</sup> for the evaluation included extensive desk research and stakeholder consultation. A consulting study published on the Commission website accompanied the evaluation.

The purpose of this synopsis report is to summarise the feedback for stakeholders and the aviation community at large on the findings from the consultation activities accompanying the ex-post evaluation. A more detailed report can be found on the Commission website, in annexes 3 to 5 and 7 to the consulting study. Feedback on the outputs from the open public consultation was also published earlier.

### **Background**

The aim of the SES performance and charging schemes is to move air traffic management performance closer to meeting the aspirational goals of the Single European Sky<sup>75</sup> by setting European Union-wide and binding national/FAB<sup>76</sup> performance targets for air navigation service providers over fixed reference periods (RPs).

During the timeframe considered in this evaluation – i.e. the first reference period (RP1, 2012-2014) and the first year of the second reference period (2015) – Union-wide performance targets were set in the key performance areas (KPAs) of environment, capacity and cost efficiency. In addition, safety performance was monitored to ensure that high safety levels were maintained or improved. The schemes' ultimate objectives were to lead to more direct routes (with less fuel burn and less CO<sub>2</sub>) and to deliver air navigation services with fewer delays and reduced cost.

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<sup>71</sup> And its predecessor, Commission Regulation (EU) No 691/2010.

<sup>72</sup> And its predecessor, Commission Regulation (EC) No 1794/2006.

<sup>73</sup> The performance scheme sets targets according to reference periods. The timeframe of the evaluation (2012-2015) therefore corresponds to the first Reference Period (RP1:2012-2014), and the first year of the second reference period (RP2: 2015-2019).

<sup>74</sup> This methodology follows the Better Regulation guidelines.

<sup>75</sup> SES aspirational goals by 2050: Triple airspace capacity; improve safety performance by a factor of 10; reduce the environmental impact by 10 %; halve the cost of air traffic management services to airspace users. Source: European Commission SES FAQs, 11 October 2012.

<sup>76</sup> Functional Airspace Block (FAB): grouping of national airspaces together to reduce fragmentation and make air navigation services more efficient.

## **2. Consultation**

### **2.1 Consultation strategy**

The evaluation roadmap initially provided for the involvement of all key stakeholder groups<sup>77</sup> concerned by the framework legislation for the Single European Sky, namely: air navigation service providers (ANSPs)<sup>78</sup>, national supervisory authorities (NSAs)<sup>79</sup>, airspace users, airport operators, the manufacturing industry and professional staff representative bodies. It included:

- a 12-week, internet-based open public consultation, to capture all spontaneous opinions, including, potentially, the views of the general public;
- a dedicated stakeholder workshop and several interviews for key stakeholder groups as defined above, to collect more detailed information and opinions on performance improvements during the consultation period.

This consultation strategy was refined as the study progressed and a targeted survey was added, with more specific questions tailored to each of the four main stakeholder groups. The aim here was to capture nuances in the various stakeholders' opinions, acknowledging their conflicting interests, and to approach respondents with higher levels of expertise reflecting the technical nature of the topics.

### **2.2 Methodology**

The following criteria were used to define the consultation activities and the target audience:

- topical coverage, using interviews for those areas where the need to check facts or plug information gaps was greatest;
- coverage of stakeholders from all seven categories (as defined in the schemes);
- geographic spread across Europe; and
- and a mix of associations and individual stakeholders. In air navigation services, airspace users and airports are traditionally consulted through associations, as happens with professional staff; the other stakeholders (ANSPs, NSAs) are consulted individually.

## **3. Consultation activities**

The consultation process was made up of four complementary activities: an open public consultation, a targeted stakeholder survey, stakeholder interviews and a workshop.

### **3.1 Open public consultation**

The open public consultation (OPC) sought to give all key stakeholders mentioned above, as well as any interested individuals, the opportunity to provide the Commission services with their views and opinion on the implementation and continued policy relevance of the SES performance and charging schemes. Further, it aimed to gather factual information on what was working well and what should be improved.

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<sup>77</sup> As listed in Article 10 of Regulation (EC) No 549/2004.

<sup>78</sup> ANSP: a public or a private legal entity providing air navigation services, in particular managing air traffic on behalf of a company, region or country.

<sup>79</sup> National supervisory authorities (NSAs): bodies ensuring the supervision of the SES regulatory framework in all Member States. They are responsible, in particular, for certifying and overseeing air navigation service providers.

The OPC ran for three months, from 7 June to 4 September 2016.

It broadly covered:

- *relevance* in relation to the identified problem(s) the regulations purported to address, the form of intervention and coverage;
- *European added value* compared to what could have been achieved in the absence of EU intervention (i.e. by Member States, nationally and/or regionally);
- The *effectiveness* of the performance and charging schemes, including an assessment of the factors hindering their implementation and the relevance of indicators; the effectiveness and independence of the Performance Review Body (PRB)<sup>80</sup>; and various cross-cutting issues (e.g. the side effects of the schemes); and
- *efficiency* in relation to the costs incurred and benefits achieved and/or expected.

### 3.2 Targeted survey

In addition to the public consultation, a more targeted, in-depth survey questionnaire ran from 7 July to 4 September 2016, covering issues not addressed in the public consultation. This was an important way of gathering expert opinions and experience.

Four targeted surveys were developed and the questionnaires were distributed to the following groups: NSAs, ANSPs, airspace users and others<sup>81</sup>.

The targeted survey covered the same issues as the OPC, with more detailed questions.

### 3.3 Interviews

Stakeholder interviews were used to accompany the surveys and acquire an in-depth understanding of the key items identified in the desk research. Interviews were conducted with all stakeholder groups mentioned above, and included the PRB and EASA<sup>82</sup>. The interviews covered the same issues as the surveys, with more specific questions.

### 3.4 Stakeholder workshop

On 17 November 2016 the study team concluded the consultation by organising on behalf of the Commission an open workshop with all those involved in implementing the performance and charging schemes: regulators, service providers and airspace users. The workshop presented the outputs of the previous consultation results and asked for feedback.

## 4. Participation

All Member States responded to the targeted survey, while 20 States took part in the OPC (Belgium and Germany having the highest participation).

**The main stakeholder groups were represented in all consultation activities, as shown below.**

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<sup>80</sup> PRB: the independent body in charge of advising the European Commission on performance matters and more specifically the implementation of the performance and charging schemes.

<sup>81</sup> Others: academic institutions, airport operators, trade union/professional staff bodies and the Network Manager.

<sup>82</sup> European Aviation Safety Agency (EASA): the agency providing the Commission with the technical expertise it requires on aviation safety matters and assisting it in exercising its legislative and regulatory tasks.

- **Interviews:**

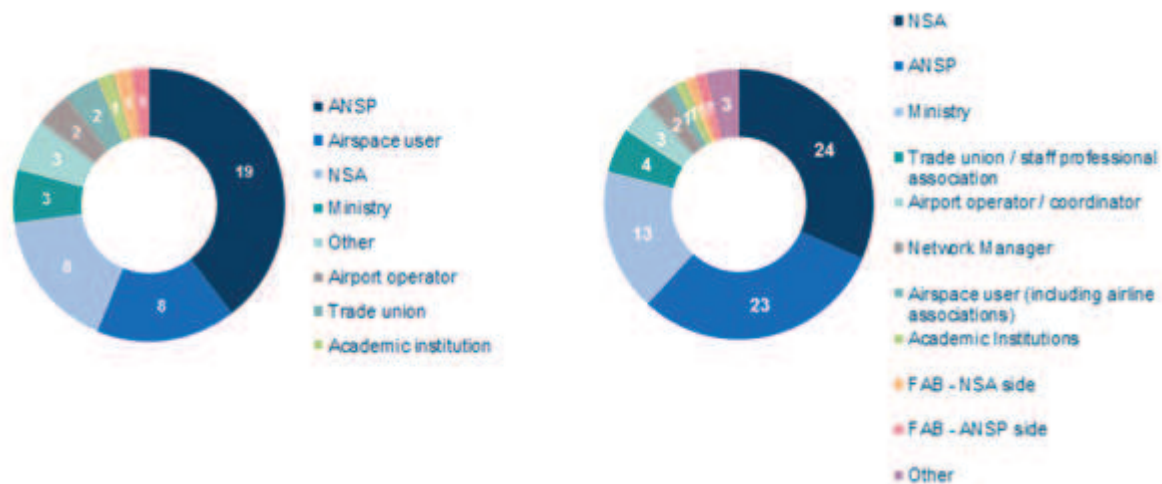
Twenty-six interviews took place with the following range of stakeholders:

- EU Member States: NSAs & ministries (9)
- ANSPs (6)
- Airspace users (2 associations & 2 airlines)
- Professional staff representative bodies (3)<sup>83</sup>
- Manufacturing industry (1)
- PRB (1)
- EASA (1)
- EUROCONTROL<sup>84</sup> (1)

- **OPC and survey:**

**OPC (48 respondents):**

**Targeted survey (76 respondents):**



**Figure 3 Distribution of respondents by stakeholder category**

The consultation activities are partly redundant, as they targeted the same stakeholder categories and some questions are similar. However, there are *differences* between the OPC and the survey *in the distribution of respondents by stakeholder category*:

- Only one airspace user representative responded to the survey, while airspace users made up one-sixth of respondents to the OPC. However, airspace users are usually represented by airline associations; therefore, even if small in number, their view is expected to reflect the position of most of their members.
- Member States formed the majority of respondents to the survey, but only a quarter of respondents to the OPC.

Moreover, only 4 % of respondents to the survey (one airspace user and two network manager representatives) had an EU-wide perspective.

<sup>83</sup> The respondents were: IFATCA, ATCEUC and ETF-ATM. The ATC-organisation of Bulgaria was also consulted in the survey.

<sup>84</sup> Interview with the EUROCONTROL Performance Review Unit and Central Route Charges Office.

## 5. Results

### 5.1 Disclaimer

- *This chapter compiles stakeholder responses. It does not represent the official position of the Commission and its services and thus does not bind the Commission.*
- *The results are not expected to fully reflect all contributions received.*

Given the high number and wide range of opinions received, the results below are a *summary* of the responses to the main topics of the consultation. For an exhaustive description of the results, please see Annex 7 to the consulting study.

- *Some limitations are apparent in the quantitative analysis.*

Because of the opposing interests of the various stakeholder groups (airspace users vs service providers and Member States/regulators vs service providers), and to avoid any bias in the results, the position of each stakeholder group is reported separately whenever possible and aggregated quantitative measurements are used with caution.

### 5.2 Results from OPC and survey

*As the scope of these consultation activities is similar, and their results are consistent overall, they are presented jointly for ease of reading. However, there are some differences between the views reflected in the OPC – where most respondents belong to the industry (ANSPs or airspace users) – and in the survey, where Member States make up half of the respondents and only one airspace user responded. Convergences or differences in stakeholders' views are reflected where relevant.*

#### 5.2.1 Overall relevance of the schemes

Most respondents believe that the objectives of the Single European Sky regarding capacity, environment, cost efficiency and safety – and consequently *the objectives of the schemes* – meet the current and future needs of aviation and society, at least partially. Nonetheless, they believe that achieving these objectives is the main challenge.

The weaknesses in the *objectives of the schemes* pinpointed by stakeholders vary according to the stakeholder group and cannot be summarised in a few statements. They include:

- a lack of flexibility in the schemes (e.g. in adapting to different local circumstances or to the size of the ANSP);
- the perception by some respondents that environmental issues and the interests of passengers and freight customers are neglected;
- certain shortcomings in the target-setting mechanism, such as a lack of flexibility in adapting targets to changing operational or economic environments;
- the need to simplify the schemes to reduce the associated burden and for clearer, more uniform rules to help implement them at national level; and
- the dependency of the current KPIs/PIs<sup>85</sup> on parameters that are not under the control of the ANSPs (e.g. traffic volatility caused by geopolitical factors).

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<sup>85</sup> KPI: key performance indicator; PI: performance indicator.



When assessing the *weaknesses in the schemes' current set-up*, the respondents highlight above all:

- the complexity of information gathering and processing;
- the partial coverage of the KPIs; and
- the strong ambition for change in such a short timeframe.

### **5.2.2 Acceptability**

Overall, *Member States* support the performance scheme and NSAs are committed to its implementation. However, some report resource problems, which reduce their capabilities or make them overly reliant on ANSPs. *Some ANSPs and Member States* in peripheral areas feel that the schemes are less relevant for them, as the main focus is on addressing high unit costs and airspace congestion in core European airspace.

In general, *ANSPs* do not see the incentives as strongly motivating when compared to the direct effect of responding to customer needs. However, they accept the principle of cost-efficiency targets, as airspace users have made these a major requirement.

*Airspace users* support the current model of the schemes and acknowledge the added value of the cost-efficiency performance area<sup>86</sup>, but they are critical of certain aspects:

- the schemes are not delivering fast enough;
- the measurement of performance does not provide a seamless gate-to-gate view;
- the cost-efficiency targets are not ambitious enough, and costs are not primarily evaluated from the perspective of airspace users (they would prefer instead a cost-efficiency KPI on the *total* costs actually incurred by airspace users, which would include all adjustments);
- the risk-sharing mechanisms in the charging schemes (e.g. on traffic) should be removed.

*Some airspace users* believe that ANSPs use strategies to exploit flaws in the performance scheme and that the PRB is not sufficiently independent and competent (as regards target-setting).

*Some airspace users* think that regulators setting targets tends to favour high-income national ANSPs, to the detriment of airspace users and passengers.

*Staff associations* feel that the schemes are skewed towards cost reduction. They acknowledge some positive impacts – better cost efficiency, greater transparency, performance consciousness in management and better consultation with users – despite some claiming that benefits would have been delivered anyway. Among the perceived negative impacts, they quote the administrative burden, along with target-setting that does not take account of local circumstances.

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<sup>86</sup> The charging scheme introduced targets for service unit costs (determined unit cost mechanism) to replace the former full cost recovery regime.

### 5.2.3 EU added value

Most stakeholders agree that the schemes have done much to help improve performance. This is valid for all KPAs, although with some variations in the perceived magnitude of the contribution.

Overall, stakeholders believe that the schemes have been important drivers in raising awareness and that they have delivered some performance improvements (especially in bringing down costs).

The following *positive outputs* from the schemes are among the most frequently quoted by stakeholders:

- the more transparent and uniform reporting of ANSP performance across Europe;
- the trend towards performance-based management at ANSPs;
- the appropriate speed of the change; and
- the positive move towards a more evidence-based and challenging relationship between service providers and authorities.

More details on the contributions of the schemes and the EU added value per key performance area are reported in section 5.2.5 on effectiveness.

### 5.2.4 Coherence

Stakeholders were asked to evaluate the coherence of the schemes from an internal perspective (i.e. rating the way the interdependencies between the four KPAs are addressed) and from an external perspective (i.e. assessing the schemes' consistency with the other Single European Sky initiatives).

To the first question, stakeholders respond that the schemes should take better account of the interdependencies between KPAs and KPIs to reflect industry reality. In particular, they claim that they have difficulty setting the right balance between cost efficiency and the other performance areas. They express positive views on the second question, in particular on the coherence with the FAB concept, the SESAR programme and the network functions. Only one Member State indicates that European schemes overlap with its national initiatives.

### 5.2.5 Effectiveness

This is a rather technical topic. Moreover, desk research is more relevant than stakeholder consultation in establishing how effective the schemes are. For these reasons, this section of the report is limited to the main findings. More details, including stakeholders' views on the relevance of the performance indicators – are available in the consulting study.

Overall, the schemes are seen as a substantial factor in improving performance; this view is shared primarily by Member States. However, stakeholders generally claim that there is still room for improvement. An analysis per performance area is provided below.

- *Safety*

Most respondents report that safety achievements are in line with their expectations, although there is a consensus that this KPA is the least impacted by the schemes. Stakeholders value the importance of this KPA in the performance scheme as a means to ensure that the pressure on other KPAs does not place an excessive strain on safety. They also recognise that the link between the safety KPIs – measuring the quality of safety management – and the actual safety level is indirect. However, ANSPs do not support the idea of introducing targets for safety indicators that would measure occurrence reporting, as there is a risk that this might lead to under-reporting. ANSPs consider the reporting on current PIs as an administrative burden.

- *Capacity*

Most respondents – primarily Member States – feel that the achievements of the capacity KPA have met their expectations. However, the vast majority of airspace users and some ANSPs rate capacity achievements less highly than expected. Airspace users refer to the fact that targets were generally not met, claiming that ANSPs were not pushed hard enough to make the necessary investments, and there were no significant consequences (e.g. no penalties).

Overall, the respondents indicate that the schemes have contributed somewhat to this capacity improvement. Among the factors hindering the achievement of the capacity KPA, they quote primarily: financial limitations, social and labour issues, and interdependencies with other KPAs. The lack of flexibility in target-setting is flagged as an issue which does not make it possible to address the changes in traffic demand and local circumstances properly. Airspace users point to a lack of political support and insufficient performance at FAB level.

- *Environment*

As with capacity, most respondents – except airspace users – consider that the achievements of the environment KPA have met their expectations. Most stakeholders view the schemes as having had limited effectiveness, noting that this KPA is particularly sensitive to interdependencies with others (such as capacity and safety).

ANSPs state they do not have full control over flight efficiency, which depends to a large extent on military cooperation and route planning by airlines. Service providers and Member States raise concerns over cost displacement issues (i.e. airspace users flying longer routes to overfly states with cheaper route charges).

When reporting on issues impacting flight efficiency, airspace users point to institutional constraints and ANS fragmentation.

- *Cost efficiency*

Most respondents to the survey indicate that the schemes have had a positive impact overall on cost efficiency, although in the OPC they express different levels of satisfaction with the achievements. Airspace users find the results insufficient, while the ANSPs account for more than 80 % of those indicating that the results have exceeded their expectations.

All stakeholders agree that:

- cost efficiency has improved;
- this improvement has happened either more quickly or to a greater extent than would have been the case in the absence of the schemes;
- there is added value in the uniform and transparent reporting across ANSPs; and
- ANSPs are more aware of cost efficiency and capacity objectives.

ANSPs and NSAs think that the cost efficiency improvements have been achieved at the cost of trade-offs with other KPAs (mainly capacity). ANSPs claim not to have full direct control over the cost-efficiency targets for en-route ANS, due to a dependency on traffic variations.

Airspace users think that the adjustment mechanisms built into the schemes for risk-sharing allow ANSPs to adopt 'gaming' strategies. They complain that the capital spending planned when establishing the cost-efficiency targets did not actually materialise – compromising the pace of the SESAR implementation. Although the schemes have made for substantial progress in absolute terms, airspace users feel that this was not enough, because adjustments meant that the actual unit costs incurred by users were higher than the targets agreed at the Single Sky Committee (SSC)<sup>87</sup>.

### **5.2.6 Efficiency**

Respondents are relatively positive about the efficiency of the schemes, meaning that, overall, the benefits accrued from the schemes outweigh the costs. NSAs are more positive than ANSPs, although all point out that the schemes have generated an additional administrative workload, in particular for monitoring, which has increased due to a lack of guidance materials. Airspace users claim that they ultimately bear these additional supervision costs and therefore favour simplification as well.

### **5.2.7 Horizontal issues – unintended effects**

Respondents report that the schemes have had two unintended positive effects: first, the terminal cost has also decreased as a result of synergies with en-route costs in the ANS cost basis; and second, pools of experts have been created in some FABs to disseminate best practices in performance among stakeholders. Among the negative unintended effects, some stakeholders consider that the complexity of the schemes and the lack of understanding of the interdependencies between KPAs may have led some stakeholders to make sub-optimal decisions. Others point to the schemes putting too much focus on short-term issues, rather than taking a long-term view. This penalises investment planning and may jeopardise capacity in the future.

### **5.2.8 PRB set-up**

Stakeholders were asked whether the PRB had been effective in providing independent advice to the Commission. Four-fifths of the OPC respondents and half of the survey respondents

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<sup>87</sup> SSC: a regulatory committee made up of representatives from Member States. It helps the Commission manage the SES and makes sure that due account is taken of the interests of all categories of users.

answered that it had. The survey shows that ANSPs, NSAs and Member States generally express positive opinions, while airspace users have more negative views.

A small minority of stakeholders have raised concerns about:

- the independence of the PRB (pointing to a lack of consideration of ‘true costs’ for users and inconsistencies between the investments approved in the local performance plans and the amounts charged to users);
- problems of transparency (due to insufficient consultation processes); and
- and a lack of objectivity when analysing the numbers (although no concrete examples were cited).

### **5.3 Interviews and workshop – conclusions**

Overall, the views expressed during the interviews and the workshop mirror the answers collected from the OPC and the targeted survey.

Stakeholders generally agree that the schemes are relevant and that the principles of economic regulation must continue to apply to air navigation services due to their monopolistic nature. However, they consider that the schemes have not delivered to the extent they had expected. They view the initial reference periods as useful steps for testing the schemes, and expect improvements in their set-up for the next reference period (RP3). However, because of their conflicting interests the various stakeholder groups often express opposing views on how to develop the schemes. A careful stakeholder consultation approach which takes all views into account fairly will be required in preparing for RP3.

### **Annex 3: Methods and analytical models used in preparing the evaluation**

#### **• Evaluation framework**

The evaluation framework consists of the following five-step analysis applied to each of the 28 evaluation questions:

- definition of the areas to be measured (quantitative/qualitative evaluation);
- definition of the relevant available indicators for the quantitative analysis (mostly the indicators defined in the schemes) and identification of relevant sources;
- definition of the additional information necessary to counterbalance the data from the quantitative analysis; identification of relevant sources (mostly qualitative, through consultation);
- description of the methodological approach and steps taken for the evaluation; and
- identification of the limitations of the analysis and possible mitigation measures.

The study went beyond the information collected through the formal performance monitoring under the schemes, in order to validate the relevance of the current indicators. It also asked

stakeholders whether they perceived any deficiencies in the current operation of the schemes; to this end, the stakeholder consultations were an important input.

The evaluation framework (20 pages) is set out in the annexes to the consulting study (see Annex 2).

- **Data**

The data came from all actors in the management and execution of the schemes: the PRB, the PRU/Eurocontrol, EASA, the Member States and the NSAs; sources included:

- PRB annual monitoring reports (Volumes 1-4);
- annual performance review reports (PRRs published by Performance Review Commission of Eurocontrol);
- the PRB's online performance monitoring dashboard;
- NSA monitoring reports;
- national/FAB performance plans (PPs for RP1);
- data reported for ATM Cost-Effectiveness (ACE) benchmarking reports;
- Member States' annual monitoring reports (under Article 18(4) of Regulation (EU) No 390/2013); and
- European ATM master plan reporting: European Single Sky Implementation report (ESSIP), complemented by States' Local Single Sky Implementation (LSSIP) documents.

A key objective of the evaluation was to go beyond the collection and verification of data published by the PRB and Eurocontrol. This was collected and scrutinised as part of the desk research, and provided the starting point for the evaluation. A whole section of the study (Chapter 6) was dedicated to assessing the quality of the data used for the management of the schemes and reviewing the relevant processes.



Annex 4: Principles of the charging scheme

The chart below summarises the method for calculating the determined and actual unit costs for *en route* ANSs.

Figure 9: Cost charging mechanisms

