



REPORT COMMISSIONED BY THE PERFORMANCE REVIEW COMMISSION

# ATM Cost-Effectiveness (ACE) 2010 Benchmarking Report with 2011-2015 outlook

Prepared by the Performance Review Unit (PRU)  
with the ACE Working Group

May 2012

## **BACKGROUND**

This report has been commissioned by the Performance Review Commission (PRC).

The PRC was established in 1998 by the Permanent Commission of EUROCONTROL, in accordance with the ECAC Institutional Strategy (1997).

One objective in this Strategy is «*to introduce strong, transparent and independent performance review and target setting to facilitate more effective management of the European ATM system, encourage mutual accountability for system performance and provide a better basis for investment analyses and, with reference to existing practice, provide guidelines to States on economic regulation to assist them in carrying out their responsibilities.*»

The PRC's website address is <http://www.eurocontrol.int/prc>

In September 2010, EUROCONTROL accepted the designation by the European Commission as the SES Performance Review Body (PRB) acting through its Performance Review Commission supported by the Performance Review Unit.

## **NOTICE**

The Performance Review Unit (PRU) has made every effort to ensure that the information and analysis contained in this document are as accurate and complete as possible. Should you find any errors or inconsistencies we would be grateful if you could please bring them to the PRU's attention.

The PRU's e-mail address is [pru@eurocontrol.int](mailto:pru@eurocontrol.int)

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Prepared by the Performance Review Unit (PRU)  
with the ACE 2010 Working Group

*Final Report*

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ATM Cost-Effectiveness (ACE) 2010 Benchmarking Report  
with 2011-2015 outlook

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### ABSTRACT

This report is the tenth in a series of annual reports based on mandatory information disclosure provided by 37 Air Navigation Services Providers (ANSPs) to the EUROCONTROL Performance Review Commission (PRC). This report comprises factual data and analysis on cost-effectiveness and productivity for 37 ANSPs for the year 2010, including high level trend analysis for the years 2006-2010. The scope of the report is both en-route and terminal navigation services (i.e. gate-to-gate). The main focus is on the ATM/CNS provision costs as these costs are under the direct control and responsibility of the ANSP. Costs borne by airspace users for less than optimal quality of service are also considered. The report describes a performance framework for the analysis of cost-effectiveness. The framework highlights 3 key performance drivers contributing to cost-effectiveness (productivity, employment costs and support costs). The report also presents detailed productivity comparisons for 64 Area Control Centres (ACCs) grouped in 3 clusters of different traffic complexity characteristics. Finally, the report analyses forward-looking information for the years 2011-2015, inferring on future financial cost-effectiveness performance at both system and ANSP levels, and displaying future capital expenditures and future capacity plans.

### Keywords

EUROCONTROL Performance Review Commission - Economic information disclosure – Benchmarking – Target setting – Exogenous factors – Complexity metrics - ATM/CNS cost-effectiveness comparisons - European Air Navigation Services Providers (ANSPs) - Gate-to-gate - En-route and Terminal ANS - Inputs and outputs metrics – Performance framework - Quality of service - 2010 data – Traffic downturn - Factual analysis – Historic trend analysis - Costs drivers - Productivity – Employment costs - Support costs – Area Control Centres (ACCs) productivity comparisons – Current and future capital expenditures – ATM systems – Five years forward-looking trend analysis (2011-2015).

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## READER'S GUIDE

<p>This table indicates which chapters of the report are likely to be of most interest to particular readers and stakeholders.</p>	
<b>Executive summary</b>	All stakeholders with an interest in ATM who want to know what this report is about, or want an overview of the main findings.
<b>Chapter 1: Introduction</b>	Those wanting a short overview of the structure of the report, the list of participating ANSPs, and the process to analyse the data comprised in this report. All those who are interested in understanding the differences between the SES II reporting requirements and the ACE analysis in terms of scope, entities and KPIs.
<b>Part I: - European ANS data and introduction to ANSP benchmarking</b>	
<b>Chapter 2: European ANS system data</b>	Brief summary of the main economic, financial and operational metrics for the whole European ANS system in 2010.
<b>Chapter 3: Factors affecting performance</b>	All those who are interested in the main (measurable) factors which affect the observed performance of an ANSP such as size, cost of living, traffic complexity and traffic variability. This chapter is particularly relevant to scholars and economic regulators who are interested in developing econometric methodology to benchmark ANSPs with a view to produce a normative assessment of performance.
<b>Part II: - Financial cost-effectiveness</b>	
<b>Chapter 4: Financial cost-effectiveness (2010)</b>	All those who are interested in understanding how ATM/CNS provision cost-effectiveness in 2010 is measured and benchmarked for each ANSP, including its three main economic drivers (productivity, employment costs and support costs). This chapter is particularly relevant to ANSPs' management, regulators and NSAs in order to identify best practices and areas for improvement.
<b>Chapter 5: Changes in financial cost-effectiveness (2006-2010)</b>	All those who are interested in trends and dynamic analysis of ATM/CNS cost-effectiveness performance between 2006 and 2010. This chapter is particularly relevant to ANSPs' management, regulators and NSAs in order to identify how cost-effectiveness performance has evolved and which have been the sources of improvement (productivity, employment costs and support costs).
<b>Chapter 6: Forward looking financial cost-effectiveness (2011-2015)</b>	All those who are interested in forward-looking expectations of ATM/CNS cost-effectiveness performance for the 2011-2015 period, including capital investment and staff projections. This chapter is particularly relevant for those interested in cost-effectiveness planning, regulators and NSAs, and for airspace users during their consultation processes.
<b>Part III: - Economic cost-effectiveness</b>	
<b>Chapter 7: Economic cost-effectiveness</b>	All those who are interested in understanding how the quality of service (currently only ATFM delays) is factually measured, valued in monetary terms and benchmarked for each ANSP. This chapter is particularly relevant to ANSPs' management, regulators and NSAs in order to identify areas for improvement, and understand trade-offs between quality of service and financial cost-effectiveness.
<b>Annexes:</b>	Tables with data used in the report. The annexes also include detailed information on ANSPs planned capital expenditures.

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# EXECUTIVE SUMMARY

## Independent benchmarking of the cost-effectiveness of 37 European ANSPs

This ATM Cost-Effectiveness (ACE) 2010 Benchmarking Report, the tenth in the series, presents a review and comparison of ATM cost-effectiveness for 37 Air Navigation Service Providers (ANSPs) in Europe.

ACE 2010 presents information on performance indicators relating to cost-effectiveness and productivity for the year 2010, and how they changed over time (2006-2010). It examines both individual ANSPs and the European ATM/CNS system as a whole. In addition, ACE 2010 analyses forward-looking information covering the 2011-2015 period based on information provided by ANSPs in November 2011.

The ACE benchmarking work is carried out by the Performance Review Commission (PRC) and is based on information provided by ANSPs in compliance with Decision No. 88 of the Permanent Commission of EUROCONTROL on economic information disclosure and in the context of Annex IV 2.1(a) of EC regulation N°691/2010.

The data processing, analysis and reporting were conducted with the assistance of the ACE Working Group, which comprises representatives from participating ANSPs, airspace users, regulatory authorities and the Performance Review Unit (PRU). This enabled participants to share experiences and gain an improved common understanding of underlying assumptions and limitations of the data.

EU-wide targets for Cost-Efficiency, Capacity and Environment were adopted by the EC on 3 December 2010 for RP1 (2012-2014). The ACE benchmarking activities set the foundation for a more normative analysis to assess the scope for ANSPs cost-efficiency improvement and have been one of the main inputs considered for determining the EU-wide cost-efficiency target. The ACE data analysis had also a significant role in the context of the assessment of national performance plans that was carried out by the PRB in 2011.

## The European ANS system is a business of €8 570M with some 57 800 staff

The European ANS system analysed in this report comprises 37 participating ANSPs, excluding elements related to services provided to military operational air traffic (OAT), oceanic ANS, and landside airport management operations. The European ANS system also includes National Supervisory Authorities (NSAs), national MET providers and the EUROCONTROL Agency. In 2010, total ANS costs were around €8 570M (see Table 0.1 below), of which some €7 480M related directly to the provision of gate-to-gate ATM/CNS.

	2009	2010	09/10
	37 ANSPs	37 ANSPs	37 ANSPs
Gate-to-gate ANS revenues (not adjusted by over/under recoveries) (in € M):			
En-route ANS revenues	8 004	8 210	2.6%
Terminal ANS revenues	6 341	6 540	3.1%
	1 662	1 670	0.5%
Gate-to-gate ANS costs (in € M):	8 938	8 572	-4.1%
ATM/CNS provision costs	7 854	7 476	-4.8%
MET costs	437	437	0.0%
EUROCONTROL Agency costs	542	516	-4.8%
Payment to national authorities and irrecoverable VAT	105	144	36.8%
Gate-to-gate ATM/CNS costs (in € M):	7 854	7 476	-4.8%
En-route ATM/CNS costs	6 011	5 769	-4.0%
Terminal ATM/CNS costs	1 843	1 707	-7.4%
Gate-to-gate ANS staff:	57 600	57 808	0.4%
ATCOs in OPS	16 934	16 944	0.1%
ACC ATCOs	9 617	9 494	-1.3%
APPs + TWRs ATCOs	7 317	7 451	1.8%
NBV of gate-to-gate fixed assets (in € M)	7 712	7 625	-1.1%
Gate-to-gate capex (in € M)	1 336	1 151	-13.9%
Outputs (in M)			
Distance controlled (km)	9 491	9 765	2.9%
Total flight-hours controlled	13.6	13.9	2.6%
ACC flight-hours controlled	11.9	12.2	2.9%
IFR airport movements controlled	14.8	14.8	0.2%
IFR flights controlled	9.4	9.5	0.8%
Gate-to-gate ATFM delays ('000 min.)	15 166	27 476	81.2%

Table 0.1: Key system data for 2009 and 2010

Total ANS revenues in 2010 amounted to some €8 210M. The European ANSPs employed some 57 800 staff, which is slightly larger than the workforce at Airbus worldwide (55 000 employees). Some 16 900 staff (29%) were ATCOs working on operational duty, compared to some 14 600 in the United States (FAA/ATO, including 1 300 for contracted TWRs). On average, in Europe, 2.4 additional staff are required for every ATCO.

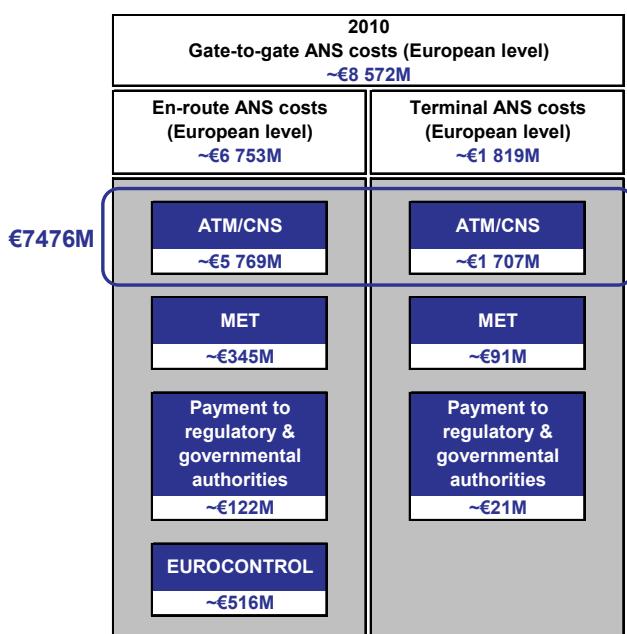


Figure 0.1: Gate-to-gate ANS costs breakdown

ACE 2010 first considers the total costs at State level for providing ANS, however, since some elements of ANS provision are outside the control of individual ANSPs, it then focuses on the specific costs of providing ATM/CNS (~€7 476M). These represent 87% of total ANS costs. Other ANS costs include the costs of aeronautical meteorology services (5%), the costs of the EUROCONTROL Agency (6%) and the costs associated to regulatory and governmental authorities (2%).

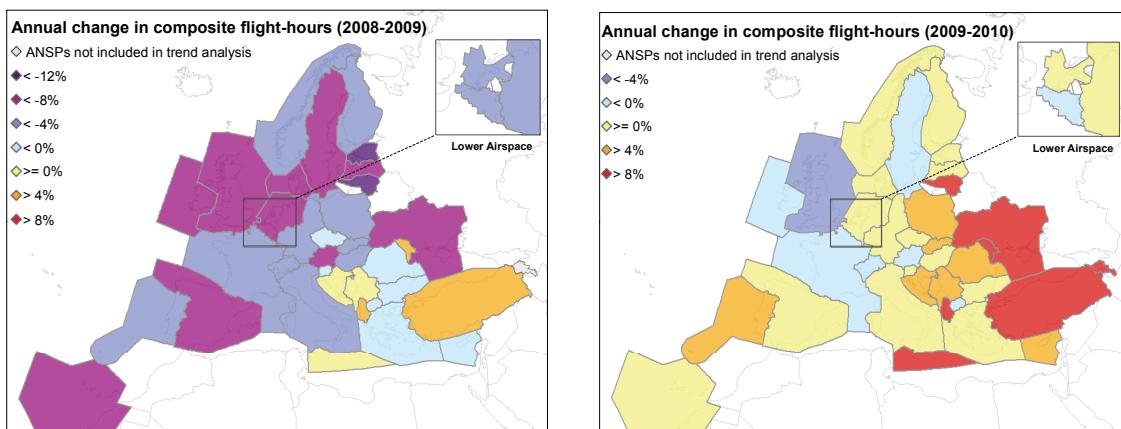
The allocation of costs between en-route and terminal ANS is not done consistently across the European ANSPs. This lack of consistency might distort performance comparisons carried out separately for en-route and terminal ANS. For this reason, the focus of the cost-effectiveness analysis in this report is “gate-to-gate” ANS.

ANSPs' controllable costs are then divided by an output metric to obtain a measure of performance – the **financial cost-effectiveness KPI**. The output metric is the composite flight-hour, a “gate-to-gate” measure which combines en-route flight-hours controlled and IFR airport movements controlled. Many factors contribute to observed differences in unit costs between ANSPs. Some of these factors are measurable; others (such as regulatory constraints) are less obviously quantifiable. Ideally, since the 37 ANSPs operate in very diverse environments across Europe, all of these should be taken into account in making fair performance comparisons, especially since many of these factors are outside the control of an ANSP. As in previous years, the analysis undertaken is a purely **factual** analysis of the cost-effectiveness indicators – measuring what the indicators are.

ACE also analyses indicators derived from ANSP balance sheets and capital expenditures. The total Net Book Value (NBV) of fixed assets used by the European ANSPs to provide ATM/CNS services is valued at some €7 625M, which means that overall €0.93 of fixed assets are required to generate €1 of revenue, an indication of relative capital intensity (this ratio is about 2 for airlines and about 3 for main airports operators). Fixed assets mainly relate to ATM/CNS systems and equipment in operation or under construction. In 2010, the total ANSP capex at European system level amounted to some €1 150M.

### 2010 traffic did not bounce back after the sharp decrease experienced in 2009

Composite flight-hours rose by +2.1% in 2010, a modest recovery compared to the sharp traffic decrease recorded in 2009 (-6.7%), to reach a level below that of 2007. The traffic growth observed at European system level masks contrasted situations across ANSPs, and for eight of them traffic decreased in 2010. Among the five largest ANSPs, for NATS and DSNA traffic fell for the second consecutive year. 2010 was also marked by a volcanic eruption in Iceland which created severe traffic disruptions across Europe. As a result, the traffic recorded in April 2010 was some 11% below that of April 2009.

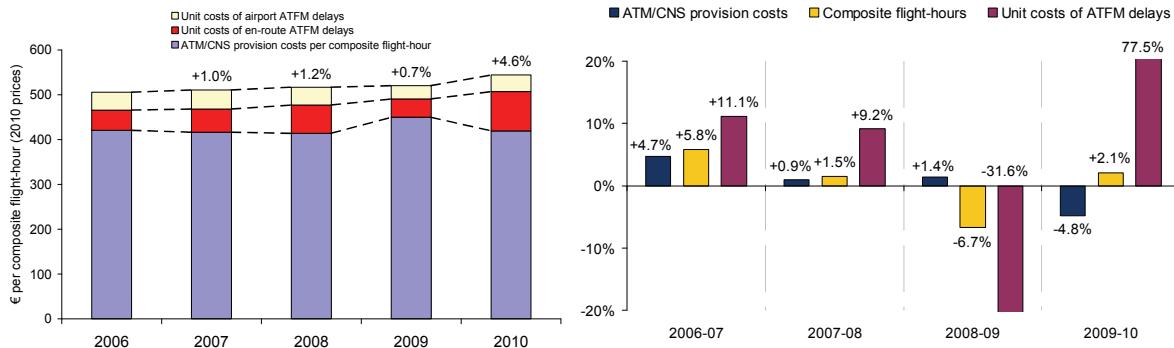


**Figure 0.2: Change in composite flight-hours between 2008-2009 and 2009-2010**

A major theme of this ACE report is to assess the degree of reactivity of the ANS industry with respect to the traffic downturn.

### In 2010, efforts made to reduce ATM/CNS costs were cancelled by a sharp increase in ATFM delays

An assessment of the overall performance of an ANSP should take into account all the areas related to the economics of ANS - not only financial cost-effectiveness but also the quality of service provided, such as efficient routings and adequate levels of ATC capacity, while ensuring ANS safety. ACE therefore introduced the concept of economic cost-effectiveness KPI, which adds a monetary value of the cost of ground ATFM delay to the controllable financial costs. Other elements of quality of service such as flight-efficiency and airborne holdings have not been included in the indicator as they cannot be so readily quantified at ANSP level. This indicator allows the assessment of performance to take into account trade-offs between quality of service and costs.



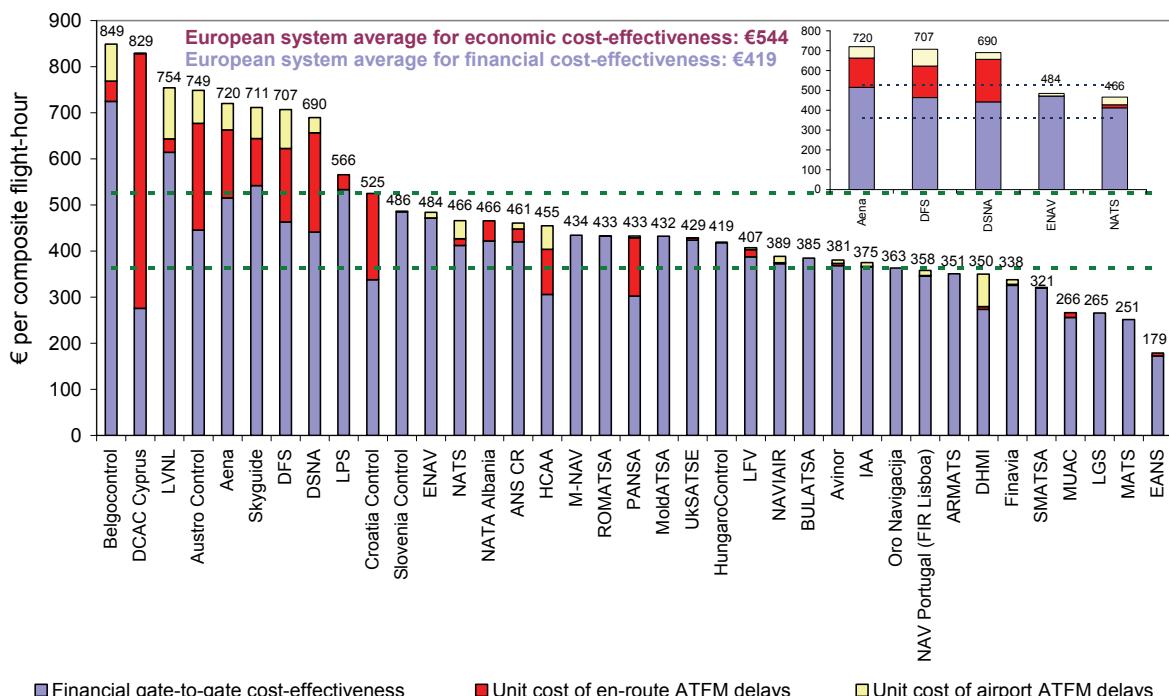
**Figure 0.3: Changes in gate-to-gate cost-effectiveness KPI (2006-2010, real terms)**

At European level, the economic costs per composite flight-hour slightly increased between 2006 and 2009 (i.e. +1.0% p.a. in real terms) and then substantially rose in 2010 (i.e. +4.6% in real terms). As a result, unit economic costs increased by +7.7% in real terms between 2006 and 2010.

In 2010, ATM/CNS provision costs fell by -4.8% in real terms. This is an important result since ATM/CNS provision costs never declined during the last decade. However, this reduction was outweighed by a sharp increase in the unit costs of ATFM delays (+77.5%) which is disappointing given the relatively low traffic growth experienced in 2010 (+2.1%). Overall, the result was a +4.6% rise in unit economic costs in 2010.

### There is a wide range of cost-effectiveness performance among ANSPs

In 2010, the economic cost-effectiveness KPI ranges from €849 (Belgocontrol) to €179 (EANS), a factor greater than five (see Figure 0.4 below). Although the five largest ANSPs operate in relatively similar economic and operational environments, there is a substantial variation in unit costs, ranging from Aena (€720) to NATS (€466).



**Figure 0.4: Economic gate-to-gate cost-effectiveness KPI, 2010**

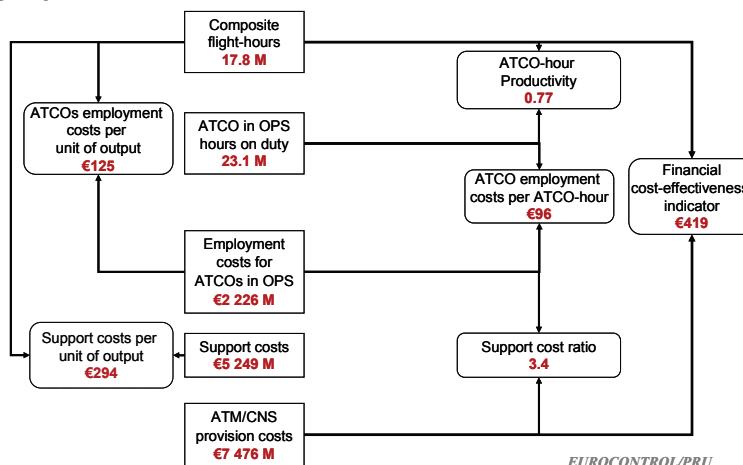
Across Europe, ATFM delays contributed to some 23% of the total economic gate-to-gate costs in 2010, compared to 12% in 2009. The substantial rise in ATFM delays for three of the five largest ANSPs significantly contributed to the increase observed at

European system level. For DSNA (36%), DFS (34%) and Aena (28%) the share of ATFM delays amounts to more than 20% of the economic costs. The increase in ATFM delays for DFS was mainly due to staff training relating to the implementation of the VAFORIT system in Rhein ACC. The large share for DSNA and Aena reflects an increase in ATFM delays mainly relating to social tensions.

Several ANSPs (e.g. DCAC Cyprus, Austro Control and PANSA) have had recurrent ATC capacity issues for several years and could not implement the necessary measures to address them in 2010, although the traffic downturn in 2009 was an opportunity to reduce the capacity gap. Looking ahead, this situation offers a unique opportunity to better match capacity and demand, while at the same time improving financial cost-effectiveness. Furthermore, in the context of SES II, the body in charge of the Network Management and Design functions should effectively support ANSPs to improve the quality of service provided at system level.

### Higher productivity combined with lower ATCOs employment costs and support costs contributed to substantially improve financial cost-effectiveness in 2010

Figure 0.5 shows the analytical framework which is used in the ACE analysis to break down the financial cost-effectiveness KPI into a number of key components. In 2010 at European system level, the average ATM/CNS provision cost per composite flight hour is €419.

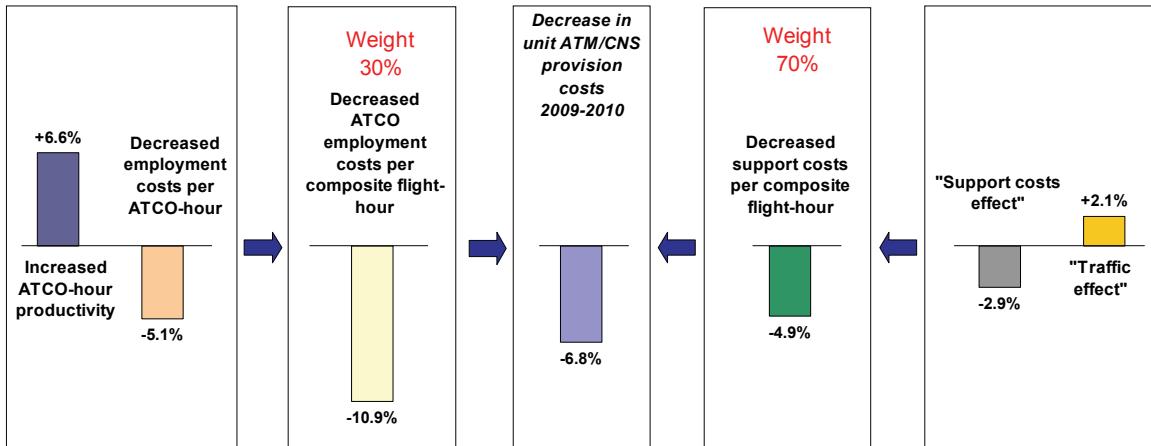


**Figure 0.5: ACE key performance indicators, 2010**

This indicator can be broken down into two additive indicators: ATCOs employment costs per unit output (€125) and support costs per unit output (€294).

Key components of the financial cost-effectiveness KPI also include ATCO-hour productivity (0.77 composite flight-hours per ATCO-hour) and ATCO employment costs per ATCO-hour (€96).

At European system level, unit ATM/CNS provision costs fell by -6.8% in real terms between 2009 and 2010. Figure 0.6 shows that in 2010, ANSPs managed to substantially decrease employment costs per ATCO-hour (-5.1%), while increasing ATCO-hour productivity (+6.6%). These results are heavily influenced by the introduction of Law 9/2010 which was adopted in Spain in 2010. Besides a number of structural changes, this law introduced new working conditions for Spanish ATCOs, rising contractual working hours and significantly reducing the number of overtime hours, which was one of the main driver for high ATCO employment costs for Aena in the past.



**Figure 0.6: Changes in the financial cost-effectiveness KPI, 2009-2010 (real terms)**

Figure 0.6 also shows that the substantial decrease in support costs (-2.9%) combined with the +2.1% traffic increase contributed to the -6.8% reduction in unit ATM/CNS provision costs in 2010.

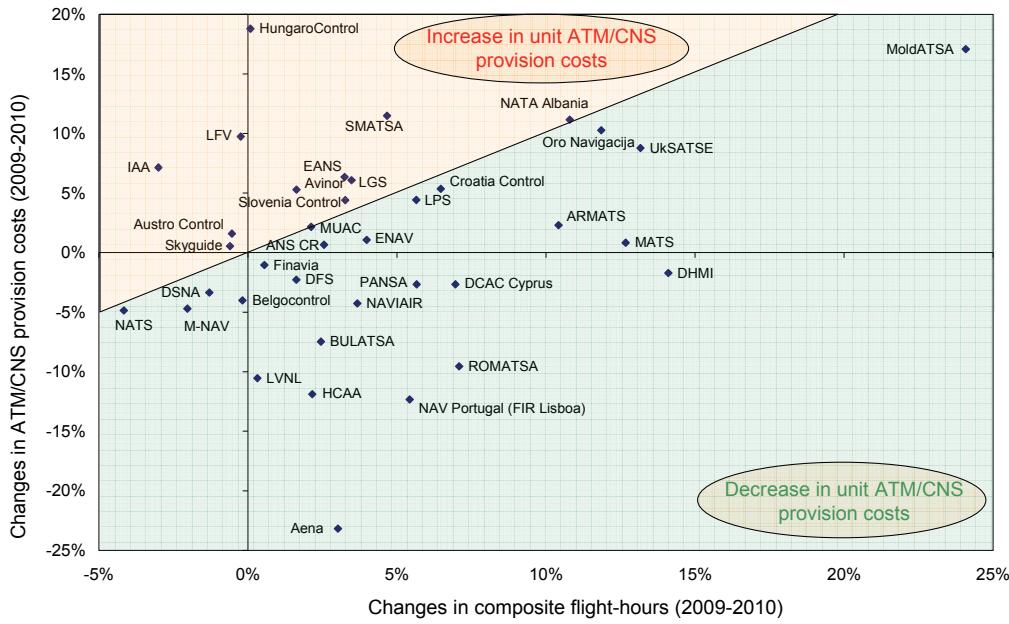
**Cost containment measures initiated in 2009 generated substantial savings at European system level and contributed to decrease ATM/CNS costs in 2010**

Table 0.2 indicates that for 2009 and 2010, the actual number of composite flight-hours is some 8-9% lower than planned in November 2008. This reflects the impact of the severe financial crisis and economic downturn on traffic. Due to short-term rigidities and unavoidable lead time to adjust ANS costs downwards, the impact of cost-containment measures introduced by the European ANSPs in 2009 mainly materialised in 2010. Actual 2010 ATM/CNS provision costs are -10.3% lower than planned in November 2008, which is a remarkable achievement for the ANS industry. At European system level, these measures generated some €800M of savings compared to previous years plans and contributed to decrease ATM/CNS provision costs (-4.8%, see Figure 0.3) in 2010. This indicates that, as a whole, the ANS industry was reactive and showed flexibility to adjust costs downwards in response to the sharp traffic decrease in 2009.

European system level (in €2010)	2009	2010
Planned costs in Nov. 2008 (M€)	7 685	7 778
Actual costs (M€)	7 337	6 977
Difference between actual costs and Nov. 2008 plans (M€)	-349	-800
Difference between actual costs and Nov. 2008 plans (%)	-4.5%	-10.3%
Planned composite flight-hours in Nov. 2008 ('000)	17 504	18 046
Actual composite flight-hours ('000)	16 093	16 423
Difference between actual composite flight-hours and Nov. 2008 plans (%)	-8.1%	-9.0%

**Table 0.2: Comparison of ATM/CNS provision costs and composite flight-hours at system level (data provided in Nov.'08 versus Nov.'11) (€2010)**

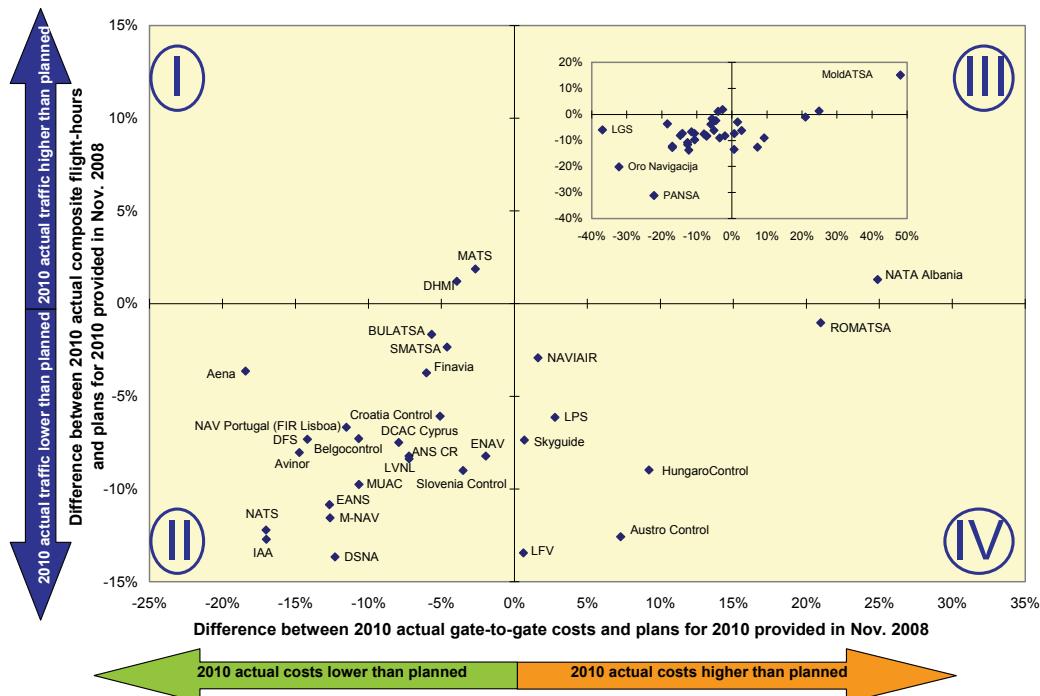
Figure 0.7 shows that 16 ANSPs could reduce their ATM/CNS provision costs between 2009 and 2010 (see bottom part of the chart). For four ANSPs (Belgocontrol, DSNA, M-NAV and NATS) these decreases were sufficient to outweigh the decrease in traffic and to achieve reductions in unit costs in 2010.



**Figure 0.7: Changes in ATM/CNS provision costs and traffic volumes (2009-2010)**

Figure 0.8 below shows that, for most of the ANSPs, the actual 2010 traffic was lower than planned in November 2008 (ACE 2007 plans). For nine ANSPs, the actual 2010 traffic was at least -10% below ACE 2007 plans. This is for example the case of DSNA (-14%) and NATS (-12%), despite the fact that DSNA was planning for a very modest growth, and that NATS was already anticipating a decline in flight-hours.

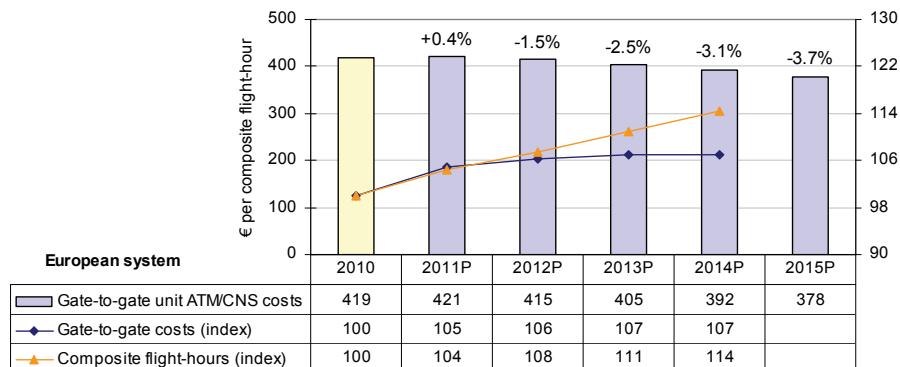
Figure 0.8 also indicates that for 25 ANSPs, 2010 actual ATM/CNS costs are lower than planned in November 2008 (see Quadrants I and II). Among the five largest ANSPs, 2010 actual costs were substantially lower than planned for Aena (-18%), DFS (-14%), NATS (-17%), DSNA (-12%) and to a lower extent for ENAV (-2%). Given their weight in the European system, the five largest ANSPs significantly contributed to lower the actual 2010 ATM/CNS provision costs compared to ACE 2007 plans.



**Figure 0.8: Comparison of 2010 actual ATM/CNS provision costs and traffic with ACE 2007 plans**

**After a -6.8% decrease in 2010, unit ATM/CNS provision costs are planned to reduce by -2.1% per annum until 2015**

At European system level, after the -6.8% reduction in 2010, gate-to-gate unit ATM/CNS provision costs are planned to slightly increase in 2011 (+0.4%) and then decrease by -2.7% p.a. until 2015. Overall, gate-to-gate unit ATM/CNS provision costs are planned to decrease by -10.0% between 2010 and 2015 (-2.1% p.a.). For the years 2012-2014 which correspond to the SES Performance Scheme RP1, the unit costs profile is in line with States revised Performance Plans submitted at the end of 2011.



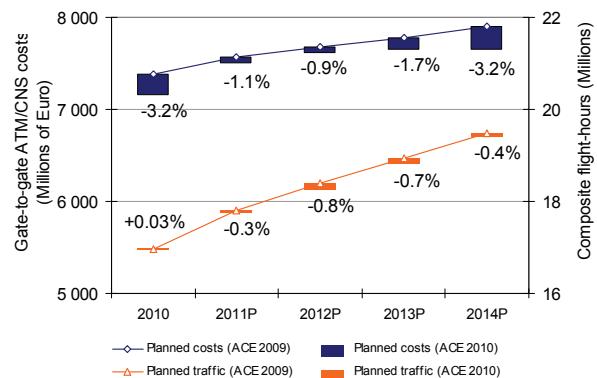
**Figure 0.9: Forward-looking cost-effectiveness at European system level (2010-2015, real terms)**

In ACE 2009, ATM/CNS provision costs per composite flight-hour were expected to reduce by -11% (or -2.3% p.a.) between 2009 and 2014. According to ACE 2010 plans, unit costs are forecast to decrease by -13% over the same period (or -2.7% p.a.).

Figure 0.10 shows that actual 2010 costs were much lower than planned in ACE 2009 (-3.2%). In other words, in ACE 2010, the changes in unit ATM/CNS provision costs over 2010-2014 are computed using a lower base than in ACE 2009.

Furthermore, Figure 0.10 shows that in ACE 2010, over the 2011-2014 period, ACE 2009 ATM/CNS costs forecasts have been revised downwards in a greater magnitude than traffic volumes (-1.7% compared to -0.5%, on average). This contributes to the more optimistic unit costs profile in ACE 2010 compared to ACE 2009 plans.

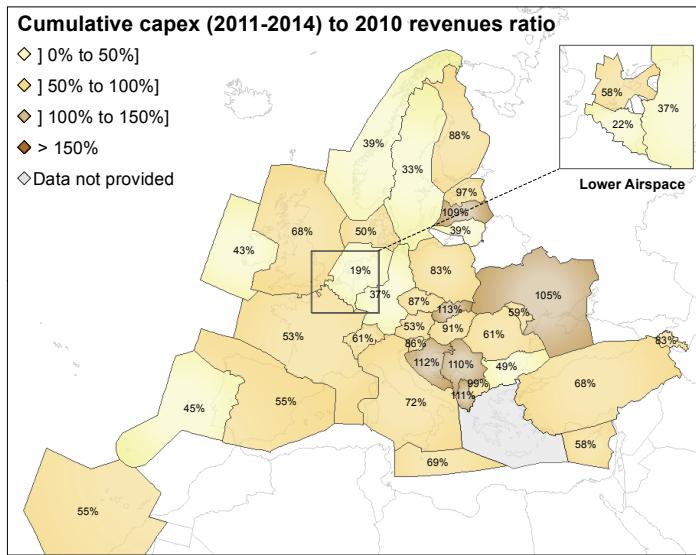
This analysis suggests that the cost-containment measures implemented by the ANSPs generated more savings than planned in 2010 and that additional benefits are expected for future years compared to ACE 2009 plans.



**Figure 0.10: Changes in planned costs and traffic at European system level (2010-2014, real terms)**

## Several ANSPs planned for a substantial investment programme over the 2011-2015 period

Overall, the planned cumulative capex for the period 2011-2015 amounts to some €5 677M and represents some 69% of the 2010 total ANS revenues, indicating that substantial investment programmes are planned for the next years.



**Figure 0.11: Ratio of ANSPs cumulative capex (2011-2014) to 2010 revenues**

Figure 0.11 shows that for 6 ANSPs, the cumulative capex planned over 2011-2014 represent more than 100% of their 2010 revenues. A significant proportion of these investments relate to major upgrades or to the replacement of existing ATM systems. It will be important, and a challenge, to start monitoring how these investments relate to IP1 or to the European ATM Master Plan, and gaining an understanding of the quantified contribution to performance improvements.

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# 1 INTRODUCTION

The Air Traffic Management Cost-Effectiveness (ACE) 2010 Benchmarking Report commissioned by EUROCONTROL's independent Performance Review Commission (PRC) is the tenth in a series of reports comparing the ATM cost-effectiveness of EUROCONTROL Member States' Air Navigation Service Providers (ANSPs)<sup>1</sup>.

The ACE benchmarking work is carried out by the Performance Review Commission (PRC) in the context of Articles 3.3(i), 3.6(b)(c), and 3.8 of EC regulation N°691/2010.

The report is based on information provided by ANSPs in compliance with Decision No. 88 of the Permanent Commission of EUROCONTROL, which makes annual disclosure of ANS information mandatory, according to the Specification for Economic Information Disclosure<sup>2</sup> (SEID), in all EUROCONTROL Member States. More details on reporting requirements are provided in Section 1.7.

Since these services are outside the PRC's terms of reference, this report does not address performance relating to:

- oceanic ANS;
- services provided to military operational air traffic (OAT); or,
- airport (landside) management operations.

The focus of this report is primarily on a cross-sectional analysis of ANSPs for the year 2010. However, the aviation community is also interested in measuring how cost-effectiveness and productivity at the European and ANSP levels varies over time, and in understanding the reasons why variations occur. Hence, this report makes use of previous years' data from 2006 onwards to examine changes over time, where relevant and valid.

Five-year periods are considered to form a solid basis to examine changes in the medium term. This is particularly relevant given the characteristics of the ANS industry which requires a long lead time to develop ATC capacity and infrastructure.

## 1.1 Organisation of the report

This report presents a slightly different structure than in the ACE 2009 report. This year, an explicit choice was made to streamline the report and to have a greater focus on the analysis of the cost-effectiveness performance of the ATM industry at European level.

The structure of the present ACE 2010 Benchmarking Report is as follows:

Chapter 1 provides an overview of the participating ANSPs and outlines the processes involved in the production of this report. Then the report is divided into four parts.

**Part I** provides an overview of the economics of the European ATM system with a focus on the supply side.

- Chapter 2 presents 2010 key data for the European ATM system;
- Chapter 3 examines the importance of exogenous factors (such as cost of living, traffic variability and traffic complexity) and endogenous factors (such as

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<sup>1</sup> Previous reports in the series from ACE 2001 (Sept. 2003) to ACE 2009 (June 2011) can be found on the PRC web site at <http://www.eurocontrol.int/prc/>.

<sup>2</sup> PRC Specification for Economic Information Disclosure - Version 2.6, December 2008, can be found on the PRC web site.

operational and technical set-up) when assessing and benchmarking the performance of an ANSP.

**Part II** focuses on the financial cost-effectiveness of ANSPs, based on their gate-to-gate ATM/CNS provision costs per unit of traffic output.

- Chapter 4 compares ANSPs' 2010 financial cost-effectiveness and the various components of cost-effectiveness (productivity, employment costs, and support costs);
- Chapter 5 looks at how financial cost-effectiveness and its components have changed over time (2006-2010);
- Chapter 6 analyses ANSPs' five-year data projections (2011-2015), as disclosed to the PRU by November 2011. This chapter infers on future financial cost-effectiveness performance. It also reports on future capital expenditure as well as planned number of ATCOs in OPS at European level.

**Part III** looks at economic cost-effectiveness by valuing ATFM delays (a measure of the quality of service) attributable to ANSPs in monetary terms. Given the likely trade-offs at play, a measure of quality of service is important when considering the performance of an ANSP. This analysis is expected to expand in future years, as more data become available for analysis.

- Chapter 7 compares ANSPs' 2010 economic cost-effectiveness and considers how it has changed over time (2006-2010).

Finally, this report also comprises several annexes with relevant statistical data used in the analysis.

## 1.2 Overview of participating ANSPs

In total, 37 ANSPs reported 2010 data in compliance with the requirement from Decision No. 88 of the Permanent Commission of EUROCONTROL (see Table 1.1). In addition to the EUROCONTROL Member States, the en-route ANSPs of two Baltic States (Estonia and Latvia) provided data on a voluntary basis for inclusion in the analysis. With one exception<sup>3</sup>, all the reported information relates to the calendar year 2010.

Table 1.1 shows the list of participating ANSPs, describing both their organisational and corporate arrangements, and the scope of ANS services provided.

	ANSP	Code	Country	Organisational & Corporate Arrangements	OAT Services Oceanic	MUAC	CEATS	Delegated ATM	Internal MET	Ownership and management of airports
1	Aena	ES	Spain	State enterprise						x
2	ANS CR	CZ	Czech Republic	State enterprise		x				
3	ARMATS	AM	Armenia	Joint-stock company (State-owned)						
4	Austro Control	AT	Austria	Joint-stock company (State-owned)				x		
5	Avinor	NO	Norway	Joint-stock company (State-owned)	x	x				x
6	Belgocontrol	BE	Belgium	State enterprise		x		x		
7	BULATSA	BG	Bulgaria	State enterprise				x		
8	Croatia Control	HR	Croatia	Joint-stock company (State-owned)	x		x	x	x	
9	DCAC Cyprus	CY	Cyprus	State body						
10	DFS	DE	Germany	Limited liability company (State-owned)	x	x				
11	DHMI	TR	Turkey	State body (autonomous budget)						x
12	DSNA	FR	France	State body (autonomous budget)				x		
13	EANS	EE	Estonia	Joint-stock company (State-owned)						
14	ENAV+ITAF	IT	Italy	Joint-stock company (State-owned)				x	x	
15	Finavia	FI	Finland	State enterprise	x		x	x	x	
16	HCAA	GR	Greece	State body						x
17	HungaroControl	HU	Hungary	State enterprise				x	x	
18	IAA	IE	Ireland	Joint-stock company (State-owned)	x					
19	LFV	SE	Sweden	State enterprise				x	x	x
20	LGS	LV	Latvia	Joint-stock company (State-owned)	x			x		
21	LPS	SK	Slovak Republic	State enterprise	x		x			
22	LVNL	NL	Netherlands	Independent administrative body			x			
23	MATS	MT	Malta	Joint-stock company (State-owned)						
24	M-NAV	MK	F.Y.R. Macedonia	Joint-stock company (State-owned)	x			x		
25	MoldATSA	MD	Moldova	State enterprise	x				x	
26	MUAC			International organisation						
27	NATA Albania	AL	Albania	Joint-stock company (State-owned)	x			x		
28	NATS	UK	United Kingdom	Joint-stock company (part-private)		x				
29	NAV Portugal (FIR Lisboa)	PT	Portugal	State enterprise		x				
30	NAVAIR	DK	Denmark	State enterprise					x	
31	Oro Navigacija	LT	Lithuania	State enterprise						
32	PANSA	PL	Poland	State body (acting as a legal entity with an autonomous budget)	x					
33	ROMATSA	RO	Romania	State enterprise					x	
34	Skyguide	CH	Switzerland	Joint-stock company (part-private)	x		x			
35	Slovenia Control	SI	Slovenia	State enterprise	x		x			
36	SMATSA	RS	Serbia	Limited liability company	x			x	x	
37	UkSATSE	UA	Ukraine	State enterprise					x	

■ States covered by the SES Regulations  
■ States part of the ECAA  
■ States not covered by the SES Regulations

**Table 1.1: States and ANSPs<sup>4</sup> participating in ACE 2010**

Table 1.1 indicates (coloured yellow) which ANSPs were at 1 January 2010 part of the Single European Sky (SES), and hence subject to relevant SES regulations and obligations. In addition to SES members, a number of States (coloured blue) are committed, following the signing of an agreement relating to the establishment of a European Common Aviation Area (ECAA)<sup>5</sup>, to cooperate in the field of ATM, with a view

<sup>3</sup> For NATS, the disclosed data relate to the financial year 1 April 2010 to 31 March 2011.

<sup>4</sup> In Italy, the ITAF (Italian Air Force) provides ATC services mainly at regional civil/military airports and the corresponding costs are included in the ACE data analysis.

<sup>5</sup> Decision 2006/682/EC published on 16 October 2006 in the Official Journal of the European Union. States which have signed this Agreement but are not yet EU members comprise the Republic of Albania, Bosnia and Herzegovina, the Republic of Croatia, the former Yugoslav Republic of Macedonia, the Republic of Iceland, the Republic of Montenegro, the Kingdom of Norway, and the Republic of Serbia.

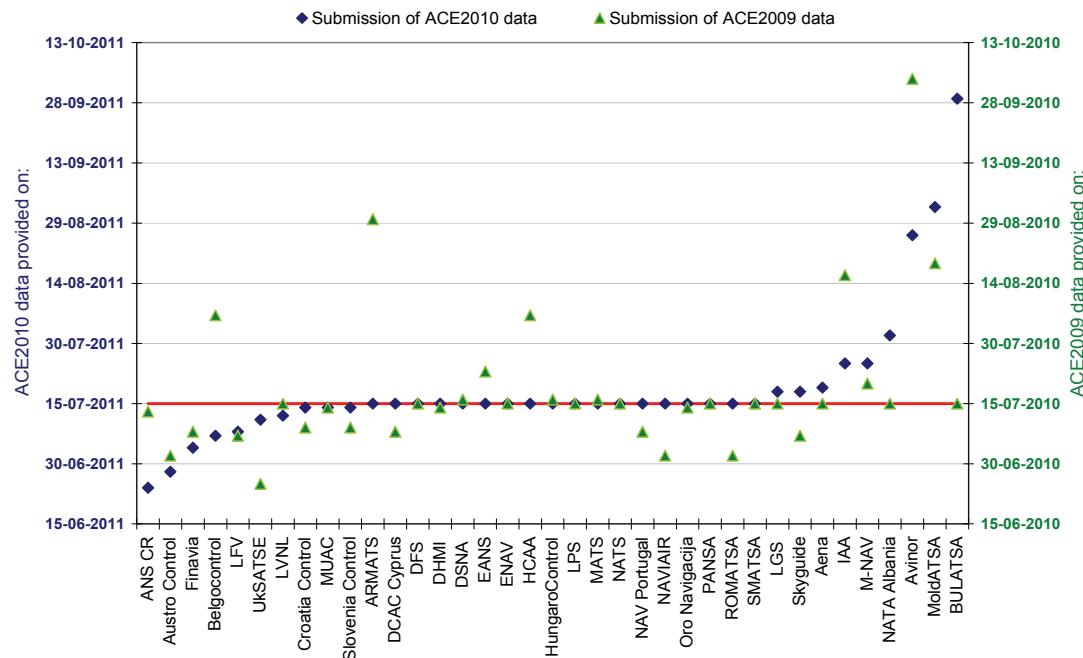
to extending the SES regulations<sup>6</sup> to the ECAA States. Hence, in principle all the en-route ANSPs of EUROCONTROL States and other States disclosing information to the PRC are covered by the SES regulations, except Armenia, Moldova, Turkey and Ukraine.

Table 1.1 also shows the extent to which the ANSPs incur costs relating to services that are not provided by all ANSPs. In order to enhance cost-effectiveness comparison across ANSPs, such costs, relating to oceanic ANS, military operational air traffic (OAT), airport management operations and payment for delegation of ATM services<sup>7</sup> were excluded to the maximum possible extent.

### 1.3 Data submission

The SEID (see footnote 2) requires that participating ANSPs submit their information to the PRC/PRU by 15 July in the year following the year to which it relates. The SEID became mandatory as part of the SES II legislation. The ACE 2010 data have been submitted in the SEID Version 2.6 which has been used now since ACE 2008. The SEID is currently being updated to consider the lessons learnt from the use of the SEID V2.6. It is expected that marginal refinements and/or clarifications be brought to the SEID in 2012 so that ANSPs should be able to use the revised version in 2013 for the submission of ACE 2012 data.

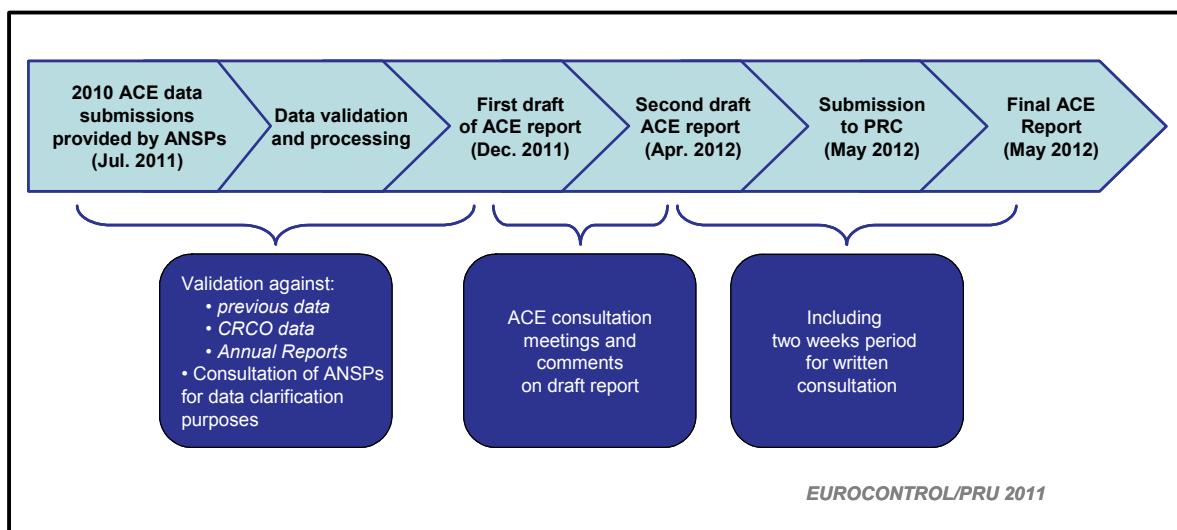
Figure 1.1 indicates that the timeliness of submissions has continued to improve since by 15 July 2011 the PRU had received 28 out of 37 ACE data submissions (compared to 26 for ACE 2009 and 25 for ACE 2008). It is important that this timely submission of ACE data is sustained and improved. The ACE benchmarking analysis must be seen as timely since several stakeholders, most notably ANSPs' management, regulatory authorities (e.g. NSAs) and airspace users, have a keen interest in receiving the information in the ACE reports as early as possible. Clearly, the timescale of the ACE Benchmarking Report production is inevitably delayed if data are not submitted on time.



The general and gradual improvement in the quality and the timing of the ACE data submission is marred by some problems relating to few individual ANSPs. For instance, if the timing and the quality of HCAA data submissions recently improved, there are still issues to be addressed. HCAA is still not in a position to provide complete balance-sheet data, although capital-related costs are charged to airspace users. Similarly, the quality of the operational data provided by HCAA (in particular staff numbers and working hours) is not satisfactory. This issue with HCAA is of particular concern and the implementation of adequate data submission processes by HCAA would greatly contribute to improve the quality and the quantity of the information provided.

#### 1.4 Data validation, processing and reporting

The PRU is supported by an ACE Working Group (WG), including ANSPs, regulatory authorities and airspace users' representatives. The process leading to the production of the ACE report, which comprises data validation, analysis and consultation, is summarised in Figure 1.2 below.



**Figure 1.2: Data validation, processing and reporting**

In order to ensure comparability among ANSPs and quality of analysis, the information submitted by the ANSPs is subject by the PRU to a thorough data validation process which makes extensive use of ANSPs' Annual Reports and of their statutory financial accounts.

During this validation process a number of issues emerged:

- Annual Reports with disclosure of financial accounts are not available for some ANSPs (see Section 1.5 below). This removes one means of validating the financial data submitted;
- ANSPs which are involved in non-ANS activities (such as airport ownership and management, see Table 1.1) do not necessarily disclose separate accounts for their ANS and non-ANS activities. This means that the financial data submitted for the ANS activities cannot be validated with the information provided in the Annual Report;
- Except for a few ANSPs, Annual Reports do not disclose the separate costs for the various segments of ANS (such as en-route and terminal ANS) which means that the cost breakdown submitted cannot be validated.

As ANSPs progressively comply with the SES Regulation on Service Provision, which requires publication of Annual Reports including statutory accounts, and separation of ANS from non-ANS activity in ANSPs internal accounts, some of these shortcomings are expected to be gradually overcome (see also Section 1.5 below).

In most cases, CFMU data have been used as the basis for the output metrics used in the ACE data analysis, and this practice has been generally accepted, including in cases where in previous years there had been discrepancies. However, for Estonia (EANS) and Latvia<sup>8</sup> (LGS), who are not part of the CFMU area, the output metrics used in this report are based on their own traffic data.

## 1.5 ANSPs' Annual Reports

ANSPs' Annual Reports provide a valuable means of validating the 2010 information disclosure data.

The SES Service Provision Regulation (SPR) (EC No 550/2004) came into force on 20 April 2004 and is applicable to 2010 Financial Accounts in all EU Member States (plus Switzerland and Norway) and to associated ANSPs. This Regulation is also applicable to States which have signed the ECAA Agreement (see Section 1.2), although the timing of its implementation is not yet decided for individual States. Among other provisions, the SPR requires that ANSPs meet certain standards of information disclosure (transparency) and reporting, and in particular that:

- ANSPs should draw up, submit to audit and publish their Financial Accounts (Art.12.1);
- in all cases, ANSPs should publish an Annual Report and regularly undergo an independent audit (Art 12.2);
- ANSPs should, in their internal accounting, identify the relevant costs and income for ANS broken down in accordance with EUROCONTROL's principles for establishing the cost-base for route facility charges and the calculation of unit rates and, where appropriate, shall keep consolidated accounts for other, non-air navigation services, as they would be required to do if the services in question were provided by separate undertakings (Art 12.3). The latter requirement is particularly relevant for the ANSPs which are part of an organisation which owns, manages and operates airports, such as Aena<sup>9</sup>, LFV<sup>10</sup>, Avinor, Finavia, HCAA, and DHMI<sup>11</sup>.

Figure 1.3 displays the status of ANSPs 2010 Annual Reports and indicates that 32 out of 37 participating ANSPs have published an Annual Report for the year 2010.

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<sup>8</sup> Latvia is part of the CFMU area as of 1<sup>st</sup> January 2011.

<sup>9</sup> In 2011, Aena went through a restructuration process relating to the separation of the airport division of Aena (creation of a new company Aena Aeropuertos S.A.) from the ANS department.

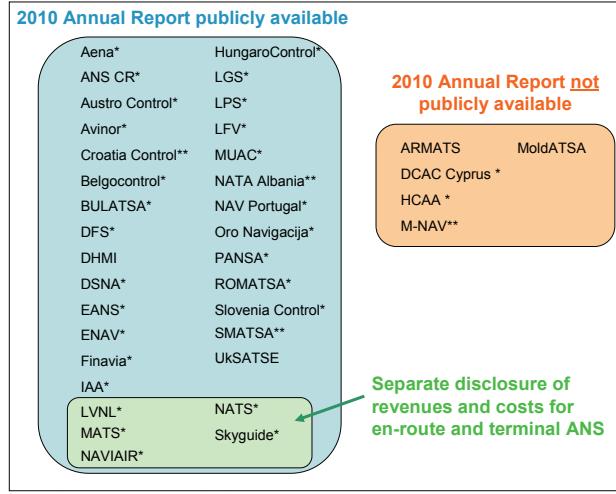
<sup>10</sup> From the 1<sup>st</sup> of April 2010, the former airport division of LFV operates as a separate limited liability company, 100% owned by the State (Swedavia AB).

<sup>11</sup> Although it should be noted that DHMI is not covered by the SES regulations.

It is generally considered that an Annual Report produced according to “best practice” should comprise three main components:

- a Management Report;
- Annual Financial Accounts with relevant business segmentation and explanatory notes; and,
- an independent Audit Report.

Five ANSPs (including two which are subject to SES Regulations – namely HCAA and DCAC Cyprus) have not published Annual Reports for 2010.



\* ANSPs covered by the SES Regulations

\*\* ANSPs operating in States member of ECAA

**Figure 1.3: Status of 2010 Annual Reports**

ANSPs’ Annual Accounts are drafted in accordance with specific accounting principles. Often, (national) General Accepted Accounting Principles (GAAP) are used. In the context of the SES, Article 12 of the SPR prescribes that ANSPs Annual Accounts shall comply, to the maximum extent possible, with International Financial Reporting Standards (IFRS). Table 1.2 shows the 21 ANSPs whose 2010 Annual Accounts were partly or fully prepared according to IFRS.

ANSPs reporting according to IFRS in 2010	
Aena ARMATS ANS CR BULATSA Austro Control Avinor Croatia Control DFS EANS LGS LPS	LVNL MATS NATA Albania NATS NAVIAIR NAV Portugal Oro Navigacija PANSA ROMATSA Skyguide

**Table 1.2: IFRS reporting status**

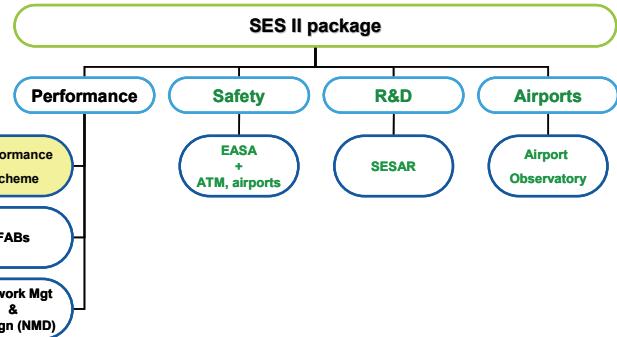
It should be noted that in some cases, the implementation of IFRS may have a significant impact on an ANSPs’ cost base<sup>12</sup> (such as different treatment of costs related to the pension scheme, and changes in depreciation rules), hence the importance to identify and understand the impact of changes in the accounting principles used to draw the financial accounts.

<sup>12</sup> From 2007 onwards, this has been the case for the German ANSP, DFS, whose cost base includes costs recognised only since the conversion to IFRS. These costs, mainly due to the revaluation of DFS pension obligations, have been spread over a period of 15 years.

## 1.6 A new EU regulatory environment for ANS performance

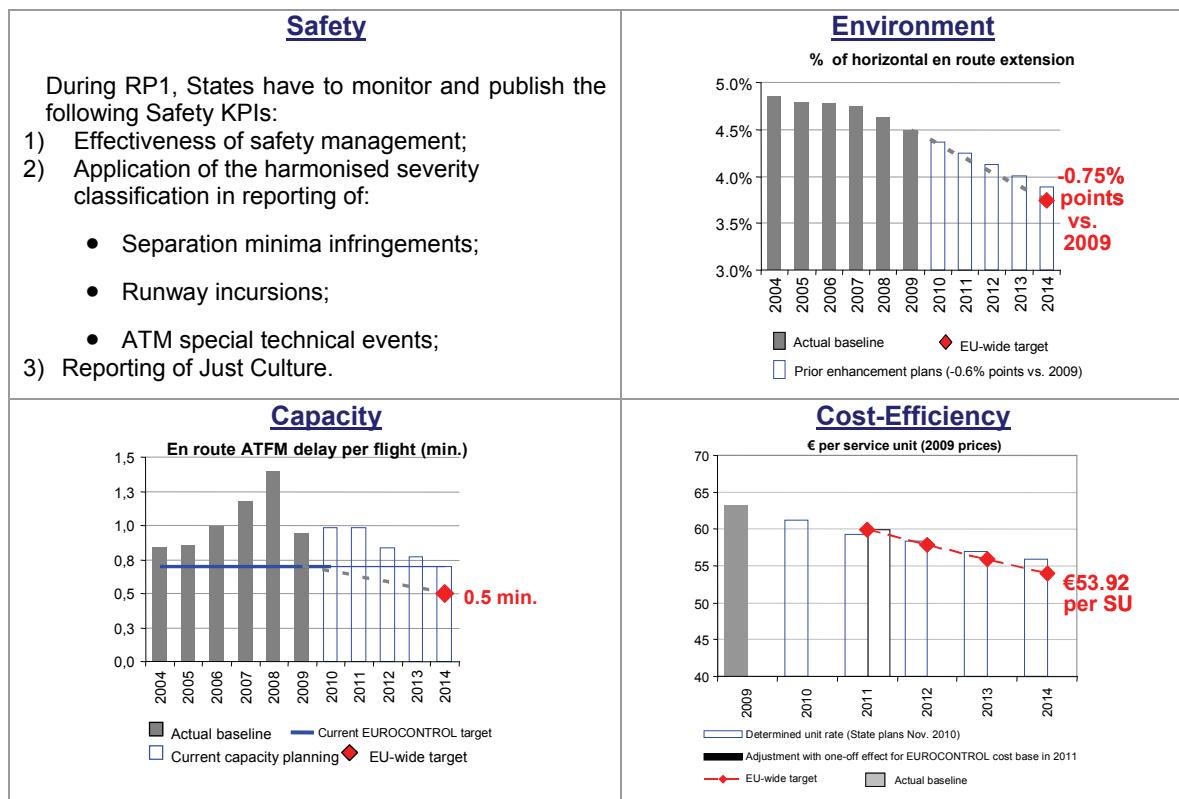
As part of the SES II package adopted in 2009 (EC N°1070/2009), a stronger framework on performance has been implemented (see Figure 1.4 below).

Commission Regulation (EU) No 691/2010 laying down a performance scheme (see yellow box in Figure 1.4) entered into force on 23 August 2010. This marked the start of the implementation of the performance scheme, and in particular preparation for the first reference period (RP1) that runs for three years from 2012 to 2014.



**Figure 1.4: SES II pillars**

The SES Performance Scheme includes EU-wide performance targets which are transposed into binding national/FAB targets for which clear accountabilities must be assigned within national/FAB performance plans. Following the PRB recommendations for EU-wide targets for Cost-Efficiency, Capacity and Environment were adopted by the EC on 3 December 2010 for RP1 (2012-2014) as indicated in Figure 1.5 below. It should be noted that the EU-wide Cost-Efficiency target is expressed in terms of **en-route** determined costs per service unit, and is computed at **State** level (i.e. including ANSPs, MET, EUROCONTROL and NSAs costs). The main objective of the ACE data analysis is to benchmark **ANSPs gate-to-gate** cost-effectiveness performance. For this reason, the financial cost-effectiveness KPI analysed in this ACE Report is expressed in terms of gate-to-gate ATM/CNS provision costs per composite flight-hour and computed at ANSP level. Further details on the computation of the financial cost-effectiveness KPI are provided in Section 4.3.



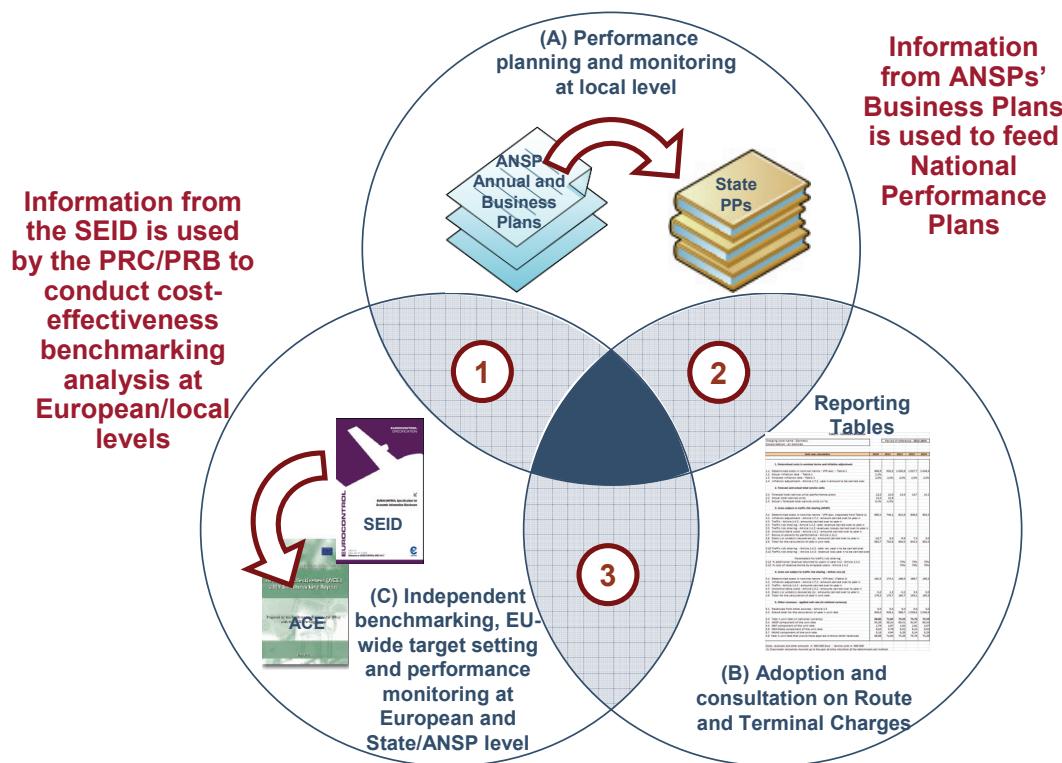
**Figure 1.5: EU-wide targets adopted on 3 December 2010 for RP1 (2012-2014)**

## 1.7 Purposes and scope of information disclosure requirements

The objective of this section is to present the legal economic/financial information disclosure requirements prevailing at European level, and how their differences respond to **specific and distinct objectives**. These legal requirements are defined in the following documents:

- For the SES member States, the Performance Scheme Regulation (Regulation (EC) No 691/2010).
- For both SES and EUROCONTROL member States, the Specification for Economic Information Disclosure (SEID) which is a legal EUROCONTROL document serving as the main source of information for the ACE benchmarking activities and which is also referenced in the Performance Regulation for the performance review of the **en-route monopoly ANSPs**.
- For the SES member States, the Charging Scheme Regulation (Regulation (EC) No 1191/2010).
- For the non-SES member States which are part of the EUROCONTROL Multilateral Route Charges system, the Reporting Tables (Principles for establishing the cost-base for route facility charges and the calculation of the unit rates<sup>13</sup>, October 2011, and in particular §1.4.3 and §1.4.5).

Figure 1.6 below shows States/ANSPs different legal reporting requirements and the different objectives that these requirements serve to achieve.



**Figure 1.6: States/ANSPs different reporting requirements and their objectives**

The three different objectives identified in Figure 1.6 are:

- (A) the performance planning and monitoring at local level;
- (B) the adoption and consultation on Route and Terminal charges; and,

<sup>13</sup> Available on the CRCO website:

(<http://publish.eurocontrol.int/sites/default/files/content/documents/route-charges/reference-documents/201110-principles-for-establishing-cost-base-for-route-charges-and-unit-rates.pdf>).

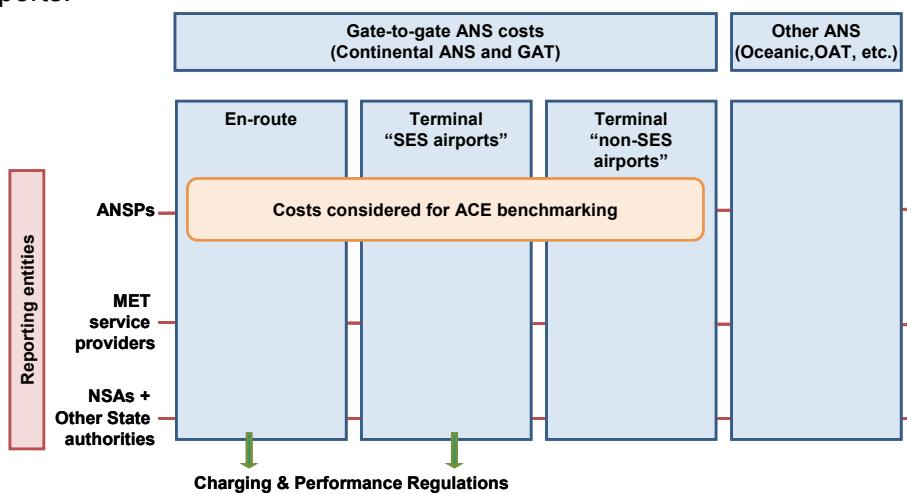
(C) independent benchmarking, EU-wide target-setting and monitoring of both European system and State/ANSP performance.

As indicated in Figure 1.6, there is a certain degree of interdependency across all the different reporting requirements. For instance, the information disclosed in ANSPs Annual Reports and Business Plans is used to provide data in the Specification for Economic Information Disclosure (see (1)). Similarly, actual and planned costs figures provided in the Reporting Tables should be consistent with the information disclosed in National Performance Plans, in the year of their adoption (see (2)). Finally, According to the new Charging Scheme Regulation and EUROCONTROL principles, States report information broken down into different reporting entities including ANSPs for both en-route and terminal ANS (see (3)).

However, although the financial information provided in the SEID is usually consistent with data provided for ANSPs in the Reporting Tables, the monitoring and analysis of cost-efficiency performance requires complementary information on the ANSP's outputs and key drivers which are not available in the Reporting Tables but collected through the SEID. Indeed, the information provided in the Reporting Tables is essentially required to adopt ANS charges<sup>14</sup> that are paid by airspace users.

Furthermore, only States subject to relevant SES regulations and obligations shall provide information on Terminal ANS costs in the Reporting Tables. According to the EC Regulation 1794/2006, these States may decide not to disclose information on airports with less than 50 000 commercial movements per year in the Reporting Tables (with the exception that at least relevant information on the main airport in each State has to be reported). This is not consistent with the SEID which requires all the en-route ANSPs operating in EUROCONTROL Member States to report all terminal ANS costs (regardless of the level of activity at airports) since the ACE data analysis encompasses both en-route and terminal activities in order to have a genuine comparison of ANSPs gate-to-gate cost-efficiency performance.

Figure 1.7 shows the different entities (rows) subject to information disclosure and the main bases used for charging purposes (columns). Terminal costs are reported separately for airports covered by SES Regulations (i.e. "SES airports"), and other "non-SES" airports.



**Figure 1.7: Activities and entities covered by the different reporting requirements**

<sup>14</sup> Charges reflect costs but also take into account additional adjustments such as over/under recoveries and income from other sources.

Finally, although the information collected in National/FABs Performance Plans is required to support the EU-wide target setting process, for the economic aspects this data shall be complemented by information submitted in the SEID. Indeed, the ACE benchmarking activities set the foundation for a more normative analysis to assess the scope for ANSPs cost-efficiency improvement and have been one of the main inputs considered for determining the EU-wide cost-efficiency target. The ACE data analysis had also a significant role in the context of the assessment of national performance plans<sup>15</sup> that was carried out by the PRB during the Summer 2011.

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<sup>15</sup> PRB assessment reports on national/FAB performance plans for RP1 can be found on the PRC website ([http://www.eurocontrol.int/prc/public/standard\\_page/Performance\\_Plan.html](http://www.eurocontrol.int/prc/public/standard_page/Performance_Plan.html)).

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## **PART I: EUROPEAN ANS DATA AND INTRODUCTION TO ANSP BENCHMARKING**

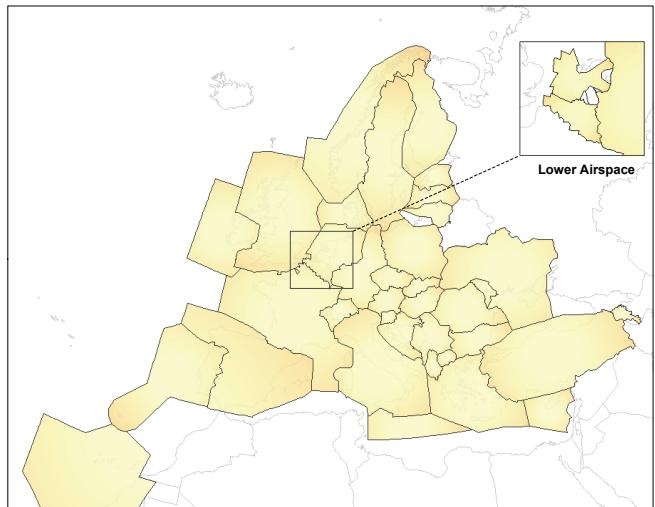
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## 2 EUROPEAN ANS SYSTEM DATA

This chapter provides aggregate information on the European ANS system<sup>16</sup> reported in compliance with the SEID for the year 2010. In addition, it provides a detailed presentation of the different ANS cost categories and explain how ANSP's costs are defined in the context of the ACE analysis in order to provide fair comparisons of performance across ANSPs and across time.

### 2.1 Coverage of the ACE 2010 Benchmarking Report

This ACE Report includes all EUROCONTROL Member States as of 1st January 2010, with one exception: Bosnia & Herzegovina<sup>17</sup>, for which information was not requested. It includes the ANSPs of two Baltic States (Estonia and Latvia<sup>18</sup>), which provided information on a voluntary basis and for the second year the Armenian ANSP, ARMATS, which was "integrated" into the Multilateral Route Charges System as from January 2009. For the purpose of this report, oceanic airspace was excluded. The geographical area covered by the information disclosed is shown in Figure 2.1.



**Figure 2.1: Geographic coverage of the ACE 2010 data analysis**

Over the last six years, the ACE Report has provided increasing coverage of the ANS system. The ACE 2005 data analysis included 35 ANSPs. In ACE 2006, one more ANSP (SMATSA) started to participate, and as of ACE 2009, the number of ANSPs included in the ACE data analysis increased to 37 with the addition of ARMATS.

### 2.2 European ANS system data for the years 2009 and 2010

Table 2.1 below comprises high level data for the European ANS system in 2010 and compares this information with the data provided in ACE 2009.

The economic downturn which started to affect the last quarter of 2008, severely hit the aviation community throughout 2009. In 2010 traffic volumes started to rise again, although at a lower rate than before the economic crisis. This is reflected in Table 2.1 which indicates that at European system level, the total number of flight-hours controlled by the ANSPs increased by some +2.6% in 2010 (compared to an average of +4.5% p.a. over the 2003-2008 period).

<sup>16</sup> For the purpose of this report, the "European ANS system" includes all 37 ANSPs that submitted data following the requirement from Decision No. 88 of the Permanent Commission of EUROCONTROL.

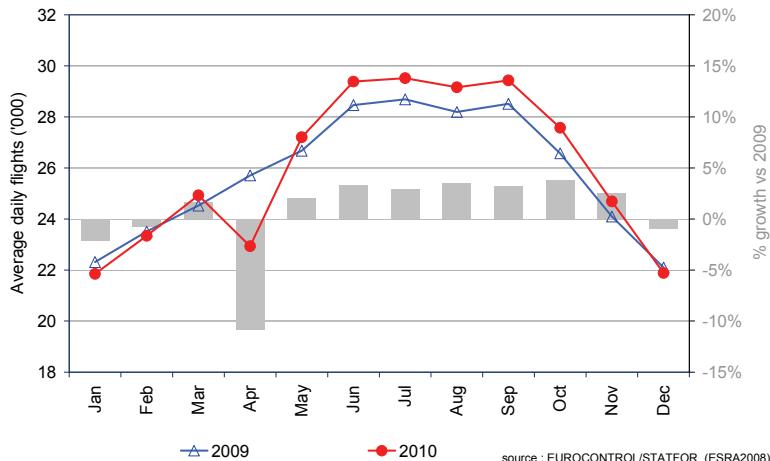
<sup>17</sup> Although Bosnia & Herzegovina (BIH) has been a EUROCONTROL Member State since 1 March 2004, its ANSP (BHANSA) was not requested to report data according to the SEID, since the area control services in BIH's airspace were provided in 2010 by Croatia Control and SMATSA. It should be noted that BHANSA will start providing area control services in BIH's airspace gradually from the last quarter of 2011 to the beginning of 2012. As a result, the PRU expects that BHANSA starts providing data according to the SEID by 2013 (i.e. ACE 2012).

<sup>18</sup> Latvia is a EUROCONTROL Member State as of January 2011.

	2009	2010	09/10
	37 ANSPs	37 ANSPs	37 ANSPs
<b>Gate-to-gate ANS revenues (not adjusted by over/under recoveries) (in € M):</b>	<b>8 004</b>	<b>8 210</b>	<b>2.6%</b>
En-route ANS revenues	6 341	6 540	3.1%
Terminal ANS revenues	1 662	1 670	0.5%
<b>Gate-to-gate ANS costs (in € M):</b>	<b>8 938</b>	<b>8 572</b>	<b>-4.1%</b>
ATM/CNS provision costs	7 854	7 476	-4.8%
MET costs	437	437	0.0%
EUROCONTROL Agency costs	542	516	-4.8%
Payment to national authorities and irrecoverable VAT	105	144	36.8%
<b>Gate-to-gate ATM/CNS costs (in € M):</b>	<b>7 854</b>	<b>7 476</b>	<b>-4.8%</b>
En-route ATM/CNS costs	6 011	5 769	-4.0%
Terminal ATM/CNS costs	1 843	1 707	-7.4%
<b>Gate-to-gate ANS staff:</b>	<b>57 600</b>	<b>57 808</b>	<b>0.4%</b>
ATCOs in OPS	16 934	16 944	0.1%
ACC ATCOs	9 617	9 494	-1.3%
APPs + TWRs ATCOs	7 317	7 451	1.8%
<b>NBV of gate-to-gate fixed assets (in € M)</b>	<b>7 712</b>	<b>7 625</b>	<b>-1.1%</b>
<b>Gate-to-gate capex (in € M)</b>	<b>1 336</b>	<b>1 151</b>	<b>-13.9%</b>
<b>Outputs (in M)</b>			
Distance controlled (km)	9 491	9 765	2.9%
Total flight-hours controlled	13.6	13.9	2.6%
ACC flight-hours controlled	11.9	12.2	2.9%
IFR airport movements controlled	14.8	14.8	0.2%
IFR flights controlled	9.4	9.5	0.8%
<b>Gate-to-gate ATFM delays ('000 min.)</b>	<b>15 166</b>	<b>27 476</b>	<b>81.2%</b>

**Table 2.1: High level data for the European ANS system for 2009 and 2010 (real terms)**

Figure 2.2 shows monthly changes in IFR flights (expressed in average daily flights) between 2009 and 2010. Figure 2.2 indicates that the +2.6% traffic growth in 2010 was affected by a significant decrease in April 2010 when some 111 000 flights were cancelled<sup>19</sup> following a volcanic eruption in Iceland which created severe traffic disruptions across Europe.



**Figure 2.2: Monthly evolution of IFR traffic (2009 vs 2010)**

Table 2.1 shows that overall, in 2010 ANS revenues rose by +2.6% in real terms while gate-to-gate ANS costs decreased by -4.1%. This is an important result since the total ANS costs never declined during the last decade. The main drivers for this reduction were lower ATM/CNS provision costs (-4.8%) and EUROCONTROL costs (-4.8%) while MET costs remained fairly constant (-0.01%) and payments to national authorities and irrecoverable VAT<sup>20</sup> rose by +36.8%.

<sup>19</sup> An estimated 5 000 extra flights took place (repositioning of aircraft and crew, repatriation of stranded passengers etc.), resulting in a net reduction of 106 000 flights.

<sup>20</sup> The significant increase in the payments to national authorities and irrecoverable VAT is mainly due to the fact that in its 2010 data submission, DSNA separately identified the costs relating to European ANS system data

In the meantime, the number of total gate-to-gate ANS staff and ATCOs in OPS remained fairly constant (+0.4% and +0.1%, respectively).

Finally, it is worth noting that despite the relatively low traffic increase experienced in 2010, ATFM delays sharply increased at European system level (+81% compared to 2009). Further details on the drivers underlying the high ATFM delays in 2010 are provided in Chapter 7 of this Report.

### 2.3 System outputs

In 2010, European ATC operational units controlled 13.9M flight-hours over a total distance of 9 765M kilometres. The various TWR operational units handled 14.8M IFR airport movements and 3.3M VFR airport movements.

In ACE 2001 (Chapter 4) the concept of “composite flight-hours” was introduced, to reflect the fact that the service provided by ANSPs is “gate-to-gate” and that difference in the boundaries used by different ANSPs between terminal and en-route ANS could distort the performance picture obtained if they were considered individually. Composite gate-to-gate flight-hours were defined as en-route flight-hours **plus** IFR airport movements weighted by a factor that reflected the relative (monetary) importance of terminal and en-route costs in the cost base. Details of the calculation are shown in Annex 2, and the definition is:

$$\text{Composite gate-to-gate flight-hours} = (\text{en-route flight-hours}) + (0.26 \times \text{IFR airport movements})$$

According to this definition, the total number of composite flight-hours for the European system in 2010 is 17.8M. The average weighting factor (0.26) is based on the total monetary value of the outputs over the 2002-2010 period.

En-route flight-hours are computed from the flight plans provided by airspace users to the EUROCONTROL CFMU (so-called “CFMU Model III<sup>21</sup>”). En-route flight-hours comprise the number of flight-hours controlled by ACCs and APPs operational units<sup>22</sup>. Similarly, the number of IFR airport movements controlled by the TWR operational units is used as the output measure for terminal ANS.

### 2.4 ANS revenues

Total ANS revenues in 2010 were €8 210M. This is slightly higher than the combined revenues of Europe’s three largest airport operators (BAA, AdP and Fraport), which amounted to €7.5B.

The breakdown of ANS revenues is shown in Figure 2.3. The main share (79.7%) was collected for en-route ANS services and the remainder (20.3%) for terminal services. Overall, this share has remained fairly stable between 2006 and 2010. However, marginal changes are expected in the forthcoming years with the progressive adoption of the Common Charging Scheme Regulation (EC No. 1794/2006), which *inter alia*, will harmonize the computation of the terminal service units and will enhance the transparency on the financing of terminal ANS.

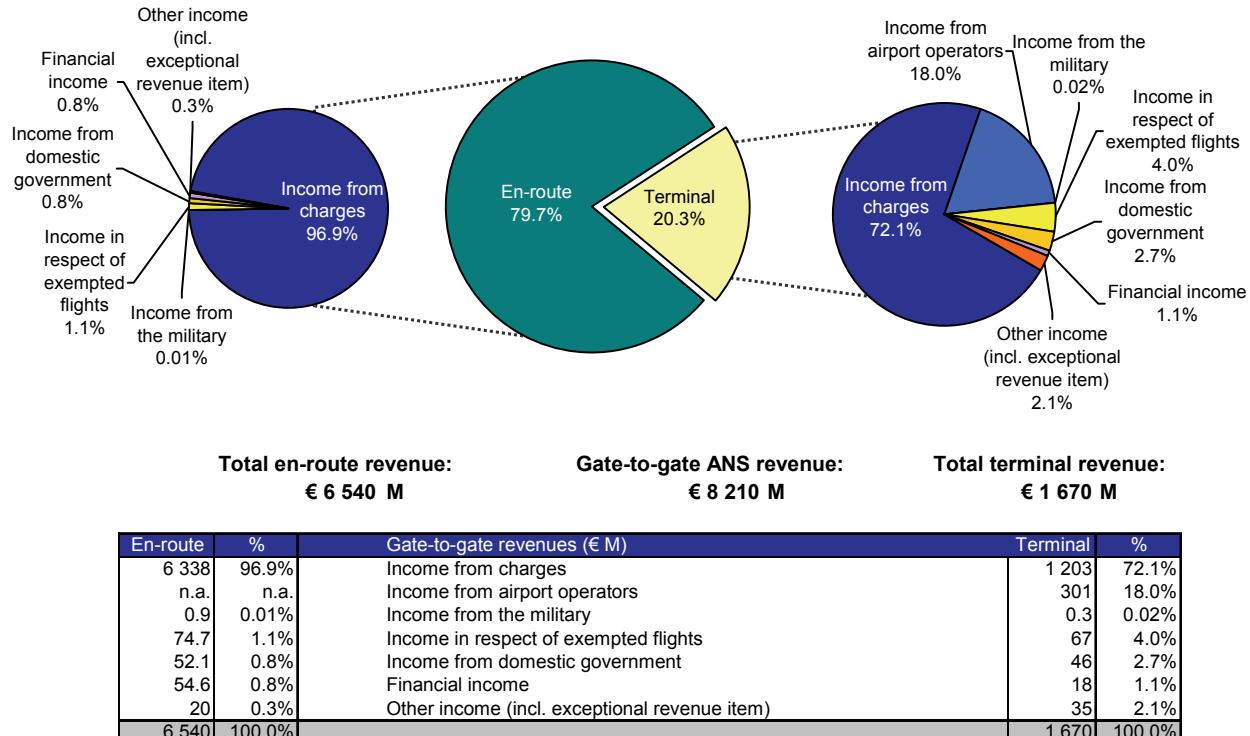
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irrecoverable VAT (i.e. some €40M) while these were reported as non-staff operating costs in previous years submissions.

<sup>21</sup> In the CFMU Model III, the flight plan is updated with the actual position of the flight, when a given threshold of lateral, horizontal and time deviations are observed. It is therefore not as accurate as radar tracks, but is nevertheless fairly close to actual trajectories.

<sup>22</sup> Since 2007, en-route flight-hours include time spent in Terminal Manoeuvring Areas (TMAs) and therefore account for airborne holdings.

Almost all en-route revenue comes from the collection of charges (96.9%, see left pie chart). The proportion is lower for terminal revenue (72.1%, see right pie chart), as additional income may directly come from airport operators (18.0% e.g. through a contractual arrangement between the ANSP and the airport operator) much of which is subsequently recovered from airspace users and passengers.



**Figure 2.3: Breakdown of gate-to-gate ANS revenues in 2010**

## 2.5 ANS costs

Total ANS costs for the European system amounted to €8 572M in 2010, comprising the following five cost categories<sup>23</sup> (see Figure 2.4).

- ATM/CNS provision costs<sup>24</sup> (including MUAC<sup>25</sup>);
- aeronautical Meteorological costs (MET)<sup>26</sup>;
- EUROCONTROL costs<sup>27</sup>;
- payments for regulatory and supervisory services; and,
- payments to governmental authorities (e.g. for the use of government-owned assets).

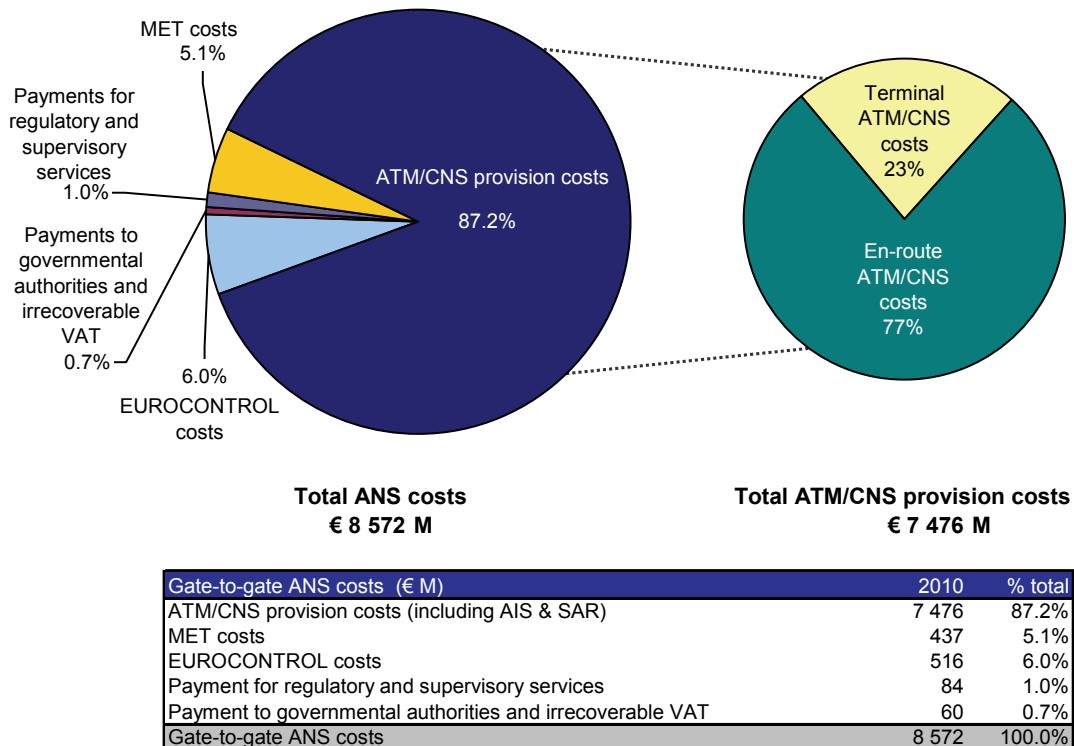
<sup>23</sup> Detailed definitions of these costs are given in the SEID.

<sup>24</sup> The costs of providing ATM services and the Communication, Navigation and Surveillance infrastructure. For the purpose of this report this includes the costs for Aeronautical Information Services (AIS) and, if any, Search and Rescue Services (SAR).

<sup>25</sup> Costs for MUAC are included in the ATM/CNS costs in Figure 2.4 as EUROCONTROL MUAC is a certified ANSP and therefore included in the cost-effectiveness analysis.

<sup>26</sup> Including MET costs reported by the UK and Danish CAAs.

<sup>27</sup> Excluding MUAC, CEATS, and CRCO administrative costs.



**Figure 2.4: Breakdown of total ANS costs at system level in 2010**

Around 87% of the total costs relates to ATM/CNS provision, and are under the direct control and responsibility of the ANSP. These ATM/CNS provision costs amounted to €7 476M in 2010, and form the basis for the analysis of ATM cost-effectiveness in **Part II** and **Part III** of this report.

The following costs categories have therefore been excluded from the cost-effectiveness analyses comprised in **Part II** and **Part III** of this report:

- Costs relating to services provided to military OAT, Oceanic ANS, AFIS/ATC at smaller regional aerodromes<sup>28</sup>, and reported under the “Other” column in the SEID;
- MET costs (whether provided internally or externally);
- Payments to governmental or regulatory authorities;
- EUROCONTROL costs<sup>29</sup>; and
- Payment to other ANSPs or States for delegated services, including payments for MUAC & CEATS.

ATM/CNS provision costs can be further broken down into the following cost types<sup>30</sup>:

- staff costs, comprising:
  - employment costs for ATCOs in OPS;
  - employment costs for all other staff;
- non-staff operating costs (e.g. rentals, energy, telecom, insurance, outsourced maintenance);
- capital-related costs comprising:

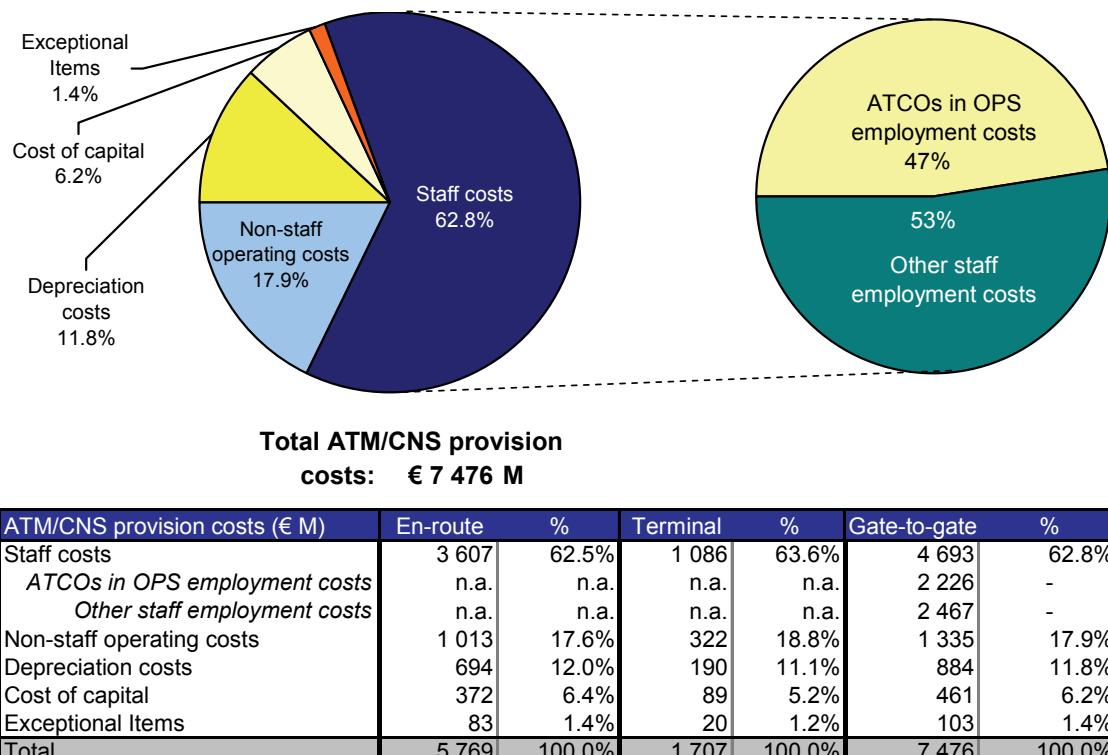
<sup>28</sup> This is the case for Avinor, ENAV, and Finavia.

<sup>29</sup> Excluding MUAC and CEATS costs.

<sup>30</sup> Detailed definitions of these costs are given in the SEID.

- depreciation;
- the cost of capital;
- exceptional items.

The distribution of costs between these categories is shown in Figure 2.5 below. Staff costs are the main element of costs (63%), followed by direct operating costs, depreciation costs and cost of capital. At European system level, operating costs (including staff costs, non-staff operating costs and exceptional cost items) account for some 82% of total ATM/CNS provision costs, and capital-related costs (cost of capital and depreciation) amount to some 18%.



**Figure 2.5: Breakdown of European ATM/CNS provision costs in 2010**

Table 2.2 shows the ANS cost categories as a proportion of total en-route and terminal ANS costs for each individual ANSP/State. It also shows in a transparent manner which costs data submitted by ANSPs in the SEID are extracted and adjusted so that they can be used meaningfully to compare performance across ANSPs and across time.

The figures reported in the last column of Table 2.2 (gate-to-gate ATM/CNS provision costs, amounting to €7 476M at European system level) are those which are used for the benchmarking of ATM/CNS cost-effectiveness across ANSPs in **Part II and Part III** of this report. The subset of costs used in the analysis has been chosen to cover, as far as possible, those costs that are under the direct control of the ANSP, and relate to the provision of ATM/CNS services for GAT.

Country	ANS/P	EN-ROUTE ANS COSTS		TERMINAL ANS COSTS		Gate-to-gate ATM/CNS costs (in €'000)
		Total ANS costs (in €'000)	MET costs (%)	Total ANS costs (in €'000)	MET costs (%)	
Aena	Spain	760 890	5.3%	0.8%	8.2%	94.8%
ANIS/CR	Czech Republic	101 172	2.2%	1.2%	6.6%	90.0%
ARMA TS	Armenia	3 665	6.9%			93.1%
Austro Control	Austria	163 904	9.2%			91.8%
Avinor	Norway	85 836	1.1%	0.3%	8.2%	90.3%
BelgoControl	Belgium/Lux.	157 853	4.7%	27.1%	8.1%	60.1%
BULATSA	Bulgaria	74 389	7.5%	0.6%	6.5%	85.1%
Croatia Control	Croatia	68 585	5.7%	1.4%	5.1%	87.8%
DCAC/Cyprus	Cyprus	48 115	8.5%	11.9%	5.0%	74.6%
DFS	Germany	854 930	3.8%	8.6%	8.4%	79.1%
DHMI	Turkey	250 747	7.8%	1.0%	6.7%	84.5%
DSNA	France	1 138 182	5.7%	4.9%	7.3%	2.9%
EANS	Estonia	10 150	0.5%	1.9%		97.6%
ENAV	Italy	633 690	5.6%	0.2%	8.1%	86.1%
Finavia	Finland	29 465	8.5%	1.4%	12.1%	78.0%
F.Y.R Macedonia	M-NAV	10 676	5.8%	3.7%	5.4%	85.1%
HCAA	Greece	165 386	5.9%	2.0%	7.5%	84.7%
HungaroControl	Hungary	83 134	2.4%	1.9%	5.8%	89.9%
IAA	Ireland	109 931	5.9%	1.5%	7.4%	83.5%
LFV	Sweden	197 178	3.7%	1.7%	6.6%	88.0%
LGS	Lithuania	16 904	2.4%	10.2%		87.5%
LPS	Slovak Republic	49 077	2.3%	2.4%	5.8%	89.5%
LVNL	Netherlands	165 104	5.0%	20.4%	9.6%	0.0%
MATS	Malta	11 799	5.1%	5.8%		89.1%
MoldATSA	Moldova	7 498	8.6%	2.4%	4.5%	84.5%
MUAC		138 763		0	0.0%	100.0%
NATA/Albania	Albania	18 104	1.6%	1.8%	5.0%	91.6%
NATS	United Kingdom	654 766	5.4%	1.2%	9.3%	83.1%
NAV/Portugal (FIR Lisboa)	Portugal (FIR Lisboa)	110 341	4.8%	0.3%	8.7%	86.2%
NAVIAIR	Denmark	96 250	4.8%	1.3%	7.5%	0.0%
Oro navigacíia	Lithuania	19 360	2.3%	1.3%	5.8%	90.7%
PANSA	Poland	117 531	3.9%	1.9%	8.5%	85.7%
ROMATSA	Romania	141 444	5.4%	6.4%		85.8%
Skyguide	Switzerland	195 505	4.5%	5.3%	2.4%	85.9%
Slovenia Control	Slovenia	26 220	5.1%	2.3%	5.6%	87.0%
SMATSA	Serbia and Montenegro	72 909	6.1%	6.4%	2.3%	85.2%
UKSATSE	Ukraine	151 089	1.0%	1.2%	5.1%	92.8%

**Table 2.2: Breakdown of en-route and terminal ANS costs, 2010**

5 786 868

5 747 588

1 706 716

## 2.6 Assets, liabilities and capital expenditures

For the comparison of ATM performance across ANSPs, only the capital employed by the ANSPs which is directly related to the provision of en-route and terminal ANS is used. Therefore, in this report assets relating to ANS activities reported under the “Other ANS” column of the SEID (such as Oceanic and OAT), have been excluded.

The disclosure of consistent and reliable ANS assets and liabilities data is proving particularly difficult for ANSPs which are part of an organisation which owns, manages and operates airports. However, the more extensive disclosure of balance sheet information required by the SEID V2.6 has allowed a more comprehensive and consistent picture of ANSPs assets and liabilities to be developed over time.

In ANSPs' balance sheets, assets comprise:

- the net book value (NBV) of fixed assets both in operation<sup>31</sup> and under construction;
- current assets, comprising principally stock, cash and debtors; and,
- long-term financial assets, including investments required to cover provisions for pensions and investments in other companies.

The liabilities (which must be numerically equal to the assets), comprise:

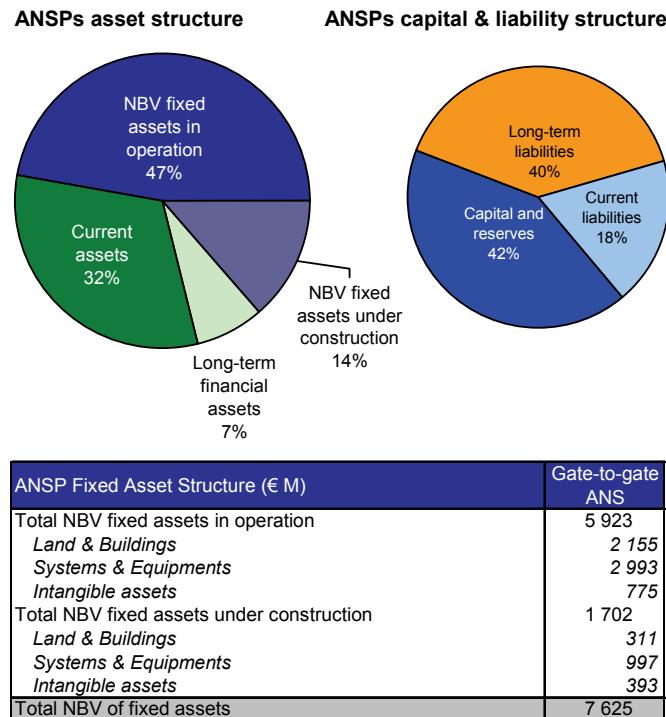
- capital and reserves – the equity in the organisation, including both shareholders' funds and the accumulated retained profit;
- current liabilities, comprising creditors, short-term loans and provisions; and
- long-term liabilities, comprising long-term loans, and provisions for pensions and other long-term liabilities.

The total NBV of the fixed assets used by the European ANSPs to provide ATM/CNS is valued at some €7 625M<sup>32</sup>, which means that overall for the ANS industry €0.93 of capital is required to generate €1 of revenue, an indication of relative capital intensity (this ratio is about 2 for airlines and about 3 for main airports operators). Figure 2.6 shows the breakdown of the balance sheet for European ANS, both assets and liabilities.

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<sup>31</sup> The NBV is the value of the asset net of cumulative depreciation.

<sup>32</sup> Note that this figure exclusively relates to assets booked in ANSPs accounts. Assets owned by MET service providers and NSAs are not included.



**Figure 2.6: ANSP assets and liabilities structure, 2010**

Asset values comprise chiefly fixed assets (61%) either already in operation (47%) or under construction (14%). Current assets amount to 32% and long-term financial assets represent 7% of the total. The liability side of the balance-sheet comprises capital and reserves (42%), long-term liabilities (40%) and current liabilities (18%).

The ANSPs' equity at European system level substantially exceeds their long-term debt, although this is an area where there is great variance across ANSPs. Understanding the main drivers for the differences in the equity/long-term debt ratio across ANSPs would require further investigation. This is an area of greater importance with the introduction of the risk sharing arrangements as part of the SES II package.

The ratio of current assets to current liabilities is commonly known as "*current ratio*" and it is used to measure the "*liquidity*" risk. Therefore, it indicates the capability to cover the current debt by only employing "*liquid*" resources. For instance, its value at ANSPs' European system level was some 1.8 at the end of 2010 despite the severe traffic downturn which hit the system in 2009 and the slow traffic recovery over the course of 2010. This is a high value if we consider that, on average, ANSPs would be able to cover up to 180% of their current debt by only using their liquid assets.

Even when using a more stringent measure of liquidity, such as the "*quick ratio*" (retaining only debtors and cash assets instead of all current assets) the value is 1.3. In this case, it indicates that, on average, ANSPs would be able to pay 130% of their current debt by only using their most "*liquid*" assets.

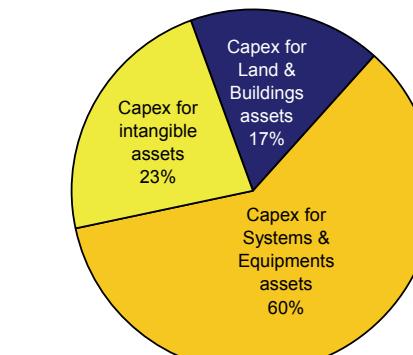
Figure 2.7 shows the breakdown of 2010 capital expenditure (capex) between land & building, systems & equipments and intangible assets. At European system level, the capex for the 37 ANSPs amounted to some €1 151M in 2010.

Capex planned for the period 2011-2015 are analysed in Chapter 6 of this ACE Report. Details on the nature of the major investment projects for each ANSPs participating to the ACE 2010 data analysis are provided in Annex 7 of this Report.

Similarly to last year, data concerning the physical numbers of surveillance and navigation assets have been collected. The 37 ANSPs were responsible for 197 primary radars, and 328 secondary surveillance radars (SSRs), Mode S and MSSR, many of which were co-located with primary radars. This amounts to 25 SSRs per million km<sup>2</sup>. Densities of SSRs tend to be low (less than 20) in peripheral areas of Europe (although in some cases this is inevitable as the areas include major areas of sea), and higher in the core area.

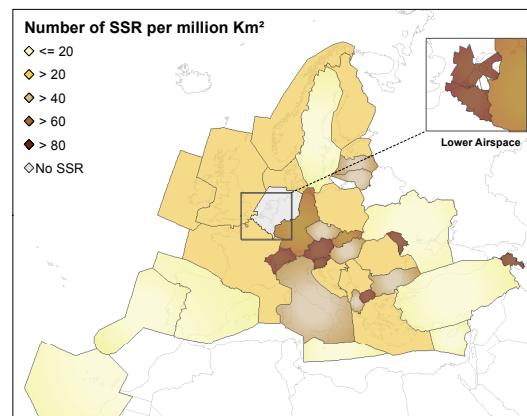
A rather similar pattern is observed with different types of navaids. On average, there were some 83 DMEs and 53 VORs per million km<sup>2</sup>, with in general lower values observed in peripheral areas of Europe. Note that in the table below, no SSRs are displayed for MUAC which uses the CNS infrastructure made available by the Four States contributing to MUAC budget (see lower airspace map).

Surveillance and navigation aids physical assets	2010
Primary radar only	35
Primary radar co-located with Mode S	67
Primary radar co-located with MSSR	95
MSSR only	166
Surface movement radars	90
ADS-B ground stations	71
Weather radars	48
Other surveillance assets	135
Distance measuring equipment (DME)	1 084
Non-directional beacons (NDBs)	850
Very high frequency omni-directional ranges (VORs)	691
Runway ends with ILS	547
Other navaids assets	241



Total gate-to-gate capex: € 1 151

**Figure 2.7: ANSP capex structure, 2010**



**Figure 2.8: Surveillance and navigation aids physical assets, 2010**

## 2.7 Staff

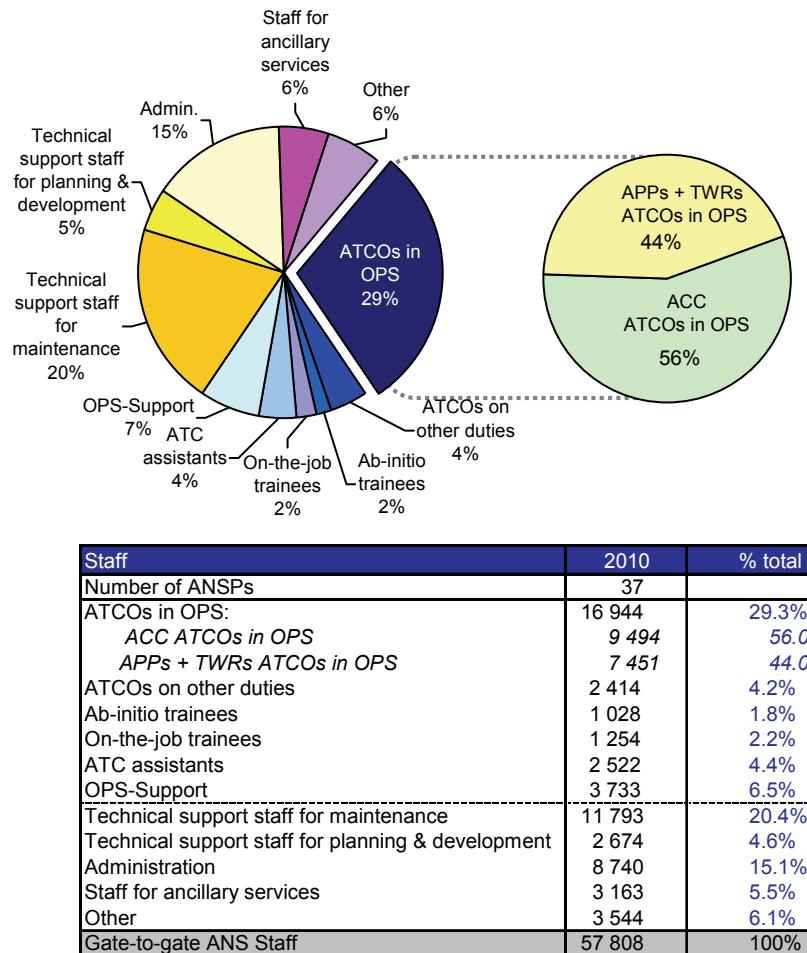
ANSPs are required to disclose information about a number of staff categories<sup>33</sup>. The staff numbers are reported as Full Time Equivalents (FTEs).

The 37 European ANSPs, including MUAC, employed 57 808 staff<sup>34</sup> in 2010. Of these, some 48% are directly involved in operations (blue colours in Figure 2.9 below).

<sup>33</sup> Precise definitions of the categories can be found in the SEID.

<sup>34</sup> This excludes EUROCONTROL Agency staff other than MUAC.

The largest share (29%) relates to air traffic controllers working on operational duty (ATCOs in OPS). Some 56% of ATCOs in OPS work in ACCs and some 44% in APP and TWR operational units, as illustrated in Figure 2.9 below.



**Figure 2.9: Breakdown of European ANS system staff in 2010**

In addition to operational duties, some 2 414 FTE ATCOs (4.2% of the total workforce) participate in activities outside the operations room (such as providing training, or working on special projects) which are not directly related to the active control of traffic.

Figure 2.9 above also shows that the second and third largest categories are technical support staff for maintenance (20.4%) and administration staff (15.1%).

For the purpose of this report, “support staff” are defined as staff who are not ATCOs in OPS, and the “support staff ratio” is defined as:

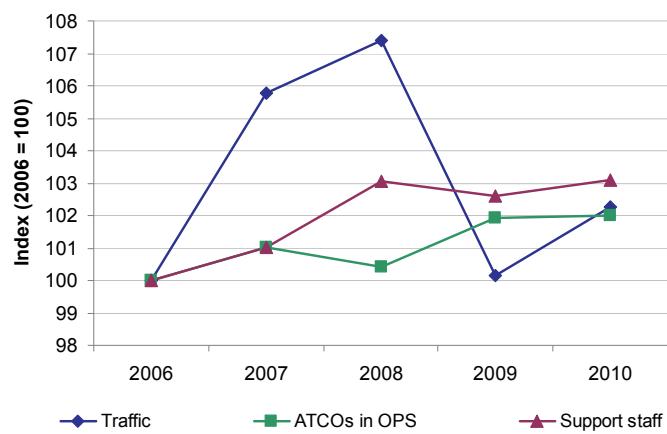
$$\text{Support Staff Ratio} = \frac{\text{Total Staff}}{\text{Total ATCOs in OPS}} = \frac{57 808}{16 944} = 3.4$$

That means that for every ATCO in OPS there are 2.4 **additional** staff needed for support.

Figure 2.10 below shows how traffic, ATCOs in OPS and support staff (i.e. total staff, excluding ATCOs in OPS) have changed for the 36 ANSPs between 2006 and 2010. Note that ARMATS has been excluded from this analysis since it started to report data from 2009 onwards.

At European system, the total number of ATCOs in OPS slightly increased between 2008 and 2010 (+1.6%). In the meantime, the number of support staff remained fairly constant (+0.05%). As a result, the support staff ratio reduced by some -1% between 2008 and 2010.

Changes in the employment costs for support staff between 2006 and 2010 are analysed in Chapter 5 of this ACE Report.



**Figure 2.10: Changes in traffic, ATCOs in OPS and support staff, 2006-2010**

### 3 FACTORS AFFECTING PERFORMANCE

#### 3.1 Introduction

The ACE benchmarking analysis has the objective of comparing ATM cost-effectiveness performance across a wide range of ANSPs. The major focus of this report is to examine and analyse the quantitative facts about the observed cost-effectiveness performance of the ANSPs. This factual analysis provides a comprehensive description and comparison of performance as viewed by the users of ATM/CNS services.

However, such a factual analysis cannot be either a complete explanation of performance differences between ANSPs, or an exhaustive guide on how performance can be improved, without some complementary consideration of how differences in performance arose. This is particularly true in the present context stemming from the second SES legislative package (see Section 1.6) which requires that ANSP performance be subject to quantified target setting.

This chapter is structured as follows:

- Section 3.2 provides a briefly description of the factors that could possibly affect cost-effectiveness performance.
- Section 3.3 presents specific factors that are measured by the PRU.
- Section 3.4 is an attempt to make a preliminary and a priori assessment of the magnitude and the direction of the possible impact of these factors through an econometric analysis.

The proposed framework is not at this stage intended to be applied quantitatively since it is difficult to identify and/or measure a full set of factors which may significantly impact on the performance. The mere recognition that 1) there are factors which are exogenous to the ANSP, 2) they are commonly accepted as drivers for performance, and 3) reliably measurable across all the European ANSPs, is to be considered as an achievement and critical step for future quantitative analyses.

#### 3.2 Framework for factors affecting performance

The framework illustrated in Figure 3.1 below, first introduced in the ACE 2007 Benchmarking Report, shows **exogenous** and **endogenous** factors which influence ANSP performance.

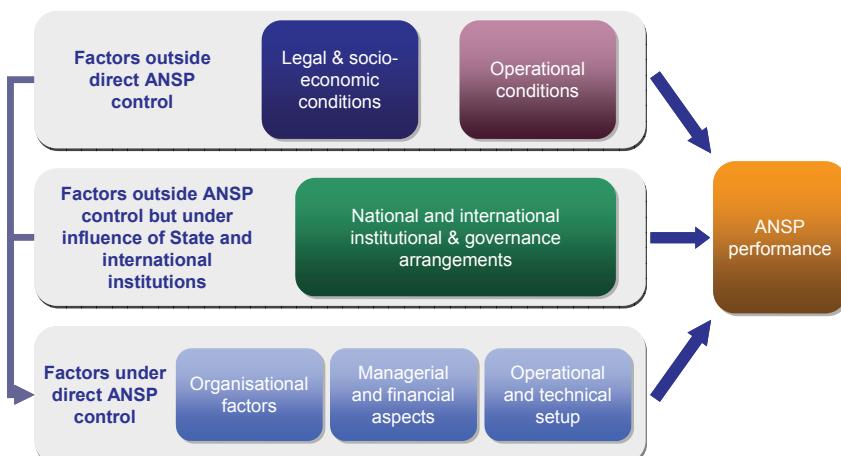


Figure 3.1: Factors affecting cost-effectiveness performance

Exogenous factors are those outside the control of an ANSP whereas endogenous factors are those entirely under the ANSP's control.

In Figure 3.1, exogenous factors have been classified into two main areas (top and central set of factors in Figure 3.1), according to which decision-makers have an influence over them. In particular, exogenous factors comprise:

- legal and socio-economic conditions (for example taxation policy), and operational conditions (for example traffic patterns the ANSP has to deal with) that are affected by decision makers and conditions outside aviation policy-making, and;
- institutional and governance arrangements such as international requirements imposed by the Single European Sky, that are influenced by aviation sector policy decisions.

On the other hand, endogenous factors, as shown in the lower area in Figure 3.1, can be classified into three groups that should be taken into account in the scope of a comprehensive analysis of ANSPs' influence on performance:

- organisational factors such as the internal organisation structure.
- Managerial and financial aspects such as the collective bargaining process.
- Operational and technical setup such as the operational structure.

However, endogenous factors can be influenced by exogenous factors. For example, ANSP's organisational and management decisions are to some extent influenced by its institutional, legal and socio-economic environment.

A more comprehensive description and analysis of the performance framework illustrated in Figure 3.1 was developed and can be found in Chapter 3 of the ACE 2009 Benchmarking Report.

In the next section, particular care is given to the observation and measurement of exogenous factors that, in the context of the ACE Benchmarking Report, arise from the specific basic conditions in which an ANSP operates and that are likely to influence the way ANSPs organise and conduct their business.

### 3.3 Quantification of some exogenous factors

Exogenous factors cover a wide spectrum of observability and measurability and capturing their local impact on ANSPs performance is not a straightforward exercise.

Indeed, these factors are either directly and readily quantified (i.e. irrecoverable VAT), or difficult to estimate (i.e. traffic complexity, market wage rates and exchange rate volatility) or simply impossible to identify (i.e. political influence/interference on ANS provision).

Moreover, it is possible that similar conditions could create effects working in opposite direction (bringing both benefits and difficulties). Likewise, similar exogenous factors may not necessarily affect different ANSPs to the same degree, either because of endogenous factors relating to how an issue is managed, or because of other exogenous factors constraining an ANSP's response.

Nevertheless, progress has been made in identifying ways of quantifying some exogenous factors that might have an impact on ATM performance. The results of this analysis are shown in this report. The factors examined comprise:

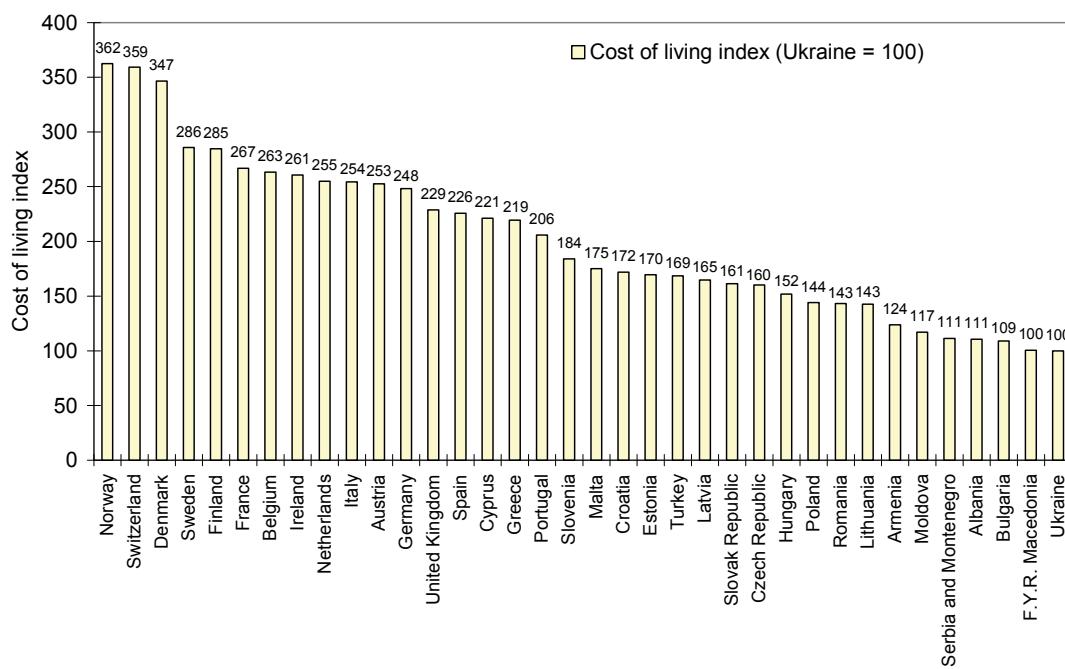
- differences in prevailing wage rates between countries;

- measurements of traffic characteristics that can be classified under the general heading of “traffic complexity”; and,
- traffic variability.

### 3.3.1 Cost of living

Employment costs constitute a major part of ANS provision costs. Staff has to be recruited in local labour markets, and therefore the prevailing wage rates, for many different grades and types of staff, will have a major influence on the overall employment costs.

There are a number of ways of measuring differences in prevailing wage levels between different countries. In previous ACE reports, unit employment costs have been compared with levels of GDP per head, and with Purchasing Power Parity (PPP<sup>35</sup>) indices. To demonstrate the variability of PPP across the sample, a cost of living index<sup>36</sup> relative to Ukraine =100 (Ukraine having the lowest index) has been calculated. This cost of living index compares GDP measured at current prices and GDP adjusted for PPPs). The interpretation of this index is that to achieve the same standard of living, earnings in Denmark or in Switzerland (using market exchange rates) will need to be some four times higher as those in Ukraine (see Figure 3.2 below).



**Figure 3.2: Index of cost of living (based on PPPs) in 2010, (source IMF April 2012)**

<sup>35</sup> PPP compares the price, in national currency, of a defined basket of goods and services, between different countries. PPP exchange rates are then the exchange rates at which the price of the basket is the same in the two countries being compared. A PPP index is the ratio of the PPP exchange rate to the market exchange rate, and a high PPP index means that the same amount of money, converted to national currency, will buy fewer goods and services.

<sup>36</sup> UkSATSE does not agree with the value of the PPPs used for Ukraine. According to UkSATSE the real PPP in Ukraine is significantly higher than the value used in Figure 3.2. According to the information provided in the IMF database (April 2012), PPP exchange rates for Ukraine have increased from 1.868 UAH per current international Dollar in 2006 to 3.570 UAH per current international Dollar in 2010 (+91%). The current IMF PPP estimated figure for 2011 (3.989 UAH per current international Dollar) is some 12% higher than in 2010. This indicates that the relative cost of living is increasing faster in Ukraine and that the difference in cost of living with the other States is slowly reducing over time. See Annex 5 for further details on the PPPs indices that are used in this report.

It should be noted that the extent to which prevailing wage levels influence actual employment costs may differ for different classes of staff. For instance, considering highly-qualified staff such as ATCOs, the possibility of international mobility might also impact the level of wages and salaries and eventually contribute to a certain degree of convergence in ATCO employment costs across different countries.

### 3.3.2 Traffic complexity

A number of **traffic characteristics** that might be expected to have an impact on the cost-effectiveness performance have been grouped together under the generic label of "**traffic complexity**".

In ACE 2005, an indicator of "traffic complexity" was implemented for the first time. It is a combination of two elements which give a quantitative representation of the density of traffic and intensity of potential interactions between traffic. In concrete, these two elements are:

- an **adjusted density**, which is a measure of the concentration of traffic in a given volume of airspace (ANSP/ACC level), and defined in terms of minutes of interaction among aircraft per flight-hour<sup>37</sup>; and,
- a **structural complexity** index, which captures the fact that the traffic in some areas is structurally more complex. The structural complexity index is composed of the sum of three metrics: ascending and descending routes, crossing routes, and variable speeds (a proxy for traffic mix). Clearly, ATC provision in lower airspace will, all other things being equal, face a relatively higher proportion of ascending and descending routes.

Structural complexity and adjusted density are independent. Traffic in an area could be dense, but structurally simple; equally, traffic could be structurally complex but sparse. However, the two impacts are **multiplicative**; the impact of structural complexity is greater when the traffic is denser.

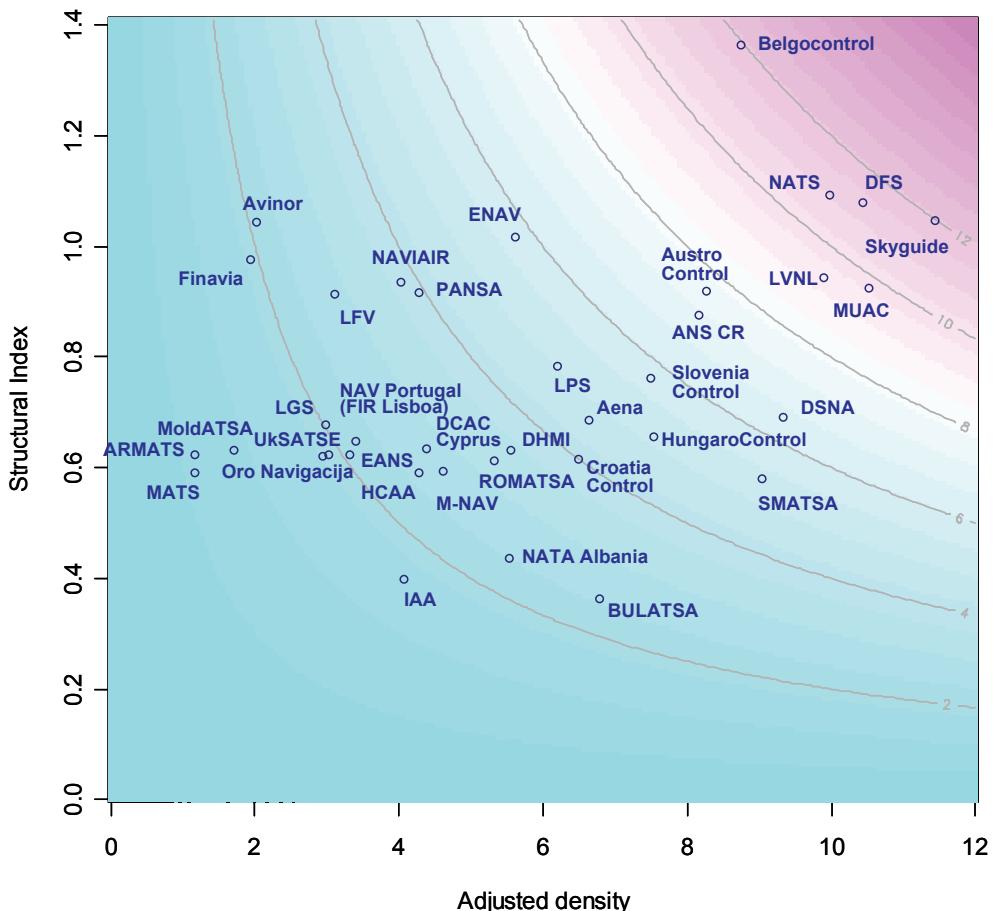
The relationship between "traffic complexity" and cost-effectiveness, or ATM performance in general, is not straightforward. The effects of traffic complexity on ATM performance can work in either of two ways, which go in opposite directions as briefly described below:

Positive effect	Higher density is expected to contribute to a better utilisation of resources and to more effective exploitation of economies of scale (up to the point when resources become fully utilised). This is similar to the "density effect" argument described in the table above.
Negative effect	Higher structural complexity entails higher ATCO workload and more sophisticated ATM systems and tools for the same volume of traffic.

Traffic complexity can influence either costs or quality of service, depending on an ANSP's response to it.

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<sup>37</sup> Interactions are defined as a period in which two aircraft are simultaneously present in a cell of 20x20 Nautical Miles and 3 000 feet in height. Only cells above FL85 are considered in this computation.



**Figure 3.3: Traffic complexity metrics for ANSPs, 2010**

Figure 3.3 above shows the structural complexity index and the adjusted density metric calculated at ANSP level (yearly data) for the year 2010<sup>38</sup>. ANSPs with the highest overall complexity score are located in the top right corner. Moving to the left it shows ANSPs (like Avinor) with high structural complexity but lower density. Moving down it shows ANSPs with high density but lower structural complexity (such as BULATSA).

Although the overall results remain fairly stable over time, it is worth mentioning that some ANSPs, amongst those with the greatest traffic complexity score, have shifted their position in the overall ranking. This is the case for Skyguide, whose traffic complexity score is now ranked as the highest in Europe, followed by Belgocontrol and DFS. Annex 3 provides the detailed figures of the traffic complexity metrics for each ANSP<sup>39</sup>.

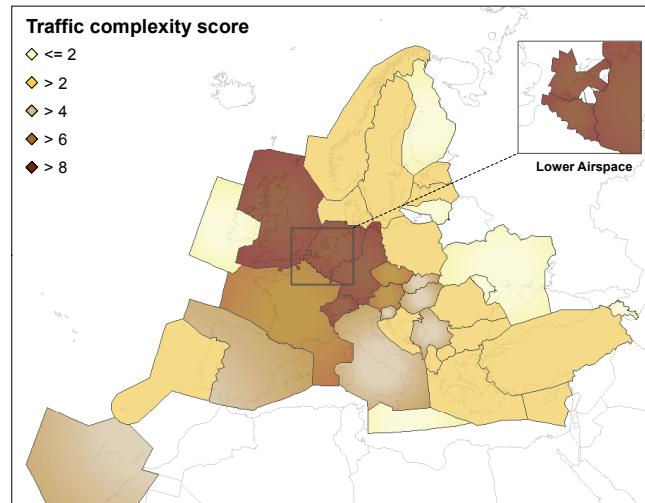
The twelve most “complex” ANSPs (those with an overall complexity score higher than 5 minutes of interaction per flight-hour) comprise four of the five largest ANSPs (Aena being ranked 15<sup>th</sup> with an overall complexity score just above four minutes of interaction per flight-hour, a result which is influenced by the low traffic density of Canarias airspace).

<sup>38</sup> See Annex 3 for a table displaying the traffic complexity indicators for each ANSP.

<sup>39</sup> As neither Estonia nor Latvia were part of the CFMU area in 2010, the CFMU does not record all the traffic crossing these countries. As a consequence, since the traffic complexity metrics are based on CFMU data, the figures calculated for these two ANSPs and their ACCs (Tallinn ACC and Riga ACC) might be underestimated.

The map in Figure 3.4 displays five different groupings of ANSPs that have been identified according to the overall complexity scores.

Skyguide, Belgocontrol, DFS, NATS, MUAC and LVNL show the highest complexity score - more than 9 minutes of interaction per flight-hour. In other words, for each flight-hour controlled in these airspaces there are on average more than nine minutes of potential interactions between aircraft.



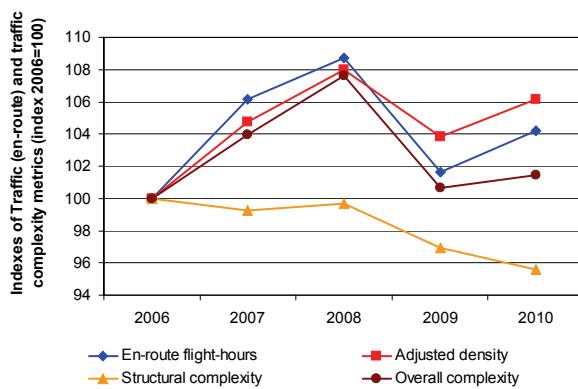
**Figure 3.4: Overall complexity scores at ANSP level, 2010**

The average complexity score for the European system is close to six minutes (6.08) of interaction per flight-hour, this is slightly higher (+0.8%) than in 2009 (i.e. 6.03) and some +1.5% higher than in 2006. Figure 3.5 below shows how traffic (en-route flight-hours), overall complexity and its two main components (i.e. adjusted density and structural complexity) changed between 2006 and 2008.

As expected, adjusted density (red line) and traffic (blue line) tend to follow a similar pattern over time.

On the other hand, despite an increase in traffic over the 2006-2008 period, the structural traffic complexity (orange line) remained fairly constant.

This is an indication that the drivers for the structural traffic complexity rather reflect the network structure than the changes in traffic volumes.



**Figure 3.5: Trend in overall complexity metrics and traffic at European system level, 2006-2010**

Figure 3.5 also shows that between 2008 and 2010, at European system level, the structural traffic complexity indicator significantly decreased. This might reflect the implementation of the European ATS Route Network (ARN) in 2008.

### 3.3.3 Traffic variability

**Variability in traffic demand** is another important factor in comparative ATM performance. If traffic is highly variable, resources may be underutilised, or made available when there is little demand for them – this is termed “allocative inefficiency”. Variability in traffic demand is therefore likely to have an impact on productivity, cost-effectiveness, quality of service and predictability of operations. It is broadly recognised that the different types of variability in traffic demand can be characterized as follows:

<b>Temporal</b>	<b>Seasonal</b> variability	the difference in traffic levels between different times of the year.
	<b>Within-week</b> variability	the difference in traffic levels between different days of the week.
	<b>Hourly</b> variability	the variation of traffic through the day.
	<b>Spatial</b> variability	variability within the ANSP airspace (e.g., variability in the tracks across the North Atlantic, caused principally by weather variation).

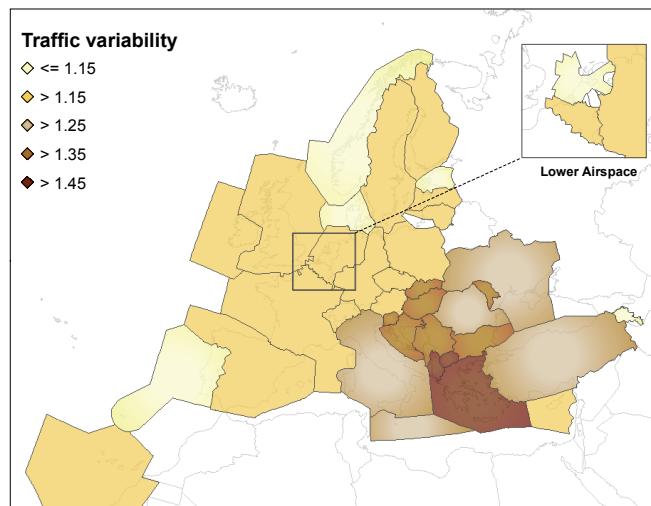
Conceptually, an index of traffic variability could be developed to capture each types of variability.

Different types of variability require different types of management practices, processes, and training to ensure that an ANSP can operate flexibly in the face of variable traffic demand. To a large extent, variability can be statistically predictable, and therefore adequate measures to mitigate the impact of variability could in principle be planned (for example, overtime, flexibility in breaks, and flexibility to extend/reduce shift length). When the degree of **unpredictable** variation, either temporal or spatial, is significant additional flexibility might be required, with a clear trade-off between costs and quality of service.

Seasonal variability is particularly difficult for an ANSP to adapt to as working practices that are practically feasible have only a limited ability to deal with high seasonal variability.

A useful indicator of differences in seasonal variability is the ratio of traffic in the peak week to the average weekly traffic.

Seasonal traffic variability tends to be significantly higher in South-Eastern Europe (see Figure 3.6), where the “traffic complexity” score tends to be lower (see Figure 3.4).



**Figure 3.6: Seasonal traffic variations, 2010**

### 3.4 Econometric analysis of ANSPs cost-efficiency

The current ATM cost-effectiveness analysis is a factual benchmarking of outputs and costs. It does not directly take into account the impact of exogenous and endogenous factors on cost-efficiency performance.

The ANS industry is characterised by a high level of heterogeneity which can be linked to exogenous factors. As shown in Section 3.2 above, ANSPs provide ANS in contexts that differ significantly in terms of legal and socio-economic conditions, operational characteristics and institutional arrangements.

In principle, once the impact of all exogenous factors has been accounted for, the remaining differences in performance across ANSPs should relate to inefficiencies associated with a number of endogenous factors which are under ANSPs direct control (i.e. see organisational factors, managerial and financial aspects, and operational and technical setup as described in Section 3.2 above). Practically, however, the best hope

is to identify the main exogenous factors and to quantify the impact of some of them as they are not all observable and measurable.

In 2010, the PRU commissioned a Report<sup>40</sup> to CEG (Competition Economists Group) to develop an econometric methodology to estimate the level of cost-inefficiency at European system level. CEG based its modelling approach on two estimation models:

- The Random Effects model proposed by Pitt and Lee<sup>41</sup> which assumes that ANSPs inefficiency is invariant in time. This implies that non-observed ANSP specificities which do not change over time will be considered as inefficiency. Therefore, inefficiency estimates are likely to be over-estimated when there is a high level of heterogeneity in the industry.
- The True Random Effects model proposed by W. Greene<sup>42</sup> which assumes that ANSPs inefficiency is variant in time. This means that persistent differences across ANSPs due to inefficiency will be considered as heterogeneity and not as inefficiency. This means that in this model inefficiency is likely to be under-estimated if there is a high level of heterogeneity in the industry.

The application of these two models on the ACE data set resulted in the estimation of a threshold for the European system cost-inefficiency (13%-60%). Given the different underlying assumptions used in these two models, it is likely that the “genuine” system level inefficiency is within this threshold.

The PRU plans to progress on the econometric-cost benchmarking analysis in the near future by making use of the ACE 2010 and ACE 2011 data submissions. This will contribute to expand the dataset used in the econometric analysis from some 250 to some 300 observations. A larger database should allow for a more accurate estimation of the key variables/parameters and hence, should provide a more precise inefficiency range.

The main aim is to improve the quality and reliability of the estimates obtained with these econometric models, in order to build an effective portfolio of quantitative tools and empirical evidence at the PRU’s disposal that will contribute to the setting in 2013 of the EU-wide performance targets for the second Reference Period (RP2) and support the assessment of national performance plans in 2014.

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<sup>40</sup> See “Econometric cost-efficiency benchmarking of Air Navigation Service Providers” (May 2011), a Technical Note commissioned by the PRU. This document is available on the PRC website: <http://www.eurocontrol.int/articles/performance-review-monitoring-and-reporting>.

<sup>41</sup> Pitt, M. and L. Lee (1981) “The Measurement and Sources of Technical Inefficiency in Indonesian Weaving Industry”, *Journal of Development Economics* 9:43-64.

<sup>42</sup> Greene, W. (2005), “Reconsidering Heterogeneity in Panel Data Estimators of the Stochastic Frontier Model”, *Journal of Econometrics* 126: 269-303.

## **PART II: FINANCIAL COST-EFFECTIVENESS**

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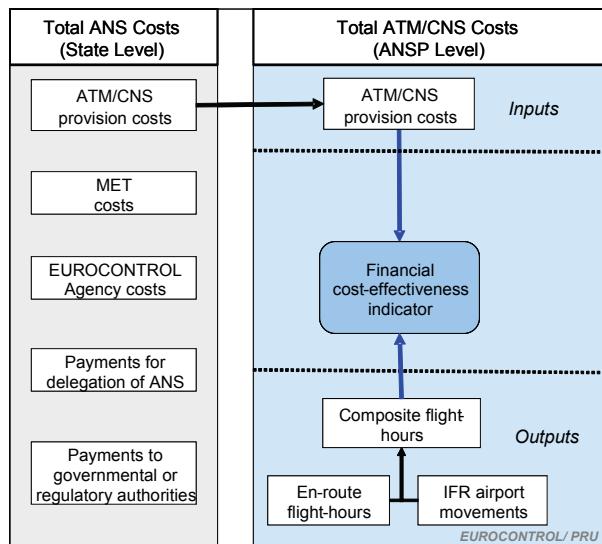
## 4 FINANCIAL COST-EFFECTIVENESS (2010)

### 4.1 Introduction

This chapter examines and compares ANSPs' financial cost-effectiveness for the year 2010.

As illustrated in Figure 4.1, the financial cost-effectiveness analysis focuses on a subset of the total ANS costs submitted at State level: the ANSP ATM/CNS provision costs. These costs have been defined to cover, as far as possible, the costs that are under the direct control of ANSPs and that can be used meaningfully to compare performance across ANSPs and across time.

The measure of output is the "composite flight-hour" as defined in Section 2.3, and the financial cost-effectiveness indicator is the cost of ATM/CNS provision per unit of output.



**Figure 4.1: Conceptual framework for the analysis of financial cost-effectiveness**

The following costs categories have therefore been excluded from the financial cost-effectiveness analyses:

- Costs relating to services provided to military OAT, Oceanic ANS, AFIS/ATC at smaller regional aerodromes<sup>43</sup>, and reported under the "Other" column in the SEID;
- MET costs (whether provided internally or externally);
- Payments to governmental or regulatory authorities;
- EUROCONTROL costs<sup>44</sup>; and
- Payment to other ANSPs or States for delegated services, including payments for MUAC & CEATS.

The ANS costs per category for individual ANSPs/States, with a breakdown between en-route and terminal costs, are available in Annex 6 of this Report.

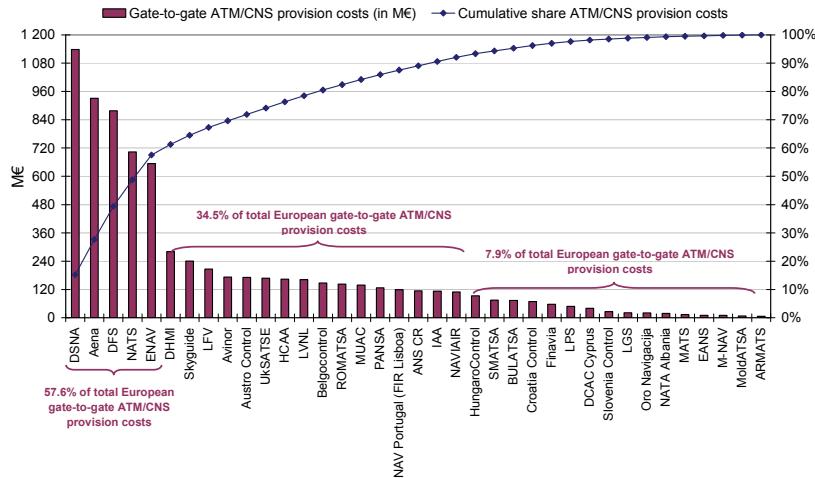
As identified in previous ACE reports, the allocation of costs between en-route and terminal ANS is not done consistently across the European ANSPs. This lack of consistency might distort performance comparisons carried out separately for en-route and terminal ANS. For this reason, the focus of the cost-effectiveness analysis in this report is "gate-to-gate" ANS.

Figure 4.2 shows individual ANSPs' total gate-to-gate ATM/CNS provision costs in 2010. These costs are used in subsequent chapters of Part II, Part III, and Part IV for the purposes of comparing ANSPs' ATM/CNS cost-effectiveness.

<sup>43</sup> This is the case for Avinor, ENAV, and Finavia.

<sup>44</sup> Excluding MUAC and CEATS costs.

Five ANSPs (Aena, DSNA, NATS, DFS, and ENAV) bear 58% of total European gate-to-gate ATM/CNS provision costs, while their share of traffic is 53%. At first sight, this result contrasts with the expectation of some form of increasing returns to scale in the provision of ANS (the performance of larger ANSPs might benefit from their larger size).



**Figure 4.2: Distribution of ATM/CNS provision costs in 2010**

The impact of size on ANSPs performance is an important policy issue given the infrastructure characteristics of the ANS sector. It should be noted that:

- Under the current full cost recovery regime that applies to most ANSPs, they may have little incentive to fully exploit scale effects, hence the difficulty to observe them;
- Larger ANSPs tend to develop bespoke ATM systems internally which can be more costly than a commercial off-the-shelf (COTS) solution, and;
- Size is not the only factor that has an impact on ANSPs costs.

It is noteworthy that between 2009 and 2010, the share of the five largest ANSPs in the total European system ATM/CNS provision costs decreased from 60% to 58%. This mainly reflects the significant reduction in Aena ATM/CNS provision costs following the implementation of Law 9/2010. It is likely that greater scale effects will be observed in the forthcoming decade as a result of a new regulatory regime introduced by the SES II Performance Scheme and in particular of the incentive scheme which is part of the amended Charging Scheme regulation.

Because of their weight in the European system and their relatively similar operational and economic characteristics (size, scope of service provided, economic conditions, presence of major hubs), this ACE report places a particular focus on the results of the five largest ANSPs (Aena, DFS, DSNA, ENAV and NATS).

Section 4.2 compares the financial gate-to-gate cost-effectiveness indicator across ANSPs for the year 2010. It also highlights the en-route and terminal components of this indicator. Section 4.3 presents the analytical framework developed to break down cost-effectiveness into its main economic components. Section 4.4 gives the results obtained from applying this framework to the financial cost-effectiveness indicator, providing insights into differences in ATCO productivity, ATCO employment costs, and support costs.

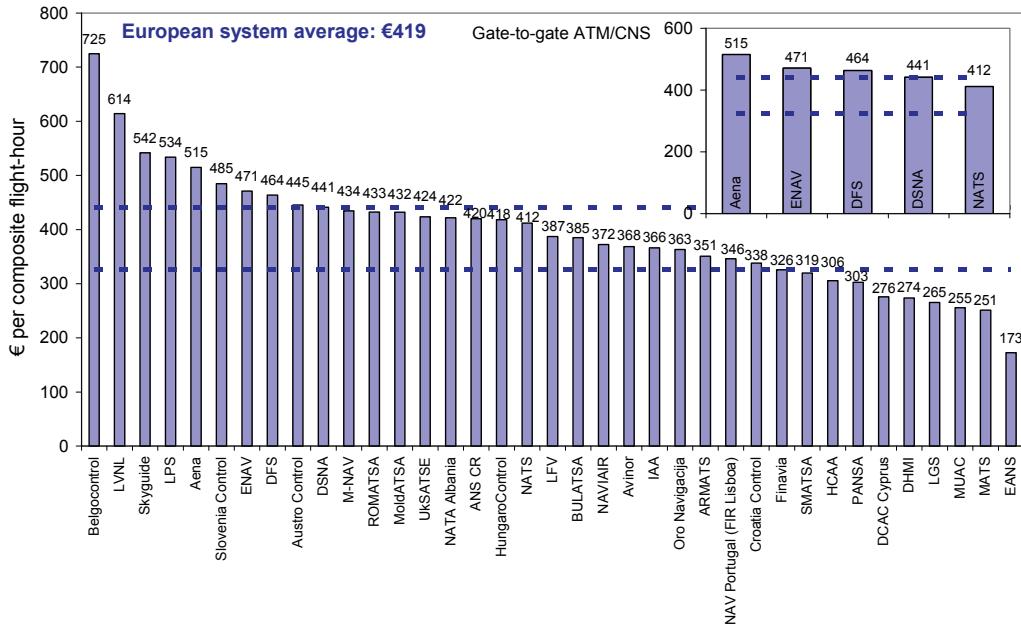
## 4.2 Financial cost-effectiveness indicator (2010)

The European system ATM/CNS provision cost per composite flight-hour for 2010 was €419. The financial cost-effectiveness indicators for each ANSP are shown in Figure 4.3.

The financial cost per composite flight-hour varies between €725 for Belgocontrol and €173 for EANS, a factor of more than four. EANS, which is among the smallest ANSPs of the European sample, has consistently recorded the lowest unit cost since the inception of this analysis a decade ago. The two dotted lines in Figure 4.3 represent the top and bottom

quartiles<sup>45</sup> and provide an indication of the dispersion of unit ATM/CNS provision costs across the sample of 37 ANSPs.

Belgocontrol and LVNL remain the two ANSPs with the highest unit costs, although it should be noted that (1) LVNL<sup>46</sup> has significantly reduced its unit cost in 2010 and (2) both ANSPs exclusively provide ATC services in lower airspace.



Note that this KPI is a factual indicator. A genuine measurement of **cost inefficiencies** would require full account to be taken of identified and **measurable** exogenous factors such as cost of living, traffic complexity, and traffic variability (as described in Chapter 3).

While some of the more detailed analysis of the components of costs presented later in the chapter may contain some inconsistencies due to different reporting and different interpretations of definitions, the gate-to-gate financial cost-effectiveness indicator itself is robust for each ANSP since, in most cases, it is based on financial numbers that are reconcilable with audited accounts from Annual Reports and output data collected by EUROCONTROL.

**Figure 4.3: Comparison of the financial cost-effectiveness indicator, 2010**

The unit costs for the five largest ANSPs<sup>47</sup> are displayed in the top right corner of Figure 4.3 above. These ANSPs, which operate in relatively similar economic and operational environments, show unit costs ranging from €515 (Aena<sup>48</sup>) to €412 (NATS). This range is

<sup>45</sup> 25% of observations lie below the bottom quartile, whilst 25% lie above the top quartile; the remaining 50% lie between the two quartiles. Thus in Figure 4.3, 75% of ANSPs have ATM/CNS costs per composite flight-hour lower than €441.

<sup>46</sup> In 2010, LVNL had no equity in its balance sheet and was fully financed through debt. The objective of LVNL for the next years is to build up an equity capital in order to improve LVNL financial situation and to be in a position to bear potential losses in revenues arising from the traffic risk sharing during the first Reference Period (RP1). The equity capital is being built by adding to the 2010 actual en-route cost-base an exceptional cost item of €22M which was not reported in LVNL 2010 data submission. This amount will contribute to generate an under-recovery for the year 2010 that will be recovered by the Netherlands through the 2012-2014 chargeable unit rates and will be recorded as equity in LVNL balance-sheet. If this exceptional cost item was included in LVNL ATM/CNS provision costs, its cost-effectiveness KPI would be substantially higher at some €698 per composite flight-hour (instead of €614).

<sup>47</sup> ENAV 2010 ATM/CNS provision costs comprise costs relating to ATC services (€37.9M) provided by the Italian Air Force (ITAF) mainly at regional civil/military airports. It is foreseen that in future ACE Reports, figures will be reported as ENAV+ITAF. See also Footnote 61.

<sup>48</sup> Aena 2010 ATM/CNS provision costs comprise costs relating to ATM/CNS infrastructure shared with the military authority (€16.2M).

much smaller than observed in the previous years mainly due to the significant decrease in Aena unit ATM/CNS provision costs.

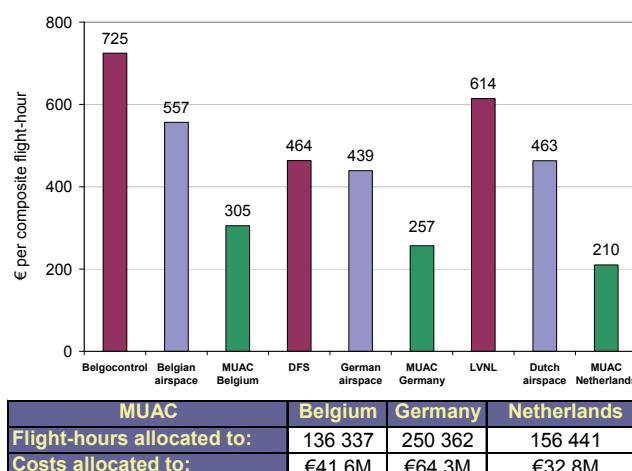
Figure 4.3 indicates that in 2010, Aena unit cost is +16% higher than the average of the other four largest ANSPs, while the ACE 2009 analysis showed a gap of +52% in 2009. The decrease in Aena unit ATM/CNS provision costs mainly result from the introduction of a specific law (Law 9/2010) which was adopted in Spain in 2010. Besides a number of structural changes, this law introduced new working conditions for ATCOs, rising contractual working hours and significantly reducing the number of overtime hours, which was one of the main driver for high ATCO employment costs in the past. The Law 9/2010 also requires that the chargeable unit rate of Spain converge towards the corresponding average of the five largest States by 2013.

It is also noteworthy that among the five largest ANSPs, NATS is the only one operating outside of the Euro zone and that the **level** of NATS unit costs expressed in Euro is affected by exchange rate fluctuations<sup>49</sup>. Between 2007 and 2010 the British Pound depreciated by -17%. Assuming that the Pound had remained at its 2007 level, NATS 2010 unit cost would be above that of ENAV. On the other hand, the level of Skyguide 2010 unit costs expressed in Euro is negatively affected by the significant appreciation of the Swiss Franc compared to the Euro between 2009 and 2010 (9%).

It should be noted that the unit ATM/CNS provision costs reported for MUAC in Figure 4.3 (€255) do not include costs of the infrastructure which is made available for joint use and provided free of charges by the ANSPs (Belgocontrol, DFS and LVNL) operating in the Four States<sup>50</sup> airspace. To better assess the cost-effectiveness of ATM/CNS provided in each of the Four States national airspaces, MUAC costs and output are consolidated with the costs and outputs of the national providers. The bottom of Figure 4.4 shows the figures which have been used for this “adjustment”. The costs figures are based on the cost allocation keys used to establish the Four States cost-base, while the flight-hours are based on those controlled by MUAC in the three FIRs (Belgium, Netherlands and Germany). The top of Figure 4.4 provides a view of this consolidated ANSP costs per composite flight-hour in the airspace of Belgium, the Netherlands and Germany (see blue bars).

Figure 4.4 shows that the gate-to-gate unit costs for ATM/CNS provision in the Belgian airspace would amount to €557 per composite flight-hour.

While this is notably below Belgocontrol unit costs (-23%), gate-to-gate unit costs for ATM/CNS provision in the Belgian airspace would still be the highest in Europe, just above Skyguide (see Figure 4.3).



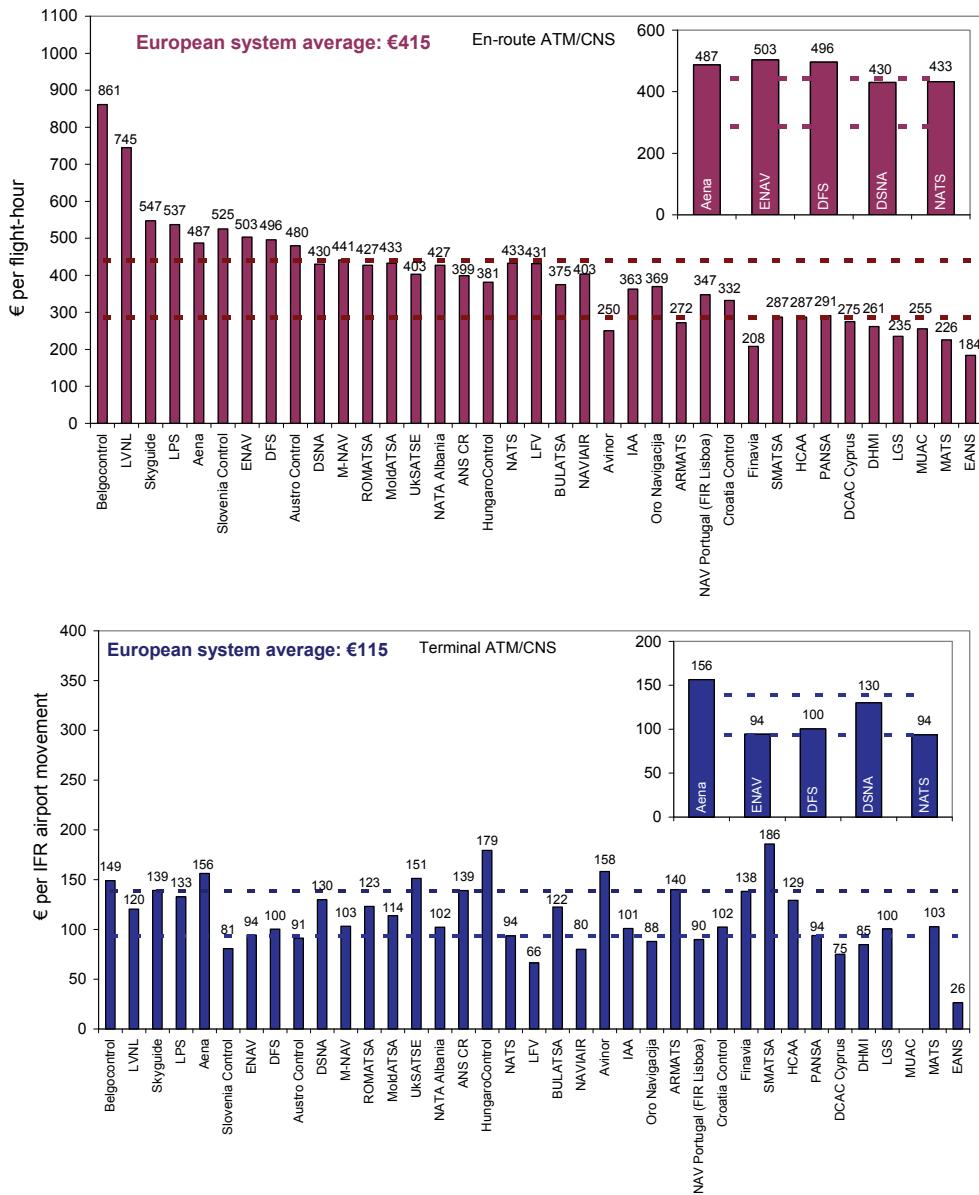
**Figure 4.4: Adjustment of the financial cost-effectiveness indicator for ANSPs operating in the Four States airspace (2010)**

<sup>49</sup> It should be noted that the changes in unit costs analysed in this Report (see Chapter 5) are not affected by changes in national currency against the Euro. Readers should however be aware of exchange rate fluctuations when comparing the values extracted from different ACE reports. Annex 5 comprises further information on the methodology used to express financial figures in real terms.

<sup>50</sup> Belgium, Germany, the Netherlands, and Luxembourg. Note that for the purposes of this report Luxembourg figures are not included as they amount to less than 1% of MUAC total costs.

The gate-to-gate unit costs in the Dutch airspace would be at €463 (i.e. -25% compared to LVNL), a level below ENAV unit costs, and LVNL would rank seventh instead of second. Figure 4.4 also shows that the unit cost in the German airspace (€439) would be -5% below DFS unit costs (€464). This is not surprising since the size of MUAC operations in German airspace compared to the total en-route and terminal operations of DFS is smaller than for Belgocontrol and LVNL.

The gate-to-gate financial cost-effectiveness indicator in Figure 4.3 can be broken down into en-route and terminal components. This is shown in Figure 4.5 below. To facilitate the comparison and interpretation of the results, ANSPs are ranked according to the results obtained in the gate-to-gate financial cost-effectiveness indicator (Figure 4.3). The output units in Figure 4.5 are en-route flight-hours and IFR airport movements, respectively – compared to the gate-to-gate composite flight-hours used in Figure 4.3.



**Figure 4.5: Breakdown of financial cost-effectiveness into en-route and terminal, 2010<sup>51,52</sup>**

<sup>51</sup> The dotted lines on the graphs represent the bottom and top quartiles.

<sup>52</sup> MUAC operates exclusively in upper airspace and therefore has no terminal ANS costs.

It is difficult to determine whether the differences shown in Figure 4.5 above are driven by economic and operational factors (for example, size of operations, economies of scale, or traffic complexity), or purely cost-allocation differences, which are known to exist across States/ANSPs.

There are cases where a high en-route cost per flight-hour (top graph) corresponds to a low terminal cost per IFR airport movement (bottom graph) and vice versa. For example:

- SMATSA and Avinor have relatively high unit costs in terminal service provision but relatively low unit costs in en-route.
- Slovenia Control and ENAV have a relatively high unit cost in en-route service provision but a relatively low terminal unit cost.

For ANSPs who own and operate a large number of airports such as Avinor, Finavia and LFV (until the separation of the airport division, now Swedavia AB, in April 2010) differences in terminal unit costs (see Figure 4.5) seem to be mainly be due to differences in cost allocation. Indeed, in Sweden most terminal ANS assets (TWR buildings, ILS) and capital-related costs were allocated to the airport division of LFV in 2010 and not to the ANS department. As a result, these costs are mainly recovered through landing fees rather than terminal ANS charges.

Furthermore, in 2011, Aena went through a restructuring process relating to the separation of the airport division (creation of a new company Aena Aeropuertos S.A.) from the ANS department. In September 2011, ferroNATS (a consortium made by NATS and the Spanish construction company Ferrovial) has been awarded a contract to provide ATC services at 10 airports in Spain<sup>53</sup>. Similarly, ANS CR, in partnership with Saerco, has been awarded a contract to provide ATC services at three airports in Spain Canarias<sup>54</sup>. It is likely that this restructuring process will affect the level of Aena terminal unit costs in the forthcoming years and it will be informative to monitor the extent to which cost-effectiveness performance will improve.

In 2010, several ANSPs used a different methodology to allocate costs between en-route and terminal ANS. This is particularly the case for Belgocontrol where the costs relating to ATM/CNS provision at regional airports used to be reported as en-route costs (in consistency with the en-route costs charged to airspace users). Since 1 January 2010, Belgocontrol does not charge these costs to airspace users (neither in the en-route nor terminal cost base) but for the purposes of the ACE 2010 benchmarking analysis, Belgocontrol reported these costs as terminal ATM/CNS costs.

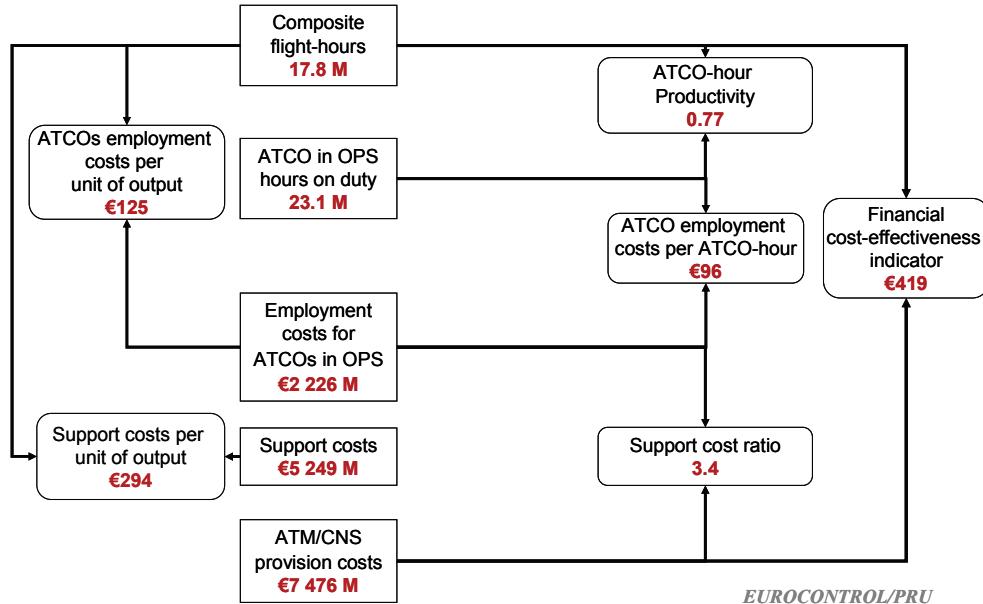
### 4.3 Framework for gate-to-gate cost-effectiveness and productivity analysis

The PRU has developed an analytical framework that allows cost-effectiveness to be broken down into a number of key components. This framework helps in understanding differences in cost-effectiveness by allowing examination of the detailed factors underlying it. The framework and the 2010 results for each of its components at European system level are displayed in Figure 4.6 below.

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<sup>53</sup> Alicante, Valencia, Ibiza, Sabadell, Sevilla, Jerez, Melilla, Madrid Cuatro Vientos, Vigo and A Coruña airports.

<sup>54</sup> La Palma, Lanzarote and Fuerteventura.



**Figure 4.6: Performance framework for gate-to-gate cost-effectiveness analysis (2010)**

The right-hand side of Figure 4.6 shows that the financial cost-effectiveness indicator (ATM/CNS provision costs per composite flight-hour) is made up of three component performance **ratios**:

- Higher ATCO-hour productivity (composite flight-hours per ATCO-hour) improves cost-effectiveness;
- Lower ATCO **employment costs per ATCO-hour** improve cost-effectiveness; and,
- All other things being equal, a lower **support cost ratio** improves cost-effectiveness.

These three ratios multiplied together give the overall financial cost-effectiveness indicator.

The financial cost-effectiveness indicator can also be broken down into two additive factors, as shown on left-hand side of Figure 4.6:

- **ATCO employment costs per unit of output** is the ratio of the employment costs for the ATCOs in OPS to the output (measured in composite flight-hours). All other things being equal, lower ATCOs in OPS employment costs per unit of output will improve financial cost-effectiveness. At European level, this component comprises some 30% of the overall financial cost-effectiveness indicator.
- **Support costs per unit of output** is the ratio of support costs<sup>55</sup> to the output. All other things being equal, lower support costs per unit of output will improve financial cost-effectiveness. At European level this component comprises some 70% of the overall financial cost-effectiveness indicator.

The latter indicator is preferred to the support cost ratio for two main reasons. First, the support cost ratio cannot be viewed in isolation since a low ratio may simply be a symptom of high ATCO employment costs. Second, given that there are fixed costs in the provision of ATM/CNS (such as infrastructure and ATM systems), “support costs per unit of output” can give additional insights into the analysis of support costs and scale effects. The analysis of cost-effectiveness provided in Section 4.4 therefore focuses on the **support costs per unit of output** indicator rather than the support cost ratio.

Because of the critical importance of ATCOs in OPS in the provision of ATC services, the framework presented in Figure 4.6 puts a clear focus on this resource. Important support

<sup>55</sup> Support costs are defined as the sum of non-ATCO employment costs, non-staff operating costs and capital-related costs.

functions (with and without operational characteristics) are currently embedded in the so-called “support staff”. The employment costs of these support staff represent the majority of support costs and should be seen as an important contributor for cost-effectiveness performance improvement.

#### 4.4 Breakdown of gate-to-gate cost-effectiveness for individual ANSPs

The breakdown of the overall indicator illustrated in Figure 4.3 into the components discussed above is shown in Figure 4.7, Figure 4.9, Figure 4.11, and Figure 4.14. When displayed, the two dotted lines represent the bottom and top quartiles<sup>56</sup> for the three components.

In the bottom right of each figure a miniature replica of Figure 4.6 is displayed to guide the reader through the framework.

Finally, to summarize and facilitate the interpretation of the results, the concept of the “performance ratio” has been introduced and presented in Section 4.5. Performance ratios are a simple way to capture the relative advantages and weaknesses of an ANSP compared to the European average.

##### 4.4.1 ATCO-hour productivity (2010)

ATCO-hour productivity is the efficiency with which an ANSP deploys and makes use of its ATCOs. In 2010, the European system as a whole handled 0.77 composite flight-hours per ATCO-hour. ATCO-hour productivity for each ANSP is shown in Figure 4.7.

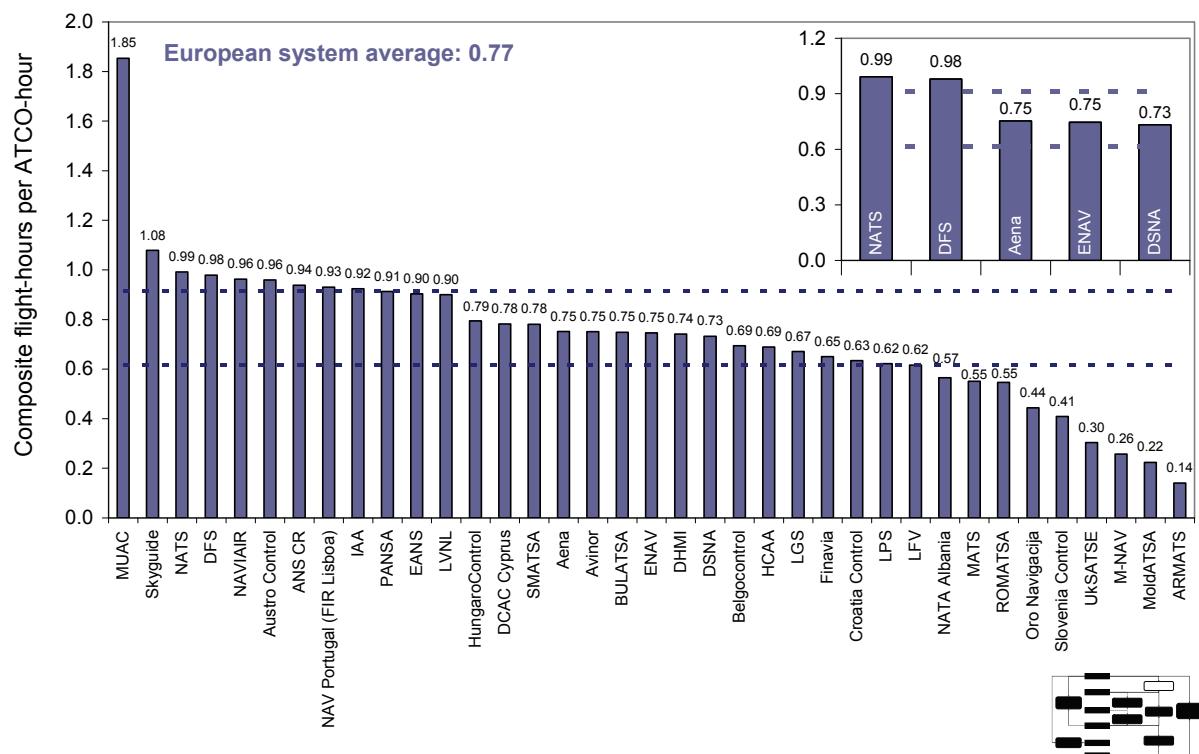


Figure 4.7: ATCO-hour productivity (gate-to-gate), 2010

There is a wide range of ATCO-hour productivity among individual ANSPs. The ANSP with the highest ATCO-hour productivity is MUAC (1.85) which only provides ATC services in upper airspace, while the ANSP with the lowest ATCO-hour productivity is ARMATS (0.14), i.e. one of the smallest ANSPs in terms of traffic volumes. A somewhat fairer comparison of MUAC ATCO-hour productivity is presented in Figure 4.8 below (see Cluster 2).

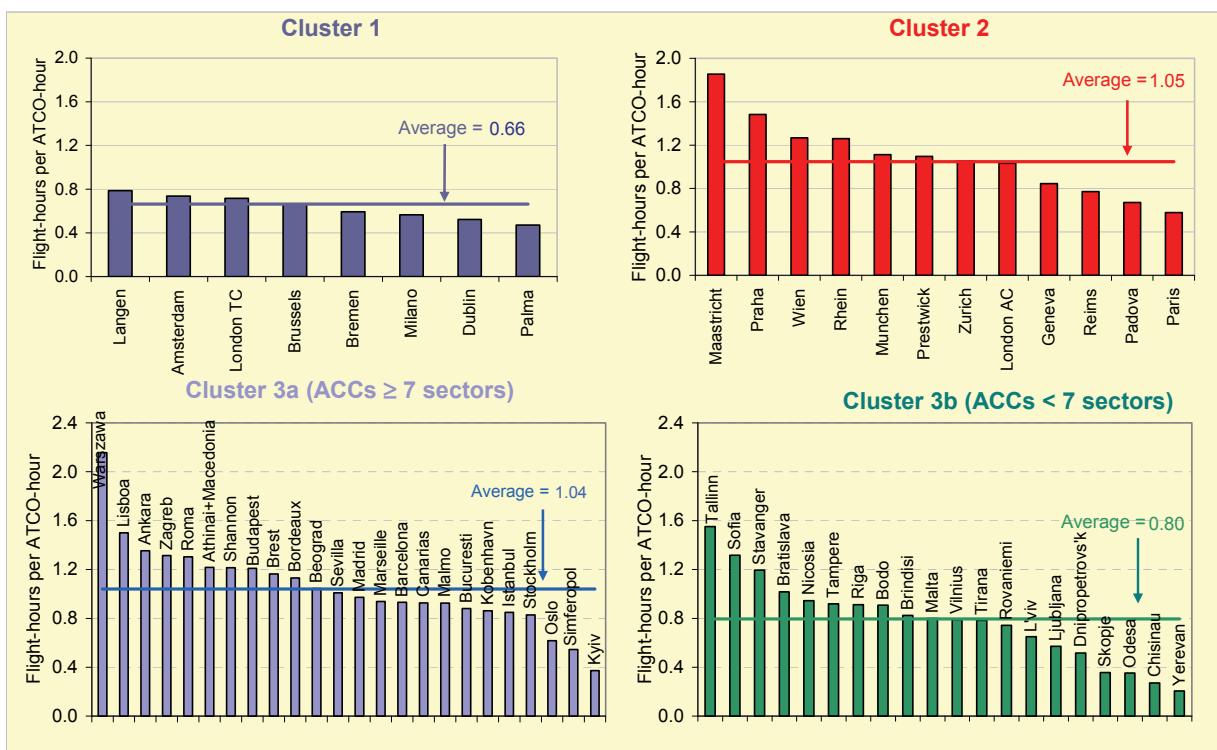
<sup>56</sup> 25% of observations lie below the bottom quartile, whilst 75% lie below the top quartile. (Thus, in Figure 4.7, 75% of ANSPs have ATCO-hour productivity less than 0.90).

Figure 4.7 also indicates that there are substantial differences in ATCO-hour productivity even among the five largest ANSPs. Indeed, NATS ATCO-hour productivity (0.99) is some +35% higher than that of DSNA (0.73). In Spain, the application of Law 9/2010 resulted in a sharp reduction in the number of ATCO-hours on duty, increasing Aena ATCO productivity in 2010.

Most of the ANSPs that achieved or are close to top quartile ATCO-hour productivity (ANS CR, Austro Control, DFS, LVNL, MUAC, NATS and Skyguide) are among the most complex ANSPs. On the other hand, ARMATS, UkSATSE and MoldATSA, which belong to the least complex grouping in Figure 3.3, show an ATCO-hour productivity which is lower than the bottom quartile. Low productivity in some of these ANSPs may be a consequence of their small size, and the consequent difficulty in adapting their available ATC capacity to low traffic volumes and high seasonal variability.

It is important to mention that if the European average productivity (0.77) could be raised to the level of the top quartile in Figure 4.7 (0.91), it would bring significant gains in cost-effectiveness.

ATCO-hour productivity measured at ANSP level reflects an average performance, which can hide large differences among ACCs even for those operating in the same country/ANSP. On the other hand, ACCs belonging to different ANSPs may share similar characteristics. It is therefore important to analyse and compare productivity at ACC level (see Figure 4.8).



**Figure 4.8: Summary of productivity results at ACC level (2010)**

In Figure 4.8, ACCs are grouped in clusters based on three operational characteristics: (1) their complexity scores, (2) the average used flight levels, and (3) their number of sectors. More information on the definition of clusters can be found in previous ACE reports<sup>57</sup>. So far, no clear-cut statistical relationship between ATCO productivity, traffic complexity and traffic variability could be inferred because the relationships between all these metrics are not

<sup>57</sup> See for example ACE 2008 report, p.104. Report available on the PRC website: ([http://www.eurocontrol.int/prc/public/standard\\_page/doc\\_ace\\_reports.html](http://www.eurocontrol.int/prc/public/standard_page/doc_ace_reports.html)).

straightforward. Nevertheless, it is useful to compare the ATCO productivity of ACCs that share similar “operational” characteristics. Each cluster is briefly described below:

- **Cluster 1 (ACCs serving predominantly lower airspace with relatively high structural complexity)** has the lowest average productivity of any of the clusters (0.66 flight-hour per ATCO-hour). Palma (with the lowest productivity) has also the lowest overall complexity score but the highest seasonal traffic variability in Cluster 1.
- **Cluster 2 (ACCs serving dense upper airspace)** has an average productivity of 1.05 flight-hour per ATCO-hour. Within this cluster, Maastricht has significantly higher productivity (1.85 flight-hours per ATCO-hour, some +77% above the average in Cluster 2). Factors that could explain Maastricht's higher productivity (in particular advanced ATC systems and procedures) were detailed in p.128 of the ACE 2006 Benchmarking Report. Trend analysis over 2006-2010 suggests that the gap between the productivity of MUAC and the average value for the other ACCs in Cluster 2 has slightly increased (i.e. from +72% in 2006 to +77% in 2010).
- **Cluster 3a (ACCs with 7 sectors or more and serving airspace with relatively low complexity)** has an average productivity of 1.04 flight-hour per ATCO-hour. Within this cluster, Warszawa has significantly higher productivity (2.2 flight-hours per ATCO-hour). It should also be noted that within this cluster Marseille and Bordeaux have the highest overall complexity, and Canarias, Shannon and Kyiv the lowest.
- **Cluster 3b (ACCs with less than 7 sectors serving airspace with relatively low complexity)** has an average productivity of 0.80 flight-hour per ATCO-hour. While Yerevan and Chisinau show the lowest productivity, they also have among the lowest overall complexity.

ATCO-hour productivity is affected by a number of factors, including:

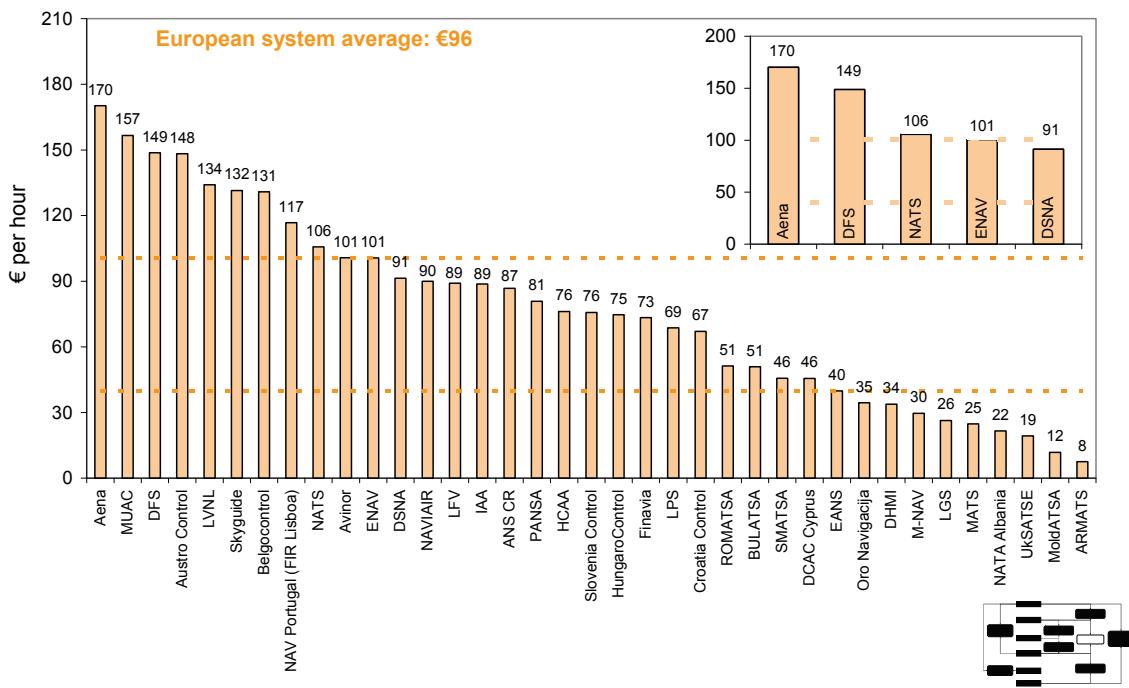
- Advanced ATM systems, tools and procedures, with increased ATM system functionality and reliability, allowing greater ATCOs confidence in using them.
- Flexible deployment of operational staff to meet demand through the optimisation of roster cycles and the use of overtime. Manning per sector and rating policies have an impact on the flexibility to change the sector configuration and to adapt to changes in operational conditions.
- Operational concepts and processes affecting the airspace and sector designs, the ASM, ATFM and ATFCM processes and the civil/military arrangements.
- Adequate combination of technical, human and managerial tools such as training, and willingness to work flexibly.
- Enhancement of the cooperation with other ANSPs to achieve synergies (e.g. cross border sectorization and rating).

It is generally considered that SES tools such as FABs, the Network Manager, the performance scheme and the technological pillar (SESAR) should contribute to increase ATCO productivity by a significant factor while ensuring safety standards.

Changes over time in ATCO-hour productivity for the European system and for individual ANSPs level are described in Section 5.3 and further analysis of relationship between productivity and quality of service is provided in Chapter 8.

#### **4.4.2 ATCO employment costs per ATCO-hour (2010)**

The average unit ATCO employment costs in the European system amount to €96 per ATCO-hour. Figure 4.9 shows the values for this indicator for all the ANSPs.



**Figure 4.9: ATCO employment costs per ATCO-hour (gate-to-gate), 2010**

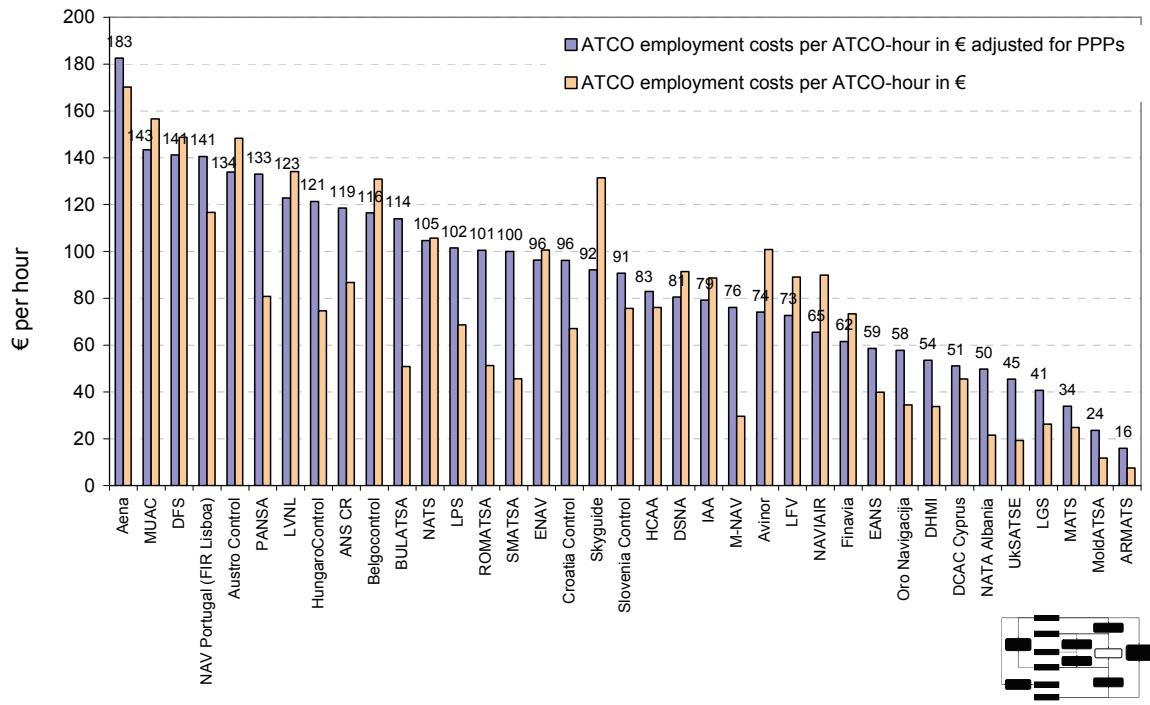
There is a wide range of ATCO-hour employment costs across ANSPs, which is not surprising given the heterogeneity in the social and economic environments across Europe.

For Aena, ATCO employment costs per ATCO-hour fell by -13% in real terms, between 2009 and 2010, mainly due to the application of Law 9/2010, which rose the number of contractual working hours and significantly limited the use of overtime. Despite this significant improvement, Aena ATCO employment costs per ATCO-hour remain some 57% higher than the average of the other four largest ANSPs.

A major exogenous factor that underlies differences in unit employment costs is the difference in prevailing market wage rates in the national economies in general. This is also associated with differences in the cost of living (see discussion in Chapter 3). To assess the influence of these exogenous differences, employment costs per ATCO-hour have been examined in the context of Purchasing Power Parity (PPP). There are some limitations<sup>58</sup> inherent to the use of PPPs and for this reason the ACE data analysis does not put a significant weight on results obtained with PPPs adjustments.

Figure 4.10 below shows the ATCO employment costs per ATCO-hour both **before** and **after** adjustment for PPP. The adjustment reduces the dispersion of this indicator. After PPP adjustment, the average unit employment costs per ATCO-hour amounts to €101 (compared to €96 without adjustment). For many Central and Eastern European ANSPs (PANSA, HungaroControl, ANS CR, BULATSA, LPS, SMATSA, Croatia Control and ROMATSA) the PPP adjustment brings the unit employment costs close to those in Western Europe.

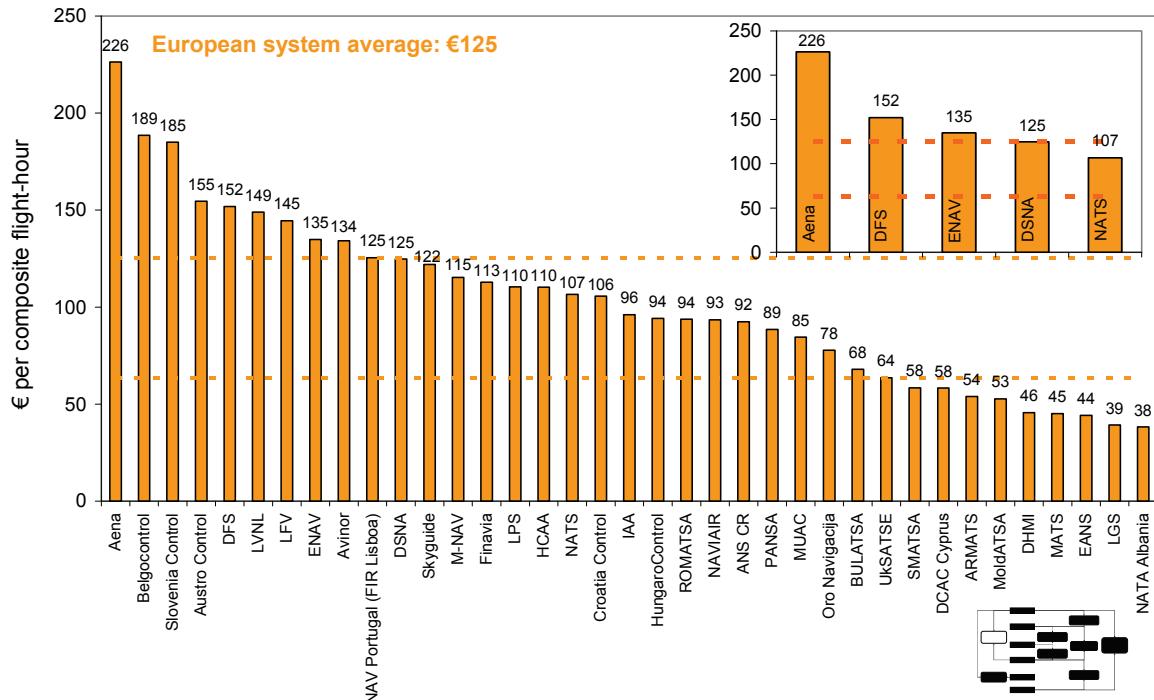
<sup>58</sup> For instance, it is possible that, for a given country, the cost of living in regions where the ANSP headquarter and other main buildings (e.g. ACCs) are located is higher than the average value computed at national level.



**Figure 4.10: Employment costs per ATCO-hour with and without PPPs, 2010**

#### 4.4.3 ATCO employment costs per composite flight-hour (2010)

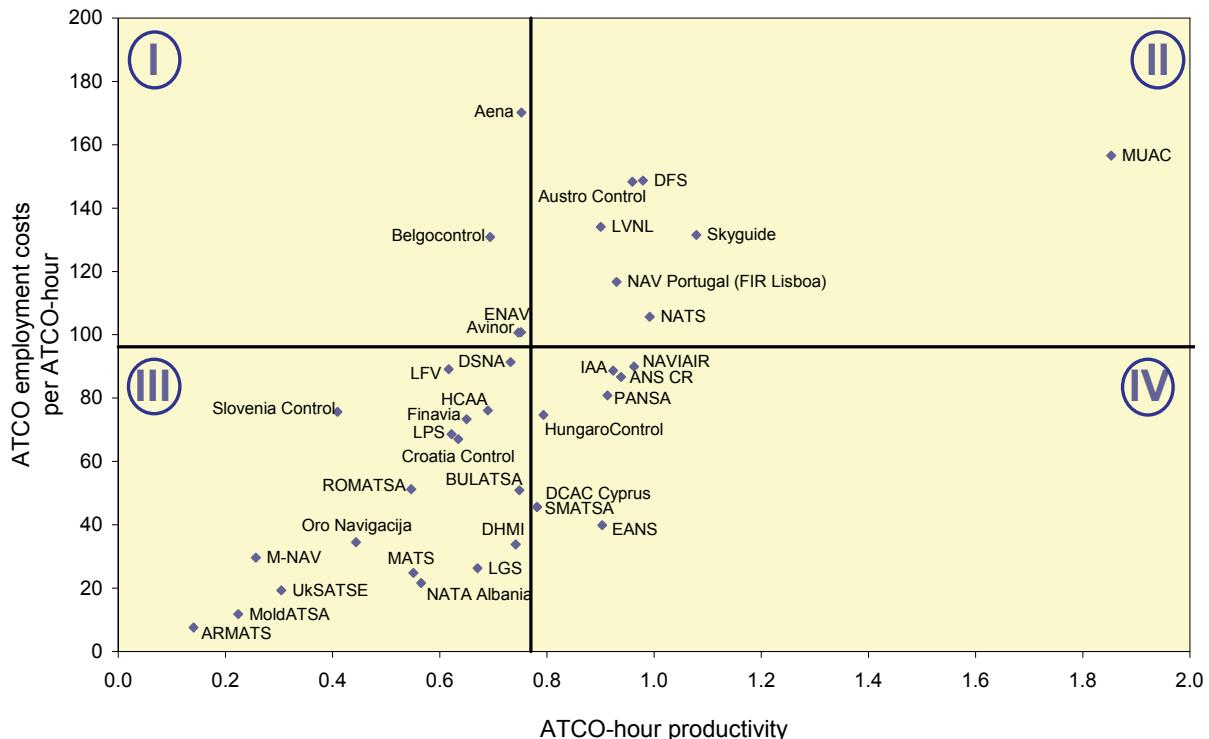
The ATCO employment costs per composite flight-hour result from the combination of the previous two components: ATCO-hour productivity and employment costs per ATCO-hour. All other things being equal, lower ATCO employment costs per unit output will contribute to greater financial cost-effectiveness. This indicator is displayed in Figure 4.11.



**Figure 4.11: ATCO employment costs per composite flight-hour, 2010**

In order to provide an insight into the relationship between ATCO-hour productivity and employment costs, Figure 4.12 below presents the ANSPs classified in four quadrants

according to their level of ATCO productivity and employment costs. The quadrants are established on the basis of the European average values for these two metrics.



**Figure 4.12: Components of ATCO employment costs per unit of output, 2010**

An ANSP may have high ATCO employment costs per ATCO-hour but if its ATCOs are highly productive then it will have lower employment costs per composite flight-hour. This is the case for the ANSPs in the top right (Quadrant II) of Figure 4.12 such as MUAC and to a lower extent Skyguide, which shows ATCO employment costs per ATCO-hour above the European average but ATCO employment costs per composite flight-hour below the European average (see also Figure 4.11 above).

Aena, and to a lesser extent Belgocontrol (Quadrant I) combine higher ATCO employment costs with lower ATCO productivity, resulting in high ATCO employment costs per unit of output (see also Figure 4.11 above).

Some ANSPs such as ANS CR (Quadrant IV) have both higher ATCO-hour productivity and lower ATCO employment costs per ATCO-hour (without PPP adjustment).

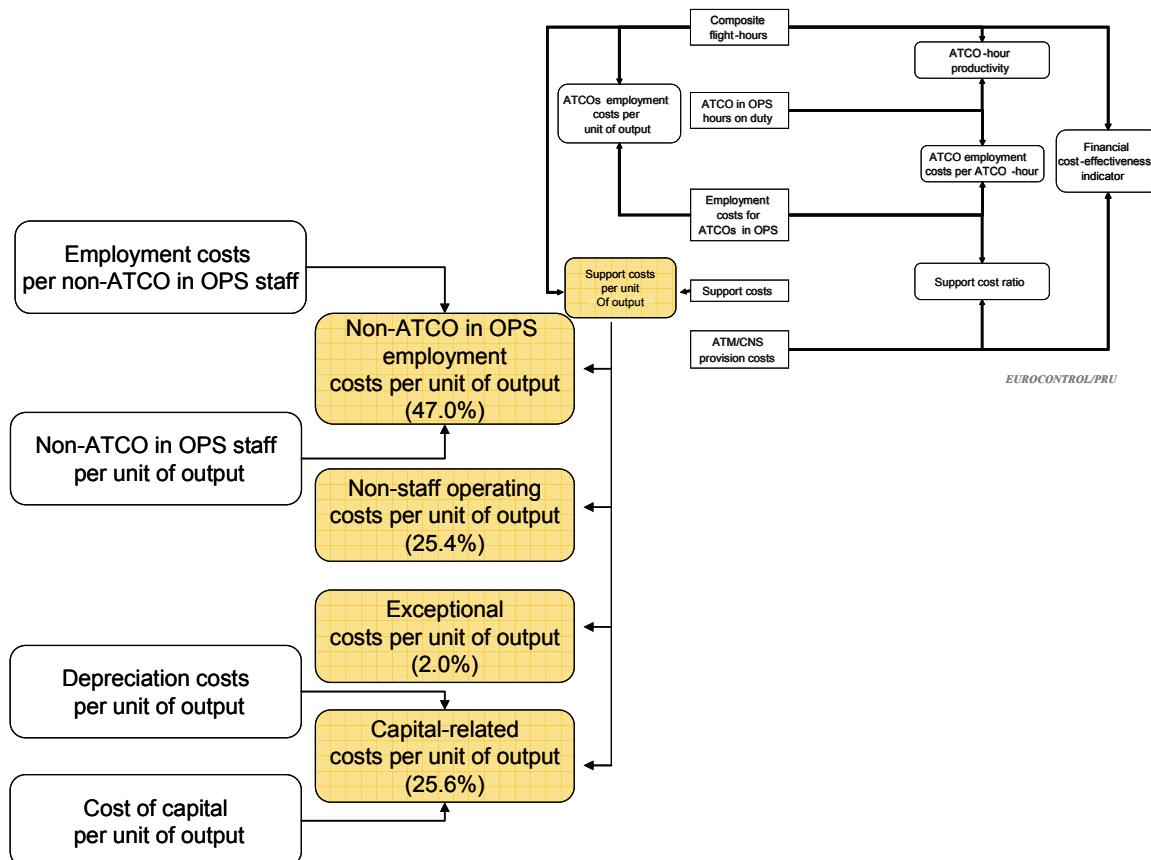
Finally, ANSPs such as ARMATS, MoldATSA, M-NAV and UKSATSE (Quadrant III) show both lower ATCO-hour productivity and lower ATCO employment costs per ATCO-hour.

#### 4.4.4 Support costs per composite flight-hour (2010)

Support costs amount to 70% of total ATM/CNS provision costs. Effective management of these costs, especially in a context of traffic increases, would have a major impact on cost-effectiveness. It is therefore important to understand the components of support costs, and what might drive changes in them. A study of ATM/CNS fragmentation throughout Europe suggested that fragmentation contributed to higher support costs<sup>59</sup>. Therefore, reducing the current level of fragmentation (e.g. joint procurement and rationalisation of investments within FABs) has the potential to decrease support costs and improve cost-effectiveness. For

<sup>59</sup> The impact of fragmentation in European ATM/CNS, Report commissioned by the EUROCONTROL PRC, April 2006. The report is available on the PRC website: ([http://www.eurocontrol.int/prc/public/standard\\_page/doc\\_other\\_reports.html](http://www.eurocontrol.int/prc/public/standard_page/doc_other_reports.html)).

the purposes of analysing differences in support costs, the part of the framework presented in Section 4.3 which is relating to support costs is further developed in Figure 4.13 below.

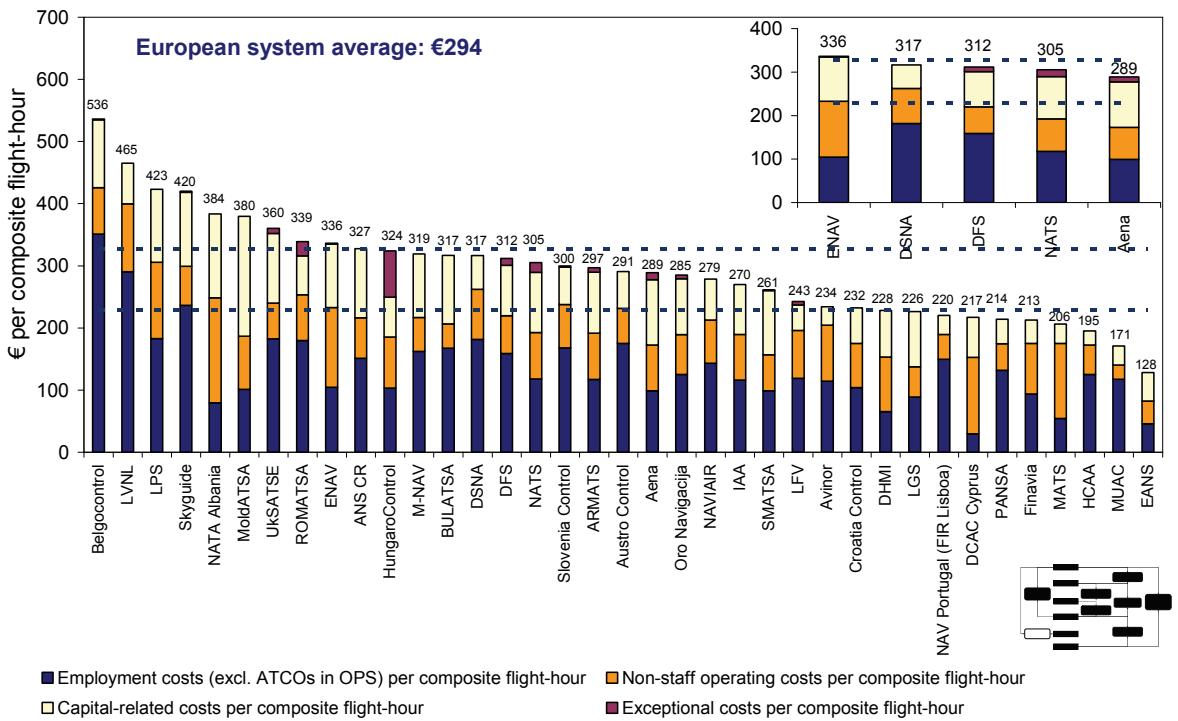


**Figure 4.13: Framework for support costs analysis (2010)**

As shown in Figure 4.13 support costs can be broken down into four separate components that provide further insight into the nature of support costs:

- **employment costs for non-ATCO in OPS staff**; these cover ATCOs on other duties, trainees, technical support and administrative staff (47.0% of support costs);
- **non-staff operating costs** mostly comprise expenses for energy, communications, contracted services, rentals, insurance, and taxes (25.4% of support costs);
- **exceptional costs** (2.0% of support costs); and,
- **capital-related costs**, comprising depreciation and financing costs for the capital employed (25.6% of support costs).

At system level, employment costs for staff other than ATCOs in OPS account for 47% of total support costs. In the context of planning processes and contract renegotiation for support staff, it is important for ANSPs to monitor this indicator and to set quantitative objectives in terms of employment costs per unit of output.



**Figure 4.14: Support costs per composite flight-hour<sup>60</sup>, 2010**

The European average support cost per composite flight-hour is €294. Figure 4.14 shows that:

- The level of unit support costs varies significantly across ANSPs – a factor greater than four between Belgocontrol and EANS; and,
- There are important differences in the composition of support costs. In some instances this might indicate the substitution which can take place through the contracting out of support functions.

The choice between providing some important operational support functions internally or externally has clearly an impact on the proportion of support costs that is classified as employment costs, non-staff operating costs, or capital-related costs. This is particularly the case for the five largest ANSPs. ENAV outsources the maintenance of ATM systems and the corresponding costs are comprised in the non-staff operating costs<sup>61</sup>. For Aena, DSNA, DFS and NATS some activities are carried out by internal staff and the relating costs appear as employment costs or as capital-related costs when, according to IFRS, the employment costs of staff working on research and development projects can be capitalised in the balance-sheet.

### Non-ATCO in OPS employment costs per composite flight-hour

Like ATCO in OPS employment costs, employment costs for the support staff are also affected by the cost of living<sup>62</sup>. Using the same methodology as in Figure 4.10, Figure 4.15

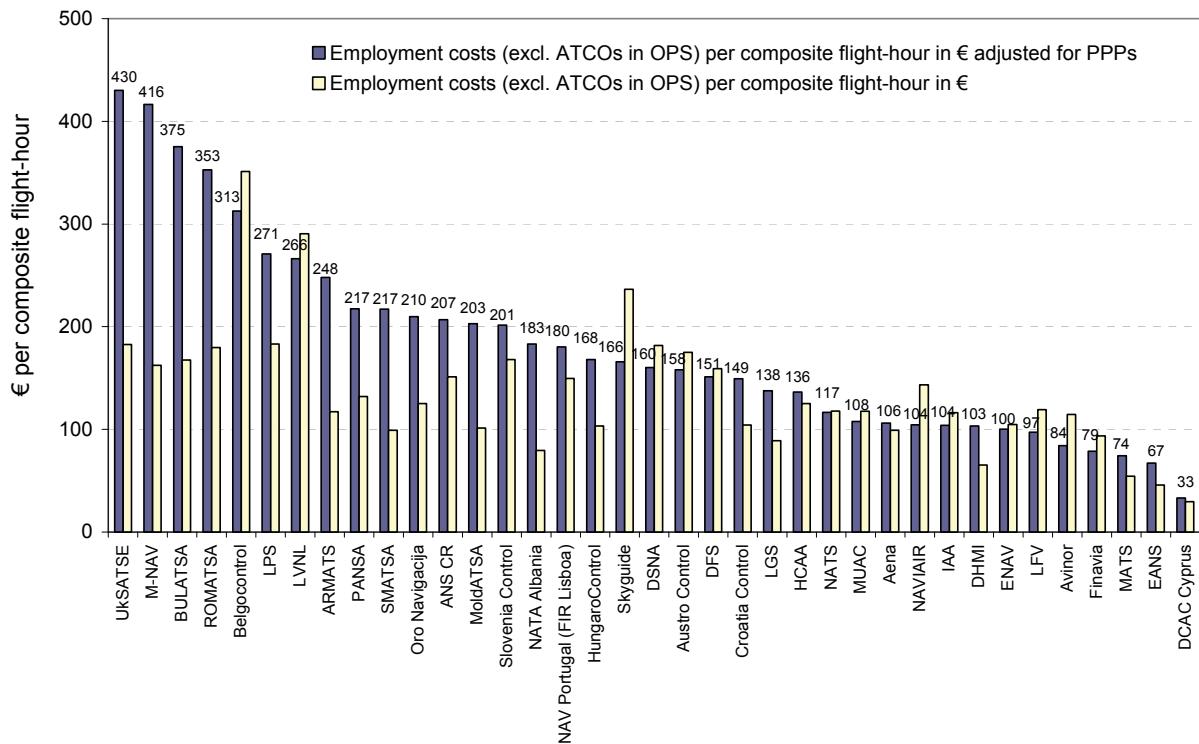
<sup>60</sup> It should be noted that, although Oro Navigacija and ANS CR reported the cost of capital in their ACE 2010 data submission, these costs were not charged to airspace users (for both en-route and terminal ANS for Oro Navigacija and for terminal ANS for ANS CR).

<sup>61</sup> A non negligible part of ENAV non-staff operating costs (some 21% or €37.8M) relates to ATC services provided by the Italian Air Force mainly at regional civil/military airports. It should also be noted that ENAV en-route and terminal depreciation costs are netted-off by revenues (some €13M in 2010) arising from a public funding mechanism whose objective is the economic development of the Southern regions of Italy in the context of the Cohesion Policy of the European Union.

<sup>62</sup> There may also be an impact on non-staff operating costs if support functions have been outsourced, particularly if outsourced staff are paid in local currency. However, this relationship is less clear and for the purposes of this analysis, the focus is on employment costs.

shows the impact of adjusting the non-ATCO in OPS employment costs per composite flight-hour for PPPs. It is noteworthy that Aena average unit employment costs for support staff lies close to the bottom quartile which significantly contrasts with the ATCO unit employment costs (see Figure 4.10).

After PPP adjustment, the average unit employment cost for support staff per composite flight-hour amounts to €151 (compared to €138 without adjustment). Figure 4.15 shows that after adjusting for PPPs, the unit employment costs of many Central and Eastern European ANSPs are higher than to those in Western Europe.

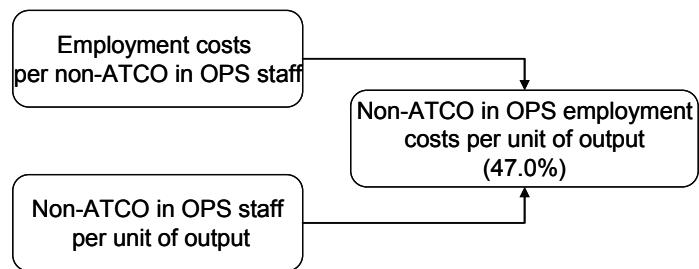


**Figure 4.15: Non-ATCO in OPS employment costs with and without adjustment for PPPs, 2010**

As economic conditions, both cost of living and general wage levels, are converging across Europe, there is a clear upward pressure on employment costs for these ANSPs. In order to sustain the current level of staffing and associated employment costs, it will be of great importance to effectively manage non-ATCO in OPS employment costs.

As shown in Figure 4.16, which comprises an extract of the framework presented in Figure 4.13, non-ATCO in OPS employment costs per composite flight-hour can be broken down into two indicators:

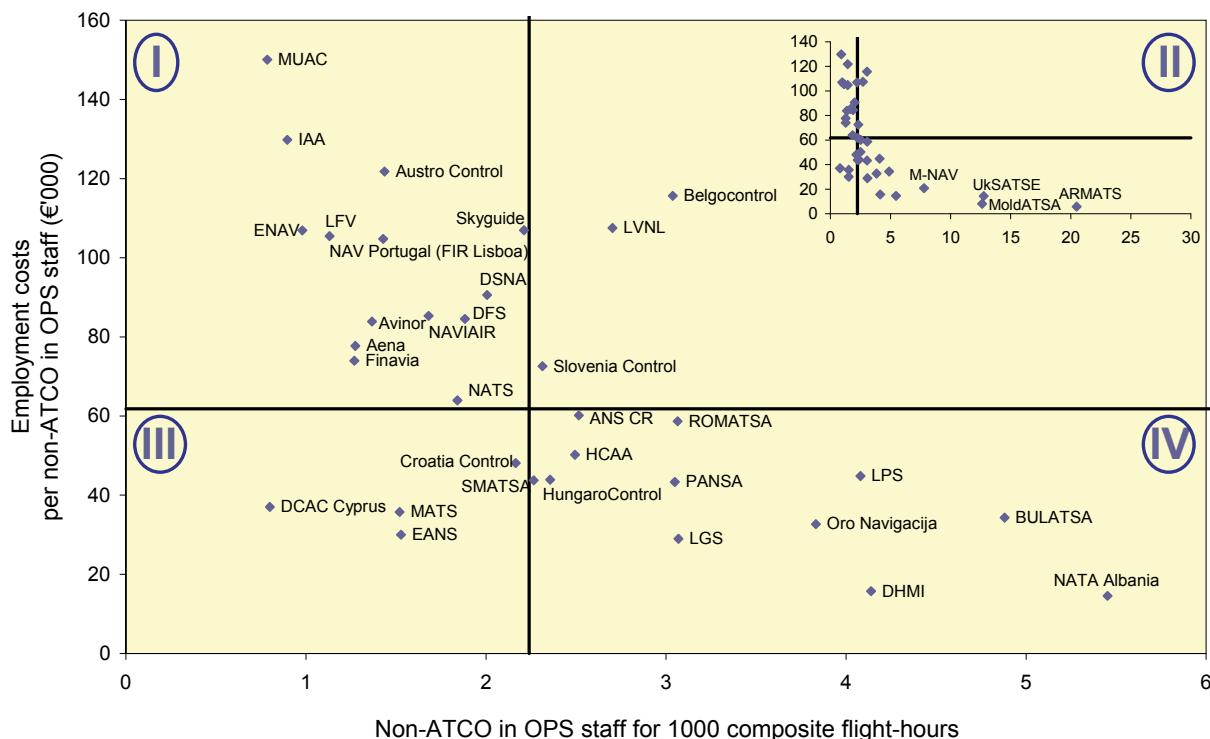
- (1) the employment costs per non-ATCO in OPS staff; and,
- (2) the number of non-ATCO in OPS staff required by unit of output.



**Figure 4.16: Breakdown of non-ATCO in OPS employment costs**

In order to provide an insight into the relationship of these two indicators, Figure 4.17 below presents the ANSPs classified in four quadrants according to their level of employment costs per non-ATCO in OPS staff and the number of non-ATCO in OPS staff required per composite flight-hour.

In Figure 4.17, the quadrants are determined by the European averages i.e. some 62 €'000 for the employment costs per non ATCO-staff, and 2.2 non-ATCO staff for 1000 composite flight-hours.



**Figure 4.17: Employment costs per non-ATCO in OPS staff and support staff per unit of output, 2010<sup>63</sup>**

An ANSP may have high employment costs for support staff but if a low number of support staff is required per unit of output it will have lower support staff employment costs per composite flight-hour. This is the case for the ANSPs in the top left of Figure 4.17 such as MUAC and IAA (Quadrant I).

Belgocontrol and LVNL (Quadrant II) combine relatively high unit employment costs for support staff with a relatively high number of support staff per composite flight-hour, resulting in high support staff costs per unit of output (see also Figure 4.15 above).

DCAC Cyprus and MATS (Quadrant III) have lower unit employment costs for support staff and a low number of support staff per composite flight-hour.

Finally, for ANSPs such as NATA Albania, BULATSA, DHMI, LPS and Oro Navigacija (Quadrant IV) lower unit employment costs for support staff are combined with a higher number of support staff per unit of output.

Figure 4.17 indicates that there is no clear-cut relationship between these two indicators. However, ANSPs where the unit employment costs for support staff are lower tend to have a larger number of support staff per unit of output. This is particularly the case for four ANSPs, ARMATS, M-NAV, MoldATSA and UkSATSE. These ANSPs are shown in the miniature replica which is inserted in Figure 4.17 (see top-right corner). For these ANSPs, the large numbers of support staff per unit of output are the main driver for the relatively high non-ATCO in OPS employment costs shown in Figure 4.15.

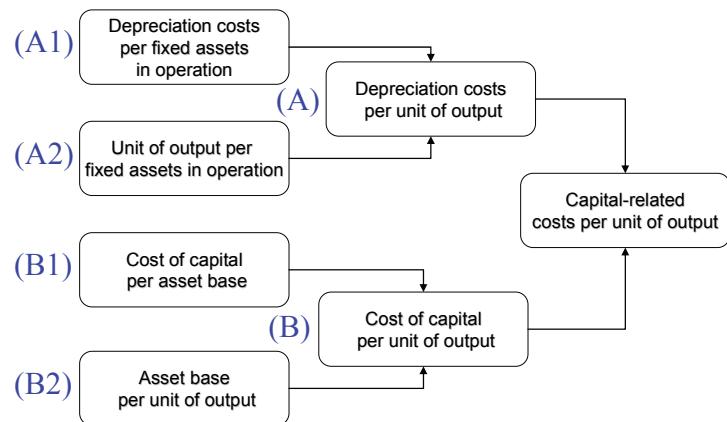
<sup>63</sup> As explained in Section 2.5, MET costs are not included in the ACE benchmarking analysis. Therefore to ensure consistency, for those ANSPs where MET services are provided internally, MET staff are deducted from the total support staff reported in Figure 4.17.

In some cases, a low number of support staff per unit of output might be associated with an ANSP involved in airport management activities (e.g. Aena until 2011 and LFV until April 2010) illustrating potential staff allocation issues. It can also reflect the fact that maintenance activities are outsourced (e.g. ENAV). For this reason, support staff employment costs should not be treated separately but analysed along with the other components of support costs (i.e. non-staff operating costs and capital-related costs).

### Capital-related costs per composite flight-hour

A further component of support cost which shows an important variation between ANSPs is the capital-related costs.

As shown in Figure 4.18 capital-related costs can be further broken down into depreciation costs per unit of output and cost of capital per unit of output.



**Figure 4.18: Breakdown of capital-related costs**

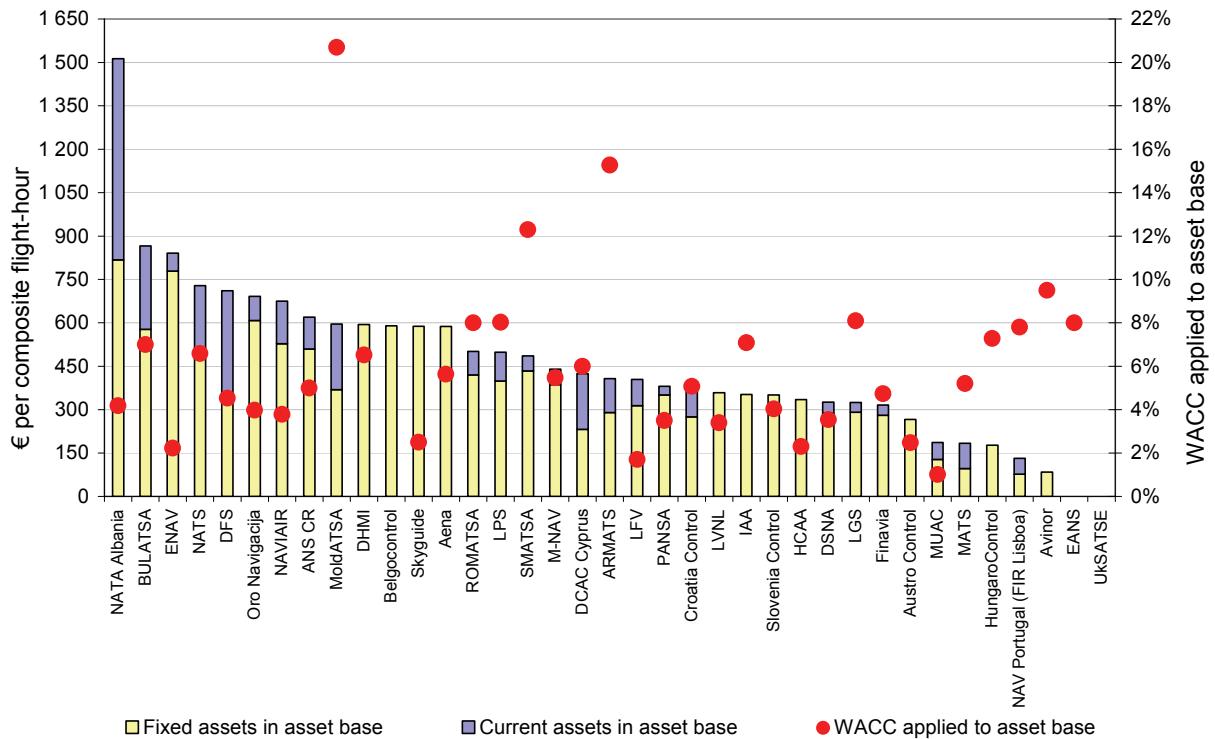
**Depreciation costs per unit of output (A)** is the relationship between the **average depreciation rate of fixed assets** (see A1) with the **productivity of fixed assets** (see A2).

**Cost of capital per unit of output (B)** is the relationship between the **average rate of return** (see B1) with a measure of **capital intensity** (see B2).

These two factors are examined in Figure 4.19. The bar, measured on the left-hand scale, shows the asset base to which the cost of capital is applied, divided by the composite flight-hours, to give a fair comparison across ANSPs. At a minimum, the asset base should comprise fixed assets that are employed to provide ATC services (the yellow bar in the diagram). It is also reasonable to include some current assets which are shown as the blue bar. The sum of these two quantities (fixed assets and current assets) is the asset base to which an average rate<sup>64</sup> (see red dots) is applied to calculate the cost of capital<sup>65</sup>. ANSPs are ranked by their ratio of asset base per composite flight-hour.

<sup>64</sup> Commonly referred to the Weighted Average Cost of Capital (WACC).

<sup>65</sup> The information provided in Figure 4.19 relates to the assumptions used to compute an economic cost of capital for the purposes of the ACE Benchmarking analysis. This may differ from the cost of capital that is part of the cost-base **charged** to airspace users, for terminal ANS. See footnote 60.



**Figure 4.19: Asset bases and average WACCs used to compute the cost of capital, 2010**

Figure 4.19 shows that out of the 34 ANSPs reporting complete data on the calculation of the cost of capital, eight calculated a cost of capital based only on the value of fixed assets. The remaining 26 ANSPs included current assets which in some cases represent a significant proportion of the asset base.

WACCs used to calculate the cost of capital are mostly in the range of 2-8% per year. Figure 4.19 indicates that the rates for MoldATSA, ARMATS and SMATSA are over 10% (20.7%, 15.3% and 12.3%, respectively). These higher (nominal) rates shall be seen in the light of the higher inflation in these countries (6-10% in 2010). On the other hand, some of the WACCs reported in Figure 4.19 appear high considering the low-risk nature of the ANS activity in a context of full-cost recovery for en-route ANS.

Both the magnitude of the asset base and the level of the WACCs (and in particular the return on equity) would require further analysis in order to better understand the differences reported in Figure 4.19.

#### 4.5 Performance ratios (2010)

Table 4.1 summarises the relationship between the three multiplicative components of financial cost-effectiveness (ATCO-hour productivity, employment costs per ATCO-hour and support cost ratio) and the two complementary components (ATCO employment costs per composite flight-hour and the support cost per composite flight-hour), described in Section 4.4. To facilitate the interpretation of the results, the concept of the “performance ratio” has been introduced.

The **performance ratios** represent the relationship between the value for an ANSP of an indicator and the value of that indicator for the European system as a whole. Performance ratios are defined such that a value **greater than one** implies a performance **better** than the European average, in terms of the positive contribution it makes to cost effectiveness. An ANSP with the **same** performance as the European system will have a performance ratio of **one**.

ANSPs	Country	Financial cost-effectiveness KPI indexes*	Performance ratios			ATCO employment costs per composite flight-hour*	Support costs per composite flight-hour*
			ATCO-hour productivity	ATCO employment costs per ATCO-hour*	Support cost ratio*		
Aena	ES	0.81	0.98	0.57	1.48	0.55	1.02
ANS CR	CZ	1.00	1.22	1.11	0.74	1.35	0.90
ARMATS	AM	1.20	0.18	12.72	0.52	2.32	0.99
Austro Control	AT	0.94	1.25	0.65	1.17	0.81	1.01
Avinor	NO	1.14	0.98	0.95	1.22	0.93	1.26
Belgocontrol	BE	0.58	0.90	0.73	0.87	0.66	0.55
BULATSA	BG	1.09	0.97	1.89	0.59	1.84	0.93
Croatia Control	HR	1.24	0.82	1.43	1.05	1.18	1.27
DCAC Cyprus	CY	1.52	1.01	2.11	0.71	2.14	1.36
DFS	DE	0.90	1.27	0.65	1.10	0.82	0.94
DHMI	TR	1.53	0.96	2.85	0.56	2.74	1.29
DSNA	FR	0.95	0.95	1.05	0.95	1.00	0.93
EANS	EE	2.43	1.17	2.41	0.86	2.83	2.29
ENAV	IT	0.89	0.97	0.96	0.96	0.93	0.88
Finavia	FI	1.29	0.84	1.31	1.16	1.11	1.38
HCAA	GR	1.37	0.90	1.26	1.21	1.13	1.51
HungaroControl	HU	1.00	1.03	1.29	0.76	1.33	0.91
IAA	IE	1.15	1.20	1.08	0.88	1.30	1.09
LFV	SE	1.08	0.80	1.08	1.25	0.86	1.21
LGS	LV	1.58	0.87	3.66	0.50	3.19	1.30
LPS	SK	0.79	0.81	1.40	0.69	1.13	0.70
LVNL	NL	0.68	1.17	0.72	0.81	0.84	0.63
MATS	MT	1.67	0.71	3.88	0.60	2.77	1.43
M-NAV	MK	0.97	0.33	3.25	0.89	1.08	0.92
MoldATSA	MD	0.97	0.29	8.16	0.41	2.37	0.78
MUAC		1.64	2.41	0.61	1.11	1.48	1.72
NATA Albania	AL	0.99	0.73	4.45	0.30	3.27	0.77
NATS	UK	1.02	1.29	0.91	0.87	1.17	0.96
NAV Portugal (FIR Lisboa)	PT	1.21	1.21	0.82	1.22	1.00	1.34
NAVI AIR	DK	1.13	1.25	1.07	0.84	1.34	1.06
Oro Navigacija	LT	1.16	0.58	2.79	0.72	1.61	1.03
PANSA	PL	1.39	1.19	1.19	0.98	1.41	1.38
ROMATSA	RO	0.97	0.71	1.88	0.73	1.33	0.87
Skyguide	CH	0.77	1.40	0.73	0.76	1.02	0.70
Slovenia Control	SI	0.86	0.53	1.27	1.28	0.68	0.98
SMATSA	RS/ME	1.31	1.01	2.11	0.61	2.14	1.13
UkSATSE	UA	0.99	0.39	4.98	0.50	1.97	0.82
Total European System		1.00	1.00	1.00	1.00	1.00	1.00

**Table 4.1: The components of gate-to-gate cost-effectiveness, 2010<sup>66</sup>**

In Table 4.1 ANSPs for which a given component makes a particularly positive contribution to its cost-effectiveness (more than 1.30) are highlighted in green – those where a given component makes a particularly low contribution (less than 1/1.30) are in orange.

Some ANSPs more than make up for a relatively low contribution from one component by a relatively high contribution from another and, as a result, are more cost-effective than the average (cost-effectiveness index greater than 1).

On the left-hand-side the three ratios are multiplicative; the product of the ratios for each of the components equals the performance ratio for overall financial cost-effectiveness (see financial cost-effectiveness index in Table 4.1). The following example for ANS CR illustrates the interpretation of the performance ratios:

<sup>66</sup> For the ATCO employment costs per ATCO-hour, the support costs ratio, the ATCO employment costs per composite flight-hour and the support costs per composite flight-hour (asterisked in Table 4.1), the inverse ratio is used, since **higher** unit employment costs and **higher** support costs imply **lower** cost-effectiveness.

1.00	ANS CR's gate-to-gate <b>ATM/CNS costs per composite flight-hour</b> are <b>in line with</b> (1/1.00 - 1) with the European average.
$= 1.22$	Its <b>ATCO-hour productivity</b> is <b>+22% higher</b> than the European average, and the <b>ATCO employment costs per ATCO-hour</b> of ANS CR are <b>-10% lower</b> (1/1.11 - 1) than the sample average.
$\times 1.11$	
$\times 0.74$	<b>This is outweighed by a higher support cost ratio</b> , which is <b>+35% higher</b> (1/0.74 - 1) than the sample average.

On the right-hand-side, the two complementary performance ratios are normalised using the European average (note that these ratios are neither multiplicative nor additive):

1.35	ANS CR's <b>ATCOs in OPS employment costs per composite flight-hour</b> are <b>-26% lower</b> (1/1.35 - 1) than the European average, while
0.90	the <b>support costs per composite flight-hour</b> are <b>+11% higher</b> (1/0.90 - 1) than the sample average.

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## 5 CHANGES IN FINANCIAL COST-EFFECTIVENESS (2006-2010)

### 5.1 Introduction

This chapter examines the changes in financial cost-effectiveness between 2006 and 2010, both for the European system level and for individual ANSPs. The indicators presented in this chapter will not be directly comparable to those in individual ACE reports (including this one), for the following reasons:

- The sample of ANSPs must be consistent; this has to be the 36 which disclosed consistent information over the period<sup>67</sup>;
- The financial figures in previous years' calculations have been restated in 2010 prices and 2010 exchange rates in order to ensure consistency in time series comparison. At European system level for the period 2006-2010, price indexes increased by +9.3% (i.e. some +2.2% per annum)<sup>68</sup>;
- As part of the experience and understanding gained from the last data validation process, the PRU has made some data adjustments in order to ensure comparability over time. These adjustments have been made in a fully transparent way with the cooperation of the participating ANSPs.

The main objective of this Chapter is to look at the medium term developments in financial cost-effectiveness for 2006-2010 at European system level and at ANSP level. A five year period forms a solid basis to derive medium term trends.

The period 2006-2010 was rich in changes and analysing the overall variation in cost-effectiveness cannot be done meaningfully without considering the main events characterising this period. Traffic was rising fast in 2007 (+5.8%) and continued to rise modestly in 2008 (+1.5%) reflecting the early impacts of the financial crisis in 2008. In 2009 the economic situation further deteriorated in Europe and the traffic controlled by ANSPs fell by an unprecedented -6.7%. In 2010, traffic rose by +2.1% to reach a level which is only +2.2% above that of 2006.

At European system level, traffic rose by +2.1% in 2010, but this overall growth masks a contrasted situation across the various ANSPs, as illustrated in Figure 5.1.

The year 2010 was also marked by a volcanic eruption in Iceland which created severe traffic disruptions across Europe. Although all ANSPs had to introduce specific measures, ANSPs operating on the southern border of Europe (NAV Portugal, Aena, MATS, DCAC Cyprus, HCAA and DHMI) were much less impacted by the volcanic ash crisis than other ANSPs.

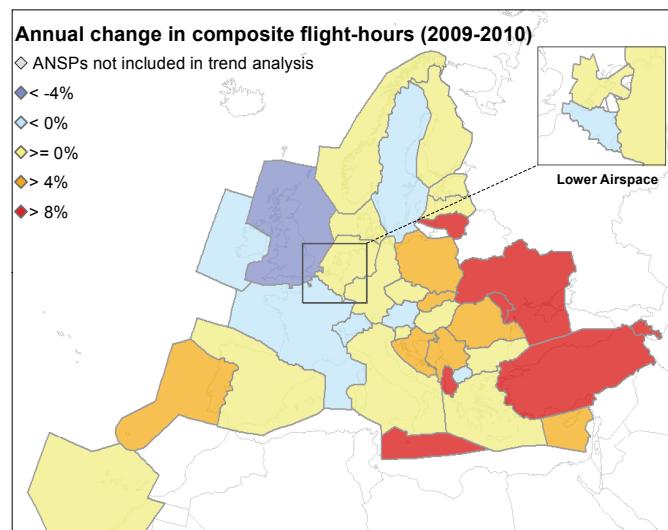


Figure 5.1: Annual change in composite flight-hours between 2009 and 2010

<sup>67</sup> This is not a serious limitation. Only ARMATS is omitted from the historical analysis since it did not start disclosing information until after the start of the period. The ANSPs included in this analysis comprise 99.9% of the 2010 sample in terms of output (composite flight-hours).

<sup>68</sup> Source: Inflation rates (average consumer prices) from IMF database available at <http://www.imf.org/external/pubs/ft/weo/2011/02/weodata/index.aspx>.

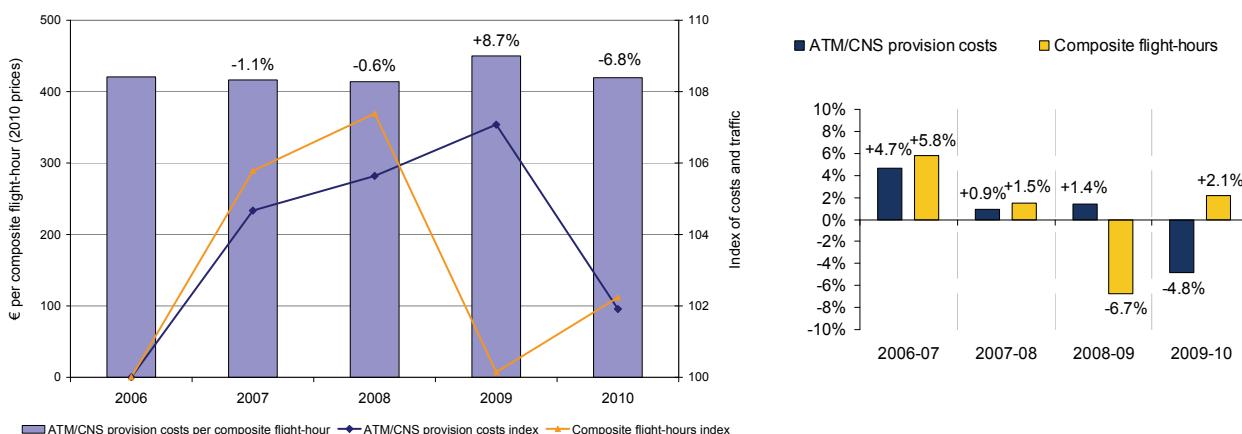
Figure 5.1 also shows that while 29 ANSPs recorded traffic increases in 2010, the number of composite flight-hours decreased for eight ANSPs, including NATS and DSNA. The highest traffic increases are observed for ANSPs operating in Eastern Europe.

## 5.2 Medium term changes in financial cost-effectiveness (2006-2010)

### 5.2.1 Changes at European system level (2006-2010)

Figure 5.2 shows how the financial cost-effectiveness indicator has changed over time for Europe as a whole. The blue bars show the ATM/CNS provision costs per composite flight-hour, with all years expressed in the same price base (€2010), with the scale on the left-hand axis. To show how the indicator is driven by changes in traffic and costs, indexes of those variables are plotted as the orange and dark blue lines, respectively, with the scale on the right-hand axis.

At European system level, unit ATM/CNS provision costs remained fairly constant between 2006 and 2010<sup>69</sup> (-0.3% in real terms over the period or an annual average of -0.1%). Figure 5.2 indicates that, after two years of moderate reduction (-1.1% in 2007 and -0.6% in 2008) and a staggering increase in 2009 (+8.7%), unit ATM/CNS provision costs significantly fell in 2010 (-6.8%). As indicated on the right-hand side of Figure 5.2, the cost-effectiveness improvement in 2010 results from a combination of a decrease in ATM/CNS provision costs (-4.8%) and an increase in traffic volumes (+2.1%).



**Figure 5.2: Changes in financial cost-effectiveness KPI (2006-2010, real terms)**

This is an important result which indicates that the cost-containment measures implemented by several European ANSPs generated genuine cost savings which led to a decrease of ATM/CNS provision costs in 2010. It should be emphasised that total ATM/CNS provision costs never declined during the decade, even after the traffic downturn in the wake of the September 11 terrorist attacks and the outbreak of SARS<sup>70</sup> in 2002.

### 5.2.2 Changes at ANSP level (2006-2010)

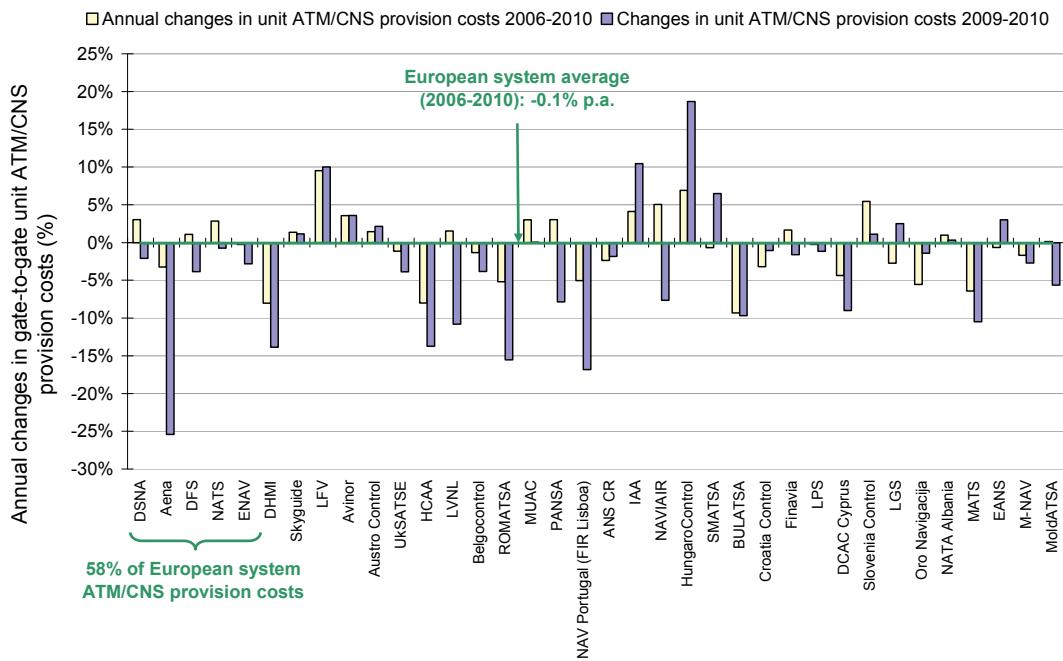
Figure 5.3 shows the annual changes in unit ATM/CNS provision costs for each ANSP, between 2006 and 2010 (yellow bars) and between 2009 and 2010 (blue bars).

Between 2006 and 2010, unit costs fell for 19 out of 36 ANSPs. Among the five largest ANSPs, unit costs fell in real terms for Aena (-3.2% p.a.) and ENAV (-0.2% p.a.) between

<sup>69</sup> It should be noted that in nominal terms, unit ATM/CNS provision costs increased by some +11% between 2006 and 2010, given that at European system level, price indexes increased by +9.3%.

<sup>70</sup> Severe acute respiratory syndrome.

2006 and 2010. On the other hand, during this period unit costs rose for DSNA (+3.0% p.a.), DFS (+1.1% p.a.) and NATS (+2.9% p.a.).



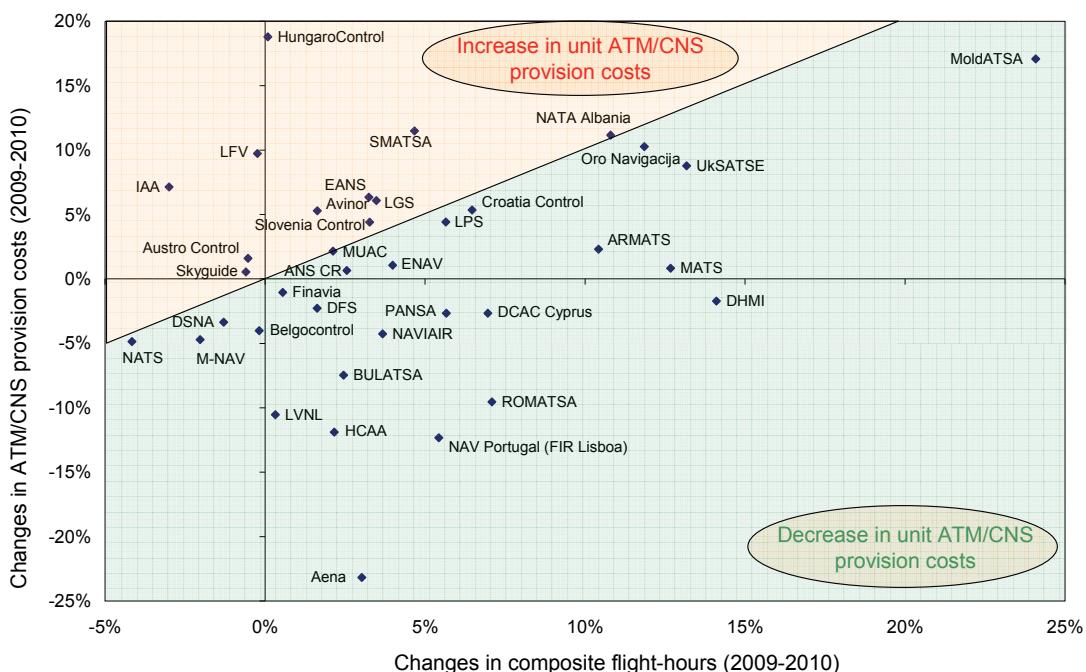
**Figure 5.3: Annual changes in gate-to-gate ATM/CNS provision costs per composite flight-hour, 2006-2010 (real terms)**

Figure 5.3 also shows that between 2009 and 2010 (see blue bars) unit costs fell for 24 ANSPs out of 36. Significant reductions (greater than 10%) are observed for seven ANSPs (Aena (-25%), NAV Portugal (-17%), ROMATSA (-16%), DHMI (-14%), HCAA (-14%), LVNL (-11%) and MATS (-11%)).

- For DHMI and ROMATSA, the reduction in ATM/CNS provision costs was exacerbated by a substantial increase in traffic volumes (+14.1% and +7.1%, respectively). Similarly, while in Malta the number of composite flight-hours increased by +12.7% in 2010, MATS could keep its ATM/CNS provision costs fairly constant (+0.8%).
- As already mentioned in Chapter 4, the significant reduction in Aena 2010 gate-to-gate ATM/CNS provision costs mainly results from the implementation of a specific law (Law 9/2010), which introduced new working conditions and resulted in significantly lower ATCO employment costs.
- The -12.3% reduction in NAV Portugal 2010 ATM/CNS provision costs is mainly driven by (a) the cost-containment measures implemented by NAV Portugal (in line with the “Growing and Stability Programme” of the Portuguese Government), and (b) the fact that the 2009 en-route cost-base included exceptional costs relating to the depreciation of pension costs arising from a change in actuarial assumptions in 2005.
- LVNL ATM/CNS provision costs reduced by -10.5% in 2010. This significant decrease mainly reflects the fact that the 2009 cost-base included one-off exceptional costs associated with a staff reduction programme (reduction in the number of support staff of 128 FTEs by 2014 compared to 2008 (100 FTEs by end 2010 and a further 28 in 2014)).
- The substantial decrease in HCAA ATM/CNS provision costs (-11.9%) mainly reflects the implementation of an Economic Stability Programme in Greece which included, *inter alia*, reductions in the salaries of public administration employees in 2010.

A more detailed analysis of the changes in cost-effectiveness between 2009 and 2010, identifying the cost and the traffic effects is provided in Figure 5.4. This analysis builds on last year ACE Report findings which concluded that given short term rigidities to adjust costs

downwards and unavoidable lead time, it was likely that cost-containment measures implemented in 2009 would actually only have an impact on costs in 2010 and onwards.



**Figure 5.4: Changes in ATM/CNS provision costs and traffic volumes (2009-2010)**

Figure 5.4 shows that 16 ANSPs could reduce their ATM/CNS provision costs between 2009 and 2010 (see bottom part of the chart). At face value, this indicates for these ANSPs a certain degree of reactivity and would suggest that cost-containment measures have been implemented. For four ANSPs (Belgocontrol, M-NAV, NATS and DSNA) these reductions were sufficient to outweigh the decrease in traffic and to achieve reductions in unit costs in 2010.

Figure 5.4 also indicates that for 12 ANSPs (Avinor, Croatia Control, EANS, HungaroControl, IAA, LFV, LGS, MoldATSA, NATA Albania, Oro Navigacija, SMATSA and UKSATSE) ATM/CNS provision costs increased by more than +5% in 2010. For MoldATSA, NATA Albania, Oro Navigacija and UKSATSE, this increase should be seen in the light of a substantial rise in composite flight-hours (more than +10% in 2010).

All the five largest ANSPs could achieve a reduction in unit ATM/CNS provision costs in 2010 (Aena (-25%), ENAV (-2.8%), DFS (-3.8%), DSNA (-2.1%) and to a lower extent NATS (-0.7%)). For DSNA and NATS, these decreases should be seen in the light of a reduction in traffic volumes in 2010 (-1.3% and -4.2%, respectively). It should be noted that the decrease in DSNA unit ATM/CNS provision costs is affected by a change in data reporting. Indeed, in its 2010 data submission, DSNA separately identified the costs relating to irrecoverable VAT (i.e. some €40M) while these were reported as non-staff operating costs in previous years submissions. Without this change in reporting, DSNA 2010 unit ATM/CNS provision costs would have been slightly higher (+1.6%) than in 2009.

Another complementary analysis<sup>71</sup> to understand whether and where cost-containment measures have been implemented is to compare the actual 2010 ATM/CNS provision costs with the plans prepared in November 2008, that is when the impact of the financial crisis and economic downturn could not be reflected in ANSPs plans for 2010.

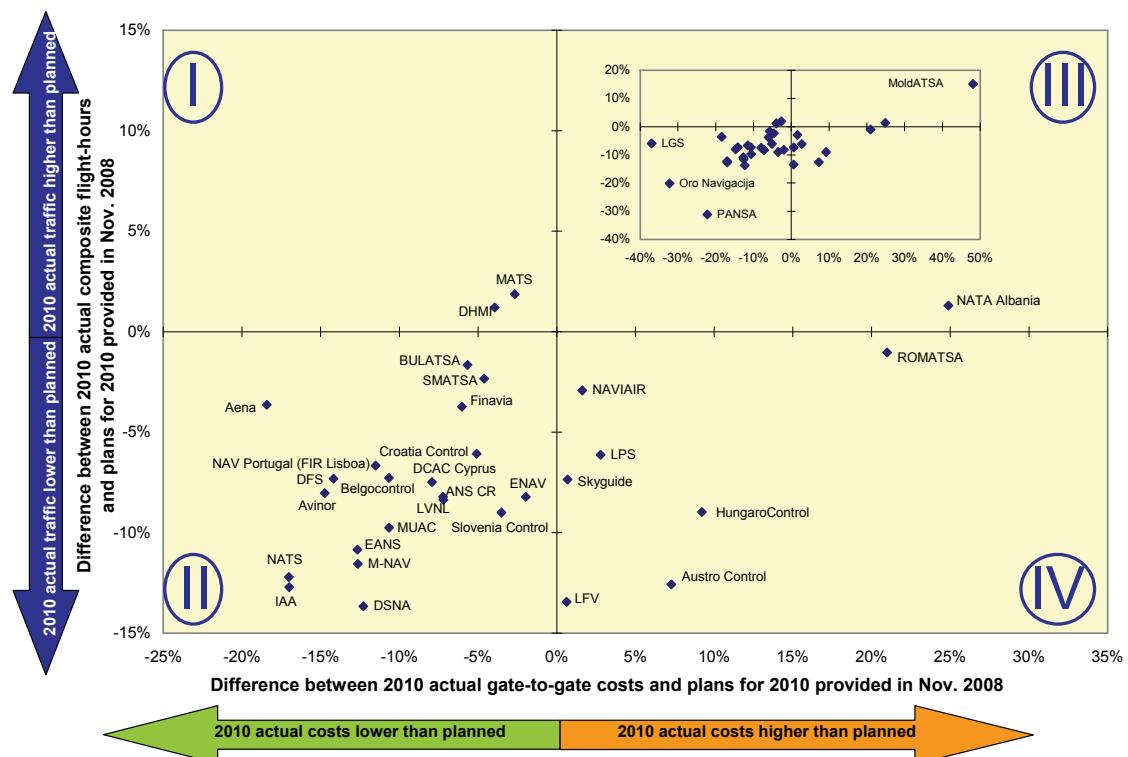
<sup>71</sup> As part of the ACE 2007 data submission, both HCAA and UKSATSE did not provide 2010 gate-to-gate ATM/CNS provision costs planned in Nov. 2008 and therefore, they could **not** be included in this analysis.

European system level (in €2010)	2009	2010
Planned costs in Nov. 2008 (M€)	7 685	7 778
Actual costs (M€)	7 337	6 977
Difference between actual costs and Nov. 2008 plans (M€)	-349	-800
Difference between actual costs and Nov. 2008 plans (%)	-4.5%	-10.3%
Planned composite flight-hours in Nov. 2008 ('000)	17 504	18 046
Actual composite flight-hours ('000)	16 093	16 423
Difference between actual composite flight-hours and Nov. 2008 plans (%)	-8.1%	-9.0%

**Table 5.1: Comparison of ATM/CNS provision costs and composite flight-hours at system level (data provided in Nov.'08 versus Nov.'11) (€2010)**

Table 5.1 indicates that for 2009 and 2010, the actual number of composite flight-hours is some 8-9% lower than planned in November 2008. This reflects the impact of the sharp traffic downturn in 2009. Table 5.1 also shows that 2010 actual ATM/CNS provision costs are -10.3% lower than planned in November 2008 (compared to -4.5% for the year 2009). This is a clear indication that, due to short term rigidities and unavoidable lead time to adjust ANS costs downwards, the impact of the cost-containment measures introduced in 2009 mainly materialised in 2010. The “savings” for the year 2010 compared to the plans are valued at some €800M at European system level. This remarkable achievement indicates that, as a whole, the ANS industry was reactive and showed flexibility to adjust costs downwards in response to the sharp traffic decrease in 2009.

In order to better understand how these cost-containment measures impacted ANSPs cost-bases and which ANSPs mostly contributed to lower the ATM/CNS provision costs planned for 2010 in November 2008, Figure 5.5 below shows the difference between actual and planned 2010 ATM/CNS provision costs. Similarly, the difference between the actual and planned 2010 traffic is shown on the y-axis.



**Figure 5.5: Comparison of 2010 actual ATM/CNS provision costs and traffic with ACE 2007 plans<sup>72</sup>**

<sup>72</sup> As part of the ACE 2007 data submission NATS only provided 2010 en-route ATM/CNS provision costs. Therefore, in Figure 5.5 only the en-route flight-hours planned in ACE 2007 for 2010 have been considered for NATS.

Figure 5.5 shows that for 25 ANSPs, actual 2010 costs were lower than planned in November 2008 (and reported as part of the ACE 2007 data cycle). Among the five largest ANSPs, 2010 actual costs were lower than planned for Aena (-18%), DFS (-14%), NATS (-17%), DSNA (-12%) and to a lower extent for ENAV (-2%). Given their weight in the European system, the five largest ANSPs significantly contributed to reduce actual 2010 ATM/CNS provision costs by -10.3% compared to ACE 2007 plans.

For six ANSPs, 2010 actual costs are more than -15% lower than planned in November 2008 (i.e. Oro Navigacija (-32%), LGS (-37%), Aena (-18%), IAA (-17%), PANSA (-22%) and NATS (-17%)). It should be noted, however, that these ANSPs (except Aena and NATS) were planning for significant costs increases compared to their 2007 levels.

The right hand side of Figure 5.5 shows that for nine ANSPs, actual 2010 costs were higher than planned in November 2008. For three of them, MoldATSA (+48%), NATA Albania (+25%) and ROMATSA (+21%) actual costs were more than +20% higher than planned. It should be noted that in November 2008, ROMATSA was planning for significant cost reductions (-9% compared to 2007 baseline), which did not materialise in 2010.

Some States/ANSPs also implemented specific measures focused on reducing or stabilizing the chargeable cost base in order to reduce the impact of the economic downturn on airspace users. The most notable examples include:

- Spain decided not to charge some 10% of its en-route cost-base in 2010.
- Similarly, in Switzerland, EUROCONTROL costs are borne by the Swiss government and not charged to the airspace users.

The impact of such measures is not fully reflected in Figure 5.4 and Figure 5.5 since the objective of the ACE data analysis is to focus on the costs relating to the provision of ATM/CNS services and not on the costs charged to airspace users. However, it is noteworthy that some ANSPs could genuinely reduce ATM/CNS provision costs between 2009 and 2010 and at the same time decided not to charge a part of the cost-base to airspace users. This is particularly the case of Oro Navigacija and ANS CR which did not charge the cost of capital to airspace users in 2009 and 2010.

Figure 5.5 above also shows that in 2010, actual traffic was lower than planned in ACE 2007 for all the ANSPs, with the exception of MoldATSA (+15%), and to a lower extent, MATS (+2%), NATA Albania (+1%) and DHMI (+1%).

For nine ANSPs, the actual 2010 traffic was at least -10% below ACE 2007 plans. This is for example the case of DSNA (-14%) and NATS (-12%), despite the fact that DSNA was planning for a very modest growth and that NATS was already anticipating a decline in composite flight-hours. On the other hand, for PANSA (-31%) and Oro Navigacija (-20%), the optimistic traffic outlook shown in November 2008 did not materialise in 2010.

### 5.3 Changes in the components of financial cost-effectiveness (2006-2010)

This section analyses the changes in the components of financial cost-effectiveness between 2006 and 2010 for the 36 ANSPs that have reported ACE data consistently since 2006.

Year-on-year changes that can be observed in the charts could be due to:

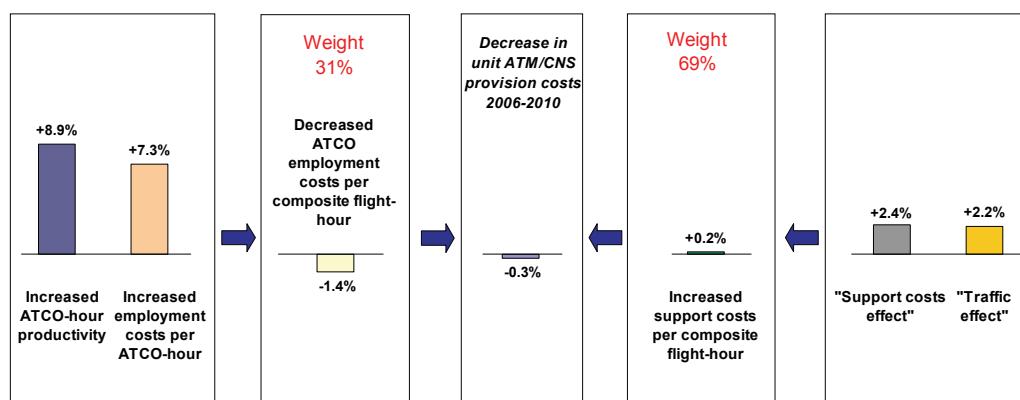
- Genuine changes in performance;
- Changes in ANSPs data reporting; and,
- Known errors that were made in data submissions in earlier years and identified during the extensive data validation process carried out by the PRU. Where possible the PRU has made retrospective adjustments to ensure data consistency.

The maturity in reporting has improved since 2006. Some, but not all, ANSPs have been able to revise their 2005-2008 data to be consistent with the data definitions used in 2009 and 2010. Therefore some caution is needed with the interpretation of these comparisons, since the results can be affected by changes in data reporting.

### 5.3.1 Changes at European system level (2006-2010)

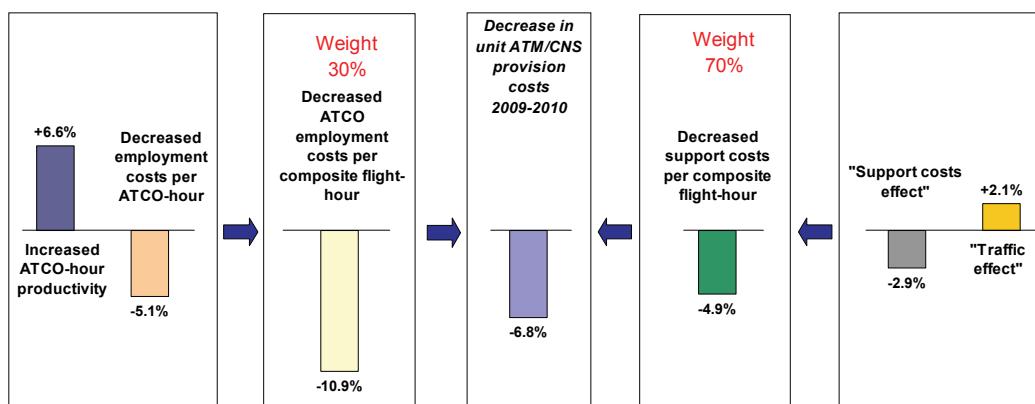
Figure 5.6 shows how the various component ratios have contributed to the overall change in unit costs between 2006 and 2010 at European system level<sup>73</sup>:

- The left-hand side indicates that the increase in ATCO-hour productivity (+8.9%) was higher than the increase in ATCO employment costs (+7.3%). This resulted in lower ATCO employment costs per composite flight-hour (-1.4%);
- The right-hand side indicates that support costs (+2.4%) rose slightly faster than traffic (+2.2%), and as a result support costs per composite flight-hour remained fairly constant (+0.2%) over the 2006-2010 period;
- The central part shows that, given the weights of ATCO costs (31%) and support costs (69%), overall unit costs remained fairly constant between 2006 and 2010 (-0.3%).



**Figure 5.6: Breakdown of changes in financial cost-effectiveness, 2006-2010 (real terms)**

The strong traffic decrease in 2009 led to a sharp increase in unit ATM/CNS provision costs (+8.7%) which significantly affects the changes over 2006-2010 as shown in Figure 5.6. For this reason, Figure 5.7 below focuses on the changes between 2009 and 2010.



**Figure 5.7: Breakdown of changes in financial cost-effectiveness, 2009-2010 (real terms)**

<sup>73</sup> Figure 5.6 does not include ARMATS, as it was not part of the ACE sample before 2009. For comparability purposes, ARMATS has been also excluded from the scope of Figure 5.7.

Figure 5.7 indicates that in 2010, ANSPs managed to substantially decrease employment costs per ATCO-hour (-5.1%), while increasing ATCO-hour productivity (+6.6%). These improvements combined with the decrease in support costs (-2.9%) and the +2.1% traffic increase contributed to the -6.8% reduction in unit ATM/CNS provision costs in 2010.

Given the weight of Aena in the European system, the changes shown in Figure 5.7 in terms of ATCO-hour productivity and employment costs per ATCO-hour are heavily influenced by the implementation of Law 9/2010 in Spain<sup>74</sup>.

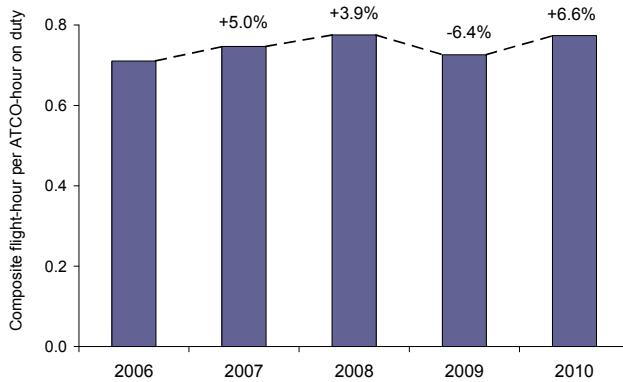
The following sections provide an analysis of the changes in the three main components of the cost-effectiveness indicator: ATCO-hour productivity (Section 5.3.2), ATCO employment costs per ATCO-hour (Section 5.3.3), and support costs per composite flight-hour (Section 5.3.4).

### 5.3.2 Changes in ATCO-hour productivity at ANSP level (2006-2010)

As indicated in Figure 5.6, between 2006 and 2010 ATCO-hour productivity rose by +8.9% at European system level.

Figure 5.8 shows that this overall change is driven by:

- continuous productivity increases over 2006-2008;
- a significant decrease in 2009, reflecting the -6.7% fall in traffic; and,
- a +6.6% productivity increase in 2010, to reach a level (0.77) close to that achieved in 2008 (0.78).

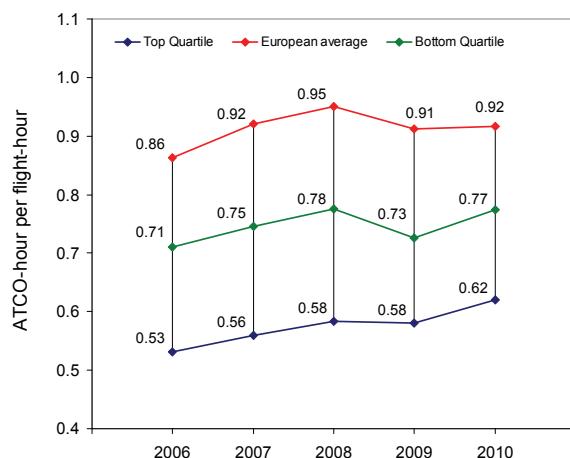


**Figure 5.8: Changes in ATCO-hour productivity (2006-2010)**

Analysis shows that in 2010, ATCO-hours on duty reduced by -4.2% compared to 2009. This indicates that the traffic increase in 2010 (+2.1%) was absorbed using less resources than in 2009.

Figure 5.9 shows that the productivity increase at European system level mainly results from an increase in the bottom quartile. This indicates that the rise at European level mainly reflects improvements in ANSPs with relatively lower ATCO-hour productivity levels, while the ATCO-hour productivity of ANSPs in the top quartile remained fairly constant.

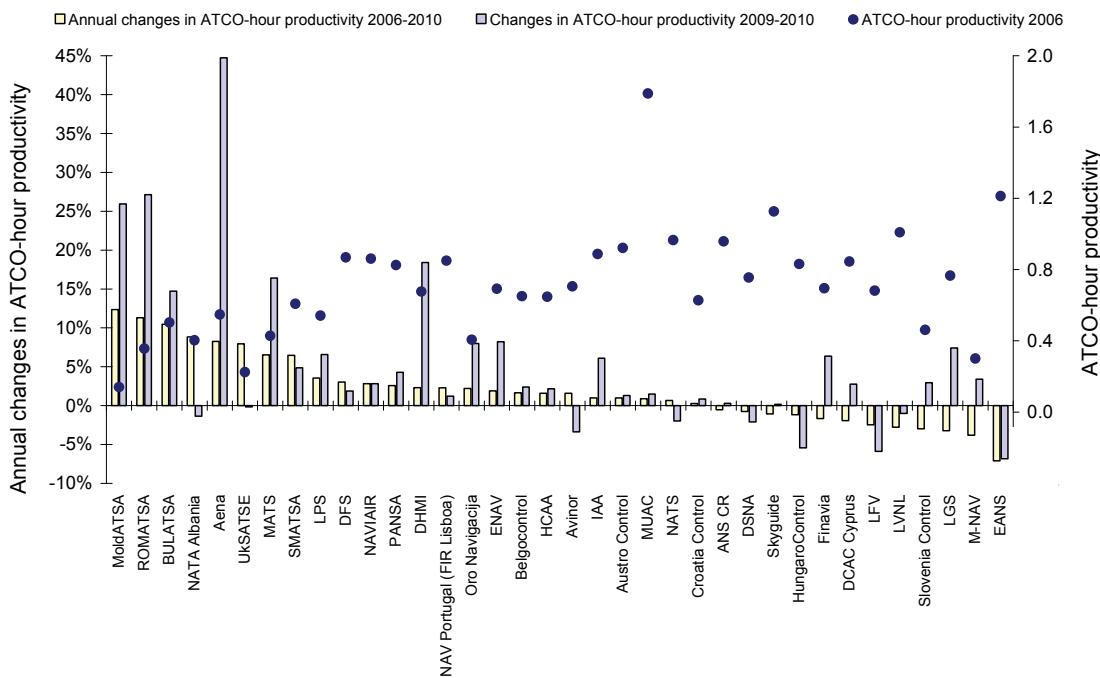
The information presented in Figure 5.6 and Figure 5.8 for the European system level masks contrasted trends across ANSPs, hence the importance to look at changes in ATCO-hour productivity at ANSP level.



**Figure 5.9: Improvement in ATCO-hour productivity (2006-2010)**

<sup>74</sup> This law introduced new working conditions for ATCOs, rising contractual working hours and significantly reducing the number of overtime hours, which was one of the main driver for high ATCO employment costs in the past.

Figure 5.10 shows the **annual** changes in ATCO-hour productivity for each ANSP, between 2006 and 2010 (yellow bars) and between 2009 and 2010 (blue bars). It also shows the levels of ATCO-hour productivity achieved in 2006 (blue dots).



**Figure 5.10: Average annual changes in ATCO-hour productivity at ANSP level (2006-2010 and 2009-2010)**

Between 2006 and 2010, ATCO-hour productivity rose for 24 out of 36 ANSPs. The largest increases are observed for ANSPs starting from a relatively low level in 2006 and which benefited from a solid traffic growth over the period.

The significant improvement in ATCO-hour productivity (+45%) observed for Spain in 2010 mainly result from the implementation of Law 09/2010 which resulted in significant reductions in the number of overtime hours performed by Aena ATCOs in OPS.

Between 2006 and 2010, ATCO-hour productivity fell for 12 ANSPs. For most of these ANSPs, the decrease in productivity over the period 2006-2010 is mainly driven by a significant reduction in 2009 following the traffic downturn.

Since the impact of the economic downturn on traffic was not of the same magnitude across all ANSPs, it is important to analyse the information provided in Figure 5.10 in the light of changes in traffic volumes between 2009 and 2010. It is also important to look at the changes in terms of ATCO-hours on duty<sup>75</sup> in order to understand how each individual ANSP reacted to the lower traffic volumes in 2009. This information is provided in Table 5.2 where the change in each ANSP's productivity indicator (A) between 2009 and 2010 has been broken down into a traffic volume effect (B) and an ATCO-hour effect (C).

<sup>75</sup> It is possible that some of the ANSPs showing particularly large productivity changes have recorded ATCO-hours on duty inconsistently across the years. The figures for ATCO-hours on duty are often estimated figures, or figures used for planning purposes, which could deviate from actual hours on duty. Although the SEID V2.6 has brought further clarity and enhanced comparability, this is still an area where accurate and consistent reporting across all ANSPs remains a challenge.

ANSPs	Country	(A)	(B)	(C)
		Changes in ATCO-hour productivity 2009-2010	"Traffic effect"	"ATCO-hour effect"
Aena	ES	44.7%	3.0%	-28.8%
ROMATSA	RO	27.1%	7.1%	-15.8%
MoldATSA	MD	25.9%	24.1%	-1.5%
ARMATS	AM	20.6%	10.4%	-8.5%
DHMI	TR	18.4%	14.1%	-3.6%
MATS	MT	16.4%	12.7%	-3.2%
BULATSA	BG	14.7%	2.4%	-10.7%
ENAV	IT	8.2%	4.0%	-3.9%
Oro Navigacija	LT	8.0%	11.9%	3.6%
LGS	LV	7.4%	3.5%	-3.7%
LPS	SK	6.6%	5.7%	-0.9%
Finavia	FI	6.4%	0.6%	-5.5%
IAA	IE	6.1%	-3.0%	-8.6%
SMATSA	SB	4.9%	4.7%	-0.2%
PANSA	PL	4.3%	5.7%	1.3%
M-NAV	MK	3.4%	-2.0%	-5.3%
Slovenia Control	SI	3.0%	3.3%	0.3%
NAVI AIR	DK	2.8%	3.7%	0.8%
DCAC Cyprus	CY	2.8%	7.0%	4.1%
Belgocontrol	BE	2.4%	-0.2%	-2.5%
HCAA	GR	2.2%	2.2%	0.0%
DFS	DE	1.9%	1.6%	-0.3%
MUAC		1.5%	2.1%	0.6%
Astro Control	AT	1.3%	-0.5%	-1.8%
NAV Portugal (FIR Lisboa)	PT	1.2%	5.4%	4.2%
Croatia Control	HR	0.8%	6.5%	5.6%
ANS CR	CZ	0.3%	2.6%	2.3%
Skyguide	CH	0.2%	-0.6%	-0.8%
UkSATSE	UA	-0.2%	13.2%	13.4%
LVNL	NL	-1.0%	0.3%	1.3%
NATA Albania	AL	-1.4%	10.8%	12.3%
NATS	UK	-2.0%	-4.2%	-2.2%
DSNA	FR	-2.1%	-1.3%	0.8%
Avinor	NO	-3.4%	1.6%	5.2%
HungaroControl	HU	-5.4%	0.1%	5.8%
LFV	SE	-5.9%	-0.2%	6.0%
EANS	EE	-6.8%	3.2%	10.8%
Total European System (37 ANSPs)		6.6%	2.1%	-4.2%

**Table 5.2: Changes in ATCO-hours on duty and traffic volumes (2009-2010)**

Table 5.2 indicates that 28 ANSPs achieved an increase in ATCO-hour productivity in 2010. The most significant increases in productivity are observed for Aena (+44.7%), ROMATSA (+27.1%), MoldATSA (+25.9%), ARMATS (+20.6%), DHMI (+18.4%), MATS (+16.4%), and BULATSA (+14.7%). It should be noted that for IAA (+6.1%) M-NAV (+3.4%) Belgocontrol (+2.4%) and Austro Control (+1.3%), the increase in ATCO-hour productivity was achieved despite a context of traffic decrease.

Table 5.2 also shows that 19 ANSPs could achieve a reduction in the number of ATCO-hours on duty in 2010. This indicates a certain flexibility to deploy operational staff (for example through the use of less overtime hours) to better adapt to the sharp decrease in traffic volumes. ATCO-hour productivity increased for 18 of these 19 ANSPs in 2010. On the other hand, for NATS, the reduction in ATCO-hours on duty (-2.2%) was not sufficient to compensate for the decrease in traffic (-4.2%) and therefore to avoid a decrease in ATCO-hour productivity between 2009 and 2010 (-2.0%).

Positive values in column (A) mean that productivity improved between 2009 and 2010.

Positive values in column (B) mean that traffic volumes rose between 2009 and 2010.

Positive values in column (C) mean that the number of ATCO-hours rose between 2009 and 2010. All other things being equal, a positive value contributes to lower productivity (hence the red dot).

Productivity improves if traffic grows faster than the ATCO-hours on duty.

For example: DFS's 2010 productivity is +1.9% higher than in 2009 because the traffic increased by +1.6% while the number of ATCO-hours decreased by -0.3%.

*Note: By mathematical construction, the % variation in productivity (A) can be approximated as the difference between the "traffic effect" (B) and the "ATCO-hour effect" (C). The larger the % variations, the less accurate the approximation. This explains why in some cases (A) is not exactly equal to (B) - (C).*

It can be also noted that for some ANSPs such as EANS, LFV, HungaroControl and Avinor, the decrease in productivity between 2009 and 2010 is mainly due to a significant increase in ATCO-hours on duty.

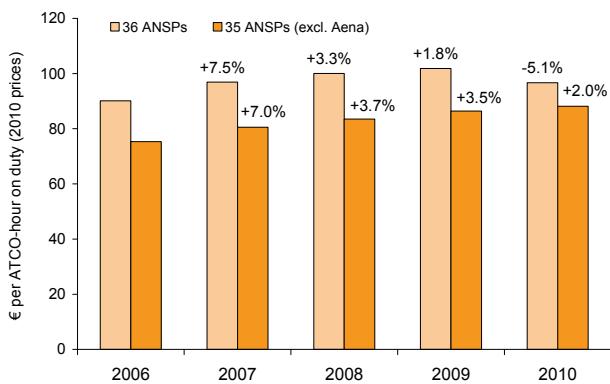
ATCO productivity improvements can result from more effective OPS room management and by making a better use of existing resources, for example through the adaptation of rosters (preferably individually based to enhance flexibility) and shift times, effective management of overtime, and through the adaptation of sector opening times to traffic demand patterns. In other words, if the traffic growth observed in 2010 further develops in the next years, there is an opportunity to increase ATCO-hour productivity without significantly affecting the other components of cost-effectiveness, while ensuring safety standards.

### 5.3.3 Changes in ATCO employment costs at ANSP level (2006-2010)

As indicated in Figure 5.6, between 2006 and 2010 ATCO employment costs per ATCO-hour increased by +7.3% in real terms at European system level.

Figure 5.11 shows that this overall change is driven by:

- a significant employment costs increase in 2007 (+7.5%) and smaller increases in 2008 (+3.3%) and 2009 (+1.8%); and
- a significant decrease in 2010 (-5.1%).

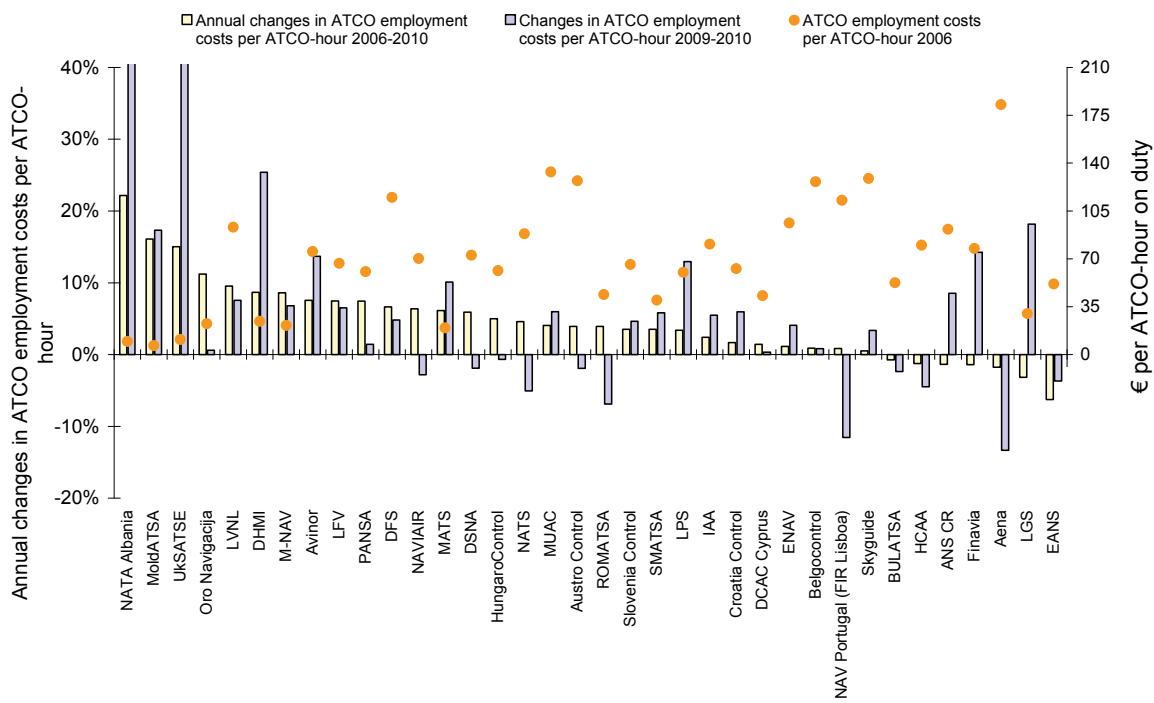


**Figure 5.11: Changes in ATCO employment costs per ATCO-hour (2006-2010)**

The decrease in employment costs per ATCO-hour observed in 2010 at European system level (-5.1%) is mainly driven by the reduction of ATCO employment costs at Aena. For this reason, Figure 5.11 also shows the changes in employment costs per ATCO-hour excluding Aena (i.e. see orange bars, +2.0% in 2010).

Figure 5.12 shows the **annual** changes for each ANSP between 2006 and 2010 (yellow bars), and between 2009 and 2010 (blue bars).

Between 2006 and 2010, ATCO employment costs per ATCO-hour rose for 29 out of 36 ANSPs. In four ANSPs (NATA Albania (+22.2%), MoldATSA (+16.1%), UKSATSE (+15.0%) and Oro Navigacija (+11.2%)), these increases were greater or equal than +10% a year. These four ANSPs all tended to have relatively low levels of ATCO employment costs in 2006. These remain comparatively low in 2010, even after PPP adjustment (see Figure 4.10, p. 48).



**Figure 5.12: Average annual changes in ATCO employment costs per ATCO-hour, 2006-2010 and 2009-2010 (real terms)**

Figure 5.12 also indicates that between 2009 and 2010, employment costs per ATCO-hour increased by more than +15% for five ANSPs, namely NATA Albania (+96%), UKSATSE (+57%), DHMI (+25%), LGS (+18%) and MoldATSA (+17%). It should be noted that the large change in employment costs per ATCO-hour observed for NATA Albania in 2010 might be driven by changes in data reporting.

Employment costs are typically subject to complex bargaining agreements between ANSPs management and staff which usually are embedded into a collective agreement. The duration of the collective agreement, the terms and methods for renegotiation greatly vary across ANSPs. In many cases salary conditions are negotiated every year.

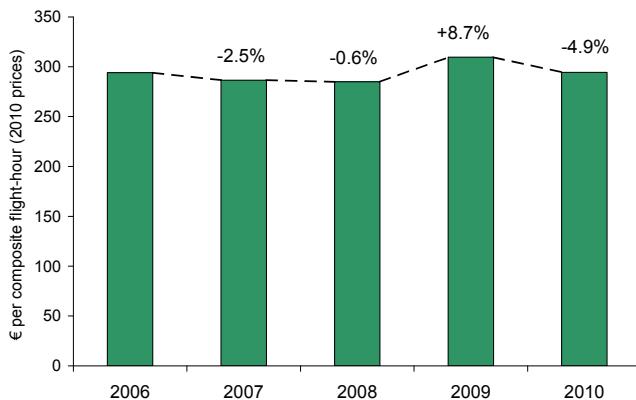
Employment costs can be profoundly affected by pension arrangements, and particularly whether the pension scheme is defined benefit or defined contribution. In recent years there has been increasing recognition that traditional methods of accounting for the costs of providing for future pensions tend to under-represent costs. New methods, now mandated by IFRS, make a fairer provision for these costs. In the cases where this has been fully applied, recognition of the true costs has resulted in very substantial increases in employment costs, as well as exceptional costs. The impact of this is likely to spread as it is recognised in more and more ANSPs. This is an area which requires the utmost attention given the long term consequences of pensions-related decisions and their magnitude in the cost bases.

### 5.3.4 Changes in support costs per composite flight-hour (2006-2010)

As indicated in Figure 5.6, support costs per composite flight-hours remained fairly constant between 2006 and 2010 (i.e. +0.2% in real terms) at European system level.

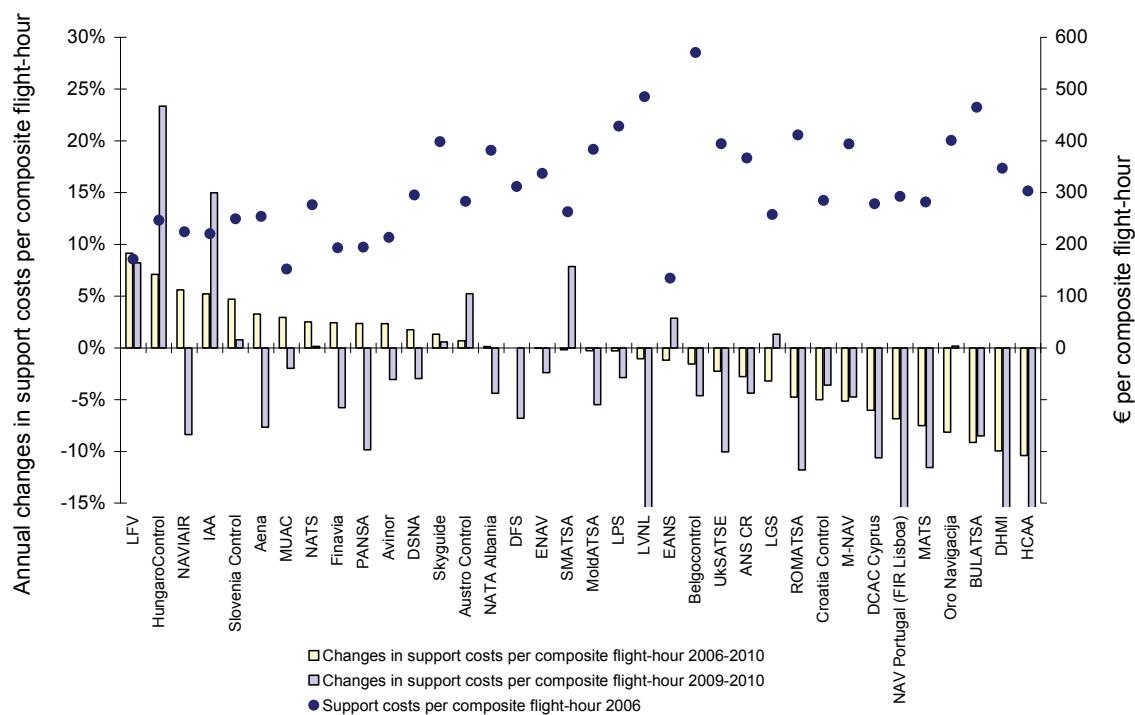
Figure 5.13 shows that with the exception of 2009 (+8.7%), decreases in unit support costs were achieved in all years over the 2006-2010 period. This is particularly the case in 2010 with a reduction of -4.9%.

Figure 5.13 also indicates that in 2010, unit support costs (€294) are close to their 2006 level.



**Figure 5.13: Changes in support costs per composite flight-hour (2006-2010)**

Figure 5.14 displays the annual changes in unit support costs for each ANSP<sup>76</sup> between 2006 and 2010 (yellow bars) and between 2009 and 2010 (blue bar).



**Figure 5.14: Average annual change in support cost per composite flight-hour at ANSP level, 2006-2010 and 2009-2010 (real terms)**

Between 2006 and 2010, unit support costs fell for 21 ANSPs, and for two ANSPs the reduction was greater than 10% p.a. (DHMI and HCAA). On the other hand, increases in unit support costs larger than +5% p.a. are observed for LFV, HungaroControl, NAVIAIR and IAA. In 2010, 25 ANSPs were in a position to reduce unit support costs (see blue bars in Figure 5.14 above).

Support costs are made of non-ATCO in OPS employment costs, non-staff operating costs and capital-related costs. A number of factors have an impact on these costs, some of them are identified below.

<sup>76</sup> See also footnote 65, p. 54 for the reported cost of capital for Oro Navigacija and ANS CR.

**Non-ATCO in OPS employment costs** can be affected by:

- Outsourcing of non-core activities (such as maintenance of technical equipment, and professional training) could transfer costs from this category to non-staff costs.
- Research & development policies may involve ATM systems either being developed in-house, or purchased off-the-shelf. In principle, either solution could lead to the most cost-effective outcome, depending on circumstances; this would depend on whether there were, for example, significant economies of scale, or major transaction costs.
- Arrangements relating to the collective agreement and the pension scheme for non-ATCOs in OPS.

**Non-staff operating costs** can be affected by:

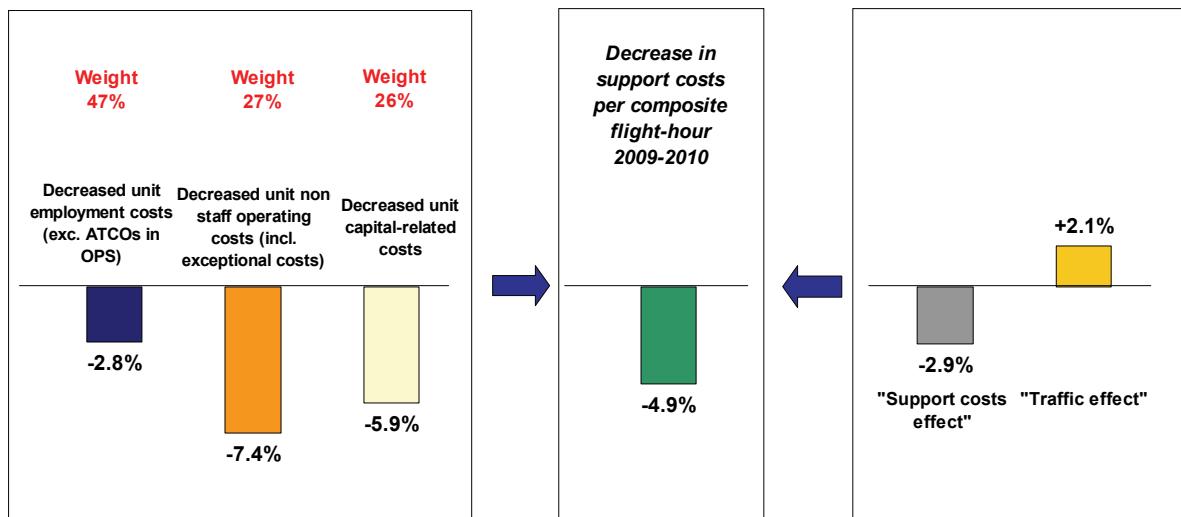
- The terms and conditions for renegotiation of contracts for outsourced activities.
- Enhancement of the cooperation with other ANSPs to achieve synergies in the context of a FAB (sharing training of ATCOs, joint maintenance, and other matters).

**Capital-related costs** can be affected by:

- The extent of the investment programme.
- Accounting life of the assets.
- The degree to which assets are owned or rented.

There are trade-offs among all the components of support costs. For example, outsourcing maintenance activities will reduce non-ATCO in OPS employment costs but increase non-staff operating costs. Similarly, renting rather than owning an asset will reduce capital-related costs but increase non-staff operating costs. Each ANSP should seek opportunities for change and evaluate them rigorously, taking into account all elements of support costs.

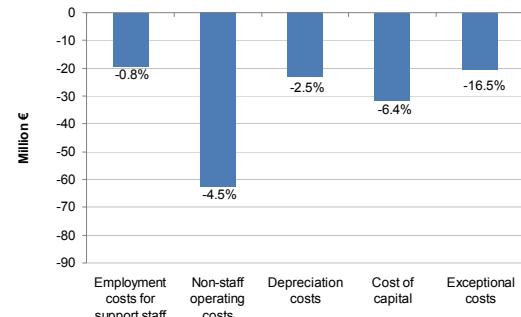
The right-hand-side of Figure 5.15 below indicates that the -4.9% decrease in unit support costs achieved between 2009 and 2010 results from the combination of lower support costs (-2.9%) with higher traffic than in 2009 (+2.1%). The left-hand-side of Figure 5.15 shows that between 2009 and 2010, all the components of unit support costs decreased at European system level.



**Figure 5.15: Changes in the components of support costs per composite flight-hour, 2009-2010 (real terms)**

Figure 5.16 shows the changes in the different components of support costs (see the “support costs effect” bar on the right-hand side of Figure 5.15) between 2009 and 2010.

Figure 5.16 also indicates that the main contributor for the decrease in support costs is the reduction in non-staff operating costs (-4.5%, or -€63M).



**Figure 5.16: Changes in the components of support costs (2009-2010)**

Reductions in the cost of capital (-€31M) and depreciation costs (-€23M) might reflect the postponement of non-essential investment projects, as well as the decision to lower the weighted average cost of capital charged to airspace users in the context of the cost-containment measures implemented in 2009 and 2010 (see also Figure 4.19, p. 55). Another contributions to the decrease in support costs are the reduction in exceptional costs (-€20M, mainly driven by a significant decrease in IFRS transition costs for DFS in 2010) and the decrease in employment costs for support staff (-€19M).

Table 5.3 shows the changes in the various components of support costs for individual ANSPs. The right-hand-part of Table 5.3 shows how the three components of support costs (employment costs for “support” staff, non-staff operating costs (including exceptional costs) and capital-related costs) have changed over time for individual ANSPs.

ANSPs	Country	Changes in support costs 2009-2010	Staff costs (exc. ATCOs in OPS) 2009-2010	Non-staff operating costs 2009-2010	Capital related costs 2009-2010	Exceptional costs 2009-2010
HungaroControl	HU	23.5%	0.2%	-3.8%	-13.3%	
MoldATSA	MD	17.3%	-10.2%	29.6%	33.0%	
SMATSA	YU	12.9%	3.3%	7.8%	27.5%	11.7%
Oro Navigacija	LT	12.0%	-1.4%	6.1%	33.6%	
IAA	IE	11.5%	25.8%	-4.2%	9.9%	
LFV	SE	8.0%	40.6%	-17.7%	-12.7%	
EANS	EE	6.2%	15.8%	7.5%	-2.8%	
NATA Albania	AL	5.9%	20.3%	1.3%	4.6%	
LGS	LV	4.8%	16.2%	-3.9%	0.0%	
Austro Control	AT	4.7%	8.7%	9.7%	-9.3%	
Slovenia Control	SI	4.1%	9.1%	5.0%	2.4%	-78.3%
Croatia Control	HR	2.6%	-0.6%	5.7%	5.1%	
LPS	SK	2.6%	12.7%	-3.4%	-4.5%	
UKSATSE	UA	1.8%	6.5%	-46.1%	55.8%	132.2%
ENAV	IT	1.5%	2.4%	3.7%	-1.9%	-3.3%
MUAC		0.1%	3.4%	-16.9%	3.3%	
Skyguide	CH	0.0%	4.8%	0.5%	-4.8%	-79.1%
MATS	MT	-0.3%	-0.8%	15.2%	-34.2%	
ARMATS	AM	-1.0%	4.8%	-7.3%	4.3%	205.8%
Avinor	NO	-1.5%	-5.3%	1.5%	5.9%	
ANS CR	CZ	-1.9%	4.6%	-5.4%	-7.8%	
NATS	UK	-4.0%	-9.8%	2.6%	1.3%	-16.7%
DSNA	FR	-4.2%	-1.1%	-6.7%	-10.0%	
DCAC Cyprus	CY	-4.4%	-20.7%	4.0%	-9.8%	
PANSA	PL	-4.7%	-8.2%	3.9%	-1.1%	
Belgocontrol	BE	-4.8%	-4.1%	0.4%	5.4%	-93.7%
Aena	ES	-4.9%	-4.5%	-14.3%	4.2%	-15.3%
NAVI AIR	DK	-5.0%	1.8%	-2.3%	-19.0%	
DHMI	TR	-5.2%	-1.6%	-0.9%	-12.6%	
Finavia	FI	-5.3%	-17.4%	36.1%	-26.5%	
DFS	DE	-5.3%	11.2%	-2.2%	-18.7%	-55.2%
ROMATSA	RO	-5.5%	14.7%	-31.7%	-6.0%	-17.5%
BULATSA	BG	-6.3%	4.5%	-17.6%	-15.4%	
M-NAV	MK	-6.7%	-8.8%	-8.1%	-2.3%	
NAV Portugal (FIR Lisboa)	PT	-14.7%	-15.9%	-15.3%	-7.2%	
LVNL	NL	-15.4%	-25.9%	11.5%	9.0%	
HCAA	GR	-15.6%	-24.9%	18.9%	-8.8%	
Total European System (37 ANSPs)		-2.9%	-0.8%	-4.5%	-3.9%	-16.5%

**Table 5.3: Breakdown of changes in support costs, 2009-2010 (real terms)**

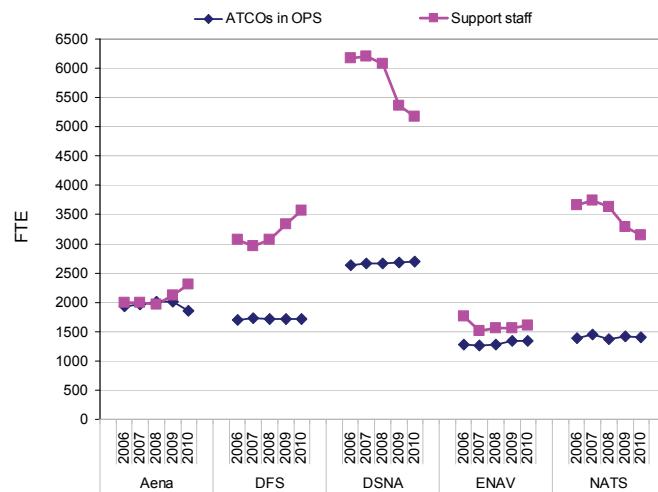
Table 5.3 shows that in 2010, support costs decreased in real terms for 21 ANSPs. This result clearly indicates a certain degree of reactivity and suggests that cost-containment measures were implemented by most of these ANSPs.

Table 5.3 indicates that support costs increased by more than +20% in 2010 for HungaroControl (+23.5%). This rise is mainly driven by the reporting of exceptional costs (i.e. €16.7M) which reflect the inclusion of one-off exceptional pension-related costs in the 2010 cost-base. For some ANSPs, the increase in support costs in 2010 was compensated by a rise in traffic volumes, therefore resulting in a decrease of unit support costs. This is particularly the case for NATA Albania, LPS and UkSATSE.

Between 2009 and 2010, at the exception of ENAV (+1.5%), support costs substantially decreased for all the five largest ANSPs: DSNA (-4.2%), DFS (-5.3%), NATS (-4.0%) and Aena (-4.9%).

In 2010, non-ATCOs in OPS employment costs (which are the largest component of support costs) increased for DFS (+11.2%), while they substantially reduced for NATS (-9.8%), Aena (-4.5%) and to a lower extent DSNA (-1.1%).

For DFS, the rise in non-ATCOs in OPS employment costs in 2010 (+11.2%) was partly driven by a +6.9% increase in the number of support staff indicated in Figure 5.17.



**Figure 5.17: Changes in ATCOs in OPS and “support” staff for the five largest ANSPs (2006-2010)**

Figure 5.17 also shows that for NATS, the substantial decrease in support staff between 2009 and 2010 (-4.6%) contributed to reduce non-ATCOs in OPS employment costs (-9.8%).

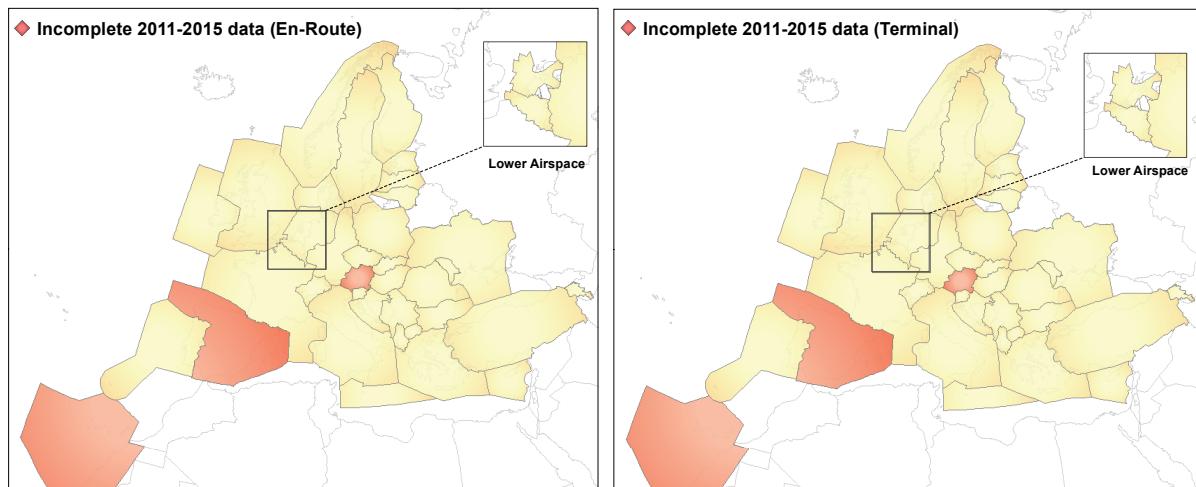
## 6 FORWARD-LOOKING FINANCIAL COST-EFFECTIVENESS (2011-2015)

### 6.1 Introduction

Besides the disclosure of 2010 data, the SEID requires ANSPs to report five years forward-looking data on plans and projections of traffic demand, costs, staff, capital expenditure and ATC capacity.

The objective of this chapter is to aggregate ANSP forward-looking plans and projections in order to assess the cost-effectiveness of the European ATM system as a whole over the 2011-2015 period.

Unfortunately, some ANSPs did not provide complete forward-looking data covering the 2011-2015 period, limiting the ability to compute the forward-looking gate-to-gate financial cost-effectiveness KPIs until 2015, and/or the factors affecting future economic performance, namely the planned capital expenditures (capex) and the planned staff and capacity data. The maps displayed in Figure 6.1 show the status of data submission to compute the gate-to-gate ATM/CNS provision costs per composite flight-hour<sup>77</sup>. It should be noted that for the first time, NATS was in a position to provide planned costs and traffic data for terminal ANS.



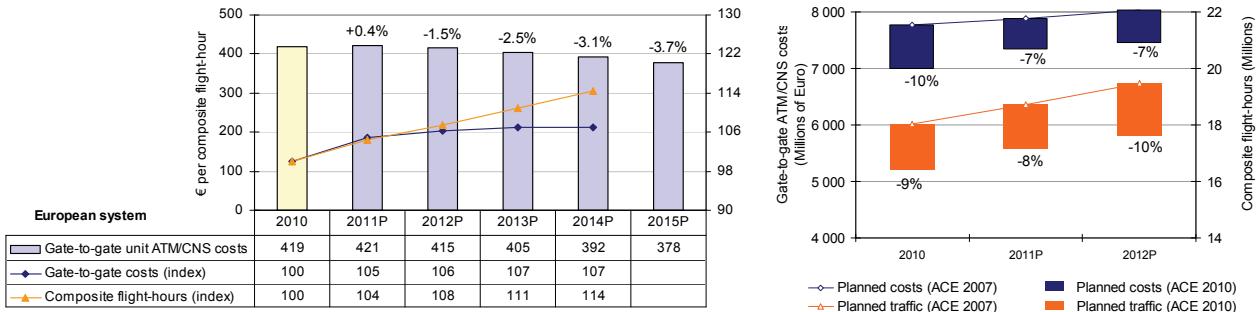
**Figure 6.1: Status of ANSPs planned costs and traffic data submission**

The production of realistic and complete plans is an important element of ANSPs' performance. EC Regulation 2096/2005 (20 December 2005) on Common Requirements for provision of ANS (which requires ANSPs to produce a Business Plan covering a minimum period of five years and comprising performance objectives in terms of cost-effectiveness) and the EC Regulation 1070/2009 on SES II (21 October 2009) in respect to the Performance Scheme, and its implementing rule (EC N°691/2010) should effectively contribute to enhance the level of maturity of ANSPs planning processes.

### 6.2 Forward-looking financial cost-effectiveness at European system level

This Section provides information for the ANSPs that consistently reported planned gate-to-gate forward-looking information until 2015.

<sup>77</sup> Forward-looking data relating to Austro Control and Aena are included in Section 6.2 although these ANSPs did not report planned costs and traffic data for the year 2015.



**Figure 6.2: Forward-looking cost-effectiveness at European system level (2010-2015, real terms)<sup>78</sup>**

The left-hand side of Figure 6.2 shows that, at European system level, gate-to-gate unit ATM/CNS provision costs are planned to increase in 2011 (+0.4%) and then decrease by -2.7% p.a. until 2015. Overall, gate-to-gate unit ATM/CNS provision costs are planned to decrease by -10.0% between 2010 and 2015. For the years 2012-2014 which correspond to the SES Performance Scheme RP1, the unit costs profile is in line with States revised Performance Plans submitted at the end of 2011.

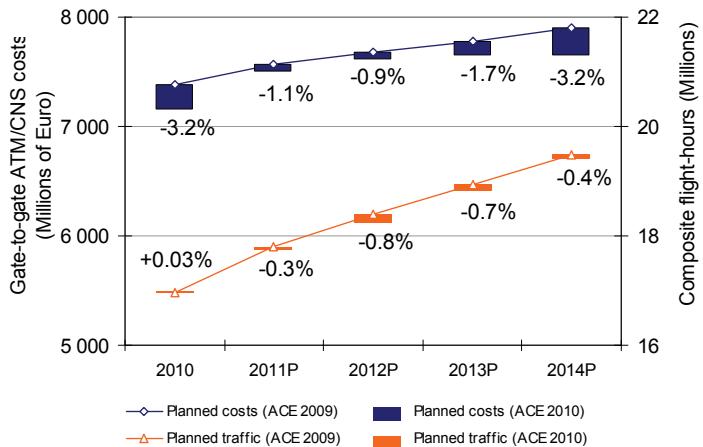
The right-hand side of Figure 6.2 indicates that in ACE 2010, over the 2010-2012 period, both ATM/CNS provision costs and traffic forecasts have been revised downwards compared to the plans provided in ACE 2007. This reflects the impact of the sharp traffic downturn in 2009 on ACE 2010 plans and indicates that there was a significant degree of reactivity and flexibility from ANSPs to adjust actual and planned costs downwards. A more detailed analysis of the difference between actual 2010 costs and plans made in November 2008 (ACE 2007) is provided in Chapter 5 of this ACE Report.

In ACE 2009, ATM/CNS provision costs per composite flight-hour were expected to reduce by -11% (or -2.3% p.a.) between 2009 and 2014. According to ACE 2010 plans, unit costs are forecast to decrease by -13% over the same period (or -2.7% p.a.).

Figure 6.3 shows that actual 2010 costs were much lower than planned in ACE 2009 (-3.2%). In other words, in ACE 2010, the changes in unit ATM/CNS provision costs over 2010-2014 are computed using a lower base than in ACE 2009.

Furthermore, Figure 6.3 also shows that in ACE 2010, over the 2011-2014 period, ACE 2009 ATM/CNS costs forecasts have been revised downwards in a greater magnitude than traffic volumes (-1.7% compared to -0.5%, on average over the period). This contributes to the more optimistic unit costs profile in ACE 2010 compared to ACE 2009 plans.

This analysis suggests that the cost-containment measures implemented by the ANSPs generated more savings than planned in 2010 and that additional benefits are expected for future years compared to ACE 2009 plans.



**Figure 6.3: Changes in planned costs and traffic at European system level (2010-2014, real terms)**

<sup>78</sup> Aena and Austro Control did not provide complete forward-looking data for 2015. For this reason, in Figure 6.2, the costs and traffic indexes are not computed for the year 2015.

### 6.2.1 Changes in planned unit ATM/CNS provision costs at ANSP level

The overall trend in planned ATM/CNS unit cost at European level (see graph in Figure 6.2) is not uniform across Europe. Planned changes in real ATM/CNS unit costs at ANSP level for the period 2010-2015 are displayed in Figure 6.4 for the 35 ANSPs that reported planned unit ATM/CNS provision costs until 2015.

Unit costs are planned to rise for eight ANSPs. Two ANSPs, MATS (+16%) and DHMI (+7%) plan for unit costs increases greater than +5% over the 2010-2015 period.

Figure 6.4 indicates that 27 ANSPs plan reductions in unit costs between 2010 and 2015. This is particularly the case for MoldATSA (-36%), HCAA (-23%), Croatia Control (-22%), and Belgocontrol (-20%).

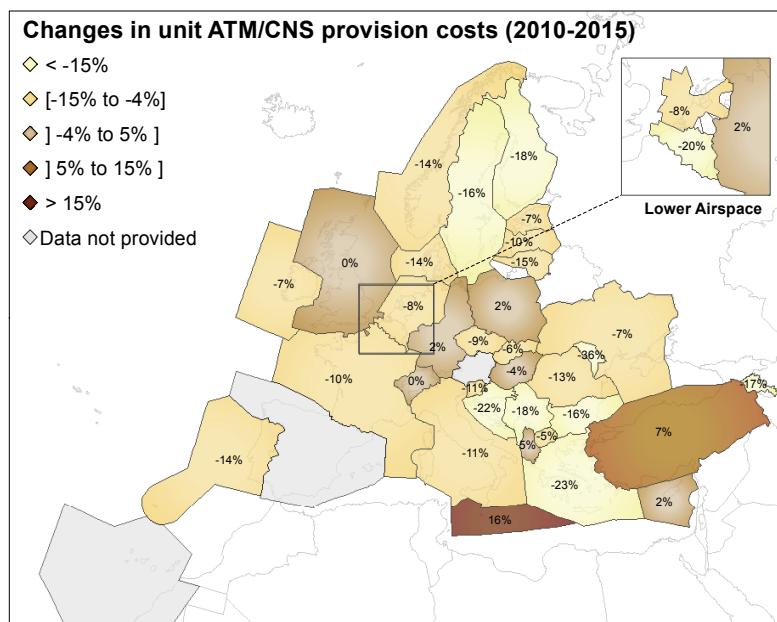
Among the five largest ANSPs, unit ATM/CNS provision costs are planned to rise between 2010 and 2015 for DFS (+2%) and to decrease for ENAV (-11%) and DSNA (-10%).

For NATS, unit ATM/CNS provision costs are expected to remain fairly constant over the 2010-2015 period (+0.5%).

For Aena which only reported planned costs data until 2014, unit ATM/CNS provision costs are planned to decrease by -15% between 2010 and 2014. Similarly, for Austro Control which did not provide planned costs and traffic data for 2015, ATM/CNS provision costs are expected to decrease by -6% between 2010 and 2014.

### 6.3 Changes in fixed assets and capital expenditure (capex)

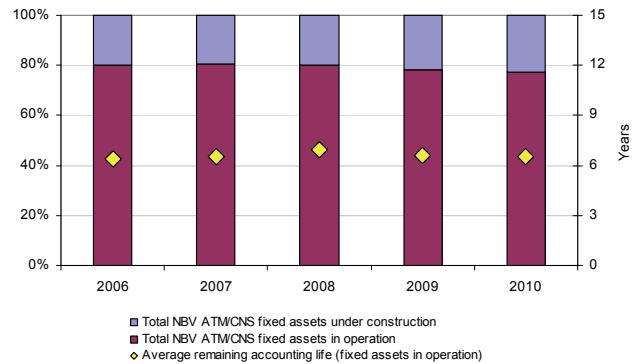
Figure 6.5 shows the proportion of fixed assets which are in operation and the average remaining accounting life of the asset base, for the ANSPs that consistently reported information on the net book value (NBV) of their fixed assets, between 2006 and 2010<sup>79</sup>. The share of assets under construction remained close to 20% over the 2006-2010 period.



**Figure 6.4: ANSPs planned changes in gate-to-gate unit ATM/CNS provision costs (2010-2015, real terms)**

<sup>79</sup> No data for ARMATS and HCAA are available for the 2005-2008 period. These two ANSPs are therefore excluded from Figure 6.5.

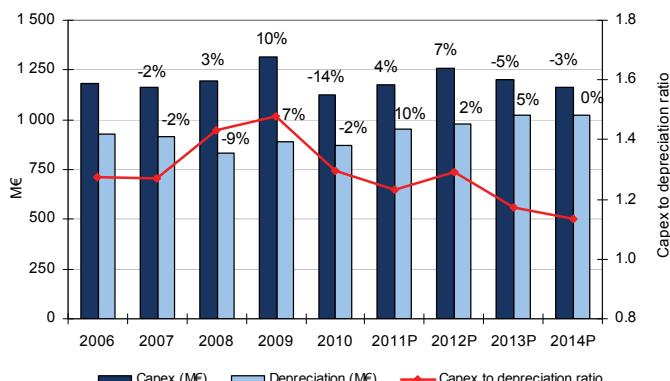
The value of the assets under construction in 2010 amounted to some €1 702M at European system level, a value which is above the 2010 capex (€1 151M) indicating that assets relating to previous years capex are still not in operation. Among the five largest ANSPs, NATS and ENAV are those with the largest share of assets under construction (42% and 37% respectively). At European system level, the average remaining accounting life of fixed assets is slightly above six years in 2010, a value comparable to that of 2009.



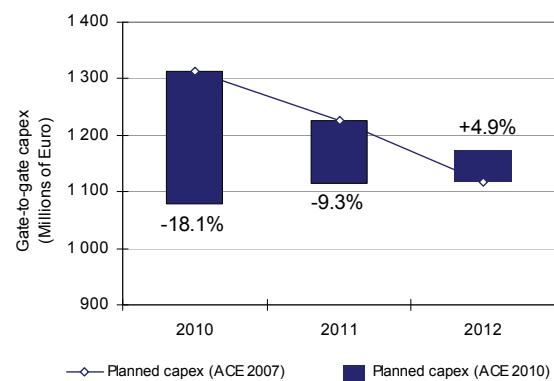
**Figure 6.5: Asset structure at European system level (2006-2010)**

This value is highly dependent on the depreciation policy: a more rapid depreciation of new investments and/or write-offs of previous investments tends to reduce the remaining accounting life of fixed assets.

Figure 6.6 shows the capital expenditure (capex) and depreciation costs at European system level, between 2006 and 2014 for the 34 ANSPs that consistently reported this information over this period. In 2010, capex amounted to some €1 151M. It is noteworthy that some 56% of this capex originated from the five largest ANSPs. Overall, the planned cumulative capex for the period 2011-2015 amounts to some €5 677M and represents some 69% of the 2010 total ANS revenues (i.e. €8 210M, see Section 2.4). This indicates that substantial investments programmes are planned for the future years.



**Figure 6.6: Forward-looking capex and depreciation costs at European system level (2006-2014, real terms)**



**Figure 6.7: Changes in planned capex at European system level (2010-2012, real terms)**

A significant proportion of these investments relate to major upgrades or to the replacement of existing ATM systems. It will be important, and a challenge, to start monitoring how these investments relate to IP1 or to the European ATM Master Plan, and gaining an understanding of the quantified contribution to performance improvements.

Figure 6.7 compares the capex<sup>80</sup> planned in ACE 2007 with the plans provided in ACE 2010 for the years 2010-2012. The actual 2010 capex have been -18% (or -€238M) below ACE 2007 plans. Furthermore, if in ACE 2009 the capex planned for the year 2011 were fairly in line with ACE 2007 plans, Figure 6.7 indicates that in ACE 2010, the 2011 capex have been revised

<sup>80</sup> Note that ARMATS, BULATSA, DCAC Cyprus, EANS, HCAA and MoldATSA are excluded from Figure 6.7.

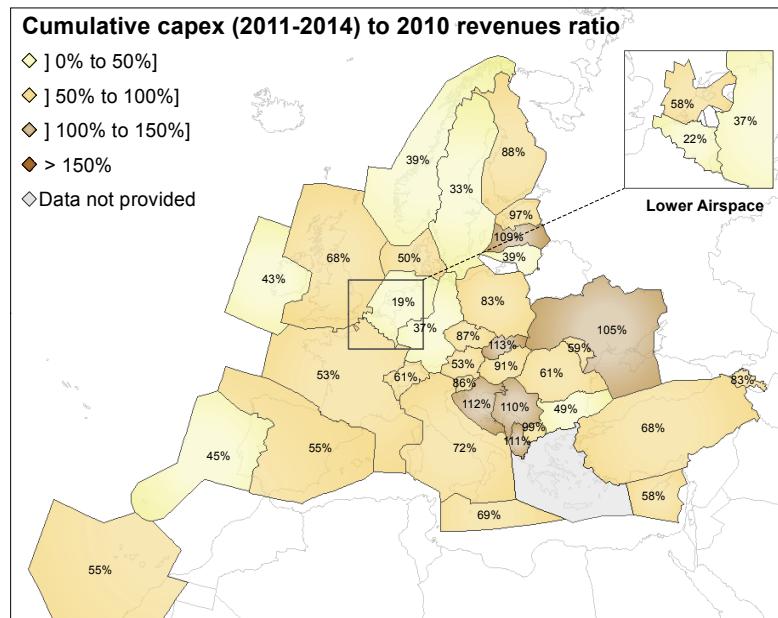
substantially downwards (i.e. -9%, or some -€114M). This suggests that several ANSPs revised their investment plans in the context of the cost-containment measures implemented following the traffic downturn in 2009.

### 6.3.1 Ratio of cumulative capex (2011-2014) to 2010 revenues at ANSP level

The cumulative capex (2011-2014)<sup>81</sup> to 2010 revenues ratio is displayed in Figure 6.8 for each ANSP.

The ratio is higher than 100% for 6 ANSPs, including, inter alia: LPS (113%), Croatia Control (112%), NATA Albania (111%), SMATSA (110%), LGS (109%) and Uksatse (105%).

This undoubtedly indicates substantial investments over the 2011-2014 period for these ANSPs, either as an extension of the present investment cycle (e.g. SMATSA, NATA Albania) or the start of a new investment cycle (e.g. Uksatse, LGS or Croatia Control).



**Figure 6.8: Ratio of ANSPs cumulative capex (2011-2014) to 2010 revenues**

Five ANSPs which are part of the FAB Central Europe (FAB CE) stand among the ANSPs with the highest cumulative capex to revenue ratio: LPS (113%), Croatia Control (112%), HungaroControl (91%), ANS CR (87%) and Slovenia Control (86%). In fact, all these ANSPs are planning, or have recently put into operation, significant investments, relating in particular to the construction of new ACC operational units and/or to major upgrades/replacement of ATM systems.

Given that several ANSPs plan very substantial capital expenditures, and in order to better understand the specific investment cycles, it is particularly important that ANSPs provide some information on the nature and extent of the planned capex. Additional details on the nature of the major investment projects for each ANSPs are provided in Annex 7 of this Report.

### 6.4 Changes in ATCOs in OPS and en-route ATC capacity

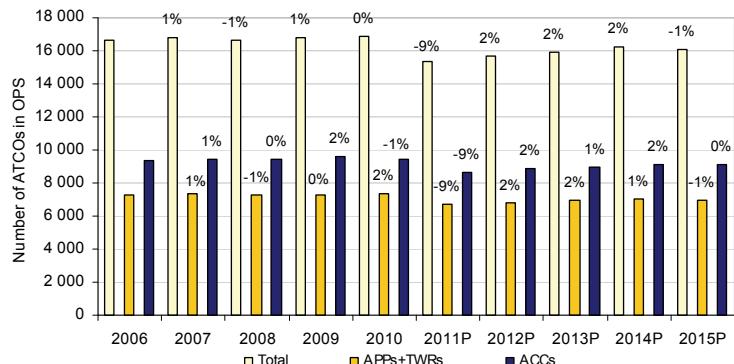
Figure 6.9 shows the forward-looking projections for ATCOs in OPS until 2015, with a breakdown into those that are operational in ACCs and those that are working in terminal operational units (APPs+TWRs)<sup>82</sup>.

<sup>81</sup> This analysis is based on the 2011-2014 period since Aena, EANS and NAVIAIR did not provide planned capex data for the year 2015.

<sup>82</sup> ARMATS is not included in Figure 6.9.

It should be noted that the decreases for ACCs and APPs+TWRs ATCOs in 2011 (i.e. -9%) are mainly due to the fact that Aena did not report the planned number of ACC and APP+TWR ATCOs<sup>83</sup>.

At European system level, the total number of ATCOs in OPS is planned to increase by +4.8% between 2011 and 2015.

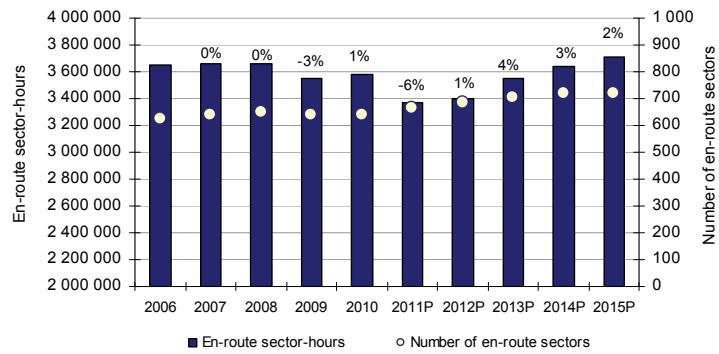


**Figure 6.9: Planned number of ATCOs in OPS at European system level (2006-2015)**

Figure 6.10 shows the number of en-route sectors and corresponding sector-hours planned to be opened between 2011 and 2015.

This information provides an insight into the planned level of ATC capacity<sup>84</sup> until 2015. It should be noted that the apparent drop of sector-hours in 2011 (-6%) is mainly due to the fact that NATS did not report complete sector-hours data between 2011 and 2015.

Figure 6.10 indicates that at European system level, for the 34 ANSPs that consistently reported this information, the total number of sector-hours is planned to increase by +8.2% between 2011 and 2014.



**Figure 6.10: Planned number of en-route sectors and sector-hours at European system level (2006-2015)**

<sup>83</sup> Austro Control, LVNL and NAVIAIR are included in Figure 6.9 although these ANSPs did not report planned ATCOs in OPS for 2015.

<sup>84</sup> ARMATS and Uksatse are not included in Figure 6.10.

## **PART III: ECONOMIC COST-EFFECTIVENESS**

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## 7 ECONOMIC COST-EFFECTIVENESS

### 7.1 Introduction

An assessment of the overall economic performance of ANSPs shall take into account both the financial cost-effectiveness, presented in **Part II**, and the **quality of service** provided, such as efficient routings and adequate levels of ATC capacity, while ensuring ANS safety.

As illustrated in Figure 7.1, there is to some extent a trade-off between financial cost-effectiveness and the quality of service provided.

Indeed, measures to expand ATC capacity and reduce delays may impose financial costs on airspace users. Therefore, if sole emphasis is placed on financial cost-effectiveness, it could disincentivise such measures, even when the benefits of delays saved outweigh the financial costs to the ANSP (and airspace users).

The objectives of this chapter are twofold. Firstly, it is to explain how the quality of service is factually measured and valued in monetary terms.

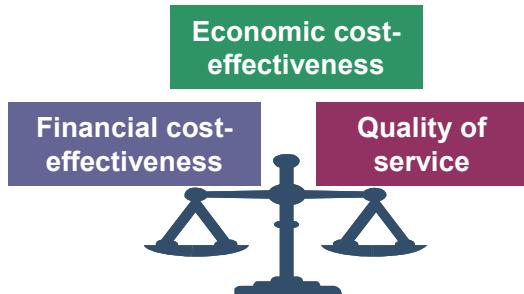
Secondly, it is to take a more comprehensive view of an ANSP cost-effectiveness performance by adding the quality of service dimension to the metrics presented in **Part II** of the report and articulating some of the key trade-offs that become more visible when considering a medium term perspective (five years).

### 7.2 The measures of quality of service

The quality of service provided by ANSPs impacts the efficiency of aircraft operations; inefficient routings or lack of adequate ATC capacity carry with them additional costs that need to be taken into consideration for a full economic assessment of ANSP performance.

A number of factors affect aircraft operations and contribute to the quality of service that is provided to airspace users by an ANSP. These include:

- ATFM ground delays both en-route and airport;
- airborne holding (although these are mostly a consequence of airport constraints);
- horizontal flight-efficiency and the resulting route length extension; and
- vertical flight-efficiency and the resulting deviation from optimal vertical flight profile.



**Figure 7.1: Trade-off between cost-effectiveness and quality of service**

#### Economic assessment & interdependencies

There are interdependencies between financial cost-effectiveness and operational performance, linked with demand-capacity balancing. Insufficient ATC capacity results in lower service quality (i.e. delays) with a negative impact on punctuality and airspace users' costs; while ATC capacity higher than demand may contribute towards lower financial cost-effectiveness (underutilisation of resources).

There are also interdependencies between flight-efficiency (economic & environmental impact) and delays (ATC capacity).

Because of the close link between fuel burn and gaseous emissions<sup>85</sup>, the last three factors have also an environmental impact in terms of additional green house gases emissions (CO<sub>2</sub>, N<sub>2</sub>O, etc.) and emissions affecting local air quality (NO<sub>x</sub>, CO, PM, etc.), and hence external costs to society at large.

As both ATFM delays and flight-efficiency have a cost to airspace users, there are internal trade-offs between these measures of quality of service. Moreover, it is likely that these trade-offs are exacerbated in particularly dense and congested airspaces.

The PRU is currently developing a methodology to compute ANS-related inefficiencies at ANSP and FAB levels. It is therefore envisaged that in the future, ACE reports will also include ANS-related inefficiencies in the airborne phase (i.e. flight-efficiency) as part of the economic cost-effectiveness indicator.

This would contribute to better reflect the quality of service associated with ATM/CNS provision, although it is important to bear in mind that local flight-efficiency improvements depend to some extent on civil/military coordination issues and European wide improvements in route and airspace designs: two issues which are not necessary under the full control of an ANSP and which might be better addressed at FAB level.

For the present report, however, the ANS-related inefficiencies in the airborne phase are not sufficiently mature to permit full consideration in the evaluation of economic cost-effectiveness. As a consequence of this limitation, the quality of service associated with ATM/CNS provision by ANSPs is, for the time being, assessed only in terms of **ATFM ground delays**, which are calculated consistently for all EUROCONTROL States by the CFMU<sup>86</sup>.

To incorporate ATFM delays into the measure of cost-effectiveness, the costs of ATFM delays in this report are approximated to be €81 per minute.

### **ATFM delay costs**

The cost of ATFM delay is based on the findings of the study “European airline delay cost reference values” by the University of Westminster<sup>87</sup> in March 2011. This study is an update of the report published in May 2004. It is based on more recent data and also brings a number of methodological improvements. One of the most important changes compared to the previous study is the consideration of “tactical” delays on the ground (engine off) below 15 minutes. Intuitively, this should reduce the average cost per minute, however other factors have significantly increased, and the overall result is a cost of €81 per minute (applicable to all ATFM delays), which is close to the €82 used in the ACE 2009 report (but which was applicable to ATFM delays above 15 minutes).

The estimated costs of ATFM delays includes direct costs (crew, passenger compensation, etc.) the network effect (i.e. cost of reactionary delays) and the estimated costs to an airline to retain passenger loyalty. The cost of time lost by passengers is only partly reflected.

Unavoidably, there is some uncertainty in this estimate and, hence, corresponding cost estimates should be viewed with care. To ensure consistency in time series, the updated cost per minute of ATFM delays has been applied consistently to all years and to all ANSPs.

<sup>85</sup> The emissions of CO<sub>2</sub> are directly proportional to fuel consumption (3.15 kg CO<sub>2</sub>/ kg fuel).

<sup>86</sup> EUROCONTROL Central Flow Management Unit (CFMU).

<sup>87</sup> [http://www.eurocontrol.int/prc/gallery/content/public/Docs/European%20airline%20delay%20cost%20reference%20values%20\(Final%20Report,%20V3.2\).pdf](http://www.eurocontrol.int/prc/gallery/content/public/Docs/European%20airline%20delay%20cost%20reference%20values%20(Final%20Report,%20V3.2).pdf).

### 7.3 The measure of economic gate-to-gate cost-effectiveness

In this report, the indicator of economic cost-effectiveness is defined as ATM/CNS provision costs plus the costs of ATFM delay, all expressed per composite flight-hour<sup>88</sup>. The conceptual framework is illustrated in Figure 7.2.

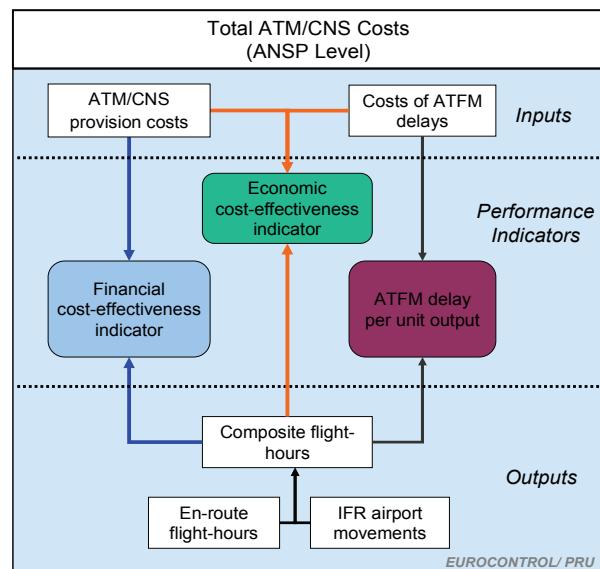
The analysis of financial cost-effectiveness is based on the ATM/CNS costs provided by the ANSPs, and is presented in **Part II** of this report (Chapters 4-6).

Table 7.1 shows how the economic cost-effectiveness indicator has been calculated: the costs of ATFM delays are added to the ATM/CNS provision costs to obtain the economic costs of service provision (see column 10). The indicator of economic cost-effectiveness is the economic cost per composite flight-hour.

While this approach enables to develop a more comprehensive view of an ANSP cost-effectiveness performance, there are also several drawbacks which need to be borne in mind for the interpretation of the results, in particular the factors affecting performance which are highlighted in Chapter 3.

As shown in Table 7.1, ATFM delays vary significantly across the various ANSPs. In 2010, the five largest ANSPs which handle 53% of the European system traffic account for 72% of total ATFM delays. DSNA, DFS and Aena are the main contributors with 29%, 21% and 17% of the system ATFM delays, while NATS<sup>89</sup> and ENAV contributed to 4.2% and 0.8%, respectively (see column 5 in Table 7.1). It is noteworthy that Austro Control, with a relatively low share of traffic (i.e. less than 3% of European system traffic) contributed to more than 5% of the total European ATFM delays.

There are also a number of ANSPs with very low ATFM delay figures or for which no ATFM delay was reported in 2010 (i.e. LGS).



**Figure 7.2: Conceptual framework for the analysis of economic cost-effectiveness**

<sup>88</sup> As defined in Annex 2 of this ACE Benchmarking Report.

<sup>89</sup> It should be noted that the total ATFM delays data used in this ACE Report for NATS differ from the en-route attributable delays on which NERL delay bonus/penalty system is based in the context of the economic regulation regime in place in the UK.

- The data provided in Table 7.1 and Figure 7.3 relate to gate-to-gate ATFM delays and not only en-route delays; and,
- NERL attributable delays exclude delays relating to causes such as weather which are included in the total ATFM delays analysis in this report.

ANSPs	(1)	(2)	(3)	(4)=(2)+(3)	(5)	(6)=(4)xE81	(7)	(8)=(1)/(7)	(9)=(6)/(7)	(10)=(8)+(9)
	Gate-to-gate ATM/CNS provision costs (in €'000)	ATFM delays < 15 min. ('000 minutes)	ATFM delays > 15 min. ('000 minutes)	Total ATFM delays ('000 minutes)	% share in European System ATFM delays	Costs of ATFM delays (in €'000)	Composite flight-hours (in '000)	Financial gate-to-gate cost-effectiveness	Cost of delay per composite flight-hour	Economic cost per composite flight-hour
Aena	930 573	728	3 848	4 576	16.7%	370 647	1 807	515	205	720
ANS CR	114 714	26	111	137	0.5%	11 133	273	420	41	461
ARMATS	6 333	0	0	0	0.0%	0	18	351	0	351
BULATSA	73 330	0	0	0	0.0%	0	191	385	0	385
Astro Control	171 450	319	1 124	1 442	5.2%	116 829	385	445	303	749
Avinor	172 898	11	61	71	0.3%	5 772	469	368	12	381
Belgocontrol	147 515	52	261	312	1.1%	25 283	204	725	124	849
Croatia Control	68 851	93	378	471	1.7%	38 161	204	338	187	525
DCAC Cyprus	40 663	113	896	1 008	3.7%	81 659	148	276	553	829
DFS	877 736	1 022	4 676	5 698	20.7%	461 565	1 893	464	244	707
DHMI	280 168	133	833	965	3.5%	78 189	1 024	274	76	350
DSNA	1 137 731	815	7 091	7 906	28.8%	640 397	2 577	441	248	690
EANS	10 732	1	4	5	0.0%	388	62	173	6	179
ENAV	653 665	23	199	222	0.8%	17 996	1 387	471	13	484
Finavia	57 480	6	20	26	0.1%	2 093	176	326	12	338
HCAA	164 266	72	917	989	3.6%	80 099	537	306	149	455
HungaroControl	93 736	0	1	2	0.0%	141	224	418	1	419
IAA	112 731	3	31	34	0.1%	2 731	308	366	9	375
LFV	206 263	25	106	130	0.5%	10 552	533	387	20	407
LGS	21 101	0	0	0	0.0%	0	80	265	0	265
LPS	48 755	8	28	36	0.1%	2 946	91	534	32	566
LVNL	161 441	92	363	455	1.7%	36 830	263	614	140	754
MATS	13 884	0	0	0	0.0%	6	55	251	0	251
M-NAV	10 376	0	0	0	0.0%	0	24	434	0	434
MoldATSA	7 881	0	0	0	0.0%	0	18	432	0	432
MUAC	138 759	20	53	73	0.3%	5 924	543	255	11	266
NATA Albania	18 724	5	19	24	0.1%	1 945	44	422	44	466
NATS	703 647	146	994	1 141	4.2%	92 401	1 708	412	54	466
NAV Portugal (FIR Lisboa)	119 368	6	45	51	0.2%	4 128	345	346	12	358
NAVIAIR	109 643	8	52	60	0.2%	4 853	295	372	16	389
Oro Navigacija	20 871	0	0	0	0.0%	0	58	363	0	363
PANSA	127 801	163	516	679	2.5%	54 959	422	303	130	433
ROMATSA	142 690	0	0	0	0.0%	39	330	433	0	433
Skyguide	240 642	219	710	929	3.4%	75 257	444	542	169	711
Slovenia Control	25 821	0	1	1	0.0%	74	53	485	1	486
SMATSA	75 051	0	5	5	0.0%	420	235	319	2	321
UkSATSE	168 295	3	23	26	0.1%	2 122	397	424	5	429
Total European System	7 475 585	4 111	23 365	27 476	100%	2 225 542	17 826	419	125	544

**Table 7.1: Economic cost-effectiveness indicator, 2010**

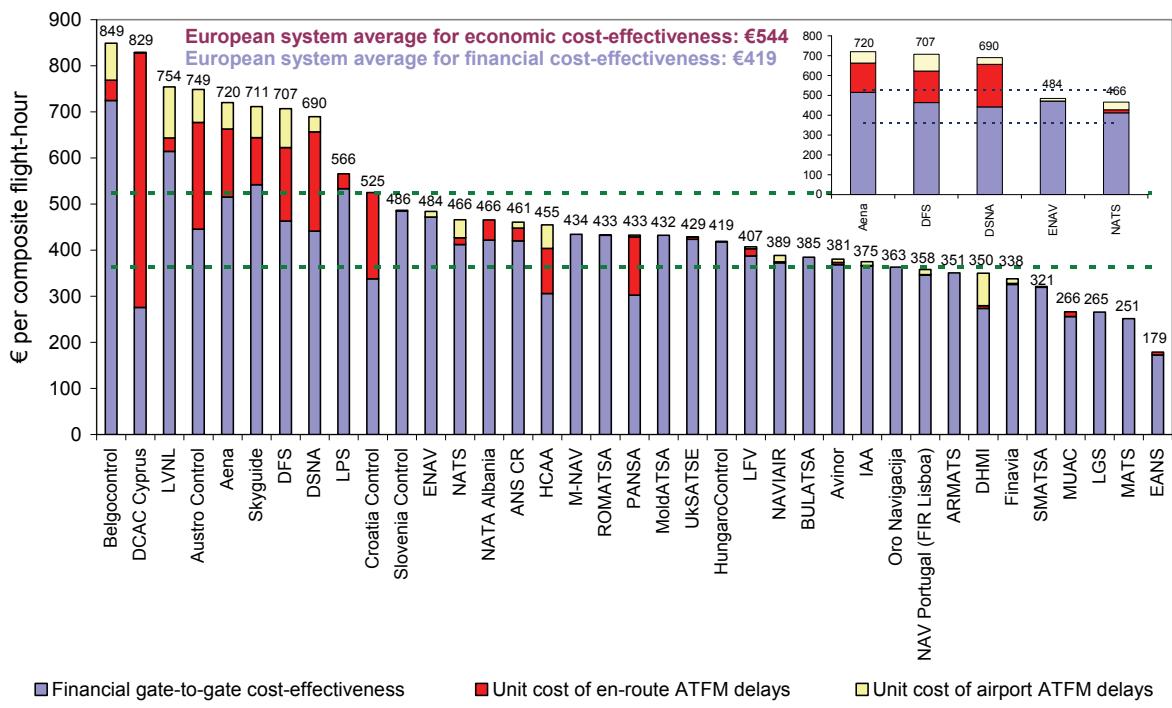
#### 7.4 Comparison of economic cost-effectiveness (2010)

The overall economic cost-effectiveness indicator is not uniform across Europe. Figure 7.3 displays the comparison of the gate-to-gate economic cost per composite flight-hour by ANSP<sup>90</sup>.

The economic cost effectiveness KPI at European system level amounts to €544 per composite flight-hour in 2010. The two dotted lines displayed in Figure 7.3 represent the bottom and top quartiles which provide an indication of the dispersion in economic unit costs across ANSPs. There is a difference of some €162 between the bottom and top quartile in Figure 7.3. This is higher than in 2009 (€154) and indicates that the dispersion increased in 2010.

The economic cost-effectiveness indicator ranges from €849 (Belgocontrol) to €179 (EANS), a factor greater than five.

<sup>90</sup> ENAV 2010 ATM/CNS provision costs comprise costs relating to ATC services (€37.9M) provided by the Italian Air Force (ITAF) mainly at regional civil/military airports.

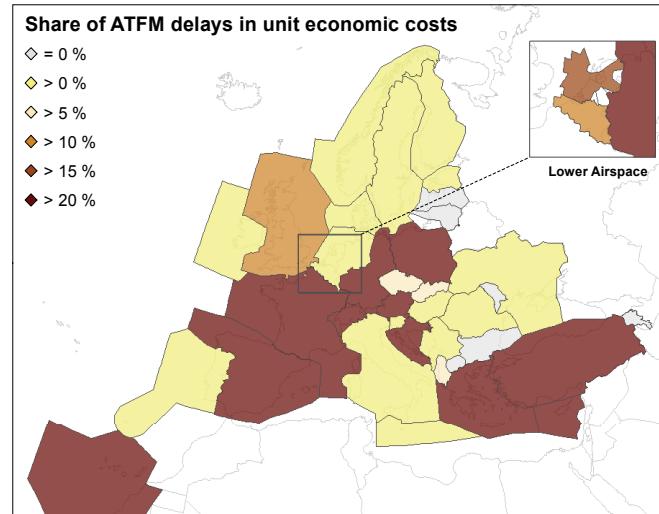


**Figure 7.3: Economic gate-to-gate cost-effectiveness KPI, 2010**

Note that this economic cost-effectiveness indicator is a factual indicator. A genuine measurement of **cost inefficiencies** would require full account to be taken of identified and **measurable** exogenous factors such as cost of living, traffic complexity, and traffic variability (as described in Chapter 3).

Figure 7.4 shows the geographical distribution of the share of ATFM delays in economic gate-to-gate unit costs by ANSP in 2010.

For Aena, Austro Control, Croatia Control, DCAC Cyprus, DFS, DHMI, DSNA, HCAA, PANSA and Skyguide the estimated costs of ATFM delays account for more than 20% of the economic unit costs in 2010.



**Figure 7.4: Share of ATFM delays in unit economic costs, 2010**

On the other hand, it is important to note that some of these ANSPs managed to reduce ATFM delays despite a significant increase in traffic in 2010. This is in particular the case for DHMI (+14%) and PANSA (+6%).

Across Europe, ATFM delays contributed some 23% (12% in 2009) to the total economic gate-to-gate cost in 2010. The ash cloud in April 2010 caused a notable drop in traffic in April 2010, but the impact in terms of ATFM delays was relatively small because flights were cancelled instead of delayed.

Several ANSPs (e.g. DCAC Cyprus, Austro Control, PANSA) have had recurrent capacity issues for several years and could not implement the necessary measures to address them in 2010, although the traffic downturn in 2009 was an opportunity to significantly reduce the capacity gap.

For DCAC Cyprus, the share of ATFM delays to the total economic costs rose from 55% in 2009 to 67% in 2010. This higher share mainly reflects a sharp increase in en-route ATFM delays (+62%). Austro Control's share of ATFM delays to the total economic costs rose by +6 percentage points to reach 41% in 2010, despite a slight decrease in traffic volumes (-0.5%). For PANSA, ATFM delays are mainly relating to the technical limitations of the current ATM system and to a shortage of ATCOs. It is expected that the new ATM system Pegasus-21, which is planned to be commissioned in 2012, will contribute to improve this situation.

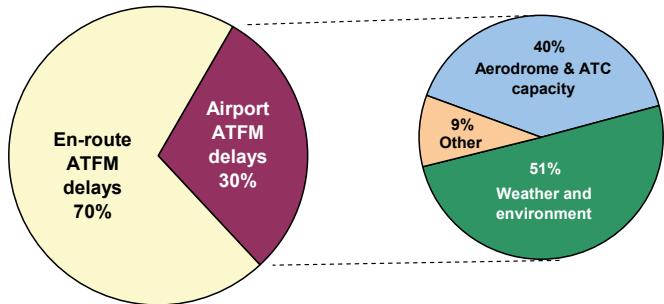
Amongst the five largest ANSPs, for DSNA (36%), DFS (34%) and Aena (28%) the share of ATFM delays amounts to more than 20% of the economic costs. The increase in ATFM delays for DFS was mainly due to staff training relating to the implementation of the VAFORIT system in Rhein ACC. The large share for DSNA and Aena reflects an increase in ATFM delays mainly relating to social tensions (for Aena this is mainly due to the transition period that was on-going in Spain in 2010).

Figure 7.5 shows the breakdown of ATFM delays by type and delay cause. Airport ATFM delays represent 30% of the total ATFM delays of which 51% are caused by weather and environment issues which may be difficult for the ANSP to influence.

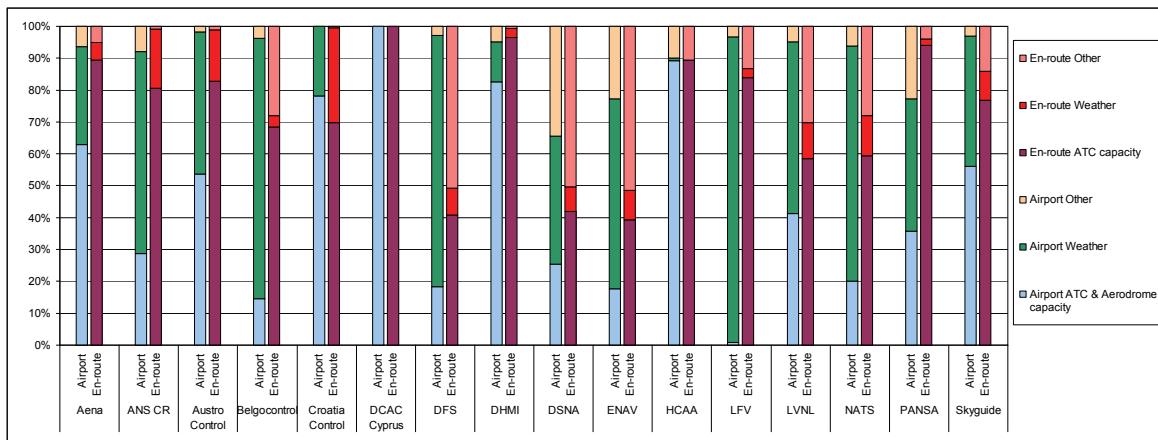
However, 40% of airport ATFM delays result from aerodrome or ATC capacity problems. This can rise up to 100% in individual ANSPs (see Figure 7.6 below).

As indicated above, ATFM delays (and the associated costs to airspace users) arise from both en-route and airport ATFM delays. The results should be interpreted with a degree of caution, especially in cases where ATFM delays largely arise from airport ATFM delays. Airport ATFM delays, and associated costs, may arise from airport constraints, which are outside the direct control of the respective ANSP (such as compliance with environmental constraints or lack of airport infrastructure).

Figure 7.6 shows the distribution of delays by cause for those ANSPs with more than 100 000 minutes of ATFM delays. The number of these ANSPs increased from 15 to 16, between 2009 and 2010.



**Figure 7.5: Breakdown of ATFM delays, 2010**



**Figure 7.6: Causes of en-route and airport ATFM delays, 2010**

Figure 7.6 indicates that en-route ATFM delays for the most of the ANSPs are mainly associated with ATC capacity issues (see purple bar). The airport ATFM delays recorded for Aena, Austro Control, Croatia Control, DCAC Cyprus, DHMI, HCAA and Skyguide are mainly associated with aerodrome capacity issues (see light blue bar).

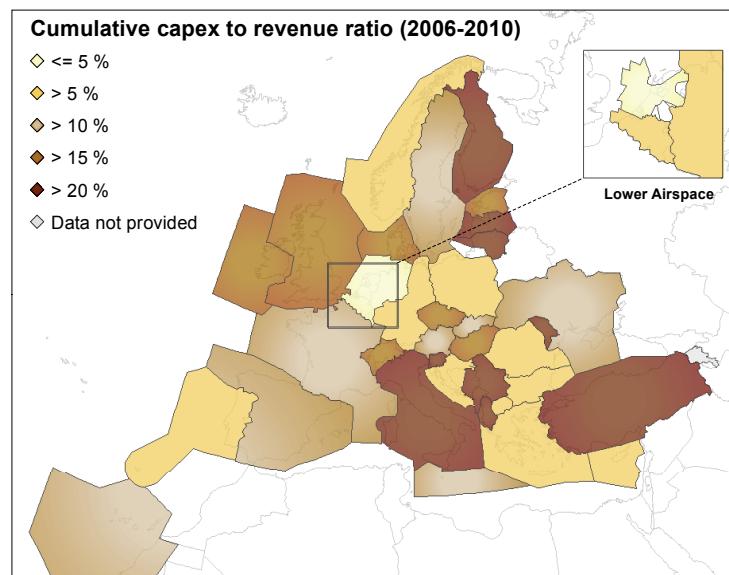
On the other hand, the airport ATFM delays for ANS CR, Belgocontrol, DFS, DSNA, ENAV, LFV, LVNL, NATS and PANSA are mainly due to weather (see green bar). This reflects the impact of the adverse weather conditions faced by these ANSPs during the 2010 winter season.

In absence of exceptional events (i.e. severe weather, industrial actions, etc.), the level of ATFM delays should mainly depend on the extent to which the ATC capacity provided by an ANSP is in line with the traffic demand. In the medium-term, the level of capacity provided can be gradually increased through a variety of measures including the recruitment of additional ATCOs and capital investment (e.g. ATM systems with higher capabilities, etc.).

Between 2006 and 2010, ANSPs invested some €6.0 billion with different investment cycles and magnitudes across ANSPs.

Average ANSPs “capex to revenue” ratios – a measure of the magnitude of the investment - for the period 2006-2010 are shown in Figure 7.7.

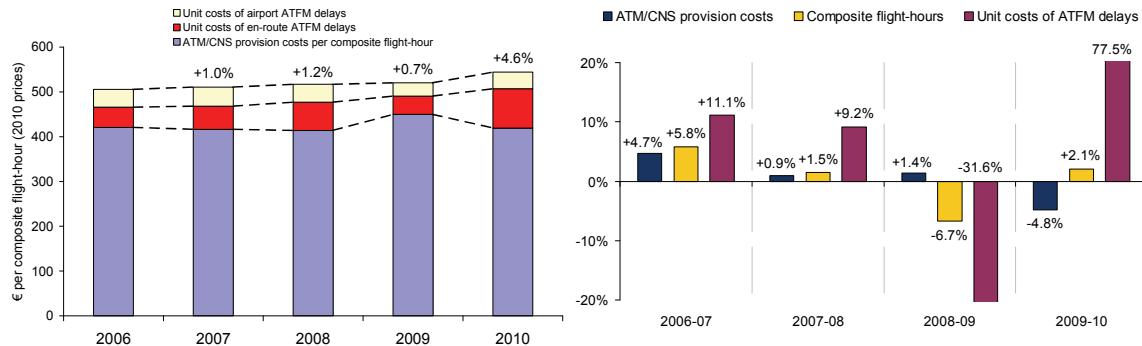
For 16 ANSPs, the “capex to revenue” ratio is higher than 15% indicating substantial investments on the period.



**Figure 7.7: ANSPs cumulative capex (2006-2010)**

## 7.5 Trends in economic cost-effectiveness (2006-2010)

This section analyses the changes of the economic gate-to-gate cost-effectiveness indicator between 2006 and 2010 at European system level. Note that, for the reasons detailed in Chapter 5, the indicators presented in this section are not directly comparable to those in previous ACE reports.



**Figure 7.8: Trend in gate-to-gate economic cost-effectiveness (2006-2010, real terms)**

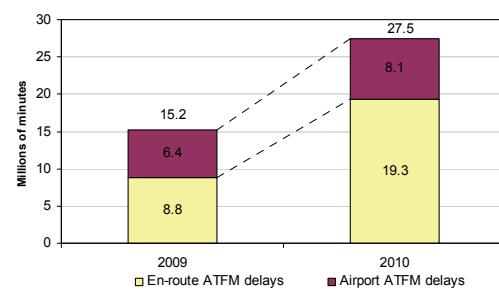
The left-hand side of Figure 7.8 shows that at system level, economic costs per composite flight-hour slightly increased between 2006 and 2009 (i.e. +1.0% p.a. in real terms) and then substantially rose in 2010 (i.e. +4.6% in real terms). As a result, at European system level, unit economic costs increased by +7.7% in real terms between 2006 and 2010. Since, in the meantime, average consumer prices grew by some +9.3%, the economic unit costs increased by some +17% in nominal terms.

The left-hand side of Figure 7.8 indicates that in 2009, traffic volumes significantly fell (-6.7%) reflecting the impact of the economic crisis on the ANS industry. In the meantime, gate-to-gate ATM/CNS provision costs slightly increased (+1.4% in real terms), leading to a +8.7% increase in unit costs. Figure 7.8 also shows that this significant increase was compensated by a sharp decrease in the unit costs of ATFM delays (-31.6%) and as a result unit economic costs remained fairly constant in 2009 (+0.7%).

In 2010, the number of composite flight-hours increased by +2.1%. This is much lower than the levels achieved before the economic crisis (+4-6% a year over 2004-2007) indicating that traffic growth did not bounce back in 2010 following the downturn experienced in 2009. In the meantime, ATM/CNS provision costs fell by -4.8% in real terms. However, this decrease was outweighed by a sharp increase in the unit costs of ATFM delays (+77.5%) which is disappointing given the relatively low traffic growth experienced in 2010. Overall, the result was a +4.6% rise in unit economic costs in 2010.

Figure 7.9 shows that the increase in the unit costs of ATFM delays in 2010 (+77.5%) is mainly due to an increase in en-route ATFM delays (i.e. from 8.8M minutes to 19.3M minutes).

The substantial increase in en-route ATFM delays for three of the five largest ANSPs (Aena, DFS and DSNA) significantly contributed to the increase observed at European system level.



**Figure 7.9: Changes in ATFM delays, (2009-2010)**

The changes in economic gate-to-gate unit costs at European system level mask a contrasted picture for the 36 ANSPs that consistently reported ACE data since 2006.

Between 2006 and 2010, economic gate-to-gate costs per composite flight-hour fell for 19 ANSPs:

- For 14 ANSPs, the performance improvement was mainly due to a reduction in unit ATM/CNS provision costs;
- For 5 ANSPs, the main driver for the decrease in economic gate-to-gate unit cost was a reduction in ATFM delays.

It is important to note that differences in the investment cycle can affect the economic gate-to-gate cost-effectiveness either through high levels of delay **prior** to a major ATM investment, or through high capital-related costs (depreciation, cost of capital) **after** the major ATM investment (see also Chapter 3 on factors affecting performance).

The top of Figure 7.10 shows the evolution of economic gate-to-gate cost-effectiveness for ANSPs with a complexity score **higher** than 4 minutes of interaction per flight-hour and the bottom of Figure 7.10 for those ANSP with a complexity score **below** 4 minutes. It is important to note that changes in traffic volumes between 2009 and 2010 significantly differ between these two groups. Indeed, while for the 22 less “complex” ANSPs traffic volumes increased by +5.7% in 2010, they remained fairly constant for the 15 most “complex” ANSPs (+0.5%).

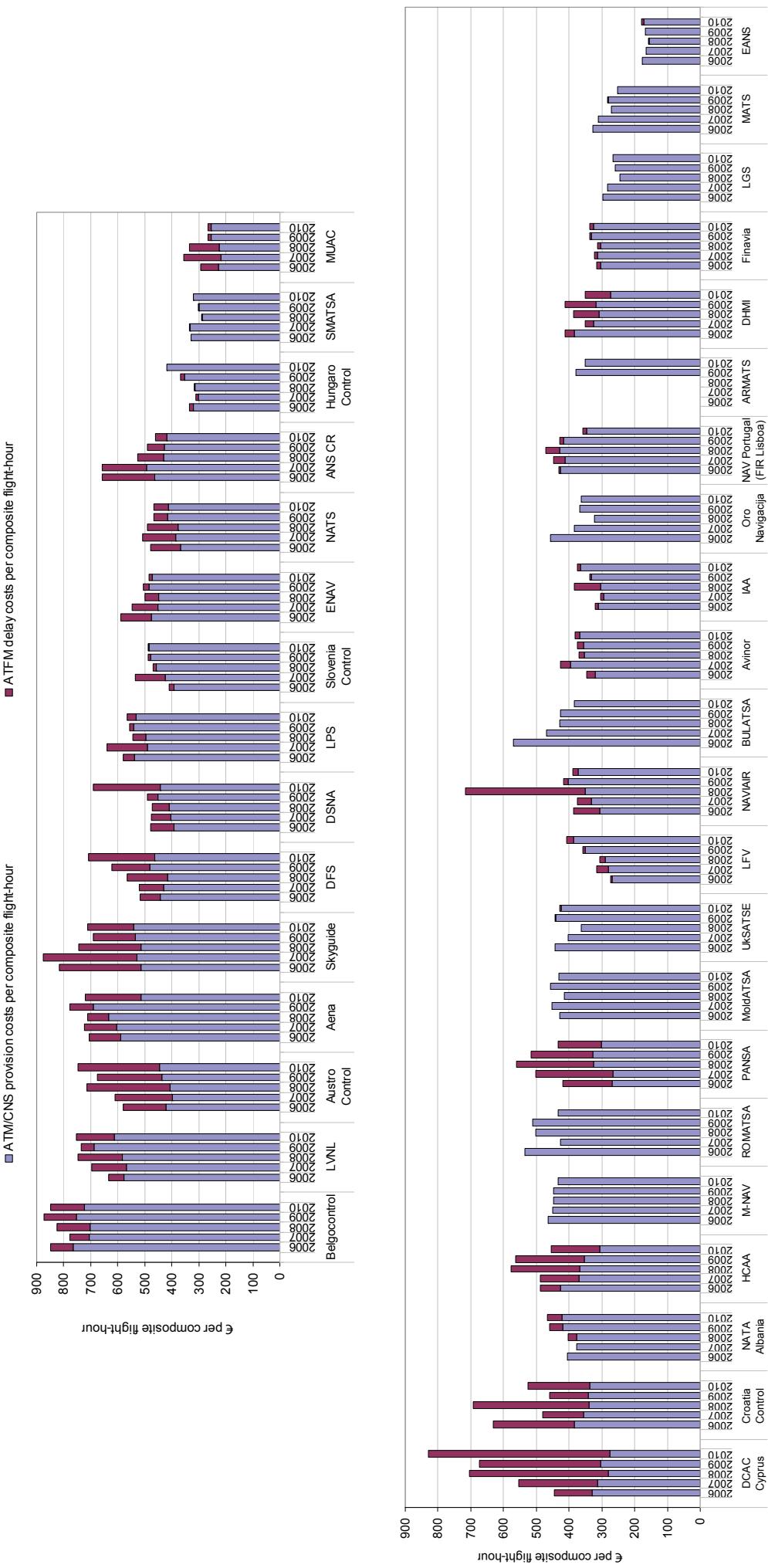
The top chart in Figure 7.10 suggests that:

- The rise in unit economic costs for LVNL (+2.7%), Austro Control (+11.0%), DFS (+13.7%), Skyguide (+2.9%), DSNA (+41.1%) and LPS (+1.5%) is mainly due to an increase of ATFM delays in 2010. For HungaroControl (+14.3%) and SMATSA (+6.8%), the increase in unit economic costs mainly results from a rise in ATM/CNS provision costs per composite flight-hours.
- In 2010, five ANSPs could reduce their economic gate-to-gate unit costs (Aena (-7.5%), ANS CR (-6.1%), Belgocontrol (-2.9%), ENAV (-4.3%) and to a lower extent Slovenia Control (-0.4%). For Slovenia Control and ANS CR, this is mainly due to a decrease in ATFM delays. On the other hand, for Aena and Belgocontrol the reduction in unit economic costs results from a decrease in unit ATM/CNS provision costs which more than compensated for the rise in ATFM delays. For ENAV, the improvement in economic cost-effectiveness results from a decrease in both ATFM delays and unit ATM/CNS provision costs.
- Unit economic costs remained fairly constant between 2009 and 2010 for NATS (+0.1%) and MUAC (-0.1%).

The bottom chart in Figure 7.10 indicates that:

- Five ANSPs experienced no ATFM delays throughout the 2006-2010 period despite high traffic growth in many of these ANSPs.
- 13 ANSPs managed to reduce their economic cost-effectiveness KPI between 2009 and 2010, mainly through a decrease in unit ATM/CNS provision costs. HCAA (-19.3%), PANSA (-16.3%) and DHMI (-14.9%) achieved to reduce both ATFM delays and unit ATM/CNS provision costs. Nevertheless, the quality of service provided is still an issue for these ANSPs for which the share of ATFM delays in total economic costs is higher than 20% (see also Figure 7.4 above).
- In 2010, unit economic costs increased for 8 ANSPs and in particular for DCAC Cyprus (+23.0%), Croatia Control (+14.2%) and LFV (+13.7%). The unit costs of ATFM delays recorded for DCAC Cyprus which were already high in 2009 (€371) increased by +49.2% in 2010 and represents some 67% of economic cost-effectiveness KPI.

**Figure 7.10: Changes in economic cost-effectiveness by ANSP (2006-2010)**



## ANNEX 1 – STATUS ON ANSPs YEAR 2010 ANNUAL REPORTS

	Availability of a public Annual Reports (AR)	Availability of Management Report	Availability of Annual Accounts	Independent audited accounts	Separate accounts for en-route and terminal ANS costs	Information provided in English	PRU comments
Aena	✓	✓	✓	✓	No	✓	Includes airport activities.
ANS CR	✓	✓	✓	✓	No	✓	
ARMATS	No	No	No	No	No	No	PRU received an extract of the financial statements comprising an Income and a Balance Sheet statement.
Austro Control	✓	✓	✓	✓	No	✓	
Avinor	✓	✓	✓	✓	No	✓	
Belgocontrol	✓	✓	✓	✓	No	✓	Audit performed by the "Collège des Commissaires". No cash flow statement.
BULATSA	✓	✓	✓	✓	No	✓	
Croatia Control	✓	✓	✓	✓	No	✓	
DCAC Cyprus	No	No	No	No	No	No	
DFS	✓	✓	✓	✓	No	✓	Separate accounts are used for internal reporting purposes and charges calculation.
DHMI	✓	✓	✓	✓	No	✓	Includes airport activities.
DSNA	✓	✓	✓	✓	No	✓	
EANS	✓	✓	✓	✓	No	✓	
ENAV	✓	✓	✓	✓	No	No	
Finavia	✓	✓	✓	✓	No	✓	Detailed accounts only available for total Finavia.
HCAA	No	No	No	No	No	No	
HungaroControl	✓	✓	✓	✓	No	✓	
IAA	✓	✓	✓	✓	No	✓	
LFV	✓	✓	✓	✓	No	✓	Information from the first quarter included both airport operation and air navigation services.
LGS	✓	✓	✓	✓	No	✓	
LPS	✓	✓	✓	✓	No	✓	
LVNL	✓	✓	✓	✓	✓	✓	Separate Income Statement for en-route and terminal ANS
MATS	✓	✓	✓	✓	✓	✓	Separate Income Statement for en-route and terminal ANS.
M-NAV	No	No	No	No	No	No	
MoldATSA	No	No	No	No	No	No	PRU received an extract of the financial statements comprising a Balance Sheet statement.
MUAC	✓	✓	✓	✓	n/appl	✓	
NATA Albania	✓	✓	✓	✓	No	✓	
NATS	✓	✓	✓	✓	✓	✓	Several ARs for individual group companies.
NAV Portugal (FIR Lisboa)	✓	✓	✓	✓	No	✓	
NAVIAIR	✓	✓	✓	✓	✓	✓	
Oro Navigacija	✓	✓	✓	✓	✓	✓	Total revenues and costs provided for both en-route and terminal ANS.
PANSA	✓	✓	✓	✓	No	✓	
ROMATSA	✓	✓	✓	✓	No	✓	
Skyguide	✓	✓	✓	✓	✓	✓	Separate accounts for en-route, terminal and military OAT services.
Slovenia Control	✓	✓	✓	✓	No	✓	
SMATSA	✓	✓	✓	✓	No	✓	
UkSATSE	✓	✓	✓	✓	No	✓	Annual Report does not include a balance-sheet statement.

**Annex 1 - Table 0.1: Status on ANSP's 2010 Annual Reports**

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## ANNEX 2 - PERFORMANCE INDICATORS USED FOR THE COMPARISON OF ANSPS

The output measures for ANS provision are, for en-route, the en-route flight-hours controlled<sup>91</sup> and, for terminal ANS, the number of IFR airport movements controlled. Those output measures can be derived from the EUROCONTROL database and therefore readily available and consistent across the ANSPs included in the analysis.

In addition to those output metrics, it is important to consider a "gate-to-gate" perspective, because the boundaries used to allocate costs between en-route and terminal ANS vary between ANSPs and might introduce a bias in the cost-effectiveness analysis<sup>92</sup>.

For this reason, an indicator combining the two separate output measures for en-route and terminal ANS provision has been calculated. The "composite gate-to-gate flight-hours" are determined by weighting the output measures by their respective average cost of the service for the whole European system. This average weighting factor is based on the total monetary value of the outputs over the period 2002-2010 and amounts to 0.26.

The composite gate-to-gate flight-hours are consequently defined as:

$$\text{Composite gate-to-gate flight-hours} = \text{En-route flight-hours} + (0.26 \times \text{IFR airport movements})$$

In the ACE 2001-2006 Reports, two different weighting factors were used to compute ANSPs cost-effectiveness: one for the year under study and another to examine changes in performance across time. As the ACE data sample became larger in terms of years, the difference between these two weighting factors became insignificant. For the sake of simplicity, it was therefore proposed in the ACE 2007 Benchmarking Report to use only one weighting factor to analyse ANSPs performance for the year and to examine historical changes in cost-effectiveness.

Although the composite gate-to-gate output metric does not fully reflect all aspects of the complexity of the services provided, it is nevertheless the best metric currently available for the analysis of gate-to-gate cost-effectiveness<sup>93</sup>.

<sup>91</sup> Controlled flight-hours are calculated by the CFMU as the difference between the exit time and entry time of any given flight in the controlled airspace of an operational unit. Three types of flight-hours are currently computed by the CFMU (filed model, regulated model and current model). The data used for the cost-effectiveness analysis is based on the current model (Model III or CFTM) and includes flight-hours controlled in the ACC, APP and FIS operational units which are described in the CFMU environment.

<sup>92</sup> See also working paper on "Cost-effectiveness and Productivity Key Performance Indicators", available on the PRC web site at [www.eurocontrol.int/prc](http://www.eurocontrol.int/prc).

<sup>93</sup> Further details on the theoretical background to producing composite indicators can be found in a working paper on "Productivity of European ANSPs: basic concepts and application" (Sept. 2003).

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## ANNEX 3 – TRAFFIC COMPLEXITY INDICATORS AT ANSP LEVEL

ANSPs	[1] Adjusted density	[2] Vertical interactions	[3] Horizontal interactions	[4] Speed interactions	[5] = [2]+[3]+[4]	[6] = [1]x[5]
Skyguide	11.45	0.28	0.55	0.21	1.04	11.96
Belgocontrol	8.76	0.42	0.53	0.42	1.36	11.93
DFS	10.44	0.29	0.53	0.26	1.08	11.26
NATS	9.99	0.37	0.41	0.31	1.09	10.90
MUAC	10.53	0.25	0.51	0.16	0.92	9.71
LVNL	9.91	0.21	0.36	0.36	0.94	9.33
Austro Control	8.27	0.21	0.49	0.22	0.92	7.60
ANS CR	8.18	0.17	0.50	0.20	0.87	7.15
DSNA	9.33	0.15	0.39	0.14	0.69	6.44
Slovenia Control	7.51	0.15	0.49	0.12	0.76	5.71
ENAV	5.62	0.27	0.55	0.19	1.01	5.70
SMATSA	9.04	0.05	0.47	0.06	0.58	5.23
HungaroControl	7.55	0.07	0.44	0.14	0.66	4.95
LPS	6.21	0.14	0.48	0.17	0.78	4.86
Aena	6.64	0.17	0.39	0.13	0.69	4.55
Croatia Control	6.51	0.06	0.47	0.08	0.61	4.00
PANSA	4.28	0.14	0.52	0.25	0.92	3.92
NAVIAIR	4.04	0.18	0.55	0.21	0.93	3.78
DHMI	5.55	0.14	0.38	0.11	0.63	3.51
ROMATSA	5.33	0.07	0.39	0.15	0.61	3.26
LFV	3.11	0.22	0.46	0.23	0.91	2.84
DCAC Cyprus	4.40	0.14	0.39	0.11	0.63	2.79
M-NAV	4.61	0.11	0.42	0.06	0.59	2.73
HCAA	4.28	0.11	0.39	0.09	0.59	2.52
BULATSA	6.78	0.05	0.25	0.06	0.36	2.45
NATA Albania	5.54	0.06	0.33	0.05	0.43	2.41
NAV Portugal (FIR Lisboa)	3.42	0.17	0.39	0.08	0.65	2.21
Avinor	2.03	0.33	0.47	0.25	1.04	2.12
EANS	3.32	0.15	0.29	0.19	0.62	2.07
LGS	2.99	0.10	0.43	0.14	0.68	2.02
Finavia	1.95	0.27	0.34	0.36	0.98	1.90
UkSATSE	3.04	0.05	0.39	0.18	0.62	1.89
Oro Navigacija	2.94	0.07	0.37	0.17	0.62	1.82
IAA	4.08	0.07	0.22	0.10	0.40	1.61
MoldATSA	1.71	0.05	0.39	0.19	0.63	1.08
ARMATS	1.17	0.09	0.37	0.17	0.62	0.73
MATS	1.18	0.11	0.36	0.12	0.59	0.70
Average	7.22	0.21	0.44	0.19	0.84	6.08

**Annex 3 - Table 0.1: Traffic complexity indicators at ANSP level, 2010**

ANSPs	ACC name	[1] Adjusted density	[2] Vertical interactions	[3] Horizontal interactions	[4] Speed interactions	[5] = [2]+[3]+[4]	[6] = [1]x[5]	Average used flight level
Aena	Palma	5.8	0.25	0.38	0.28	0.91	5.3	115
Aena	Barcelona	6.5	0.21	0.44	0.12	0.76	5.0	276
Aena	Madrid	7.0	0.12	0.36	0.08	0.55	3.9	333
Aena	Sevilla	4.9	0.19	0.35	0.10	0.64	3.1	288
Aena	Canarias	2.4	0.19	0.27	0.12	0.58	1.4	248
ANS CR	Praha	8.2	0.16	0.50	0.19	0.86	7.0	315
ARMATS	Yerevan	1.2	0.07	0.37	0.17	0.61	0.7	320
Austro Control	Wien	8.4	0.17	0.50	0.18	0.85	7.1	324
Avinor	Oslo	3.1	0.34	0.47	0.22	1.02	3.2	192
Avinor	Bodo	0.9	0.33	0.46	0.27	1.06	0.9	185
Avinor	Stavanger	1.1	0.25	0.43	0.27	0.95	1.0	189
Belgocontrol	Brussels	8.8	0.42	0.53	0.42	1.36	11.9	157
BULATSA	Sofia	6.9	0.05	0.25	0.05	0.35	2.5	347
Croatia Control	Zagreb	6.7	0.06	0.47	0.08	0.61	4.1	342
DCAC Cyprus	Nicosia	4.4	0.14	0.39	0.11	0.63	2.8	318
DFS	Langen	10.6	0.39	0.51	0.44	1.34	14.2	147
DFS	Munchen	9.6	0.32	0.48	0.30	1.10	10.6	229
DFS	Rhein	11.8	0.20	0.56	0.16	0.92	10.9	347
DFS	Bremen	4.4	0.32	0.50	0.40	1.22	5.4	129
DHMI	Istanbul	5.5	0.20	0.29	0.11	0.60	3.3	286
DHMI	Ankara	5.4	0.10	0.41	0.10	0.61	3.3	339
DSNA	Reims	10.4	0.20	0.40	0.16	0.76	7.9	330
DSNA	Paris	8.5	0.23	0.27	0.28	0.78	6.6	243
DSNA	Marseille	7.8	0.16	0.42	0.13	0.72	5.6	318
DSNA	Bordeaux	10.1	0.11	0.38	0.09	0.58	5.9	336
DSNA	Brest	9.4	0.09	0.43	0.08	0.59	5.5	348
EANS	Tallinn	3.3	0.15	0.29	0.19	0.62	2.1	310
ENAV	Milano	6.4	0.43	0.58	0.37	1.37	8.8	174
ENAV	Padova	6.6	0.28	0.62	0.19	1.09	7.2	301
ENAV	Roma	5.5	0.24	0.52	0.14	0.90	4.9	285
ENAV	Brindisi	3.7	0.14	0.49	0.10	0.73	2.7	315
Finavia	Tampere	1.6	0.28	0.27	0.31	0.86	1.4	253
Finavia	Rovaniemi	0.5	0.46	0.41	0.41	1.28	0.6	235
HCAA	Athinai+Macedonia	4.3	0.09	0.38	0.07	0.53	2.3	318
HungaroControl	Budapest	7.7	0.06	0.44	0.13	0.64	4.9	333
IAA	Dublin	5.5	0.30	0.40	0.36	1.06	5.8	126
IAA	Shannon	3.9	0.04	0.20	0.06	0.31	1.2	332
LFV	Malmo	3.4	0.16	0.49	0.16	0.80	2.7	312
LFV	Stockholm	2.2	0.35	0.39	0.37	1.10	2.4	233
LGS	Riga	3.1	0.09	0.44	0.13	0.66	2.0	337
LPS	Bratislava	6.3	0.13	0.48	0.17	0.78	4.9	322
LVNL	Amsterdam	9.9	0.21	0.36	0.36	0.94	9.3	161
MATS	Malta	1.1	0.09	0.34	0.11	0.54	0.6	336
M-NAV	Skopje	4.8	0.10	0.43	0.05	0.58	2.8	324
MoldATSA	Chisinau	1.7	0.05	0.39	0.19	0.63	1.1	323
MUAC	Maastricht	10.5	0.25	0.51	0.16	0.92	9.7	342
NATA Albania	Tirana	5.5	0.06	0.33	0.05	0.43	2.4	323
NATS	London TC	25.1	0.46	0.50	0.33	1.29	32.4	112
NATS	Prestwick	5.0	0.33	0.40	0.40	1.13	5.6	228
NATS	London AC	8.9	0.31	0.34	0.24	0.89	7.9	304
NAV Portugal (FIR Lisboa)	Lisboa	3.5	0.17	0.39	0.08	0.64	2.2	298
NAVIAIR	Kobenhavn	3.8	0.16	0.55	0.17	0.89	3.3	303
Oro Navigacija	Vilnius	2.9	0.07	0.37	0.17	0.62	1.8	307
PANSA	Warszawa	3.9	0.11	0.53	0.19	0.83	3.2	332
ROMATSA	Bucuresti	5.4	0.06	0.39	0.15	0.60	3.2	329
Skyguide	Zurich	10.3	0.30	0.53	0.24	1.07	11.0	285
Skyguide	Geneva	11.8	0.22	0.57	0.17	0.96	11.4	310
Slovenia Control	Ljubljana	7.5	0.15	0.49	0.12	0.76	5.7	288
SMATSA	Beograd	9.2	0.05	0.47	0.06	0.57	5.3	347
UkSATSE	Simferopol	4.2	0.02	0.36	0.16	0.54	2.2	347
UkSATSE	L'viv	2.8	0.02	0.52	0.19	0.73	2.1	342
UkSATSE	Kyiv	2.4	0.13	0.35	0.24	0.71	1.7	323
UkSATSE	Odesa	2.2	0.04	0.47	0.12	0.63	1.4	332
UkSATSE	Dnipropetrov'sk	3.2	0.06	0.30	0.15	0.51	1.6	341
European system average		7.1	0.2	0.4	0.2	0.8	5.9	292

**Annex 3 - Table 0.2: Traffic complexity indicators at ACC level, 2010**

## ANNEX 4 – COST OF CAPITAL REPORTED BY ANSPS

ANSPs	Comments
Aena	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 5.6%.
ANS CR	Gross cost of capital computed as the product of an average rate of 5.0% and an asset base comprising the NBV of fixed assets and a part of the working capital.
ARMATS	Corresponds to the product of an asset base comprising the long-term assets and the average net current assets (working capital) with an average rate of 15.3%.
Austro Control	Corresponds to the product of an asset base comprising the NBV of fixed assets (excluding assets under construction, land and financial assets) with an average rate of 2.48%.
Avinor	Corresponds to the product of an asset base comprising the NBV of fixed assets in operations at year-end with a weighted average cost of capital (calculated at Avinor Group level) of 9.5%.
Belgocontrol	Gross cost of capital which comprises the financial cost of debt and the product of the yearly average Belgian OLO rate (linear bonds, 1.9%) with an asset base corresponding to the total NBV of fixed assets less the borrowings.
BULATSA	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 7%.
Croatia Control	Corresponds to the product of the asset base comprising the NBV of fixed assets and the current assets with an average rate of 5.1%.
DCAC Cyprus	Corresponds to the product of the asset base comprising the NBV of fixed assets in operation and the current assets with an average rate of 6.0%.
DFS	Corresponds to the product of an asset base comprising the NBV of fixed assets in operation and the net current assets with an average rate of 4.53%.
DHMi	Corresponds to the product of an asset base comprising the NBV of fixed assets with an average rate of 6.52%.
DSNA	Corresponds to the product of an asset base comprising the NBV of fixed assets in operation and net current assets with an average rate of 3.54%.
EANS	Computed as the sum of the cost of equity (8% required return on equity) and the cost of debt.
ENAV	Corresponds to the product of an asset base comprising the NBV of fixed assets and net current assets with an average rate of 2.2%.
Finavia	Corresponds to the product of an asset base comprising the NBV of fixed assets and net current assets with an average rate of 4.7% including the return on equity (7.0%) and the cost of debt (1.9%).
HCAA	Corresponds to the product of the average operating capital employed with an average rate of 2.3%.
HungaroControl	Gross cost of capital calculated using the return on equity (i.e. 7.3%) applied to the average NBV of fixed assets and net current assets.
IAA	Corresponds to the product of an asset base comprising the NBV of fixed assets with an average rate of 7.08%.
LFV	Corresponds to the product of an asset base comprising the NBV of fixed assets and the current assets with an average rate of 1.7%.
LGS	Corresponds to the product of an asset base comprising the NBV of fixed assets and the current assets with an average rate of 8.1%.
LPS	Corresponds to the product of an asset base comprising the NBV of fixed assets and the current assets with an average rate of 8.0%.
LVNL	Corresponds to the product of an asset base comprising the NBV of fixed assets with an average rate of 3.4%.
MATS	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 5.2%.
M-NAV	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 5.5%.
MoldATSA	Corresponds to the product of an asset base comprising the NBV of fixed assets in operation and the net current assets with an average rate of 20.7%, plus a part of the capex in the year not capitalised in the balance-sheet.
MUAC	Corresponds to the product of the actual interest paid by EUROCONTROL to the banks (1.0%) with the proportion of EUROCONTROL NBV assets belonging to MUAC.
NATA Albania	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 4.2%.
NATS	Economic cost of capital computed as the product of the regulatory rate of return (6.6%) with the regulatory asset base for en-route ANS and with the

	capital employed for terminal ANS.
NAV Portugal (FIR Lisboa)	Corresponds to the product of an asset base comprising the NBV of fixed assets and the current assets with an average rate of 7.8%.
NAVIAIR	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 3.8%.
Oro Navigacija	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 4.0%.
PANSA	Corresponds to the product of an asset base comprising long-term assets and net current assets (excluding the provision for over/under recoveries) with an average rate of 3.5%.
ROMATSA	Gross cost of capital calculated using the return on equity (i.e. 8%) applied to the average NBV of fixed assets and the average net current assets, excluding interest bearing accounts.
Skyguide	Corresponds to the product of an asset base comprising the NBV of fixed assets with an average rate of 2.50%.
Slovenia Control	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 4.0%.
SMATSA	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 12.3%.
UkSATSE	Includes elements of capital expenditure.

**Annex 4 - Table 0.1: Comments on cost of capital reported by ANSPs, 2010**

## ANNEX 5 – EXCHANGE RATES, INFLATION RATES AND PURCHASING POWER PARITIES (PPPs) 2010 DATA

ANSPs	Countries	2010 Exchange rate (1 €=)	2010 Inflation rate (%)	2010 PPPs	Comments
Aena	Spain	1	2.0	0.93	
ANS CR	Czech Republic	25.25	1.2	18.47	
ARMATS	Armenia	493.25	7.3	260.80	PPPs from IMF database
Austro Control	Austria	1	1.7	1.11	
Avinor	Norway	8.59	2.3	11.69	
Belgocontrol	Belgium	1	2.3	1.12	
BULATSA	Bulgaria	1.96	3.0	0.87	
Croatia Control	Croatia	7.30	1.1	5.09	
DCAC Cyprus	Cyprus	1	2.6	0.89	
DFS	Germany	1	1.2	1.05	
DHMI	Turkey	2.00	8.6	1.26	
DSNA	France	1	1.7	1.13	
EANS	Estonia	15.65	2.7	0.68	PPP adjustment made on Euros since EUROSTAT PPPs for Estonia are based on the Euro and not the EEK
ENAV	Italy	1	1.6	1.05	
Finavia	Finland	1	1.7	1.19	
HCAA	Greece	1	4.7	0.92	
HungaroControl	Hungary	274.78	4.7	169.20	
IAA	Ireland	1	-1.6	1.12	
LFV	Sweden	9.56	1.9	11.72	
LGS	Latvia	0.70	-1.2	0.45	
LPS	Slovak Republic	1	0.7	0.68	
LVNL	Netherlands	1	0.9	1.09	
MATS	Malta	1	2.0	0.73	
M-NAV	F.Y.R. Macedonia	61.16	1.5	23.83	
MoldATSA	Moldova	16.34	7.4	8.16	PPPs from IMF database
MUAC		1	0.9	1.09	Netherlands PPPs and inflation rate used for MUAC
NATA Albania	Albania	133.25	3.6	57.83	
NATS	United Kingdom	0.85	3.3	0.86	
NAV Portugal (FIR Lisboa)	Portugal	1	1.4	0.83	
NAVIAIR	Denmark	7.44	2.2	10.22	
Oro Navigacija	Lithuania	3.45	1.2	2.06	
PANSA	Poland	3.99	2.7	2.42	
ROMATSA	Romania	4.21	6.1	2.14	
Skyguide	Switzerland	1.38	0.6	1.97	
Slovenia Control	Slovenia	1	2.1	0.83	
SMATSA	Serbia and Montenegro	102.82	6.2	46.92	Data for Serbia only since ACE data is provided in Serbian Dinar
UkSATSE	Ukraine	10.53	9.4	4.47	PPPs from IMF database

**Annex 5 - Table 0.1: 2010 Exchange rates, inflation rates and PPPs data**

Presentation and comparison of historical series of financial data from different countries poses problems, especially when different currencies are involved, and inflation rates differ. There is a danger that time-series comparisons can be distorted by transient variations in exchange rates.

For this reason, the following approach has been adopted in this Report for allowing for inflation and exchange rate variation. The financial elements of performance are assessed, for each year, in national currency. They are then converted to national currency in 2010 prices using national inflation rates. Finally, for comparison purposes in 2010, all national currencies are converted to Euros using the 2010 exchange rate.

This approach has the virtue that an ANSP's performance time series is not distorted by transient changes in exchange rates over the period. It does mean, however, that the performance figures for any ANSP in a given year prior to 2010 are not the same as the figures in that year's ACE report, and cannot legitimately be compared with another ANSP's figures for the same year. Cross-sectional comparison using the figures in this report is only appropriate for 2010 data.

The exchange rates used in this Report to convert the 2010 data in Euros are those provided by the ANSPs in their ACE data submission.

The historical inflation figures used in this analysis were obtained from EUROSTAT (<http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>) or from International Monetary Fund (<http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx>), when data is not available in EUROSTAT. For the projections (2011-2015), the ANSPs' own assumptions concerning inflation rates were used.

Purchasing Power Parities (PPPs) are currency conversion rates that are applied to convert economic indicators in national currency to an artificial common currency (Purchasing Power Standard (PPS) for EUROSTAT statistics). The PPPs data used to adjust most of the ANSPs employment costs in Chapter 5 of this report was extracted from EUROSTAT.

For three countries (Armenia, Moldova and Ukraine), PPP data was not available in the EUROSTAT database. In these cases, the IMF database was used. Since in the IMF database, the PPPs are expressed in local currency per **international Dollar** rather than **PPS**, an adjustment has been made so that the figures used for Armenia, MoldATSA and UkSATSE are as consistent as possible with the data used for the rest of the ANSPs. The assumption underlying this adjustment is that the difference in PPPs between two countries shall be the same in the EUROSTAT and in the IMF databases.

According to the IMF database, there is a factor of 3.94 between the PPPs for Ukraine (3.57 UAH per international dollar in 2010) and the PPPs for France (0.905 Euro per international Dollar). This factor is applied to the PPPs for France as disclosed in the EUROSTAT database (i.e. 1.134) to express the PPPs for Ukraine in PPS ( $4.47 = 1.134 \times 3.94$ ). A similar methodology is used to express Moldova and Armenia PPPs in PPS.

## ANNEX 6 - KEY DATA

		En-route ANS revenues (in €'000)		Terminal ANS revenues (in €'000)		Gate-to-gate ANS revenues (in €'000)	
		income from charges	Other income	income for airport operator	income received from other ANS	Stakes for delegated operation of ANS	Stakes for delegation of ANS
		income from charges	Financial income	Other income from domestic government	income in respect of military	income in respect of other ANS	income received from other ANS
ANSPs		income from charges	Other income	income for airport operator	income in respect of military	income received from other ANS	Stakes for delegation of ANS
ANSA	919.54	0	13 115	6 750	290	3 987	159
ANSOR	100.16	0	1 806	685	325	0	102 362
ARINATIS	4.025	0	0	5	0	0	4 029
Austro Control	168.280	0	468	1 810	311	0	170 849
Avinor	92.157	0	0	0	0	0	92 157
Belpointcontrol	159.003	0	0	0	11 426	617	4 137
BULSA SA	79.144	0	0	505	0	0	78 579
Croatia Control	55.934	0	7 057	0	0	0	63 041
DCAC Cyprus	39.508	0	0	0	0	0	39 508
DFFS	665.250	0	0	37 874	0	0	703 123
DIMI	256.154	0	0	7 792	1 854	0	265 840
DSNA	1 070.834	0	0	19 945	0	0	1 098 533
EANS	124.16	0	0	0	0	0	12 418
ENAV	554.324	0	0	15 882	23 029	0	7 681
Finavia	49.436	0	0	128	0	0	799
HCAA	168.932	0	0	1 811	534	0	3 091
HungaroControl	73.631	0	0	2 203	0	0	2 178
IAA	108.812	0	0	725	741	0	2 430
LEV	146.442	0	0	128	222	0	19 074
LGS	18.724	0	0	705	121	43	1 063
LPS	45.932	0	0	2 408	0	0	48 199
LVNL	160.534	0	0	2 408	0	36	1 781
MATAS	12 000	0	0	270	0	0	164 809
M-NAY	9.806	0	0	0	52	0	12 330
Mobatca	7.222	0	0	0	39	5	9 249
MUAC	0	0	0	402 279	0	0	402 279
NATA	17 640	0	0	1 586	294	0	19 520
NATS	533.547	0	0	0	0	0	1 991
NAVPortugal (FIR Lisboa)	126.196	0	0	0	0	0	-582
NAVINIR	30.877	0	0	1 052	0	0	7 105
Otonovacijska	18.323	0	0	97	69	0	164 157
PANSA	136.905	0	0	0	551	600	-1 083
ROMATSA	153.888	0	0	0	5 175	993	17 904
Skyguide	113.143	0	0	39 234	0	0	1 570
Slovenia Control	27.633	0	0	140	0	0	2 514
SMATSA	58.356	0	0	0	2 965	0	66 257
URSA TSE	154.093	0	0	0	0	0	4 833

		En-route ANS revenues (in €'000)		Terminal ANS revenues (in €'000)		Gate-to-gate ANS revenues (in €'000)	
		income from charges	Other income	income for airport operator	income received from other ANS	Stakes for delegated operation of ANS	Stakes for delegation of ANS
		income from charges	Financial income	Other income from domestic government	income in respect of military	income in respect of other ANS	income received from other ANS
ANSPs		income from charges	Other income	income for airport operator	income in respect of military	income received from other ANS	Stakes for delegation of ANS
ANSA	919.54	0	13 115	6 750	290	3 987	159
ANSOR	100.16	0	1 806	685	325	0	102 362
ARINATIS	4.025	0	5	0	0	0	4 029
Austro Control	168.280	0	468	1 810	311	0	170 849
Avinor	92.157	0	0	0	0	0	92 157
Belpointcontrol	159.003	0	0	0	11 426	617	4 137
BULSA SA	79.144	0	0	505	0	0	78 579
Croatia Control	55.934	0	7 057	0	0	0	63 041
DCAC Cyprus	39.508	0	0	0	0	0	39 508
DFFS	665.250	0	0	37 874	0	0	703 123
DIMI	256.154	0	0	7 792	1 854	0	265 840
DSNA	1 070.834	0	0	19 945	0	0	1 098 533
EANS	124.16	0	0	0	0	0	12 418
ENAV	554.324	0	0	15 882	23 029	0	7 681
Finavia	49.436	0	0	128	0	0	799
HCAA	168.932	0	0	1 811	534	0	3 091
HungaroControl	73.631	0	0	2 203	0	0	2 178
IAA	108.812	0	0	725	741	0	2 430
LEV	146.442	0	0	128	222	0	19 074
LGS	18.724	0	0	705	121	43	1 063
LPS	45.932	0	0	2 408	0	36	1 781
LVNL	160.534	0	0	2 408	0	0	164 809
MATAS	12 000	0	0	270	0	0	12 330
M-NAY	9.806	0	0	0	52	0	9 249
Mobatca	7.222	0	0	0	39	5	7 305
MUAC	0	0	0	402 279	0	0	402 279
NATA	17 640	0	0	1 586	294	0	1 991
NATS	533.547	0	0	0	0	0	-582
NAVPortugal (FIR Lisboa)	126.196	0	0	1 052	0	0	7 105
NAVINIR	30.877	0	0	97	69	0	164 157
Otonovacijska	18.323	0	0	0	551	600	-1 083
PANSA	136.905	0	0	0	5 175	993	17 904
ROMATSA	153.888	0	0	0	17 904	0	1 570
Skyguide	113.143	0	0	39 234	0	0	2 514
Slovenia Control	27.633	0	0	140	0	0	2 514
SMATSA	58.356	0	0	0	2 965	0	66 257
URSA TSE	154.093	0	0	0	0	0	4 833

		En-route ANS revenues (in €'000)		Terminal ANS revenues (in €'000)		Gate-to-gate ANS revenues (in €'000)	
		income from charges	Other income	income for airport operator	income received from other ANS	Stakes for delegated operation of ANS	Stakes for delegation of ANS
		income from charges	Financial income	Other income from domestic government	income in respect of military	income in respect of other ANS	income received from other ANS
ANSPs		income from charges	Other income	income for airport operator	income in respect of military	income received from other ANS	Stakes for delegation of ANS
ANSA	919.54	0	13 115	6 750	290	3 987	159
ANSOR	100.16	0	1 806	685	325	0	102 362
ARINATIS	4.025	0	5	0	0	0	4 029
Austro Control	168.280	0	468	1 810	311	0	170 849
Avinor	92.157	0	0	0	0	0	92 157
Belpointcontrol	159.003	0	0	0	11 426	617	4 137
BULSA SA	79.144	0	0	505	0	0	78 579
Croatia Control	55.934	0	7 057	0	0	0	63 041
DCAC Cyprus	39.508	0	0	0	0	0	39 508
DFFS	665.250	0	0	37 874	0	0	703 123
DIMI	256.154	0	0	7 792	1 854	0	265 840
DSNA	1 070.834	0	0	19 945	0	0	1 098 533
EANS	124.16	0	0	0	0	0	12 418
ENAV	554.324	0	0	15 882	23 029	0	7 681
Finavia	49.436	0	0	128	0	0	799
HCAA	168.932	0	0	1 811	534	0	3 091
HungaroControl	73.631	0	0	2 203	0	0	2 178
IAA	108.812	0	0	725	741	0	2 430
LEV	146.442	0	0	128	222	0	19 074
LGS	18.724	0	0	705	121	43	1 063
LPS	45.932	0	0	2 408	0	36	1 781
LVNL	160.534	0	0	2 408	0	0	164 809
MATAS	12 000	0	0	270	0	0	12 330
M-NAY	9.806	0	0	0	52	0	9 249
Mobatca	7.222	0	0	0	39	5	7 305
MUAC	0	0	0	402 279	0	0	402 279
NATA	17 640	0	0	1 586	294	0	1 991
NATS	533.547	0	0	0	0	0	-582
NAVPortugal (FIR Lisboa)	126.196	0	0	1 052	0	0	7 105
NAVINIR	30.877	0	0	97	69	0	164 157
Otonovacijska	18.323	0	0	0	551	600	-1 083
PANSA	136.905	0	0	0	5 175	993	17 904
ROMATSA	153.888	0	0	0	17 904	0	1 570
Skyguide	113.143	0	0	39 234	0	0	2 514
Slovenia Control	27.633	0	0	140	0	0	2 514
SMATSA	58.356	0	0	0	2 965	0	66 257
URSA TSE	154.093	0	0	0	0	0	4 833

**Annex 6 - Table 0.1: Breakdown of total ANS revenues (en-route, terminal and gate-to-gate), 2010**

**Annex 6 - Table 0.2: Breakdown of total ANS costs (en-route, terminal and gate-to-gate), 2010**

	ANSPs	En-route ANS costs (in €'000)		Terminal ANS costs (in €'000)		Gate-to-gate ANS costs (in €'000)		Total costs
		ATM/CNS provision costs	MET costs	ATM/CNS provision costs	MET costs	ATM/CNS provision costs	MET costs	
Aena	645 100	40 084	6 241	7 285	62 181	0	0	285 473
ANS-CR	91 071	2 242	0	6 686	630	0	0	100 629
ARMA TS	3 411	0	0	254	0	0	0	23 655
Austro Control	137 351	15 019	0	11 534	0	0	0	34 099
AviNor	77 536	970	283	0	7 048	0	0	85 836
Belgocontrol	94 855	7 439	1 134	0	12 792	41 633	0	157 833
BULATS A	63 281	5 602	440	0	4 851	0	0	216
Croatia Control	60 218	3 900	0	0	0	64 118	0	8 632
DGAC Cyprus	35 877	4 102	5 710	0	2 426	0	0	48 115
DFS	676 583	32 695	0	0	0	709 178	201 153	5 540
DHMI	211 839	19 561	2 397	0	16 889	0	0	250 747
DSNA	902 608	64 598	9 973	0	82 79	45 447	2 341	235 123
EANS	9 907	5 1	0	0	0	0	0	1 138 122
ENAV	545 878	35 237	0	0	51 602	973	0	633 600
Firavia	22 977	2 500	233	0	3 576	179	0	107 787
HCAA	140 056	9 698	3 272	0	12 360	0	0	165 386
HungaroControl	74 777	1 996	893	0	4 789	678	0	83 134
IAA	91 786	6 463	1 623	1 977	8 082	0	0	109 931
IFV	173 531	7 373	4 09	0	0	0	0	181 313
LGS	14 786	401	1 716	0	0	0	0	32 732
LPS	43 928	1 114	916	0	2 862	257	0	49 077
LVNL	107 216	8 206	878	0	15 862	32 842	0	24 210
MATS	10 513	0	0	0	0	0	0	54 125
M-NAV	9 086	624	0	0	574	0	0	10 998
MediATA SA	6 355	647	181	0	335	0	0	10 283
MUAC	138 759	0	0	0	0	0	0	7 438
NATA Albania	16 576	288	330	0	910	0	0	4 117
NATS	544 339	138	5 070	0	0	549 547	0	5 070
NAV Portugal (FIR Lisboa)	95 062	5 315	380	0	9 583	0	0	110 341
NAVIAR	82 337	4 590	1 208	887	7 228	0	0	96 250
Otonavia/ciencia	17 556	438	249	0	1 117	0	0	3 316
PANSA	100 762	4 629	1 624	0	9 948	569	0	19 390
ROMATSA	121 335	7 585	3 451	0	9 073	0	0	21 355
Skyguide	176 539	8 796	0	0	0	64 293	0	3 897
Slovenia Control	22 821	1 339	474	0	1 470	117	0	2 620
SMATSA	62 117	4 476	0	1 663	0	0	0	49 000
URSATSE	140 188	1 457	1 808	0	7 636	0	0	151 089

	ANSPs	En-route ANS costs (in €'000)		Terminal ANS costs (in €'000)		Gate-to-gate ANS costs (in €'000)		Total costs
		ATM/CNS provision costs	MET costs	ATM/CNS provision costs	MET costs	ATM/CNS provision costs	MET costs	
Aena	645 100	40 084	6 241	7 285	62 181	0	0	285 473
ANS-CR	91 071	2 242	0	6 686	630	0	0	100 629
ARMA TS	3 411	0	0	254	0	0	0	23 655
Austro Control	137 351	15 019	0	11 534	0	0	0	34 099
AviNor	77 536	970	283	0	7 048	0	0	85 836
Belgocontrol	94 855	7 439	1 134	0	12 792	41 633	0	157 833
BULATS A	63 281	5 602	440	0	4 851	0	0	216
Croatia Control	60 218	3 900	0	0	0	64 118	0	8 632
DGAC Cyprus	35 877	4 102	5 710	0	2 426	0	0	48 115
DFS	676 583	32 695	0	0	0	709 178	201 153	5 540
DHMI	211 839	19 561	2 397	0	16 889	0	0	250 747
DSNA	902 608	64 598	9 973	0	82 79	45 447	2 341	235 123
EANS	9 907	5 1	0	0	0	0	0	1 138 122
ENAV	545 878	35 237	0	0	51 602	973	0	633 600
Firavia	22 977	2 500	233	0	3 576	179	0	107 787
HCAA	140 056	9 698	3 272	0	12 360	0	0	165 386
HungaroControl	74 777	1 996	893	0	4 789	678	0	83 134
IAA	91 786	6 463	1 623	1 977	8 082	0	0	109 931
IFV	173 531	7 373	4 09	0	0	0	0	181 313
LGS	14 786	401	1 716	0	0	0	0	32 732
LPS	43 928	1 114	916	0	2 862	257	0	49 077
LVNL	107 216	8 206	878	0	15 862	32 842	0	24 210
MATS	10 513	0	0	0	0	0	0	54 125
M-NAV	9 086	624	0	0	574	0	0	10 998
MediATA SA	6 355	647	181	0	335	0	0	10 283
MUAC	138 759	0	0	0	0	0	0	7 438
NATA Albania	16 576	288	330	0	910	0	0	4 117
NATS	544 339	138	5 070	0	0	549 547	0	5 070
NAV Portugal (FIR Lisboa)	95 062	5 315	380	0	9 583	0	0	110 341
NAVIAR	82 337	4 590	1 208	887	7 228	0	0	96 250
Otonavia/ciencia	17 556	438	249	0	1 117	0	0	3 316
PANSA	100 762	4 629	1 624	0	9 948	569	0	19 390
ROMATSA	121 335	7 585	3 451	0	9 073	0	0	21 355
Skyguide	176 539	8 796	0	0	0	64 293	0	3 897
Slovenia Control	22 821	1 339	474	0	1 470	117	0	2 620
SMATSA	62 117	4 476	0	1 663	0	0	0	49 000
URSATSE	140 188	1 457	1 808	0	7 636	0	0	151 089

	ANSPs	En-route ANS costs (in €'000)		Terminal ANS costs (in €'000)		Gate-to-gate ANS costs (in €'000)		Total costs
		ATM/CNS provision costs	MET costs	ATM/CNS provision costs	MET costs	ATM/CNS provision costs	MET costs	
Aena	645 100	40 084	6 241	7 285	62 181	0	0	285 473
ANS-CR	91 071	2 242	0	6 686	630	0	0	100 629
ARMA TS	3 411	0	0	254	0	0	0	23 655
Austro Control	137 351	15 019	0	11 534	0	0	0	34 099
AviNor	77 536	970	283	0	7 048	0	0	85 836
Belgocontrol	94 855	7 439	1 134	0	12 792	41 633	0	157 833
BULATS A	63 281	5 602	440	0	4 851	0	0	216
Croatia Control	60 218	3 900	0	0	0	64 118	0	8 632
DGAC Cyprus	35 877	4 102	5 710	0	2 426	0	0	48 115
DFS	676 583	32 695	0	0	0	709 178	201 153	5 540
DHMI	211 839	19 561	2 397	0	16 889	0	0	250 747
DSNA	902 608	64 598	9 973	0	82 79	45 447	2 341	235 123
EANS	9 907	5 1	0	0	0	0	0	1 138 122
ENAV	545 878	35 237	0	0	51 602	973	0	633 600
Firavia	22 977	2 500	233	0	3 576	179	0	107 787
HCAA	140 056	9 698	3 272	0	12 360	0	0	165 386
HungaroControl	74 777	1 996	893	0	4 789	678	0	83 134
IAA	91 786	6 463	1 623	1 977	8 082	0	0	109 931
IFV	173 531	7 373	4 09	0	0	0	0	181 313
LGS	14 786	401	1 716	0	0	0	0	32 732
LPS	43 928	1 114	916	0	2 862	257	0	49 077
LVNL	107 216	8 206	878	0	15 862	32 842	0	24 210
MATS	10 513	0	0	0	0	0	0	54 125
M-NAV	9 086	624	0	0	574	0	0	10 998
MediATA SA	6 355	647	181	0	335	0	0	10 283
MUAC	138 759	0	0	0	0	0	0	7 438
NATA Albania	16 576	288	330	0	910	0	0	4 117
NATS	544 339	138	5 070	0	0	549 547	0	5 070
NAV Portugal (FIR Lisboa)	95 062	5 315	380	0	9 583	0	0	110 341
NAVIAR	82 337	4 590	1 208	887	7 228	0	0	96 250
Otonavia/ciencia	17 556	438	249	0	1 117	0	0	3 316
PANSA	100 762	4 629	1 624	0	9 948	569	0	19 390
ROMATSA	121 335	7 585	3 451	0	9 073	0	0	21 355
Skyguide	176 539	8 796	0	0	0	64 293	0	3 897
Slovenia Control	22 821	1 339	474	0	1 470	117	0	2 620
SMATSA	62 117	4 476	0	1 663	0	0	0	49 000
URSATSE	140 188	1 457	1 808	0	7 636	0	0	151 089

	ANSPs	En-route ANS costs (in €'000)		Terminal ANS costs (in €'000)		Gate-to-gate ANS costs (in €'000)		Total costs
ATM/CNS provision costs	MET costs	ATM/CNS provision costs	MET costs	ATM/CNS provision costs	MET costs			


<tbl

ANSPS	En-route ATM/CNS costs (in €'000)		Terminal ATM/CNS costs (in €'000)		Gate-to-gate ATM/CNS costs (in €'000)		ATM/CNS provision costs	
	Cost of capital		Depreciation costs		Non-staff operating costs			
	Staff costs	Non-staff operating costs	Staff costs	Depreciation costs	Non-staff operating costs	Cost of capital		
Aena	401 768	101 193	90 447	36 151	15 531	645 100	185 639	
ANS CR	50 948	14 429	18 967	7 021	0	91 071	15 633	
ARMATS	1 675	325	579	114	3 411	1 415	625	
Austro Control	104 306	16 777	14 513	1 755	0	137 351	22 537	
Avior	54 016	15 419	6 029	2 072	0	77 536	62 725	
Belgacontrol	70 128	10 104	12 226	2 215	182	94 885	39 752	
BULATSA	37 773	6 331	9 429	0	9 429	6 331	1 076	
Croatia Control	37 153	13 066	6 918	3 083	0	60 218	5 995	
DCAC Cyprus	11 394	16 111	5 116	3 256	0	35 877	1 584	
DFS	460 120	83 444	69 900	48 235	14 883	676 533	128 707	
DHMI	87 933	6 633	25 023	31 311	0	211 899	25 541	
DSNA	635 731	156 529	87 713	22 636	0	902 608	154 204	
EANS	5 030	2 136	1 804	938	0	9 907	570	
ENAV	280 232	149 242	93 301	21 580	1 524	545 818	52 161	
Finavia	15 076	5 513	1 545	733	0	22 977	21 385	
HCAA	112 004	18 073	6 782	3 198	0	140 066	14 565	
HungaroControl	34 212	15 026	8 390	2 665	13 884	74 777	10 063	
IAA	55 575	18 623	12 217	5 371	0	91 786	9 820	
LEV	111 900	36 766	19 750	1 978	3 138	173 531	28 577	
LGS	7 679	2 386	1 226	1 488	0	14 786	2 511	
LPS	23 978	10 184	6 474	3 292	0	43 928	2 831	
LYNL	77 324	19 372	7 634	2 906	0	107 316	38 194	
MATS	3 677	5 484	936	416	0	10 513	1 817	
M-NAV	5 845	1 084	1 652	514	0	9 036	785	
Moldavia	2 323	1 165	802	2 046	0	6 355	484	
MUAC	109 823	12 450	15 466	1 020	0	138 579	0	
NATA Albania	3 844	7 120	2 293	2 919	0	16 576	1 380	
NATS	276 732	86 649	78 086	23 505	544 339	106 550	41 175	
NAV Portugal (FIR Lisboa)	73 978	12 434	5 558	3 091	0	95 002	20 956	
NAVIAIR	50 389	16 197	9 328	5 922	0	19 376	4 201	
Oto Navigacila	9 906	2 979	3 029	1 332	310	17 556	1 770	
PANSA	73 698	14 253	8 587	4 224	0	100 732	19 528	
ROMATSA	77 248	19 660	7 775	10 151	6 500	121 335	13 006	
Skyguide	115 543	20 513	34 785	4 896	0	43 622	176 349	
Slovenia Control	16 254	3 397	2 353	721	96	22 821	2 543	
SMATSA	31 392	11 532	7 621	1 144	133	5 604	2 059	
UKSATSE	80 443	19 121	6 422	3 187	2 395	140 188	17 384	
Total	3 607 049	1 013 173	693 949	371 891	82 806	5 768 888	1 086 209	

**Annex 6 - Table 0.3: Breakdown of ATM/CNS provision costs (en-route, terminal and gate-to-gate), 2010**

ANSP BALANCE SHEET in (€'000)									
ANSPs	NBV fixed assets in operation					NBV fixed assets under construction			
	Long-term financial assets		Current assets		Long-term liabilities		Capital and reserves		Current liabilities
Aena	839 432	253 370	152 601	173 798	1 419 202	350 191	766 880	262 130	1 419 202
ANS CR	113 173	24 094	0	47 641	184 908	163 983	8 797	12 128	184 908
ARMATS	4 800	522	0	4 034	9 355	6 867	891	1 597	9 355
Astro Control	171 226	43 918	25 570	102 947	343 661	57 337	209 672	76 652	343 661
Avinor	67 544	24 686	0	0	92 230				
Belgocontrol	180 114	5 946	501	81 647	268 208	179 728	41 116	47 364	268 208
BULATSA	106 619	840	0	76 754	184 212	156 349	12 303	15 560	184 212
Croatia Control	49 440	8 504	5 227	38 141	101 311	59 652	22 932	18 727	101 311
DCAC Cyprus	24 839	9 303	0	28 542	62 684	38 309	24 375	0	62 684
DFS	715 259	16 880	60 453	886 327	1 678 889	462 927	1 043 560	172 402	1 678 889
DHMI	509 605	98 707	1 085	71 009	680 377	588 415	36 042	45 920	680 377
DSNA	676 504	135 856	167	276 463	1 088 989	290 480	697 521	100 988	1 088 989
EANS	8 740	6 080	0	3 239	18 059	13 592	2 186	2 281	18 059
ENAV	862 494	491 475	114 817	836 774	2 305 560	1 252 270	250 487	802 804	2 305 560
Finavia	50 183	10 637	0	16 909	77 729	41 032	32 689	4 008	77 729
HCAA	179 994	0	0	0	179 994				
HungaroControl	62 421	2 807	17 737	65 336	148 301	80 814	44 564	22 922	148 301
IAA	67 741	51 444	0	74 849	194 034	49 763	112 099	32 172	194 034
LFV	114 475	52 748	56 752	336 826	560 802	24 892	496 079	34 631	555 602
GS	22 348	2 443	18	9 515	34 324	27 689	3 090	3 544	34 324
LPS	32 355	3 367	0	35 072	70 794	59 910	3 490	7 394	70 794
LVNL	86 195	6 769	0	48 875	141 839	34 602	138 236	38 205	141 839
MATS	5 316	0	0	9 457	14 773	5 404	4 490	4 878	14 773
M-NAV	9 347	0	0	6 203	15 550	12 823	1 925	802	15 550
MoldATSA	6 229	708	99	4 269	11 305	11 191	0	113	11 305
MUAC	72 664	3 413	0	34 987	111 064	0	76 077	34 987	111 064
NATA Albania	17 742	19 283	122	32 186	69 333	39 722	28 623	987	69 333
NATS	617 609	393 815	470 022	432 651	1 934 097	620 268	988 808	325 022	1 934 097
NAV Portugal (FIR Lisboa)	46 649	21 697	64 706	146 539	279 591	89 140	136 591	53 860	279 591
NAVAIR	121 129	37 208	11	73 650	231 998	95 606	103 005	33 387	231 998
Oto navacialia	34 692	982	1 158	5 519	46 331	44 554	591	1 186	46 331
PANSA	127 909	18 998	12 295	51 436	210 638	144 869	22 066	43 702	210 638
ROMATSA	135 780	11 251	0	116 645	263 676	208 841	41 214	13 621	263 676
Skyguide	270 496	14 604	52 429	106 327	443 856	231 277	7 894	204 686	443 856
Slovenia Control	9 272	9 635	255	5 444	24 576	4 102	12 225	8 249	24 576
SMATSA	60 900	71 475	0	25 185	157 561	84 865	42 034	30 662	157 561
UKSATSE	66 062	44 370	4 235	106 127	220 794	195 649	1 449	23 596	220 794
Total	6 547 298	1 897 785	1 040 231	4 305 290	13 880 604	5 707 909	5 414 003	2 481 267	13 803 180

Annex 6 - Table 0.4: Balance Sheet data at ANSP level, 2010

**Annex 6 - Table 0.5: Total staff and ATCos in OPS data, 2010**

**Annex 6 - Table 0.6: Operational data (ANSPs and State level), 2010**

ANSPs	Size of controlled airspace	Number of ACC operational units	Number of TWR operational units	Number of ATC operational units	Number of AFIS	Total distance in charging area	The ANSP Total IFR flights controlled by the ANSP	Total flight-hours controlled by the ANSP	Total flight-hours controlled by the ANSP more controlled by the ANSP	Composite flight-hours
Aena	2 190 000	5	19	37	0	81 6093 423	1 711 331	1 324 059	1 826 744	1 806 729
ANS CR	79 500	1	4	4	0	157 029 446	652 224	228 245	170 064	273 180
ARMATS	29 800	1	1	2	2	8 272 407	52 871	12 537	20 872	18 052
Austro Control	80 000	1	6	6	0	196 707 548	891 540	286 216	373 656	384 945
Avinor	719 000	3	17	28		133 920 792	538 710	310 002	603 185	469 378
Belgocontrol	39 500	1	4	5	0	160 019 682	543 422	110 156	353 429	203 541
BULATS A	145 120	1	3	5	0	128 918 204	505 241	168 894	82 055	190 575
Croatia Control	158 000	1	9	10	0	111 977 000	456 833	181 496	84 344	203 782
DCAC Cyprus	174 000	1	2	2	0	93 898 220	284 754	130 669	63 835	147 536
DFS	388 000	4	0	16	0	979 541 051	2 773 324	1 363 222	2 006 451	1 883 375
DHMI	932 000	2	17	22		564 701 713	934 638	810 588	806 363	1 023 649
DSNA	1 010 000	5	12	80	0	1 378 852 188	2 700 546	2 099 436	1 808 548	2 577 298
EANS	77 102	1	2	2	0	38 251 615	154 985	53 893	31 464	62 207
ENAV	734 000	4	23	12	11	709 945 442	1 588 358	1 094 843	1 143 351	1 386 944
Finavia	415 000	2	7	19	6	58 740 206	231 835	110 485	249 596	176 434
HCAA	538 000	1	16	18	15	330 829 825	654 652	487 838	187 517	557 385
HungaroControl	93 000	1	1	2	1	144 328 910	621 898	196 148	105 642	224 061
IAA	457 000	2	3	3	0	185 220 931	510 396	253 091	207 552	307 931
IFV	636 000	2	26	35	2	238 998 314	659 616	402 168	493 534	532 572
LGS	95 300	1	2	2	0	45 830 665	207 223	62 904	62 847	79 510
LPS	48 700	1	2	5	0	61 102 233	369 491	81 776	36 336	91 377
LVNL	52 000	1	3	4	0	183 330 150	531 683	144 099	449 558	262 883
MATS	231 000	1	2	1	0	29 064 636	95 256	46 587	32 804	55 255
M-NAV	24 800	1	2	2	1	14 324 576	124 982	20 579	12 505	23 883
MoldATSA	33 700	1	0	4	3	10 572 109	54 404	14 644	13 582	18 233
MUAC	260 000	1	0	0	0	1 322 890 863	1 522 410	543 140	543 140	543 140
NATA Algarve	35 900	1	1	1	1	29 864 429	181 465	38 833	110 441	21 022
NATS	880 000	3	16	16	0	683 387 826	2 132 747	1 258 315	1 703 016	1 708 293
NAV Portugal (FIR Lisboa)	655 000	1	4	6	0	183 601 237	425 598	273 612	270 464	345 075
NAVIAIR	158 000	1	7	7	1	115 861 309	607 011	204 222	341 727	294 514
Oto navigacija	74 700	1	3	4	0	28 881 097	170 901	47 539	37 718	57 505
PANSA	334 000	1	4	11	0	240 152 878	584 907	346 269	288 339	422 455
ROMATSA	255 000	1	2	16	0	208 750 817	469 537	284 088	173 439	329 915
Skyguide	73 400	2	4	7	0	123 137 577	1 164 630	322 120	461 886	444 162
Slovenia Control	19 900	1	3	0	0	30 773 155	248 756	43 445	37 134	53 257
SMATSA	144 676	1	8	8	0	140 530 602	539 558	216 515	69 612	234 908
UKSATSE	776 442	5	12	32	0	265 342 581	429 413	348 229	185 803	397 323
Total		64	247	441	93	10 164 345 643	13 910 902	14 815 994	17 825 648	

## ANNEX 7 – INFORMATION ON ANSPS MAJOR CAPEX PROJECTS

This Annex presents, for each individual ANSP, information on the nature of the capex (historic and planned) between 2006 and 2015, including a breakdown of the major capex projects by area (i.e. ATM, Communication, Surveillance, etc.). It also indicates the dates of commissioning, major upgrades and replacement of the main ATM systems (FDPS, RDPS, HMI and VCS) for each ACC.

### Aena

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2006 (all ACCs)*	C: 2006 (all ACCs)*	C: 2006 (all ACCs)*	C: 2000 (All ACCs-TMA) 2002 (All ACCs-En-route)*
					2006				
					2007				
					2008				
					2009				Canarias, Palma
<b>€483.1M</b>	<b>€69.7M</b>	<b>€74.1M</b>	<b>€135.4M</b>	<b>€36.0M</b>	2010	All ACCs	All ACCs	All ACCs	Barcelona
					2011				Madrid, Sevilla
					2012				Canarias
					2013	All ACCs	All ACCs	All ACCs	Madrid
					2014				Palma
					2015				Sevilla

\* C = Commissioning      Upgrade      Replacement

### ANS CR

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 1994*	C: 2000*	C: 2007*	C: 2007*
					2006				
					2007				
					2008				
					2009				
<b>€100.4M (2008-2016)</b>	<b>€8.1M</b>	<b>€7.1M</b>	<b>€22.2M</b>	<b>€22.2M</b>	2010				
					2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

### ARMATS

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2000*	C: 2000*	C: 2000*	C: 2000*
					2006				
					2007				
					2008				
					2009				
					2010				
<b>€3.7M</b>	<b>€0.5M</b>	<b>€1.6M (2011-2016)</b>	<b>€3.6M</b>	<b>€0.4M</b>	2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## Austro Control

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 1986*	C: 1986*	C: 1986*	C: 1996*
						2006				
						2007				
						2008				
						2009				
	€5.5M					2010				
€36.1M		€5.7M	€15.7M	€13.6M	€111.7M	2011				
						2012				
						2013				
						2014				
						2015				

\* C = Commissioning      Upgrade      Replacement

## AVINOR

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 1996 (Oslo) 2004 (Stav.) 2008 (Bodo)*	C: 1996 (Oslo) 2004 (Stav.) 2008 (Bodo)*	C: 2004 (Stav.)*	C: 2007 (Bodo)*
					2006				
					2007				
					2008	Bodo	Bodo		
€91.7M (2009-2016)		€17.9M			2009	Oslo	Oslo		
					2010				
					2011				
					2012				
					2013				Stavanger
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## Belgocontrol

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2009*	C: 2003*	C: 2009*	C: 2008-2009*
					2006				
					2007				
					2008				
					2009				
					2010				
€6.2M (2011-2016)	€2.4M	€10.9M (2011-2016)	€16.8M		2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## BULATSA

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2005*	C: 2005*	C: 2005*	C: 2003*
					2006				
					2007				
					2008				
<b>€8.7M</b>	<b>€6.1M</b>	<b>€6.0M</b>	<b>€19.6M</b>	<b>€9.4M</b>	2009				
					2010				
					2011				
					2012				
					2013				<b>Replacement</b>
					2014				
					2015				

\* C = Commissioning       Upgrade       Replacement

## Croatia Control

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2005*	C: 2005*	C: 2005*	C: 2005*
					2006				
					2007				
					2008				
<b>€47.0M</b>	<b>€7.2M</b>	<b>€3.1M</b>			2009				
					2010				
					2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning       Upgrade       Replacement

## DCAC Cyprus

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2000*	C: 2000*	C: 2000*	C: 1998*
<b>€26.5M (2003-2013)</b>	<b>€5.2M</b>	<b>€2.9M</b>	<b>€8.9M</b>	<b>€13.1M</b>	2006				
					2007				
					2008				<span style="background-color: #999; display: inline-block; width: 15px; height: 15px;"></span>
					2009				
					2010				
					2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning       Upgrade       Replacement

## DFS

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 1981 (Karl.) 2004 (Bremen) 1999 (Langen) 1999 (München)*	C: 1981 (Karl.) 2004 (Bremen) 1999 (Langen) 1999 (München)*	C: 1981 (Karl.) 2004 (Bremen) 1999 (Langen) 1999 (München)*	C: 2009 (Karl.) 2003 (Bremen) 2002 (Langen) 2002 (München)*
<b>€105.5M</b> (2004-2018)	<b>€40.9M</b> (2008-2018)		<b>€10.7M</b> (2002-2014)	<b>€104.1M</b> (2002-2014)	2006	Karlsruhe			
					2007				
					2008	Bremen, Langen, München		Langen, München	
					2009				Karlsruhe
					2010	Karlsruhe	Karlsruhe	Karlsruhe	
					2011			Bremen	
					2012				Langen (2012-2013) München (2013-2014)
					2013				
					2014				
					2015	Langen (2015-16)	Langen (2015-16)	Langen (2015-16)	

\* C = Commissioning      Upgrade      Replacement

## DHMI

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2008 (All ACCs)*	C: 2008 (All ACCs)*	C: 2008 (All ACCs)*	C: 2005 (All ACCs)*
<b>€42.3M</b>	<b>€15.0M</b>	<b>€3.3M</b>	<b>€85.5M</b>	<b>€47.0M</b>	2006				
					2007				All ACCs
					2008				
					2009				
					2010				
					2011				
					2012	All ACCs	All ACCs	All ACCs	
					2013				
					2014				All ACCs
					2015				

\* C = Commissioning      Upgrade      Replacement

## DSNA

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 1982*	C: 1982*	C: 2000*	C: 2000 (Marseille) 2000/2003 (Brest) 2002/2005 (Reims) 2002/2006 (Paris) 2003 (Bordeaux)*
<b>€610M*</b> (2003-2016)	<b>€80M</b>			<b>€45M</b> (2012-2017)	2006					
					2007		All ACCs			
					2008					
					2009			All ACCs		
					2010					
					2011					
					2012					
					2013					
					2014					
					2015					

\*\* The amount provided under "Other" (i.e. €45M) relates to the new airport Notre Dame des Landes in Nantes and includes capex relating to ATM, CNS and building

\* C = Commissioning      Upgrade      Replacement

## EANS

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2002*	C: 2002*	C: 2002*	C: 1998*
					2006				
					2007				
					2008				
					2009				
					2010				
<b>€9.0M</b>	<b>€2.7M</b>	<b>€2.5M</b>	<b>€2.9M</b>	<b>€0.2M</b>	2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## ENAV

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 1999 (All ACCs)*	C: 1999 (All ACCs)*	C: 1999 (All ACCs)*	C: 2000 (Roma) 2001 (Padova) 2005 (Brindisi, MI.)*
<b>€380.0M (2004-2015)</b>	<b>€124.5M</b>	<b>€64.7M</b>	<b>€99.3M</b>	<b>€204.8M</b>	<b>€17.0M**</b>	2006				Roma
						2007				
						2008				Brindisi, Milano, Padova
						2009				Roma
						2010				
						2011				
						2012				
						2013				
						2014				
						2015	All ACCs	All ACCs	All ACCs	

\*\* The amount provided under "Other" (i.e. €17M) relates to MET

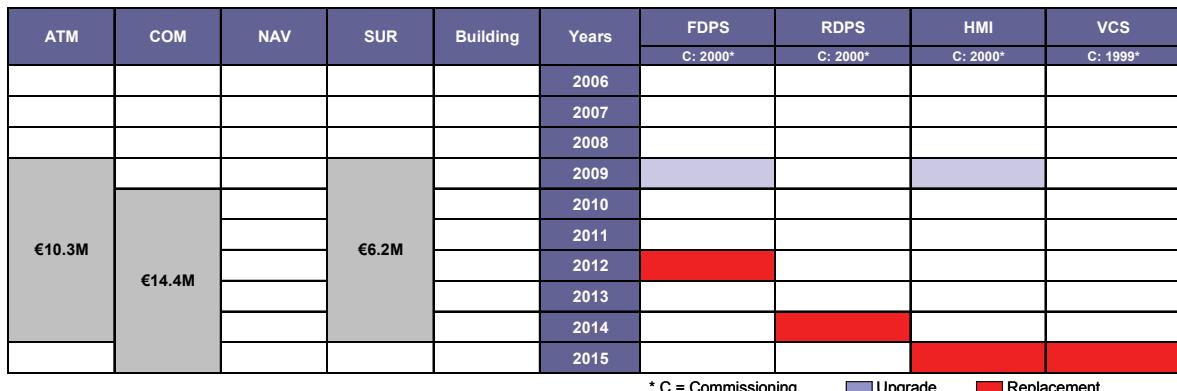
\* C = Commissioning      Upgrade      Replacement

## Finavia

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2000 (Tamp.) 2009 (Rovan.)*	C: 2000 (Tamp.) 2009 (Rovan.)*	C: 2000 (Tamp.) 2009 (Rovan.)*	C: 2009 (All ACCs)*
<b>€13.9M</b>	<b>€5.8M (2011-2016)</b>	<b>€12.1M (2011-2016)</b>	<b>€3.7M (2013-2016)</b>	<b>€1.0M</b>	2006				
					2007				
					2008				
					2009				
					2010				
					2011				
					2012	Tampere	Tampere	Tampere	
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## HCAA



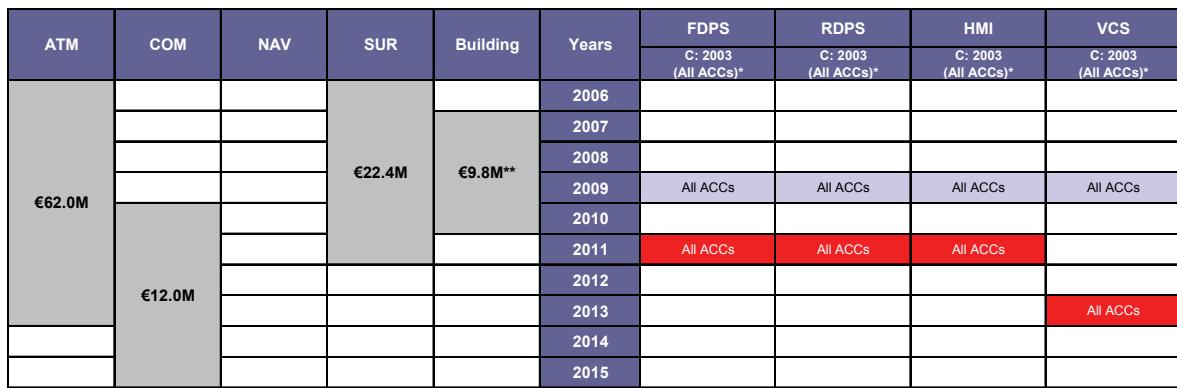
\* C = Commissioning      Upgrade      Replacement

## HungaroControl



\* C = Commissioning      Upgrade      Replacement

## IAA



\*\* The capex provided under "Building" (i.e. €9.8M) comprises an amount relating to Cork Tower (i.e. €7.3M, over 2007-2010) which also includes capex relating to ATM systems      \* C = Commissioning      Upgrade      Replacement

## LFV

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2005 (All ACCs)*	C: 2009 (All ACCs)*	C: 2005 (All ACCs)*	C: 2010 (All ACCs)*
<b>€77.1M</b>	<b>€5.3M</b>				2006				
					2007				
					2008				
			<b>€6.9M</b>	<b>€10.6M</b>	2009	All ACCs		All ACCs	
					2010				
					2011	Malmo		Malmo	
					2012	Stockholm		Stockholm	
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## LGS

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 1999*	C: 1999*	C: 1999*	C: 2003*
<b>€13.5M</b> (2006-2016+)						2006				
			<b>€12.6M</b>			2007				
	<b>€2.3M</b> (2011-2016+)					2008				
						2009				
						2010				
					<b>€1.6M</b>	2011				
						2012				
						2013				Red
						2014				
						2015				

\* C = Commissioning      Upgrade      Replacement

## LPS

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 1999*	C: 2005*	C: 1999*	C: 2009*
<b>€1.6M</b>					2006				
			<b>€5.2M</b>		2007				
	<b>€2.2M</b>				2008				
					2009				
					2010				
					2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## LVNL

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 1998*	C: 1998*	C: 1998*	C: 1988*
					2006				
					2007				
					2008				
<b>€105.2M (2009-2016)</b>	<b>€9.8M</b>		<b>€6.0M</b>	<b>€33.0M</b>	2009				
					2010				
					2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning       Upgrade       Replacement

## MATS

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 1996*	C: 1996*	C: 1996*	C: 1996*
					2006				
					2007				
					2008				
					2009				
					2010				
<b>€7.5M</b>	<b>€0.3M</b>		<b>€4.8M</b>	<b>€1.3M</b>	2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning       Upgrade       Replacement

## M-NAV

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2002*	C: 2002*	C: 2002*	C: 2003*
					2006				
					2007				
					2008				
					2009				
					2010				
<b>€7.3M</b>	<b>€0.9M</b>		<b>€2.9M</b>	<b>€0.7M</b>	2011				
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning       Upgrade       Replacement

## MoldATSA

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 1998*	C: 1998*	C: 1998*	C: 2001*
						2006				
						2007				
						2008				
	<b>€4.0M</b>	<b>€1.2M</b>				2009				
						2010				
						2011				
			<b>€1.5M</b>	<b>€1.5M</b>	<b>€1.8M</b>	2012				
						2013				
						2014				
						2015				

\*\* The amount provided under "Other" (i.e. €0.8M) relates to MET

\* C = Commissioning

■ Upgrade

■ Replacement

## MUAC

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2008*	C: 2008*	C: 2002*	C: 1995*
<b>€100.3M</b> (2003-2016)					2006				
					2007				
					2008				
				<b>€17.1M</b>	2009			■ Upgrade	
					2010				
					2011				
					2012				
					2013		■ Replacement		
					2014				■ Replacement
					2015				

\* C = Commissioning

■ Upgrade

■ Replacement

## NATA Albania

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2004*	C: 2004*	C: 2004*	C: 2008*
					2006				
					2007				
<b>€14.1M</b>	<b>€1.3M</b>			<b>€18.8M</b>	2008				
					2009		■ Upgrade		
			<b>€0.3M</b>		2010			■ Upgrade	
					2011			■ Upgrade	
					2012				
					2013				
					2014	■ Replacement	■ Replacement	■ Replacement	■ Replacement
					2015				

\* C = Commissioning

■ Upgrade

■ Replacement

## NATS

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS		
						C: 2001 (All ACCs)*	C: 1996 (Lon. AC) 2007 (Lon. TC) 2009 (Prest.)*	C: 2001 (Lon. AC) 2007 (Lon. TC) 2009 (Prest.)*	C: 2002 (Lon. AC) 2007 (Lon. TC) 2008 (Prest.)*		
<b>€695.5M</b> (2003-2014)			<b>€191.0M</b> (1999-2013)	<b>€18.0M</b>	2006						
					2007						
					2008				London AC		
					2009		London AC, Prestwick	Prestwick			
					2010	Prestwick	London TC	London TC			
					2011	London AC and TC		London AC	London TC		
					2012		London AC				
					2013						
					2014		London TC, Prestwick	London TC, Prestwick			
					2015						

\* C = Commissioning      Upgrade      Replacement

## NAV Portugal

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS		
						C: 2001*	C: 2001*	C: 2001*	C: 1999*		
<b>€57.3M</b>			<b>€7.1M</b>	<b>€6.8M</b>	2006						
					2007						
					2008						
					2009						
					2010						
					2011						
					2012						
					2013						
					2014						
					2015				Replacement		

\* C = Commissioning      Upgrade      Replacement

## NAVAIR

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2007*	C: 2006*	C: 2007*	C: 2007*
<b>€17.6M</b>		<b>€5.5M</b>			2006				
					2007				
					2008				
					2009				
					2010				
					2011				
					2012	Replacement	Replacement	Replacement	Replacement
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## Oro Navigacija

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2005*	C: 2005*	C: 2005*	C: 2005*
<b>€4.8M</b> (2006-2016)	<b>€3.2M</b> (2009-2016)	<b>€3.3M</b> (2010-2016)	<b>€11.3M</b>	<b>€1.2M</b>		2006				
						2007				
						2008				
						2009				
						2010				
						2011				
						2012				
						2013				
						2014				
						2015	(2015-2017)	(2015-2017)	(2015-2017)	(2015-2017)

\* C = Commissioning      Upgrade      Replacement

## PANSA

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2001*	C: 2001*	C: 2001*	C: 2001*
<b>€47.5M</b>	<b>€3.9M</b>	<b>€18.1M</b>	<b>€26.8M</b>	<b>€33.8M</b>	2006				
					2007				
					2008				
					2009				
					2010				
					2011				
					2012	Replacement	Replacement	Replacement	Replacement
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## ROMATSA

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2003*	C: 2003*	C: 2003*	C: 2004*
<b>€74.5M</b>	<b>€8.7M</b>	<b>€11.3M</b>	<b>€4.2M</b>		2006				
					2007				
					2008				
					2009				
					2010				
					2011				
					2012				
					2013				
					2014				
					2015	Replacement	Replacement	Replacement	(2015-2017)

\* C = Commissioning      Upgrade      Replacement

## Skyguide

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 1999 (Geneva) 2007 (Zurich)*	C: 2004 (All ACCs)*	C: 2003/06 (Gen) 2004/05 (Zurich)*	C: 2004/05 (Gen) 2009/10 (Zurich)*
<b>€36.7M</b> (2005-2014)	<b>€8.0M</b>				2006	Geneva		Geneva (stripless)	
					2007				
					2008				
					2009				
					2010	All ACCs (ARTAS v7)	Geneva (INCH evolution)		
					2011	Zurich (v2)	Zurich (CFL/ INCH evolution)	All ACCs (v4.6)	
					2012				
					2013				
					2014				
					2015			Zurich	

\* C = Commissioning      Upgrade      Replacement

## Slovenia Control

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2007*	C: 2000*	C: 2000*	C: 1998*
<b>€10.6M</b> (2011-2017)	<b>€2.5M</b>	<b>€2.1M</b> (2009-2016)	<b>€5.9M</b> (2011-2017)	<b>€18.4M</b>	2006				
					2007				
					2008				
					2009				
					2010				
					2011				
					2012				Replacement
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## SMATSA

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
						C: 2004*	C: 2004*	C: 2004*	C: 2004*
<b>€40.9M</b>	<b>€4.9M</b>	<b>€17.6M</b>		<b>€17.6M</b>	2006				
					2007				
					2008				
					2009				
					2010				
					2011	Replacement	Replacement	Replacement	Replacement
					2012				
					2013				
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

## UkSATSE

ATM	COM	NAV	SUR	Building	Years	FDPS	RDPS	HMI	VCS
					2006	Kharkiv			
					2007				
					2008	Kyiv			
					2009				
€83.0M	€44.0M	€18.0M	€56.0M	€123.0M	2010				Kyiv
					2011	L'viv	L'viv	L'viv	Kyiv
					2012	Kyiv, Simferopol	Kyiv	Kyiv	L'viv
					2013	Odesa	Odesa, Simferopol	Odesa, Simferopol	
					2014				
					2015				

\* C = Commissioning      Upgrade      Replacement

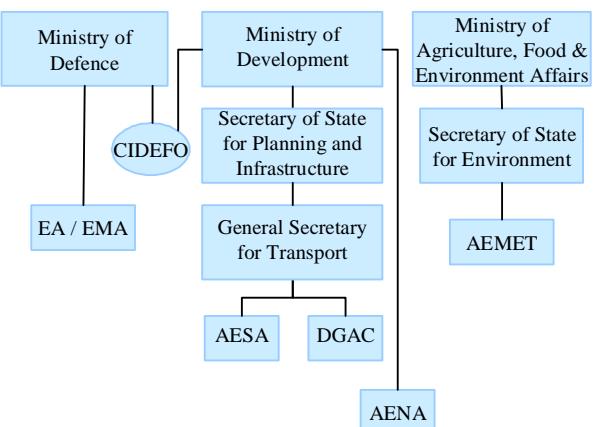
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## **ANNEX 8 - ANSP FACT SHEETS**

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### Institutional arrangements and links (2012)



### Status (2012)

- Business Public Entity attached to Ministry of Development
- A company with specific status (governed by Private Law, except when acting in its administrative capacity)
- 100% State-owned

#### **National Supervisory Authority (NSA):**

- AESA (Spanish Aviation Safety State Agency) (for AENA)
- Spanish Air Force Staff (for MIL)
- Secretary of State for Environment (for MET)

#### **Body responsible for:**

##### Safety Regulation

Spanish Civil Aviation Authority - Government  
AESA - Government

##### Airspace Regulation

Spanish Civil Aviation Authority - Government  
AESA - Government

##### Economic Regulation

Government

### Corporate governance structure (2012)

MANAGEMENT COMMITTEE  
Chairman + 11 members + Secretary  
Chairman is the CEO

BOARD OF DIRECTORS

### Aena (2012)

**CHAIRMAN OF THE MANAGEMENT COMMITTEE:**  
Jose Manuel Vargas Gomez

#### **DIRECTOR GENERAL (CEO):**

Jose Manuel Vargas Gomez

#### **DIRECTOR OF AIR NAVIGATION:**

Ignacio Gonzalez Sanchez

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

Note: This Fact Sheet reflects the situation as of 15/03/2012.

### Key financial and operational figures (2010)

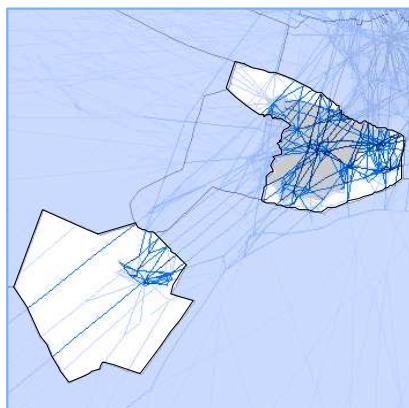
Gate-to-gate total revenues (M€)	1 041
Gate-to-gate total costs (M€)	1 033
Gate-to-gate ATM/CNS provision costs (M€)	931
Gate-to-gate total ATM/CNS assets(M€)	1 039
Gate-to-gate ANS total capex (M€)	159
ATCOs in OPS	1 855
Gate-to-gate total staff	4 157
Total IFR flight-hours controlled by ANSP ('000)	1 324
IFR airport movements controlled by ANSP ('000)	1 827
En-route sectors	70
Minutes of ATFM delays ('000)	4 576

### Operational ATS units:

5 ACCs (Madrid, Barcelona, Canary Islands, Palma, Sevilla)  
19 APPs (Valencia TACC, Malaga APP and Santiago TACC  
+ 16 APPs co-located with TWR units)  
37 TWRs

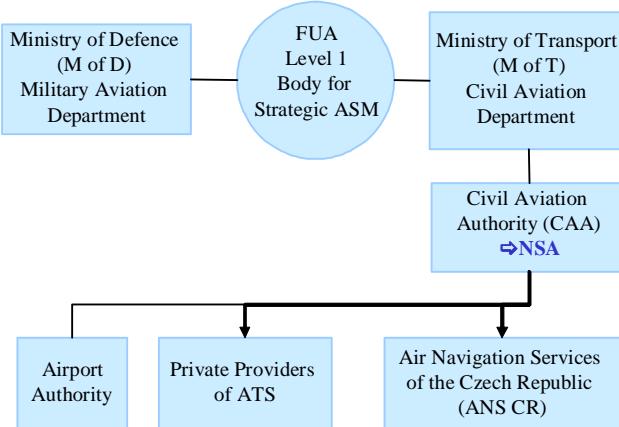
### Size

Size of controlled airspace: 2 190 000 km<sup>2</sup>





### Institutional arrangements and links (2012)



### Status (2012)

- State-enterprise founded under the State Enterprise Act in 1995
- 100% State-owned

**National Supervisory Authority (NSA):**  
Civil Aviation Authority (CAA)

#### Body responsible for:

Safety Regulation  
Civil Aviation Authority

Airspace Regulation  
Body for Strategic ASM

Economic Regulation  
Ministry of Transport

### Corporate governance structure (2012)

#### SUPERVISORY BOARD (6 members)

Chairman + 5 members  
Members appointed by:  
4 M of T  
2 ANS CR employees

DIRECTOR GENERAL  
appointed by the M of T

### ANS CR (2012)

**CHAIRMAN OF THE SUPERVISORY BOARD:**  
Lukáš Hampl

**DIRECTOR GENERAL (CEO):**  
Jan Klas

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

### Operational ATS units:

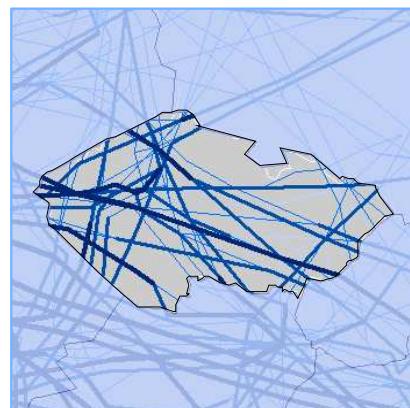
1 ACC (Praha)  
4 APPs (Praha, Karlovy Vary, Brno, Ostrava)  
4 TWRs (Praha, Karlovy Vary, Brno, Ostrava)  
1 AFIS (located in Praha ACC)

### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	125
Gate-to-gate total costs (M€)	125
Gate-to-gate ATM/CNS provision costs (M€)	115
Gate-to-gate total ATM/CNS assets(M€)	137
Gate-to-gate ANS total capex (M€)	18
ATCOs in OPS	189
Gate-to-gate total staff	876
Total IFR flight-hours controlled by ANSP ('000)	228
IFR airport movements controlled by ANSP ('000)	170
En-route sectors	9
Minutes of ATFM delays ('000)	137

### Size

Size of controlled airspace: 79 500 km<sup>2</sup>

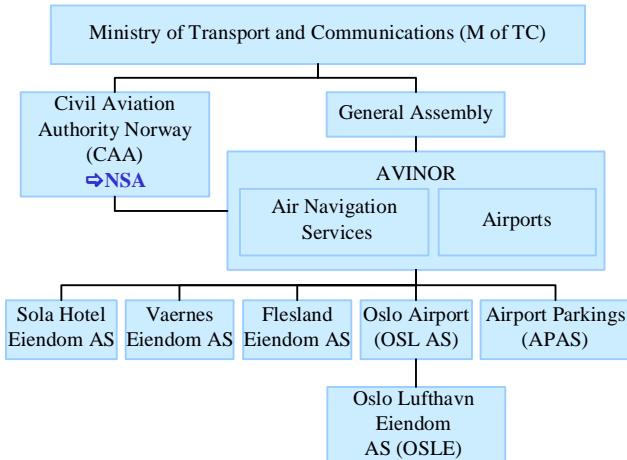




<p><b>Institutional arrangements and links (2012)</b></p> <p><i>Government</i></p> <pre> graph TD     GDCA[General Department of Civil Aviation (GDCA)] --&gt; ARMATS[ARMATS]     GDCA --&gt; MDef[Ministry of Defence]     MDef --&gt; AF[Air Force]     MDef --&gt; AD[Air Defence]     MDef --&gt; ME[Ministry of Environment]     ME --&gt; AMC[Aviation Meteorological Centre]   </pre>	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Joint-stock company as of 1997</li> <li>- 100% State-owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b> General Department of Civil Aviation (GDCA)</p> <p><b>Body responsible for:</b></p> <p><u>Safety Regulation</u> General Department of Civil Aviation (GDCA)</p> <p><u>Airspace Regulation</u> General Department of Civil Aviation (GDCA) and Ministry of Defence</p> <p><u>Economic Regulation</u> Tax Authorities</p>																						
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<p><b>Key financial and operational figures (2010)</b></p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 80%;">Gate-to-gate total revenues (M€)</td> <td style="width: 20%; text-align: right;">7</td> </tr> <tr> <td>Gate-to-gate total costs (M€)</td> <td style="text-align: right;">7</td> </tr> <tr> <td>Gate-to-gate ATM/CNS provision costs (M€)</td> <td style="text-align: right;">6</td> </tr> <tr> <td>Gate-to-gate total ATM/CNS assets(M€)</td> <td style="text-align: right;">5</td> </tr> <tr> <td>Gate-to-gate ANS total capex (M€)</td> <td style="text-align: right;">1</td> </tr> <tr> <td>ATCOs in OPS</td> <td style="text-align: right;">87</td> </tr> <tr> <td>Gate-to-gate total staff</td> <td style="text-align: right;">457</td> </tr> <tr> <td>Total IFR flight-hours controlled by ANSP ('000)</td> <td style="text-align: right;">13</td> </tr> <tr> <td>IFR airport movements controlled by ANSP ('000)</td> <td style="text-align: right;">21</td> </tr> <tr> <td>En-route sectors</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Minutes of ATFM delays ('000)</td> <td style="text-align: right;">0</td> </tr> </tbody> </table>	Gate-to-gate total revenues (M€)	7	Gate-to-gate total costs (M€)	7	Gate-to-gate ATM/CNS provision costs (M€)	6	Gate-to-gate total ATM/CNS assets(M€)	5	Gate-to-gate ANS total capex (M€)	1	ATCOs in OPS	87	Gate-to-gate total staff	457	Total IFR flight-hours controlled by ANSP ('000)	13	IFR airport movements controlled by ANSP ('000)	21	En-route sectors	1	Minutes of ATFM delays ('000)	0	<p><b>Size</b></p> <p>Size of controlled airspace: 29 800 km<sup>2</sup></p>
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<p><b>Institutional arrangements and links (2012)</b></p> <pre> graph TD     MofD[Federal Ministry of Defence (M of D)] --- AD[Air Division]     MofTIT[Federal Ministry of Transport, Innovation and Technology as supreme CAA (M of TIT) ⇒ NSA] --&gt; AC[AUSTRO CONTROL]     MofTIT --&gt; NSANSA[National Supervisory Authority (NSA)]     AD --&gt; AC   </pre>	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Private limited company as of 1994</li> <li>- 100% State-owned (Law makes provision for Austrian Airports to own up to 49 %)</li> </ul> <p><b>National Supervisory Authority (NSA):</b> Federal Ministry of Transport, Innovation and Technology (M of TIT)</p> <p><b>Body responsible for:</b></p> <p><b>Safety Regulation</b> The power for regulatory decisions including safety oversight lies within the M of TIT</p> <p><b>Airspace Regulation</b> M of TIT, normally on basis of proposals of Austro Control</p> <p><b>Economic Regulation</b> Covered by the National Supervisory Authority</p>																						
<p><b>Corporate governance structure (2012)</b></p> <pre> graph TD     GA[GENERAL ASSEMBLY - M of TIT] --&gt; SB[SUPERVISORY BOARD (9 members) Chairman + 8 members All members are appointed by M of TIT. Members represent: 1 from M of Finance, 1 from M of TIT, 2 from the field of aviation, 1 from the field of consulting, 3 from works council.]     SB --&gt; MB[MANAGING BOARD 2 members Members appointed by M of TIT.]   </pre>	<p><b>Austro Control (2012)</b></p> <p><b>CHAIRMAN OF THE SUPERVISORY BOARD:</b> Dr. Caspar Einem</p> <p><b>MANAGING BOARD:</b> Dr. Heinz Sommerbauer Mag. Johann Zemsky</p>																						
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<p><b>Key financial and operational figures (2010)</b></p> <table> <tbody> <tr> <td>Gate-to-gate total revenues (M€)</td> <td>211</td> </tr> <tr> <td>Gate-to-gate total costs (M€)</td> <td>201</td> </tr> <tr> <td>Gate-to-gate ATM/CNS provision costs (M€)</td> <td>171</td> </tr> <tr> <td>Gate-to-gate total ATM/CNS assets(M€)</td> <td>172</td> </tr> <tr> <td>Gate-to-gate ANS total capex (M€)</td> <td>42</td> </tr> <tr> <td>ATCOs in OPS</td> <td>270</td> </tr> <tr> <td>Gate-to-gate total staff</td> <td>896</td> </tr> <tr> <td>Total IFR flight-hours controlled by ANSP ('000)</td> <td>286</td> </tr> <tr> <td>IFR airport movements controlled by ANSP ('000)</td> <td>374</td> </tr> <tr> <td>En-route sectors</td> <td>11</td> </tr> <tr> <td>Minutes of ATFM delays ('000)</td> <td>1 442</td> </tr> </tbody> </table>	Gate-to-gate total revenues (M€)	211	Gate-to-gate total costs (M€)	201	Gate-to-gate ATM/CNS provision costs (M€)	171	Gate-to-gate total ATM/CNS assets(M€)	172	Gate-to-gate ANS total capex (M€)	42	ATCOs in OPS	270	Gate-to-gate total staff	896	Total IFR flight-hours controlled by ANSP ('000)	286	IFR airport movements controlled by ANSP ('000)	374	En-route sectors	11	Minutes of ATFM delays ('000)	1 442	<p><b>Size</b> Size of controlled airspace: 80 000 km<sup>2</sup></p>
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### Institutional arrangements and links (2012)



### Status (2012)

- State owned limited company.
- Civil ANSP and airport owner/ operator
- Independent of CAA

#### National Supervisory Authority (NSA):

Civil Aviation Authority Norway (CAA)

#### Body responsible for:

##### Safety Regulation

Civil Aviation Authority Norway

##### Airspace Regulation

Civil Aviation Authority Norway

##### Economic Regulation

Aeronautic charges are set annually by the Ministry of Transport and Communications

### Corporate governance structure (2012)

SUPERVISORY BOARD (10 members )  
Chairman + 9 members  
Members represent: 6 M of TC, 4 staff

EXECUTIVE BOARD (8 members)  
CEO + 7 members  
CEO appointed by Supervisory Board

### Avinor (2012)

#### CHAIRMAN OF THE SUPERVISORY BOARD:

Ola Mørkved Rinnan

#### CHIEF EXECUTIVE OFFICER:

Dag Falk-Petersen

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input checked="" type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- AVINOR owns and operates 46 airports, 12 in association with Armed Forces

### Operational ATS units:

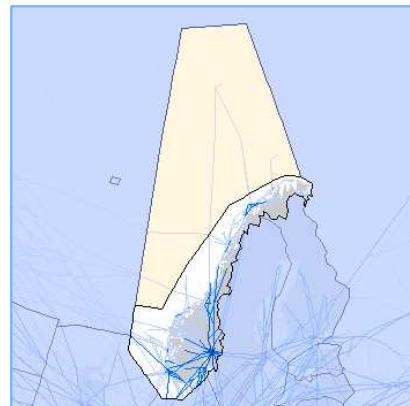
3 ACCs Oslo (ACC + APP), Stavanger (ACC), Bodø (ACC + APP + Oceanic)  
17 APPs (1 APP combined with Oslo ACC+16 TWRs/APPs)  
17 TWRs  
28 AFISs

### Key financial and operational figures (2010)

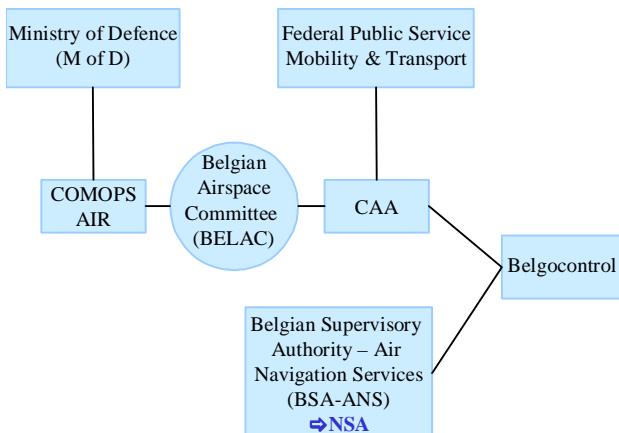
Gate-to-gate total revenues (M€)	177
Gate-to-gate total costs (M€)	185
Gate-to-gate ATM/CNS provision costs (M€)	173
Gate-to-gate total ATM/CNS assets(M€)	90
Gate-to-gate ANS total capex (M€)	7
ATCOs in OPS	371
Gate-to-gate total staff	1 012
Total IFR flight-hours controlled by ANSP ('000)	310
IFR airport movements controlled by ANSP ('000)	603
En-route sectors	19
Minutes of ATFM delays ('000)	71

### Size

Size of controlled airspace: 2 169 000 km<sup>2</sup>



### Institutional arrangements and links (2012)



### Status (2012)

- Public Autonomous Enterprise as of 1998 under a management contract
- 100% State-owned

#### National Supervisory Authority (NSA):

Belgian Supervisory Authority - Air Navigation Services (BSA-ANS)

#### Body responsible for:

##### Safety Regulation

Civil Aviation Authority

##### Airspace Regulation

Belgian Airspace Committee

##### Economic Regulation

Federal Public Service of Mobility and Transport

### Corporate governance structure (2012)

SUPERVISORY BOARD (10 members)  
 Chairman + CEO + 8 members  
 Members appointed by Ministry of Mobility  
 CEO represents staff.

EXECUTIVE BOARD (4 members)  
 CEO + 3 members

### Belgocontrol (2012)

**CHAIRMAN OF THE SUPERVISORY BOARD:**  
 Charles-Louis d'Arenberg

**DIRECTOR GENERAL (CEO):**  
 Jean-Claude Tintin

### Scope of services

<input checked="" type="checkbox"/> GAT	<input type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET

- Belgocontrol controls lower airspace up to FL 245, including Luxembourg airspace above FL 145/165
- Upper airspace (> FL 245) is controlled by Maastricht UAC

### Operational ATS units:

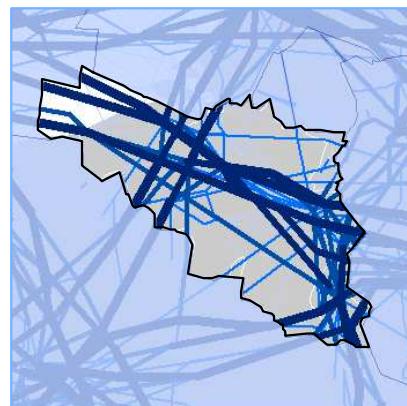
- 1 ACC (Brussels)
- 4 APPs (Brussels, Liege, Charleroi, Oostende)
- 5 TWRs (Brussels, Antwerp, Liege, Charleroi, Oostende)

### Key financial and operational figures (2010)

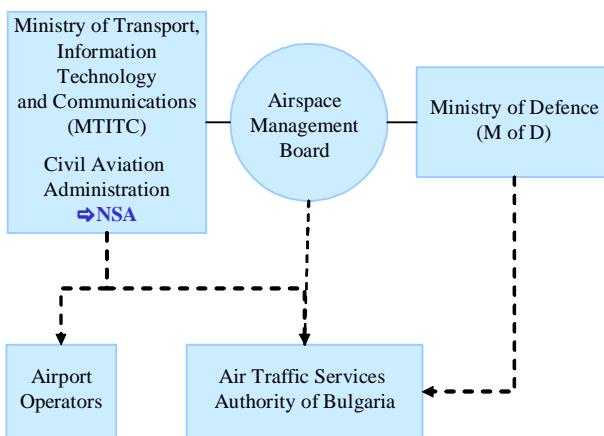
Gate-to-gate total revenues (M€)	205
Gate-to-gate total costs (M€)	216
Gate-to-gate ATM/CNS provision costs (M€)	148
Gate-to-gate total ATM/CNS assets(M€)	171
Gate-to-gate ANS total capex (M€)	13
ATCOs in OPS	220
Gate-to-gate total staff	907
Total IFR flight-hours controlled by ANSP ('000)	110
IFR airport movements controlled by ANSP ('000)	353
En-route sectors	7
Minutes of ATFM delays ('000)	312

### Size

Size of controlled airspace: 39 500 km<sup>2</sup>



**Institutional arrangements and links (2012)**



**Status (2012)**

- State enterprise as of April 2001 (Art 53 §1 of the Civil Aviation Law)
- 100% State-owned

**National Supervisory Authority (NSA):**

Civil Aviation Administration

**Body responsible for:**

Safety Regulation

Civil Aviation Administration (Ministry of Transport, Information Technology and Communications (MTITC))

Airspace Regulation

Airspace Management Board

Economic Regulation

Ministry of Transport, Information Technology and Communications (MTITC)

**Corporate governance structure (2012)**

MANAGEMENT BOARD (3 members)  
DG + 2 members

All members appointed by the MTITC.

**BULATSA (2012)**

**CHAIRMAN OF THE MANAGEMENT BOARD:**  
Iskra Angelova

**DIRECTOR GENERAL (CEO):**  
Diyan Dinev

**Scope of services**

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET

- Training of ATCOs

**Operational ATS units:**

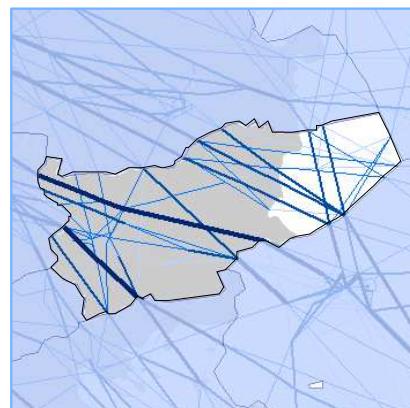
- 1 ACCs (Sofia)
- 3 APPs (Sofia, Varna, Burgas)
- 5 TWRs (Sofia, Varna, Burgas, Gorna Oriahovitsa, Plovdiv)

**Key financial and operational figures (2010)**

Gate-to-gate total revenues (M€)	86
Gate-to-gate total costs (M€)	86
Gate-to-gate ATM/CNS provision costs (M€)	73
Gate-to-gate total ATM/CNS assets(M€)	105
Gate-to-gate ANS total capex (M€)	2
ATCOs in OPS	195
Gate-to-gate total staff	1 216
Total IFR flight-hours controlled by ANSP ('000)	169
IFR airport movements controlled by ANSP ('000)	82
En-route sectors	6
Minutes of ATFM delays ('000)	0

**Size**

Size of controlled airspace: 145 120 km<sup>2</sup>

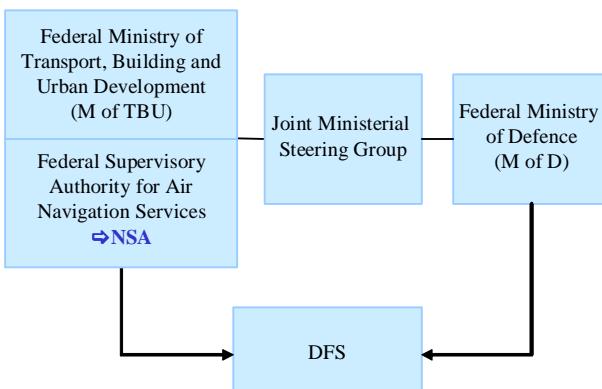




<p><b>Institutional arrangements and links (2012)</b></p>	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Limited liability company as of 1 January 2000</li> <li>- 100% State-owned</li> <li>- Integrated civil/military ANSP</li> </ul> <p><b>National Supervisory Authority (NSA):</b> Croatian Civil Aviation Agency (CCAA)</p> <p><b>Body responsible for:</b></p> <ul style="list-style-type: none"> <li><u>Safety Regulation</u>: Directorate General for Civil Aviation</li> <li><u>Airspace Regulation</u>: M of STI</li> <li><u>Economic Regulation</u>: State Law and Croatia Control Ltd</li> </ul>																						
<p><b>Corporate governance structure (2012)</b></p> <p><b>ASSEMBLY</b> (3 members) The President represents Ministry of STI (Minister), the other Two members represent M of D (Minister) and M of F (Minister).</p> <p><b>SUPERVISORY BOARD</b> (5 members) The Chairman + 4 members The members represent the M of STI, M of D, M of F, and employees. They are appointed for a 4-year period. The member representing the employees is elected and appointed pursuant to the Company Statute and Labour Relations Act.</p> <p><b>MANAGEMENT</b> Director General The DG is appointed by the Supervisory Board for a 5-year period, following an open competition and under the conditions stipulated by the Company Statute.</p>	<p><b>Croatia Control (2012)</b></p> <p><b>CHAIRMAN OF THE SUPERVISORY BOARD:</b> Ante Cajic</p> <p><b>DIRECTOR GENERAL:</b> Dražen Ramljak</p>																						
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<u>Institutional arrangements and links (2012)</u>		<u>Status (2012)</u>																						
<pre> graph TD     NSA[National Supervisory Authority ⇒ NSA] --&gt; DCA[Department of Civil Aviation (DCA)]     NSA -.-&gt; MoCW[Ministry of Communications and Works]     MoCW --&gt; DCA     MoCW -.-&gt; MoFA[Ministry of Foreign Affairs]     MoFA --&gt; DCA     MoF[Ministry of Finance] --&gt; CYTA[Cyprus Telecom Authority (CYTA)]     CYTA --&gt; MoF   </pre>		<ul style="list-style-type: none"> <li>- State body</li> <li>- 100% State-owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b> Department of Civil Aviation</p> <p><b>Body responsible for:</b>  <u>Safety Regulation</u> Department of Civil Aviation of Cyprus</p> <p><u>Airspace Regulation</u> Department of Civil Aviation of Cyprus</p> <p><u>Economic Regulation</u> Ministry of Finance</p>																						
<u>Corporate governance structure (2012)</u>		<u>DCAC Cyprus (2012)</u>																						
<pre> graph TD     MoCW[Minister of Communications and Works] --&gt; Director[Director DCAC]     Director --&gt; ANS[Head of ANS Section]     Director --&gt; TAA[Head of T&amp;A Section]     Director --&gt; AS[Head of Aviation Security Section]     Director --&gt; NSA[Head of NSA]   </pre> <p>Director DCAC, Head of ANS Section, Head of T&amp;A Section, Head of Aviation Security Section and Head of Safety Regulation Unit are nominated by the Civil Service. The Head of the NSA is nominated by the Council of Ministers.</p>		<p><b>DIRECTOR OF DCAC:</b> Leonidas Leonidou</p> <p><b>HEAD OF NSA:</b> Panayiota Demetriou</p> <p><b>HEAD OF ANS SECTION (COO):</b> Nicos Nicolaou</p> <p><b>HEAD OF AIR TRANSPORT AND AIRPORTS SECTION:</b> Iacovos Demetriou</p>																						
<u>Scope of services</u>		<u>Operational ATS units:</u>																						
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<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET																						
<u>Key financial and operational figures (2010)</u>		<u>Size</u>																						
<table> <tr> <td>Gate-to-gate total revenues (M€)</td> <td>40</td> </tr> <tr> <td>Gate-to-gate total costs (M€)</td> <td>53</td> </tr> <tr> <td>Gate-to-gate ATM/CNS provision costs (M€)</td> <td>41</td> </tr> <tr> <td>Gate-to-gate total ATM/CNS assets(M€)</td> <td>34</td> </tr> <tr> <td>Gate-to-gate ANS total capex (M€)</td> <td>5</td> </tr> <tr> <td>ATCOs in OPS</td> <td>70</td> </tr> <tr> <td>Gate-to-gate total staff</td> <td>188</td> </tr> <tr> <td>Total IFR flight-hours controlled by ANSP ('000)</td> <td>131</td> </tr> <tr> <td>IFR airport movements controlled by ANSP ('000)</td> <td>64</td> </tr> <tr> <td>En-route sectors</td> <td>3</td> </tr> <tr> <td>Minutes of ATFM delays ('000)</td> <td>1 008</td> </tr> </table>		Gate-to-gate total revenues (M€)	40	Gate-to-gate total costs (M€)	53	Gate-to-gate ATM/CNS provision costs (M€)	41	Gate-to-gate total ATM/CNS assets(M€)	34	Gate-to-gate ANS total capex (M€)	5	ATCOs in OPS	70	Gate-to-gate total staff	188	Total IFR flight-hours controlled by ANSP ('000)	131	IFR airport movements controlled by ANSP ('000)	64	En-route sectors	3	Minutes of ATFM delays ('000)	1 008	<p>Size of controlled airspace: 174 000 km<sup>2</sup></p>
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Minutes of ATFM delays ('000)	1 008																							

Institutional arrangements and links (2012)Status (2012)

- Limited liability company as of 1993, governed by Private Company Law
- 100% State-owned
- Integrated civil/military ANSP

**National Supervisory Authority (NSA):**

Federal Supervisory Authority for Air Navigation Services

**Body responsible for:**Safety Regulation

Federal Supervisory Authority for Air Navigation Services (NSA)

Airspace Regulation

Federal Supervisory Authority for Air Navigation Services (NSA)

Economic Regulation

Federal Supervisory Authority for Air Navigation Services (NSA)

Corporate governance structure (2012)

## SHAREHOLDER Meeting with M of TBU

## Supervisory Board (12 Members)

Chairman + 11 Members

Chairman appointed by the Government

Members represent: 1 (Chairman) from M of TBU

1 M of TBU

2 M of D, 1 M of F, 1 KFW\*, 6 staff reps

Chairman has a double voting right

## EXECUTIVE BOARD (3 members)

CEO + 2 members

Executive Board is appointed by the Supervisory Board.

\* KFW = KFW-Bankengruppe

DFS (2012)**CHAIRMAN OF THE SUPERVISORY BOARD:**

Prof. Klaus-Dieter Scheurle

**CHAIRMAN OF THE EXECUTIVE BOARD:**

Dieter Kaden

Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- DFS controls both upper and lower airspace, except GAT for the upper airspace in North-Western Germany
- Other ANS
- Consulting, training, engineering & maintenance services

**Operational ATS units:**

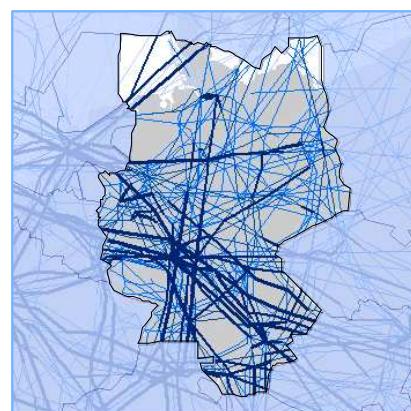
1 UAC	(Karlsruhe)
1 ACC/UAC/APP	(München)
2 ACCs/APPs	(Bremen, Langen)
1 ACC	(co-located with Maastricht UAC) for OAT in upper airspace in North-Western Germany
16 TWRs	(Berlin Tempelhof closed in Nov.08)

Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	912
Gate-to-gate total costs (M€)	878
Gate-to-gate ATM/CNS provision costs (M€)	878
Gate-to-gate total ATM/CNS assets(M€)	664
Gate-to-gate ANS total capex (M€)	80
ATCOs in OPS	1 716
Gate-to-gate total staff	5 280
Total IFR flight-hours controlled by ANSP ('000)	1 363
IFR airport movements controlled by ANSP ('000)	2 006
En-route sectors	108
Minutes of ATFM delays ('000)	5 698

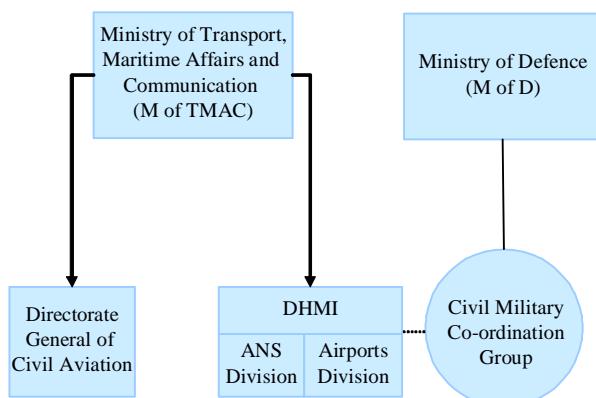
Size

Size of controlled airspace: 388 000 km<sup>2</sup>





### Institutional arrangements and links (2012)



### Status (2012)

- Autonomous State body
- 100% State-owned

#### **National Supervisory Authority (NSA):**

Not applicable since Turkey is not bound by SES Regulations

#### **Body responsible for:**

##### Safety Regulation

Directorate General of Civil Aviation

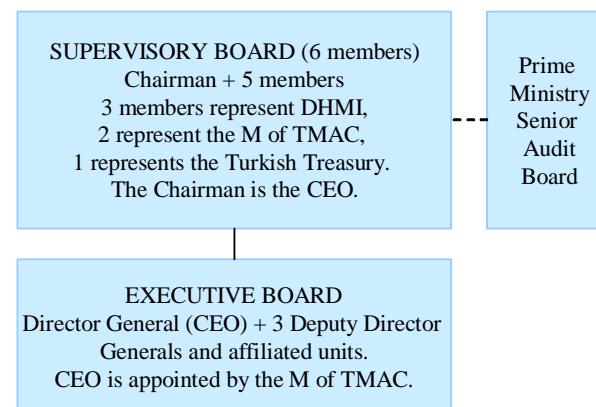
##### Airspace Regulation

General Directorate of DHMI

##### Economic Regulation

General Directorate of DHMI

### Corporate governance structure (2012)



### DHMI (2012)

#### **CHAIRMAN OF THE SUPERVISORY BOARD:**

Mr. Orhan Birdal

#### **DIRECTOR GENERAL (CEO):**

Mr. Orhan Birdal

#### **DIRECTOR ANS DIVISION:**

Mr. Mustafa Kılıç

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- DHMI is responsible for the administration of 45 State Airports. ATS services are provided by DHMI in 37 Airports

### Operational ATS units:

2 ACCs (Ankara, Istanbul)

17 APPs

37 TWRs

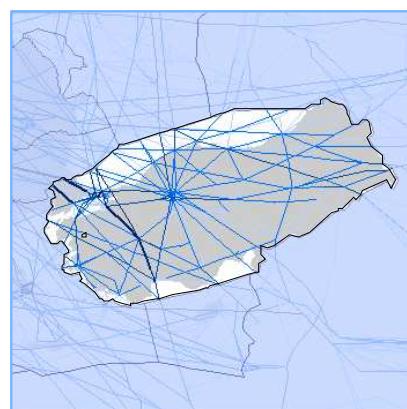
22 AFISs

### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	371
Gate-to-gate total costs (M€)	319
Gate-to-gate ATM/CNS provision costs (M€)	280
Gate-to-gate total ATM/CNS assets(M€)	608
Gate-to-gate ANS total capex (M€)	70
ATCOs in OPS	843
Gate-to-gate total staff	5 080
Total IFR flight-hours controlled by ANSP ('000)	811
IFR airport movements controlled by ANSP ('000)	806
En-route sectors	22
Minutes of ATFM delays ('000)	965

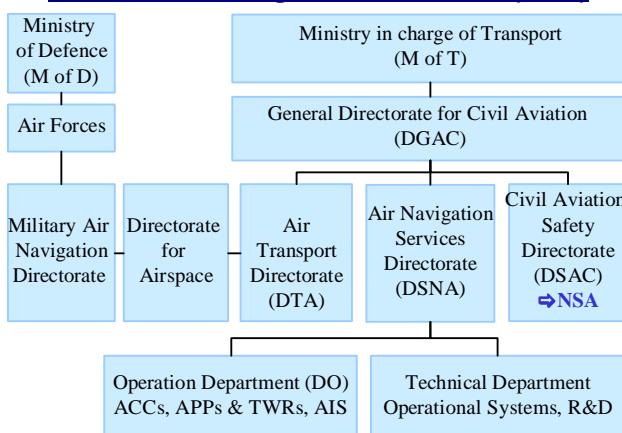
### Size

Size of controlled airspace: 982 000 km<sup>2</sup>





### Institutional arrangements and links (2012)



### Status (2012)

- DSNA is a division of DGAC
- 100% State-owned

#### National Supervisory Authority (NSA):

Directorate for Civil Aviation Safety (DSAC)

#### Body responsible for:

##### Safety Regulation

Air Transport Directorate (DTA)

##### Airspace Regulation

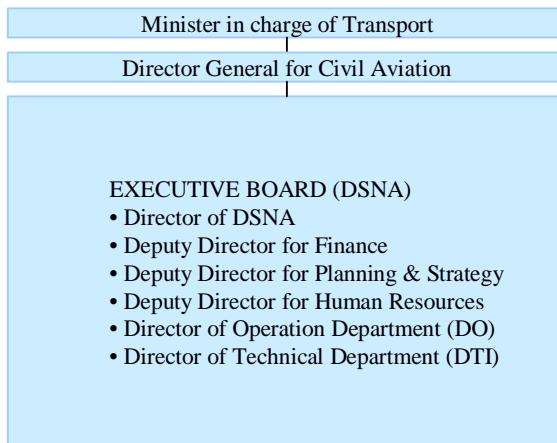
Air Transport Directorate (DTA)

Direction de la circulation aérienne militaire (DIRCAM)

##### Economic Regulation

Air Transport Directorate (DTA)

### Corporate governance structure (2012)



### DSNA (2012)

#### DIRECTOR OF DSNA:

M. Georges

#### DIRECTOR OF OPERATION DEPARTEMENT (DO):

M. Bruneau

#### DIRECTOR OF TECHNICAL DEPARTEMENT (DTI):

P. Planchon

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- Delegation of airspace to Skyguide and Jersey

### Operational ATS units:

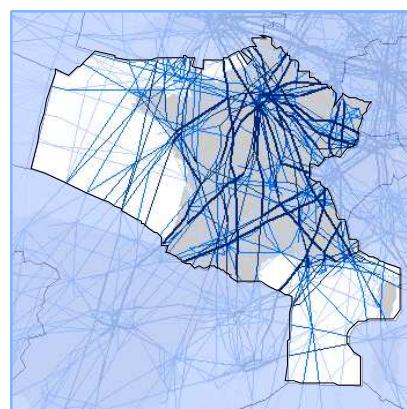
5 ACCs  
12 APPs/TWRs (i.e. Paris Orly, Paris CDG, Marseille, Lyon, Nice, Bordeaux, Toulouse, Clermont Ferrand, Montpellier, Strasbourg, Bâle-Mulhouse, Nantes)  
68 TWRs

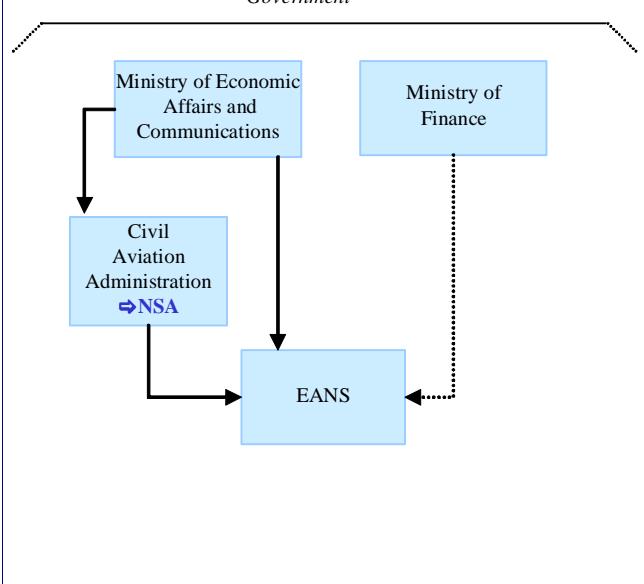
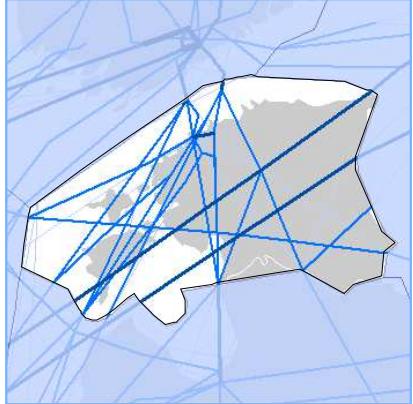
### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	1 353
Gate-to-gate total costs (M€)	1 407
Gate-to-gate ATM/CNS provision costs (M€)	1 138
Gate-to-gate total ATM/CNS assets(M€)	767
Gate-to-gate ANS total capex (M€)	120
ATCOs in OPS	2 699
Gate-to-gate total staff	7 868
Total IFR flight-hours controlled by ANSP ('000)	2 099
IFR airport movements controlled by ANSP ('000)	1 809
En-route sectors	87
Minutes of ATFM delays ('000)	7 906

### Size

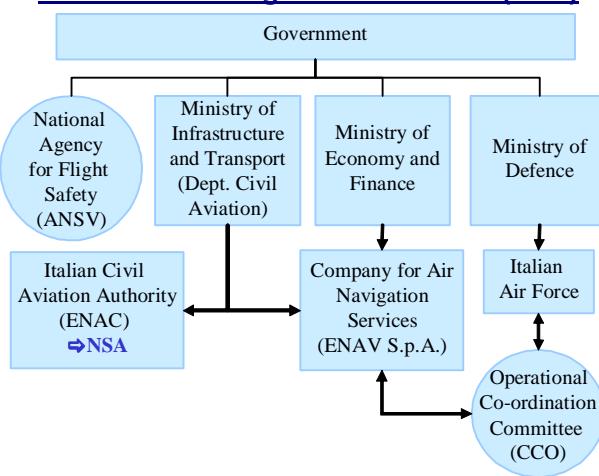
Size of controlled airspace: 1 010 000 km<sup>2</sup>



<u>Institutional arrangements and links (2012)</u>  <pre> graph TD     G[Government] --- MEAC[Ministry of Economic Affairs and Communications]     G --- MF[Ministry of Finance]     G --- CAA[Civil Aviation Administration ⇒ NSA]     G --- EANS[EANS]     MEAC --&gt; CAA     MF -.-&gt; EANS     CAA --&gt; EANS     EANS --&gt; CAA   </pre>	<u>Status (2012)</u> <ul style="list-style-type: none"> <li>- Joint-stock company as of 1998</li> <li>- 100% State-owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b> Civil Aviation Administration</p> <p><b>Body responsible for:</b> <i>Safety Regulation</i> Government of the Republic of Estonia Safety Supervision is done by the Civil Aviation Administration (CAA)</p> <p><i>Airspace Regulation</i> Government of the Republic of Estonia</p> <p><i>Economic Regulation</i> Government of the Republic of Estonia (Ministry of Economic Affairs and Communications &amp; Ministry of Finance)</p>																						
<u>Corporate governance structure (2012)</u>  <pre> graph TD     SB[SUPERVISORY BOARD (6 members)] --- CB[EXECUTIVE BOARD (3 members)]     SB --- Chairman[Chairman + 5 members]     SB --- Members[Members: 3 appointed by M of EC, of which 1 is elected Chairman by members of the Supervisory Board; 3 appointed by M of F.]     CB --- CEO[CEO + 2 members]     CB --- CEOApp[CEO appointed by the Supervisory Board]   </pre>	<b>EANS (2012)</b> <p><b>CHAIRMAN OF THE SUPERVISORY BOARD:</b> Andres Uusma</p> <p><b>CHAIRMAN OF THE MANAGEMENT BOARD &amp; CEO:</b> Tanel Rautits</p>																						
<u>Scope of services</u> <table border="1"> <tr> <td><input checked="" type="checkbox"/> GAT</td> <td><input checked="" type="checkbox"/> Upper Airspace</td> <td><input type="checkbox"/> Oceanic ANS</td> </tr> <tr> <td><input type="checkbox"/> OAT</td> <td><input checked="" type="checkbox"/> Lower Airspace</td> <td><input type="checkbox"/> MET</td> </tr> </table> <ul style="list-style-type: none"> <li>- Tech. serv. (NAV/COMM/SUR), Aeronautical info serv.</li> <li>- Consultancy services</li> <li>- Control Tallinn Aerodrome</li> <li>- Estonia is not member of EUROCONTROL</li> <li>- Estonia belongs to IFPS zone</li> </ul>	<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS	<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET	<u>Operational ATS units:</u> 1 ACC (Tallinn) 2 APPs/TWRs (Tallinn, Tartu)																
<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS																					
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET																					
<u>Key financial and operational figures (2010)</u> <table border="1"> <tr><td>Gate-to-gate total revenues (M€)</td><td>13</td></tr> <tr><td>Gate-to-gate total costs (M€)</td><td>11</td></tr> <tr><td>Gate-to-gate ATM/CNS provision costs (M€)</td><td>11</td></tr> <tr><td>Gate-to-gate total ATM/CNS assets(M€)</td><td>15</td></tr> <tr><td>Gate-to-gate ANS total capex (M€)</td><td>5</td></tr> <tr><td>ATCOs in OPS</td><td>41</td></tr> <tr><td>Gate-to-gate total staff</td><td>136</td></tr> <tr><td>Total IFR flight-hours controlled by ANSP ('000)</td><td>54</td></tr> <tr><td>IFR airport movements controlled by ANSP ('000)</td><td>31</td></tr> <tr><td>En-route sectors</td><td>3</td></tr> <tr><td>Minutes of ATFM delays ('000)</td><td>5</td></tr> </table>	Gate-to-gate total revenues (M€)	13	Gate-to-gate total costs (M€)	11	Gate-to-gate ATM/CNS provision costs (M€)	11	Gate-to-gate total ATM/CNS assets(M€)	15	Gate-to-gate ANS total capex (M€)	5	ATCOs in OPS	41	Gate-to-gate total staff	136	Total IFR flight-hours controlled by ANSP ('000)	54	IFR airport movements controlled by ANSP ('000)	31	En-route sectors	3	Minutes of ATFM delays ('000)	5	<u>Size</u> Size of controlled airspace: 77 102 km <sup>2</sup> 
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En-route sectors	3																						
Minutes of ATFM delays ('000)	5																						



### Institutional arrangements and links (2012)



### Status (2012)

- Joint-Stock Company
- 100% State-owned by Ministry of Economy and Finance

#### National Supervisory Authority (NSA):

Italian Civil Aviation Authority (ENAC)

#### Body responsible for:

##### Safety Regulation

Italian Civil Aviation Authority (ENAC) and Ministry of Infrastructure and Transport (M of IT)

##### Airspace Regulation

Italian Civil Aviation Authority (ENAC)

##### Economic Regulation

Ministry of Infrastructure and Transport and ENAC review annually ANS charges in co-operation with Ministry of Economy and Finance and Ministry of Defence

### Corporate governance structure (2012)

**CHIEF EXECUTIVE OFFICER**  
The CEO has been appointed by the Ministry of Economy and Finance in consultation with the Ministry of Infrastructure and Transport.

Reciprocal obligations between the Ministry of Infrastructure and Transport and ENAV are regulated through programme contract and service contract.

### ENAV (2012)

**CHIEF EXECUTIVE OFFICER (CEO):**  
Massimo Garbini

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET

- Aeronautical Information service
- Training and licensing of ATCO's
- R&D consultancy services
- Aerodrome weather services, ATM and CNS
- Flight inspection

### Operational ATS units:

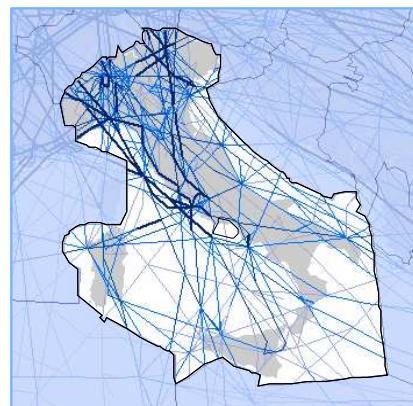
4 ACCs (Milan, Padua, Rome, Brindisi)  
18 APPs co-located within TWR units + 1 APP stand-alone + 4 APPs co-located within ACC units  
28 TWRS (including 16 low traffic airports which are not included in ACE data analysis)  
11 AFISs (low traffic airports not included in ACE data analysis)

### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	704
Gate-to-gate total costs (M€)	735
Gate-to-gate ATM/CNS provision costs (M€)	654
Gate-to-gate total ATM/CNS assets(M€)	1 031
Gate-to-gate ANS total capex (M€)	166
ATCOs in OPS	1 336
Gate-to-gate total staff	2 943
Total IFR flight-hours controlled by ANSP ('000)	1 085
IFR airport movements controlled by ANSP ('000)	1 143
En-route sectors	61
Minutes of ATFM delays ('000)	222

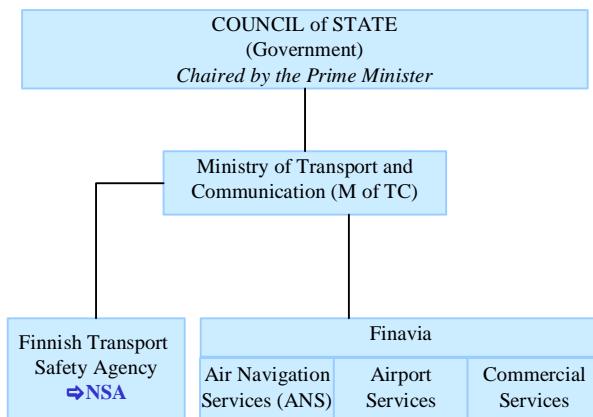
### Size

Size of controlled airspace: 734 000 km<sup>2</sup>





### Institutional arrangements and links (2012)



### Status (2012)

- Public Limited Company
- Integrated civil/military ANSP
- 100% State-owned

#### National Supervisory Authority (NSA):

Finnish Transport Safety Agency

#### Body responsible for:

##### Safety Regulation

Finnish Transport Safety Agency

##### Airspace Regulation

Finnish Transport Safety Agency

##### Economic Regulation

Finnish Transport Safety Agency

### Corporate governance structure (2012)

The BOARD (6 members)  
Chairman + 5 members (1 member represents staff)  
All members are appointed by the Council of State.  
*Chief Executive Officer of Finavia is not a member of the Board.*

Chief Executive Officer

### Finavia (2012)

**CHAIRMAN OF THE FINAVIA BOARD:**  
Soili Suonoja

**CHIEF EXECUTIVE OFFICER:**  
Kari Savolainen

**VICE PRESIDENT - AIR NAVIGATION SERVICES:**  
Raine Luojus

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET

- Finavia owns and operates 25 airports
- Partly internal MET provision, partly outsourced
- Delegation of ATS in certain areas to LFV and Avinor
- 194 ATCOs in OPS reported below do not include those providing services to military OAT flights

### Operational ATS units:

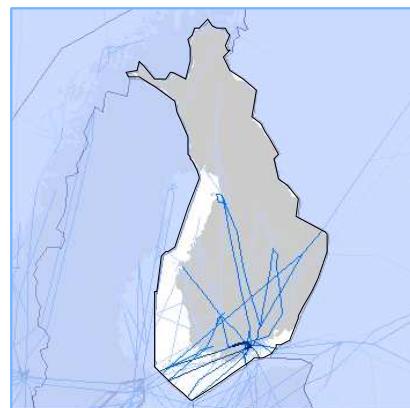
- 1 ACC (Tampere - from end of November 2010)
- 5 APPs (Helsinki, Jyväskylä, Kuopio, Tampere-Pirkkala, Rovaniemi)
- 2 Mil-APPs (Halli, Kauhava)
- 19 TWRs
- 6 AFISs (Enontekiö, Kittilä, Kajaani, Savonlinna, Kuusamo, Varkaus)

### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	48
Gate-to-gate total costs (M€)	67
Gate-to-gate ATM/CNS provision costs (M€)	57
Gate-to-gate total ATM/CNS assets(M€)	52
Gate-to-gate ANS total capex (M€)	11
ATCOs in OPS	194
Gate-to-gate total staff	459
Total IFR flight-hours controlled by ANSP ('000)	110
IFR airport movements controlled by ANSP ('000)	250
En-route sectors	5
Minutes of ATFM delays ('000)	26

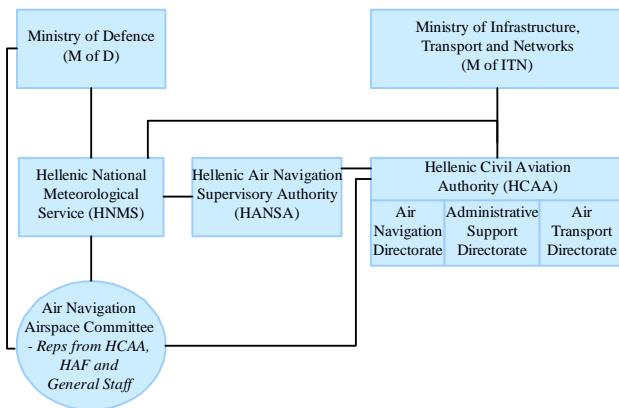
### Size

Size of controlled airspace: 415 000 km<sup>2</sup>





### Institutional arrangements and links (2012)



### Status (2012)

- State body
- 100% State-owned

#### National Supervisory Authority (NSA):

Hellenic Air Navigation Supervisory Authority (HANSA)

#### Body responsible for:

##### Safety Regulation

Hellenic Civil Aviation Authority

##### Airspace Regulation

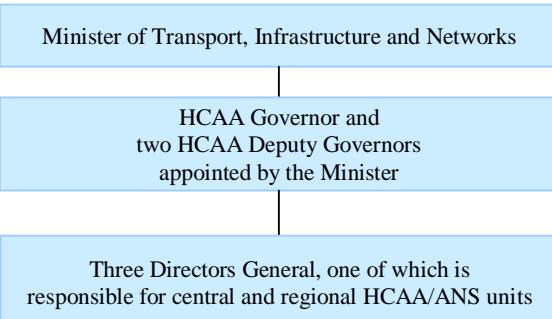
Air Navigation Airspace Committee

##### Economic Regulation

Ministry of Transport, Infrastructure and Networks and HCAA for charges

Ministry of Finance for HCAA Budget

### Corporate governance structure (2012)



### HCAA (2012)

#### GOVERNOR:

F. Papadimitropoulou

#### DEPUTY GOVERNORS:

G. Nanidis  
S. Konsolakis

#### DIRECTOR GENERAL OF AIR NAVIGATION:

G. Kontogiannis

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

### Operational ATS units:

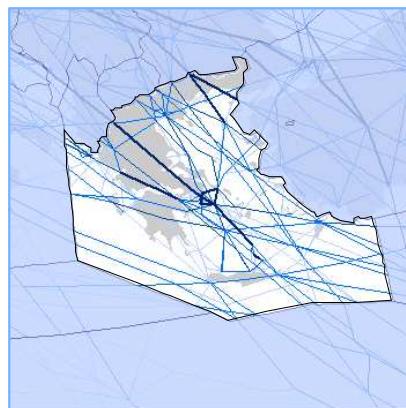
1 ACC  
16 APPs  
18 TWRs  
15 AFISs

### Key financial and operational figures (2010)

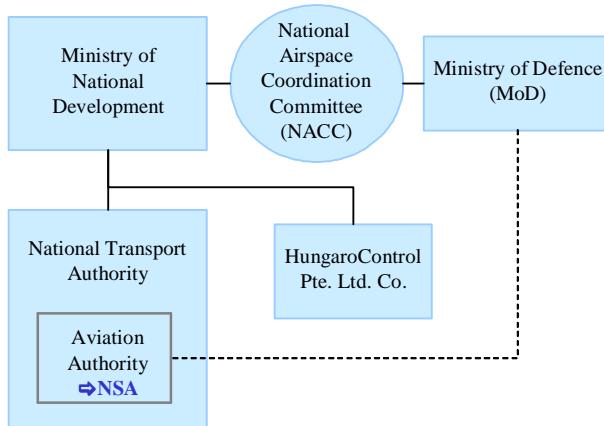
Gate-to-gate total revenues (M€)	181
Gate-to-gate total costs (M€)	191
Gate-to-gate ATM/CNS provision costs (M€)	164
Gate-to-gate total ATM/CNS assets(M€)	180
Gate-to-gate ANS total capex (M€)	18
ATCOs in OPS	530
Gate-to-gate total staff	1 870
Total IFR flight-hours controlled by ANSP ('000)	488
IFR airport movements controlled by ANSP ('000)	188
En-route sectors	12
Minutes of ATFM delays ('000)	989

### Size

Size of controlled airspace: 538 000 km<sup>2</sup>



### Institutional arrangements and links (2012)



### Status (2012)

- HungaroControl was set up on January 1st 2002
- Registered as Private Limited Company as of 22 November 2006
- Operates as a Private Limited Company as of 1 January 2007
- 100% State-owned

#### National Supervisory Authority (NSA):

Aviation Authority

#### Body responsible for:

##### Safety Regulation

Ministry of National Development

##### Airspace Regulation

Govt., Ministry of National Development

##### Economic Regulation

Govt., Ministry of National Development

### Corporate governance structure (2012)

#### SHAREHOLDER

The Minister responsible for transport exercises the rights of the shareholder on behalf of the State

#### CHIEF EXECUTIVE OFFICER

The CEO is appointed by the Minister responsible for transport

#### SUPERVISORY BOARD

President + 5 members

The President and all members are appointed by the Minister responsible for transport

2 members are representatives of the employees

### HungaroControl (2012)

#### CHIEF EXECUTIVE OFFICER (CEO):

Kornél Szepessy

#### CHAIRMAN OF THE SUPERVISORY BOARD:

Zoltán Schváb

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET

- HungaroControl provides Training activities (ATM training courses, language courses) in its Civil Aviation Training Centre (CATC)

### Operational ATS units:

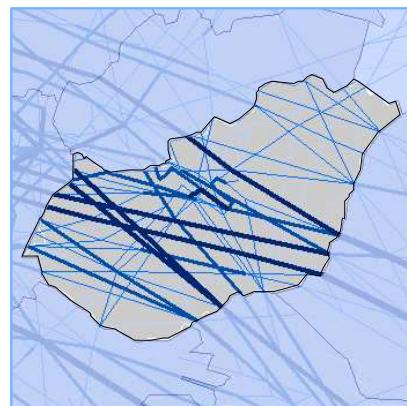
- 1 ACC (Budapest)
- 1 APP (Budapest)
- 2 TWRs (Budapest and Sármellék)
- 1 AFIS (Sármellék)

### Key financial and operational figures (2010)

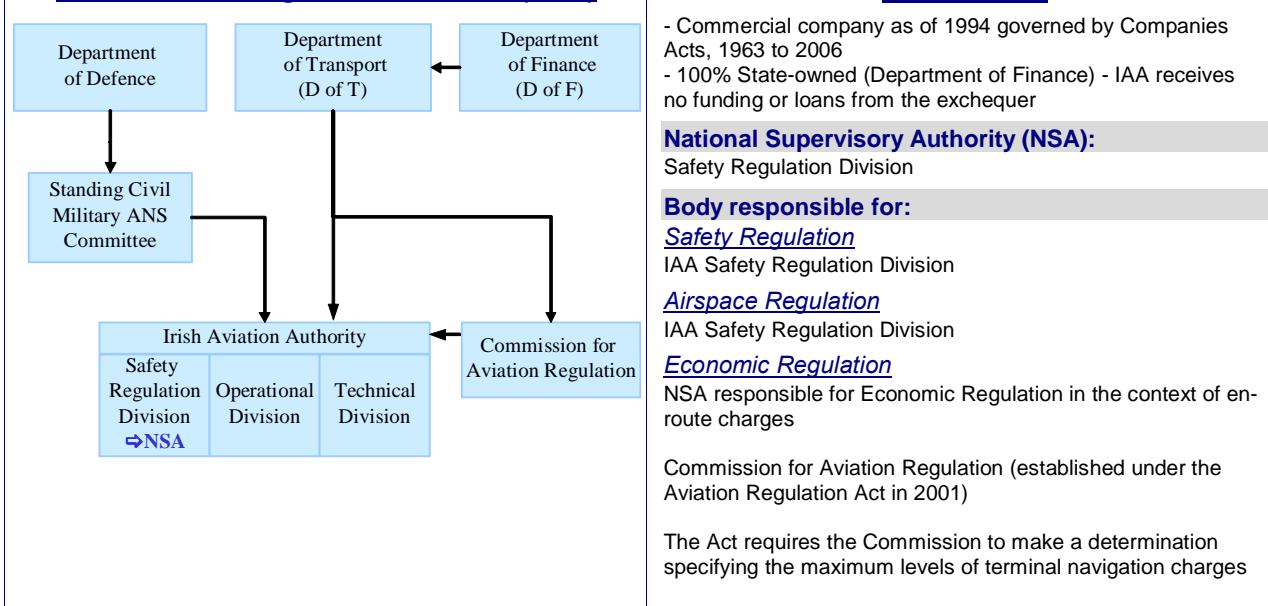
Gate-to-gate total revenues (M€)	99
Gate-to-gate total costs (M€)	103
Gate-to-gate ATM/CNS provision costs (M€)	94
Gate-to-gate total ATM/CNS assets(M€)	65
Gate-to-gate ANS total capex (M€)	14
ATCOs in OPS	182
Gate-to-gate total staff	731
Total IFR flight-hours controlled by ANSP ('000)	196
IFR airport movements controlled by ANSP ('000)	106
En-route sectors	7
Minutes of ATFM delays ('000)	2

### Size

Size of controlled airspace: 93 000 km<sup>2</sup>



### Institutional arrangements and links (2012)



### Status (2012)

- Commercial company as of 1994 governed by Companies Acts, 1963 to 2006
- 100% State-owned (Department of Finance) - IAA receives no funding or loans from the exchequer

#### **National Supervisory Authority (NSA):**

Safety Regulation Division

#### **Body responsible for:**

##### Safety Regulation

IAA Safety Regulation Division

##### Airspace Regulation

IAA Safety Regulation Division

##### Economic Regulation

NSA responsible for Economic Regulation in the context of en-route charges

Commission for Aviation Regulation (established under the Aviation Regulation Act in 2001)

The Act requires the Commission to make a determination specifying the maximum levels of terminal navigation charges

### Corporate governance structure (2012)

BOARD OF THE AUTHORITY (9 members)  
Chairman + CEO + 7 members

EXECUTIVE BOARD (Senior Management Board)  
(8 members)  
CEO + 7 senior executives

### IAA (2012)

#### **CHAIRMAN OF THE BOARD OF AUTHORITY:**

Anne Nolan

#### **CHIEF EXECUTIVE OFFICER:**

Eamonn Brennan

#### **DIRECTOR OF OPERATIONS DIVISION:**

Donie Mooney

#### **DIRECTOR OF TECHNICAL DIVISION:**

Philip Hughes

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input checked="" type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

### Operational ATS units:

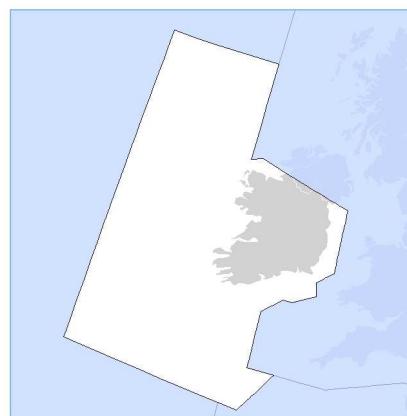
- 2 ACCs (Dublin, Shannon)
- 3 APPs (Dublin, Shannon, Cork)
- 3 TWRs (Dublin, Shannon, Cork)

### Key financial and operational figures (2010)

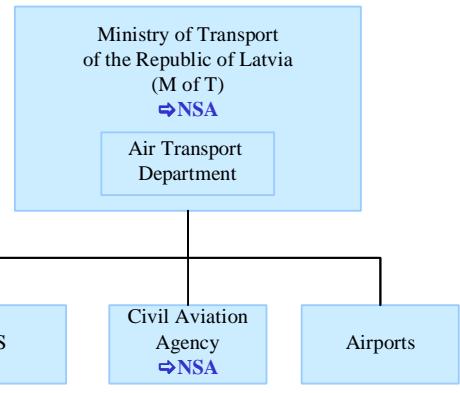
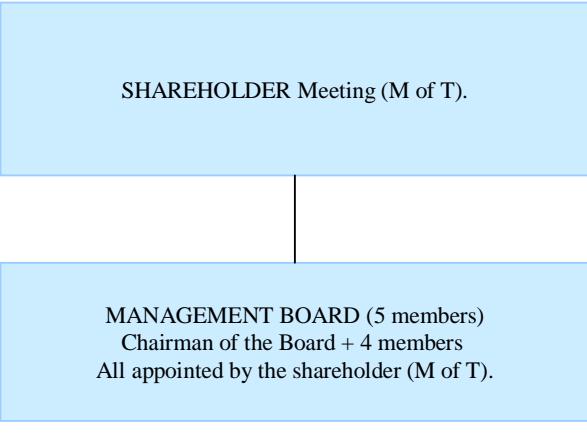
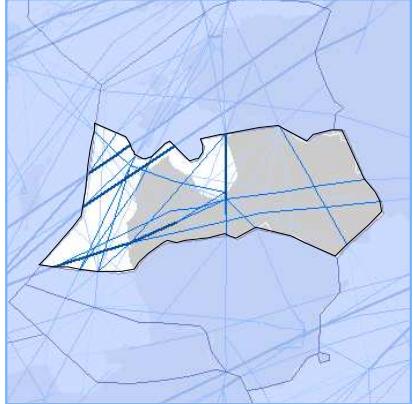
Gate-to-gate total revenues (M€)	133
Gate-to-gate total costs (M€)	133
Gate-to-gate ATM/CNS provision costs (M€)	113
Gate-to-gate total ATM/CNS assets(M€)	116
Gate-to-gate ANS total capex (M€)	15
ATCOs in OPS	212
Gate-to-gate total staff	488
Total IFR flight-hours controlled by ANSP ('000)	253
IFR airport movements controlled by ANSP ('000)	208
En-route sectors	11
Minutes of ATFM delays ('000)	34

### Size

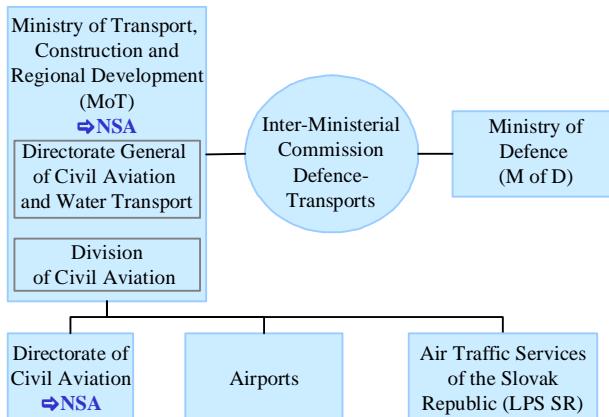
Size of controlled airspace: 457 000 km<sup>2</sup>



<p><b>Institutional arrangements and links (2012)</b></p> <pre> graph TD     Parliament[Parliament] --&gt; MinistryOfDefense[Ministry of Defense]     MinistryOfDefense --&gt; SwedishArmedForces[Swedish Armed Forces]     MinistryOfDefense --&gt; SwedishTransportAgency[Swedish Transport Agency ⇒ NSA]     SwedishTransportAgency --&gt; LFV[LFV]     MinistryOfEnterprise[Ministry of Enterprise, Energy and Communications (M of EEC)] --&gt; LFV     MinistryOfEnterprise --&gt; Swedavia[Swedavia]     LFV --&gt; ProductionTerminal[Production Terminal]     LFV --&gt; ProductionEnroute[Production En-route]     LFV --&gt; ProductsServices[Products &amp; Services]     LFV --&gt; BusinessSupport[Business Support]     LFV --&gt; LFVholding[LFV holding (Subsidiaries)]   </pre>	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Public Enterprise</li> <li>- 100% State-owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b> Swedish Transport Agency</p> <p><b>Body responsible for:</b></p> <ul style="list-style-type: none"> <li><u>Safety Regulation</u> Swedish Transport Agency</li> <li><u>Airspace Regulation</u> Swedish Transport Agency</li> <li><u>Economic Regulation</u> Swedish Transport Agency</li> </ul>																						
<p><b>Corporate governance structure (2012)</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 10px;">           BOARD OF DIRECTORS (8 members)            Chairman + DG + 6 members            6 members (Chairman + DG + 4 members) are appointed by the Government; 2 members are appointed by Trade Unions.         </td> <td style="padding: 10px;">           EXECUTIVE BOARD (8 members)            DG + 7 members            DG appointed by the Government         </td> </tr> </table>	BOARD OF DIRECTORS (8 members) Chairman + DG + 6 members 6 members (Chairman + DG + 4 members) are appointed by the Government; 2 members are appointed by Trade Unions.	EXECUTIVE BOARD (8 members) DG + 7 members DG appointed by the Government	<p><b>LFV (2012)</b></p> <p><b>CHAIRMAN OF THE BOARD OF DIRECTORS:</b> Nils Gunnar Billinger</p> <p><b>DIRECTOR GENERAL:</b> Thomas Allard</p>																				
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<p><b>Institutional arrangements and links (2012)</b></p>  <pre> graph TD     MT[Ministry of Transport of the Republic of Latvia (M of T)] --&gt; ATD[Air Transport Department]     ATD --&gt; LGS[LGS]     ATD --&gt; CAA[Civil Aviation Agency ⇒ NSA]     ATD --&gt; AP[Airports]   </pre>	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Joint-stock company since 1997</li> <li>- 100% State-owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b></p> <ul style="list-style-type: none"> <li>- MoT (for policy and economic issues)</li> <li>- Civil Aviation Agency (for safety, operational aspects, certification and licensing issues)</li> </ul> <p><b>Body responsible for:</b></p> <p><i>Safety Regulation</i> Civil Aviation Agency</p> <p><i>Airspace Regulation</i> Civil Aviation Agency</p> <p><i>Economic Regulation</i> Air Transport Department</p>																						
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<p><b>Scope of services</b></p> <table border="1"> <tr> <td><input checked="" type="checkbox"/> GAT</td> <td><input checked="" type="checkbox"/> Upper Airspace</td> <td><input type="checkbox"/> Oceanic ANS</td> </tr> <tr> <td><input checked="" type="checkbox"/> OAT</td> <td><input checked="" type="checkbox"/> Lower Airspace</td> <td><input checked="" type="checkbox"/> MET</td> </tr> </table> <p>- ATC services delegated to Latvia by Lithuania over a part of the Baltic Sea</p>	<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS	<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET	<p><b>Operational ATS units:</b></p> <ul style="list-style-type: none"> <li>1 ACC (Riga)</li> <li>2 APPs (Riga, Liepaja)</li> <li>2 TWRs (Riga and Liepaja)</li> </ul> <p>In Liepaja APP and TWR are combined in one ATS unit.</p>																
<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS																					
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### Institutional arrangements and links (2012)



### Status (2012)

- State-owned enterprise as of January 2000
- 100% State-owned

#### **National Supervisory Authority (NSA):**

Civil Aviation Authority

#### **Body responsible for:**

##### Safety Regulation

Ministry of Transport, Construction and Regional Development

##### Airspace Regulation

Ministry of Transport, Construction and Regional Development

##### Economic Regulation

Ministry of Transport, Construction and Regional Development and other State bodies

### Corporate governance structure (2012)

SUPERVISORY BOARD (9 members)  
Chairman + 8 members  
Members represent: 5 MoT,  
3 staff reps., 1 trade union association rep.

EXECUTIVE BOARD (9 members)  
CEO + 8 members  
The CEO is appointed by the MoT.

### LPS (2012)

**CHAIRPERSON OF THE SUPERVISORY BOARD:**  
Peter Horal

**DIRECTOR GENERAL (CEO):**  
Miroslav Bartoš

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

### Operational ATS units:

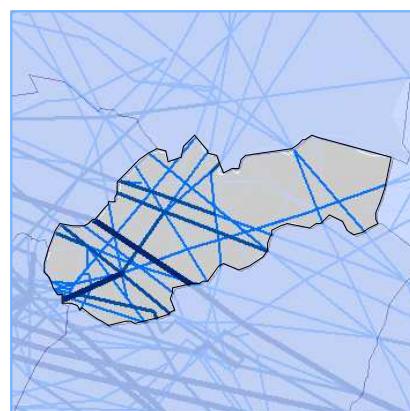
- 1 ACC (Bratislava)
- 2 APPs (Bratislava, Kosice)
- 5 TWRs (Bratislava, Kosice, Piestany, Poprad and Zilina)
- 1 Central ATS Reporting Office (Bratislava)

### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	53
Gate-to-gate total costs (M€)	54
Gate-to-gate ATM/CNS provision costs (M€)	49
Gate-to-gate total ATM/CNS assets(M€)	36
Gate-to-gate ANS total capex (M€)	6
ATCOs in OPS	100
Gate-to-gate total staff	473
Total IFR flight-hours controlled by ANSP ('000)	82
IFR airport movements controlled by ANSP ('000)	36
En-route sectors	5
Minutes of ATFM delays ('000)	36

### Size

Size of controlled airspace: 48 700 km<sup>2</sup>





### Institutional arrangements and links (2012)

Ministry of Infrastructure and the Environment (MIE)

Directorate - General  
for Civil Aviation and  
Maritime Affairs  
(DGLM)

The Human Environment and  
Transport Inspectorate  
(ILenT)  
⇒ **NSA**

LVNL

### Status (2012)

- Corporate Entity as of 1993 (by Air Traffic Law)
- 100% State-owned

#### **National Supervisory Authority (NSA):**

The Human Environment and Transport Inspectorate (ILenT)

#### **Body responsible for:**

##### Safety Regulation

Directorate-General for Civil Aviation and Maritime Affairs (DGLM)

##### Airspace Regulation

Directorate-General for Civil Aviation and Maritime Affairs (DGLM)

##### Economic Regulation

Directorate-General for Civil Aviation and Maritime Affairs (DGLM)

### Corporate governance structure (2012)

#### SUPERVISORY DIRECTORS BOARD (6 members )

Chairman + 5 members + 1 observer

Members comprise representatives from: Ministry of Defence, and members nominated by Dutch scheduled airlines (KLM), Dutch charter airlines (Transavia) and Dutch airports (Amsterdam Schiphol)

#### EXECUTIVE BOARD (2 members)

Chairman + 1 member

Executive Board of LVNL is appointed by the MIE, on the recommendation of the Supervisory Board.

### LVNL (2012)

#### **CHAIRMAN OF THE SUPERVISORY BOARD:**

G.J.N.H. Cerfontaine

#### **CHAIRMAN OF THE EXECUTIVE BOARD (CEO):**

Ir. P. Riemens (CEO)

### Scope of services

<input checked="" type="checkbox"/> GAT	<input type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- Controls lower airspace up to FL 245

### Operational ATS units:

- 1 ACC (Amsterdam)
- 3 APPs (Schiphol, Eelde, Beek)
- 4 TWRs (Schiphol, Rotterdam, Eelde, Beek)

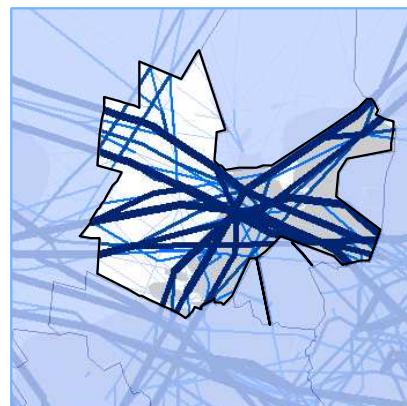
- New Millingen ACC (Military ACC) is not included in ACE data analysis
- Rotterdam APP has been located in Schiphol since 2002

### Key financial and operational figures (2010)

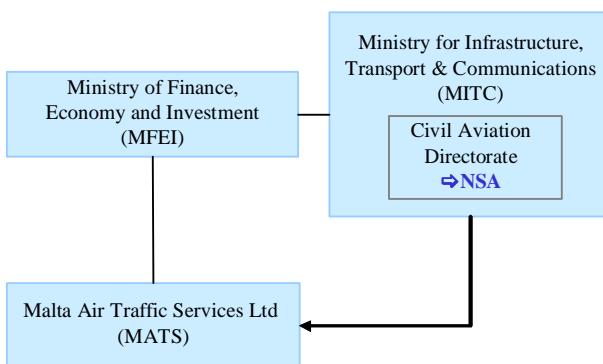
Gate-to-gate total revenues (M€)	225
Gate-to-gate total costs (M€)	221
Gate-to-gate ATM/CNS provision costs (M€)	161
Gate-to-gate total ATM/CNS assets(M€)	91
Gate-to-gate ANS total capex (M€)	4
ATCOs in OPS	182
Gate-to-gate total staff	892
Total IFR flight-hours controlled by ANSP ('000)	144
IFR airport movements controlled by ANSP ('000)	450
En-route sectors	5
Minutes of ATFM delays ('000)	455

### Size

Size of controlled airspace: 52 000 km<sup>2</sup>



### Institutional arrangements and links (2012)



### Status (2012)

- Malta Air Traffic Services Ltd (Reg. no. C27965) is a fully Government owned company. MATS has been operating as the sole ANSP for Malta since the 1st January 2002

#### **National Supervisory Authority (NSA):**

Civil Aviation Directorate Malta (CADM)

#### **Body responsible for:**

##### Safety Regulation

Civil Aviation Directorate

##### Airspace Regulation

Civil Aviation Directorate

##### Economic Regulation

Civil Aviation Directorate

### Corporate governance structure (2012)

#### BOARD of DIRECTORS (5 members)

Chairman + 4 Directors

Members appointed by the Government, representing the MFEI.

The Board of Directors appoints the CEO.

### MATS (2012)

#### **CHAIRMAN OF THE SUPERVISORY BOARD:**

Maj. Vanni Ganado

#### **CEO:**

Brig. Carmel Vassallo

#### **HEAD OF ATS DIVISION:**

Robert Sant

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- MATS controls portions of airspace delegated to Malta ACC by Rome ACC

### Operational ATS units:

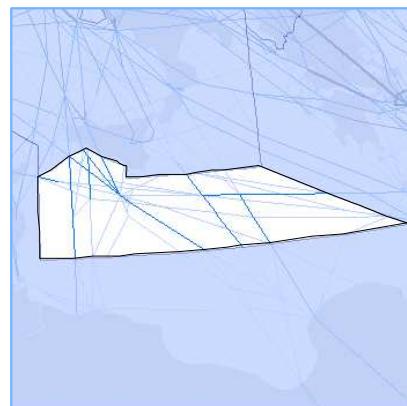
- 1 ACC/APP (Malta)
- 1 TWR/APP (Luqa)

### Key financial and operational figures (2010)

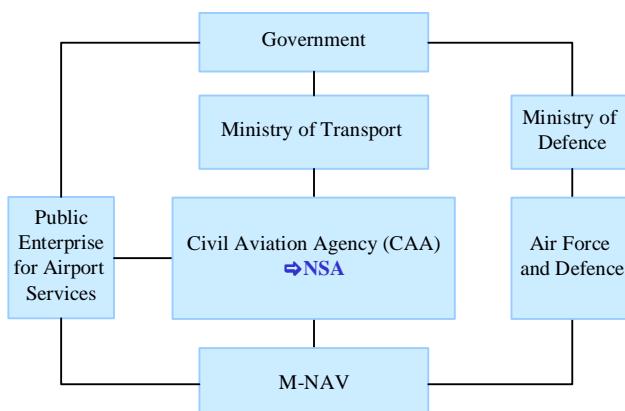
Gate-to-gate total revenues (M€)	15
Gate-to-gate total costs (M€)	15
Gate-to-gate ATM/CNS provision costs (M€)	14
Gate-to-gate total ATM/CNS assets(M€)	5
Gate-to-gate ANS total capex (M€)	1
ATCOs in OPS	56
Gate-to-gate total staff	140
Total IFR flight-hours controlled by ANSP ('000)	47
IFR airport movements controlled by ANSP ('000)	33
En-route sectors	2
Minutes of ATFM delays ('000)	0

### Size

Size of controlled airspace: 231 000 km<sup>2</sup>



### Institutional arrangements and links (2012)



### Status (2012)

- Joint-stock company
- 100% State-owned

#### National Supervisory Authority (NSA):

Civil Aviation Agency (CAA)

#### Body responsible for:

##### Safety Regulation

Safety Dept. of Civil Aviation Agency

##### Airspace Regulation

ATM Dept. of Civil Aviation Agency

##### Economic Regulation

Government, Civil Aviation Agency

### Corporate governance structure (2012)

#### SUPERVISORY BOARD

(3 members appointed by the Government)

#### MANAGEMENT BOARD

(3 executive directors appointed by the Government)

### M-NAV (2012)

#### CHAIRMAN OF THE SUPERVISORY BOARD:

Dragan Andreevski

#### DIRECTOR GENERAL OF CAA:

Dejan Mojsoski

#### DIRECTOR OF ANS DEPARTEMENT:

Nikolet Tagarinski

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET

### Operational ATS units:

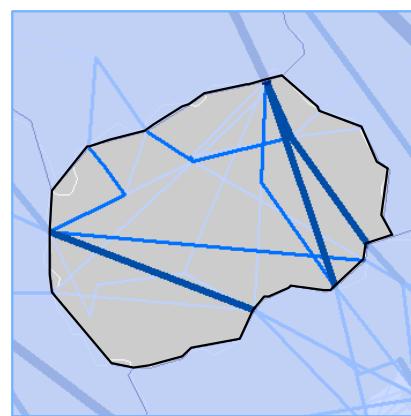
- 1 ACC (Skopje)
- 2 APPs (Skopje and Ohrid)
- 2 TWRs (Skopje and Ohrid)
- 1 AFIS (Skopje)

### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	11
Gate-to-gate total costs (M€)	12
Gate-to-gate ATM/CNS provision costs (M€)	10
Gate-to-gate total ATM/CNS assets(M€)	9
Gate-to-gate ANS total capex (M€)	0
ATCOs in OPS	66
Gate-to-gate total staff	273
Total IFR flight-hours controlled by ANSP ('000)	21
IFR airport movements controlled by ANSP ('000)	13
En-route sectors	3
Minutes of ATFM delays ('000)	0

### Size

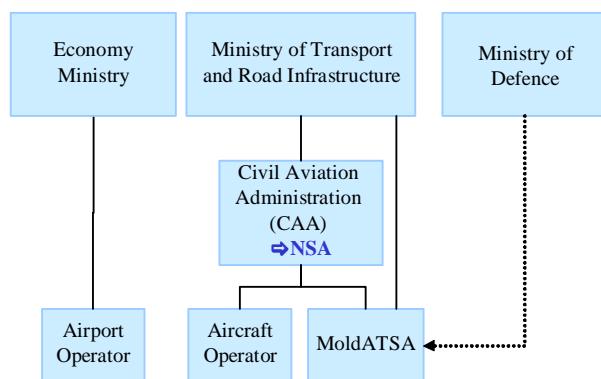
Size of controlled airspace: 24 800 km<sup>2</sup>





### Institutional arrangements and links (2012)

*Government*



### Status (2012)

- State enterprise since 1994 (by Government Regulation Nr.3 from 12.01.1994)
- 100% State-owned

#### **National Supervisory Authority (NSA):**

Civil Aviation Administration (CAA)

#### **Body responsible for:**

##### Safety Regulation

Ministry of Transport and Road Infrastructure

##### Airspace Regulation

Ministry of Transport and Road Infrastructure

##### Economic Regulation

Ministry of Transport and Road Infrastructure

### Corporate governance structure (2012)

#### SUPERVISORY BOARD (7 members)

Chairman + 6 members

All members are appointed by the Ministry of Transport and Road Infrastructure

Members represent Ministry of Transport and Road Infrastructure (2), MoldATSA management (1), Ministry of Finance (2), Ministry of Economy (2)

Management Board:  
Director General MoldATSA

### MoldATSA (2012)

#### *CHAIRMAN OF THE SUPERVISORY BOARD:*

Valentin Dogotari

#### *DIRECTOR GENERAL (CEO):*

Sorin Stati

#### *HEAD OF ATM DIVISION:*

Serghei Gheorghita

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET

### Operational ATS units:

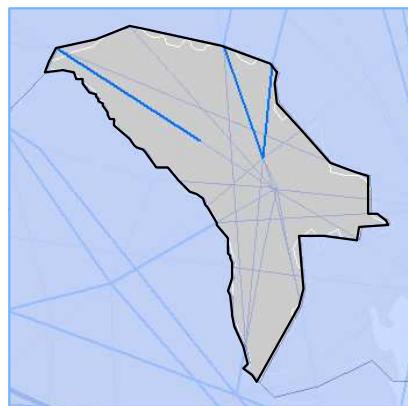
- 1 ACC (Chisinau)
- 1 APP (Chisinau)
- 4 TWRs (Chisinau, Balti, Cahul, Marculesti)

### Key financial and operational figures (2010)

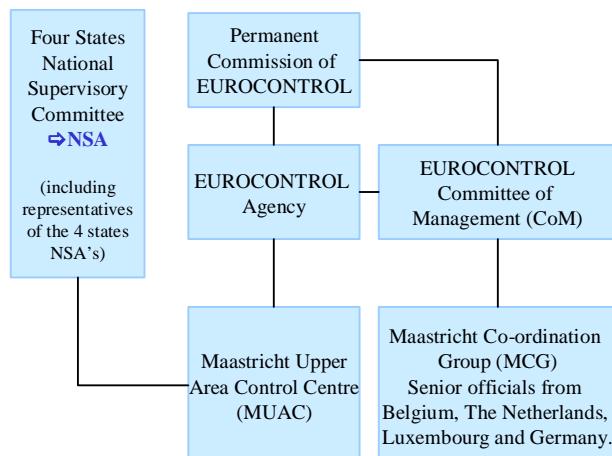
Gate-to-gate total revenues (M€)	9
Gate-to-gate total costs (M€)	9
Gate-to-gate ATM/CNS provision costs (M€)	8
Gate-to-gate total ATM/CNS assets(M€)	7
Gate-to-gate ANS total capex (M€)	1
ATCOs in OPS	55
Gate-to-gate total staff	315
Total IFR flight-hours controlled by ANSP ('000)	15
IFR airport movements controlled by ANSP ('000)	14
En-route sectors	2
Minutes of ATFM delays ('000)	0

### Size

Size of controlled airspace: 33 700 km<sup>2</sup>



### Institutional arrangements and links (2012)



### Status (2012)

- EUROCONTROL: International Organisation established under the EUROCONTROL Convention of 13.12.1960 and amended on 12.2.1981. At the request of the Benelux States and Germany, MUAC is operated as a EUROCONTROL Agency's Service according to the Maastricht Agreements of 25.11.1986

#### National Supervisory Authority (NSA):

Four States National Supervisory Committee

#### Body responsible for:

##### Safety Regulation

Maastricht Agreements Art. 1.2: each of the 4 States retains its competence and obligations in respect of regulations

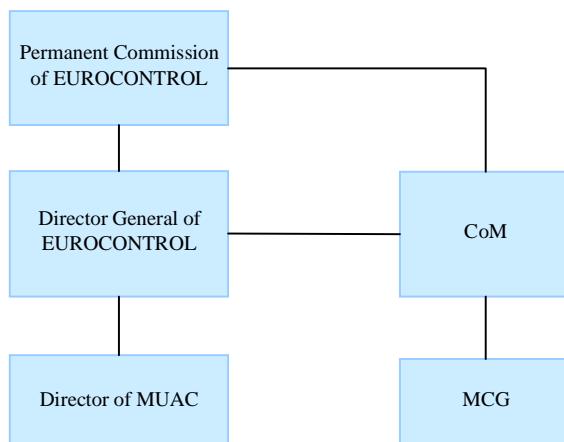
##### Airspace Regulation

The MCG determines a common position for the 4 States in all matters relating to the operation of ATS by MUAC concerning, inter alia, airspace organisation and sectorisation

##### Economic Regulation

Financial arrangements for the exploitation of MUAC are adopted by the Committee of Management. EUROCONTROL DG seeks approval of the budget, which contains a special budgetary Annex for MUAC, with the Permanent Commission

### Corporate governance structure (2012)



### MUAC (2012)

#### DIRECTOR GENERAL OF EUROCONTROL:

David McMillan

#### DIRECTOR OF MUAC:

Jac Jansen

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- Controls GAT in the upper airspace (>FL245) above Benelux and North-Western Germany
- A German ATC unit responsible for handling OAT above North-Western Germany and managed by the DFS is co-located at MUAC

### Key financial and operational figures (2010)

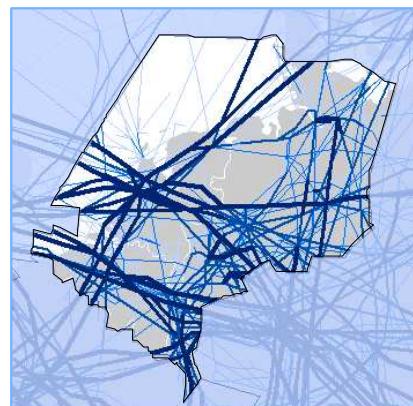
Gate-to-gate total revenues (M€)	402
Gate-to-gate total costs (M€)	139
Gate-to-gate ATM/CNS provision costs (M€)	139
Gate-to-gate total ATM/CNS assets(M€)	69
Gate-to-gate ANS total capex (M€)	10
ATCOs in OPS	227
Gate-to-gate total staff	653
Total IFR flight-hours controlled by ANSP ('000)	543
IFR airport movements controlled by ANSP ('000)	n/appl
En-route sectors	16
Minutes of ATFM delays ('000)	73

### Operational ATS units:

1 ACC (Maastricht)

### Size

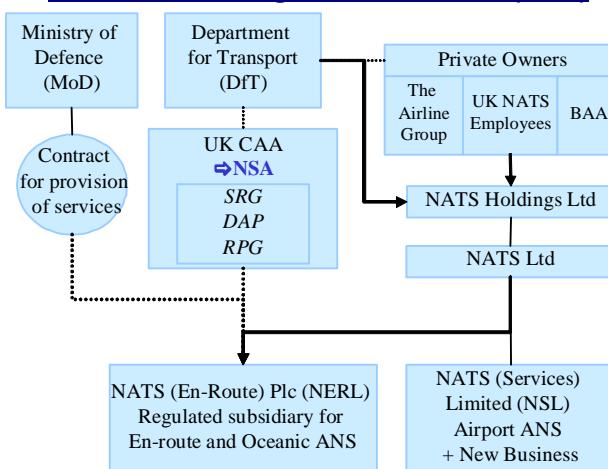
Size of controlled airspace: 260 000 km<sup>2</sup>



<p><b>Institutional arrangements and links (2012)</b></p> <pre> graph TD     MPATT[Ministry of Public Affairs, Transport and Telecommunications (MPATT)] --- CAA[Civil Aviation Agency (CAA)]     CAA --- NATA[National Air Traffic Agency (NATA)]     CAA -- "NSA" --&gt; NATA     CAA --- METE[Ministry of Economy, Trade and Energy (METE)]     METE --- NATA   </pre>	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Since May 1999 NATA is a joint-stock company</li> <li>- 100% State owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b>  Civil Aviation Agency (CAA)</p> <p><b>Body responsible for:</b></p> <p><u>Safety Regulation</u>  MPATT and Directorate General of Civil Aviation (DGCA)</p> <p><u>Airspace Regulation</u>  MPATT and Directorate General of Civil Aviation (DGCA)</p> <p><u>Economic Regulation</u>  Ministry of Economy, Trade and Energy (METE)</p>																						
<p><b>Corporate governance structure (2012)</b></p> <pre> graph TD     SB[SUPERVISORY BOARD (6 members)] --- Chairman[Chairman + 5 members]     Chairman --- MPATT[Chairman is the Director of Transport and Telecommunications (MPATT)]     SB --- METE[All 6 members are nominated by the METE, 2 are proposed by the MPATT, 2 members by the METE and 2 by the Finance Ministry]     MB[MANAGEMENT BOARD (5 members)] --- DG[Director General + 4 Divisions Chiefs (Economic, Operational, Services-Security, Technical)]     DG --- MPATT[Director General appointed by MPATT through the Supervisory Board of NATA]   </pre>	<p><b>NATA Albania (2012)</b></p> <p><b>CHAIRMAN OF SUPERVISORY BOARD:</b>  Ervin Minarolli</p> <p><b>DIRECTOR GENERAL (CEO) OF NATA:</b>  Petrit Sulaj</p> <p><b>DIRECTOR OF THE ATS DEPARTMENT:</b>  Edmond Metaj</p>																						
<p><b>Scope of services</b></p> <table border="1"> <tr> <td><input checked="" type="checkbox"/> GAT</td> <td><input checked="" type="checkbox"/> Upper Airspace</td> <td><input type="checkbox"/> Oceanic ANS</td> </tr> <tr> <td><input checked="" type="checkbox"/> OAT</td> <td><input checked="" type="checkbox"/> Lower Airspace</td> <td><input checked="" type="checkbox"/> MET</td> </tr> </table>	<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS	<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET	<p><b>Operational ATS units:</b></p> <table> <tr> <td>1 ACC</td> <td>(Tirana)</td> </tr> <tr> <td>1 APP</td> <td>(Tirana)</td> </tr> <tr> <td>1 TWR</td> <td>(Tirana)</td> </tr> <tr> <td>1 AFIS</td> <td>(Tirana)</td> </tr> </table>	1 ACC	(Tirana)	1 APP	(Tirana)	1 TWR	(Tirana)	1 AFIS	(Tirana)								
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<p><b>Key financial and operational figures (2010)</b></p> <table> <tr> <td>Gate-to-gate total revenues (M€)</td> <td>21</td> </tr> <tr> <td>Gate-to-gate total costs (M€)</td> <td>20</td> </tr> <tr> <td>Gate-to-gate ATM/CNS provision costs (M€)</td> <td>19</td> </tr> <tr> <td>Gate-to-gate total ATM/CNS assets(M€)</td> <td>37</td> </tr> <tr> <td>Gate-to-gate ANS total capex (M€)</td> <td>13</td> </tr> <tr> <td>ATCOs in OPS</td> <td>46</td> </tr> <tr> <td>Gate-to-gate total staff</td> <td>303</td> </tr> <tr> <td>Total IFR flight-hours controlled by ANSP ('000)</td> <td>39</td> </tr> <tr> <td>IFR airport movements controlled by ANSP ('000)</td> <td>21</td> </tr> <tr> <td>En-route sectors</td> <td>3</td> </tr> <tr> <td>Minutes of ATFM delays ('000)</td> <td>24</td> </tr> </table>	Gate-to-gate total revenues (M€)	21	Gate-to-gate total costs (M€)	20	Gate-to-gate ATM/CNS provision costs (M€)	19	Gate-to-gate total ATM/CNS assets(M€)	37	Gate-to-gate ANS total capex (M€)	13	ATCOs in OPS	46	Gate-to-gate total staff	303	Total IFR flight-hours controlled by ANSP ('000)	39	IFR airport movements controlled by ANSP ('000)	21	En-route sectors	3	Minutes of ATFM delays ('000)	24	<p><b>Size</b></p> <p>Size of controlled airspace: 35 900 km<sup>2</sup></p>
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En-route sectors	3																						
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### Institutional arrangements and links (2012)



### Status (2012)

- Public Private Partnership as of 2001
  - 49% State-owned (Govt retains a Golden Share)
  - 51% private-owned (42% by the Airline Group, 4% by BAA and 5% by UK NATS employees)
- The Airline Group comprises 7 UK airlines: BA, Virgin Atlantic, Lufthansa, EasyJet, Thomas Cook, Thomson Airways and Monarch Airlines

#### National Supervisory Authority (NSA):

UK CAA

#### Body responsible for:

##### Safety Regulation

UK CAA, Safety Regulation Group (SRG)

##### Airspace Regulation

UK CAA, Directorate of Airspace Policy (DAP)

##### Economic Regulation

UK CAA, Regulatory Policy Group (RPG) which sets charges through a formula linked to the Retail Price Index (RPI) where "RPI minus X" targets for En-route and Oceanic Charges are usually set for 5 years at a time (although CP3 was set at 4 years to align with RP1)

### Corporate governance structure (2012)



### NATS (2012)

#### CHAIRMAN OF THE NATS BOARD:

John Devaney

#### CEO of NATS:

Richard Deakin

#### MANAGING DIRECTOR, NATS SERVICES:

Paul Reid

#### MANAGING DIRECTOR, NATS OPERATIONS

Ian Hall

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input checked="" type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

### Operational ATS units:

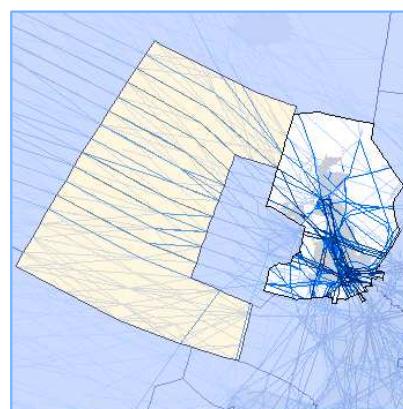
- 1 OAC (Shanwick)
- 3 ACCs (London AC, London TC, Prestwick)
- 16 APPs
- 16 TWRs (including Gibraltar TWR)
- 2 AFISs

### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	792
Gate-to-gate total costs (M€)	713
Gate-to-gate ATM/CNS provision costs (M€)	704
Gate-to-gate total ATM/CNS assets(M€)	826
Gate-to-gate ANS total capex (M€)	125
ATCOs in OPS	1 396
Gate-to-gate total staff	4 541
Total IFR flight-hours controlled by ANSP ('000)	1 258
IFR airport movements controlled by ANSP ('000)	1 703
En-route sectors	71
Minutes of ATFM delays ('000)	1 141

### Size

Size of controlled airspace: 3 000 000 km<sup>2</sup>



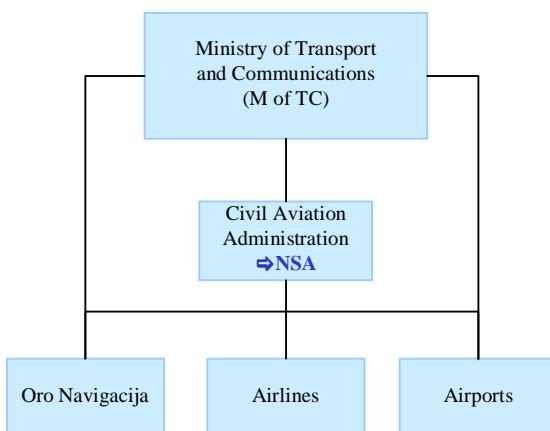
Continental: 880 000 km<sup>2</sup> - Oceanic: 2 120 000 km<sup>2</sup>

<p><b>Institutional arrangements and links (2012)</b></p>	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Public Entity Corporation as of December 1998</li> <li>- 100% State-owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b> National Institute for Civil Aviation (INAC)</p> <p><b>Body responsible for:</b></p> <ul style="list-style-type: none"> <li><b>Safety Regulation:</b> National Institute of Civil Aviation (INAC)</li> <li><b>Airspace Regulation:</b> INAC+FA (Portuguese Air Force) + NAV Portugal in close permanent co-ordination</li> <li><b>Economic Regulation:</b> National Institute of Civil Aviation (INAC)</li> </ul>																						
<p><b>Corporate governance structure (2012)</b></p> <p>BOARD OF ADMINISTRATION (3 members) Chairman + 2 members</p> <p>All members are appointed by the MEE for a 3 year term. Each member has executive functions within NAV Portugal. Each member is responsible to supervise one or several NAV Portugal Directorates and Advisory Bodies to the Board. There are 8 Directorates and 5 Advisory Bodies.</p> <p>NAV Portugal has also a Board of Auditors composed of 3 members who are appointed by MEE for a 3 year term.</p>	<p><b>NAV Portugal (2012)</b></p> <p><b>CHAIRMAN OF THE BOARD OF ADMINISTRATION:</b> Luis Ottolini Coimbra</p> <p><b>CEO:</b> Luis Ottolini Coimbra</p>																						
<p><b>Scope of services</b></p> <table border="1"> <tr> <td><input checked="" type="checkbox"/> GAT</td> <td><input checked="" type="checkbox"/> Upper Airspace</td> <td><input checked="" type="checkbox"/> Oceanic ANS</td> </tr> <tr> <td><input type="checkbox"/> OAT</td> <td><input checked="" type="checkbox"/> Lower Airspace</td> <td><input type="checkbox"/> MET</td> </tr> </table>	<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input checked="" type="checkbox"/> Oceanic ANS	<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET	<p><b>Operational ATS units:</b></p> <ul style="list-style-type: none"> <li>2 ACCs (Lisboa, Santa Maria)</li> <li>8 APPs (Lisboa, Porto, Faro, Madeira, Santa Maria, Ponta Delgada, Horta, Flores)</li> <li>10 TWRs (Lisboa, Cascais, Porto, Faro, Funchal, Porto Santo, Ponta Delgada, Santa Maria, Horta, Flores)</li> </ul>																
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<p><b>Institutional arrangements and links (2012)</b></p> <pre> graph TD     MoT[Ministry of Transport (MoT)] --- AIB[Accident Investigation Board (AIB)]     MoT --- CAA[Danish CAA (Trafikstyrelsen) <b>⇒ NSA</b>]     MoT --- NAVIAIR[Air Navigation Service (NAVIAIR)]     CAA --- Bornholm[Bornholm Airport]   </pre>	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Company owned by the state</li> <li>- 100% State-owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b> Danish CAA (Trafikstyrelsen)</p> <p><b>Body responsible for:</b></p> <ul style="list-style-type: none"> <li><b>Safety Regulation</b>: Civil Aviation Administration (Trafikstyrelsen)</li> <li><b>Airspace Regulation</b>: Civil Aviation Administration (Trafikstyrelsen)</li> <li><b>Economic Regulation</b>: Civil Aviation Administration (Trafikstyrelsen)</li> </ul>																						
<p><b>Corporate governance structure (2012)</b></p> <table border="1"> <tr> <td> <b>SUPERVISORY BOARD</b> 1 Chairman + 8 Members       </td></tr> <tr> <td> <b>EXECUTIVE BOARD (3 members)</b> CEO + 2 members The CEO is appointed by the Supervisory Board.       </td></tr> </table>	<b>SUPERVISORY BOARD</b> 1 Chairman + 8 Members	<b>EXECUTIVE BOARD (3 members)</b> CEO + 2 members The CEO is appointed by the Supervisory Board.	<p><b>NAVIAIR (2012)</b></p> <p><b>CHAIRMAN OF SUPERVISORY BOARD</b> Anne Birgitte Lundholdt</p> <p><b>DIRECTOR GENERAL (CEO):</b> Morten Dambæk</p>																				
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<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS																					
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<p><b>Key financial and operational figures (2010)</b></p> <table border="1"> <tr> <td>Gate-to-gate total revenues (M€)</td> <td>117</td> </tr> <tr> <td>Gate-to-gate total costs (M€)</td> <td>119</td> </tr> <tr> <td>Gate-to-gate ATM/CNS provision costs (M€)</td> <td>110</td> </tr> <tr> <td>Gate-to-gate total ATM/CNS assets(M€)</td> <td>155</td> </tr> <tr> <td>Gate-to-gate ANS total capex (M€)</td> <td>16</td> </tr> <tr> <td>ATCOs in OPS</td> <td>197</td> </tr> <tr> <td>Gate-to-gate total staff</td> <td>692</td> </tr> <tr> <td>Total IFR flight-hours controlled by ANSP ('000)</td> <td>204</td> </tr> <tr> <td>IFR airport movements controlled by ANSP ('000)</td> <td>342</td> </tr> <tr> <td>En-route sectors</td> <td>7</td> </tr> <tr> <td>Minutes of ATFM delays ('000)</td> <td>60</td> </tr> </table>	Gate-to-gate total revenues (M€)	117	Gate-to-gate total costs (M€)	119	Gate-to-gate ATM/CNS provision costs (M€)	110	Gate-to-gate total ATM/CNS assets(M€)	155	Gate-to-gate ANS total capex (M€)	16	ATCOs in OPS	197	Gate-to-gate total staff	692	Total IFR flight-hours controlled by ANSP ('000)	204	IFR airport movements controlled by ANSP ('000)	342	En-route sectors	7	Minutes of ATFM delays ('000)	60	<p><b>Size</b></p> <p>Size of controlled airspace: 158 000 km<sup>2</sup></p>
Gate-to-gate total revenues (M€)	117																						
Gate-to-gate total costs (M€)	119																						
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IFR airport movements controlled by ANSP ('000)	342																						
En-route sectors	7																						
Minutes of ATFM delays ('000)	60																						



### Institutional arrangements and links (2012)



### Status (2012)

- Since July 2001
- 100% State-owned Enterprise (SOE)

#### National Supervisory Authority (NSA):

Civil Aviation Administration

#### Body responsible for:

##### Safety Regulation

Lithuania CAA

##### Airspace Regulation

Oro Navigacija in coordination with CAA and M of TC

##### Economic Regulation

Oro Navigacija in coordination with CAA and M of TC

### Corporate governance structure (2012)

SUPERVISORY BOARD (5 members)  
Chairman + 4 members  
(Chairman + 3) represent M of TC  
1 represent Oro Navigacija.

MANAGEMENT BOARD  
Duties taken up by Director General  
DG is appointed by Minister.

### Oro Navigacija (2012)

CHAIRMAN OF THE SUPERVISORY BOARD:  
Tomas Karpavičius

DIRECTOR GENERAL (CEO):  
Algimantas Raščius

DIRECTOR ATM:  
Sergej Smirnov

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- Air Navigation Services are delegated to LGS (Latvia) above some part of the Baltic sea

### Operational ATS units:

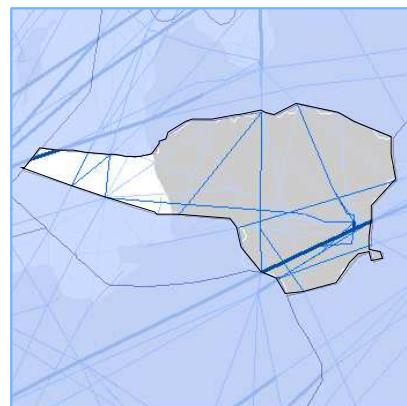
- 1 ACC (Vilnius)
- 3 APPs
- 4 TWRs

### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	22
Gate-to-gate total costs (M€)	23
Gate-to-gate ATM/CNS provision costs (M€)	21
Gate-to-gate total ATM/CNS assets(M€)	36
Gate-to-gate ANS total capex (M€)	5
ATCOs in OPS	82
Gate-to-gate total staff	302
Total IFR flight-hours controlled by ANSP ('000)	48
IFR airport movements controlled by ANSP ('000)	38
En-route sectors	2
Minutes of ATFM delays ('000)	0

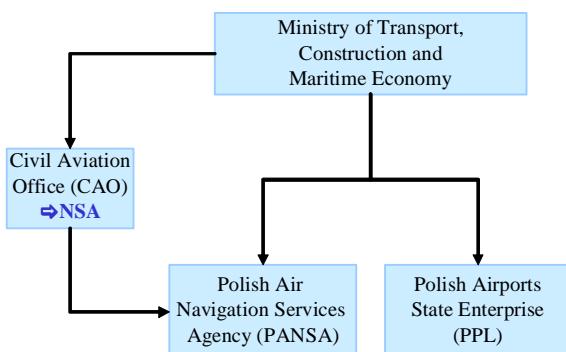
### Size

Size of controlled airspace: 74 700 km<sup>2</sup>





### Institutional arrangements and links (2012)



### Status (2012)

- PANSA has been operating as an independent entity as from 1st April 2007, separated from the Polish Airports State Enterprise (PPL)
- State body (acting as a legal entity with an autonomous budget)
- 100% State owned

#### **National Supervisory Authority (NSA):**

Civil Aviation Office (CAO)

#### **Body responsible for:**

##### Safety Regulation

Civil Aviation Office (CAO)

##### Airspace Regulation

Civil Aviation Office (CAO)

##### Economic Regulation

Civil Aviation Office (CAO)

### Corporate governance structure (2012)

NO SUPERVISORY BOARD

#### ADMINISTRATION

According to the Act establishing PANSA, the Agency is managed by the President and his two Vice-Presidents.  
The President is nominated by the Prime Minister.  
The two Vice-Presidents are nominated by the MoT

### PANSA (2012)

#### **PRESIDENT OF PANSA:**

Krzysztof Banaszek

#### **VICE PRESIDENT- AIR NAVIGATION DEPARTMENT:**

Maciej Rodak

#### **VICE PRESIDENT- FINANCE AND ADMINISTRATION DEPARTMENT:**

Maciej Piotrowski

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- APP Kraków is providing ATC services for Kraków and Katowice
- Katowice TWR is providing only aerodrome control when APP Kraków is providing radar services for Katowice

### Operational ATS units:

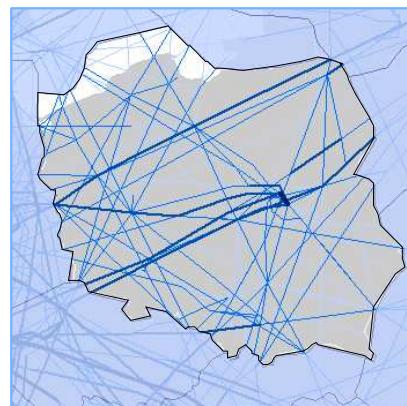
- 1 ACC with 8 sectors
- 4 APPs (Warszawa, Gdańsk, Kraków, Poznań) providing radar control
- 5 TWRs (Warszawa, Gdańsk, Kraków, Poznań, Katowice) providing aerodrome control
- 6 TWRs (Wrocław, Szczecin, Rzeszów, Łódź, Zielona Góra, Bydgoszcz) providing aerodrome control and non-radar approach control
- 4 FIS units (Warszawa, Kraków, Gdańsk, Poznań)

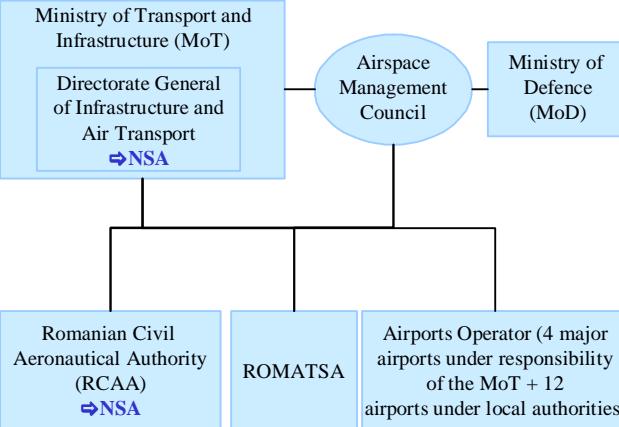
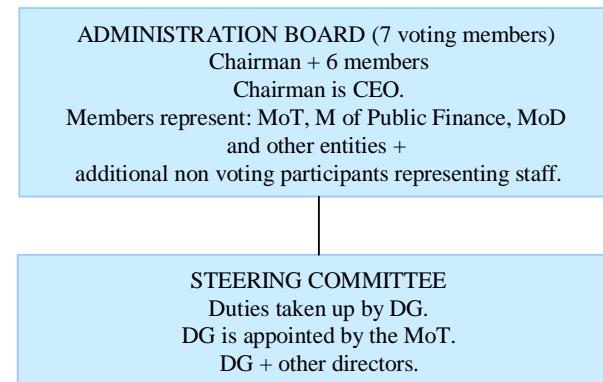
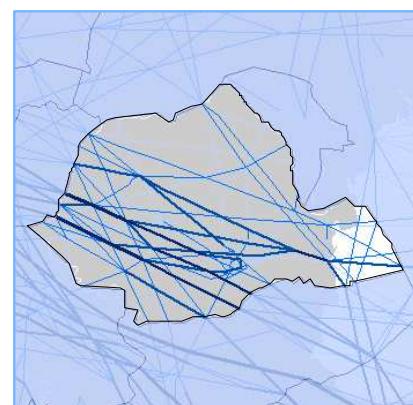
### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	150
Gate-to-gate total costs (M€)	148
Gate-to-gate ATM/CNS provision costs (M€)	128
Gate-to-gate total ATM/CNS assets(M€)	144
Gate-to-gate ANS total capex (M€)	19
ATCOs in OPS	404
Gate-to-gate total staff	1 692
Total IFR flight-hours controlled by ANSP ('000)	346
IFR airport movements controlled by ANSP ('000)	288
En-route sectors	8
Minutes of ATFM delays ('000)	679

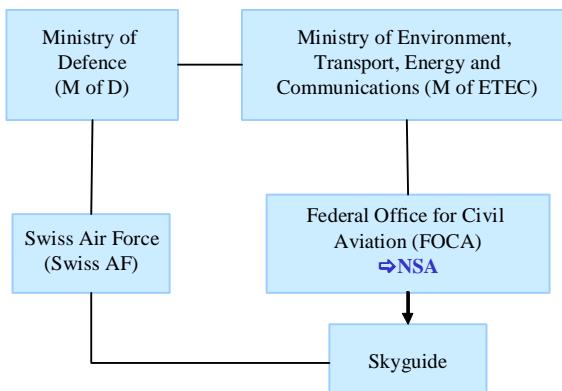
### Size

Size of controlled airspace: 334 000 km<sup>2</sup>



<p><b>Institutional arrangements and links (2012)</b></p>  <pre> graph TD     AMC((Airspace Management Council)) --- MoT[Ministry of Transport and Infrastructure (MoT)]     AMC --- MoD[Ministry of Defence (MoD)]     AMC --- ROMATSA[ROMATSA]     AMC --- RCAA[Romanian Civil Aeronautical Authority (RCAA)]     ROMATSA --- AirportsOperator[Airports Operator (4 major airports under responsibility of the MoT + 12 airports under local authorities)]   </pre>	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Autonomous and self-financing organisation as of 1991 (Government Resolution GR74/1991 ammended by GR731/1992, GR75/2005, GR1090/2006, GR1251/2007, GR741/2008)</li> <li>- 100% State-owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b></p> <ul style="list-style-type: none"> <li>- Directorate General of Infrastructure and Air Transport</li> <li>- Romanian Civil Aeronautical Authority (RCAA)</li> </ul> <p><b>Body responsible for:</b></p> <p><b>Safety Regulation</b> Ministry of Transport and Infrastructure Enforcement and safety oversight is delegated and discharged through the RCAA</p> <p><b>Airspace Regulation</b> Both Ministry of Transport and Infrastructure and Ministry of Defence, and discharged through the RCAA and Air Force Staff</p> <p><b>Economic Regulation</b> Ministry of Transport and Infrastructure</p>																						
<p><b>Corporate governance structure (2012)</b></p>  <pre> graph TD     AdminBoard["ADMINISTRATION BOARD (7 voting members) Chairman + 6 members Chairman is CEO. Members represent: MoT, M of Public Finance, MoD and other entities + additional non voting participants representing staff."]     AdminBoard --- SteeringCommittee["STEERING COMMITTEE Duties taken up by DG. DG is appointed by the MoT. DG + other directors."]   </pre>	<p><b>ROMATSA (2012)</b></p> <p><b>CHAIRMAN OF THE ADMINISTRATION BOARD:</b> Bogdan Donciu</p> <p><b>DIRECTOR GENERAL (CEO):</b> Bogdan Donciu</p>																						
<p><b>Scope of services</b></p> <table border="1"> <tr> <td><input checked="" type="checkbox"/> GAT</td> <td><input checked="" type="checkbox"/> Upper Airspace</td> <td><input type="checkbox"/> Oceanic ANS</td> </tr> <tr> <td><input type="checkbox"/> OAT</td> <td><input checked="" type="checkbox"/> Lower Airspace</td> <td><input checked="" type="checkbox"/> MET</td> </tr> </table>	<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS	<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET	<p><b>Operational ATS units:</b></p> <ul style="list-style-type: none"> <li>1 ACC (Bucharest + 1 secondary location - Arad)</li> <li>2 APPs</li> <li>16 TWRs</li> </ul>																
<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS																					
<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET																					
<p><b>Key financial and operational figures (2010)</b></p> <table> <tbody> <tr> <td>Gate-to-gate total revenues (M€)</td> <td>179</td> </tr> <tr> <td>Gate-to-gate total costs (M€)</td> <td>164</td> </tr> <tr> <td>Gate-to-gate ATM/CNS provision costs (M€)</td> <td>143</td> </tr> <tr> <td>Gate-to-gate total ATM/CNS assets(M€)</td> <td>138</td> </tr> <tr> <td>Gate-to-gate ANS total capex (M€)</td> <td>10</td> </tr> <tr> <td>ATCOs in OPS</td> <td>440</td> </tr> <tr> <td>Gate-to-gate total staff</td> <td>1 584</td> </tr> <tr> <td>Total IFR flight-hours controlled by ANSP ('000)</td> <td>284</td> </tr> <tr> <td>IFR airport movements controlled by ANSP ('000)</td> <td>173</td> </tr> <tr> <td>En-route sectors</td> <td>8</td> </tr> <tr> <td>Minutes of ATFM delays ('000)</td> <td>0</td> </tr> </tbody> </table>	Gate-to-gate total revenues (M€)	179	Gate-to-gate total costs (M€)	164	Gate-to-gate ATM/CNS provision costs (M€)	143	Gate-to-gate total ATM/CNS assets(M€)	138	Gate-to-gate ANS total capex (M€)	10	ATCOs in OPS	440	Gate-to-gate total staff	1 584	Total IFR flight-hours controlled by ANSP ('000)	284	IFR airport movements controlled by ANSP ('000)	173	En-route sectors	8	Minutes of ATFM delays ('000)	0	<p><b>Size</b></p> <p>Size of controlled airspace: 255 000 km<sup>2</sup></p> 
Gate-to-gate total revenues (M€)	179																						
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En-route sectors	8																						
Minutes of ATFM delays ('000)	0																						

### Institutional arrangements and links (2012)



### Status (2012)

- Joint-stock company as of 1996. Currently 14 shareholders; 99,91% is held by the Swiss Confederation which by law must hold at least 51%  
 - Integrated civil/military as of 2001

#### National Supervisory Authority (NSA):

Federal Office for Civil Aviation (FOCA)

#### Body responsible for:

##### Safety Regulation

Federal Office for Civil Aviation

##### Airspace Regulation

Federal Office for Civil Aviation

##### Economic Regulation

The Ministry of the Environment, Transport, Energy and Communications

### Corporate governance structure (2012)

GENERAL ASSEMBLY of the Shareholders

SUPERVISORY BOARD (7 members)

Chairman + 6 members

All members are appointed by the General Assembly for their expertise.

EXECUTIVE BOARD (6 members)

CEO + 5 members

The CEO is appointed by the Supervisory Board.

### Skyguide (2012)

#### CHAIRMAN OF THE SUPERVISORY BOARD:

Guy Emmenegger

#### DIRECTOR GENERAL (CEO):

Daniel Weder

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

- ATC services delegated to Geneva ACC by France

### Operational ATS units:

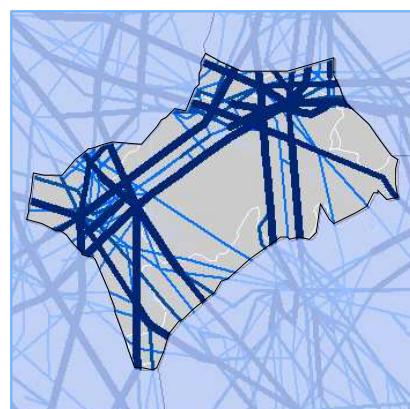
2 ACCs (Geneva, Zurich)  
 4 APPs (Geneva, Zurich, Lugano, Bern)  
 7 TWRs (Geneva, Zurich, Lugano, Bern, Buochs, Altenrhein, Grenchen)

### Key financial and operational figures (2010)

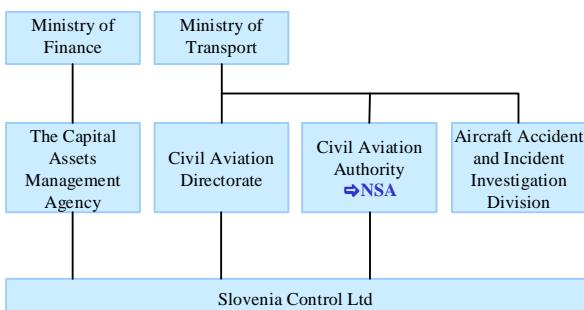
Gate-to-gate total revenues (M€)	244
Gate-to-gate total costs (M€)	254
Gate-to-gate ATM/CNS provision costs (M€)	241
Gate-to-gate total ATM/CNS assets(M€)	275
Gate-to-gate ANS total capex (M€)	24
ATCOs in OPS	326
Gate-to-gate total staff	1 308
Total IFR flight-hours controlled by ANSP ('000)	322
IFR airport movements controlled by ANSP ('000)	462
En-route sectors	19
Minutes of ATFM delays ('000)	929

### Size

Size of controlled airspace: 73 400 km<sup>2</sup>



### Institutional arrangements and links (2012)



### Status (2012)

- In May 2004 the provision of ANS was separated from the Slovenian Civil Aviation Authority and became a 100% state-owned enterprise, Slovenia Control Ltd

#### National Supervisory Authority (NSA):

Civil Aviation Authority

#### Body responsible for:

##### Safety Regulation

Ministry of Transport (Civil Aviation Directorate)

##### Airspace Regulation

Ministry of Transport (Civil Aviation Directorate)

##### Economic Regulation

Ministry of Finance (The Capital Assets Management Agency)

### Corporate governance structure (2012)

#### Supervisory Board

Chairman from MoT + 3 members from MoT, MoD, MoF appointed by the Government + 2 staff reps. appointed by "employees board"

#### Director General (CEO) of Slovenia Control

appointed by the Government for a period of 5 years

### Slovenia Control (2012)

#### CHAIRMAN OF THE SUPERVISORY BOARD:

Mirko Komac

#### DIRECTOR GENERAL (CEO):

Franc Željko Županič

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input type="checkbox"/> MET

### Operational ATS units:

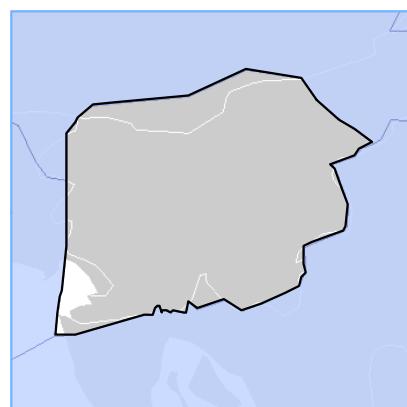
- 1 ACC (Ljubljana)
- 3 APPs (Ljubljana, Maribor, Portorož)
- 3 TWRs (Ljubljana, Maribor, Portorož)

### Key financial and operational figures (2010)

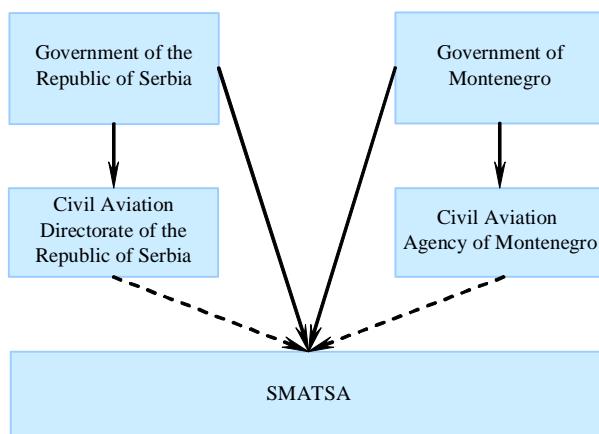
Gate-to-gate total revenues (M€)	30
Gate-to-gate total costs (M€)	30
Gate-to-gate ATM/CNS provision costs (M€)	26
Gate-to-gate total ATM/CNS assets(M€)	19
Gate-to-gate ANS total capex (M€)	7
ATCOs in OPS	90
Gate-to-gate total staff	214
Total IFR flight-hours controlled by ANSP ('000)	43
IFR airport movements controlled by ANSP ('000)	37
En-route sectors	3
Minutes of ATFM delays ('000)	1

### Size

Size of controlled airspace: 19 900 km<sup>2</sup>



### Institutional arrangements and links (2012)



### Status (2012)

- Limited liability company founded in 2003
- 92% owned by Serbia and 8% owned by Montenegro
- Integrated civil/military ANSP

Note: This Fact Sheet reflects the situation as of 25/04/2012.

#### National Supervisory Authority (NSA):

Civil Aviation Directorate Of The Republic Of Serbia  
Civil Aviation Agency of Montenegro

#### Body responsible for:

##### Safety Regulation

- Civil Aviation Directorate Of The Republic Of Serbia
- Civil Aviation Agency of Montenegro

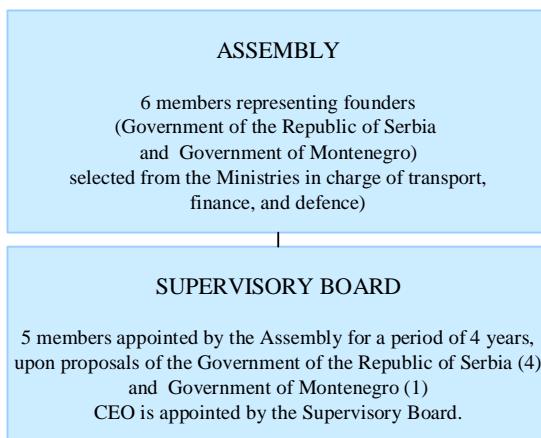
##### Airspace Regulation

- Civil Aviation Directorate Of The Republic Of Serbia
- Civil Aviation Agency of Montenegro

##### Economic Regulation

Ministry of Finance of the Republic of Serbia

### Corporate governance structure (2012)



### SMATSA (2012)

#### PRESIDENT OF THE ASSEMBLY:

Tatjana Isakovic

#### PRESIDENT OF THE SUPERVISORY BOARD:

Jelica Petrovic Vujacic

#### CHIEF EXECUTIVE OFFICER

Nikola Stankov

### Scope of services

<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS
<input checked="" type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET

- ANS Services (ATM, CNS, MET, AIS)
- SMATSA provides Air Traffic Services in the 55% of the upper airspace of Bosnia and Herzegovina
- ANS personnel and pilot training, Flight Inspection Services, PANS-OPS and cartography

### Operational ATS units:

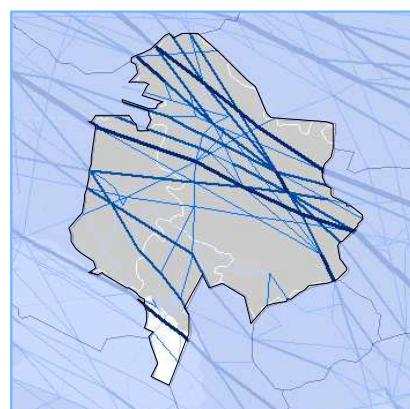
- 1 ACC (Belgrade)
- 8 APPs/TWRs (Belgrade, Batajnica, Kraljevo, Nis, Uzice, Vrsac, Podgorica, Tivat)

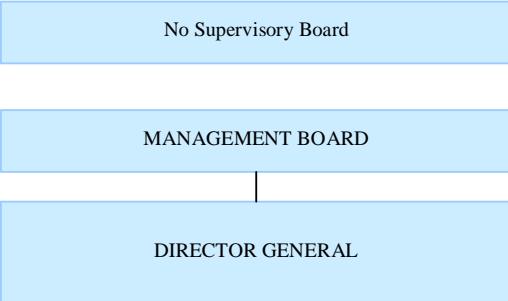
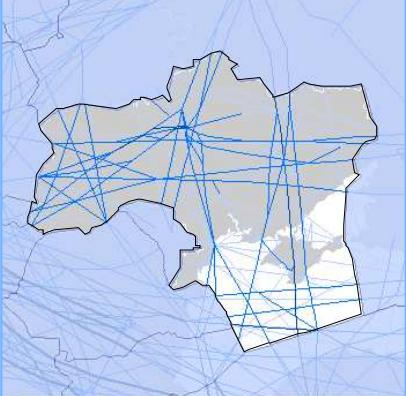
### Key financial and operational figures (2010)

Gate-to-gate total revenues (M€)	78
Gate-to-gate total costs (M€)	82
Gate-to-gate ATM/CNS provision costs (M€)	75
Gate-to-gate total ATM/CNS assets(M€)	128
Gate-to-gate ANS total capex (M€)	84
ATCOs in OPS	233
Gate-to-gate total staff	866
Total IFR flight-hours controlled by ANSP ('000)	217
IFR airport movements controlled by ANSP ('000)	70
En-route sectors	8
Minutes of ATFM delays ('000)	5

### Size

Size of controlled airspace: 144 676 km<sup>2</sup>



<p><b>Institutional arrangements and links (2012)</b></p> 	<p><b>Status (2012)</b></p> <ul style="list-style-type: none"> <li>- Self-financing enterprise</li> <li>- 100% State-owned</li> </ul> <p><b>National Supervisory Authority (NSA):</b> Not applicable since Ukraine is not bound by SES Regulations</p> <p><b>Body responsible for:</b></p> <p><i>Safety Regulation</i> State Aviation Service</p> <p><i>Airspace Regulation</i> State Aviation Service</p> <p><i>Economic Regulation</i> Ministry of Infrastructure of Ukraine</p>																						
<p><b>Corporate governance structure (2012)</b></p> 	<p><b>UkSATSE (2012)</b></p> <p><i>DIRECTOR GENERAL OF UKSATSE:</i> Yuriy Cherednichenko</p>																						
<p><b>Scope of services</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;"><input checked="" type="checkbox"/> GAT</td> <td style="padding: 2px;"><input checked="" type="checkbox"/> Upper Airspace</td> <td style="padding: 2px;"><input type="checkbox"/> Oceanic ANS</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> OAT</td> <td style="padding: 2px;"><input checked="" type="checkbox"/> Lower Airspace</td> <td style="padding: 2px;"><input checked="" type="checkbox"/> MET</td> </tr> </table>	<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS	<input type="checkbox"/> OAT	<input checked="" type="checkbox"/> Lower Airspace	<input checked="" type="checkbox"/> MET	<p><b>Operational ATS units:</b></p> <p>5 ACC/APPs (Kyiv, Simferopol', Dnipropetrov'sk, Odesa, L'viv)      7 APPs (Donetsk, Kharkiv, Luhansk, Ivano-Frankivs'k, Zaporizhzhia, Uzghorod, Chernivtsi)      22 TWRs</p>																
<input checked="" type="checkbox"/> GAT	<input checked="" type="checkbox"/> Upper Airspace	<input type="checkbox"/> Oceanic ANS																					
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## GLOSSARY

ACC	Area Control Centre
ACE	Air Traffic Management Cost-Effectiveness
ADS-B	Automatic Dependent Surveillance-Broadcast
Aena	Aeropuertos Españoles y Navegación Aérea, Spain
AFIS	Airport/Aerodrome Flight Information Service
AIS	Aeronautical Information Services
ANS	Air Navigation Services
ANS CR	Air Navigation Services of the Czech Republic
ANSP	Air Navigation Service Provider
APP	Approach Control Unit
ARMATS	Armenian Air Traffic Services
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
BULATSA	Air Traffic Services Authority, Bulgaria
Austro Control	Austro Control Österreichische Gesellschaft für Zivilluftfahrt mbH, Austria
Avinor	Avinor, Norway
B	Billion
Belgocontrol	Belgocontrol, Belgium
CAPEX	Capital Expenditure
CEATS	Central European Air Traffic Services
CFMU	Central Flow Management Unit
CNS	Communications, Navigation and Surveillance
CRCO	Central Route Charges Office
Croatia Control	Hrvatska kontrola zračne plovidbe d.o.o., Croatian Air Navigation Services
DCAC Cyprus	Department of Civil Aviation of Cyprus
DFS	Deutsche Flugsicherung GmbH, Germany
DHMİ	Devlet Hava Meydanları İşletmesi, Turkey
DME	Distance-Measuring Equipment
DSNA	Direction des services de la navigation aérienne, France
EANS	Estonian Air Navigation Services
EC	European Commission
ECAC	European Civil Aviation Conference
ENAV	Ente Nazionale di Assistenza al Volo S.p.A., Italy
ERC	EUROCONTROL Research Centre
ETS	Early Termination of Service
EU	European Union
FAB	Functional Airspace Block
FDP	Flight Data Processing system
Finavia	Finavia, Finland
FIS	Flight Information Service
FL	Flight Level
FTE	Full-Time Equivalent
GDP	Gross Domestic Product
HCAA	Hellenic Civil Aviation Authority, Greece

HMI	Human-Machine Interface
HQ	Headquarters
HungaroControl	HungaroControl, Hungary
IAA	Irish Aviation Authority, Ireland
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LFV	Luftfartsverket, Sweden
LGS	Latvijas Gaisa Satiksme, Latvia
LPS	Letové Prevádzkové Služby Slovenskej Republiky, Státny Podnik, Slovak Republik
LVNL	Luchtverkeersleiding Nederland, Netherlands
M	Million
MATS	Malta Air Traffic Services Ltd
MET	Aeronautical Meteorology
M-NAV	Air Navigation Services Provider of the former Yugoslav Republic of Macedonia
MoldATSA	Moldavian Air Traffic Services Authority
MSSR	Monopulse Secondary Surveillance Radar
MUAC	Maastricht Upper Air Centre
NSA	National Supervisory Authority
NATA Albania	National Air Traffic Agency, Albania
NATS	National Air Traffic Services, UK
NAV Portugal	Navegação Aérea de Portugal – NAV Portugal, EPE
NAVIAIR	Air Navigation Services – Flyvesikringstjenesten, Denmark
NBV	Net Book Value
NDB	Non-Directional Beacon
OAT	Operational air traffic
OPS	Operations
Oro Navigacija	State Enterprise Oro Navigacija, Lithuania
PANSA	Polish Air Navigation Services Agency
PPPs	Purchasing power parities
PRB	Performance Review Body
PRC	Performance Review Commission
PRR	Performance Review Report
PRU	Performance Review Unit
RDP	Radar Data Processing system
RP1	Reference Period 1
RPI	Retail Price Index
ROMATSA	Romanian Air Traffic Services Administration
SAR	Search and Rescue
SES	Single European Sky
SESAR IP1	Single European Sky ATM Research Implementation Package 1
SEID	Specification for Economic Information Disclosure
Skyguide	Skyguide, Switzerland
Slovenia Control	Slovenia Control, Slovenia
SMATSA	Serbia and Montenegro Air Traffic Services Agency
TC	Terminal Control
TWR	Traffic Controlled Tower
UK CAA	United Kingdom Civil Aviation Authority
UkSATSE	Ukrainian State Air Traffic Service Enterprise
VFR	Visual Flight Rules
VOR	Very high frequency Omni-directional Range



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