steer davies gleave

Impact assessment of options for the regulatory approach in RP3 of the SES Performance and Charging Schemes

Final Report
February 2018

European Commission, DG
MOVE E3 - Single European Sky

Our ref: 23143501
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Prepared by:

Steer Davies Gleave
28-32 Upper Ground
London SE1 9PD

+44 20 7910 5000
www.steerdaviesgleave.com

Prepared for:

European Commission, DG MOVE E3 - Single European Sky
Office DM24 5/75
Avenue du Bourget 1
1140 Brussels (Evere)
Belgium

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Introduction

The European Commission (the Commission) is preparing for Reference Period 3 (RP3) of the Single European Sky (SES) Performance and Charging Schemes for Air Navigation Services (ANS). As part of this process, it is considering options for changing Regulation (EU) No 390/2013 (the Performance Regulation) and Regulation (EU) No 391/2013 (the Charging Regulation).

- The Performance Regulation lays down the performance scheme for setting and implementing binding targets for EU Member States in the key performance areas (KPAs) of safety, environment, airspace capacity and cost efficiency. The first Reference Period (RP1) ran from 2012 to 2014, and was followed by the current five-year Reference Period (RP2) which runs from 2015 to 2019. The scheme, binding for the EU Member States, is extended to third states (currently Norway and Switzerland, but to include six Balkan states from RP3).
- The Charging Regulation is closely linked to the Performance Regulation and lays down a common charging scheme for ANS. Charges are calculated on the basis of determined unit costs that are set for each year of the Reference Period. The scheme also includes incentive mechanisms providing for sharing of financial risks between air navigation service providers (ANSPs) and airspace users.

The primary legislation underpinning the SES[1] will not be subject to change in RP3, and any modifications to the Performance and Charging Schemes will therefore be made through changes to the key implementing regulations mentioned above. At the same time, it is important to consider the need for some changes to other legislation to ensure that selected options have the desired effect[2].

Steer Davies Gleave was commissioned in August 2017 to identify specific options for change and assess their impacts. The aim of the study was to:

- identify options for RP3 by drawing on available material (including material from the Commission, PRB and EASA as well as stakeholders' position papers);
- perform an impact assessment of these options and assess their contribution to the objectives of the Performance and Charging Schemes for RP3;
- provide recommendations for future development of the schemes in RP3 based on the identification of a preferred option; and
- develop guidance material supporting the implementation of the preferred option.

During this study, we have:

- sought to describe the problem in more detail, using evidence obtained from stakeholder consultation and additional research; and

[1] Regulation (EC) No 549/2004 (the Framework Regulation) and Regulation (EC) No 550/2004 (the Services Provision Regulation).

[2] For example, it is likely that implementation of some of the options under consideration would require a change to Regulation (EU) No 677/2011 laying down detailed rules for the implementation of air traffic (ATM) network functions (Regulation 677/2011).

- investigated the impact of options for addressing the problem, developed in discussion with the Commission and tested with stakeholders.

Stakeholder consultation

We undertook three separate consultation activities to provide stakeholders with an opportunity to express their views on the policy objectives for RP3, the key issues to be addressed and the expected impact of a set of specific measures intended to address the problems identified. These were:

- a targeted stakeholder consultation organised by Steer Davies Gleave, in which over 70 organisations were invited to participate, which was launched in September 2017 and remained open until end of December 2017;
- face-to-face and telephone interviews with 26 stakeholders, including industry representatives, ANSPs, airspace users, employee representative bodies, national authorities and other parties, held during the period 15 September 2017 to 30 November 2017; and
- a full-day stakeholder workshop in Brussels, attended by more than 110 industry participants, on 14 November 2017.

The stakeholder consultation exercise confirmed that there was no clear consensus among stakeholders on the appropriate direction for RP3. There was some common ground on the nature of the issues experienced during RP2 but strong differences of opinion on how these should be addressed, even within stakeholder groups.

Intervention logic

In the case of the Performance Scheme, the key problems identified were that the various monitoring and incentive mechanisms are not sufficiently integrated to deliver optimal outcomes, notably in the area of capacity provision, do not fully capture the performance of the air navigation industry, fail to take account of the interactions between the different KPAs and give rise to duplication of regulatory effort. Regarding the Charging Scheme, the mechanisms are overly complex and onerous and insufficiently transparent, with the result that the scheme does not create sufficiently strong incentives to improve efficiency and can give rise to perverse incentives.

Our analysis indicated that the problem can be linked to:

- inadequate integration of capacity planning and network management processes;
- insufficient incentives to take account of environmental impacts in route design;
- perverse incentives arising from the relationship between cost efficiency and capacity;
- difficulties in ensuring consistency between Union-wide and lower level targets;
- insufficient consideration of the interaction between terminal and en-route services;
- duplication of regulatory monitoring resulting in an excessive administrative burden;
- lack of clarity of the Charging Scheme; and
- inefficiencies arising from risk sharing and the fact that charges are not sufficiently reflective of underlying costs.

Policy objectives

Given these findings, we developed objectives to guide the design of potential policy interventions for RP3. In the context of this study, focused on possible changes to implementing regulations, we equated the general objectives with the overall aims for the

modification of the two key pieces of legislation under review (the Performance and Charging Regulations). We also developed specific objectives, shown in the table below, which are a restatement or recast of objectives already defined for RP3 in papers submitted to the SSC.

Scheme	Objective	Rationale
Performance Scheme	Ensure key interdependencies captured in target setting process	• Recognises trade-offs and interactions between different elements of the Performance Scheme – requires that these be considered explicitly
	Ensure gate-to-gate approach embedded in management of performance	• Identifies the need for NSAs and ANSPs to take account of interactions between terminal and en-route air traffic management in setting targets and formulating plans
	Ensure link between Performance Scheme and Network Management	• Recognises the need for greater coordination between processes defined by the Performance Regulation and those set out in Regulation 677/2011 for which the Network Manager is responsible
	Strengthen role of NSAs and reduce duplication of regulatory monitoring	• Highlights the importance of giving NSAs a greater role in the regulatory framework
Charging Scheme	Ensure efficient allocation of risk between stakeholders	• Recognises the need to address the underlying issue of misalignment of charges and costs and misallocation/inadequate management of risks
Both schemes	Simplify operation of the Schemes and improve their efficiency	• Recognises the need to reduce resources required to administer the schemes so that they can be redeployed more effectively in the improvement of air navigation services • Responds to stakeholder concerns that the Schemes lack clarity in key areas and are too complex and onerous

Source: Steer Davies Gleave

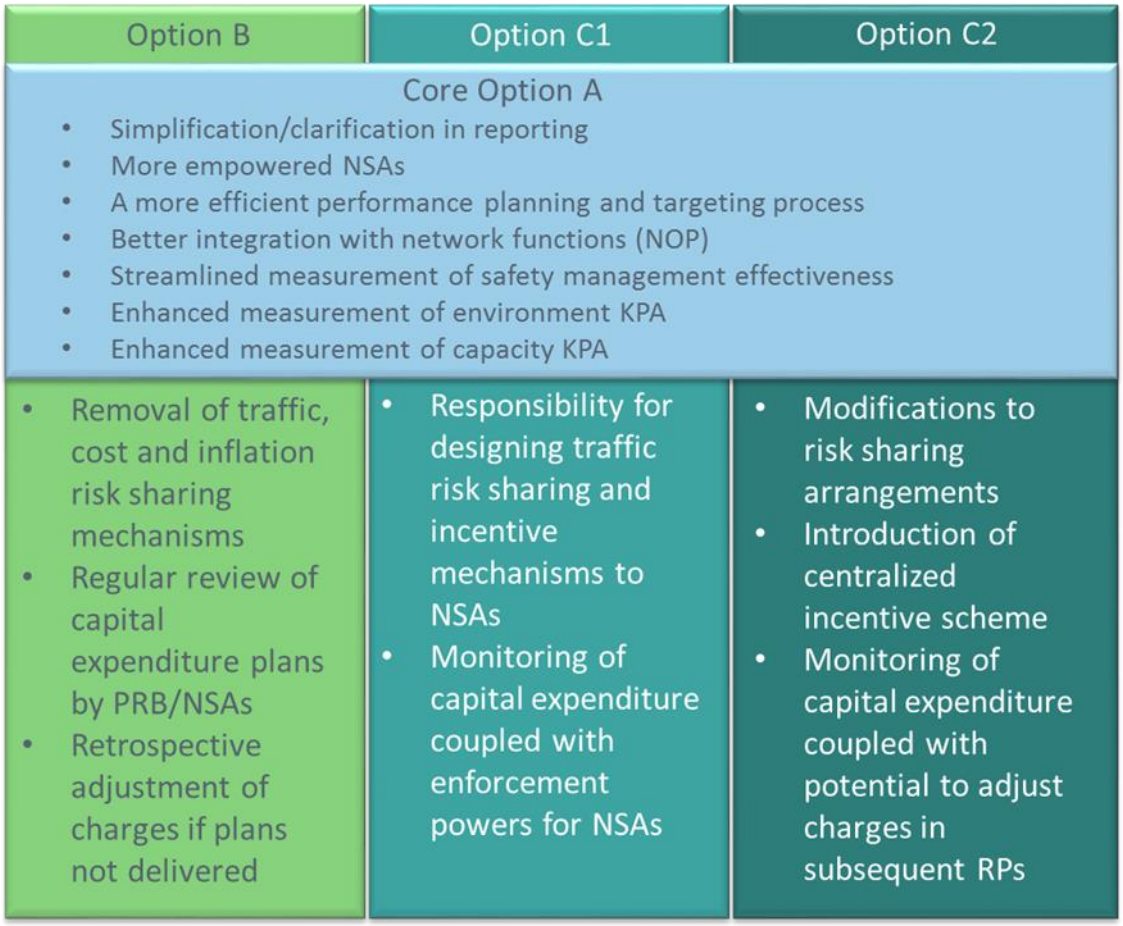
Policy options

As required by the Task Specifications for the study, we identified and reviewed a wide range of possible measures for improving the Performance and Charging Schemes in RP3. These were sifted and combined into a series of coherent options. Note, however, that measures discounted for the purposes of changing the Performance and Charging Schemes for RP3 should not necessarily be permanently set aside. In particular, we note that:

- The changes to be considered in this impact assessment are restricted to changes in implementing regulations, and that changes to Commission regulations could be introduced in later periods.
- Further, while some technologies and/or performance indicators may be insufficiently mature to be introduced within the next two years, further development during RP3 may enable their application in RP4 or RP5.

The figure below illustrates the structure of the options developed and their relationship with each other. Note that option A is a standalone option, as well as being a component of options B, C1 and C2.

Structure of the options considered in the impact assessment



Source: Steer Davies Gleave

Approach to the Impact Assessment

The short-listed policy options were subjected to an impact assessment (IA) to estimate their impacts across a range of areas, in line with the Better Regulation Guidelines and "Toolbox". We constructed an Excel-based IA tool to enable us to calculate the quantified and monetised impacts in each Member State and Switzerland across a 20-year assessment period from 2015 to 2035. The tool was used to:

- define the baseline scenario, which can be described as a 'do minimum' scenario, in which there is no significant change to the regulatory framework put in place for RP2 and established trends continue;
- estimate the impacts of the four policy options tested for RP3, with impacts measured in terms of deviations from the baseline; and
- assess the sensitivity of the options tested.

We used multi-criteria analysis (MCA) to combine impacts to judge each option. We also analysed qualitatively impacts that could not be assessed using the IA tool.

Results and conclusions of the Impact Assessment

From the results of the MCA and the qualitative assessment of impacts, we consider that Option C1 is the most appropriate option for implementation in RP3. It delivers slightly lower

delay savings than C2, but significantly more than Options A and B. Importantly, C1 also delivers the lowest unit rates of all the options resulting in similar levels of administrative cost, but without affecting the cost of capital to the same extent as Option B. The savings in unit rate brought by Option C1 are driven primarily by effective scrutiny of capital expenditure programmes of ANSPs by the NSAs and reimbursement of planned capital expenditure that is not delivered. We also note that it is supported by both NSAs and ANSPs, although airspace users are concerned that it would further complicate the Charging Scheme by introducing geographical variation into the application of both risk-sharing and incentive mechanisms.

Option B delivers benefits in the form of better alignment between planned and actual capital expenditure, including through reimbursement of planned expenditure not delivered, as under Option C1. It also enables some savings in regulatory resources, which translate into a small reduction in unit rates. However, the removal of risk sharing arrangements results in an increase in the cost of capital and the option provides no direct incentives for ANSPs to reduce delay. We also note that the option does not command support across the stakeholder community.

Option C2 has the potential to deliver lower unit rates as well as the highest reduction in delay among all four options. As it involves only limited changes to risk sharing arrangements, it does not result in a material increase in ANSPs' cost of capital. However, we suggest that the introduction of a pan-European capacity incentive framework, with supporting delay attribution and dispute resolution arrangements, raises issues that are not adequately captured by our estimates of increased regulatory costs. In particular, we consider that achieving the necessary consensus across a sufficiently wide range of stakeholders would be challenging within the timeframe available for agreeing changes for RP3.

For option C1 to deliver the intended benefits, NSAs would need to be adequately empowered and resourced, as their level of responsibility for delivery of RP3 objectives would be increased, firstly in the area of capacity but especially in relation to cost-efficiency, where their involvement with the traffic risk-sharing scheme and the incentive mechanisms would be enhanced. More specifically, if there were a failure by NSAs to scrutinise capital expenditure effectively from the start of RP3, the benefits of the option could be significantly undermined. Hence, following implementation, the impacts would need to be kept under review with a view to a further assessment prior to RP4. Further, in the light of these results, we suggest that the Commission should provide support, possibly in the form of non-binding guidance, to NSAs on effective monitoring of capital expenditure, factors to be taken into account in defining the risk sharing and incentives mechanisms and ensuring stakeholder consultations are meaningful.

1 Introduction

Background

1.1 The European Commission (the Commission) is preparing for Reference Period 3 (RP3) of the Single European Sky (SES) Performance and Charging Schemes. As part of this process, it is considering options for changing Regulation (EU) No 390/2013 laying down a performance scheme for air navigation services and network functions (the Performance Regulation) and Regulation (EU) No 391/2013 laying down a common charging scheme for air navigation services (the Charging Regulation). Steer Davies Gleave has been commissioned to identify specific options for change and assess their impacts.

1.2 The primary legislation underpinning the SES[3] will not be subject to change in RP3, and any modifications to the Performance and Charging Schemes will therefore be made through changes to the to key implementing regulations mentioned above. At the same time, it will be important to consider the need for some changes to other legislation to ensure that selected options have the desired effect[4].

Purpose and organisation of this report

1.3 This report is the fourth main deliverable for the impact assessment of options for the regulatory approach in RP3 of the SES Performance and Charging Schemes. It has been prepared to meet the requirements for the Final Report set out in the Task Specifications for the study.

1.4 The report is organised as follows:

- Chapter 2 summarises the methodological framework for the study;
- Chapter 3 presents an update of the intervention logic underpinning the impact assessment;
- Chapter 4 presents the results of a sifting and consolidation of the measures considered during the impact assessment and describes four policy options;
- Chapter 5 provides a description of the impact assessment tool used for the study, including the baseline scenario and the assumptions used in quantifying impacts of different options;
- Chapter 6 presents the results of the impact assessment; and

[3] Regulation (EC) No 549/2004 (the Framework Regulation) and Regulation (EC) No 550/2004 (the Services Provision Regulation).

[4] For example, it is likely that implementation of some of the options under consideration would require a change to Regulation (EU) No 677/2011 laying down detailed rules for the implementation of air traffic (ATM) network functions (Regulation 677/2011).

- Chapter 7 sets out our conclusions.

1.5 The report also includes the following Appendices:

- Appendix A provides a long list of measures for improving the Performance and Charging Schemes that were identified and reviewed during the study;
- Appendix B summarises the results of an initial sifting of the measures and provides an explanation for the exclusion of further measures during the process of formulating final options;
- Appendix C reports on the results of the stakeholder consultation undertaken as part of the study;
- Appendix D summarises the proceedings at a stakeholder workshop held on 14 November to discuss a series of proposed options for change;
- Appendix E provides more detail on the assumptions used in the quantitative analysis; and
- Appendix F presents the results of the impact assessment for each Member State.

2 Methodological framework

Overview

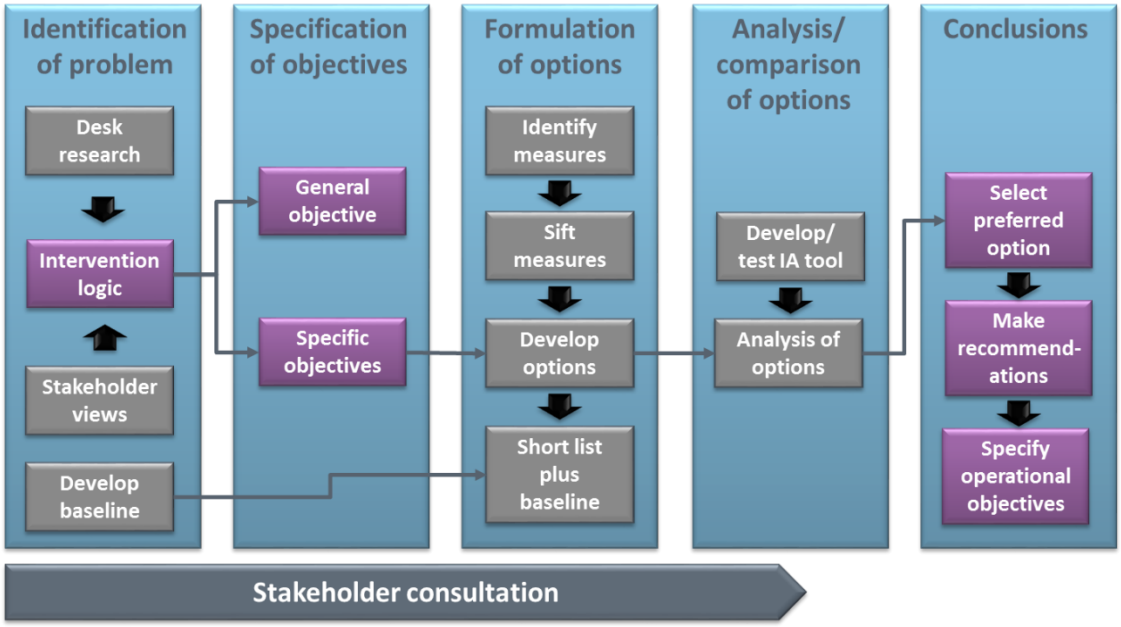
2.1 Since any changes to the Performance and Charging Schemes for RP3 will be limited to the relevant implementing regulations, it has not been necessary to carry out a full impact assessment of the options for change. We have nevertheless undertaken the assessment in accordance with the Commission's Better Regulation Guidelines[5]. These require impact assessment studies to proceed according to the following steps:

- **Identification of the problem:** the changes to the legislation considered must be designed to address specific problems for which there is clear evidence.
- **Specification of objectives:** once the problem has been identified, it is necessary to define a number of objectives to guide the subsequent formulation of options.
- **Formulation of options:** options must be developed by combining individual policy measures that have been sifted against clear criteria. Each option should represent a coherent package of measures that, together, meet all the objectives defined in the previous stage.
- **Analysis/comparison of options:** the options are compared using rigorous analysis of their expected effects on charges for air navigation services (ANS), the cost efficiency of the air navigation service providers (ANSPs), the administrative burden of the Performance and Charging Schemes (including regulatory costs incurred by ANSPs and National Supervisory Authorities (NSAs)), employment within the ANS sector and the environment.
- **Conclusions:** a preferred option is selected based on the results of the comparative analysis. The impact assessment must also make recommendations on the appropriate changes to legislation to implement the preferred option, and on guidance to stakeholders that is expected to support them in working within the new regulatory arrangements. Implementation must be supported by a monitoring framework, based on one or more operational objectives that will facilitate subsequent evaluation of the new Performance and Charging Schemes at a later date.

2.2 The relationship between these various steps is shown in the figure below. In the remainder of this chapter, we describe each in more detail.

[5] Commission Staff Working Document: Better Regulation Guidelines (SWD (2017) 350 final).

Figure 2.1: Overview of methodological framework



Source: Steer Davies Gleave

Identification of problem

2.3 It is important that any changes to the Performance and Charging Schemes introduced for RP3 address identified failings in the existing regulatory framework applied during RP2. We have investigated current problems by reviewing a number of information sources, in particular:

- relevant studies of the sector undertaken by, or on behalf of the Commission, Eurocontrol and other institutions and forums with an interest in ANS and the SES;
- papers submitted to the Single Sky Committee (SSC) discussing possible changes to the Performance and Charging Regulations in anticipation of RP3[6];
- papers provided by stakeholders in response to proposals discussed by the SSC and responses to the stakeholder consultation forming part of this study;
- the Network Strategy Plan 2015-2019[7] and Network Operations Plan (NOP) 2017-2019/21[8] prepared by the Network Manager in accordance with Regulation 677/2011; and
- the Annual Monitoring Reports prepared by the Performance Review Body (PRB).

2.4 We have used these sources to develop a comprehensive definition of the problem arising from shortcomings in the existing legislation, as set out in Chapter 3. The problem definition includes an assessment of a baseline scenario, representing a quantified projection of the outcomes for the ANS sector, measured in terms of the four Key Performance Areas (KPAs)

[6] In particular, we have reviewed Revision of the Performance Scheme (options) (SSC/17/Ad-Hoc/WP5) and Revision of the Charging Scheme (options) (SSC/17/Ad-Hoc/WP6), each provided as an annex to the Task Specifications for this study.

[7] Network Strategy Plan 2015-2019, Network Manager, July 2014.

[8] European Network Operations Plan, Network Manager, June 2017.

covered by the legislation[9], if the Performance and Charging Schemes were to remain unchanged during RP3 and beyond. The baseline is described in Chapter 5.

Specification of objectives

2.5 In discussion with the Commission, we specified a series of objectives for changes to legislation in RP3. In accordance with the Better Regulation Guidelines, these consist of:

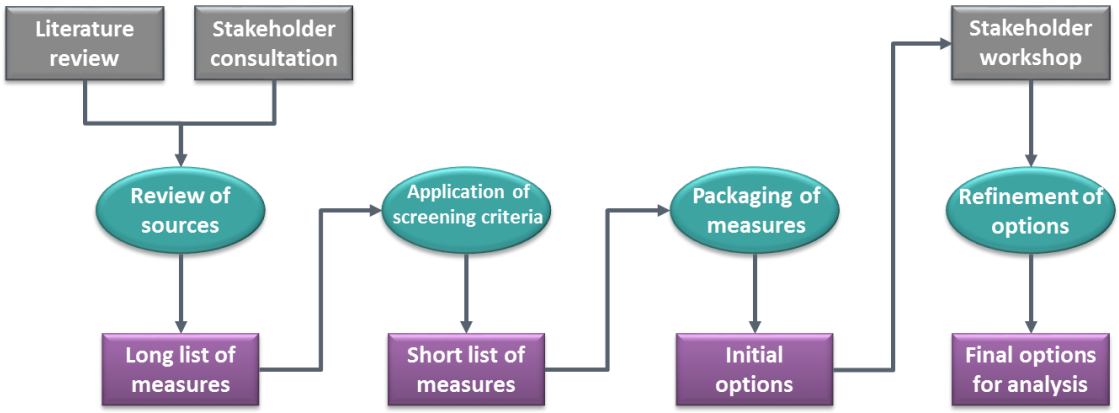
- general objectives, aligned with treaty-based goals and capturing the overall purpose of the changes under consideration; and
- specific objectives reflecting the need to address the different aspects of the problem investigated in the previous step.

2.6 As required, we have developed specific objectives that are SMART (specific, measurable, achievable, relevant and time-bound), such that it will be possible, post RP3, to determine unequivocally whether they have been met. Both the general and the specific objectives, and their relationship to the problem definition, are described in Chapter 3.

Formulation of options

2.7 A wide range of measures were already under discussion in the SSC and other SES forums prior to the start of the study. We undertook an extensive review of these at the inception stage before sifting and consolidating them into a series of options through the process shown below.

Figure 2.2: Formulation of options



Source: Steer Davies Gleave

2.8 The long list of policy measures included in Appendix A was derived from a wide range of sources. These included three pieces of analysis undertaken by the Performance Review Unit (PRU) on behalf of the Commission, namely:

- a discussion paper on improved demand-capacity balancing[10];
- a review of different proposals for enhancing the measurement of the environment KPA[11]; and

[9] The four KPAs identified in the Framework Regulation and subject to monitoring under the Performance regulation are safety, the environment, capacity and cost efficiency.

[10] Improved demand-capacity balancing, discussion paper, Eurocontrol, 15 September 2017.

- a simulation of different models of risk sharing that could be introduced under the Charging Regulation[12].

2.9 We also reviewed proposals described in the papers submitted to the SSC (see footnote 4) and suggestions put forward by stakeholders in separate documents provided to the Commission and in discussions during the consultation exercise. Overall, we identified 67 separate measures, 30 concerning the Performance Scheme and 37 concerning the Charging Scheme[13].

2.10 The long list was subjected to a sifting exercise to identify a set of practical measures that could realistically be implemented for RP3. This required the application of sifting criteria recommended by the Better Regulation Guidelines, suitably modified and supplemented to reflect the characteristics of the SES and the associated regulatory framework. The criteria applied are shown in Table 2.1.

Table 2.1: Sifting criteria

Criterion	Explanation
Legal feasibility	Measures should respect the principle of conferral. They should also respect any obligation arising from the EU Treaties (and relevant international agreements) and ensure respect for fundamental rights. Legal obligations incorporated in existing primary or secondary EU legislation may also rule out certain measures.
Technical feasibility	Technical constraints and lack of technical maturity may prevent the implementation, monitoring and/or enforcement of theoretical measures.
Previous policy choices	Certain measures may be ruled out by previous Commission policy choices or mandates by EU institutions.
Coherence with other EU policy objectives	Certain measures may be ruled out early due to poor coherence with other general EU policy objectives.
Effectiveness and efficiency	It may already be possible to show that some measures would achieve a worse cost-benefit balance than others.
Proportionality	Some measures may clearly restrict the scope for national decision-making over and above what is needed to achieve the objectives satisfactorily.
Political feasibility	Measures that would clearly fail to garner the necessary political support for legislative adoption and/or implementation may also need to be discarded.
Relevance	When it can be shown that two options are not likely to differ materially in terms of their significant impacts or their distribution, only one should be retained. In addition, measures must address, at least to some degree, the objectives for the proposed policy or legislative change (in this case, the objectives for RP3).
Accountability	Where a measure allocate responsibility to parties that they cannot necessarily meet for reasons outside their control, such that the parties cannot be held accountable, the measure may be rejected.

Source: Better Regulation Guidelines, adapted by Steer Davies Gleave

2.11 Following the sifting exercise, we combined the remaining measures into a series of options for analysis. Each option was developed with a view to meeting all the objectives for RP3

[11] Support to the impact assessment of RP3 options, topic B – environment, Eurocontrol, 15 September 2017.

[12] Support to the impact assessment of RP3 options, topic C – economics, Eurocontrol, 13 October 2017.

[13] In practice, it is difficult to specify the number of potential measures reviewed precisely. As indicated in Appendix A, some are similar to, or overlap with, others and some are insufficiently well defined to allow them to be distinguished clearly from the alternatives.

previously defined. They were shared with stakeholders at a workshop held in November 2017, the proceedings of which are summarised in Appendix D, and further refined in the light of comments and observations received. The final set of options analysed are described in Chapter 4.

Analysis/comparison of options

2.12 We have analysed the options by estimating their impacts in terms of a wide range of metrics, including those related to the KPAs covered by the Performance Scheme. The analysis was undertaken using the impact assessment (IA) tool described in Chapter 5, which calculates impacts of options relative to the baseline projection. We have also assessed some impacts qualitatively in the view of the difficulties of modelling them reliably, either because of inadequate data or difficulties in capturing behavioural responses to changes within the IA tool. The following table summarises our approach to the analysis of impacts.

Table 2.2: Approach to the analysis of impacts

Impact		Quantitative analysis		
		Monetised	Non-monetised	Qualitative analysis
Economic impacts				
1	Charges paid by airspace users	✓		
2	Regulatory impacts – airspace user/ANSP costs	✓		
3	Regulatory impacts – NSA/Member State costs	✓		
4	Service quality (measured in terms of cost of delay)	✓		
5	Changes in ease of free movement of goods, capital and workers			✓
6	Changes in consumer choice and prices			✓
7	Impacts on barriers to entry and market structure			✓
8	Relocation of businesses between Member States			✓
9	Economic effects on small and medium sized enterprises (SMEs)			✓
Social impacts				
10	Employment levels	✓	✓	
11	Working conditions and job quality			✓
12	Level of infringement of social rules (including labour law)			✓
Environmental impacts				
13	Fuel burn and the associated costs	✓	✓	
14	Level of carbon dioxide emissions	✓	✓	

Source: Steer Davies Gleave

2.13 The scope and functionality of the impact assessment tool reflects the following considerations:

- We do not anticipate there will be an impact on the level of air transport activity (measured in flights or service units) as a result of any of the options modelled[14]. However, the tool includes a baseline projection of traffic for the purpose of calculating unit rates.
- The SES KPIs included within the tool are limited to delay and KEA[15] (although KEA is included only within the baseline as it was not possible to estimate the impact of any of the policy options on the metric). The impact of options on cost efficiency is captured through the estimation of unit rates, and none of the options is expected to have an safety-related impacts (other than on the regulatory cost associated with safety monitoring).
- All options have an impact on regulatory costs (incurred primarily by ANSPs and NSAs). We have assumed that any increases or savings in such costs will be reflected in an adjustment to the determined cost base and not internalised by the organisation concerned.

Stakeholder consultation

2.14 We undertook an extensive stakeholder consultation exercise in support of the study, engaging with stakeholders through the following channels:

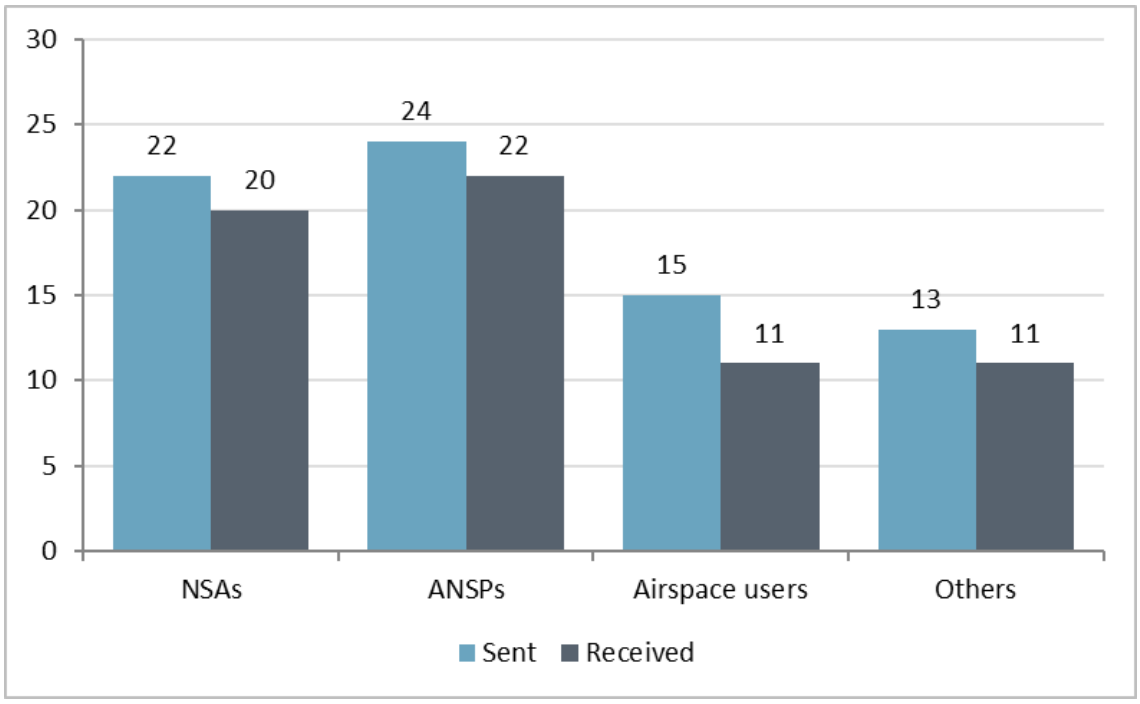
- a combination of face-to-face and telephone interviews with 26 stakeholders including airspace users and their representative organisations, ANSPs, functional airspace blocks (FABs), CANSO, the Network Manager, NSAs and Member States;
- a review of stakeholder written submissions to the Commission and the SSC;
- questionnaires tailored to different stakeholder groups and distributed to 74 stakeholders across the European Union; and
- a stakeholder workshop held in Brussels at which we set out proposed options for analysis and sought comments on their merits and likely impacts.

2.15 The results of the stakeholder consultation are set out in Appendix C. The level of response to the questionnaire is shown in the figure below.

[14] This reflects the share of air navigation charges in total airline operating costs, which we estimate to be between 8% and 12% in the case of low cost carriers. Any change to charges resulting from the options considered in this study is therefore likely to have only a marginal impact on air fares, which are anyway determined by a wide range of market-related and commercial factors as well as underlying costs. We have assumed, as a first approximation, that traffic levels do not vary between options.

[15] KEA is a measure of the horizontal en-route flight efficiency based on the actual trajectory of the flight. It is defined as a comparison between the length of the en-route part of the actual trajectory derived from surveillance data and the corresponding portion of the great circle distance, summed over all relevant flights traversing European airspace.

Figure 2.3: Level of stakeholder questionnaire responses



Source: Steer Davies Gleave analysis

Conclusions

2.16 Based on the analysis described above, and taking account of stakeholder comments on the proposals discussed at the workshop, we identified a preferred set of policy changes for implementation in RP3. These are described in Chapter 7, together with a number of recommendations relating to the introduction of supporting guidance and a monitoring framework to facilitate evaluation.

3 Intervention logic

Introduction

3.1 This chapter discusses the intervention logic underpinning the impact assessment. This is based on a review of relevant data sources referenced through this report, and the results of the stakeholder consultation exercise described in Appendix C.

3.2 As already noted, the possible changes to the Performance and Charging Schemes that the Commission is considering for implementation in RP3 are limited to the implementing regulations, and will not therefore be subject to a full impact assessment of the kind undertaken when a major new policy intervention is in prospect. Accordingly, the Task Specifications for this study do not require us to undertake a thorough investigation of the problem and associated evidence base supporting the case for intervention. Nevertheless, it is important that the impact assessment is rooted in a clearly specified intervention logic, informing both the selection of appropriate policy measures and their grouping into coherent policy options for further analysis.

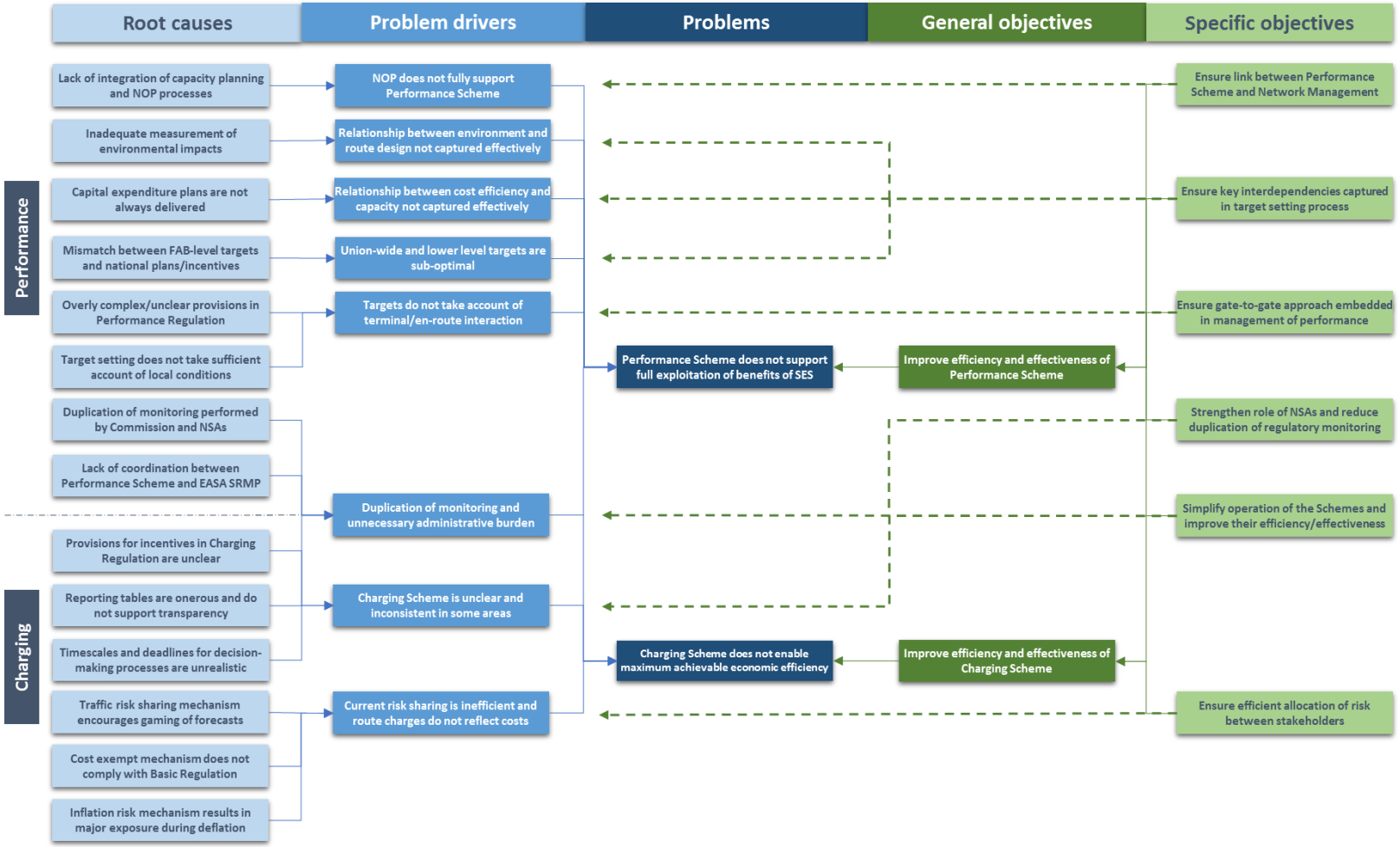
Overview

3.3 We provide an illustration of the intervention logic in Figure 3.1. As shown, we have considered the Performance and Charging Schemes separately, noting that in formulating policy measures and options and assessing their impacts we have also considered the interactions between them. In each case, we have:

- defined the principal problem in terms of a failure to deliver the full benefits anticipated when the Performance and Charging Regulations (and broader framework of SES legislation) were implemented;
- set out a number of problem drivers, which represent the key elements of the problem that will need to be addressed in RP3; and
- indicated the underlying root causes that have informed the development of individual policy measures.

3.4 In addition, we have formulated general objectives (high level aims, in this case ultimately rooted in the overall objectives of the SES) and specific objectives (more focused aims, aligned with the principal elements of the problem), in accordance with the methodology described in the previous chapter. We outline the main elements of the problem in the following sections before going on the explain the objectives.

Figure 3.1: Overview of the intervention logic



Source: Steer Davies Gleave

Problem definition

Key problems with the Performance and Charging Schemes

3.5 Both the Performance and Charging Schemes represent a substantial development of the SES, delivering benefits in the form of stronger incentives to improve performance across the full range of KPAs and much greater transparency and consistency of performance data, notably in respect of the cost information used to calculate unit rates. Nevertheless, it is also clear from the experience of stakeholders, communicated through the SSC and other forums, that both schemes need to be improved if the benefits of the SES are to be fully realised and efficient pricing and delivery of ANS is to be achieved. More specifically:

- in the case of the Performance Scheme, the various monitoring and incentive mechanisms are not sufficiently integrated to deliver optimal outcomes, notably in the area of capacity provision, do not fully capture the performance of the air navigation industry, fail to take account of the interactions between the different KPAs and give rise to duplication of regulatory effort; and
- in the case of the Charging Scheme, the mechanisms are overly complex and onerous and insufficiently transparent, with the result that the scheme does not create sufficiently strong incentives to improve efficiency and can give rise to perverse incentives.

3.6 We discuss the drivers of these problems and their underpinning root causes in the following paragraphs.

Problem drivers and root causes

Integration of capacity planning and NOP processes

3.7 The Commission has noted that the different pieces of legislation that define and give effect to the SES might be better aligned to ensure the efficiency of certain measures being considered for RP3. This is particularly apparent in the case of the planning processes defined by Regulation 677/2011, which are intended to support the setting and monitoring of Union-wide targets:

- Specific provisions included in the legislation require the Network Manager to produce a Network Operations Plan (NOP) for the delivery of the targets and identify any potential for differences between reported and planned performance.
- The Performance Regulation also requires the Network Manager to prepare a Network Performance Plan (NPP) and, on request, to define corrective measures if targets are not met.

3.8 In practice, the Performance Scheme is insufficiently flexible to enable short term changes in response to NOP processes, and there is anyway insufficient compliance of NOP recommendations to address shortfalls in service delivery (e.g. at weekends and during holidays). ANSP representatives tended to agree that there should be a better link between the Performance Scheme and the network functions, although they considered that integration should not result in a confusion of operational and regulatory functions.

Relationship between the environment and route design

3.9 The Performance Scheme captures the relationship between flight routing and environmental impacts through two Key Performance Indicators (KPIs): KEP (which measures horizontal flight efficiency by reference to the trajectory in the last filed flight plan) and KEA (which measures horizontal flight efficiency by reference to the actual trajectory flown). While the actual

trajectory ultimately determines the environmental impact, and often differs from the planned trajectory, KEP is nevertheless important since it provides an indication of the environmental impacts potentially arising from the planning process. However, flight planning is currently insufficiently dynamic, since the airlines flight planning systems do not always make full use of various tools and techniques facilitating re-routing and do not enable a full exploitation of constrained routes (CDRs) and/or free route airspace (FRA). This means that the Network Manager and ANSPs can only influence flight planning to a limited degree, which tends to undermine the value of KEP as a measure of the contribution of the ANS industry to reducing environmental impacts.

3.10 In addition, the environment KPA is not subject to comprehensive measurement, with measures such as fuel emissions, vertical flight efficiency, noise levels and air quality excluded from the list of performance indicators monitored. In some cases (e.g. vertical flight efficiency), this has been due to the difficulty of identifying the contribution of different parties to measured inefficiency, while in others (e.g. noise), it reflects the fact that the associated environmental impacts are local (i.e. mainly on the ground or at low flight levels) and not easily captured within the Performance Scheme. Nevertheless, the limitations of the current measurement arrangements mean that this element of the scheme is not enabling full exploitation of the potential environmental benefits of the SES.

3.11 We identified support for the view that the environment KPA should be subject to better measurement during the stakeholder consultation. ANSPs, in particular, were concerned that current metrics did not adequately capture the contribution of different parties to measured outcomes. For example, Naviair suggested that environmental targets should focus on airlines rather than ANSPs, and that charging should be based on the actual-flown route in order to bring charges into line with costs actually incurred. FABEC also supported the view that the impact of other stakeholders on ANSP performance should be captured within the Performance Scheme, for example through the monitoring of relevant environmental indicators.

Relationship between cost efficiency and capacity

3.12 In principle, it should be possible for ANSPs to deliver appropriate capacity in a cost-efficient manner, optimising the price - quality ratio faced by airspace users. The latter have stressed the importance of achieving the appropriate balance of price and quality through the regulatory process, as there is no competitive discipline on ANSPs. However, during the stakeholder consultation, and through their responses to SSC discussions, ANSP representatives and other stakeholders have suggested that undue emphasis on achieving cost efficiency targets can undermine the quality of service delivery by encouraging underinvestment. When ANSPs face cost pressures, they often seek to postpone or reduce capital expenditure programmes, which has a detrimental effect on capacity in the medium to long term.

3.13 At the same time, airspace users have expressed concerns that capital expenditure is not subject to sufficient regulatory scrutiny, with the result that planned expenditure, the costs of which are reflected in unit rates, may not be delivered. The same concern was raised in a recent report from the European Court of Auditors[16], which noted that “capital expenditure included in performance plans is part of the determined unit cost and will be charged to

[16] Single European Sky: a changed culture but not a single sky, European Court of Auditors, 2017.

airspace users even if ANSPs opt to cancel or postpone such investments. While the Performance Review Body has identified capital underspending of approximately €1 billion during the 2012-2015 period, there is no provision for the return of these amounts to users should the related investments never materialize".

Union-wide and lower level targets

3.14 In principle, the planning framework defined by the Performance Regulation includes a process for setting Union-wide targets covering the various KPAs and consistent targets at a more disaggregated level (the national and FAB levels). However, in practice the relationship between the various targets can be unclear and they are not always consistent. This is partly the result of different target setting requirements in different KPAs, as follows:

- in the case of safety, capacity and the environment, targets for the relevant KPIs are largely set at the FAB level[17];
- cost efficiency KPI targets are set at the level of the charging zone (as a first approximation, the national level); and
- performance plans are aligned with Flight Information Region (FIR) boundaries.

3.15 Coupled with the interaction between KPAs, these differences in the approach to target setting tend to undermine accountability for performance. This is a concern for the design of effective incentive schemes, for example where individual ANSPs can receive rewards for improving capacity notwithstanding that the overall FAB target for the capacity KPI is missed.

3.16 These concerns echo the findings of the Court of Auditors report, which made a number of recommendations to better address the fragmentation of the SES. In particular, the Court directed the Commission to assess the added value of maintaining the regulatory requirements for FABs "given their ineffectiveness in targeting defragmentation", and to review policy options which, on their own or in addition to FABs, could effectively deliver defragmentation and generate economies of scale. In the Court's view, such options could include the active promotion of integrated or cross border service provision, taking into account possible restructuring of ANSP services to encourage a more competitive approach.

3.17 The difficulties surrounding consistent target setting are compounded by insufficient involvement of NSAs and other stakeholders in the determination of Union-wide targets. At present, the Performance Regulation provides for the adoption of targets no later than 12 months before the beginning of a Reference Period and the subsequent preparation of consistent performance plans and targets by NSAs. In practice, this introduces the potential for inconsistency, leading to delays in the approval of performance plans. Moreover, there is currently no formal mechanism for enabling NSAs to communicate information on local influences and constraints on national targets (e.g. in the form of likely ranges for KPIs), which would help to improve the reliability of targets and simplify the process for ensuring consistency.

3.18 In addition, the process for revising plans and targets is overly complex and unclear. This is partly due to the inclusion of provisions within the Performance and Charging Regulations apparently duplicating mechanisms for making revisions (in particular, the alert mechanism defined by Article 19 of the Performance Regulation and the traffic risk sharing mechanism defined by Article 13 of the Charging Regulation). It also reflects a lack of integration with

[17] Arrival ATFM delay minute targets are set at the national level.

other parts of the SES framework, for example the planning processes defined by Regulation 677/2011 as already discussed.

Terminal/en-route interaction

3.19 The Commission is concerned that industry planning processes do not encourage a gate-to-gate approach, whereby interactions between terminal and en-route air traffic movements are considered in the development of specific plans and targets, particularly in respect of the capacity KPA. This concern was echoed by airspace users during the stakeholder consultation.

3.20 In a previous report for the Commission on modulation of charges[18], we highlighted the difficulty in defining clear boundaries between en-route, terminal and approach activity, not least because of the range of different practices and distinctions between activities applied across the European Union. At the same time, the use of en-route air traffic flow management (ATFM) delay as the KPI for capacity and the monitoring of delay due to terminal and airport navigation services as a lower level performance indicator may be inhibiting the adoption of a more integrated approach. In addition, failure to monitor vertical flight efficiency means that the contribution of continuous climb operation (CCO) and continuous descent operation (CDO) to overall flight efficiency is not currently captured.

3.21 Airspace users strongly support an embedded gate-to-gate approach in the management of airspace. However, while the ANSP community endorses the importance of such an approach, they also note that it cannot be delivered through the management of airspace alone. For example:

- CANSO considered that the objective of a gate-to-gate approach was close to being met, as it considers that while there is no single gate-to-gate indicator, the major parts of a flight are already covered by indicators. It also indicated that such an approach should not obscure the performance of en-route and terminal services, nor create barriers to market-based provision of terminal ANS where Member States sought to implement it.
- FABEC stated that it fully supported a gate-to-gate approach, but observed that since all requirements on terminal services were determined locally, KPIs for capacity and cost efficiency in relation to terminal services should continue to be set nationally. It also noted that the performance contribution from other stakeholders should be regulated, as the share of en-route ANSPs in overall delay is approximately 25%[19].
- More generally, the stakeholder consultation confirmed that most ANSPs consider that delivery of a gate-to-gate approach depends on a range of factors, some of which are outside their control.

Regulatory monitoring and the administrative burden

3.22 Article 18 (1) of the Performance Regulation requires that "the National Supervisory Authorities and the Commission shall monitor the implementation of performance plans". This results in further duplication of monitoring activity, adding to the level of administrative

[18] Policy options for the modulation of charges in the Single European Sky, Steer Davies Gleave, April 2015.

[19] We have not been able to identify the source of this figure. However, we note that, according to the 2016 Performance Review report, en-route ATFM delay accounted for 56.4% of total ATFM delay, and of this 55.3% related to capacity and staffing issues for which ANSPs are primarily responsible. 55.3% of 56.4% equates to 31.2%, which is broadly comparable with the figure indicated by FABEC.

resource required, since the integration of monitoring processes within the different organisations is not clearly defined. Moreover, some stakeholders reported that a lack of standard templates and failure to introduce automated processes was contributing to the administrative burden.

3.23 The current duplication of regulatory activity is partly due to a lack of independence and resources among some NSAs, creating a need for greater scrutiny of performance plans by the Commission and the PRB. This concern was raised in the recent Court of Auditors report, which identified various cases demonstrating the adverse effects of failing to ensure hierarchical and financial separation of ANSPs and NSAs:

- In France, the NSA and the ANSP report to the same Director General and share financial resources from a common budget, primarily funded by the same navigation charges over which the NSA has regulatory oversight.
- In Hungary, there is arguably no functional separation (as required by the Framework Regulation) as the national law allocates responsibility for establishing the ATM cost base to the ANSP, and the NSA lacks the necessary resources to carry out its oversight role.

3.24 As discussed in Appendix B, these issues cannot readily be addressed without a change to the Framework Regulation, which is outside the scope of the current impact assessment, but they serve to demonstrate the pressing need to strengthen both the role and capabilities of NSAs if the Performance Scheme is to operate more effectively in RP3.

3.25 There was widespread support for a strengthening of the role of NSAs among stakeholders, although there were different views on what this would mean in practice. For example:

- CANSO considered that the Performance Scheme should be simplified and duplication of activity eliminated to enable NSAs to operate more effectively.
- HANSA suggested that a clearer and more robust regulatory framework was required.
- Belgocontrol considered that while NSAs “can best address local requirements”, the nature of the relationship between individual ANSPs and their respective NSAs should be taken into account in deciding how much regulatory authority to pass to the latter.
- IATA also supported a strengthening of the role of the NSAs but noted that this would require improvements in areas such as technical/operational competence and systems/processes for quality management. It also highlighted the importance of introducing organizational structures to prevent conflicts of interest.
- A4E added that the performance of NSAs should be overseen by the Commission as they do not always act in the best interests of all stakeholders. It also suggested that there should be a more effective appeal mechanism for NSA decisions.

3.26 We also note that the Performance Scheme overlaps with the Safety Risk Management Process (SRMP) administered by EASA. This results in further duplication of performance monitoring activity, potentially leading to inconsistencies as well as inefficiency. EASA’s role in relation to monitoring for the purposes of the Performance Scheme, and its relationship with the administration of the SRMP also needs to be better defined.

3.27 Similar concerns have arisen in respect of the Charging Scheme, partly due to the ambiguity and complexity of some of the risk sharing and incentive mechanisms underpinning it, as discussed further below. In addition, the Commission has noted that the timescales within which the NSAs must submit information and those provided for its review and validation are challenging. This tends to increase the resources that each party needs to administer the regime, while increasing the risk of error and non-compliance.

Lack of clarity of the Charging Scheme

3.28 Various aspects of the Charging Scheme are unclear and/or give rise to inconsistencies in the application of specific provisions. Concerns identified by the Commission and stakeholders include the following:

- Article 15 of the Charging Regulation, which sets out requirements for incentive schemes for ANSPs, is open to considerable interpretation, leading to significant variation in the parameters used to calculate financial bonuses and penalties;
- incentive schemes must be based on established capacity targets, which means that some ANSPs have no opportunity to earn a bonus (since they face a target of zero delay) and that all ANSPs have a disincentive to accept additional traffic likely to cause above-target delay;
- the reporting tables supporting the Charging Scheme, while providing useful information, have become increasingly complex and onerous to prepare, but remain ambiguous to some degree (for example, in respect of the treatment of other revenues); and
- various provisions of the Charging Regulation, including those relating to market conditions and restructuring costs, have had little or no application, and it is possible that this is the result of lack of clarity or transparency making it difficult to assess the costs of compliance.

Risk sharing and cost reflectivity

3.29 The complexity of the Charging Scheme arises partly from the number of mechanisms intended to modify the risk allocation and the interaction between them. We note, in particular, that:

- the traffic risk sharing mechanism includes a dead band, sharing keys within a defined range of variation and a cap, and provides for retrospective adjustment in year 'n+2', not only making for a relatively complex calculation but also incentivising cautious traffic forecasts[20];
- the 'cost exempt' mechanism adds further complexity and, since experience to date shows it relates to costs accounting for less than 1% of the total cost base, it is arguably disproportionate and applies to costs that ANSPs can manage to some degree; and
- the inflation risk mechanism, while similar to mechanisms applied in the regulation of other sectors, can lead to substantial and inappropriate retrospective adjustments to certain costs (e.g. depreciation).

3.30 The administration of these mechanisms requires significant resource within the Commission, the NSAs and the ANSPs, adding to the regulatory burden highlighted above. In addition, it arguably makes it more difficult for ANSPs and airspace users to plan, since ANS charges paid and received over the Reference Period can be influenced by a wide range of factors but only after a time lag. We also note that it is not clear whether the 'cost exempt' mechanism is

[20] The dead band provides an incentive to underestimate traffic by up to 2% when preparing forecasts, since a variation between forecast and actual traffic falling outside the dead band results in additional revenue from airspace users.

compliant with the requirements of the basic legislation underpinning the Charging Regulation[21].

3.31 Some stakeholders have also argued that the Charging Scheme does not result in cost reflective charges. Key concerns include the following:

- Charges are based on the route and distances flown in the latest available flight plan rather than the actual route flown. This means that charges do not fully reflect underlying costs of service provision, and can cause a misallocation of risk and reward between ANSPs. Against this, airspace users have noted that basing charges on the actual route flown could encourage ANSPs to manage airspace with a view to increasing route length and hence revenues, an issue discussed further in Appendix B.
- The Network Manager's costs are not sufficiently transparent, making it difficult to ensure that they are properly reflected in charges. This issue was identified in an earlier report for the Commission on the Network Manager[22], and remains a concern among a number of stakeholders, particularly airspace users. More generally, the Commission has noted that the current unit rates on which charges are based do not provide transparent information on the costs of different ANSP services within the overall service offer, weakening the relationship between costs and charges and potentially leading to a misallocation of resources.

3.32 However, we were not able to identify a consensus view on whether the current allocation of risk delivered by the Charging Scheme is efficient. For example, CANSO commented that the objective of an efficient allocation of risks between stakeholders was largely met, while FABEC considered that improvements could be made in respect of traffic and cost risk.

Objectives

3.33 As shown in Table 3.1, we have specified both general and specific objectives for the options included in the impact assessment. In the context of this study, which is focused on possible changes to implementing regulations, we have equated general objectives with the overall aims for the modification of the two key pieces of legislation under review (the Performance and Charging Regulations). In each case, the intention is to improve the efficiency and effectiveness of the schemes that they define during RP3.

3.34 Our suggested specific objectives are a restatement or recast of objectives already defined for RP3 in papers submitted to the SSC[23]. Note that each relates to one or more specific problem drivers, such that if all objectives are met the Commission can be confident that the entire problem has been addressed, at least to some degree. In combining individual policy measures into packages for the purposes of defining options for assessment, we have sought to ensure that each specific objective is matched by at least one measure.

3.35 The following table provides a brief rationale for each of the specific objectives in Table 3.1.

[21] Regulation (EC) No 550/2004 on the provision of air navigation services in the Single European Sky (the Service Provision Regulation).

[22] Review of the Single European Sky Network Manager, Steer Davies Gleave, June 2016.

[23] See footnote 4 above.

Table 3.1: Specific objectives

Scheme	Objective	Rationale
Performance Scheme	Ensure key interdependencies captured in target setting process	• Recognises trade-offs and interactions between different elements of the Performance Scheme – requires that these be considered explicitly
	Ensure gate-to-gate approach embedded in management of performance	• Identifies the need for NSAs and ANSPs to take account of interactions between terminal and en-route air traffic management in setting targets and formulating plans
	Ensure link between Performance Scheme and Network Management	• Recognises the need for greater coordination between processes defined by the Performance Regulation and those set out in Regulation 677/2011 for which the Network Manager is responsible
	Strengthen role of NSAs and reduce duplication of regulatory monitoring	• Highlights the importance of giving NSAs a greater role in the regulatory framework
Charging Scheme	Ensure efficient allocation of risk between stakeholders	• Recognises the need to address the underlying issue of misalignment of charges and costs and misallocation/inadequate management of risks
Both schemes	Simplify operation of the Schemes and improve their efficiency	• Recognises the need to reduce resources required to administer the schemes so that they can be redeployed more effectively in the improvement of air navigation services • Responds to stakeholder concerns that the Schemes lack clarity in key areas and are too complex and onerous

Source: Steer Davies Gleave

4 Development of options

Introduction

4.1 As required by the Task Specifications for the study, we have identified and reviewed a wide range of possible measures for improving the Performance and Charging Schemes in RP3, as shown in Appendix A. These have been sifted and combined into a series of coherent options using the methodology described in Chapter 2. In this chapter, we describe the options in detail, referencing the individual measures that they include and providing a rationale for their formulation. We have also summarised the changes to legislation that would be required to implement them.

4.2 As already noted, the development of options was based on a short list of measures established through the application of the sifting criteria set out in Table 2.1. The reasons for setting aside certain measures during the initial sifting exercise and in the subsequent development of options are set out in Appendix B. In addition, in this chapter we have provided an explanation of how and why the remaining measures have been adapted in defining a final set of coherent options for analysis.

4.3 Note, however, that while measures may have been discounted for the purposes of changing the Performance and Charging Schemes for RP3, this does not always mean that they should be permanently set aside. In particular, we note that the changes to be considered in this impact assessment are restricted to changes in implementing regulations, and that changes to Commission regulations could be introduced in later periods. Further, while some technologies and/or performance indicators may be insufficiently mature to be introduced within the next two years, further development during RP3 may enable their application in RP4 or RP5.

Structure of options

4.4 The proposals adopted for RP3 will depend on the industry's appetite for change and willingness to agree on specific amendments to the relevant regulations. We have therefore structured the options to reflect different degrees of change, increasing the potential for agreement in some areas while allowing scope for ongoing debate in others. At the same time, we note the need to meet the requirements of the Commission's Better Regulation Guidelines, which state that options for investigation in an impact assessment must meet all the objectives for change.

4.5 Given these constraints, we have developed an option (Option A) representing a minimum aspiration for changing the framework of regulation for RP3. It includes measures designed to strengthen the independence and capability of NSAs and to improve the process for setting performance plans and targets. It is also intended to improve the management of airspace

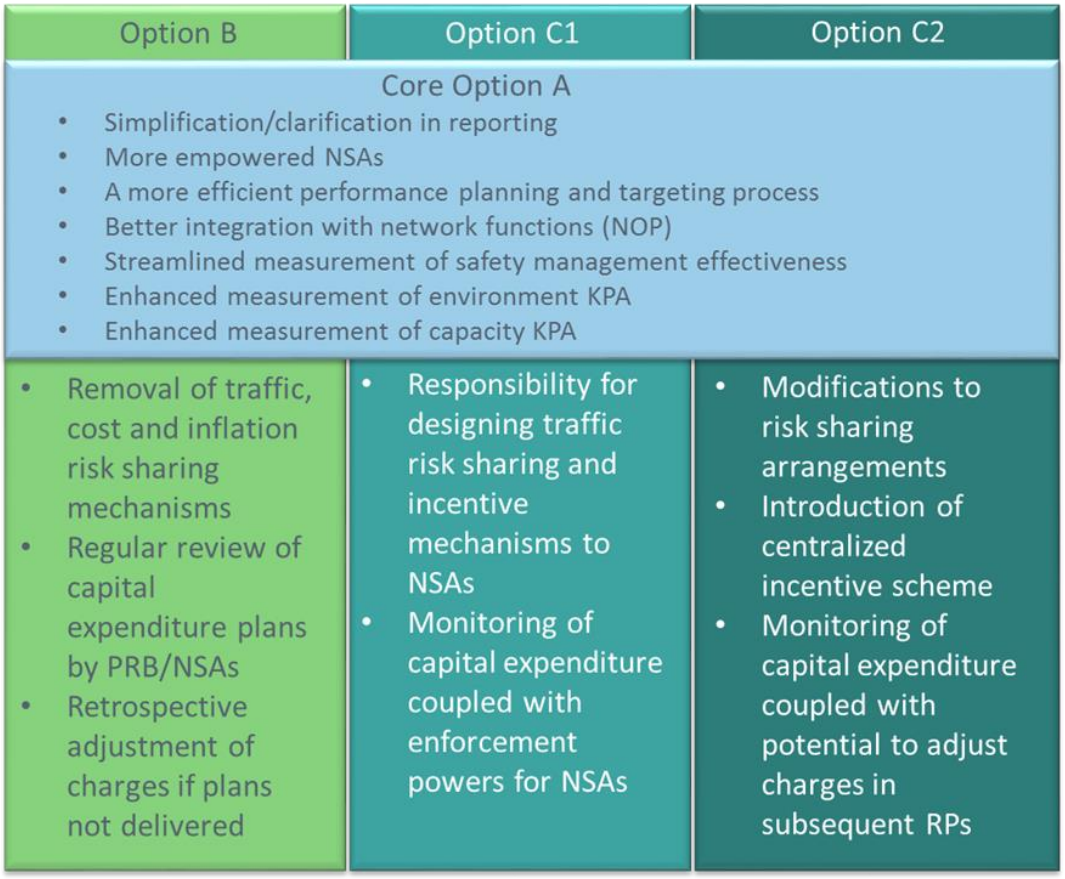
capacity through the NOP produced by the Network Manager in accordance with Regulation 677/2011.

4.6 The elements of Option A, which are largely focused on the Performance Scheme, are also common to all other options under consideration. This means that Option A, while it is an independent, standalone option, is also part of Options B, C1 and C2 and is therefore defined as "the core option". The following measures are included in each of the other options:

- Option B: this involves radical simplification of the Charging Scheme through replacement of the current risk sharing arrangements with a simple price cap (removing the existing risk sharing and incentive mechanisms) and strengthened regulatory scrutiny of capital expenditure.
- Option C: this involves retaining the current framework of risk sharing but modifying the parameters to achieve an alternative allocation of risk. It has two variants, namely:
  - Option C1, under which, subject to Commission approval, the parameters would be specified by the NSA with a view to reflecting local circumstances within the relevant charging zone and incentive mechanisms would similarly be locally determined; and
  - Option C2, under which risk sharing mechanisms and incentive arrangements would be centrally determined (with parameter values defined in legislation) and provide for increased risk exposure for the ANSPs.

4.7 The structure of the options and their relationship with each other is illustrated in the figure below.

Figure 4.1: Structure of options



Source: Steer Davies Gleave

Option A – the core option

Purpose

4.8 As already noted, Option A can be considered a minimum aspiration that meets all the objectives for RP3. It is intended to build on the existing regulatory framework, strengthening the role and powers of NSAs and integrating processes that already exist rather than introducing entirely new arrangements. At the same time, it would provide NSAs with additional powers designed to ensure that ANSPs comply with their respective performance plans and with the requirements of the NOP. It would also introduce new environment and capacity measures to enhance the effectiveness of the Performance Scheme by enabling monitoring of vertical flight efficiency and different aspects of delay. We discuss each element of the option in turn in the following sections.

Simplification and clarification

Definition

4.9 This element of the option includes several measures to clarify aspects of the Performance Scheme and provide for some simplification that will reduce the regulatory burden. These are as follows:

- The treatment of public funding of investment for the purposes of calculating unit rates should be clarified, with such funding identified explicitly in the calculation in Table 2 of Annex VI of the Charging Regulation. Supplementary guidance should also be provided by the European Commission to ensure that public funding is treated correctly as a category of 'other revenues' under item 5 of Table 2.
- The process for applying initial unit rates prior to approval should also be clarified. We suggest that an adjustment in the form of a reimbursement (or, where applicable, additional payment) should be made for the year in which it applies rather than through the calculation of unit rates for the subsequent year.
- Operational performance monitoring should apply to the group of airports covered by the airport collaborative decision-making (A-CDM) process[24]. Cost efficiency targets should, however, be determined by reference to all airports at which terminal air navigation services are provided.

Rationale

4.10 There is currently considerable ambiguity over the appropriate treatment of public funding of investment in air navigation services, and the basis for including such funding as a category of 'other revenues' in the calculation of unit rates is not clear. The aim for RP3 should be to ensure that such public funding of capital expenditure included in determined costs is properly

[24] The A-CDM process, which is intended to enable improvements in airport operating efficiency through optimal use of resources and enhanced predictability of events, has been implemented at 25 European airports. A key benefit is that the Network Manager receives more accurate target take-off times, allowing improved en-route sectoral planning and a more coordinated gate-to-gate approach. Note that the list of airports in scope for A-CDM may evolve.

reflected such that investment is not over-remunerated, a concern expressed by representatives of airspace users during our stakeholder consultation[25].

4.11 As regards the treatment of initial unit rates prior to approval, we note that the Charging Regulation already provides for circumstances in which the elapsed time between submission of unit rates for approval (1 June in year n-1) and the final date for informing the Commission of any necessary revisions (1 November in year n-1) is not met. However, Article 17 currently requires that any adjustments arising from the temporary application of initial rates is taken into account in the calculation of the unit rate for the following year. In our view, this complicates the calculation and reduces transparency and economic efficiency, since the rate in the following year is not a reflection of the underlying cost of service provision.

4.12 The proposal relating to the number of airports subject to operational performance monitoring reflects current reporting practice, which falls short of the aspiration at the beginning of RP2. At present, operational information is only provided for a limited number of airports, and it is arguably more important to ensure that this is of sufficient quality to provide an indication of performance levels at key locations across the SES, rather than to seek information from a wider group of airports that they do not have the capacity to provide. The focus on A-CDM airports will achieve this aim while providing stakeholders with greater clarity on the scope of the reporting requirements.

Changes to legislation

Table 4.1: Simplification and clarification – changes to legislation

Area of legislation	Changes
Performance Regulation	• State that operational performance monitoring will apply to those airports that have the greatest impact or have the most significant demand upon the ATM network, modifying Article 1 (list of airports to be defined, and may evolve).
Charging Regulation	• Provide for more explicit treatment of publicly funded capital costs in determination of unit costs in Annex II of the Charging Regulation – incorporate guidance being prepared for RP2. • Clarify process for applying initial unit rates prior to approval, modifying Article 17(1) of the Charging Regulation.
Other legislation	We have not identified any significant changes to the broader legal framework that would be necessary to implement these measures. However, there may be a case for reinforcing the requirements for monitoring and reporting of operational data under Article 20 of Regulation 677/2011 to ensure that any reduction in reported data is balanced by rigorous and regular reporting.

Source: Steer Davies Gleave review of SES legislation

More empowered NSAs

Definition

4.13 We consider that the following measures will strengthen the role of the NSAs:

- The Performance Regulation should be amended to confer enforcement powers on NSAs, including the ability to exact penalties in the event that ANSPs persistently fail to comply with their performance plans or with corrective measures identified in the NOP.

[25] In practice, guidance on this issue is already being developed by the Commission, and this is expected to clarify the treatment of public funds under the framework already in place for RP2. Hence, this element of the simplification and clarification component of Option A for RP3 may prove unnecessary.

- NSAs should be required to demonstrate their independence, impartiality and capabilities prior to receiving delegated authority to specify local risk sharing and incentive arrangements (as provided for under Option C1 below).
- The Commission should provide guidance on best practice regulation, including case studies of good regulatory decision-making that draw on the experience of Member States.

Rationale

4.14 We note that the degree of independence, capability and resourcing of NSAs varies considerably across Member States, and the policy measures defined above are intended to address this as far as possible without revising primary legislation[26]. Various stakeholders have stated that NSAs frequently lack the powers to ensure that ANSPs take action to remedy shortages of capacity, and this is endorsed by the work on balancing demand and capacity undertaken by Eurocontrol's Performance Review Unit in support of the impact assessment. In our view, NSAs must be given explicit enforcement powers if they are to undertake a greater role in providing regulatory scrutiny in the absence of a fully independent pan-European regulator.

4.15 At the same time, we consider that the Performance Scheme must also take account of the current position of NSAs, recognising that some will not have the capability to undertake and/or scrutinise the analysis needed to support the development of bespoke risk sharing or incentive frameworks (as under Option C1 below). Hence, we suggest that NSAs should be required to demonstrate their independence and capability to the Commission prior to undertaking a significantly enhanced role, although all would have the ability to exact penalties for service failures. In addition, we believe that there would be merit in the Commission providing guidance on good regulatory practice to share knowledge of successful approaches to particular aspects of regulation, for example analysis of capital expenditure and the organisation of stakeholder consultation. This should build on the work of the NSA Coordination Platform.

4.16 This approach goes some way to addressing the issue of NSA independence highlighted in the recent report by the Court of Auditors on the SES[27]. The Court stated that Member States should ensure that NSAs are hierarchically, financially and functionally independent from ANSPs and have the resources necessary to oversee and monitor the performance and charging schemes. It also noted that the prompt adoption of the applicable provisions in the SES2+ legislative package would be beneficial in this regard. While, as already indicated, ensuring NSA independence through legislative change is not within the scope of changes envisaged for RP3, enhancing their powers and capability would help to strengthen their autonomy and potentially pave the way for more extensive change in the future.

[26] See Appendix B for a discussion of the legislative implications of making NSAs more independent.

[27] See footnote 14 above.

Changes to legislation

Table 4.2: More empowered NSAs – changes to legislation

Area of legislation	Changes
Performance Regulation	• Permit NSAs to take enforcement action in the event that ANSPs persistently fail to comply with their performance plans or with corrective measures, addition a new provision to Article 18. • While no further changes would be required under these measures, under Option C1 below it would be necessary to add a new provision to Article 4 requiring NSAs to demonstrate their capability and independence before being given delegated authority to set risk sharing and incentive mechanism parameters.
Charging Regulation	• No changes required.
Other legislation	We have not identified any significant changes to the broader legal framework that would be necessary to implement these measures. As discussed in Appendix B, full independence for NSAs would require a change to Article 4 of Regulation 549/2004.

Source: Steer Davies Gleave review of SES legislation

More efficient performance planning and targeting

Definition

4.17 We consider that performance plans for RP3 should be prepared on a consistent basis, either at the national/charging zone level or the functional airspace block (FAB) level. This would enable Member States, through discussion, to decide the appropriate geographical scope of plans and targets according to local circumstances. Some may consider that the preparation of FAB-level plans introduces an additional layer of administration while bringing only limited benefits, while others may wish to preserve established mechanisms from cross-border cooperation embedded within a FAB organisation.

4.18 While in our view this flexibility is likely to result in significant benefits, as discussed further below, it is important that it does not result in further complexity compared to the current arrangements (in which safety, environment and capacity targets are established at the FAB level and cost efficiency targets at the national/charging zone level). At the same time, while doubts have been expressed about the value in preparing performance plans at the FAB level, it is important that ANSPs continue to work collaboratively to ensure cross-border coordination and provide cross-border services where appropriate. Hence, we suggest that the Performance Regulation should also require that:

- NSAs notify the Commission in advance, nine months before the beginning of the Reference Period (i.e. three months before the submission of plans to the Commission), whether they intend to prepare their plans at the FAB or national/charging zone level;
- Member States having determined the geographical scope of the plan, NSAs ensure that it applies consistently across all targets (including safety, environment, capacity and cost efficiency targets);
- regardless of their geographical scope, performance plans include initiatives designed to support cross-border coordination and the provision of cross-border services; and
- NSAs report on recent and expected progress in the deployment of common projects under the Single European Sky ATM Research (SESAR) programme and, more generally, on change management practices in relation to operational and staff matters.

4.19 We also suggest that NSAs should have the opportunity to provide information on local conditions that could inform the setting of Union-wide targets. Any such information would

need to be submitted to the Commission at least 19 months prior to the start of the Reference Period if it is to be taken into account in initial proposals for Union-wide targets (issued by the Commission 15 months in advance in accordance with Article 10 of the Performance Regulation). In preparing information for submission, we would expect the NSAs to take advice from the relevant ANSPs as well as the Network Manager.

Rationale

4.20 As noted in a recent SSC paper[28], the development of FAB-level performance plans has tended to weaken the link between measured performance and the contributions to performance made by individual ANSPs. This has been particularly evident in the operation of incentive mechanisms, which have resulted in some ANSPs being rewarded although overall FAB-level targets have been missed. There is therefore a case for enabling ANSPs and NSAs to re-establish the relationship between individual contributions to performance and measured outcomes while ensuring consistency in the geographical scope of local targets. This would ensure clear accountability while improving the transparency of the Performance Scheme.

4.21 However, we recognise that the impetus towards cross-border collaboration generated by the introduction of FABs must be preserved, and consider that Member States should be permitted to continue to plan at the FAB level where they can demonstrate that this delivers significant benefits. We also suggest that cross-border initiatives should continue to be encouraged regardless of the geographical scope of performance plans. The potential value of new approaches to cross-border collaboration and services, for example dynamic sectorisation, was recently underlined in a paper submitted to the NSA Coordination Platform FAB Working Group[29], and the performance plans provide a critical mechanism for the realisation of such initiatives and the associated benefits. It is therefore important to ensure that they continue to be developed and applied through the SES planning framework, including in circumstances where individual plans are prepared at the national/charging zone level.

4.22 We also consider that the Performance Scheme should provide a mechanism for tracking the progress of SESAR deployment at national level. An explicit requirement on the NSAs to comment on progress in relation to SESAR and to report on broader change management practices in the performance plans would ensure that they provided useful information (which should anyway be taken into account in performance planning) without adding materially to the administrative burden.

[28] See footnote 4 above.

[29] NCP/FABWG/12/06, 6 September 2009.

Changes in legislation

Table 4.3: More efficient performance planning and targeting – changes to legislation

Area of legislation	Changes
Performance Regulation	• Permit preparation of performance plans and setting of targets at the national level, modifying Article 11(1). • Require NSAs to include an explanation of the initiatives in place or being developed to support cross-border coordination and the provision of cross border services, modifying Article 11(3). • Require NSAs to report on past and expected progress in deployment of SESAR common projects, modifying Article 11(3). • Require NSAs to provide specific inputs to the Network Manager nine months before the setting of Union-wide targets on particular local conditions expected to constrain performance in any KPA, modifying Article 10.
Charging Regulation	• No changes required.
Other legislation	The impact of these measures could be reinforced and/or extended through changes to the responsibilities of the Network Manager and the SESAR Deployment Manager. More specifically: • In preparing the Network Strategy Plan (incorporating the Network Performance Plan), the Network Manager could be required to identify all initiatives supporting the development of cross-border coordination and provision of cross-border services, highlighting those on which the delivery of the plan is particularly dependent. This would require modification to Article 6 and Annex V of Regulation 677/2011. • The SESAR deployment manager could be required to report to the Commission on the implications of the Performance Plans for the implementation of common projects. This would require a modification to Article 9(2) of Regulation 409/2013.

Source: Steer Davies Gleave review of SES legislation

Better integration with network functions

Definition

4.23 In preparation for the impact assessment of options for RP3, the Commission requested Eurocontrol to undertake work to determine how demand and capacity could be better balanced[30]. We consider that the suggested approach, which focuses on better integration between the performance planning and monitoring processes defined by the Performance Scheme and the network planning activity undertaken by the Network Manager, provides a basis for more dynamic capacity balancing. It also increases the scope for regulatory action at the local level to ensure delivery of capacity plans, in line with the objective of strengthening the role of NSAs. The elements of the proposal are as follows:

- The Network Manager would continue to use traffic forecasts to provide local reference values, setting the parameters within which ANSPs prepared their performance plans for submission to the NSAs and the Commission. Initial capacity plans would be based on the STATFOR central forecast, with deviations from this triggering changes to revenue to cover changes in cost under the traffic risk sharing arrangements. ANSPs would be permitted to use alternative forecasts of traffic where these could be justified (e.g. based on evidence of systematic deviations of actual traffic from previous STATFOR forecasts), with the Commission assessing the arguments (taking advice from the PRB) as part of the process for approving performance plans.

[30] See footnote 8 above.

- The traffic thresholds defining the validity of the performance plans would be aligned with those defining the limits of the traffic risk sharing mechanism and the alert thresholds. In effect, these thresholds would determine the range of traffic scenarios that could be accommodated by the performance plans through automatic adjustment of revenues without the need for reopening the plans[31].
- A new mechanism would be introduced to enable the Network Manager to reassign delay, providing it with flexibility to reroute flights in circumstances where individual ANSPs might otherwise resist additional traffic because of the impact on delay at the local level. This could take the form of a delay budget forming part of the Union-wide target, and local reference values would be set after it had been taken into account. Alternatively, it might involve attribution of delay according to the identity of the ANSP causing the re-routing or the introduction of delay insurance (with the Network Manager covering claims for delay due to rerouting up to a predefined threshold). Regardless of the mechanism, the Union-wide capacity target would not be affected[32].
- At the start of the Reference Period, the Network Manager would develop an initial NOP, setting out required and planned capacity profiles over the following five years as well as local reference values, consistent with the Union-wide targets. This would be up-dated every six months, with the Network Manager modifying the required capacity profile in the light of changes in traffic levels and other events affecting the demand and supply of capacity while continuing to ensure consistency of individual reference values with the Union-wide targets. ANSPs would be required to modify their capacity plans accordingly.
- Ongoing capacity and flow management would continue to be undertaken through the existing pre-tactical and tactical processes. The delay budget or alternative mechanism would, however, be available to enable ANSPs to accept more traffic than anticipated in the NOP.
- The Network Manager would monitor delays against reference values as well as required, planned and delivered capacity. It would also suggest corrective measures to address emerging problems, identifying these in the next NOP (after approval by the Network Management Board). NSAs would have the power to impose financial penalties if annual delay targets were not met or corrective measures set out in the NOP were not adopted. Such penalties would be discretionary and in addition to any payments made under incentive mechanisms in operation under the Charging Scheme[33].
- If, notwithstanding previous attempts at enforcement, an ANSP continued to miss targets and/or failed to take corrective action identified in the NOP, it would be possible for the Commission to take action, as under the current legislation. However, there would be an

[31] Note that this framework would need to be modified if combined with Option B below, which would involve the abolition of the traffic risk sharing mechanism. The traffic thresholds would nevertheless continue to define the limits within which the Performance Plans were considered to remain valid.

[32] Hence, in the case the delay budget mechanism, a target of 0.5 minutes per flight and a delay budget of 0.1 minutes per flight would result in delay of 0.4 minutes per flight being allocated to ANSPs (with reference values calculated accordingly).

[33] Regulatory frameworks can include penalties in the sense of liquidated damages (i.e. automatic compensation under a contract for losses due to a failure to deliver a service to the required standard) and penalties in the sense of discretionary fines for material and/or persistent failures to meet regulatory targets. We are aware of frameworks that include both, as in the case of the UK rail sector where track access contracts include delay compensation mechanisms while the Office of Rail and Road also has the power to fine the infrastructure manager for poor performance.

explicit role for the PRB, after seeking information and advice from the Network Manager, in supporting the Commission in developing further corrective measures.

- The Network Manager would be subject to monitoring against KPIs designed to capture performance in different areas of its role. These would be set out in the Network Performance Plan (NPP) prepared in accordance with Article 6(d) of the Performance Regulation, and approved by the Commission as part of the broader process of approving the NPP.

Rationale

4.24 The approach provides for greater consistency between key elements of the SES framework, in particular the performance planning arrangements, the traffic risk sharing mechanism and the development and application of the NOP. It would strengthen the link between the performance plans and the NOP, making the latter a more effective tool for planning and ensuring the implementation of changes in capacity in response to changes in the level and distribution of traffic. It would also enhance the regulatory framework, with the NOP providing a trigger for enforcement at the discretion of the NSAs. Note, however, that the NOP would continue to be primarily an operational document and the Network Manager would not have any regulatory powers under the proposal.

Change in legislation

Table 4.4: Better integration with network functions – changes to legislation

Area of legislation	Changes

Performance Regulation	• Require that traffic forecasts must be consistent with STATFOR forecasts and consistent across KPAs except where NSAs can justify alternative forecasts, modifying Article 11(3a).
	• Require that traffic forecasts are consistent with alert thresholds and traffic risk sharing parameters (if traffic risk sharing remains in place), modifying Articles 10(4) and 11(3a) as appropriate.
	• Modify Article 6 to ensure that the reference values contained in the NOP are consistent with Union-wide targets, taking account of the latest traffic forecasts.
	• Modify Article 3 to give PRB an explicit role in advising the Commission on corrective measures (after taking guidance from the Network Manager).
	• Introduce a hierarchy of responses if local capacity targets are not met (appropriate provisions to be included in Article 18 of the Performance Regulation):
	  ◦ Corrective measures;
	  ◦ NSA sanctions, coupled with revision of performance plan if considered appropriate – see Table 4.2; and
	  ◦ Escalation to Commission on advice of PRB.

Charging Regulation	• No changes required.
Other legislation	• Require the Network Manager to update capacity plans in line with Network Operations Plan cycle (every six months), ensuring consistency with Union-wide targets and taking account of latest traffic forecasts - requirement to be included in list of Network Manager tasks in Article 4(1) of Regulation 677/2011. • To enable the implementation of a 'delay budget' or alternative mechanism enabling easier re-routing of flights, further provisions would need to be included in Regulation 677/2011. • Article 6 and Annex V of Regulation 677/2011 could be strengthened to require that the Network Operations Plan (NOP) formally identifies specific failures to deliver performance plans contributing to the missing of targets, and that it proposes corrective measures. This would provide the basis for the relevant NSA and/or the Commission, on the recommendation of the PRB, to take action under the new provisions in the Performance Regulation.

Source: Steer Davies Gleave review of SES legislation

Streamlined measurement of the safety KPA

Definition

4.25 The suggested approach to streamlined measurement of safety reflects the work of the EASA RP3 S(K)PI development working group, which proposed several revisions to the approach to measurement applied in RP2. It would involve a significant reduction in the number of safety-related measures, as follows:

- The effectiveness of safety management would be retained as the sole leading indicator of safety, but would apply only to ANSPs. The existing questionnaire would be replaced with either the CANSO Standard of Excellence or the EASA cross-domain assessment tool.
- The extent of application of the Risk Analysis Tool (RAT) severity classification and level of just culture (both KPIs during RP2) would no longer be measured.
- The extent of automated safety data recording systems and reporting of incidents (both PIs in RP2) would similarly be removed from the framework of measurement. However, the number of specific occurrences, other than airspace infringements, would continue to be monitored within the Performance Scheme.

- A new performance indicator, based on the number of hours during which traffic is greater than 110% of the slot rate as a proportion of total ATFM regulated hours, would be introduced.

4.26 We note that there is no clear consensus on which of the two possible approaches to measuring safety management effectiveness should be adopted. We suggest that it would not be appropriate to identify the specific metric to be used in legislation, since it may be necessary to change this in the future in response to new developments in the monitoring of management effectiveness.

Rationale

4.27 We understand that the current approach to measuring safety management effectiveness, which is questionnaire-based, is subject to a number of shortcomings and considered not fit for purpose. The merits of the CANSO Standard of Excellence and EASA cross-domain tool require further assessment, but each has advantages:

- The CANSO approach is already accepted by ANSPs and would enable comparison across all CANSO organisations (including some outside the European Union).
- The EASA tool, as its name implies, would allow comparison across aviation stakeholders.

4.28 With respect to the use of the RAT, there is little merit in retaining the measure as part of the Performance Scheme as ANSPs are anyway known to value it as means of identifying risk and assessing higher severity incidents. Removal of the measure from the scheme is therefore expected to have little effect other than to allow ANSPs greater flexibility to classify lower severity incidents in a way that reflects their circumstances. In any event, they will continue to be required to apply the RAT classification in reporting runway incursions, separation minima infringements and ATM-specific occurrences.

4.29 The measurement of safety management effectiveness already includes questions related to just culture, and this can be expected to continue in RP3 (regardless of the approach to measurement adopted). Hence, as in the case of use of the RAT, removal of this aspect of the measurement framework is unlikely to affect ANSP behaviour materially.

4.30 The removal of the incidence of automated safety data recording reflects the difficulties experienced by some ANSPs in implementing recording systems and the risk that mandating them could undermine the level and quality of reporting. The view among stakeholders appears to be that the Performance Scheme should define the data to be collected and the ANSPs should have the flexibility to use whatever means of collecting is most appropriate given their circumstances. Similarly, the extent of reporting is considered to add little to the Performance Scheme and is anyway covered by EASA's Safety Risk Management Process (SRMP).

4.31 The number of separation minima infringements, runway incursions and ATM-specific occurrences is valuable data, providing an indication of the level of safety achieved, although it is proposed that the number of airspace infringements will no longer be monitored under the Performance Scheme as it is captured within the ATM Risk Portfolio. However, there is value in monitoring air traffic controller workload by reference to traffic relative to the slot rate during regulated hours, as proposed by the EASA RP3 S(K)PI development working group.

Changes to legislation

Table 4.5: Streamlined measurement of safety KPA – changes to legislation

Area of legislation	Changes
Performance Regulation	• These changes would require modification of Section 1(1.1) and (1.2) of Annex I of the Performance Regulation.
Charging Regulation	• No changes required.
Other legislation	• No changes required.

Source: Steer Davies Gleave review of SES legislation

Enhanced measurement of the environment KPA

Definition

4.32 Eurocontrol has also undertaken work to assess the potential to introduce additional measures of the environmental impact of ATM. This involved reviewing the level of support for various proposals among stakeholders and undertaking an assessment of the maturity (and hence readiness) of specific metrics. Again, there was broad support for the conclusions of this assessment at the stakeholder workshop, and these align with the following proposal:

- The flight efficiency of the actual flight trajectory (KEA) would be retained as a KPI. Similarly, the current PIs based on additional time in the taxi-out phase and arrival sequencing and metering area (ASMA) transit time would continue to be monitored.
- The flight efficiency of the planned flight trajectory (KEP) should not be targeted but retained as a PI. This would be supplemented by a new 'shortest constrained route' indicator, allowing the separate contribution of ANSPs and airspace users to flight efficiency to be assessed.
- A new measure of vertical flight efficiency, based on the share of flights applying continuous descent operations (CDOs) from a defined altitude (top of descent, 7,000 feet or an alternative), would be introduced as a PI.
- A new measure of the use of military airspace would be introduced. This would be based either on availability of CDR or on availability of reserved/restricted airspace.

Rationale

4.33 KEA is an important measure of actual flight efficiency, representing the outcome of the interaction of a range of factors. While it is important to understand the impact of each of these factors, as discussed below, KEA provides a headline value that can be linked to observable environmental effects. It should therefore be retained as a KPI, the value of which will depend on the effectiveness of collaboration between ANSPs, airspace users and other stakeholders.

4.34 The ongoing monitoring of taxi-out additional time and ASMA transit time is important for ensuring that the Performance Scheme encourages a gate-to-gate approach in ATM. Moreover, while both are affected by factors outside the ANSPs' control, they can be regarded as reasonable proxy measures of ANSP efficiency. They can also be further developed to address shortcomings in measurement identified by stakeholders (e.g. lack of ANSP control over push-back and apron and taxi way movements).

4.35 The proposed new measure of vertical flight efficiency reflects recent work carried out by a Eurocontrol-sponsored task force, including a range of industry stakeholders, on continuous climb operations (CCOs) and CDOs. This concluded that a single CCO or CDO can result in fuel

savings of between 50 and 200 kilograms of fuel per flight as compared with a non-optimised climb or descent profile[34]. In practice, inefficient level flight is a particular feature of descents, and in developing a measurement methodology, the task force therefore focused on CDOs.

4.36 The new measure would be a valuable addition to the range of environment-related metrics included in the Performance Scheme, since it would:

- capture the extent to which ANSPs are able to provide CDOs (e.g. through changing working practices or modifying airspace design);
- align with one of the objectives of the SESAR Master Plan (SESAR Solution #11), which states that implementation of CDOs in higher density traffic and at higher levels is a priority; and
- similarly align with the findings of the recent Court of Auditors report on environmental KPIs[35], which recommended their modification to capture the responsiveness of the ATM system to the desired trajectories of airspace users, both in their horizontal and vertical dimensions, with an indicative deadline of 2019.

4.37 In addition, the data required to calculate the metric is already available, and it would therefore be possible to introduce it as a PI in RP3 at reasonable cost.

4.38 Stakeholders representing European military users of airspace have argued that release of military airspace for civilian use (otherwise known as conditional routes or CDRs) requires significant resources, and that the value of this activity should therefore be monitored. This suggests the need for a metric capturing the use of released military airspace. However, it is important that any such metric reflects the demand for airspace at the time civil users are given access to CDRs. Two proposed metrics have been proposed by the Network Manager and would require more discussion with military stakeholders to determine which one would be most appropriate. These are:

- The Rate of CDR Availability (RoCA): this represents the average CDR availability according to the EAUP/EUUP related to a given time period. RoCA represents the ratio of the total CDR segment opening, whatever category it may be, to the total time during a given time period.
- The Rate of Airspace Availability (RoAA): this represents the average reserved/restricted airspace availability according to the EAUP/EUUP related to a given time period. RoAA represents the ratio of the total reserved/restricted airspace opening time, whatever type it may be, to the total time during a given time period.

[34] Environment – proposal for assessing vertical flight efficiency, Eurocontrol, 24 October 2017.

[35] See footnote 14 above.

Changes to legislation

Table 4.6: Enhanced measurement of environment KPA – changes to legislation

Area of legislation	Changes
Performance Regulation	• Use the flight efficiency of the actual flight trajectory as the KPI and relegate the efficiency of the planned trajectory to the level of PI, modifying Section 2(2.1) and (2.2) of Annex I. • Introduce a new vertical flight efficiency metric as a PI, modifying Section 2(2.2) of Annex I. • Introduce a new shortest constrained route indicator as a PI, modifying Section 2(2.2) of Annex I. • Introduce a new measure of use of released military airspace as a PI (modifying Section 2(2.2) of Annex I.
Charging Regulation	• No changes required.
Other legislation	• No changes required.

Source: Steer Davies Gleave review of SES legislation

Enhanced measurement of the capacity KPA

Definition

4.39 We consider that the current measures of capacity are insufficient to provide a clear picture of the level of service provided and should be supplemented with the following:

- en-route and terminal air traffic flow management (ATFM) delay per flight incurred at weekends;
- ATFM delay incurred in the first rotation; and
- the number and average value of ATFM delays exceeding 15 minutes.

4.40 We also suggest that NSAs should develop a better understanding of available capacity and the relationship between additional traffic (relative to forecast values) and additional cost. This element of the proposal would need to be achieved primarily through facilitation of exchange of expertise and information, perhaps within the forum provided by the NSA Coordination Platform, rather than through provisions in the Performance Regulation. However, Annex II of the Performance Regulation could be expanded to require NSAs to report on an analysis of capacity and set out the implications for accommodation of variations in traffic levels[36]. This would be particularly important if the core option were combined with Option C1, discussed below, under which responsibility for setting the parameters of the traffic risk sharing mechanism would be devolved to NSAs.

4.41 As already noted, the implementation of this option would also involve the separate measurement of the performance of the Network Manager, and the relevant metrics for inclusion in the NPP would enhance the measurement of capacity. More specifically, these would include:

- minimum level of the effectiveness of safety management of the Network Manager;
- an environmental indicator linked to the average horizontal en-route flight efficiency (to be developed further);

[36] Note that this requirement would be separate to, but might inform, the investment plans on which NSAs are already required to report.

- Network Manager contribution to en-route and arrival delay savings (each expressed as a proportion of, respectively, total en-route and arrival delay);
- average minutes of en-route ATFM delay per flight (relating to both delay optimisation and flight planning);
- a measure of the minimisation of individual flight penalties, with an outcome indicator based on the percentage of flights with an ATFM delay greater than 30 minutes; and
- a Network Manager cost metric related to its cost profile or replaced by a specific unit rate.

Rationale

4.42 The proposed additional measures can all be monitored using existing data and their introduction should therefore not increase administrative costs significantly. Together with the existing KPIs and PIs, they will provide a more comprehensive picture of the outputs of capacity provision, focusing on the following key aspects of the service:

- the extent to which sufficient capacity is provided at weekends, a well-documented issue arising from constraints on the availability and deployment of air traffic controllers through the week;
- the extent of delays arising at the beginning of the operating day, which can have knock-on effects throughout the day;
- the extent of long delays that can be particularly detrimental to airline operating efficiency as well as passengers; and
- the contribution of the Network Manager to reducing delay and ensuring the efficiency of ATFM.

4.43 There is general recognition that NSAs need to have a better understanding of the profile of availability of capacity within their respective charging zones and its relationship with demand. At present, there are no generally accepted direct measures of capacity (as distinct from delay, representing the output of capacity provision), but it is nevertheless possible for NSAs to identify the deployment of air traffic controllers, assess their productivity and draw conclusions about the potential for ANSPs to absorb further traffic. In our view, the inclusion of analysis of this kind in the performance plans would increase confidence in the delivery of delay and other targets.

Changes to legislation

Table 4.7: Enhanced measurement of capacity KPA – changes to legislation

Area of legislation	Changes

Performance Regulation	• Introduce the following new PIs, modifying Section 3(3.2) of Annex I:
	  ◦ en-route and terminal air traffic flow management (ATFM) delay per flight incurred at weekends;
	  ◦ ATFM delay incurred in the first rotation; and
	  ◦ the number and average value of ATFM delays exceeding 15 minutes.
	• Require NSAs to report on an analysis of capacity and set out the implications for accommodation of variations in traffic levels through new provisions in Annex II.
	• Introduce new PIs capturing the Network Manager's contribution to performance, modifying Section 3(3.2) of Annex I.

Charging Regulation	• No changes required.
Other legislation	We suggest that the Network Manager would need to report on the new PIs through the regular updating of the NOP and its more general reporting function defined in Article 20 of Regulation 677/2011. However, it would seem inappropriate to refer to specific metrics in this regulation as these could change over time and it would be sufficient to cross refer to Annex I of the Performance Regulation.

Source: Steer Davies Gleave review of SES legislation

Improved measurement of the cost efficiency KPA

Definition

4.44 During the stakeholder consultation, representatives of airspace users commented that the lack of transparency surrounding the relationship between costs and charges was partly the result of the application of lagged adjustment mechanisms. This would be addressed by introducing a new performance indicator of the true cost of ANS services, based on the application of adjustments to charges in the year in which cost changes arise (i.e. adjustments would be applied in year n rather than n+2).

Rationale

4.45 The suggested additional performance indicator would allow airspace users, NSAs and other stakeholders to track changes in the true cost of ANS through the Reference Period using a more meaningful measure of unit costs than is currently available.

Changes in legislation

Table 4.8: Enhanced measurement of cost-efficiency KPA – changes to legislation

Area of legislation	Changes
Performance Regulation	• Modify Section 4(4.2) of Annex I to include new PI based on application of adjustments in current year.
Charging Regulation	• No changes required.
Other legislation	• No change required.

Source: Steer Davies Gleave review of SES legislation

Option B – simplified price cap

Definition

4.46 Representatives of the airspace users have highlighted the complexity of the Charging Scheme in RP2 and noted the difficulties of establishing a clear relationship between the service offered and price charged by ANSPs. This lack of clarity arises from both the risk sharing mechanisms which, for example, provide for an adjustment to determined costs in year n+2 to reflect deviations in traffic from forecast levels in year n, and the incentive mechanism, which has been applied differently in different charging zones. Option B is intended to address this issue by simplifying the Charging Scheme substantially while introducing additional regulatory scrutiny of capital expenditure plans and their implementation. It would also include all the measures covered by the core option described above.

Simplification of the Charging Scheme

4.47 Option B would involve the following changes to the Charging Scheme[37]:

- The traffic risk sharing mechanism defined by Article 13 of the Charging Regulation would be removed. Hence, if the traffic handled by an ANSP were below what was forecast at the time the performance plan was prepared, the revenue it received would be lower than expected, with no compensating adjustment. Equally, higher than forecast traffic would result in additional revenue, potentially over and above what was required to cover costs.
- The costs exempt from risk sharing mechanism set out in Article 14 of the Charging Regulation would also be removed. Hence, there would be no provision for compensating for unforeseen changes in pension and other specific categories of cost through carryover to a subsequent Reference Period.
- The costs included in the reporting tables submitted in accordance with Annex II of the Charging Regulation would be expressed in nominal terms, based on an explicit inflation rate identified by the Member State/ANSP. Differences between outturn costs and the projected costs in the reporting tables due to divergences between estimated and actual inflation would not result in any compensating adjustment of unit rates.
- The provisions of the Charging Regulation relating to incentive schemes for ANSPs (Article 15 of the Regulation) would be similarly removed. Hence, there would be no automatic payment of bonuses or penalties consequent on the actual level of delay diverging from a benchmark level. However, NSAs would be able to impose penalties for failure to meet capacity targets under the provisions for discretionary enforcement discussed in the context of the core option.

Regulatory scrutiny of capital expenditure

4.48 As part of the submission of costs for consultation under Article 9 of the Charging Regulation, Member States would need to ensure that the following were included:

[37] We have described the proposal as a simplified price cap since it provides for regulation of unit rates while removing the complexity of the mechanisms for adjusting rates in the event of unforeseen changes to traffic, costs and inflation. However, it must be emphasised that the approach, which is a modification of the proposal suggested by IATA, is not price cap regulation as conventionally applied by industry regulators in other sectors.

- the ANSP's 10-year vision for investment, together with planned investment for the forthcoming Reference Period;
- detailed capital expenditure plans for the Reference Period, showing the profile of expenditure and how it was linked to the delivery of the benefits of the associated investment;
- mechanisms for monitoring progress in implementing the plans, including clearly defined change control procedures for modifying plans when required; and
- confirmation that overall projected costs, including depreciation on existing and new assets for the duration of the performance plan, were consistent with improving levels of efficiency and supported the delivery of Union-wide cost efficiency targets.

4.49 Capital expenditure plans would be reviewed by the Commission, Eurocontrol, NSAs and airspace user representatives as part of the review of performance plans under current processes, with the Commission approving them as part of the process for approving determined costs. Actual capital expenditure would be reviewed against the plan by the NSAs on an annual basis, with the NSAs noting:

- the extent of any deviation in capital expenditure from the plans; and
- whether change control procedures had been correctly applied.

4.50 Following the end of the Reference Period, the NSAs would prepare reports on any excess expenditure or underinvestment compared to the plan and provide an assessment of whether such divergences, over the Reference Period as a whole, were the result of inefficiency. In making the assessment, they would need to take account of arguments for changing capital expenditure plans, for example to modify the balance between capital and operating expenditure or to postpone or bring forward such expenditure in the light of changed circumstances.

4.51 Based on the reports prepared by the NSAs, and after taking advice from the PRB and consulting with stakeholders (including representatives of airspace users as well as the Network Manager), the Commission would determine the need for any adjustment of charges paid by airspace users due to inefficient underinvestment. Such adjustment would take the form of a reimbursement of charges paid rather than a modification of determined costs for the subsequent Reference Period. Additional expenditure incurred efficiently (e.g. as a result of a divergence between actual and forecast inflation) would not be compensated, in line with the proposition underlying this option that the ANSPs should accept all risk relating to traffic and costs.

Rationale

4.52 As already noted, the primary rationale for this option is the simplification of the Charging Scheme to ensure a more transparent relationship, from an airspace user's perspective, between the service provided and the charges paid. More specifically, it would remove entirely the potential for adjustments to unit rates in future years as a result of differences between outturn and forecast values in the current year. The consequence of this would be to transfer risk largely to the ANSPs, for example allowing them to earn additional revenues if traffic exceeded forecasts while requiring them to accept lower than expected revenue where forecast traffic failed to emerge.

4.53 As the incentive mechanism would also be removed under this option, there would be no automatic reward for over-delivery of performance or penalty for under-delivery (although the ability to impose penalties on a discretionary basis would be available to NSAs, these would

not take the form of a reimbursement of airspace users). Hence, in the absence of incentivisation of outputs, there would be a need for greater regulatory scrutiny of inputs, particularly capital expenditure supporting investment in capacity. This, in turn, would require more intrusive monitoring of capital expenditure plans than at present, and adjustment of determined costs and unit rates if the Commission identified (on the advice of the PRB, NSAs and stakeholders) instances of inefficient under-investment. Such an adjustment would be calculated to prevent over-remuneration of ANSP investment, a key concern of airspace users in relation to experience in RP2.

Change in legislation

Table 4.9: Option B – changes to legislation

Area of legislation	Changes
Performance Regulation	• No changes required.

Charging Regulation	• Remove traffic risk sharing mechanism, deleting Article 13.
	• Remove cost exempt risk sharing mechanism, deleting Article 14.
	• Remove inflation risk sharing mechanism, modifying Article 7(1).
	• Modify Article 17 to introduce process for regulating capital expenditure:
	  ◦ Require the ANSPs to prepare a ten-year outlook and plans for capital investment and restructuring over three years, updated annually on a rolling basis and reviewed and approved by their respective NSAs;
	  ◦ Require the Commission to consider the case for reimbursement of unspent planned capital expenditure after review by NSAs and on advice of PRB.

Other legislation	• No changes required.

Source: Steer Davies Gleave review of SES legislation

Option C1 – devolved risk allocation mechanisms

Definition

4.54 The risk allocation mechanisms and incentive arrangements for the Charging Scheme are set out in the Charging Regulation, and are based on clearly defined principles and parameters. The parameters defining traffic risk sharing arrangements, namely the dead band threshold, upper threshold for risk sharing and sharing keys are prescribed in Article 13. There is arguably greater scope for interpretation of the provisions covering incentive mechanisms (Article 15), but key parameters are nevertheless clearly defined (e.g. the cap on aggregate bonuses and penalties of one per cent of annual revenues) and paragraph 1(b) indicates that incentive schemes should be designed to ensure delivery of the relevant performance scheme targets.

4.55 While defining parameters in the legislation provides for greater clarity, there is a case for allowing more flexibility in the application of both risk sharing arrangements and incentive schemes. This would allow mechanisms to be designed to take account of the local circumstances of individual ANSPs. For example, experience from RP2 suggests that some can accommodate traffic over and above the level forecast in the performance plan without incurring significant additional costs, while others can only do so after taking steps to enhance capacity through changes to working arrangements resulting in increased costs. Similarly, some ANSPs consistently deliver target values of delay despite accommodating additional traffic, while others have failed to meet their targets even when traffic was considerably below historical levels. Such differences in performance demonstrate that ANSPs are subject to different capacity constraints and have delivered different levels of efficiency, implying a need for different risk sharing arrangements. Option C1 would provide for this while including all the measures covered by the core option described above.

Traffic risk sharing

4.56 A more flexible approach to traffic risk sharing could be achieved by allowing NSAs to define the relevant parameters within defined constraints, as follows:

- The NSAs would propose bespoke traffic risk sharing arrangements 12 months before the start of the Reference Period, allowing sufficient time for the Commission to assess the implications of each proposal, drawing on advice from the PRB and Eurocontrol. In making the proposal, the NSA would need to demonstrate the case for bespoke arrangements, based on evidence of available capacity within the relevant ANSP and previous performance in response to variations in traffic levels. Where the Commission rejected the proposal, the standard arrangements would continue to apply.
- The NSA would be able to propose changes to a number of the relevant parameters, including the dead band (assuming the dead band remained as part of the default arrangements) and the sharing keys. However, the values for the sharing keys would be chosen within a range defined in the legislation – between 0 and 30 in the case of the ANSP share of any change in revenue due to deviations from forecast traffic levels. This would reflect the range of values of cost elasticity with respect to traffic observed across the SES (with ANSPs operating close to capacity experiencing an increase in variable costs, which represent 30% for the cost base on average, and those with substantial spare capacity facing little or no increase, as a result of additional traffic).
- The available range of values for the sharing keys would be the same for both higher and lower than forecast traffic. However, within these parameters, the scheme proposed by an NSA could be asymmetric, with different values applying according to whether the

ANSP experienced more or less traffic than forecast. For example, in the case of an ANSP operating with spare capacity, it might be appropriate to set a 0% ANSP sharing key in the case of traffic increases (because more traffic could be accommodated at no extra cost) and a 30% ANSP sharing key in the case of traffic decreases (because the organisation could be expected to reduce costs in response to excess capacity). It would be for the NSA, in discussion with the ANSP, to determine the appropriate values, taking account of possible traffic variation and the need to preserve capacity notwithstanding short-term changes in demand.

- The NSA would not be able to change the upper threshold within which the sharing keys applied, as this would align with the alert thresholds and provide a common trigger for reopening performance plans, as indicated in the discussion of the core option.

Incentive schemes

4.57 NSAs would similarly have the flexibility to specify incentive mechanisms to reflect local conditions, subject to constraints defined in a revised Article 15 of the Charging Regulation. This proposal, which was one of the options shortlisted in Steer Davies Gleave's recent report for the Commission on ATM performance incentives[38], can be summarised as follows:

- NSAs would propose incentive schemes designed to address identified problems within a FIR or Member State, for example delays in excess of 15 minutes or delays at weekends[39]. Again, it would need to demonstrate the case for bespoke arrangements, based on evidence of the problem and consideration of the implications for targets and performance payments (i.e. bonus and penalty rates).
- The NSA would be required to consult stakeholders on the scheme, a number of which would anyway be involved in its design. Airspace users would be asked for their views on specific problems to be addressed and, where possible, to demonstrate the associated operational costs (which would, in turn, inform the calibration of bonus and penalty rates).
- Again, schemes should be asymmetric, but would need to be designed within defined parameters. The maximum value of penalties would be capped at three per cent of annual revenues, while bonus payments would be capped at one per cent. There would be no default incentive scheme, and NSAs would not be required to implement one (although they would need to provide a rationale where they did not).

Cost and inflation risk sharing

4.58 The cost and inflation risk sharing mechanisms would be modified as follows under this option:

- The current mechanism for exempting certain unforeseen costs from the overall cost sharing arrangements would be removed. Hence, ANSPs/Member States would be required to absorb all differences between forecast and actual costs, subject to the following provisions relating to pension costs.
- The NSAs would be required to monitor changes in national pension arrangements (including changes driven by legislation and market conditions). Where such changes

[38] Further development in air traffic management in the area of performance incentives, Steer Davies Gleave, August 2017.

[39] We note that around half of ANSPs do not cause significant delay, and that incentives based on simple measures of delay serve little purpose. Allowing NSAs to develop incentive mechanisms to address other, capacity-related issues, would therefore enhance the effectiveness of the incentive framework.

resulted in an unforeseen change in pension costs, the NSAs would be permitted to propose a change in the determined cost base, subject to consultation with stakeholders and an audit by a suitably qualified actuary (the latter reporting to the Commission and the PRB). Any change would need to be approved by the Commission.

- The inflation adjustment mechanism would not apply to certain costs, for example depreciation.

Regulatory scrutiny of capital expenditure

4.59 In principle, the regulation of ANSPs through output-based incentives is inconsistent with separate regulation of inputs. Under output-based regulation, the focus is on whether the regulated entity delivers the required outputs (defined by the targets and benchmarks underpinning the incentive mechanism) for the regulated charge, and the regulator is not required to consider the combination of inputs used. In practice, some regulatory scrutiny of both operational and capital expenditure is required, particularly where performance levels are affected by a wide range of factors and targets may be met even where investment plans have not been implemented.

4.60 We therefore suggest that this option should also include scrutiny of capital expenditure, with ANSPs providing a 10-year vision and NSAs undertaking regular monitoring of the implementation of investment plans as in Option B. Option C1 also includes provision for automatic reimbursement of airspace users for planned capital expenditure that is not delivered. Again, as under Option B, this takes the form of a payment at the end of the reference period following an assessment of the level of the underspend, but under Option C1 it would be enforced by the NSAs rather than the Commission.

Rationale

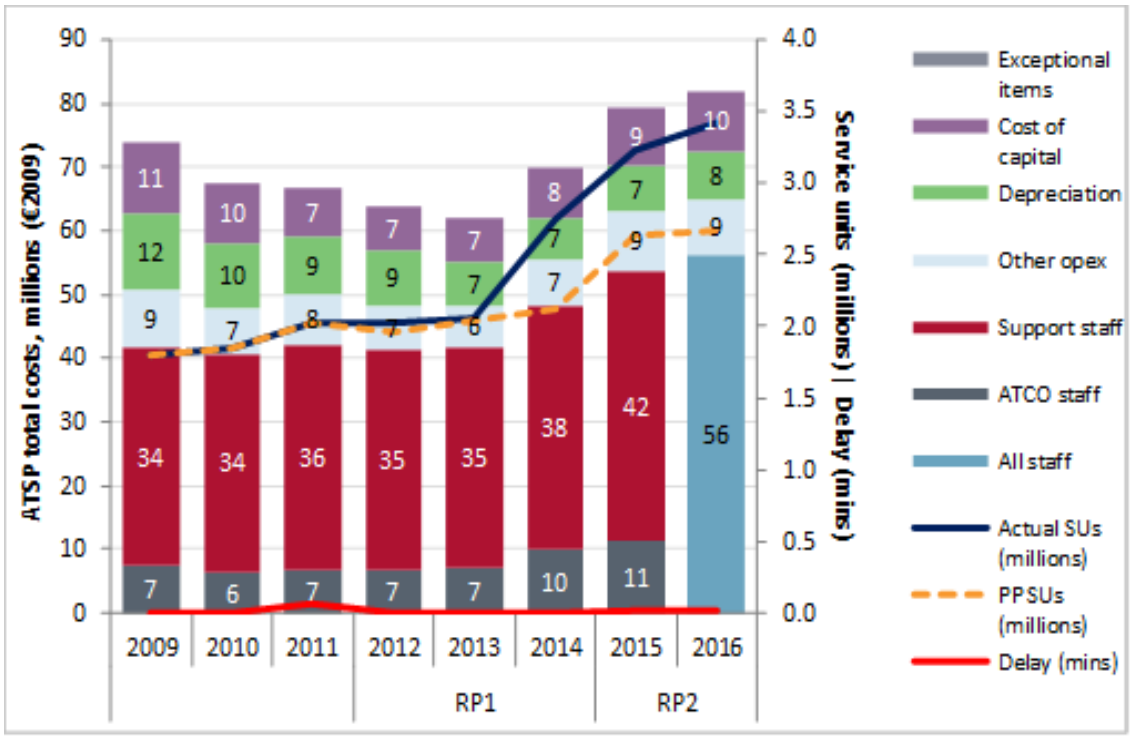
4.61 We have already noted that the primary rationale for this option is the recognition that different ANSPs have different levels of available capacity, and hence different capabilities to accommodate higher than expected levels of traffic. They also face different problems in managing the airspace, and this is manifested in different patterns of delay in different FIRs and charging zones. Figure 4.2, which shows trends in traffic, ANSP costs and delay relative to target for Bulgaria and Denmark, demonstrates the scope for variation in circumstances.

4.62 As shown, the two Member States demonstrate the potential for different outcomes following an increase in traffic. In the case of Bulgaria, the increase arose due to the political situation in Ukraine, which resulted in the diversion of traffic that would otherwise have been routed through Ukrainian airspace. The ANSP was able to accommodate the traffic while avoiding any increase in delay (which was kept to zero), but only achieved this through a material increase in resources (reflected in an increase in the costs of staff, including air traffic controllers).

4.63 By contrast, Denmark was able to accommodate a significant increase in traffic with little or no increase in costs while again keeping delay at zero. This appears to reflect the fact that the traffic increase was largely anticipated and presumably taken into account in resource planning for RP2. As a result, the cost elasticity with respect to traffic for Denmark appears significantly lower than that for Bulgaria, and may even be approximately zero. Taken together, these examples suggest that the appropriate traffic risk sharing mechanism in each case will differ.

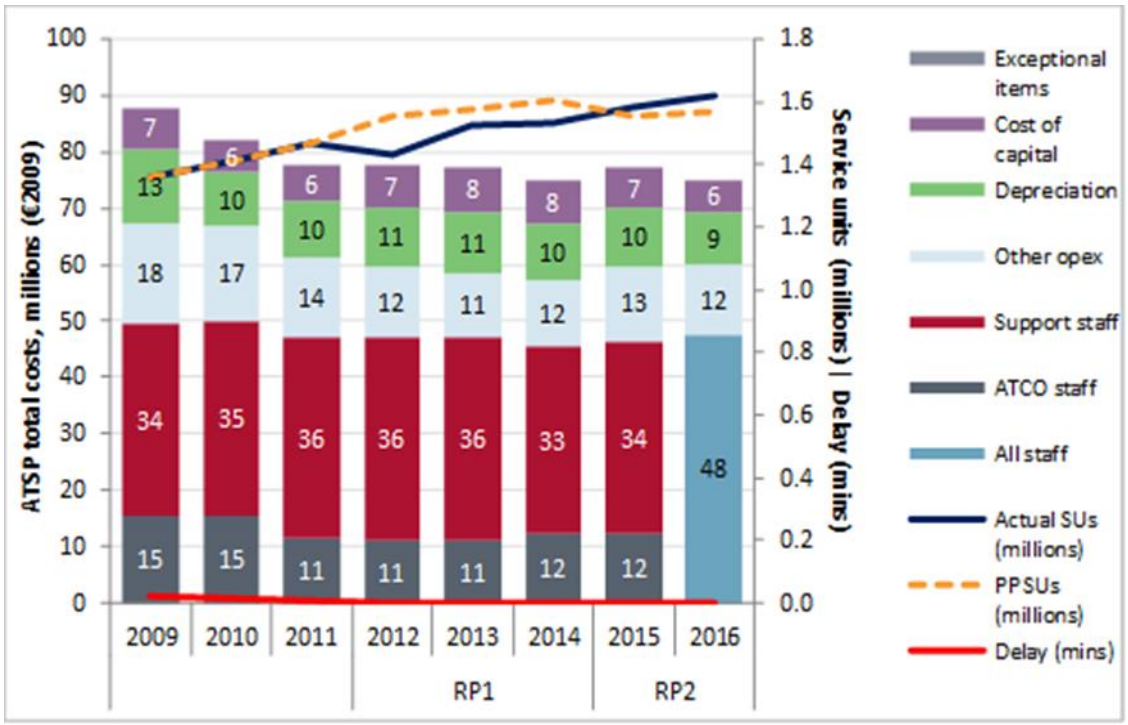
Figure 4.2: Trends in traffic, costs and delay in Bulgaria and Denmark

Bulgaria



Source: ACE benchmarking reports, PRB monitoring reports, RP1/RP2 dashboards and performance plans

Denmark



Source: ACE benchmarking reports, PRB monitoring reports, RP1/RP2 dashboards and performance plans

4.64 The option also provides for simplification of the cost sharing mechanism by largely removing the provisions relating to cost exemption. This reflects the fact that these provisions have been little used in practice, with exemptions typically accounting for less than one percent of costs at a SES network level, as shown below.

Table 4.10: Share of costs benefitting from cost exempt provisions (en-route only)

2009 € millions	2012	2013	2014	RP1 total	**2015**	2016
Pension exempt costs	48.3	3.6	3.6	**55.5**	34.7	21.6
Total exempt costs	36.1	(7.4)	(10.1)	**18.5**	17.3	2.8
Total costs[40]	6,258	6,319	6,305	**18,881**	6,079	6,075
Pension exempt costs (%)	0.8%	0.1%	0.1%	**0.3%**	0.6%	0.4%
Total exempt costs (%)	0.6%	(0.1%)	(0.2%)	**0.1%**	0.3%	0.0%

Source: PRB monitoring reports

4.65 This suggests that the current cost exempt provisions are disproportionate, adding to the complexity of the risk sharing arrangements to address a risk relating to an insignificant proportion of costs. Removal of the cost exempt mechanism would therefore simplify the Charging Scheme significantly without increasing ANSP risk unduly. However, unforeseen pension costs, representing the largest proportion of costs falling within the exempt categories since 2012, are a major concern for a number of ANSPs and some provision for accommodating these through an adjustment to determined costs on a 'by exception' basis has therefore been included in this option.

4.66 The exclusion of depreciation from the inflation adjustment mechanism reflects concerns expressed by stakeholders during RP2 about the risk associated with the potential level of adjustment under the current mechanism. Further, since depreciation is normally calculated on a historic cost basis, there is no clear rationale for applying inflation to this category of costs.

4.67 The proposal for devolving responsibility for developing an incentive mechanism to the NSAs similarly reflects the perceived need to provide flexibility in response to variations in local circumstances. In discussions with stakeholders during the study on performance incentives[41], NSAs and ANSPs were particularly supportive of this option, noting that the current approach defined in Article 15 was too generic and did not incentivise initiatives to address known problems. These can vary significantly between FIRs, and include the following:

- Seasonal capacity constraints, typically encountered by Area Control Centres (ACCs) handling substantial increases in traffic over the summer (e.g. Barcelona), can result in significant en-route delay. This may be masked by delay-based metrics calculated as annual averages, as used in incentive schemes.

[40] Cost exempt payments can be both positive and negative, which means that the total cost exempt figure, at either a total or sub-category level, is a net total. The net total for any sub-category, such as pensions, can therefore be greater in monetary terms than the net total for all cost exemptions.

[41] See footnote 10 above.

- Sector limitation can arise when staffing arrangements do not allow ANSPs to open the maximum number of sectors on days when traffic volumes cannot easily be accommodated without generating delay. Such problems have been encountered in Brest, Nicosia and Warsaw ACCs, again in the summer months when holiday traffic results in a peak in traffic volumes.
- The deterioration in performance at weekends is well documented and arises due to the difficulties of deploying sufficient air traffic controllers over the weekend period, although it can be exacerbated by increased traffic levels during holiday periods. Again, poor performance on particular days will be masked by metrics based on average delay through the year.
- First rotation delays, arising during the morning peak, can have substantial knock-on effects, leading to the accumulation of reactionary delay through the day and preventing airspace users from recovering their original schedules. Accordingly, the NOP for 2017 identified a reduction in first rotation delays as one of the Network Manager's key priorities, targeting a 10% reduction for at least one airport or ACC with a significant problem.
- Long delays, in excess of 15 minutes, can cause substantial disruption when they arise but may not be reflected in metrics based on average delay per flight.

4.68 The results of the stakeholder consultation for the study on performance incentives indicated that NSAs would value the opportunity to implement incentive schemes designed to address specific problems of the kind outlined above. By targeting such problems, bespoke schemes could help to improve performance more effectively than a generic scheme defined in legislation. At the same time, we recognise that this option would add to the complexity of the Performance and Charging Schemes, a concern that has been raised by airspace users. This highlights the potential for tension between the objectives for RP3 and the need to balance a greater focus on local circumstances on the one hand, and the need for more transparency and simplicity on the other.

Changes to legislation

Table 4.11: Option C1 – changes to legislation

Area of legislation	Changes
Performance Regulation	• No changes required.

Charging Regulation	• Modify Article 13 to permit NSAs to specify the dead band and sharing keys within defined parameters (allowing for the possibility of asymmetric keys) after demonstrating the case as well as their capacity and independence to the Commission (see Table 4.2).
	• Modify Article 15 to enable NSAs to submit incentive schemes for approval, setting out the rationale, again on condition that they can demonstrate sufficient capacity and independence.
	• Modify Article 15 to specify key principles and parameters with which incentive schemes should comply:
	  • Asymmetry, with bonus rates being below those of penalty rates;
	  • A maximum cap on penalties and bonuses in any year; and
	  • Requirement for stakeholder consultation.
	• Remove existing Article 15 but introduce new provisions allowing pension costs to be treated separately by exception and where a case can be made.
	• Modify Article 7(1) to exclude depreciation from inflation risk sharing mechanism.
	• Introduce process for regulating capital expenditure with new provisions in Article 17, as under Option B, but NSAs to consider the case for reimbursement of unspent planned capital expenditure or other sanctions.

Other legislation	• No changes required.

Source: Steer Davies Gleave review of SES legislation

Option C2 – centralised risk allocation mechanisms

Definition

4.69 Option C1 relies heavily on NSAs to ensure that the incentives provided by the Charging Scheme reflect an efficient allocation of risk between ANSPs and airspace users. This is in line with the objective of RP3 to strengthen the role of NSAs and also recognises the need to take account of local circumstances in the allocation of risk. However, in practice some NSAs may not have the capability, either in terms of skills or resources, to take responsibility for the design of risk sharing and incentive arrangements in the way envisaged under Option C1. Option C2 is therefore based on a more centralised approach, whereby the relevant mechanisms are fully specified in the Charging Regulation. However, it includes all the measures covered by the core option, including strengthening the role and enforcement powers of NSAs in the performance planning and monitoring process.

4.70 The current risk sharing arrangements are already well-defined, but there is a case for modifying them in the light of concerns expressed by some stakeholders about the potential for perverse incentives. The specification of incentive scheme requirements, while relatively prescriptive, is open to interpretation and has been applied in different ways in different Member States. There is therefore a case for a centrally defined scheme for a pan-European network, providing greater consistency and transparency for airspace users.

Risk sharing arrangements

4.71 Option C2 would involve the following changes to the current risk sharing mechanisms while retaining the same broad framework covering traffic, cost and inflation risk:

- The dead band currently applying to the traffic risk sharing mechanisms would be removed, simplifying the mechanism. However, the sharing keys and upper threshold would remain unchanged, reflecting the lack of any material change in the structure of ANSP costs since the mechanism was first introduced in 2009 (discussed further below).
- The same changes to the cost exempt and inflation risk sharing arrangements as under Option C1 would apply.

Incentive mechanism

4.72 In our previous report for the Commission on performance incentives, we put forward for consideration a centrally administered incentive scheme based on the payment of penalties for delay. The introduction of such a scheme would be consistent with the centralised approach to risk allocation under this option. It would include the following elements:

- The Commission would oversee the development and implementation of a centrally defined delay attribution system providing for delay to be attributed to specific causes and allocated between parties according to fault. Weather-related delays would not be allocated to any party but all other delays, including those caused by industrial action, would be assigned to the party best placed to manage the underlying risk.
- Delay benchmarks would be set at the national/charging zone level and in line with targets and reference values. Penalties would be calculated automatically on an annual or monthly basis by the CRCO and paid to airspace users in the form of discounted charges.
- Maximum penalty payments would be defined in legislation as a percentage of total charges per flight.
- There would be a dispute resolution mechanism whereby disputes over the allocation of delay would be considered and resolved by an independent panel.

Regulatory scrutiny of capital expenditure

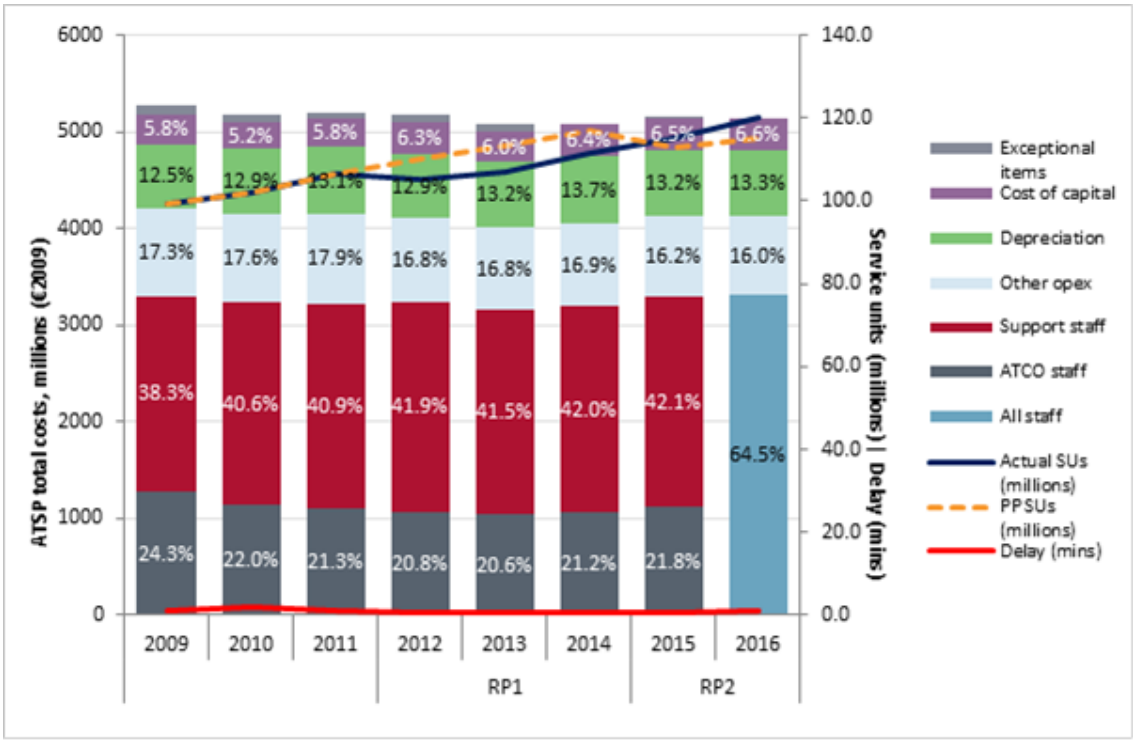
4.73 For the reasons discussed in paragraph 4.59, we suggest that capital expenditure should be subject to regulatory scrutiny by the NSAs under this option as under Option C1. However, in line with the principle underpinning Option C2, namely that regulatory mechanisms should reflect the conventional approach to regulation, we propose that the delivery of capital investment plans should be incentivised through the potential for adjustment to charges in subsequent Reference Periods[42]. NSAs would therefore be required to identify underinvestment over a Reference Period, based on the results of regular monitoring of progress. This would enable the Commission, after taking advice from the PRB, to decide whether charges in the following Reference Period should be adjusted downwards to avoid over-remuneration of investment.

Rationale

4.74 The changes to the traffic risk sharing arrangements under this option are limited since there is little evidence that there have been any changes in the average structure of ANSP costs since 2009 that would justify changes to the common risk allocation framework currently in place. This is illustrated in the figure below, which shows total European ANSP costs and traffic levels over the last eight years.

[42] Under a standard regulatory approach, any capital underspend during a reference period is taken into account in setting charges for the subsequent reference period.

Figure 4.3: Trends in traffic, costs and delay in Europe



Source: ACE benchmarking reports, PRB monitoring reports, RP1/RP2 dashboards and performance plans

4.75 The 30:70 allocation of changes in revenue relative to forecast levels was put in place in 2009 and reflected analysis of the structure of ANSP costs (in particular the share of variable costs in the total) and of the elasticity of costs with respect to traffic. The allocation can therefore be considered consistent with the 24.3% of costs accounted for by air traffic controllers prevailing at the time. While the figure suggests some decline in the share by 2015, this appears marginal and is insufficient to suggest a material change in the structure or variability of costs. There is therefore no clear case for modifying the sharing keys for a traffic risk sharing scheme administered at the European level[43]. A similar argument applies in respect of the upper threshold applied to the traffic risk sharing mechanism.

4.76 However, a case for removing the dead band can be made on the grounds that this would simplify and increase the transparency of the mechanism. It would also remove the perverse incentive to plan on the basis of relatively low traffic forecasts in the expectation that actual traffic will give rise to additional revenue fully allocated to the ANSPs. While we note that the use of standard forecasts would anyway remove this incentive, to the extent that ANSPs retain some freedom to determine the basis of forecasting (whether in all cases or, as under our core option, by exception), we consider that any change designed to encourage accurate forecasting is likely to be beneficial.

[43] As noted in the discussion of Option C1 above, trends in cost vary considerably between Member States, supporting the case for flexibility in setting sharing keys at the national level. However, there appears to be no case for change if the sharing keys continue to be set at the European level.

4.77 As already noted, the same changes to the cost exempt and inflation risk sharing arrangements as under option C1 are made under Option C2, and the same rationale applies (see paragraphs 4.64 to 4.66).

4.78 The introduction of a centrally administered penalty scheme would address a number of concerns about existing incentive schemes expressed by stakeholders. In particular, it would provide for compensation to airspace users for delays incurred on a consistent basis across the SES, thereby encouraging ANSPs to deliver against their delay targets (e.g. by changing working practices or enhancing staffing levels). This approach is consistent with the arrangements for providing airline passengers with compensation under the passenger rights legislation. Further, a penalty-based system would ensure that no ANSP effectively received an automatic bonus (as is the case at present for those ANSPs that consistently deliver services with zero delay).

4.79 The scheme would involve significant implementation costs, but once in place would operate automatically through the charging system administered by CRCO (except in cases where the attribution of delay was subject to dispute). There might also be some cost savings to set against implementation costs, as NSAs would no longer be required to administer individual schemes.

Changes in legislation

Table 4.12: Option C2 – changes to legislation

Area of legislation	Changes
Performance Regulation	• No changes required.

Charging Regulation	• Delete Article 13(3) and (4) to remove the dead band from the traffic risk sharing mechanism.
	• Modify Article 15 to define centrally administered incentive scheme, providing for:
	  ◦ Supporting delay attribution and dispute resolution mechanism;
	  ◦ Definition of the delay categories to be included;
	  ◦ Common penalty rates and cap on penalties;
	  ◦ Mechanism for applying penalties in the form of an adjustment to charges within the relevant year.
	• Remove existing Article 15 but introduce new provisions allowing pension costs to be treated separately by exception and where a case can be made.
	• Modify Article 7(1) to exclude depreciation from inflation risk sharing mechanism.
	• Introduce process for regulating capital expenditure with new provisions in Article 17, as under Option B, but provide for adjustment to unit rates in subsequent reference period in the event of unspent planned capital expenditure.

Other legislation	• No changes required.

Source: Steer Davies Gleave review of SES legislation

Delivery of RP3 objectives

4.80 The tables below summarise the performance of the options against the objectives for RP3. Note that in the case of Options B and C (which include Option A), the assessment focuses on those measures that are incremental to the core. As indicated:

- Option A addresses all the objectives to some degree, although its impact on risk allocation is minimal as it does not include any measures relating to the Charging Scheme.

- While the simplification of the Charging Scheme under Option B clearly affects risk allocation, it is open to question whether the resulting allocation (under which risk is largely transferred to the ANSPs) is efficient.
- Option C1 meets a number of the objectives for RP3, in particular strengthening the role of NSAs. It also improves risk allocation since it provides for flexibility to reflect the local circumstances of individual ANSPs within the charging and incentive framework, and increases the effectiveness of the Charging Regulation, but at the expense of additional complexity from the perspective of airspace users.
- Option C2 meets the same objectives as Option C1, but illustrates the trade-off between simplifying the Charging Scheme, on the one hand, and achieving an efficient allocation of risk, on the other. While Option C2 provides for a simpler and more transparent scheme than C1 by introducing common risk sharing and incentive arrangements to be applied across the SES, by definition it does not take account of different circumstances prevailing in different Member States. It nevertheless improves the overall effectiveness of the Charging Scheme by strengthening positive incentives and removing current anomalies.

Table 4.13: Option A - performance against RP3 objectives

Objective	Elements of option						
	Simplification/ clarification	Empowerment of NSAs	Efficient planning/ targeting	Integration with network functions	Safety measurement	Environment measurement	Capacity measurement
Simplify the operation of the Performance and Charging Schemes and improve their efficiency and effectiveness	✓		✓	✓	✓	✓	✓
Ensure the link between the Performance Scheme and the management of the network				✓			
Strengthen the role of the NSAs and reduce duplication of regulation		✓					
Ensure that a gate-to-gate approach is embedded in performance management						✓	
Ensure key interdependencies are captured in the target-setting process			✓	✓			
Ensure efficient allocation of risk between stakeholders			✓				

Source: Steer Davies Gleave

Table 4.14: Option B – performance against RP3 objectives

Objective	Elements of option	
	Simplification of charging scheme	Regulatory scrutiny of capital expenditure
Simplify the operation of the Performance and Charging Schemes and improve their efficiency and effectiveness	✓	
Ensure the link between the Performance Scheme and the management of the network		✓
Strengthen the role of the NSAs and reduce duplication of regulation		✓
Ensure that a gate-to-gate approach is embedded in performance management		
Ensure key interdependencies are captured in the target-setting process		✓
Ensure efficient allocation of risk between stakeholders		?

Source: Steer Davies Gleave

Table 4.15: Option C1 – performance against RP3 objectives

Objective	Elements of option		
	Traffic risk sharing	Incentive schemes	Regulatory scrutiny of capital expenditure
Simplify the operation of the Performance and Charging Schemes and improve their efficiency and effectiveness	✓(?)	✓(?)	
Ensure the link between the Performance Scheme and the management of the network			
Strengthen the role of the NSAs and reduce duplication of regulation	✓	✓	✓
Ensure that a gate-to-gate approach is embedded in performance management			
Ensure key interdependencies are captured in the target-setting process			✓
Ensure efficient allocation of risk between stakeholders	✓	✓	✓

Source: Steer Davies Gleave

Table 4.16: Option C2 – performance against RP3 objectives

Objective	Elements of option		
	Traffic risk sharing	Incentive schemes	Regulatory scrutiny of capital expenditure
Simplify the operation of the Performance and Charging Schemes and improve their efficiency and effectiveness	✓	✓	
Ensure the link between the Performance Scheme and the management of the network			
Strengthen the role of the NSAs and reduce duplication of regulation	✓	✓	✓
Ensure that a gate-to-gate approach is embedded in performance management			
Ensure key interdependencies are captured in the target-setting process			✓
Ensure efficient allocation of risk between stakeholders	✓(?)	✓(?)	✓

Source: Steer Davies Gleave

Measures included in this option

4.81 Table 4.17 to Table 4.20 show the measures from the original long list that are included in each of the options described above. The references relate to the description of measures provided in Appendix A.

Table 4.17: Measures included in Option A

Option element	Measures	
	Code	Description
Simplification and clarification	TOR1	Clarify treatment of public funding of investment programmes in calculation of unit rate
	CRT3	Clarify process for applying initial unit rates prior to approval
	OMR1	Introduce simplified tables – restrict reporting by airports to the A-CDM airports (other than for cost-efficiency) and remove certain safety-related metrics
More empowered NSAs	NEP1	Introduce enforcement measures to be applied when performance does not meet Union-wide targets – initial enforcement by NSAs
More efficient performance planning and targeting	GEO3	Allow for the preparation of performance plans at the national level and set national level targets, but provide the flexibility for Member States to agree to continue to submit FAB level performance if they choose
	PPA1	Involve NSAs in process for setting Union-wide targets
Better integration with network functions	RPD2	Retain 5-year duration of Reference Period but permit changes to capacity plans year-by-year
	ROT1	Introduce simpler process for revising targets in specific circumstances
	NEP1	Introduce enforcement measures to be applied when performance does not meet Union-wide targets – enforcement by Commission following escalation
	PRR2	Establish a more explicit role for the PRB in specific areas, for example the identification of corrective measures to address capacity issues
	NPP1	Introduce new KPIs and/or performance indicators capturing the contribution of the Network Manager to network performance
Streamline measurement of safety KPA	SDU1	Limit the number of KPIs included in the safety element of the Performance Scheme and draw on other measures monitored by EASA under the Safety Risk Management Process
	SLI1	Use a leading indicator of safety management effectiveness to set a target for the Performance Scheme and lagging indicators to monitor specific aspects of safety
	SME1/2	Use CANSO standard of excellence v2.1 to measure safety management effectiveness Use cross-domain tool developed by EASA to measure safety management effectiveness
Enhanced measurement of the environment KPA	EKE1	Use flight efficiency of the actual flight trajectory (KEA) as the single KPI for the purposes of target setting (while retaining efficiency based on the planned trajectory (KEP) as a performance indicator)
	EVF	Introduce a vertical flight efficiency indicator to complement the existing measurement of horizontal flight efficiency
	ESC1	Introduce a shortest constrained route indicator, allowing identification of ANSPs' and airspace users' efficiency contributions
	ECU	Introduction of a measure of the flexible use of airspace such as civil use of released military airspace
Enhanced measurement of the capacity KPA	CAP1	Introduce additional measures of delay to supplement existing metric and capture information on specific problems
	NPP1	Introduce new KPIs and/or performance indicators capturing the contribution of the Network Manager to network performance

Source: Steer Davies Gleave analysis

Table 4.18: Measures included in Option B

Option element	Measures	
	Code	Description
Simplification of Charging Scheme	STR4	Remove traffic risk sharing mechanism
	SCO1	Remove cost risk sharing mechanism
	SIN3	Set cost efficiency targets in nominal terms and remove the inflation mechanism
	ISA4	Remove incentive mechanism
Regulatory scrutiny of capital expenditure	PCR1	Apply rebates to charges when planned capital costs are not incurred (modified such that expenditure over the Reference Period is assessed and rebates made at the end rather than annually)

Source: Steer Davies Gleave analysis

Table 4.19: Measures included in Option C1

Option element	Measures	
	Code	Description
Traffic risk sharing	STR1	Remove the dead band (if proposed by NSA)
	STR2	Change the sharing keys (if proposed by the NSA)
Incentive schemes	ISA1	Specification of incentive mechanisms devolved to NSAs, with mechanisms designed to address specific, known issues within the relevant airspace
Regulatory scrutiny of capital expenditure	PCR1	Apply rebates to charges when planned capital costs are not incurred (modified such that expenditure over the Reference Period is assessed and rebates made at the end rather than annually)

Source: Steer Davies Gleave analysis

Table 4.20: Measures included in Option C2

Option element	Measures	
	Code	Description
Traffic risk sharing	STR1	Remove the dead band
	SCO2	Remove current cost risk sharing mechanism but introduce new mechanism for pensions
	SIN1	Limit the application of inflation adjustment to specific costs
Incentive schemes	ISA2	Centrally administered incentive mechanism, based on agreed delay attribution mechanism, with penalties for failing to deliver 'contracted' capacity
Regulatory scrutiny of capital expenditure	PCR1	Apply rebates to charges when planned capital costs are not incurred (modified such that expenditure over the Reference Period is assessed and unit rates adjusted in the subsequent Reference Period)

Source: Steer Davies Gleave analysis

5 Impact assessment tool

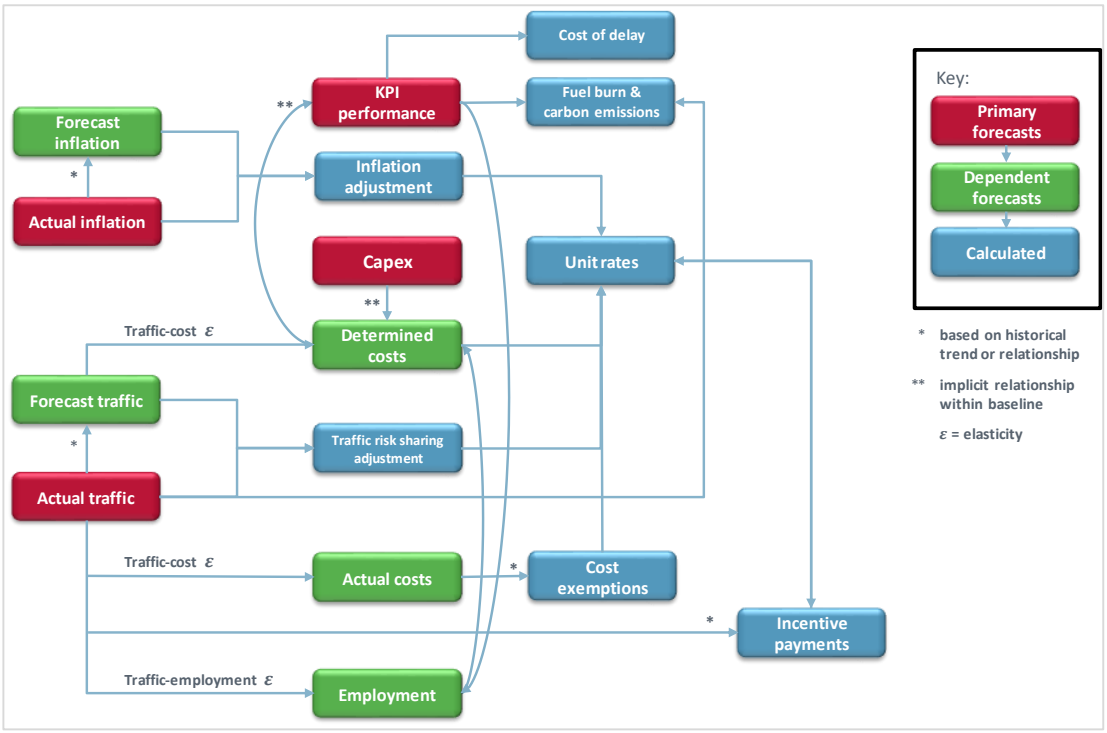
Overview

5.1 This chapter describes the impact assessment (IA) tool used to undertake the analysis of quantified impacts (monetised and non-monetised). A detailed description of the assumptions used in calculating the various impacts listed in Table 2.2 is provided in Appendix E.

5.2 Figure 5.1 provides an overview of the structure of the IA tool. As shown, it is based on modelling of three types of forecast:

- **primary forecasts** (in red boxes), which are independent of other forecasts and form the underlying growth rates within the tool;
- **dependent forecasts** (in green boxes), which (for years after forecasts from other sources are not available) are based on one of the primary forecast's growth rates; and
- **calculated forecasts** (in blue boxes), which are calculated from a combination of primary and dependent forecasts.

Figure 5.1: Overview of model structure



Source: Steer Davies Gleave

5.3 The tool generates projections of a range of metrics, discussed further below, under a baseline scenario and each of the options described in the previous chapter. We have chosen to generate projections over the period 2016 to 2035, which allows us to assess the impacts of options over the longer term. In general, we would not expect to observe the full effect of the options within the timeframe of RP3, which ends in 2024. All future reference periods are assumed to last for five years.

5.4 The impacts of each option are calculated in terms of a change to each of a number of metrics relative to the baseline scenario. The baseline can be described as a 'do minimum' scenario, in which there is no significant change to the regulatory framework put in place for RP2 and established trends in the various metrics continue. We discuss the basis for projecting the metrics when describing the baseline in paragraphs 5.7 to 5.40.

5.5 The level of disaggregation within the tool, and the assumptions used to estimate values at the national/charging zone level, are shown in Table 5.1. Most metrics are disaggregated at a charging zone level, as they are used to calculate unit rates (which are determined by charging zone). Some, such as environmental impacts, are presented at a more aggregated level.

Table 5.1: Level of disaggregation within the impact assessment tool

Metric	Disaggregation in input source	Disaggregation in baseline scenario	Rationale for the level of disaggregation	Assumption used for conversion
Traffic	Charging zone level (en-route and terminal)	Charging zone level (en-route and terminal)	Used to calculate unit rates, which apply at a charging zone level	-
Inflation	Country level (en-route and terminal)	Charging zone level (en-route and terminal)	Used to calculate unit rates, which apply at a charging zone level	The inflation rate of each charging zone is assumed to be the rate of the Member State in which it is located[44]
Unit rates	Charging zone level (en-route and terminal)	Charging zone level (en-route and terminal)	Unit rates apply at a charging zone level	-
Costs	Four entities[45] within charging zones (en-route and terminal)	Four entities within charging zones (en-route and terminal)	Used to calculate unit rates, which apply at a charging zone level	-
Employment levels	ATSP level	Charging zone level (en-route and terminal)	Used to calculate employment levels and costs which apply at a charging zone level	Employment levels are apportioned to charging zones in one country based on relative share of RP2 employment costs
KPIs	En-route ATSP level	En-route ATSP level	Used to calculate incentives, apply only at an en-route ANSP level, and environmental costs	-

[44] The rate for the Belgium and Luxembourg en-route charging zones is assumed to be that of Belgium

[45] ATSP, other ANSPs, METSP and NSAs.

Metric	Disaggregation in input source	Disaggregation in baseline scenario	Rationale for the level of disaggregation	Assumption used for conversion
Environmental metrics	Inputs apply at an EU-wide level	En-route ATSP level	Environmental costs are affected by KPIs and therefore provided at en-route ANSP level	Fuel burn and carbon emission assumptions apply in the same way EU-wide
Capital expenditure	ATSP level	Charging zone level	Used to calculate unit rates, which apply at a charging zone level	For each ANSP, capital expenditure is apportioned to each en-route and terminal charging zone based on relative share of RP2 operating costs

Source: Steer Davies Gleave

5.6 Note that the IA tool does not consider the impact of changes to the level of unit rates for airspace users on fare levels for air passengers. Airlines yield-manage their fares and therefore will not necessarily pass on any additional savings or costs to consumers. In addition, any increase in airline fares would be negligible, given the limited share of ANS charges in overall airline costs – a maximum of 13% based on Steer Davies Gleave analysis[46] of airline annual reports.

Baseline

5.7 The baseline scenario has been defined by reference to the metrics discussed above. In each case, we provide an explanation of the assumptions used to generate the baseline projection. The key general assumptions underpinning the baseline are shown in Table 5.2 below.

Table 5.2: Baseline scenario – general assumptions

Area	Assumption
Reference Period length	5 years
Price base	All monetary values are presented in € 2009, or have been converted to € 2009 using EU-wide HCIP
Exchange rates	All non-Euro currencies have been converted to Euros using the 2009 exchange rates from the RP2 performance plans

Source: Eurostat, RP2 performance plans

Traffic

5.8 We have expressed traffic levels within the IA tool in terms of service units[47]. Within the baseline scenario, we have included two traffic forecast profiles: an 'actual' forecast and a 'performance plan' forecast. It is necessary to include both, as the difference between the actual level of service units and the level forecast in the performance plans is used as the basis of an adjustment within the traffic risk sharing mechanism. If the actual and forecast levels of

[46] The maximum value of 13% was found for a low-cost airline. We expect that this value would be lower for other airlines, particularly those with a higher cost-base. The analysis was based on 2017 annual reports.

[47] En-route service units of a specific flight are equal to the product of the distance flown (expressed in 100 kilometres) by the square root of the Maximum Take Off Weight of the aircraft which performed the flight (expressed in 50 tonnes).

service units were forecast at the same level, there would be no traffic risk sharing adjustment, and it would therefore not be possible to assess measures involving a change to the risk sharing mechanism. In the IA tool, 'actual' refers to traffic levels that are assumed to arise, while 'performance plan' refers to forecasts that would be developed by each NSA/ANSP in its own performance plan.

5.9 To forecast 'actual' service units, we have used the most recent STATFOR medium-term and long-term forecasts of IFR[48] movements, using the base or central case forecast in each case[49]. We have converted IFR movements to en-route and terminal service units using, respectively, the historic ratio between IFR movements and en-route and terminal service units. The forecasts between 2023 and 2035 have been adjusted to create a smooth growth profile between 2016 and 2035. A summary of the STATFOR forecasts used in the baseline scenario is shown in Table 5.3.

5.10 As well as the en-route and terminal service unit forecast, which are used for the unit rate calculation, we have also included the IFR movement forecasts in the IA tool to enable a calculation of the baseline level of environmental costs.

Table 5.3: Baseline scenario traffic expressed in service-units

Metric	Forecast source	Forecast date	Last forecast year/ latest year available	STATFOR Forecast used
'Actual' traffic	STATFOR Medium-term	February 2017	2023	Base
	STATFOR Long-term	June 2013	2035	A - Global growth
'Performance plan' traffic	RP1 and RP2 Performance Plans	-	2019	Long-term profile follows long-term STATFOR profile described above

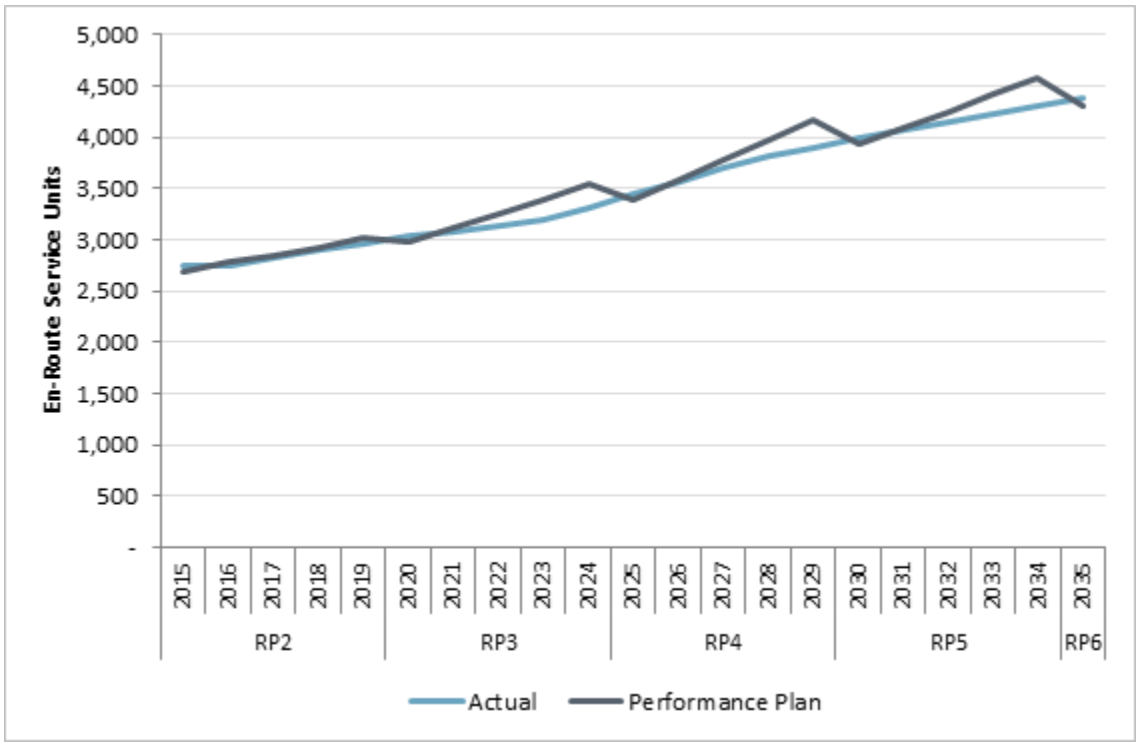
Source: Steer Davies Gleave analysis

5.11 To forecast 'performance plan' service units, we have used the historic relationship between actual service units and forecast performance plan service units in RP1 and RP2. As ANSPs produce new service unit forecasts for each Reference Period, based on the most recent traffic trends, the level of forecast service units is close to the actual level in the first year of each Reference Period and diverges thereafter. An illustration of the relationship between the 'actual' service unit forecast and the 'performance plan' forecast in the baseline scenario for one charging zone is shown in Figure 5.2.

[48] IFR: Instrument Flight Rules

[49] Note that we assumed that performance plan targets deviate from actual levels to demonstrate the impact of traffic risk sharing, notwithstanding that ANSPs would be required to adopt STATFOR central forecasts under option A.

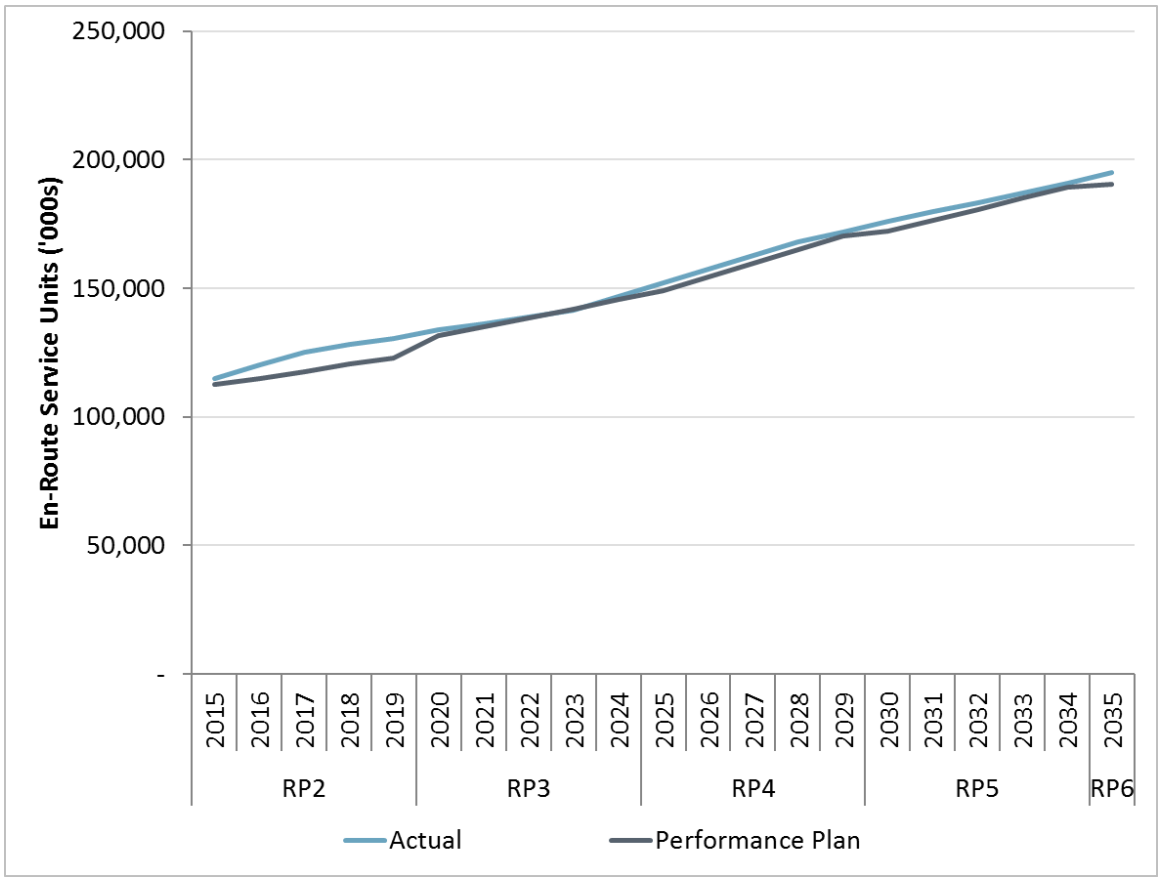
Figure 5.2: Illustration of baseline scenario traffic growth for Austria



Source: Steer Davies Gleave analysis

5.12 The chart below shows the profile of the service units for all the charging zones included in the IA tool. We observe that, overall across all the Member States involved in RP2, based on our assumptions, actual (i.e. STATFOR) traffic throughout the assessment period is higher than the performance plan traffic. This is because, overall across all States, performance plan traffic numbers have historically been lower than actuals, due to stronger traffic growth than expected and/or slight forecasting inaccuracies in favour of lower performance plan forecasts.

Figure 5.3: Baseline scenario traffic growth for all States (actual and performance plans)



Source: Steer Davies Gleave analysis

Inflation

5.13 We have also included two inflation forecasts within the baseline scenario, an 'actual' forecast and a 'performance plan' forecast. Again, the difference between actual inflation and inflation forecast in the performance plans is used as an adjustment within the risk sharing mechanism.

- Forecasts of 'actual' inflation for the baseline scenario are based on International Monetary Fund (IMF) forecasts. These forecasts are to 2022, and for the remainder of the assessment period we have assumed the average inflation rate between 2020 and 2022 applies.
- To forecast 'performance plan' inflation, we have used the historic relationship between actual inflation and inflation forecast in the performance plans in RP1 and RP2. Therefore, within the baseline scenario, 'performance plan' inflation and 'actual' inflation follow a similar relationship to 'performance plan' traffic and 'actual' traffic shown in Figure 5.2.

5.14 The assumptions used for the inflation forecast are shown in Table 5.4.

Table 5.4: Baseline scenario inflation assumptions

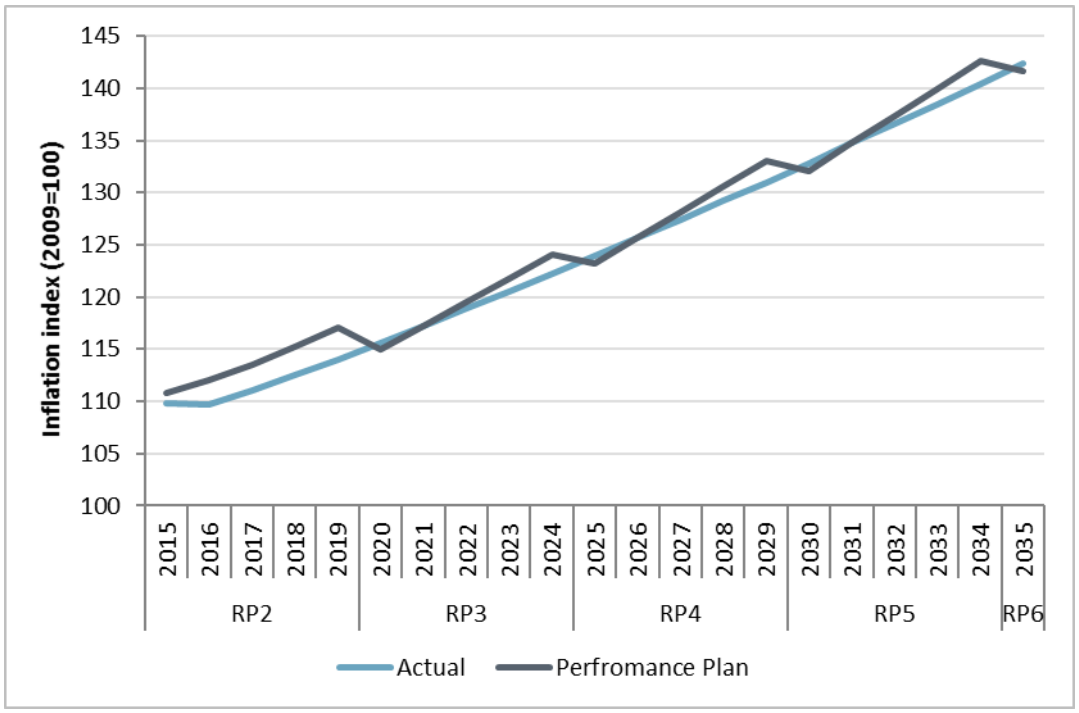
Metric	Forecast source	Forecast date	Last forecast year	Forecast assumption to 2035
'Actual' inflation	IMF World Economic Outlook	April 2017	2022	Average of 2020-2022 IMF rates
'Performance plan' Inflation	RP1 and RP2 performance plans	-	2019	Long-term profile follows long-term 'actual' profile described above

Source: Steer Davies Gleave analysis

5.15 To be consistent with RP1 and RP2 performance plans, all monetary data in the baseline scenario are presented in Euros expressed in 2009 prices. However, the IA tool also includes the functionality to present monetary data in nominal terms, as this is necessary to investigate the effects of certain policy measures under the different options.

5.16 Historically in RP1 and RP2, across all Member States, the difference between forecast and actual inflation resulted in airspace users being reimbursed (i.e. lower outturn charges, excluding other adjustments).

Figure 5.4: Illustration of inflation scenario traffic growth for Italy



Source: Steer Davies Gleave

Unit rates

5.17 Complete and consistent determined en-route and terminal unit rate data is available in the PRB monitoring reports up to 2016. We have calculated unit rates[50] for the remainder of the

[50] ANS Determined Unit Rate is defined as the en route determined costs (in real terms) divided by the total en route service units. The yearly values of the determined costs are fixed in advance, for the entire reference period in the performance plans.

assessment period using unit costs and forecast service units after making the following adjustments:

- an inflation adjustment;
- a traffic risk sharing adjustment;
- a traffic volume adjustment; and
- an incentive payment adjustment; and
- a cost exemption adjustment.

5.18 A summary of the determined unit rate assumptions used is shown in Table 5.5.

Table 5.5: Baseline scenario unit rates assumptions

Metric	Source	Latest year available	Forecast assumption to 2035
En-route unit rates	PRB monitoring reports	2016	Calculated from unit costs and service units
Terminal unit rates	PRB monitoring reports	2016	Calculated from unit costs and service units

Source: Steer Davies Gleave analysis

5.19 The baseline scenario includes forecasts of both determined costs (from ANSP's performance plans) and actual costs, again with the aim of calculating the effect of risk sharing adjustments. We have assumed total ANSP costs grow with traffic, with a cost elasticity with respect to traffic of 0.3 (the elasticity between 2003 and 2008 estimated by work undertaken by Eurocontrol[51]).

5.20 The exact relationship between costs and traffic will in practice differ between ANSPs, depending on several factors, including their systems, staff levels and staffing arrangements, and their location with respect to the evolving distribution of traffic across the network. Further, as seen during RP1 and the first years of RP2, total system costs have remained relatively flat (in real terms) while traffic has grown. However, this has been in the context of a recovery following the reduction in traffic experienced through the global financial crisis. Over the long-term, as any historic over-capacity is taken up by the additional traffic, we would expect costs to resume growing in response to traffic growth. The elasticity observed during the growth period of 2003-2008 is considered a suitable estimate for the long-term relationship between costs and traffic. As it is less than unity, the elasticity implicitly accounts for productivity and efficiency gains by ANSPs.

5.21 Note, however, that the assumption on the elasticity of costs with respect to traffic over the long term need not constrain assumptions about the situation of individual ANSPs over the short to medium term (i.e. within a single Reference Period). This is an important consideration in the modelling of traffic risk sharing arrangements under Option C1, which provides for the application of different traffic sharing keys according to an ANSP's ability to accommodate additional traffic without increasing capacity. Our specific assumptions for modelling purposes are set out in Appendix E, but here we note that for some ANSPs we have assumed that significant increases in traffic in the short term could be handled at no extra

[51] Performance Scheme: Initial EU-wide Targets Proposals, Consultation Document, Produced by the EUROCONTROL Performance Review Commission upon the invitation of the European Commission DG-MOVE, 2nd August 2010. p.62 section 6.3.39 and footnote 25

cost, notwithstanding the application of cost elasticity of 0.3 to generate a baseline projection of costs over the long term.

5.22 In any event, for the purposes of this analysis, which focuses on the impacts of changes to the performance and charging regimes, potential differences in the cost-traffic relationship between ANSPs are not relevant, since these would not differ between the baseline and the options and would therefore not affect the results.

5.23 A summary of the determined and actual cost forecast assumptions used is shown in Table 5.6.

Table 5.6: Baseline scenario cost assumptions

Metric	Source	Last forecast year/ latest year available	Forecast assumption to 2035
Actual costs	Historic reporting tables	2016	Grow with actual traffic with elasticity of 0.3[52]
Determined costs	RP1 and RP2 performance plans, STATFOR Long-term	2019 2035	Grow with performance plan traffic with elasticity of 0.3[53]

Source: Steer Davies Gleave analysis

5.24 The reporting tables and performance plans also contains ANSPs' costs disaggregated by:

- staff;
- other operating costs;
- depreciation;
- cost of capital;
- exceptional items; and
- VFR exempted flights.

5.25 We have forecast each of these cost items within the baseline scenario and have used them as a basis for estimating specific impacts.

5.26 We have also estimated the proportion of the costs that are exempt from the risk sharing mechanism. Given that cost exemptions are, by definition, exceptional, we have not attempted to forecast future cost exemptions by applying simple trends in historic data. Rather, to reflect their exceptional nature, we have applied the broad magnitude of historic cost exemptions (relative to total costs) randomly across charging zones throughout the assessment period. We have assumed that the resulting cost exempt adjustments are then passed through to airspace users in the following Reference Period.

Unit rate income

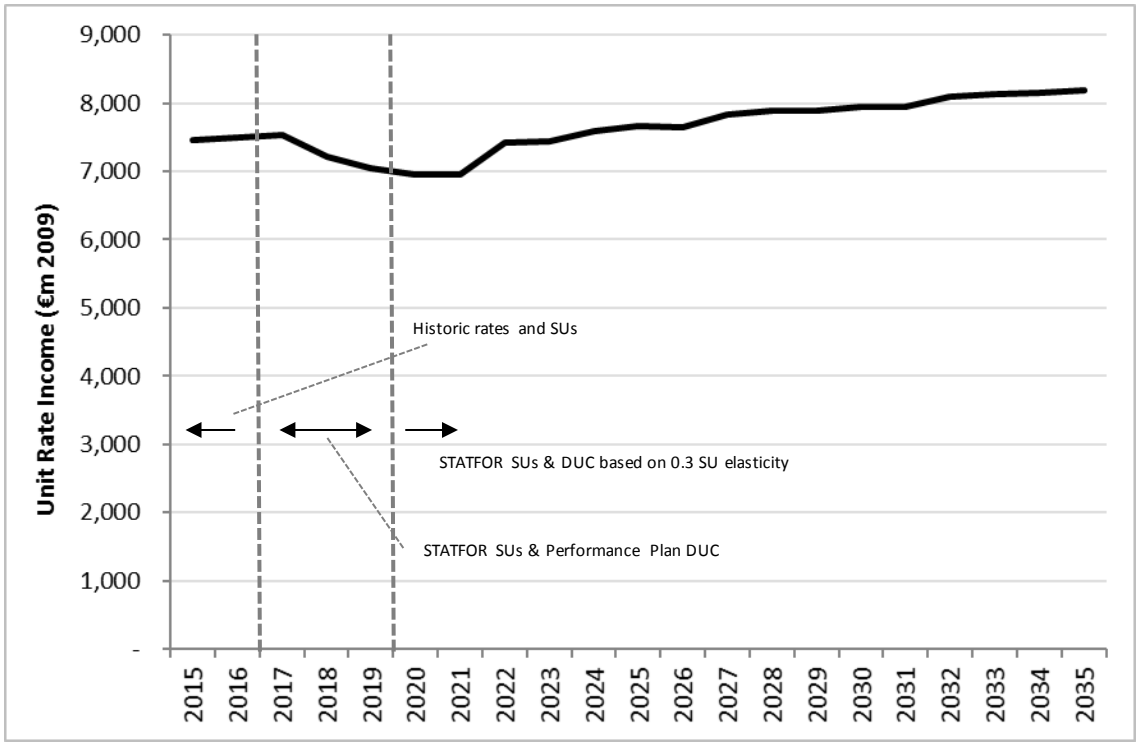
5.27 Figure 5.5 shows our projections of unit rate income at the European level over the period of the impact assessment. This has been estimated using our forecast of the actual level of service units described above and unit rates as follows:

[52] Refer to footnote 51

[53] Refer to footnote 51

- From 2015 to 2016, we have used historic published unit rates as described above, which include some rates that are the result of political decisions and may not truly reflect the determined cost (therefore unit rate income in these years is higher compared to the remainder of RP2).
- From 2017 to 2019, the unit rates are based on determined costs from RP2 performance plans, which are forecast to fall while the level of actual traffic increases (therefore unit rate income falls in the latter part of RP2 and the two following years).
- From 2020 onwards, the unit rates are based on our forecast of determined costs, which are forecast to grow based on an elasticity relationship with traffic as described above (therefore unit rate income grows throughout the remainder of the assessment period).

Figure 5.5: Baseline unit rate income



Source: Steer Davies Gleave analysis

Employment

5.28 The current number of full time equivalent employees (FTEs) and total staff costs have been taken from ANSPs' 2015 ACE submissions. In forecasting ANSP employment, we have differentiated between air traffic controllers and support staff, and have assumed numbers of each type of employee grow with different elasticities with respect to traffic, as follows:

- We would expect the number of air traffic controller FTEs to be more responsive to the level of traffic than total ANSP costs, as non-staff costs (such as maintenance or utilities) are more likely to benefit from economies of scale than staff costs. We have therefore assumed a growth elasticity of 0.4, which is somewhat higher than the total ANSP cost elasticity of 0.3.
- On the other hand, the number of support staff FTEs is likely to be relatively unresponsive to the level of traffic, given many of their activities benefit from economies of scale and they are not directly involved with ANS provision. At the same time, the number of

support staff required can be expected to increase in the long term if traffic continues to grow. We have therefore assumed a growth elasticity of 0.1.

5.29 The assumed share of FTEs between en-route and terminal entities is based on the split within the 2015 ACE submissions.

5.30 A summary of the employment forecast assumptions used is shown in Table 5.7.

Table 5.7: Baseline scenario employment assumptions

Metric	Source	Latest year available	Forecast assumption to 2035
Air traffic controller FTEs	ANSP ACE submissions	2015	Grows with actual traffic with an elasticity of 0.4 En-route – 76% of total staff Terminal – 24% of total staff
Support staff FTEs	ANSP ACE submissions	2015	Grows with performance plan traffic with an elasticity of 0.1 En-route – 73% of total staff Terminal – 17% of total staff
Average cost per FTE	ANSP ACE submissions	2015	The average cost per FTE, for air traffic controllers and support staff, for each ANSP, is assumed to remain constant in real terms throughout the assessment period
Air traffic controller-hour productivity	ANSP ACE submissions	2015	Air traffic controller hours grow with the number of controllers (with an elasticity of 1) Composite flight hours grow with the number of IFR movements (with an elasticity of 1)

Source: Steer Davies Gleave analysis

5.31 Staff costs, for both air traffic controllers and support staff are assumed to grow directly in proportion to the number of FTEs, assuming the average cost per employee remains constant in real terms at the 2015 level.

Key Performance Indicators

5.32 The Key Performance Indicators (KPIs) we have included within the baseline scenario are:

- KEP at union-wide level;
- KEA at an en-route ATSP level; and
- delay minutes at an en-route ATSP level.

5.33 As delay at charging zone level has only been recorded within the Performance Scheme since 2012, and KEA at charging zone level since 2016, it is not possible to extrapolate reliable trends. Each of these KPIs are likely to be influenced by various factors, including the level of traffic and the quality of ANS provision (which in turn will be directly influenced by the resources deployed by ANSPs, as reflected in investment and operating costs incurred). Given the lack of historic data and the number of influencing factors, we have assumed the level of delay and KEA performance remain constant at the 2021 level forecast in the June 2017 NOP (the last forecast year in the most up-to-date NOP).

5.34 The cost of delay has been monetised using the 2015 University of Westminster reference values[54] on delay cost per minute. A summary of the KPI forecast assumptions used is shown in Table 5.8 below.

Table 5.8: Baseline scenario KPI assumptions

Metric	Forecast source	Latest year available	Forecast assumption to 2035
Union-wide KEP	PRB Monitoring Reports	2016	Scores remain constant at 2021 level forecast in June 2017 NOP
Country level KEA	PRB Monitoring Reports	2016	Scores remain constant at 2021 level forecast in June 2017 NOP
Country level delay	PRB Monitoring Reports	2016	Scores improve by 1% a year (or remain zero in countries where the score is currently zero)
Cost of delay (per minute)	European airline delay cost reference values, University of Westminster (2015)	2015	Cost of delay per minute remains constant in real terms

Source: Steer Davies Gleave analysis

5.35 Note that we have not included KPI targets within the baseline scenario. Forecasting targets implies a level of expected performance which conflicts with the principle of policy neutrality normally underpinning the baseline scenario for an impact assessment (the scenario should focus on what is likely to happen rather than what policy makers believe *should* happen within a given regulatory framework). In addition, any attempt to forecast performance in line with one or more targets would necessarily require an assumption about future target setting policy that would also be difficult to substantiate.

Environment

5.36 All environmental metrics have been taken from the European Aviation Environmental Report (2016), which includes the following (forecast to beyond 2035):

- the number of passenger kilometres (pkm) per flight;
- the average jet fuel burn per pkm (in low, central and high technological advance scenarios); and
- kilograms (kg) of carbon emitted per kg of fuel burned.

5.37 As the environmental metrics are all directly related to the number of flights, each is assumed to grow in line with the level of traffic. The cost of jet fuel and the cost of carbon have been monetised using, respectively, the U.S. Energy Information Administration projections and the projected Emission Trading Scheme (ETS) carbon price from the 2016 PRIMES Reference Scenario. These forecasts already take account of fleet turnover and advances in aircraft technology, neither of which will be affected by any of the options.

5.38 A summary of the assumptions used to forecast environmental metrics is shown in Table 5.9.

[54] http://www.eurocontrol.int/sites/default/files/publication/files/european-airline-delay-cost-reference-values-final-report-4-1.pdf

Table 5.9: Baseline scenario environmental metric assumptions

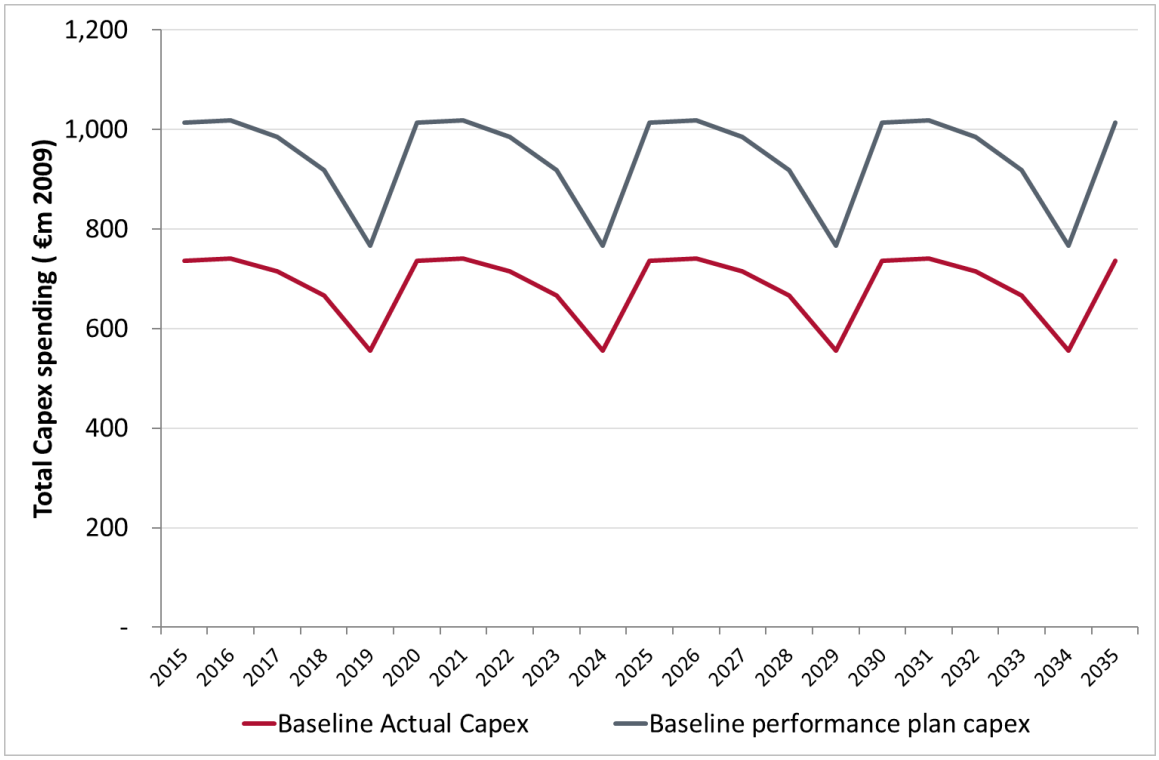
Metric	Source	Forecast assumption (2015 to 2035)
Passenger kilometres	European Aviation Environmental Report 2016	1.37 - 2.56 pkm per flight
Fuel	European Aviation Environmental Report 2016	0.031 - 0.022 kg of fuel burn per pkm (central technological advancement scenario)
Carbon emissions	European Aviation Environmental Report 2016	3.16 kg of carbon emitted per kg of fuel burnt
Jet fuel price	U.S. Energy Information Administration	€0.64 - €0.79 per kg
Carbon price	PRIMES 2016 Reference Scenario	€6.9 - €38.8 per tonne

Source: Steer Davies Gleave analysis

Capital expenditure

5.39 We have assumed that ANSP capital expenditure follows a five-year cyclical profile in the years after RP2, based on the minimum and maximum levels of annual spending in RP2 taken from the RP2 Performance Plans, as illustrated in Figure 5.6. Actual spending is assumed to follow the same profile as planned capital expenditure, with actual relative to planned spending reflecting the disparity between the two observed in RP1 and RP2 (for years 2012 to 2015), taken from the PRB Monitoring Reports.

Figure 5.6: Illustration of baseline scenario actual and performance plan profile of the capital expenditure



Source: Steer Davies Gleave analysis

5.40 A summary of the capital expenditure forecast assumptions used is shown in Table 5.10.

Table 5.10: Baseline scenario capital expenditure assumptions

Metric	Forecast source	Last forecast year/ latest year available	Forecast assumption to 2035
Performance plan capital expenditure	PRB Monitoring Reports	2019	Follows five-year cyclical profile based on RP2 spending levels
Actual capital expenditure	PRB Monitoring Reports	2015	Constant proportion of planned capital spending based on historic disparity between RP1 and RP2 performance plan and actual (based on 2012-2015)

Source: Steer Davies Gleave

Incentives

5.41 While we have not forecast a KPI target trajectory, we have assumed that the level of incentive payments will remain at the same level as in the first two years of RP2, implying that KPI performance relative to target levels remains at a similar level over the forecasting period. Accordingly, we have replicated the level of payments in RP2 shown in the relevant reporting tables.

Interdependencies

5.42 The different areas of ANSPs' activity covered by the Performance and Charging Schemes (i.e. the KPAs of cost-efficiency, capacity, environment and safety) are all linked, and it is important that the associated interdependencies are taken into account, as reflected in one of the specific objectives for the impact assessment set out in Chapter 3. However, the relationships between KPAs are complex and cannot be readily captured within the IA tool:

- In the case of some links it is possible to model a relationship, drawing on previous analysis, for example the elasticity of costs of service provision with respect to traffic, which has been examined by the PRU and some NSAs. This is used in the IA tool to calculate future costs based on the STATFOR traffic forecasts, as already described.
- For other links, however, it is not possible to establish a conclusive relationship that can be modelled explicitly, as in the case of the link between capital expenditure and delay for example. In these cases, it is nevertheless necessary to ensure that implicit relationships within an assumed scenario are understood and that modelled outcomes are consistent with them. The key relationships of this kind that we have identified are summarised in Table 5.11 below.

Table 5.11: Interdependencies which cannot be modelled explicitly

Link	Description	Approach to ensuring link is recognised
Risk and impact on cost of capital	Changes to the risk to which ANSPs are exposed would, in principle, be reflected in changes to their cost of capital. The cost of capital would increase under increased exposure to risk and vice versa. The degree to which the cost of capital would change for each ANSP would vary and be related to its gearing, the structure and pricing of its debt and its equity risk premium.	Reflect changes in ANSPs' risk in their total costs. Size of the change in cost of capital should not exceed the extent of the change in risk.
Capital expenditure and cost of capital included in determined and actual costs	Depending on the way in which new capital expenditure is financed, and as older capital expenditure is completed, ANSPs' cost of capital would also change.	Use average cost of capital across the period, as captured in the evolution of the overall cost of provision.
Capital expenditure and depreciation charged in determined and actual costs	Depending on the phasing and completion of investment projects, different capital expenditure programmes may be commissioned, and the resulting assets depreciated, at different times.	Use average depreciation across the period, as captured in the evolution of the overall cost of provision.
Cost of provision and capacity	The cost of service provision (including the cost of capital and depreciation) is related to the quality of service provided, the capacity available and the delay generated. These relationships are influenced by many variables (e.g. existing sectorisation, implementation of FRA, technology, labour arrangements, weather and one-off events), and the associated effects may also vary between ANSPs.	Assume a steady, long-term improvement in performance alongside growth in the cost of provision and increasing maturity of the performance regime. Where measures may impact performance, the corresponding impact on costs must be considered.
Cost of provision and the environment	As in the case of capacity, the cost of service provision (including the cost of capital and depreciation) is related to the quality of service provided, the airspace structure and routes made available (all similarly influenced by many variables, including the availability of capacity).	As for the cost of provision and capacity.
Cost of provision and safety	The cost of service provision (including the cost of capital and depreciation) is similarly related to the level of safety achieved. The degree to which safety margins are impacted by changes to the other areas again depends on a very large number of variables. In addition, as traffic increases the improved safety margin is reduced even further.	ANSPs are presumed to deliver a safe service – this will be captured in the evolution of the overall cost of provision.

Source: Steer Davies Gleave

Calculating the impact of policy measures

5.43 The assumptions used to calculate the impact of each of the policy measures are set out in Appendix E. At a high level, they cover the following:

- impacts on regulatory costs;
- impacts on the cost of capital resulting from changes in the allocation of risk;
- changes to planned and actual levels of capital expenditure, which through their impact on the asset base also affect the cost of capital as well as the depreciation charged;
- changes to the level of outturn delay;
- changes to the level of employment; and
- impacts on fuel efficiency.

5.44 As described above, it is not possible to explicitly model the complex interdependencies between all these influences in the IA tool. However, we have sought to ensure that the results of the analysis are consistent with known interdependencies, at least to a first approximation.

Impacts of measures on regulatory costs

5.45 The impact of the policy measures on regulatory costs has been modelled using assumptions about the effort or burden that the measures are expected to bring about in terms of staff full-time equivalents (FTEs) for each of the entities involved (ANSPs, NSAs, the PRB, the Commission and the Network Manager). Increments and decrements in FTEs have been applied where relevant, which are in turn multiplied by different staff cost assumptions across entities and Member States to give a monetised impact for the change in regulatory costs. For each entity, cost per FTE has been estimated based on ACE submission data and the estimates used in a recent SES evaluation study[55]. In addition, where the policy measures call for the introduction of new systems, the implementation, operation and maintenance of these has also been included.

5.46 A summary of the FTE assumptions used in each option is set out in Table 5.12 below.

[55] Support study for an ex-post evaluation of the SES performance and charging schemes, February 2017

Table 5.12: Detailed FTE assumptions

Package	Area	Timing		Incremental FTEs					Rationale	Additional Costs
		First impact year(s)	Re-occurrence	per ANSP	per NSA	NM	PRB	EC		
Option A										
Simplification and clarification	-	-	-	-	-	-	-	-	No additional costs associated with clarification or operational performance monitoring applying only at A-CDM airports – as this is what currently happens in practice.	-
More empowered NSAs	All	2019	Annually	1.0	0.2	-	-	-	FTEs required for more rigorous performance planning and a more prominent role for NSAs.	One off cost for EC equivalent to 1 FTE in 2019, associated with providing guidance on best practice regulation.
More efficient performance planning and targeting	-	-	-	-	-	-	-	-	No additional net costs associated better performance planning and targeting – the additional cost of more detailed planning initially is assumed to cancel out the savings later on the process.	-
Better integration with the network functions	Delay monitoring and penalties	2020	Annually	-	0.25	0.25	-	-	Increase in FTE requirement for the monitoring of delays and the suggestion of corrective measures by the NM, and for the imposition of penalties by NSAs.	-

Package	Area	Timing		Incremental FTEs					Rationale	Additional Costs
		First impact year(s)	Re-occurrence	per ANSP	per NSA	NM	PRB	EC		
Streamlined measurement of safety	Safety	2020	Annually	(0.5)	(0.5)	-	-	-	Reduction in FTE requirement associated with a simplification of safety monitoring.	-
Enhanced measurement of the environment KPA	All	-	-	-	-	-	-	-	No change in FTE requirement, due to the net result of the removal and addition of different measures and performance indicators.	-
Enhanced measurement of the capacity KPA	NSA Coordination Platform	2020	Annually	-	0.5	-	-	-	Increase in FTE requirement for NSAs in relation to the work associated with the NSA coordination platform and working more closely with the NM.	-
Option B										
Simplification of the Charging Scheme	All	2020	Annually	(1.0)	(1.0)	-	(0.4)	-	Reduction in FTE requirement associated with the removal of risk sharing and incentive schemes.	-
Regulatory scrutiny of capital expenditure	Capex scrutiny	2019	Annually	Scaled proportionately based on each ANSP's level of capex spending (where the average level is equivalent to 1 FTE)	Scaled proportionately based on each ANSP's level of capex spending (where the average level is equivalent to 0.5 FTEs)	-	0.5	-	Increase in FTE requirement associated with more detailed planning and greater regulatory scrutiny of capital expenditure.	-

Package	Area	Timing		Incremental FTEs					Rationale	Additional Costs
		First impact year(s)	Re-occurrence	per ANSP	per NSA	NM	PRB	EC		
	Capex reimbursement	2020	Annually	0.25	0.5	-	-	-	Increase in FTE requirement associated with defining and agreeing the amount of unspent capital expenditure.	-
Option C1										
Traffic risk sharing	Devolved risk sharing	2019	The first year before each RP	-	0.5	-	-	-	Increase in FTE requirement for NSA associated with the specification of the bespoke traffic risk sharing arrangements.	-
Regulatory scrutiny of capital expenditure[56]	Capex scrutiny	2019	Annually	Scaled proportionately based on each ANSP's level of capex spending (where the average level is equivalent to 1 FTE)	Scaled proportionately based on each ANSP's level of capex spending (where the average level is equivalent to 0.5 FTEs)	-	0.5	-	Increase in FTE requirement associated with more detailed planning and greater regulatory scrutiny of capital expenditure.	-
	Capex reimbursement	2020	Annually	0.25	0.5	-	-	-	Increase in FTE requirement associated with defining and agreeing the amount of unspent capital expenditure.	-
Incentive schemes	All	2019	The first year before each RP	0.25	0.25	-	-	-	Increase in FTE requirement associated with specifying incentive schemes (which are already largely specified by NSAs) at a Member State level.	-

[56] As in Option B, the difference being that in C1, the decision is left to the NSAs rather than being part of the Option itself

Package	Area	Timing		Incremental FTEs					Rationale	Additional Costs
		First impact year(s)	Re-occurrence	per ANSP	per NSA	NM	PRB	EC		
Option C2										
Risk sharing arrangements	-	-	-	-	-	-	-	-	No change in FTE requirement as risk sharing arrangements are already centrally administrated.	-
Incentive mechanism	Establishment of incentive scheme	2018 &2019 – the two years preceding RP3		0.5	0.5	2.0	2.0	2.0	Increase in FTE requirement associated with the establishment of a centrally administered incentive scheme.	€4 million set up cost for the EC (based on cost estimate for centralised European slot coordinator from 2013 SDG study)
	Oversight and compliance	2020	Annually	0.25	-	1.0	-	-	Increase in FTE requirement associated with compliance for ANSPs and oversight for the NM.	-
Regulatory scrutiny of capital expenditure	Capex scrutiny	2019	Annually	Scaled proportionately based on each ANSP's level of capex spending (where the average level is equivalent to 1 FTE)	Scaled proportionately based on each ANSP's level of capex spending (where the average level is equivalent to 0.5 FTEs)	-	0.5	-	Increase in FTE requirement associated with more detailed planning and greater regulatory scrutiny of capital expenditure.	-
	Capex reimbursement	2025	Annually	0.25	0.5	-	-	-	Increase in FTE requirement associated with defining and agreeing the amount of unspent capital expenditure.	-

Source: Steer Davies Gleave analysis. Note that numbers in brackets and red represent FTE losses.

Impacts of measures on capital expenditure

5.47 As described in the previous chapter, the treatment of observed capital underspend in each of the options is different. The key differences in approach, notably in respect of the timing of repayments to airspace users, have been captured within the modelling of unit rates, and the assumptions underpinning the calculations are summarised in Table 5.13.

Table 5.13: Approaches to regulation of capital expenditure under each option

Option	Description	Treatment of capital underspend
A	No capital expenditure scrutiny	None
B	All NSAs would be required to scrutinise the capital programme of ANSPs annually and report to the Commission. The Commission, after consultation, would determine the need to reimburse airspace users in the case of underinvestment	Airspace users would be reimbursed for underinvestment at the end of the current regulatory period as a cash payment (i.e. for RP3 underinvestment, through a reimbursement of excessive unit charges at the end of RP3)
C1	Devolvement to NSAs: all NSAs would be required to scrutinise the capital programme of ANSPs over each regulatory period before the end of period, and all would be empowered to require a reimbursement of airspace users in the case of underinvestment	Airspace users would be reimbursed for underinvestment at the end of the current regulatory period as a cash payment (i.e. for RP3 underinvestment, through a reimbursement of excessive unit charges at the end of RP3)
C2	All NSAs would be required to scrutinise the capital programme of an entire regulatory period and report to the Commission. The Commission would decide if ANSPs need to adjust their subsequent determined costs in the case of underinvestment	Airspace users would be reimbursed for underinvestment through the determination of charges for the subsequent regulatory period (i.e. through RP4 determined costs rebates for RP3 underinvestment)

Source: Steer Davies Gleave

5.48 There is currently a substantial mismatch between planned and actual levels of investment. Increased scrutiny of capital expenditure plans and their delivery is expected to bring change to both the level of investment planned (as set out in performance plans) and in the extent to which it is actually delivered. We present the levels projected over the period of the analysis in Figure 5.7 below to illustrate the effects of increased regulatory scrutiny of capital expenditure under Options B, C1 and C2. As already noted, in the case of the baseline we have assumed a substantial mismatch between planned and actual levels of investment, reflecting ANSPs' historic record of delivery of capital expenditure in recent years.

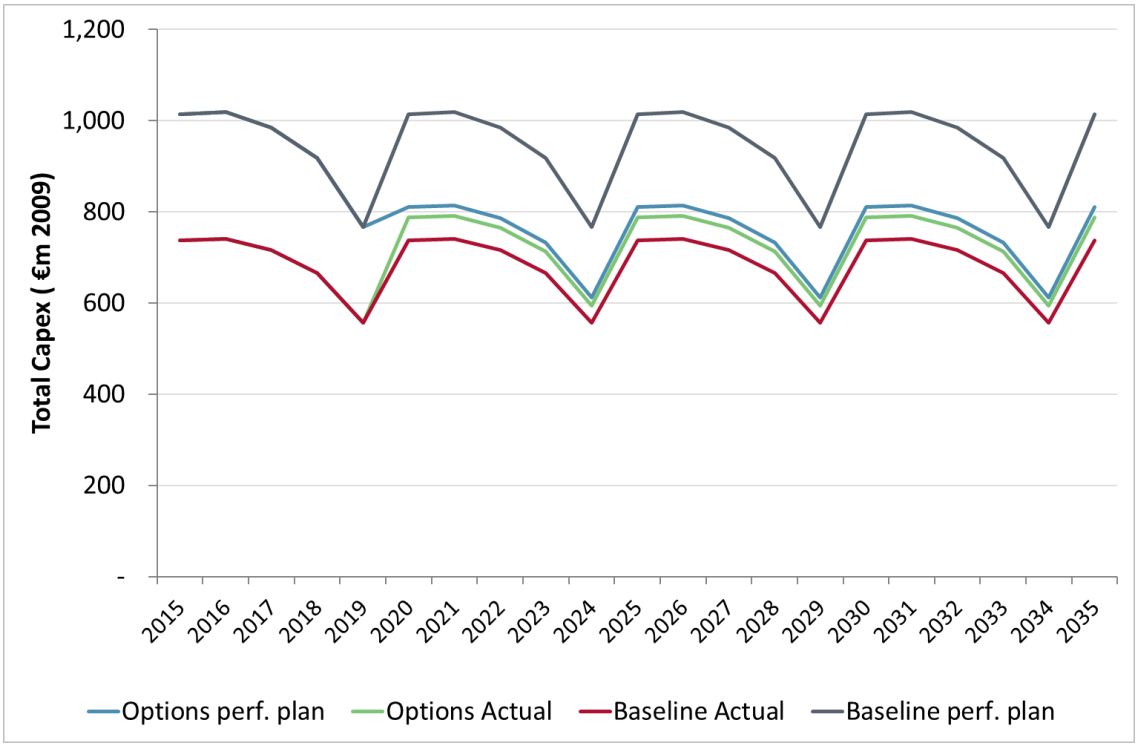
5.49 The introduction of more effective regulation is assumed to have two separate effects that bring planned and actual expenditure more into line:

- First, ANSPs are assumed to reduce planned capital expenditure significantly, since persistent overstatement of expected expenditure levels will be identified by their regulator and is likely to result in regulatory action. In our view, the potential for airspace users to be reimbursed for planned expenditure not incurred will mean that ANSPs are likely to limit their ambition and avoid "gold-plating" of projects. This will lead to a reduction in the level of planned expenditure compared to that observed in RP1 and RP2, as shown in Figure 5.7.
- Secondly, ANSPs are assumed to increase actual expenditure, again in response to the potential for regulatory action and reimbursement of airspace users, with the gap between actual and planned investment narrowing compared to that observed in RP1 and

RP2 (converging towards the "best-in-class" observed). We expect that increased capital expenditure will lead to better ANS provision and some delay savings, described in more detail in Chapter 6, paragraph 6.10. Overall, from RP3 onwards, we have assumed that there will be a 5% increase in the level of actual capital expenditure compared to the baseline as a result of more effective regulation in Options B, C1 and C2 (as shown in Figure 5.7).

5.50 Note that since delivery of real investment is clearly more challenging than modification of planned activity, we have assumed that the increase in actual expenditure delivered is less than the reduction in that planned, and that some mismatch between planned and actual expenditure persists (recognising regulated entities often fail to deliver investment plans in full even when facing a strong regulatory framework). Under Options B, C1 and C2, the value of the mismatch between planned expenditure (the blue line in Figure 5.7) and actual expenditure (the green line in Figure 5.7) is repaid to airspace users in accordance with the relevant approach in each case (see Table 5.13).

Figure 5.7: Impact of greater regulatory scrutiny of capital expenditure



Source: Steer Davies Gleave analysis

5.51 The reduction in the planned level of capital expenditure is assumed to reduce the size of the planned total asset base, and therefore the cost of capital component of the determined cost, by the value of the reduction in capital expenditure in monetary terms (setting aside any additional changes that could be introduced in the methods applied for depreciating assets or calculating the cost of capital).

5.52 A smaller planned total asset base, as a result of a reduction in planned capital expenditure, also implies a lower level of depreciation. The impact on depreciation has been derived from an analysis of the difference between planned capital expenditure and planned depreciation costs, and actual capital expenditure and actual depreciation costs in RP1 and RP2 to date.

Based on the results of this analysis, we have assumed that a 1% reduction in capital expenditure leads to a reduction in depreciation costs of 0.36%.

Impacts of measures on cost of capital

5.53 In addition to changes to the total asset base described above, we would expect ANSPs to adjust their weighted average cost of capital (WACC) in response to changes to the risk to which they are exposed. Calculating this for each ANSP would require an estimate of the elements within the Capital Asset Pricing Model equation, including the risk-free rate, the market risk premium (in each Member State) and the entity-specific risk for each ANSP. Given this information is not readily available, we used simplifying assumptions to estimate changes to the WACC arising from changes to risk exposure.

5.54 Initially, we considered assuming that the required return on equity rate would be adjusted in line with a change in risk, but that the interest rates on any debt raised in debt markets would not be affected. However, in some cases, this method significantly overestimated the increase in the cost of capital beyond what we would reasonably expect.

5.55 We also analysed the relationship between SES states' country specific risk (as issued by ratings agencies) and the yield on 10-year bonds to understand the relationship between risk and required return. However, while this method is useful for understanding the return required on debt (used for financing by only a small number of ANSPs), it is not helpful in understanding the return required on equity.

5.56 Although the above analysis did not provide a means to estimate changes to the WACC, it did provide an upper and lower bound within which the impact could be estimated. Based on this range, we have assumed that a 1 percentage point (pp) change to ANSPs' risk exposure leads to a 0.25 pp change to the WACC percentage: for example, removing the +/-2% dead band from the traffic risk sharing mechanism, but leaving all other aspects of risk sharing unchanged, would result in a reduction in the maximum risk exposure of the ANSP from +/-4.4% of revenues to +/-3% of revenues (a reduction of 1.4%). In this case, the WACC percentage for each ANSP would be adjusted down by 0.35% to reflect this.

5.57 Note that in some cases, multiple changes to the risk sharing mechanisms will lead to both increases and decreases to ANSPs' risk exposure. In such cases, the overall change to the WACC percentage is calculated based on the net change in risk. The assumed change in risk exposure arising from each change to the risk sharing mechanisms is set out in Appendix E.

Impacts of measures on delay

5.58 The level of outturn delay is expected to change as a result of the implementation of a number of policy measures.

- The introduction of a central delay budget for the Network Manager is expected to reduce delay across the network. The extent of this reduction has been estimated based on the results of the Network Delay Optimisation Trial in summer 2017, which show that the concept has removed the performance scheme constraint to network collaboration and reduced network delay.
- Additionally, better integration with network functions, increased scrutiny of the delivery of capital expenditure supporting service quality, and the possible application of incentives are also expected to lead to improvements in the level of delay, contributing to a reduction in the gap between the delay forecast in the NOP and the actual delay delivered by ANSPs.

5.59 The improvement to actual delay has been estimated by reviewing the NOP from 2012 through to 2017 and identifying the gap between actual delay in a given year and the closest NOP forecast for that year[57]. On average, the closest NOP delay forecast was approximately 15% lower than the actual delay. Considering that the three policy measures listed above (i.e. better integration with network functions, increased delivery of capital expenditure supporting service quality, and the possible application of incentives) contribute towards the realisation of the NOP delay forecast, we have assumed that their combined implementation would deliver as much as a 14% improvement in delay. This improvement has been limited to eligible ANSPs where delay is not already minimal (below 0.05 mins/flight). More specifically:

- Under Option A, better integration with network functions is assumed to deliver an 8% improvement in delay at all eligible ANSPs.
- Under Options B, C1 and C2, increased delivery of capital expenditure is assumed to support a further 2% improvement in delay – a total of 10% at all eligible ANSPs.
- Under Option C1, assumptions on the impact of incentives differentiate between ANSPs with known issues (identified in the 2014 to 2017 NOPs) and remaining ANSPs. Incentives on ANSPs with significant issues are assumed to improve delay performance by a further 4% (giving a total of 14%) while incentives on other ANSPs is assumed to result in a smaller improvement of 2% (giving a total of 12%).
- Under Option C2, the combined impact of the policy measures applied through a central regime is assumed to deliver an overall improvement of 14% for all eligible ANSPs.

Impacts of measures on employment

5.60 Reductions in delay through the above policy measures (whether in Options A, B, C1 or C2) are, to an extent, expected to be facilitated by additional air traffic controller FTEs. This reflects our review of the NOP actions proposed by ANSPs and those recommended by the Network Manager to improve service delivery, which indicates that in many cases air traffic controllers' recruitment is planned alongside other activities (e.g. upgrade or commissioning of systems and changes to operating procedures). We have therefore assumed that the significant improvements in delay indicated above are accompanied by an increase in the number of air traffic controller FTEs.

5.61 It is not straightforward to isolate the impact of additional air traffic controller FTEs on delay from that of other activities in an evolving traffic context. At a high level, we are able to identify the historical relationship between outturn delay and the number of air traffic controller FTEs and estimate a relationship between the two, which implicitly captures other activities (e.g. the commissioning of new systems) that are planned to continue in RP3 and beyond. The change in outturn delay and the change in air traffic controllers at SES level between 2009 and 2015 indicates a high-level elasticity of -0.2, implicit of other factors. This elasticity has been applied in the IA tool to estimate the increase in air traffic controller employment that may accompany a significant change in outturn delay through the delivery of additional capacity at eligible ANSPs. The costs associated with these additional air traffic controller FTEs are then captured in the determined cost base. The cost per FTE in each ANSP is based on ACE submission data and assumed to remain constant in real terms throughout the assessment period.

[57] The forecast is usually made part-way through the year (i.e. the June 2015 forecast for the 2015 full-year result).

5.62 Note that, as mentioned above in paragraph 5.28, the baseline also includes an air traffic controller productivity assumption since the elasticity of employment to traffic is 0.4 (well below unity). We also note that increases in air traffic controller FTEs would not necessarily be expected to correspond directly to increases in the total number of individuals employed, as some of the increase in FTEs may be delivered by changes to the deployment and rostering of existing controllers.

Impacts of measures on fuel efficiency

5.63 The introduction of a vertical flight efficiency indicator, based on share of flights applying CDO, is expected to drive an increase in the number of flights that operate continuous descents, resulting in fuel savings. Given this measure only involves the introduction of a PI, without the specification of any targets, the impact is only limited.

5.64 The size of the fuel savings that might be realised have been estimated using a combination of sources including:

- analysis from the PRC's PRR 2015 – for the degree to which CDO is used at major airports across the SES;
- Environmental Impacts of Continuous-descent Operations in Paris and New York Regions, Isolation of ATM/Airspace Effects and Comparison of Models, 2013, Thompson et al, Tenth USA/Europe Air Traffic Management Research and Development Seminar – for the size of the relevant fuel savings;
- CORINAIR fuel consumption tables, ICAO – for the estimation of the descent as a proportion of the whole flight envelope.

5.65 Full CDO is understood to enable relatively substantial savings in fuel consumption for the descent phase of the flight, which, assuming a 25% improvement in the implementation of CDO, translates to an average fuel saving of 0.5% for the flight overall. This fuel saving has been used in the tool as part of the core Option A.

Impacts of measures on unit rates

5.66 Unit rates paid to ANSPs by airspace users will be affected by the options in two ways; through changes to ANSPs' determined cost base and through changes to the unit rate adjustment mechanisms.

Changes to determined costs

5.67 Under all four options, the measures will have an impact on ANSPs' determined cost base. These impacts, which have been described above, can be summarised as follows:

- changes to regulatory costs borne by ANSPs and NSAs;
- changes to the cost of capital component of determined costs, through both changes to the WACC and the planned total asset base;
- changes to ANSPs' depreciation costs;
- changes to the level of employment costs; and
- the introduction of payments from ANSPs to airspace users associated with capital underspend, which will be reimbursed through unit rates.

Changes to adjustment mechanisms

5.68 Within the baseline, the adjustment mechanisms affecting the unit rates paid by airspace users are as follows:

- the inflation mechanism;
- the traffic risk sharing mechanism;
- incentive payments;
- cost exemptions; and
- the traffic volume adjustment.

5.69 Under the inflation, traffic risk and cost sharing mechanisms, a total amount of over-/under-recovery ("adjustment payment charges") is carried over from year n to year n+2 to be reimbursed/charged to users. The associated unit rate adjustments are calculated using the forecast traffic for year n+2 and are subtracted/added to the determined unit cost for that year to give the unit rate charged to users in that year. However, as outturn traffic for year n+2 may be different from that forecast, the total amounts reimbursed/charged to users in that year may not equal the total amount of over-/under-recoveries due. This is corrected by the traffic volume adjustment mechanism as part of the following adjustment cycle, effectively in year n+4. This recurring correction (described as the traffic adjustment in the PRB Monitoring Reports) is referred to here as the traffic volume adjustment to distinguish it from the traffic risk sharing mechanism.

5.70 Under Option A the specification of the mechanisms remains unchanged, but the size of the inflation, traffic risk sharing, traffic volume and cost exemption adjustments will change relative to the baseline position because they are linked to the size of the determined cost base. Under Options B, C1 and C2, the size of all the adjustments will change due to both changes to the determined cost base (as in Option A) and changes to the specification of the mechanisms (described for each option in Chapter 4).

Multi-criteria analysis

5.71 The objective of the impact assessment tool is to compare and rank the policy options. To do so, different economic approaches are possible: cost-benefit analyses (CBA), multi-criteria analysis (MCA), least-cost analysis, cost-effectiveness analysis, SWOT[58] analysis or counterfactual analysis. The Better Regulations Guidelines state that typically, MCA should be used to assess and rank alternative options in an impact assessment.

5.72 MCA is particularly useful when the impact assessment must take account of specific policy objectives since it enables the effectiveness, efficiency and coherence of policies to be assessed simultaneously. It supports decision-making by providing measurable criteria to assess the extent to which the objectives have been achieved by the various policy measures under consideration. In simple circumstances, the process of identifying objectives and criteria may alone provide sufficient information for decision-makers. However, in more sophisticated applications such as this study, MCA provides a method of aggregating evidence against individual criteria to provide indicators of the overall performance of options.

5.73 We have combined the outputs generated by the IA tool within a MCA framework. A key feature of MCA is its emphasis on the judgement of decision-makers in establishing objectives and criteria, estimating weights reflecting their relative importance and, to some extent, in judging the contribution of each option to each performance criterion. However, in this study, it has not been necessary to allocate weights to non-monetised impacts as it has been possible to monetise all quantifiable impacts. Note that we have assessed some impacts using qualitative commentary (at paragraph 6.38) but have not used any type of qualitative scoring

[58] Strengths, Weaknesses, Opportunities, Threats

methodology. Accordingly, the qualitative analysis is not included within the MCA, but instead provides supplementary commentary to further inform decision-making.

5.74 Fuel burn and carbon emissions have been excluded from the MCA framework as the impacts are equivalent across all options (arising, as they do, from measures in the core option) and therefore do not have an effect on the MCA scoring.

6 Results

Introduction

6.1 In this chapter, we set out the quantitative and qualitative results of the impact assessment. The primary focus of the analysis has been on the impact on ANS charges, delay and administrative costs. This reflects our analysis of the problem described in Chapter 3, and the primary concerns about the current regulatory framework raised by stakeholders, namely the level of cost efficiency achieved relative to the quality of service delivered. While there was no clear consensus among stakeholders on the nature of the problem or the appropriate solutions, most stakeholders recognise the importance of the price - quality ratio and of the underlying interaction between cost-efficiency and capacity. In addition, we have investigated employment and environmental impacts although, as discussed further below, these are less important as differentiators between options.

6.2 Accordingly, for each option, we set out the results of our analysis of:

- ANS charges and the income generated from them;
- ANSPs' weighted average cost of capital (WACC);
- levels of capital expenditure;
- levels of delay and the associated cost;
- administrative costs driven by changes to the resources needed to support changes to the regulatory framework;
- employment levels in the ANS industry; and
- environmental impacts.

6.3 We then go on to present the results of the MCA, which provides a means of ranking the options based on the quantitative results, and discuss the implications of sensitivity testing, before summarising our qualitative assessment of additional impacts considered.

Quantitative results

6.4 In this section we present the results of the impacts that we were able to quantify, as indicated in Table 2.2. Monetised impacts are presented in net present value (NPV) terms, taking 2016 as the base year and using a discount rate of 4%, consistent with both the Better Regulation Guidelines and Eurocontrol cost-benefit analysis guidance. Although 2016 is the base year for our assessment, the NPVs are presented using a 2009 price base, in line with the performance plans and reporting tables.

Regulatory costs

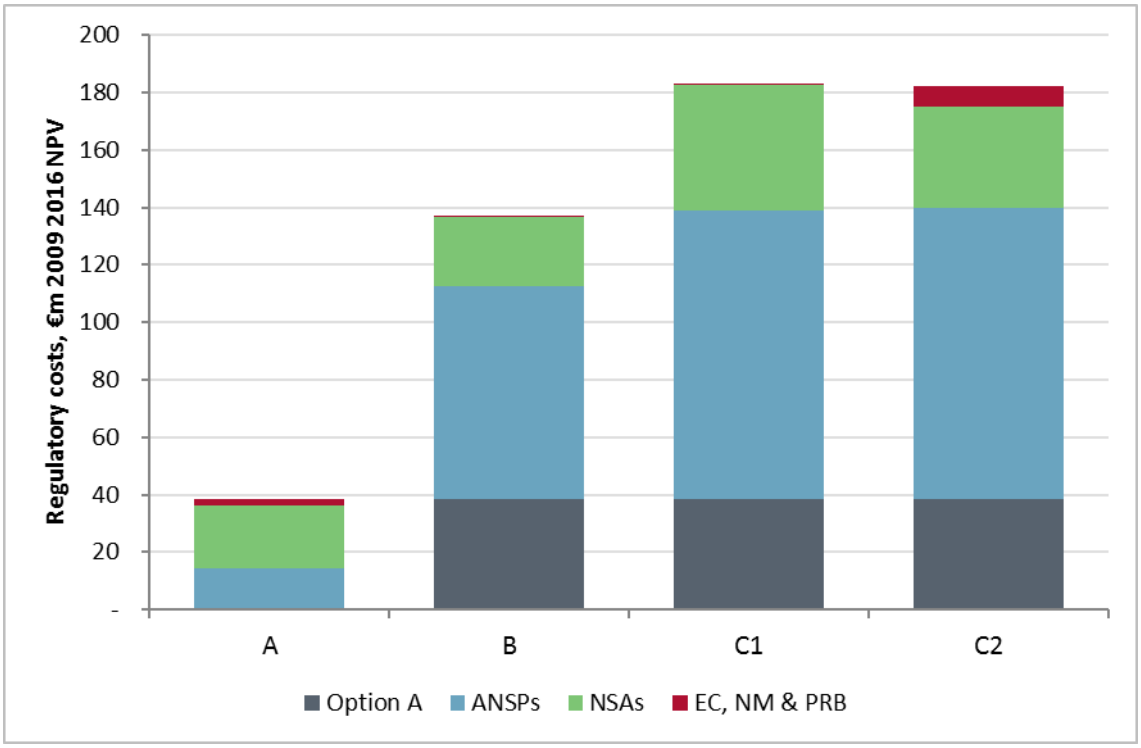
6.5 The impact of the different options on regulatory costs is limited when set against either total industry costs or total regulatory costs reported by NSAs. Nevertheless, the regulatory

resources required to support the changes in each case are an important consideration, since they give an indication of the practical implications for different organisations of implementing more effective regulatory mechanisms. In estimating changes in administrative costs, we have distinguished between:

- the costs incurred by pan-European institutions, in particular the Commission, the PRB, the Network Manager and the CRCO;
- the additional regulatory resources required by NSAs; and
- the costs incurred by ANSPs in complying with a revised regulatory framework.

6.6 We have assumed that airspace users do not incur any additional costs as a result of regulatory change. It is possible that they would require some supplementary resources to engage in the consultation process forming part of the new regulatory arrangements for capital expenditure. However, to the extent that regulation is more effective under a given option, we would expect this resource cost be offset by a reduction in the resources needed to make wider representations to the Commission and the NSAs under the current arrangements.

Figure 6.1: NPV of regulatory costs relative to baseline (2015 – 2035)



Source: Steer Davies Gleave analysis

6.7 As shown, all options involve an increase in the costs arising from regulatory activity compared to the baseline. The impacts in each case can be summarised as follows:

- Under Option A, NSAs employ additional resources to strengthen their capabilities in response to their empowerment and enhanced role. ANSPs must also strengthen their ability to monitor and report information, for example as a result of the introduction of new metrics and to support their response to an evolving NOP. The PRB and Commission require some additional resources to oversee the introduction of the new arrangements

and monitor the application of corrective measures, but the associated impact on regulatory costs is marginal.

- Option B involves significant additional regulatory activity focused on the preparation and monitoring of capital expenditure plans. The impact on ANSP costs is particularly marked as the information on investment plans and progress that they are required to submit is considerably greater than at present.
- Option C1 results in a further step change in the resources required by NSAs in view of their devolved responsibilities for specifying traffic risk sharing and incentive mechanisms. ANSPs must also support the implementation and monitor the new arrangements and therefore experience a correspondingly significant increase in administrative resources.
- The employment of additional resources in Option C2 is driven by the implementation and operation of the centralised incentive mechanism and supporting systems and processes. Implementation involves the development of agreed delay attribution and dispute processes, which generate a significant volume of ongoing monitoring and engagement activity within the ANSPs. We have also assumed a one-off system implementation cost, borne by the Commission, and additional activity for the PRB in monitoring outcomes and helping to resolve disputes.

6.8 Note that as Options C1 and C2 incorporate Option A and regulatory scrutiny of capital expenditure as well as other measures, they result in higher administrative costs than Option B.

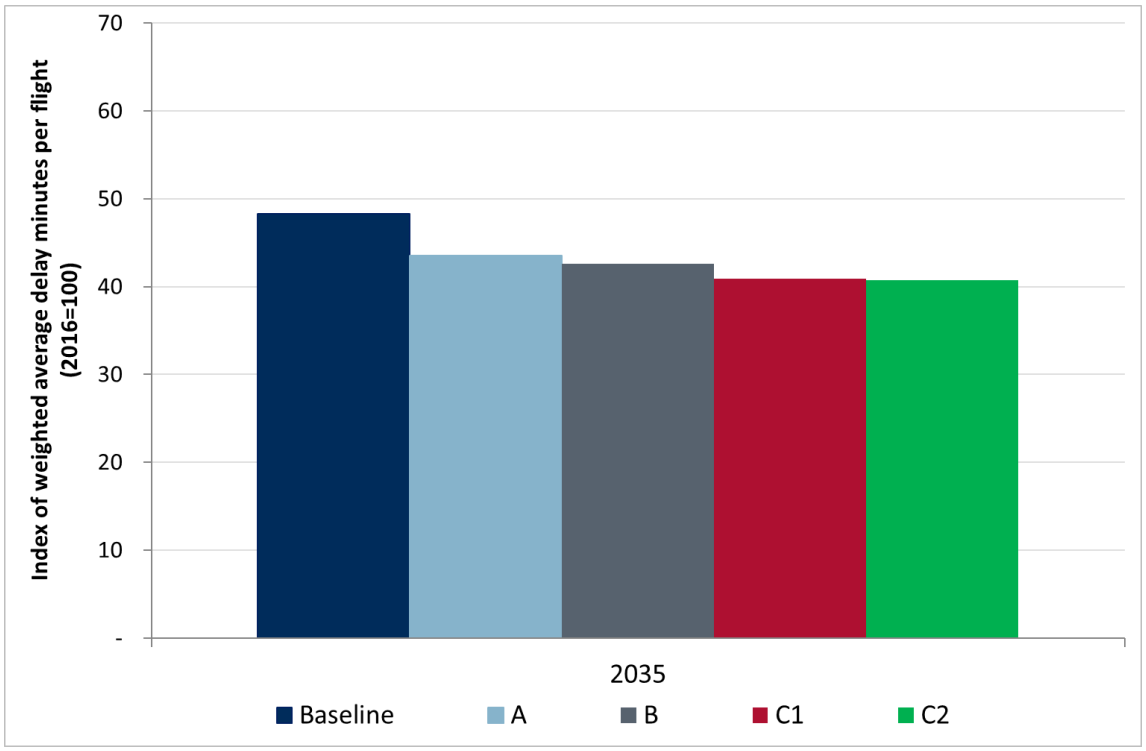
Cost of delay

6.9 Figure 6.2 shows the impact of each option on weighted average delay per flight across Europe in selected years. Weighted average delay has been calculated as the average delay across en-route charging zones, weighted by the number of service units.

6.10 All options result in some reduction in delay, but their effects differ as follows:

- Option A improves the balancing of capacity and demand through better integration of the Performance Scheme and the network functions, and hence delivers some reduction in delay. However, this is limited to what can be achieved through more effective capacity planning in the short to medium term, since the incentives on ANSPs to improve performance are equivalent to those prevailing under the current regulatory framework (i.e. incentives do not differ from the baseline).
- Option B includes the improvements delivered under Option A, and delivers further delay savings as a result of the greater level of capital investment undertaken by ANSPs. However, as the incentive mechanism is removed in this option, there is no financial reward for achieving further improvement.
- In Option C1, the introduction of bespoke incentive mechanisms results in a number of ANSPs that are experiencing known problems taking action to address them. The option also delivers all the benefits arising from better balancing of demand and capacity, since it incorporates Option A, and results in higher capital investment.
- Option C2 similarly includes strong incentives for ANSPs to deliver improved performance as a result of the introduction of a centralised incentive mechanism based on penalty payments for failure to deliver capacity in line with Union-wide targets. If the parameters of the mechanism are calibrated correctly, we would expect this to ensure that the targets are met, such that penalty payments are avoided.

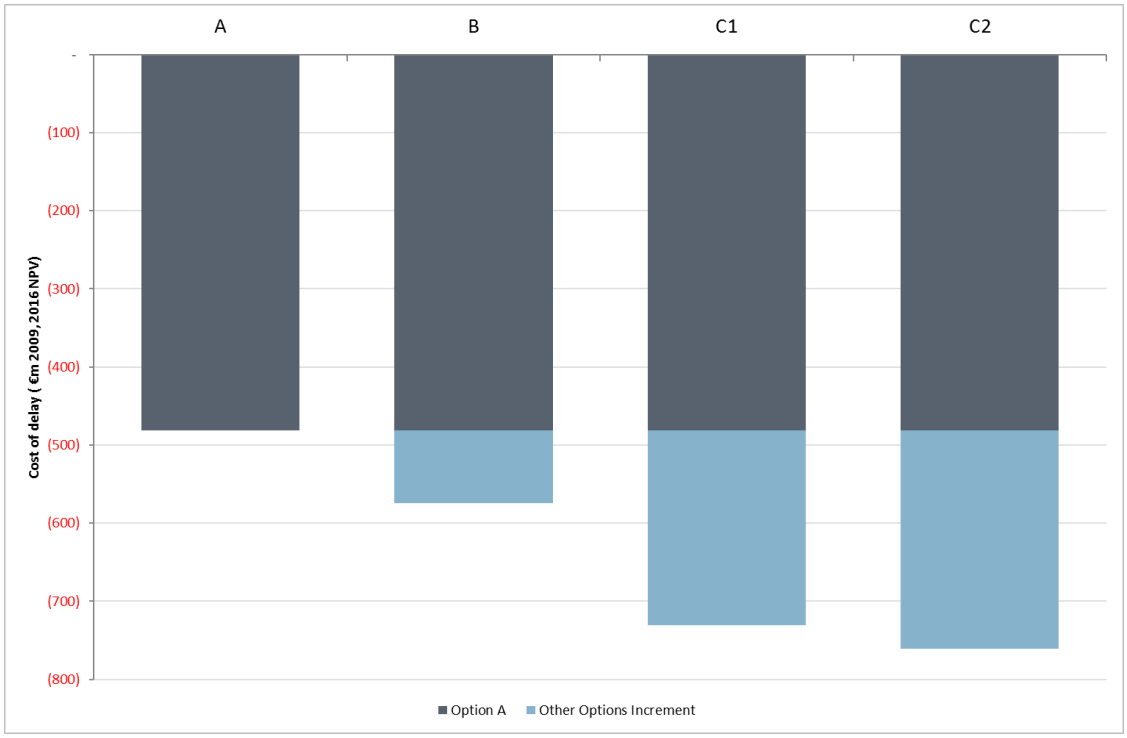
Figure 6.2: Change in average delay (2016 – 2035)



Source: Steer Davies Gleave analysis

6.11 Figure 6.3 presents the associated reductions in the cost of delay relative to the baseline in terms of an NPV. It confirms that delay savings are greatest under Options C1 and C2.

Figure 6.3: NPV of cost of delay relative to baseline (2015 – 2035)

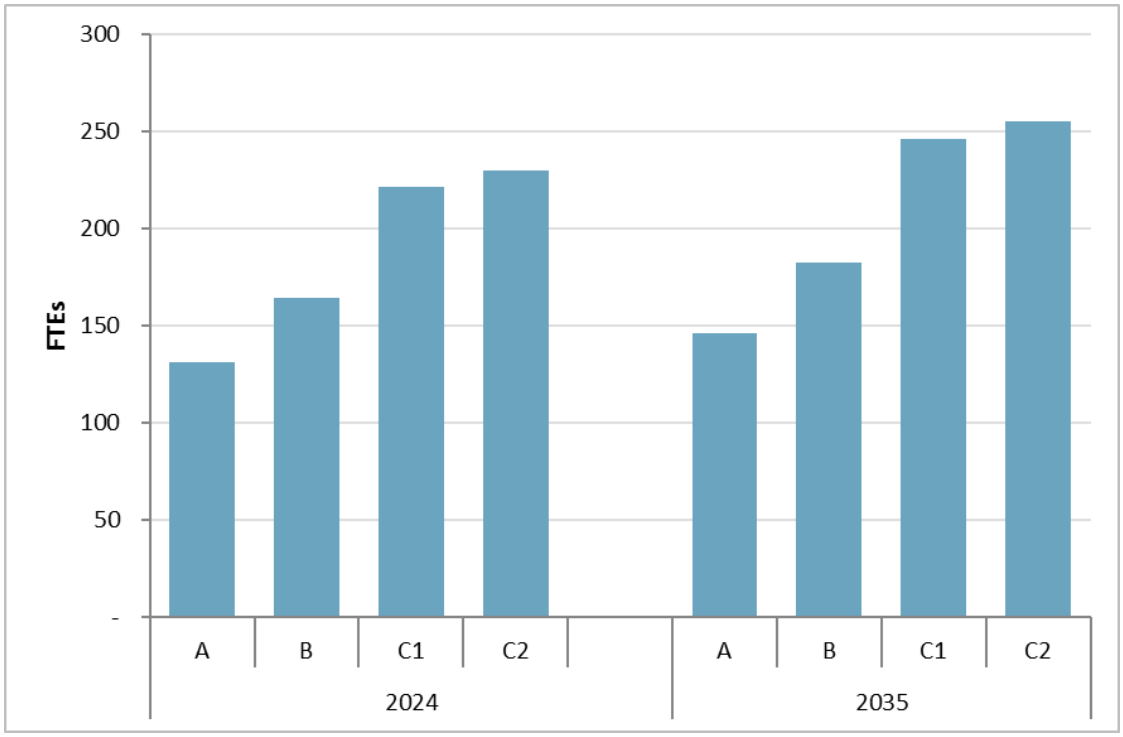


Source: Steer Davies Gleave analysis

Employment

6.12 The figure below shows the impact on air traffic controller employment under each option compared to the baseline (across all Member States). The changes are driven by the extent of delay reductions in each case, based on the elasticity assumption described in Chapter 5.

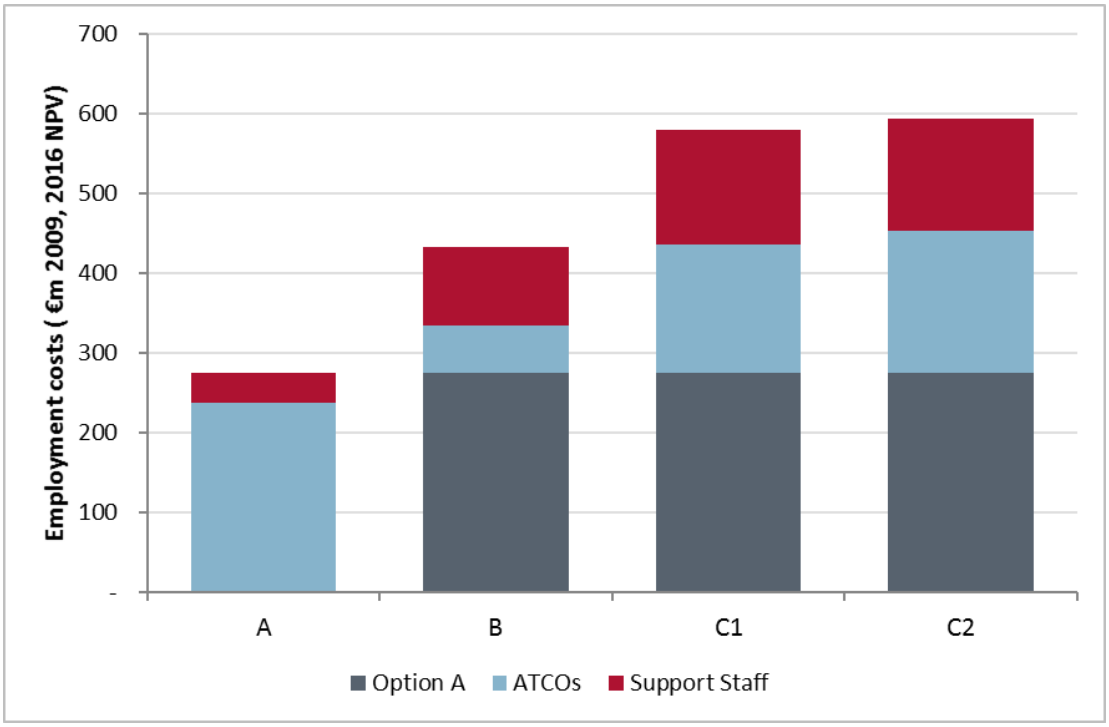
Figure 6.4: Change in the SES total air traffic controller FTEs in selected years compared to the baseline



Source: Steer Davies Gleave analysis

6.13 Figure 6.5 shows the NPV of support staff and air traffic controller employment costs, calculated using the average staff cost assumptions described in Chapter 5.

Figure 6.5: NPV of employment costs relative to baseline (2015 – 2035)



Source: Steer Davies Gleave analysis

ANS charges

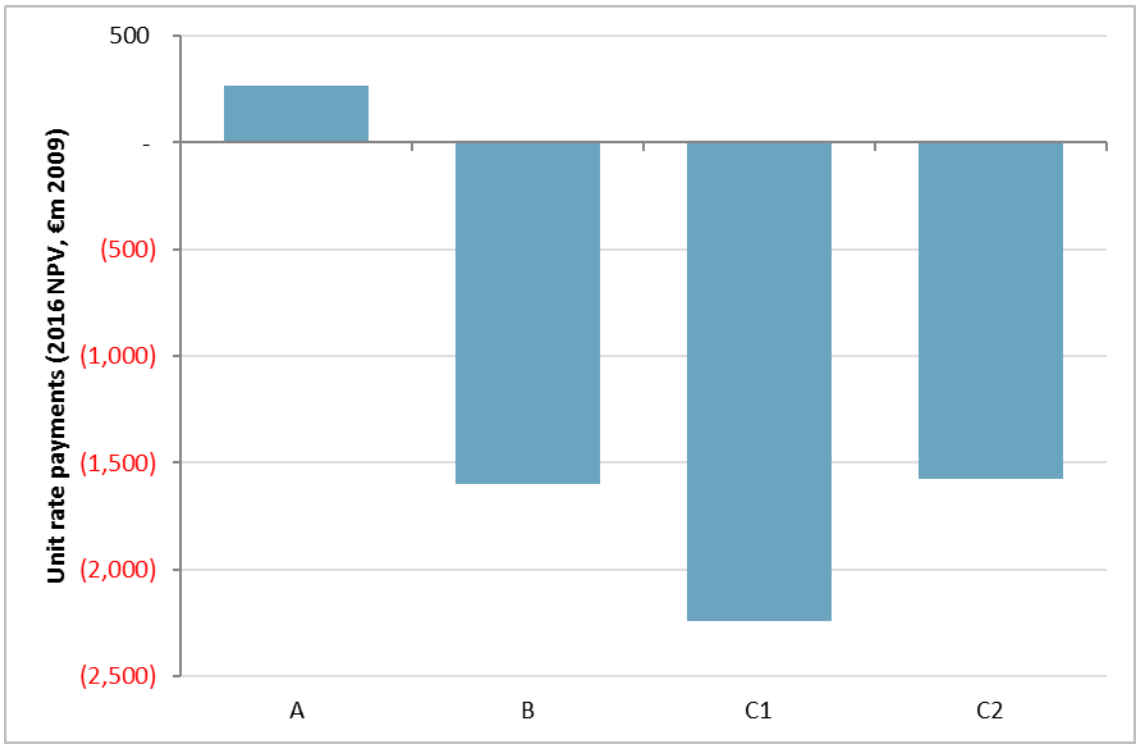
6.14 Figure 6.6 presents the NPV of unit rate income changes relative to the baseline. Figure 6.7 shows our projections of unit rate income from ANS charges at the European level over the period of the impact assessment. Under most options, income is lower than under the baseline, driven primarily by more effective regulation of capital expenditure. The levels of income observed reflect a number of different, and in some cases partially offsetting, effects, as follows:

- In Option A, the change to the regulatory framework is limited, although there are some additional administrative costs associated with the empowerment of NSAs and additional employment costs associated with an increased number of air traffic controllers, leading to a slight increase in unit rates.
- In Option B, the removal of the risk sharing mechanisms results in an increase in ANSPs' risk exposure, leading to a higher cost of capital and a removal of the adjustment payments (that lower unit rates in the baseline). However, the associated impact is small compared with the reimbursement of airspace users, lower depreciation costs and cost of capital, associated with lower planned capital expenditure than in the baseline. The net impact of Option B is an overall reduction in unit rates relative to the baseline.
- In Option C1, the cost of capital for some ANSPs increases as a result of a higher risk exposure under the revised traffic risk sharing arrangements introduced by their respective NSAs. However, fewer are affected than under Option B (as some retain the default risk sharing arrangements defined by the Charging Scheme), and the impact on costs is correspondingly less. However, as in Option B, the net impact is small compared to reimbursement payments to airspace users and a lower cost of capital and depreciation costs. The net impact is an overall reduction in unit rates relative to both the baseline and Option B.

- In Option C2, the centralised risk sharing mechanism results in a relatively small increase in ANSPs' risk exposure, and a lower level of planned capital expenditure leads to a reduced cost of capital and depreciation cost (as in Option B and C1). However, the mechanism for reimbursing airspace users, for underinvestment in RP3, does not begin until RP4 (as shown in Figure 6.6), which means the overall unit rate saving, relative the baseline, is smaller than in Option C1.

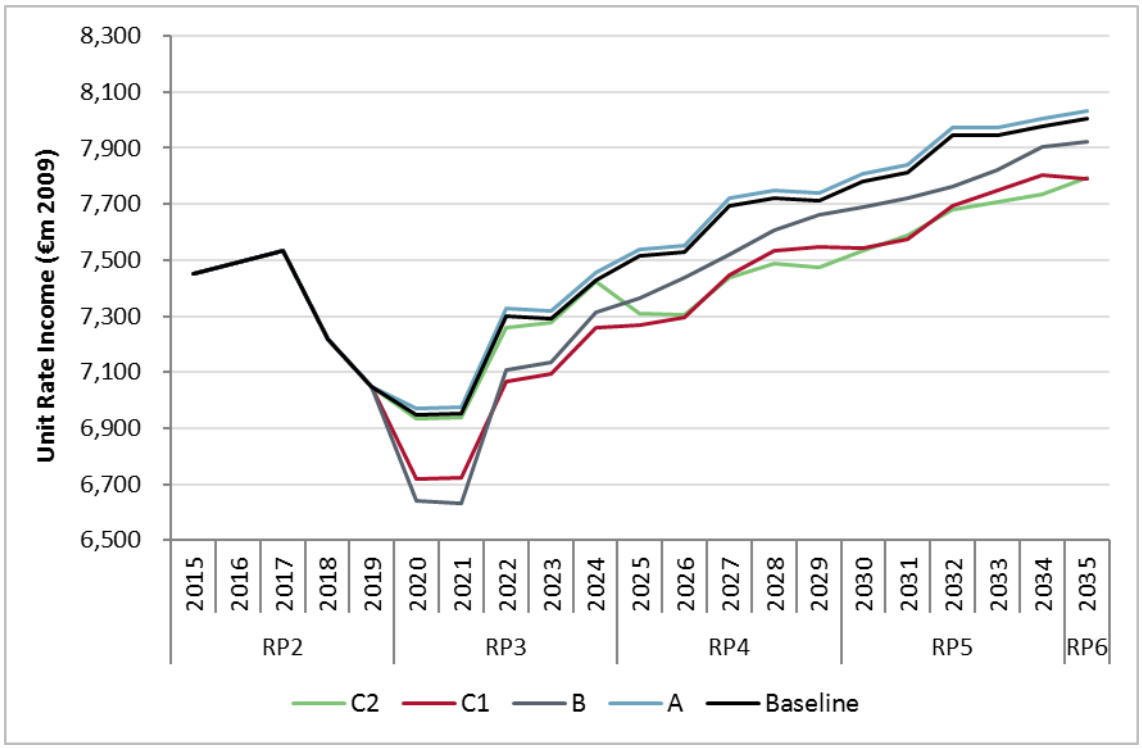
6.15 Figure 6.7 shows our projections of unit rate income at the European level over the period of the impact assessment in the baseline and under the four options. Note that to show differences in income between the baseline and the four options, the minimum value of the vertical axis has not been set to zero. This appears to overstate both the relative fall in unit rate income between 2018 and 2021, and the relative increase in income throughout the period.

Figure 6.6: NPV of unit rate income relative to baseline (2015 – 2035)



Source: Steer Davies Gleave analysis

Figure 6.7: Unit rate income (2015 – 2035)

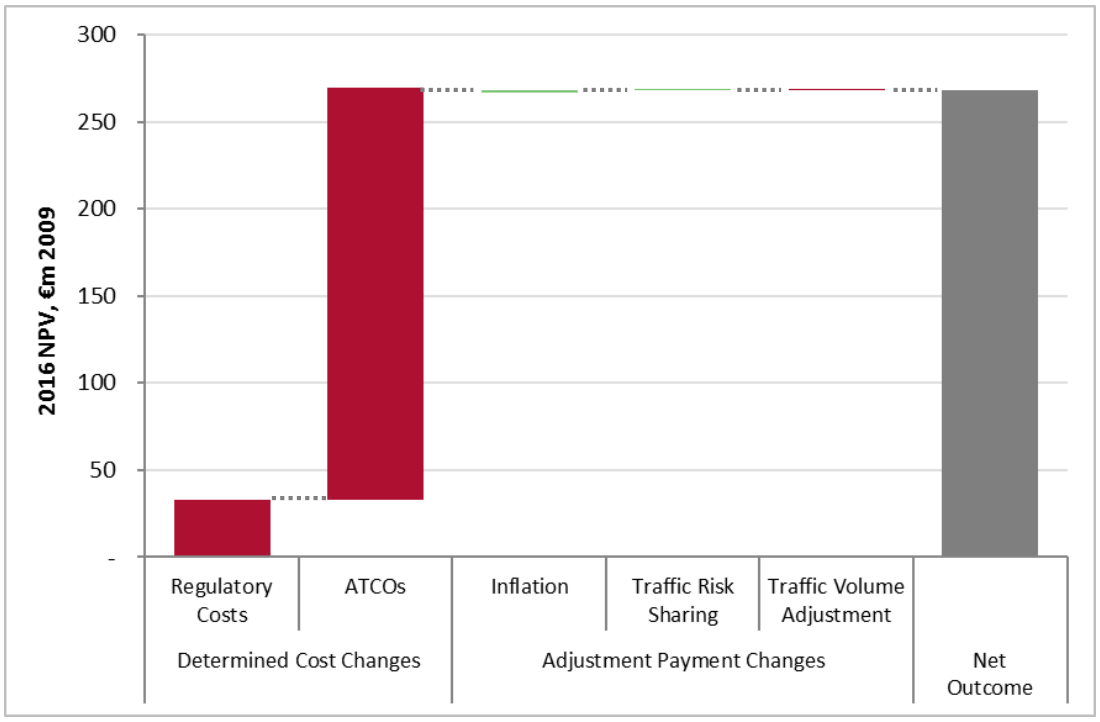


Source: Steer Davies Gleave analysis

6.16 Figure 6.8 to Figure 6.11 below illustrate, on a NPV basis and for the entire SES, the different effects of the various factors influencing unit rates under each option. Note that these impacts vary between geographies and years, depending on the particular circumstances of individual ANSPs, and that the changes in the figures below represent the net change across all ANSPs and the entire assessment period. As discussed in Chapter 5, in the baseline scenario actual inflation is assumed to be lower than forecast in the performance plans whereas actual traffic is assumed to be higher than forecast (across all Member States and charging zones throughout the assessment period). This has implications for the direction of the impacts when the risk sharing mechanisms are removed in Option B, and to a lesser extent, when they are adjusted in Options C1 and C2.

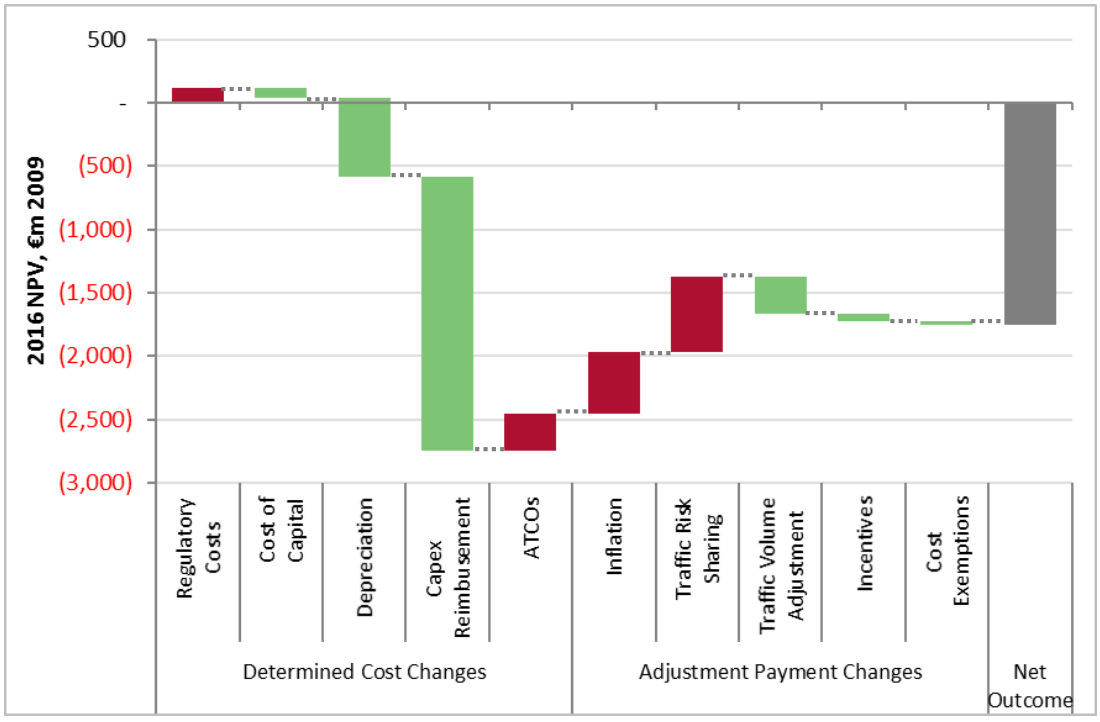
6.17 In the figures below, incremental changes that increase unit rates are shown in **red** and decremental changes that decrease unit rates are shown in **green**. The figures show that the decrease in total unit rate payments under Options B, C1 and C2 are driven largely by the lower level of planned capital expenditure, through both the reimbursement payments and, to a lesser extent, depreciation costs. Under Option C2 the total reimbursement payments are smaller than in Options B and C1 (as they begin in RP4 as opposed to RP3), and under Option B the overall decrease in unit rates is less marked due to the removal of the risk sharing mechanisms (which, other things being equal, has the effect of increasing rates). Hence, the total decrease in unit rate payments is largest under Option C1. Under Option A, there is a modest increase in unit rate payments due to increased regulatory costs and additional employment costs. Table 6.1 provides a more detailed explanation of the changes to unit rates under each option. Further explanation of changes to the cost of capital is provided below in paragraph 6.18.

Figure 6.8: Impact of Option A on unit rate income (shown incrementally)



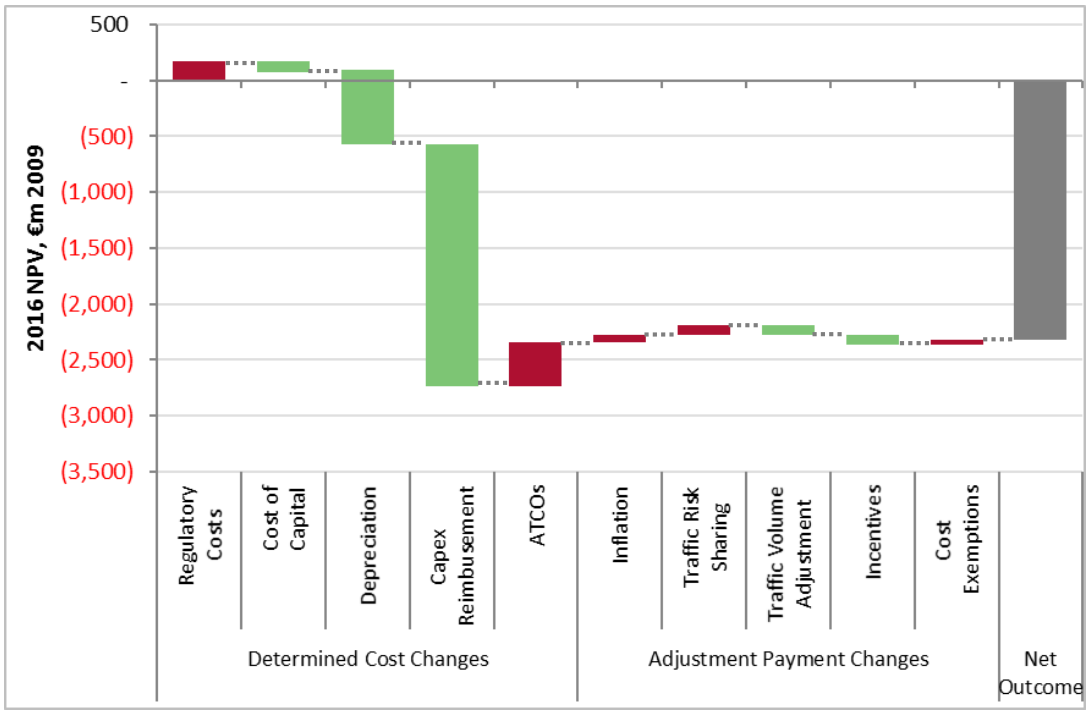
Source: Steer Davies Gleave analysis

Figure 6.9: Impact of Option B on unit rate income (shown incrementally)



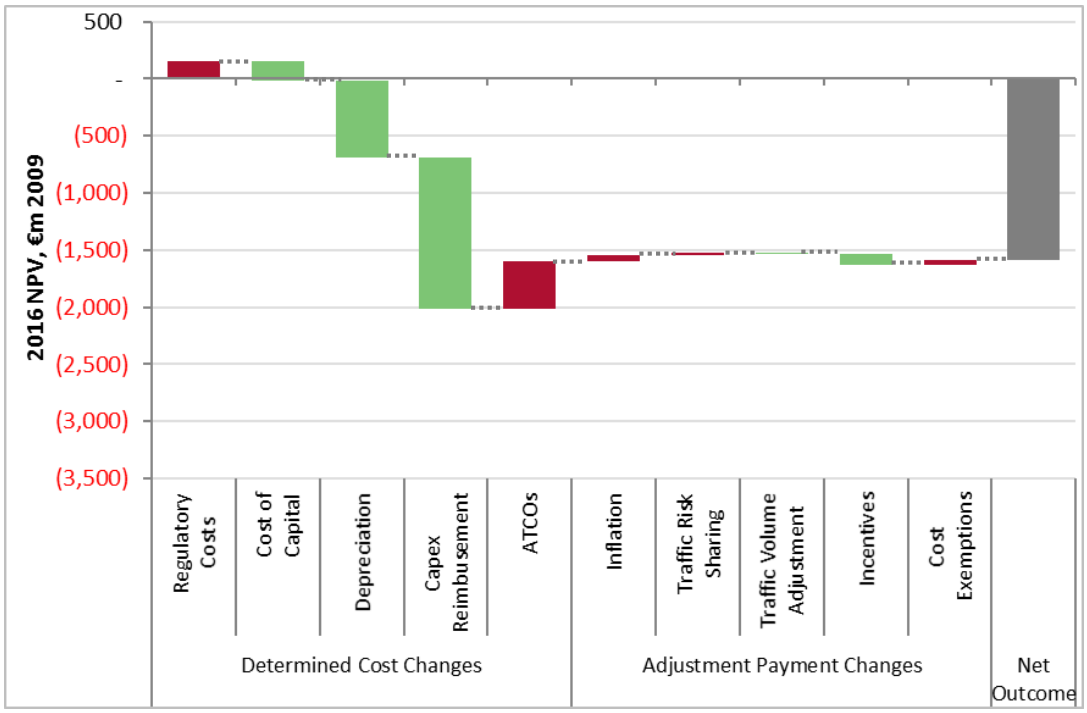
Source: Steer Davies Gleave analysis

Figure 6.10: Impact of Option C1 on unit rate income (shown incrementally)



Source: Steer Davies Gleave analysis

Figure 6.11: Impact of Option C2 on unit rate income (shown incrementally)



Source: Steer Davies Gleave analysis

Table 6.1: Explanation of changes to unit rates

Area of regulatory change		A	B	C1	C2
Determined costs changes	Regulatory costs[59]	Increase in costs resulting from a net increase in regulatory activity			
	Cost of capital	-	Net decrease resulting from a smaller total asset base and an increased WACC %	Net decrease resulting from a smaller total asset base and varying changes to the WACC % across ANSPs	Net decrease resulting from a smaller total asset base and increased WACC %
	Depreciation	-	Decrease resulting from a lower level of planned capital expenditure		
	Capex reimbursement	-	Decrease resulting from new reimbursement payment due to lower than planned capital expenditure (starting in RP3)		Decrease resulting from new reimbursement payment due to lower than planned capital expenditure (starting in RP4)
	ATCO costs	Increase in ATCOs resulting from delay savings			
Adjustments payment changes	Inflation	Decrease resulting only from increases in determined costs	Net increase resulting from removal of the inflation mechanism	Net increase resulting from the removal of the mechanism on depreciation	
	Traffic risk sharing	Decrease resulting only from increase in determined costs	Net increase resulting from removal of the mechanism	Net increase in adjustments resulting from a decrease in determined costs and changes to the traffic risk sharing mechanism	
	Traffic volume	Increase resulting only from increases in determined costs	Net decrease resulting from both the removal of inflation and traffic mechanisms and a decrease in determined costs	Net decrease resulting from changes to inflation and traffic mechanisms and a decrease in determined costs	
	Incentives	-	Net decrease resulting from removal of incentive mechanism	Net decrease resulting from changes to the incentive mechanism	
	Cost exemptions	-	Net decrease resulting from removal of cost exemptions	Net increase resulting from the removal cost exemptions, except pensions	

Source: Steer Davies Gleave analysis

[59] Regulatory costs borne by ANSPs and NSAs are included as impacts twice within the MCA (as part of both regulatory costs and unit rates). This ensures explicit consideration of additional regulatory activity as well as the effect on ANS charges.

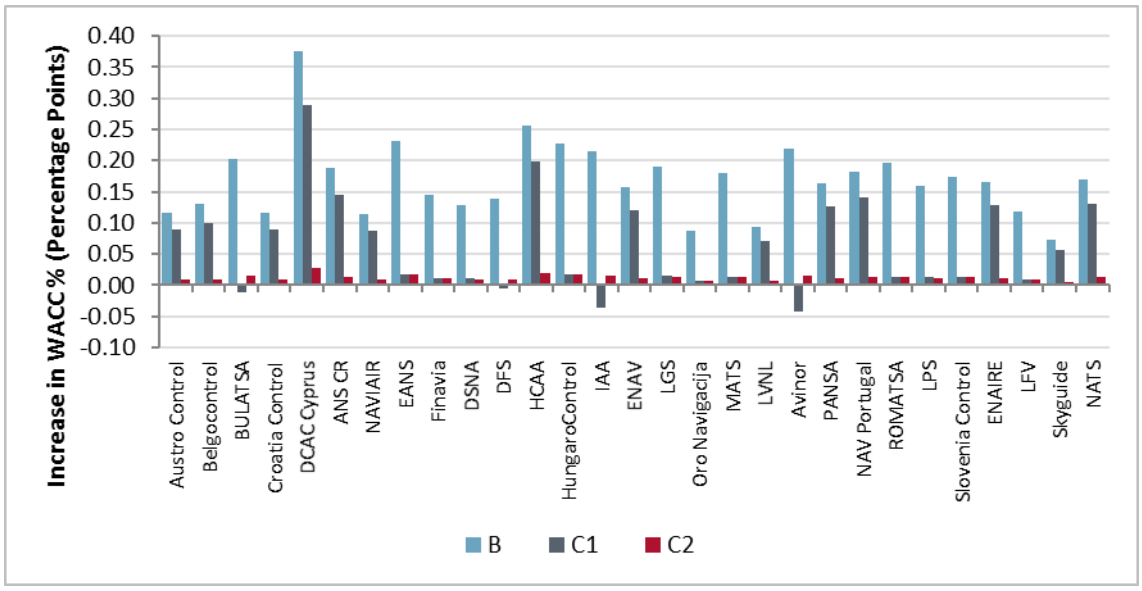
6.18 As discussed in Chapter 5, changes to the cost of capital shown in Figure 6.8 to Figure 6.11 above are driven by two components:

- changes to the planned total asset base; and
- changes to the weighted average cost of capital or WACC.

6.19 Under Options B, C1 and C2, the size of the planned total asset base is reduced by approximately 2.0% due to greater regulatory scrutiny. However, changes to the WACC (in percentage terms) vary across the three options. In particular, changes to the risk sharing mechanisms are assumed to change ANSPs' risk exposure and, therefore, their WACC percentage. Figure 6.12 shows each ANSP's change in WACC percentage under options B, C1 and C2 (there is no change under Option A). The changes can be explained as follows:

- Under Option B, the removal of the inflation mechanism, traffic risk sharing mechanism and cost exemptions cause an increase to all ANSPs' WACC percentages;
- Under Option C1, traffic risk sharing mechanisms specified by NSAs, as well as smaller adjustments to the inflation mechanism and cost exemptions, cause bespoke changes to each ANSP's WACC percentage depending on the design of the new traffic risk sharing arrangements; and
- Under Option C2, a slight adjustment to the traffic risk sharing mechanism, as well as adjustments to the inflation mechanism and cost exemptions, cause a small increase in all ANSPs' WACC percentage.

Figure 6.12: Change in ANSPs' WACC percentage



Source: Steer Davies Gleave analysis

6.20 The planned total asset base and WACC percentage are not considered as impacts within the MCA, but have an impact on the cost of capital component of the determined costs charged to airspace users, as described above.

Environmental impacts

6.21 As described in Chapter 5, the introduction of a vertical flight efficiency indicator, based on share of flights applying CDO, is expected to drive an increase in the number of flights that operate continuous descents, resulting in annual fuel savings of approximately 0.5% per year.

The cost of the fuel saved, as well as the associated cost of carbon emission savings, is shown in Table 6.2. As the introduction of a vertical flight efficiency indicator is part of Option A, the savings impact is the same across all four options.

Table 6.2: Cost of fuel and carbon savings

Impact	Cost of saving (2016 NPV, €m 2009)
Cost of Fuel	47,634
Cost of carbon emissions	5,157

Source: Steer Davies Gleave analysis

6.22 The introduction of a measure of the flexible use of airspace based on rate of actual use of reserved or restricted airspace could be expected to:

- further encourage the availability of reserved or restricted airspace to civilian users; and
- increase use of released airspace by civilian users.

6.23 These effects would result in reduced horizontal route extension (an improvement in KEA) and associated fuel burn. Their size would depend on the number of, and area/distance covered by, CDRs, and their location with respect to the traffic flows in the network. We anticipate that the potential savings realised would be similar to those achieved through the implementation of Free Route Airspace, albeit weighted by the factors above (number, area, location), but it has not been possible estimate these as relevant data was not available.

6.24 There is no environmental impact of KEP being downgraded from KPI to PI: KEP is not within direct control of the ANSPs and/or the Network Manager as it is linked to airspace users' decisions on routing.

Multi Criteria Analysis

Results of MCA

6.25 We have applied the MCA methodology described in Chapter 5 to each of the quantitative results, expressed in NPV terms, described above. As explained in paragraph 6.21, the monetised results of the environmental impacts are the same across all options and are therefore not included in the table of MCA results below.

6.26 The resulting scoring and ranking of the options is shown in the Table 6.3. It should be noted that not all the benefits will appear from the start of RP3 (e.g. the unit rate impact of reimbursement of airspace users of capital underspend would only arise following the end of RP3). At the same time, some additional costs will arise from the start of the Reference Period (e.g. regulatory costs for NSAs and ANSPs).

Table 6.3: Results of MCA

	A	B	C1	C2
Unit Rates	(0.071)	0.424	0.593	0.417
Regulatory Costs	(0.010)	(0.036)	(0.048)	(0.048)
Cost of Delay	0.127	0.152	0.193	0.201
Employment	0.073	0.115	0.153	0.157
Score	**0.119**	**0.654**	**0.892**	**0.727**
Rank	4	3	1	2

Source: Steer Davies Gleave

6.27 As indicated, based on this analysis, Option C1 is the best performing option, primarily reflecting its impact on unit rate income – which is significantly larger, in monetary terms, than the other three impacts. The impact on unit rate income under Option B, C1 and C2 is driven predominately by the capital expenditure reimbursement payments but is also heavily dependent on the changes to the risk sharing mechanisms. Given these two elements are important drivers of the MCA results, we have carried out sensitivity analysis to test the robustness of our assumptions.

Sensitivity analysis

6.28 We have carried out the following tests:

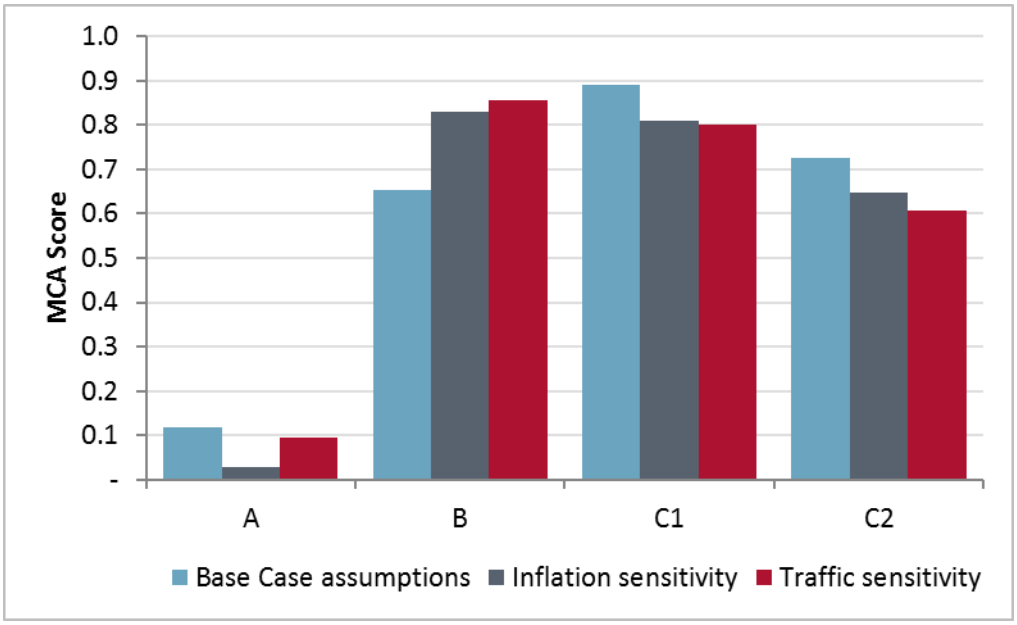
- A sensitivity on the impact of the actual level of inflation, across all Member States throughout the assessment period - in this sensitivity test we have tested the impact of actual inflation being higher than that forecast in the performance plans (as opposed to lower than forecast in the performance plans in the main baseline assumption).
- A sensitivity on the impact of the actual level of traffic, across all charging zones throughout the assessment period - in this sensitivity we have tested the impact of actual traffic being lower than forecast in the performance plans (as opposed to higher than forecast in the performance plans in the main baseline assumption).

- A sensitivity on greater regulatory scrutiny of capital expenditure, given that it is one of the largest drivers of unit rate adjustments - we have completed a number of tests, reflecting the potential variety of approaches adopted by NSAs[60]:
  - A first test, where there is no mismatch between the planned and actual level of capital investment, and hence no reimbursement of airspace users;
  - A second test, in which we assume that around half of the NSAs (including three of the largest five Member States) proactively and annually scrutinise capital expenditure and require reimbursement of airspace users under Option C1 (assumptions for Options A, B and C2 on capital expenditure scrutiny and reimbursement remain unchanged); and
  - A third test, in which we assume that only a small number of NSAs (including just one of the five largest Member States) effectively scrutinise capital expenditure and ensure reimbursement of airspace users under Option C1 (assumptions for Options A, B and C2 on capital expenditure scrutiny and reimbursements remain unchanged).

Traffic and inflation sensitivity

6.29 The MCA scores for the inflation and traffic sensitivities are shown in Figure 6.13.

Figure 6.13: Results of MCA under sensitivity analysis for inflation and traffic



Source: Steer Davies Gleave analysis

6.30 Under the inflation and traffic sensitivity scenarios, where inflation and traffic are assumed to be, respectively, higher and lower than forecast, Option B becomes the highest scoring option, as shown in the table below.

[60] Under the base case scenario, as described in paragraph 4.60 and in more detail in Appendix E, all NSAs are assumed scrutinise capital expenditure on a ongoing basis and, where a mismatch between planned and actual expenditure occurs, to require reimbursement of airspace users.

Table 6.4: Results of MCA under sensitivity analysis for inflation and traffic

Scenario	A	B	C1	C2
Base case	0.12	0.65	**0.89 (highest)**	0.73
Inflation sensitivity	0.03	**0.83 (highest)**	0.81	0.65
Traffic sensitivity	0.10	**0.86 (highest)**	0.80	0.61

Source: Steer Davies Gleave analysis

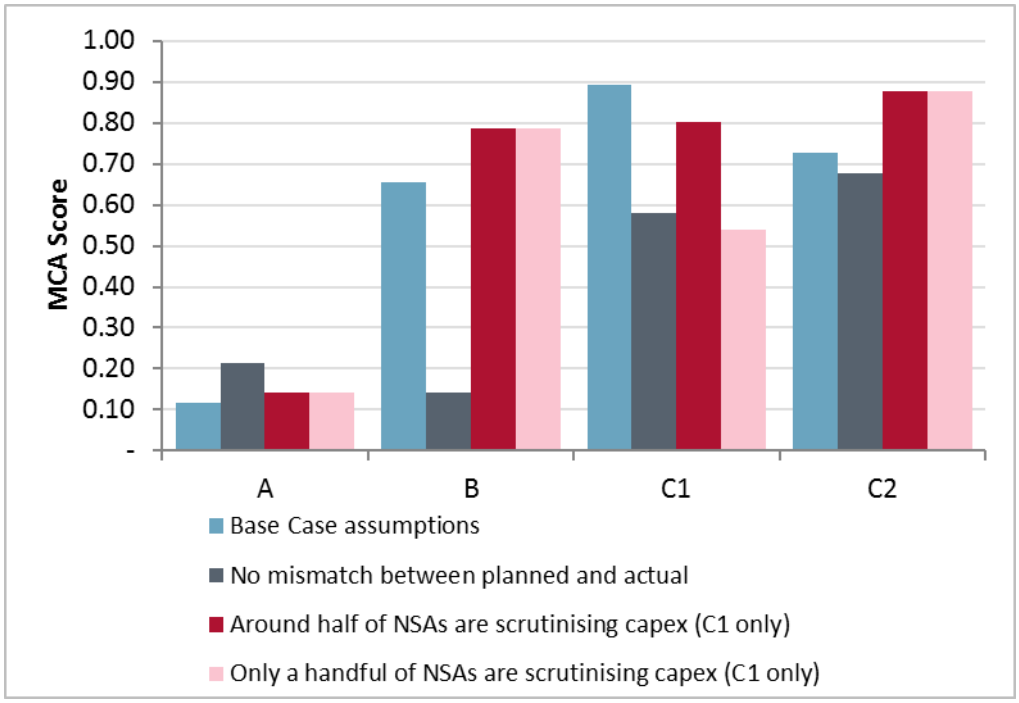
6.31 Under the base set of assumptions, because inflation is assumed to be lower than, and traffic is higher than, forecast, the removal of each mechanism under Option B leads to an increase in unit rates. Conversely, under the two sensitivity scenarios, where the assumed level of actual inflation and traffic relative to the forecasts is reversed, the removal of the mechanisms leads to a decrease in unit rates.

6.32 The inflation and traffic sensitivity scenarios also cause the changes to the risk sharing mechanism to decrease unit rates under options C1 and C2. However, because the changes to the mechanisms under these two options are more limited, the overall impact on unit rates is small compared to the impact under Option B.

Capital expenditure scrutiny

6.33 The MCA scores for the capital expenditure scrutiny sensitivities are shown in Figure 6.14.

Figure 6.14: Results of MCA under the capital expenditure scrutiny sensitivity



Source: Steer Davies Gleave analysis
Note: The latter two sensitivity scenarios, where not all NSAs enforce capital expenditure reimbursement payments, affect only the results of Option C1. However, as the MCA scores options relative to each other, the relative MCA score of each is affected.

6.34 Under the capital expenditure reimbursement sensitivity scenarios, we observe that where there is no mismatch between planned and actual capex, the removal of reimbursement significantly reduces the unit rate savings in options B, C1 and C2. This means Option C2

becomes the best scoring option, due in part to additional delay savings compared to the other options, and Option B becomes the lowest scoring option, as shown in the table below.

Table 6.5: Results of MCA under sensitivity analysis for inflation and traffic

Scenario	A	B	C1	C2
Base case	0.12	0.65	**0.89 (highest)**	0.73
No mismatch between planned and actual sensitivity	0.21	0.14	0.58	**0.68 (highest)**
Around half of NSAs proactive sensitivity	0.14	0.79	0.80	**0.88 (highest)**
Handful of proactive NSAs sensitivity	0.14	0.79	0.54	**0.88 (highest)**

Source: Steer Davies Gleave analysis

6.35 The sensitivity tests also show that without involvement of all NSAs in the regulation of capital expenditure, Option C1 does not perform as well as C2 and, in the case where very few NSAs are involved, is also inferior to Option B.

Implications of sensitivity analysis

6.36 This analysis demonstrates that the results of the assessment can be highly sensitive to the assumed relationship between forecast and actual traffic, and forecast and actual inflation. In practice, this means that within a mechanism where there is an unequal allocation of risk, the winners and losers from a given set of risk sharing arrangements will depend heavily on the outturn level of exogenous factors, such as traffic and inflation, compared to the level that has been forecast.

6.37 The sensitivity analysis also demonstrates that for Option C1 to effectively deliver its intended benefits, all NSAs are required to be adequately scrutinise capital expenditure from the very start of RP3 and ensure full reimbursement of airspace users where actual expenditure falls short of that anticipated in the performance plans and used to calculate determined costs.

Qualitative results

6.38 As described in Chapter 2, we have assessed some impacts qualitatively in view of the difficulties of modelling them reliably, either because of inadequate data or difficulties in capturing behavioural responses to changes within the IA tool. Where possible, we have supported our observations with factual information provided by stakeholders. However, in some cases we relied on views offered by stakeholders that we could not verify independently. Where we had no evidence of, or a priori reason for, an effect, we assumed that the option would have no impact.

Economic impacts

Table 6.6: Qualitative analysis of market impacts

Option	Changes in consumer choice and prices	Impact on barriers to entry and market structure
A	Airlines yield-manage their fares and therefore will not necessarily pass on any additional costs to consumers. Any increase in airline fares would be negligible, given the small contribution of ANS charges to overall airline costs (a maximum of 13% based on SDG analysis). Airlines did not highlight any potential impacts on their fares.	No evidence that this option would have any material effect.
B	As for Option A.	**ATM market** En-route: no impact identified Terminal: Where competition for services is available, increased ANSP risk exposure and increased regulatory and administrative costs may impact participation of service providers in the market. **Airline market** The requirement for ANSPs to set out a long-term (10-year) vision may influence airlines' plans for growth or route development by providing assurance to airlines that sufficient capacity will be available to support these plans.
C1	As for Option A.	As for Option B, albeit with a smaller change to ANSPs' exposure to risk, but potentially larger increases in regulatory and administrative costs.
C2	As for Option A.	As for Option C1.

Source: Steer Davies Gleave analysis

Table 6.7: Qualitative analysis of impacts on business activity

Option	Changes in ease of free movement	Relocation of businesses	Economic impacts on SMEs
A	No evidence that this option would have any material effect.	No evidence that these options would have any material effect.	No evidence that this option would have any material effect.
B	Potentially marginal improvements in connectivity as the requirement for ANSPs to set out a long-term (10-year) vision may influence airlines' plans for growth or route development by providing assurance to airlines that sufficient capacity will be available to support these plans.	As for Option A.	ATM technology SMEs may stand benefit from the focus on and increased scrutiny of capital expenditure and the delivery of projects at ANSPs, which may turn to the market in search of innovative approaches and tech-based solutions. Where competition for Terminal ANS is available, increased ANSP risk exposure and increased regulatory and administrative costs may impact participation of small- and medium-sized service providers in the market.
C1	As for Option B.	As for Option A.	As for Option B.
C2	As for Option B.	As for Option A.	As for Option B.

Source: Steer Davies Gleave analysis

Social impacts

Table 6.8: Qualitative analysis of social impacts

Option	Changes in working conditions and job quality	Level of infringement of social rules and/or employment law
A	Increased flexibility of air traffic controller working arrangements may be brought about by ANSPs planning for improved and more dynamic demand-capacity balancing.	No evidence that these options would affect the level of infringement of social rules and/or employment law.
B	As for Option A.	As for Option A.
C1	As for Option A, and additionally further changes may be brought about by the implementation of incentives. The design of the incentives to target specific issues (e.g. weekend capacity) may require additional flexibility in air traffic controller working arrangements, or may link delay performance to individual staff incentives.	As for Option A.
C2	As for Option A.	As for Option A.

Source: Steer Davies Gleave analysis

7 Conclusions

Introduction

7.1 As discussed in Chapter 4, during this study we have developed and assessed the impacts of four options, which can be summarised as follows:

- **Option A:** this includes a set of changes to the Performance and Charging Schemes that are designed to remove unnecessary reporting requirements, streamline safety monitoring arrangements and provide for greater integration between the Performance Scheme and the network functions, particularly in the area of network planning and management of capacity. It also includes the introduction of new measures of capacity and flight efficiency. Option A can be regarded as a minimum aspiration for RP3.
- **Option B:** this includes a substantial simplification of the Charging Scheme with the removal of all risk sharing mechanisms and the incentive mechanism. It also provides for greater regulatory scrutiny of capital expenditure. Option B is similar to the proposal put forward by IATA in response to discussion in the SSC, differing only in terms of the mechanism for reimbursing airlines (which is applied retrospectively at the end of a Reference Period in Option B rather than annually as in the IATA proposal).
- **Option C1:** this option is designed to fully address the objective of strengthening and empowering NSAs, and involves the devolution of responsibility for specifying traffic risk sharing parameters and incentive mechanisms to the national level, although the inflation mechanism would continue to be defined in legislation (and would not apply to depreciation). The cost exemption mechanism would be largely removed, although there would be provision for separate treatment of pension costs by exception. The option also provides for greater regulatory scrutiny of capital expenditure, as under Option B, with NSAs responsible for ensuring reimbursement of airspace users in the event of capital underspend.
- **Option C2:** this represents a more conventional regulatory approach, with risk sharing parameters and the incentive mechanism determined centrally and regulatory scrutiny of capital expenditure in common with Options B and C1. The incentive mechanism is more powerful than at present and is based on penalty payments, but focuses on the same delay metric as under the current Article 15 arrangements rather than on different issues arising in different parts of the airspace as under Option C1. The reimbursement of airspace users in the event of underinvestment is through an adjustment of determined costs in the subsequent Reference Period (RP4), and the link between charges paid and quality of service received is therefore less immediate than under Options B and C1.

7.2 In our view, these options are internally consistent, with the various elements within each based on a common approach to regulation.

Preferred option

7.3 The impacts of the options can be summarised as follows:

- Option A delivers significant benefits in terms of delay reduction without any major change to the existing regulatory framework. These benefits derive from the more effective operation of existing organisations, achieved largely through better integration of established processes (in particular, the development and periodic updating of the NOP) and limited additional resourcing of NSAs to strengthen their capability and support empowerment. In our view, Option A represents an appropriate fall-back position in the event that it is not possible to achieve consensus on more extensive reform of the Performance and Charging Schemes.
- Option B delivers some additional benefits in the form of better alignment between planned and actual capital expenditure and enables some savings in regulatory resources (offsetting the increases needed to support more effective regulation of investment). These effects translate into lower unit rates. However, the elimination of risk sharing arrangements results in a significant increase in the cost of capital and the option provides no direct incentives for ANSPs to reduce delay. Further, while we recognise that any anticipated impact on the cost of capital is likely to be disputed by airspace users (on the grounds that many ANSPs already receive a return on capital that more than compensates for their risk exposure), the lack of consensus on this issue itself means that the option would not receive support across the stakeholder community.
- Option C1 delivers slightly lower delay savings than C2, but significantly more than the other two options. C1 also delivers the lowest unit rates of all the options and is supported by both NSAs and ANSPs, although airspace users are concerned that it would further complicate the Charging Scheme by introducing geographical variation into the application of both risk sharing and incentive mechanisms. In our view, there is often a trade-off between the complexity and the efficiency of regulatory frameworks, since a more efficient allocation of risk typically requires the application of bespoke arrangements reflecting the characteristics of different suppliers or markets.
- Option C2 has the potential to deliver lower unit rates as well as the highest reduction in delay among all four options. As it involves only limited changes to risk sharing arrangements, it does not result in the increase in ANSPs' cost of capital experienced under Option B. However, we suggest that the introduction of a pan-European capacity incentive framework, with supporting delay attribution and dispute resolution arrangements, raises issues that are not adequately captured by our estimates of increased regulatory costs. In particular, we consider that achieving the necessary consensus across a sufficiently wide range of stakeholders would be challenging within the timeframe available for agreeing changes for RP3. Option C2 scores equally with Option C1 as introducing the highest increase in administrative costs.

7.4 In the light of these considerations, we recommend Option C1 to be taken forward by the European Commission for RP3. For the avoidance of doubt, the adoption of C1 would result in the application of all policy measures included in Option A as well as requiring greater devolution of regulatory responsibility to the NSAs in respect of traffic risk sharing and incentives.

7.5 It is important to note that for Option C1 to deliver the intended benefits, NSAs must be adequately independent, empowered and resourced, as their role in the delivery of RP3 objectives will be increased in respect of both capacity and cost-efficiency. In its 2017 report,

the Court of Auditors recommended that NSAs should be fully independent and this has been accepted by the Commission. However, we note that Regulation 549/2004 laying down the framework for the creation of the SES does not provide the same degree of independence from the service providers or government authorities as the analogous legislation for the rail sector (see the further discussion in Appendix B). As indicated in the introduction to this report, this regulation is outside the scope of the changes planned for RP3.

7.6 In addition, as illustrated by the results of the sensitivity analysis on capital expenditure scrutiny, a failure by a substantial number of NSAs to regulate capital expenditure effectively from the start of RP3, and to ensure adequate reimbursement of capital underspend where required, would significantly undermine the case for C1. In these circumstances, the Commission may need to consider a centrally administered mechanism reimbursing airspace users. In any event, we recommend that the Commission provides support, possibly in the form of non-binding guidance to NSAs on:

- how to scrutinise capital expenditure;
- how to set the risk sharing and incentives mechanisms; and
- how to ensure that stakeholder consultation is meaningful and fulfil best practices.

7.7 More generally, the central case assumptions that have been used for inflation and traffic reflect the historical position, but the sensitivity results suggest that the impacts need to be kept under review with a view to a further assessment prior to RP4.

Monitoring and evaluation

7.8 As required by the Better Regulation Guidelines, we have defined operational objectives which are specific for Option C1 and these are shown in Table 7.1.

7.9 We have also considered an approach to monitoring the impact of the preferred option with a view to its future evaluation. As the Performance Scheme is, by definition, a framework for ongoing monitoring of the ANS sector, we see little value in developing further metrics simply for the purposes of evaluation of changes to the Performance and Charging Schemes introduced in RP3. This would be to risk adding to the administrative burden and compromising the objective of greater simplicity discussed in Chapter 3.

7.10 Nevertheless, we have sought to identify metrics already monitored or proposed under the preferred option that are likely to be important in any future evaluation exercise. We have already noted that the focus of all the options investigated, including Option C1, is primarily on improvements in cost efficiency and capacity. Against this background, we suggest that the following metrics are likely to be of particular importance:

- the average Union-wide determined unit cost for en-route and terminal ANS, ideally modified such that adjustments made in respect of a particular year are made in the same year in order to improve the transparency of any trends identified;
- trends in annual planned and actual capital expenditure, which will support an assessment of the effectiveness of the new approach to regulating such expenditure; and
- the new delay metrics identified under Option A (delays at weekends, long delays and delays incurred during the first rotation), which are likely to provide an indication of whether bespoke incentive arrangements introduced under the preferred option have been effective in addressing specific problems in different parts of the SES.

7.11 In addition, a comprehensive and detailed assessment of the NSAs' independence, powers and resources should be undertaken to ensure adequate devolution of some regulatory powers.

Table 7.1: Operational objectives and monitoring data

Operational objective	Monitoring metric	Administrative cost
Minimise costs to airspace users	Average Union-wide determined unit cost for en-route and terminal ANS	None, as the recording of this information already exists
	Analysis of ANSPs capital expenditure: actual vs. planned, actual and planned capex vs. quality of service delivered and planned	This is already undertaken by some NSAs, but should be done systematically across the SES annually
Ensure better demand-capacity matching	New ATFM delay metrics (as per option A) focussed on week-ends, first rotation and delays greater than 15'	Minimal, as the raw data is already recorded.
Strengthen the role of NSAs and devolve traffic risk sharing and incentives parameters to NSAs	Better resourced, empowered and properly independent NSAs	This assessment would need to be undertaken in a comprehensive manner across all NSAs of the SES
	Delay metric capacity	Minimal, as the raw data is already recorded by the Network Manager

Source: Steer Davies Gleave

7.12 We note that most of our proposed metrics for monitoring and evaluation could be recorded at little or no cost, as most would already be recorded and monitored during RP3, and could therefore be captured as part of existing regulatory processes.

7.13 There are, however, two important exceptions:

- The assessment of the capabilities, powers and independence of the NSAs - we suggest that the Commission should engage with Member States to support and encourage them to strengthen NSAs, as required under Option C1, such that the intended benefits of devolution of power to NSAs can be realised.
- The analysis of the capital expenditure programmes of ANSPs - such an analysis would be an important step towards more transparency and the provision of cost-effective ANS to airspace users, as well as providing useful benchmarks for NSAs and ANSPs. We note that some NSAs across Europe undertake this kind of analysis, but there would be merit in extending it to all ANSPs included in the Performance Scheme, undertaking it on a more regular basis and ensuring that the results were published.

7.14 A future evaluation will need to take account of changes to the Performance Scheme in the areas of safety and the environment. To that end, we propose that:

- the new metric for monitoring safety management effectiveness is analysed, both as a measure of the impact of safety management arrangements introduced and from the perspective of EASA and other stakeholders responsible for compiling it;
- the new measure of vertical flight efficiency is reviewed to assess whether it is enabling effective monitoring of CDOs and whether measurement alone has resulted in any

perceptible change in performance (e.g. as a result of more terminal service providers offering CDOs); and

- the new shortest unconstrained route indicator is used to estimate the relative contributions of ANSPs and airspace users to flight efficiency.

steer davies gleave

Appendices

A Long list of policy measures

Measures for improving the Performance Scheme

Measures related to developing and monitoring plans and targets

Table A.1: Establish plans and targets at the national rather than the FAB level

Dimension	Detail	
Simple descriptor	GEO: geographical scope of plans and targets	
Description of measure/variants	GEO1	Establish performance plans at FAB level but set targets at national/charging zone level
	GEO2	Establish both performance plans and targets at national level, but require NSAs to identify cross-border initiatives and services in plans
	GEO3	Allow for the preparation of performance plans at the national level and set national level targets, as in GEO2, but provide the flexibility for Member States to agree to continue to submit FAB level performance if they choose
Rationale	Would provide for a better link between plans and targets set by the NSAs and the organisations primarily responsible for delivering them (ANSPs). This would address some of the perverse effects of applying incentive mechanisms at the level of the FAB and the individual ANSP	
Parties required to take action for implementation	• FABs may need to modify planning procedures, depending on governance arrangements (although might still have coordinating role, even under GEO2) • NSAs focus on development of national plans, supported by their respective ANSPs, under GEO2 and GEO3 • Commission and NSA processes may need further modification if this measure is linked to PPA (see Table A.4)	
Scope of activity affected	Planning and monitoring all aspects of performance	
Legislative implications	• Need for legislative change appears minimal – Articles 9, 10 and 11 of the Performance Regulation currently make reference to preparation of plans at the FAB level but could be modified to provide the required change/flexibility under GEO1, GEO2 or GEO3.	
Issues and risks	• Likely to reduce any impetus for the further development of FABs • Could complicate setting of Union-wide targets if the Commission is required to review a larger number of national targets, although this was the approach followed during RP1.	

Table A.2: Permit changes within the duration of the Reference Period

Dimension	Detail	
Simple descriptor	RPD: reference period flexibility	
Description of measure/variants	RPD1	Reduce RP3 to three years rather than 5 (this change would not apply beyond RP3)
	RPD2	Retain five-year duration but permit changes to capacity plans year-by-year
Rationale	Would ensure that capacity plans can be modified to reflect the outcome of network functions processes, in particular the Network Operations Plan	
Parties required to take action for implementation	• FABs/ANSPs would need to change planning procedures to enable integration with network functions processes • Network Manager might need to change planning procedures to support integrated approach • Commission/PRB and NSAs would need to introduce annual planning and approval processes	
Scope of activity affected	Capacity planning and target setting, preparation of Network Operations Plan	
Legislative implications	• Introduction of a three-year reference period would require a modification of Article 8 of the Performance Regulation (which limits the duration of a reference period to five years) • Under RPD2, requirements for drawing up of performance plans under Article 11 of the Performance Regulation would need to be modified (in particular, Article 11 3(d), which refers to 'performance targets …set by reference to each key performance indicator, for the entire reference period …') • Similarly, under RPD2 it might also be necessary to modify Chapter III of the Regulation on the adoption of performance plans, which is currently written on the assumption that plans must be consistent with five-year targets defined at the start of the reference period • Article 18 of the Regulation defines a process of monitoring against annual values and implementation of corrective measures where targets are not met – RPD2 would require a greater degree of flexibility and hence a modification of these provisions • It may also be appropriate to modify the role of the Network Manager under Article 6(c) of the Regulation in order to provide for more explicit integration of performance plans with the network functions	
Issues and risks	• Enabling more frequent modification of plans and/or targets under RPD1 or 2 could undermine incentives for improvement in the capacity KPA by removing the regulatory discipline of the current five-year reference period	

Table A.3: Establish a simpler process for revision of performance targets

Dimension	Detail
Simple descriptor	ROT: simplify revision of targets
Description of measure/variants	ROT1 Introduce a simpler process for revising targets in specific, unforeseen circumstances, while allowing for consultation and ensuring consistency
Rationale	Would clarify the circumstances in which targets can be changed and simplify the procedures for making changes. Could also remove redundant provisions, in particular the alert threshold for cost efficiency, which duplicates to some degree the traffic risk sharing mechanism
Parties required to take action for implementation	• Commission/Performance Review Body (PRB) would need to modify the procedures for changing targets and potentially remove or constrain the potential to trigger alerts
Scope of activity affected	Revision of targets as a result of unforeseen events
Legislative implications	• Potential modification of Article 17 as necessary, for example to provide greater clarity on appropriate test for change of targets • Potential modification of Article 19 to limit the scope of alert mechanisms and avoid duplication of other mechanisms
Issues and risks	• It is not yet apparent whether the current lack of clarity concerns the interpretation of Article 17 or the application of procedures supporting it • Duplication of alert mechanism requires further investigation – not clear whether this issue only concerns cost efficiency/traffic risk or relates to the use of alert mechanisms more generally

Table A.4: Involve NSAs in setting of Union-wide targets

Dimension	Detail
Simple descriptor	PPA: revision of performance targets
Description of measure/variants	PPA1 Involve NSAs in process for setting Union-wide targets
Rationale	Involving NSAs in the process of setting Union-wide targets rather than requiring them to produce plans after the targets have been set would help to ensure greater consistency and reduce the timescale for the adoption process under Chapter III of the Regulation. It would also help to ensure that Union-wide targets fully reflect local conditions
Parties required to take action for implementation	• The Commission's/PRB's processes for setting Union-wide targets would change to allow for participation by NSAs • NSA processes would similarly need to change to support, rather than react to, Union-wide target setting • There would also be implications for ANSPs, given their role in supporting the development of national/FAB performance plans • The Network Manager would need to perform a coordination role at an earlier stage and modify the consultation process underpinning the development of the Network Performance Plan to reflect the changed role of the NSAs
Scope of activity affected	Setting of Union-wide targets and preparation of supporting performance plans
Legislative implications	• Processes described in Chapter II of the Regulation would need to be modified to reflect earlier involvement of NSAs and their new role in target setting • Articles 14 and 15 of the Regulation would also require changes, since the process for ensuring consistency of Union-wide targets and national/FAB plans would begin prior to setting the targets
Issues and risks	• The NSAs are heavily dependent on the ANSPs for information when developing plans, and this situation could be expected to persist following the adoption of ROT1. Hence, the process of target setting might not be sufficiently independent of the ANSPs' individual objectives, with the result that incentives for improvement across the KPAs could be undermined • The measure would not eliminate the potential for disputes, which could be expected to arise prior to the determination of Union-wide targets, potentially lengthening the process (although the process of adoption currently set out in Articles 14 and 15 of the Regulation would be simplified) • Data and opinions would need to be provided earlier than under the current system. Initial reaction to Commission suggests that NSAs and ANSPs are reluctant to provide data earlier.

Table A.5: Standardise and simplify report requirements

Dimension	Detail
Simple descriptor	OMR: ongoing monitoring and reporting
Description of measure/variants	OMR1 Introduce simplified tables covering and eliminate requirements to report information that does not support the regulatory process or otherwise add value. Specific proposals include the restriction of reporting by airports to the A-CDM airports (other than for cost-efficiency) and removal of certain safety-related metrics
Rationale	This would reduce the administrative burden by ensuring that a given piece of information is only reported once rather than by two or more organisations
Parties required to take action for implementation	• The Commission/PRB would need to re-specify reporting requirements to enable greater consolidation and effective use of existing reporting arrangements (e.g. monitoring of capacity and flight efficiency as part of the network functions) • NSAs, ANSPs and the Network Manager would need to modify their reporting arrangements accordingly
Scope of activity affected	All aspects of performance reporting
Legislative implications	• Would require modifications to Annex II, III and V of the Performance Regulation • There may also be implications for Articles 18, 20 and 21 of the Regulation (to be considered further)
Issues and risks	• The value added from reporting of certain information may change over time, particularly if there is a policy aim to encourage more competition for the market. It may therefore be difficult to identify reporting requirements that can be safely set aside

Table A.6: Establish a clearer role for the PRB

Dimension	Detail
Simple descriptor	PRR: PRB role
Description of measure/variants	PRR1 Establish a more independent regulatory role for the PRB, including formal responsibility for approving performance plans, targets and unit rates
	PRR2 Establish a more explicit role for the PRB in specific areas, for example the identification of corrective measures to address capacity issues
Rationale	The distinct roles of the Commission and PRB would be clearly defined, with the former setting the policy framework and the latter approving performance plans and unit rates within the framework. Would also allocate formal responsibilities for ensuring effective consultation with stakeholders prior to approval to the PRB.
Parties required to take action for implementation	• The Commission would need to re-specify the role of the PRB • The PRB would need to ensure that it had access to adequate resources in order to deliver redefined responsibilities
Scope of activity affected	Preparation and approval of performance plans, targets and unit rates
Legislative implications	• Would require redefinition of responsibilities of PRB, as defined in Article 3 of the Performance Regulation, and further amendments to other articles • Would require corresponding changes to the Charging Regulation to define the PRB's role in relation to approval of unit rates
Issues and risks	• The role of the PRB would change significantly, with implications for resourcing • A separate appeals mechanism would need to be established

Measures related to Key Performance Areas

Table A.7: Reduce number of safety KPIs and ensure complementarity with SRMP

Dimension	Detail
Simple descriptor	SDU: eliminate safety measurement duplication
Description of measure/variants	SDU1 Limit the number of KPIs included in safety element of the Performance Scheme and draw on other measures monitored by EASA under the Safety Risk Management Process (SRMP)
Rationale	Would reduce the administrative burden arising from monitoring while ensuring effective monitoring of safety using a range of measures
Parties required to take action for implementation	• The Commission/PRB would need to redefine the safety element of the Performance Scheme to encompass a more limited number of measures • EASA would undertake all safety monitoring, including monitoring of relevant KPIs under the Performance Scheme and additional measures covered by SRMP
Scope of activity affected	Safety monitoring
Legislative implications	• An initial reading of Article 7 of the Performance Regulation suggests that implementation of this measure would not require legislative change, but there may be a case for defining EASA's role more explicitly • Annex I and V of the Performance Regulation might require some modification
Issues and risks	• No major issues or risks identified, but implementation might have implications for EASA resources

Table A.8: Use a single leading indicator for target setting

Dimension	Detail
Simple descriptor	SLI: use of safety leading and lagging indicators
Description of measure/variants	SLI1 Use a leading indicator of safety management effectiveness to set a target for the Performance Scheme and lagging indicators to monitor specific aspects of safety (runway incursions, separation minima infringements and over deliveries due to flow management)
Rationale	Would provide for a clear, overall measure of safety management and avoid perverse incentives to underreport safety-related incidents
Parties required to take action for implementation	• The Commission/PRB would need to redefine the safety element of the Performance Scheme to encompass a more limited number of measures
Scope of activity affected	Safety monitoring
Legislative implications	• As for SDU – see Table A7
Issues and risks	• As for SDU – see Table A7

Table A.9: Introduce new process for monitoring effectiveness of safety management

Dimension	Detail	
Simple descriptor	SME: safety management effectiveness	
Description of measure/variants	SME1	Use CANSO standard of excellence v2.1 to measure safety management effectiveness
	SME2	Use cross-domain tool developed by EASA to measure safety management effectiveness
	SME3	Remove measurement of safety management effectiveness from Performance Scheme and monitor it under the SRMP
Rationale	Would provide a rigorous basis for monitoring safety management effectiveness	
Parties required to take action for implementation	• The Commission/PRB would need to redefine the safety element of the Performance Scheme to capture the new measurement process • May require some modification of EASA's role in relation to the Performance Scheme • NSAs and ANSPs would need to introduce new processes to support the new approach	
Scope of activity affected	Safety monitoring	
Legislative implications	• As for SDU – see Table A7 • SME3 might require a modification of Regulation (EC) No 549/2004 – out of scope	
Issues and risks	• SME3 could undermine the balance between safety and the other KPAs	

Table A.10: Use flight efficiency of actual route flown for purposes of target setting

Dimension	Detail	
Simple descriptor	EKE: measurement of flight efficiency	
Description of measure/variants	EKE1	Use flight efficiency of the actual flight trajectory (KEA) as the single KPI for the purposes of target setting in the environment KPA (while retaining efficiency based on the planned trajectory (KEP) as a performance indicator and using KEP-KEA as a measure of predictability)
Rationale	KEA is better aligned with the environmental impact of flights, while KEP currently fails to reflect the potential for a more dynamic approach to flight planning (e.g. Group Re-routing Tool and use of conditional routes) and cannot be influenced to the same extent by the Network Manager and ANSPs	
Parties required to take action for implementation	• Commission/PRB would need to redefine the environment element of the Performance Scheme but implementation would not require any substantial change to existing monitoring activity	
Scope of activity affected	Monitoring of environmental impacts	
Legislative implications	• Annex I of the Performance Regulation would require some modification to re-designate KEP as a performance indicator rather than a KPI	
Issues and risks	• No major risks or issues identified, but the application of KEP would need to be kept under review as flight planning becomes more dynamic	

Table A.11: Introduce new airspace productivity indicators

Dimension	Detail	
Simple descriptor	CEP: new en-route airspace productivity indicator CTP: new terminal airspace productivity indicator	
Description of measure/variants	CEP	Introduction of a measure of the traffic accommodated per unit of en-route capacity, providing an indicator of the effectiveness of capacity management
	CTP	Introduction of a measure of the traffic accommodated per unit of terminal capacity, providing an indicator of the effectiveness of capacity management
Rationale	Would provide a more input-based measure of capacity provision to complement ongoing measurement of delay	
Parties required to take action for implementation	• The Commission/PRB would need to redefine the capacity element of the Performance Scheme to encompass the new indicators • NSAs and ANSPs would need to monitor and report on a broader range of metrics	
Scope of activity affected	Monitoring of capacity provision	
Legislative implications	• Annex I and V of the Performance Regulation would require some modification to include the new indicators	
Issues and risks	• Not clear if indicators are sufficiently mature to enable their introduction in RP3, although potential for trialling them as PIs • One or more measures of capacity would need to be developed and agreed • The additional regulatory burden on NSAs and ANSPs is unclear but could be significant	

Table A.12: Introduce new capacity indicators

Dimension	Detail	
Simple descriptor	CAP: new capacity measures	
Description of measure/variants	CAP1	Introduce additional measures of delay to supplement existing metric and capture information on specific problems
Rationale	Would supplement existing delay measure, which fails to capture specific problems (e.g. long delays, delays at weekends, delays arising from initial rotation)	
Parties required to take action for implementation	• The Commission/PRB would need to redefine the capacity element of the Performance Scheme to encompass the new indicators • NSAs and ANSPs would need to monitor and report on a broader range of metrics	
Scope of activity affected	Monitoring of capacity provision	
Legislative implications	• Annex I and V of the Performance Regulation would require some modification to include the new indicators	
Issues and risks	• The metrics identified are relatively simple to monitor based on existing data but there might be some additional regulatory burden	

Table A.13: Introduce new performance indicators in the environment KPA

Dimension	Detail	
Simple descriptor	EAF: additional fuel emissions indicator EVF: vertical flight efficiency indicator ESC: shortest constrained route indicator ENO: noise indicator EAQ: air quality indicator ECU: flexible use of airspace indicator	
Description of measure/variants	EAF	Introduction of an additional fuel emissions indicator to measure the contribution of ATFM to meeting the aviation industry objective of carbon-neutral growth from 2020
	EVF	Introduction of a vertical flight efficiency indicator to complement the existing measurement of horizontal flight efficiency
	ESC	Introduction of a shortest constrained route indicator, allowing better identification of contributions of ANSPs and airspace users to flight efficiency
	ENO	Introduction of a measure of the number of people exposed to (increased) aircraft noise in the vicinity of airports
	EAQ	Introduction of a measure of local air quality in the vicinity of airports
	ECU	Introduction of a measure of the flexible use of airspace such as the effectiveness of booking procedures, conditional route usage and/or civil use of released military airspace
Rationale	Would provide for a more comprehensive understanding of environmental impacts and the contribution of ATFM to limiting them	
Parties required to take action for implementation	• The Commission/PRB would need to redefine the environmental element of the Performance Scheme to encompass the new indicators • NSAs and ANSPs would need to monitor and report on a broader range of metrics	
Scope of activity affected	Monitoring of environmental impacts	
Legislative implications	• Annex I and V of the Performance Regulation would require some modification to include the new indicators	
Issues and risks	• Some of the proposed new indicators are insufficiently mature to enable their introduction in RP3, although potential for trialling some as PIs	

Table A.14: Require stakeholders to make available more information on demand/capacity

Dimension	Detail
Simple descriptor	CCM: Cost-efficient capacity margins
Description of measure/variants	CCM1 Reporting of information on demand and capacity utilisation at the local level
Rationale	Would provide transparent information on the need for significant cost increases in order to accommodate variations in traffic, potentially informing the calibration of elasticity values and improving understanding of the relationship between the cost-efficiency and capacity KPAs
Parties required to take action for implementation	• The Commission/PRB would need to specify new, enhanced reporting requirements • NSAs, ANSPs and the Network Manager would need to respond to the new reporting requirements by collecting and providing additional data
Scope of activity affected	Monitoring of cost-efficiency and capacity
Legislative implications	• If capacity utilisation/capacity margins were a new performance indicator, Annex I and Annex V of the Performance Regulation would need to be amended accordingly
Issues and risks	• This would be a significant new area of monitoring activity and could have implications for NSA and ANSP resources • The measure could be in conflict with OMR above – the value of regular reporting would need to be established and considered against monitoring and reporting costs

Table A.15: Introduce a new change management indicator

Dimension	Detail
Simple descriptor	CMI: change management indicator
Description of measure/variants	CMI1 Introduction of a change management indicator enabling tracking of change delivery (including change driven by SESAR), based on similar methodology to that applied under Effectiveness of Safety Management
Rationale	Would ensure that the critical role of change management is explicitly recognised within the Performance Scheme and enable monitoring of the delivery of change driven by SESAR as well as other initiatives
Parties required to take action for implementation	• If based on the established methodology for safety, the Commission/PRB would need to issue a questionnaire to Member States and other stakeholders, asking questions on the purpose of change programmes, expected impacts, levels of staff involvement etc • NSAs, ANSPs and other stakeholders would need to provide regular responses to the questionnaire • The Commission/PRB would need to collate the results and publish the indicator
Scope of activity affected	Monitoring of cost-efficiency and capacity
Legislative implications	• If change management were a new performance indicator, Annex I and Annex V of the Performance Regulation would need to be amended accordingly
Issues and risks	• This would be a significant new area of monitoring activity and could have implications for NSA and ANSP resources • More generally, the inclusion of a further indicator in the Performance Scheme would add to the regulatory burden • The methodology for the indicator would need to be developed

Measures related to alignment of Performance Scheme and regulation of Network Functions

Table A.16: Introduce new indicators to enable a more dynamic adjustment of capacity

Dimension	Detail
Simple descriptor	NPL: network planning – planning loops
Description of measure/variants	NPL1 Introduce a new set of performance indicators measuring sector throughput in the absence of regulation, declared capacity and actual throughput, and use them to enable ANSPs to rebalance capacity and optimise capacity profiles as part of the NOP process
Rationale	Would enable greater optimisation of capacity planning through the year in response to demand and help to eliminate both capacity shortfalls and significant under-use of capacity
Parties required to take action for implementation	• The Commission/PRB would need to redefine the capacity element of the Performance Scheme to encompass the new indicators • NSAs and ANSPs would need to monitor and report on a broader range of metrics • The Network Manager may need to modify the NOP to take account of the new metrics and enable the desired optimisation process
Scope of activity affected	Capacity planning and monitoring
Legislative implications	• Annex I and V of the Performance Regulation would require some modification to include the new indicators • It may be appropriate to provide explicitly for this optimisation process under Article 6 of Commission Regulation (EU) No 677/2011 on implementation of the ATFM network functions
Issues and risks	• The additional monitoring and reporting requirements would result in additional costs for NSAs and ANSPs • The integration of the new monitoring and optimisation process with the existing NOP process would require further consideration • An appropriate measure of “capacity” would need to be established

Table A.17: Enforce NOP planning process to ensure alignment with Union-wide targets

Dimension	Detail
Simple descriptor	NEP: network planning - enforcement
Description of measure/variants	NEP1 Introduce enforcement measures (provision for escalation to Commission/PRB and application of defined sanctions) to be applied in circumstances where performance is not consistent with the Union-wide targets
Rationale	Would ensure that the NOP supports the delivery of the Union-wide targets, as intended, and that ANSPs cannot plan to fail without facing consequences
Parties required to take action for implementation	• The Commission would need to specify enforcement measures (beyond the infringement proceedings at Member State level already available) • The Network Manager and Network Management Board would need to proactively identify deviations from Union-wide targets and escalate incidents as required
Scope of activity affected	Preparation and delivery of the NOP
Legislative implications	• Regulation 677/2011 would need to be amended to define specific enforcement measures
Issues and risks	• Application of sanctions is likely to be controversial • Could have implications for Network Manager governance arrangements since enforcement would need to be triggered on the advice of the Network Manager

Table A.18: Improve the definition of processes/indicators in the Network Performance Plan

Dimension	Detail
Simple descriptor	NPP: network planning – performance plan
Description of measure/variants	NPP1 Introduce new KPIs and/or performance indicators capturing the contribution of the Network Manager to network performance
Rationale	Would explicitly recognise the Network Manager's role as a service provider in its own right and provide a means of measuring its contribution alongside the contribution of ANSPs
Parties required to take action for implementation	• The Commission/PRB would need to specify appropriate KPIs and or performance indicators • The Network Manager would need to monitor and report in accordance with the new requirements
Scope of activity affected	Preparation and delivery of the Network Performance Plan
Legislative implications	• The Performance Regulation and/or Regulation 677/2011 would need to be amended to define specific indicators and reporting requirements • More specifically, it may be appropriate to make explicit reference to the new indicators in Article 6(d) of the Performance Regulation (defining the contents of the Network Performance Plan) as well as in Annex I and V
Issues and risks	• It is difficult to identify metrics that fully capture the Network Manager's contribution to network performance, although it already monitors a number of potential measures

Measures for improving the Charging Scheme

Measures related to risk sharing

Table A.19: Modify or remove traffic risk sharing parameters

Dimension	Detail	
Simple descriptor	STR: sharing traffic risk	
Description of measure/variants	STR1	Remove the dead band
	STR2	Change the sharing keys
	STR3	Change the cap
	STR4	Remove traffic risk sharing mechanism
Rationale	Would allow for better allocation of risk and, in the case of STR1, reduce the scope for gaming behaviour in the setting of traffic forecasts. STR4 would simplify the Charging Scheme	
Parties required to take action for implementation	• Member States would need to modify the calculation of unit rates to incorporate the revised traffic risk sharing mechanism	
Scope of activity affected	Calculation of unit rates	
Legislative implications	• Would require modifications to Article 13 paragraphs 3,4 and 5 of the Charging Regulation	
Issues and risks	• Could result in significant changes to the risk allocation between ANSPs and airspace users	

Table A.20: Remove cost exempt mechanism/introduce new mechanism for pensions

Dimension	Detail	
Simple descriptor	SCO: sharing cost risk	
Description of measure/variants	SCO1	Remove the cost risk sharing mechanism
	SCO2	Remove current cost risk sharing mechanism but introduce new mechanism for pensions
Rationale	Would simplify the setting of charges, reducing the administrative burden, and provide for a more coherent treatment of costs that takes account of the impacts of other risk sharing mechanisms	
Parties required to take action for implementation	• Member States would need to modify the calculation of unit rates to incorporate the revised cost risk sharing arrangements	
Scope of activity affected	Calculation of unit rates	
Legislative implications	• Would require modifications to/elimination of Article 14 and parts of Annex VII of the Charging Regulation	
Issues and risks	• Could result in significant changes to the risk allocation between ANSPs and airspace users • SCO1 could have implications for the funding of pensions, particularly for ANSPs with Defined Benefits schemes.	

Table A.21: Modify or remove inflation adjustment mechanism

Dimension	Detail	
Simple descriptor	SIN: sharing inflation risk	
Description of measure/variants	SIN1	Limit the application of inflation adjustment to specific costs (e.g. exclude depreciation)
	SIN2	Apply sharing keys (with a 50:50 allocation of risk) to the adjustment in year N+2
	SIN3	Set cost efficiency targets in nominal terms and remove the inflation mechanism
Rationale	Would address concerns that the inflation adjustment introduces significant risk in circumstances in which inflation is continuously below expectations and could simplify the Charging Scheme (although SIN1 and SIN2 would arguably add to the complexity of the unit rate calculation)	
Parties required to take action for implementation	• Member States would need to modify the calculation of unit rates to incorporate the revised inflation risk sharing arrangements	
Scope of activity affected	Calculation of unit rates	
Legislative implications	• Would require modification of Article 7, 1 of the Charging regulation	
Issues and risks	• Could result in significant changes to the risk allocation between ANSPs and airspace users • Inflation adjustment pre-dated the Performance Scheme and is also commonly used in other regulated industries and therefore making this change would establish a precedent	

Measures designed to improve incentives

Table A.22: Modify or remove incentive mechanism

Dimension	Detail	
Simple descriptor	ISA: incentive mechanisms	
Description of measure/variants	ISA1	Specification of incentive mechanisms devolved to NSAs, with mechanisms designed to address specific, known issues within the relevant airspace
	ISA2	Centrally administered incentive mechanism, based on agreed delay attribution mechanism, with penalties for failing to deliver 'contracted' capacity
	ISA3	Incentives linked to capacity provided (measured by reference to 3-hour peak), with penalties for under-provision (scheme complemented by additional PIs measuring contribution of delays in 3-hour peak to total delay and delays over 15 minutes)
	ISA4	Remove all incentive schemes
Rationale	Would improve the effectiveness of incentives, which currently result in ANSPs being rewarded when delay is above target. ISA4 would simplify the Charging Scheme, although the impact on delay is unclear	
Parties required to take action for implementation	• Member States would need to modify the calculation of unit rates to incorporate any revisions to the incentive mechanism (except under ISA4, under which no adjustments to unit rates would be required) • Under ISA1, NSAs would need to develop incentive mechanisms to address locally defined issues, consulting with all relevant stakeholders	
Scope of activity affected	Calculation of unit rates	
Legislative implications	• Would require modification of Article 15, 1 of the Charging Regulation (ISA4 would require the removal of Article 15 in its entirety)	
Issues and risks	• ISA1 could make the Charging Scheme more complicated and less transparent • ISA2 would add significant administrative cost in the short term as key centralised systems were set up to support the mechanism (e.g. delay attribution and dispute arrangements) • ISA4 could result in increased delay, although it is not clear that the current mechanism is effectively incentivising delay reduction	

Measures related to the setting of charges

Table A.23: Introduce 'conditional' price cap regulation

Dimension	Detail
Simple descriptor	PCR: 'conditional' price cap regulation
Description of measure/variants	PCR1 Remove risk sharing mechanisms and introduce a cap on unit rates, initially based on operating costs but subject to modification to accommodate capital costs of annually approved investment programme (with rebates when costs are not incurred)
Rationale	Would ensure that charges only include remuneration of capital costs associated with approved schemes and reduce the potential for ANSPs to reduce investment included in plans and funded through charges
Parties required to take action for implementation	• The Central Route Charges Office (CRCO) would need to modify the calculation of charges to reflect the new arrangements • Member States would need to modify the calculation of unit rates
Scope of activity affected	Calculation of unit rates
Legislative implications	• Would require substantial changes to the Charging Regulation, including removal of current Articles 13, 14 and 15 and modification of Articles 7, 11 and 12
Issues and risks	• Would mean that ANSPs were not in control of investment plans • Could lead to protracted disputes • Could result in major under-investment if ANSPs considered that costs of new investment would not be remunerated • Administrative costs of annual adjustments to unit rates could be substantial

Table A.24: Modify the relationship between route planned/flown and charge

Dimension	Detail	
Simple descriptor	RUR: routes units and rates	
Description of measure/variants	RUR1	Base the charge on the route actually flown rather than on the latest flight plan
	RUR2	Pre-define route charges for each origin-destination pair
	RUR3	Transitional financial compensation for new route design causing traffic shift
	RUR4	Common unit rates within defined regions and/or upper and lower airspace
Rationale	RUR1 would improve cost relatedness and remove the perverse incentive to plan longer routes to avoid airspace with higher unit rates. The other variants would provide ANSPs with a greater incentive to support changes to route design that improve operational efficiency but change the distribution of revenue under current charging arrangements	
Parties required to take action for implementation	• The Central Route Charges Office (CRCO) would need to modify the calculation of charges to reflect the new arrangements • Member States would need to modify the calculation of unit rates under RUR2 and RUR4 • Any transitional compensation arrangements under RUR3 would need to be determined by the relevant ANSPs but would also need to be overseen or administered by an independent body, possibly the CRCO	
Scope of activity affected	Determination and collection of charges	
Legislative implications	• Options involving redefinition of the basis for charging (RUR2 and RUR4) would require significant changes to Charging Regulation (primarily Articles 11 and 17, but also other Articles currently referring to the setting of unit rates for each charging zone)	
Issues and risks	• Likely to have major implications for charges paid by airspace users and distribution of revenue between ANSPs. In previous discussions on modulation of charges, changes that resulted in a redistribution of revenues were not supported by all categories of stakeholder	

Table A.25: Enable greater flexibility in setting charges below the maximum

Dimension	Detail
Simple descriptor	CSM: charge setting below maximum
Description of measure/variants	CSM1 Provide the flexibility for Member States to set charges below the maximum indicated by the calculations performed under the Charging Regulation, enabling smoothing of adjustments to charges within a reference period
Rationale	Would benefit airspace users by enabling them to share in reduction of actual costs below determined costs
Parties required to take action for implementation	• Member States would need to consider the case for setting charges lower than the maximum, but no significant effort required for implementation of the measure
Scope of activity affected	Calculation of unit rates
Legislative implications	• Articles 11 and 12 of the Charging Regulation would need to be modified to refer to maximum unit rates • Similar changes might also be needed to Annex IV and V
Issues and risks	• No major issues or risks identified

Table A.26: Require provision of more information to support unit rate consultation

Dimension	Detail
Simple descriptor	URC: unit rate consultation
Description of measure/variants	URC1 Provide further information on costs and forecasts to stakeholders during consultation process
Rationale	Would increase the transparency of the Charging Scheme and ensure that stakeholders are better informed prior to formulating their consultation responses
Parties required to take action for implementation	• The Commission/PRB would need to consider how Annex II, VI and VII should be expanded, based on stakeholder comments • Member States would need to ensure compliance with the enhanced reporting requirements
Scope of activity affected	Consultation on determined costs (and determination of charges)
Legislative implications	• Would require modification of Article 9 and Annex II, VI and VII of the Charging Regulation
Issues and risks	• Could increase the administrative burden significantly, depending on the additional reporting requirements • Based on the experience of similar schemes, e.g. the airport charges Directive consultation requirements, the requirements will need to be tightly specified and implemented in a consistent way across ANSPs

Table A.27: Introduce a unit rate for the Network Manager

Dimension	Detail
Simple descriptor	URN: Network Manager unit rate
Description of measure/variants	URN1 Specify a unit rate for the Network Manager, based on submission of cost information analogous to that provided by ANSPs in accordance with the Charging Regulation
Rationale	Would ensure the same level of transparency of costs for the Network Manager as for ANSPs and improve the cost-relatedness of charging
Parties required to take action for implementation	• The Commission/PRB would need to specify the way in which the unit rate should be calculated and the supporting cost information to be submitted • The Network Manager would need to comply with the new reporting and charging arrangements • The CRCO would need to modify its systems to support the collection of charges
Scope of activity affected	Calculation of unit rates
Legislative implications	• The Charging Regulation would require substantial amendment to incorporate provisions defining the way in which the Network Manager unit rate was set (including additional annexes setting out the calculation of the rate and the supporting cost information that must be provided)
Issues and risks	• The basis for calculating the user charge requires further consideration – could be a simple multiplication of the unit rate and the total number of service units or a more complex calculation using different weightings for different routes or groups of routes • The introduction of the new rate could create winners and losers among airspace users since the application of a specific unit rate for the Network Manager would be unlikely to lead to a simple replication of charges currently incurred • The additional administrative burden on the Network Manager could be significant

Table A.28: Differentiate unit rates by service

Dimension	Detail
Simple descriptor	URS: differentiated unit rates
Description of measure/variants	URS1 Introduce unit rates for specific services
Rationale	Would improve cost-relatedness and provide incentives to optimise the use/provision of different services
Parties required to take action for implementation	• The Commission/PRB would need to redefine the Charging Scheme, specifying separate unit rates for individual services and the associated calculation and cost reporting requirements • ANSPs would need to comply with the new requirements and modify their systems accordingly
Scope of activity affected	Calculation of unit rates
Legislative implications	• The Charging Regulation would need substantial amendment to provide for separate calculation of new unit rates and reporting of the required cost information
Issues and risks	• The administrative burden arising from the change could be significant • The introduction of unit rates for specific services could create winners and losers • Might be considered an application of modulation of charges requiring revenue neutrality

Table A.29: Modify principles governing terminal/en-route cost allocation

Dimension	Detail	
Simple descriptor	ERT: terminal/en-route cost allocation	
Description of measure/variants	ERT1	Clarify the definitions of terminal, approach and en-route services for the purposes of the application of SES legislation
	ERT2	Modify principles in Charging Regulation to provide for greater consistency in allocation of terminal and en-route costs across Member States
Rationale	Would improve cost-relatedness and reduce potential for cross-subsidy from flights using SES en-route airspace to those originating and terminating within Europe	
Parties required to take action for implementation	• The Commission/PRB would need to modify the principles governing cost allocation set out in Article 8 of the Charging regulation • NSAs and ANSPs would need to modify data collection and reporting processes and systems to ensure compliance with any change in the required allocation	
Scope of activity affected	Calculation of unit rates	
Legislative implications	• Article 8 of the Charging Regulation would need to be amended to capture any changes or additions to principles	
Issues and risks	• Our previous study for the Commission on modulation charges[61] highlighted a number of complexities – there are a large number of approaches for allocating en-route and terminal costs in place across the European Union, and enforcing a given approach is likely to be challenging and difficult to monitor/govern • The adoption of a more consistent approach across Member States will result in winners and losers among airspace users	

[61] Policy options for the modulation of charges in the Single European Sky, April 2015

Table A.30: Modify treatment of capital expenditure in determination of charges

Dimension	Detail
Simple descriptor	CCA – capital expenditure and charges
Description of measure/variants	CCA1 More detailed monitoring of capital expenditure by NSAs CCA2 Introduce specific mechanism for treatment of capital expenditure in calculating charges
Rationale	Would remove the incentive to reduce capital expenditure in order to meet cost efficiency targets (as experienced during RP2 when capital expenditure was much lower than forecast)
Parties required to take action for implementation	• The Commission/PRB would need to define changes to the calculation of capital expenditure costs, as currently set out in Article 7 of the Charging Regulation • NSAs and ANSPs would need to modify data collection and reporting processes and systems to ensure compliance with any change in the treatment of capital expenditure
Scope of activity affected	Monitoring of costs and calculation of unit rates
Legislative implications	• Would require modification of Article 7 of the Charging Regulation and corresponding changes to Annex II, III, Vi and V (CCA1 would require more limited changes since it involves reporting rather than a change to the treatment of capital expenditure costs)
Issues and risks	• There may be good reasons for postponing or reducing capital expenditure and a lower level of expenditure than planned may be an indication of efficiency. In practice, it can be difficult to distinguish between reductions in expenditure reflecting an intention to postpone it and those resulting from greater efficiency, and the development of a mechanism that works effectively is therefore likely to be challenging. In other industries, expenditure on specific projects agreed with service users has been specified and monitored rather than the general programme

Table A.31: Clarify treatment of other revenues

Dimension	Detail
Simple descriptor	TOR: treatment of other revenues
Description of measure/variants	TOR1 Clarify treatment of public funding of investment programmes in calculation of unit rate
Rationale	Would ensure consistency and provide ANSPs with an incentive to apply for funding
Parties required to take action for implementation	• The Commission/PRB would need to specify the treatment of other revenues in Annex VI of the Charging Regulation • NSAs and ANSPs would need to modify reporting processes and systems to ensure compliance with any changes
Scope of activity affected	Calculation of unit rates
Legislative implications	• Would require changes to Annex VI of the Charging Regulation
Issues and risks	• Treatment of other revenue would need careful definition to ensure principle of cost-relatedness was observed

Measures related to administration of Charging Scheme

Table A.32: Simplify reporting tables

Dimension	Detail
Simple descriptor	RTR: reporting tables
Description of measure/variants	RTR1 Simplify the reporting tables and remove the requirement to provide information that does not support the application of the Charging Scheme
Rationale	Reduce the work needed to analyse and compare the information provided and the resources required to collect and report it
Parties required to take action for implementation	• The Commission/PRB would need to re-specify the reporting tables in Annex II – VII of the Charging Regulation • NSAs and ANSPs would need to modify data collection and reporting processes and systems to ensure compliance with any changes (this would involve incurring one-off costs in the expectation of reducing the ongoing administrative burden)
Scope of activity affected	Collection of cost data and monitoring of costs
Legislative implications	• Would require changes to Annex II – VII of the Charging Regulation (possibly focused Annex VII, which provides complementary information rather than data central to the calculation of unit rates)
Issues and risks	• The scope for simplification needs to be considered in tandem with other measures that might require additional information for their implementation • There may be a tension between this measure and MCM (see below) since the latter would require provision of more cost information in the interests of greater transparency

Table A.33: Introduce more realistic timescales for decision-making

Dimension	Detail	
Simple descriptor	CRT: Charging Regulation timescales	
Description of measure/variants	CRT1	Extend the timescales for reporting information beyond the current 1 June deadline and increase the time available to the Commission to respond to proposed unit rates beyond the current four months
	CRT2	Align the billing process with regulatory timescales
	CRT3	Clarify process for applying initial unit rates prior to approval
	CRT4	Reduce time available for reporting
Rationale	CRT1, 2 and 3 would allow for more rigorous reporting and review prior to the determination of charges and clarify the approach to retrospective adjustments in situations where initial unit rates have been applied. CRT4 would increase time available for Commission to review and approve costs	
Parties required to take action for implementation	• The Commission/PRB would need to modify specified timescales in the light of stakeholder suggestions • NSAs and ANSPs would need to modify data collection and reporting processes and systems to ensure compliance with any changes • The CRCO might also need to modify its systems to align billing and regulatory cycles (in the case of CRT2)	
Scope of activity affected	Administration of reporting and unit rate approval processes	
Legislative implications	• The timescales in Article 9 of the Charging Regulation would need to be modified	
Issues and risks	• There is a balance between time to prepare and report, time to consult and time to review and approve, and it may be difficult to extend the time period in one case without materially reducing that in another • Ideally, the process would eliminate the need for retrospective adjustments, but this may not be possible in practice	

Measures designed to encourage use of existing provisions

Table A.34: Remove provisions relating to restructuring costs

Dimension	Detail
Simple descriptor	CRC: restructuring costs
Description of measure/variants	CRC1 Remove current provisions relating to restructuring costs and require NSAs and ANSPs to anticipate future restructuring costs in seeking approval for unit rates prior to the start of a reference period
Rationale	The relevant provision in the Charging Regulation has not been used and its removal could be expected to simplify the Charing Scheme without loss of benefit
Parties required to take action for implementation	• The Commission/PRB would need to remove the current provision
Scope of activity affected	Treatment of restructuring costs
Legislative implications	• Article 7, 4 of the Charging Regulation would need to be removed
Issues and risks	• While these provisions have not been used to date, it is possible that they have been considered and might be used in the future • The reasons for stakeholders not using the provisions requires further investigation

Table A.35: Modify provisions relating to modulation of charges

Dimension	Detail
Simple descriptor	CMO: modulation of charges
Description of measure/variants	CMO1 Provide for specific incentives to accelerate the deployment of SESAR technology under Article 16, 2 of the Charging Regulation
Rationale	Would encourage the take-up of SESAR technology (if linked to a specific ATM functionality)
Parties required to take action for implementation	• The Commission/PRB would need to specify a component of the unit rate and/or charge calculation applying to qualifying airlines/flights, and define supporting reporting requirements • The CRCO would need to modify its systems to enable the appropriate adjustment to charges
Scope of activity affected	Calculation of unit rates and charges
Legislative implications	• Would require modification of Article 16 of the Charging Regulation and preparation of supporting annex explaining how the adjustment to the unit rate/charge should be calculated
Issues and risks	• The design of an appropriate incentive is likely to be challenging, as discussed in our previous report on the modulation of charges[62]

[62] See footnote 61.

Table A.36: Modify provisions relating to market conditions

Dimension	Detail	
Simple descriptor	MCM: market conditions	
Description of measure/variants	MCM1	Modify criteria for establishing market conditions in the light of experience to date
	MCM2	Increase transparency of information on cases where market conditions have been established
	MCM3	Introduce compulsory competitive tendering of specific services
Rationale	Would provide greater clarity on criteria for establishing market conditions and/or enhance competition in service provision	
Parties required to take action for implementation	• Commission would need to specify revised criteria/information requirements • MCM3 would require new legislation and Member States would need to develop implementation programmes	
Scope of activity affected	Calculation of unit rates and charges	
Legislative implications	• Would require modification of Article 3 and ANNEX 3 of the Charging Regulation • MCM3 would require major new legislation	
Issues and risks	• Securing political support for introduction of legislation underpinning MCM3 would be challenging	

B Excluded policy measures

Results of initial sifting exercise

Table B.1: Results of sifting – Performance Scheme

Measures		Retained	Set aside	Comment
GEO	GEO1: Establish performance plans at FAB level but set targets at national/charging zone level		✓	**Coherence:** would not address the aim of introducing greater consistency across geographies for target setting
	GEO2: Establish both performance plans and targets at national level		✓	**Coherence:** not consistent with established policy in relation to FABs and investment in their creation
	GEO3: Allow for the preparation of performance plans at the national level and set national level targets, but provide the flexibility for Member States to agree to continue to submit FAB level performance if they choose	✓		Retained but would need to be supplemented by requirements designed to maintain ongoing cross border cooperation and provision of cross border services
RPD	RPD1: Reduce RP3 to three years rather than 5 (this change would not apply beyond RP3)		✓	**Coherence:** insufficient time for other policy measures to take effect
	RPD2: Retain five-year duration but permit changes to capacity plans year-by-year	✓		Retained and combined with measures to streamline the performance and network planning processes
ROT	ROT1: Introduce a simpler process for revising targets in specific, unforeseen circumstances, while allowing for consultation and ensuring consistency	✓		Retained and combined with RPD2 and NEP
PPA	PPA1: Involve NSAs in process for setting Union-wide targets	✓		Retained and combined with GEO3
OMR	OMR1: Introduce simplified tables covering all KPAs and eliminate requirements to report information that does not support the regulatory process or otherwise add value	✓		Retained and combined with similar measure focusing on simplification of Charging Scheme reporting tables
PRR	PRR1: Establish an independent role for the PRB, including formal responsibility for reviewing performance plans, targets and unit rates prior to Commission approval		✓	**Legal feasibility:** would not be consistent with Article 11(2) of Regulation 549/2004 (limiting the PRB's role to one of assistance)
	PRR2: Establish a more explicit role for the PRB in specific areas, for example the identification of corrective measures to address capacity issues	✓		Retained
SDU	SDU1: Limit the number of KPIs included in safety element of the Performance Scheme and draw on other measures monitored by EASA under the Safety Risk Management Process (SRMP)	✓		Retained and combined with SLI and SME1/2

Measures		Retained	Set aside	Comment
SLI	SLI1: Use a leading indicator of safety management effectiveness to set a target for the Performance Scheme and lagging indicators to monitor specific aspects of safety (runway incursions, separation minima infringements and over deliveries due to flow management)	✓		Retained and combined with SDU and SME2
SME	SME1: Use CANSO standard of excellence v2.1 to measure safety management effectiveness	✓		Retained and combined with SDU and SLI – to be considered as an alternative to SME2
	SME2: Use cross-domain tool developed by EASA to measure safety management effectiveness	✓		Retained and combined with SDU and SLI – to be considered as an alternative to SME1
	SME3: Remove measurement of safety management effectiveness from Performance Scheme and monitor it under the SRMP		✓	**Legal feasibility/coherence:** inconsistent with scope of Performance Scheme as defined in Article 11 of Regulation 549/2004
EKE	EKE1: Use flight efficiency of the actual flight trajectory (KEA) as the single KPI for the purposes of target setting in the environment KPA (while retaining efficiency based on the planned trajectory (KEP) as a performance indicator and using KEP-KEA as a measure of predictability)	✓		Relegation of KEP to a PI is retained - KEA is better aligned with the environmental impact of the flight and enables a better understanding of the relative contributions of ANSPs and airspace users if combined with a new measure of the shortest available route (see below) PRU analysis indicates that KEP-KEA is not a useful measure however and this will be set aside
CEP	CEP1: Introduction of a measure of the traffic accommodated per unit of en-route capacity, providing an indicator of the effectiveness of capacity management	✓		Would support better balancing of capacity and demand in support of ROT and NEP
CTP	CTP1: Introduction of a measure of the traffic accommodated per unit of terminal capacity, providing an indicator of the effectiveness of capacity management	✓		Would support better balancing of capacity and demand in support of ROT and NEP
CAP	CAP1: Introduce additional measures of delay to supplement existing metric and capture information on specific problems	✓		Would supplement existing delay measure, which fails to capture specific problems (e.g. long delays, delays at weekends)
EAF	EAF1: Introduction of an additional fuel emissions indicator to measure the contribution of ATFM to meeting the aviation industry objective of carbon-neutral growth from 2020		✓	**Relevance:** would show similar trends to existing indicators and therefore would not provide new information on the effects of flight efficiency
EVF	EVF1: Introduction of a vertical flight efficiency indicator to complement the existing measurement of horizontal flight efficiency	✓		Would provide useful information, potentially contributing to meeting 'gate-to-gate' objective, although would need development
ESC	ESC1: Introduction of a shortest constrained route indicator, allowing better identification of contributions of ANSPs and airspace users to flight efficiency	✓		Combined with KEA, would enable the contributions of airspace users and ANSPs to be distinguished
ENO	ENO1: Introduction of a measure of the number of people exposed to (increased) aircraft noise in the vicinity of airports		✓	**Legal/political/technical feasibility/coherence:** Likely to be inconsistent with agreements reached at the local level and would not identify the air navigation contribution to noise
EAQ	EAQ1: Introduction of a measure of local air quality in the vicinity of airports		✓	**Legal/political/technical feasibility/coherence:** Likely to be inconsistent with agreements reached at the local level and would not identify the air navigation contribution to air quality

Measures		Retained	Set aside	Comment
ECU	ECU1: Introduction of a measure of the flexible use of airspace based on rate of actual use of reserved or restricted airspace (defined in 7.2.4 of Airspace Management Handbook)	✓		Retained but would need to be supplemented by information on the level of demand at the time airspace is released
CCM	CCM1: Reporting of information on demand and capacity utilisation at the local level		✓	**Relevance:** duplicates CEP and CTP
CMI	CMI1: Introduction of a change management indicator enabling tracking of change delivery related to SESAR deployment	✓		Would enable explicit monitoring of progress of SESAR deployment
NPL	NPL1: Introduce a new set of performance indicators measuring sector throughput in the absence of regulation, declared capacity and actual throughput, and use them to enable ANSPs to rebalance capacity and optimise capacity profiles as part of the NOP process		✓	**Relevance:** duplicates CEP and CTP
NEP	NEP1: Introduce enforcement measures (provision for escalation to Commission/PRB and application of defined sanctions) to be applied in circumstances where performance is not consistent with the Union-wide targets	✓		Retained and combined with RPD2 and ROT
NPP	NPP1: Introduce new KPIs and/or performance indicators capturing the contribution of the Network Manager to network performance	✓		Retained and combined with CEP and CTP

Source: Steer Davies Gleave analysis

Table B.2: Results of sifting – Charging Scheme

Measures		Retained	Set aside	Comment
STR	STR1: Remove the dead band from the traffic risk sharing mechanism	✓		Retained and combined with other measures
	STR2: Change the traffic risk sharing keys from 70:30 to 50:50		✓	**Coherence:** no evidence that would lead to improved risk allocation (see paragraphs 4.74 and 4.75)
	STR3: Change the cap	✓		Retained and combined with other measures
	STR4: Remove traffic risk sharing mechanism	✓		Retained and combined with SCO1, SIN3 and PCR1
SCO	SCO1: Remove cost risk sharing mechanism	✓		Retained and combined with STR4, SIN3 and PCR1
	SCO2: Remove cost risk sharing but make separate provision for pensions	✓		Would simplify the Charging Scheme while allowing ANSPs to pass on unexpected increases in pensions costs – the most significant element of the costs exempt from risk sharing mechanism to date
SIN	SIN1: Limit the application of inflation adjustment to specific costs (e.g. exclude depreciation)	✓		Would address concerns raised about current mechanism, e.g. application of inflation to depreciation
	SIN2: Apply sharing keys (with a 50:50 allocation of risk) to the adjustment in year N+2		✓	**Coherence:** no clear justification for proposed change

Measures		Retained	Set aside	Comment
	SIN3: Set cost efficiency targets in nominal terms and remove the inflation mechanism	✓		Retained and combined with SCO1, STR4 and PCR1
PCR	PCR1: Remove risk sharing mechanisms and introduce a cap on unit rates, initially based on operating costs but subject to modification to accommodate capital costs of annually approved investment programme (with rebates when costs are not incurred)	✓		Retained and combined with SCO1, STR4 and SIN3
ISA	ISA1: Specification of incentive mechanisms devolved to NSAs, with mechanisms designed to address specific, known issues within the relevant airspace	✓		Would encourage specific problems to be addressed and reduce scope for perverse/ineffective incentives
	ISA2: Centrally administered incentive mechanism, based on agreed delay attribution mechanism, with penalties for failing to deliver 'contracted' capacity	✓		Would ensure consistency of approach and avoid application of anomalous bonus payments
	ISA3: Incentives linked to capacity provided (measured by reference to 3-hour peak), with penalties for under-provision (scheme complemented by additional PIs measuring contribution of delays in 3-hour peak to total delay and delays over 15 minutes)		✓	**Relevance:** already included in PCR1
	ISA4: Remove all incentive schemes	✓		Consistent with aim of greater simplicity and would remove perverse aspects of current arrangements
RUR	RUR1: Base the charge on the route actually flown rather than on the latest flight plan	✓		Would result in closer alignment between charges and costs of services used
	RUR2: Pre-define route charges for each origin-destination pair		✓	**Coherence:** inconsistent with the aim of establishing charges that are related as far as possible to underlying costs
	RUR3: Transitional financial compensation for new route design causing traffic shift		✓	**Proportionality:** could be agreed independently by ANSPs – not clear that a change in legislation is necessary
	RUR4: Common unit rates within defined regions and/or upper and lower airspace		✓	**Legal/political feasibility:** would require further development of FABs – not realistic within RP3 timescales
CSM	CSM1: Provide the flexibility for Member States to set charges below the maximum indicated by the calculations performed under the Charging Regulation, enabling smoothing of adjustments to charges within a reference period	✓		Retained but will not be examined through the impact assessment – a small change to legislation provide additional flexibility
URC	URC1: Provide further information on costs and forecasts to stakeholders during consultation process	✓		Retained but additional information to be determined through stakeholder consultation
URN	URN1: Specify a unit rate for the Network Manager, based on submission of cost information analogous to that provided by ANSPs in accordance with the Charging Regulation		✓	**Technical feasibility:** this measure is being separately considered by the Network Manager – analysis should follow the specification of a specific proposal
URS	URS1: Introduce unit rates for specific services		✓	**Technical/political feasibility:** a significant change, requiring major modification of current charging arrangements – unlikely to secure sufficient support within available timescales
ERT	ERT1: Clarify the definitions of terminal, approach and en-route services for the purposes of the application of SES legislation		✓	**Proportionality:** more effectively addressed through guidance than legislation

Measures		Retained	Set aside	Comment
	ERT2: Modify principles in Charging Regulation to provide for greater consistency in allocation of terminal and en-route costs across Member States		✓	**Proportionality:** more effectively addressed through guidance than legislation
CCA	CCA1: More detailed monitoring of capital expenditure by NSAs	✓		Retained and combined with PCR1
	CCA2: Introduce specific mechanism for treatment of capital expenditure in calculating charges	✓		Retained and combined with PCR1
TOR	TOR1: Clarify treatment of public funding of investment programmes in calculation of unit rate	✓		Retained and combined with RTR1 – variations in treatment require further investigation
RTR	RTR1: Simplify reporting tables	✓		Retained and combined with TOR1 – scope for simplification requires further investigation
CRT	CRT1: Extend the timescales for reporting information beyond the current 1 June deadline		✓	**Technical/political feasibility/relevance:** timescales are already constrained and likely to be strongly resisted by parts of stakeholder community/anyway addressed by PPA1 if extended to Charging Scheme
	CRT2: Align the billing process with regulatory timescales		✓	**Technical feasibility:** CRCO has indicated that the costs of implementation would be considerable
	CRT3: Clarify process for applying initial unit rates prior to approval	✓		Retained and combined with other measures concerning clarification/simplification
	CRT4: Reduce time available for reporting		✓	**Technical/political feasibility/relevance:** timescales are already constrained and likely to be strongly resisted by parts of stakeholder community/anyway addressed by PPA1 if extended to Charging Scheme
CRC	CRC1: Remove current provisions relating to restructuring costs and require NSAs and ANSPs to anticipate future restructuring costs in seeking approval for unit rates	✓		Retained and combined with PCR1
CMO	CMO1: Modulation of charges		✓	**Technical/political feasibility/relevance:** a means of addressing issues rather than an end in itself/anyway difficult to agree and implement a change within the timescales available for RP3
MCM	MCM1: Modify criteria for establishing market conditions in the light of experience to date		✓	**Proportionality:** more effectively addressed through guidance than legislation
	MCM2: Increase transparency of information on cases where market conditions have been established		✓	**Relevance/coherence:** the introduction of more competition would require bespoke legislation – not appropriate to address this through the Charging Regulation
	MCM3: Introduce compulsory competitive tendering of specific services		✓	**Legal/political feasibility:** would require bespoke legislation – not appropriate to address this through the Charging Regulation

Source: Steer Davies Gleave analysis

Rationale for exclusion of further measures

Rationalisation of reporting requirements

B.1 We have also considered other measures that in principle could enable further simplification of the Performance and Charging Schemes, but have concluded that these should not be taken forward for RP3. They may nevertheless warrant further consideration in the context of a more extensive revision of the Schemes prior to a later Reference Period.

B.2 Representatives of ANSPs have suggested that the reporting requirements under both the implementing regulations could be simplified, while representatives of airspace users have indicated that all the information currently provided is of value. Indeed, the latter would like to see enhanced reporting requirements, with ANSPs in particular providing more detailed information in order to justify the basis of unit rates. We have therefore not been able to identify clear opportunities for reducing reporting requirements.

B.3 At the same time, ANSPs have indicated that the reporting information needed to support the calculation of unit rates is similar, although not equivalent to, information provided to Eurocontrol under the ATM Cost-effectiveness (ACE) benchmarking programme. Moreover, representatives of airspace users have suggested that ACE data provides a good benchmark for the level of detail to which they would expect regulators and stakeholder to have access to scrutinise costs effectively. In principle, this suggests some scope for rationalisation of reporting requirements while continuing to provide organisations with the information that they need. In practice, this would be challenging since:

- ACE data is collected for a different purpose and submission timescales do not align with those of the Charging Scheme;
- ACE data covers all Eurocontrol Member States, some of which are not subject to the Performance and Charging Schemes;
- ACE data, while more detailed than information reported under the Charging Scheme, is not as comprehensive in that it excludes key categories of cost (e.g. NSA costs); and
- agreement on a consolidated set of reporting requirements would therefore be difficult to achieve and, in our view, could not be achieved in the timescales available for RP3.

B.4 Hence, we do not propose that such a measure be included in the core option. However, consolidation appears to be a reasonable aspiration to work towards over the longer term, and might be considered for RP4 or RP5.

Charging according to the actual route flown

B.5 As indicated in a recent SSC paper[63], it has been argued that under the current charging arrangements airlines have an incentive to plan to fly longer routes to avoid airspace charged at relatively high unit rates. Since the charge is based on the planned route, they can in theory benefit from seeking a more direct flight after the plan has been accepted, thereby saving on fuel costs while still benefitting from the lower charges attached to the airspace included in the plan. At the same time, recent developments in radar technology would permit the calculation of charges based on the actual route flown, which would in principle make charges

[63] See footnote 4 above.

more reflective of underlying costs (with ANSPs receiving revenues to cover the cost of services provided).

B.6 However, various stakeholders have suggested that this approach to charging would be detrimental to cost efficiency for the following reasons:

- Research undertaken by Eurocontrol's Central Route Charges Office (CRCO) suggests that the deviation between actual and planned routes is relatively limited, equivalent to perhaps 7% of service units at the European level. This is significant, but does not suggest a serious mismatch between planned and actual routes. Moreover, further analysis by the CRCO (based on flights and charges incurred in a single week in July 2016) indicates that airspace users incur net losses as a result of filing flight plans differing from the route actually flown (equivalent to 0.23% of charges over the period) .
- The introduction of charges based on the actual rather than planned route would tend, other things being equal, to result in a greater coincidence of planned and actual route. To the extent that this increased average route length, it would result in greater fuel burn and a detrimental effect on the environment.
- Representatives of airspace users have argued that charging according to the actual route would encourage ANSPs to direct flights with the aim of lengthening them, thereby increasing their revenues. In addition, ANSPs would benefit from factors such as adverse weather conditions causing longer flights even where they incurred few of any additional costs in providing the service.

B.7 In our view, it is not possible to determine on the basis of the available evidence whether introducing this change to the charging framework would improve or undermine cost efficiency. The outcome would depend on a number of factors affecting the incentives of both ANSPs and airspace users, and further analysis would be needed to be confident of anticipating the overall effect. We therefore suggest that this measure is not adopted for RP3, but that further analysis should be performed to strengthen the evidence base.

Greater independence for NSAs

B.8 We have considered the scope for further legislative change to ensure the independence of NSAs, but have concluded that this would be difficult in the absence of changes to primary legislation, notably Article 4 of Regulation (EC) 549/2004 laying down the framework for the creation of the SES (Regulation 549/2004). This states that:

The national supervisory authorities shall be independent of air navigation service providers. This independence shall be achieved through adequate separation, at the functional level at least, between the national supervisory authorities and such providers.

B.9 The regulation goes on to state that NSAs are not prevented from 'exercising their tasks within the rules of organisation of national civil aviation authorities or any other public bodies'.

B.10 In our view, the Regulation does not provide for the same degree of independence from either the relevant service provider or government authority enjoyed by other regulators. In particular, it appears to enable NSAs to operate under the same governance and organisational structure as their corresponding ANSPs or government departments. This is in contrast to the position in the European rail sector, as set out in Article 55 of Directive 2012/34/EU establishing a single European railway area, which states that:

Each Member State shall establish a single national regulatory body for the railway sector… this body shall be a stand-alone authority which is, in organisational, functional, hierarchical

and decision-making terms, legally distinct and independent from any other public or private entity. It shall also be independent in its organisation, funding decisions, legal structure and decision-making from any infrastructure manager, charging body, allocation body or applicant. It shall furthermore be functionally independent from any competent authority involved in the award of a public service contract.

B.11 We suggest that the introduction of similar provisions into the framework of legislation governing the SES would considerably strengthen the independence of NSAs. However, since this would clearly require a change to Regulation 549/2004, it is not within the scope of measures for consideration in this study, although we recommend that it is considered further in preparation for RP4.

Alignment of geographical scope of targets and performance plans

B.12 Various measures have been put forward for aligning the geographical scope of targets and performance plans, including preparing plans at the FAB level while setting targets at the national/charging zone level and excluding FABs from the performance planning and targeting process. However, we suggest that the approach set out in paragraphs 4.17 to 4.19 provides for greater consistency while ensuring that Member States can continue to capture the benefits of planning at the FAB level where they choose to do so.

Exclusion of safety management effectiveness from the Performance Scheme

B.13 We considered the arguments for excluding safety management effectiveness from the Performance Scheme, but concluded that it was important to retain a leading indicator of safety within the measurement framework. The absence of such a metric would place undue reliance on CANSO and EASA to promote a consistent approach to measurement, and on the broader regulatory framework for reporting.

Measurement of flight predictability

B.14 Eurocontrol also considered the case for monitoring the value of KEP minus KEA (see paragraph 4.32) as a measure of flight predictability, but concluded that this would not be a meaningful exercise. In principle, a reduction in the value might indicate an improvement in predictability (with actual flight efficiency more in line with the plan). However, in practice a reduction might reflect an increase in KEA (i.e. a reduction in the efficiency of the actual trajectory). Hence, the measure could lead to perverse incentives and should not be taken forward for inclusion in the performance Scheme.

Measurement of Flexible Use of Airspace

B.15 In our view, there would also be value in measuring flexible use of airspace (FUA) using metrics already defined in the European Route Network Improvement Plan (Part 3, Airspace Management Handbook – Guidance for Airspace Management). Stakeholders representing military organisations have noted that significant cost is involved in providing for FUA, and some quantification of the associated benefits is required to determine whether this is justified. There are five measures of FUA use rates in the Airspace Management Handbook that could be used for this purpose:

- the rate of CDR availability, which captures average availability within a given time period (with daytime and night time periods weighted in the calculation to take account of the limited amount of traffic operating at night);

- the rate of airspace availability, representing the percentage of reserved/restricted airspace opening in total time within a given time period (similarly weighted to take account of the limited amount of traffic operating at night);
- the rate of aircraft interested, representing the average number of aircraft interested in filing flight plans that take advantage of an available CDR or unallocated reserved/restricted airspace;
- the rate of actual use of an available CDR or reserved/restricted airspace during a given time period, expressed as a percentage of the number of potential users; and
- the time window of availability, calculated as the number of occasions on which a CDR or reserved/restricted airspace was opened for a defined time threshold (e.g. selected to reflect the minimum time required for flight planning).

B.16 However, to provide a meaningful indicator of the take-up of airspace released to civil users, these metrics would need to be supplemented by additional information on the level of demand prevailing at the time. In addition, accurate measurement would require provision of decisions affecting route availability to the Network Manager, and we understand that at present such information is not always provided in a timely manner. We have therefore concluded that it would not be appropriate to introduce an indicator of FUA in RP3, although this could be considered for future Reference Periods.

Additional measures of capacity

B.17 We note that stakeholders have suggested that new measures of capacity, for example measures of en-route and terminal airspace capacity, be introduced as soon as possible. However, there is general recognition that no suitable measures currently exist, and we consider that the timescales for their development would not allow their introduction in RP3. We nevertheless suggest that such measures could provide valuable information, helping to improve the industry's understanding of the relationship between costs, capacity provision and demand, and that work should be undertaken to develop suitable metrics for trial in RP3 or RP4.

Annual adjustment of charges based on regulatory monitoring of capital expenditure

B.18 We describe under Option B a mechanism for scrutinising the capital expenditure of ANSPs and adjusting charges in the event of inefficient underinvestment (see paragraphs 4.48to 4.51). This approach draws heavily on proposals put forward by IATA in anticipation of RP3. However, it differs in at least one important respect, namely that it envisages an assessment of the efficiency of capital expenditure over the entire Reference Period, with payments adjusted retrospectively as necessary rather than on an annual basis (although capital expenditure would be monitored each year). In our view, an annual adjustment of charges would be unduly restrictive and could give rise to perverse behaviour since:

- circumstances can change such that any organisation undertaking substantial capital investment may need to change the balance between capital and operating expenditure in the interests of greater efficiency (e.g. due to a change in relative prices);
- similarly, it may be appropriate to bring forward or postpone capital investment to secure prospective cost savings that could not be foreseen at the time the original investment plan was prepared; and
- the threat of a price adjustment as a result of a failure to undertake capital expenditure or complete investment programmes in line with a plan could encourage compliance with the plan even where this was inefficient for the reasons given above (e.g. an ANSP could

decide to undertake expenditure to meet the level defined in the plan, notwithstanding the potential to secure savings by postponing it).

Further devolution of regulatory authority

B.19 We describe under Option C1 a framework for devolving authority to design both traffic risk sharing and incentive mechanisms to the NSAs (see paragraphs 4.54 to 4.60). In principle, it would be possible to devolve more responsibility to NSAs, allowing them greater freedom to design risk sharing and incentive mechanisms that fully reflect the capacity constraints and relative levels of cost-efficiency faced by their respective ANSPs. However, we consider that there are risks in further devolution of regulatory authority in circumstances where the capabilities and degree of independence of NSAs varies considerably across Europe. We would expect well-established NSAs, which are relatively well-resourced and have a strong track record in the development and implementation of regulatory mechanisms, to respond effectively to the flexibility offered under this option. At the same time, NSAs that have more limited resources and are not yet fully independent from an ANSP are likely to find the development of coherent risk sharing mechanisms challenging.

B.20 In addition, it is clearly important to maintain the integrity of a regulatory framework designed to encourage the development of a European system. Further devolution of regulatory powers and responsibilities would risk undermining the timescales underpinning the approval and monitoring of performance targets and charges and, as already noted, add to the complexity of the framework. This would make it more vulnerable to procedural delays and regulatory challenge.

B.21 For these reasons, we have not considered a further extension of devolution. In addition, we consider that retaining a default traffic risk sharing mechanism that can be applied where NSAs do not have the capability to design, and secure support for, a bespoke arrangement, is important. In time, the need for a definition of the default position may diminish as NSAs become better skilled and resourced, but this will need to be tested in subsequent Reference Periods.

C Analysis of stakeholder consultation

Stakeholder views on policy measures considered

C.1 We present below the views of the different groups of stakeholders on the measures that were presented to them. The stakeholders were contacted early in the study, before the options were defined. As a result, stakeholders were consulted on measures, which for convenience were grouped into packages.

C.2 In Chapter 4 we have identified the measures that are included in each option. We present below the views of stakeholders based, as far as possible, on this allocation of measures to options, but note that it is not always possible to disaggregate high level responses provided by some stakeholders. We also note that:

- Not all stakeholders within the same group (i.e. ANSPs or airspace users) share the same views. National and business circumstances vary and explain different views.
- In many cases, the questions asked were complex and in some cases, addressed in more depth by trade representatives who were more able to provide detailed responses than individual respondents. It is not clear whether and how much their members were consulted before the drafting of the response, and hence whether the response is representative of the views of member organisations. For the purposes of the figures below, we have given no more weight to the views of representative organisations than to those of other stakeholders.
- As measures were "packaged" together for consultation on some of the topics presented below, respondents provided responses that sometimes were not "in-favour" or "against" but instead indicated support to some measures alongside disagreement for others. This is why the number of responses from NSAs and ANSPs shown in the graphics of this appendix can be smaller than the total respondent sample, as many of them could not be seen as entirely "in favour" or "against". Some respondents also did not provide a view on every package of measure either.

Option A

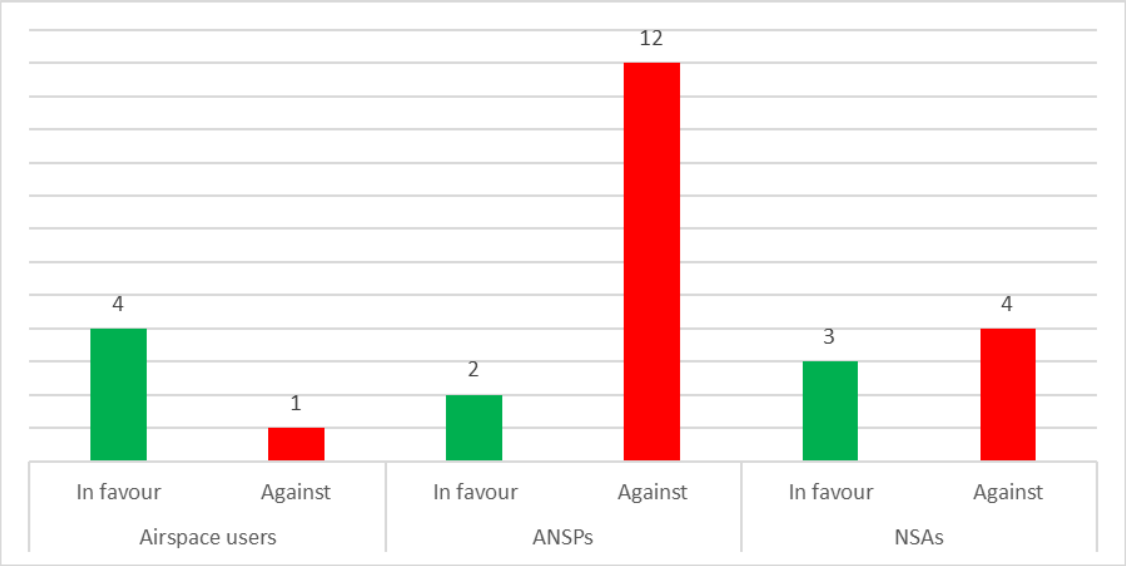
Better integration with network functions

C.3 Stakeholders were asked about their views on changes related to:

- The Network Manager: requiring the Network Manager to update capacity plans in line with Network Operations Plan cycle (every six months), ensuring consistency with Union-wide targets and taking account of latest traffic forecasts and introducing a Network Manager 'delay budget';

- Traffic forecasts (traffic forecasts to be consistent with STATFOR forecasts and consistent across KPAs, range of traffic forecasts to be consistent with alert thresholds and traffic risk sharing parameters, and for performance plans to include a range of traffic forecasts within which plans and local targets remain valid); and
- The introduction of a hierarchy of responses if local capacity targets are not met, including corrective measures, performance incentives (if applied), NSA sanctions (coupled with revision of performance plan if considered appropriate) and escalation to Commission on advice of PRB.

Figure C.1: Better integration with network functions



Source: Steer Davies Gleave analysis of stakeholder responses

Table C.1: Better integration with network functions rationale

Stakeholder	In favour	Against
Airspace users	The only way the performance scheme can work is if the service provider knows there will be sanctions/fines for poor performance, they will change behaviour. There must be a role for the Network Manager, as they are the one who can identify the capacity shortfall and start the discussion with the service provider. The NM proposes solutions but far too often the service provider simply ignores the proposed solutions. The escalation should be directly to the NSA at the same time as the escalation to the Commission. Transparent and more dynamic capacity adjustment is supported through alignment between the performance plans and NOP. The ability to transparently see where service providers plan to generate unacceptable delay will allow more targeted mitigation. Enhanced consultation mechanisms between stakeholders and Statfor will support application of the Statfor base case scenario as the mandated basis for capacity planning. We consider that the role of the Network Manager (as well as the role of the PRB) is, for the time being (RP3), defined in an acceptable way by the current SES legislation but it is not actually implemented. The role of NM shall be strengthened - the NM shall be covered by an individual performance plan and therefore, be responsible for achieving the PP's KPI's. The Network Manager must be given enough resources to effectively carry out this mission, but also to ensure that its recommendations are followed.	The creation of a Network Manager delay budget is not supported - it will become a form of "uncontrollable delay" that can distort achievement of performance targets. Constantly modifying the national performance plans under “Network Manager updates capacity plans in line with Network Operations Plan every six months” is not practicable (higher administrative burden and costs, increased complexity).

Stakeholder	In favour	Against
ANSPs	Regarding the creation of a NM 'delay budget', we support this in principle. A mechanism to recognise that an ACC may generate excess ATFM delay where a neighbouring ACC needs to unload traffic due to events or issues is welcome. However, there are concerns that the required mechanisms for determining delay budgets and identifying qualifying traffic and events are likely to be complex and transparency, and therefore acceptability, difficult to ensure. Further work is needed prior to deciding on such an approach. We agree that a level of consistency between performance plans and the NM Network Operations Plan (NOP) available in the year of the establishment of the plans should be ensured.	We do not support a rigid hierarchy of responses if local capacity targets are not met. The conditions for invoking the responses and the nature of those responses should be up to the NSA to define locally (e.g. corrective actions will not always be necessary, if a performance shortfall is temporary or due to exogenous non-recurring events). We consider that NSAs should continue to have discretion to adopt a traffic forecast different to STATFOR's, provided that any differences are well evidenced and justified and consulted. We do not support the creation of a NM 'delay budget', or the various corrective and other mechanisms proposed. The inclusion in performance plans of a range of traffic forecasts within which plans and local targets remain valid seems overly burdensome. NSAs have the ability to set local alert thresholds, which should be sufficient to trigger a review and potential revision of the PPs. The conditions and processes associate with this provision (in Article 19 of the current Performance Regulation) should be clarified. Local discretion should be exercised to apply an alert mechanism / re-open plan, rather than a rigid test. For example, changes in traffic patterns rather than traffic growth might create challenges to deliver performance within a target and be grounds to adjust the Performance Plan. This is not in line with the objective to reduce the administrative burden. The measures listed seem to set up the NM as a pseudo-regulatory function which would prejudice the work and responsibilities of the NSA. We do not support such a blurring of responsibilities. The NM should have a more clearly defined support function. Overall, most of the identified initiatives in this package would result in an increase in complexity, lack of transparency and an increase in administrative burden – in clear opposition to a number of key objectives of the Commission.

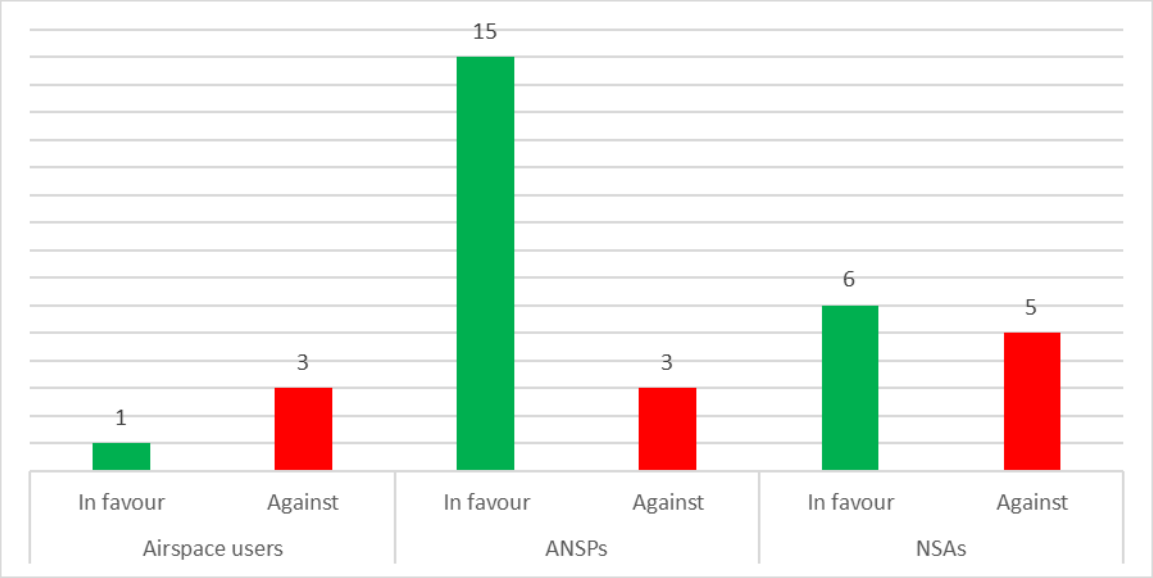
Stakeholder	In favour	Against
NSAs	The creation of a NM 'delay budget' can solve some the issues identified during RP1 and RP2. However, the new system and its mechanisms require further developments and clarifications. We are in favour of using STATFOR and believes that all Member States shall use the same scenario. Our opinion is that the capacity issue should be prioritised in the areas of Europe where the potential for improvements is biggest. We would prefer not to make the system more complex to reach improved capacity, one size does not fit all, so local conditions should be considered.	Deviations from STATFOR forecasts should be possible with proper justifications. The proposal on a hierarchy of responses if capacity targets are not met has many weak points. Firstly, it assumes that the NM knows best what are the required actions in every circumstance. This could not always be the case. Secondly, it assumes that all actions proposed only affect the ANSPs because the proposal is based on the NOP cycle which up to now only includes NM and ANSPs on a collaborative approach. However, some measures could affect third parties such as regulators, military, etc. The possibility to enforce measures and even impose sanctions on the foundations of the sole assessment of the NM is both partial and worrisome. It also raises accountability implications. In addition, there are already similar mechanisms that can be applied whenever performance drops are continuously witnessed, like Article 18 of Regulation 390/2013. Every attribution given to the NM must be subject to the corresponding responsibility and accountability. The changes proposed modify the balance between NM and ANSPs and can also affect other parties. However, this responsibility and accountability of the NM is nowhere to be seen in the set of proposals: the NM can eventually enforce actions and suggest sanctions based on their analysis of the impact of the measures proposed by ANSPs. Without even discussing the fact that NM estimates are not fully transparent, this measure related to enforcement carries a cost (investments, resources, etc). What if these enforcement actions prove to be not relevant or not enough to meet the target? If the NM has no accountability, at the end of the day it is the ANSPs (and potential third parties) who will carry the costs, and it will be the ANSPs who will be penalized through the capacity incentive mechanisms. This is simply not acceptable. Reopening of performance plans could be avoided to a great extent by implementing of changes in traffic-risk sharing and inflation risk sharing profiles versus the way they are applied today.
Others		

Better performance planning and targeting

C.4 Stakeholders were asked about their views on a number of measures, including preparation of performance plans and setting of targets at the national level, requirement for NSAs to include

an explanation of the initiatives in place or being developed to support cross-border coordination and the provision of cross border services, requirement for NSAs to report on past and expected progress in deployment of SESAR common projects and requirement for NSAs to provide specific inputs to the Network Manager prior to the setting of Union-wide targets on particular local conditions expected to constrain performance in any KPA.

Figure C.2: Better performance planning and targeting



Source: Steer Davies Gleave analysis of stakeholder responses

Table C.2: Better performance planning and targeting rationale

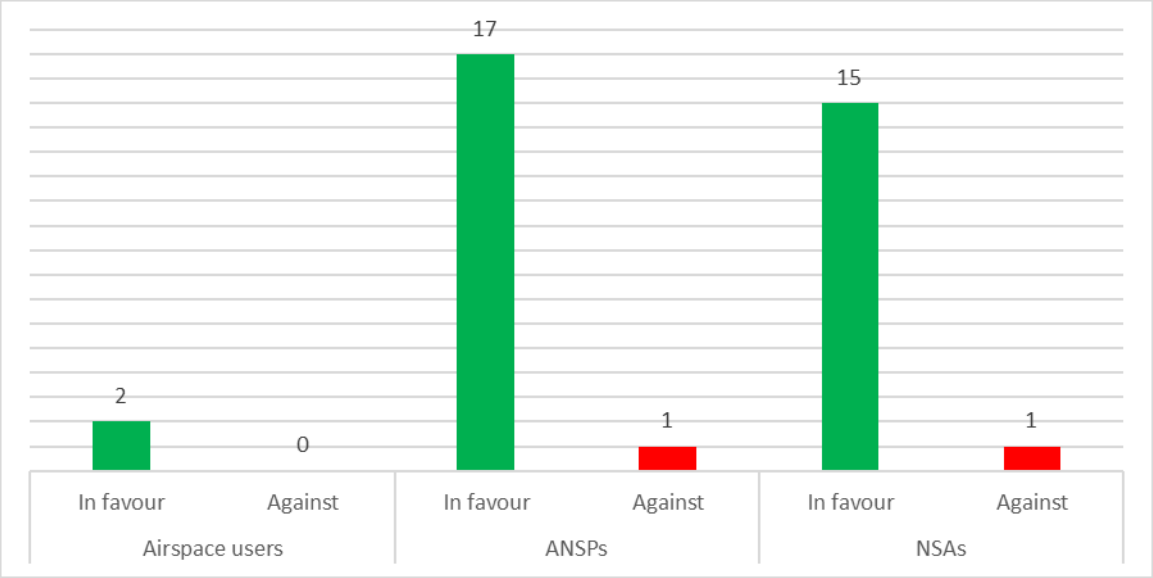
Stakeholder	In favour	Against
Airspace users	Properly resourced NSAs certified by the PRB will enhance NSA capability to support the PRB;	We request a European economic regulation to deliver a cost-effective ATM service provision at Network level. A fragmented economic regulation provided by NSAs is certainly not a solution to a fragmented monopolistic ATM service provision. The tasks described should be performed by the European Commission with the effective support of the PRB as it is foreseen in the current legislation. The current description of tasks will lead to further fragmentation of expertise and resources leading. This is definitively not a better performance and targeting process and will inevitably increase the complexity. The relationship between the NSA's and the ANSP's is far too cosy to allow for Target Setting and Monitoring at National/FAB level. The only monitoring proven to be effective is monitoring by the Network Manager and enforcement by the Commission Legislation through the NSA.
ANSPs	We support the proposal that locally "binding" targets should to be determined at the local level by NSAs, based on (local) conditions and customer consultation and NSA analysis. Targets should not seek to optimise performance in all KPAs as this will result in an unbalanced and unrealistic set of targets as a whole. Interdependencies must be taken into account in order to establish a coherent and balanced target set across the KPAs. Coordination between NSAs and the NM should be officially established for RP3. An enhanced role for the NM in performance planning should be considered, including the ability to comment on capacity plans or provide opinions to the ANSP and relevant NSA. It is important however that the NM does not have a quasi-regulatory role. In addition, the EC should consider how best to ensure cross-border coordination particularly in capacity planning and the integration/ facilitation of SESAR led investments. We support the mixture of bottom up and top down processes to establish the target ranges.	We consider that reporting on past and expected progress in deployment of SESAR common projects falls within the SESAR Deployment Manager's remit. It is not clear what additional benefit mandating NSAs to submit such reports would bring. Performance plans at national level may counteract cross-border initiatives to improve performance. We agree only on preparation performance plans and setting of targets at national level. We DO NOT agree on the other roles proposed for NSA here. We rather believe in flexible application of EU wide targets on local target setting (as it is done in many cases currently), instead of believing in a perfect forecasting ability which takes into account all of the local issues with a proper weighting (as de-facto assumed in the questionnaire).

Stakeholder	In favour	Against
NSAs	Significant improvements to the target setting process are required, especially in terms of recognition of interdependencies between KPAs/KPIs, and in terms of taking into account local circumstances. We support the recognition of local conditions in the setting of targets. A one size fits all approach does not take into account local circumstances and constraints. National individual cost-eff. targets based on previous years contribution to the EU-wide target (RP1 and RP2) should be taken into consideration before setting national targets. In the targeting process one important parameter should be the achievements already made during RP1 and RP2 for each Member State. We are in favour of an improved process regarding planning and targeting. It is important that the targets are decided well in advance to allow both ANSPs and the member states the relevant time to plan and prepare the performance plan.	Reducing the Performance Plans to national level would negate the added value brought by coordination within FABs, especially on operational KPAs. Reporting on SESAR deployment is done through LSSIP - and may also involve the SDM. Please do not mix up with the Performance Scheme. This would require significant additional resources for the NSA, and without a proper mandate it may not be feasible to proceed. The worst-case scenario is for an NSA to proactively develop sensible sustainable local targets, and then see PRB/Commission completely ignore/set aside this work. As well as being a waste of resources, it would seriously undermine the NSA role. We prefer to keep the planning process as it was for RP2
Others		

Simplification and clarification

C.5 Stakeholders were asked about their views on a reduction of data reporting requirements in Annex V of the Performance Regulation, and in Annexes II, III, VI and VII of the Charging Regulation, on the provision for more explicit treatment of publicly funded capital costs in determination of unit costs in Annex II of the Charging Regulation, on clarification of the process for applying initial unit rates prior to approval and on clarification of the specific transparency requirements relating to market conditions in Annex III of the Charging Regulation.

Figure C.3: Simplification and clarification



Source: Steer Davies Gleave analysis of stakeholder responses

Table C.3: Simplification and clarification rationale

Stakeholder	In favour	Against
Airspace users	We support clarification of "applying initial unit rates prior to approval "and "specific transparency requirements relating to market conditions in Annex III of the Charging Regulation". Clarification should also be provided for many other items, such as reporting of data regarding "Common projects" and "CEF Funds". We support "reduce data reporting requirements" ONLY when there is duplication. More clarification needs to be provided to reduce data reporting requirements in Annex V of the Performance Regulation, but the data provided must contain the data set specifications laid out in 2.1 (a,b) of Annex V of the Performance regulation. We support Eurocontrol PRU, CRCO and the EC to align data submission (deadlines) to minimize NSA's reporting requirements and to ensure that full data is received by the stakeholders in a timely and complete manner.	Reducing data reporting requirements in Annexes II, III, VI and VII of the Charging Regulation is not supported as the data is essential for unit rate calculations.
ANSPs	A general clarification of the roles and boundaries of the NM, PRB and NSAs would also be helpful. The data reporting requirements in Annex V should be limited to those elements needed in order to evaluate and monitor performance in the context of the performance and charging schemes. We consider that the processes and conditions for invoking alert mechanisms should also be simplified. A transparent mechanism needs to be developed for the treatment of funded capital costs. There should also be a general analysis for simplification possibilities in the accounting and reporting requirements. Areas for optimisation are e.g. - a modification of the reporting tables, especially the calculation and reporting of the cost of capital in the reporting tables should be excluded from the determined cost, but treated as part of the chargeable unit rate. - where resources of an ANSP are used by en-route and terminal together, there should be a reporting line "cost-allocations".	Regarding transparency requirements relating to market conditions in Annex III, these should only be considered for RP4 as contestability assessments are already starting and if the requirements now change there won't be enough time to complete before the submission of PPs for RP3. There seems no need for amendments in Annex III of the Charging Regulation as regards to market conditions. However, it shall be noted that Annex III table B for airports reports only the contract price with ANSP. Airport needs to cover also other expenses for equipment etc. to enable ANS at the airport. If APP services at the airport are provided in market conditions the cost allocation between en-route costs and TN-costs should be considered. We would not support a mechanism in which public funds are passed to airspace users through a reduction in the depreciation charge. This is not transparent. In passing funds back, mechanisms to account for exchange rate fluctuations (so that the value of funds received is fully passed to users), and situations in which funds are returned to INEA should be developed. Funds which were applied for while the RP2 framework was in force should be treated in the same way, regardless of whether they are received in RP2 or RP3.

Stakeholder	In favour	Against
NSAs	Strongly support steps that simplify and clarify the application of the performance scheme Strongly support provision for more explicit treatment of publicly funded capital costs Support clarification of process for applying initial unit rates prior to approval Particularly support clarification of the reporting requirements relating to market conditions under Annex III of the Charging Regulation - in completing this for the first time in 2017 (in relation to 2016), we found there was a lack of clarity as to what was required, the definition of the units used in the template and difficulties in applying these to the different scenarios that may exist across terminal services. From an NSA perspective, it is positive to have more guidance in particular regarding the treatment of publicly funded capital costs in determination. Also regarding the process for applying initial unit rates prior to approval.	Reporting requirements have not been a significant burden and should remain without new alterations.
Others	Clarifying the specific transparency requirements relating to market conditions in Annex III of the Charging Regulation would address a clear weakness of current system.	

C.6 We present below all the simplification measures that have been suggested by stakeholders.

Figure C.4: Simplification measures suggested by the consultation participants

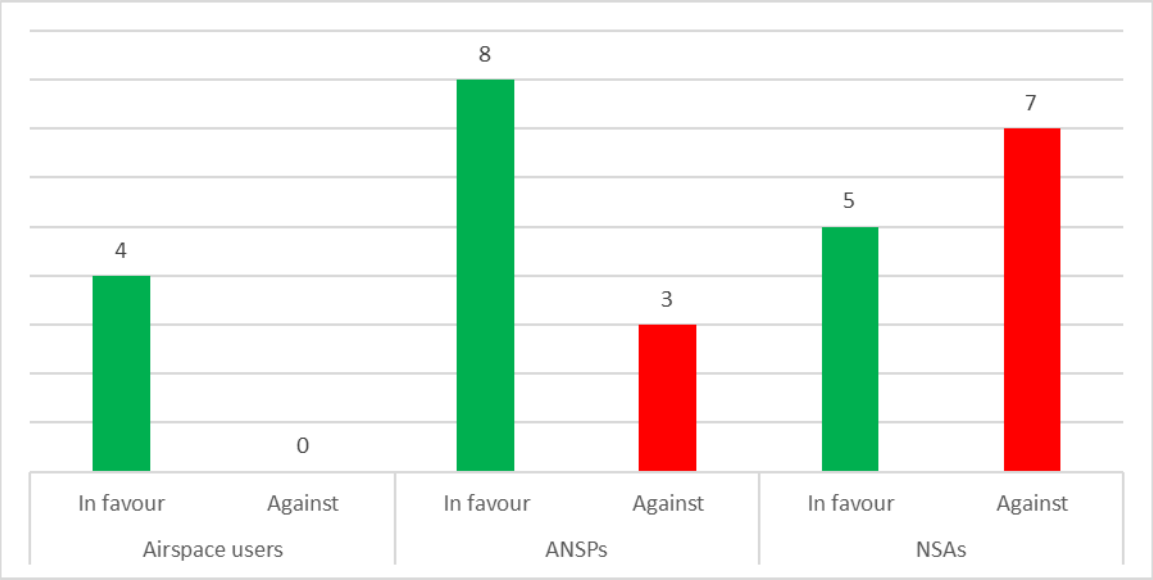
Respondents	Simplification suggested
ANSPs	The data reporting requirements in Annex V should be limited to those elements needed in order to evaluate and monitor performance in the context of the performance and charging schemes. The alignment of CRCO's billing system with the regulatory cycle would also add clarity and streamline consultative processes. Duplication of efforts to report on other data for different reports should be avoided (ICAO EUR Perf. Framework, ACE, PRR, etc.) There should also be a general analysis for simplification possibilities in the accounting and reporting requirements. Areas for optimisation are e.g. - a modification of the reporting tables, especially the calculation and reporting of the cost of capital in the reporting tables should be excluded from the determined cost, but treated as part of the chargeable unit rate. - where resources of an ANSP are used by en-route and terminal together, there should be a reporting line "cost-allocations". It shall be noted that Annex III table B for airports reports only the contract price with ANSP. Airport needs to cover also other expenses for equipment etc. to enable ANS at the airport. If APP services at the airport are provided in market conditions the cost allocation between en-route costs and TN-costs should be considered.
Others	Reporting requirements in annex V could be simplified by reference to standards and made less onerous by using information already available in NM wherever possible.

More effective measurement of performance: safety

C.7 Stakeholders were asked for their opinions on:

- The introduction of a new PI for en-route airspace productivity, measuring capacity utilisation by reference to declared and unconstrained capacity;
- The introduction of a new PI for terminal airspace productivity – specification of metrics as for en-route; and
- The introduction of a new KPI capturing the Network Manager's contribution to performance.

Figure C.5: More effective measurement of safety performance



Source: Steer Davies Gleave analysis of stakeholder responses

Table C.4: More effective measurement of safety performance rationale

Stakeholder	In favour	Against
Airspace users	Safety is paramount in the ATM service provision and recommendations of EASA are to be implemented. The handover of air navigation safety performance activities from Eurocontrol to EASA must be fully completed before the commencement of RP3. For RP3, safety metrics must develop beyond merely process and rule compliance to a risk basis.	We cannot agree to the use of the CANSO standard, we must use the EASA standards.
ANSPs	We support the work and report of the EASA WG. The use of Standard of Excellence and SRMP is supported	We do not support the use of automatic safety data acquisition tools for the purpose of monitoring and benchmarking safety performance within the scope of the Performance Scheme. Responsibilities are to remain unchanged. A common reporting tool is to be used. Formal responsibility for safety monitoring should remain within the remit of the NSAs. We DO NOT support this proposal. If safety severity classification would be as PI that might lead to undesired behaviour if classification would be made aiming to optimise PI. Safety monitoring should take place closer to actions on national level in order to enable prompt actions as required. RAT should be exploited not only through the quantitative parameter but also through the qualitative. In order to do so, assurance of correct understanding of the tool through EASA AMC and/or training should be achieved. Just Culture questionnaire should be reconsidered in order to better reflect a top down approach instead of bottom up, subject to the influence of Ministries of Justice on the issue. Method of EASA through monitoring by "thorough" and "light" verification should be re-evaluated in order to reflect real time situation on safety. Also, ICAO audit results should be considered in parallel.

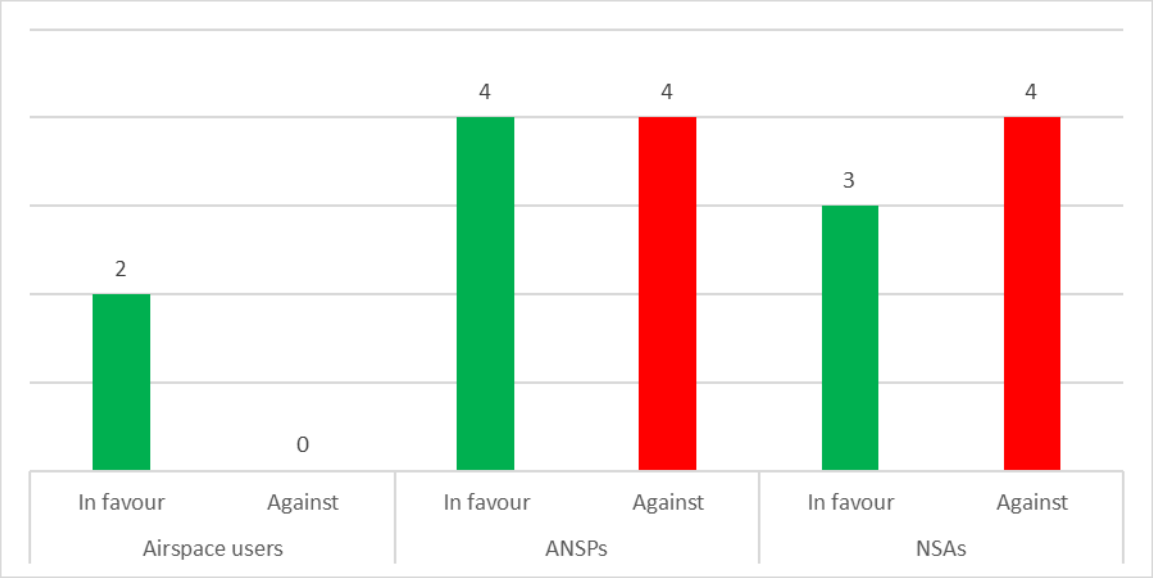
Stakeholder	In favour	Against
NSAs	We highly support the development of an EASA leading indicator to assess the performance of the ANSP's SMS, rather than using CANSO's. Safety in the EU should be kept under the umbrella of EASA and the application of the NSAs at National level. In this line, NSAs should continue being the ones responsible for the oversight and verification of this leading KPI at local level, making use of AMC and GM from EASA. Standardisation initiatives from EASA would contribute to a common understanding and assessment of the KPI Use of either EASA or CANSO tool is supported in principle; in particular, we want to ensure there is no overlap/double-reporting between the performance scheme and EASA requirements. At the same time, we have some concerns about EASA's role in the RP2 monitoring process which would need to be addressed first (e.g. difference in scope between indicators as applied at national level or as reported by EASA).	The monitoring of safety should be performed by the NSA because the NSA knows the local environment and can easily access data from ANSPs. EASA should be the overseer of the NSA and this state of affairs should be retained.

More effective measurement of performance – environment

C.8 Stakeholders were asked to provide views related to:

- The use the flight efficiency of the actual flight trajectory as the KPI and relegate the efficiency of the planned trajectory to the level of PI;
- The introduction of a new vertical flight efficiency metric as a PI;
- The introduction of a new shortest constrained route indicator as a PI; and
- The introduction of a new measure of use of released military airspace.

Figure C.6: More effective measurement of environment performance



Source: Steer Davies Gleave analysis of stakeholder responses

Table C.5: More effective measurement of environment performance rationale

Stakeholder	In favour	Against
Airspace users	We agree with a new measure of use of released military airspace as a timely notification of airspace is important. A gate-to-gate approach is essential for the improvement of environmental performance across European airspace. We suggest KPI such as: • En-route-TMA-Airport (Gate-to-Gate fuel burn); • En-route Shortest Constrained Route (SCR); • En-route identification and quantification of constraints to environment performance due mandatory ATFM scenarios; • TMA identification and quantification of constraints to continuous descent/climb operations • TMA arrival sequencing and metering area (ASMA); • Airport taxi-in and taxi-out times.	We strongly disagree with the use of the flight efficiency of the actual flight trajectory as the KPI and relegate the efficiency of the planned trajectory to the level of PI: the planned trajectory is what the Airspace User has built into its cost structure. The measurement of use of released military airspace is not supported, there is much complexity around this application of FUA and the airspace release maybe during a time that AO cannot utilize it, e.g. after departure of the aircraft, similarly the airspace release may also be captured at a time that is not consistent with its need e.g. 0200 when nothing is flying. Having a shortest constrained route as a PI may result in aircraft operators being criticised for not choosing the shortest route.
ANSPs	Regarding KEA KPI, we consider that this should take into account airspace user preferences, so that ANSPs are not penalised for decisions outside of their control, e.g. deviation from flight plan, rather than deviation from most direct route. Some consideration is also needed whether this is a good indicator where ANSPs operate Free Route Airspace. We support a vertical flight efficiency metric in principle, but would need additional information on the proposed indicator and calculation mechanism before being able to evaluate its merits. A new PI based on the shortest constrained route could be useful and should be developed further. We believe there may be merit in developing measures on the use of military airspace. More effective measurement might help ensure there is a clearer delineation, and where ANSPs have taken all reasonable measures in respect of efficiency, capacity and environment, they are not inadvertently held accountable (by the performance scheme) for matters outside of their control.	We propose to replace the ANSP KPI for Environment by an indicator measuring the shortest route available as enabled by ANSPs also taking into account all ANSP constraints during the way. The transparency of military airspaces and the cost-optimised planning by aircraft operators (criteria route charges / wind) would be rightfully excluded. A lot of research is still necessary to develop ENV indicators, and we recommend to not repeat the Average Taxi-out / ASMA failure.

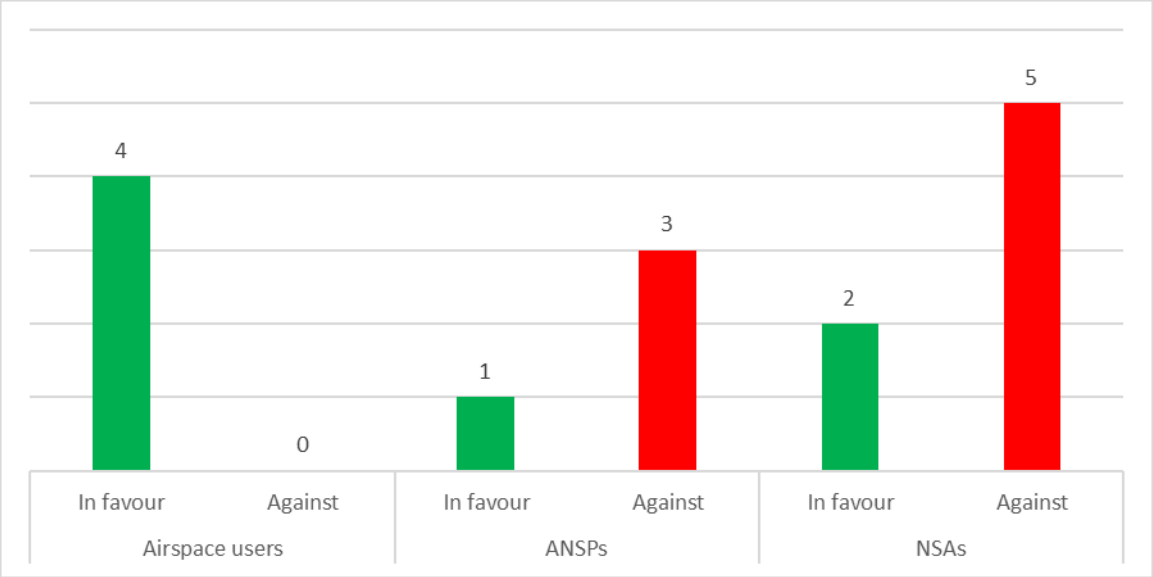
Stakeholder	In favour	Against
NSAs	Firstly, ENV KPIs are in the hands of airspace users, and therefore are of limited value in terms of judging ANSPs performance. Secondly, they cannot be calculated and therefore managed by the ANSPs, since the algorithms are the property of the Network Manager. We agree on the use the flight efficiency of the actual flight trajectory as the KPI and to relegate the efficiency of the planned trajectory to the level of PI. Measuring civil use of released military airspace is very much supported. We are in favour of a full "gate-of-gate" perspective. Hence we are positive to introducing a new PI for vertical flight efficiency.	Indicators on vertical flight efficiency do not seem sufficiently mature for application in RP3.

More effective measurement of performance: capacity

C.9 Stakeholders were asked to provide views related to:

- The introduction of a new PI for en-route airspace productivity, measuring capacity utilisation by reference to declared and unconstrained capacity;
- The introduction of a new PI for terminal airspace productivity – specification of metrics as for en-route; and
- The introduction a new KPI capturing the Network Manager's contribution to performance.

Figure C.7: More effective measurement of capacity performance



Source: Steer Davies Gleave analysis of stakeholder responses

Table C.6: More effective measurement of capacity performance rationale

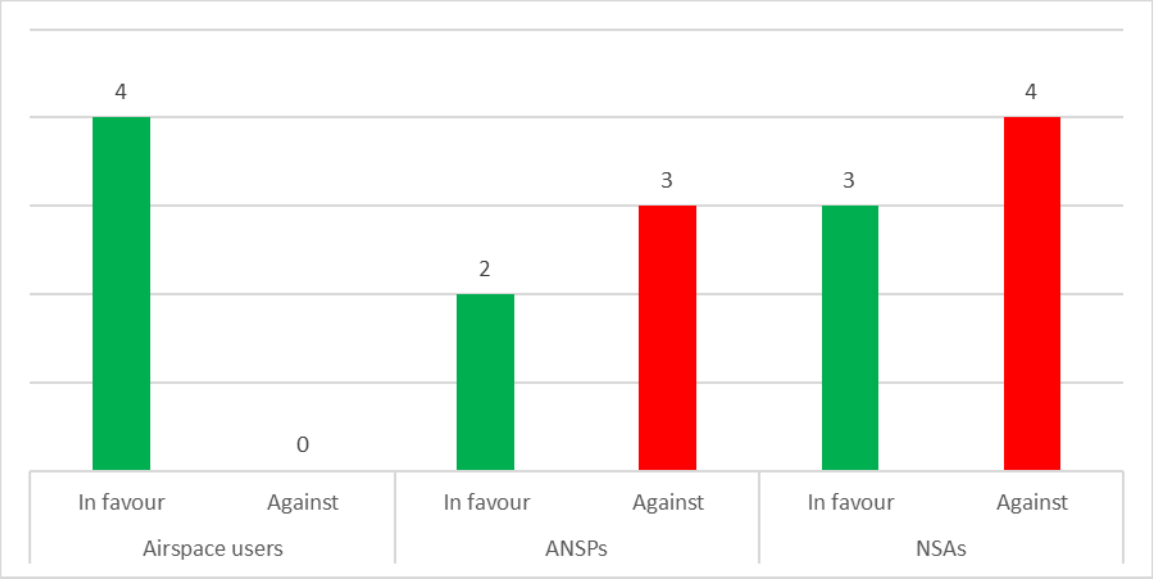
Stakeholder	In favour	Against
Airspace users	To achieve improved capacity performance from European service providers, it is essential that metrics are established with targets for all phases of flight; en-route, terminal and airport. For all phases of flight, it is essential that all delay targets are correlated with an airspace productivity metric to measure the relationship between the actual performance versus that which was planned and paid for, to ensure that targets are not achieved through the application of costly ATFM measures at the expense of the customer. The capacity target for RP1 and RP2 at an average en-route air traffic flow management (ATFM) delay per flight of 0.5min/flight per calendar year is considered to be a suitable overall for RP3. Measurement for peak period performance is an essential requirement to understand system performance A transparent appeal mechanism under the supervision of the EC must be provided.	
ANSPs	We consider that the capacity KPA target should be assessed in the light of the actual traffic evolution vs. the planned traffic as forecast in the performance plan. We consider that the current KPI based on ATFM delay would remain a valid indicator. However, it is recognised that it measures inefficiencies and therefore lacks any measure of output or productivity in order to provide a complete picture of the capacity service provision of ANSPs. We therefore support, in principle, the development of a capacity PI to provide some form of 'proper' capacity measure. This could be some form of capacity utilisation (service rate vs. declared capacity) or productivity (output/input measure). We support a measure of NM contribution to network performance. NM performance must be clearly differentiated from ANSP contributions to individual State performance. We believe that current methods are not sufficient to demonstrate this, and therefore question the practicalities of this proposal. ANSPs have to make their decision on capacity provision several years before eventually this capacity can be provided (criteria are training of ATCOs 3-5 years; developing next generation of ATS support functions 5-15 years). A performance scheme drives the right behaviour if it considers these framework conditions and the individual ANSP situation when selecting indicators and setting targets. An indicator like a service level agreement on flight hours controlled per year put in context with a demand ratio, based on the traffic forecast at the moment when ANSPs have to make their decision on capacity provision (e.g. at the time of PP development), would be an appropriate approach.	In principle, any KPI used as basis for targets, whether financially incentivised or not, should be adjusted to ensure that they cover only factors that are within the control of the ANSP. We consider that the KPI of ATFM delay per flight should be refined to cover only those causes that are under the ANSP's control, e.g. the C, R, S, T, M, P delay causes. We DO NOT see the need for PI for terminal airspace productivity

Stakeholder	In favour	Against
NSAs	A PI should be developed to capacity "produced" by ANSPs, based on what was known at the time of writing the performance plans. This could alleviate the problem of delays put solely on ANSPs responsibility while other stakeholders also play an important role. In fact, a given ANSP could be in a position where it has offered the capacity that was planned to be required but traffic shifts to another region of its airspace and delays are generated even though the ANSP has done its part. Rather than indicators on the airspace productivity, we advocate to consider the above proposal on incentive, that allows taking into account the offered capacity without deleting the principle of an incentive linked to ATFM delays (en-route and terminal) and that somewhat hinges the role of the NM under regulation 677/2011 and the Performance Scheme.	A new PI for en-route airspace productivity - need further details about how this would work. This would appear to move measurement nearer to inputs rather than outcomes. Would this introduce scope for perverse incentives - for example, to keep sectors open even when not required? There are several other questions that we'd seek further consideration of before being able to make an informed judgment - for example, is the challenging part having a meaningful measure of en route capacity? At what level of airspace aggregation? Would this depend on the patterns of traffic and therefore change even with known fluctuations - weekdays v weekends? Would the interpretation of good and bad be based on some target level of utilization which is not too constraining on the one hand or expensive on the other? Would this be the same in all cases?

More effective measurement of SESAR performance

C.10 Stakeholders were asked about the introduction of a change management indicator enabling tracking of change delivery related to SESAR deployment.

Figure C.8: More effective measurement of SESAR performance



Source: Steer Davies Gleave analysis of stakeholder responses

Table C.7: More effective measurement of SESAR performance rationale

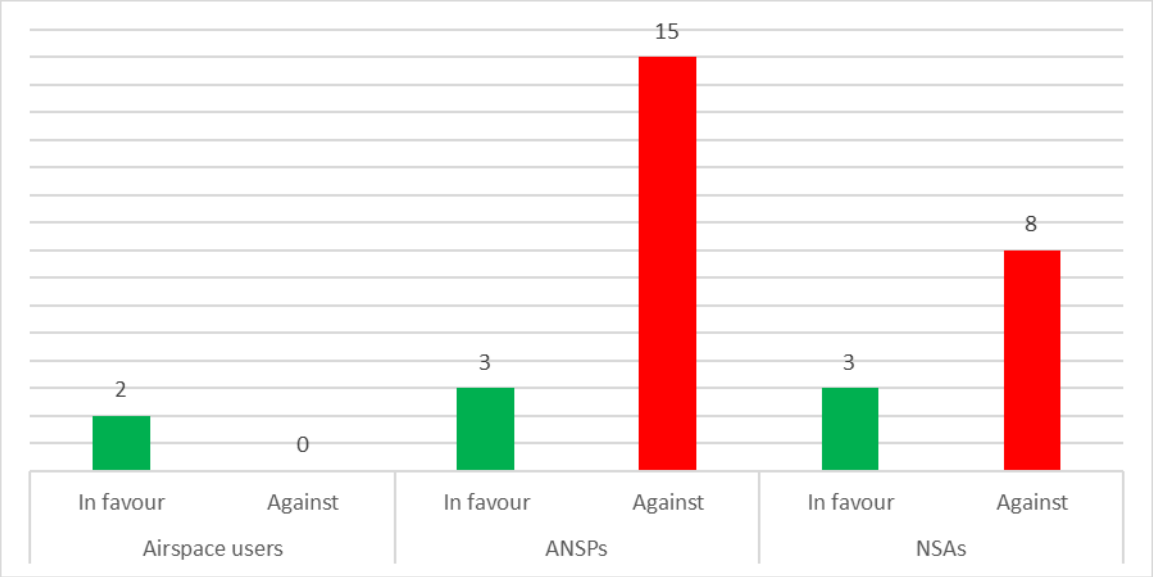
Stakeholder	In favour	Against
Airspace users	For all years of a reference period, the difference (profit/loss) between actual and operating-related cost shall be borne by the service provider. In advance of RP3, service providers should be incentivized to undertake a structured debt refinancing to achieve a Cost of Capital (CoC) reflective of the historically low long-term national bond rates. The RP3 Performance Plan assessment shall include assessment criteria for consistency of cost of capital levels with 10-year national bond rates. In advance of RP3, service provider should be incentivized to adopt a rate of return (RoR) and Weighted Average Cost of Capital (WACC) fully reflective of the risk of providing a monopoly service. The RP3 Performance Plan assessment shall include assessment criteria for consistency of RoR and WACC levels with monopoly service provision risk. Genuine Price Cap Scheme The introduction of a change management indicator enabling tracking of change delivery related to SESAR deployment is long overdue, as airspace Users have no indication as to the value for money being generated from each SESAR project.	
ANSPs	We agree in principle. However, to track overall change delivery (not only from SESAR technological improvements) more factors shall be taken in consideration. For example, in respect of cost-efficiency, it is very important that historical performance shall be duly taken into account (Revenue Recovery Imbalanced Account is to be introduced to measure and quantify it, reference RPA 2003 study).	The implementation of SESAR should not be measured in the framework of cost efficiency. There is already efficiency in deploying SESAR. The current problem is that SESAR doesn't bring any added value, at least not in our country.
NSAs	It seems a good move to hold ANSPs accountability for delivery of SESAR, but are we comfortable that this should be only linked to SESAR? For example, if limited to SESAR it could lead ANSPs to prioritise SESAR over local airspace change projects, even where such airspace change had greater and more immediate pay-offs. From an NSA perspective, there are no major comments against this proposal (introduce a change management indicator enabling tracking of change delivery related to SESAR deployment). However, the added value is not clearly seen until the PI is not specified. In particular it has to be understood how such an indicator could help the NSAs in monitoring the implementation of projects and the link with CAPEX.	Reporting of SESAR implementation is a complex issue and it is not mature for coupling with the Performance Scheme. We fear that the administrative burden exceeds the benefits. Furthermore, we expect the ANSPs to be rational and responsible in their investment decisions.

Option B

Removal of risk sharing mechanisms (including removal of traffic risk sharing, cost-exempt risk sharing and inflation risk sharing)

C.11 Stakeholders were asked about their approach to risk, related to either modification of RP2 risk sharing arrangements (as in Option C) or removal of risk sharing mechanisms (as in Option B). The overall responses for Option B show the following level of support.

Figure C.9: Removal of risk sharing mechanisms



Source: Steer Davies Gleave analysis of stakeholder responses

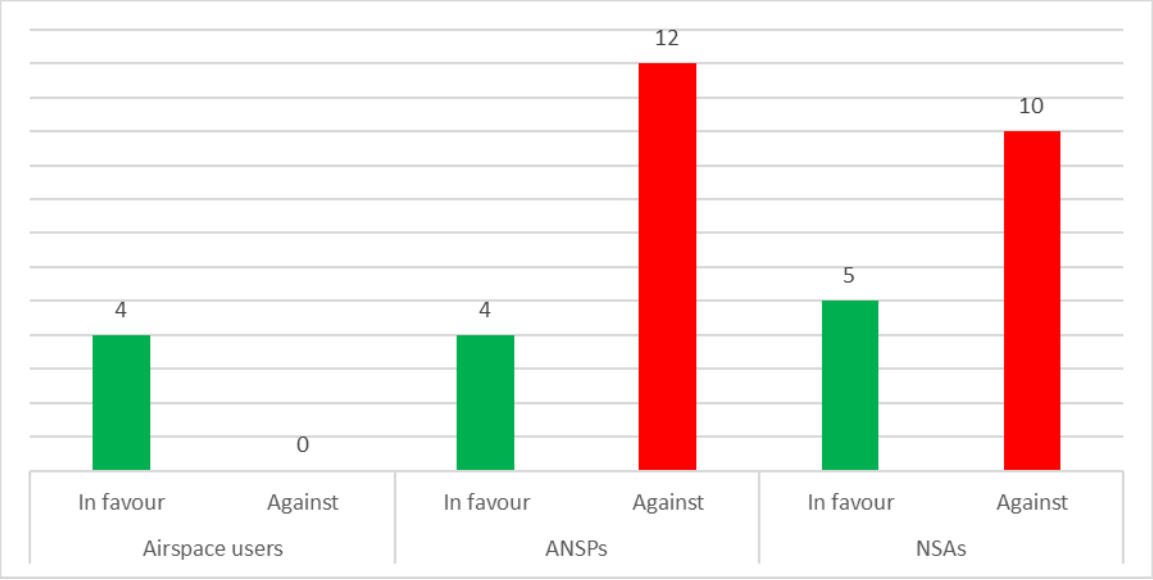
Table C.8: Removal of risk sharing mechanisms rationale

Stakeholder	In favour	Against
Airspace users	The removal of risk-sharing is in alignment with the objectives to simplify the operation of the performance and charging schemes and improve its efficiency, and ensure an efficient allocation of risk between stakeholders.	N/A
ANSPs	We support removal of the risk sharing when it comes to traffic (however there must be some limit when it comes to significant changes in traffic compared to forecast. There should not be any adjustments afterwards, but a possibility to easily revise traffic forecasts Removal of traffic risk sharing is only acceptable if it would be in line with the elasticity of costs. Since this is not the case, an acceptable solution could be to put it onto to the side of a 3rd party, namely the EU budget When it comes to inflation we support a removal of risk sharing completely. Instead we think that when calculating next years' charges the actual inflation of the last 12-mont-period should be used We could agree on this proposal for removal of risk sharing mechanism except the cost exempt. The cost exempt items are out of the control for ANSPs. Traffic risk sharing should be replaced by the more flexible approach towards the charges, which should reflect the actually observed traffic and the applicable (justified) costs	Sharing the impact of unforeseen developments in traffic and costs related to exogenous effects is an integral part of a balanced approach to ANSP financial risk management ANSPs are obliged to offer service irrespective of how many flights turn up and with limited scope to adjust service standards. It is therefore vital that the financial risks arising both from unforeseen traffic evolutions and from the development of certain costs exempt from risk sharing continue to be shared with airspace users Removing the provisions would have a material impact on cost of capital and overall most likely raise costs for airspace users Risk sharing is a necessary component of an incentive based regulatory regime Inflation risk sharing is counter-productive currently, and in fact it adds additional risk to the system. This is so, because the current provisions refer to the whole cost base, regardless of included cost items' non-inflation linked nature (eg. depreciation, Eurocontrol cost base etc.). Elimination of the whole inflation provision, or limiting it to a certain part of the cost base (to be defined optionally by States/ANSP's) is seen necessary to enhance system wide efficiency.

Stakeholder	In favour	Against
NSAs	From an NSA point of view removing risk sharing would hugely simplify the scheme. Removing the dead-band seems a reasonable solution. As seen, it is not that unusual to see actual traffic varying more than 2%, so the initial rational for the dead-band (let the ANSPs manage accurate forecasts) seems not realistic.	Removal of risk sharing mechanisms would place a very high risk on ANSPs, particularly if subject to the private sector. It would also imply big windfalls as well as downsides. The sensitivity analysis performed for the preparation of the performance plans revealed significant financial risks faced by the ANSPs in relation to some elements (traffic, costs, exchange rate, inflation etc.). The risks stemming from the financial exposure, in case of removing the sharing mechanism, will increase significantly and conduct to much higher cost of capital. the cost exempt risk sharing mechanism Sweden cannot support the removal this mechanism Eliminating it would mean: Either coming back to the previous system (full cost recovery) Or just the opposite, letting a traffic loss without any compensation for an ANSP and a traffic surplus without any compensation to the airspace users, which would be excessive in both cases

Capital expenditure scrutiny

Figure C.10: Enhanced capital expenditure scrutiny



Source: Steer Davies Gleave analysis of stakeholder responses

Table C.9: Enhanced capital expenditure scrutiny rationale

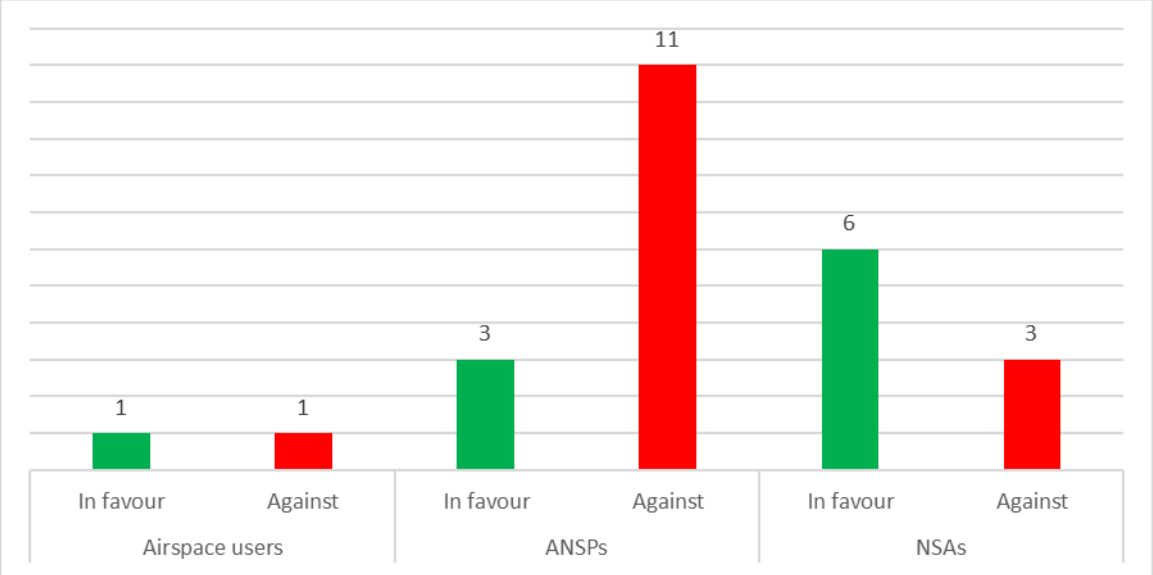
Stakeholder	In favour	Against
Airspace users	The cost effectiveness of the ATM service provision would be improved. This measure would ensure that planned and pre-financed capital investments are actually implemented and generated the stated benefits. It would also secure future capacity availability.	N/A
ANSPs	The current regulation does not provide for sufficient transparency with respect to ANSP capital expenditure and therefore does not provide the required assurance to customers on the implementation of the CAPEX plan. Greater transparency should be focused on the monitoring and reporting of actual expenditure vs. the plan. What is needed is to make sure that there is traceability of investments planned and made and that no depreciation is charged twice. A depreciation that was included in the determined costs for assets which have not been put into operation in a given year should be credited to the airspace users. Investments should of course be consulted thoroughly before and during an RP. Separation of investment costs from determined costs should be considered. The rationale is that investments cash flows are difficult to plan for many years ahead. We see a certain merit in proposing a 10-year outlook for capital investment and to update it annually on a rolling basis	It is not practicable at 'project level' to provide detailed information on how specific investments will contribute to performance targets and demonstration of "coherence with performance targets" as many investments are enabling investments that provide benefits to larger programmes. We DO NOT support requirement for 10-years plans as that would not be based on any realistic information. The proposal for NSA to approve capital investments is not in line with the legal requirements for ANSP to make its own decisions. It is not acceptable to combine the systems, a "full cost recovery" for depreciation and cost of capital and "determined costs" for staff costs and other operating costs. The same system should be applied for all costs categories irrespective of their nature. Moreover, the proposals add extensive complexity and are not aligned with the objective to simplify the schemes. CAPEX shall be treated as part of the cost risk sharing. There shall be no differentiation between OPEX and CAPEX items, it shall be a decision of the management. Focus shall be given on providing functionalities, capabilities (e.g. CPDLC shall be provided by 2020 - if this is not met, consequence shall be based on lost advantages, and not on difference to CAPEX plan).

Stakeholder	In favour	Against
NSAs	Investments do need more in-depth monitoring where appropriate, but this has to be done on national level by NSAs The current process of planning, monitoring and recovering capital costs is not optimal. Some compensation in favour of the airspace users should be considered when actual traffic rises above planned traffic but the actual CAPEX and depreciation are below the planned CAPEX and depreciation. This is however a complex issue.	Micro management does not belong to a performance scheme. That could have been relevant in the old full cost recovery regime. A ten-year outlook on capex is a nice theoretical idea, but difficult to achieve every year (10 is too far to be realistic and there is a fair risk to underestimate the investment needs more than 5 years in front). Besides, some freedom should be left to the ANSP about their regular consultation meeting on investment strategy: trying to harmonize in detail may bring more administrative burden that genuine benefits. Require the ANSPs to prepare a ten-year outlook would be a significant increase in administrative effort. Requiring the Commission to approve capital plans on an annual basis would be a significant shift in control to the Commission and away from NSAs who likely have better understanding of local capital requirements.

Option C

Modification of risk sharing mechanisms (including changes to the dead-band, traffic threshold, sharing keys, and changes to the inflation risk sharing)

Figure C.11: Modification of risk sharing mechanisms



Source: Steer Davies Gleave analysis of stakeholder responses

Table C.10: Modification of risk sharing mechanisms rationale

Stakeholder	In favour	Against
Airspace users	An asymmetric system will reduce the gaming strategies from the ANSPs and therefore reduce the costs charged to airspace users. The removal of the costs exempted from cost sharing and the reduction of the WACC will ensure that the system remain coherent (pressure to improve the cost-effectiveness service provision) while a protection is granted to the ANSPs regarding the traffic	A genuine price cap is needed to drive the correct behaviours of ANSPs, i.e. to bear the potential costs and benefits relating to their own financial performance within a reference period. Risk-sharing mechanisms are distorting such efforts and provide for gaming opportunities. They are further adding complexity and administrative costs to the system.
ANSPs	The regulation should however allow the possibility for ANSPs taking a higher share of traffic risk and/or removing the dead-band where considered appropriate locally. Risk sharing mechanism should be simplified or could be even removed. The 'N+2' adjustment mechanism impacts should be reduced. ANSPs need to plan their activities and if they reach the targets or perform better they should be compensated by the additional income. The proposed abolition of the dead-band is supported, since the current scheme is not in line with the cost-traffic elasticity of service providers. The main point about the new traffic risk sharing scheme is, that the new scheme shall be based on elasticity figures, rather than on "bargaining" about percentage points, because this is the only way to get closer to system-wide optimum/efficient solutions. The listed options shall be measured against this background, and only options according to this principle shall be proposed.	In common with risks from traffic volume variations and certain specific cost components, the variations in the inflation rate are not controllable by ANSPs and none of the inflation risk should be borne by the ANSP. There is strong regulatory precedence for allowing regulated entities to inflate prices. Any change in the risk sharing framework that places greater financial risk on the ANSP, e.g. changes to traffic risk sharing keys, thresholds and dead-bands or the new proposal to share inflation risk, will need to be accompanied by an increased Cost of Capital.

Stakeholder	In favour	Against
NSAs	The introduction of risk sharing on inflation seems interesting unless a "perfect" ANSP-inflation index could be provided. The dead-band is unnecessary, it complicates the formulae without providing any real improvements to outcomes. The inflation risk sharing may be modified but not in a way that increases the ANSPs risks. Instead of a sharing key, a better approach for inflation risk sharing is to limit adjustments only to positive values (adjustments corresponding to deflation not to be taken into account). Different costs categories (staff costs, depreciation) cannot have the same evolution as inflation trend especially in case of deflation. Labour contracts typically are fixed with no possibility to adjust them negatively. Distributing the inflation risk between ANSPs and users, rather than putting it all to users seems reasonable. Inflation risk sharing shall not be applied to depreciation and interest costs, i.e. only to staff and operating costs. To handle the risk we propose that the performance scheme is decided with regard to the DC (not DUC) in real terms for an entire reference period. The calculation of the unit rates would thereafter be made yearly according to the latest available figures for traffic and inflation to improve the accuracy in these forecasts. We are open to a change until 50/50. The mechanism should remain symmetric because it is based on a theoric long-term relation between costs and capacity (a bit idealistic)	The actual traffic risk sharing mechanism should not be changed. Increasing the traffic threshold to 15% will increase the risks for ANSPs. Instead of increasing the traffic threshold it is better to strengthen the alert mechanism in case of traffic deviations to allow the appropriate revisions of Performance Plans according to the local conditions and traffic volatility (uncontrollable factor). It seems reasonable to keep the 10% alert threshold. An alert threshold is necessary to avoid situations where the financial impact becomes unsustainable due to very big traffic deviations.

D Stakeholder workshop

First session

Presentations

D.1 The EC gave an introductory presentation, which set out the key objectives for RP3, an overview and some expectations of the workshop, and the role of the impact assessment (IA) within the option selection process. SDG gave an overview of the IA framework, which included the scope of the study, the methodology and expected outcomes of the IA, and the timescales for the remainder of the study.

D.2 Three supporting studies were presented by Eurocontrol. The first was an overview of the impacts of alternative risk-sharing scenarios (based on model simulations carried out by Eurocontrol), the second proposed some changes to environmental KPA indicators, and the third proposed measures for improved demand-capacity balancing (DCB).

Question & Answer session

D.3 AU associations expressed some concerns about the possibility of developing sensible options given the short timeline for RP3, as well as some concerns with Eurocontrol's presentations. Firstly, it was argued the risk sharing simulation presented did not seem to consider any behaviour change, assumed an unrealistic relationship between service units and cost efficiency and did not consider any cost of capital impacts (including the regulated return [return on equity]) therefore conclusions cannot be made about ANSPs' financial health. Secondly, it was argued that although some parts the DCB presentation were supported (a more prominent role for the NOP and looking at capacity and delay), the presentation was misleading as it implied AUs have been better off in recent years because cost-efficiency has improved – it did not consider performance in other KPAs or investment. The trade-off between cost-efficiency and capacity also should have been considered. Lastly, it was argued the proposals in the KPA environment presentation fail to achieve a gate-to-gate approach.

D.4 NSAs stated that, as they are not part of the decision-making process on capacity targets, they know little about how this information is calculated and it is therefore difficult to enforce the targets as the NSAs feel they are "outside" this process. One NSA also stated the current KPI framework is good but risk allocation must be fair and efficient. A Ministry of Defence also noted that released military airspace is not being fully utilised.

D.5 An ANSP association noted that the proposals in Eurocontrol's DCB presentation represent a significant change. It was stated that the NOP currently provides a firm operational and planning environment, if the NM is given a regulatory input, it will blur responsibility between its regulatory and operational roles, and lead to accountability issues when ANSPs cannot deliver capacity. An ANSP stated that Eurocontrol's risk-sharing simulation should have used

planned (as opposed to actual) values, it was also asked what the criteria are for assessing the efficient allocation of risk.

D.6 In response to the AU associations' comments on the Eurocontrol's risk-sharing presentation, Eurocontrol confirmed that the scenarios used in the risk-sharing simulation intended to capture the change in behaviour of ANSPs to certain risk sharing models. Therefore, the risk-sharing simulations were not static. It was also confirmed that the study had considered all ANSP costs including cost of capital. The gains and losses due to changes to the risk sharing mechanism were computed on the total cost base. However, it was also highlighted by Eurocontrol that the results of each proposed risk sharing model were presented as the difference compared to the current risk sharing model.

D.7 The NM confirmed that, while KEP is assigned at a network level, it is a collective responsibility and it is important to break down the different elements to understand the contributing parts of airspace design. NM confirmed that without unexpected events in 2016, the KEA target may have been met. For RP3, it was confirmed that the target for KEA would need a thorough analysis. It was stated that there are already PIs in the current regulation for civil use of military airspace, they should be retained in the future and better exploited. It was also highlighted by the NM that while there is no single gate-to-gate indicator, most major parts of a flight are already covered. The NM also stated the proposals in the DCB presentation are removing rigidity by providing flexibility through the NOP (in particular with reference values being adapted to consider traffic and complexity evolutions) to create a better link between performance and regulation. It was also stated by the NM that agility and flexibility is needed to alter the NOP to create a better link between performance and regulation, by allowing, through the NOP, the management of the reference values within set parameters.

D.8 EC stated that today's proposals are a starting point, not the final proposal. More specifically, SDG stated the PRU's risk sharing work is a starting point and SDG's IA will seek to consider behaviour change as well as the other interdependencies raised. SDG and EC noted the timeline for RP3 is challenging but manageable. All other points raised were noted.

Second session

Presentations

D.9 The criteria for sifting measures were presented by SDG, which set out the sifting criteria (consistent with EC IA guidelines) and the measures that have not been set aside as a result of the sifting process. SDG also set out the measures included in the core option across seven different areas, which included: simplification/clarification in reporting, more empowered NSAs, more efficient performance planning and targeting, better integration with network functions, streamlined measurement of safety management effectiveness, enhanced measurement of environment KPA, and enhanced measurement of capacity KPA.

Question & Answer session

D.10 NSAs questioned how, under the core option proposals, the NOP now relates to the Performance Plans (PPs) – one NSA stated that currently NSA monitoring of PPs is reactive and NSAs need to be more involved in the capacity building process, and questioned whether there should be more flexibility in reopening PPs. One NSA also expressed concerns, in relation to the core option proposals, on the regulatory relationship between the NM and ANSPs.

D.11 An ANSP association stated more details were needed on the sifting process and that there is a need to fundamentally address the target setting process and rigidity should not be increased

– currently targets can be not met even if traffic deviates from the forecast within the 10% threshold. One AU stated that it did not agree with the proposal to charge AUs based on the actual route as opposed to the planned route. An AU association also questioned how the core option helps to achieve a gate-to-gate approach.

D.12 The NM, with respect to the relationship between NM and NSAs, pointed out that NSAs needed inputs from the NM such as expected targets. On the other hand, it was stated that NSAs should not be requested to provide reports to the NM, although a continuous dialogue should exist and is fully supported by NM. It was stated by the NM that the NOP does not only exist for NSA to initiate measures, it is also to remove rigidity in the system and to enable the achievement of operational performance. NM confirmed that there would be the need to set some margins for the traffic forecasts and reference values to avoid the need to reopen the PPs.

D.13 SDG stated it does not intend for the NM to become a regulator, but the NOP could be used to trigger regulatory action by NSAs – currently the NOP is not used for enforcement and is primarily operational, but it could support regulation without taking away from its operational function. The AUs' point raised on charging based on the route actually flown was noted, although other stakeholders have said the opposite. The NM's point on information flows was noted – there may be another method of providing the NM with a picture of local conditions. All other points raised were noted, especially the need to better align the NOP and its evolutions over the years of the reference period and PPs.

Third session

Presentations

D.14 Four further proposed options were presented by SDG. Option B (as well as the measures included in the core option) included measures which would provide stronger regulation of capital expenditure (capex). Option C1 proposed modifications to the risk-sharing mechanism and incentives devolved to NSAs, Option C2 also proposed modifications to the risk-sharing mechanism and a centralised incentive mechanism, and Option C3 proposed the removal of the risk-sharing and incentive mechanisms. All variants of Option B also included the proposals included within Option B.

Question & Answer session

D.15 ANSPs stated that too much capex monitoring would not be productive and the complexity associated with it may not be proportional and that increased uncertainty would also increase the cost of capital and the likelihood that capex is delayed. On the other hand, one ANSP association stated capex plans are currently part of PPs, which are overseen by NSAs and questioned whether the proposals actually change this. Several ANSPs also expressed support for measures which devolved responsibility to the national level to better take account of local circumstances (in particular devolved incentives, but not the asymmetry between bonus and penalty), although one ANSP association stated NSA independence and strength needs to be taken into account (and suggested the PRB could oversee in some cases). One ANSP also asked why the length of the Reference Period has not been mentioned and stated more information on the rationale for the options is needed.

D.16 A Staff Association stated incentive schemes are not needed to get good performance. It was argued that traffic fluctuations will vary across locations and therefore it is difficult to

incentivise behaviour and ANPSs are not the only actors in the system who are responsible for delays, often there is a significant margin of error contained within flow plans.

D.17 One NSA stated that Options B and C weaken (instead of strengthen) the NSAs, especially with respect to capex, and that capex should not be treated differently given the interdependencies between capex and operating costs (opex). Another NSA stated that NSAs do not have a right to interfere in ANSP management and that the retrospective capex adjustments, proposed in Option B, should only be applied where quality of service has not been met.

D.18 AU Associations stated more explanation was needed on the rationale for the option sifting process as it is not clear how the options have been put together. It is not clear, for example, why incentive schemes are asymmetrical, why there is no reference to the weighted average cost of capital (WACC), what the rationale for the risk-sharing keys are and why there is no reference to Eurocontrol costs – this makes it difficult to assess future trade-offs. Additionally, it was stated that none of the options provide a gate-to-gate approach. An AU stated there is a risk in strengthening NSAs as in some cases they are too close to the ANSP.

D.19 SDG stated any scrutiny of capex carries uncertainty, but scrutiny of capex is common in other industries. Although capex is currently part of the PPs, something has to be done with capex as there is currently no consequence if the capex plans aren't delivered, AUs pay for things that do not happen and ANSPs are over-remunerated. The options are not intended to establish the PRB as a regulator, but it could oversee capex that takes account of a 'Network perspective'. SDG does not agree that incentive mechanisms do not work, they are about managing risk not controlling events. SDG accepts more rationale on the proposed options is needed, this will be provided. All other points raised were noted, in particular those relating to the skill level and independence of NSAs, and local level decision making.

E Impact assessment tool assumptions

Option	Package	Entities affected	First year of impact	Reoccurrence	Impact
A	Simplification and clarification	-	-	-	No quantifiable impact.
A	More empowered NSAs	All ANSPs All NSAs EC	2019	Annually	Increased regulatory costs, equivalent to 1 annual FTE for ANSPS and annual 0.2 FTEs for NSAs, associated with more rigorous performance planning and a more prominent role for NSAs. One off cost for EC, equivalent to 1 FTE, associated with providing guidance on best practice regulation. (In the absence of a robust method to sift NSAs on the basis of their competence, it is assumed all NSAs reach the required level of independence and resources)
A	More efficient performance planning and targeting	All ANSPs All NSAs	2019	Annually	Additional costs for ANSPs and NSAs associated with more rigorous performance and targeting in the initial planning stage, leading to time and cost savings later in the process and therefore no net change in quantifiable costs.

Option	Package	Entities affected	First year of impact	Reoccurrence	Impact
A	Better integration with the network functions	All ANSPs	2020	Annually	Increased regulatory costs, equivalent to 0.25 FTEs for NSAs and the NM, associated with the monitoring of delays and the suggestion of corrective measures by the NM, and for the imposition of penalties by NSAs. The introduction of a central delay budget for the NM is expected to reduce delay across the network by 2.3% (this reduction has been estimated based on the results of the Network Delay Optimisation Trial in summer 2017). Improvement to actual delay towards achieving the NOP forecasts at eligible ANSPs with over 0.05 minutes of average delay (with no improvement at the remaining ANSPs). This has been estimated by reviewing the NOP from 2012 through to 2017 and identifying the gap between actual delay in a given year and the closest NOP forecast for that year (usually made part-way through the year i.e. the June 2015 forecast for the 2015 full-year result etc.). On average, the most recent NOP delay forecast has been approximately -15% lower than the actual delay. Better integration with the network functions is assumed to improve delay by eight (of the 15) percentage points towards the NOP forecast. Reductions in delay are, to an extent, expected to be facilitated by additional ATCOs. Our review of the NOP actions proposed by ANSPs and those recommended by the Network Manager to improve service delivery indicates that in many cases ATCO recruitment is planned alongside other activities (upgrade or commissioning of systems, changes to operating procedures etc.). We assume then that the significant improvements in delay above are accompanied by an increase in the number of ATCOs. The change in outturn delay and the change in ATCOs at SES level between 2009 and 2015 indicates a high-level elasticity of -0.2, implicit of other factors. This elasticity has been applied in the tool to estimate the increase in ATCO employment that may accompany a significant change in outturn delay through the delivery of additional capacity at eligible ANSPs. The costs associated with these additional ATCOs are then captured in the determined cost base.
A	Streamlined measurement of safety	All ANSPs All NSAs PRB	2020	Annually	Reduced regulatory costs, equivalent to 0.5 annual FTEs for both ANSPs and NSAs, associated with a simplification of safety monitoring.

Option	Package	Entities affected	First year of impact	Reoccurrence	Impact
A	Enhanced measurement of the environment KPA	All ANSPs	2020	Annually	No net change in regulatory costs as a result of the combination of increments and decrements associated with: • introducing a vertical flight efficiency indicator, based on share of flights applying CDO • introducing a shortest constrained route indicator • introducing a measure of the flexible use of airspace based on rate of actual use of reserved or restricted airspace • removing KEP as a KPI, but retaining it as a PI only • removing the provisions relating to the planning and usage of CDRs Full CDO is understood to enable relatively substantial savings in fuel consumption for the descent phase of the flight, which, assuming a 25% improvement in the implementation of CDO below 7,000 ft, translates to an average fuel saving of 0.5% for the flight overall. The size of the fuel savings that might be realised have been estimated using a combination of sources including: • analysis from the PRC's PRR 2015 – for the degree to which CDO is used at major airports across the SES; • Environmental Impacts of Continuous-descent Operations in Paris and New York Regions, Isolation of ATM/Airspace Effects and Comparison of Models, 2013, Thompson et al, Tenth USA/Europe Air Traffic Management Research and Development Seminar – for the size of the relevant fuel savings; • CORINAIR[64] fuel consumption tables, ICAO – for the estimation of the descent as a proportion of the whole flight envelope.
A	Enhanced measurement of the capacity KPA	All NSAs	2020	Annually	Increased regulatory costs for NSAs, equivalent to 0.5 annual FTEs, associated with both more work in relation to the NSA coordination platform and the time taken for NSA to become familiar with capacity management and NM mechanisms.

[64] https://www.eea.europa.eu/publications/emep-eea-guidebook-2016

Option	Package	Entities affected	First year of impact	Reoccurrence	Impact
B	Simplification of the Charging Scheme	All ANSPs AUs	2020	Annually	A removal of traffic risk sharing adjustments from the unit rate calculation and an increase to ANSPs' WACC % equivalent to 25% of the 5.6% increase to their traffic risk exposure (from 4.4% to 10.0%) A removal of cost exemptions from the unit rate calculation and an increase to ANSPs' WACC % equivalent to 25% of the increase of their 0.3% revenue risk exposure (equivalent to the average cost exemption proportion of total costs in RP1 and RP2 to date). A removal of inflation adjustments from the unit rate calculation and an increase to ANSPs' WACC % equivalent to 25% of the increase of their 9.3% inflation risk exposure (equivalent to maximum disparity, across all Member States, between forecast and actual inflation in RP1 and RP2 to date) Removal of incentive (bonus and penalty) payments to ANSPs and incentive adjustments in the unit rate calculation. Reduced regulatory costs, equivalent to 1 annual FTE for both ANSPs and NSAs, and 0.4 FTEs for the PRB, associated with a removal of the risk sharing and incentive schemes.

Option	Package	Entities affected	First year of impact	Reoccurrence	Impact
B	Regulatory scrutiny of capital expenditure	All NSAs All ANSPS AUs PRB	2020	Annually	An increase in regulatory costs for ANSPs associated with producing more detailed capex plans and the for the reimbursement of unspent capex, and for the PRB and NSAs to review and monitor the plans. The number of FTEs required by each ANSP and NSA for the closer regulatory oversight is in proportion to the historic level of planned capex in each charging zone (where the NSA FTE requirement is equivalent to half of that of the ANSP and the PRB requirement is 0.5 annual FTEs). The increased cost associated with process of reimbursement is equivalent to 0.5 annual FTEs for NSAs and 0.25 annual FTEs for ANSPs. A 5% increase in the level of actual capex and a decrease in the level of planned capex, such that the proportionate disparity between planned and actual capex is equivalent to that of the ANSP that completed the highest proportion of its planned capex projects (excluding ANSPs that invested more than their planned level). A unit rate reimbursement to AUs in the current RP in the form of a retrospective adjustment to unit rates based on the difference between the value of the actual and planned level of capex. A decrease in the value of each ANSP's total asset base used in the cost of capital component of the DUC calculation (equivalent to the decrease in the value of planned capex) and a decrease in the value of each ANSP's the depreciation component of the DUC calculation (based on the historic relationship between the disparity between planned and actual capex and the disparity between PP depreciation and actual depreciation). Further improvement to actual delay towards achieving the NOP forecasts at eligible ANSPs with over 0.05 minutes of average delay (with no improvement at the remaining ANSPs). This has been estimated by reviewing the NOP from 2012 through to 2017 as in Option A. Regulatory scrutiny of capital expenditure is assumed to improve delay by two (of the 15) percentage points towards the NOP forecast. Reductions in delay are, to an extent, expected to be facilitated by additional ATCOs. Our review of the NOP actions proposed by ANSPs and those recommended by the Network Manager to improve service delivery indicates that in many cases ATCO recruitment is planned alongside other activities (upgrade or commissioning of systems, changes to operating procedures etc.). We assume then that the significant improvements in delay above are accompanied by an increase in the number of ATCOs. The change in outturn delay and the change in ATCOs at SES level between 2009 and 2015 indicates a high level elasticity of -0.2, implicit of other factors. This elasticity has been applied in the tool to estimate the increase in ATCO employment that may accompany a significant change in outturn delay through the delivery of additional capacity at eligible ANSPs. The costs associated with these additional ATCOs are then captured in the determined cost base.

Option	Package	Entities affected	First year of impact	Reoccurrence	Impact
C1	Traffic risk sharing	All NSAs All ANSPs AUs	2020	Annually	Increase regulatory costs for NSAs, equivalent to 0.5 FTEs in the first year before each RP, associated with the specification of the bespoke traffic risk sharing arrangements. A bespoke change to the traffic risk sharing adjustments used in the unit rate calculation in each charging zone. The 2% deadband is removed, the cap increased to 15% and the sharing keys are set as follows: • In charging zones where (between 2009 and 2016) ANSP costs have grown at a CAGR of more than 30% of the CAGR of SUs, the ANSP sharing key remains at 30%; • In charging zones where ANSP costs have grown at a CAGR of less than 30% of the CAGR of SUs, but delay has also significantly increased, the ANSP sharing key also remains at 30%; and • In charging zones where ANSPs have either absorbed more traffic without a negative impact on delay or significantly decreased delay, and/ or where costs have grown at a CAGR of less than 30% of the CAGR of SUs, the ANSP sharing key is set at between 30% and 0% based on the historical relationship between actual costs and actual SUs. The ANSP sharing key is set at or closer to zero where delay has decreased the most or costs have increased the least. Based on the above criteria, en-route charging zones (as well as the corresponding terminal charging zones) have had their sharing keys set as follows: • 0%: Austria, Belgium & Luxembourg, Croatia, Cyprus, Czech Republic, Denmark, Greece, Italy, Netherlands, Poland, Portugal, Spain, Switzerland and United Kingdom; • 5%: Ireland; • 16%: Bulgaria; • 18%: Germany; • 29%: Romania; • 30%: Estonia, Finland, France, Hungary, Latvia, Lithuania, Malta, Norway, Slovakia, Slovenia and Sweden. A bespoke increase to each ANSP's WACC % equivalent to 25% of the increase in traffic risk exposure based on the removal of the deadband, the increase of the cap and a change to the risk sharing keys (if applicable). A removal of the inflation mechanism on depreciation costs and an increase to ANSPs' WACC % equivalent to 25% of the 1.2% increase in inflation risk (the share of depreciation in determined costs applied to the 9.3% increase I inflation risk association with removing the mechanism on all costs. A removal of non-pension cost exemptions from the unit rate calculation and an increase to ANSPs' WACC % equivalent to 25% of the increase of their -0.2% revenue risk exposure (equivalent to the average pension cost exemption proportion of total costs in RP1 and RP2 to date). Regulatory scrutiny of capital expenditure: in this Option is assumed to be adequately done by all NSAs, on an annual basis. It is also assumed that this would lead to annual reimbursement to airspace users, where there was a discrepancy between actual and planned capex.

Option	Package	Entities affected	First year of impact	Reoccurrence	Impact
C1	Incentive schemes	All NSAs All ANSPs AUs	2020	Annually	Increase regulatory costs for ANSPs and NSAs, equivalent to 0.25 FTEs in the first year before each RP, associated with the specification of the bespoke incentive schemes. Improvement to actual delay towards achieving the NOP forecasts at eligible en-route ANSPs with over 0.05 minutes of average delay (with no improvement at the remaining ANSPs). This has been estimated by reviewing the NOP from 2012 through to 2017 as in Option A and Option B. Improvement in delay is supported further by the implementation of incentives where known issues exist. The charging zones where incentives are applied under option C1 have been determined using the ACCs identified in the 2014 to 2017 NOPs. These are: • Cyprus; • Czech Republic; • France; • Germany; • Greece; • Poland; • Portugal; • Spain Canarias; and • Spain Continental. The application of incentives is differentiated between ANSPs with known issues (identified in the 2014 to 2017 NOPs) and remaining ANSPs. Bespoke incentive schemes, that are specified by NSAs and where bonus and penalty payments are calibrated to address specific issues in each ANSP (listed above), are assumed to improve delay by four percentage points towards the level forecast in the NOP. Delay is assumed to improve by two percentage points at the remaining eligible ANSPs. Reductions in delay are, to an extent, expected to be facilitated by additional ATCOs. Our review of the NOP actions proposed by ANSPs and those recommended by the Network Manager to improve service delivery indicates that in many cases ATCO recruitment is planned alongside other activities (upgrade or commissioning of systems, changes to operating procedures etc.). We assume then that the significant improvements in delay above are accompanied by an increase in the number of ATCOs. The change in outturn delay and the change in ATCOs at SES level between 2009 and 2015 indicates a high level elasticity of -0.2, implicit of other factors. This elasticity has been applied in the tool to estimate the increase in ATCO employment that may accompany a significant change in outturn delay through the delivery of additional capacity at eligible ANSPs. The costs associated with these additional ATCOs are then captured in the determined cost base.

Option	Package	Entities affected	First year of impact	Reoccurrence	Impact
C2	Risk sharing arrangements	All NSAs All ANSPs AUs	2020	Annually	A removal of the 2% deadband and increase of the cap to 15%within the traffic risk sharing mechanism and an increase to ANSPs' WACC % equivalent to 25% of the 0.1% increased traffic risk exposure (from 4.4% to 4.5%). A removal of the inflation mechanism on depreciation and non-pension cost exemptions, with the same impacts on ANSPs' WACC, as in Option C1.
C2	Incentive mechanism	All NSAs All ANSPs AUs EC PRB NM	2020	Annually	Increased regulatory costs, in the two years preceding the start of RP3, associated with the establishment of a centrally administered incentive scheme, including 0.5 FTEs for ANSPs and NSAs, and 2 FTEs for the EC, the PRB and the NM, as well as a € 4 million set up cost for the EC. In addition, increased regulatory costs associated with over sight and compliance with the incentive schemes equivalent to 0.25 annual FTEs for ANSPs and 1 FTE for the NM. Removal of bonus incentive payments to ANSPs and incentive adjustments in the unit rate calculation (with penalty payments retained). Improvement to actual delay towards achieving the NOP forecasts in en-route charging zones with over 0.05 minutes of average delay (with no improvement in the remaining charging zones). This has been estimated by reviewing the NOP from 2012 through to 2017 as in Option A and Option B. Delay is assumed to improve by 14%, in all charging zones to be in line with NOP forecasts. Reductions in delay are, to an extent, expected to be facilitated by additional ATCOs. Our review of the NOP actions proposed by ANSPs and those recommended by the Network Manager to improve service delivery indicates that in many cases ATCO recruitment is planned alongside other activities (upgrade or commissioning of systems, changes to operating procedures etc.). We assume then that the significant improvements in delay above are accompanied by an increase in the number of ATCOs. The change in outturn delay and the change in ATCOs at SES level between 2009 and 2015 indicates a high level elasticity of -0.2, implicit of other factors. This elasticity has been applied in the tool to estimate the increase in ATCO employment that may accompany a significant change in outturn delay through the delivery of additional capacity at eligible ANSPs. The costs associated with these additional ATCOs are then captured in the determined cost base.
C2	Regulatory scrutiny of capital expenditure	All NSAs All ANSPS AUs PRB	2020	Annually	The same impacts of regulatory scrutiny of capital expenditure, as in Option B and Option Ci, except that the unspent capex is reimbursed through unit rates in the subsequent (not current) RP, starting from RP4.

F Impact assessment results for each Member State

Option A

Member State	En-route charging zone	Terminal charging zone	Unit Rates (€)	Determined Costs (2016 NPV, € 2009)						Adjustments (2016 NPV, € 2009)					Delay		FTEs (2035)		Fuel burn		Carbon emissions	
				Regulatory Costs		Cost of Capital	Depreciation	Capex Reimbursement	ATCOs	Inflation	Traffic Risk Sharing	Traffic Sharing	Incentives	Cost Exemptions	Avg. mins per flight (2035)	Cost (2016 NPV, € 2009)	Support	ATCOs	Billion kg	Cost (2016 NPV, € 2009)	Billion kg	Cost (2016 NPV, € 2009)
				ANSPs	NSAs																	
Charging Zones																						
Austria	Austria	Austria	10.4	0.8	1.2	-	-	-	8.7	0.0	(0.1)	0.0	-	-	(0.011)	(14.5)	1.8	4.3	(4.6)	(2,167.9)	(14.7)	(234.9)
Belgium & Luxembourg	Belgium & Luxembourg	Belgium Antwerpen Belgium Brussels Belgium Charleroi Belgium Liege Belgium Oostende-Brugge Luxembourg	1.6	0.7	1.1	-	-	-	-	(0.0)	(0.0)	0.0	-	-	-	(0.5)	1.8	-	(4.5)	(2,110.4)	(14.2)	(226.5)
Bulgaria	Bulgaria	Bulgaria	0.7	0.3	0.4	-	-	-	-	(0.0)	0.0	0.0	-	-	-	-	1.8	-	(3.4)	(1,572.0)	(10.7)	(173.0)
Croatia	Croatia	Croatia	4.8	0.3	0.4	-	-	-	4.2	(0.1)	0.0	0.0	-	-	(0.016)	(10.5)	1.8	3.6	(2.3)	(1,088.2)	(7.4)	(119.1)
Cyprus	Cyprus	Cyprus	2.2	0.3	0.5	-	-	-	1.5	(0.1)	0.2	0.0	-	-	(0.067)	(30.6)	1.8	1.7	(1.7)	(802.5)	(5.5)	(89.6)
Czech Republic	Czech Republic	Czech Republic	4.5	0.4	0.6	-	-	-	3.7	(0.1)	(0.0)	0.0	-	-	(0.016)	(15.4)	1.8	2.9	(3.3)	(1,556.3)	(10.5)	(169.2)

Denmark	Denmark	Denmark	1.3	0.6	0.9	-	-	-	-	(0.0)	0.0	0.0	-	-	-	-	1.8	-	(2.3)	(1,088.2)	(7.3)	(117.1)
Estonia	Estonia	Estonia	0.5	0.2	0.3	-	-	-	-	(0.0)	0.0	(0.0)	-	-	-	-	1.8	-	(0.8)	(393.2)	(2.7)	(43.0)
Finland	Finland	Finland	1.0	0.4	0.7	-	-	-	-	(0.0)	(0.0)	0.0	-	-	-	-	1.8	-	(0.9)	(425.1)	(2.9)	(45.8)
France	France	France	51.1	0.6	0.9	-	-	-	49.1	0.1	-	0.0	-	-	(0.015)	(51.8)	1.8	39.7	(12.0)	(5,628.9)	(38.0)	(606.8)
Germany	Germany	Germany	55.1	0.7	1.0	-	-	-	53.9	(0.4)	0.0	0.0	-	-	(0.035)	(108.7)	1.8	26.4	(11.7)	(5,504.1)	(37.1)	(591.2)
Greece	Greece	Greece	7.2	0.4	0.6	-	-	-	6.1	(0.1)	0.4	0.1	-	-	(0.021)	(17.5)	1.8	7.7	(3.1)	(1,455.3)	(9.9)	(160.2)
Hungary	Hungary	Hungary	0.7	0.3	0.4	-	-	-	-	(0.0)	0.0	0.0	-	-	-	-	1.8	-	(3.3)	(1,536.2)	(10.4)	(167.6)
Ireland	Ireland	Ireland	2.0	0.9	1.3	-	-	-	-	(0.0)	0.0	0.0	-	-	-	-	1.8	-	(2.4)	(1,114.5)	(7.5)	(121.0)
Italy	Italy	Italy - Zone 1 Italy - Zone 2	1.1	0.5	0.8	-	-	-	-	(0.0)	(0.0)	0.0	-	-	-	-	1.8	-	(6.8)	(3,188.6)	(21.6)	(344.8)
Latvia	Latvia	Latvia	0.4	0.2	0.3	-	-	-	-	(0.0)	(0.0)	0.0	-	-	-	-	1.8	-	(1.0)	(485.1)	(3.3)	(53.2)
Lithuania	Lithuania	Lithuania	0.6	0.3	0.4	-	-	-	-	(0.0)	0.0	0.0	-	-	-	-	1.8	-	(1.1)	(503.8)	(3.4)	(55.1)
Malta	Malta	Malta	0.7	0.3	0.4	-	-	-	-	(0.0)	0.0	0.0	-	-	-	-	1.8	-	(0.5)	(242.0)	(1.7)	(26.6)
Netherlands	Netherlands	Netherlands	7.9	0.7	1.0	-	-	-	6.2	0.0	0.1	0.0	-	-	(0.010)	(12.4)	1.8	2.9	(4.5)	(2,107.2)	(14.2)	(225.5)
Norway	Norway	Norway	2.7	0.9	1.4	-	-	-	0.6	(0.0)	0.0	0.0	-	-	-	(0.6)	1.8	-	(2.1)	(969.0)	(6.5)	(104.1)
Poland	Poland	Poland	8.5	0.3	0.4	-	-	-	8.2	(0.1)	(0.4)	0.0	-	-	(0.051)	(42.4)	1.8	7.9	(3.2)	(1,485.9)	(10.1)	(161.4)
Portugal	Portugal	Portugal	9.1	0.6	0.9	-	-	-	7.4	0.1	0.3	0.0	-	-	(0.012)	(7.7)	1.8	3.5	(2.3)	(1,067.3)	(7.2)	(115.8)
Romania	Romania	Romania	0.8	0.3	0.5	-	-	-	-	(0.0)	0.0	(0.0)	-	-	-	-	1.8	-	(2.9)	(1,323.2)	(9.0)	(145.8)
Slovakia	Slovakia	Slovakia	2.8	0.4	0.5	-	-	-	2.0	(0.0)	(0.0)	0.0	-	-	(0.012)	(7.0)	1.8	1.4	(2.2)	(1,005.6)	(6.8)	(109.8)
Slovenia	Slovenia	Slovenia	1.0	0.5	0.7	-	-	-	-	(0.0)	(0.0)	0.0	-	-	-	-	1.8	-	(1.5)	(699.8)	(4.8)	(76.6)
Spain	Spain Canarias Spain Continental	Spain	26.4	0.5	0.8	-	-	-	25.2	(0.1)	(0.1)	0.0	-	-	(0.018)	(40.9)	1.8	13.3	(1.3)	(600.8)	(4.1)	(65.3)
Sweden	Sweden	Sweden	12.5	0.5	0.8	-	-	-	11.5	(0.4)	0.1	(0.0)	-	-	(0.012)	(9.6)	1.8	6.4	(2.8)	(1,329.7)	(9.0)	(143.5)
Switzerland	Switzerland	Switzerland	13.2	1.0	1.6	-	-	-	11.2	(0.2)	(0.1)	0.0	-	-	(0.080)	(83.2)	1.8	4.8	(4.0)	(1,876.6)	(12.6)	(201.0)
United Kingdom	United Kingdom	UK - Zone C	38.3	0.6	0.8	-	-	-	37.4	0.1	(0.2)	0.0	-	-	(0.010)	(27.5)	1.8	19.5	(9.2)	(4,306.9)	(29.0)	(463.0)
EU-wide entities																						
NM				0.5													0.3					
PRB				-													-					
EC				1.7													1.0					

Option B

Member State	En-route charging zone	Terminal charging zone	Unit Rates (€)	Determined Costs (2016 NPV, € 2009)						Adjustments (2016 NPV, € 2009)					Delay		FTEs (2035)		Fuel burn		Carbon emissions	
				Regulatory Costs		Cost of Capital	Depreciation	Capex Reimbursement	ATCOs	Inflation	Traffic Risk Sharing	Traffic Sharing	Incentives	Cost Exemptions	Avg. mins per flight (2035)	Cost (2016 NPV, € 2009)	Support	ATCOs	Billion kg	Cost (2016 NPV, € 2009)	Billion kg	Cost (2016 NPV, € 2009)
				ANSPs	NSAs																	
Charging Zones																						
Austria	Austria	Austria	(98.3)	4.0	2.1	(0.6)	(17.3)	(64.0)	10.9	(0.6)	31.3	(1.9)	(2.1)	0.4	(0.014)	(17.3)	4.8	5.3	(4.6)	(2,167.9)	(14.7)	(234.9)
Belgium & Luxembourg	Belgium & Luxembourg	Belgium Antwerpen Belgium Brussels Belgium Charleroi Belgium Liege Belgium Oostende-Brugge Luxembourg	(14.6)	2.5	2.7	(0.5)	(11.1)	(36.4)	-	0.8	(31.2)	(9.4)	3.9	(2.4)	-	(0.5)	4.8	-	(4.5)	(2,110.4)	(14.2)	(226.5)
Bulgaria	Bulgaria	Bulgaria	172.6	0.7	0.5	(1.2)	(9.6)	(20.0)	-	37.8	(170.0)	(29.7)	(0.1)	(0.6)	-	-	2.8	-	(3.4)	(1,572.0)	(10.7)	(173.0)
Croatia	Croatia	Croatia	(8.5)	0.8	0.6	(0.3)	(9.6)	(23.4)	5.2	16.0	(0.1)	(0.0)	(0.7)	3.1	(0.020)	(12.6)	3.0	4.5	(2.3)	(1,088.2)	(7.4)	(119.1)
Cyprus	Cyprus	Cyprus	58.6	0.6	0.5	(0.6)	(4.4)	(6.0)	1.9	24.5	(41.6)	(3.6)	(1.6)	(0.3)	(0.080)	(36.6)	2.2	2.2	(1.7)	(802.5)	(5.5)	(89.6)
Czech Republic	Czech Republic	Czech Republic	(50.1)	1.7	1.0	(0.9)	(14.9)	(51.3)	4.6	17.6	6.9	(0.7)	(1.3)	0.3	(0.020)	(18.4)	4.1	3.7	(3.3)	(1,556.3)	(10.5)	(169.2)
Denmark	Denmark	Denmark	12.4	1.5	1.1	(1.0)	(9.1)	(20.0)	-	24.6	(17.6)	(1.6)	(0.9)	(1.2)	-	-	2.9	-	(2.3)	(1,088.2)	(7.3)	(117.1)
Estonia	Estonia	Estonia	(1.8)	0.4	0.4	(0.1)	(2.5)	(5.5)	-	6.0	(1.6)	(0.1)	(1.8)	(0.0)	-	-	2.2	-	(0.8)	(393.2)	(2.7)	(43.0)
Finland	Finland	Finland	(31.2)	1.3	0.9	(0.2)	(4.2)	(23.9)	-	8.6	12.0	(1.2)	(1.8)	(0.4)	-	-	3.0	-	(0.9)	(425.1)	(2.9)	(45.8)
France	France	France	(427.3)	13.2	4.9	(4.5)	(127.1)	(387.7)	61.4	(20.6)	-	(2.6)	23.8	16.4	(0.018)	(61.9)	18.5	49.7	(12.0)	(5,628.9)	(38.0)	(606.8)
Germany	Germany	Germany	(182.4)	10.9	4.2	(8.4)	(66.5)	(282.6)	67.4	78.7	(30.8)	(8.9)	(7.9)	2.5	(0.042)	(129.8)	14.0	33.0	(11.7)	(5,504.1)	(37.1)	(591.2)
Greece	Greece	Greece	84.2	1.8	1.0	(0.8)	(8.4)	(52.5)	7.7	28.6	(153.0)	(54.3)	-	(1.5)	(0.025)	(20.8)	4.3	9.6	(3.1)	(1,455.3)	(9.9)	(160.2)
Hungary	Hungary	Hungary	61.2	0.9	0.6	(0.6)	(11.7)	(30.6)	-	15.2	(97.0)	(17.8)	-	1.5	-	-	3.3	-	(3.3)	(1,536.2)	(10.4)	(167.6)
Ireland	Ireland	Ireland	(1.8)	3.5	2.0	(0.9)	(13.1)	(47.0)	-	17.9	(44.6)	(5.0)	(3.8)	0.3	-	-	4.0	-	(2.4)	(1,114.5)	(7.5)	(121.0)
Italy	Italy	Italy - Zone 1 Italy - Zone 2	(595.8)	9.0	4.8	(7.3)	(82.5)	(298.1)	-	26.9	216.5	(21.3)	(49.5)	(0.8)	-	-	16.7	-	(6.8)	(3,188.6)	(21.6)	(344.8)
Latvia	Latvia	Latvia	(12.5)	0.5	0.4	(0.1)	(4.7)	(13.3)	-	6.5	(0.2)	(0.1)	(1.5)	(0.3)	-	-	2.6	-	(1.0)	(485.1)	(3.3)	(53.2)

Lithuania	Lithuania	Lithuania	(4.8)	0.5	0.4	(0.1)	(2.5)	(9.3)	-	3.4	(3.7)	(0.5)	(0.0)	(0.4)	-	-	2.4	-	(1.1)	(503.8)	(3.4)	(55.1)
Malta	Malta	Malta	20.3	0.6	0.5	(0.1)	(3.2)	(10.8)	-	3.2	(37.0)	(9.7)	-	0.1	-	-	2.5	-	(0.5)	(242.0)	(1.7)	(26.6)
Netherlands	Netherlands	Netherlands	(23.6)	3.3	1.8	(0.5)	(10.1)	(65.4)	7.8	(8.0)	(58.5)	(8.5)	(1.5)	(0.2)	(0.012)	(14.9)	4.7	3.6	(4.5)	(2,107.2)	(14.2)	(225.5)
Norway	Norway	Norway	(58.5)	3.9	2.2	(1.1)	(12.2)	(53.8)	0.8	8.5	1.5	(8.9)	-	(1.7)	-	(0.7)	4.2	-	(2.1)	(969.0)	(6.5)	(104.1)
Poland	Poland	Poland	(109.6)	1.3	0.7	(0.6)	(15.0)	(62.6)	10.2	29.8	70.8	(8.7)	0.2	(2.1)	(0.060)	(50.6)	4.6	9.8	(3.2)	(1,485.9)	(10.1)	(161.4)
Portugal	Portugal	Portugal	(3.2)	1.6	1.2	(0.5)	(8.9)	(21.9)	9.2	(24.6)	(76.3)	(35.0)	-	(2.2)	(0.015)	(9.2)	2.9	4.3	(2.3)	(1,067.3)	(7.2)	(115.8)
Romania	Romania	Romania	160.6	1.2	0.8	(1.2)	(8.2)	(40.1)	-	87.0	(111.2)	(3.7)	-	(0.8)	-	-	3.6	-	(2.9)	(1,323.2)	(9.0)	(145.8)
Slovakia	Slovakia	Slovakia	(20.1)	1.0	0.7	(0.4)	(5.8)	(24.8)	2.5	6.8	(0.5)	(0.5)	(0.4)	0.0	(0.015)	(8.4)	3.1	1.7	(2.2)	(1,005.6)	(6.8)	(109.8)
Slovenia	Slovenia	Slovenia	(1.1)	0.9	0.8	(0.2)	(2.6)	(4.6)	-	8.9	3.7	(0.3)	(0.5)	0.4	-	-	2.2	-	(1.5)	(699.8)	(4.8)	(76.6)
Spain	Spain Canarias Spain Continental	Spain	(113.1)	5.3	1.9	(4.8)	(63.2)	(155.2)	31.5	30.5	(62.6)	(47.3)	-	15.3	(0.021)	(48.9)	8.1	16.7	(1.3)	(600.8)	(4.1)	(65.3)
Sweden	Sweden	Sweden	2.5	1.5	1.1	(0.6)	(10.8)	(23.8)	14.4	59.2	(9.5)	0.0	(1.6)	(46.4)	(0.015)	(11.5)	3.0	8.0	(2.8)	(1,329.7)	(9.0)	(143.5)
Switzerland	Switzerland	Switzerland	(63.9)	6.6	3.2	(0.5)	(18.3)	(92.4)	14.0	20.5	(6.2)	(1.4)	(1.3)	0.5	(0.096)	(99.3)	5.9	6.0	(4.0)	(1,876.6)	(12.6)	(201.0)
United Kingdom	United Kingdom	UK - Zone C	(351.9)	7.6	3.1	(4.6)	(109.0)	(235.9)	46.7	(23.2)	22.1	(1.7)	(13.9)	(3.3)	(0.012)	(32.8)	11.9	24.4	(9.2)	(4,306.9)	(29.0)	(463.0)
EU-wide entities																						
NM				0.5													0.3					
PRB				0.1													0.1					
EC				1.7													1.0					

Option C1

Member State	En-route charging zone	Terminal charging zone	Unit Rates (€)	Determined Costs (2016 NPV, € 2009)						Adjustments (2016 NPV, € 2009)					Delay		FTEs (2035)		Fuel burn		Carbon emissions	
				Regulatory Costs		Cost of Capital	Depreciation	Capex Reimbursement	ATCOs	Inflation	Traffic Risk Sharing	Traffic Sharing	Incentives	Cost Exemptions	Avg. mins per flight (2035)	Cost (2016 NPV, € 2009)	Support	ATCOs	Billion kg	Cost (2016 NPV, € 2009)	Billion kg	Cost (2016 NPV, € 2009)
				ANSPs	NSAs																	
Charging Zones																						
Austria	Austria	Austria	(93.8)	5.5	3.2	(1.1)	(17.3)	(64.0)	13.1	(0.1)	31.3	(1.6)	(2.1)	0.2	(0.016)	(20.1)	6.8	6.4	(4.6)	(2,167.9)	(14.7)	(234.9)
Belgium & Luxembourg	Belgium & Luxembourg	Belgium Antwerpen Belgium Brussels Belgium Charleroi Belgium Liege Belgium Oostende-Brugge Luxembourg	(8.2)	3.8	3.6	(0.9)	(11.1)	(36.4)	-	0.1	(34.4)	(5.5)	3.9	(2.4)	-	(0.6)	6.8	-	(4.5)	(2,110.4)	(14.2)	(226.5)
Bulgaria	Bulgaria	Bulgaria	(2.0)	1.2	0.9	(2.1)	(9.6)	(20.0)	-	4.8	(27.5)	(3.8)	(0.1)	(0.6)	-	-	4.8	-	(3.4)	(1,572.0)	(10.7)	(173.0)
Croatia	Croatia	Croatia	(20.2)	1.3	0.9	(0.6)	(9.6)	(23.4)	6.3	2.7	(0.1)	(0.0)	(0.7)	3.1	(0.023)	(14.6)	5.0	5.4	(2.3)	(1,088.2)	(7.4)	(119.1)
Cyprus	Cyprus	Cyprus	32.1	1.2	0.9	(1.0)	(4.4)	(6.0)	2.6	3.2	(36.8)	(4.1)	-	(0.3)	(0.106)	(48.5)	4.2	3.1	(1.7)	(802.5)	(5.5)	(89.6)
Czech Republic	Czech Republic	Czech Republic	(60.2)	2.4	1.5	(1.5)	(14.9)	(51.3)	6.5	3.4	6.9	(0.4)	-	0.3	(0.026)	(24.5)	6.1	5.1	(3.3)	(1,556.3)	(10.5)	(169.2)
Denmark	Denmark	Denmark	(12.6)	2.6	1.9	(1.7)	(9.1)	(20.0)	-	3.5	(13.4)	(1.5)	(0.9)	(1.2)	-	-	4.9	-	(2.3)	(1,088.2)	(7.3)	(117.1)
Estonia	Estonia	Estonia	(6.9)	0.8	0.7	(0.3)	(2.5)	(5.5)	-	1.1	(0.9)	(0.1)	(1.8)	(0.0)	-	-	4.2	-	(0.8)	(393.2)	(2.7)	(43.0)
Finland	Finland	Finland	(32.0)	2.1	1.5	(0.4)	(4.2)	(23.9)	-	1.3	7.3	(0.4)	(1.8)	(0.3)	-	-	5.0	-	(0.9)	(425.1)	(2.9)	(45.8)
France	France	France	(433.7)	14.3	5.7	(7.9)	(127.1)	(387.7)	86.0	(2.9)	24.6	0.5	-	14.8	(0.024)	(82.0)	20.5	69.5	(12.0)	(5,628.9)	(38.0)	(606.8)
Germany	Germany	Germany	(233.1)	12.1	5.1	(14.9)	(66.5)	(282.6)	94.4	8.9	(21.0)	(1.4)	(7.9)	2.2	(0.055)	(172.0)	16.0	46.2	(11.7)	(5,504.1)	(37.1)	(591.2)
Greece	Greece	Greece	(5.2)	2.6	1.6	(1.5)	(8.4)	(52.5)	10.7	2.3	(50.5)	(5.5)	-	(1.5)	(0.033)	(27.6)	6.3	13.4	(3.1)	(1,455.3)	(9.9)	(160.2)
Hungary	Hungary	Hungary	8.7	1.4	1.0	(1.0)	(11.7)	(30.6)	-	2.4	(50.6)	(5.9)	-	1.5	-	-	5.3	-	(3.3)	(1,536.2)	(10.4)	(167.6)
Ireland	Ireland	Ireland	(16.8)	5.1	3.2	(1.6)	(13.1)	(47.0)	-	2.7	(41.8)	(3.2)	(3.8)	0.3	-	-	6.0	-	(2.4)	(1,114.5)	(7.5)	(121.0)
Italy	Italy	Italy - Zone 1 Italy - Zone 2	(609.8)	9.9	5.5	(12.9)	(82.5)	(298.1)	-	5.6	216.5	(12.5)	(47.8)	(0.8)	-	-	18.7	-	(6.8)	(3,188.6)	(21.6)	(344.8)
Latvia	Latvia	Latvia	(16.5)	0.8	0.6	(0.2)	(4.7)	(13.3)	-	1.7	(0.4)	(0.0)	(1.5)	(0.3)	-	-	4.6	-	(1.0)	(485.1)	(3.3)	(53.2)

Lithuania	Lithuania	Lithuania	(8.7)	1.0	0.8	(0.2)	(2.5)	(9.3)	-	0.5	(1.8)	(0.2)	(0.0)	(0.4)	-	-	4.4	-	(1.1)	(503.8)	(3.4)	(55.1)
Malta	Malta	Malta	(6.0)	1.1	0.8	(0.2)	(3.2)	(10.8)	-	0.6	(7.6)	(1.2)	-	0.1	-	-	4.5	-	(0.5)	(242.0)	(1.7)	(26.6)
Netherlands	Netherlands	Netherlands	(8.2)	4.6	2.7	(0.9)	(10.1)	(65.4)	9.3	(0.7)	(58.5)	(4.4)	(1.5)	0.0	(0.014)	(17.3)	6.7	4.4	(4.5)	(2,107.2)	(14.2)	(225.5)
Norway	Norway	Norway	(62.6)	5.6	3.5	(1.9)	(12.2)	(53.8)	0.9	1.1	1.7	(7.2)	-	(1.7)	-	(0.8)	6.2	-	(2.1)	(969.0)	(6.5)	(104.1)
Poland	Poland	Poland	(129.4)	1.8	1.1	(1.0)	(15.0)	(62.6)	14.3	3.7	70.8	(7.4)	-	(2.1)	(0.080)	(67.1)	6.6	13.8	(3.2)	(1,485.9)	(10.1)	(161.4)
Portugal	Portugal	Portugal	26.5	2.7	2.0	(0.8)	(8.9)	(21.9)	12.9	(2.1)	(46.7)	(4.7)	-	(1.2)	(0.020)	(12.2)	4.9	6.1	(2.3)	(1,067.3)	(7.2)	(115.8)
Romania	Romania	Romania	22.5	1.8	1.2	(2.1)	(8.2)	(40.1)	-	8.4	(68.9)	(7.8)	-	(0.7)	-	-	5.6	-	(2.9)	(1,323.2)	(9.0)	(145.8)
Slovakia	Slovakia	Slovakia	(23.4)	1.7	1.2	(0.6)	(5.8)	(24.8)	3.0	1.1	(1.3)	(0.2)	(0.4)	0.0	(0.017)	(9.7)	5.1	2.0	(2.2)	(1,005.6)	(6.8)	(109.8)
Slovenia	Slovenia	Slovenia	(5.4)	1.8	1.4	(0.3)	(2.6)	(4.6)	-	1.1	1.8	(0.1)	(0.5)	0.4	-	-	4.2	-	(1.5)	(699.8)	(4.8)	(76.6)
Spain	Spain Canarias Spain Continental	Spain	(162.8)	6.3	2.7	(8.4)	(63.2)	(155.2)	44.2	4.4	7.1	(7.3)	-	15.3	(0.028)	(64.7)	10.1	23.3	(1.3)	(600.8)	(4.1)	(65.3)
Sweden	Sweden	Sweden	24.2	2.5	1.8	(1.0)	(10.8)	(23.8)	20.1	5.8	(9.5)	0.0	(1.6)	21.6	(0.020)	(15.2)	5.0	11.2	(2.8)	(1,329.7)	(9.0)	(143.5)
Switzerland	Switzerland	Switzerland	(74.6)	8.5	4.6	(0.9)	(18.3)	(92.4)	16.8	4.1	(6.2)	(1.1)	(1.3)	0.5	(0.112)	(115.5)	7.9	7.2	(4.0)	(1,876.6)	(12.6)	(201.0)
United Kingdom	United Kingdom	UK - Zone C	(325.8)	8.6	3.8	(8.1)	(109.0)	(235.9)	56.0	(6.4)	22.1	(0.4)	(13.9)	(2.4)	(0.014)	(38.2)	13.9	29.3	(9.2)	(4,306.9)	(29.0)	(463.0)
EU-wide entities																						
NM				0.5													0.3					
PRB				0.6													0.5					
EC				1.7													1.0					

Option C2

Member State	En-route charging zone	Terminal charging zone	Unit Rates (€)	Determined Costs (2016 NPV, € 2009)						Adjustments (2016 NPV, € 2009)					Delay		FTEs (2035)		Fuel burn		Carbon emissions	
				Regulatory Costs		Cost of Capital	Depreciation	Capex Reimbursement	ATCOs	Inflation	Traffic Risk Sharing	Traffic Sharing	Incentives	Cost Exemptions	Avg. mins per flight (2035)	Cost (2016 NPV, € 2009)	Support	ATCOs	Billion kg	Cost (2016 NPV, € 2009)	Billion kg	Cost (2016 NPV, € 2009)
				ANSPs	NSAs																	
Charging Zones																						
Austria	Austria	Austria	(40.4)	5.5	2.7	(2.5)	(17.3)	(40.1)	15.3	(0.1)	2.3	0.1	(2.1)	0.2	(0.018)	(22.9)	6.3	7.5	(4.6)	(2,167.9)	(14.7)	(234.9)
Belgium & Luxembourg	Belgium & Luxembourg	Belgium Antwerpen Belgium Brussels Belgium Charleroi Belgium Liege Belgium Oostende-Brugge Luxembourg	(19.5)	3.9	3.2	(2.2)	(11.1)	(22.2)	-	0.1	(13.0)	(1.4)	(0.1)	(2.4)	-	(0.7)	6.3	-	(4.5)	(2,110.4)	(14.2)	(226.5)
Bulgaria	Bulgaria	Bulgaria	(11.4)	1.2	0.7	(4.8)	(9.6)	(11.5)	-	4.7	(11.6)	(1.2)	(0.1)	(0.6)	-	-	4.3	-	(3.4)	(1,572.0)	(10.7)	(173.0)
Croatia	Croatia	Croatia	(13.1)	1.3	0.8	(1.4)	(9.6)	(14.2)	7.3	2.5	2.0	0.0	(0.7)	3.1	(0.026)	(16.7)	4.5	6.3	(2.3)	(1,088.2)	(7.4)	(119.1)
Cyprus	Cyprus	Cyprus	4.7	1.2	0.8	(2.4)	(4.4)	(3.3)	2.6	3.2	(9.7)	(1.0)	(1.6)	(0.3)	(0.106)	(48.5)	3.7	3.1	(1.7)	(802.5)	(5.5)	(89.6)
Czech Republic	Czech Republic	Czech Republic	(34.6)	2.4	1.3	(3.5)	(14.9)	(30.7)	6.5	3.2	(2.1)	(0.0)	(1.3)	0.3	(0.026)	(24.5)	5.6	5.1	(3.3)	(1,556.3)	(10.5)	(169.2)
Denmark	Denmark	Denmark	(22.8)	2.7	1.6	(3.9)	(9.1)	(12.4)	-	3.4	1.9	(0.3)	(0.9)	(1.2)	-	-	4.4	-	(2.3)	(1,088.2)	(7.3)	(117.1)
Estonia	Estonia	Estonia	(6.0)	0.8	0.5	(0.6)	(2.5)	(3.2)	-	1.1	0.0	(0.0)	(1.8)	(0.0)	-	-	3.7	-	(0.8)	(393.2)	(2.7)	(43.0)
Finland	Finland	Finland	(18.6)	2.1	1.2	(0.9)	(4.2)	(14.7)	-	1.2	0.7	0.1	(2.8)	(0.3)	-	-	4.5	-	(0.9)	(425.1)	(2.9)	(45.8)
France	France	France	(328.5)	14.3	5.4	(18.4)	(127.1)	(239.2)	86.0	(2.7)	57.9	1.0	-	14.8	(0.024)	(82.0)	20.0	69.5	(12.0)	(5,628.9)	(38.0)	(606.8)
Germany	Germany	Germany	(173.1)	12.2	4.7	(34.7)	(66.5)	(174.3)	94.4	8.2	7.3	(0.0)	(7.9)	2.2	(0.055)	(172.0)	15.5	46.2	(11.7)	(5,504.1)	(37.1)	(591.2)
Greece	Greece	Greece	(25.4)	2.6	1.3	(3.4)	(8.4)	(33.1)	10.7	1.9	(10.2)	(1.9)	-	(1.5)	(0.033)	(27.6)	5.8	13.4	(3.1)	(1,455.3)	(9.9)	(160.2)
Hungary	Hungary	Hungary	(11.1)	1.4	0.8	(2.4)	(11.7)	(18.6)	-	2.3	(18.8)	(2.0)	-	1.5	-	-	4.8	-	(3.3)	(1,536.2)	(10.4)	(167.6)
Ireland	Ireland	Ireland	(39.2)	5.1	2.7	(3.8)	(13.1)	(29.6)	-	2.5	(3.8)	(0.6)	(3.8)	0.3	-	-	5.5	-	(2.4)	(1,114.5)	(7.5)	(121.0)
Italy	Italy	Italy - Zone 1 Italy - Zone 2	(315.1)	10.0	5.2	(30.1)	(82.5)	(182.5)	-	5.3	11.0	2.1	(49.5)	(0.8)	-	-	18.2	-	(6.8)	(3,188.6)	(21.6)	(344.8)
Latvia	Latvia	Latvia	(11.7)	0.8	0.5	(0.4)	(4.7)	(8.2)	-	1.6	(0.7)	0.0	(1.5)	(0.3)	-	-	4.1	-	(1.0)	(485.1)	(3.3)	(53.2)

Lithuania	Lithuania	Lithuania	(6.8)	1.0	0.6	(0.5)	(2.5)	(5.6)	-	0.5	(0.4)	(0.0)	(0.0)	(0.4)	-	-	3.9	-	(1.1)	(503.8)	(3.4)	(55.1)
Malta	Malta	Malta	(6.3)	1.1	0.7	(0.4)	(3.2)	(6.9)	-	0.6	(3.5)	(0.6)	-	0.1	-	-	4.0	-	(0.5)	(242.0)	(1.7)	(26.6)
Netherlands	Netherlands	Netherlands	(33.2)	4.6	2.3	(2.0)	(10.1)	(39.3)	10.9	(0.6)	(5.6)	(0.8)	(1.5)	0.0	(0.016)	(19.7)	6.2	5.1	(4.5)	(2,107.2)	(14.2)	(225.5)
Norway	Norway	Norway	(47.8)	5.6	2.9	(4.4)	(12.2)	(32.2)	1.1	1.0	6.2	(1.6)	-	(1.7)	-	(0.9)	5.7	-	(2.1)	(969.0)	(6.5)	(104.1)
Poland	Poland	Poland	(47.6)	1.8	0.9	(2.4)	(15.0)	(38.0)	14.3	3.3	11.4	(1.3)	-	(2.1)	(0.080)	(67.1)	6.1	13.8	(3.2)	(1,485.9)	(10.1)	(161.4)
Portugal	Portugal	Portugal	(8.4)	2.8	1.6	(2.0)	(8.9)	(13.6)	12.9	(2.0)	(4.3)	(1.1)	-	(1.2)	(0.020)	(12.2)	4.4	6.1	(2.3)	(1,067.3)	(7.2)	(115.8)
Romania	Romania	Romania	(6.5)	1.9	1.0	(4.8)	(8.2)	(23.4)	-	7.9	(23.7)	(2.5)	-	(0.7)	-	-	5.1	-	(2.9)	(1,323.2)	(9.0)	(145.8)
Slovakia	Slovakia	Slovakia	(13.8)	1.7	1.0	(1.5)	(5.8)	(15.5)	3.5	1.0	(2.4)	(0.0)	(0.4)	0.0	(0.020)	(11.1)	4.6	2.4	(2.2)	(1,005.6)	(6.8)	(109.8)
Slovenia	Slovenia	Slovenia	(2.0)	1.8	1.2	(0.7)	(2.6)	(2.9)	-	1.0	(0.7)	(0.0)	(0.5)	0.4	-	-	3.7	-	(1.5)	(699.8)	(4.8)	(76.6)
Spain	Spain Canarias Spain Continental	Spain	(124.2)	6.3	2.4	(19.7)	(63.2)	(95.7)	44.2	4.2	15.4	(1.0)	-	15.3	(0.028)	(64.7)	9.6	23.3	(1.3)	(600.8)	(4.1)	(65.3)
Sweden	Sweden	Sweden	17.4	2.6	1.5	(2.3)	(10.8)	(14.6)	20.1	5.5	4.7	0.4	(1.6)	21.6	(0.020)	(15.2)	4.5	11.2	(2.8)	(1,329.7)	(9.0)	(143.5)
Switzerland	Switzerland	Switzerland	(42.9)	8.6	4.0	(2.1)	(18.3)	(57.1)	19.5	3.7	(1.6)	(0.0)	(1.3)	0.5	(0.127)	(131.6)	7.4	8.5	(4.0)	(1,876.6)	(12.6)	(201.0)
United Kingdom	United Kingdom	UK - Zone C	(187.8)	8.7	3.5	(18.9)	(109.0)	(143.1)	65.4	(6.2)	(26.3)	0.7	(14.3)	(2.4)	(0.016)	(43.5)	13.4	34.2	(9.2)	(4,306.9)	(29.0)	(463.0)
EU-wide entities																						
NM				2.9													1.3					
PRB				0.7													0.5					
EC				5.5													1.0					

CONTROL INFORMATION

Prepared by	Prepared for
Steer Davies Gleave 28-32 Upper Ground London SE1 9PD +44 20 7910 5000 www.steerdaviesgleave.com	European Commission, DG MOVE E3 - Single European Sky Office DM24 5/75 Avenue du Bourget 1 1140 Brussels (Evere) Belgium
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Author/originator	**Reviewer/approver**
Simon Ellis	Clémence Routaboul
Other contributors	**Distribution**
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