Report commissioned by the
Performance Review Commission

ATM Cost-Effectiveness (ACE) 2014 Benchmarking Report with 2015-2019 outlook

Prepared by the Performance Review Unit (PRU)
with the ACE 2014 Working Group

The analysis contained in this final draft report is subject to revision as the data are not fully validated.

The ACE Working Group participants are welcome to provide written comments until 13 April 2016 and to report factual errors/omissions to the PRU.

18 March 2016

EUROCONTROL

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."

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

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

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.

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DOCUMENT IDENTIFICATION SHEET

DOCUMENT DESCRIPTION

Document Title

ATM Cost-Effectiveness (ACE) 2014 Benchmarking Report with 2015-2019 outlook

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ACE 2014	Final draft report	March 2016

Abstract

This report is the fourteenth 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 2014, including high level trend analysis for the years 2009-2014. This year, the ACE report also analyses long-term trends in ANSPs cost-effectiveness performance over the 10-year period 2004-2014. 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 analyses forward-looking information for the years 2015-2019, inferring on future financial cost-effectiveness performance at system level, and displays information on actual and planned capital expenditures.

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) – Functional Airspace Blocks (FABs) – Gate-to-gate - En-route and Terminal ANS – Inputs and outputs metrics – Performance framework – Quality of service – 2014 data – 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 (2015-2019).

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TABLE OF CONTENTS

TABLES

FIGURES

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READER'S GUIDE

This table indicates which chapters of the report are likely to be of most interest to particular readers and stakeholders.	
Executive summary	All stakeholders with an interest in ATM who want to know what this report is about, or want an overview of the main findings.
Chapter 1: Introduction	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.
Part I: - Pan-European system cost-effectiveness performance in 2014 and outlook for 2015-2019	
Chapter 2: Pan-European system cost-effectiveness performance in 2014 with 2015-2019 outlook	All those who are interested in a high level analysis of economic and financial cost-effectiveness performance in 2014 at Pan-European system and ANSP level. This chapter also includes a medium-term trend analysis of ATM/CNS cost-effectiveness performance over the 2009-2014 period, and an analysis focusing on its three main economic drivers (productivity, employment costs and support costs). Chapter 2 also comprises a forward-looking analysis of ATM/CNS performance over the 2015-2019 period, including capital investment projections. Chapter 2 provides a factual analysis which is stable over time and allow for monitoring cost-effectiveness performance achievements. Chapter 3 provides a long-term analysis of the changes in the Pan-European cost-effectiveness performance over a 10-year period between 2004 and 2014. These chapters are particularly relevant to ANSPs' management, policy makers, regulators and NSAs in order to identify best practices, areas for improvement, and to understand how cost-effectiveness performance has evolved over time. This information is also useful to support consultation processes between ANSPs and airspace users.
Chapter 3: Long-term changes in cost-effectiveness (2004-2014)	
Part II: - Cost-effectiveness performance focus at ANSP level	
Chapter 4: Focus on ANSPs individual cost-effectiveness performance	All those who are interested in obtaining an independent and comparable analysis of individual ANSP historic performance (2009-2014) in terms of economic and financial cost-effectiveness. This chapter is particularly relevant to ANSPs' management, airspace users, regulators and NSAs in order to identify how cost-effectiveness performance has evolved and which have been the sources of improvement. This chapter also includes information on ANSPs historic and planned capital investments, as well as a benchmarking analysis of financial cost-effectiveness with a set of comparators for each ANSP. This information is also useful to support consultation processes between ANSPs and airspace users.
Annexes:	With a view to increase transparency, this report comprises several annexes including the data used in the report. This information is relevant to support cost-benefit analysis of ATM research projects like the SESAR programme. The data comprised in these annexes is also useful to academic researchers for the purposes of empirical analysis.

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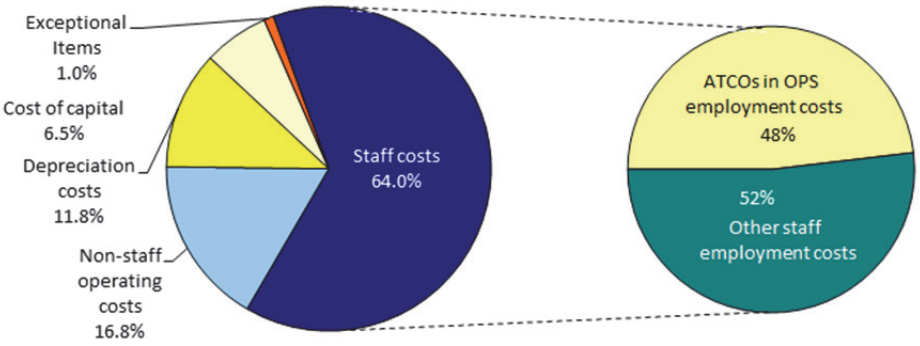
EXECUTIVE SUMMARY

This ATM Cost-Effectiveness (ACE) 2014 Benchmarking Report, the fourteenth in the series, presents a review and comparison of ATM cost-effectiveness for 37 Air Navigation Service Providers (ANSPs) in Europe. The ACE benchmarking work is carried out by the Performance Review Commission (PRC) supported by the Performance Review Unit (PRU) 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 (Performance Scheme) amended by EC Regulation N°390/2013.

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 a common understanding of underlying assumptions and limitations of the data.

From a methodological point of view, the ACE Benchmarking analysis focuses on the specific costs of providing gate-to-gate ATM/CNS services which amounted to €8 002M in 2014. 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 (depreciation and cost of capital) amount to some 18%.



Total ATM/CNS provision costs: € 8 002 M

ATM/CNS provision costs (€ M)	En-route	%	Terminal	%	Gate-to-gate	%
Staff costs	3 963	63.3%	1 154	66.2%	5 117	64.0%
ATCOs in OPS employment costs	1 966	-	497	-	2 462	-
Other staff employment costs	1 998	-	657	-	2 655	-
Non-staff operating costs	1 040	16.6%	305	17.5%	1 345	16.8%
Depreciation costs	767	12.3%	175	10.0%	942	11.8%
Cost of capital	426	6.8%	95	5.4%	521	6.5%
Exceptional Items	61	1.0%	16	0.9%	77	1.0%
Total	6 258	100.0%	1 744	100.0%	8 002	100.0%

Figure 0.1: Breakdown of ATM/CNS provision costs in 2014 [TBU]

ACE 2014 presents information on performance indicators relating to the benchmarking of cost-effectiveness and productivity performance for the year 2014, and shows how these indicators changed over time (2009-2014). It examines both individual ANSPs and the Pan-European ATM/CNS system as a whole. In addition, ACE 2014 analyses forward-looking information covering the 2015-2019 period based on information provided by ANSPs in November 2015.

The ACE factual and independent benchmarking sets the foundation for a normative analysis to quantify the potential scope of cost-efficiency improvements for ANSPs. The ACE data analysis and the gathering of business "intelligence" on ANSPs cost-efficiency performance directly feed core processes of the Single European Sky (SES) Performance Scheme.

For ANSPs operating in SES States, 2014 is the third year of application of the "determined costs" method which comprises specific risk-sharing arrangements aiming at incentivising ANSPs to better control costs and to improve their economic performance. The PRB released in October 2015 reports on the monitoring of SES performance targets for the last year of RP1 (2014) based on information provided in June 2015. This ACE 2014 Benchmarking Report complements the PRB monitoring activity by providing a detailed benchmarking of cost-effectiveness performance at ANSP level including a trend analysis of three main economic drivers (productivity, employment costs and support costs) over the 2009-2014 period.

For the first time since the start of the ACE benchmarking activity, this report also provides a long-term analysis of the changes in cost-effectiveness and its main drivers between 2004 and 2014. This 10-year period is characterised by significant changes in business cycles, the emergence of a new regulatory framework and technological evolution.

Figure 0.2 shows that during this period, ATM/CNS provision costs rose by +0.5% p.a. which was significantly less than the +1.4% p.a. increase in composite flight-hours, the output metric used in the ACE benchmarking analysis. As a result, unit ATM/CNS provision costs per composite flight-hour decreased by -0.9% p.a. between 2004 and 2014. These average changes mask different trends and cycles over the 10-year period which was marked by a global economic recession in 2009.

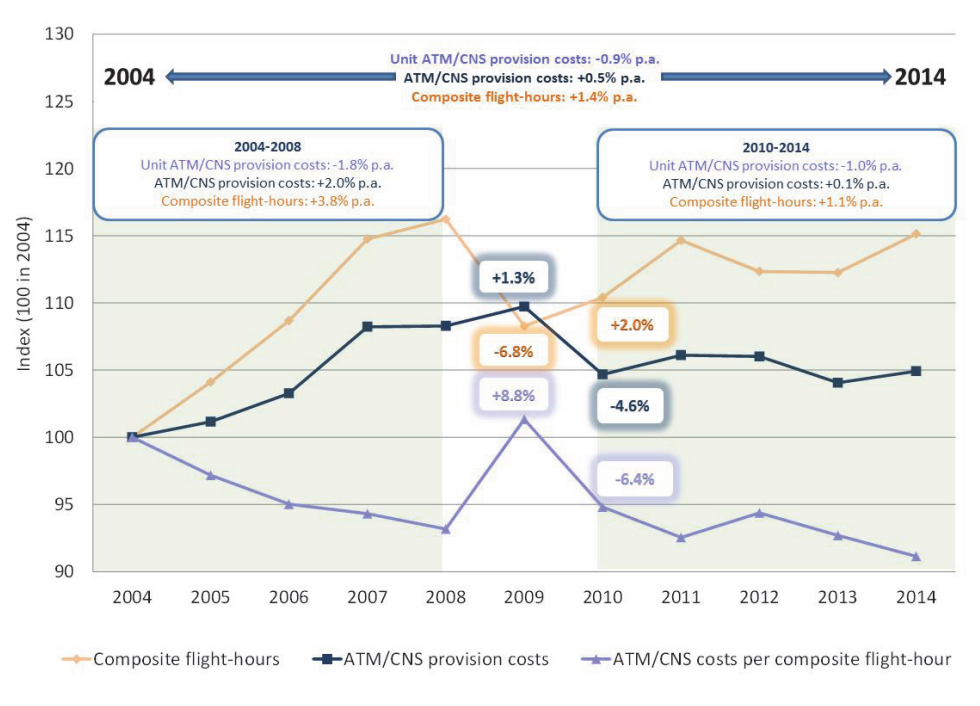


Figure 0.2: Long-term trends in traffic, ATM/CNS provision costs and unit costs [TBU]

Between 2004 and 2008, a period of sustained traffic growth, the number of composite flight-hours rose faster (+3.8% p.a.) than ATM/CNS provision costs (+2.0% p.a.). As a result, unit ATM/CNS provision costs reduced by -1.8% p.a. over this period. This demonstrated the ability of the ATM industry to reduce unit costs in a context of robust and continuous traffic growth.

Then came the year 2009 which was pivotal for the ATM system. Indeed, the economic recession struck the aviation industry with an unprecedented -6.8% traffic decrease. In the meantime, ATM/CNS provision costs continued to grow by +1.3% reflecting the short-term rigidities to adjust costs downwards and the unavoidable lead time. As a result, unit ATM/CNS provision costs increased by +8.8% and all the cost-effectiveness improvements achieved since 2004 were cancelled out.

However, in 2010, ATM/CNS provision costs reduced by -4.6% in a context of a +2.0% rebound in traffic. It should be emphasised that before 2010, ATM/CNS provision costs had never declined during the decade. This reflects the impact of the cost containment measures implemented by a majority of ANSPs in the wake of the sharp traffic decrease in 2009. This indicates that, as a whole, the ATM industry was reactive and showed flexibility to adjust costs downwards in response to the fall in traffic. This performance improvement was achieved when ANSPs operated under the so-called full-cost recovery regime which provided no strong incentives to reduce or contain costs.

Over the 2010-2014 period, ATM/CNS provision costs remained fairly constant (+0.1% p.a.) in a context of low traffic growth (+1.1% p.a. compared to +3.8% over the 2004-2008 period). As a result, unit ATM/CNS provision costs reduced by -1.0% p.a. between 2010 and 2014. The implementation of the Performance Scheme in 2012 and the financial incentives embedded in the Charging Scheme were important drivers for this improvement since the ANSPs operating in SES States had strong interests in outperforming their cost-efficiency targets, and adapt more rapidly than in the past to traffic fluctuations. It is noteworthy that this performance improvement was achieved while reducing the overall amount of ATFM delays.

Overall, despite the impact of the economic recession on the ATM industry in 2009, the cost-effectiveness performance of the Pan-European system significantly improved since 2004. Indeed, in 2014 unit ATM/CNS provision costs are -8.9% lower than in 2004. This performance improvement should be seen in the light of (a) the cost-containment measures initiated in 2009-2010 which continued to generate savings years after their implementation, and (b) for the ANSPs operating in SES States, the implementation of the Performance Scheme and the incentive mechanism embedded in the charging scheme which contributed to change the economic behaviour of these ANSPs and to maintain a downward pressure on costs during RP1.

Although benchmarking cost-effectiveness is key, looking at costs in isolation of the quality of service is not sufficient. The PRC introduced in its ACE Benchmarking Reports the concept of economic cost-effectiveness indicator in order to better capture the trade-offs between ATC capacity and costs. This indicator is defined as gate-to-gate ATM/CNS provision costs plus the costs of ground ATFM delays for both en-route and airport, all expressed per composite flight-hour. This economic performance indicator is meant to capture trade-offs between ATC capacity and costs.

The analysis of economic cost-effectiveness performance in 2014, the last year of available data, shows that although ATM/CNS provision costs rose by +1.2% in real terms, composite flight-hours increased by +2.6%, resulting in a decrease in unit ATM/CNS provision costs (-1.3%). However, this performance improvement was cancelled out by an increase in the unit costs of ATFM delays (+11.1% in 2014). As a result, 2014 unit economic costs remain at the same level as in 2013 (€482) which is the lowest level achieved since the start of the ACE benchmarking analysis in 2001.

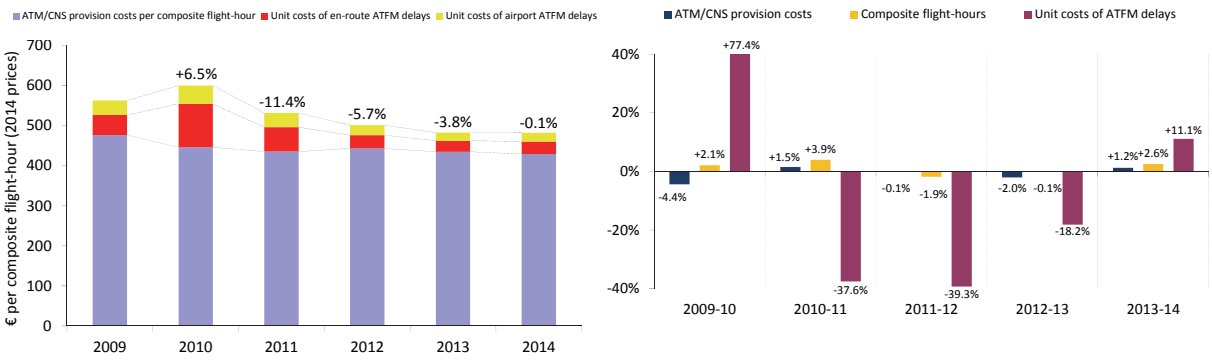


Figure 0.3: Changes in unit economic costs, 2009-2014 (real terms) [TBU]

In 2014, ATM/CNS provision costs increased for 24 out of 37 ANSPs (see Figure 0.4 below). Although all these ANSPs experienced traffic increases in 2014, only 13 of them were in a position to reduce their unit costs.

Figure 0.4: Changes in ATM/CNS provision costs and traffic volumes, 2013-2014 (real terms) [TBU]

It is noteworthy that ATM/CNS provision costs rose by more than +10.0% for four ANSPs including BULATSA (+12.1%), M-NAV (+18.4%), PANSA (+16.5%) and SMATSA (+15.1%). The main drivers for these significant increases are provided in Part I of this report.

Figure 0.4 indicates that in 2014, traffic volumes substantially decreased for UkSATSE (-36.8%) and MoldATSA (-19.9%). These substantial reductions reflect the establishment of restricted/prohibited areas in UkSATSE airspace following the accident of Malaysia airline flight MH17, military conflicts in the eastern region of Ukraine and the temporary occupation of Crimea. These events led to a transfer of staff and sectors from Simferopol ACC to other regional branches of UkSATSE (mainly Odesa and Dnipropetrovs'k). In addition, UkSATSE lost a number of infrastructure assets that were in operation. In an attempt to adjust to these unfavourable events, UkSATSE reduced its ATM/CNS provision costs by -16.4% mainly through lower staff and non-staff operating costs (-16.8%) and a lower cost of capital (-32.5%).

Figure 0.5 shows that in 2014, ATCO-hour productivity rose faster (+2.0%) than employment costs per ATCO-hour (+0.4%). In the meantime, unit support costs reduced by -1.2% since support costs rose at a lower rate (+1.4%) than traffic (+2.6%). The combination of these different elements led to the decrease in unit ATM/CNS provision costs observed at Pan-European system level in 2014 (-1.3%).

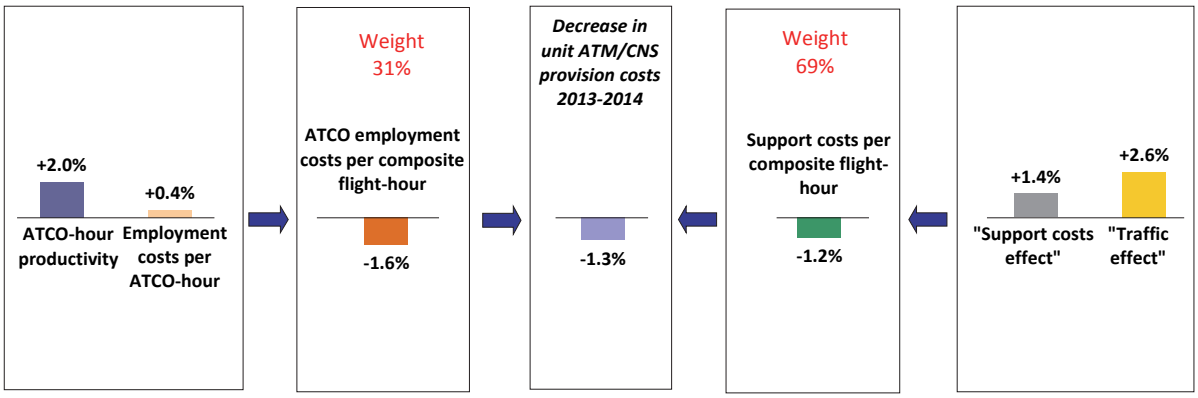


Figure 0.5: Changes in the financial cost-effectiveness indicator, 2013-2014 (real terms) [TBU]

Figure 0.6 shows the changes in the different components of support costs (see the "support costs effect" bar on the right-hand side of Figure 0.5) between 2013 and 2014.

The overall increase in support costs (+1.4%) reflects higher non-staff operating costs (+4.0% or +€51.2M), depreciation costs (+4.6% or +€41.8M) and cost of capital (+4.5% or +€22.3 M), while support staff costs remained fairly constant (-0.2%). On the other hand, a substantial reduction is observed for exceptional costs (-32.1% or -€36.5M).

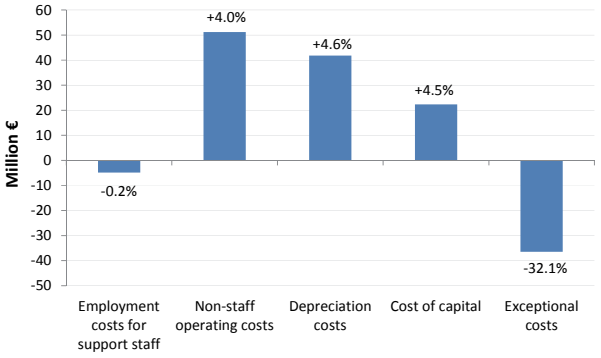


Figure 0.6: Changes in the components of support costs, 2013-2014 (real terms) [TBU]

Support costs represent some 70% of ATM/CNS provision costs and are therefore an important driver of cost-effectiveness performance. It is expected that in the future, improvements in cost-effectiveness could arise from greater competition for support services which could be available on a central basis, physically distant from the ANSPs HQs and ATC facilities and supported by innovation in IT technology.

At Pan-European system level, after the -1.3% decrease in 2014, gate-to-gate unit ATM/CNS provision costs are planned to remain fairly constant in 2015 (-0.3%) and then to fall by -2.6% p.a. until 2019.

Overall, gate-to-gate unit ATM/CNS provision costs are expected to reduce by -2.2% p.a. between 2014 and 2019. This mainly reflects the fact that over this period traffic is planned to increase faster (+2.6% p.a.) than ATM/CNS provision costs (+0.4% p.a.).

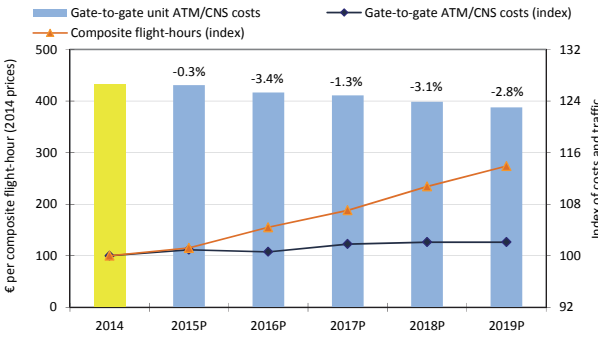


Figure 0.7: Forward-looking cost-effectiveness (2014-2019, real terms) [TBU]

The cumulative capex planned for the period 2015-2019 amounts to some €3 956M or an average of €791M per year. Figure 0.8 shows that the average capex to depreciation ratio planned over 2015-2019 (1.13) is slightly lower than that observed over the 2009-2013 period (1.17). This

indicates that, overall, ANSPs assets bases are expected to grow at a lower rate than in the last five years.

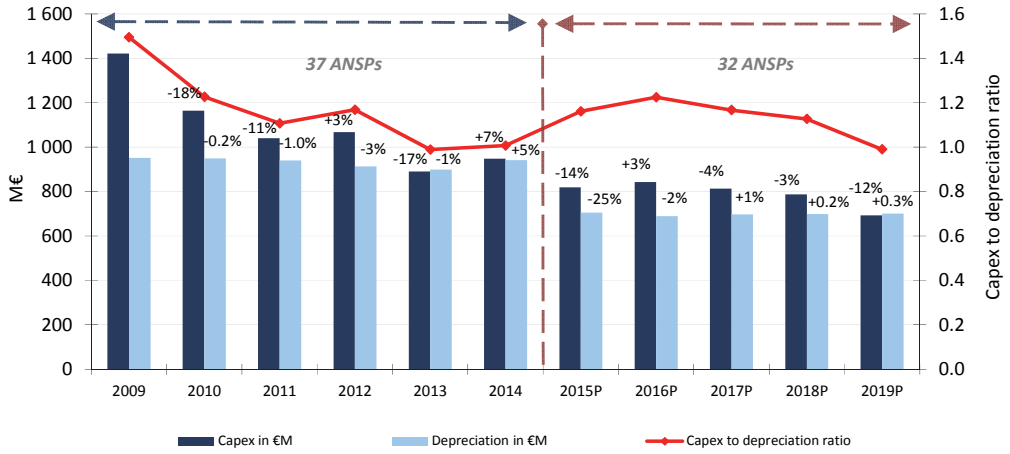


Figure 0.8: Capital expenditures and depreciation costs (2009-2019, real terms) [TBU]

A more detailed analysis of ANSPs forward-looking plans indicates that a significant proportion of these investments relates to major upgrades or to the replacement of existing ATM systems.

1 INTRODUCTION

The Air Traffic Management Cost-Effectiveness (ACE) 2014 Benchmarking Report commissioned by EUROCONTROL's independent Performance Review Commission (PRC) is the fourteenth in a series of reports comparing the ATM cost-effectiveness of EUROCONTROL Member States' Air Navigation Service Providers (ANSPs)[1].

In September 2010, the PRC, supported by the EUROCONTROL Performance Review Unit (PRU), was designated Performance Review Body (PRB) of the European Commission (EC).

The ACE benchmarking work is carried out by the PRC in the context of Articles 3.3(i), 3.6(b)(c), and 3.8 of EC regulation N°691/2010 (Performance Scheme) amended by EC Regulation N°390/2013.

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[2] (SEID), in all EUROCONTROL Member States.

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 2014. However, the aviation community is also interested in measuring how cost-effectiveness and productivity at the European and ANSP levels vary over time, and in understanding the reasons why variations occur.

Hence, this report makes use of previous years' data from 2009 onwards to examine changes over time, where relevant and valid. It is particularly relevant to have a medium-term perspective given the characteristics of the ANS industry which requires a long lead time to develop ATC capacity and infrastructure. In 2009, the economic recession affected the aviation industry with an unprecedented -7% traffic decrease at system level, basically cancelling three years of traffic growth. It is therefore interesting to look at the changes in performance over the 2009-2014 period to understand how the ATM industry reacted to this sharp decrease in traffic demand. This report also exploits the richness of the ACE data by providing a long term analysis of the changes in cost-effectiveness and its main drivers covering a 10-year period from 2004 to 2014.

1.1 Organisation of the report

The structure of the present ACE 2014 Benchmarking Report is made of two parts and four chapters:

[1] Previous reports in the series from ACE 2001 (Sept. 2003) to ACE 2013 (May 2015) can be found on the PRC web site at http://www.eurocontrol.int/articles/prc-and-prb-publications.

[2] PRC Specification for Economic Information Disclosure - Version 3.0, December 2012, can be found on the PRC web site.

Chapter 1 provides an overview of the participating ANSPs and outlines the processes involved in the production of this report.

Part I and Chapter 2 provide a high level analysis of economic and financial cost-effectiveness performance in 2014 at Pan-European system and ANSP level. This chapter also analyses changes in ATM/CNS cost-effectiveness performance between 2009 and 2014. A particular focus is put on the three main economic drivers of cost-effectiveness (productivity, employment costs and support costs). Chapter 2 also comprises a forward-looking analysis of ATM/CNS performance over the 2015-2019 period, including capital investment projections. Finally, Chapter 3 provides a long-term analysis of the changes in ANSPs cost-effectiveness and its main economic drivers over the 2004-2014 period.

Part II and Chapter 4 provide a two-page summary for each ANSP participating to the ACE programme. This summary includes an individual trend analysis of ANSPs' cost-effectiveness performance between 2009 and 2014, and comprises a benchmarking analysis of each ANSP's financial cost-effectiveness with a set of comparators. It also examines the capital expenditure planned by each ANSP for the period 2015-2019 and how these plans compare to the previous capex cycles.

Finally, this report also comprises several annexes which include statistical data used in the report, and individual ANSP Fact Sheets comprising a factual description of the governance and institutional arrangements in which the ANSP operates.

1.2 Overview of participating ANSPs

In total, 38 ANSPs reported 2014 data in compliance with the requirement from Decision No. 88 of the Permanent Commission of EUROCONTROL. In addition to the EUROCONTROL Member States, the en-route ANSP of Estonia[3] provided data in compliance with the Performance Scheme Regulation. All the reported information relates to the calendar year 2014.

Georgia has been integrated into the Multilateral Agreement for Route Charges on the 1st of January 2014. As a result, Sakaeronavigatsia, the Georgian ANSP has submitted for the first time in 2014 data in line with the SEID requirements. This information will be thoroughly validated by the PRU in the first half of 2016 in order to facilitate future data disclosure and to achieve mature data for benchmarking purposes. The objective of this process is to allow a smooth integration of Sakaeronavigatsia in the ACE 2015 benchmarking analysis.

Table 1.1 below shows the list of the ANSPs participating to the ACE 2014 benchmarking analysis, describing both their organisational and corporate arrangements, and the scope of ANS services provided.

[3] Estonia became a member of EUROCONTROL on the 1st of January 2015.

	ANSP	Code	Country	Organisational & Corporate Arrangements	OAT Services	Oceanic	MUAC	Delegated ATM	Internal MET	Ownership and management of airports
1	Albcontrol	AL	Albania	Joint-stock company (State-owned)	x				x	
2	ANS CR	CZ	Czech Republic	State-owned enterprise						
3	ARMATS	AM	Armenia	Joint-stock company (State-owned)						
4	Austro Control	AT	Austria	Limited liability company (State-owned)					x	
5	Avinor	NO	Norway	Joint-stock company (State-owned)	x	x				x
6	Belgocontrol	BE	Belgium	State-owned enterprise			x		x	
7	BULATSA	BG	Bulgaria	State-owned enterprise					x	
8	Croatia Control	HR	Croatia	Joint-stock company (State-owned)	X			x	x	
9	DCAC Cyprus	CY	Cyprus	State body						
10	DFS	DE	Germany	Limited liability company (State-owned)	x		x			
11	DHMİ	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	ENAIRE	ES	Spain	State-owned enterprise						x
15	ENAV	IT	Italy	Joint-stock company (State-owned)					x	
16	Finavia	FI	Finland	State-owned enterprise	x			x	x	x
17	HCAA	GR	Greece	State body						x
18	HungaroControl	HU	Hungary	State-owned enterprise					x	
19	IAA	IE	Ireland	Joint-stock company (State-owned)		x				
20	LFV	SE	Sweden	State-owned enterprise	x			x	x	
21	LGS	LV	Latvia	Joint-stock company (State-owned)					x	
22	LPS	SK	Slovak Republic	State-owned enterprise						
23	LVNL	NL	Netherlands	Independent administrative body			x			
24	MATS	MT	Malta	Joint-stock company (State-owned)						
25	M-NAV	MK	F.Y.R. Macedonia	Joint-stock company (State-owned)	x				x	
26	MoldATSA	MD	Moldova	State-owned enterprise	x				x	
27	MUAC			International organisation						
28	NATS	UK	United Kingdom	Joint-stock company (part-private)		x				
29	NAV Portugal	PT	Portugal	State-owned enterprise		x				
30	NAVIAIR	DK	Denmark	State-owned enterprise	x			x		
31	Oro Navigacija	LT	Lithuania	State-owned enterprise						
32	PANSA	PL	Poland	State body (acting as a legal entity with an autonomous budget)						
33	ROMATSA	RO	Romania	State-owned enterprise					x	
34	Skyguide	CH	Switzerland	Joint-stock company (part-private)	x			x		
35	Slovenia Control	SI	Slovenia	State-owned enterprise	x					
36	SMATSA	RS	Serbia	Limited liability company	x			x	x	
		ME	Montenegro							
37	UkSATSE	UA	Ukraine	State-owned 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 participating in ACE 2014 [TBU]

Table 1.1 also indicates (coloured yellow) which ANSPs were at 1 January 2014 part of the 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 signature of an agreement relating to the establishment of a European Common Aviation Area (ECAA)[4], to cooperate in the field of ATM, with a view to extending the SES regulations[5] to the ECAA States. Hence, in principle all the en-

[4] 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 former Yugoslav Republic of Macedonia, the Republic of Iceland, the Republic of Montenegro, the Kingdom of Norway, and the Republic of Serbia.

[5] This includes the second package of SES regulations (EC No 1070/2009), the amended Performance Scheme Regulation (EC No 390/2013) and amended Charging Scheme Regulation (EC No 391/2013).

route ANSPs of EUROCONTROL States[6] 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[7] 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 the 1st of July in the year following the year to which it relates. The SEID became also mandatory as part of the SES II legislation. The ACE 2014 data have been submitted in the SEID Version 3.0 template which is used for the first time in this report.

Version 3.0 of this Specification has been finalised in December 2012 following the formal EUROCONTROL Regulatory and Advisory Framework (ERAF), after consultation and full involvement of the ad-hoc ACE Working Group using lessons learnt from the use of the SEID V2.6 since 2008. The SEID V3.0 also reflects recent developments arising from the second package of the SES regulations in 2009, in particular the Performance Scheme Regulation and the amended Charging Scheme Regulation.

The main change introduced in Version 3.0 compared to Version 2.6 of the SEID (used between 2008 and 2013) relates to the separation of SES and non-SES airports for the reporting of terminal ANS data (revenues, costs, number of staff and traffic). However, the information gathered remains fully compatible with Version 2.6, so that the time series analysed in this report are not affected by the use of Version 3.0.

Figure 1.1 indicates that 18 out of 37 ANSPs provided ACE 2014 data on time by the 1st July 2015. It should be noted that the deadline to provide ACE 2014 data was the 1st July, while it was the 15th July for ACE 2013 data. On the 15th July 2015, 27 ANSPs had submitted their ACE 2014 data submission to the PRU, which is better than for ACE 2013 (23 ANSPs).

It is important that this timely submission of ACE data is sustained and even improved. Robust ACE benchmarking analysis should be available in a timely manner 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 for the production of the ACE Benchmarking Report is inevitably delayed if data are not submitted on time.

[6] In 2013, en-route ANS in Bosnia and Herzegovina were provided by Croatia Control and SMATSA between FL290 and FL660 but in 2014 there has been a gradual transition phase and in November 2014 the Bosnia and Herzegovina ANSP (BHANSA) was responsible to provide ANS between FL100 and FL325 from Sarajevo ACC. BHANSA is not included in the ACE 2014 analysis but as it is becoming a full-fledged ANSP, it is expected to participate to the ACE benchmarking programme in 2016.

[7] The column 'Delegated ATM' in Table 1.1 relates to the delegation of ATM services to or from other ANSPs, based on financial agreements.

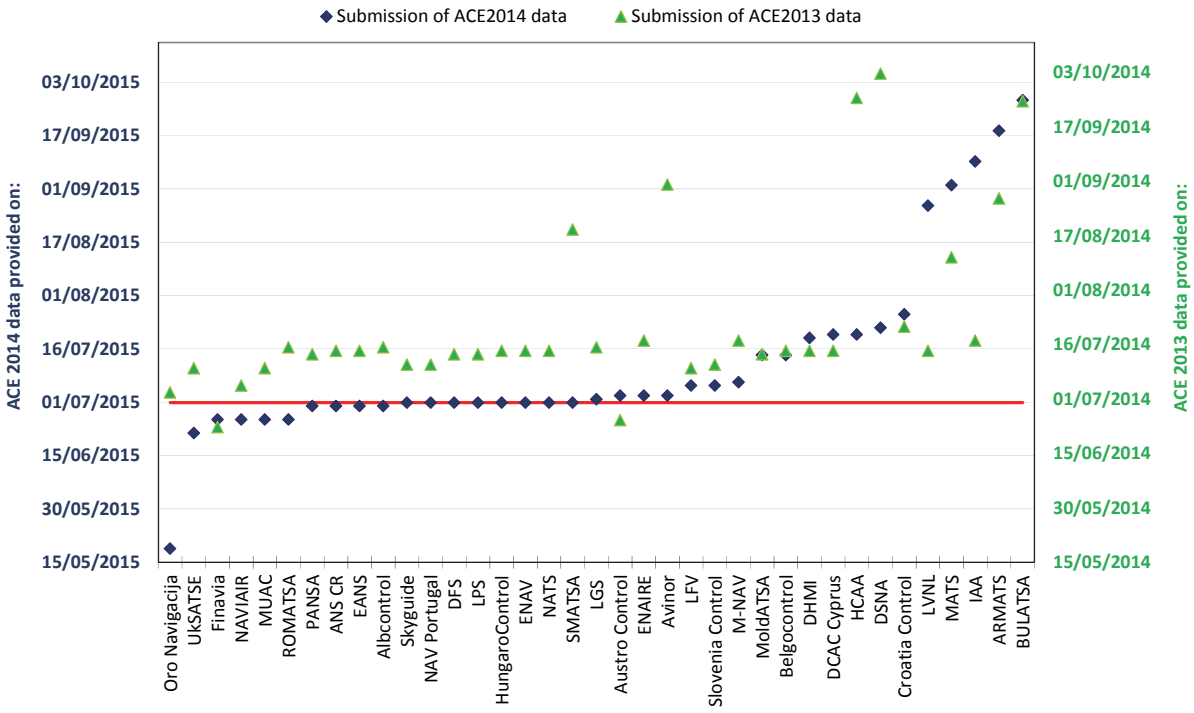


Figure 1.1: Progress with submission of 2014 data

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, DSNA and HCAA are still not in a position to provide complete balance-sheet data, although capital-related costs are charged to airspace users.

1.4 Data analysis, 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 analysis and consultation, is summarised in Figure 1.2 below.

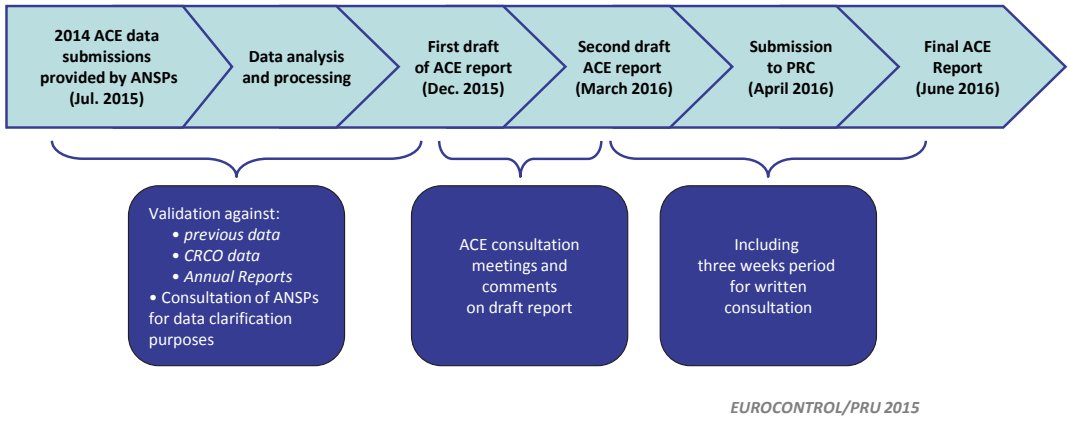


Figure 1.2: Data analysis, processing and reporting

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

During this 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 provided under the En-route and Terminal columns in the ACE data submissions cannot be fully reconciled.

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, data recorded in the Network Manager (NM) database 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.

1.5 ANSPs' Annual Reports

ANSPs' Annual Reports provided a valuable means of validating the 2014 information disclosure data.

The SES Service Provision Regulation (SPR) (EC No 550/2004) came into force on 20 April 2004 and is applicable to 2014 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); and,
- 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 Avinor, Finavia, HCAA, and DHMI[8].

Figure 1.3 displays the status of ANSPs 2014 Annual Reports and indicates that 30 out of 37 participating ANSPs have published an Annual Report for the year 2014.

[8] 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.

At the time of writing this report, seven ANSPs (including three which are subject to SES Regulations) have not published Annual Reports for 2014.

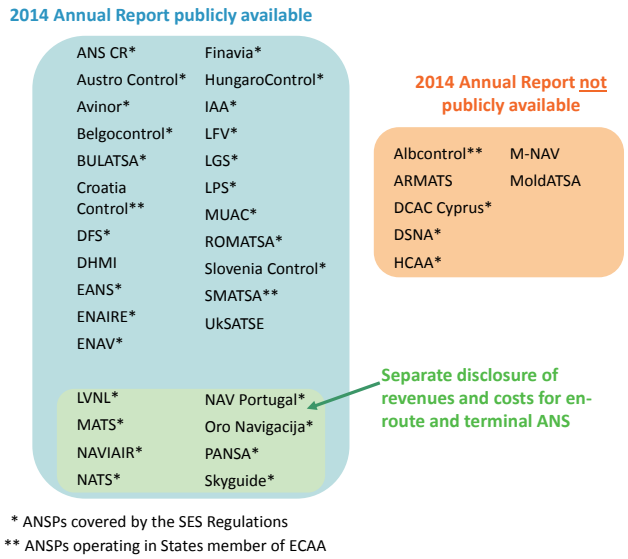


Figure 1.3: Status of 2014 Annual Reports [TBU]

ANSPs' Annual Accounts are prepared 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 26 ANSPs whose 2014 Annual Accounts were partly or fully prepared according to IFRS[9].

ANSPs reporting according to IFRS in 2014	
Albcontrol	LVNL
ANS CR	MATS
ARMATS	MUAC
Austro Control	NATS
Avinor	NAVIAIR
BULATSA	NAV Portugal
Croatia Control	Oro Navigacija
DFS	PANSA
EANS	ROMATSA
ENAIRE	Skyguide
ENAV	Slovenia Control
LGS	SMATSA
LPS	UkSATSE

Table 1.2: IFRS reporting status [TBU]

It should be noted that in some cases, the implementation of IFRS may have a significant impact on an ANSPs' cost base[10, 11] (such as different treatment of costs related to the pension scheme, and changes in depreciation rules), hence it is very important to identify and understand the impact of changes in the accounting principles used to draw the financial accounts.

[9] Skyguide Annual Accounts are prepared according to the Swiss GAAP which are close to IFRS.

[10] 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.

[11] Following the amendment of IAS 19 in 2013, any gains/losses arising from a change in actuarial assumptions have to be directly reflected in financial statements. This contrasts with the methodology that was used by some ANSPs until 2012 (i.e. corridor approach) according to which only a part of the actuarial gains/losses were recognised in the financial statements.

1.6 ANSP benchmarking and the SES Performance Scheme

The SES Performance Scheme includes Union-wide performance targets which are "transposed" into binding national/FAB targets for which clear accountabilities must be assigned within performance plans. Following the PRB recommendations, Union-wide targets for Cost-Efficiency, Capacity and Environment were adopted by the EC on the 3rd December 2010 for RP1 (2012-2014)[12]. It should be noted that the Union-wide Cost-Efficiency target is expressed in terms of en-route determined costs per service unit, and is computed at charging zone level (i.e. including ANSPs, MET, EUROCONTROL and NSAs costs).

The ACE factual and independent benchmarking sets the foundation for a normative analysis to quantify the potential scope of cost-efficiency improvements for ANSPs. Findings from the ACE Benchmarking analysis and the gathering of business "intelligence" on ANSPs cost-efficiency performance directly feed three core processes of the SES Performance Scheme:

1. Union-wide cost-efficiency target setting;
2. assessment of the cost-efficiency part of FABs/National Performance Plans; and,
3. monitoring of the cost-efficiency performance during a Reference Period.

For ANSPs operating in SES States, the year 2012 marked the start of RP1 and the end of the "full cost-recovery" mechanism for en-route ANS. Over RP1, SES States/ANSPs operate under the determined costs method which comprises specific risk-sharing arrangements aiming at incentivising ANSPs economic performance. As part of the determined costs method, the costs planned for the reference period (RP) are set in advance and frozen for the length of the RP. If actual costs are lower than the determined costs, then the State/ANSP can keep the difference. On the contrary, if actual costs are higher than determined, then the State/ANSP has to bear a loss. This mechanism provides incentives for States/ANSPs to effectively control their costs and to flexibly adapt to unforeseen changes in traffic volumes.

The three years of RP1 provide meaningful insights on how the industry has reacted to these incentives. The 2014 PRB monitoring report[13] shows that over RP1 as a whole, actual traffic (in terms of service units) was at Union-wide level -4.9% lower than expected. This report also shows that actual en-route costs were on average -4.1% lower than planned. This result indicates that SES States showed a certain degree of reactivity to adjust costs downwards in order to adapt to the lower traffic volumes than planned over RP1.

This ACE 2014 Benchmarking Report complements the PRB monitoring activity by providing a detailed comparison of cost-effectiveness performance at ANSP level including a trend analysis of three main economic drivers (productivity, employment costs and support costs) over the 2009-2014 period. Performance indicators at FAB level are also presented in Annex 9.

Annex 3 provides explanations on the differences between ACE and SES economic indicators and illustrates how these can be reconciled.

[12] The EC decision (2011/121/EU) setting RP1 performance targets is available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:048:0016:0018:EN:PDF.
[13] This document is available at: http://www.eusinglesky.eu/2014-reports.html.

PART I: PAN-EUROPEAN SYSTEM COST-EFFECTIVENESS PERFORMANCE IN 2014 AND OUTLOOK FOR 2015-2019

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2 PAN-EUROPEAN SYSTEM COST-EFFECTIVENESS PERFORMANCE IN 2014 WITH 2015-2019 OUTLOOK

2.1 Overview of European ANS system data for the year 2014

In 2014, gate-to-gate ATM/CNS provision costs amounted to some €8.0 billion, and the 37 ANSPs employed a total of some 55 441 staff (31% of them being ATCOs working on operational duties).

The Pan-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 Pan-European ANS system also includes National Supervisory Authorities (NSAs) and other regulatory and governmental authorities, national MET providers and the EUROCONTROL Agency.

In Table 2.1 below, the figures shown for MET costs, EUROCONTROL costs and the payments to national authorities and irrecoverable VAT only represent the costs **passing through ANSPs financial accounts**. This is a smaller scope than in the previous ACE reports where the total ANS costs at State level were displayed, even those not passing through ANSPs' accounts. As a result, the figures shown in Table 2.1 for the year 2013 are not directly comparable with the figures published in the ACE 2013 report. This change reflects the reporting requirements introduced by the SEID V3.0 which focuses on costs passing through ANSPs accounts.

	2013	2014	14/13
	37 ANSPs	37 ANSPs	37 ANSPs
Gate-to-gate ANS revenues (not adjusted by over/under recoveries) (in € M):	**8 819**	**9 139**	**3.6%**
En-route ANS revenues	6 972	7 242	3.9%
Terminal ANS revenues	1 847	1 898	2.8%
Gate-to-gate ATM/CNS provision costs (in € M):	**7 905**	**8 002**	**1.2%**
En-route ATM/CNS costs	6 183	6 258	1.2%
Terminal ATM/CNS costs	1 721	1 744	1.3%
Institutional costs passing through ANSPs accounts (in € M):	**766**	**718**	**-6.2%**
MET costs (including internal MET costs)	306	310	1.3%
EUROCONTROL Agency costs	314	305	-2.8%
Payment to national authorities and irrecoverable VAT	147	104	-29.2%
Gate-to-gate ANS staff:	**57 487**	**55 441**	**-3.6%**
ATCOs in OPS	17 532	17 591	0.3%
ACC ATCOs	9 874	9 873	0.0%
APPs + TWRs ATCOs	7 657	7 712	0.7%
NBV of gate-to-gate fixed assets (in € M)	**7 331**	**6 479**	**-11.6%**
Gate-to-gate capex (in € M)	**890**	**948**	**6.5%**
Outputs (in M)			
Distance controlled (km)	9 969	10 271	3.0%
Total flight-hours controlled	14.3	14.7	2.7%
ACC flight-hours controlled	12.8	13.0	1.7%
IFR airport movements controlled	14.7	15.0	2.0%
IFR flights controlled	9.4	9.6	1.7%
Gate-to-gate ATFM delays ('000 min.)	**8 669**	**9 881**	**14.0%**

Table 2.1: Key system data for 2013 and 2014, real terms [TBU]

Table 2.1 above shows that the gate-to-gate ANS revenues amounted to some €9 139M in 2014, which represents an increase of +3.6% compared to 2013. The Pan-European ANSPs employed some 55 441 staff. Overall, at system level each staff generated an average of 164.8 €'000 in terms of revenues.

Some 17 591 staff (31%) were ATCOs working on operational duty, split between ACCs (56%) and APP/TWR facilities (44%). On average, 2.2 additional staff are required for every ATCO in OPS in Europe.

ACE also analyses indicators derived from ANSP balance sheets and capital expenditures. The total Net Book Value (NBV) of fixed assets used by the Pan-European ANSPs to provide ATM/CNS services is valued at some €6 479M[14], which means that overall €0.71 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 2014, the total ANSP capex at Pan-European system level amounted to some €948M.

Some elements of ANS provision are outside the control of individual ANSPs. These elements include the costs of aeronautical MET services, the costs of the EUROCONTROL Agency and costs associated to regulatory and governmental authorities[15]. Therefore, from a methodological point of view, the ACE Benchmarking analysis focuses on the specific costs of providing gate-to-gate ATM/CNS services which amounted to €8 002M in 2014.

Figure 2.1 shows for each ANS segment the costs distribution between staff costs, non-staff operating costs, depreciation costs, the cost of capital and exceptional costs.

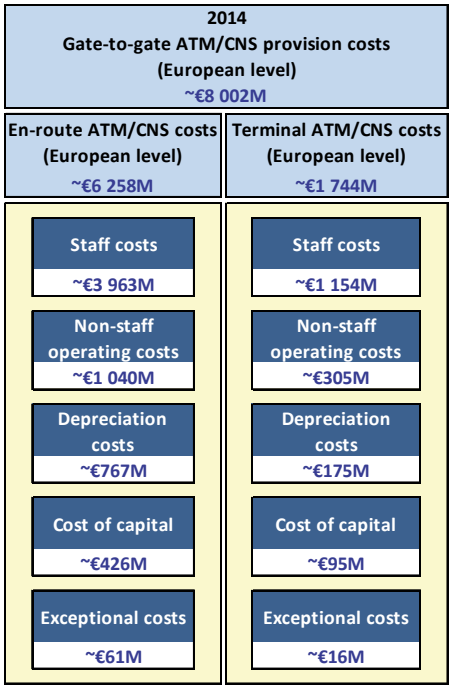


Figure 2.1: Breakdown of ATM/CNS provision costs, 2014 [TBU]

Staff costs are by far the largest costs category (64%), followed by non-staff operating costs (17%), depreciation costs (12%), the cost of capital (7%) and exceptional costs (1%).

Figure 2.1 also shows that gate-to-gate ATM/CNS provision costs can be broken down into en-route and terminal representing respectively 78% and 22% of gate-to-gate costs.

Despite the existence of common general principles, there are inevitably discrepancies in cost-allocation between en-route and terminal ANS across the European ANSPs. This lack of consistency might distort performance comparisons carried out separately for en-route and terminal. For this reason, the focus of the cost-effectiveness benchmarking analysis in this report is "gate-to-gate". For the sake of completeness, Annex 2 of this report provides the breakdown of the gate-to-gate cost-effectiveness indicator into en-route and terminal.

[14] Note that Avinor and DSNA assets and capex data are not included in Table 2.1 since, at the time of writing this final draft report, these ANSPs did not provide balance sheet data in their ACE 2014 submissions.

[15] It is important to note that the decrease in the payment to national authorities and irrecoverable VAT is mainly due to the fact that DSNA did not separately identify irrecoverable VAT in its 2014 data submission. This issue will be addressed in the final ACE 2014 Benchmarking Report.

ANSPs' ATM/CNS provision costs are then divided by an output metric to obtain a measure of performance – the **financial cost-effectiveness indicator**. The output metric is the composite flight-hour, a "gate-to-gate" measure which combines both en-route flight-hours controlled and IFR airport movements controlled. More information on the calculation of the output metric can be found in Annex 2.

2.2 Factors affecting performance

ANSPs in Europe operate in very diverse environments, both in terms of operational conditions (e.g. traffic complexity and traffic variability) and socio-economic conditions (e.g. cost of living, labour laws).

There are also significant differences in terms of size across the ANSPs since the five largest bear 57% of the total Pan-European ATM/CNS provision costs while the five smallest represent less than 1% of the costs.

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.

Methods have been developed by the PRU to measure a subset of exogenous factors. Currently, three relevant factors outside ANSPs control are consistently measured in the ACE Benchmarking Reports. As shown in Figure 2.2 below, these include the traffic complexity and the seasonal traffic variability. The third factor is the cost of living prevailing in the different countries where ANSPs operate.

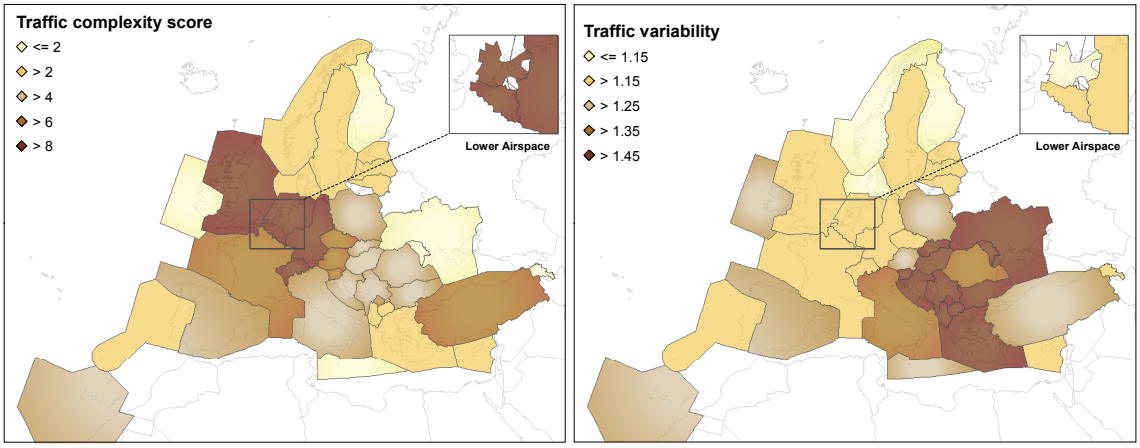


Figure 2.2: Exogenous factors measured by the PRU, 2014

Figure 2.2 shows that traffic complexity scores tends to be very high in the core of Europe (see left-hand map), while the seasonal traffic variability tends to be very high in the South-East corner of Europe (see the right-hand map).

Ideally, since the 37 ANSPs operate in very diverse environments across Europe, all the factors affecting performance should be taken into account in making fair performance comparisons, especially since many of these factors are outside the direct 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**.

The impact of size on ANSPs performance is an important policy issue given the infrastructure characteristics of the ANS sector and the expectation that fixed costs can be more effectively exploited with larger amounts of traffic.

In 2014, the five largest ANSPs (ENAIRE, DFS, ENAV, NATS and DSNA) bear some 57% of total European gate-to-gate ATM/CNS provision costs, while their share of traffic is 50%. 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).

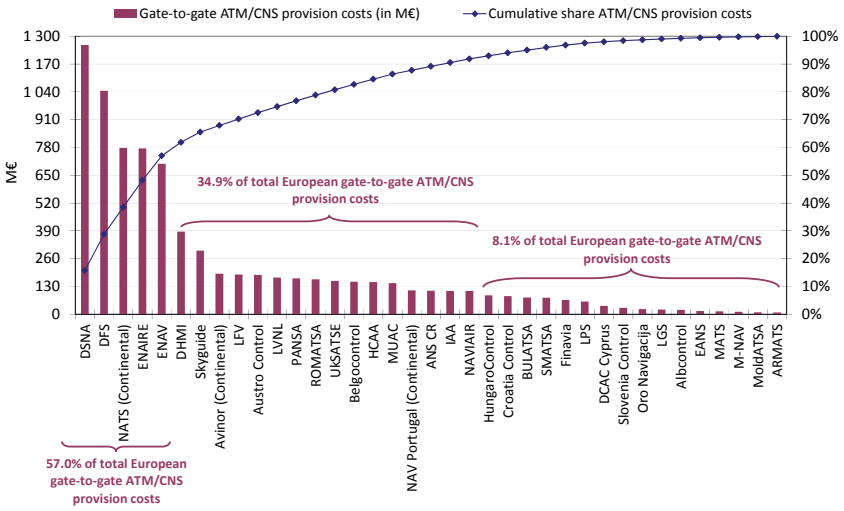


Figure 2.3: Distribution of ATM/CNS provision costs in 2014 [TBU]

However, it should be noted that:

- under the full cost recovery regime that applied to most ANSPs until December 2011, there was little incentive to fully exploit scale effects;
- the five largest ANSPs were substantially affected by the decrease in traffic volumes resulting from the economic recession. On average, the number of composite flight-hours controlled by the five largest ANSPs reduced by -9.6% between 2008 and 2014 while it rose by +7.7% for the other ANSPs;
- larger ANSPs tend to develop bespoke ATM systems internally which can be more costly than commercial off-the-shelf (COTS) solutions; and,
- size is not the only factor that has an impact on ANSPs costs.

It is expected that with the regulatory regime introduced by the SES II Performance Scheme and the incentive scheme embedded in the Charging Scheme regulation, the incentives to exploit scale effects will be stronger in RP2.

2.3 Pan-European economic cost-effectiveness performance in 2014

At Pan-European level, the unit economic costs amounted to €482 in 2014 which is -15% lower than the level achieved before the economic recession (€565 in 2008) and the lowest level since the start of the ACE benchmarking analysis in 2001.

An assessment of ANS performance should take into account the direct provision costs and indirect costs (delays, additional flight time and fuel burn) borne by airspace users, while checking that ANS safety standards are met. The PRC introduced in its ACE Benchmarking Reports the concept of economic cost-effectiveness. This indicator is defined as gate-to-gate ATM/CNS provision costs plus the costs of ground ATFM delays[16] for both en-route and airport,

[16] The cost of ATFM delays (€100 per minute in 2014, compared to €87 in 2013) is based on the findings of the study "European airline delay cost reference values" realised by the University of Westminster in March 2011 and updated in December 2015. Further details on the computation of the economic costs per composite flight-hour at ANSP and Pan-European system level are available in Annex 2 of this report.

all expressed per composite flight-hour. This economic performance indicator is meant to capture trade-offs between ATC capacity and costs.

Figure 2.4 below shows the comparison of ANSPs gate-to-gate economic cost per composite flight-hour in 2014. The two dotted lines represent the bottom and the top quartiles and provide an indication of the dispersion across ANSPs (there is a difference of €189 between the bottom and the top quartile).

The economic cost-effectiveness indicator at Pan-European level is €482 per composite flight-hour, and, on average, ground ATFM delays represent 11% of the total economic costs. According to the Network Operations Report[17], important factors contributing to en-route ATFM delays in 2014 were recurrent capacity issues in Nicosia ACC, industrial actions in France in particular in Bordeaux, Brest and Marseille ACCs[18], and some critical technical failures in Zagreb and London ACCs.

Figure 2.4 below shows that in 2014 unit economic costs ranged from €798 for Belgocontrol to €183 for MATS; a factor of more than four. Figure 2.4 also shows that DFS had the highest unit economic costs amongst the five largest ANSPs.

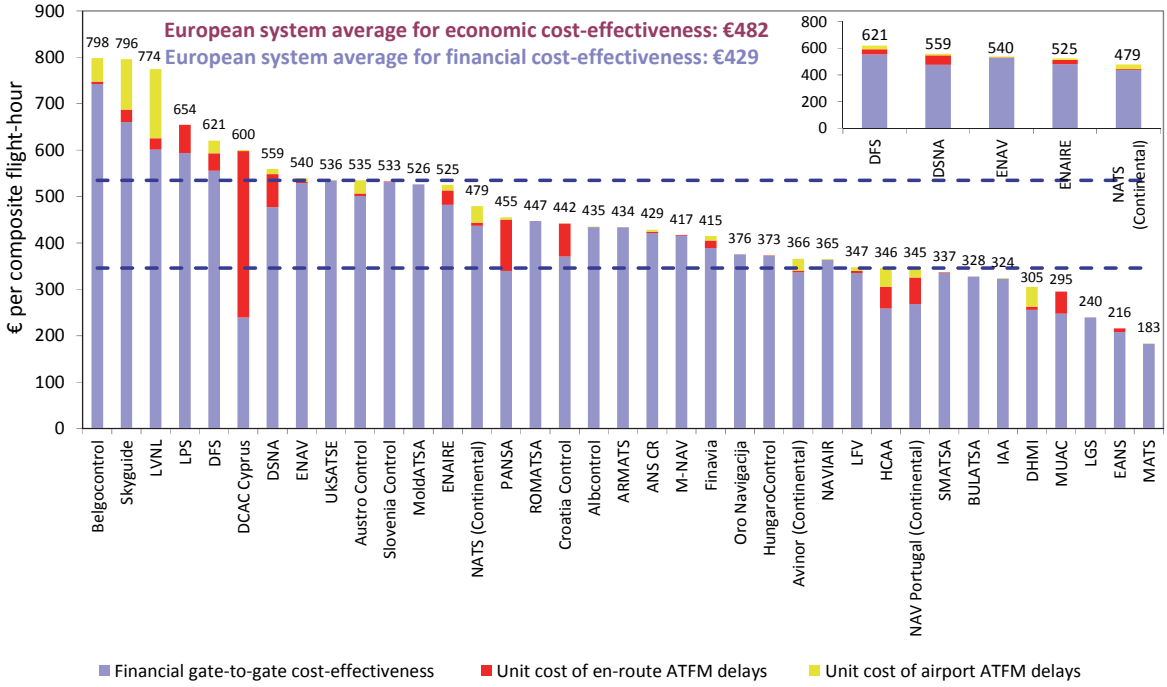


Figure 2.4: Economic gate-to-gate cost-effectiveness indicator, 2014 [TBU]

Figure 2.5 below analyses the changes in economic cost-effectiveness between 2009 and 2014 at Pan-European system level. The left-hand side of Figure 2.5 shows the changes in unit economic costs, while the right-hand side provides complementary information on the year-on-year changes in ATM/CNS provision costs, composite flight-hours and unit costs of ATFM delays.

[17] The Network Operations Report 2014 is available on the Network Manager's website: http://www.eurocontrol.int/publications/annual-network-operations-report-2014

[18] See EUROCONTROL, Network Operations Report 2014, ANNEX II – ACC.

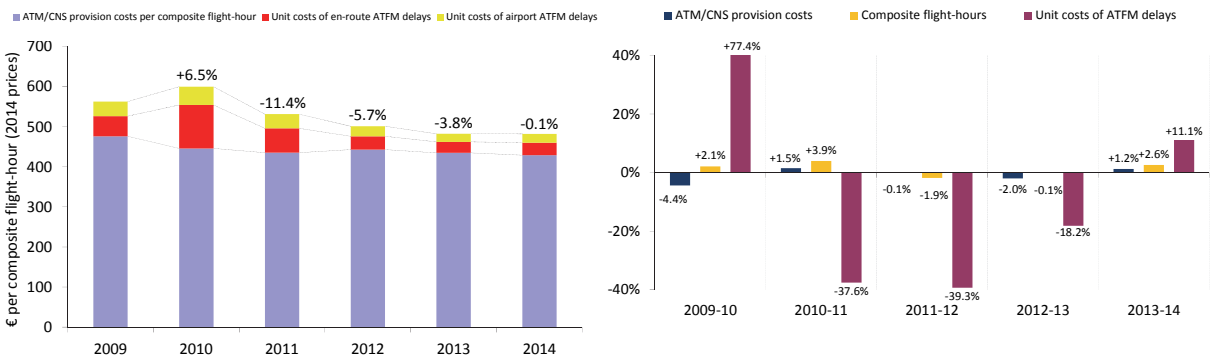


Figure 2.5: Changes in unit economic costs, 2009-2014 (real terms) [TBU]

The level of the unit economic costs in 2009 reflects the substantial impact of the economic recession on the ATM industry, when composite flight-hours sharply reduced by -6.7% compared to 2008 and ATM/CNS provision costs rose by +1.3%. In 2010, composite flight-hours rose by +2.1% while ATM/CNS provision costs fell by -4.4% in real terms. The reduction in ATM/CNS provision costs reflects the impact of cost-containment measures implemented by several European ANSPs. However, this performance improvement at system level was outweighed by a sharp increase in the unit costs of ATFM delays for a limited number of ANSPs and overall, unit economic costs rose by +6.5% in 2010.

Between 2010 and 2013, economic costs per composite flight-hour decreased by -7.0% p.a. in real terms, mainly due to the substantial decreases in unit ATFM delay costs (-32.3% p.a.). Over this period, ATM/CNS provision costs remained close to their 2010 level (-0.2% p.a.) while the number of composite flight-hours slightly increased (+0.6% p.a.).

In 2014, although ATM/CNS provision costs rose by +1.2% in real terms, composite flight-hours increased by +2.6%, resulting in a decrease in unit ATM/CNS provision costs (-1.3%). However, this performance improvement was cancelled out by an increase in the unit costs of ATFM delays (+11.1% in 2014). As a result, in 2014 unit economic costs (€482) remain at 2013 levels. It is noteworthy that this is the lowest level achieved since the start of the ACE benchmarking analysis in 2001.

In Figure 2.6 below, ANSPs are classified in two groups. The upper bar chart shows ANSPs with a relatively higher aggregated complexity score (i.e. higher than 4) while ANSPs with a relatively lower aggregated complexity score (i.e. equal or lower than 4) are shown in the bottom bar chart. Inside each group, ANSPs are ranked by unit economic costs. More information about complexity indicators measured at ANSP level is available in Annex 6.

Figure 2.6 shows that between 2013 and 2014, gate-to-gate economic costs per composite flight-hour fell for 20 ANSPs. Substantial reductions are observed for Austro Control (-13.3%), Avinor (-12.5%), HungaroControl (-10.0%), M-NAV (-10.0%) and NATS (-11.4%). For Austro Control, this reduction is mainly due to a decrease in the unit costs of ATFM delays in 2014 (see red portion of the bar).

On the other hand, Figure 2.6 also shows that unit economic costs rose for 17 ANSPs. For Croatia Control (+9.8%), DHMI (+6.4%), Finavia (+7.9%), LPS (+7.2%), LVNL (+7.7%) and MUAC (+13.7%) the main driver for the increase in unit economic costs is mainly linked to higher ATFM delays.

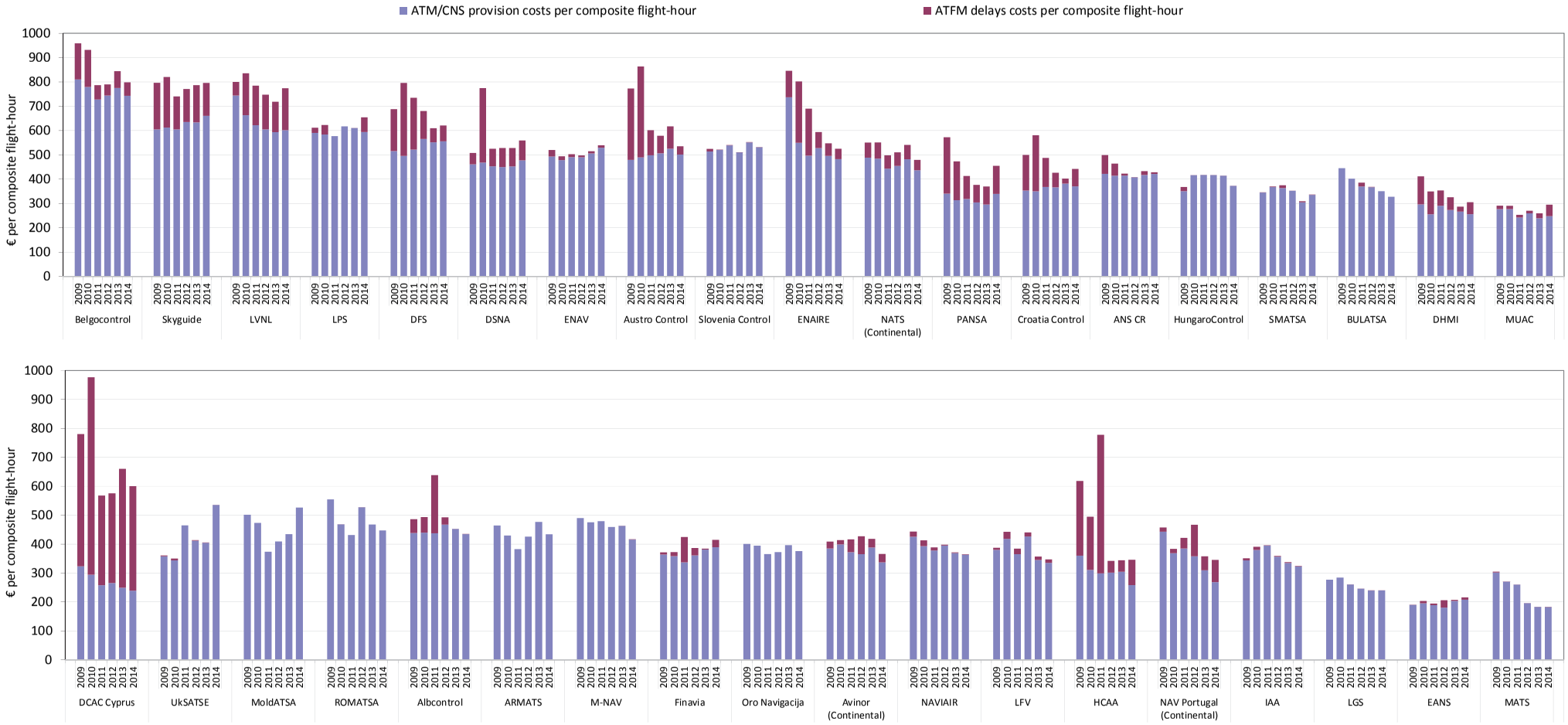


Figure 2.6: Changes in economic cost-effectiveness by ANSP, 2009-2014 (real terms) [TBU]

Figure 2.7 below shows the contribution of each of the 37 ANSPs to the change in ATFM delays observed in 2014 at Pan-European system level (i.e. increase from 8 668 656 to 9 881 075 minutes).

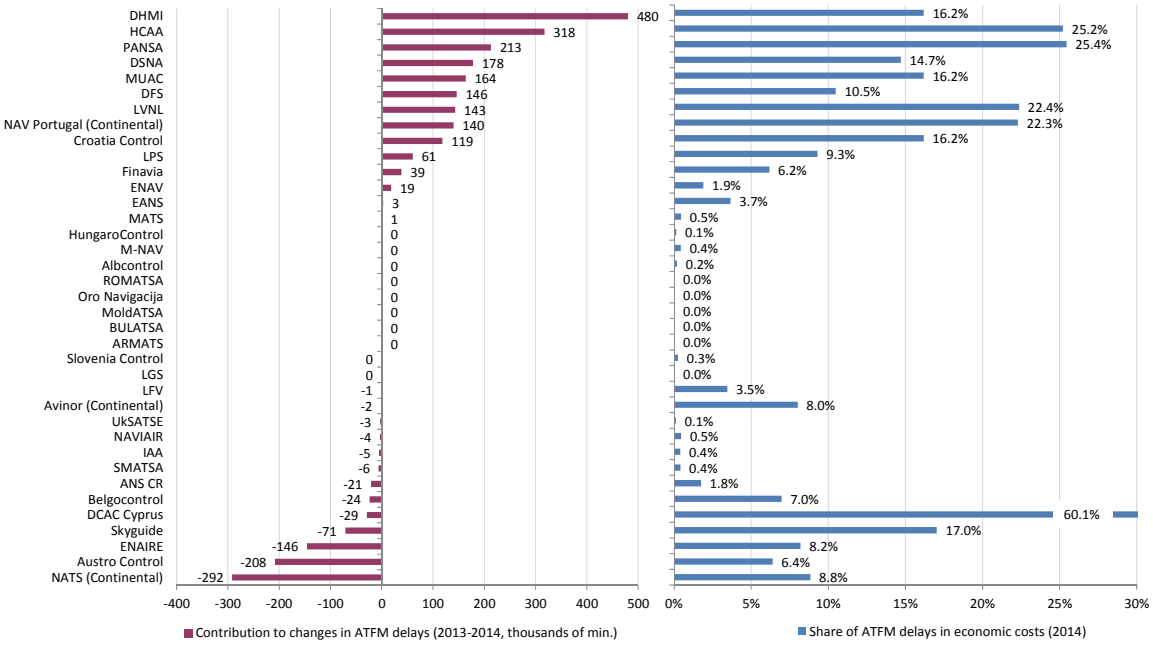


Figure 2.7: ANSPs contribution to ATFM delays increase at Pan-European system level in 2014 [TBU]

Figure 2.7 indicates that the increase in ATFM delays observed at system level in 2014, mainly reflects higher delays for nine ANSPs (DHMI, HCAA, PANSA, DSNA, MUAC, DFS, LVNL, NAV Portugal and Croatia Control). The right-hand side of Figure 2.7 shows that, as a result, for most of these ANSPs the share of ATFM delays in economic costs in 2014 is significantly higher than the European average (11%). This is particularly the case for PANSA (25.4%) and HCAA (25.2%).

For PANSA, the implementation of the new ATM system Pegasus generated exceptional ATFM delays in Warsaw ACC, in particular between May and August 2014. During this period, Warsaw ACC limited all sectors to 85% capacity (119 aircraft per hour instead of 140). The relatively high share of ATFM delays in HCAA economic costs mainly reflects a capacity shortage during the peak summer period between June and September 2014.

Figure 2.7 also indicates that the share of ATFM delays in DCAC Cyprus 2014 unit economic costs (60%) is by far the highest in Europe. DCAC Cyprus has had recurrent ATC capacity issues for several years. The implementation of capacity enhancement measures contributed to reduce ATFM delays in 2011-2012 compared to previous years, but the situation deteriorated in 2013 and did not significantly improve in 2014.

More details on the changes in ATFM delays for individual ANSPs are provided in Part II of this Report.

2.4 Pan-European financial cost-effectiveness performance in 2014

In 2014, unit ATM/CNS provision costs range from €743 (Belgocontrol) to €183 (MATS), a factor of four. Although the five largest ANSPs operate in relatively similar economic and operational environments, there is a substantial variation in unit ATM/CNS provision costs, ranging from DFS (€555) to NATS (€437).

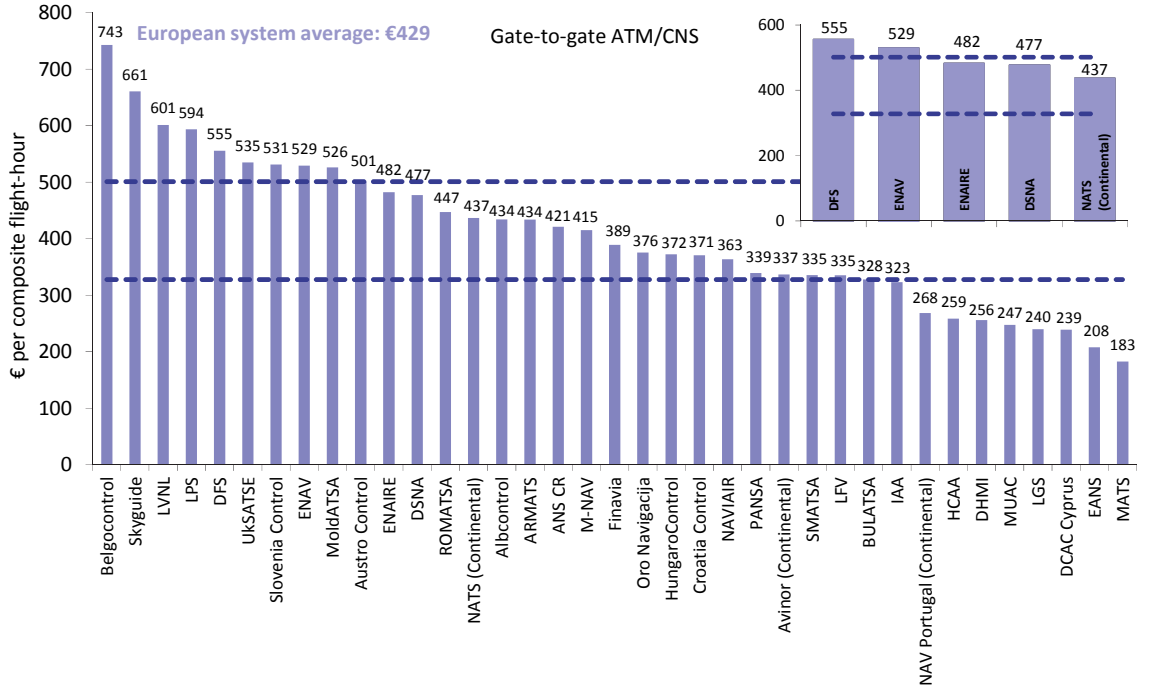


Figure 2.8: ATM/CNS provision costs per composite flight-hour, 2014 [TBU]

Because of their weight in the Pan-European system and their relatively similar operational and economic characteristics (size, scope of service provided, economic conditions, presence of major hubs), the ACE Benchmarking Reports place a particular focus on the results of the five largest ANSPs (ENAIRE, DFS, DSNA, ENAV and NATS).

Figure 2.8 shows that although the five largest ANSPs operate in relatively similar economic and operational environments, there is a substantial difference (27%) in unit ATM/CNS provision costs, ranging from DFS (€555) to NATS (€437).

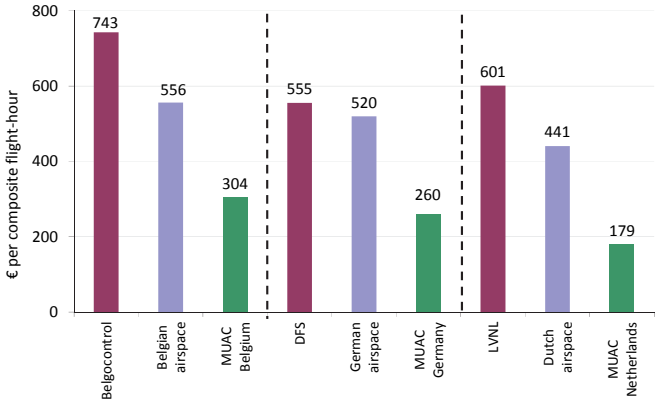
Belgocontrol and LVNL are amongst the ANSPs with the highest unit costs, ranking first and third in Figure 2.8 above. It is noteworthy that although these two ANSPs operate in relatively similar operational (both exclusively provide ATC services in lower airspace) and economic conditions, the unit ATM/CNS provision costs of Belgocontrol are in 2014 some +24% higher than that of LVNL. This substantial difference appears to be mainly driven by Belgocontrol relatively lower ATCO-hour productivity (see Figure 2.16 on p.26) and relatively higher unit support costs (see Figure 2.27 on p.36) compared to LVNL.

It should also be noted that these ANSPs own infrastructure which is made available to MUAC. To better assess the cost-effectiveness of ATM/CNS provided in each of the Four States (Belgium, Germany, the Netherlands, and Luxembourg) national airspaces, MUAC costs and outputs are consolidated with the costs and outputs of the national providers. This adjustment is presented in Figure 2.9 below.

The bottom of Figure 2.9 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 2.9 provides a view of this consolidated ATM/CNS provision costs per composite flight-hour in the airspace of Belgium, the Netherlands and Germany (see blue bars).

After this adjustment, the unit costs in Belgium airspace (€556) remain some 26% higher than in the Dutch airspace (€441).



MUAC	Belgium	Germany	Netherlands
Flight-hours allocated to:	151 866	259 671	175 805
Costs allocated to:	€46.2M	€67.6M	€31.6M

Figure 2.9: Adjustment of the financial cost-effectiveness indicator for ANSPs operating in the Four States airspace, 2014 [TBU]

Figure 2.8 also indicates that in 2014 the unit ATM/CNS provision costs of various ANSPs operating in Central and Eastern European countries (LPS, UkSATSE, Slovenia Control, MoldATSA, ROMATSA, Albcontrol and ARMATS) are higher than the Pan-European system average and in the same order of magnitude as the unit costs of ANSPs operating in Western European countries where the cost of living is much higher.

2.5 Changes in financial cost-effectiveness (2013-2014)

At Pan-European system level, 2014 was a year of traffic recovery (+2.6%) after two years of slight decreases. In the meantime, ATM/CNS provision costs increased by +1.2% in real terms, resulting in a -1.3% decrease in unit ATM/CNS provision costs compared to 2013.

Figure 2.10 provides a detailed analysis of the changes in cost-effectiveness at ANSP level between 2013 and 2014, identifying the cost and the traffic effects. It shows that in 2014, ATM/CNS provision costs increased for 24 out of 37 ANSPs (top quadrants of Figure 2.10). Although all these 24 ANSPs experienced traffic increases in 2014, only 13 could reduce unit costs (see the green dots on the top right quadrant of Figure 2.10).

ATM/CNS provision costs decreased for 13 out of 37 ANSPs compared to 2013 (bottom quadrants of Figure 2.10). Two of these ANSPs experienced a sharp traffic decrease: UkSATSE (-36.8%) and MoldATSA (-19.9%).

For UkSATSE, the -36.8% decrease in traffic reflects the establishment of restricted/prohibited areas in UkSATSE airspace following the accident of Malaysia airline flight MH17 and military conflicts in the eastern region of Ukraine (Crimea). These events led to a transfer of staff and sectors from Simferopol ACC to other regional branches of UkSATSE (mainly Odesa and Dnipropetrovs'k). In addition, UkSATSE lost a number of infrastructure assets that were in operation. In an attempt to adjust to these unfavourable events, UkSATSE reduced its ATM/CNS

provision costs by -16.4% in 2014 mainly through lower staff and non-staff operating costs (-16.8%) and a lower cost of capital (-32.5%).

MoldATSA traffic was also adversely affected by the situation in Ukraine with a -19.9% decrease. Since ATM/CNS provision costs reduced by -2.9%, MoldATSA unit costs[19] rose by +21.2% in 2014.

In 2014, Avinor ATM/CNS provision costs fell by -11.6%. It is understood that this decrease is mainly due to reductions in staff costs (-15.2%) following a decrease in staff numbers (-5.7%), the implementation of a new methodology to allocate staff and other operating costs, and the presence of exceptional staff costs in 2013 (due to the implementation of IAS 19 and negotiations with unions in 2013 following operational difficulties during the summer 2012).

Figure 2.10: Changes in ATM/CNS provision costs and traffic volumes, 2013-2014 (real terms) [TBU]

On the other hand, it is noteworthy that ATM/CNS provision costs rose by more than +10.0% for four ANSPs including BULATSA (+12.1%), M-NAV (+18.4%), PANSA (+16.5%) and SMATSA (+15.1%).

- In the case of BULATSA, the primary driver for the observed increase are higher staff costs (+14.1%), non-staff operating costs (+12.0%) and cost of capital (+15.9%) while depreciation decreased (-4.1%). The increase in BULATSA ATM/CNS provision costs should be seen in the context of a substantial traffic increase (+19.8%) reflecting a change in traffic flows following the establishment of restricted/prohibited areas in Ukraine.
- For M-NAV, the increase in ATM/CNS provision costs is mainly due to higher staff costs (+7.0%), non-staff operating costs (+34.6%, mainly reflecting higher maintenance costs) and to the reporting of exceptional costs (€0.8M) relating to a provision for bad debts. As for BULATSA, the increase in M-NAV ATM/CNS provision costs should be seen in the

[19] It is important to note that although MoldATSA reported the cost of capital in its ACE 2014 data submission, this item has not been entirely charged to airspace users in order to mitigate the impact of lower traffic on the unit rate.

context of a substantial traffic increase (+32.0%) reflecting a change in traffic flows following the establishment of restricted/prohibited areas in Ukraine.

- For PANSA, ATM/CNS provision costs rose mainly because of higher staff costs (+5.1%) and non-staff operating costs (+127.0%) while the cost of capital decreased (-78.0%). It is understood that the large increase in non-staff operating costs (+€22M) mainly relates to the reporting of a provision reflecting a financial compensation for the non-contractual use of a land.
- In the case of SMATSA, the main drivers of the observed increase in ATM/CNS provision costs are higher staff costs (+11.5%, from a level in 2013 which was relatively low due to the application of austerity measures), non-staff operating costs (+32.7%, mainly due to higher currency exchange losses) and cost of capital (+23.1%, mainly reflecting an increase in the weighted average cost of capital).

Among the five largest ANSPs, ENAIRE (-3.7%) and NATS (-8.2%) could achieve a significant reduction in ATM/CNS provision costs in 2014. These reductions were achieved in the context of a traffic decrease for ENAIRE (-1.0%) and a traffic increase for NATS (+1.2%). As a result, unit ATM/CNS provision costs reduced for these two ANSPs in 2014 (-2.8% for ENAIRE and -9.3% for NATS). On the other hand, for DSNA, DFS and ENAV, ATM/CNS provision costs increased faster than traffic leading to an increase in unit costs (+5.6%, +0.7% and +4.6%, respectively).

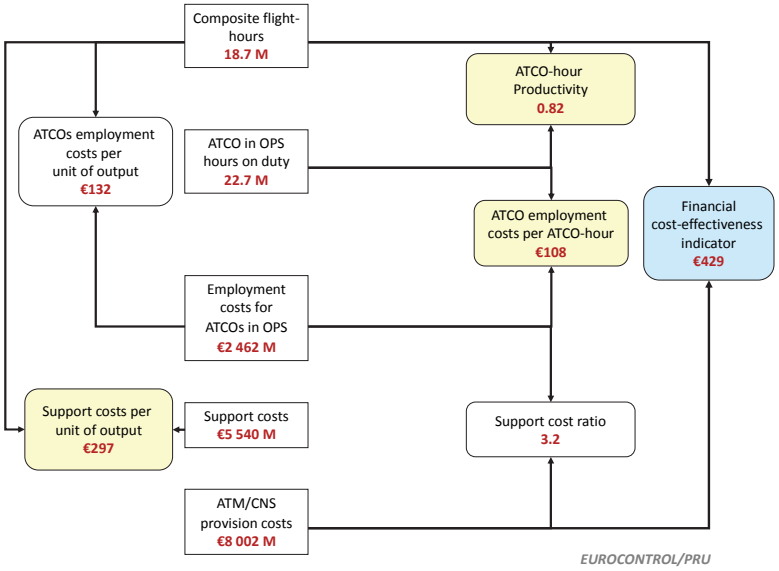
- For ENAIRE, the observed decrease in ATM/CNS provision costs in 2014 (-3.7%) reflects reductions in all cost categories, with particularly large decreases in non-staff operating costs[20] (-13.2% or -€12.3M, mainly reflecting the austerity policy adopted in previous years) and in the cost of capital (-19.7% or -€11.6M, due to the application of lower return on equity and interest rate on debt in 2014).
- In the case of NATS, total ATM/CNS provision costs fell by -8.2% between 2013 and 2014, mainly because an amount of €53M was reported in 2013 as exceptional costs (mainly redundancy costs). Reductions in non-staff operating costs (-10.6% or -€15.7M) were also an important factor contributing to the overall decrease in NATS ATM/CNS provision costs.
- For DFS, ATM/CNS provision costs rose by +1.7% between 2013 and 2014, mainly due to increases in staff costs (+1.0% or +€7.3M, despite a -2.5% decrease in total staff) and in the cost of capital (+12.8% or +€9.3M, which reflects a significant increase in DFS asset base).
- For ENAV, despite a +3.8% traffic growth in 2014, unit ATM/CNS provision costs rose by +4.6% as costs increased by +8.6%. All cost categories (except exceptional costs) increased in 2014. The largest increases are observed for the staff costs (+4.8% or +€16.6M), the non-staff operating costs (+9.1% or +€12.7M) and the cost of capital (+50.6% or +€19.3M). These increases are partly driven by a change in the scope of airports included in the ACE analysis. Costs relating to 16 airports were included in 2014 compared to 12 in 2013, this change contributed to increase the costs in larger proportions than the traffic since the additional airports are relatively small in terms of airport movements controlled. [Issue currently addressed with ENAV in the context of the data validation process]

[20] ENAIRE 2014 ATM/CNS provision costs comprise costs relating to ATM/CNS infrastructure shared with the military authority (€16.1m), which are charged to civil airspace users. It should be noted that these costs, which are borne by Spanish military authority, are not passing through ENAIRE accounts from 2014 onwards

- For DSNA, ATM/CNS provision costs rose by +6.2% reflecting increases in all cost categories except staff costs which reduced by -0.9% (or -€7.4M). The largest increases are observed for the non-staff operating costs (+19.0% or +€42.0M), the depreciation costs (+24.9% or +€27.0M) and the cost of capital (+31.5% or +€11.4M). [It is understood that the non-staff operating costs and depreciation costs reported by DSNA include irrecoverable VAT which should normally be reported separately]

More details on the changes in unit ATM/CNS provision costs for individual ANSPs are provided in Part II of this Report.

Figure 2.11 shows the analytical framework which is used in the ACE analysis to break down the financial cost-effectiveness indicator into basic economic drivers.



Key drivers for the financial cost-effectiveness performance include:

a) ATCO-hour productivity (0.82 composite flight-hours per ATCO-hour);
b) ATCO employment costs per ATCO-hour (€108); and,
c) support costs per unit output (€297).

These three economic drivers are analysed in details in the next Sections of this document.

Figure 2.11: ACE performance framework, 2014 [TBU]

Around 30% of ATM/CNS provision costs directly relates to ATCOs in OPS employment costs while 70% relate to "support" functions including non-ATCOs in OPS employment costs, non-staff operating costs and capital-related costs such as depreciation costs and the cost of capital.

Figure 2.12 shows that in 2014, ATCO-hour productivity rose faster (+2.0%) than employment costs per ATCO-hour (+0.4%) and as a result ATCO employment costs per composite flight-hour decreased by -1.6%. In the meantime, unit support costs reduced by -1.2% since support costs rose at a lower rate (+1.4%) than traffic (+2.6%). The combination of these different elements led to the decrease in unit ATM/CNS provision costs observed at Pan-European system level in 2014 (-1.3%).

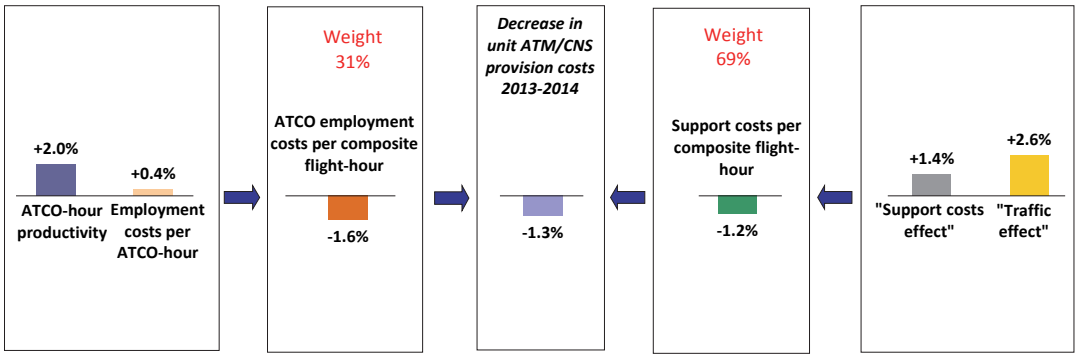


Figure 2.12: Changes in the financial cost-effectiveness indicator, 2013-2014 (real terms) [TBU]

A detailed analysis of the changes in the key drivers of cost-effectiveness between 2009 and 2014 is provided hereafter (see sections 2.6, 2.7 and 2.8 below).

2.6 ATCO-hour productivity

At Pan-European level, an average of 0.82 composite flight-hour was controlled per ATCO-hour in 2014. ATCO-hour productivity rose by +13.0% between 2009 and 2014 since the increase in traffic (+6.7%) was absorbed with substantially fewer ATCO-hours on duty (-5.6%).

Figure 2.13 indicates that starting from a relatively low base in 2009 (reflecting the fall in traffic which resulted from the economic recession), ATCO-hour productivity substantially increased for two consecutive years (+6.7% in 2010 and +2.9% in 2011), remained fairly constant in 2012 (+0.1%) and then rose again in 2013 (+0.9%) and 2014 (+2.0%). The productivity increase in 2014 benefited from the +2.6% traffic growth while ATCO-hours on duty rose by +0.6%.

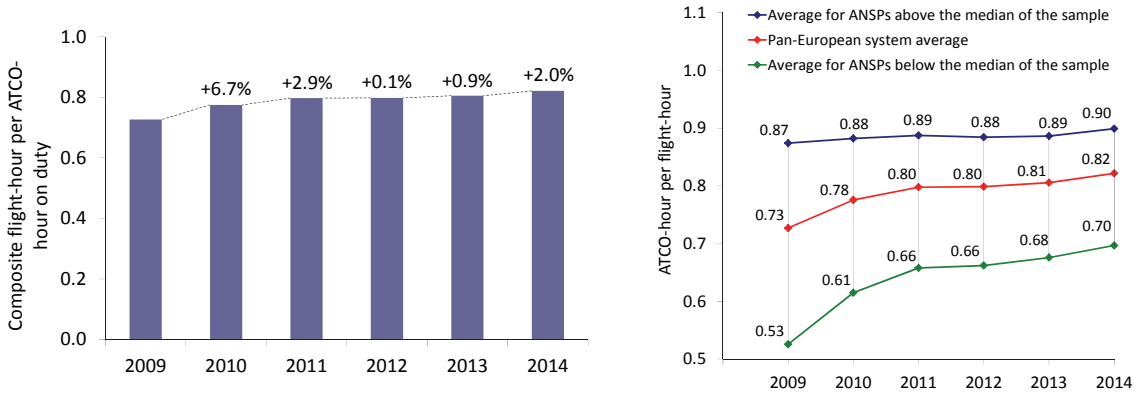


Figure 2.13: Changes in ATCO-hour productivity, 2009-2014 [TBU]

The increase in ATCO-hour productivity observed at Pan-European system level over the 2009-2014 period mainly reflects improvements in ANSPs starting in 2009 with relatively lower ATCO-hour productivity levels (see green line in the right-hand chart of Figure 2.13), while lower increases are observed for ANSPs starting in 2009 with higher productivity levels (see blue line in the right-hand chart of Figure 2.13).

Strong productivity increases were mainly achieved by Central and Eastern Europe ANSPs benefiting from higher traffic growth. However, significant improvements in productivity were also achieved by some ANSPs which started from a relatively higher base in 2009 (e.g. IAA, +24.0% and NAV Portugal, +13.1%).

At Pan-European system level, the increase in productivity achieved between 2009 and 2014 (+13.0%) is due to the fact that the overall traffic increase (+6.7%) was absorbed with substantially fewer ATCO-hours on duty (-5.6%). This result indicates that the organisation of rosters and working conditions are key aspects to manage ATCO-hour productivity performance.

Figure 2.14 shows that after a sharp reduction (-9.7%) due to lower overtime hours between 2009 and 2010, average ATCO-hours on duty continued to fall by -1.9% p.a. between 2010 and 2013 and then remained fairly constant in 2014 (+0.2%). These results are heavily influenced by the structural changes implemented in 2010-2011 by ENAIRE (at the time Aena) following the introduction of Law 9/2010 which was adopted in Spain in 2010.

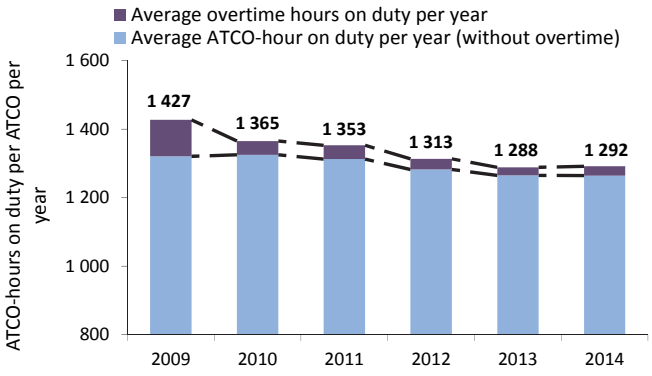


Figure 2.14: Changes in average ATCO-hours on duty, 2009-2014 [TBU]

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 and relatively lower productivity for ENAIRE in the past. Indeed, between 2009 and 2014, ENAIRE ATCO-hour productivity substantially increased from 0.52 to 0.79 (+50.8%).

In order to understand the factors underlying ATCO-hour productivity changes between 2013 and 2014, the change in each ANSP's productivity indicator has been broken down in Figure 2.15 below, into a traffic volume effect and an ATCO-hours effect.

ANSPs	(A) Changes in ATCO-hour productivity 2013-2014	(B) "Traffic effect"	(C) "ATCO-hour effect"
M-NAV	33.0%	32.0%	-0.8%
BULATSA	16.7%	19.8%	2.7%
Albcontrol	14.6%	2.0%	-11.0%
LPS	13.6%	4.3%	-8.1%
ROMATSA	12.2%	9.0%	-2.9%
HungaroControl	10.4%	12.4%	1.8%
ARMATS	9.3%	5.8%	-3.2%
Croatia Control	8.8%	5.4%	-3.1%
NAV Portugal (Continental)	8.4%	11.4%	2.8%
DCAC Cyprus	8.0%	8.5%	0.5%
DHMI	7.8%	14.4%	6.1%
LFV	7.4%	-0.3%	-7.2%
Slovenia Control	7.4%	5.7%	-1.6%
ENAV	4.7%	3.8%	-0.9%
Oro Navigacija	4.3%	5.7%	1.3%
IAA	4.0%	4.0%	0.0%
Finavia	4.0%	1.1%	-2.8%
DFS	2.6%	1.0%	-1.6%
NATS (Continental)	2.4%	1.2%	-1.2%
Austro Control	2.0%	1.4%	-0.6%
Avinor (Continental)	2.0%	1.9%	-0.1%
EANS	1.7%	3.1%	1.3%
HCAA	1.2%	21.1%	19.6%
Belgocontrol	0.6%	2.6%	2.0%
Skyguide	0.1%	1.0%	0.8%
SMATSA	0.1%	4.6%	4.6%
ANS CR	-0.1%	0.7%	0.9%
ENAIRE	-0.2%	-1.0%	-0.8%
DSNA	-1.2%	0.6%	1.8%
MUAC	-1.6%	2.2%	3.8%
PANSA	-1.8%	1.6%	3.5%
NAVIAIR	-3.0%	0.1%	3.3%
LVNL	-3.3%	2.0%	5.5%
MATS	-5.7%	0.6%	6.7%
LGS	-20.4%	-0.2%	25.3%
UkSATSE	-30.4%	-36.8%	-9.1%
MoldATSA	-33.5%	-19.9%	20.5%
Total Pan-European System	2.0%	2.6%	0.6%

Positive values in column (A) mean that productivity improved between 2013 and 2014.

Positive values in column (B) mean that traffic volumes rose between 2013 and 2014.

Positive values in column (C) mean that the number of ATCO-hours rose between 2013 and 2014. 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: LPS's 2014 productivity is +13.6% higher than in 2013 due a combination of a +4.3% increase in traffic and a -8.1% decrease in the number of ATCO-hours.

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).

Figure 2.15: Annual changes in ATCO-hour productivity, composite flight-hours and ATCO-hours on duty, 2013-2014 [TBU]

This table suggests that the largest increases in productivity are likely to arise from serving increased traffic with the same or a reduced number of ATCOs, although in some of the cases the number of ATCO-hours has risen, but not as fast as traffic growth.

Changes in ATCOs in OPS hours on duty could arise from:

- Changes in the number of FTE ATCOs in OPS (caused by such factors as newly licensed ATCOs, normal retirement, activation of an early retirement scheme);
- Changes in the number of hours on duty, through:
    - Modification of the contractual working hours following a new labour agreement;

- Changes in the number of hours not on duty (for example, through an increase in average sickness or in refresher training time); or,
- Changes in overtime (where applicable).

In 2014, the ATCO-hour productivity of the Pan-European system as a whole amounted to 0.82 composite flight-hours per ATCO-hour. It is important to note that the metric of ATCO-hour productivity used in this report reflects the average productivity during a year for a given ANSP and does not give an indication of the productivity at peak times which can be substantially higher. The ATCO-hour productivity in 2014 for each ANSP is shown in Figure 2.16 below.

There is a wide range of ATCO-hour productivity among ANSPs. The ANSP with the highest ATCO-hour productivity is MUAC (1.96), which only provides ATC services in upper airspace, while the ANSP with the lowest ATCO-hour productivity is ARMATS (0.17), i.e. one of the smallest ANSPs in terms of traffic volumes.

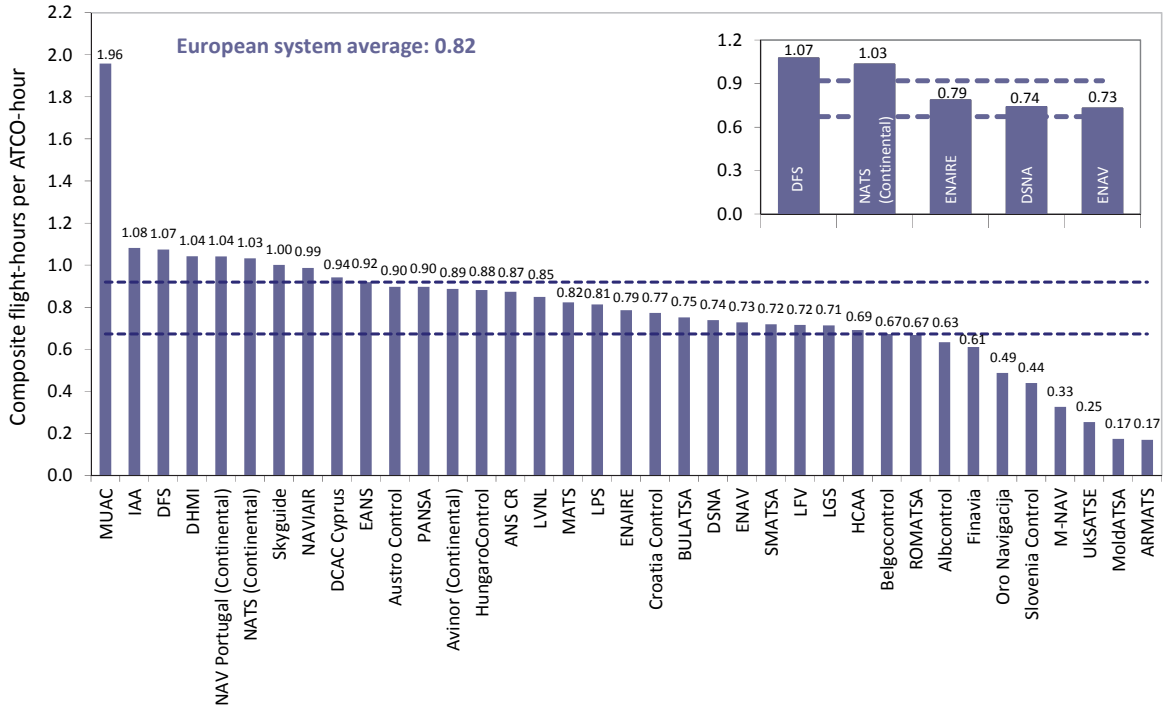


Figure 2.16: ATCO-hour productivity (gate-to-gate), 2014 [TBU]

Figure 2.16 also indicates that there are substantial differences in ATCO-hour productivity even among the five largest ANSPs. Indeed, DFS ATCO-hour productivity (1.07) is some +47.4% higher than that of ENAV (0.73).

It is important to mention that significant gains in cost-effectiveness could be achieved if the European average productivity (0.82) was raised to the level of the top quartile in Figure 2.16 (0.92). Most of the ANSPs that achieve or are close to top quartile ATCO-hour productivity (Austro Control, ANS CR, DFS, MUAC, NATS and Skyguide) are among the ANSPs with the most complex traffic. On the other hand, ARMATS, M-NAV, MoldATSA and UkSATSE, which belong to the ANSPs with the least complex traffic (see Figure 2.2) 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 difficulty in adapting their available ATC capacity and existing infrastructure to low traffic volumes and high seasonal variability. In the case of MoldATSA and UkSATSE, the very large traffic decreases experienced in 2014 (-19.9% and -36.8%, respectively) had a massive adverse impact on ATCO productivity.

Improvements in ATCO-hour productivity 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. Similarly, advanced ATM system functionalities and procedures are drivers for productivity improvements. It is also expected that SES tools such as FABs, the Network Manager, the Performance Scheme and the technological pillar (SESAR) contribute to increase ATCO productivity by a significant factor while ensuring safety standards.

Latest forecasts indicate that traffic volumes are not expected to be above 2008 levels before 2017[21]. For this reason, there should be an opportunity to maintain the overall amount of ATCO-hours at Pan-European system level and, all else equal, increase ATCO-hour productivity without significantly affecting the quality of service provided and without implementing massive investment programmes.

More details on the changes in ATCO-hour productivity for individual ANSPs are provided in Part II of this Report.

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. It is therefore important to also analyse and compare productivity at ACC level.

In Figure 2.17, the 63 ACCs part of the ACE 2014 data analysis 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 these clusters can be found in previous ACE reports[22].

Compared to the ACE 2013 Benchmarking Report, Simferopol ACC has been excluded from this analysis since operations in Simferopol ACC stopped in April 2014 due to the temporary occupation of Crimea. On the other hand, the Kosovo Force (KFOR) sector which is operated by HungaroControl opened in April 2014, and is shown as an ACC in cluster 3b.

So far, no clear-cut statistical relationship between ATCO productivity, traffic complexity and traffic variability could be inferred because the relationships and potential trade-offs between all these metrics are not 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 (0.77 flight-hour per ATCO-hour). Palma, with the lowest productivity, has one of the highest seasonal traffic variability in Cluster 1.
- **Cluster 2 (ACCs serving dense upper airspace)** has an average productivity of 1.20 flight-hour per ATCO-hour. Within this cluster, Maastricht has significantly higher productivity (1.96 flight-hours per ATCO-hour, some +64% above the average in Cluster 2). When excluding Maastricht and Karlsruhe ACCs which exclusively provide ATC services in upper airspace, the average cluster productivity falls to 1.00.

[21] According to EUROCONTROL Seven Year Forecast published in February 2016, the number of IFR flights in the ESRA08 region is planned to reach 10.2 million in 2017 compared to 10.1 million in 2008.

[22] See for example the ACE 2008 Benchmarking Report on p.104. Report available on the PRC website: (http://www.eurocontrol.int/articles/prc-and-prb-publications).

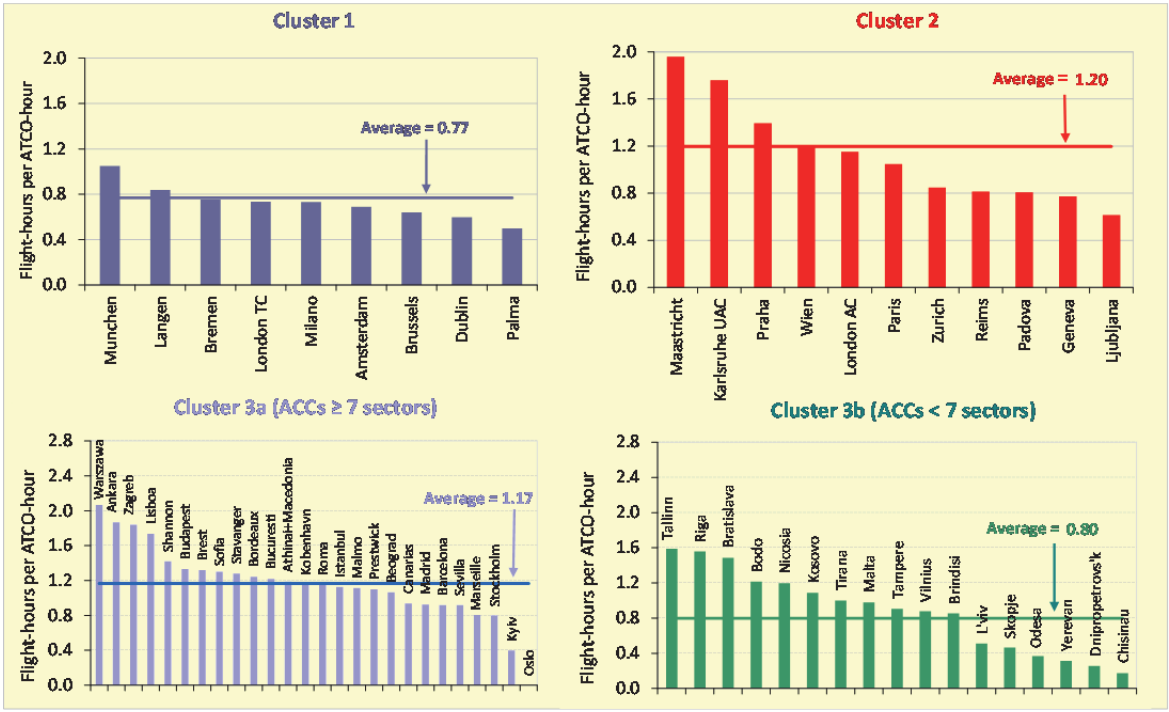


Figure 2.17: Summary of productivity results at ACC level, 2014 [TBU]

- **Cluster 3a (ACCs with 7 sectors or more and serving airspace with relatively low complexity)** has an average productivity of 1.17 flight-hour per ATCO-hour. Within this cluster, Warszawa has significantly higher productivity (2.07 flight-hours per ATCO-hour). It should also be noted that within this cluster Brest, Bordeaux and Marseille have the highest overall complexity, while Kyiv and Shannon have 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. It is important to note that Chisinau ACC, which has the lowest ATCO-hour productivity, experienced a -32.8% decrease in flight-hours controlled between 2013 and 2014 due to changes in traffic flows following the closure of a part of airspace over Ukraine.

The analysis of ATCO-hour productivity at ACC level would seem to indicate that, whilst complexity measures are helpful in providing a way of clustering ACCs into broadly consistent groups, within these clusters there are still large differences in productivity performance across individual ACCs.

Other factors as yet unidentified (and not measured) such as the impact of different operational concepts and processes, the operational flexibility, could also affect ATCO productivity performance. There may also be cultural and managerial differences. These elements would deserve further analysis in order to provide some "explanation" of the differences in ATCO-productivity and identify best practice.

2.7 ATCO employment costs

At Pan-European system level, ATCO employment costs per ATCO-hour remained almost constant between 2009 and 2014 (-0.2%).

Figure 2.18 shows that this is driven by:

- a significant decrease for the year 2010 (-5.3%); and,
- increases in each year between 2011 and 2014.

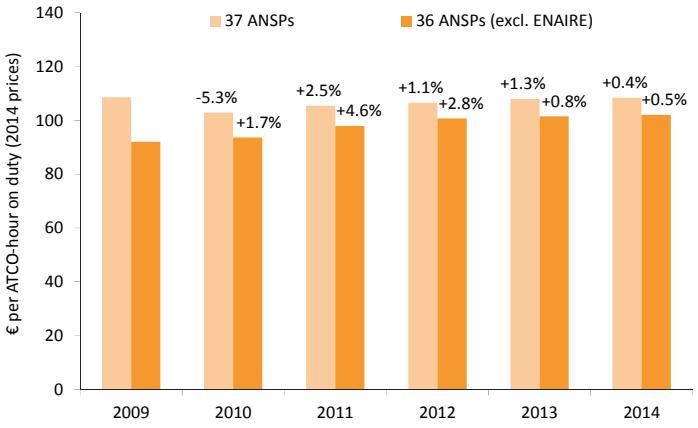


Figure 2.18: Changes in ATCO employment costs per ATCO-hour, 2009-2014 (real terms) [TBU]

Figure 2.18 shows that this overall change is significantly affected by the decrease in ENAIRE ATCO employment costs over the years 2009 and 2010. Indeed, excluding ENAIRE, ATCO employment costs per ATCO-hour have increased in real terms by +10.9% between 2009 and 2014 (equivalent to +2.1% p.a.).

In 2014, ATCO employment costs per ATCO-hour rose for 25 out of the 37 ANSPs. Increases larger than +15% were observed for six ANSPs: Albcontrol (+27.8%, from €35 to €45), ARMATS (+19.4%, from €10 to €12), BULATSA (+29.5%, from €52 to €67), M-NAV (+19.9%, from €32 to €38), MoldATSA (+42.5%, from €18 to €26) and ROMATSA (+16.9%, from €74 to €87).

Among the five largest ANSPs, the most noticeable increases in ATCO employment costs per ATCO-hour between 2013 and 2014 were observed for DFS (+8.4%, from €182 to €197) and NATS (+5.9%, from €126 to €133) reflecting a combination of higher ATCO employment costs with slightly lower ATCO-hours on duty. Smaller increases were observed for DSNA (+1.1%, from €98 to €99), ENAIRE (+0.2%, from €172 to €173) and ENAV (+1.1%, from €111 to €112). As a result, the gap observed between DFS (€197) and DSNA (€99) increased in 2014, reaching a factor of 1.99 (compared to 1.85 in 2013).

In 2014, the largest decreases in employment costs per ATCO-hour were observed for HCAA (-38.3% from €77 to €48), LFV (-28.3% from €90 to €65), LGS (-19.9% from €43 to €35) [these changes are under investigation as part of the data validation process], and NAV-Portugal (-13.5% from €129 to €112). For NAV Portugal, this reduction mainly reflects a decrease in employer contributions to a pension fund that is specific to ATCOs in OPS.

The unit ATCO employment costs at Pan-European system level amounted to €108 per ATCO-hour in 2014. Figure 2.19 shows the values for this indicator for all the ANSPs. 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.

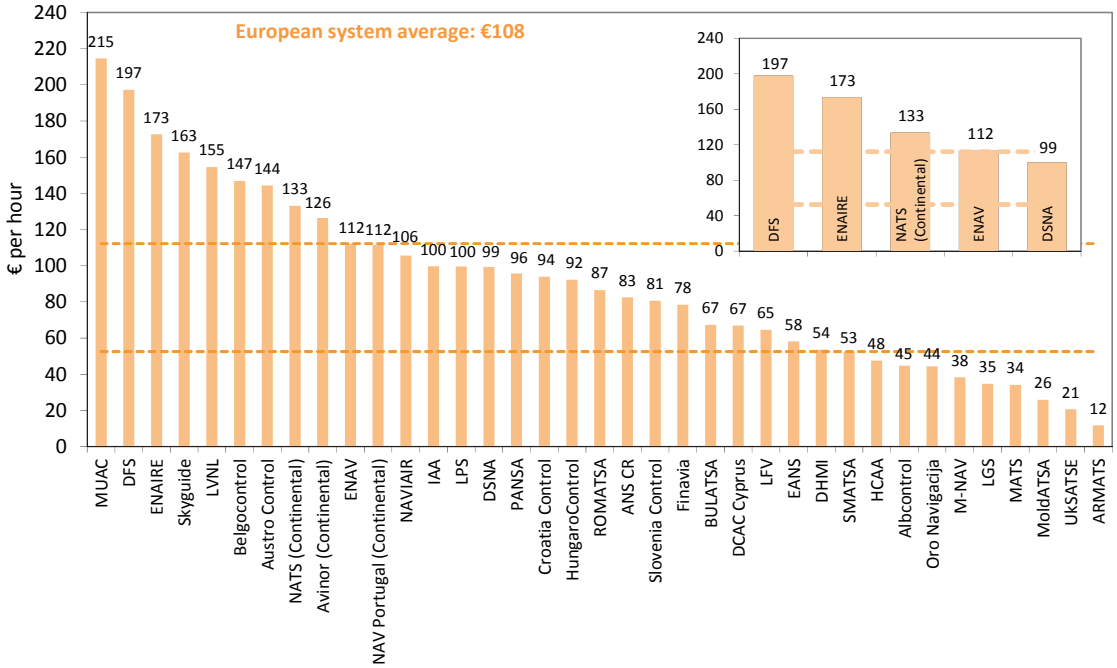


Figure 2.19: ATCO employment costs per ATCO-hour (gate-to-gate), 2014 [TBU]

In 2014, MUAC ATCO employment costs per ATCO-hour (€215) are the highest in Europe, above DFS (€197) and ENAIRE (€173).

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. To assess the influence of these exogenous differences, employment costs per ATCO-hour have been examined in the context of Purchasing Power Parity (PPP). The PPPs for 2014, which are available from the EUROSTAT and IMF databases, are reported for each State/ANSP in Annex 7 of this report.

There are some limitations[23] 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. PPPs are nevertheless a useful analytical tool in the context of international benchmarking.

Figure 2.20 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 €119 (compared to €108 without adjustment). For many Central and Eastern European ANSPs (e.g. ANS CR, BULATSA, Croatia Control, HungaroControl, LPS, PANSA and ROMATSA) the PPP adjustment brings the unit employment costs close or higher than those operating in Western Europe.

[23] 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.

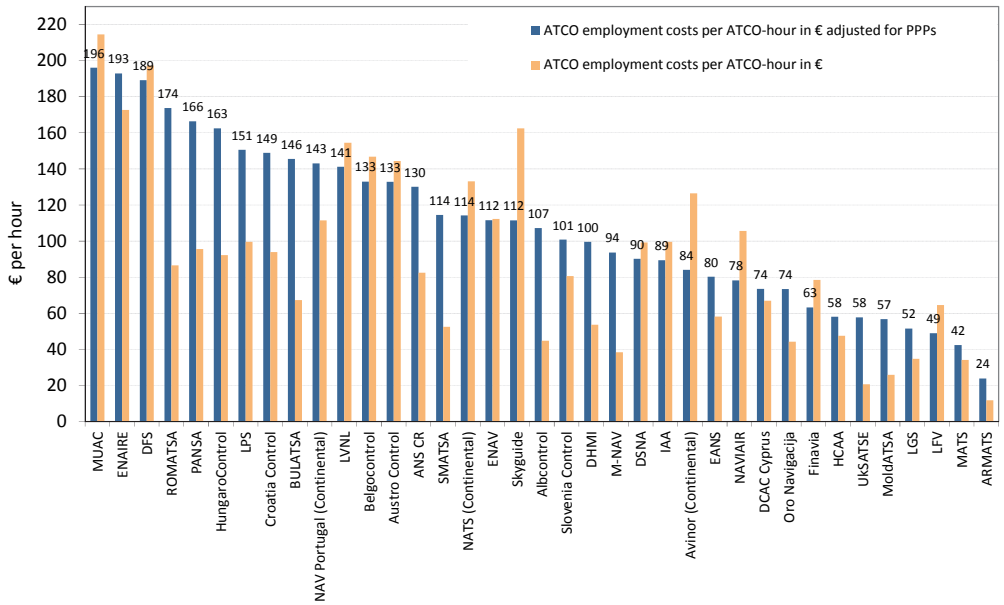


Figure 2.20: Employment costs per ATCO-hour with and without PPPs, 2014 [TBU]

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 some cases salary conditions are negotiated every year. High ATCO employment costs may be compensated for by high productivity (e.g. MUAC). Therefore, in the context of staff planning and contract renegotiation, it is important for ANSPs to manage ATCOs employment costs effectively and to set quantitative objectives for ATCO productivity.

Figure 2.21 below shows the ATCO employment costs per composite flight-hour in 2014. The ATCO employment costs per composite flight-hour result from the combination of two of the main components of the financial cost-effectiveness indicator: ATCO-hour productivity (see Figure 2.16) and employment costs per ATCO-hour (see Figure 2.19). All other things being equal, lower ATCO employment costs per unit of output will contribute to greater financial cost-effectiveness.

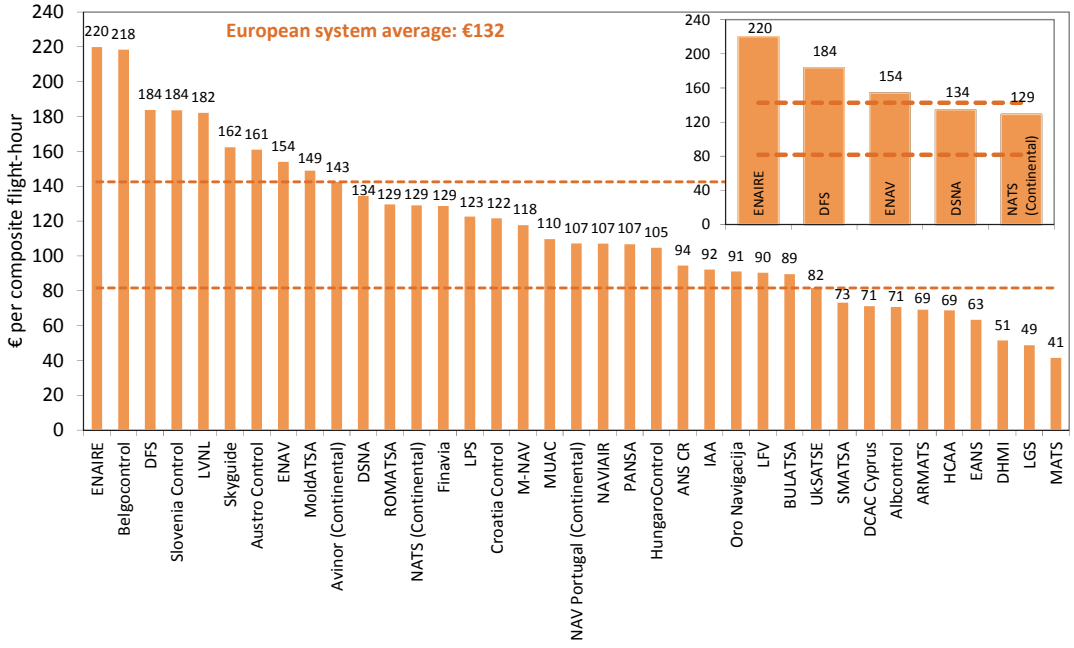


Figure 2.21: ATCO employment costs per composite flight-hour, 2014 [TBU]

In order to provide an insight into the relationship between ATCO-hour productivity and employment costs, Figure 2.22 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.

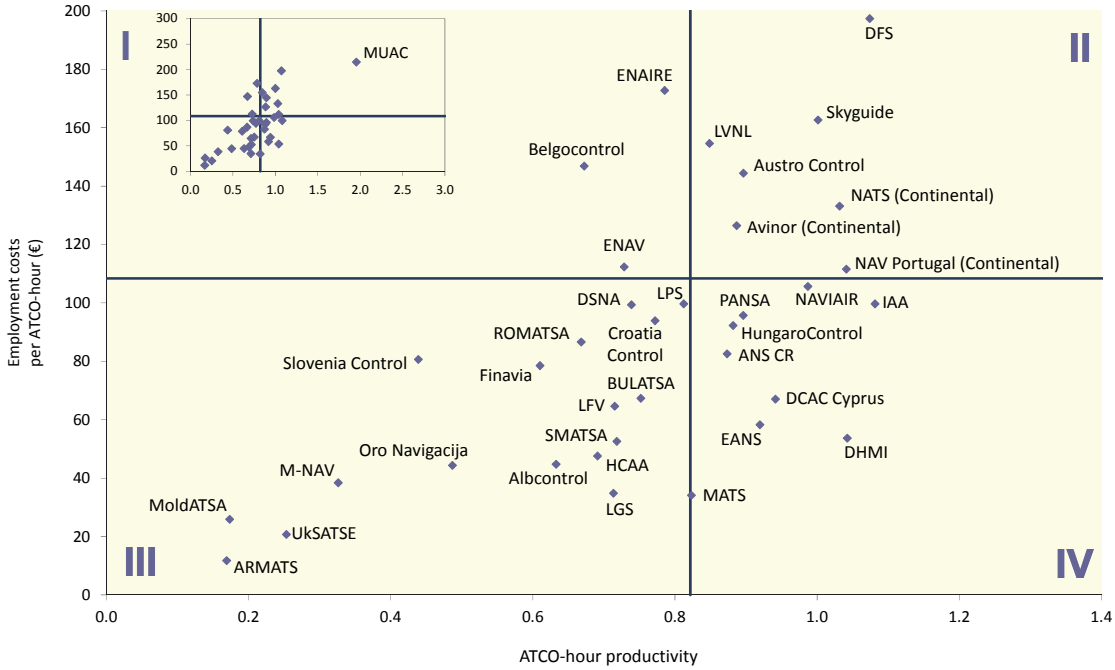


Figure 2.22: Components of ATCO employment costs per unit of output, 2014 [TBU]

An ANSP may have high ATCO employment costs per ATCO-hour but if its ATCOs are highly productive then it will have relatively 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 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 2.21 above).

ENAIRE and Belgocontrol (Quadrant I) combine higher ATCO employment costs with relatively lower ATCO productivity, resulting in higher ATCO employment costs per unit of output (see also Figure 2.21 above).

Some ANSPs such as DHMI (Quadrant IV) have both relatively 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.

More details on the changes in ATCO-hour employment costs for individual ANSPs are provided in Part II of this Report.

2.8 Support costs

In 2014, at Pan-European level, unit support costs fell by -1.2% since support costs (+1.4%) increased less than traffic (+2.6%).

As indicated in Figure 2.23, support costs per composite flight-hours fell by -9.1% between 2009 and 2014 at Pan-European system level (or -1.9% p.a.).

This results from a combination of an increase in the number of composite flight-hours (+1.3% p.a.) and a decrease in support costs (-0.6% p.a.). The latter mainly reflects the impact of the cost containment measures implemented by the Pan-European ANSPs since 2009.

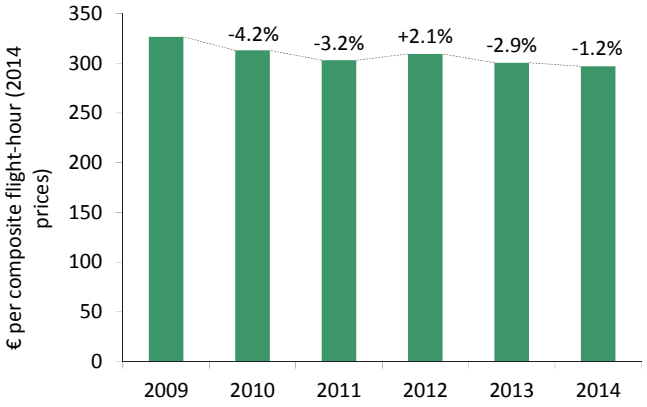


Figure 2.23: Changes in support costs per composite flight-hour, 2009-2014 (real terms) [TBU]

In 2014, support costs increased by +1.4% while traffic increased by +2.6%. As a result, unit support costs decreased (-1.2%). The main drivers of the changes in support costs are further discussed below.

Contrary to ATCO employment costs, support costs encompass a variety of cost items which require specific analysis. There is a general acknowledgement that the Pan-European system has excessive support costs due to its high level of operational, organisational, technical and regulatory fragmentation.

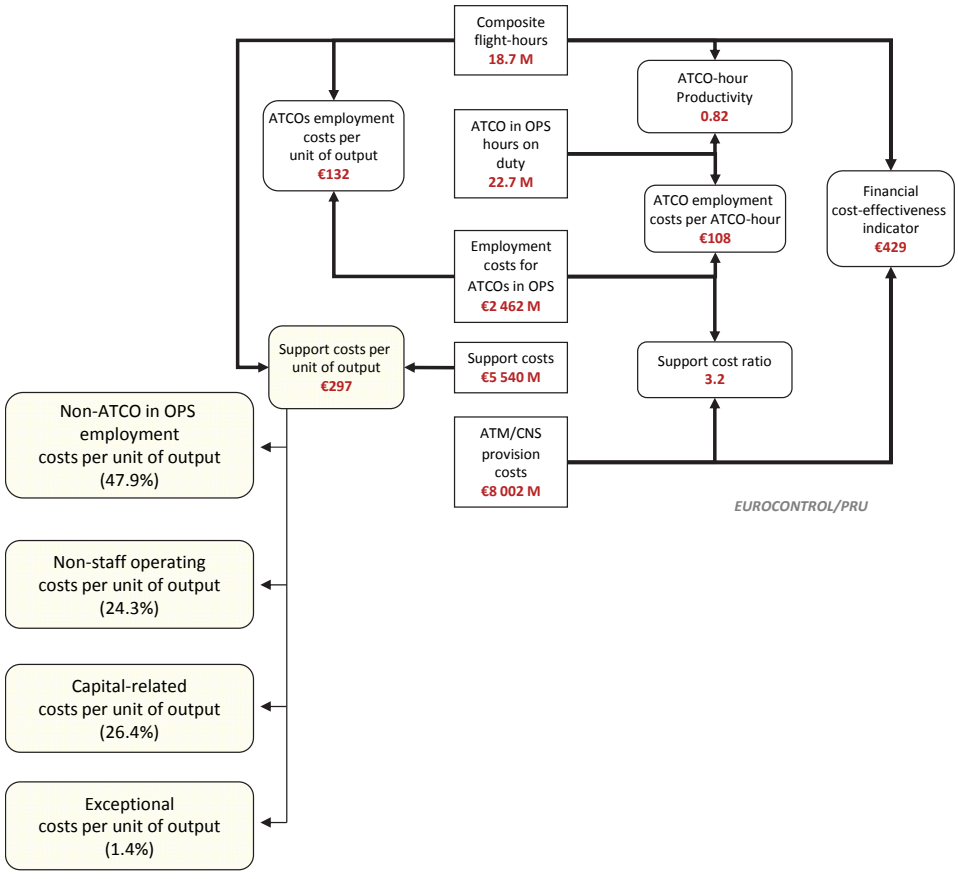


Figure 2.24: Framework for support costs analysis, 2014 [TBU]

As shown in Figure 2.24, support costs can be broken down into four separate components that provide further insight into the nature of support costs:

a) **Employment costs for non-ATCO in OPS staff** (47.9% of total support costs); these cover ATCOs on other duties, trainees, technical support and administrative staff. These costs can be affected by the following factors:
   - 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.

b) **Non-staff operating costs** (24.3% of total support costs) mostly comprise expenses for energy, communications, contracted services, rentals, insurance, and taxes. These costs can be affected by the following factors:
   - The terms and conditions 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).

c) **Capital-related costs** (26.4% of total support costs), comprising depreciation and financing costs for the capital employed. These costs can be affected by the following factors:
   - The magnitude of the investment programme.
   - The accounting life of the assets.
   - The degree to which assets are owned or rented.

d) **Exceptional costs** which represent some 1.4% of total support costs.

Figure 2.25 shows the changes in the different components of support costs (see the "support costs effect" bar on the right-hand side of Figure 2.12) between 2013 and 2014.

The overall increase in support costs is due to increases in non-staff operating costs (+4.0% or +€51.2M), depreciation costs (+4.6% or +€41.8M) and in the cost of capital (+4.5% or +€22.3M), while support staff costs remained fairly constant (-0.2% or -€4.9M). On the other hand, a large decrease is observed for exceptional costs (-32.1% or -€36.5M).

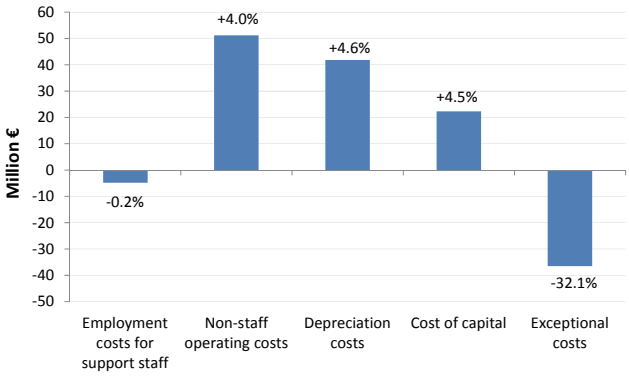


Figure 2.25: Changes in the components of support costs, 2013-2014 (real terms) [TBU]

Support costs increased for a majority of ANSPs (23 ANSPs out of 37) with particularly large increases observed for DSNA (+7.5%), ENAV (+12.5%) and DHMI (+11.3%).

For DSNA, it is important to note that the observed increase (+7.5% or +€63.0M) is affected by the reporting of irrecoverable VAT costs (some €46M in ACE 2013) under non-staff operating costs and depreciation costs, while in previous years submissions these costs were identified separately. [Issue currently addressed in the context of DSNA data validation process]

For ENAV (+12.5% or +€55.3M), the main drivers for the increase in support costs are (i) a change in the scope of airports included in the ACE analysis (increasing the costs in larger proportions than the traffic since the additional airports are relatively small in terms of airport movements controlled), and (ii) the use of a much higher weighted average cost of capital (from 2.9% in 2013 to 4.6% in 2014 for en-route ANS).

For DHMI (+11.3% or +€31.2M), the higher support costs mainly reflects increases in the cost of capital (+41.7%), and higher non-staff operating costs (+8.7%).

On the other hand, substantial decreases in support costs are observed for ENAIRE (-6.2% or -€28.0M) and NATS (-12.7% or -€79.8M). In the case of ENAIRE, the main sources of cost reductions in 2014 were lower non-staff operating costs (-13.2%) and cost of capital (-19.7%) due to the use of lower rates of return on equity and lower interest rates on debt.

For NATS, all support cost categories except depreciation costs decreased between 2013 and 2014. The main driver for the reduction in support costs is due to the fact that NATS had reported relatively high exceptional costs in its 2013 data submission (some €53.0M) which included relatively large amounts of redundancy costs for NERL staff.

As shown in Figure 2.24 above, employment costs is the largest component of support costs. These costs can be significantly affected by the type of pension arrangements, and particularly whether the pension scheme is based on "defined benefits" or "defined contributions". Some ANSPs have already taken decisive actions to deal with future pension obligations, notably changing the pension scheme for new recruits and moving away from "defined benefits" pension plans.

Figure 2.26 breaks down ANSPs staff costs (€5 117M) into different categories. Gross wages and salaries are the main component of total staff costs (76.4%). The second largest category, employer contributions to staff pensions, accounts for 15.5%.

It should be noted that the proportion of pension contributions in total staff costs can significantly differ across the Pan-European ANSPs. These differences mainly reflect the variety of pension arrangements that are in place locally.

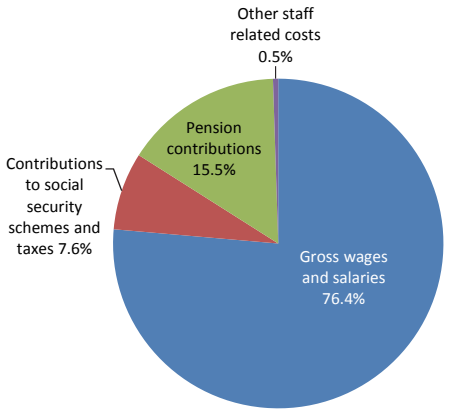


Figure 2.26: Breakdown of ANSPs staff costs, 2014 [TBU]

Support costs represent some 70% of ATM/CNS provision costs and are therefore an important driver of cost-effectiveness performance. In the future, improvements in cost-effectiveness could arise from greater competition for support services which could be available on a central basis, physically distant from the ANSPs HQs and ATC facilities and supported by innovation in IT technology.

At Pan-European system level, support costs per composite flight-hour amounted to €297 in 2014. Figure 2.27 shows that the level of unit support costs varies significantly across ANSPs – a factor of almost four between Belgocontrol (€524) and MUAC (€138)[24].

[24] It should be noted that MUAC uses infrastructure owned by Belgocontrol, DFS and LVNL (see also p.18).

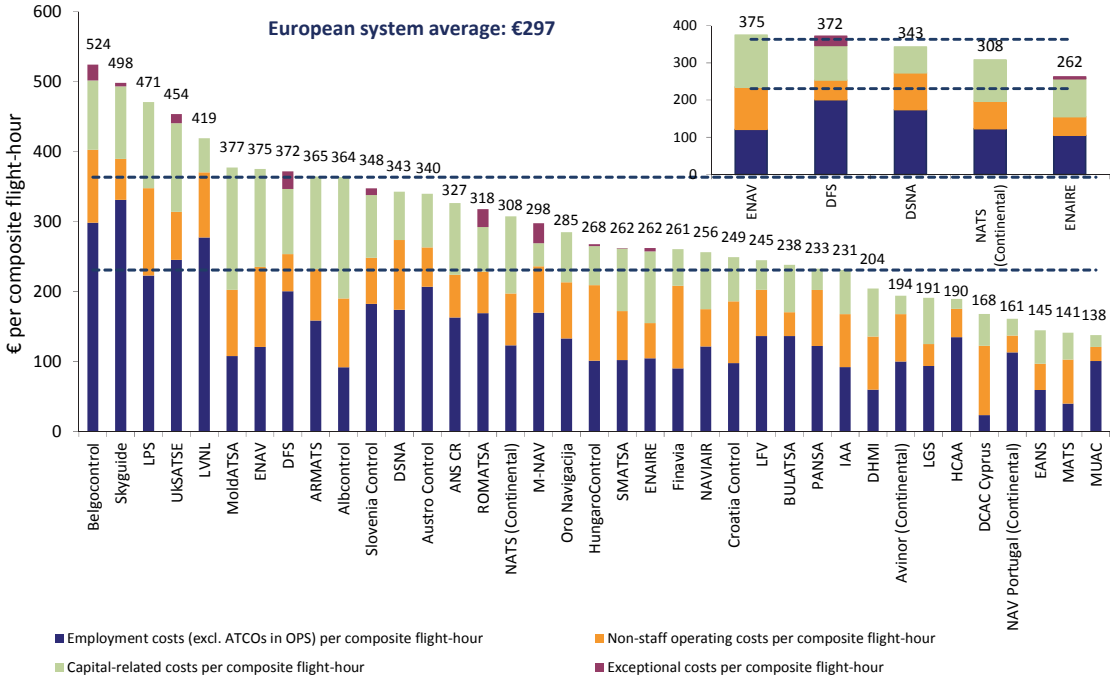


Figure 2.27: Support costs per composite flight-hour at ANSP level[25], 2014 [TBU]

Figure 2.27 indicates that there are significant differences in the composition of support costs amongst the 37 ANSPs, and in particular in the proportion of employment costs (blue bar) and non-staff operating costs (orange bar). 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. In some cases, the maintenance of ATM systems is outsourced and the corresponding costs are reported as non-staff operating costs. For other ANSPs, these activities are rather carried out by internal staff and the related costs appear as employment costs or as capital-related costs when, according to IFRS, the employment costs of staff working on R&D projects can be capitalised in the balance-sheet.

Figure 2.27 also indicates that in 2014 the unit support costs of various ANSPs operating in Central and Eastern European countries (e.g. LPS, UkSATSE, MoldATSA, ARMATS, Albcontrol, Slovenia Control, ANS CR and ROMATSA) are higher than the Pan-European system average and in the same order of magnitude as the unit support costs of ANSPs operating in Western European countries where the cost of living is much higher.

Like ATCO in OPS employment costs, employment costs for the support staff are also affected by the cost of living. Using the same methodology as in Figure 2.20, Figure 2.28 shows the impact of adjusting the non-ATCO in OPS employment costs per composite flight-hour for PPPs.

[25] It should be noted that the cost of capital reported by ANS CR in its ACE 2014 data submissions is higher than the costs charged to airspace users. Indeed, ANS CR did not charge any cost of capital to terminal ANS users.

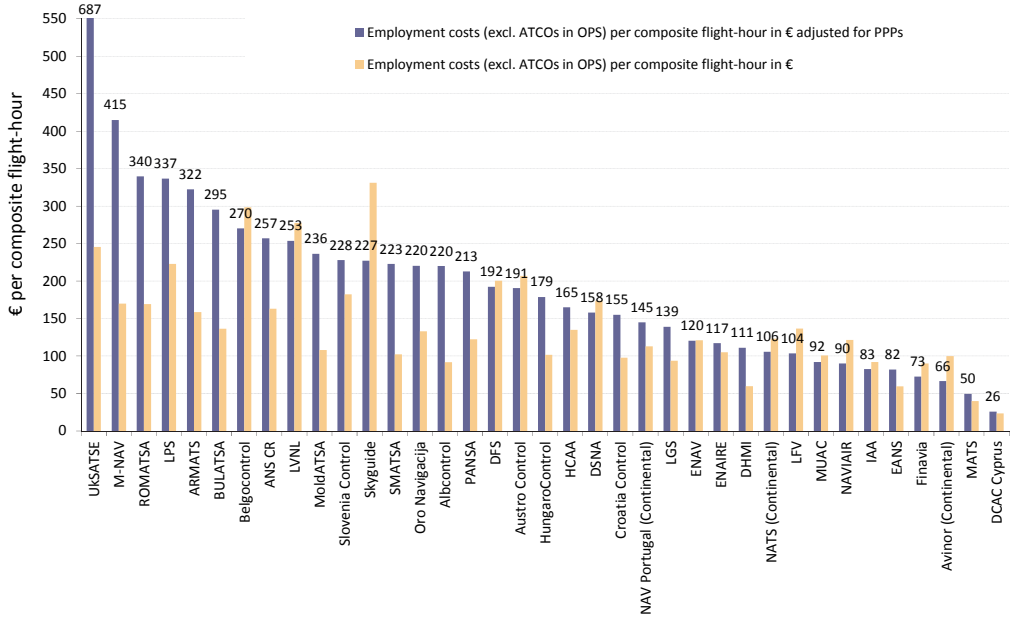


Figure 2.28: Employment costs (excl. ATCOs in OPS) with and without adjustment for PPPs, 2014 [TBU]

After PPP adjustment, the unit employment costs for support staff per composite flight-hour amounts to €161 (compared to €142 without adjustment).

Figure 2.28 indicates that after PPP adjustment, the unit employment costs of many Central and Eastern European ANSPs are generally higher than those operating in Western Europe. As both the cost of living and general wage levels are converging across Europe, there is an 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.

More details on the level and changes in support costs for individual ANSPs are provided in Part II of this Report.

2.9 Forward-looking cost-effectiveness (2015-2019)

At Pan-European System level, the gate-to-gate unit ATM/CNS provision costs are planned to fall by -2.2% p.a. between 2014 and 2019. This mainly reflects the fact that over this period traffic is expected to increase faster (+2.6% p.a.) than ATM/CNS costs provision costs (+0.4% p.a.).

The objective of this section is to provide information on ANSPs planned gate-to-gate unit ATM/CNS provision costs and capex for the period 2015-2019. It is based on data reported by ANSPs in their ACE 2014 submissions. It is important to note that NATS is excluded from this analysis since forward-looking data (based on regulatory accounting rules) and historical data (based on IFRS) are not directly comparable[26].

Figure 2.29 below shows that, at Pan-European System level, the gate-to-gate unit ATM/CNS provision costs are planned to fall by -2.2% p.a. between 2014 and 2019. This planned decrease

[26] Similarly, Avinor and EANS are for the time being excluded from this analysis since these two ANSPs did not provide a complete set of forward-looking information for the 2015-2019 period.

is due to the fact that traffic is expected to increase faster (+2.6% p.a.) than ATM/CNS provision costs (+0.4% p.a.).

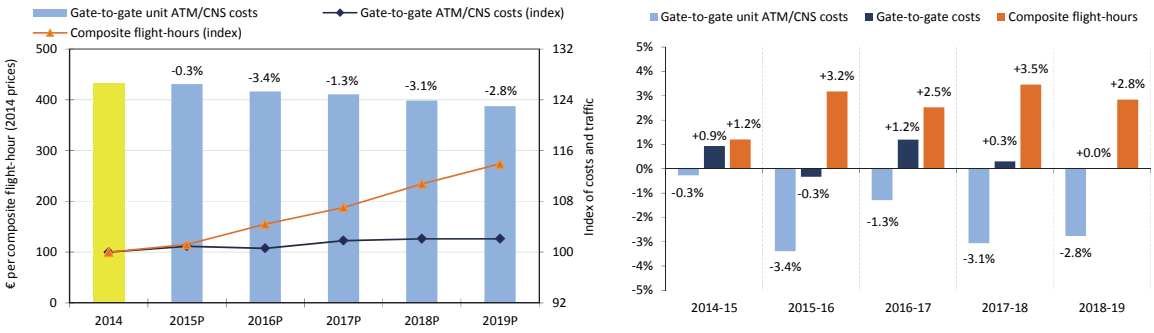


Figure 2.29: Forward-looking cost-effectiveness (2014-2019, real terms) [TBU]

The decrease in unit costs planned at Pan-European system level masks contrasted situations among ANSPs. Figure 2.30 below shows ANSPs planned changes in unit ATM/CNS provision costs (light blue bars) and identifies the costs (dark blue line) and traffic (orange line) effects.

Figure 2.30 indicates that 18 ANSPs are planning for decreases in unit ATM/CNS provision costs greater than -2.0% p.a. over the 2014-2019 period. This is particularly the case for MoldATSA (-11.3% p.a.), PANSA (-4.9% p.a.) and SMATSA (-5.0% p.a.) who plan for annual decreases in unit costs greater than -4.0%.

- For MoldATSA, the decrease in unit costs is mainly due to a substantial reduction in ATM/CNS provision costs (-11.4% p.a.) while the number of composite flight-hours is expected to remain fairly constant over the 2014-2019 period (-0.1% p.a.).
- PANSA ATM/CNS provision costs are planned to remain constant between 2014 and 2019 (+0.1% p.a.) while traffic volumes are expected to rise substantially (+5.2% p.a.). As a result, PANSA unit ATM/CNS provision costs are planned to reduce by -4.9% p.a. over the 2014-2019 period.
- For SMATSA, the planned reduction in unit ATM/CNS provision costs (-5.0% p.a.) between 2014 and 2019 reflects the combination of a planned reduction in costs (-2.1% p.a.) with an expected traffic increase (+3.1% p.a.).

On the other hand, Figure 2.30 shows that unit ATM/CNS provision costs are expected to rise by more than +4.0% p.a. for three ANSPs between 2014 and 2019:

- MATS (+10.8% p.a.) plan for substantial increases in ATM/CNS provision costs (+10.5% p.a.) in a context of slight traffic decrease (-0.3% p.a.).
- For LGS, the planned rise in unit ATM/CNS provision costs (+4.9% p.a.) reflects the combination of a planned increase in costs (+2.8% p.a.) with a reduction in traffic (-2.0% p.a.).
- On the other hand, for UkSATSE the planned increase in unit ATM/CNS provision costs (+4.1% p.a.) is mainly due to a sharp decrease in traffic (-11.4% p.a.) while costs are expected to reduce by -7.7% p.a. over the 2014-2019 period. In fact, the number of composite flight-hour controlled by UkSATSE is expected to sharply reduce in 2015 (-57.2%) reflecting a change in traffic flows following the establishment of restricted/prohibited areas in the Ukrainian airspace.

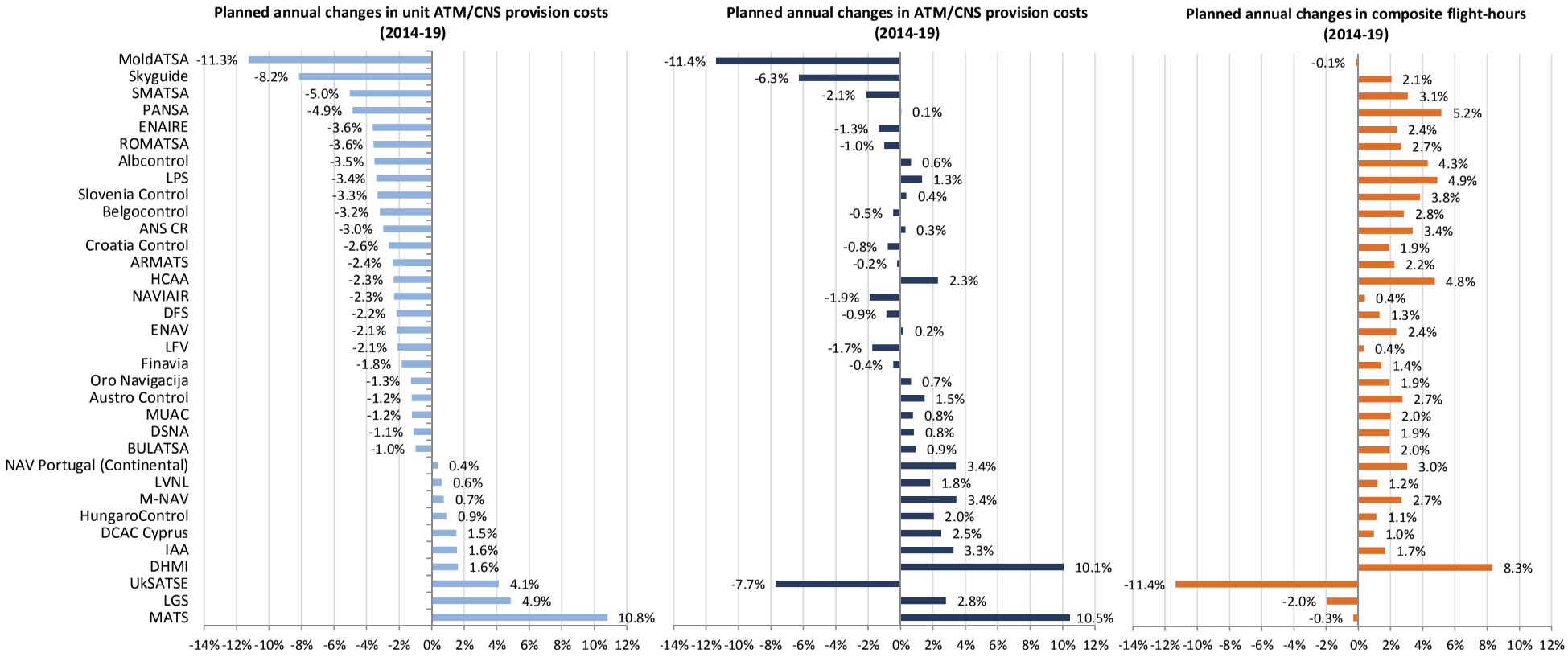


Figure 2.30: Planned changes in unit costs over the 2014-2019 period (real terms) [TBU]

Figure 2.31 below shows the total actual capex and depreciation costs at Pan-European system level between 2009 and 2014 (including the 37 ANSPs contributing to the ACE report) as well as the planned capex and depreciation costs between 2015 and 2019 for the 32 ANSPs that reported planned capex in their ACE 2014 data submission[27]. The average annual capex planned by these 32 ANSPs for the period 2015-2019 amounts to some €791M.

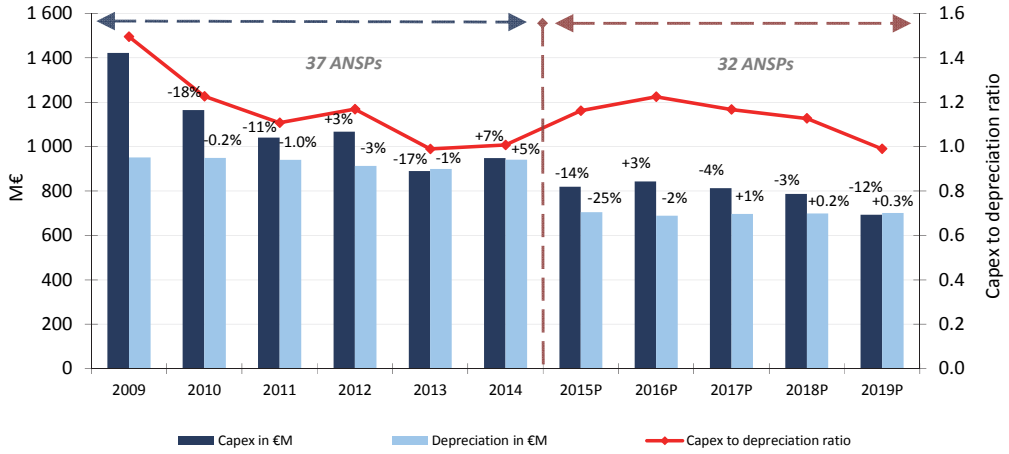


Figure 2.31: Capital expenditures and depreciation costs (2009-2019, real terms) [TBU]

The average capex to depreciation ratio planned over 2015-2019 (1.13) is lower than that observed over the 2009-2014 period (1.17). This indicates that, overall, ANSPs asset base are expected to grow at a lower rate than in the past five years.

Additional information on the nature and magnitude of the major investment projects for each ANSP is provided in Part II of this Report.

[27] Avinor, BULATSA, DSNA and EANS did not provide planned capex data for the 2015-2019 period in their ACE 2014 submissions. M-NAV capex is included in Figure 2.31, but only until 2018 since M-NAV did not report planned capex for year 2019. In addition, as explained in the introduction of Section 2.9, NATS is also excluded from the capex and depreciation costs analysis.

3 LONG-TERM CHANGES IN COST-EFFECTIVENESS (2004-2014)

ACE data have been collected since 2001 and it now becomes possible to conduct relevant long-term analysis of ATM cost-effectiveness. It would have been interesting to include the first three years of ACE data submissions (2001-2003) in this analysis. However, given that only 29 ANSPs participated to the ACE 2001 analysis, it has been decided to consider the 2004-2014 period to have a sample with a larger size. Between 2004 and 2014, the number of ANSPs participating to the ACE benchmarking exercise has increased from 34 to 37. For this reason, the results provided in this chapter focuses on the sample of 34 ANSPs for which complete time-series are available[28]. As a consequence, the figures disclosed for the Pan-European system in this Chapter differs from the data presented in Chapter 2, which reflects the information provided by 37 ANSPs over the 2009-2014 period.

A long term view is particularly interesting to examine the trend in cost-effectiveness before the economic crisis (2004-2008) and how the Pan-European ANS industry reacted to the global economic recession which affected the aviation community in 2009.

3.1 Long-term changes in cost-effectiveness at Pan-European system level (2004-2014)

Figure 3.1 shows the long-term trend in ATM/CNS provision costs, traffic measured in terms of composite flight-hours and unit costs between 2004 and 2014. Over the whole period, ATM/CNS provision costs rose by +0.5% p.a. which is significantly less than the +1.4% p.a. increase in traffic. As a result, unit ATM/CNS provision costs per composite flight-hour decreased by -0.9% p.a. between 2004 and 2014. These average changes mask different trends and cycles over the 10-year period.

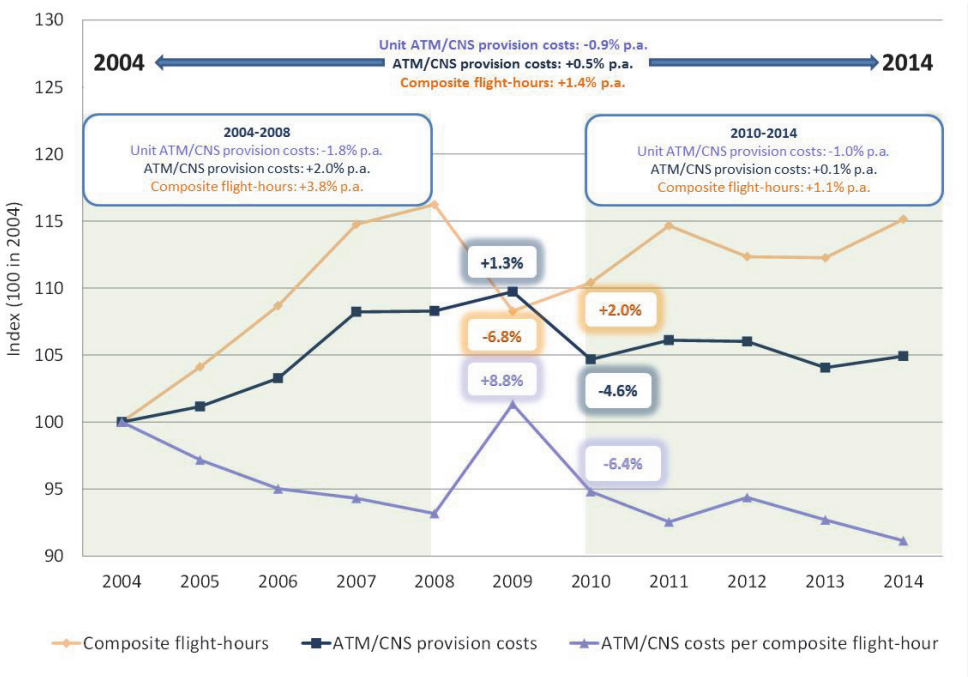


Figure 3.1: Long-term trends in traffic, ATM/CNS provision costs and unit costs [TBU]

[28] The three additional ANSPs joining the ACE benchmarking exercise during the 2004-2014 period were PANSA in 2005, SMATSA in 2006 and ARMATS in 2009.

Between 2004 and 2008, a period of sustained traffic growth, the number of composite flight-hours rose faster (+3.8% p.a.) than ATM/CNS provision costs (+2.0% p.a.). As a result, unit ATM/CNS provision costs reduced by -1.8% p.a. over this period. This demonstrated the ability of the ATM industry to reduce unit costs in a context of robust and continuous traffic growth.

In 2009, the economic recession struck the aviation industry with an unprecedented -6.8% traffic decrease. In the meantime, ATM/CNS provision costs continued to grow by +1.3% reflecting the short-term rigidities to adjust costs downwards and the unavoidable lead time. As a result, unit ATM/CNS provision costs increased by +8.8% and all the cost-effectiveness improvements achieved since 2004 were cancelled out.

In 2010, ATM/CNS provision costs reduced by -4.6% in a context of a +2.0% increase in traffic. It should be emphasised that before 2010, ATM/CNS provision costs had never declined during the decade. This reflects the impact of the cost containment measures implemented by a majority of ANSPs in the wake of the sharp traffic decrease in 2009. This indicates that, as a whole, the ATM industry was reactive and showed flexibility to adjust costs downwards in response to the fall in traffic. It is interesting to note that this performance improvement was achieved when ANSPs operated under the so-called full-cost recovery regime which provided no strong incentives to reduce/contain costs.

Between 2010 and 2014, ATM/CNS provision costs remained fairly constant in a context of low traffic growth (+1.1% p.a. compared to +3.8% over the 2004-2008 period). As a result, unit ATM/CNS provision costs reduced by -1.0% p.a. between 2010 and 2014.

Overall, ANSP cost-bases have increased by some €18.2M (+0.2%) between 2010 and 2014. Figure 3.2 below shows that this slight increase reflects the combination of higher ATCO employment costs (+€78.2M or +3.4%) and lower support costs (-€60.0M or -1.1%).

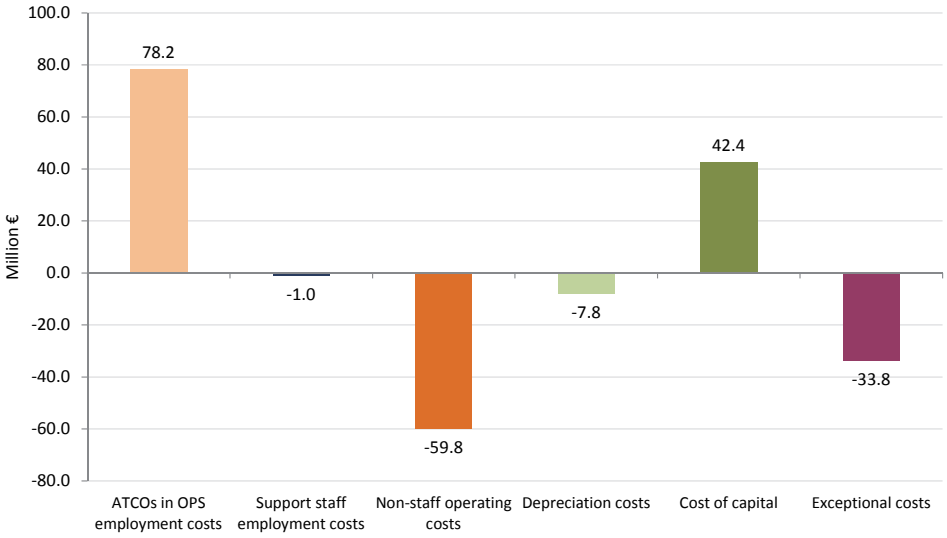


Figure 3.2: Breakdown of changes in ATM/CNS provision costs (2010-2014) [TBU]

Figure 3.2 indicates that the decrease in support costs over the 2010-2014 period is mainly due to lower non-staff operating costs (-€59.8M or -4.4%), exceptional costs (-€33.8M or -30.5%) and depreciation costs (-€7.8M or -0.8%) while support staff costs remained fairly constant (-€1.0M or -0.04%) and the cost of capital rose by +€42.4M (+9.1%).

The implementation of the Performance Scheme in 2012 and the financial incentives embedded in the Charging Scheme were important drivers for this improvement since the ANSPs operating in SES States had strong interests in outperforming their cost-efficiency targets and adapt more rapidly than in the past to fluctuations in traffic. It is important to note that this performance improvement was achieved while reducing ATFM delays (as shown in Chapter 2, see Figure 2.5).

Overall, despite the impact of the economic recession of the ATM industry in 2009, the cost-effectiveness performance of the Pan-European system significantly improved since 2004. Indeed, in 2014 unit ATM/CNS provision costs are -8.9% lower than in 2004. This performance improvement should be seen in the light of (a) the cost-containment measures initiated in 2009-2010 which continued to generate savings years after their implementation, and (b) for the ANSPs operating in SES States, the implementation of the Performance Scheme and the incentive mechanism embedded in the charging scheme which contributed to change the economic behaviour of these ANSPs and to maintain a downward pressure on costs during RP1.

3.2 Long-term changes in the components of cost-effectiveness (2004-2014)

As indicated in Figure 2.11 on p.23, the cost-effectiveness indicator is broken down into three main components: ATCO-hour productivity, ATCO employment costs per ATCO-hour and support costs per composite flight-hours. Figure 3.3 below shows the long-term changes for these indicators over the 2004-2014 period.

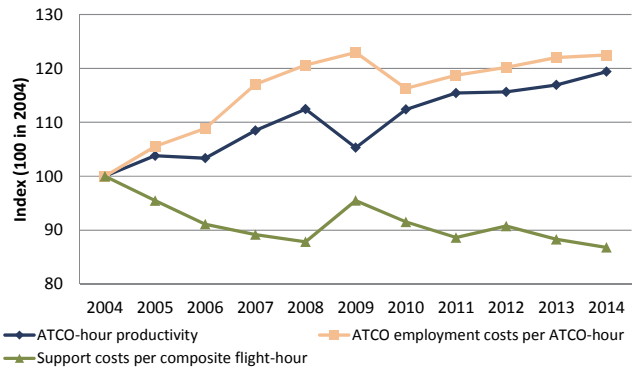


Figure 3.3: Long term trends in productivity, employment costs per ATCO-hour and unit support costs [TBU]

Figure 3.3 shows the long-term changes for these indicators over the 2004-2014 period. Employment costs per ATCO-hour (+2.0% p.a.) rose slightly faster than ATCO productivity (+1.8% p.a.). In the meantime, unit support costs fell by -1.4% p.a. since support costs remained fairly constant in a context of traffic increase (+1.4% p.a.).

As a result, unit ATM/CNS provision costs reduced by -0.9% p.a. over the 2004-2014 period.

The following sections analyse in further details the changes in ATCO-hour productivity (section 3.2.1), ATCO employment costs per ATCO-hour (section 3.2.2) and support costs per composite flight-hours (section 3.2.3) over the 2004-2014 period.

3.2.1 ATCO-hour productivity

Figure 3.4 shows that the increase in ATCO-hour productivity over the 2004-2014 period (+1.8% p.a.) results from the combination of a +1.4% p.a. traffic growth with a small reduction of ATCO-hours on duty (-0.4% p.a.).

Although ATCO-hour productivity significantly reduced in 2009 (-6.4%), it substantially increased in 2010 (+6.7%) following a -4.5% decrease of ATCO-hours on duty. As explained on p.24, these results are heavily influenced by the structural changes implemented in 2010-2011 by ENAIRE.

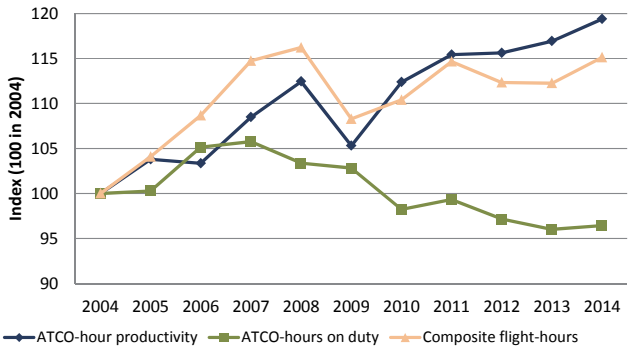


Figure 3.4: Long term trends in ATCO-hour productivity [TBU]

ATCO-hour productivity rose by +1.5% p.a. between 2010 and 2014, and as a result, the Pan-European system productivity in 2014 is +19.4% higher than in 2004.

Figure 3.5 shows that over the 2004-2014 period, improvements in ATCO-hour productivity were proportionally higher for ANSPs starting with relatively low productivity levels in 2004 (see green dots in Figure 3.5). Indeed, ATCO-hour productivity rose by +4.1% p.a. for ANSPs starting below the median of the sample in 2004. A robust traffic growth for those ANSPs (+5.9% p.a.) significantly contributed to the observed improvement but this was not the only factor since these ANSPs also managed to decrease ATCO-hours on duty (-2.2% p.a.).

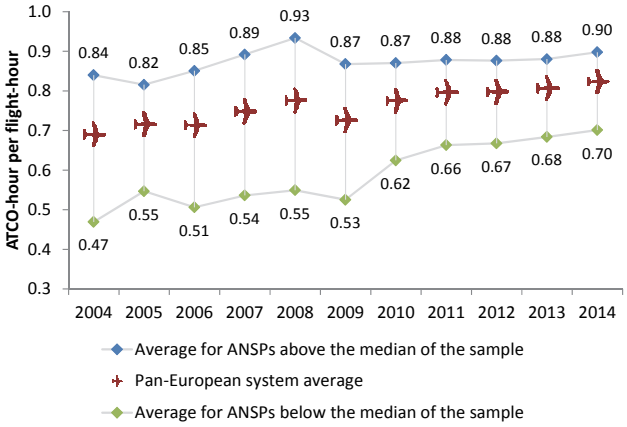


Figure 3.5: Convergence in ATCO-hour productivity levels between 2004 and 2014 [TBU]

In other words, these ANSPs could serve an increasing traffic with the same or a reduced number of ATCOs in OPS.

On the other hand, the productivity increase for ANSPs starting with relatively high levels in 2004 (see blue dots in Figure 3.5) is much lower (+0.7% p.a.). As a consequence, the substantial gap in ATCO-hour productivity observed between the two ANSP groups in 2004 (79%) significantly reduced over the years to reach 28% in 2014. This result is an indication of the convergence in ATCO-hour productivity that took place over the last ten years in the ATM industry.

3.2.2 Employment costs per ATCO-hour

Figure 3.6 shows that the increase in employment costs per ATCO-hour over the 2004-2014 period (+2.0% p.a.) is due to the fact that ATCO employment costs rose by +1.7% p.a. while ATCO-hours on duty slightly reduced (-0.4% p.a.). Following the implementation of cost-containment measures and the structural changes in ENAIRE, employment costs per ATCO-hour significantly reduced in 2010 (-5.4%) and then continuously rose until 2014 (+1.3% p.a.).

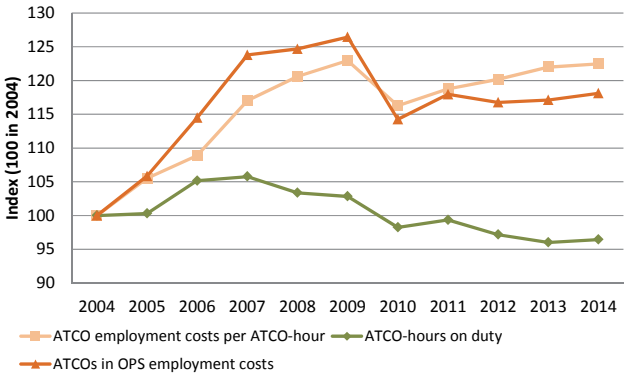


Figure 3.6: Long term trends in employment costs per ATCO-hour [TBU]

Significant increases in ATCO employment costs per ATCO-hour (+6.4% p.a.) are observed for ANSPs operating in Central and Eastern European countries (see green dots) which started from a relatively low base in 2004. This is significantly faster than for the Western European ANSPs (+1.6% p.a.).

This illustrates the gradual convergence of employment costs in Central and Eastern European economies following the strengthening of the economic integration and enhanced labour mobility.

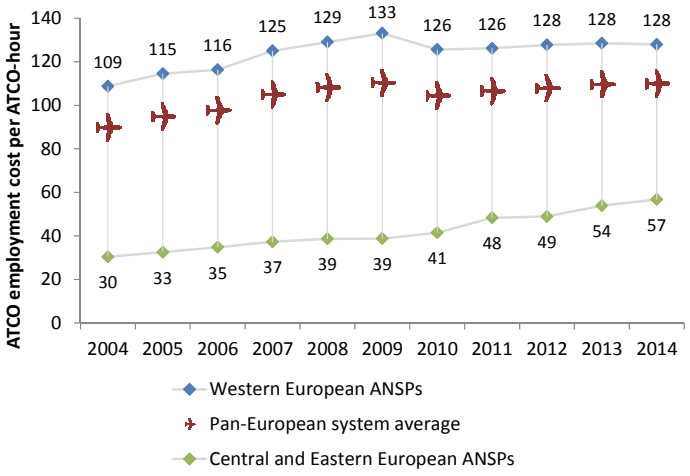


Figure 3.7: Convergence of ATCO employment costs per ATCO-hour between 2004 and 2014 [TBU]

As a result, the substantial gap in employment costs per ATCO-hour observed between the two ANSP groups in 2004 (factor 2.6) significantly reduced over the years to reach a factor 1.3 in 2014.

3.2.3 Support costs per composite flight-hour

Figure 3.8 below indicates that the decrease in unit support costs over the 2004-2014 period (-1.4% p.a.) is mainly due to the fact that support costs remained fairly constant in a context of traffic increase (+1.4% p.a.).

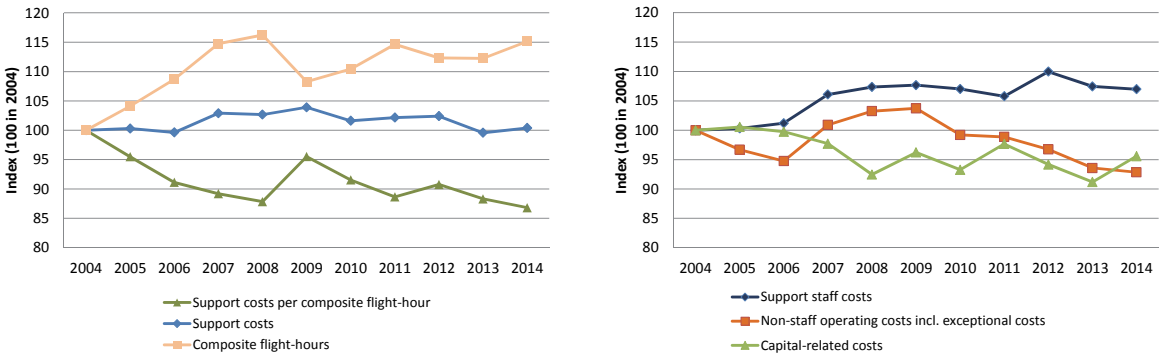


Figure 3.8: Long-term trends in support costs per composite flight-hour [TBU]

The right-hand side of Figure 3.8 shows that between 2004 and 2014, the increase in support staff costs (+0.7% p.a.) was compensated by reductions in non-staff operating costs (-0.9% p.a.) and capital-related costs (-0.4% p.a.).

Support staff costs represent some 48% of ANSPs support costs. Trends in employment costs are determined by the changes in the number of staff and in the average employment costs per staff. Figure 3.9 below shows the changes in the number of support staff (Full-Time Equivalents) at Pan-European system level and in average support staff employment costs over the 2004-2014 period.

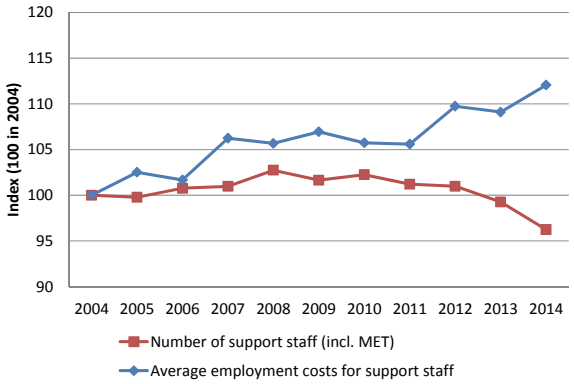


Figure 3.9: Long-term trends in support staff costs and FTEs [TBU]

Figure 3.9 below breaks down the support staff costs into its two components: the number of support staff and the average employment costs for support staff. In order to ensure consistency in time series analysis, the data provided in Figure 3.9 include information relating to internal MET staff.

Figure 3.9 indicates that the increase in support staff costs over the 2004-2014 period reflects an increase in unit employment costs for support staff (+1.1% p.a.) while the number of support staff reduced by -0.4% p.a.

Figure 3.10 below shows the changes in support staff for the five largest ANSPs over the 2004-2014 period. At the exception of DFS, support staff reduced for all the five largest ANSPs: DSNA, ENAIRE, ENAV and NATS.

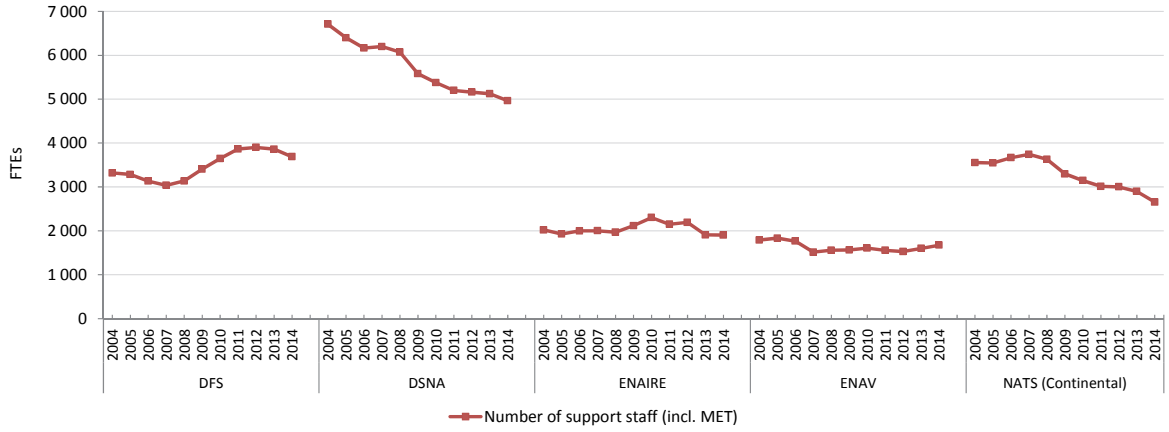


Figure 3.10: Long-term trends in support staff for the five largest ANSPs [TBU]

Figure 3.10 indicates that the number of DSNA support staff continuously reduced between 2004 and 2014 (-26.0% or -1 743 FTEs). It is noteworthy that the substantial decrease observed in 2009 (-492 FTEs) mainly reflects the fact that, following institutional changes, staff working in the ENAC (Ecole National de l'Aviation Civile, around 420 FTEs at the time) were not reported in DSNA ACE data submission from 2009 onwards.

After a +5.3% increase over the 2004-2007 period, NATS support staff reduced by -29.1% to reach a level which is -900 FTEs lower than in 2004. This reflects the implementation of staff redundancy programme following structural changes in NATS. The latest staff reduction programme was launched in 2013 for NATS En-route Limited (NERL) and NATS Services employees. It is understood that over 240 employees are expected to leave in the context of this programme.

ENAIRE (-5.9% or -119 FTEs) and ENAV (-6.5% or -116 FTEs) achieved support staff reductions over the 2004-2014 period. For ENAIRE, the decrease in support staff is mainly associated to the 2010-2014 period (-399 FTEs). This reduction should be seen in the light of (a) the restructuration that took place in Spain in 2011 (transfer of Aena airport management activities to Aena Aeropuertos), and (b) the implementation of a social plan for voluntary lay-offs which was initiated in 2013.

DFS support staff rose by +17.6% over the 2004-2012 period and then reduced in 2013 (-1.1% or -41 FTEs) and 2014 (-4.5% or -172 FTEs). The decrease in the number of support staff observed in

2014 should be seen in the context of the “increase in productivity” element of the Five-point programme set by DFS Board of Managing Directors. This programme set up in 2013 is expected to generate cost-effectiveness improvements until 2019.

It is clear that due to their weight, the support staff reductions achieved by four of the five largest ANSPs, and in particular DSNA (-1 743 FTEs) and NATS (-900 FTEs), substantially contribute to the changes observed at Pan-European system level (-1 429 FTEs).

This being said, significant decreases in support staff were also observed for ANSPs with a much lower weight in the system average. This is for example the case for Belgocontrol (-31.2% or -243 FTEs) and LVNL (-23.9% or -211 FTEs). It is understood that the support staff reductions observed for these two ANSPs reductions mainly relate to staff reduction programmes which were initiated in 2011 for Belgocontrol and 2008-2009 for LVNL.

More details on the changes in support costs for individual ANSPs are provided in Part II of this report.

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PART II: COST-EFFECTIVENESS PERFORMANCE FOCUS AT ANSP LEVEL

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4 FOCUS ON ANSPs INDIVIDUAL COST-EFFECTIVENESS PERFORMANCE

4.1 Objective of this chapter

This chapter comprises two pagers for each ANSP participating to the ACE 2014 analysis. These two pagers include an analysis of the historical development of the financial cost-effectiveness indicator and its main components over the 2009-2014 period. Individual ANSP cost-effectiveness performance is also examined in the context of a group of ANSPs which operate in relatively similar operational and economic environments (comparator groups). Finally, these two pagers comprise historical information and projections about capital expenditures provided by each ANSP.

4.2 Historical development of cost-effectiveness performance, 2009-2014

The first page presents, for each ANSP, an assessment of its cost-effectiveness performance, and how it has developed over the five-year period 2009-2014. It examines the overall economic cost-effectiveness indicator and its two components (ATM/CNS costs per composite flight-hour, ATFM delay costs per composite flight-hour), and their evolution over the period (top left). It puts these in the context of the traffic growth observed in the ANSP's airspace (top right). In this page, financial data are all expressed in real terms (2014 prices).

Developments in the components of financial cost-effectiveness (ATCO-hour productivity, ATCO employment costs per ATCO-hour, and support costs per composite flight-hour) are also examined (middle left), to help understand the underlying causes of changes in overall cost-effectiveness.

The charts on the middle right provide additional information in order to better understand the drivers behind the changes in the three components of financial cost-effectiveness. First, the changes in ATCO-hour productivity are examined in the light of changes in composite flight-hours, number of FTE ATCOs in OPS and corresponding hours on duty. A second chart focuses on the changes in ATCO-hours on duty, and in particular on overtime hours. The third chart presents the changes in support costs are broken down into employment costs of staff other than ATCOs in OPS; non-staff operating costs; capital-related costs (depreciation and the cost of capital); and exceptional items, where present.

The bottom set of graphs examine how the changes in the components over the whole period contribute to the change in the overall financial cost-effectiveness indicator. The left-hand graphs relate to ATCOs in OPS; the right-hand graphs to other elements of cost ("support costs"). The left-hand graphs show how the change in ATCO productivity combines with the change in unit ATCO employment costs to make a change in ATCO employment costs per unit output. The right-hand graphs show how the change in support costs combines with traffic growth to make a change in support costs per composite flight-hour. The relative contribution of these two effects to the change in the financial cost-effectiveness indicator depends on the relative weight of ATCO employment costs, on the one hand, and support costs, on the other, in the overall ATM/CNS provision cost.

The presentation of financial time-series 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 which happened to be particularly the case in 2009 in the wake of the financial crisis. In this chapter, the focus is on the historical development of financial performance indicators **in a given ANSP**.

For this reason, the following approach has been adopted 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 2014 prices using national inflation rates. Finally, for comparison purposes in 2014, all national currencies are converted to euros using the 2014 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 2014 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 2014 data.

The historical inflation figures used in this analysis were obtained from EUROSTAT or from the International Monetary Fund. For the projections, the ANSPs' own assumptions concerning inflation rates were used. Details of the monetary parameters used for 2014 are given in Annex 7 to this report.

4.3 ANSP's cost-effectiveness within the comparator group, 2009-2014

The top charts of the second page present the financial cost-effectiveness indicator and its main components for individual ANSPs in comparison with their respective comparator group. The approach is to consider each ANSP in the context of a group of other ANSPs (comparators) which operate in relatively similar operational and economic environments.

The chart on the top-left shows the level and changes in unit ATM/CNS provision costs over the 2009-2014 period for each ANSP part of the comparator group. The chart on the top-right shows for each ANSP the deviations in unit ATM/CNS provision costs, ATCO-hour productivity, employment costs per ATCO-hour and unit support costs from the average of the comparator group at the start (2009) and at the end (2014) of the period considered.

The ANSP comparator groups used for the benchmarking analysis are presented in the table below. These comparator groups were determined for the purposes of the RP2 cost-efficiency target-setting process using a two-step approach combining the use of statistical tools (cluster analysis) with expert judgement. For a full description of the process, methodology and results see Annex I.C of the PRB report on RP2 EU-Wide Targets Ranges[29] released in May 2013.

Nine groups of comparators have been identified, some comprising a relatively large number of ANSPs and others only comprising two organisations. Due to the unique nature of its airspace (upper airspace only, across four States), it was determined that Maastricht (MUAC) should be considered separately and therefore this ANSP was not included in the comparator group benchmarking analysis. Finally, two groups have been designed for the ANSPs not operating in SES States. It should be noted that the names of these groups have been chosen for mnemonic purposes only.

[29] This document is available at: http://ec.europa.eu/transport/media/consultations/doc/2013-07-03-sesrp2/report.pdf

Comparator Groups	ANSPs
Five Largest	ENAIRE
	DFS
	DSNA
	ENAV
	NATS (Continental)
Central Europe	ANS CR
	HungaroControl
	LPS
	Slovenia Control
	Croatia Control
	PANSA
South Eastern Europe	HCAA
	BULATSA
	ROMATSA
South Med	DCAC Cyprus
	MATS
Western Europe	Austro Control
	NAVIAIR
	Skyguide
Atlantic	NAV Portugal (Continental)
	IAA
Baltic States	EANS
	LGS
	Oro Navigacija
Nordic States	Avinor (Continental)
	LFV
	Finavia
BelNed	Belgocontrol
	LVNL
Non-SES 1	DHMI
	UkSATSE
Non-SES 2	Albcontrol
	ARMATS
	M-NAV
	MoldATSA
	SMATSA

Table 4.1: ANSPs comparator groups

4.4 Historical and forward-looking information on capital investment projects

The charts which are displayed in the middle and the bottom of the second page provide historical information and projections about capital expenditures provided by each ANSP.

The chart on the middle of the page shows the historical and planned evolution of capital expenditure and depreciation, highlighting the ANSP's investment cycles and their magnitude, across time. The ratio of these quantities (usually greater than one) is an indication of the rate at which the overall asset base is being expanded.

Finally, two tables present information on the nature of the main ANSP's capex projects between 2009 and 2019. The first table provides a high-level overview of the magnitude of capital expenditures by area (i.e. ATM, Communication, Surveillance, etc.) over the 2009-2019 period and of the upgrade/replacement cycles of the main ATM systems for each ACC. The capex allocation by area is not always straightforward, especially when ANSPs report under a large project several

smaller investments relating to different areas. The classification disclosed in this report therefore reflects the PRU understanding based on information provided by ANSPs during the validation process. In case of a project covering several areas, the rationale was to classify the whole project into the domain where the investment project was mostly contributing. The last table provides detailed information on the top 5 capex projects in monetary terms including the domain, the financial amount and the time period of the project. For ANSPs operating in SES States, this information is based on data provided in RP2 Performance Plans which is subject to change before the final adoption of the Performance Plans.

4.5 Cost-effectiveness performance focus at ANSP level

To facilitate the reading of this section, the table below displays the page number of the individual benchmarking analysis for each ANSP.

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Albcontrol (Albania) – Cost-effectiveness KPIs (€2014)

Contextual economic information

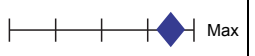
Exchange rate: 1 EUR = 139.608 ALL

Albcontrol represents 0.3% of European system gate-to-gate ATM/CNS provision costs

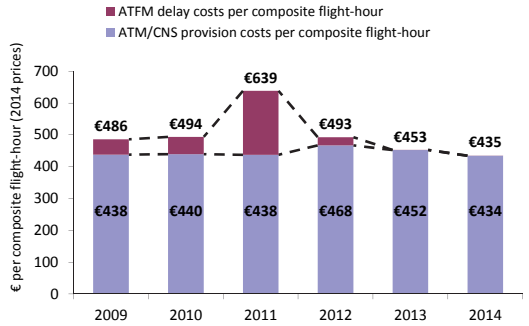
Operational conditions

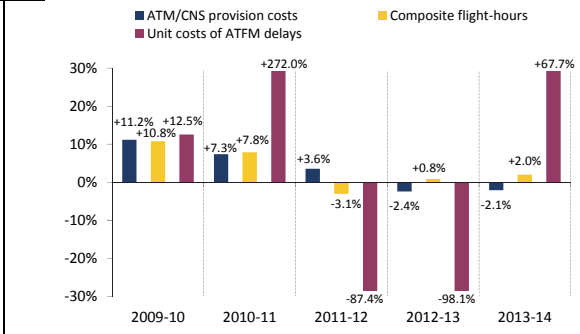
Aggregated complexity score:

Seasonal traffic variability:

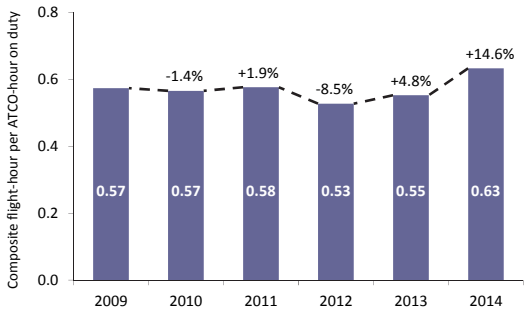


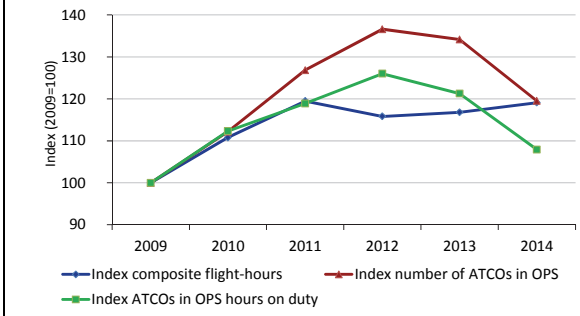
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



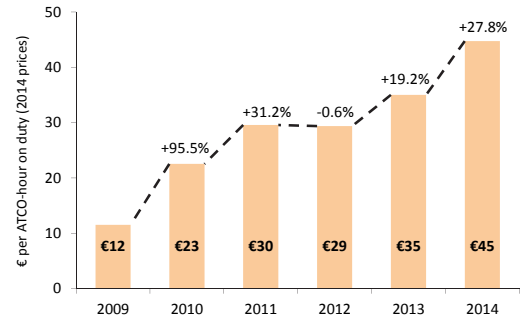


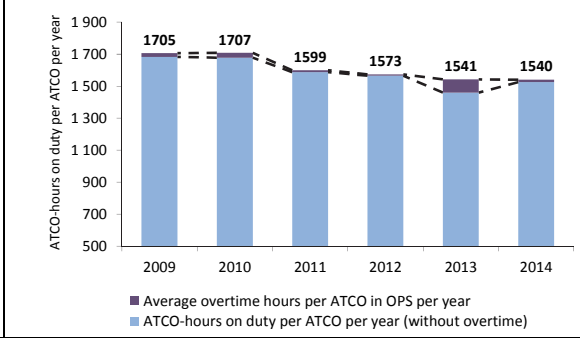
Trend in gate-to-gate ATCO-hour productivity



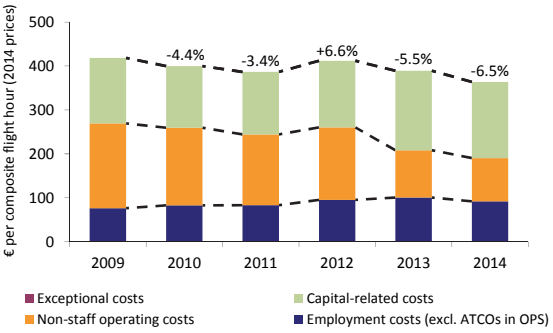


Trend in gate-to-gate employment costs per ATCO-hour

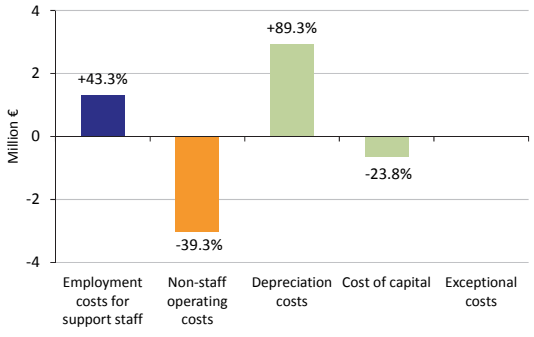




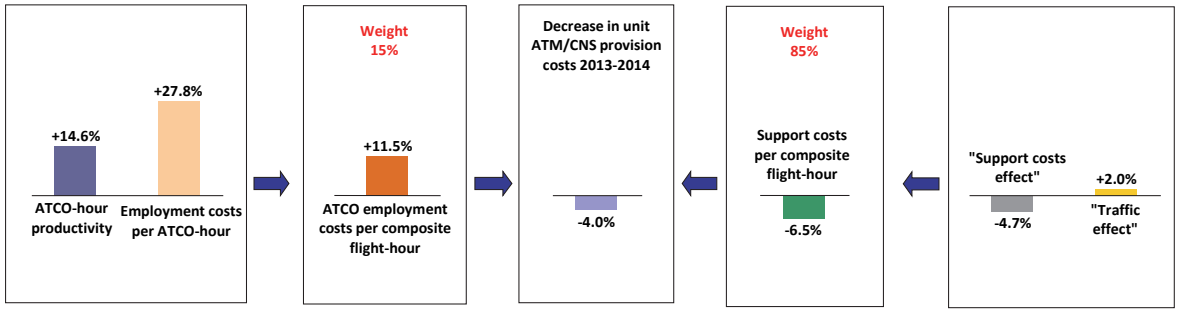
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

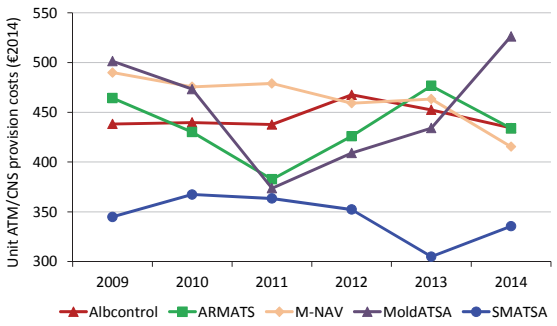


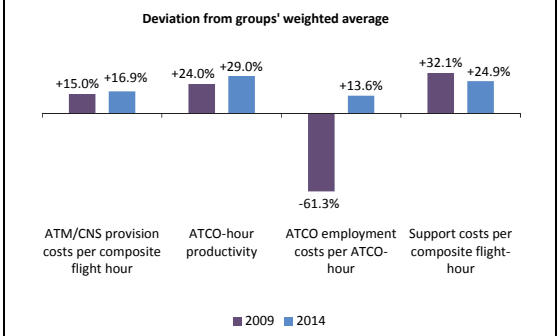
Changes in financial cost-effectiveness (2013-2014)



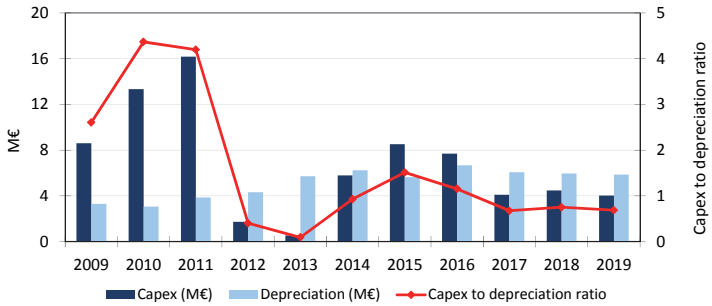
Albcontrol (Albania) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2005*	C: 2006*	C: 2005*	C: 2008*
€17.7M (2008-2012)	€2.0M (2008-2012)			€13.5M (2008-2011)		2009				
		€1.6M			€0.3M*	2010				
						2011				
				€0.3M		2012				
						2013				
€7.1M	€1.0M	€3.8M		€1.9M		2014				
						2015				
						2016				
						2017				
						2018				
						2019				

* The amount provided for under "Other" (i.e. €0.3M) related to MET

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Purchase of a new ATM system	ATM	14.5	2008	2012
2	New joint ACC/APP/TWR building located near Mother Teresa Airport	Buildings	13.5	2008	2011
3	Upgrade of SW program in Skyline equipments	ATM	3.7	2014	2016
4	Upgrade and maintenance of ATM systems	ATM	3.4	2015	2016
5	Remote radio facility (RXTX radio for VHF)	COM	2.0	2008	2012

ANS CR (Czech Republic) – Cost-effectiveness KPIs (€2014)

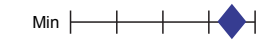
Contextual economic information

Exchange rate: 1 EUR = 27.511 CZK

ANS CR represents 1.4% of European system gate-to-gate ATM/CNS provision costs

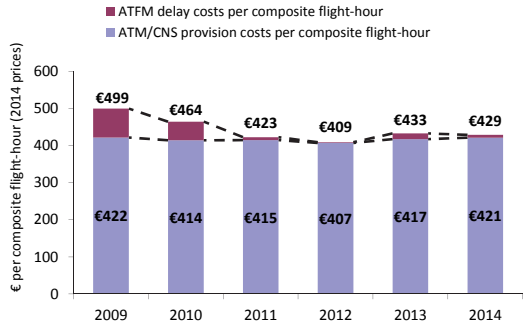
Operational conditions

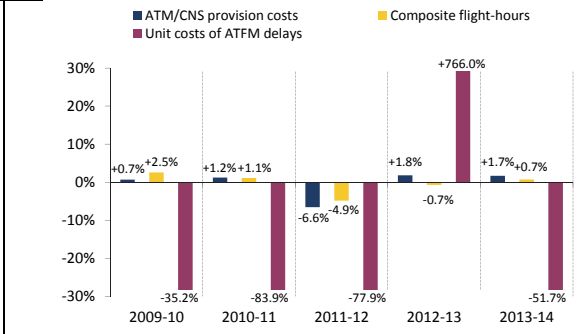
Aggregated complexity score:



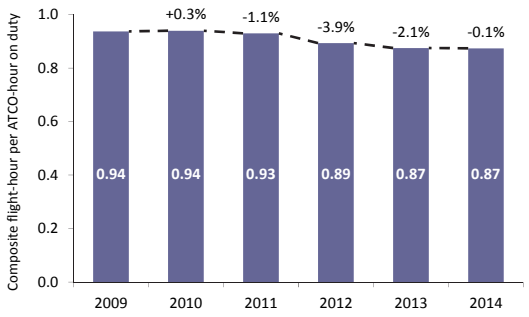
Seasonal traffic variability:

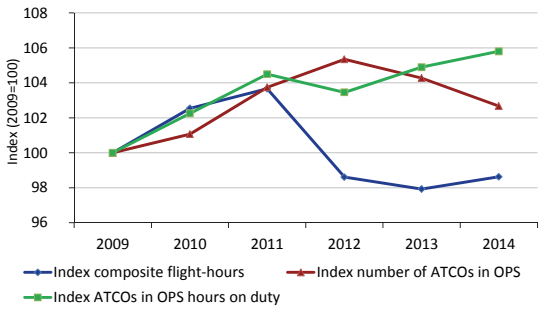
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



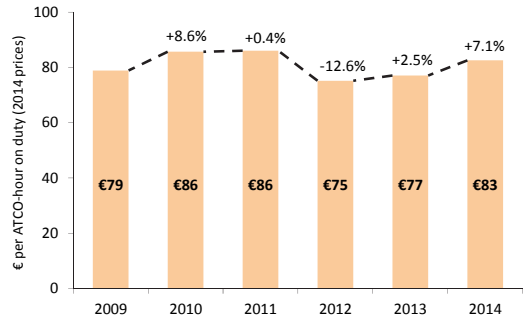


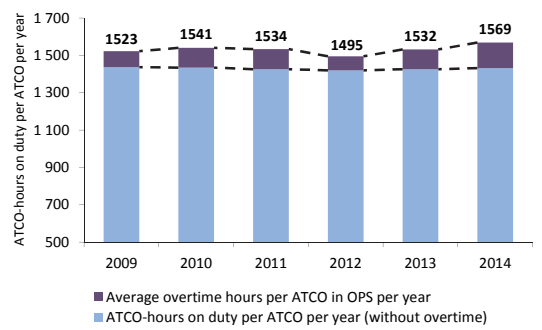
Trend in gate-to-gate ATCO-hour productivity



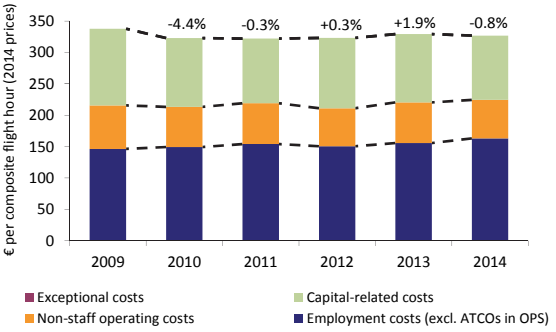


Trend in gate-to-gate employment costs per ATCO-hour

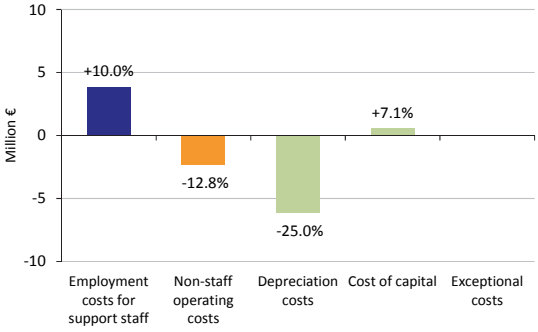




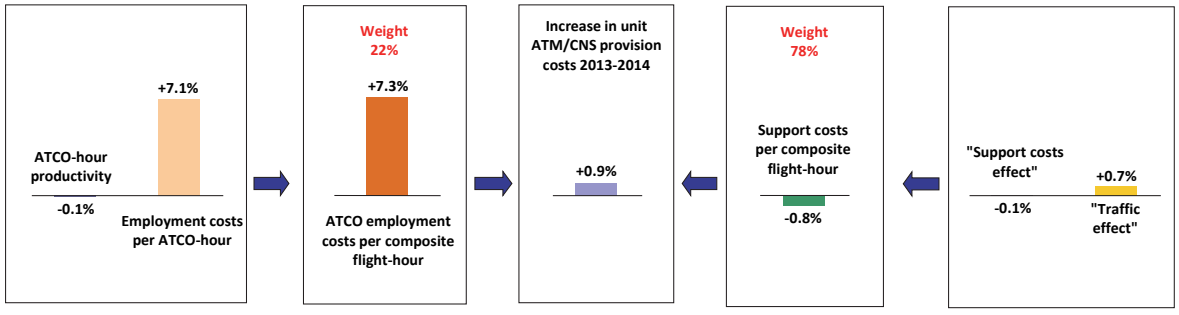
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

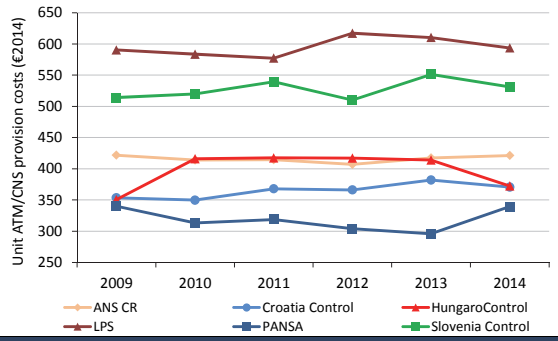


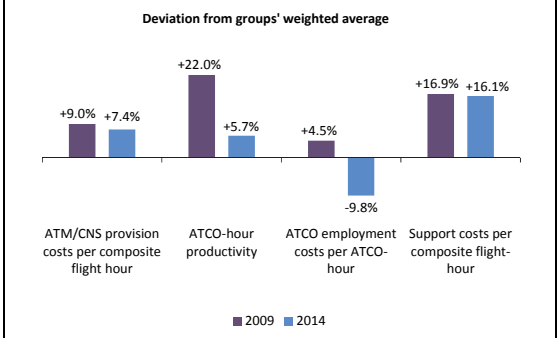
Changes in financial cost-effectiveness (2013-2014)



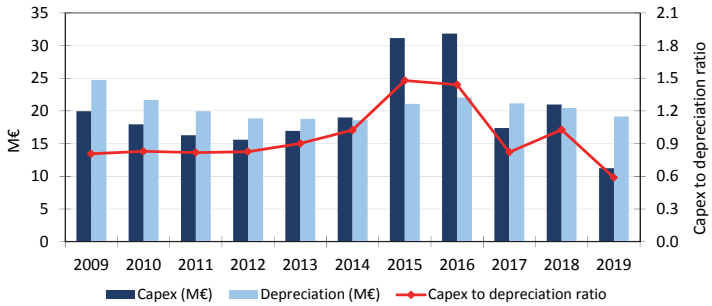
ANS CR (Czech Republic) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

ARMATS (Armenia) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 539.717 AMD

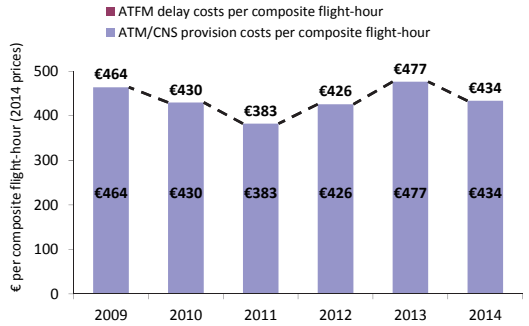
ARMATS represents 0.1% of European system gate-to-gate ATM/CNS provision costs

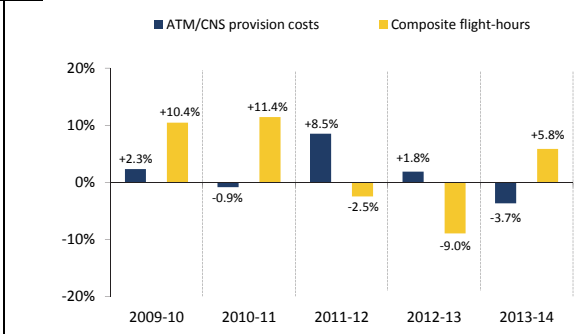
Operational conditions

Aggregated complexity score: Min — Max

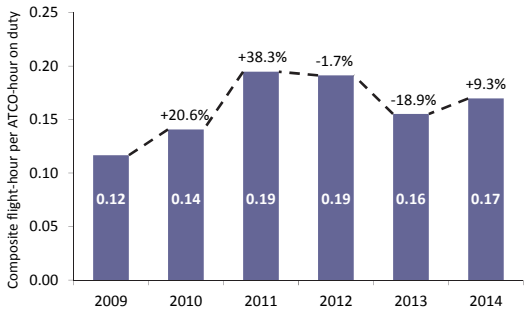
Seasonal traffic variability: Min — Max

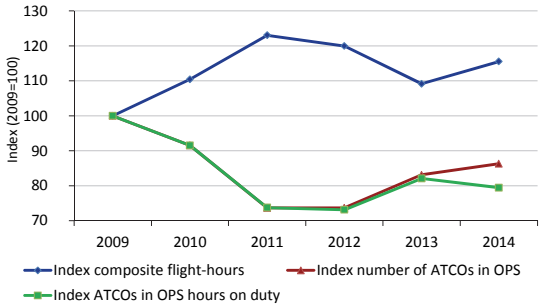
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



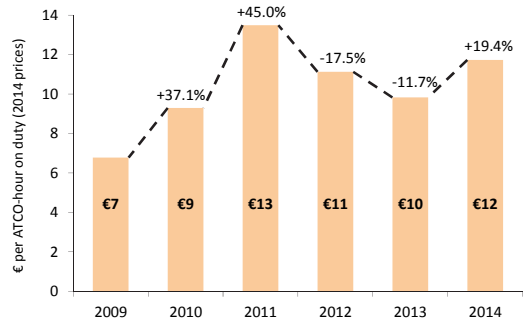


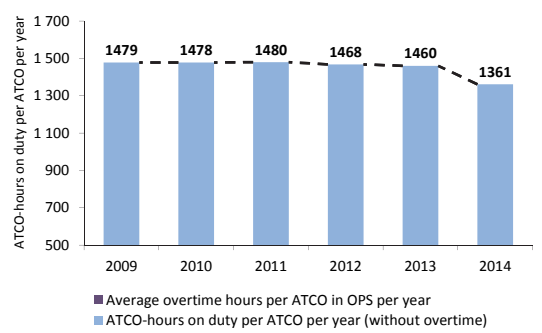
Trend in gate-to-gate ATCO-hour productivity



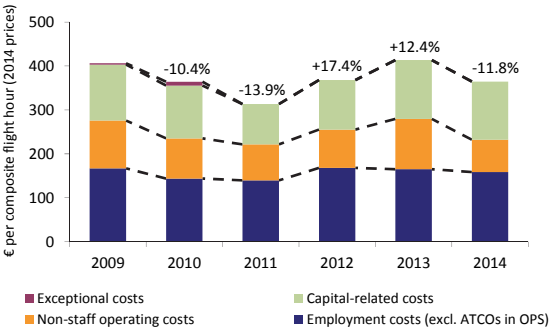


Trend in gate-to-gate employment costs per ATCO-hour

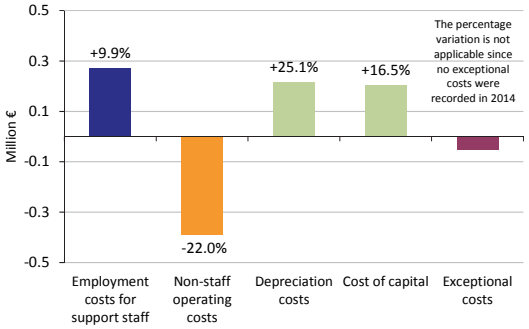




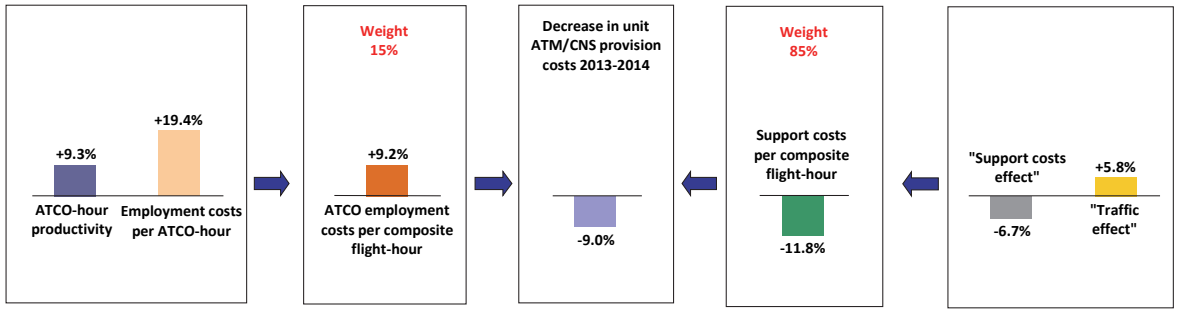
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

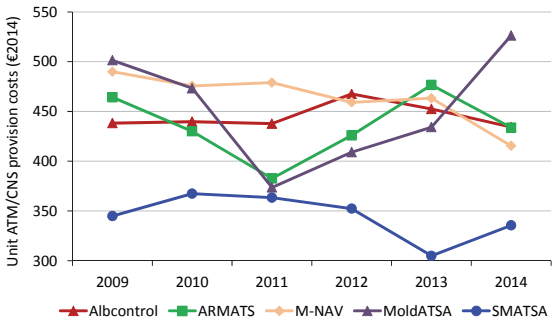


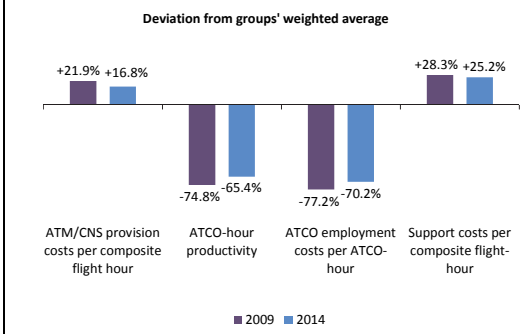
Changes in financial cost-effectiveness (2013-2014)



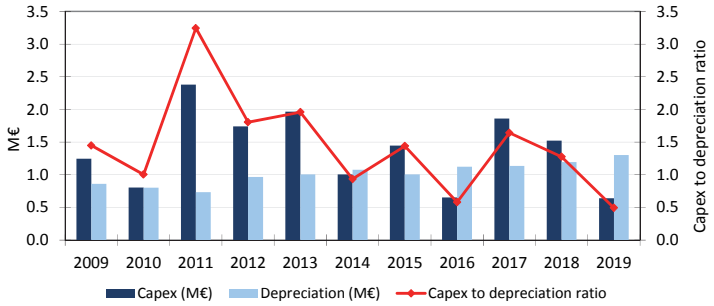
ARMATS (Armenia) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS C: 2000	RDPS C: 2000	HMI C: 2000	VCS C: 2000
						2009				
						2010				
						2011				
€2.4M	€0.5M					2012				
						2013				
						2014				
€0.8M	€0.6M		€1.3M		€0.1M	2015				
		€1.4M				2016				
			€1.9M			2017				
€0.9M						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Modernisation of ATC centre (ATM automated system and VCSS)	ATM	2.4	2012	2013
2	Acquisition of MSSR	SUR	1.9	2017	2018
3	Modernization of P3D surveillance system	SUR	1.3	2014	2016
4	Acquisition of AMAN/DMAN	ATM	0.9	2018	2019
5	Acquisition of DVOR/DME	NAV	0.7	2016	2017

Austro Control (Austria) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: Austria is within the EURO Zone

Austro Control represents 2.3% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

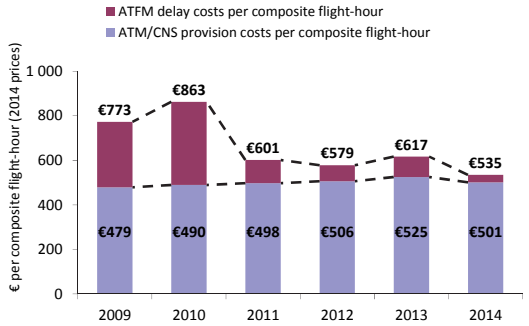
Aggregated complexity score:

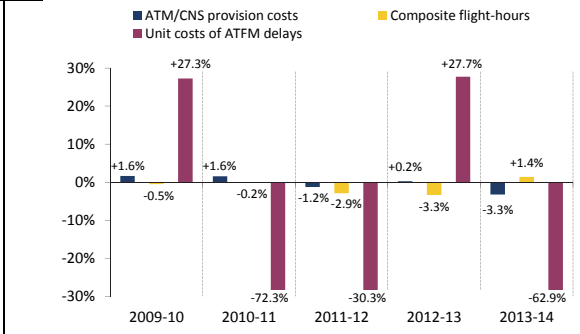
Min — Max

Seasonal traffic variability:

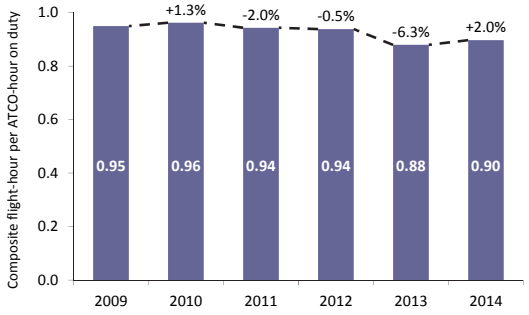
Min — Max

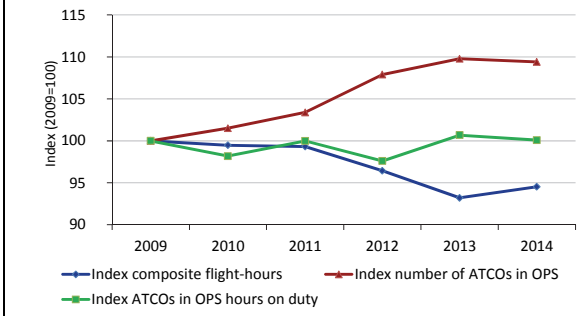
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



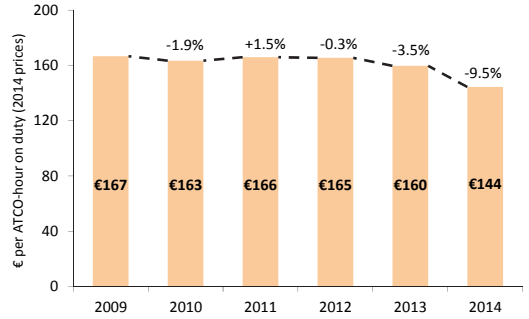


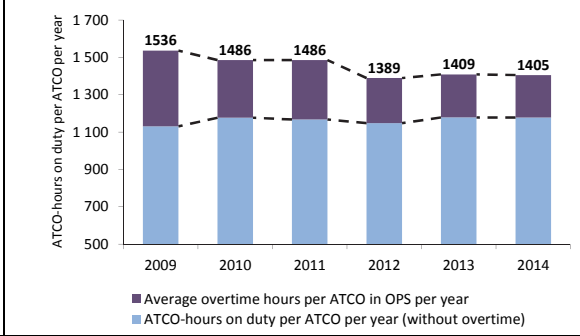
Trend in gate-to-gate ATCO-hour productivity



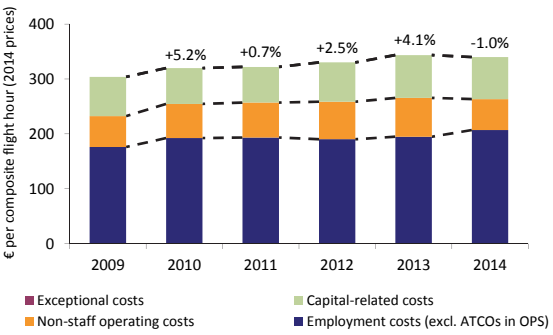


Trend in gate-to-gate employment costs per ATCO-hour

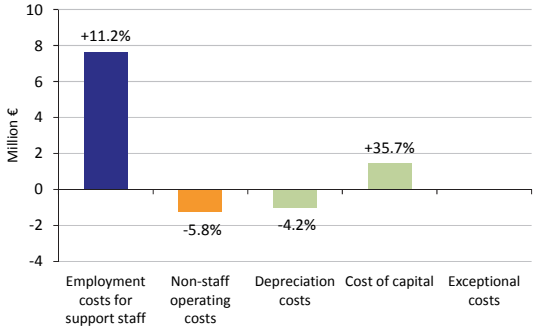




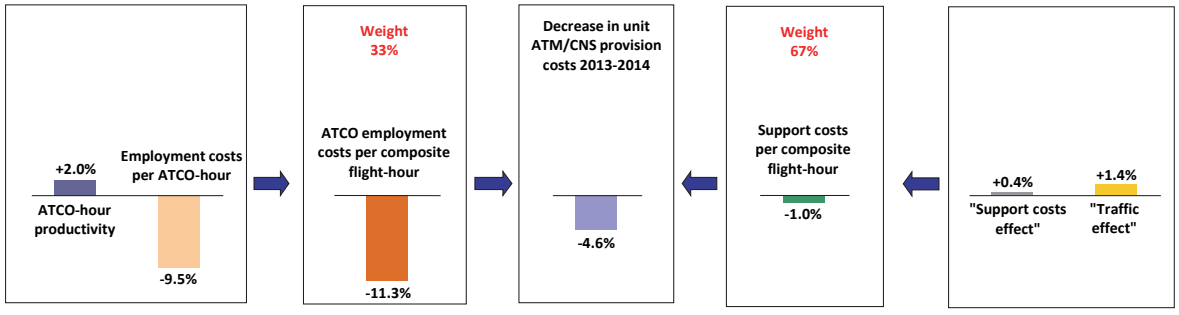
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

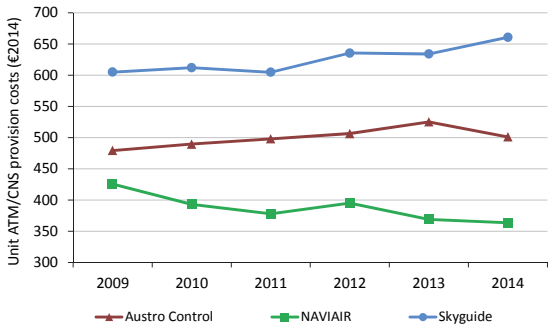


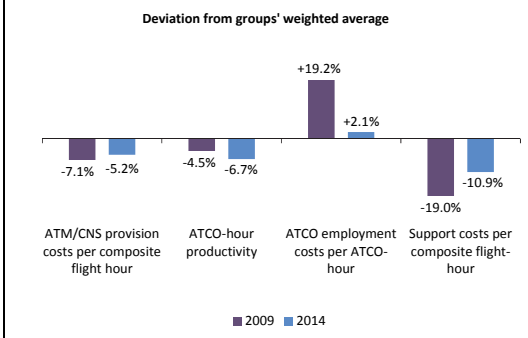
Changes in financial cost-effectiveness (2013-2014)



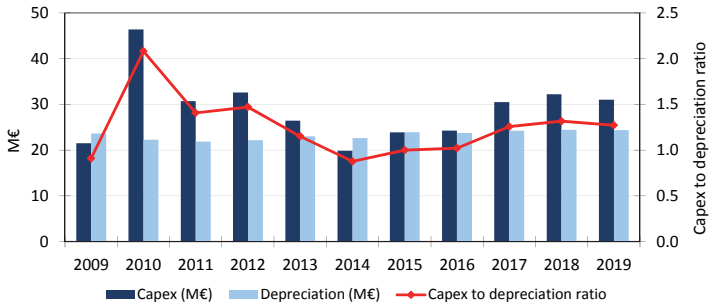
Austro Control (Austria) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2013*	C: 2013*	C: 2013*	C: 2013*
						2009				
						2010				
€33.6M		€4.3M	€10.3M	€13.6M	€81.6M	2011				
						2012				
	€4.2M					2013				
						2014				
€68.0M	€23.7M	€11.4M	€10.5M	€27.3M	€24.7M	2015				
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Investment associated with ATM Systems (including COOPANS, training and simulator facilities, etc.)	ATM	101.6	2011	2019
2	Investments associated to buildings and facility management (including Salzburg airport TWR)	Buildings	40.9	2010	2019
3	Investment associated with communication (including introduction of CPDLC, VoIP technology, 8.33 khz channel separation, etc.)	COM	27.9	2013	2019
4	Investments associated to surveillance (including upgrade to Mode-S in various locations, implementation of wide-area multilateration, etc.)	SUR	20.8	2011	2019
5	Investments associated to navigation (including upgrade of NAV infrastructure, replacement of ILS, VOR, and DME equipment, etc.)	NAV	15.7	2011	2019

Avinor Continental (Norway) – Cost-effectiveness KPIs (€2014)

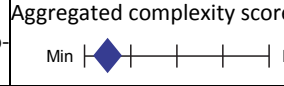
Contextual economic information

Exchange rate: 1 EUR = 8.355 NOK

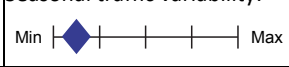
Avinor Continental represents 2.4% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

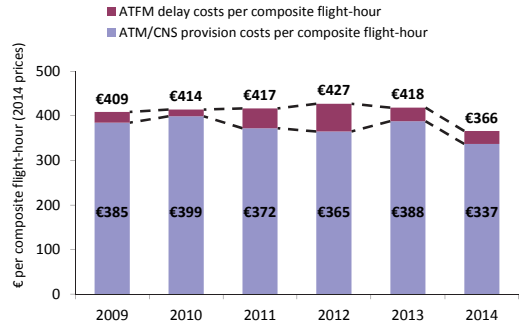
Aggregated complexity score:

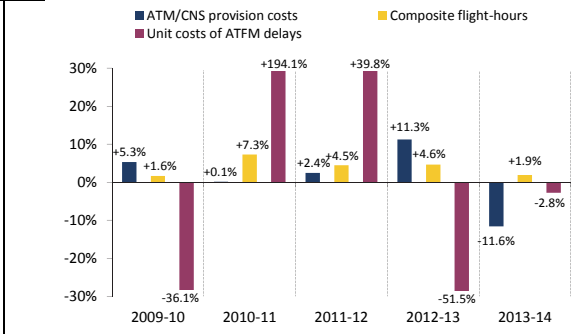


Seasonal traffic variability:

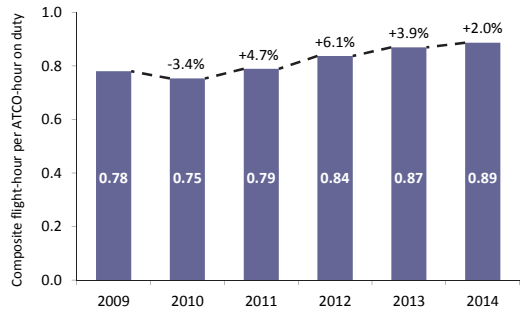


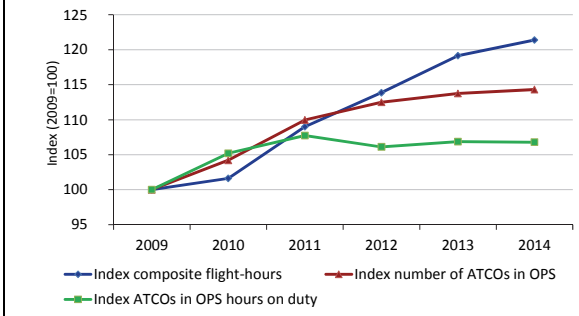
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



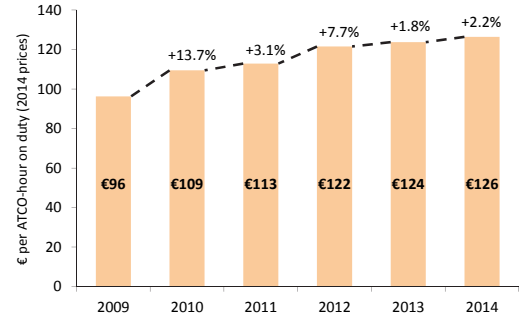


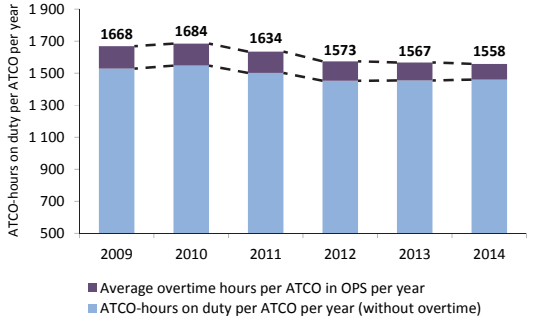
Trend in gate-to-gate ATCO-hour productivity



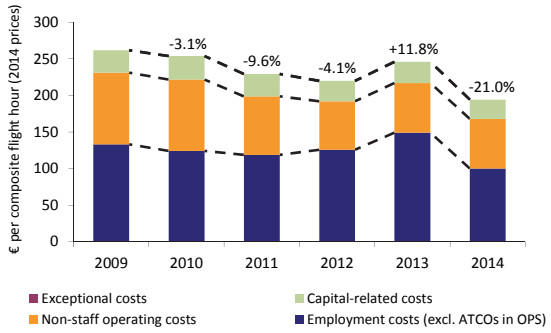


Trend in gate-to-gate employment costs per ATCO-hour

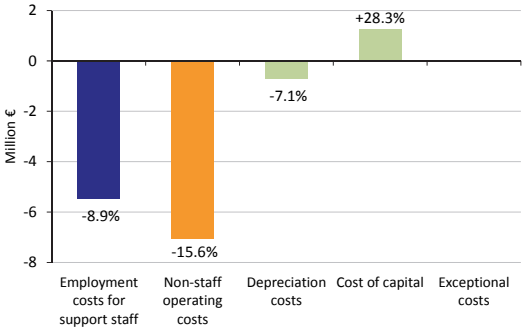




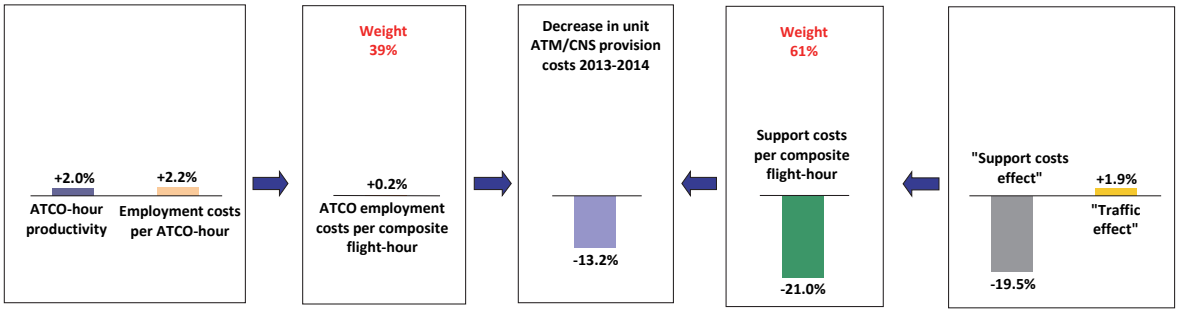
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

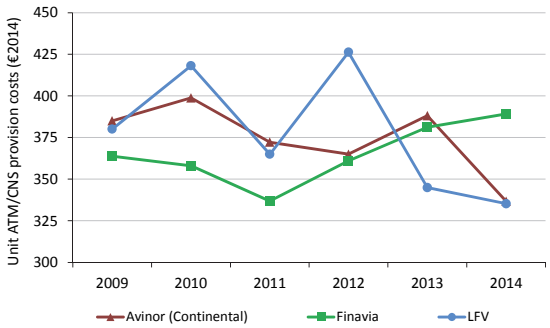


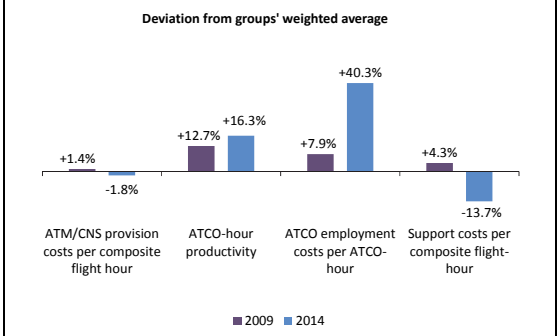
Changes in financial cost-effectiveness (2013-2014)



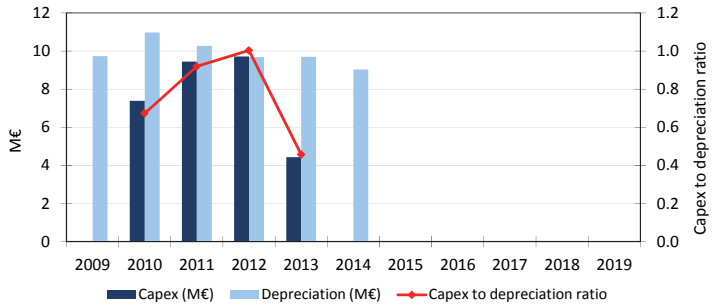
Avinor Continental (Norway) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

Belgocontrol (Belgium) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: Belgium is within the EURO Zone

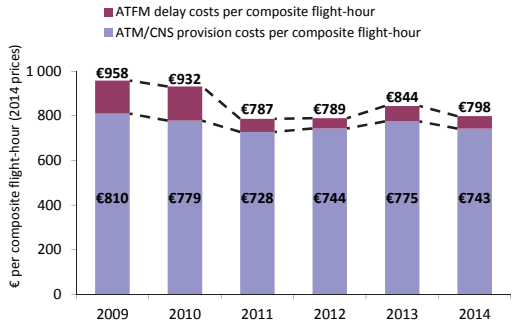
Belgocontrol represents 1.9% of European system gate-to-gate ATM/CNS provision costs

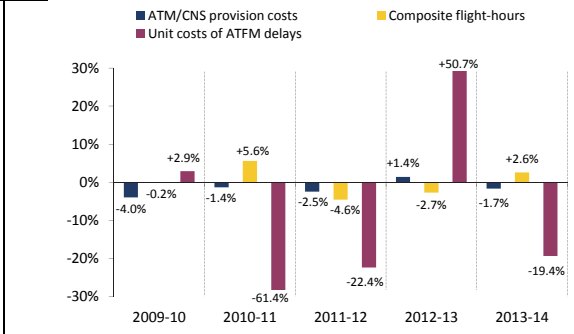
Operational conditions

Aggregated complexity score: Min — Max

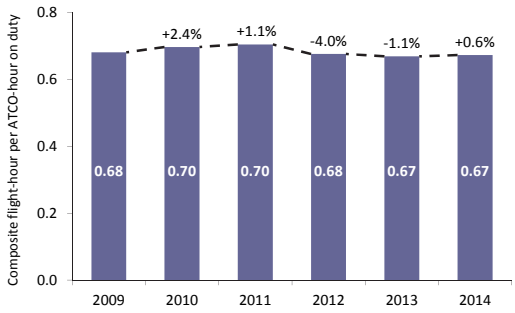
Seasonal traffic variability: Min — Max

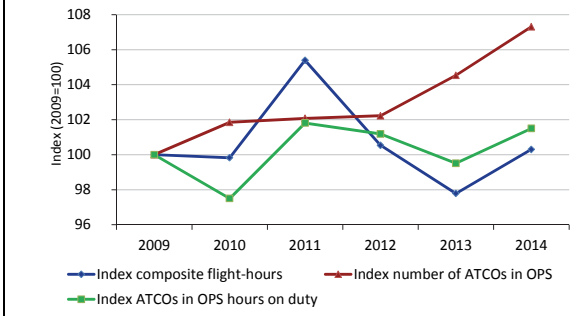
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



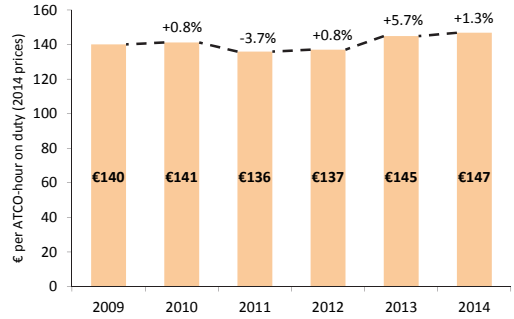


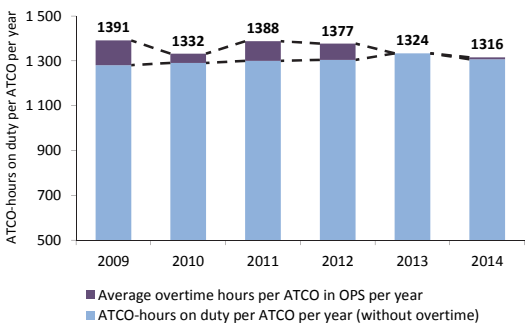
Trend in gate-to-gate ATCO-hour productivity



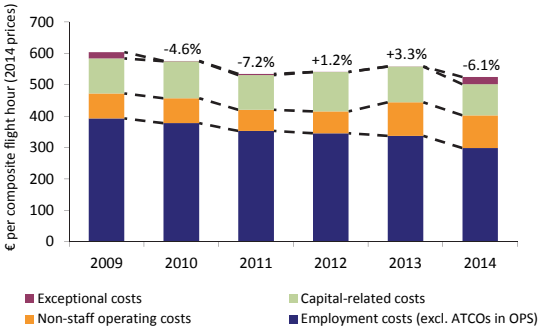


Trend in gate-to-gate employment costs per ATCO-hour

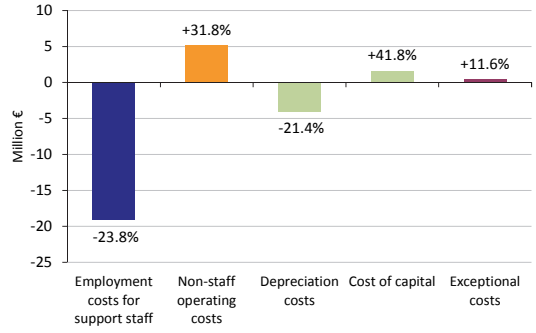




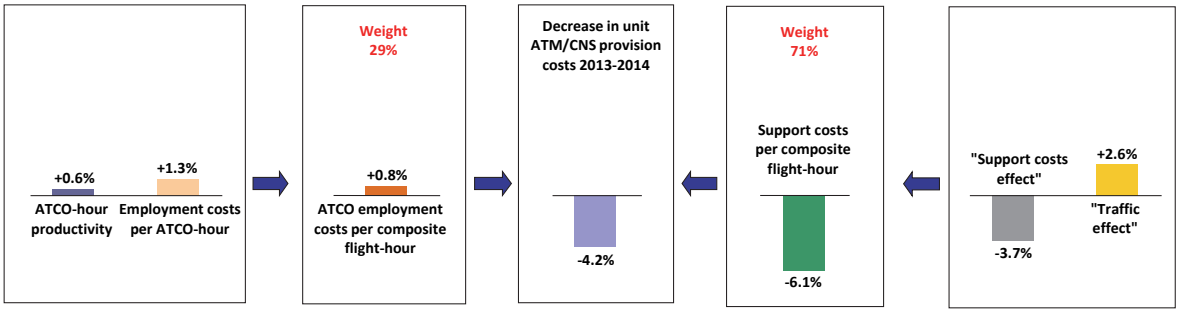
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

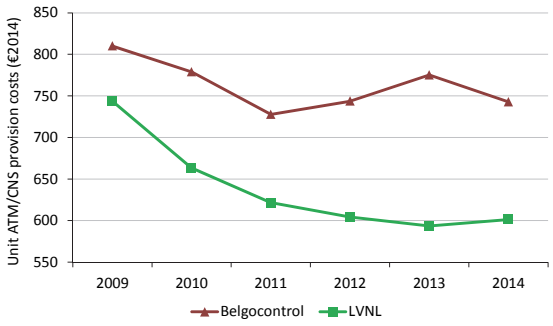


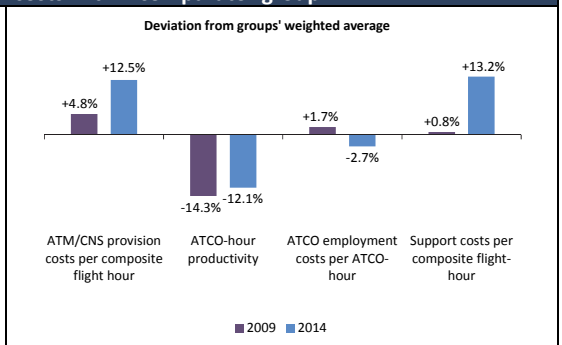
Changes in financial cost-effectiveness (2013-2014)



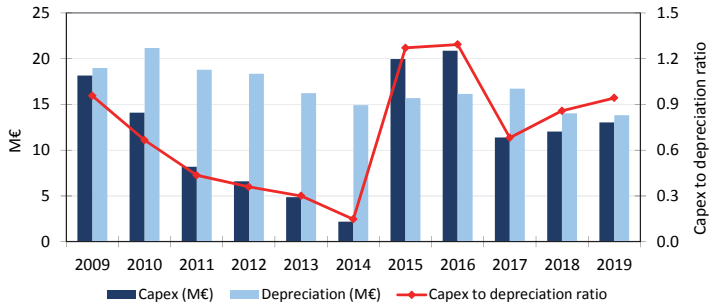
Belgocontrol (Belgium) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

BULATSA (Bulgaria) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 1.956 BGN

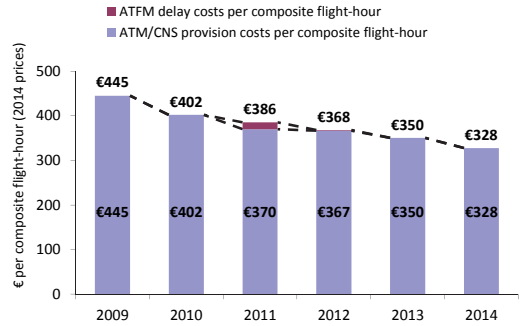
BULATSA represents 1.0% of European system gate-to-gate ATM/CNS provision costs

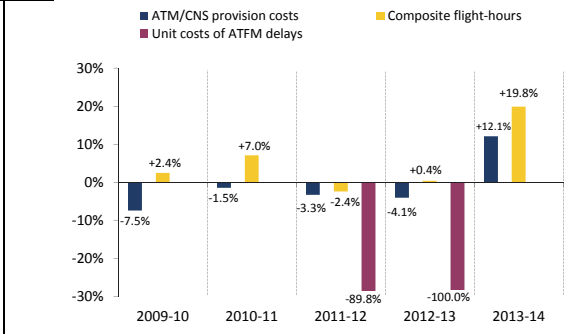
Operational conditions

Aggregated complexity score:

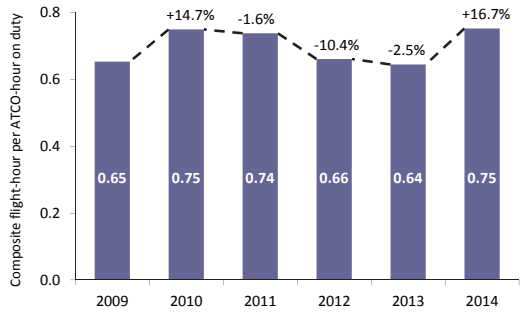
Seasonal traffic variability:

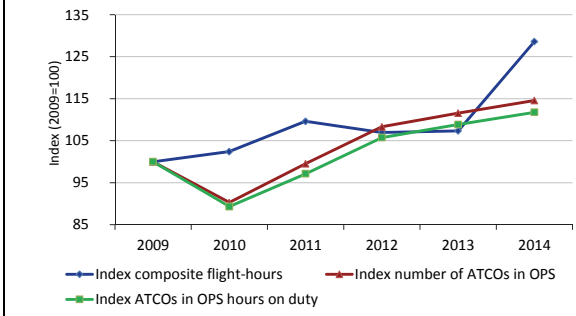
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



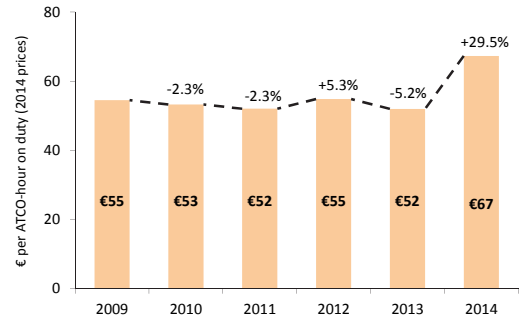


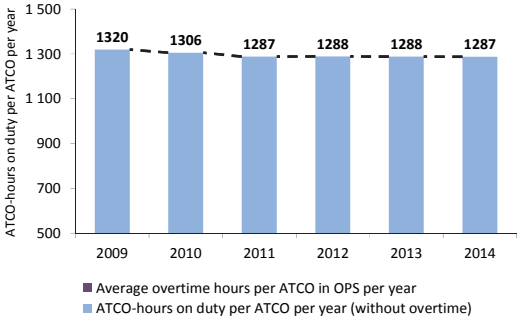
Trend in gate-to-gate ATCO-hour productivity



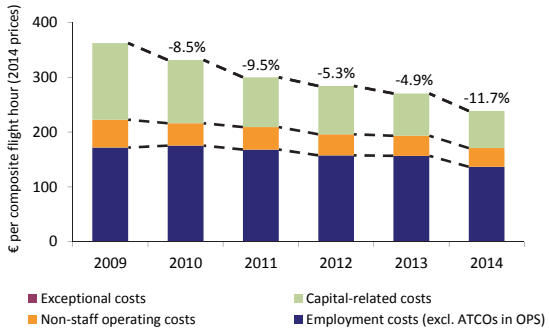


Trend in gate-to-gate employment costs per ATCO-hour

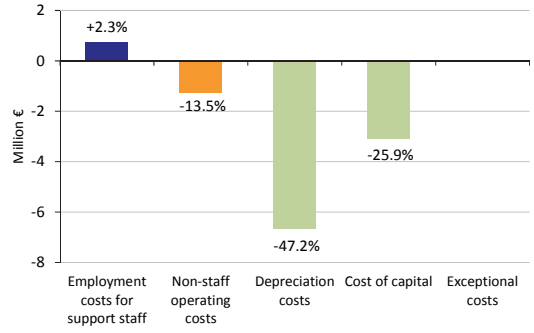




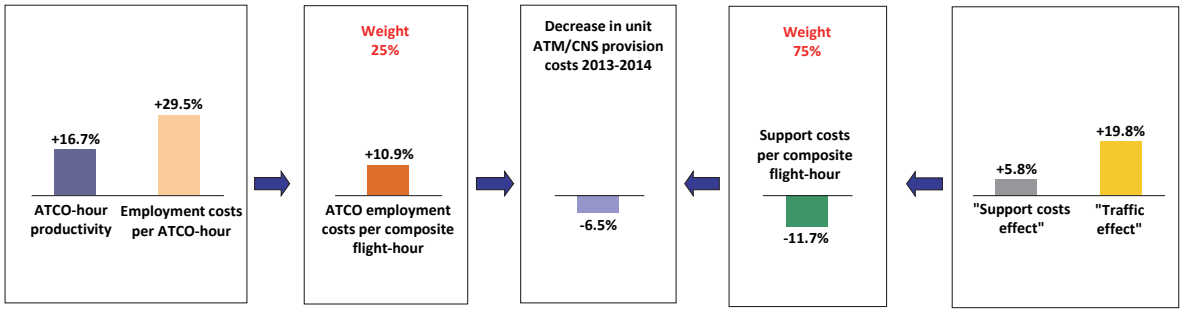
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

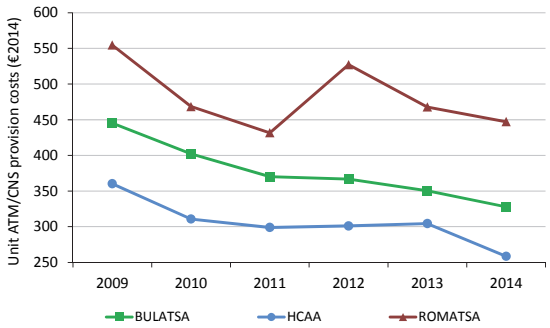


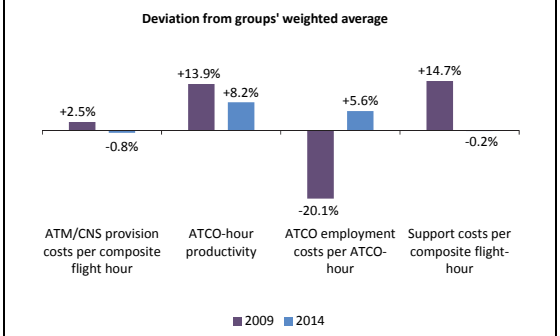
Changes in financial cost-effectiveness (2013-2014)



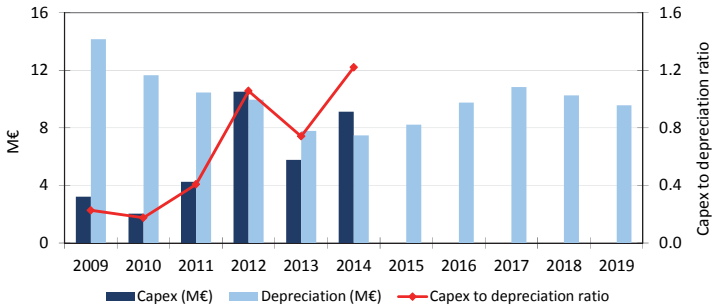
BULATSA (Bulgaria) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

Croatia Control (Croatia) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 7.632 HRK

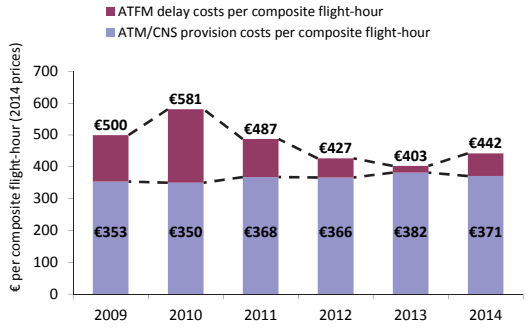
Croatia Control represents 1.1% of European system gate-to-gate ATM/CNS provision costs

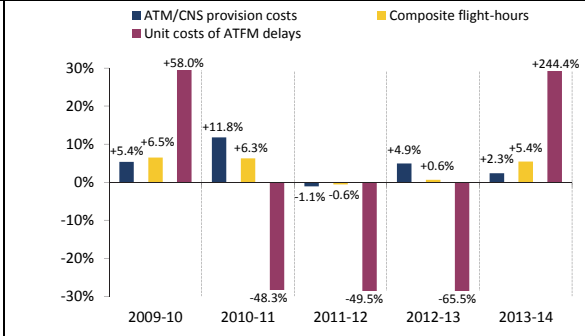
Operational conditions

Aggregated complexity score: Min — Max

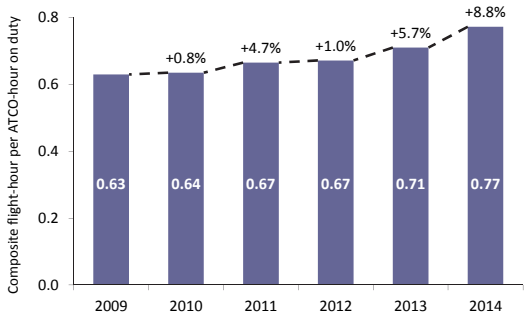
Seasonal traffic variability: Min — Max

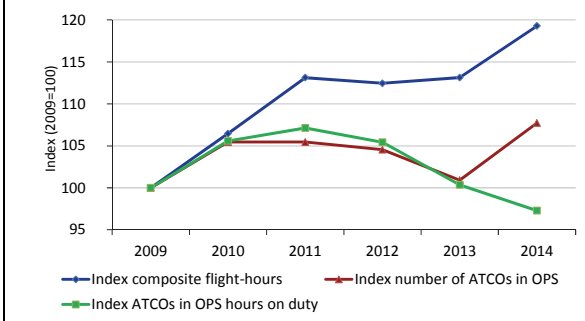
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



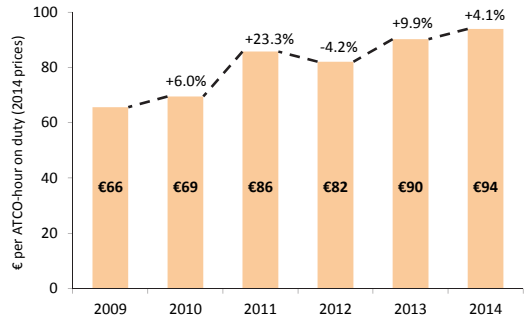


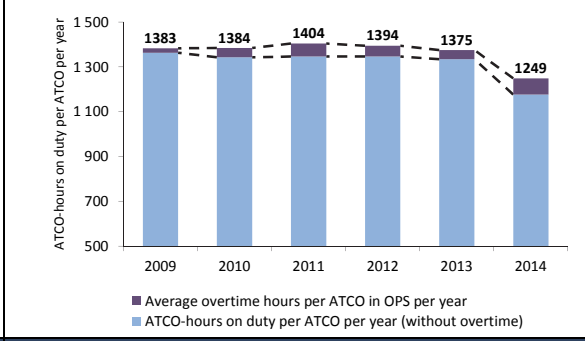
Trend in gate-to-gate ATCO-hour productivity



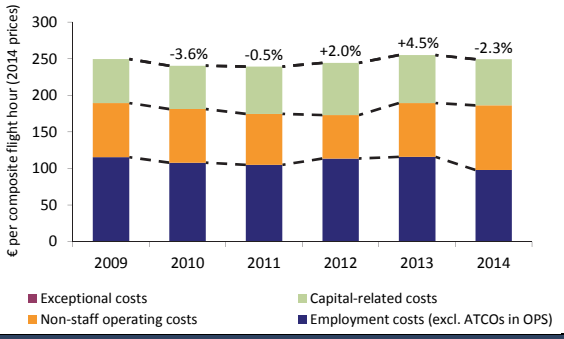


Trend in gate-to-gate employment costs per ATCO-hour

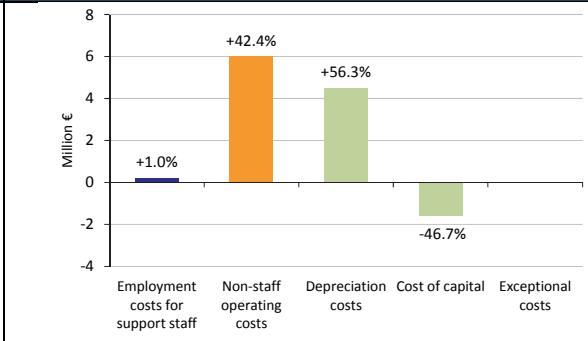




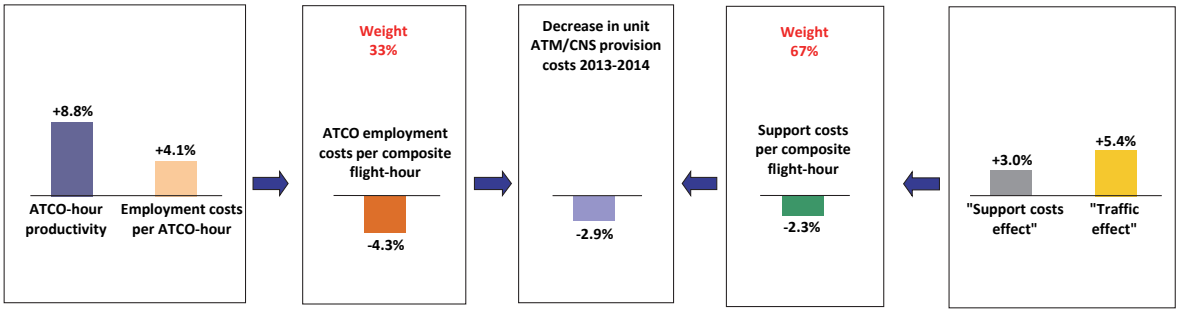
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

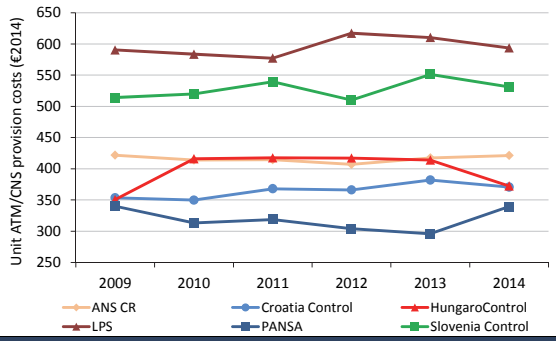


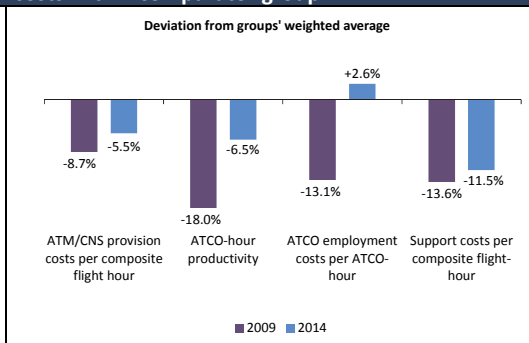
Changes in financial cost-effectiveness (2013-2014)



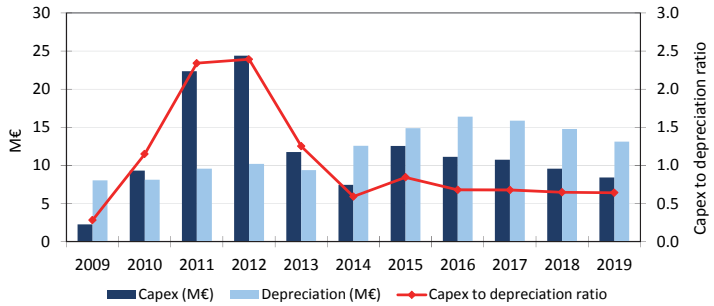
Croatia Control (Croatia) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2014*	C: 2014*	C: 2014*	C: 2014*
€47.6M	€15.0M (2004-2019)	€2.6M (2008-2013)	€3.2M	€1.5M	€1.3M	2009				
						2010				
						2011				
						2012				
						2013				
						2014				
€21.4M		€5.0M (2015-2019)	€3.1M	€7.0M	€10.0M	2015				
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	CroATMS/COOPANS Upgrade	ATM	38.4	2011	2014
2	ATM System Upgrade	ATM	17.7	2015	2019
3	CroATM (FMTP)Upgrade and Extension to Regional ATC Centres-Phase 1	ATM	8.0	2009	2011
4	Reconstruction of Old Buildings (RP2)	Buildings	7.0	2015	2019
5	VOICE-COM Systems Modernization and Replacement Project	COM	5.5	2015	2019

DCAC Cyprus (Cyprus) – Cost-effectiveness KPIs (€2014)

Contextual economic information

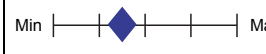
Exchange rate: Cyprus is within the EURO Zone

DCAC Cyprus represents 0.5% of European system gate-to-gate ATM/CNS provision costs

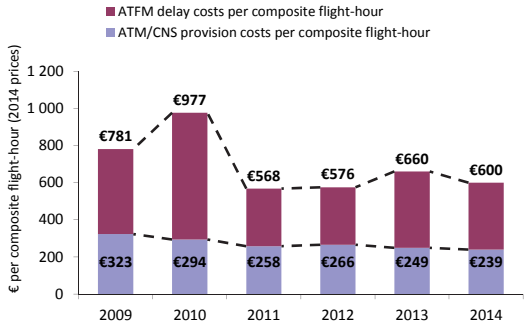
Operational conditions

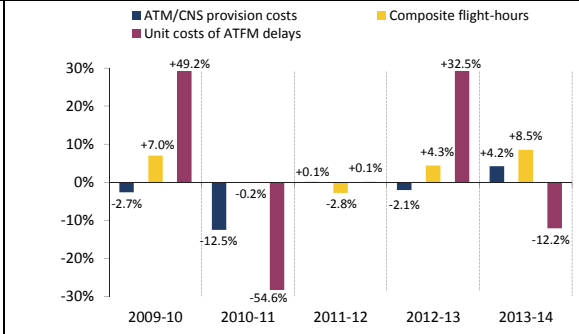
Aggregated complexity score:

Seasonal traffic variability:

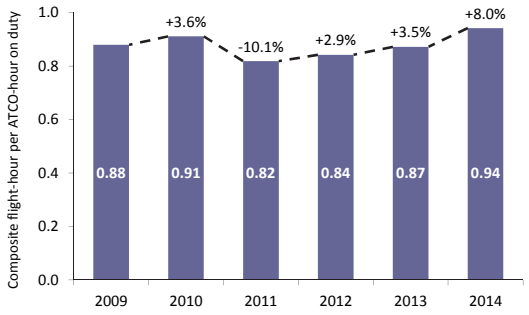


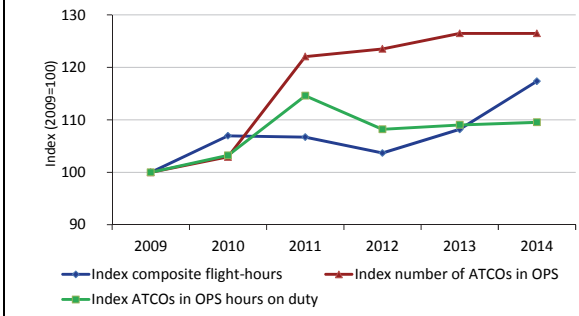
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



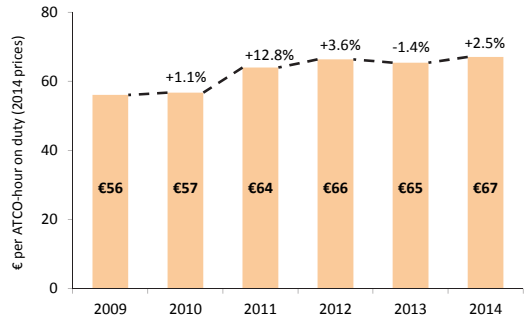


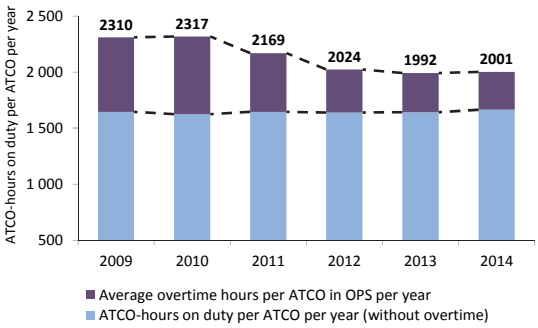
Trend in gate-to-gate ATCO-hour productivity



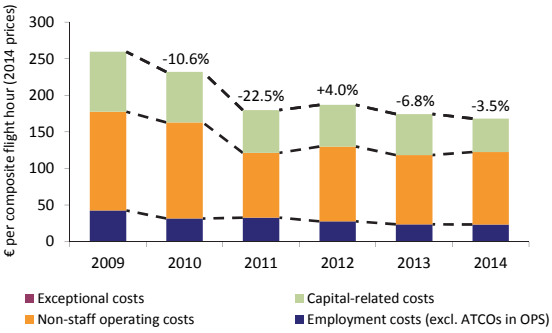


Trend in gate-to-gate employment costs per ATCO-hour

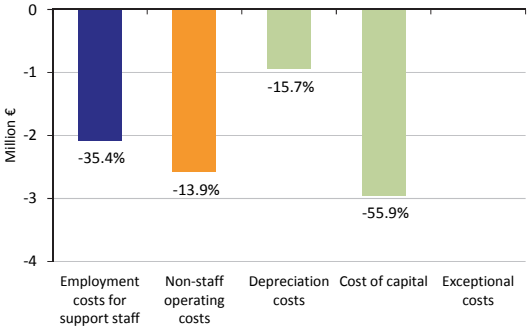




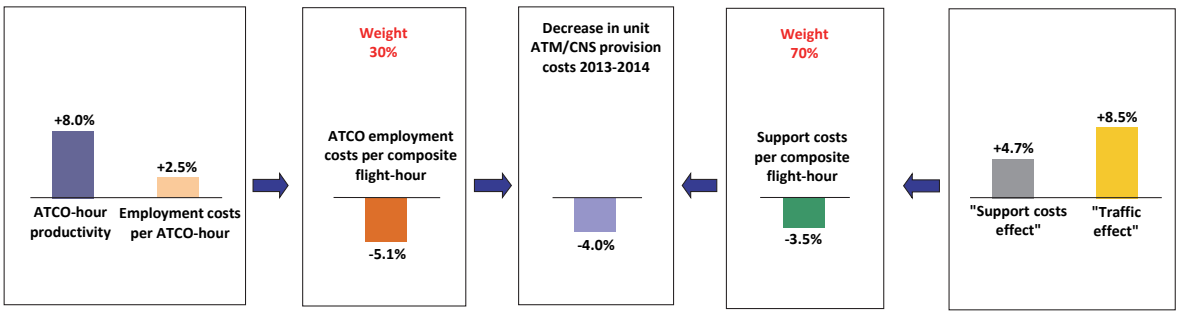
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

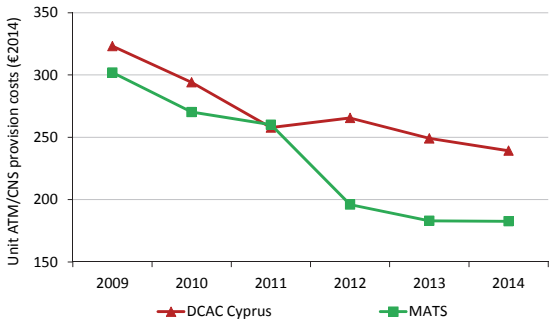


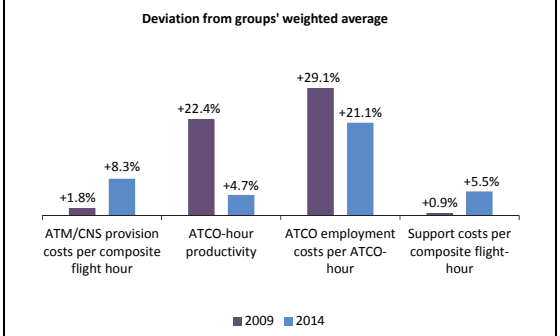
Changes in financial cost-effectiveness (2013-2014)



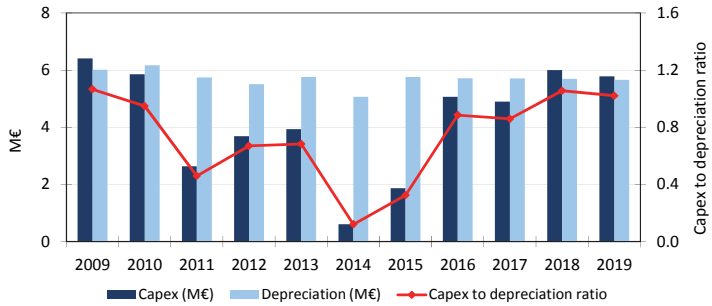
DCAC Cyprus (Cyprus) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2013*	C: 2013*	C: 2013*	C: 1998*
€19.5M (2003-2010)				€8.9M (2006-2010)		2009				
						2010				
€5.1M		€1.3M	€13.5M (2006-2018)			2011				
						2012				
	€8.1M					2013				
						2014				
€0.7M						2015				
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Implementation of new ATM systems and purchase of new equipment in Nicosia ACC (LEFCO)	ATM	19.5	2003	2010
2	New Air Traffic Control Building in Nicosia	Buildings	8.9	2006	2010
3	Radar updates in Kiona	SUR	8.4	2006	2014
4	DATALINK	COM	4.0	2017	2018
5	Replacement of Lara SSR and installation of SSR at LCPH	SUR	3.1	2016	2017

DFS (Germany) – Cost-effectiveness KPIs (€2014)

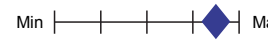
Contextual economic information

Exchange rate: Germany is within the EURO Zone

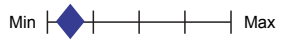
DFS represents 13.1% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

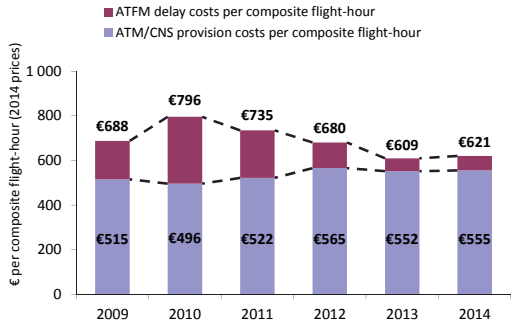
Aggregated complexity score:

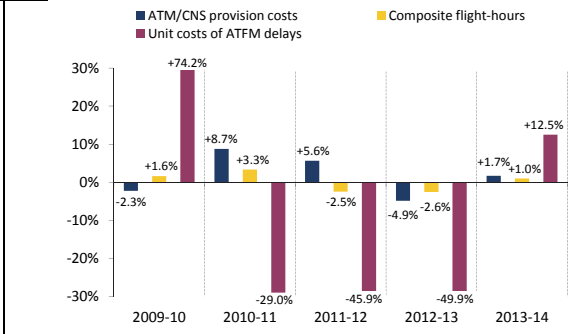


Seasonal traffic variability:

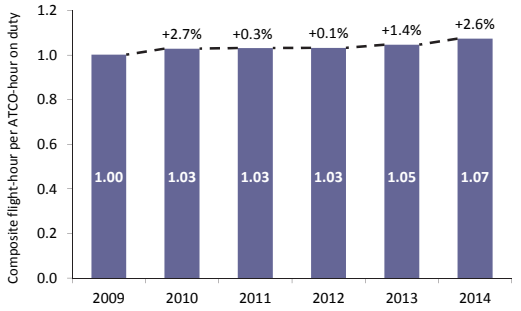


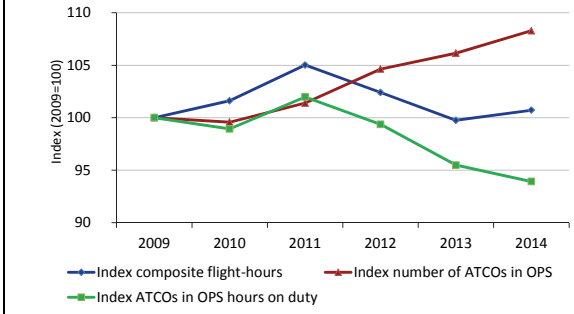
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



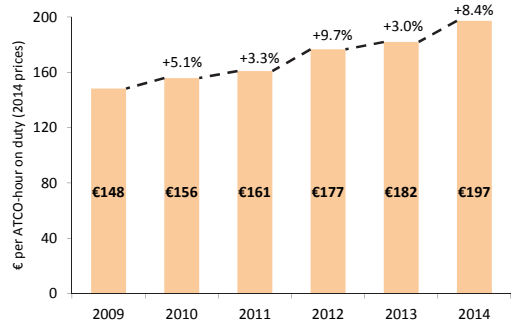


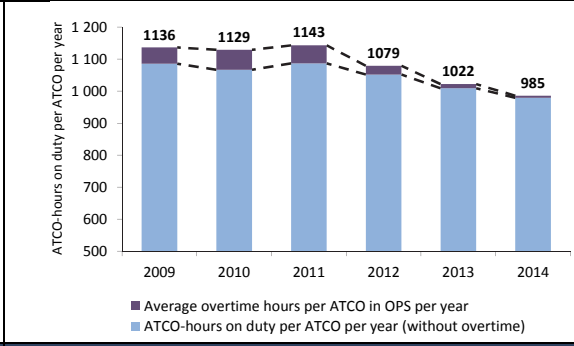
Trend in gate-to-gate ATCO-hour productivity



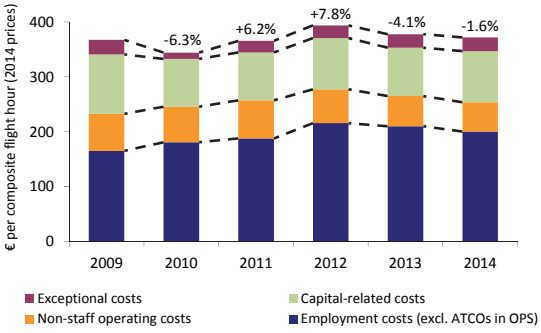


Trend in gate-to-gate employment costs per ATCO-hour

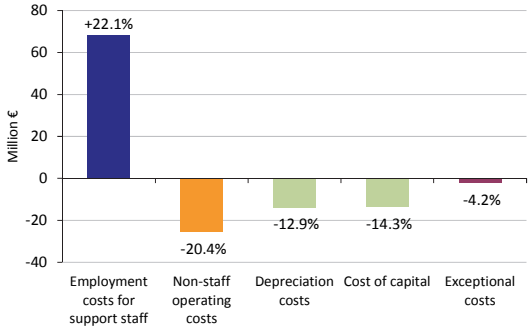




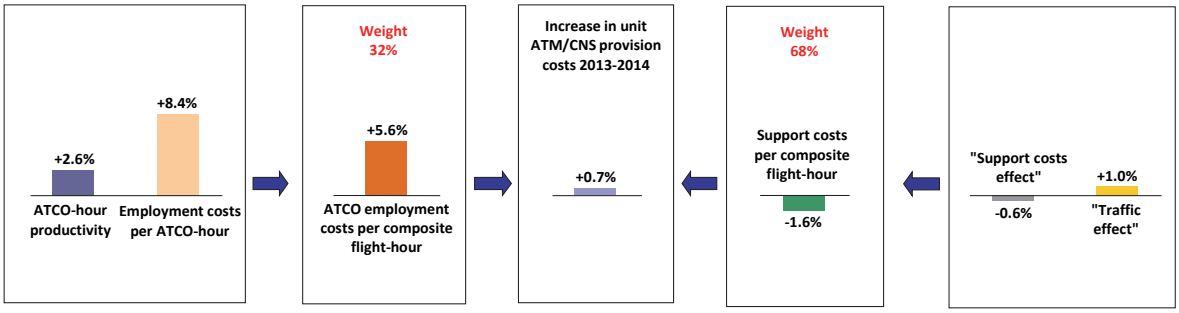
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

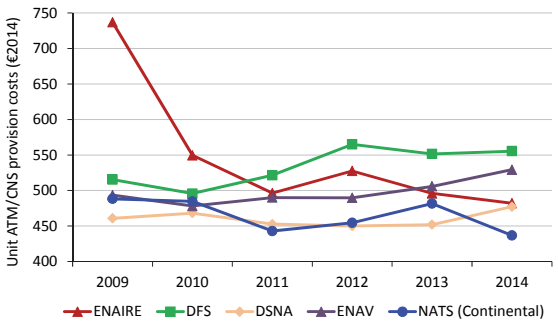


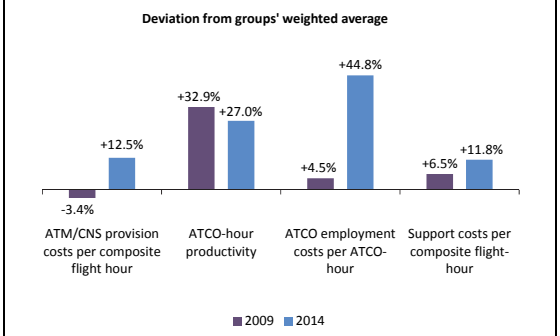
Changes in financial cost-effectiveness (2013-2014)



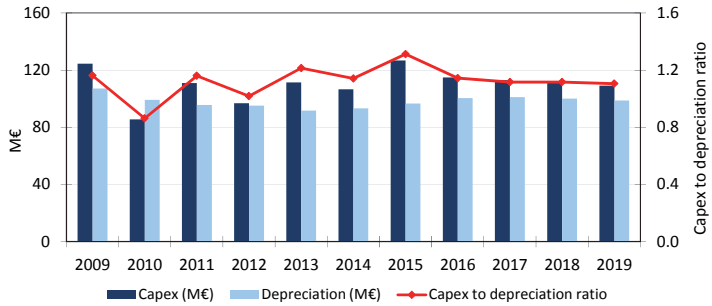
DFS (Germany) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS C: 2010 (Karl.) 2004 (Bremen) 1999 (Langen) 1999 (München)*	RDPS C: 2010 (Karl.) 2004 (Bremen) 1999 (Langen) 1999 (München)*	HMI C: 2010 (Karl.) 2008 (Bremen) 1999 (Langen) 1999 (München)*	VCS C: 2009 (Karl.) 2003 (Bremen) 2013 (Langen) 2002 (München)*
€416.7M (2004-2023)	€111.2M (2007-2020)	€55.3M (1999-2022)	€187.2M (2006-2032)	€170.4M		2009				Karlsruhe
										Bremen
						2010	Karlsruhe	Karlsruhe	Karlsruhe	
					€47.5M	2011			München	
						2012				
						2013			München	
						2014	Bremen	Bremen	Bremen	
						2015	Karlsruhe, Bremen	Bremen	Karlsruhe, München, Bremen	Langen
							Langen	Langen		München
						2016	München	München		
						2017	Karlsruhe	Karlsruhe	Karlsruhe, Langen	Bremen
						2018				
						2019	Bremen	Bremen	Bremen	

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Programme iCAS	ATM	281.0	2006	2023
2	MaRS - Modernisation and Replacement of Surveillance Infrastructure	SUR	160.3	2012	2032
3	Rasum 8.33 kHz	COM	62.8	2007	2020
4	ILS (Instrument Landing System)	NAV	55.3	1999	2022
5	Extension of München ACC	Buildings	51.8	2008	2015

DHMI (Turkey) – Cost-effectiveness KPIs (€2014)

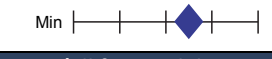
Contextual economic information

Exchange rate: 1 EUR = 2.903 TRY

DHMI represents 4.8% of European system gate-to-gate ATM/CNS provision costs

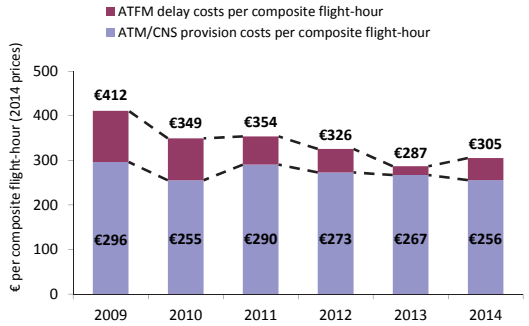
Operational conditions

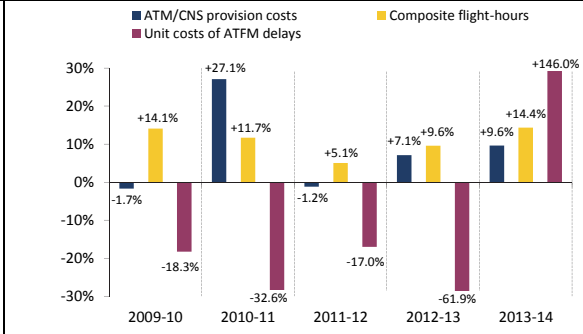
Aggregated complexity score:



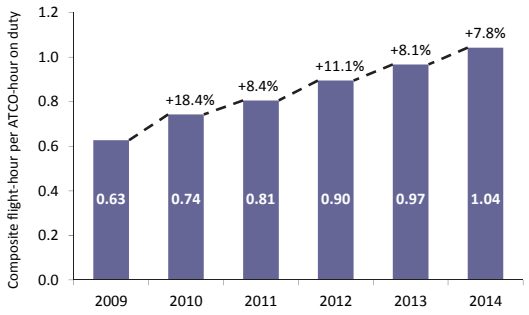
Seasonal traffic variability:

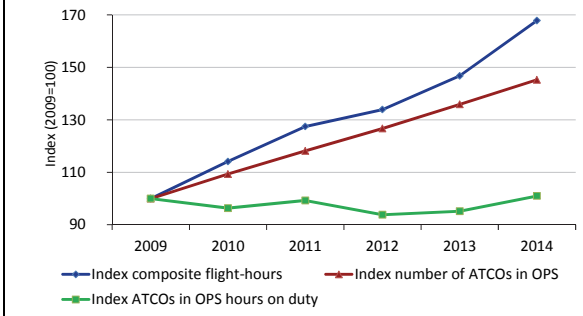
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



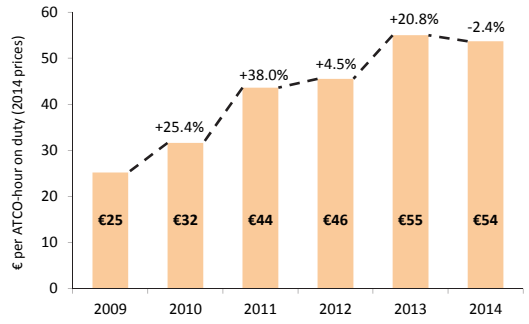


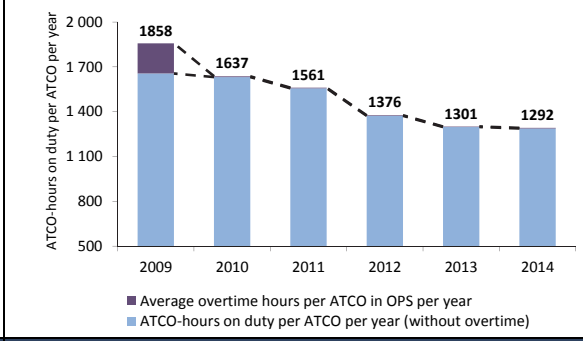
Trend in gate-to-gate ATCO-hour productivity



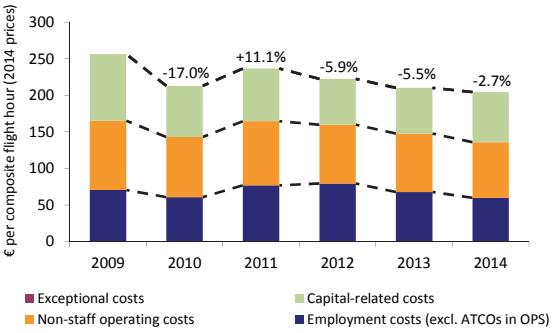


Trend in gate-to-gate employment costs per ATCO-hour

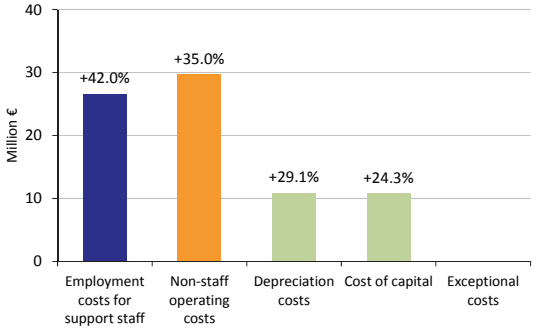




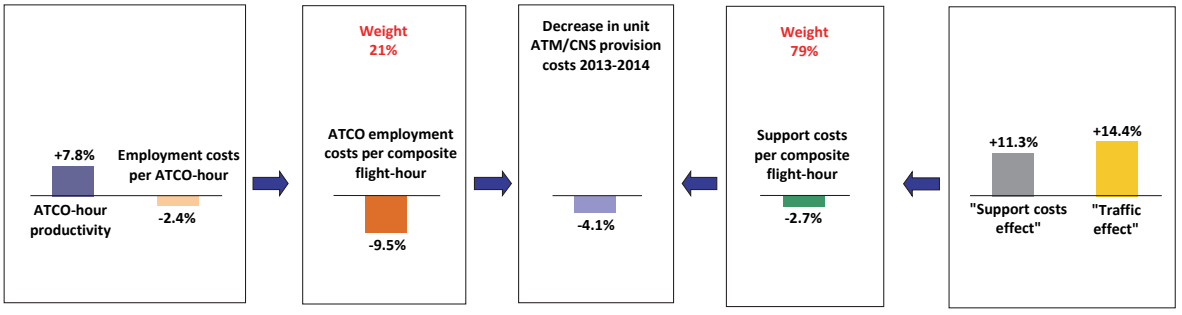
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

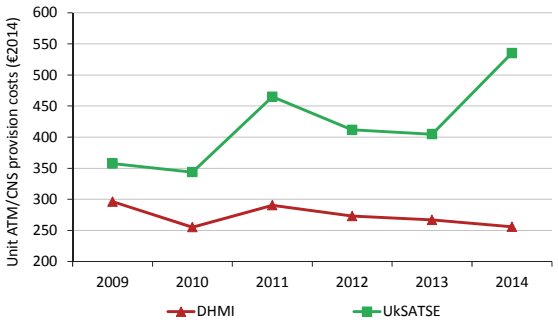


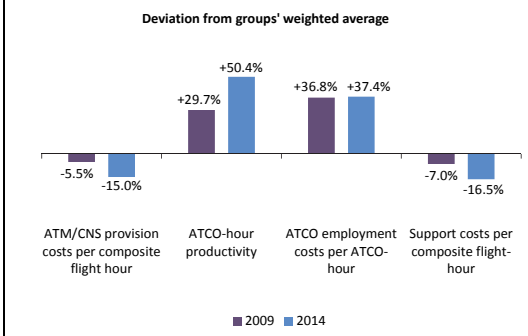
Changes in financial cost-effectiveness (2013-2014)



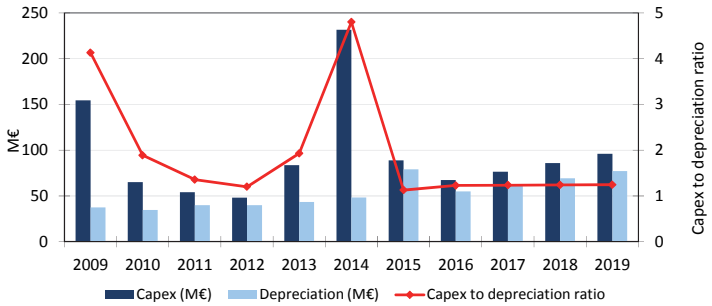
DHMI (Turkey) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2008 (All ACCs)*	C: 2008 (All ACCs)*	C: 2008 (All ACCs)*	C: 2014 (All ACCs)*
						2009				
						2010				
						2011				All ACCs
			€94.1M (2008-2016)			2012	All ACCs	All ACCs	All ACCs	
	€45.4M	€43.0M			€4.9M	2013				
€233.4.0M (2008-2019)				€55.8M (2008-2019)		2014				All ACCs
						2015	All ACCs	All ACCs	All ACCs	
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	SMART (Systematic Modernization of ATM Resources in Turkey)	ATM	117.1	2008	2016
2	Air Traffic System R & D Projects	ATM	67.4	2010	2019
3	Air navigation communication and terminal systems periodic modernisation	COM	45.4	2010	2016
4	Replacement of existing radars and procurement of additional radars	SUR	44.3	2008	2015
5	Purchase of new Radar Data Processing and Flight Data Processing systems, new Human Machine Interface and Controller Working Positions	ATM	36.1	2009	2014

DSNA (France) – Cost-effectiveness KPIs (€2014)

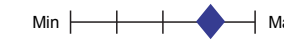
Contextual economic information

Exchange rate: France is within the EURO Zone

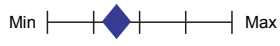
DSNA represents 15.7% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

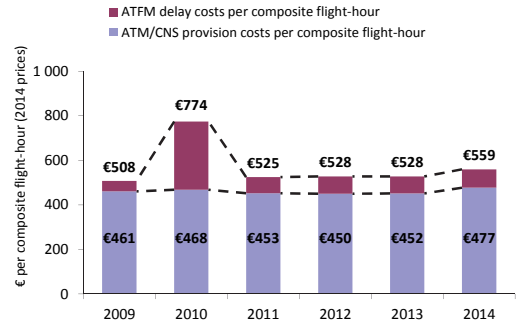
Aggregated complexity score:

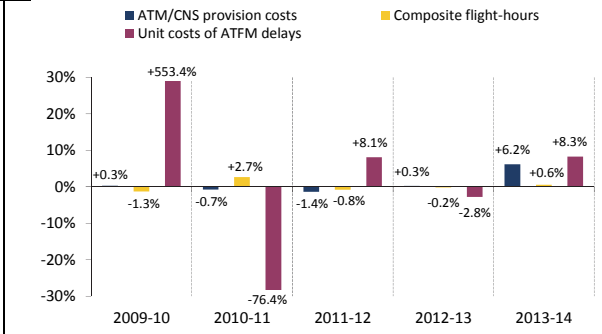


Seasonal traffic variability:

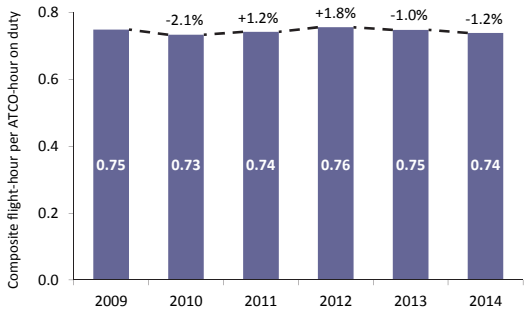


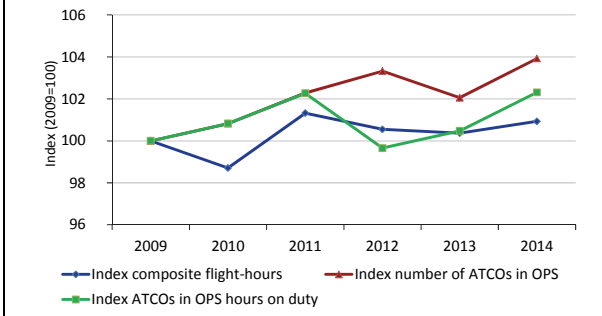
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



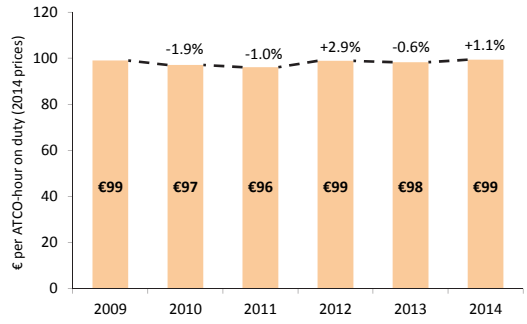


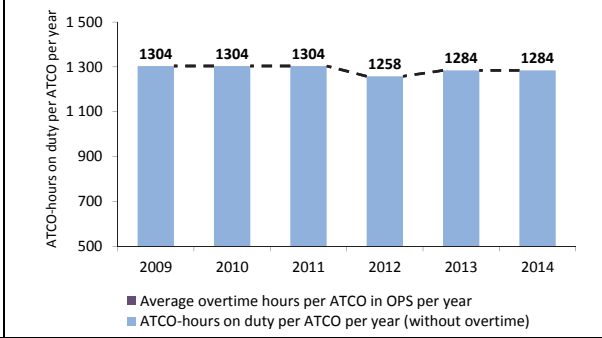
Trend in gate-to-gate ATCO-hour productivity



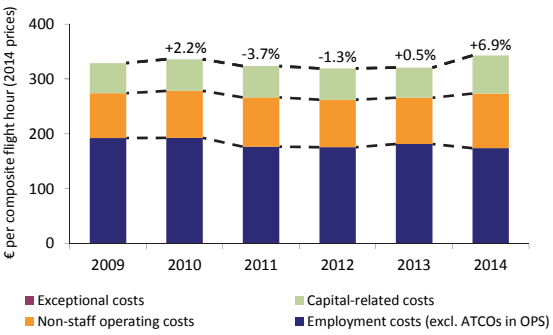


Trend in gate-to-gate employment costs per ATCO-hour

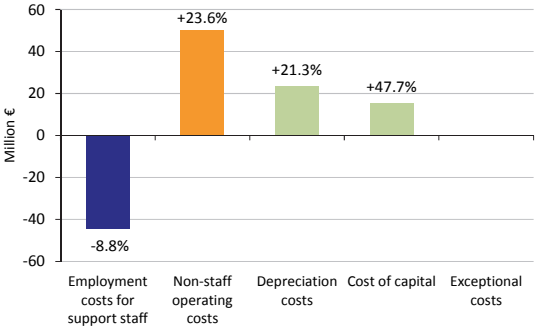




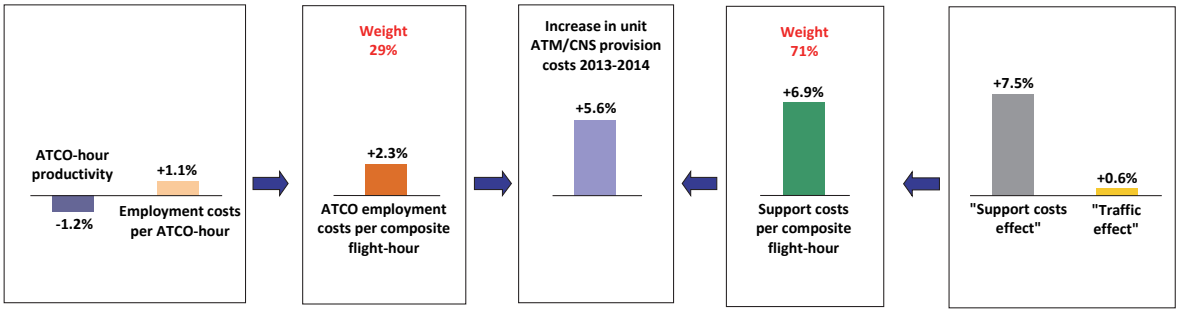
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

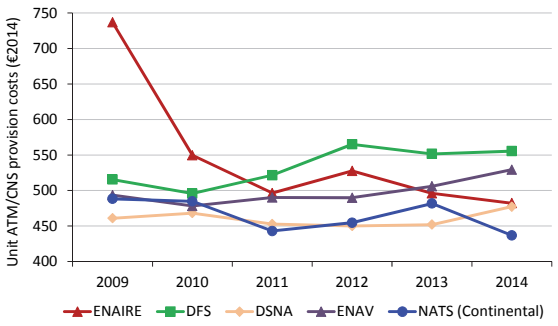


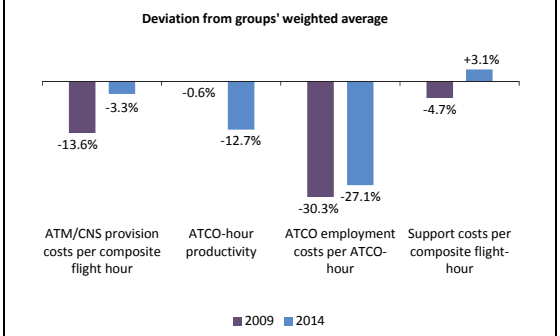
Changes in financial cost-effectiveness (2013-2014)



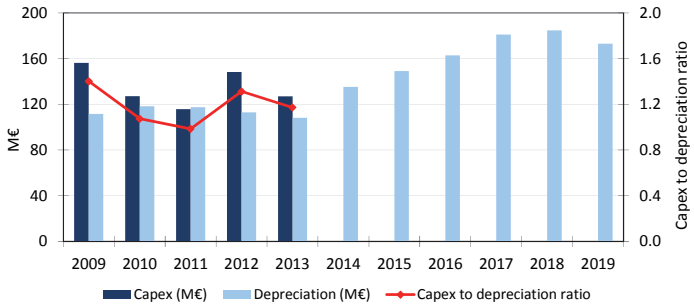
DSNA (France) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

EANS (Estonia) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: Estonia is within the EURO Zone

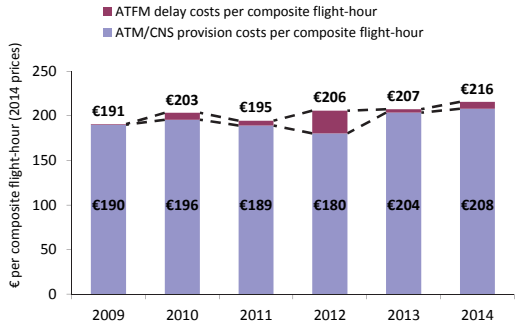
EANS represents 0.2% of European system gate-to-gate ATM/CNS provision costs

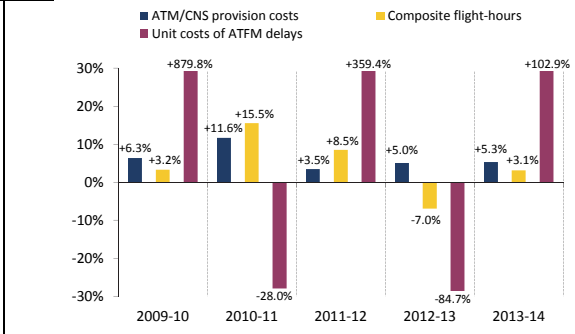
Operational conditions

Aggregated complexity score:

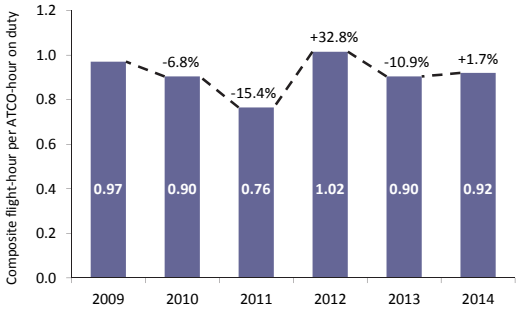
Seasonal traffic variability:

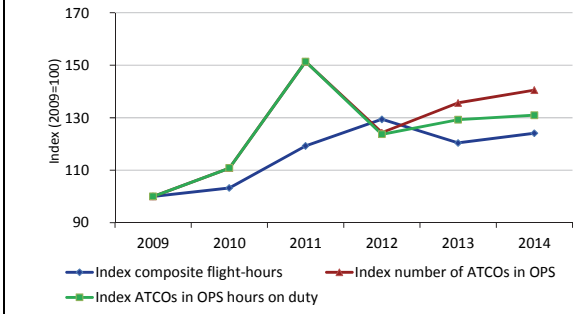
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



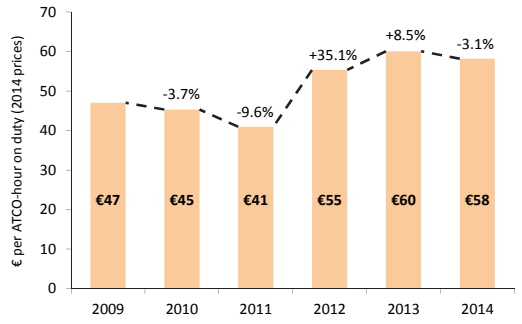


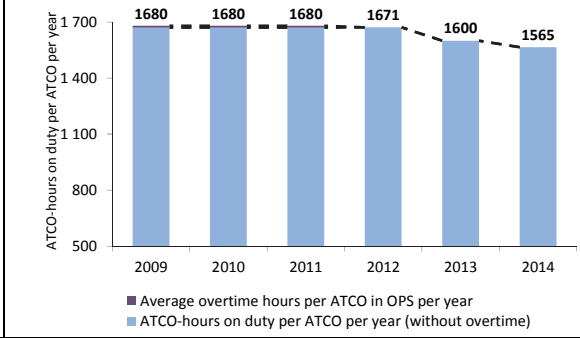
Trend in gate-to-gate ATCO-hour productivity



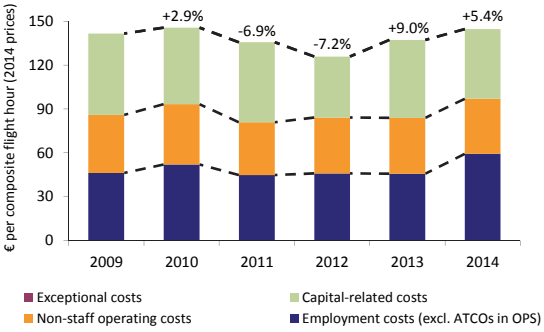


Trend in gate-to-gate employment costs per ATCO-hour

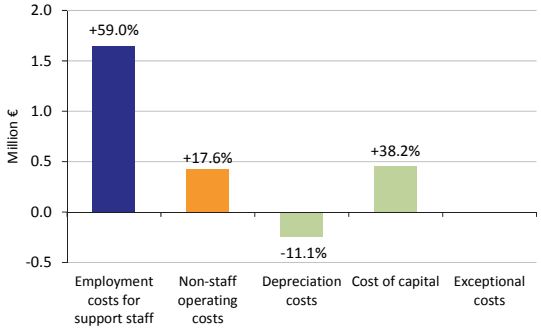




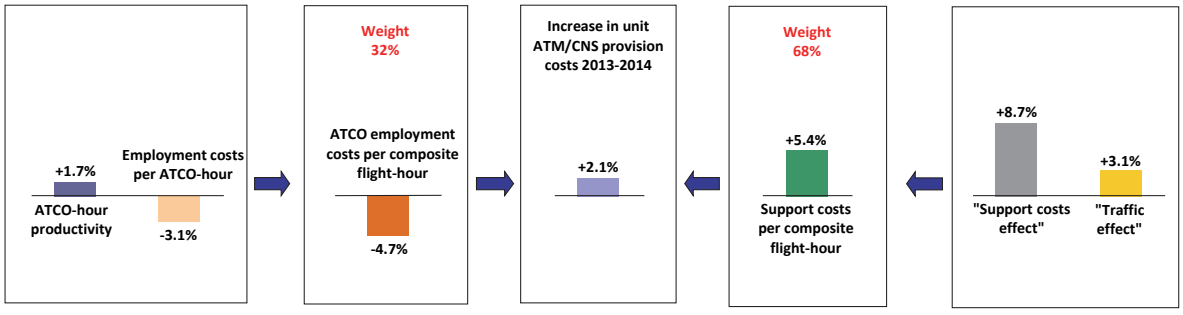
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

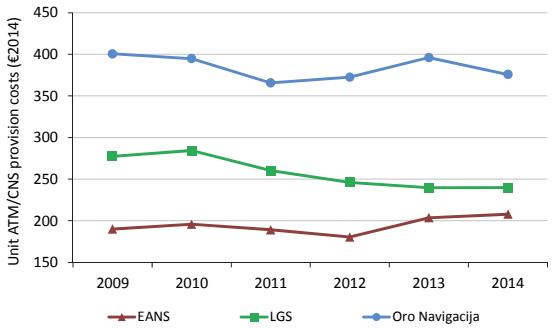


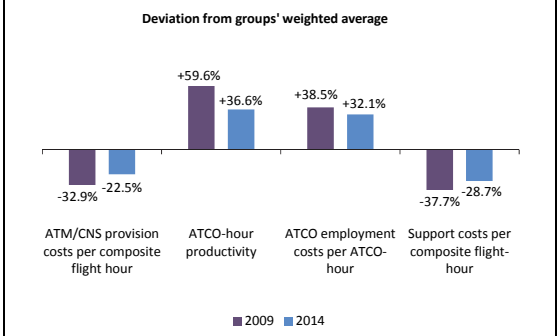
Changes in financial cost-effectiveness (2013-2014)



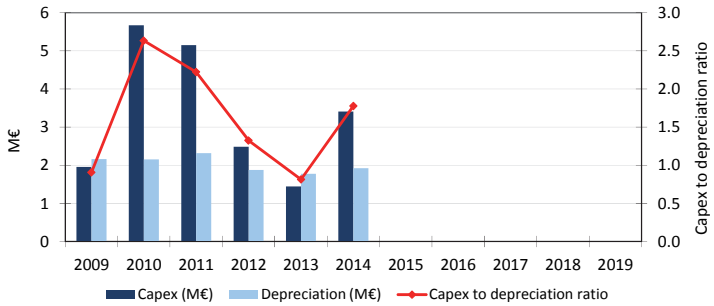
EANS (Estonia) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

ENAIRE (Spain) – Cost-effectiveness KPIs (€2014)

Contextual economic information

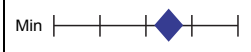
Exchange rate: Spain is within the EURO Zone

ENAIRE represents 9.7% of European system gate-to-gate ATM/CNS provision costs

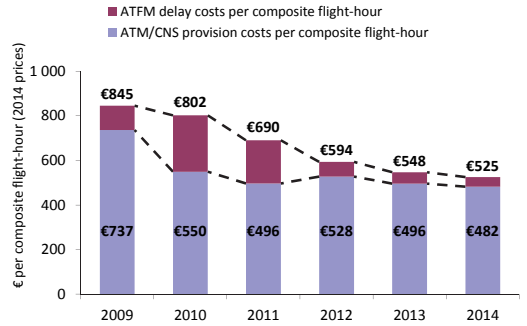
Operational conditions

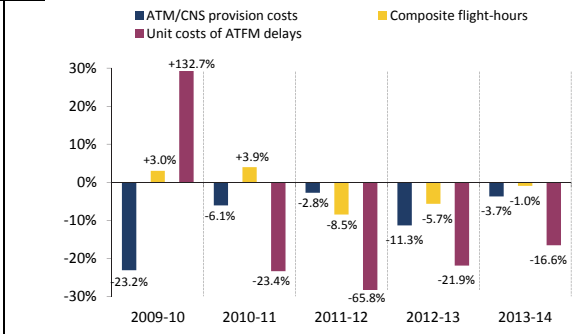
Aggregated complexity score:

Seasonal traffic variability:

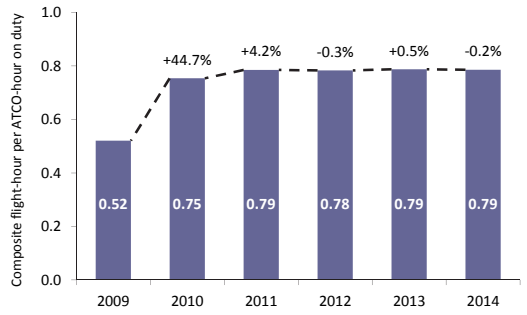


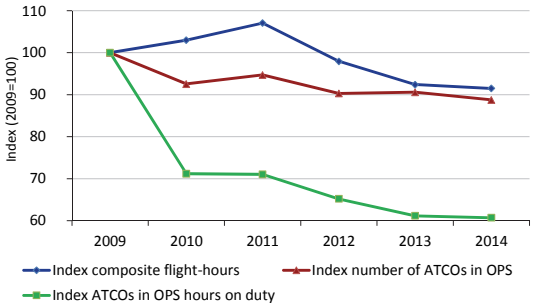
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



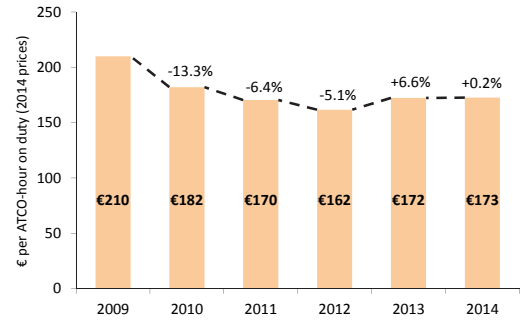


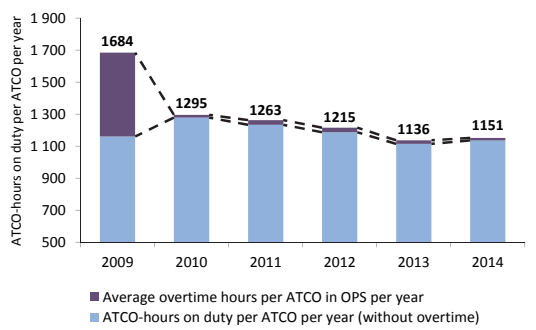
Trend in gate-to-gate ATCO-hour productivity



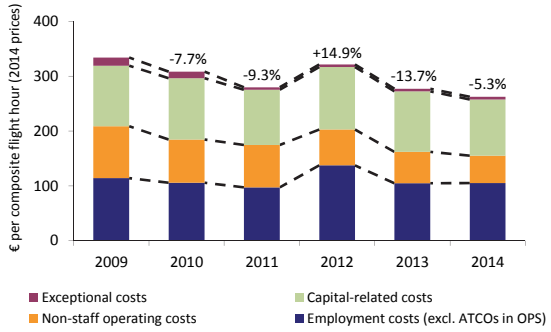


Trend in gate-to-gate employment costs per ATCO-hour

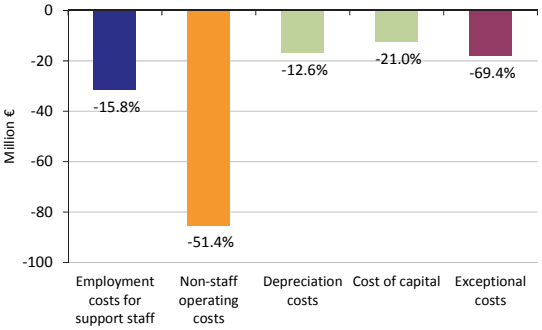




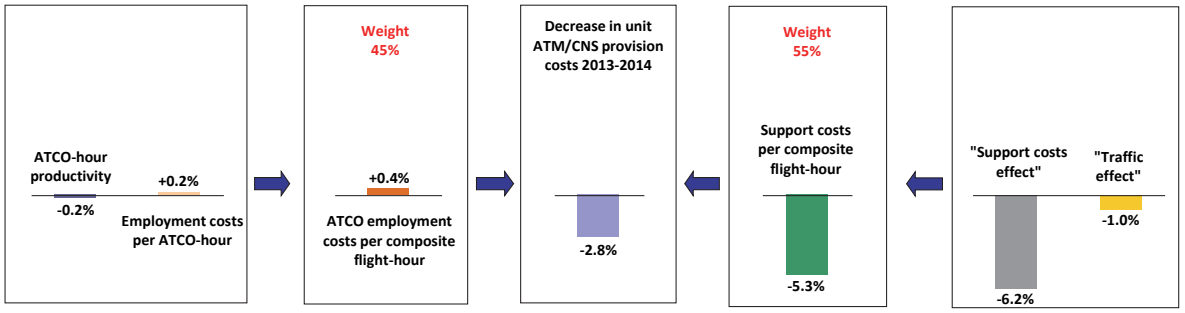
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

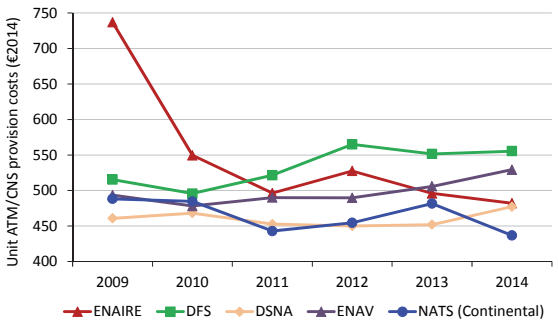


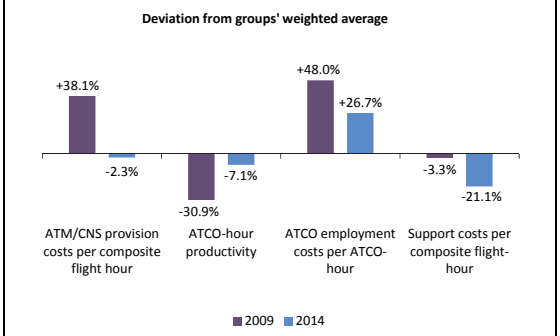
Changes in financial cost-effectiveness (2013-2014)



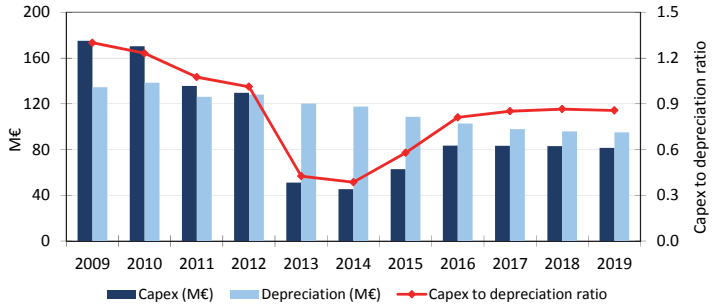
ENAIRE (Spain) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	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)*
						2009				Canarias, Palma
						2010	All ACCs	All ACCs	All ACCs	Barcelona
						2011				Madrid, Sevilla
						2012	All ACCs	All ACCs	All ACCs	
						2013				
						2014				Canarias
€170.3M	€54.8M	€34.8M	€17.8M		€98.9M	2015				Canarias
						2016	Barcelona, Canarias, Madrid, Palma, Sevilla	Barcelona, Canarias, Madrid, Palma, Sevilla	Barcelona, Canarias, Madrid, Palma, Sevilla	
						2017				Madrid
						2018				Barcelona
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	iTEC – Flight Data Processing	ATM/NAV	50.8	2015	2019
2	COMETA – Voice over Internet Protocol	ATM/NAV	42.8	2015	2019
3	SURVEILLANCE EVOLUTION – Mode-S, ADS-B	SUR	17.8	2015	2019
4	REDAN – Data Network	ATM/COM/NAV	16.1	2015	2019
5	833 – Communication Channels	ATM/COM/NAV	11.4	2015	2019

ENAV (Italy) – Cost-effectiveness KPIs (€2014)

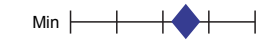
Contextual economic information

Exchange rate: Italy is within the EURO Zone

ENAV represents 8.8% of European system gate-to-gate ATM/CNS provision costs

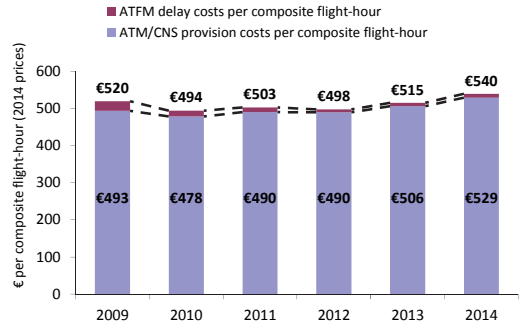
Operational conditions

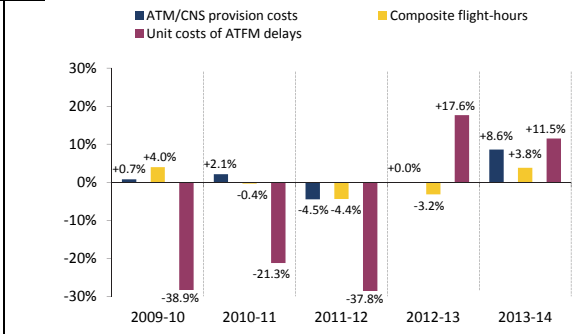
Aggregated complexity score:



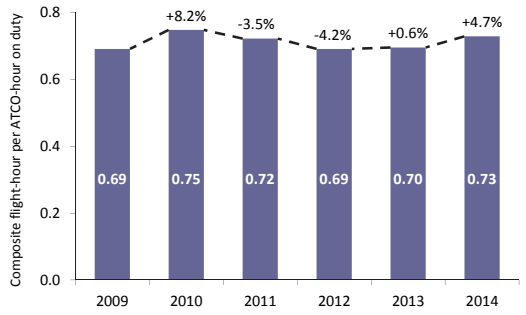
Seasonal traffic variability:

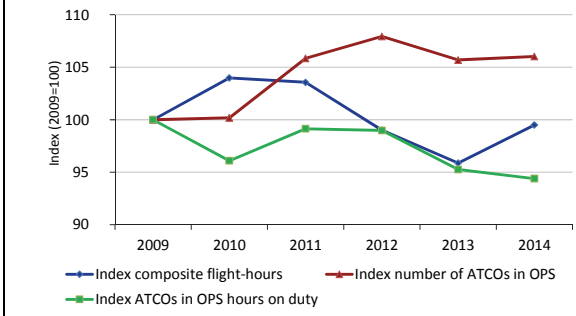
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



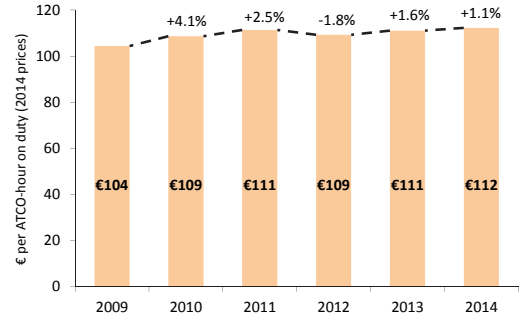


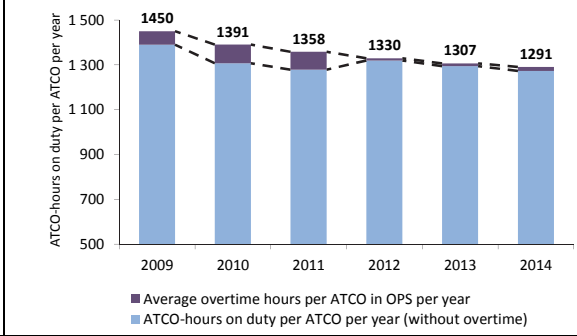
Trend in gate-to-gate ATCO-hour productivity



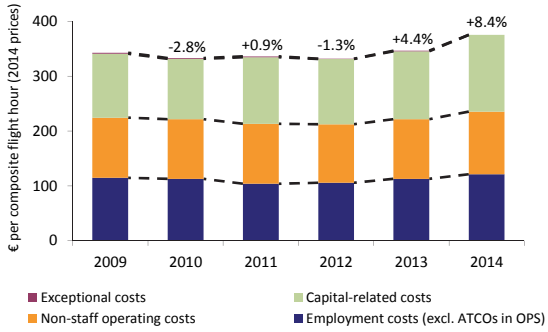


Trend in gate-to-gate employment costs per ATCO-hour

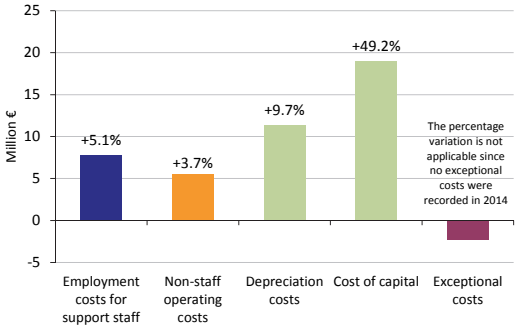




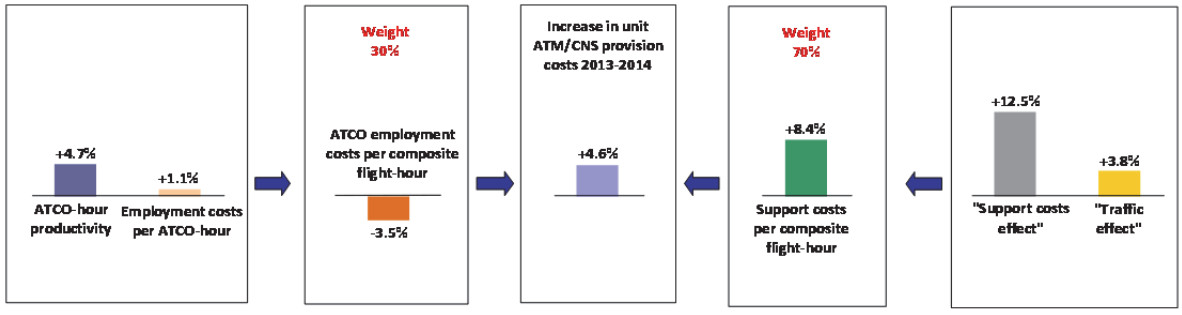
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

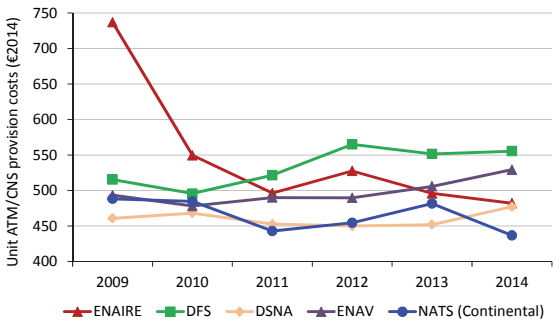


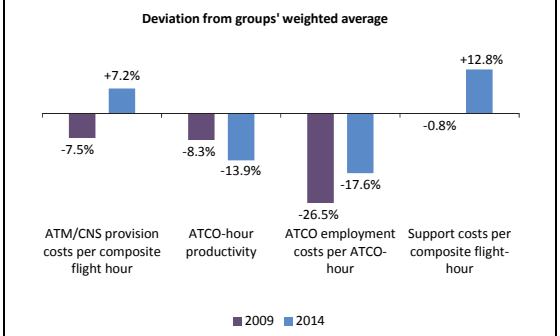
Changes in financial cost-effectiveness (2013-2014)



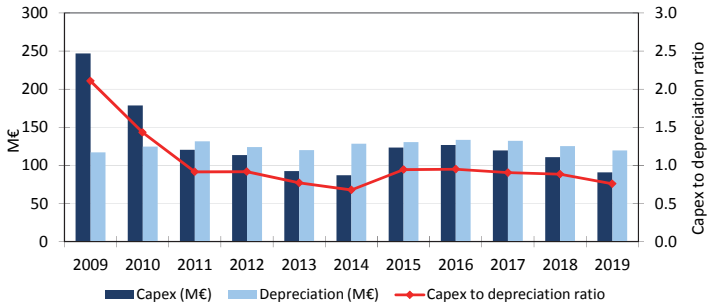
ENAV (Italy) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

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, Mil.)*
						2009				
						2010				
						2011				
						2012				
						2013				
						2014				
€188.3M	€71.3M	€1.3M	€32.3M		€430.1M	2015	All ACCs	All ACCs	All ACCs	Roma
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Development of an integrated platform for the management of ATM procedures and aeronautical data (program 4-FLIGHT)	ATM	122.9	2015	2019
2	COFLIGHT (Automatic flight plan processing system forming the core of 4-FLIGHT)	ATM	30.7	2015	2019
3	Implementation of Datalink 2000+ system in all ACCs and major Italian airports	COM	28.9	2015	2017
4	ENET + ENET Completion	COM	25.7	2015	2019
5	Other projects	Other	430.1	2015	2019

Finavia (Finland) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: Finland is within the EURO Zone

Finavia represents 0.8% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

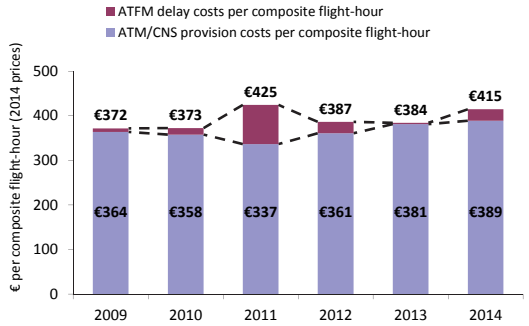
Aggregated complexity score:

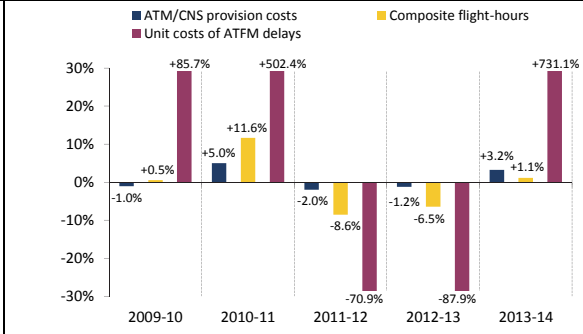
Min — Max

Seasonal traffic variability:

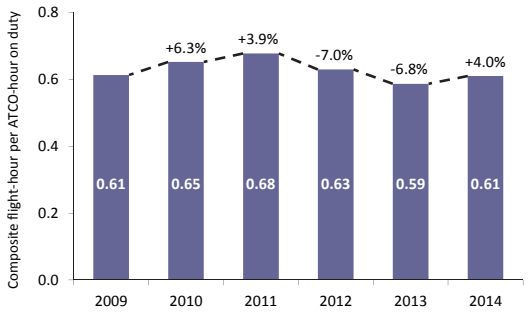
Min — Max

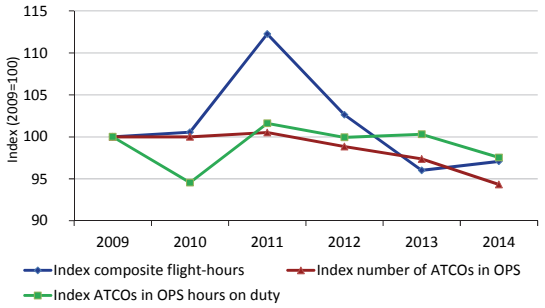
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



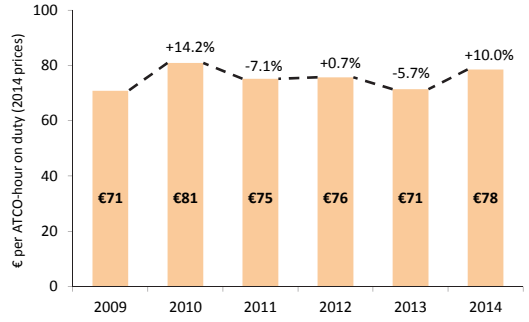


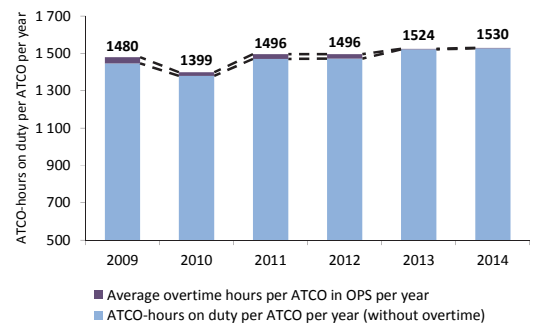
Trend in gate-to-gate ATCO-hour productivity



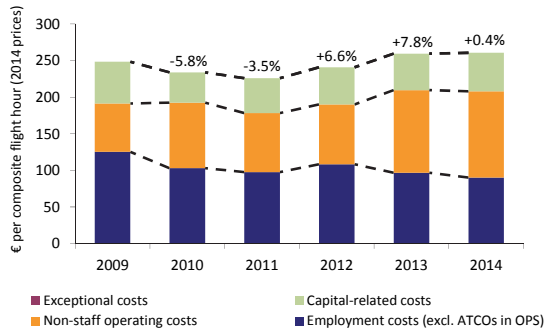


Trend in gate-to-gate employment costs per ATCO-hour

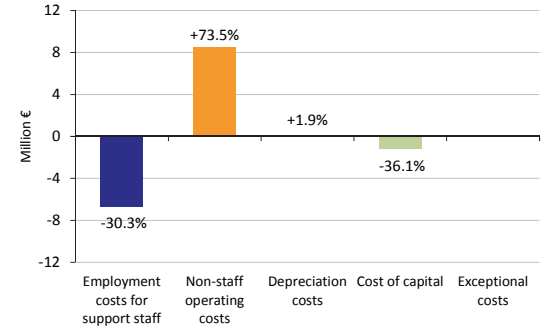




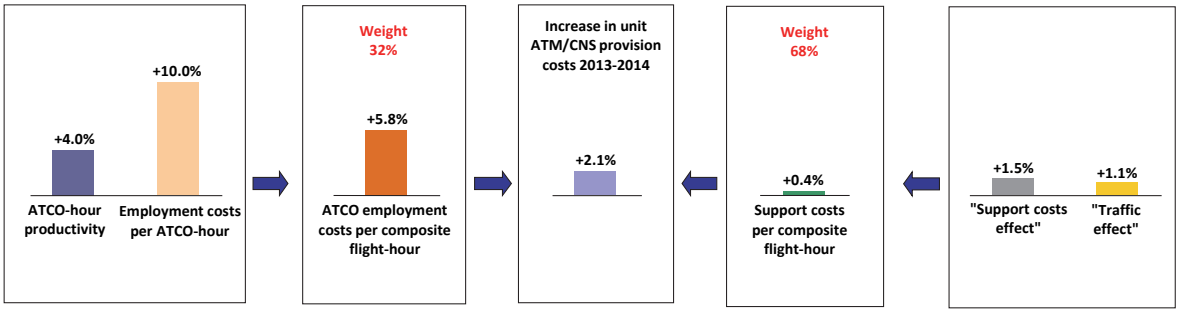
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

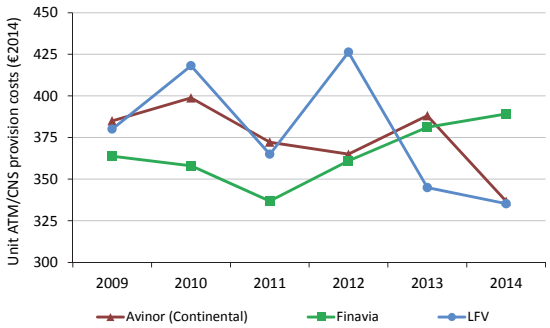


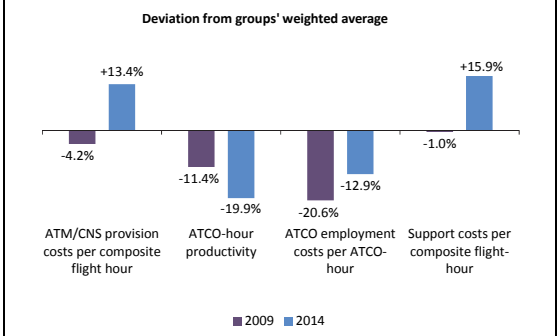
Changes in financial cost-effectiveness (2013-2014)



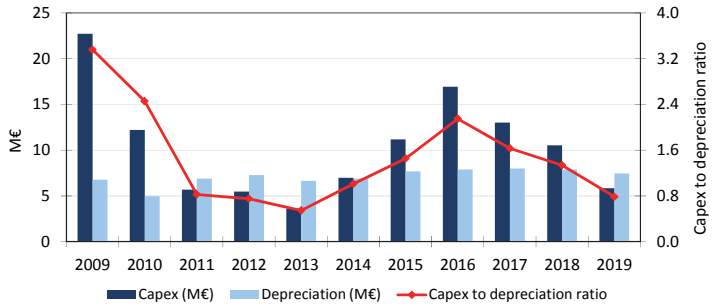
Finavia (Finland) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2012*	C: 2012*	C: 2012*	C: 2009*
						2009				
						2010				
€13.8M						2011				
	€1.0M					2012				
						2013				
						2014				
			€19.1M			2015				
€13.3M		€10.4M				2016				
	€14.0M					2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Replacement of ATM systems at Tampere and Helsinki Centres	ATM	13.8	2009	2013
2	ILS/DME renewal (all airports)	NAV	10.4	2014	2019
3	VHF radiostations (8.33 kHz-channel spacing > FL195)	COM	10.0	2016	2018
4	Investments to Wide Area Multilateration (WAM) technology	SUR	7.5	2011	2016
5	Renewal of Secondary Surveilance Radars in various locations	SUR	6.8	2016	2019

HCAA (Greece) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: Greece is within the EURO Zone

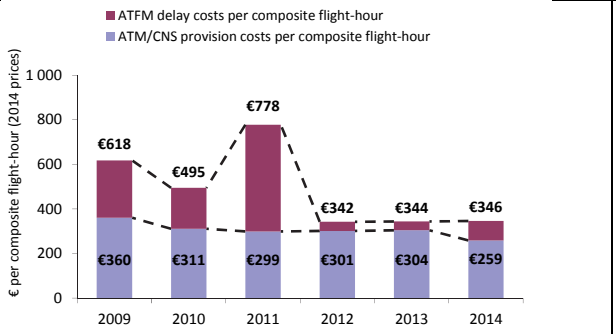
HCAA represents 1.9% of European system gate-to-gate ATM/CNS provision costs

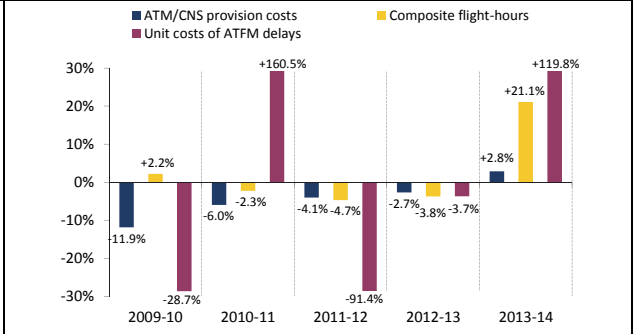
Operational conditions

Aggregated complexity score: Min — Max

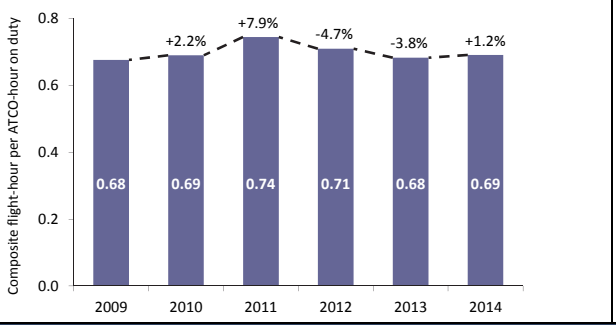
Seasonal traffic variability: Min — Max

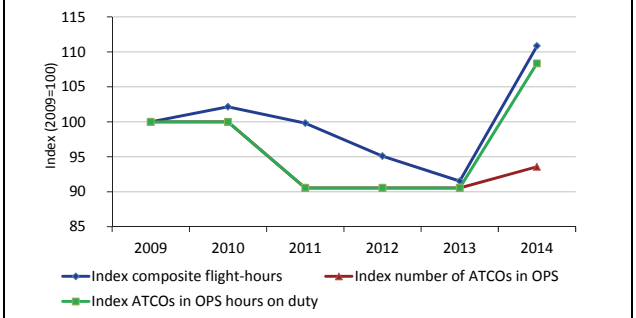
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



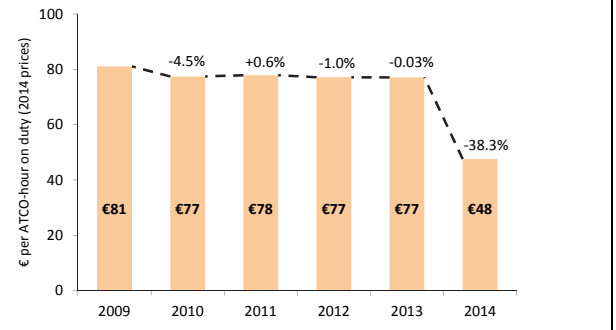


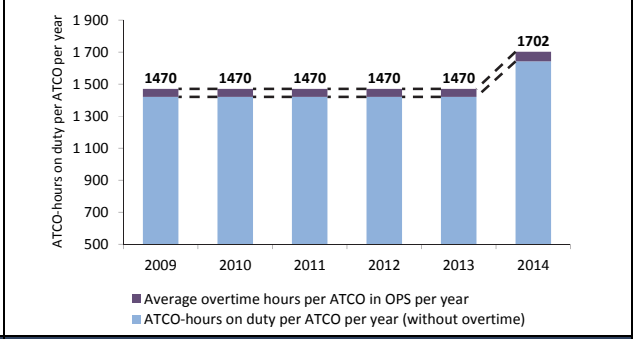
Trend in gate-to-gate ATCO-hour productivity



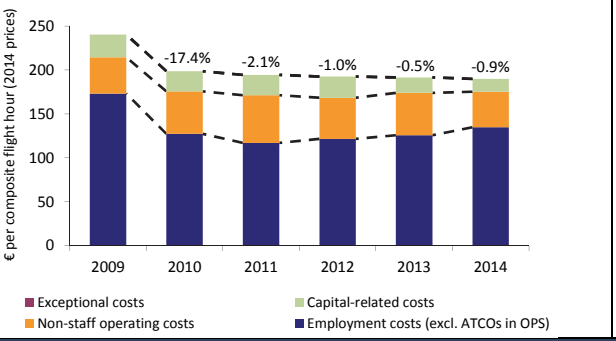


Trend in gate-to-gate employment costs per ATCO-hour

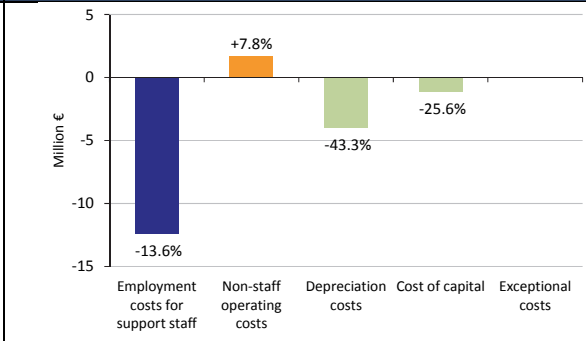




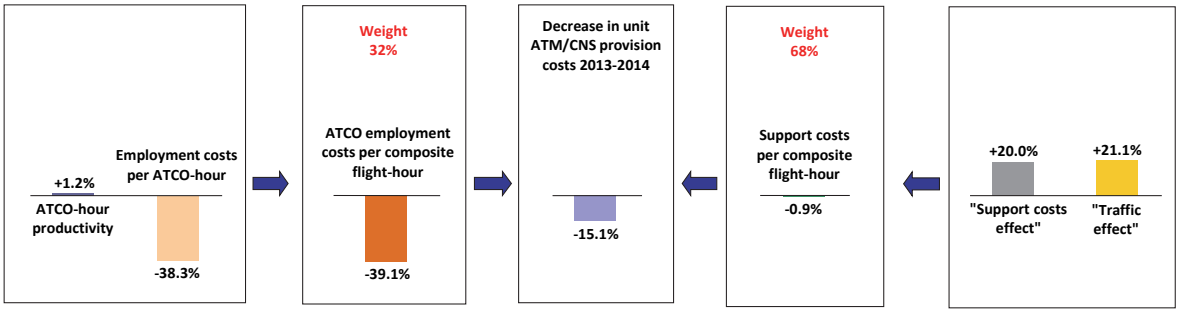
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

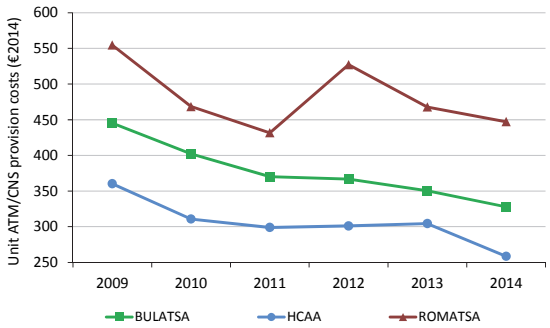


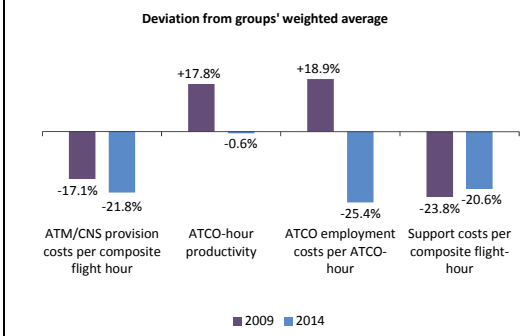
Changes in financial cost-effectiveness (2013-2014)



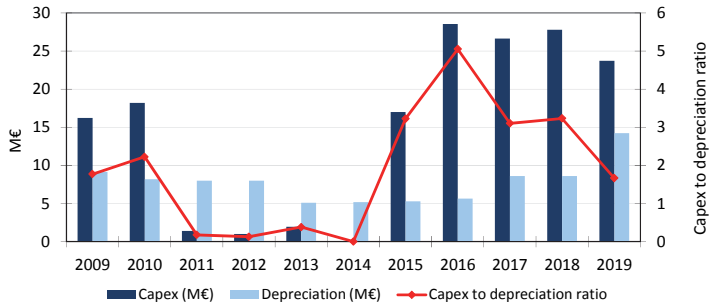
HCAA (Greece) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2000*	C: 2000*	C: 2000*	C: 1998*
€6.3M						2009				
						2010				
						2011				
						2012				
						2013				
						2014				
€112.4M (2015-2020)	€13.4M	€8.4M	€17.5M (2014-2020)			2015				
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Procurement of new SDPS, FDPS & ODS system (PALLAS)	ATM	43.1	2016	2020
2	Replacement of 4 radars (Thessaloniki, Iraklion, Rodos and Kerrkira)	ATM	19.7	2016	2020
3	Partial replacement of CNS systems at Athinai Airport	ATM	12.3	2015	2019
4	Replacement of 4 En-route Secondary Surveilance radars	ATM	11.1	2016	2020
5	Replacement of VCS/RCS system for Athinai/Makedonia	ATM	10.5	2015	2016

HungaroControl (Hungary) – Cost-effectiveness KPIs (€2014)

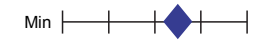
Contextual economic information

Exchange rate: 1 EUR = 308.270 HUF

HungaroControl represents 1.1% of European system gate-to-gate ATM/CNS provision costs

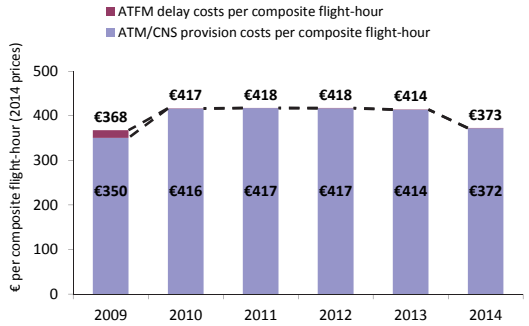
Operational conditions

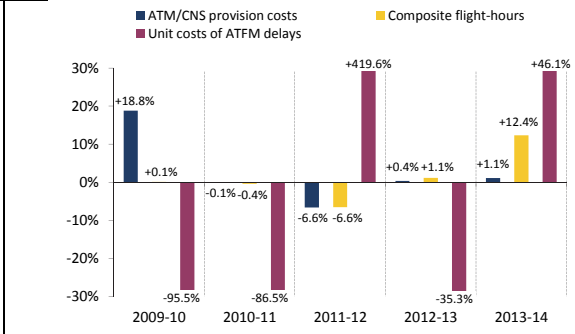
Aggregated complexity score:



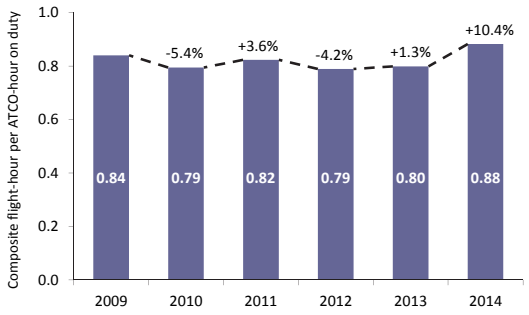
Seasonal traffic variability:

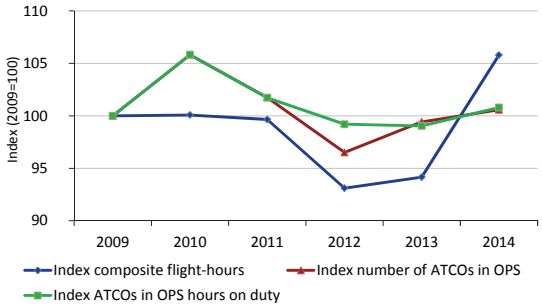
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



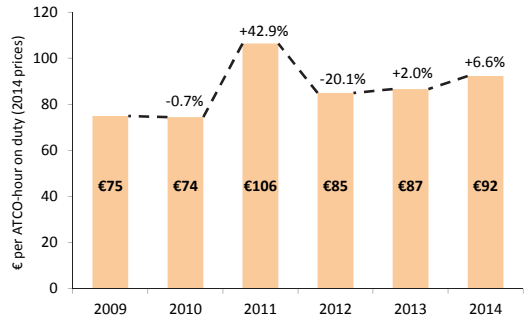


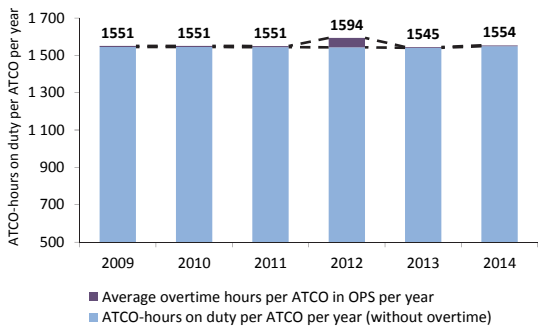
Trend in gate-to-gate ATCO-hour productivity



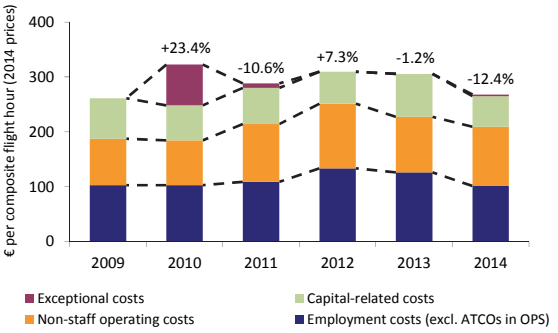


Trend in gate-to-gate employment costs per ATCO-hour

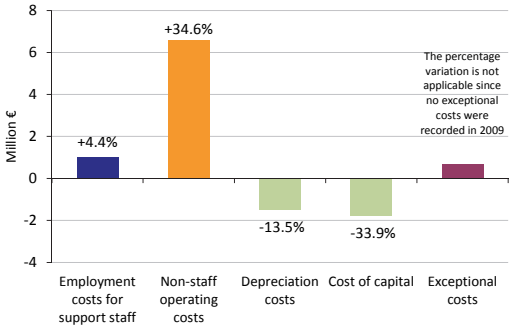




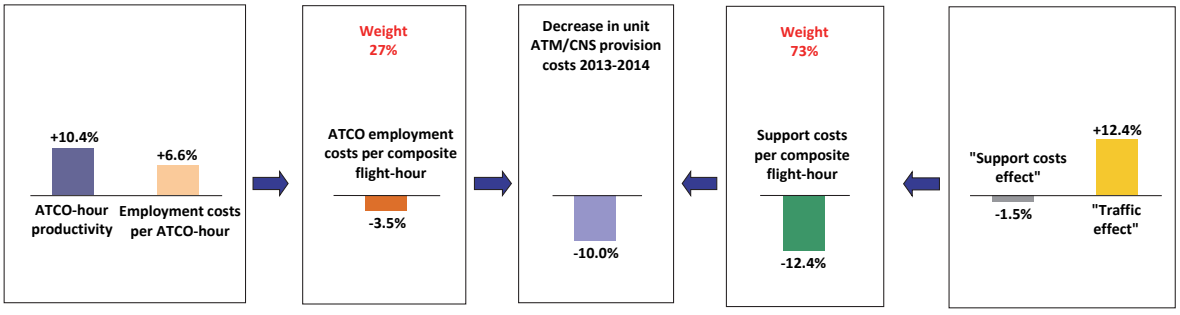
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

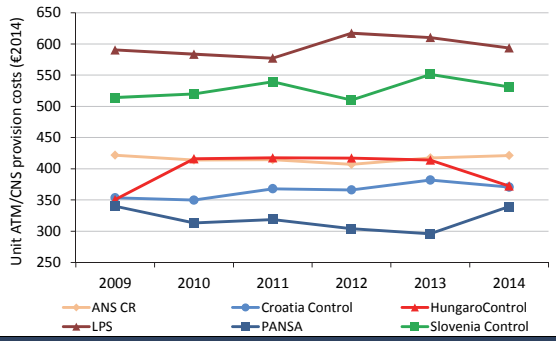


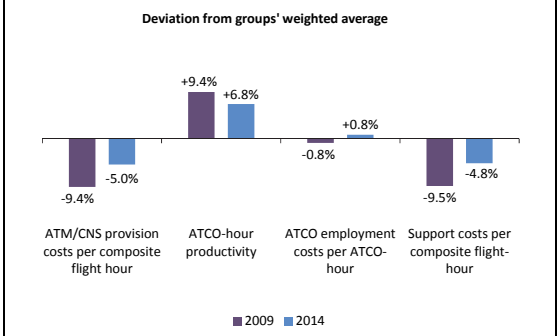
Changes in financial cost-effectiveness (2013-2014)



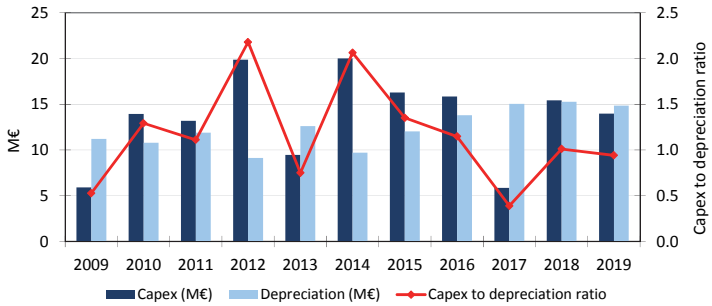
HungaroControl (Hungary) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2012	C: 2012	C: 2012	C: 2012
						2009				
						2010				
				€14.1M		2011				
					€0.7M	2012				
						2013				
€83.1M (2008-2019)	€10.6M	€1.9M				2014				
				€3.9M		2015				
			€5.3M			2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Matias build 12	ATM	19.2	2018	2019
2	MATIAS SW/HW upgrade (ANS III project)	ATM	19.1	2009	2012
3	ANS III Building (ANS III project)	Buildings	14.1	2010	2012
4	Matias build 11.2	ATM	9.6	2017	2018
5	ANS I (Contingency)	ATM	7.2	2015	2015

IAA (Ireland) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: Ireland is within the EURO Zone

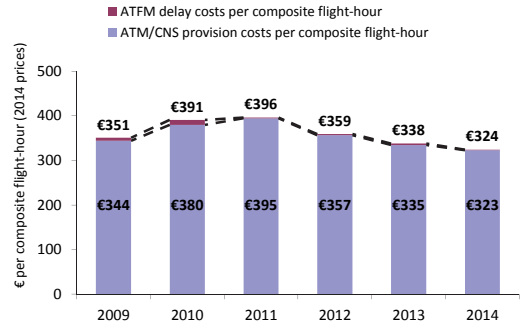
IAA represents 1.4% of European system gate-to-gate ATM/CNS provision costs

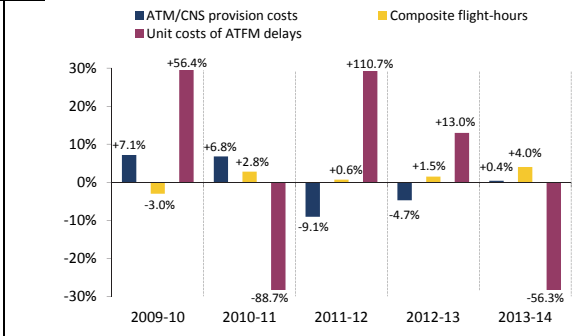
Operational conditions

Aggregated complexity score: Min — Max

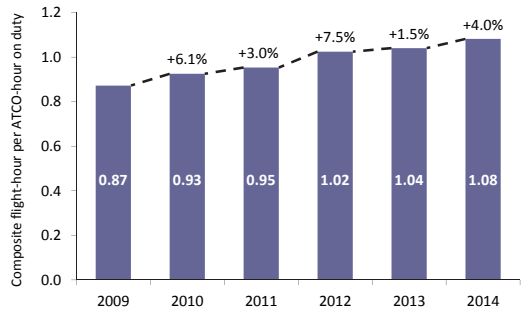
Seasonal traffic variability: Min — Max

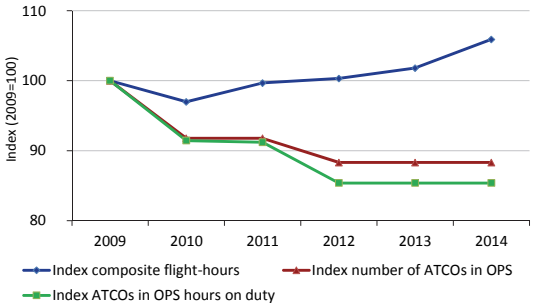
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



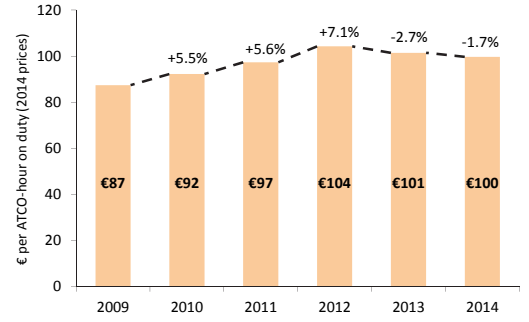


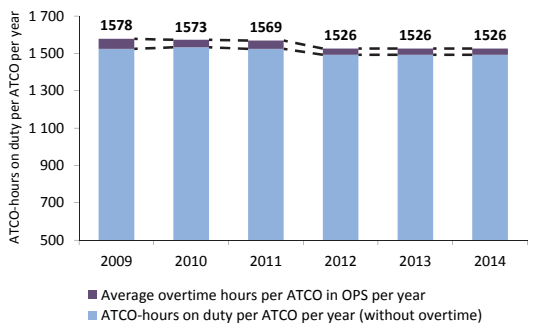
Trend in gate-to-gate ATCO-hour productivity



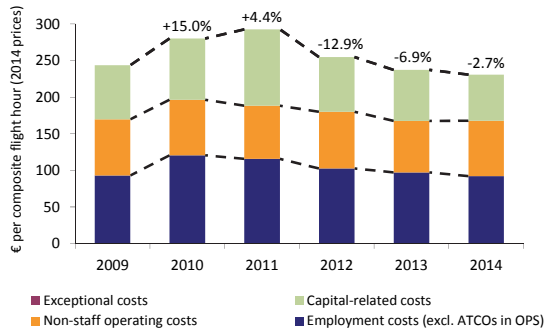


Trend in gate-to-gate employment costs per ATCO-hour

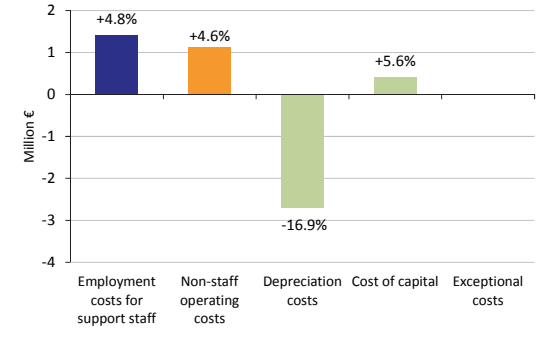




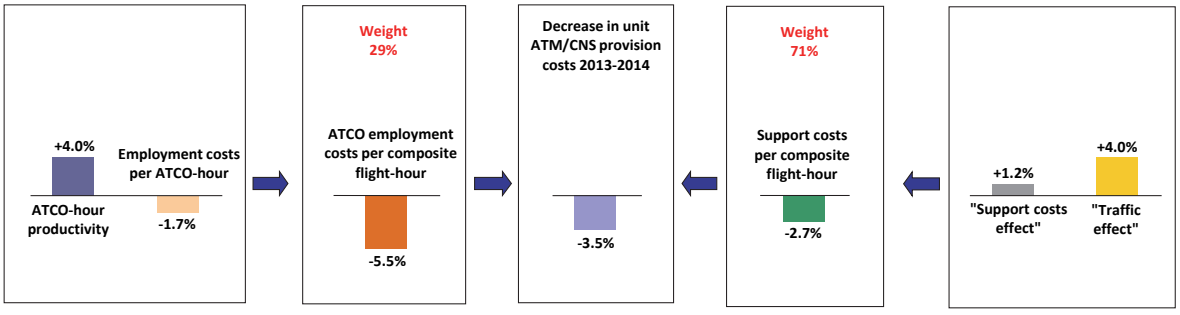
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

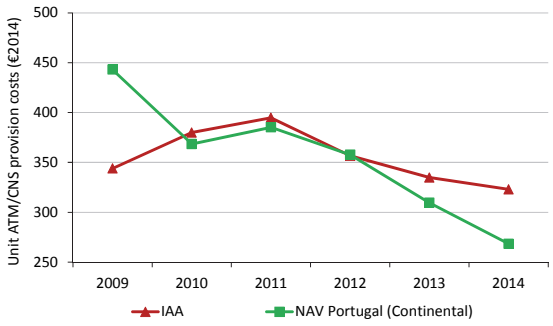


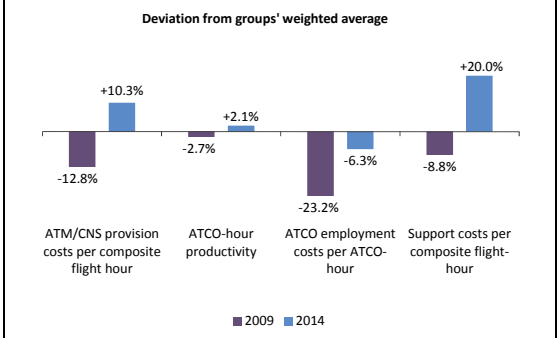
Changes in financial cost-effectiveness (2013-2014)



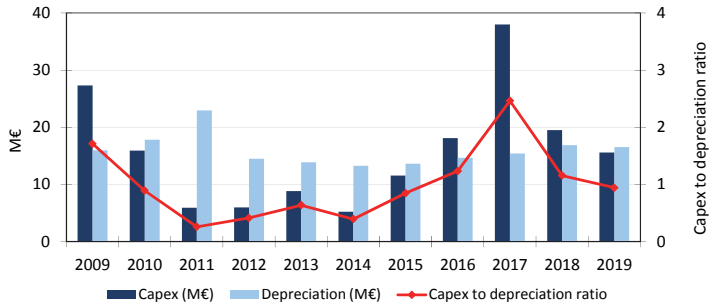
IAA (Ireland) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

LFV (Sweden) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 9.096 SEK

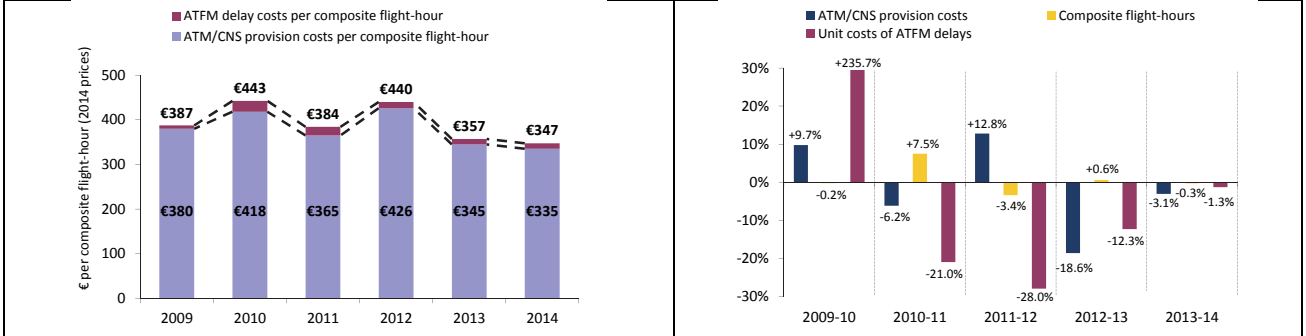
LFV represents 2.3% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

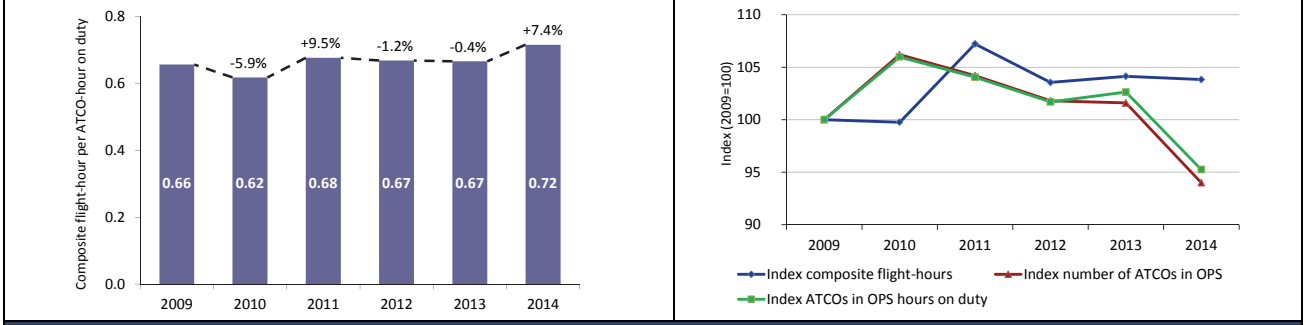
Aggregated complexity score: Min – Max

Seasonal traffic variability: Min – Max

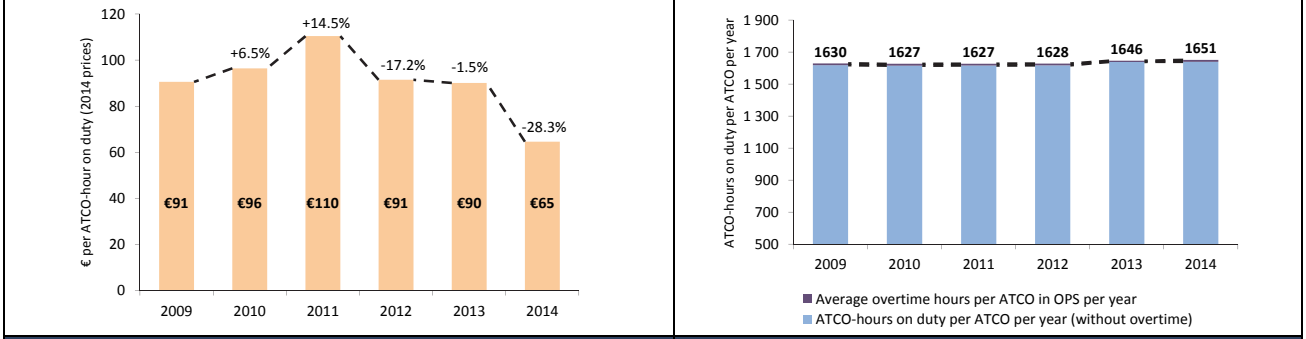
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



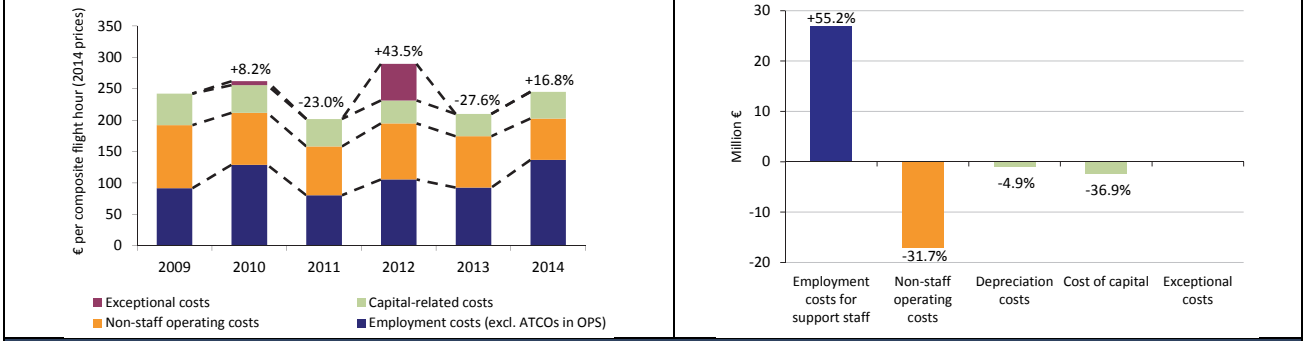
Trend in gate-to-gate ATCO-hour productivity



Trend in gate-to-gate employment costs per ATCO-hour

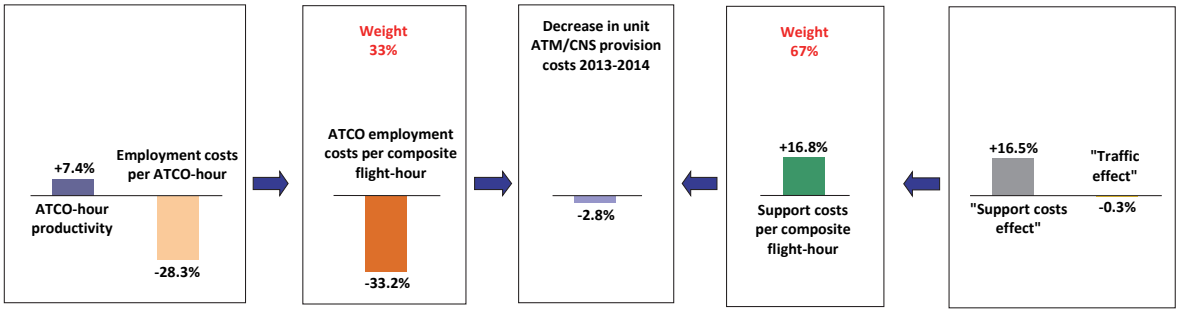


Trend in support costs per composite flight-hour



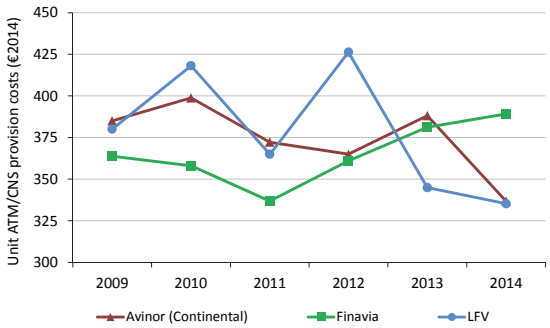
Changes in components of support costs (2009-2014)

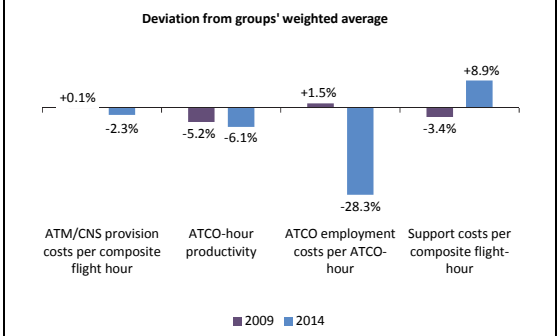
Changes in financial cost-effectiveness (2013-2014)



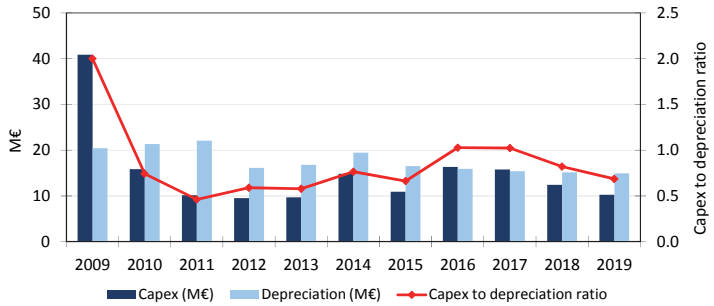
LFV (Sweden) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2012 (Malmo) 2013 (Stockholm)	C: 2012 (Malmo) 2013 (Stockholm)	C: 2012 (Malmo) 2013 (Stockholm)	C: 2010 (All ACCs)
€76.3M (2006-2020)	€12.5M (2007-2017)			€11.1M (2007-2011)		2009				
						2010				
			€21.7M		€11.0M	2011				
						2012		Stockholm		
						2013				
						2014	All ACCs		All ACCs	
						2015	All ACCs			
						2016				
						2017				All ACCs
						2018			Malmo	
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	COOPANS	ATM	66.0	2006	2020
2	Training and support building in Malmo	Buildings	11.1	2007	2011
3	Remote Tower Centre (RTC)	Other	8.6	2011	2015
4	Surveillance Upgrade Program (WAM)	SUR	8.6	2011	2017
5	Contigency system	ATM	7.8	2015	2019

LGS (Latvia) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: Latvia is within the EURO Zone

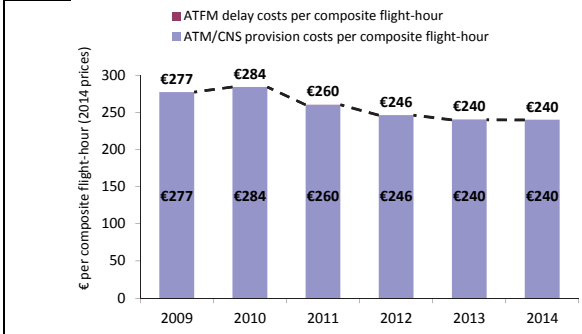
LGS represents 0.3% of European system gate-to-gate ATM/CNS provision costs

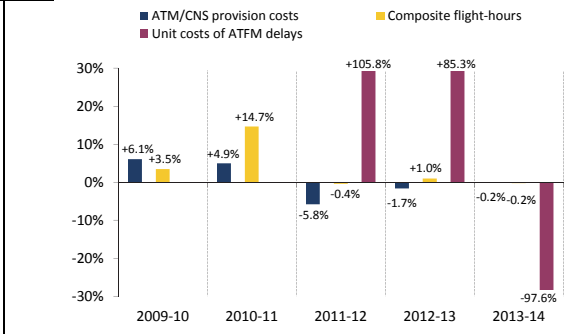
Operational conditions

Aggregated complexity score: Min — Max

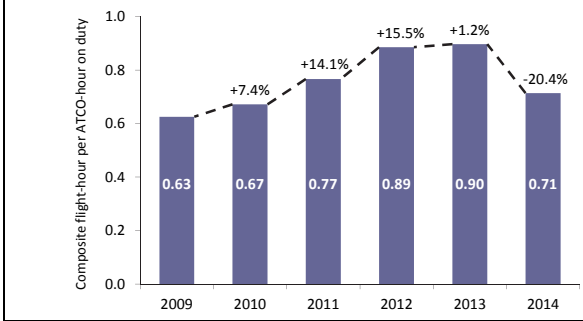
Seasonal traffic variability: Min — Max

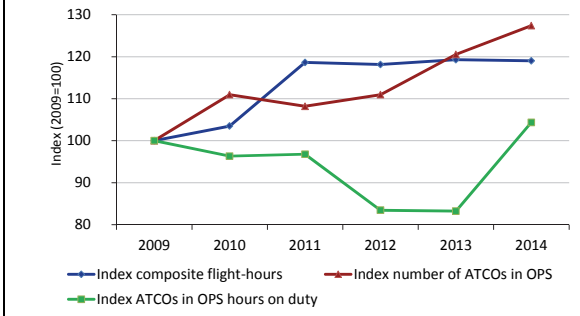
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



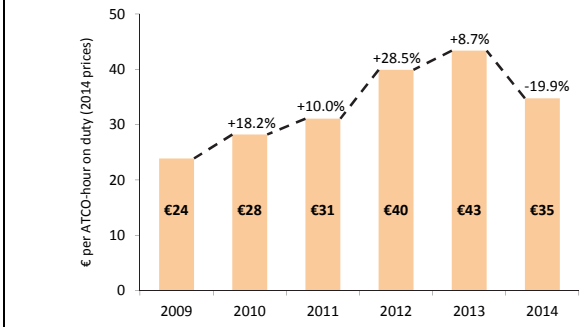


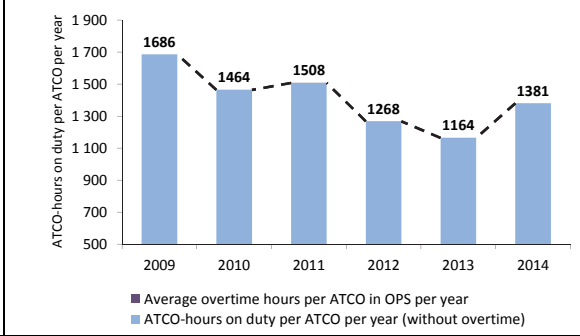
Trend in gate-to-gate ATCO-hour productivity



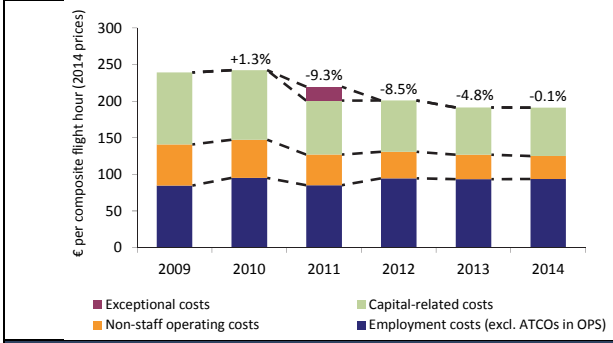


Trend in gate-to-gate employment costs per ATCO-hour

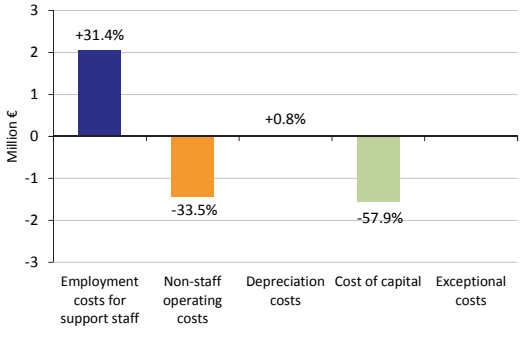




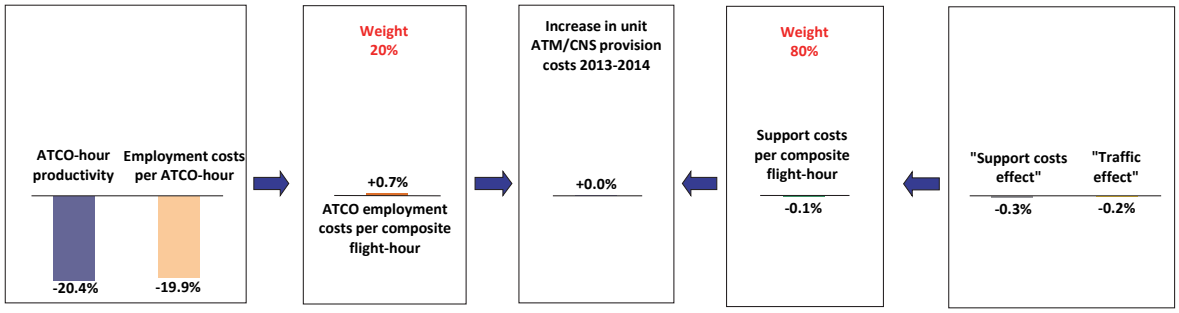
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

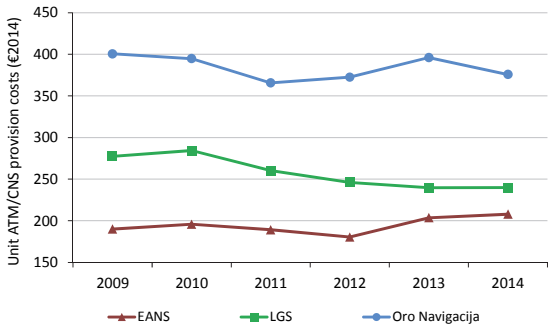


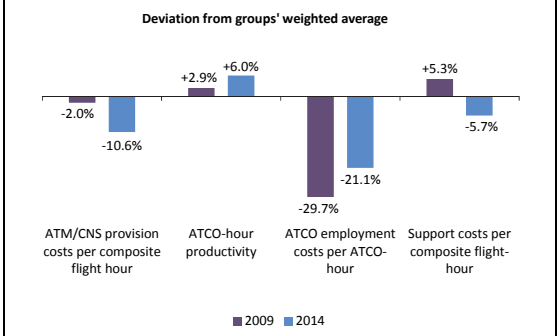
Changes in financial cost-effectiveness (2013-2014)



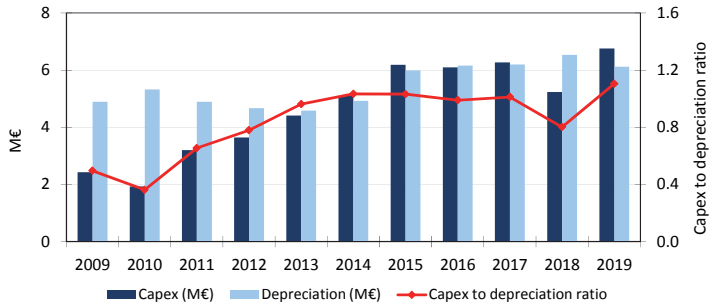
LGS (Latvia) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

LPS (Slovak Republic) – Cost-effectiveness KPIs (€2014)

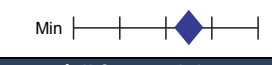
Contextual economic information

Exchange rate: Slovak Republic is within the EURO Zone

LPS represents 0.7% of European system gate-to-gate ATM/CNS provision costs

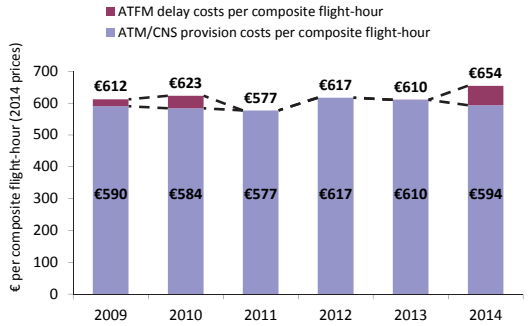
Operational conditions

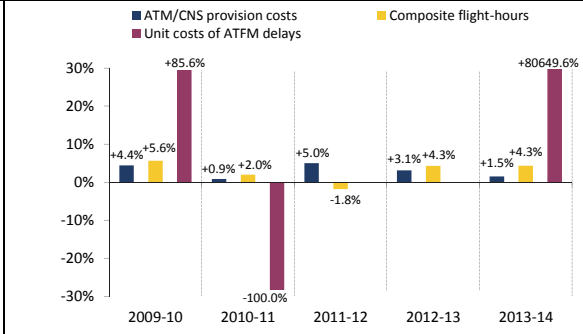
Aggregated complexity score:



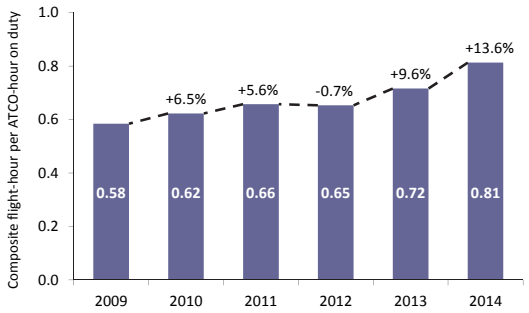
Seasonal traffic variability:

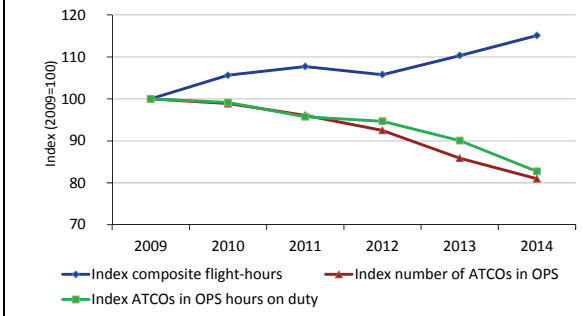
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



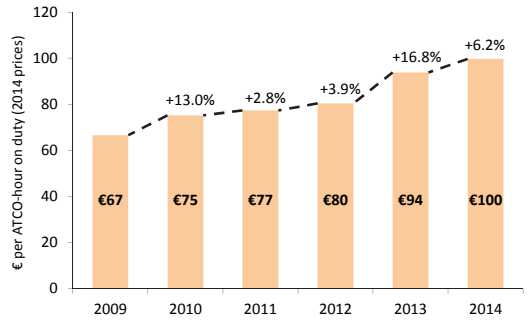


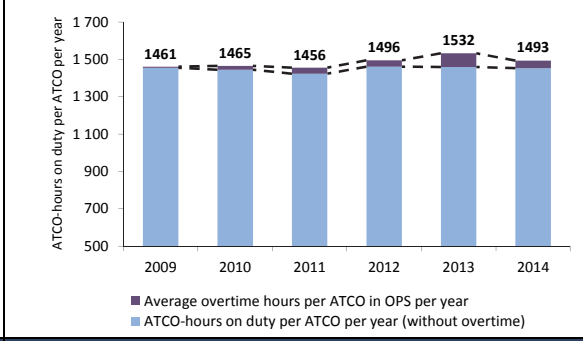
Trend in gate-to-gate ATCO-hour productivity



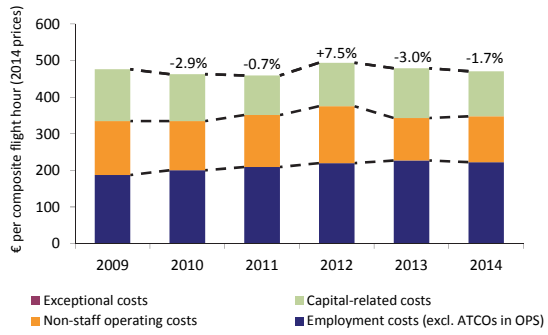


Trend in gate-to-gate employment costs per ATCO-hour

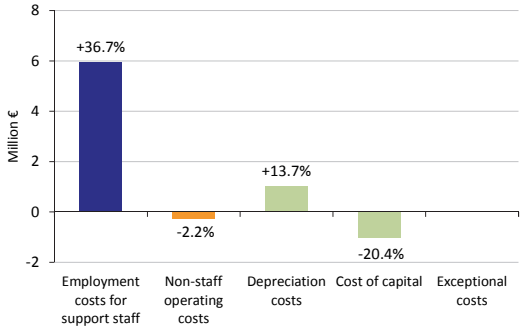




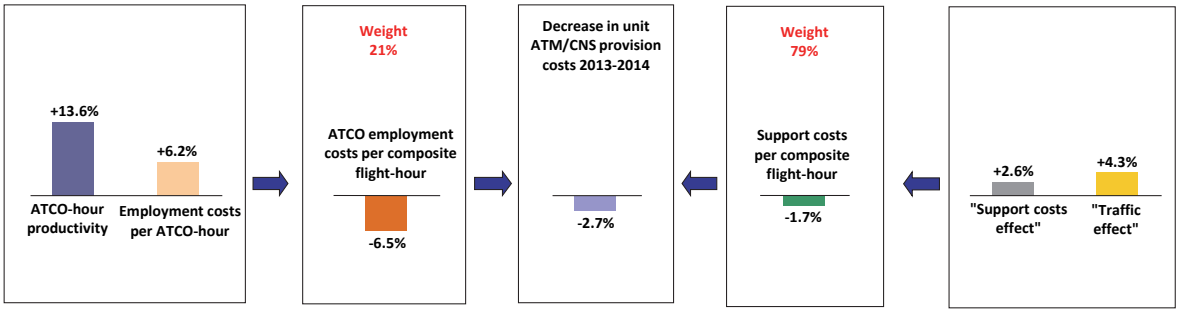
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

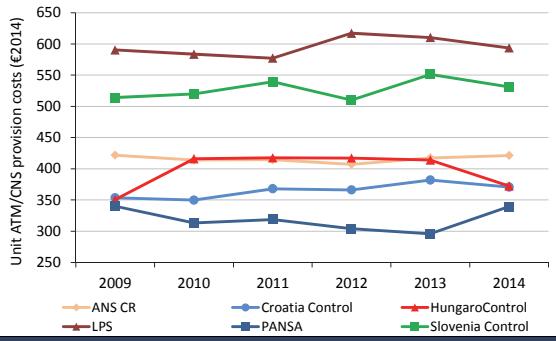


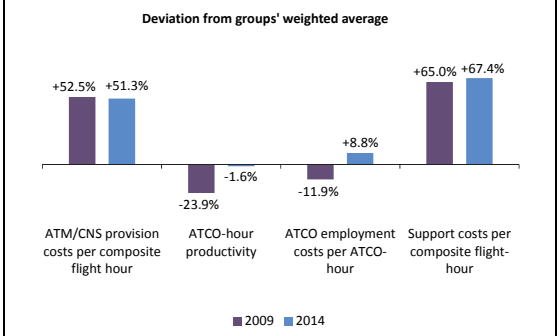
Changes in financial cost-effectiveness (2013-2014)



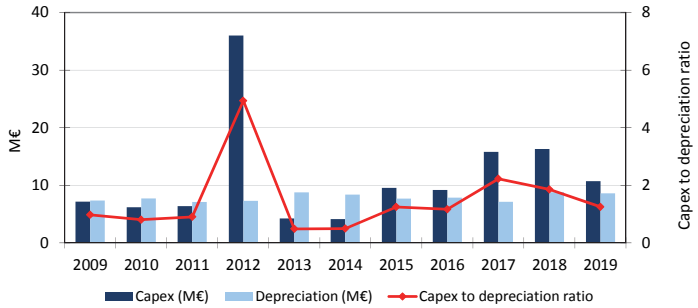
LPS (Slovak Republic) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 1999	C: 2005	C: 1999	C: 2009
						2009				
						2010				
						2011				
€4.2M			€5.1M	€33.0M (2007-2014)		2012				
	€1.2M					2013				
						2014				
				€0.5M		2015				
						2016				
€25.8M	€12.5M	€6.5M			€14.9M	2017				
			€0.2M			2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Construction of the new ACC in Bratislava	Buildings	30.0	2007	2012
2	Upgrade of the main ATM System	ATM	20.4	2015	2019
3	Navigation Systems Upgrade	NAV	6.2	2017	2019
4	Replacement of SACON Network	COM	5.0	2015	2019
5	Upgrade of Voice Communication System - Implementation of VoIP	COM	4.5	2015	2019

LVNL (Netherlands) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: Netherlands is within the EURO Zone

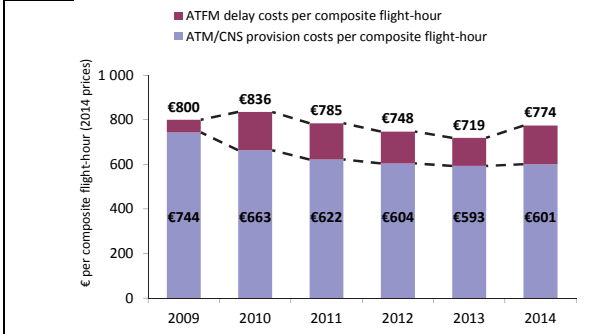
LVNL represents 2.1% of European system gate-to-gate ATM/CNS provision costs

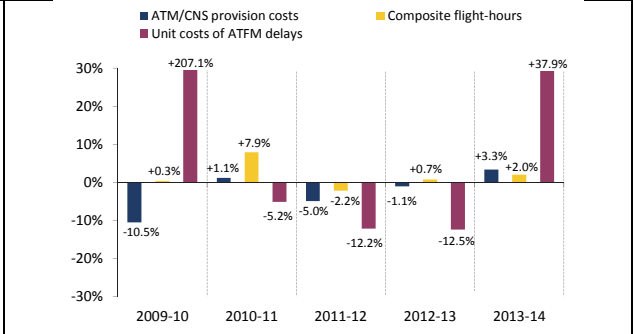
Operational conditions

Aggregated complexity score: Min — Max

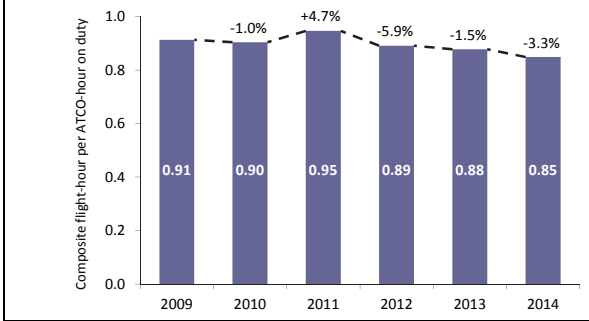
Seasonal traffic variability: Min — Max

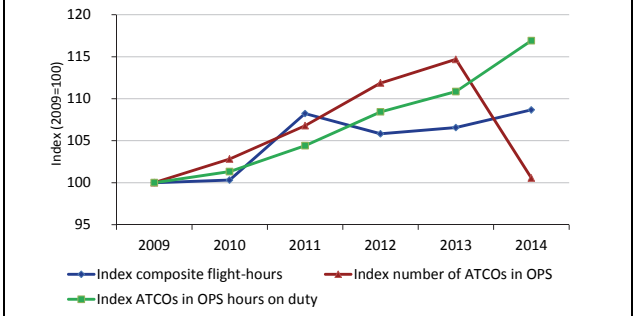
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



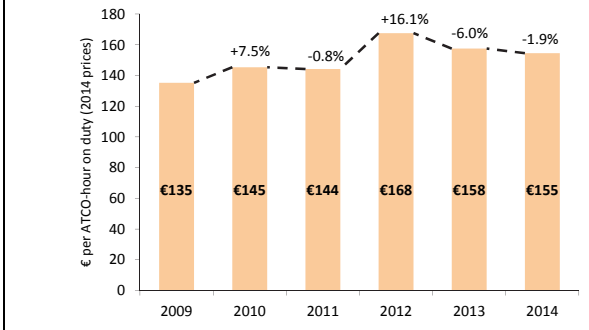


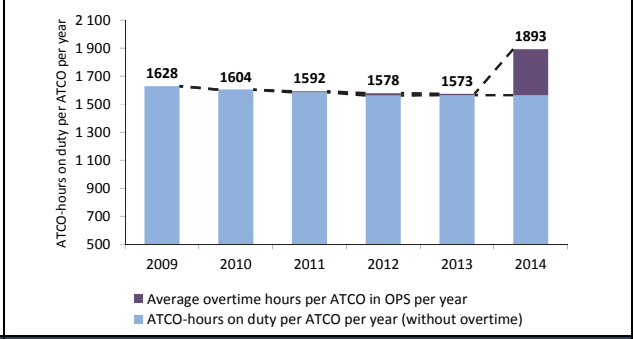
Trend in gate-to-gate ATCO-hour productivity



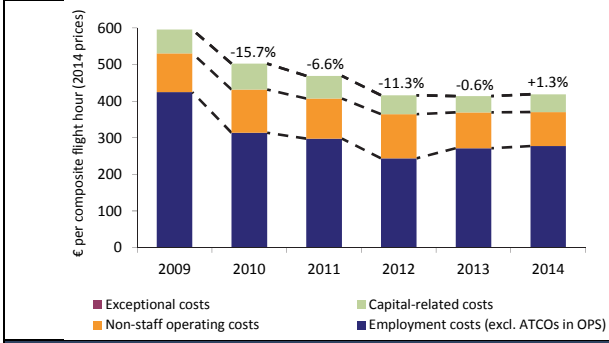


Trend in gate-to-gate employment costs per ATCO-hour

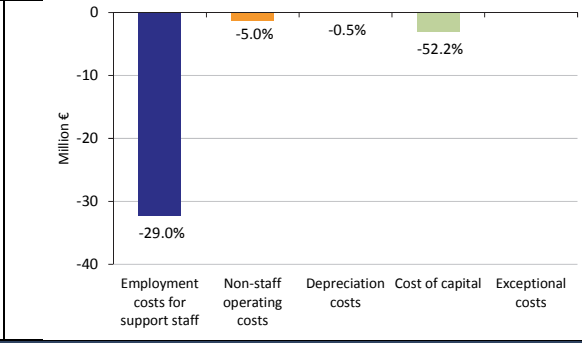




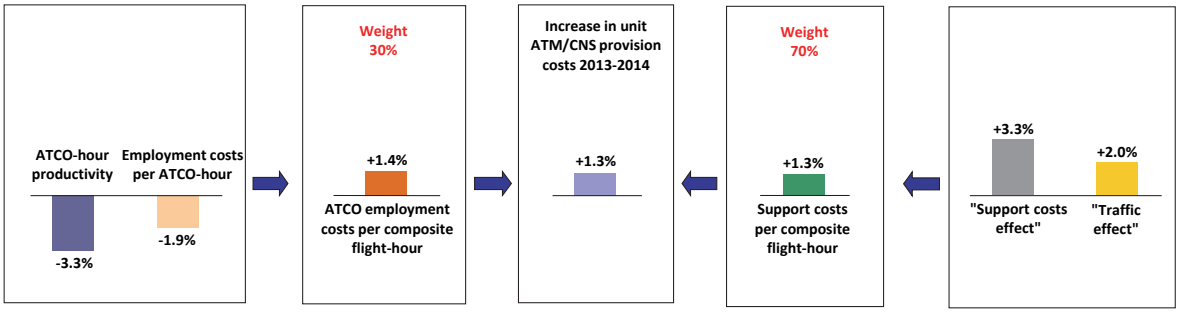
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

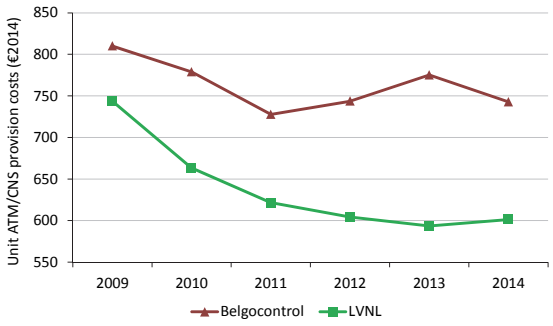


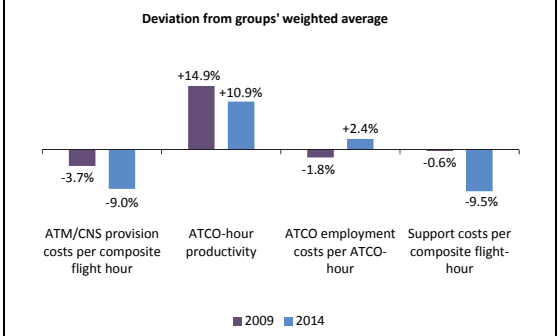
Changes in financial cost-effectiveness (2013-2014)



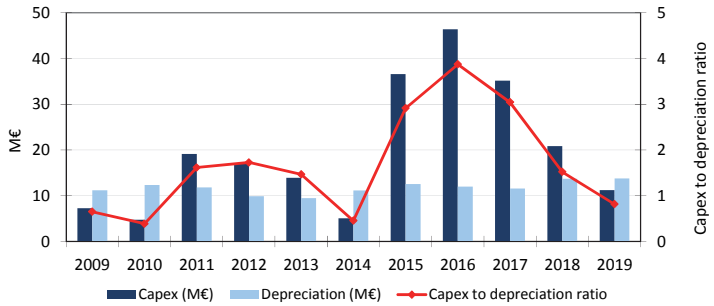
LVNL (Netherlands) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

MATS (Malta) – Cost-effectiveness KPIs (€2014)

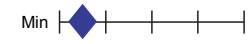
Contextual economic information

Exchange rate: Malta is within the EURO Zone

MATS represents 0.2% of European system gate-to-gate ATM/CNS provision costs

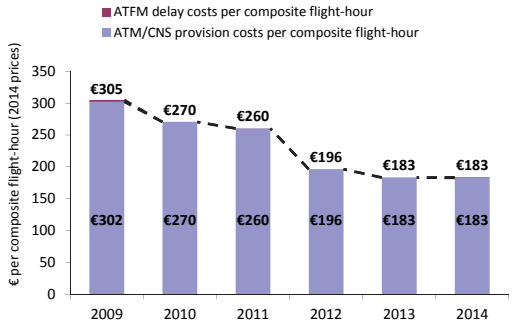
Operational conditions

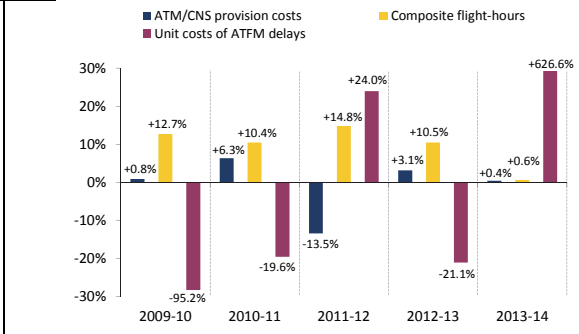
Aggregated complexity score:



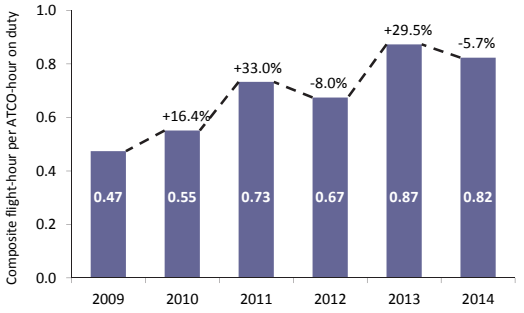
Seasonal traffic variability:

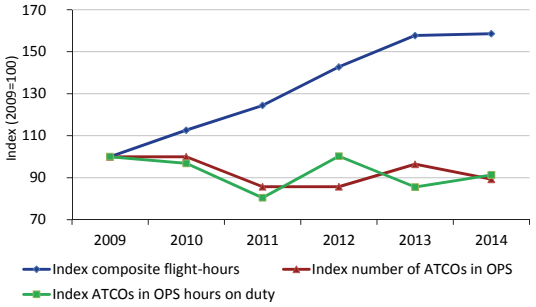
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



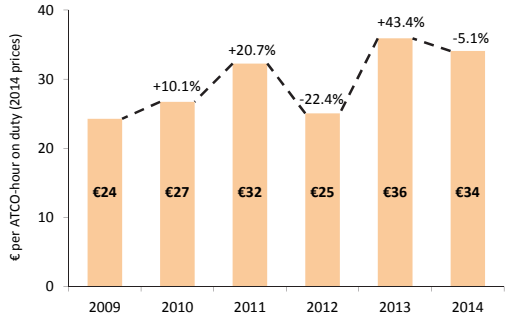


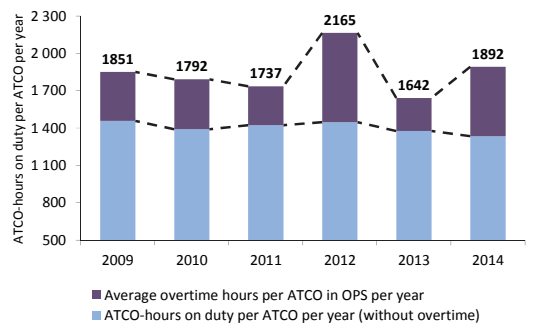
Trend in gate-to-gate ATCO-hour productivity



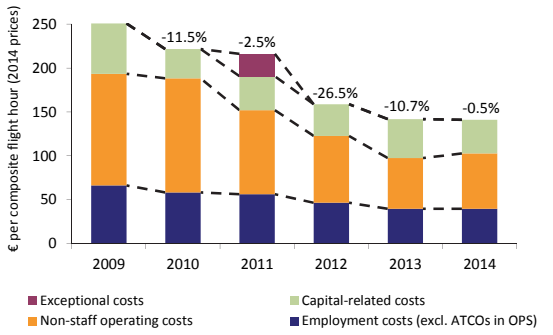


Trend in gate-to-gate employment costs per ATCO-hour

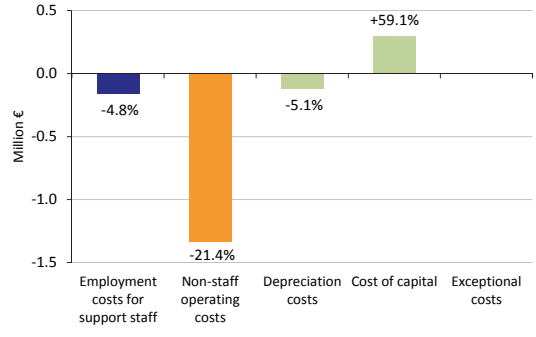




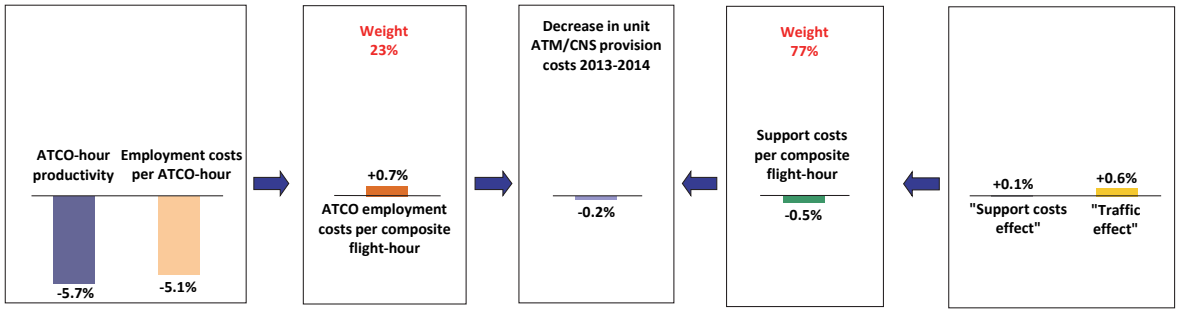
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

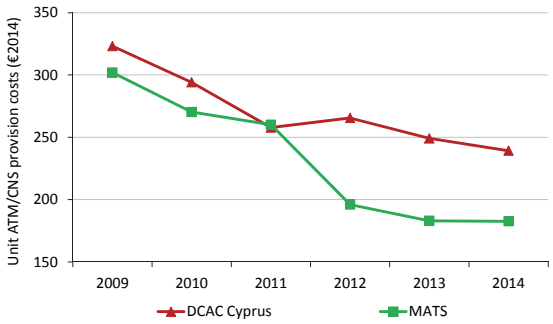


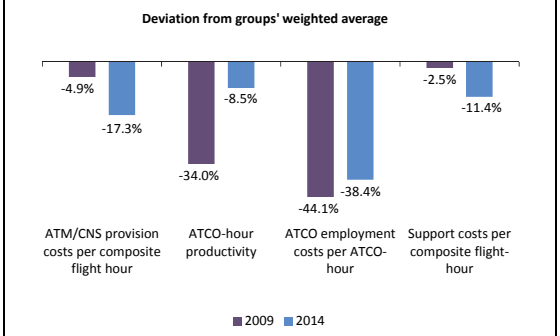
Changes in financial cost-effectiveness (2013-2014)



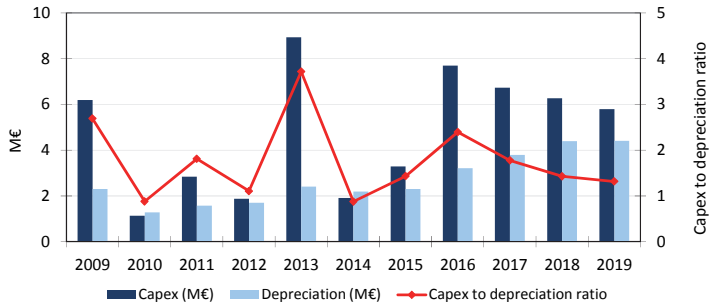
MATS (Malta) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS C: 1996*	RDPS C: 1996*	HMI C: 1996*	VCS C: 1996*
						2009				
						2010				
			€2.4M			2011				
						2012				
€8.5M						2013				
	€0.8M			€19.9M		2014				
			€2.4M			2015				
		€2.3M			€0.5M	2016				
			€2.8M			2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	New control centre and tower	Buildings	18.0	2015	2019
2	ATM system upgrade	ATM	8.5	2011	2016
3	Purchase and installation of MSSR in Halfar	SUR	2.4	2009	2013
4	Purchase and installation of MSSR in Fawwara	SUR	2.4	2014	2015
5	DINGLI en-route PSR and weather channel	SUR	2.0	2016	2017

M-NAV (F.Y.R. Macedonia) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 61.452 MKD

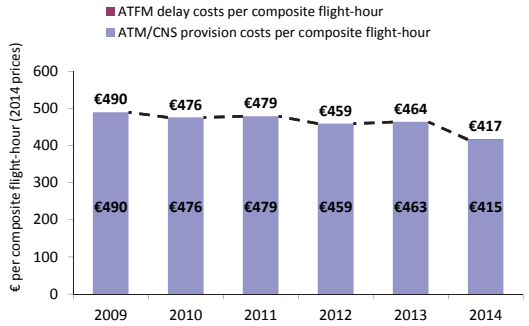
M-NAV represents 0.1% of European system gate-to-gate ATM/CNS provision costs

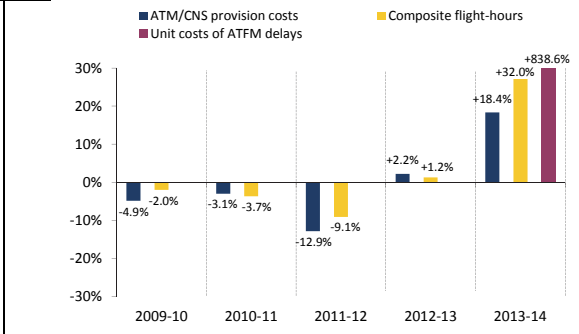
Operational conditions

Aggregated complexity score: Min — Max

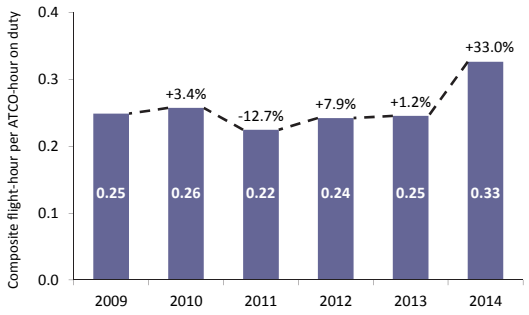
Seasonal traffic variability: Min — Max

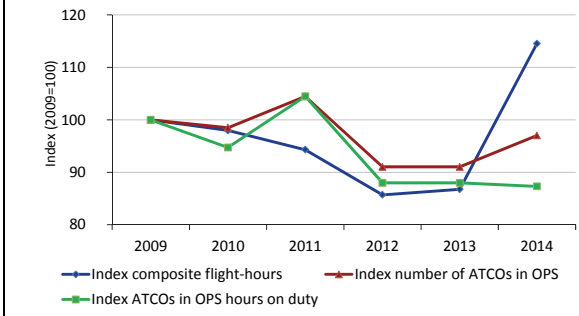
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



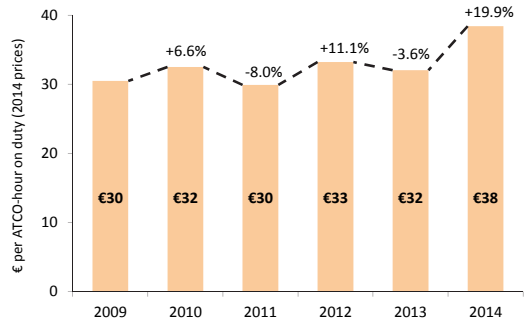


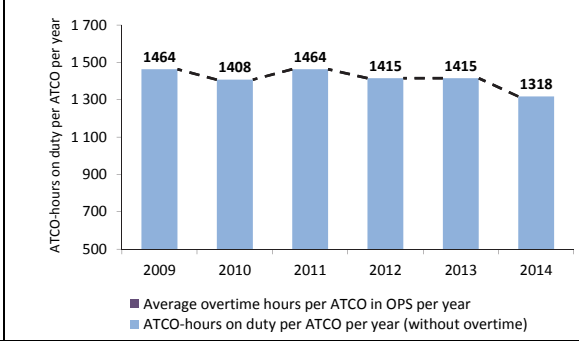
Trend in gate-to-gate ATCO-hour productivity



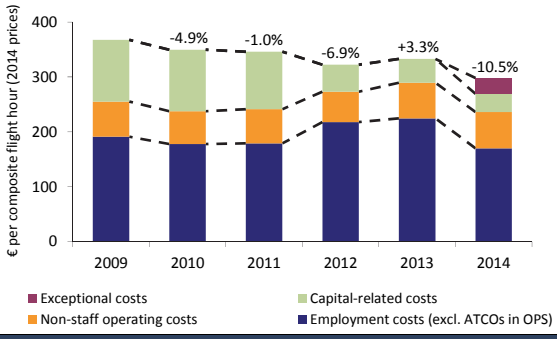


Trend in gate-to-gate employment costs per ATCO-hour

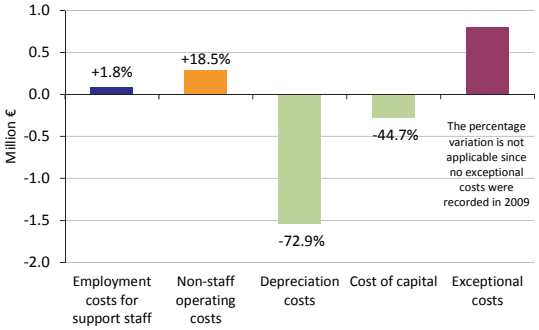




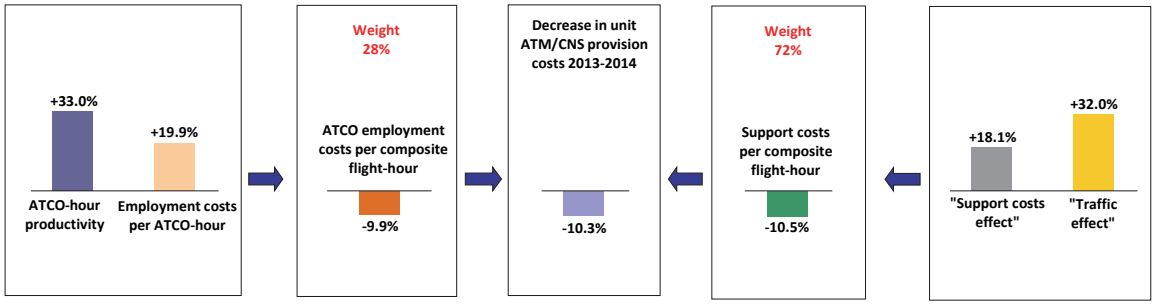
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

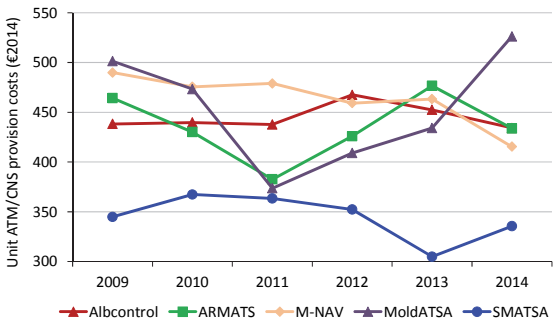


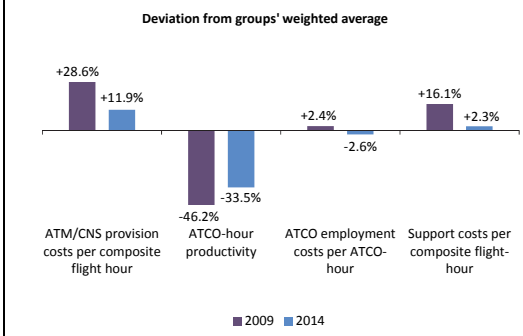
Changes in financial cost-effectiveness (2013-2014)



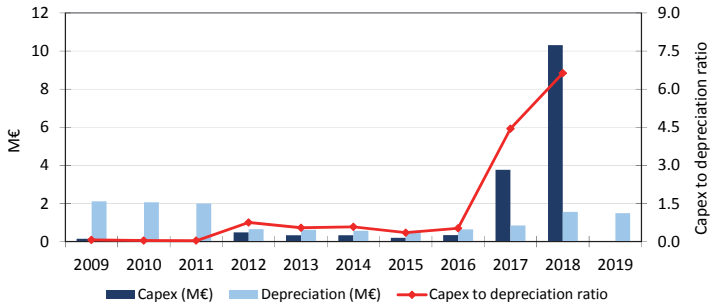
M-NAV (F.Y.R. Macedonia) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2002*	C: 2002*	C: 2002*	C: 2002*
						2009				
						2010				
						2011				
						2012				
€9.9M	€1.3M			€1.1M		2013				
			€3.8M			2014				
						2015				
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Procurement of new ATM systems	ATM	8.1	2014	2017
2	Skopje Mode S radar	SUR	2.9	2015	2018
3	Construction of new building for ANSP headquarters	Buildings	1.1	2013	2016
4	Purchase of new VHF radio system and MW link	COM	1.0	2015	2017
5	Ohrid radar upgrade	SUR	0.9	2014	2016

MoldATSA (Moldova) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 18.422 MDL

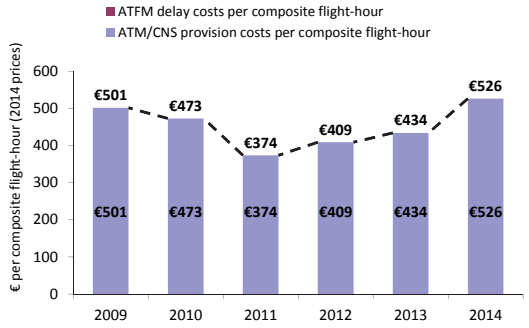
MoldATSA represents 0.1% of European system gate-to-gate ATM/CNS provision costs

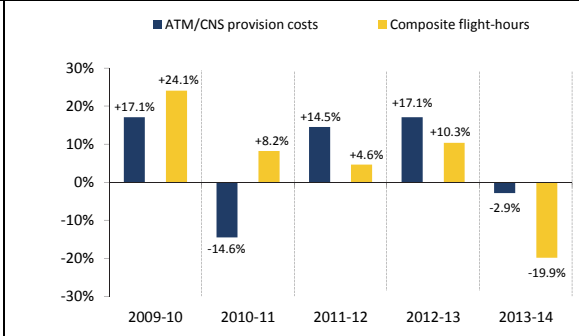
Operational conditions

Aggregated complexity score: Min — Max

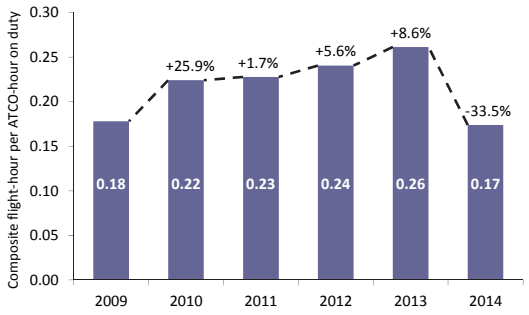
Seasonal traffic variability: Min — Max

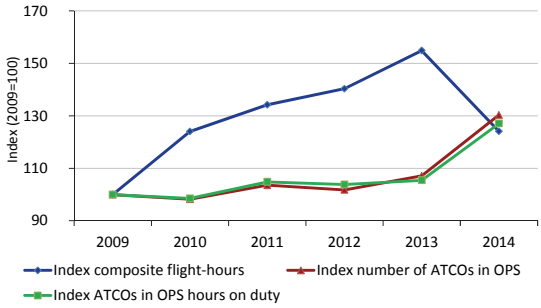
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



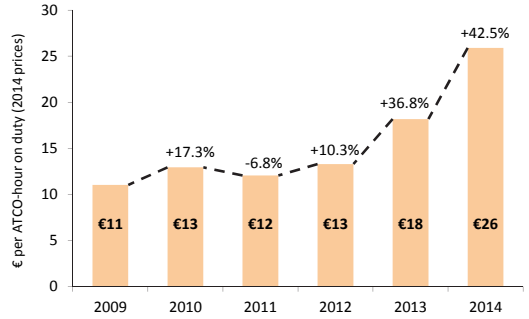


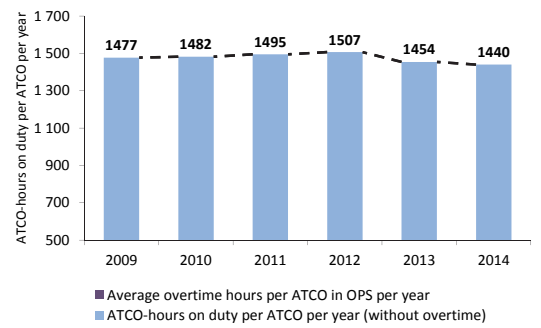
Trend in gate-to-gate ATCO-hour productivity



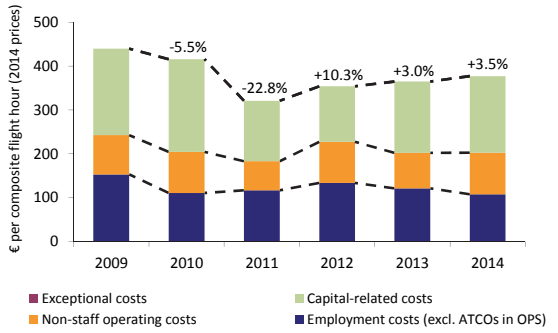


Trend in gate-to-gate employment costs per ATCO-hour

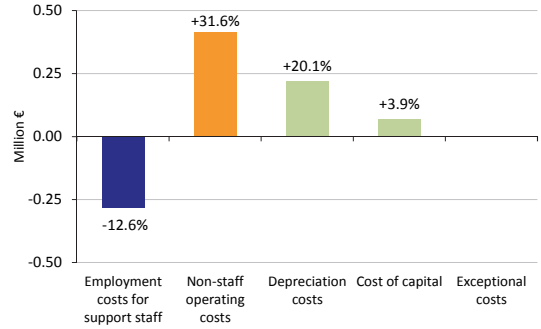




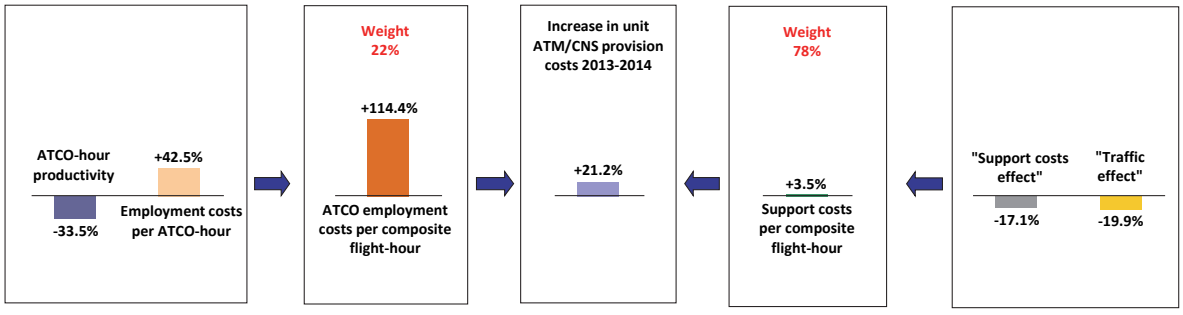
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

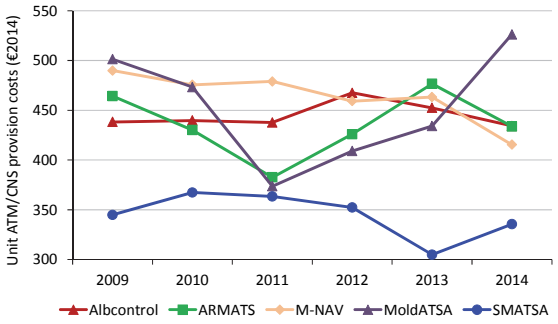


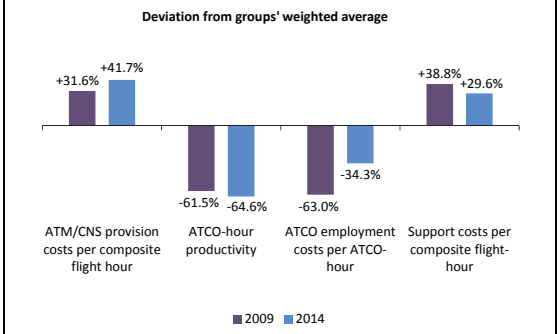
Changes in financial cost-effectiveness (2013-2014)



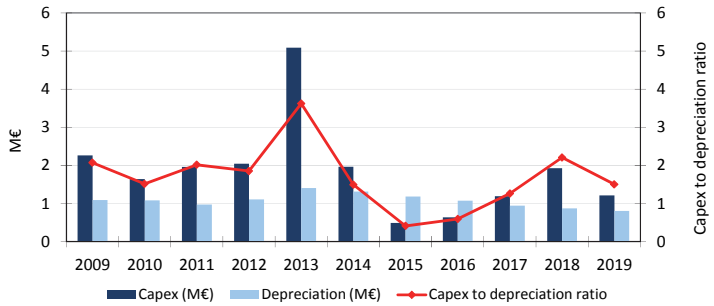
MoldATSA (Moldova) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS C: 2013	RDPS C: 2013	HMI C: 2013	VCS C: 2013
						2009				
	€1.0M				€1.0M**	2010				
						2011				
						2012				
				€4.5M (2013-2020)		2013				
€6.6M		€0.3M	€2.0M			2014				
						2015				
						2016				
		€2.4M (2017-2020)				2017				
	€0.5M					2018				
						2019				

** Part of the amount provided under "Other" (i.e. €0.5M) relates to MET

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Construction and modernisation of the tower building in Chisinau	Buildings	4.5	2013	2020
2	Replacement of FDP, RDP and HMI systems (Si ATM Sweden)	ATM	2.6	2011	2013
3	Implementation of multilateration equipment	SUR	2.0	2014	2016
4	System ILS for Chisinau airport	NAV	1.3	2018	2019
5	GBAS for Chisinau, Balti and Cahul airports	ATM	0.9	2018	2019

MUAC (Maastricht) – Cost-effectiveness KPIs (€2014)

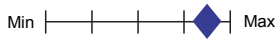
Contextual economic information

Exchange rate: Maastricht is within the EURO Zone

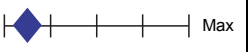
MUAC represents 1.8% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

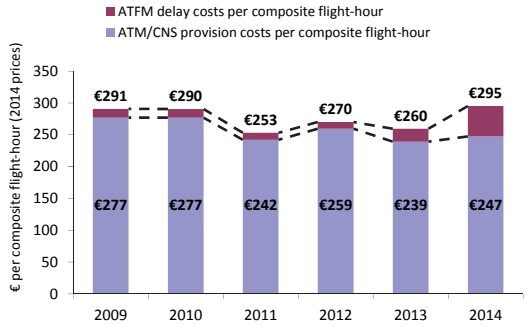
Aggregated complexity score:

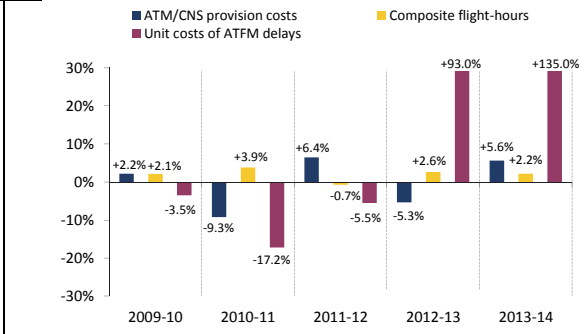


Seasonal traffic variability:

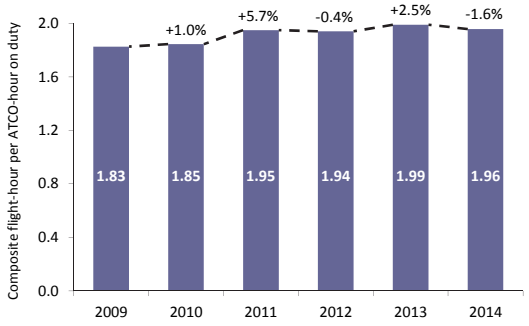


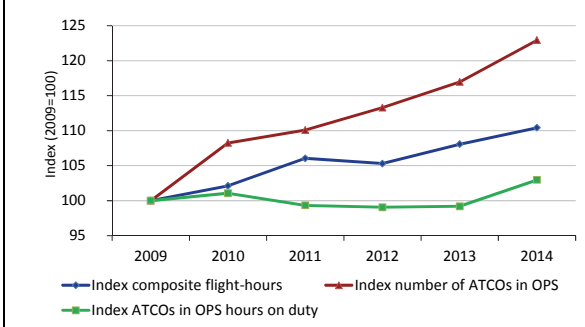
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



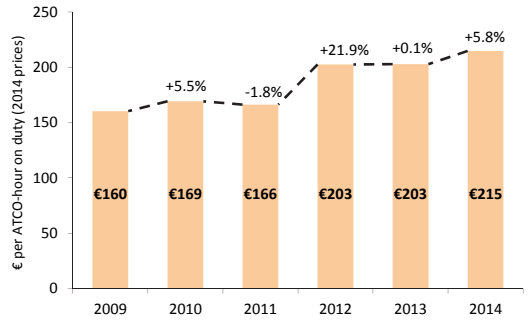


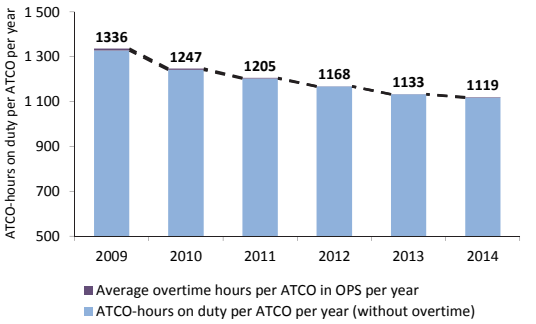
Trend in gate-to-gate ATCO-hour productivity



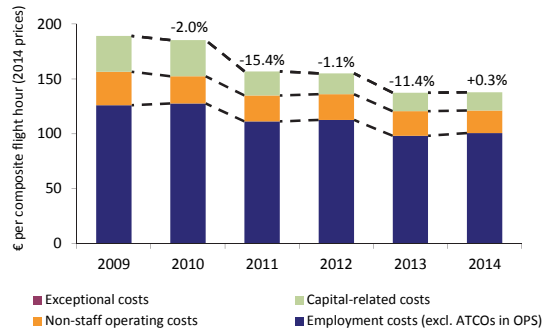


Trend in gate-to-gate employment costs per ATCO-hour

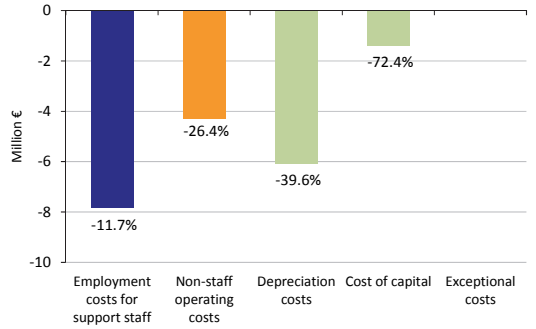




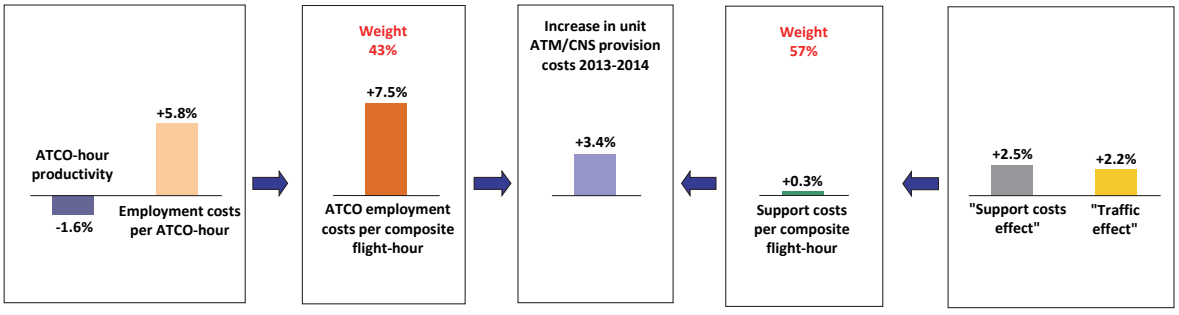
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)



Changes in financial cost-effectiveness (2013-2014)

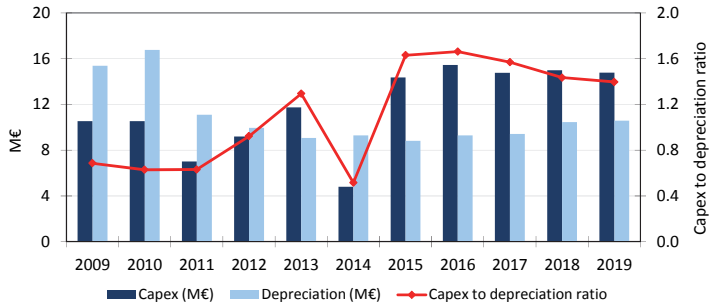


MUAC (Maastricht) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group

Due to the unique nature of its airspace (upper airspace only, across four States), it was decided that Maastricht (MUAC) should be considered separately and therefore this ANSP is not included in the comparator group benchmarking analysis

Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2008*	C: 2008*	C: 2002*	C: 1995* Upgr. 2005
				€3.6M		2009				
						2010				
€55.6M (2003-2014)	€5.1M					2011				
				€14.6M	€4.7M	2012				
						2013				
						2014				
						2015				
€55.0M (2015-2021)	€9.0M (2015-2020)			€14.4M (2015-2021)	€18.3M (2015-2021)	2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Procurement of new FDPS	ATM	50.0	2003	2011
2	Other ATM investments	ATM	31.0	2015	2021
3	Building and infrastructure (RP1)	Buildings	14.6	2012	2014
4	Building and infrastructure (RP2)	Buildings	9.1	2015	2019
5	ATM SESAR Compliant (RP3)	ATM	9.0	2020	2021

NATS Continental (United Kingdom) – Cost-effectiveness KPIs (€2014)

Contextual economic information

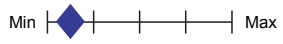
Exchange rate: 1 EUR = 0.806 GBP

NATS Continental represents 9.7% of European system gate-to-gate ATM/CNS provision costs

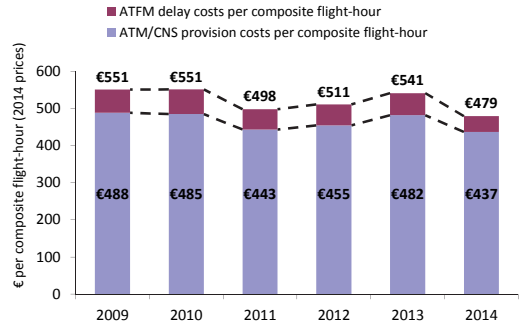
Operational conditions

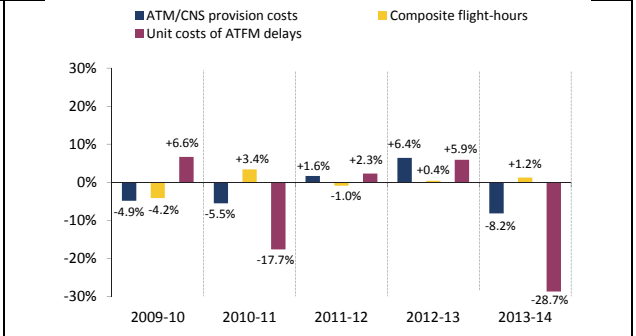
Aggregated complexity score:

Seasonal traffic variability:

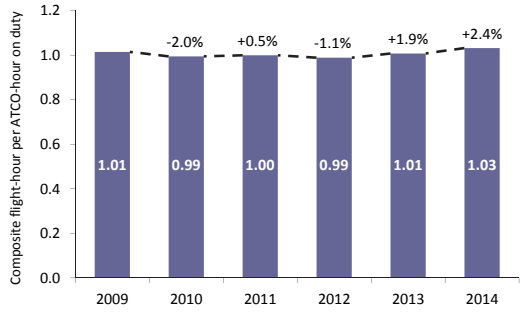


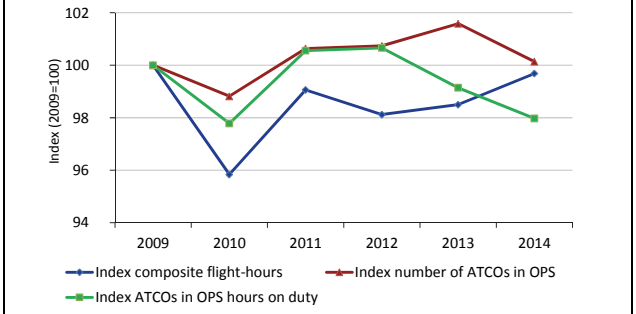
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



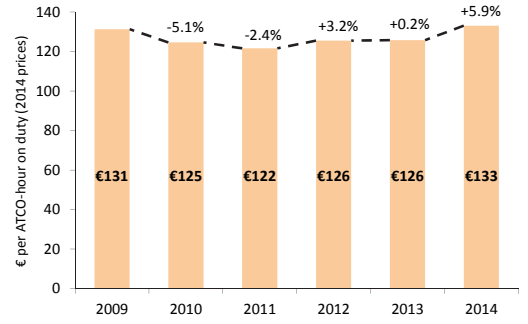


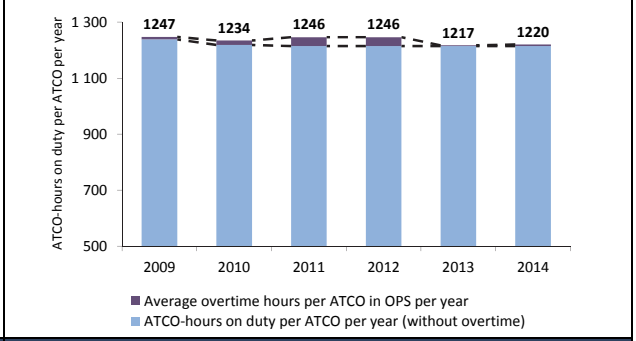
Trend in gate-to-gate ATCO-hour productivity



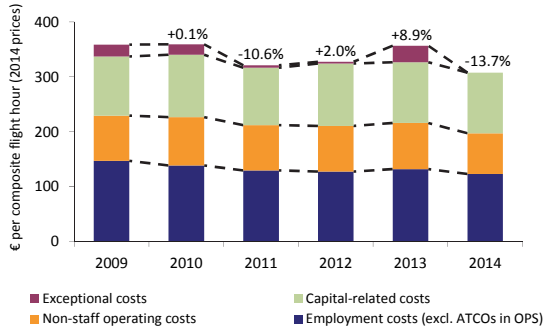


Trend in gate-to-gate employment costs per ATCO-hour

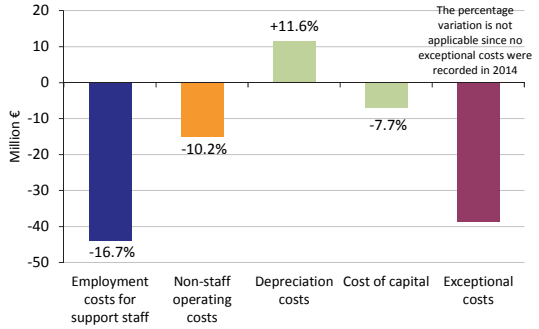




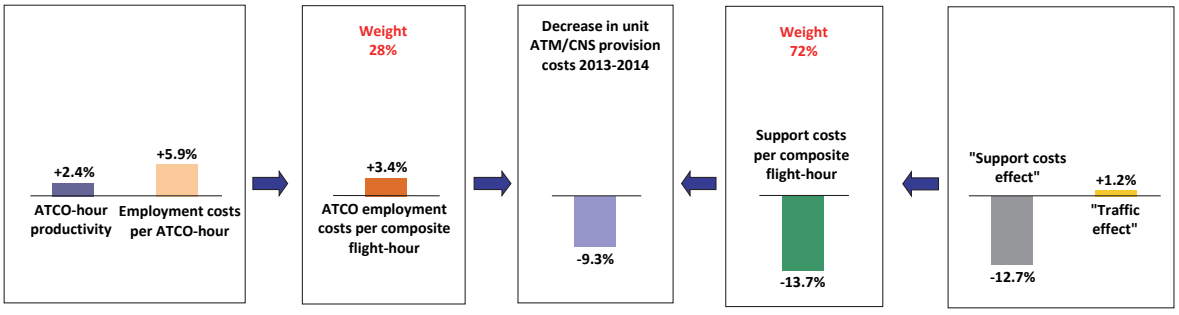
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

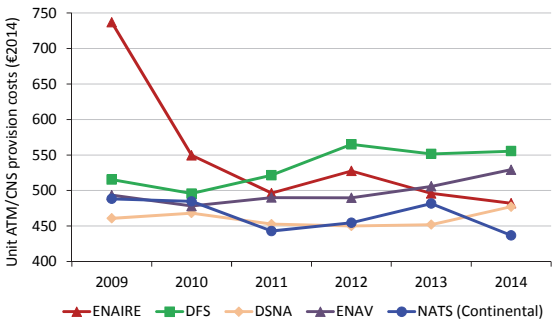


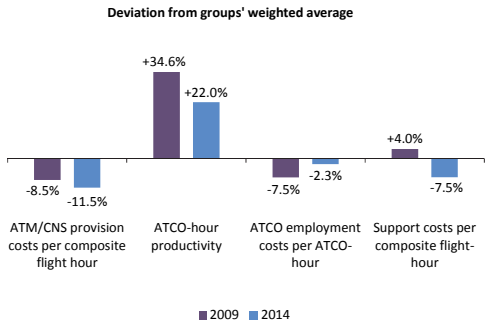
Changes in financial cost-effectiveness (2013-2014)



NATS Continental (United Kingdom) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs

Note that the planned data provided by NATS in its 2014 ACE submission reflect the figures reported in the Performance Plan for RP2, which are based on regulatory accounting rules. This is different from the methodology used by NATS to report historic and actual figures which are based on IFRS accounting.

Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2001 (Lon TC and Prest.) 2002 (Lond AC)*	C: 2002 (Lon. AC) 2007 (Lon. TC) 2009 (Prest.)*	C: 2002 (Lon. AC) 2007 (Lon. TC) 2009 (Prest.)*	C: 2002 (Lon. AC) 2007 (Lon. TC) 2008 (Prest.)*
€232.0M (2003-2011)				€19.0M (2008-2011)		2009		Prestwick	Prestwick	
						2010	Prestwick	London AC+TC	London TC	
						2011	London AC and London TC		London AC	London TC
€319.9M	€83.6M				€70.0M	2012				
						2013				
						2014				
€488.3M	€114.9M				€75.0M	2015				
						2016	London AC+TC	London AC	London AC+TC	
						2017				
						2018		London AC + TC		London AC + TC
						2019	All ACCs	Prestwick	All ACCs	Prestwick

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Centre Systems Software Development	ATM	222.3	2015	2019
2	iFACTS	ATM	201.4	2003	2011
3	iTEC (including Prestwick Upper Airspace Definition)	ATM	187.5	2015	2019
4	CNS Infrastructure (including NERC N38 System Ethernet and MSRS Change)	CNS	114.9	2015	2019
5	Airspace Development (including Time Base Separation)	ATM	45.7	2015	2019

NAV Portugal Continental (Portugal) – Cost-effectiveness KPIs (€2014)

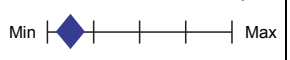
Contextual economic information

Exchange rate: Portugal is within the EURO Zone
NAV Portugal Continental represents 1.4% of European system gate-to-gate ATM/CNS provision costs

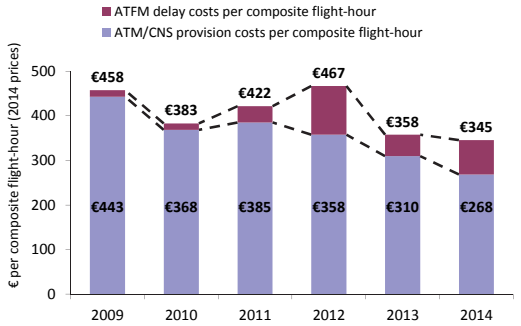
Operational conditions

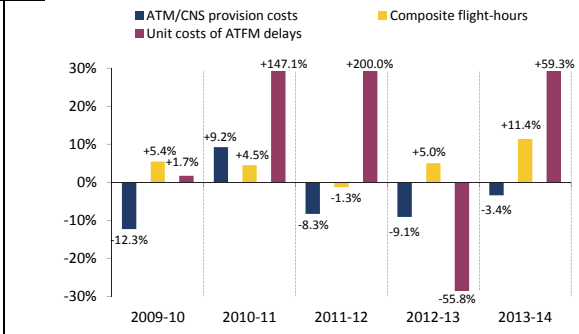
Aggregated complexity score:

Seasonal traffic variability:

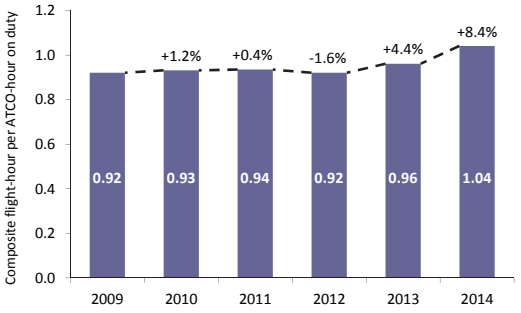


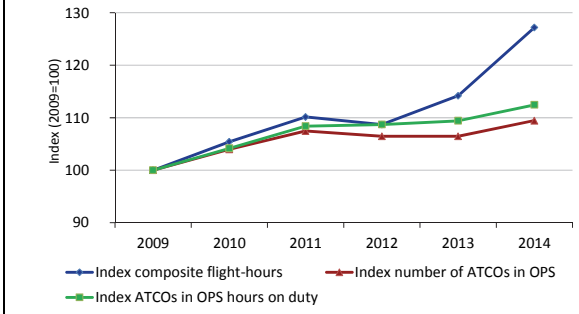
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



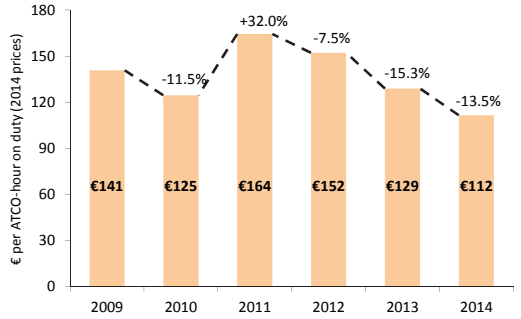


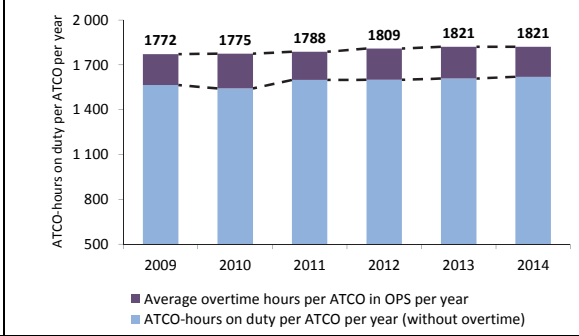
Trend in gate-to-gate ATCO-hour productivity



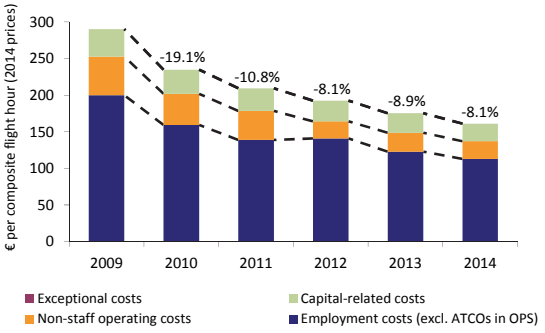


Trend in gate-to-gate employment costs per ATCO-hour

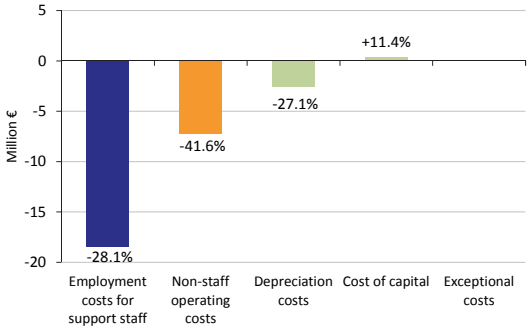




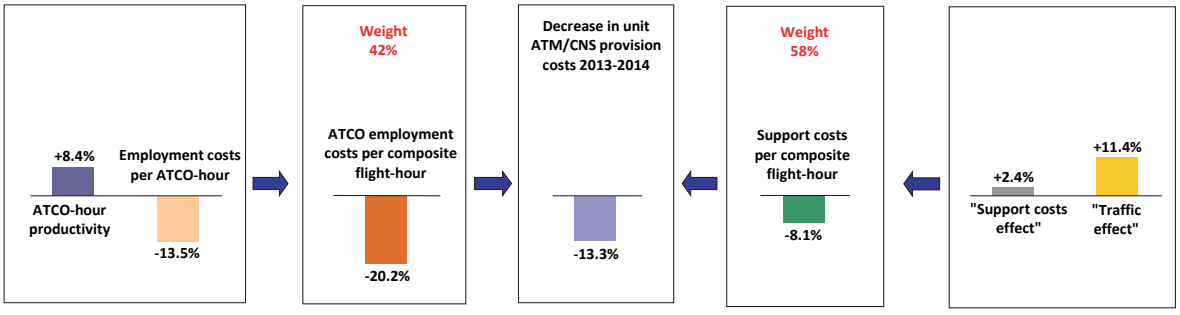
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

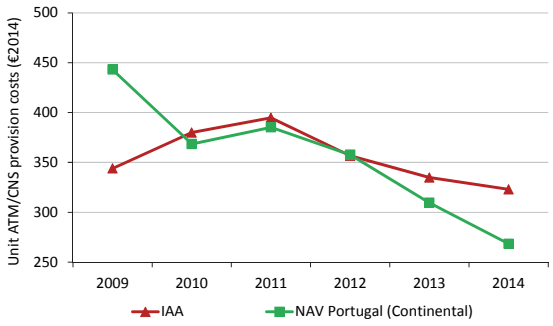


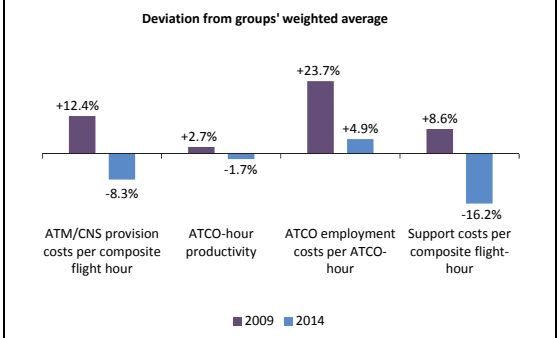
Changes in financial cost-effectiveness (2013-2014)



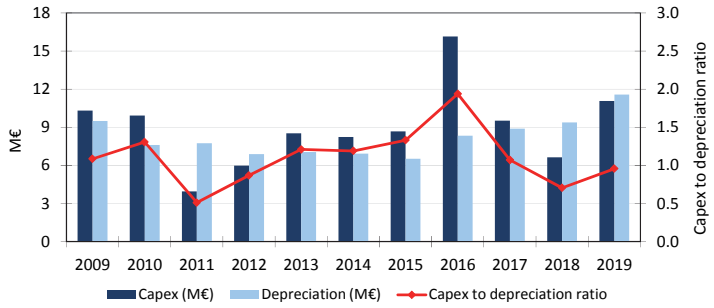
NAV Portugal Continental (Portugal) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS C: 2001*	RDPS C: 2001*	HMI C: 2001*	VCS C: 1999*
						2009				
						2010				
						2011				
€5.1M	€2.9M	€1.1M	€1.7M	€3.7M	€3.1M	2012				
						2013				
						2014				
€20.9M	€4.6M	€8.5M	€15.7M	€4.0M	€0.5M	2015				
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	ATM systems program (mainly including the evolution of the LISATM system into LISATM-iTEC)	ATM	26.0	2012	2019
2	SURVEILLANCE program (mainly including new MLAT equipment for Lisboa FIR, Mode S radar sensors, replacement of Lisboa radar)	SUR	17.4	2012	2019
3	NAVAIDS program (mainly including new ILS systems at Oporto, Faro and Lisbon and the installation of navaids in the Porto TMA)	NAV	9.6	2012	2019
4	Building program (mainly including new Tower Centre in Horta and facilities maintenance in Lisbon)	Buildings	7.7	2012	2019
5	Communication program (mainly including new VCS system and purchase of tape recorders and communications systems in the Lisbon FIR)	COM	7.5	2012	2019

NAVIAIR (Denmark) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 7.453 DKK

NAVIAIR represents 1.4% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

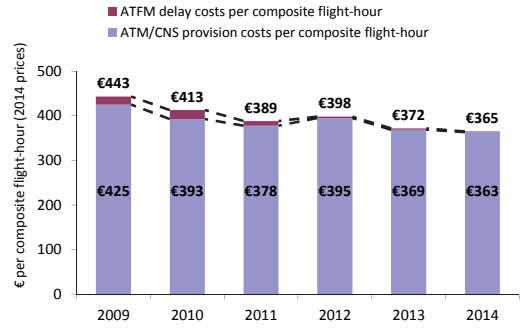
Aggregated complexity score:

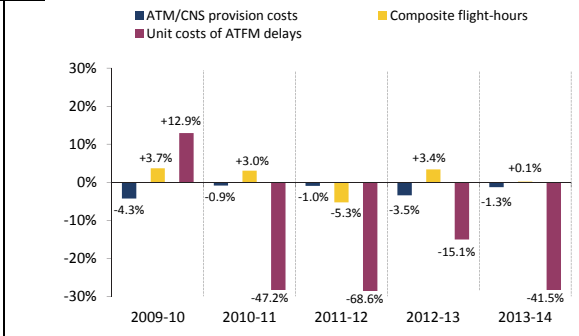
Min — Max

Seasonal traffic variability:

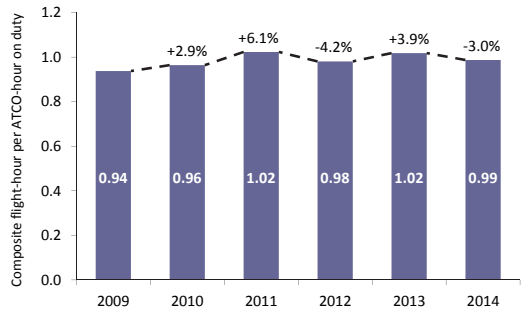
Min — Max

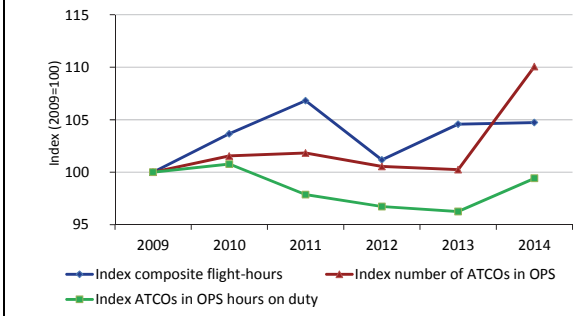
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



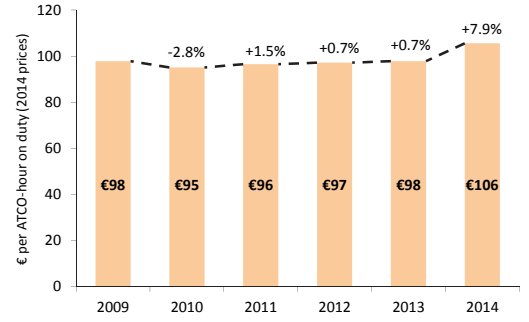


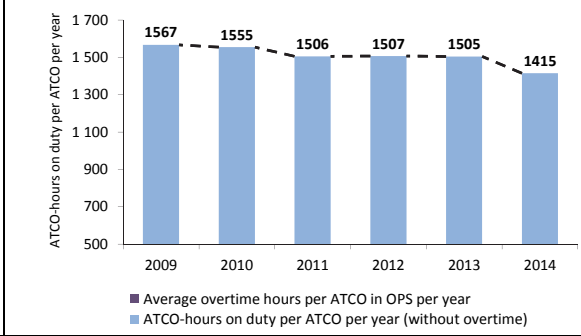
Trend in gate-to-gate ATCO-hour productivity



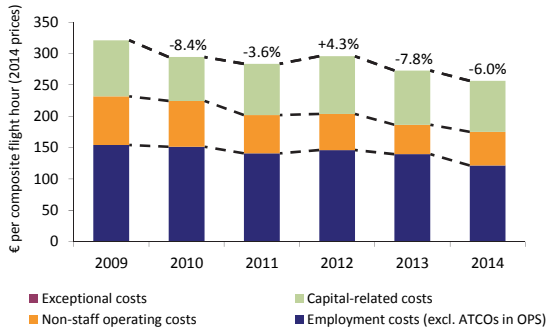


Trend in gate-to-gate employment costs per ATCO-hour

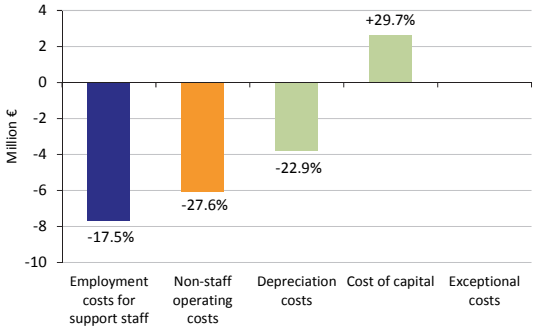




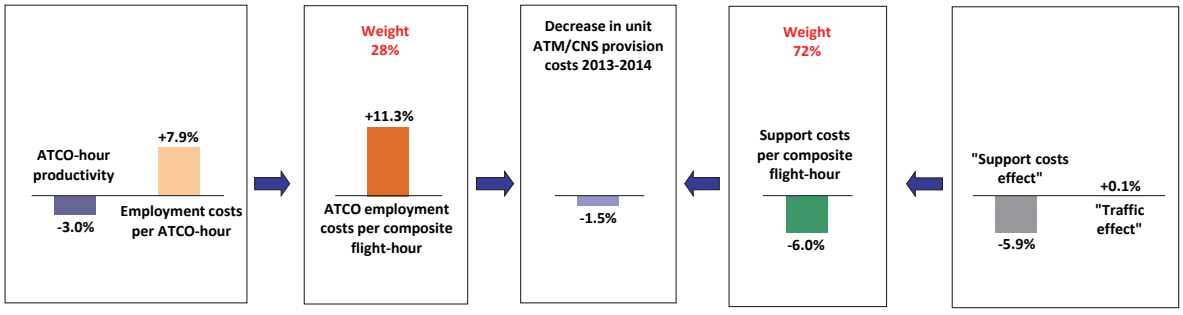
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

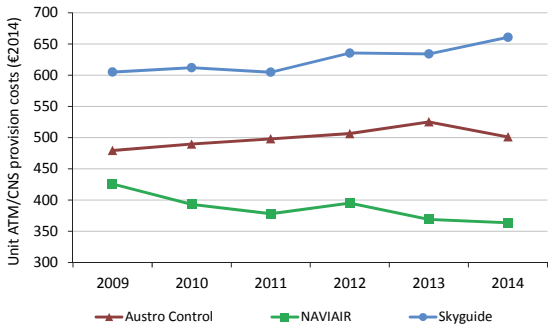


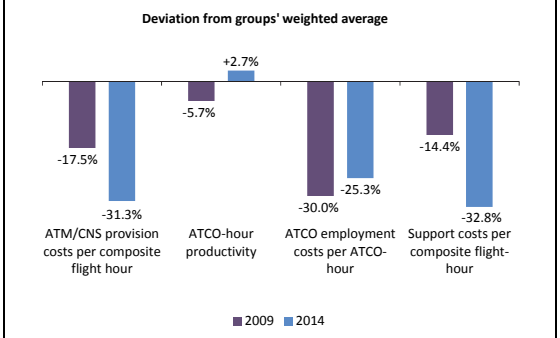
Changes in financial cost-effectiveness (2013-2014)



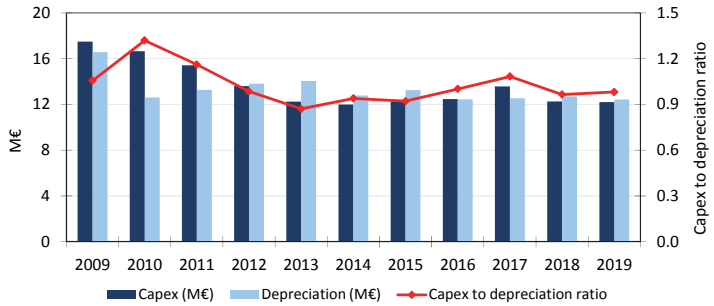
NAVIAIR (Denmark) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2008	C: 2008	C: 2008	C: 2008
						2009				
						2010				
						2011				
						2012				
						2013				
						2014				
€29.7M	€8.6M	€0.1M	€0.2M	€9.9M	€2.4M	2015				
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Investments mainly relating to COOPANS and the upgrade of the FDP, RDP and HMI systems	ATM	29.7	2015	2019
2	Investments mainly related to buildings.	Buildings	9.9	2015	2019
3a	Investments mainly relating to the implementation of Voice over Internet Protocol (VoIP) programme and related projects	COM	8.6	2015	2019
3b		NAV	0.1	2015	2019
3c		SUR	0.2	2015	2019
4	Other	Other	2.4	2015	2019

Oro Navigacija (Lithuania) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 3.453 LTL

Oro Navigacija represents 0.3% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

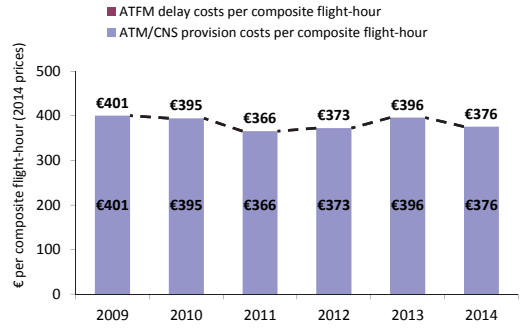
Aggregated complexity score:

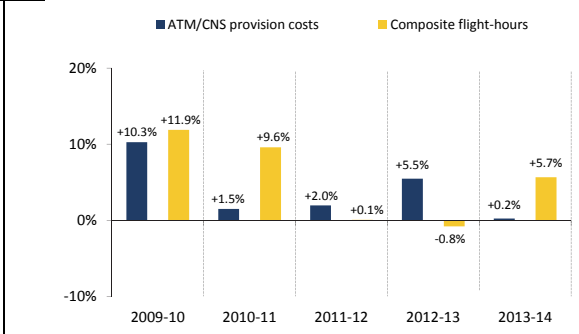
Min — Max

Seasonal traffic variability:

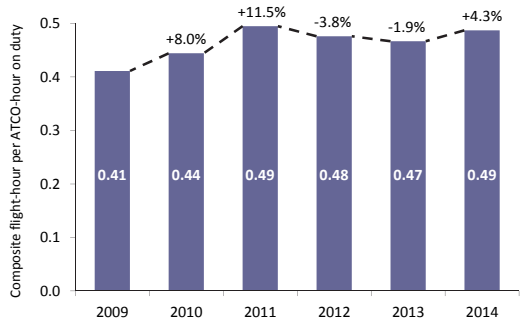
Min — Max

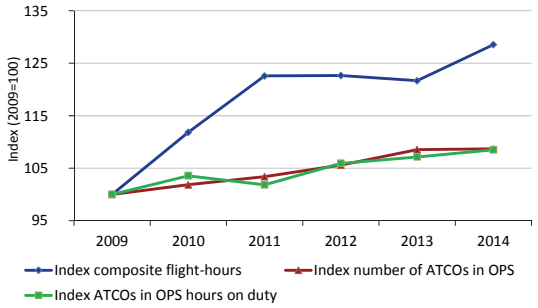
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



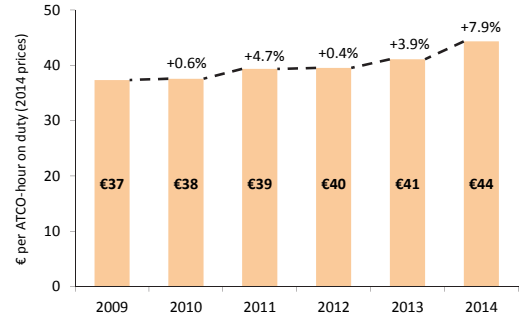


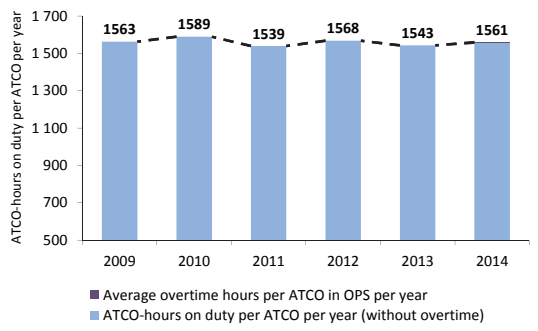
Trend in gate-to-gate ATCO-hour productivity



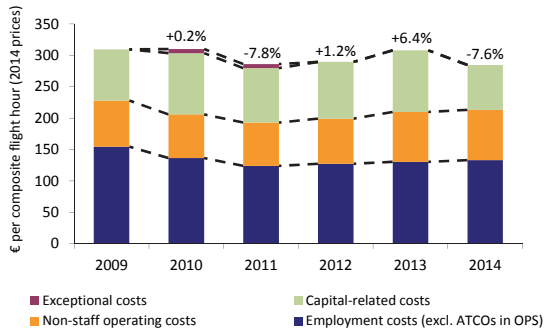


Trend in gate-to-gate employment costs per ATCO-hour

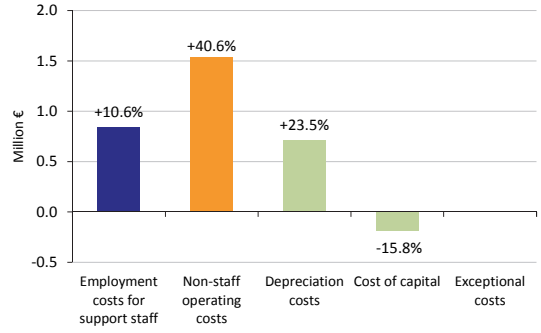




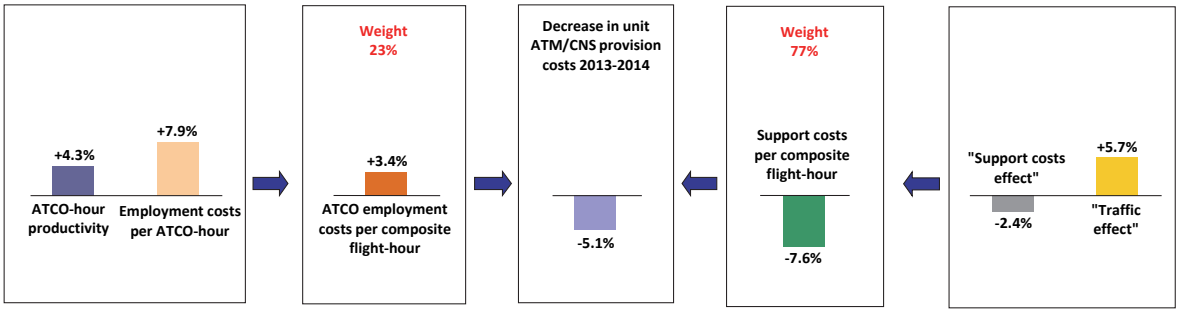
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

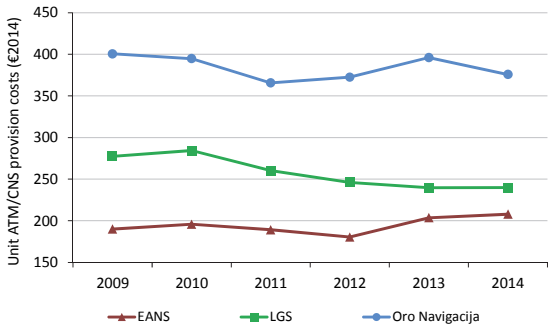


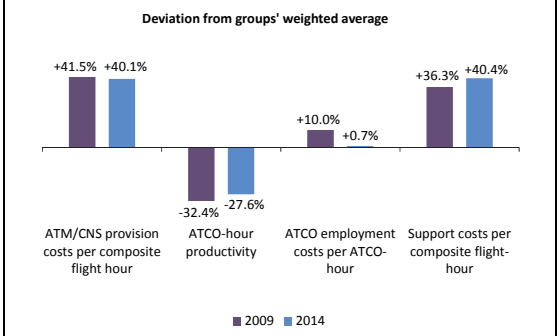
Changes in financial cost-effectiveness (2013-2014)



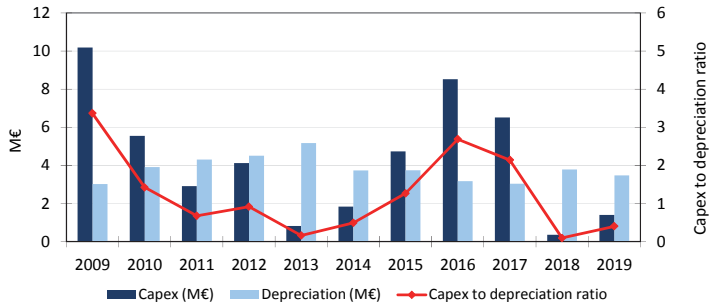
Oro Navigacija (Lithuania) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2005	C: 2005	C: 2005	C: 2005
			€14.6M (2007-2010)			2009				
						2010				
€5.4M (2008-2014)	€3.0M				€0.2M	2011				
		€0.8M	€1.4M			2012				
						2013				
	€0.3M	€0.9M		€10.7M		2014				
€5.5M		€1.0M			€1.9M	2015				
	€1.7M		€1.1M			2016				
						2017				
						2018				
€1.3M						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	ACC and administration building	Buildings	10.7	2014	2017
2	Installation of the new ATC system in new ACC	ATM	5.5	2015	2017
3	Replacement of radar (Kaunas)	SUR	4.8	2008	2010
4	Replacement of radar (Palanga)	SUR	4.8	2008	2010
5	Replacement of radar (Vilnius - 2007/2008)	SUR	3.7	2007	2008

PANSA (Poland) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EURO = 4.183 PLN

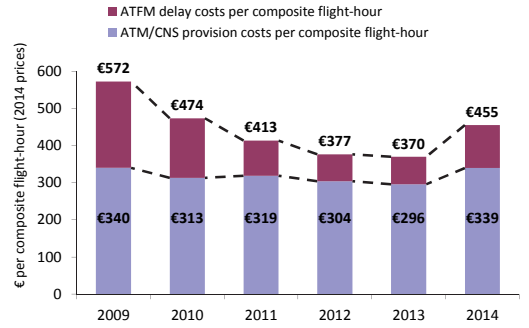
PANSA represents 2.1% of European system gate-to-gate ATM/CNS provision costs

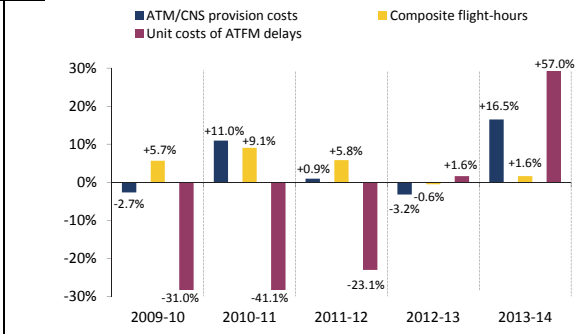
Operational conditions

Aggregated complexity score: Min — Max

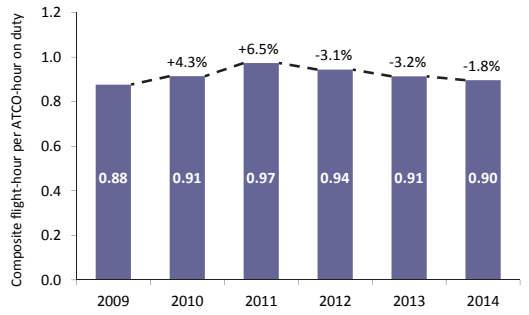
Seasonal traffic variability: Min — Max

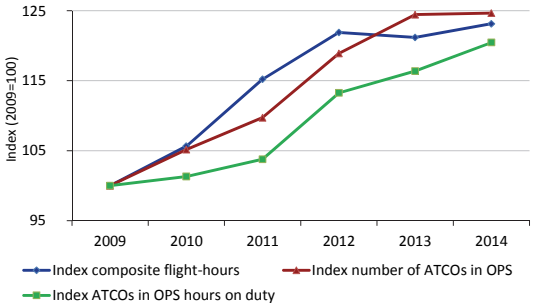
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



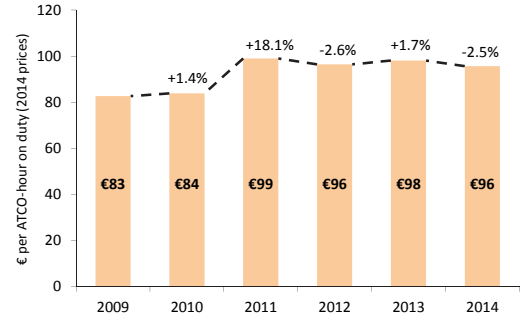


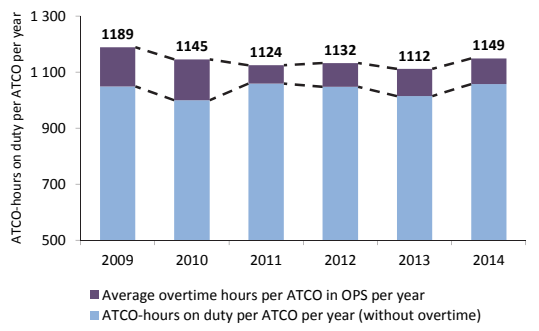
Trend in gate-to-gate ATCO-hour productivity



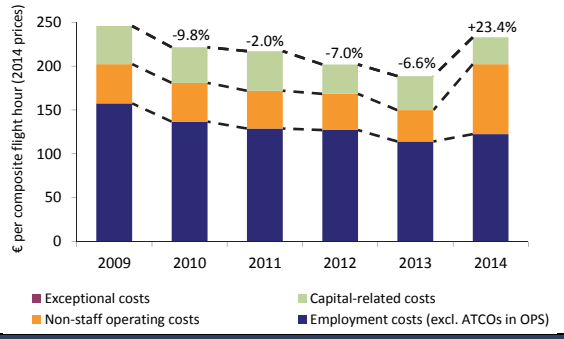


Trend in gate-to-gate employment costs per ATCO-hour

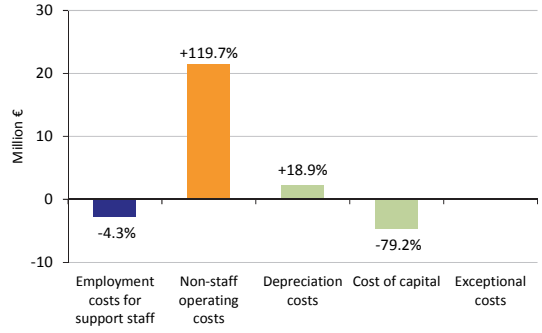




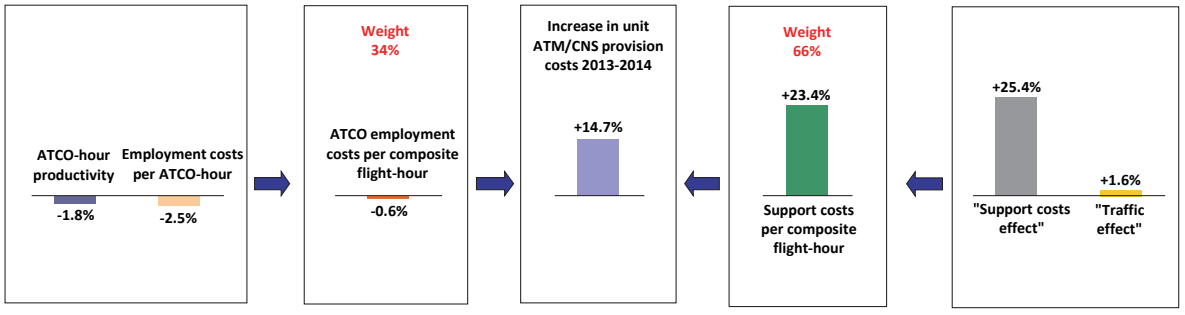
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

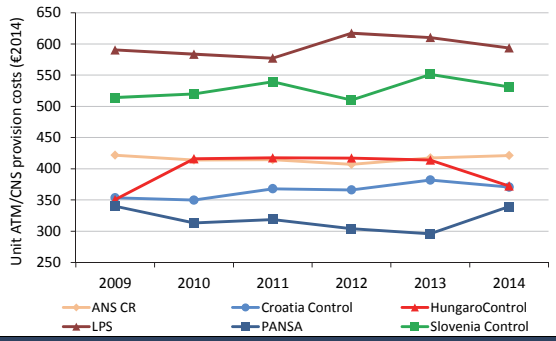


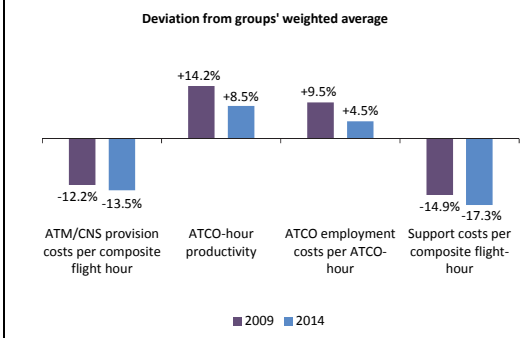
Changes in financial cost-effectiveness (2013-2014)



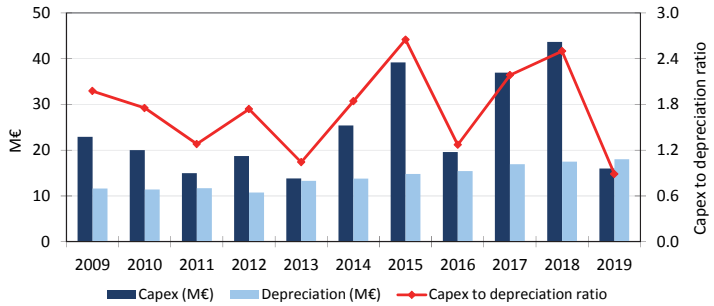
PANSA (Poland) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2013	C: 2013	C: 2013	C: 2013
						2009				
						2010				
						2011				
						2012				
						2013				
						2014				
						2015				
						2016				
						2017				
						2018				
						2019				
€67.4M (2008-2020)	€14.8M	€17.8M	€47.4M	€80.1M (2010-2020)	€17.9M					

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	ATC Training and Contingency Infrastructure	Buildings	47.8	2012	2020
2	TWR Infrastructure (Katowice, Krakow, Poznan, Modlin, RTWR-Remote TWR)	Buildings	26.7	2010	2018
3	Implementation of PEGASUS ATM system	ATM	26.6	2008	2014
4	Radiolocation Systems Radars	SUR	25.9	2011	2019
5	Upgrade of PEGASUS and supporting systems	ATM	20.5	2014	2020

ROMATSA (Romania) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 4.441 RON

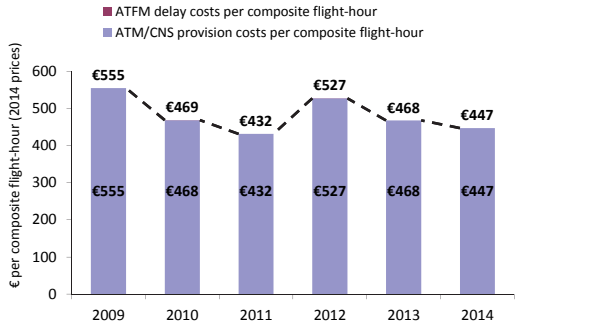
ROMATSA represents 2.0% of European system gate-to-gate ATM/CNS provision costs

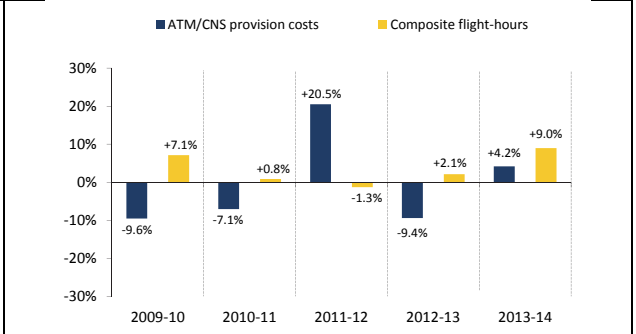
Operational conditions

Aggregated complexity score:

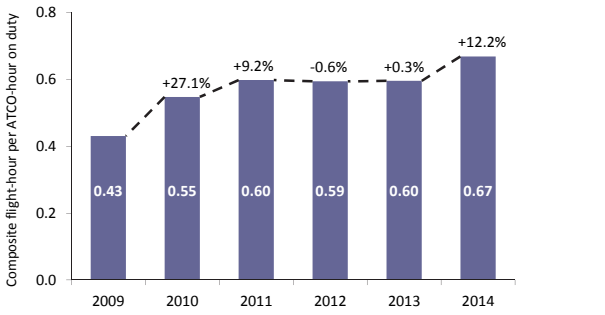
Seasonal traffic variability:

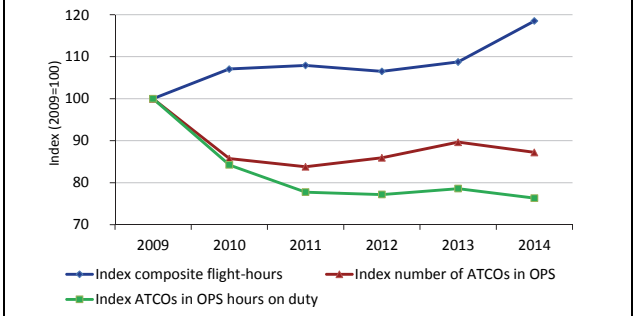
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



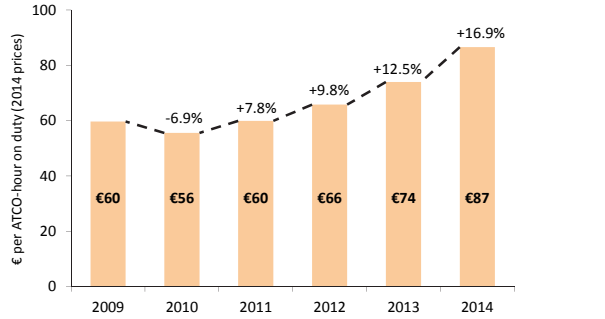


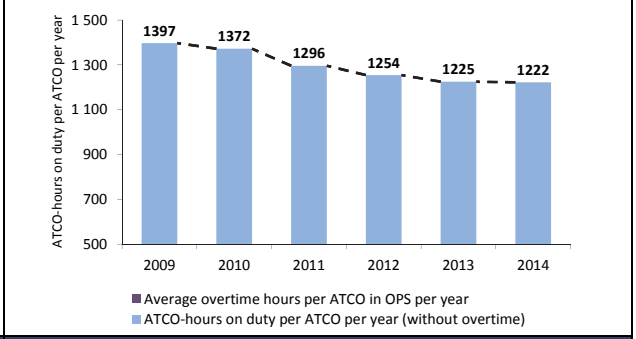
Trend in gate-to-gate ATCO-hour productivity



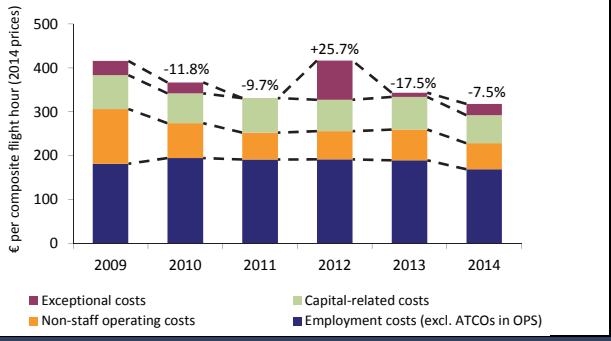


Trend in gate-to-gate employment costs per ATCO-hour

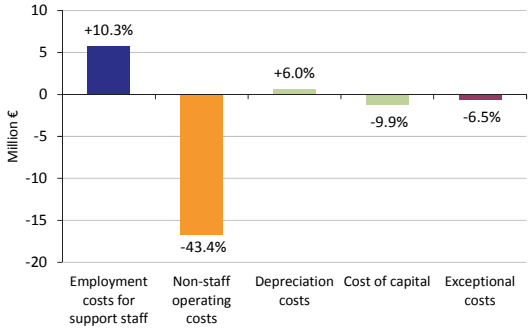




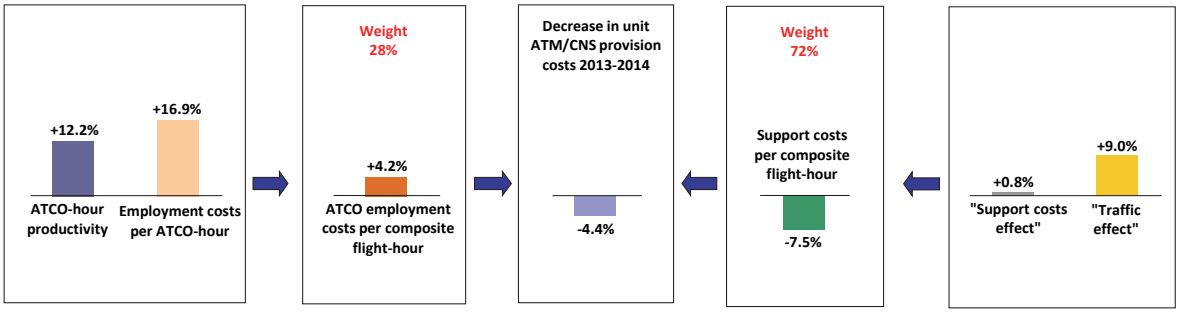
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

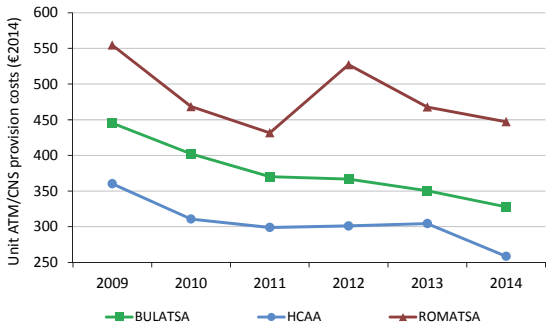


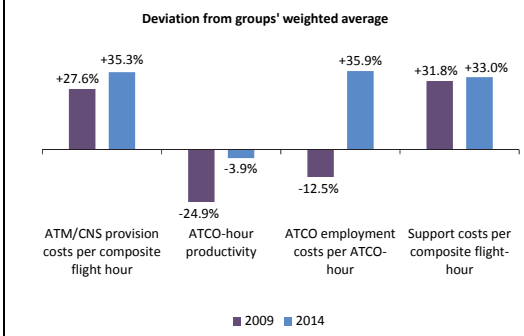
Changes in financial cost-effectiveness (2013-2014)



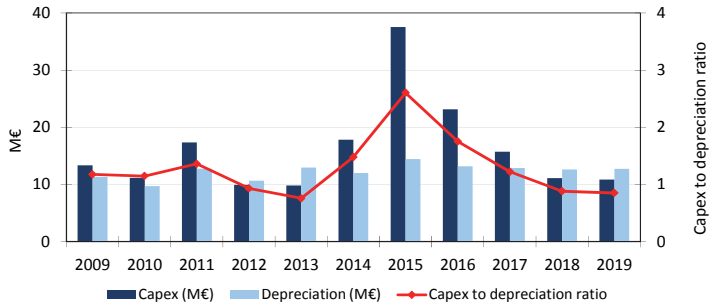
ROMATSA (Romania) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2003*	C: 2003*	C: 2003*	C: 2003*
						2009				
						2010				
		€1.1M		€0.4M		2011				
	€7.5M				€3.3M	2012				
€61.1M (2008-2021)			€16.5M			2013				
						2014				
				€16.5M		2015				
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	ATM System ROMATSA 2015+ Phase I	ATM	34.1	2013	2016
2	ATM System ROMATSA 2015+ Phase II	ATM	14.9	2017	2019
3	ATM System ROMATSA 2015+ Phase III	ATM	9.9	2019	2021
4	New CLUJ TOWER	Buildings	8.0	2014	2017
5	Mode S radars installation	SUR	7.1	2011	2015

Skyguide (Switzerland) – Cost-effectiveness KPIs (€2014)

Contextual economic information

Exchange rate: 1 EUR = 1.214 CHF

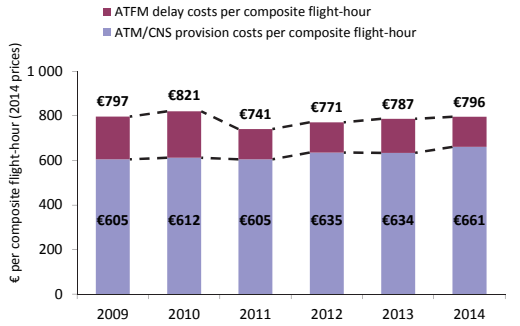
Skyguide represents 3.7% of European system gate-to-gate ATM/CNS provision costs

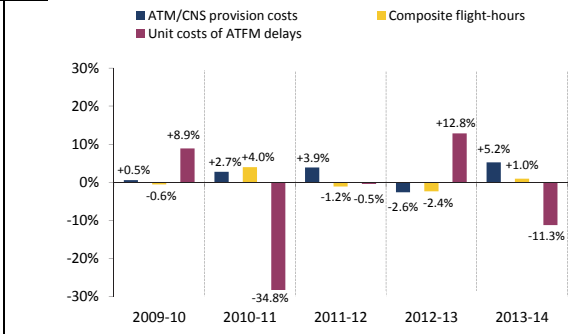
Operational conditions

Aggregated complexity score:

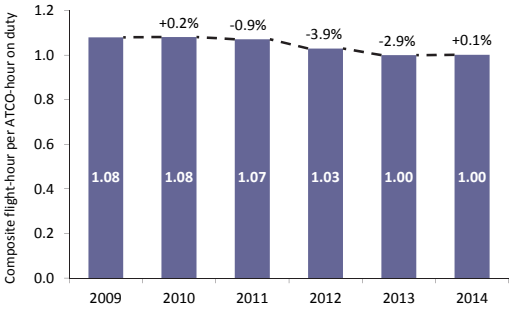
Seasonal traffic variability:

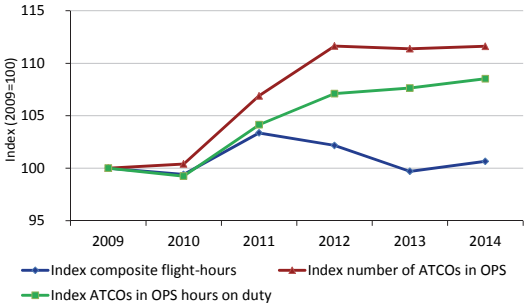
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



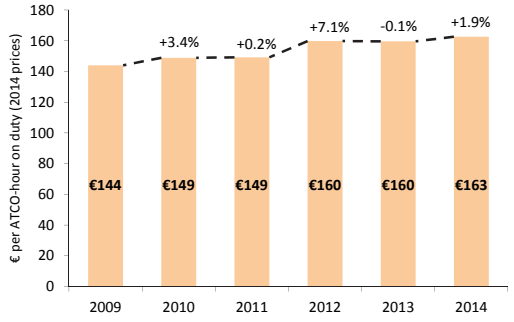


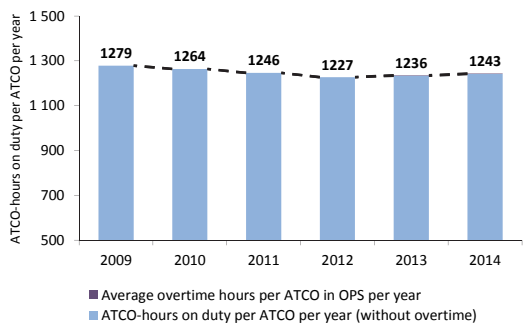
Trend in gate-to-gate ATCO-hour productivity



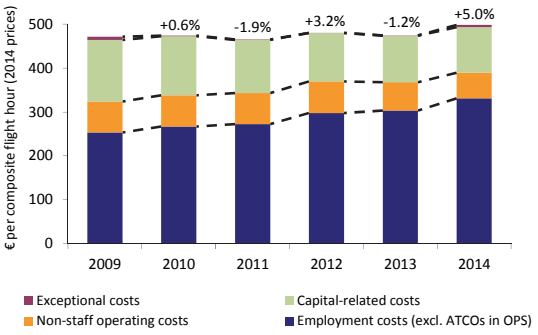


Trend in gate-to-gate employment costs per ATCO-hour

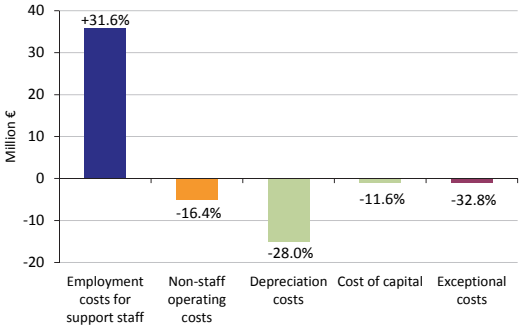




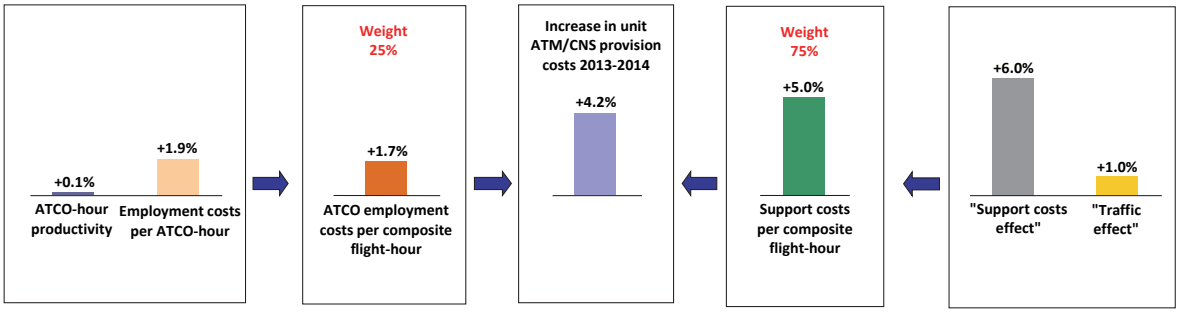
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

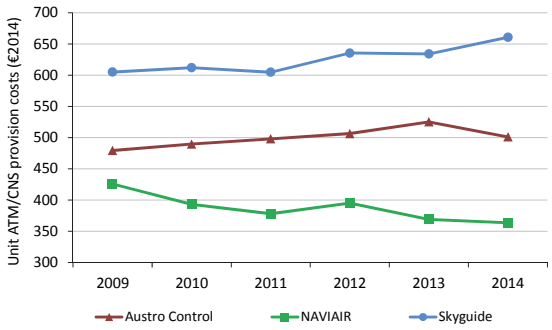


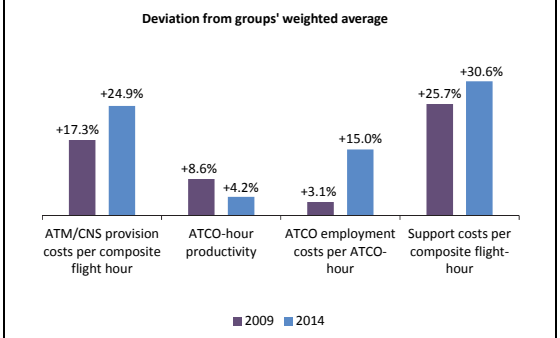
Changes in financial cost-effectiveness (2013-2014)



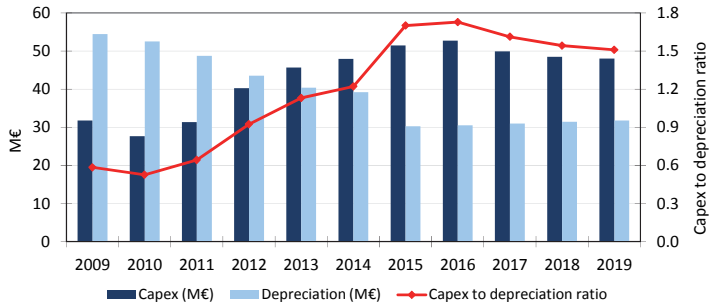
Skyguide (Switzerland) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

Slovenia Control (Slovenia) – Cost-effectiveness KPIs (€2014)

Contextual economic information

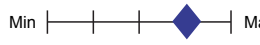
Exchange rate: Slovenia is within the EURO Zone

Slovenia Control represents 0.4% of European system gate-to-gate ATM/CNS provision costs

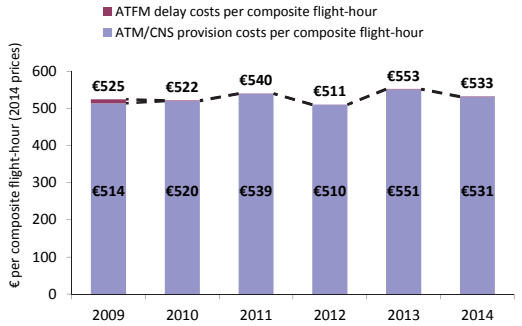
Operational conditions

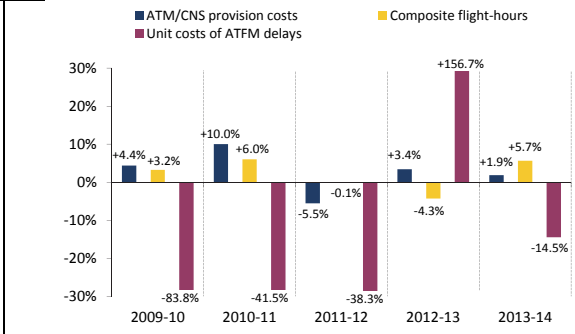
Aggregated complexity score:

Seasonal traffic variability:

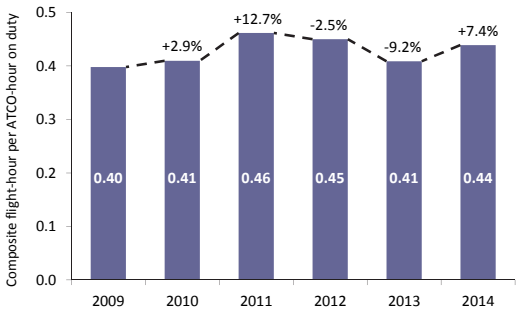


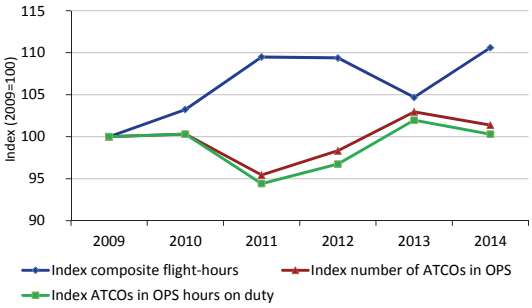
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



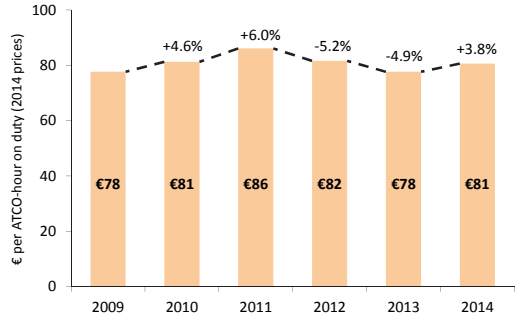


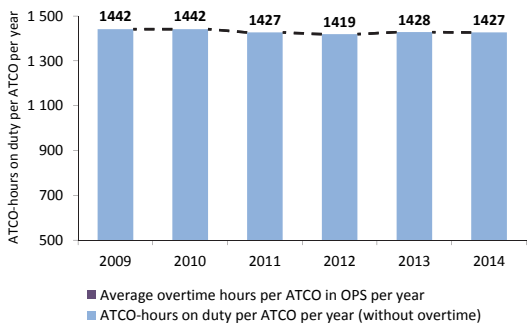
Trend in gate-to-gate ATCO-hour productivity



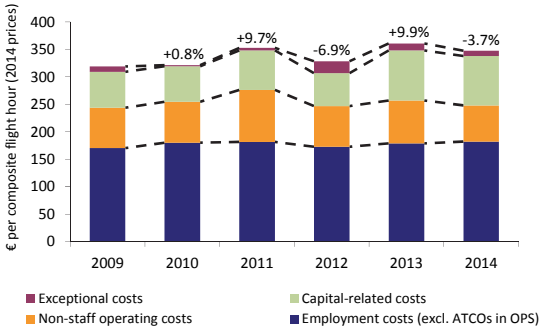


Trend in gate-to-gate employment costs per ATCO-hour

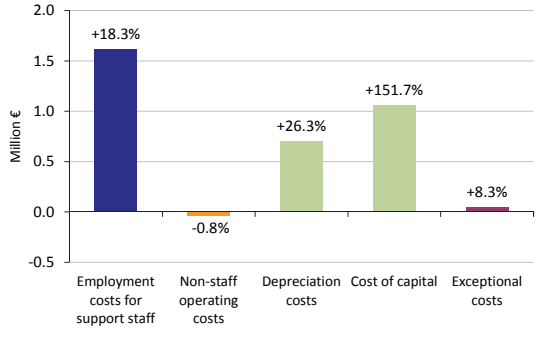




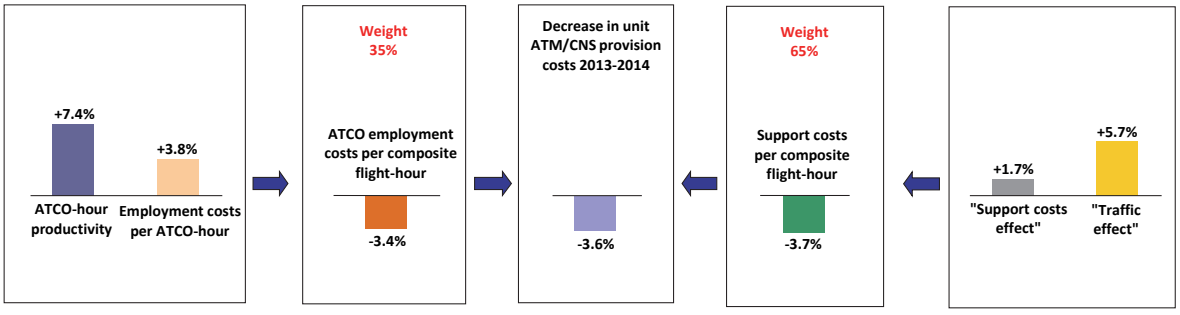
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

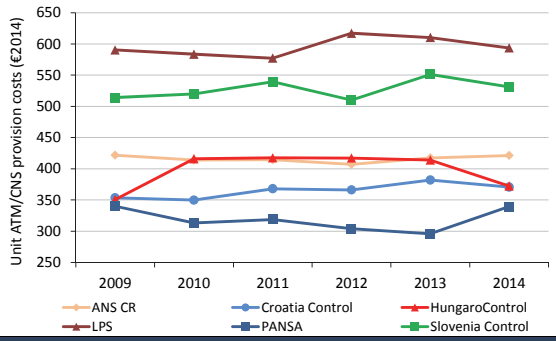


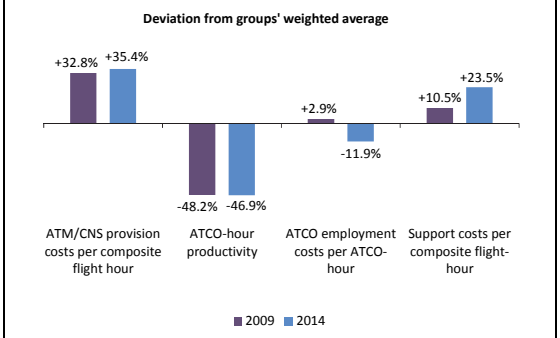
Changes in financial cost-effectiveness (2013-2014)



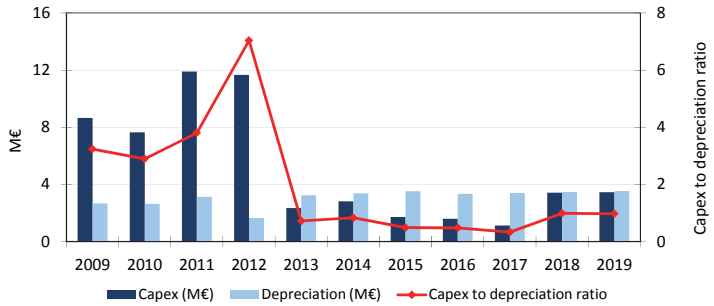
Slovenia Control (Slovenia) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

[To be completed in the final ACE 2014 Benchmarking Report]

Focus on the top five capex projects

[To be completed in the final ACE 2014 Benchmarking Report]

SMATSA (Serbia and Montenegro) – Cost-effectiveness KPIs (€2014)

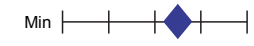
Contextual economic information

Exchange rate: 1 EUR = 117.167 RSD

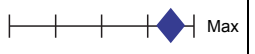
SMATSA represents 1.0% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

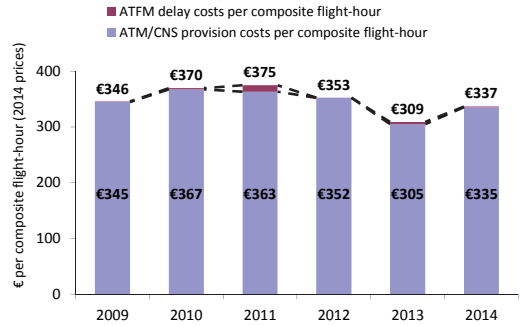
Aggregated complexity score:

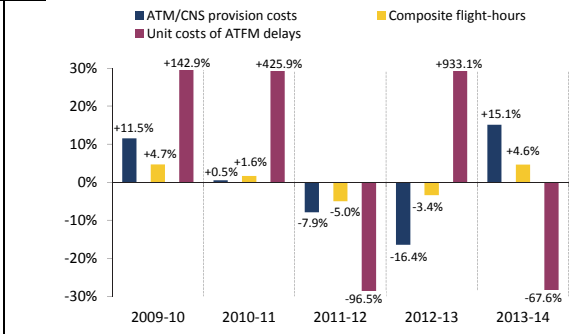


Seasonal traffic variability:

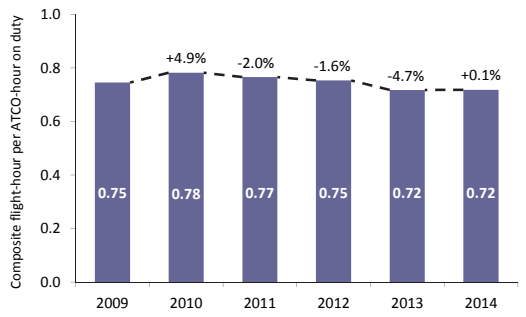


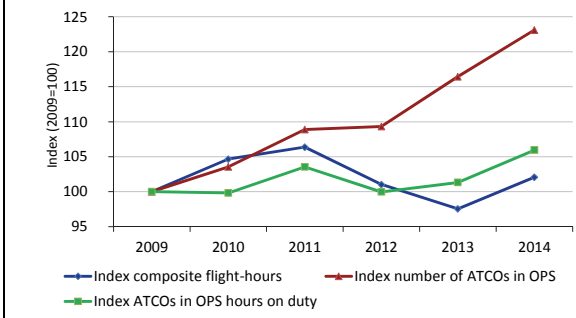
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



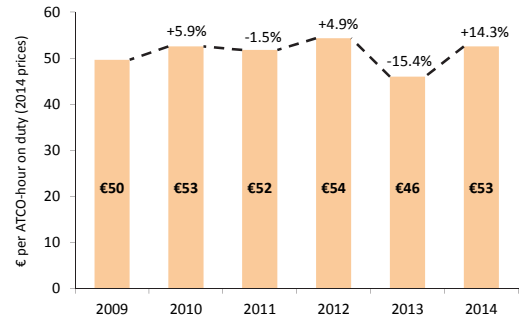


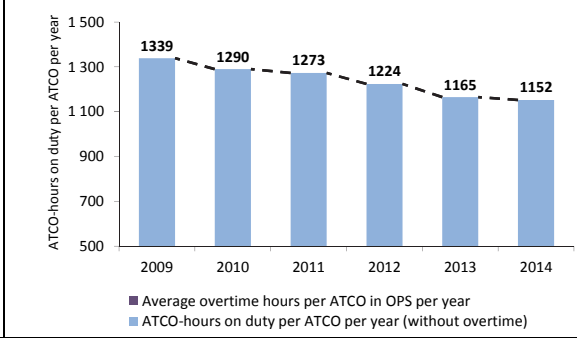
Trend in gate-to-gate ATCO-hour productivity



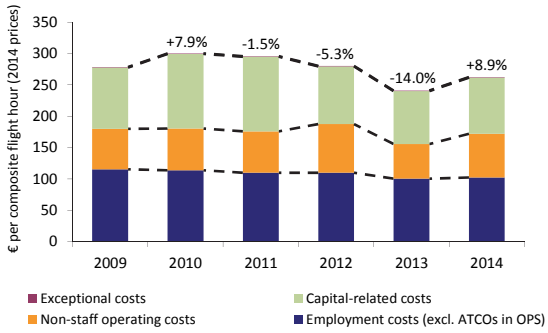


Trend in gate-to-gate employment costs per ATCO-hour

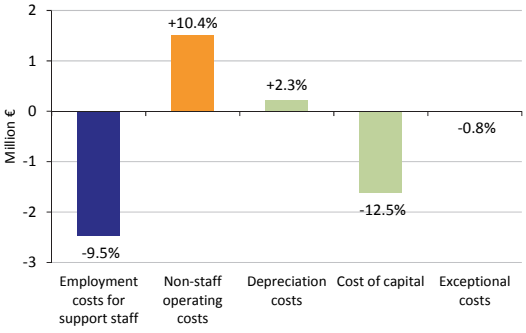




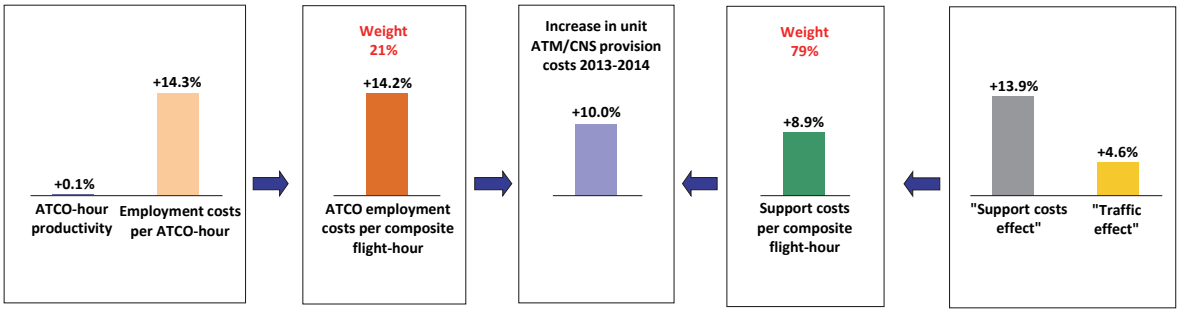
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

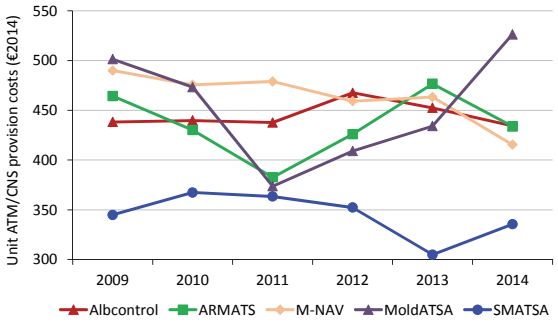


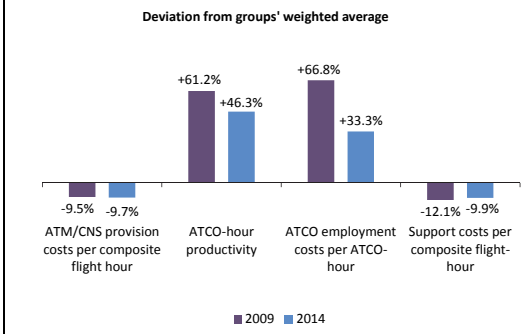
Changes in financial cost-effectiveness (2013-2014)



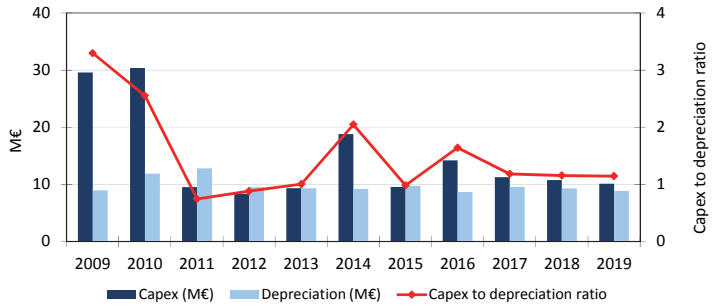
SMATSA (Serbia and Montenegro) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C: 2011	C: 2011	C: 2011	C: 2011
€58.6M (2008-2016)				€24.0M		2009				
						2010				
						2011				
	€1.0M		€5.8M			2012				
						2013				
						2014				
		€1.1M				2015				
						2016				
						2017				
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	New ATM System for Belgrade ACC and SMATSA communications network	ATM	29.8	2009	2011
2	New ATCC in Belgrade	Buildings	17.0	2009	2010
3	Aircraft equipped with Automatic Flight Inspection System	ATM	9.6	2008	2010
4	Procurement of a second aircraft for flight calibration of equipment	ATM	7.8	2013	2013
5	Reconstruction of Tivat airport TWR	Buildings	4.9	2015	2016

UkSATSE (Ukraine) – Cost-effectiveness KPIs (€2014)

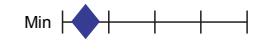
Contextual economic information

Exchange rate: 1 EUR = 15.740 UAH

UkSATSE represents 1.9% of European system gate-to-gate ATM/CNS provision costs

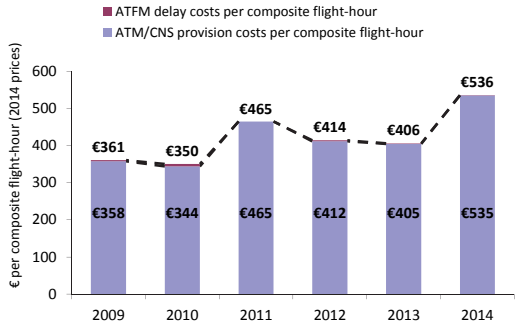
Operational conditions

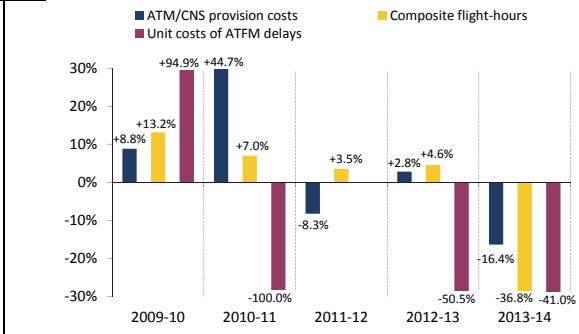
Aggregated complexity score:



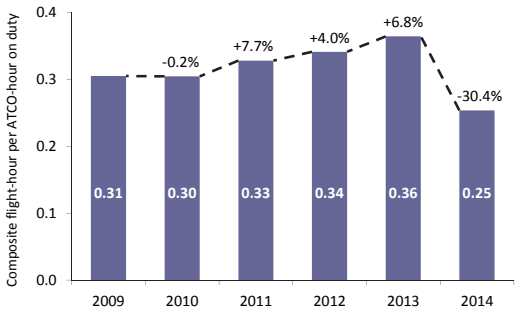
Seasonal traffic variability:

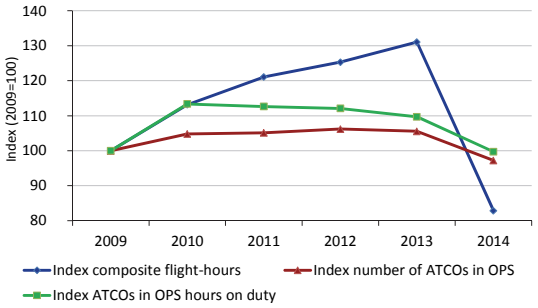
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2014 prices)



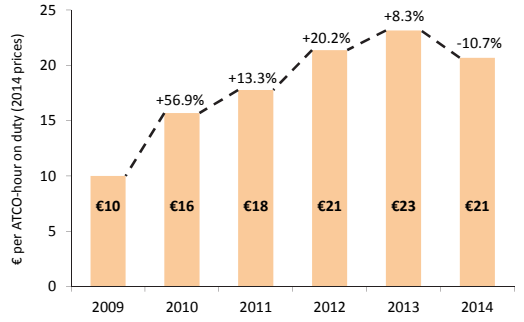


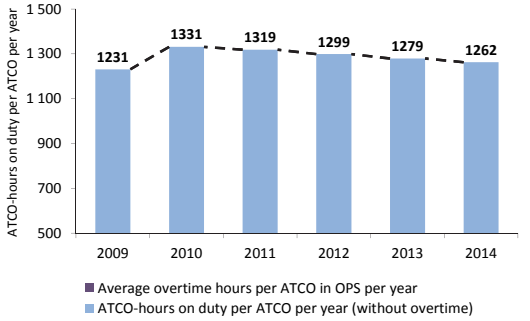
Trend in gate-to-gate ATCO-hour productivity



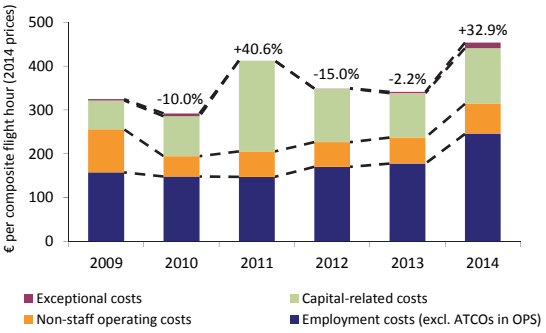


Trend in gate-to-gate employment costs per ATCO-hour

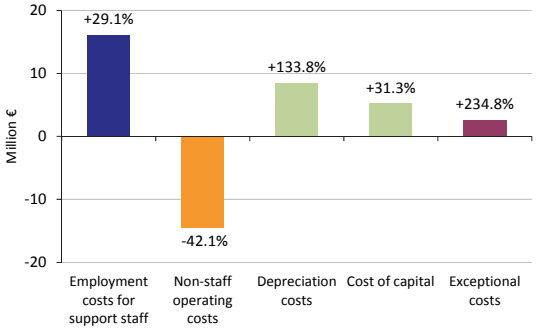




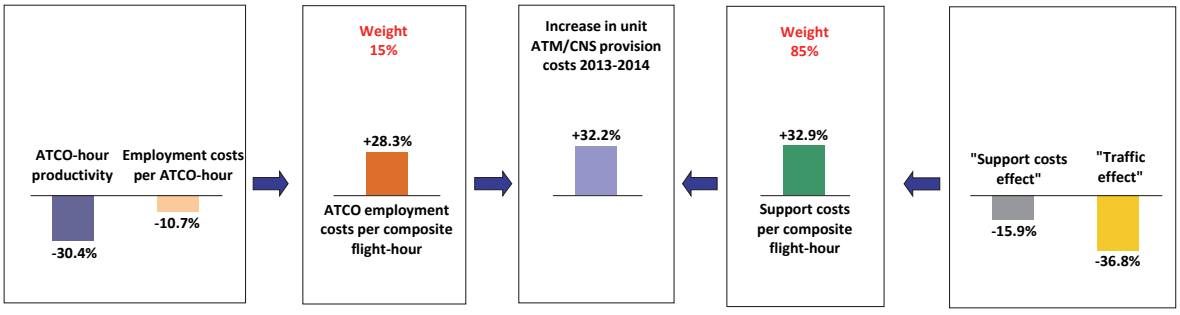
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2014)

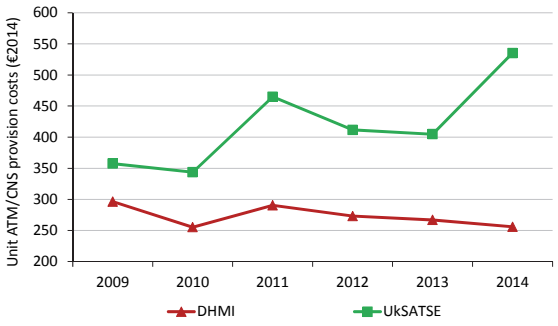


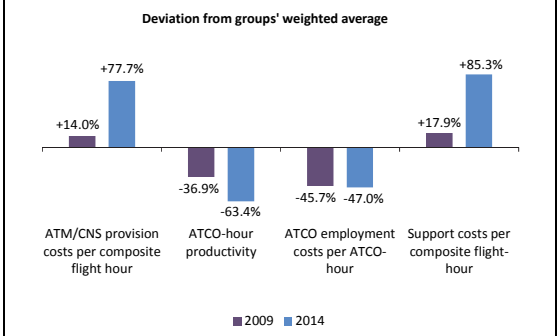
Changes in financial cost-effectiveness (2013-2014)



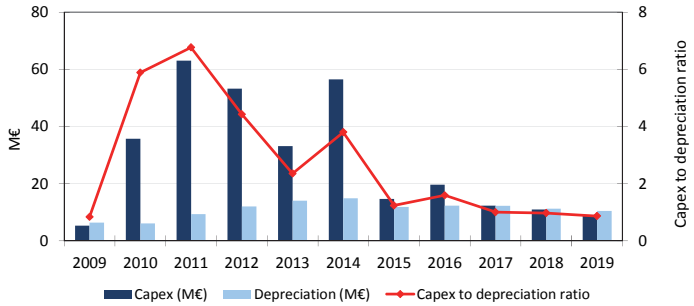
UkSATSE (Ukraine) – (€2014)

Changes in unit gate-to-gate ATM/CNS provision costs within comparator group





Planned capital expenditures and depreciation costs



Information on major capex projects and ATM systems upgrades/replacements

ATM	COM	NAV	SUR	Building	Other	Years	FDPS	RDPS	HMI	VCS
							C:1997 (L'viv) 2000 (Odesa, Kyiv) 2007 (Simf., Kyiv, Dnip.)*	C: 1997 (L'viv) 2000 (Odesa, Kyiv) 2007 (Simf., Kyiv, Dnip.)*	C: 1997 (L'viv) 2000 (Odesa, Kyiv) 2007 (Simf., Kyiv, Dnip.)*	C:2003 (Odesa, L'viv) 2006 (Simf., Dnip.) 2011 (Kyiv)*
						2009				
						2010				
						2011				
						2012				
€20.3M	€3.6M		€9.6M	€42.6M (2008-2016)	€2.8M	2013	D	D	D	
						2014	K	K	K	
						2015	L	L	L	L
	€12.1M		€7.9M			2016	O	O	O	O
						2017				D
						2018				
						2019				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Capex spent between start and end dates (€M)	Start date	End date
1	Building of new TOWERs: Donets'k TWR, Zhuliany (Kyiv) TWR, Kharkiv TWR, Dnipropetrovs'k TWR, Borispil' TWR and reconsttucting of L'viv TWR	Buildings	42.6	2008	2016
2	Upgrade of ATM systems for Kyiv ACC/APP/TWR, Donets'k APP/TWR, Kharkiv APP/TWR, Dnipropetrovs'k ACC/APP/TWR	ATM	14.7	2010	2014
3	Implementation of aerodrome surveillance radar with Mode S for Donets'k and Kharkiv RB and upgrade of radar complex TRLK - 10 in Zhydachiv	SUR	9.6	2011	2014
4	Implementation of radio equipment with VoIP function for 15 sites	COM	9.5	2015	2018
5	Implementation of 4 new MSSR Mode S (EHS)	SUR	7.9	2015	2018

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ANNEX 1 – STATUS OF ANSPs 2014 ANNUAL REPORTS

	Availability of a public Annual Report (AR)	Availability of Management Report	Availability of Annual Accounts	Independent audited accounts	Separate disclosure of en-route and terminal ANS costs	Information provided in English	PRU comments
Albcontrol	No	No	✔	✔	No	✔	At the time of writing this report, Albcontrol had only released a document comprising its Financial Statements, but not a Management Report for the year 2014.
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 "board of auditors". No cash flow statement.
BULATSA	✔	✔	✔	✔	No	✔	
Croatia Control	✔	✔	✔	✔	No	✔	
DCAC Cyprus	No	No	No	No	No	No	DCAC annually discloses a report which includes some financial information from Route Charges Document but not Financial Statements.
DFS	✔	✔	✔	✔	No	✔	Separate accounts are used for internal reporting purposes and charges calculation.
DHMİ	✔	✔	✔	✔	No	✔	Includes airport activities.
DSNA	No	No	No	No	No	No	At the time of writing this report, DSNA had not yet released its 2014 Annual Report comprising Financial Statements.
EANS	✔	✔	✔	✔	✔	✔	Separate disclosure of aggregated revenues and costs for en-route and terminal ANS.
ENAIRE	✔	✔	✔	✔	No	✔	Financial Statements are published in English while the management report is available in Spanish.
ENAV	✔	✔	✔	✔	No	✔	
Finavia	✔	✔	✔	✔	No	✔	Detailed accounts only available for total Finavia.
HCAA	No	No	No	No	No	No	PRU received HANSP report which included an extract of the en-route reporting tables but not Financial Statements.
HungaroControl	✔	✔	✔	✔	No	✔	
IAA	✔	✔	✔	✔	No	✔	
LFV	✔	✔	✔	✔	No	✔	
LGS	✔	✔	✔	✔	No	✔	
LPS	✔	✔	✔	✔	No	✔	
LVNL	✔	✔	✔	✔	✔	No	Separate Income Statement for en-route and terminal ANS.
MATS	✔	✔	✔	✔	✔	✔	At the time of writing this report, MATS had not released its 2014 Annual Report, but provided PRU with audited Financial Statements including 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.
MUAC	✔	✔	✔	✔	n/appl	✔	
NATS	✔	✔	✔	✔	✔	✔	Several Annual Reports for individual group companies.
NAV Portugal	✔	✔	✔	✔	✔	No	Separate disclosure of aggregated revenues and costs for en-route and terminal ANS.
NAVIAIR	✔	✔	✔	✔	✔	✔	
Oro Navigacija	✔	✔	✔	✔	✔	✔	Total revenues and costs provided for both en-route and terminal ANS.
PANSA	✔	✔	✔	✔	✔	✔	At the time of writing this report, PANSA had not released its 2014 Annual Report, but provided PRU with audited Financial Statements.
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 Financial Statements. UkSATSE provided a separate document with Financial Statements.

Annex 1 - Table 0.1: Status on ANSP's 2014 Annual Reports [TBU]

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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[30] and, for terminal ANS, the number of IFR airport movements controlled. 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[31].

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 Pan-European system. This average weighting factor is based on the total monetary value of the outputs over the period 2002-2014 and amounts to 0.27.

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

Composite gate-to-gate flight-hours = En-route flight-hours + (0.27 x 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[32].

The quality of service provided by ANSPs has an impact on the efficiency of aircraft operations, which carry with them additional costs that need to be taken into consideration for a full economic assessment of ANSP performance. In this ACE Benchmarking Report, an indicator of "economic" cost-effectiveness is computed at ANSP and Pan-European system levels by adding the ATM/CNS provision costs and the costs of ATFM ground delay, all expressed per composite flight-hour. This computation is shown in the Table below (see column 10).

[30] Controlled flight-hours are calculated by the Network Manager (NM) 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 NM (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 NM environment.

[31] See also working paper on "*Cost-effectiveness and Productivity Key Performance Indicators*", available on the PRC web site at www.eurocontrol.int/prc.

[32] Further details on the theoretical background to producing composite indicators can be found in a working paper on "Total Factor Productivity of European ANSPs: basic concepts and application" (Sept. 2005).

ANSPs	(1) Gate-to-gate ATM/CNS provision costs (in €'000)	(2) En-route ATFM delays ('000 minutes)	(3) Airport ATFM delays ('000 minutes)	(4)=(2)+(3) Total ATFM delays ('000 minutes)	(5) % share in European system ATFM delays	(6)=(4)x€100 Costs of ATFM delays (in €'000)	(7) Composite flight-hours (in '000)	(8)=(1)/(7) Financial gate-to-gate cost-effectiveness	(9)=(6)/(7) Costs of delay per composite flight-hour	(10)=(8)+(9) Economic costs per composite flight-hour
Albcontrol	20 742	0	0	0	0.0%	38	48	434	1	435
ANS CR	110 819	8	12	20	0.2%	1 974	263	421	8	429
ARMATS	8 213	0	0	0	0.0%	0	19	434	0	434
Austro Control	183 663	20	106	125	1.3%	12 535	367	501	34	535
Avinor (Continental)	189 379	19	146	165	1.7%	16 497	562	337	29	366
Belgocontrol	152 517	10	104	114	1.2%	11 415	205	743	56	798
BULATSA	78 526	0	0	0	0.0%	0	240	328	0	328
Croatia Control	84 714	163	1	164	1.7%	16 356	229	371	72	442
DCAC Cyprus	38 773	581	4	585	5.9%	58 481	162	239	361	600
DFS	1 044 843	716	508	1 224	12.4%	122 421	1 881	555	65	621
DHMI	385 920	102	644	745	7.5%	74 528	1 508	256	49	305
DSNA	1 259 522	1 883	290	2 173	22.0%	217 271	2 640	477	82	559
EANS	15 562	6	0	6	0.1%	591	75	208	8	216
ENAIRE	775 632	497	196	693	7.0%	69 290	1 609	482	43	525
ENAV	703 762	30	107	137	1.4%	13 653	1 330	529	10	540
Finavia	66 515	28	16	44	0.4%	4 379	171	389	26	415
HCAA	150 856	275	233	509	5.1%	50 864	584	259	87	346
HungaroControl	88 301	1	0	1	0.0%	122	237	372	1	373
IAA	108 791	0	4	4	0.0%	434	337	323	1	324
LFV	186 244	24	43	67	0.7%	6 668	555	335	12	347
LGS	21 977	0	0	0	0.0%	1	92	240	0	240
LPS	59 146	61	0	61	0.6%	6 066	100	594	61	654
LVNL	171 876	70	425	495	5.0%	49 518	286	601	173	774
MATS	14 224	0	1	1	0.0%	64	78	183	1	183
M-NAV	11 613	1	0	1	0.0%	51	28	415	2	417
MoldATSA	9 615	0	0	0	0.0%	0	18	526	0	526
MUAC	145 335	281	n/appl	281	2.8%	28 067	587	247	48	295
NATS (Continental)	777 890	129	625	754	7.6%	75 407	1 781	437	42	479
NAV Portugal (Continental)	111 921	240	81	321	3.2%	32 100	417	268	77	345
NAVIAIR	108 432	0	5	5	0.1%	498	298	363	2	365
Oro Navigacija	24 869	0	0	0	0.0%	0	66	376	0	376
PANSA	167 361	547	24	571	5.8%	57 127	493	339	116	455
ROMATSA	163 538	0	0	0	0.0%	0	366	447	0	447
Skyguide	297 772	120	491	611	6.2%	61 116	451	661	136	796
Slovenia Control	30 354	1	0	1	0.0%	78	57	531	1	533
SMATSA	76 898	2	1	3	0.0%	313	229	335	1	337
UkSATSE	155 892	0	2	2	0.0%	187	291	535	1	536
Total European System	8 002 008	5 812	4 069	9 881	100%	988 108	18 658	429	53	482

Annex 2 - Table 0.1: Economic cost-effectiveness indicator, 2014 [TBU]

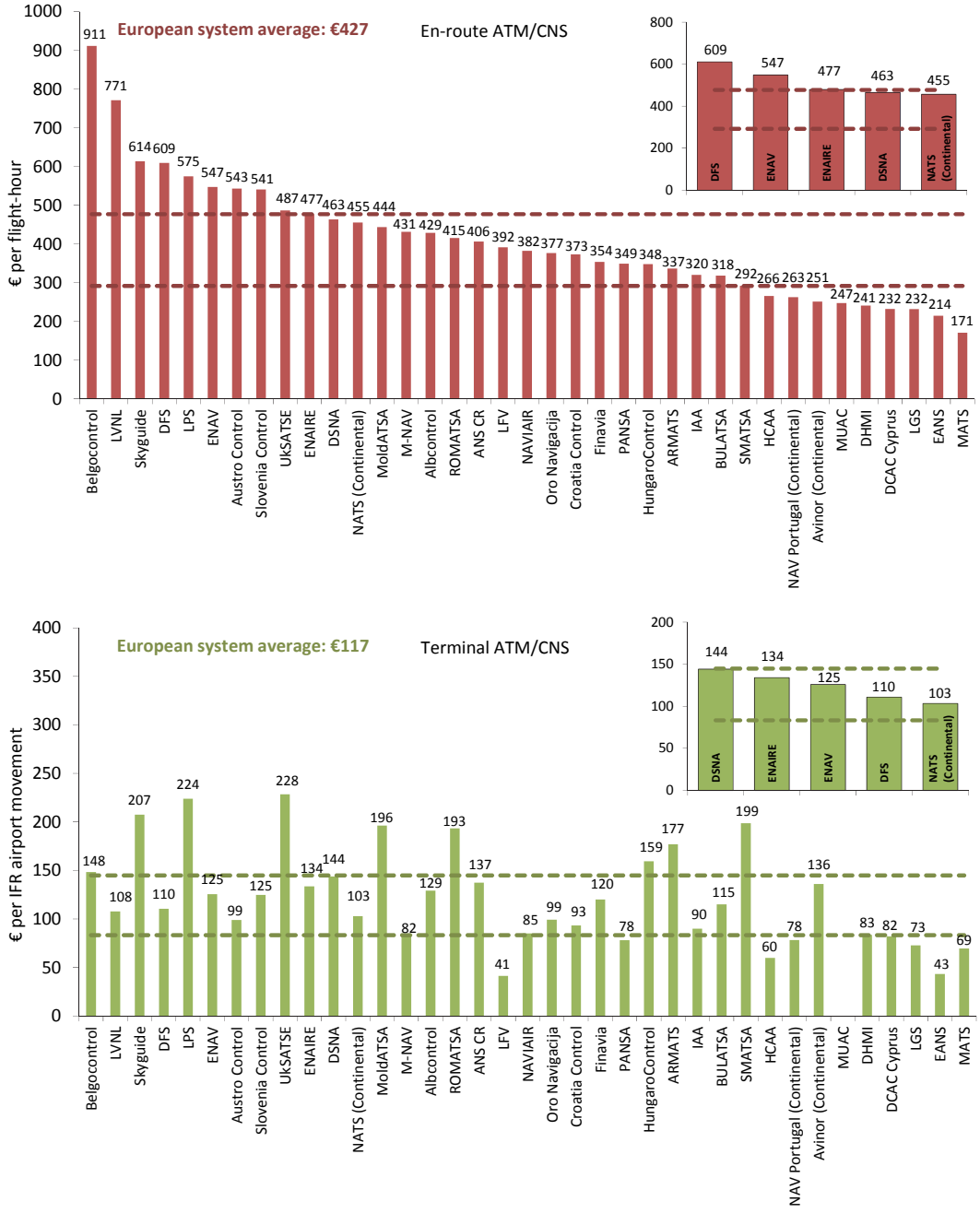
The cost of ATFM delay in this report is based on the **European airline delay cost reference values,** published by the University of Westminster. Based on the initial work published in 2004[33], the report has been updated in 2010 to improve the methodology and to take changes in the economic and regulatory environment into account. In December 2015, a further updated has been published to update the 2010 delay costs with 2014 values[34].

Based on this latest update, the estimated average European ATFM delay cost have been adjusted from €81 per minute (2010 value) to €100 per minute (2014 value). The increase in estimated ATFM delay costs is mainly driven by an increase in passenger delay costs (rebooking, compensation and care, etc.) which is the single largest group of costs, followed by reactionary, crew and maintenance costs. ATFM delays are only marginally affected by changes in jet fuel price as they primarily occur at the gate. More detailed information can be found in the updated University of Westminster report, available for download on the PRC web-page (www.eurocontrol.int/prc).

In each new ACE report, the PRU expresses the cost of one minute of ATFM delay in the price base of the year under review, using the average European Union inflation rate published by EUROSTAT (e.g. in the ACE 2013 report, the €81 per minute corresponding to the 2010 value amounted to €87 when expressed in 2013 prices). The change between ACE 2013 and ACE 2014 is therefore an increase from €87 to €100.

[33] Evaluating the true cost to airlines of one minute of airborne or ground delay (May 2004).
[34] European airline delay cost reference values (December 2015).

For the sake of completeness, the gate-to-gate financial cost-effectiveness indicator shown in the Table above (see column 8) is broken down into en-route and terminal components. To facilitate the comparison and interpretation of the results, ANSPs are ranked according to the en-route cost-effectiveness indicator. The output units in the Figure below are en-route flight-hours and IFR airport movements, respectively.



Annex 2 - Figure 0.1: Breakdown of financial cost-effectiveness into en-route and terminal [TBU]

The Figure above shows that 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 has relatively high unit costs in terminal service provision but relatively low unit costs in en-route.

It is difficult to determine whether these differences 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.

For this reason, the focus of the cost-effectiveness benchmarking analysis in this report is “gate-to-gate”.

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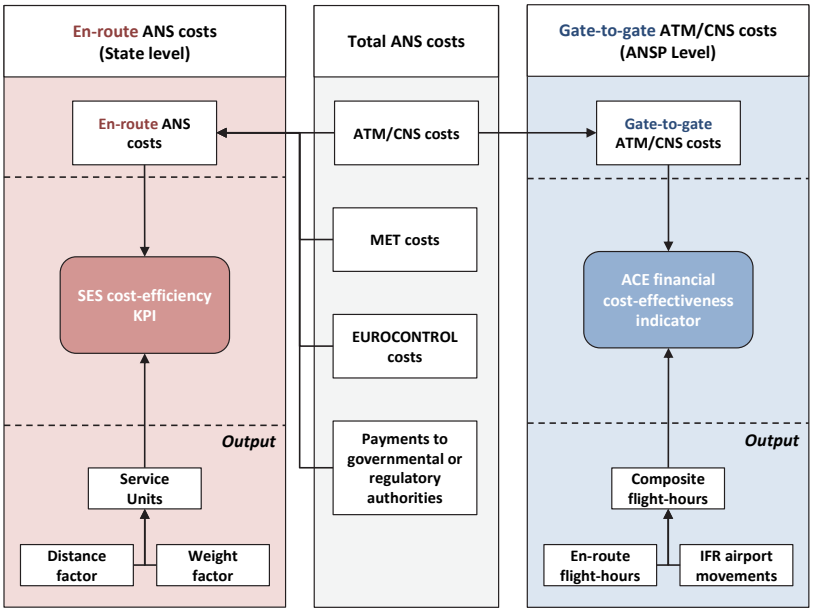
ANNEX 3 – ACE COST-EFFECTIVENESS INDICATOR AND SES COST-EFFICIENCY KPI

The objective of this Annex is to explain the main differences between the ACE financial cost-effectiveness indicator and the Single European Sky (SES) en-route cost-efficiency KPI (as defined in Regulation (EU) N°390/2013).

First of all, it should be noted that these two indicators have been specified in response to different needs:

- The purpose of ACE is to benchmark the cost-effectiveness performance of ANSPs in providing gate-to-gate ATM/CNS services (where en-route and terminal ATM/CNS are considered together). The ACE financial cost-effectiveness indicator is computed as the ratio of ATM/CNS provision costs to composite flight-hours and it can be broken down into three components (ATCO-hour productivity, ATCO employment costs per ATCO-hour and unit support costs). These components allow interpreting the differences in cost-effectiveness performance observed across Pan-European ANSPs. The ACE benchmarking analysis also informs ATM stakeholders on the level and trends of the Pan-European system cost-effectiveness performance.
- The en-route cost-efficiency KPI (the Determined Unit Cost or DUC), which is defined in the Performance Scheme regulation, is used as part of the SES cost-efficiency performance target-setting and monitoring processes. This KPI is computed as the ratio of en-route ANS costs (in real terms) to service units at charging zone level, and reflects the costs of several entities, not only the ANSP. The en-route ANS costs (in nominal terms) and service units also form the basis to calculate the unit rate that is billed to airspace users within a charging zone.

The methodology used to compute the two indicators is illustrated in the Figure below.



Annex 3 - Figure 0.1: ACE cost-effectiveness indicator and SES cost-efficiency KPI

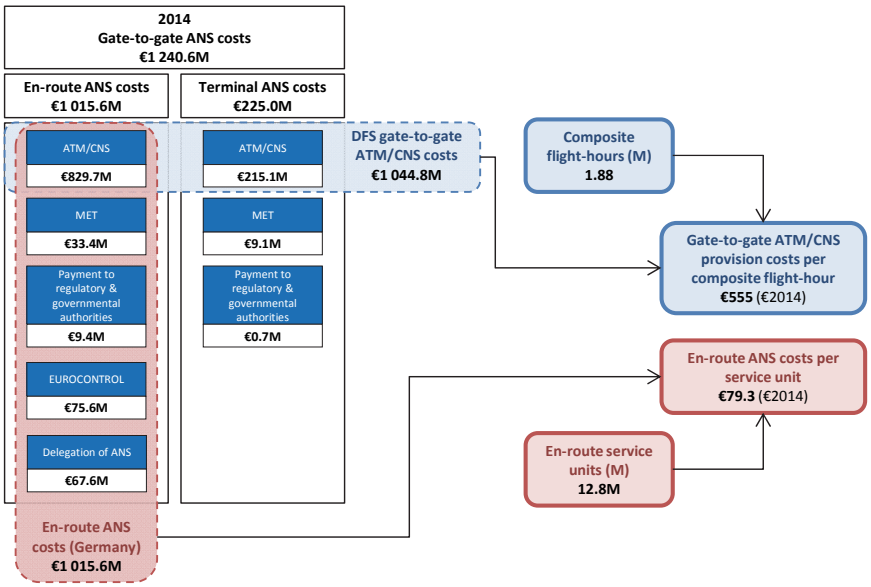
As shown in the Figure above, the main differences between the ACE financial cost-effectiveness indicator and the SES en-route cost-efficiency KPI are the following:

- **Operational scope**: En-route and terminal costs are considered together when benchmarking the economic performance of ANSPs in the ACE analysis. As explained in Annex 2 above, 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. On the other hand, the SES cost-efficiency KPI is computed for en-route and terminal ANS separately, for the purposes of the target-setting and/or monitoring processes.

- **Service scope**: Total ANS costs (including costs relating to the ANSPs, METSPs, EUROCONTROL, and NSAs) are used to compute the SES cost-efficiency KPI, while only the ANSPs ATM/CNS provision costs are included in the ACE benchmarking analysis.
- **Measure of the output**: The output metric used to compute the SES en-route cost-efficiency KPI is the number of en-route service units[35]. This metric is a function of the aircraft weight and of the distance flow within a given charging zone. This is the metric which has been historically used to compute the en-route unit rate charged to airspace users. On the other hand, the ACE financial cost-effectiveness indicator is computed using composite flight-hours[36], which combine both flight-hours and IFR airport movements as detailed in Annex 2 above. It should be noted that the geographical area controlled by ANSPs operational units can substantially differ from the charging zones in case of delegation of ANS. The composite flight-hours therefore better reflect the operational activity performed by ANSPs, while service units are more appropriate when charging zones are considered.

The Figure below provides a concrete example of reconciliation between the ACE financial cost-effectiveness indicator and the en-route costs per service unit[37]. It uses as an example the ACE 2014 data provided by DFS and the 2014 actual en-route costs and service units provided by Germany for the purposes of the Enlarged Committee for Route Charges in November 2015. In both cases, financial information is expressed in €2014.



Annex 3 - Figure 0.2: Example of reconciliation between ANSP unit gate-to-gate ATM/CNS provision costs and a charging zone unit en-route ANS costs (2014) [TBU]

[35] $Service\ unit = distance\ flown \times \sqrt{\frac{MTOW}{50}}$.

[36] Further details on the calculation of the metric can be found in Annex 2 of this report.

[37] It should be noted that the costs reported in the UK Performance Plans and charged to en-route airspace users are based on regulatory accounting rules. This is different from the methodology used by NATS to report historic and actual ATM/CNS provision costs which are based on IFRS accounting.

ANNEX 4 – PERFORMANCE RATIOS

This Annex 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 Chapter 2. 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 Pan-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 Pan-European system will have a performance ratio of **one**.

ANSPs	Country	Financial cost-effectiveness KPI indexes*	Performance ratios			Performance ratios	
			ATCO-hour productivity	ATCO employment costs per ATCO-hour*	Support cost ratio*	ATCO employment costs per composite flight-hour*	Support costs per composite flight-hour*
Albcontrol	AL	0.99	0.77	2.42	0.53	1.87	0.82
ANS CR	CZ	1.02	1.06	1.31	0.73	1.40	0.91
ARMATS	AM	0.99	0.21	9.24	0.52	1.91	0.81
Austro Control	AT	0.86	1.09	0.75	1.04	0.82	0.87
Avinor (Continental)	NO	1.27	1.08	0.86	1.38	0.93	1.53
Belgocontrol	BE	0.58	0.82	0.74	0.96	0.60	0.57
BULATSA	BG	1.31	0.92	1.61	0.89	1.48	1.25
Croatia Control	HR	1.16	0.94	1.15	1.07	1.09	1.19
DCAC Cyprus	CY	1.79	1.15	1.62	0.97	1.85	1.77
DFS	DE	0.77	1.31	0.55	1.07	0.72	0.80
DHMI	TR	1.68	1.27	2.02	0.65	2.56	1.45
DSNA	FR	0.90	0.90	1.09	0.92	0.98	0.87
EANS	EE	2.06	1.12	1.86	0.99	2.09	2.05
ENAIRE	ES	0.89	0.96	0.63	1.48	0.60	1.13
ENAV	IT	0.81	0.89	0.97	0.95	0.86	0.79
Finavia	FI	1.10	0.74	1.38	1.07	1.03	1.14
HCAA	GR	1.66	0.84	2.28	0.86	1.92	1.56
HungaroControl	HU	1.15	1.07	1.18	0.91	1.26	1.11
IAA	IE	1.33	1.32	1.09	0.93	1.43	1.29
LFV	SE	1.28	0.87	1.68	0.87	1.46	1.21
LGS	LV	1.79	0.87	3.12	0.66	2.71	1.55
LPS	SK	0.72	0.99	1.09	0.67	1.08	0.63
LVNL	NL	0.71	1.03	0.70	0.98	0.72	0.71
MATS	MT	2.35	1.00	3.18	0.74	3.19	2.10
M-NAV	MK	1.03	0.40	2.82	0.92	1.12	1.00
MoldATSA	MD	0.81	0.21	4.19	0.92	0.89	0.79
MUAC		1.73	2.38	0.51	1.44	1.20	2.15
NATS (Continental)	UK	0.98	1.26	0.81	0.96	1.02	0.96
NAV Portugal (Continental)	PT	1.60	1.27	0.97	1.30	1.23	1.84
NAVIAIR	DK	1.18	1.20	1.03	0.96	1.23	1.16
Oro Navigacija	LT	1.14	0.59	2.45	0.79	1.45	1.04
PANSA	PL	1.26	1.09	1.13	1.02	1.24	1.28
ROMATSA	RO	0.96	0.81	1.25	0.94	1.02	0.93
Skyguide	CH	0.65	1.22	0.67	0.80	0.81	0.60
Slovenia Control	SI	0.81	0.53	1.34	1.12	0.72	0.85
SMATSA	RS/ME	1.28	0.87	2.06	0.71	1.80	1.13
UkSATSE	UA	0.80	0.31	5.24	0.50	1.62	0.65
Total European System		1.00	1.00	1.00	1.00	1.00	1.00

Annex 4 – Table 0.1: The components of gate-to-gate cost-effectiveness, 2014[38][TBU]

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).

[38] 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 the Table above), the inverse ratio is used, since **higher** unit employment costs and **higher** support costs imply **lower** cost-effectiveness.

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). The following example for ENAIRE illustrates the interpretation of the performance ratios:

0.89	ENAIRE's gate-to-gate **ATM/CNS costs per composite flight-hour** are **+12% higher** (1/0.89 - 1) than the European average.
= 0.96	**ATCO-hour productivity** is **-4% lower** than the European average.
x 0.63	The **ATCO employment costs per ATCO-hour** of ENAIRE are **+59% higher** (1/0.63 - 1) than the European average.
x 1.48	**Support cost ratio** is **-33% lower** (1/1.48 - 1) than the European 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):

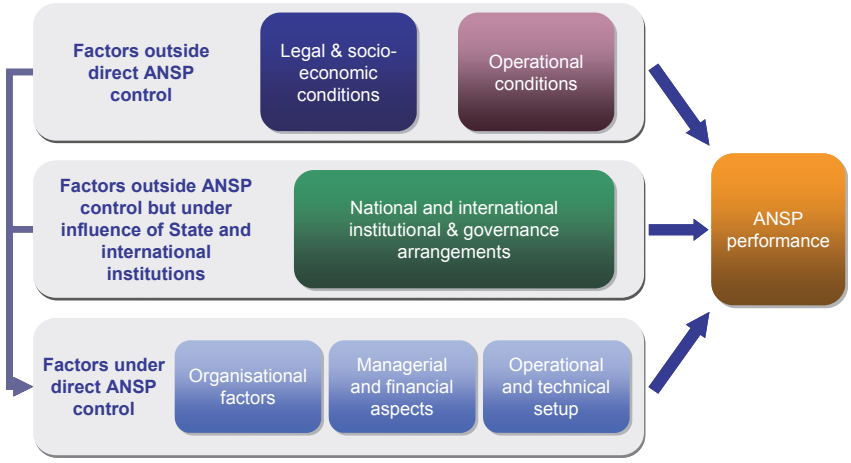
0.60	ENAIRE's ATCOs in OPS employment costs per composite flight-hour are +67% higher (1/0.60 - 1) than the European average, while
1.13	The **support costs per composite flight-hour** are **-12% lower** (1/1.13 - 1) than the European average.

ANNEX 5 – FACTORS AFFECTING PERFORMANCE

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.

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

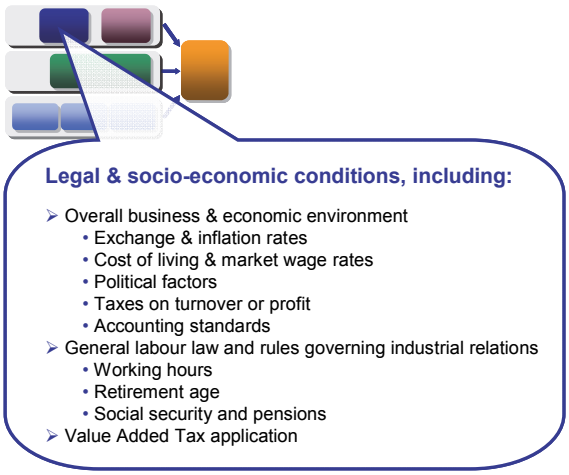


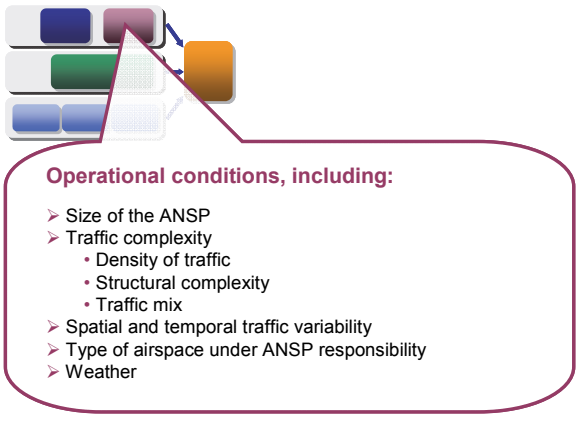
Annex 5 - Figure 0.1: Factors affecting cost-effectiveness performance

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

Exogenous factors have been classified into two main areas 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.

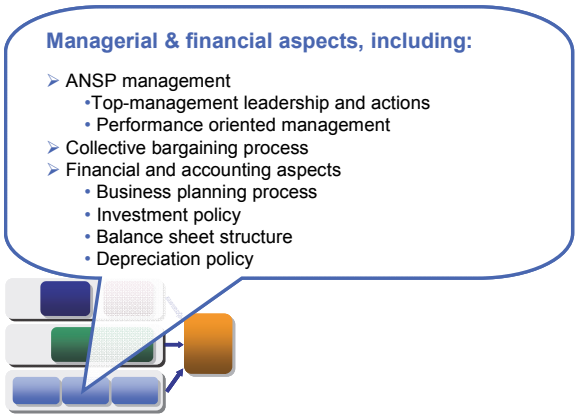


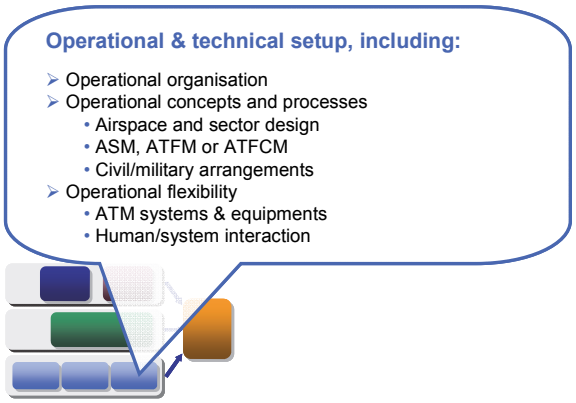


- institutional and governance arrangements such as international requirements imposed by the Single European Sky, that are influenced by aviation sector policy decisions.

The endogenous factors presented in Figure 0.1 above 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.





A more comprehensive description and analysis of the performance framework illustrated in this Annex is available in Chapter 3 of the ACE 2009 Benchmarking Report[39].

[39] Document available on the PRC website (http://www.eurocontrol.int/publications/atm-cost-effectiveness-ace-2009).

ANNEX 6 – TRAFFIC COMPLEXITY AND TRAFFIC VARIABILITY INDICATORS

	[1]	[2]	[3]	[4]	[5] = [2]+[3]+[4]	[6] = [1]x[5]
ANSPs	Adjusted density	Vertical interactions	Horizontal interactions	Speed interactions	Structural complexity indicator	Aggregated complexity score
Skyguide	11.19	0.26	0.61	0.22	1.10	12.30
NATS (Continental)	10.09	0.37	0.44	0.30	1.12	11.28
DFS	10.23	0.26	0.57	0.24	1.08	11.01
Belgocontrol	7.55	0.38	0.55	0.45	1.38	10.44
MUAC	10.48	0.26	0.55	0.17	0.98	10.26
LVNL	10.20	0.18	0.43	0.39	1.00	10.19
ANS CR	9.58	0.13	0.53	0.16	0.83	7.92
Austro Control	8.71	0.17	0.53	0.19	0.88	7.68
Slovenia Control	10.47	0.09	0.54	0.10	0.73	7.63
DSNA	10.51	0.14	0.43	0.13	0.70	7.33
DHMI	10.49	0.14	0.31	0.20	0.65	6.84
LPS	8.40	0.08	0.48	0.14	0.71	5.94
ENAV	5.72	0.25	0.60	0.16	1.00	5.73
HungaroControl	8.69	0.05	0.45	0.13	0.63	5.52
Croatia Control	8.25	0.05	0.51	0.08	0.64	5.26
SMATSA	8.22	0.04	0.51	0.07	0.62	5.11
ENAIRE	6.68	0.14	0.37	0.13	0.64	4.28
BULATSA	8.63	0.06	0.33	0.10	0.49	4.26
PANSA	4.72	0.14	0.53	0.22	0.89	4.21
ROMATSA	7.47	0.04	0.38	0.12	0.54	4.02
DCAC Cyprus	5.27	0.16	0.39	0.11	0.66	3.46
NAVIAIR	3.56	0.18	0.55	0.20	0.93	3.32
Albcontrol	6.65	0.05	0.37	0.05	0.47	3.13
M-NAV	5.45	0.08	0.46	0.04	0.57	3.13
LFV	3.04	0.21	0.50	0.23	0.94	2.87
HCAA	4.55	0.10	0.40	0.08	0.58	2.66
EANS	3.68	0.15	0.32	0.24	0.71	2.60
NAV Portugal (Continental)	4.23	0.15	0.38	0.08	0.60	2.54
LGS	3.25	0.09	0.48	0.16	0.72	2.35
Oro Navigacija	3.08	0.08	0.47	0.16	0.71	2.19
Avinor (Continental)	2.21	0.27	0.46	0.26	0.99	2.18
IAA	3.96	0.08	0.25	0.16	0.49	1.95
UkSATSE	2.75	0.06	0.37	0.17	0.60	1.64
Finavia	1.70	0.25	0.33	0.35	0.93	1.57
MATS	1.78	0.06	0.36	0.23	0.65	1.16
MoldATSA	1.50	0.04	0.44	0.15	0.63	0.94
ARMATS	1.25	0.10	0.35	0.20	0.65	0.81
Average	7.98	0.19	0.46	0.18	0.82	6.55

Annex 6 - Table 0.1: Traffic complexity indicators at ANSP level, 2014

ANSPs	ACC name	[1] Adjusted density	[2] Vertical interactions	[3] Horizontal interactions	[4] Speed interactions	[5] = [2]+[3]+[4] Structural complexity	[6] = [1]x[5] Aggregated complexity score	Average used flight level
NATS (Continental)	London TC	26.0	0.5	0.5	0.3	1.3	33.6	148
DFS	Langen	10.4	0.4	0.5	0.4	1.3	13.9	171
Skyguide	Geneva	12.0	0.2	0.6	0.2	1.0	11.7	315
DFS	Karlsruhe UAC	12.2	0.2	0.6	0.1	0.9	11.4	354
Skyguide	Zurich	9.7	0.3	0.6	0.3	1.2	11.2	287
Belgocontrol	Brussels	7.6	0.4	0.5	0.5	1.4	10.4	178
MUAC	Maastricht	10.5	0.3	0.6	0.2	1.0	10.3	344
LVNL	Amsterdam	10.2	0.2	0.4	0.4	1.0	10.2	167
DFS	Munchen	7.4	0.4	0.5	0.4	1.3	10.0	217
DSNA	Paris	10.3	0.3	0.4	0.3	0.9	9.6	224
DSNA	Reims	11.8	0.2	0.5	0.1	0.8	9.5	339
ENAV	Padova	8.1	0.2	0.7	0.1	1.0	8.3	322
NATS (Continental)	London AC	8.8	0.3	0.4	0.2	0.9	8.1	311
ANS CR	Praha	9.7	0.1	0.5	0.2	0.8	7.9	332
ENAV	Milano	6.8	0.3	0.6	0.2	1.1	7.8	272
Slovenia Control	Ljubljana	10.5	0.1	0.5	0.1	0.7	7.6	331
Austro Control	Wien	9.1	0.1	0.5	0.2	0.8	7.6	334
IAA	Dublin	6.1	0.3	0.4	0.4	1.1	6.7	161
DSNA	Brest	11.0	0.1	0.5	0.1	0.6	6.7	353
DSNA	Bordeaux	11.9	0.1	0.4	0.1	0.6	6.7	342
ENAIRE	Palma	6.8	0.2	0.4	0.3	0.9	6.4	166
LPS	Bratislava	8.5	0.1	0.5	0.1	0.7	6.0	337
DSNA	Marseille	8.6	0.1	0.4	0.1	0.7	5.9	325
DHMI	Ankara	9.8	0.1	0.3	0.2	0.6	5.8	349
HungaroControl	Budapest	8.9	0.1	0.5	0.1	0.6	5.7	344
Croatia Control	Zagreb	8.5	0.1	0.5	0.1	0.6	5.4	350
SMATSA	Beograd	8.4	0.0	0.5	0.1	0.6	5.2	350
DFS	Bremen	4.0	0.3	0.6	0.4	1.3	5.1	182
NATS (Continental)	Prestwick	4.3	0.3	0.4	0.4	1.2	5.1	259
ENAIRE	Barcelona	7.3	0.2	0.4	0.1	0.7	4.8	349
BULATSA	Sofia	8.8	0.1	0.3	0.1	0.5	4.3	351
ENAV	Roma	4.7	0.2	0.5	0.1	0.9	4.3	306
ROMATSA	Bucuresti	7.5	0.0	0.4	0.1	0.5	4.0	347
DHMI	Istanbul	7.4	0.1	0.2	0.2	0.5	4.0	302
ENAIRE	Madrid	8.0	0.1	0.4	0.1	0.5	4.0	343
PANSA	Warszawa	4.7	0.1	0.5	0.2	0.8	3.8	343
DCAC Cyprus	Nicosia	5.3	0.2	0.4	0.1	0.7	3.5	315
Albcontrol	Tirana	6.8	0.0	0.4	0.1	0.5	3.2	350
M-NAV	Skopje	5.6	0.1	0.5	0.0	0.6	3.2	341
NAVIAIR	Kobenhavn	3.4	0.2	0.6	0.2	0.9	3.1	321
ENAIRE	Sevilla	4.8	0.2	0.3	0.1	0.6	2.9	314
LFV	Malmo	3.4	0.2	0.5	0.2	0.8	2.9	327
EANS	Tallinn	3.7	0.1	0.3	0.2	0.7	2.6	317
NAV Portugal (Continental)	Lisboa	4.3	0.1	0.4	0.1	0.6	2.6	328
HCAA	Athinai+Macedonia	4.6	0.1	0.4	0.1	0.6	2.6	332
ENAV	Brindisi	3.3	0.1	0.5	0.1	0.8	2.6	331
LGS	Riga	3.3	0.1	0.5	0.2	0.7	2.3	324
Oro Navigacija	Vilnius	3.1	0.1	0.5	0.2	0.7	2.2	316
UkSATSE	Simferopol	3.6	0.0	0.4	0.2	0.6	2.2	355
LFV	Stockholm	2.0	0.3	0.4	0.4	1.1	2.2	243
UkSATSE	L'viv	2.8	0.0	0.5	0.2	0.8	2.1	350
Avinor (Continental)	Oslo	2.2	0.3	0.4	0.2	0.9	2.0	279
HungaroControl	Kosovo	6.2	0.0	0.3	0.0	0.3	2.0	359
ENAIRE	Canarias	2.8	0.2	0.3	0.1	0.6	1.7	290
UkSATSE	Dnipropetrovs'k	2.6	0.0	0.4	0.2	0.6	1.5	343
IAA	Shannon	3.8	0.0	0.2	0.1	0.4	1.5	347
UkSATSE	Kyiv	2.7	0.1	0.3	0.2	0.5	1.5	333
Avinor (Continental)	Bodo	1.5	0.2	0.4	0.2	0.8	1.3	265
Finavia	Tampere	1.3	0.3	0.3	0.3	0.9	1.1	267
MATS	Malta	1.7	0.0	0.4	0.2	0.6	1.1	332
Avinor (Continental)	Stavanger	1.3	0.2	0.4	0.3	0.9	1.1	288
UkSATSE	Odesa	2.9	0.0	0.3	0.1	0.3	1.0	346
MoldATSA	Chisinau	1.5	0.0	0.4	0.1	0.6	0.9	316
ARMATS	Yerevan	1.3	0.1	0.3	0.2	0.6	0.8	326
European system average		8.0	0.2	0.5	0.2	0.8	6.4	316

Annex 6 - Table 0.2: Traffic complexity indicators at ACC level, 2014

ANSPs	Traffic variability indicators		
	Variability based on three-months periods (2014)	Peak month / Average month (2014)	Peak week / Average week (2014)
Albcontrol	1.42	1.53	1.53
ANS CR	1.20	1.23	1.24
ARMATS	1.06	1.09	1.22
Austro Control	1.26	1.29	1.30
Avinor (Continental)	1.05	1.10	1.13
Belgocontrol	1.12	1.16	1.17
BULATSA	1.40	1.46	1.48
Croatia Control	1.43	1.52	1.52
DCAC Cyprus	1.16	1.21	1.23
DFS	1.13	1.15	1.17
DHMI	1.23	1.28	1.28
DSNA	1.19	1.22	1.23
EANS	1.16	1.17	1.19
ENAIRE	1.23	1.27	1.28
ENAV	1.27	1.32	1.35
Finavia	1.04	1.10	1.11
HCAA	1.52	1.64	1.64
HungaroControl	1.38	1.43	1.49
IAA	1.14	1.20	1.27
LFV	1.05	1.12	1.16
LGS	1.16	1.18	1.20
LPS	1.36	1.41	1.49
LVNL	1.09	1.11	1.11
MATS	1.15	1.21	1.31
M-NAV	1.61	1.69	1.71
MoldATSA	1.12	1.43	1.49
MUAC	1.11	1.13	1.16
NATS (Continental)	1.14	1.15	1.16
NAV Portugal (Continental)	1.11	1.16	1.17
NAVIAIR	1.07	1.11	1.12
Oro Navigacija	1.17	1.19	1.22
PANSA	1.20	1.24	1.26
ROMATSA	1.31	1.36	1.40
Skyguide	1.16	1.16	1.18
Slovenia Control	1.40	1.45	1.46
SMATSA	1.42	1.51	1.51
UkSATSE	1.29	1.38	1.46

Annex 6 - Table 0.3: Traffic variability indicators at ANSP level, 2014

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ANNEX 7 – EXCHANGE RATES, INFLATION RATES AND PURCHASING POWER PARITIES (PPPS) 2014 DATA

ANSPs	Countries	2014 Exchange rate (1€ =)	2014 Inflation rate (%)	2014 PPPs	Comments
Albcontrol	Albania	139.6	1.6	58.25	
ANS CR	Czech Republic	27.5	0.4	17.44	
ARMATS	Armenia	539.7	3.1	265.72	PPPs from IMF database
Austro Control	Austria	1	1.5	1.09	
Avinor (Continental)	Norway	8.4	1.9	12.56	
Belgocontrol	Belgium	1	0.5	1.10	
BULATSA	Bulgaria	2.0	-1.6	0.90	
Croatia Control	Croatia	7.6	0.2	4.81	
DCAC Cyprus	Cyprus	1	-0.3	0.91	
DFS	Germany	1	0.8	1.04	
DHMI	Turkey	2.9	8.9	1.56	
DSNA	France	1	0.6	1.10	
EANS	Estonia	1	0.5	0.73	
ENAIRE	Spain	1	-0.2	0.90	
ENAV	Italy	1	0.2	1.01	
Finavia	Finland	1	1.2	1.24	
HCAA	Greece	1	-1.4	0.82	
HungaroControl	Hungary	308.3	0.0	174.90	
IAA	Ireland	1	0.3	1.11	
LFV	Sweden	9.1	0.2	11.99	
LGS	Latvia	1.0	0.7	0.67	
LPS	Slovak Republic	1	-0.1	0.66	
LVNL	Netherlands	1	0.3	1.09	
MATS	Malta	1	0.8	0.80	
M-NAV	F.Y.R. Macedonia	61.5	-0.1	25.18	
MoldATSA	Moldova	18.4	5.1	8.41	PPPs from IMF database
MUAC		1	0.3	1.09	Netherlands' PPPs and inflation rate used for MUAC
NATS (Continental)	United Kingdom	0.8	1.5	0.94	
NAV Portugal (Continental)	Portugal	1	-0.2	0.78	
NAVIAIR	Denmark	7.5	0.3	10.06	
Oro Navigacija	Lithuania	3.5	0.2	2.08	
PANSA	Poland	4.2	0.1	2.41	
ROMATSA	Romania	4.4	1.4	2.21	
Skyguide	Switzerland	1.2	0.0	1.77	
Slovenia Control	Slovenia	1	0.4	0.80	
SMATSA	Serbia and Montenegro	117.2	2.1	53.77	Data for Serbia only since data is provided in Serbian Dinar
UkSATSE	Ukraine	15.7	12.1	5.63	PPPs from IMF database

Annex 7 - Table 0.1: 2014 Exchange rates, inflation rates and PPPs data [TBU]

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 2014 prices using national inflation rates. Finally, for comparison purposes in 2014, all national currencies are converted to Euros using the 2014 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 2014 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 2014 data.

The exchange rates used in this Report to convert the 2014 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[40] or from the International Monetary Fund[41] when the information was not available in EUROSTAT website. For the projections (2015-2019), 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 2 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 5.12 between the PPPs for Ukraine (4.214 UAH per international dollar in 2014) and the PPPs for France (0.823 Euro per international Dollar). This factor is applied to the PPPs for France as disclosed in the EUROSTAT database (i.e. 1.10) to express the PPPs for Ukraine in PPS (5.63 = 1.10 × 5.12). A similar methodology is used to express Moldova and Armenia PPPs in PPS.

[40] Latest EUROSTAT database available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home

[41] IMF October 2015 database available at: http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/index.aspx

ANNEX 8 – KEY DATA

	En-route ANS revenues (in €'000)										Terminal ANS revenues (in €'000)										Gate-to-gate ANS revenues (in €'000)									
ANSPs	Income from charges	Income for airport operator	Income received from other States for delegation of ANS	Income from the military	Income in respect of exempted flights	Other income from domestic government	Financial income	Other income	Exceptional revenue item	**Total revenues**	Income from charges	Income for airport operator	Income received from other States for delegation of ANS	Income from the military	Income in respect of exempted flights	Other income from domestic government	Financial income	Other income	Exceptional revenue item	**Total revenues**	Income from charges	Income for airport operator	Income received from other States for delegation of ANS	Income from the military	Income in respect of exempted flights	Other income from domestic government	Financial income	Other income	Exceptional revenue item	**Total revenues**
Albcontrol	20 924	0	0	0	0	0	48	0	0	20 972	1 253	0	0	0	0	0	6	236	0	1 496	22 177	0	0	0	0	0	54	236	0	22 467
ANS CR	102 626	0	0	0	476	0	0	0	0	103 102	17 782	0	0	0	69	0	0	0	0	17 851	120 408	0	0	0	545	0	0	0	0	120 953
ARMATS	4 574	0	0	0	2	0	0	0	0	4 576	4 672	0	0	0	0	0	0	0	0	4 672	9 245	0	0	0	2	0	0	0	0	9 247
Austro Control	194 146	0	0	0	737	1 565	775	0	0	197 223	38 721	0	0	0	0	0	275	0	0	38 996	232 867	0	0	0	737	1 565	1 050	0	0	236 219
Avinor (Continental)	107 646	0	0	0	0	0	0	0	0	107 646	0	95 920	0	0	0	0	0	3 308	0	99 227	107 646	95 920	0	0	0	0	0	3 308	0	206 873
Belgocontrol	165 849	0	0	0	0	0	92	4 137	7 784	177 861	27 049	0	0	0	0	0	32	4 956	11	32 048	192 898	0	0	0	0	0	123	9 092	7 795	209 909
BULATSA	101 601	0	0	0	0	0	0	0	0	101 601	8 604	0	0	0	0	0	537	527	0	9 668	110 204	0	0	0	0	0	537	527	0	111 268
Croatia Control	70 215	0	9 219	0	72	0	0	0	0	79 506	8 868	0	0	0	32	0	0	0	0	8 900	79 083	0	9 219	0	104	0	0	0	0	88 406
DCAC Cyprus	52 299	0	0	0	0	0	0	0	0	52 299	0	0	0	0	0	7 548	0	0	0	7 548	52 299	0	0	0	0	7 548	0	0	0	59 846
DFS	801 051	0	0	0	0	0	51 537	0	0	852 588	232 612	0	0	0	0	0	14 965	0	0	247 578	1 033 664	0	0	0	0	0	66 502	0	0	1 100 166
DHMI	326 334	0	0	0	3 538	0	0	0	0	329 872	105 772	0	0	0	0	0	0	0	0	105 772	432 105	0	0	0	3 538	0	0	0	0	435 643
DSNA	1 200 520	0	0	0	17 441	0	0	9 754	0	1 227 715	236 532	0	0	0	47 033	0	0	2 630	0	286 195	1 437 052	0	0	0	64 474	0	0	12 384	0	1 513 910
EANS	18 930	0	0	0	0	0	0	0	0	18 930	1 407	0	0	0	0	0	0	0	0	1 407	20 337	0	0	0	0	0	0	0	0	20 337
ENAIRE	694 492	0	0	0	8 999	0	1 343	6 448	13	711 294	18 459	145 943	0	0	0	0	321	1 940	1 341	168 004	712 951	145 943	0	0	8 999	0	1 663	8 388	1 354	879 298
ENAV	589 395	0	0	0	10 940	16 865	0	5 589	0	622 789	158 953	0	0	0	1 486	8 070	0	15 414	0	183 923	748 348	0	0	0	12 426	24 935	0	21 003	0	806 712
Finavia	40 291	0	0	255	0	440	0	0	0	40 986	17 238	0	0	222	0	240	0	194	0	17 894	57 529	0	0	477	0	680	0	194	0	58 880
HCAA	150 434	0	0	0	0	0	0	0	0	150 434	16 021	0	0	0	0	3 738	0	0	0	19 759	166 455	0	0	0	0	3 738	0	0	0	170 193
HungaroControl	101 305	0	0	0	1 181	0	2 193	1 719	1 879	108 277	19 710	0	0	0	72	0	427	362	145	20 716	121 015	0	0	0	1 253	0	2 620	2 081	2 025	128 993
IAA	118 577	0	0	0	1 652	0	125	2 854	0	123 208	21 603	0	0	0	0	0	139	714	0	22 456	140 180	0	0	0	1 652	0	263	3 568	0	145 663
LFV	218 084	0	1 215	0	796	0	45 098	0	-33 094	232 098	21 942	11 220	0	0	0	0	2 879	0	-2 112	33 928	240 026	11 220	1 215	0	796	0	47 976	0	-35 207	266 026
LGS	21 643	0	0	0	0	0	2	53	0	21 698	2 766	0	0	0	0	0	7	255	0	3 028	24 409	0	0	0	0	0	9	308	0	24 726
LPS	62 748	0	0	0	1 080	0	73	1 147	0	65 048	4 027	0	0	0	98	0	5	74	0	4 204	66 775	0	0	0	1 178	0	78	1 221	0	69 252
LVNL	122 451	0	0	0	0	0	0	2 715	0	125 166	56 372	0	0	0	0	0	0	9 079	0	65 451	178 823	0	0	0	0	0	0	11 794	0	190 617
MATS	19 731	0	0	0	0	0	0	0	0	19 731	0	1 015	0	0	0	1 863	0	0	0	2 879	19 731	1 015	0	0	0	1 863	0	0	0	22 610
M-NAV	12 700	0	0	0	0	0	20	0	0	12 720	1 321	0	0	0	0	0	0	70	0	1 391	14 021	0	0	0	0	0	20	70	0	14 111
MoldATSA	4 527	0	0	0	0	0	0	0	351	4 878	2 668	0	0	0	0	0	0	0	0	2 668	7 195	0	0	0	0	0	0	0	351	7 546
MUAC											n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl										
NATS (Continental)	780 462	0	0	0	0	0	4 393	1 041	-4 019	781 878	14 722	212 151	0	0	0	0	1 296	3 902	0	232 072	795 184	212 151	0	0	0	0	5 690	4 943	-4 019	1 013 949
NAV Portugal (Continental)	117 799	0	0	0	0	0	0	1 424	0	119 223	24 917	0	0	0	0	0	0	824	0	25 741	142 716	0	0	0	0	0	0	2 248	0	144 964
NAVIAIR	90 810	0	0	0	1 633	0	111	1 225	0	93 779	29 545	3 133	0	0	80	0	12	12	0	32 782	120 355	3 133	0	0	1 713	0	123	1 237	0	126 561
Oro navigacija	22 147	0	0	191	147	0	65	154	0	22 704	4 888	0	0	45	305	0	15	37	0	5 289	27 034	0	0	236	452	0	80	191	0	27 993
PANSA	138 303	0	0	0	1 257	0	165	368	0	140 093	25 555	0	0	0	499	0	28	65	0	26 146	163 858	0	0	0	1 756	0	194	432	0	166 240
ROMATSA	156 936	0	0	0	2 309	0	4 616	256	10 376	174 493	15 334	0	0	0	0	0	492	20	0	15 846	172 269	0	0	0	2 309	0	5 108	276	10 376	190 339
Skyguide	145 259	0	44 154	0	0	35 530	190	932	0	226 066	81 085	0	0	0	0	18 131	90	5 407	0	104 712	226 345	0	44 154	0	0	53 660	280	6 339	0	330 778
Slovenia Control	30 504	0	0	0	126	0	0	113	0	30 743	2 791	101	0	337	70	0	13	135	1 573	5 021	33 295	101	0	337	196	0	13	248	1 573	35 764
SMATSA	70 289	0	6 515	0	0	0	2 385	0	0	79 189	6 761	0	0	0	0	0	645	0	6 488	13 894	77 050	0	6 515	0	0	0	3 030	0	6 488	93 083
UkSATSE	122 343	0	0	0	0	0	0	0	0	122 343	28 489	0	0	0	0	0	0	0	0	28 489	150 832	0	0	0	0	0	0	0	0	150 832

Annex 8 - Table 0.1: Breakdown of total ANS revenues (en-route, terminal and gate-to-gate), 2014 [TBU]

ANSPs	Gate-to-gate ANS costs (in €'000)							
	ATM/CNS provision costs	MET costs	Payment for regulatory and supervisory services	Payment ot the State for provision of other services	Eurocontrol costs	Payments for delegation of ANS	Irrecoverable value added tax (VAT)	**Total costs**
Albcontrol	20 742	524	938	0	1 015	0	0	23 219
ANS CR	110 819	2 664	542	0	6 536	0	0	120 560
ARMATS	8 213	0	0	0	258	0	0	8 471
Austro Control	183 663	21 339	665	0	11 484	0	0	217 151
Avinor (Continental)	189 379	2 415	1 119	0	8 778	0	0	201 691
Belgocontrol	152 517	11 215	2 116	0	9 774	37 176	0	212 797
BULATSA	78 526	6 938	45	0	3 876	0	1	89 387
Croatia Control	84 714	5 244	0	0	0	0	0	89 958
DCAC Cyprus	38 773	4 353	10 113	0	2 436	0	0	55 675
DFS	1 044 843	0	616	0	0	0	0	1 045 460
DHMI	385 920	24 494	2 708	0	20 370	0	0	433 491
DSNA	1 259 522	86 590	13 500	0	76 318	50 878	0	1 486 808
EANS	15 562	0	0	0	0	0	0	15 562
ENAIRE	775 632	26 196	7 528	19 383	48 050	0	0	876 788
ENAV	703 762	26 571	4 069	0	40 265	0	0	774 667
Finavia	66 515	7 185	321	0	0	352	0	74 373
HCAA	150 856	7 959	1 059	0	9 733	0	0	169 607
HungaroControl	88 301	2 973	1 870	0	5 023	0	0	98 167
IAA	108 791	8 098	1 674	2 551	6 917	0	0	128 031
LFV	186 244	1 530	878	0	0	0	0	188 652
LGS	21 977	1 429	1 169	0	1 034	0	0	25 609
LPS	59 146	2 619	1 209	0	3 372	0	0	66 346
LVNL	171 876	8 611	0	0	0	0	5 934	186 421
MATS	14 224	751	452	0	741	0	0	16 169
M-NAV	11 613	900	334	0	0	0	0	12 846
MoldATSA	9 615	1 231	0	0	401	0	0	11 247
MUAC	145 335	0	0	0	0	0	8	145 343
NATS (Continental)	777 890	583	9 945	0	0	804	130	789 352
NAV Portugal (Continental)	111 921	5 346	747	4 186	7 511	0	0	129 711
NAVIAIR	108 432	0	0	0	0	0	0	108 432
Oro navigacija	24 869	602	402	0	1 318	0	0	27 190
PANSA	167 361	8 494	2 675	0	8 845	891	0	188 265
ROMATSA	163 538	10 187	2 395	0	8 854	0	0	184 973
Skyguide	297 772	13 673	0	0	9 479	0	0	320 924
Slovenia Control	30 354	1 613	754	0	1 479	0	0	34 201
SMATSA	76 898	5 316	0	0	3 077	0	0	85 290
UkSATSE	155 892	1 902	1 768	0	8 155	0	0	167 718

Annex 8 - Table 0.2: Breakdown of total gate-to-gate ANS costs, 2014 [TBU]

ANSPs	En-route ATM/CNS costs (in €'000)						Terminal ATM/CNS costs (in €'000)						Gate-to-gate ATM/CNS costs (in €'000)					
	Staff costs	Non-staff operating costs	Depreciation costs	Cost of capital	Exceptional items	ATM/CNS provision costs	Staff costs	Non-staff operating costs	Depreciation costs	Cost of capital	Exceptional items	ATM/CNS provision costs	Staff costs	Non-staff operating costs	Depreciation costs	Cost of capital	Exceptional items	ATM/CNS provision costs
Albcontrol	5 929	4 570	5 954	1 957	0	18 410	1 830	132	288	80	0	2 331	7 760	4 702	6 243	2 037	0	20 742
ANS CR	54 281	13 413	15 968	8 389	0	92 051	13 460	2 708	2 599	0	0	18 767	67 741	16 121	18 567	8 389	0	110 819
ARMATS	2 291	771	607	811	0	4 480	2 023	620	468	622	0	3 733	4 314	1 391	1 075	1 433	0	8 213
Austro Control	110 756	16 648	17 768	5 174	0	150 346	24 149	4 004	4 870	294	0	33 317	134 905	20 652	22 638	5 468	0	183 663
Avinor (Continental)	63 830	20 085	5 759	4 760	0	94 434	72 544	18 136	3 279	987	0	94 946	136 374	38 221	9 038	5 746	0	189 379
Belgocontrol	67 988	12 136	10 261	4 510	3 498	98 393	38 096	9 272	4 662	920	1 174	54 124	106 084	21 408	14 923	5 430	4 673	152 517
BULATSA	47 996	7 284	6 530	8 017	0	69 826	6 112	891	947	751	0	8 700	54 108	8 174	7 476	8 768	0	78 526
Croatia Control	44 500	18 757	11 554	1 713	0	76 524	5 622	1 418	1 023	127	0	8 190	50 123	20 175	12 578	1 839	0	84 714
DCAC Cyprus	13 251	14 460	4 365	2 009	0	34 084	2 079	1 585	702	322	0	4 689	15 330	16 045	5 067	2 331	0	38 773
DFS	572 836	75 589	76 295	68 579	36 398	829 697	149 703	24 682	16 993	13 182	10 586	215 147	722 540	100 271	93 288	81 761	46 984	1 044 843
DHMI	132 723	90 583	33 725	30 950	0	287 980	35 002	24 068	14 490	24 380	0	97 940	167 724	114 651	48 215	55 329	0	385 920
DSNA	641 883	211 170	108 831	36 032	0	997 916	171 748	51 811	26 336	11 711	0	261 606	813 631	262 982	135 167	47 743	0	1 259 522
EANS	8 825	2 572	1 639	996	0	14 031	358	239	283	652	0	1 531	9 182	2 811	1 922	1 648	0	15 562
ENAIRE	393 806	67 896	96 598	39 560	6 405	604 266	128 555	12 823	20 986	7 474	1 528	171 365	522 361	80 719	117 583	47 035	7 933	775 632
ENAV	295 596	113 719	98 952	48 000	0	556 266	70 231	38 244	29 521	9 500	0	147 496	365 827	151 963	128 473	57 500	0	703 762
Finavia	20 390	12 767	3 912	1 161	0	38 230	16 983	7 401	2 979	922	0	28 285	37 373	20 168	6 891	2 083	0	66 515
HCAA	101 991	19 034	3 386	3 303	0	127 715	16 833	4 502	1 805	0	0	23 140	118 825	23 537	5 191	3 303	0	150 856
HungaroControl	39 616	22 346	8 773	3 135	669	74 539	9 228	3 229	922	383	0	13 762	48 844	25 575	9 695	3 518	669	88 301
IAA	52 933	20 728	9 262	5 595	0	88 518	9 125	4 796	4 009	2 344	0	20 274	62 058	25 524	13 271	7 939	0	108 791
LFV	108 943	33 336	19 432	4 100	0	165 810	17 021	3 412	0	0	0	20 433	125 964	36 748	19 432	4 100	0	186 244
LGS	10 440	2 392	3 515	823	0	17 170	2 610	476	1 417	304	0	4 807	13 050	2 868	4 932	1 127	0	21 977
LPS	30 940	11 258	7 488	3 509	0	53 196	3 476	1 198	869	407	0	5 951	34 416	12 456	8 357	3 916	0	59 146
LVNL	90 991	17 924	7 590	1 902	0	118 407	40 382	8 630	3 534	923	0	53 469	131 373	26 554	11 124	2 825	0	171 876
MATS	4 761	4 386	1 704	704	0	11 556	1 567	515	481	105	0	2 668	6 328	4 902	2 185	809	0	14 224
M-NAV	7 479	1 649	512	321	537	10 498	560	199	60	29	267	1 115	8 039	1 849	572	350	804	11 613
MoldATSA	2 942	629	1 074	1 171	0	5 817	1 751	1 105	240	703	0	3 798	4 693	1 734	1 314	1 874	0	9 615
MUAC	123 560	11 957	9 289	529	0	145 335	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	123 560	11 957	9 289	529	0	145 335
NATS (Continental)	319 672	87 237	105 541	83 162	0	595 612	129 348	44 843	5 618	2 470	0	182 278	449 019	132 080	111 159	85 632	0	777 890
NAV Portugal (Continental)	72 402	8 721	5 253	2 711	0	89 086	19 380	1 399	1 671	386	0	22 835	91 782	10 120	6 923	3 096	0	111 921
NAVIAIR	48 617	12 169	10 999	8 339	0	80 124	19 548	3 819	1 779	3 161	0	28 308	68 166	15 988	12 778	11 500	0	108 432
Oro navigacija	12 405	4 190	2 771	739	0	20 104	2 418	1 123	966	257	0	4 765	14 823	5 313	3 737	996	0	24 869
PANSA	96 572	33 596	11 970	479	0	142 617	16 423	5 771	1 818	732	0	24 743	112 995	39 367	13 788	1 211	0	167 361
ROMATSA	90 629	17 442	10 169	9 519	8 368	136 127	18 581	4 305	1 859	1 740	926	27 411	109 210	21 747	12 028	11 259	9 294	163 538
Skyguide	147 485	16 884	26 981	5 171	1 532	198 053	74 992	9 416	12 264	2 351	696	99 719	222 477	26 299	39 245	7 522	2 229	297 772
Slovenia Control	18 159	3 501	3 228	1 700	187	26 775	2 756	266	149	48	360	3 579	20 915	3 767	3 377	1 748	547	30 354
SMATSA	31 402	12 474	7 393	9 022	130	60 420	8 797	3 549	1 798	2 300	35	16 478	40 199	16 023	9 190	11 321	164	76 898
UkSATSE	74 636	15 989	11 884	17 740	2 956	123 204	20 639	3 978	2 990	4 296	785	32 688	95 275	19 967	14 874	22 035	3 741	155 892
Total	3 963 458	1 040 259	766 932	426 291	60 679	6 257 619	1 153 929	304 567	174 674	94 862	16 357	1 744 389	5 117 388	1 344 826	941 606	521 152	77 036	8 002 008

Annex 8 - Table 0.3: Breakdown of ATM/CNS provision costs[42] (en-route, terminal and gate-to-gate), 2014 [TBU]

[42] ENAIRE 2014 ATM/CNS provision costs comprise costs relating to ATM/CNS infrastructure shared with the military authority (€16.1m), which are charged to civil airspace users. It should be noted that these costs, which are borne by Spanish military authority, are not passing through ENAIRE accounts from 2014 onwards

ANSPs	ANSP BALANCE SHEET in (€'000)								
	NBV fixed assets in operation	NBV fixed assets under construction	Long-term financial assets and receivables	Current assets	**Total assets**	Capital and reserves	Long-term liabilities	Current liabilities	**Total liabilities**
Albcontrol	33 797	1 875	48	24 800	60 520	43 487	15 242	1 791	60 520
ANS CR	102 651	19 738	11 050	78 224	211 663	196 687	5 489	9 487	211 663
ARMATS	9 664	886	66	2 854	13 470	11 602	1 153	715	13 470
Austro Control	228 090	11 810	48 567	124 243	412 710	67 181	287 660	57 869	412 710
Avinor (Continental)									
Belgocontrol	109 626	5 461	85	87 730	202 902	136 805	17 320	48 776	202 902
BULATSA	78 310	10 489	2 125	105 621	196 545	153 448	25 969	17 127	196 545
Croatia Control	66 759	9 189	1 202	55 526	132 677	61 943	50 068	20 666	132 677
DCAC Cyprus	23 466	532	0	15 069	39 067	15 449	23 618	0	39 067
DFS	774 464	11 068	123 251	1 630 143	2 538 926	684 173	1 639 652	215 101	2 538 926
DHMI	557 771	93 614	51	225 321	876 758	716 270	36 878	123 610	876 758
DSNA									
EANS	15 023	4 098	0	7 087	26 207	15 409	6 659	4 139	26 207
ENAIRE	566 290	110 188	110 431	315 916	1 102 826	705 184	207 774	189 868	1 102 826
ENAV	936 082	265 938	305 882	505 353	2 013 255	1 283 674	379 262	350 320	2 013 255
Finavia	40 755	10 439	0	86 845	138 039	82 220	32 940	22 879	138 039
HCAA	103 644	0	0	0	103 644	103 644	0	0	103 644
HungaroControl	56 299	12 479	2 038	94 236	165 052	89 422	51 463	24 167	165 052
IAA	63 922	15 081	11 933	164 227	255 163	83 986	140 089	31 088	255 163
LFV	105 736	24 317	25 078	485 873	641 004	86 995	495 237	58 771	641 003
LGS	17 345	4 254	6	8 565	30 170	27 615	472	2 083	30 170
LPS	50 702	3 885	10	40 419	95 016	68 277	14 770	11 969	95 016
LVNL	75 052	36 417	0	43 101	154 570	21 525	98 474	34 571	154 570
MATS	12 656	249	0	14 885	27 790	21 755	2 876	3 160	27 790
M-NAV	6 423	316	0	8 401	15 140	13 699	349	1 092	15 140
MoldATSA	7 349	1 344	31	3 741	12 466	11 448	0	1 018	12 466
MUAC	67 581	5 785	0	61 307	134 673	0	73 366	61 307	134 673
NATS (Continental)	811 954	377 462	486 801	571 164	2 247 381	659 827	1 351 489	236 066	2 247 381
NAV Portugal (Continental)	57 598	9 887	81 436	124 588	273 509	93 403	130 422	49 683	273 509
NAVIAIR	145 060	12 175	10 141	71 216	238 592	122 206	89 807	26 578	238 592
Oro navigacija	25 664	815	5 606	13 882	45 968	42 817	994	2 156	45 968
PANSA	148 311	13 408	17 505	123 854	303 078	163 201	100 911	38 966	303 078
ROMATSA	73 216	23 091	5 992	139 936	242 235	155 782	71 275	15 177	242 235
Skyguide	250 216	63 225	43 047	188 125	544 613	286 343	176 509	81 761	544 613
Slovenia Control	32 508	1 417	214	6 416	40 555	15 045	15 989	9 521	40 555
SMATSA	115 959	2 016	0	39 953	157 929	102 363	34 428	21 137	157 929
UkSATSE	173 290	35 133	1 024	84 618	294 065	283 363	1 822	8 880	294 065
Total	5 943 230	1 198 083	1 293 620	5 553 242	13 988 175	6 626 247	5 580 426	1 781 501	13 988 175

Annex 8 - Table 0.4: Balance Sheet data at ANSP level, 2014 [TBU]

ANSPs	ATCOs in OPS	ATCOs on other duties	Ab-initio trainees	On-the-job trainees	ATC assistants	OPS support (non-ATCO)	Technical support staff for operational maintenance	Technical support staff for planning & development	Administration	Staff for ancillary services	Internal MET	Other	**Total staff**	ACC ATCOs in OPS	ACC ATCO-hours on duty	APPs+TWRs ATCOs in OPS	APPs+TWRs ATCO-hours on duty	Employment costs for ATCOs in OPS (€'000)
Albcontrol	49	6	0	24	7	0	86	0	72	23	15	45	327	32	50 752	17	24 701	3 376
ANS CR	192	20	11	12	96	66	132	24	227	30	0	70	880	93	144 290	99	156 979	24 863
ARMATS	82	0	0	2	18	14	138	0	45	26	0	70	395	24	32 400	58	79 228	1 309
Austro Control	291	20	18	22	42	73	102	93	71	32	95	0	858	120	168 840	171	240 084	59 037
Avinor (Continental)	409	100	26	25	121	0	190	39	31	22	0	16	978	184	284 819	223	349 218	80 170
Belgocontrol	232	25	0	5	0	45	158	23	123	30	76	50	767	90	115 151	142	190 169	44 833
BULATSA	248	58	0	2	42	25	366	26	141	41	69	84	1 101	124	158 621	123	159 926	21 432
Croatia Control	235	23	0	16	37	47	105	32	111	38	60	0	704	101	101 300	136	194 616	27 786
DCAC Cyprus	86	9	0	0	45	0	0	0	31	26	0	0	197	59	116 761	27	55 323	11 528
DFS	1 777	121	98	301	338	525	872	564	465	102	0	302	5 465	1 374	1 226 370	403	524 819	345 506
DHMI	1 120	58	50	47	32	329	1 382	22	1 317	451	0	1 075	5 883	512	741 376	608	705 280	77 604
DSNA	2 782	326	214	196	117	1 131	1 250	382	1 136	212	0	0	7 746	1 448	1 859 232	1 334	1 712 856	354 686
EANS	52	16	0	0	4	1	29	0	7	26	0	28	163	25	38 392	27	43 011	4 738
ENAIRE	1 779	253	0	0	154	50	514	318	507	15	0	92	3 682	1 150	1 332 525	629	715 308	353 656
ENAV	1 414	199	8	79	47	20	108	110	580	143	246	131	3 086	831	1 033 804	582	791 360	204 870
Finavia	183	25	0	0	20	0	69	10	21	46	3	0	377	55	78 529	128	201 472	21 979
HCAA	496	48	2	16	5	48	494	46	90	5	0	410	1 660	210	357 420	286	486 772	40 133
HungaroControl	173	7	5	5	31	29	97	30	192	69	22	65	725	97	150 081	76	118 788	24 800
IAA	204	34	12	10	24	8	45	22	71	0	0	0	430	141	214 743	63	96 579	31 029
LFV	470	112	0	25	33	76	111	7	131	33	0	0	998	213	356 775	257	419 424	50 139
LGS	93	0	0	0	0	39	103	0	91	23	13	1	363	33	47 520	60	80 880	4 465
LPS	82	28	6	6	43	26	116	15	123	28	0	0	474	41	59 269	41	63 365	12 217
LVNL	178	54	0	0	56	172	104	91	166	11	0	19	851	64	107 611	114	229 258	52 059
MATS	54	0	0	0	0	0	44	0	34	18	0	0	150	30	59 568	20	35 040	3 224
M-NAV	65	22	0	0	9	8	46	0	51	29	17	24	271	37	48 507	28	37 156	3 288
MoldATSA	73	6	0	10	0	11	62	11	68	10	35	58	344	44	63 316	29	41 818	2 722
MUAC	268	24	4	4	44	57	128	0	57	0	0	0	586	268	299 908	n/appl	n/appl	64 373
NATS (Continental)	1 415	195	12	6	380	307	827	190	738	0	0	0	4 069	926	1 129 610	489	596 556	229 789
NAV Portugal (Continental)	220	37	0	1	26	55	93	58	165	43	0	6	704	88	159 104	132	241 428	44 668
NAVIAIR	214	59	0	0	92	32	96	30	84	12	0	0	618	96	135 313	118	166 927	31 915
Oro navigacija	87	11	0	1	0	23	66	8	68	27	0	0	291	34	53 124	53	82 737	6 024
PANSA	482	10	48	51	75	287	323	55	336	108	0	0	1 775	136	156 180	343	394 017	52 632
ROMATSA	448	107	9	17	79	0	360	0	392	10	123	0	1 544	208	252 061	240	294 954	47 345
Skyguide	362	69	11	38	96	208	175	90	205	70	0	23	1 347	220	296 402	142	153 783	73 190
Slovenia Control	91	14	0	0	11	5	36	0	36	24	0	0	217	54	77 203	37	52 967	10 495
SMATSA	277	61	0	8	31	31	91	104	98	64	91	0	856	156	179 712	121	139 392	16 765
UkSATSE	910	308	0	9	81	124	2 488	37	742	108	39	618	5 464	555	679 875	355	468 955	23 762
Total	17 591	2 465	534	938	2 236	3 870	11 406	2 435	8 824	1 955	904	3 188	56 345	9 873	12 366 464	7 712	10 345 145	2 462 408

Annex 8 - Table 0.5: Total staff and ATCOs in OPS data, 2014 [TBU]

ANSPs	Size of controlled airspace	Number of ACC operational units	Number of APP operational units	Number of TWR operational units	Number of AFIS	Total IFR flights controlled by the ANSP	Total IFR km controlled by the ANSP	Total flight-hours controlled by the ANSP	IFR Airport movements controlled by the ANSP	Composite flight-hours
Albcontrol	36 000	1	1	1	1	198 244	33 331 270	42 952	18 056	47 764
ANS CR	76 100	1	4	4	0	682 563	168 971 391	226 714	136 646	263 130
ARMATS	29 700	1	1	2	2	50 239	9 884 670	13 311	21 106	18 936
Austro Control	79 500	1	6	6	0	903 549	192 896 981	276 826	336 938	366 618
Avinor (Continental)	724 000	3	17	19	0	621 113	201 897 047	376 179	698 585	562 348
Belgocontrol	39 500	1	4	5	0	563 112	53 320 849	107 974	365 318	205 329
BULATSA	146 000	1	3	5	0	683 320	176 176 449	219 380	75 736	239 563
Croatia Control	158 000	1	7	10	0	520 874	158 775 686	205 093	87 901	228 518
DCAC Cyprus	174 000	1	2	2	0	304 328	113 713 482	146 777	57 247	162 033
DFS	390 000	4	16	16	0	2 772 617	882 794 873	1 361 858	1 947 971	1 880 979
DHMI	982 000	2	34	44	0	1 235 140	878 055 078	1 195 491	1 173 454	1 508 209
DSNA	1 010 000	5	12	81	51	2 845 477	1 542 050 584	2 154 187	1 821 345	2 639 563
EANS	77 102	1	2	2	0	190 501	49 015 062	65 420	35 403	74 855
ENAIRE	2 190 000	5	17	22	0	1 681 498	882 223 857	1 267 014	1 282 703	1 608 846
ENAV	733 000	4	24	16	11	1 550 608	711 039 027	1 016 435	1 175 749	1 329 764
Finavia	411 000	1	7	15	10	229 263	65 193 461	108 085	235 694	170 896
HCAA	538 000	1	16	18	15	677 777	359 238 720	480 211	387 838	583 568
HungaroControl	104 000	1	1	1	0	717 157	166 460 855	214 075	86 401	237 100
IAA	481 000	2	3	3	0	536 948	214 828 496	276 582	225 814	336 760
LFV	626 000	2	25	25	1	682 995	283 127 815	423 388	495 576	555 456
LGS	95 600	1	2	2	1	241 318	55 622 920	74 000	66 137	91 625
LPS	48 700	1	2	5	0	435 890	72 583 169	92 561	26 590	99 647
LVNL	53 000	1	4	4	0	567 805	70 315 845	153 540	496 588	285 877
MATS	231 000	1	2	1	1	101 906	48 513 703	67 652	38 425	77 892
M-NAV	24 700	1	2	2	1	146 380	19 126 115	24 339	13 565	27 954
MoldATSA	34 800	1	1	4	0	56 298	9 367 914	13 110	19 359	18 269
MUAC	260 000	1	0	0	0	1 671 185	480 168 823	587 342	n/appl	587 342
NATS (Continental)	870 000	3	16	16	0	2 214 690	798 501 566	1 308 524	1 772 434	1 780 866
NAV Portugal (Continental)	671 000	1	4	6	0	479 220	240 379 955	339 348	291 627	417 065
NAVIAIR	158 000	1	7	6	1	632 309	138 344 091	209 633	332 873	298 341
Oro navigacija	74 600	1	3	4	0	224 039	37 573 389	53 376	48 064	66 185
PANSA	334 000	1	4	13	0	690 554	299 778 310	408 597	317 128	493 110
ROMATSA	254 000	1	3	16	0	598 230	257 175 163	327 830	141 793	365 616
Skyguide	42 800	2	4	7	0	1 164 916	208 425 913	322 705	480 593	450 780
Slovenia Control	20 400	1	3	3	0	273 748	36 845 333	49 500	28 693	57 146
SMATSA	129 099	1	8	8	0	551 569	162 052 126	207 116	82 980	229 230
UkSATSE	777 000	5	11	22	5	320 276	192 733 880	253 159	143 155	291 309
Total		63	278	416	100		10 270 503 867	14 670 286	14 965 485	18 658 488

Annex 8 - Table 0.6: Operational data (ANSP and State level), 2014 [TBU]

ANSPs	ACC Code	Flight-hours controlled	ATCO-hours on duty	ATCO-hour productivity	Average transit time in minutes	IFR ACC Movements	Size of the controlled area	ATCOs in OPS	Size of OPS room area (m²)	Number of sectors	Sum of sector-hours
Albcontrol	Tirana	50 752	50 752	1.00	15	198 244	36 000	32	265	4	26 679
ANS CR	Praha	201 233	144 290	1.39	18	674 877	77 100	93	950	9	31 348
ARMATS	Yerevan	10 159	32 400	0.31	13	47 631	29 700	24	168	1	8 760
Austro Control	Wien	204 039	168 840	1.21	16	750 706	79 500	120	900	13	40 400
Avinor (Continental)	Bodo	79 000	65 013	1.22	22	214 914	403 000	51	450	6	38 000
Avinor (Continental)	Oslo					352 659	115 000	60	605	6	30 316
Avinor (Continental)	Stavanger	81 129	63 465	1.28	20	247 000	205 000	41	250	7	
Belgocontrol	Brussels	73 723	115 151	0.64	8	556 637	39 500	90	1 054	7	24 723
BULATSA	Sofia	206 274	158 621	1.30	19	664 887	145 000	124	1 183	12	28 999
Croatia Control	Zagreb	186 597	101 300	1.84	23	494 626	158 000	101	800	10	24 674
DCAC Cyprus	Nicosia	139 609	116 761	1.20	28	304 270	174 000	59	250	5	25 370
DFS	Karlsruhe UAC	581 558	330 319	1.76	21	1 690 405	261 000	385	1 850	38	137 124
DFS	Langen	351 368	419 200	0.84	17	1 210 588	108 000	452	1 689	35	136 975
DFS	Munchen	247 682	235 992	1.05	14	1 038 635	119 000	293	1 262	19	100 109
DFS	Bremen	181 250	240 859	0.75	18	614 391	174 000	245	1 050	17	88 826
DHMI	Ankara	752 061	402 544	1.87	54	840 134	779 000	278	295	11	83 220
DHMI	Istanbul	381 861	338 832	1.13	25	903 642	233 000	234	420	11	96 360
DSNA	Bordeaux	437 267	351 816	1.24	31	846 054	212 000	274	1 295	19	111 988
DSNA	Reims	249 071	305 592	0.82	18	839 073	117 000	238	1 040	17	74 891
DSNA	Paris	405 852	387 768	1.05	21	1 164 870	167 000	302	1 250	20	117 622
DSNA	Marseille	369 863	459 672	0.80	22	987 357	298 000	358	1 310	28	116 438
DSNA	Brest	468 298	354 384	1.32	30	922 951	400 000	276	850	18	85 553
EANS	Tallinn	60 927	38 392	1.59	20	185 471	77 102	25	269	3	11 315
ENAIRE	Canarias	161 323	172 044	0.94	34	282 590	1 370 000	146	624	9	46 894
ENAIRE	Barcelona	314 702	342 281	0.92	25	745 314	266 000	296	1 395	19	94 091
ENAIRE	Madrid	494 634	534 701	0.93	32	917 735	435 000	458	1 013	25	146 334
ENAIRE	Palma	64 666	129 621	0.50	15	253 626	51 400	115	783	8	37 111
ENAIRE	Sevilla	141 313	153 879	0.92	26	328 698	179 000	135	574	7	40 973
ENAV	Brindisi	92 195	107 881	0.85	21	266 486	136 000	90	550	4	16 989
ENAV	Milano	223 732	304 977	0.73	19	720 213	73 300	226	593	20	69 055
ENAV	Padova	192 178	238 445	0.81	17	676 877	94 600	191	375	13	47 203
ENAV	Roma	439 752	382 500	1.15	32	817 362	429 000	324	1 600	22	86 354
Finavia	Tampere	71 102	78 529	0.91	25	167 642	411 000	55	550	6	17 885
HCAA	Athinai+Macedonia	424 442	357 420	1.19	39	650 291	538 000	210	1 000	12	59 400
HungaroControl	Budapest	191 276	143 529	1.33	18	640 174	92 900	96	720	8	21 277
HungaroControl	Kosovo	7 122	6 552	1.09	8	56 891	11 400	55	720	1	6 550
IAA	Dublin	32 823	54 828	0.60	10	195 263	23 200	36	441	4	22 197
IAA	Shannon	226 922	159 915	1.42	34	395 338	449 000	105	576	9	44 951
LFV	Malmo	218 140	195 975	1.11	26	505 711	225 000	117	841	13	45 000
LFV	Stockholm	128 319	160 800	0.80	20	393 441	479 000	96	828	11	46 800
LGS	Riga	74 000	47 520	1.56	18	240 950	95 600	33	169	4	74 000
LPS	Bratislava	88 075	59 269	1.49	12	423 738	48 700	41	813	5	14 947
LVNL	Amsterdam	74 098	107 611	0.69	8	525 957	53 000	64	1 800	5	29 493
MATS	Malta	58 313	59 568	0.98	35	100 996	231 000	30	121	2	23 360
M-NAV	Skopje	22 590	48 507	0.47	10	142 080	24 700	37	202	3	13 200
MoldATSA	Chisinau	11 087	63 316	0.18	12	54 227	34 800	44	144	2	17 520
MUAC	Maastricht	587 342	299 908	1.96	21	1 671 185	260 000	268	1 050	20	70 925
NATS (Continental)	Prestwick	336 440	305 793	1.10	23	876 141	612 000	251	1 020	23	124 008
NATS (Continental)	London AC	512 611	445 227	1.15	17	1 837 024	287 000	365	2 000	18	81 060
NATS (Continental)	London TC	277 824	378 590	0.73	13	1 281 694	40 600	310	766	23	109 758
NAV Portugal (Continental)	Lisboa	275 942	159 104	1.73	36	453 798	671 000	88	663	8	55 992
NAVIAIR	Kobenhavn	156 019	135 313	1.15	18	534 231	158 000	96	600	7	31 208
Oro Navigacija	Vilnius	46 563	53 124	0.88	13	217 832	74 600	34	336	3	19 710
PANSA	Warszawa	322 582	156 180	2.07	30	647 807	331 000	136	1 300	9	39 670
ROMATSA	Bucuresti	307 310	252 061	1.22	31	590 045	254 000	208	1 391	11	59 220
Skyguide	Geneva	110 353	142 752	0.77	11	603 798	30 000	108	1 113	9	30 797
Skyguide	Zurich	130 583	153 651	0.85	11	724 317	39 800	111	960	9	37 097
Slovenia Control	Ljubljana	47 581	77 203	0.62	11	271 241	20 400	54	360	4	15 713
SMATSA	Beograd	191 271	179 712	1.06	21	544 121	129 099	156	744	9	39 250
UkSATSE	Kyiv	97 577	246 225	0.40	30	194 345	185 000	201	883	12	72 005
UkSATSE	Dnipropetrovs'k	35 829	139 650	0.26	26	82 359	288 000	114	415	7	61 320
UkSATSE	L'viv	55 456	109 025	0.51	25	132 606	133 000	89	202	5	24 747
UkSATSE	Odesa	37 232	101 675	0.37	22	103 859	170 000	83	235	6	48 910
Total		13 000 892	12 126 824	1.07	22	36 018 025	13 842 001	9 826		711	3 382 664

Annex 8 - Table 0.7: Operational data at ACC level, 2014 [TBU]

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ANNEX 9 – PERFORMANCE INDICATORS AT FAB LEVEL

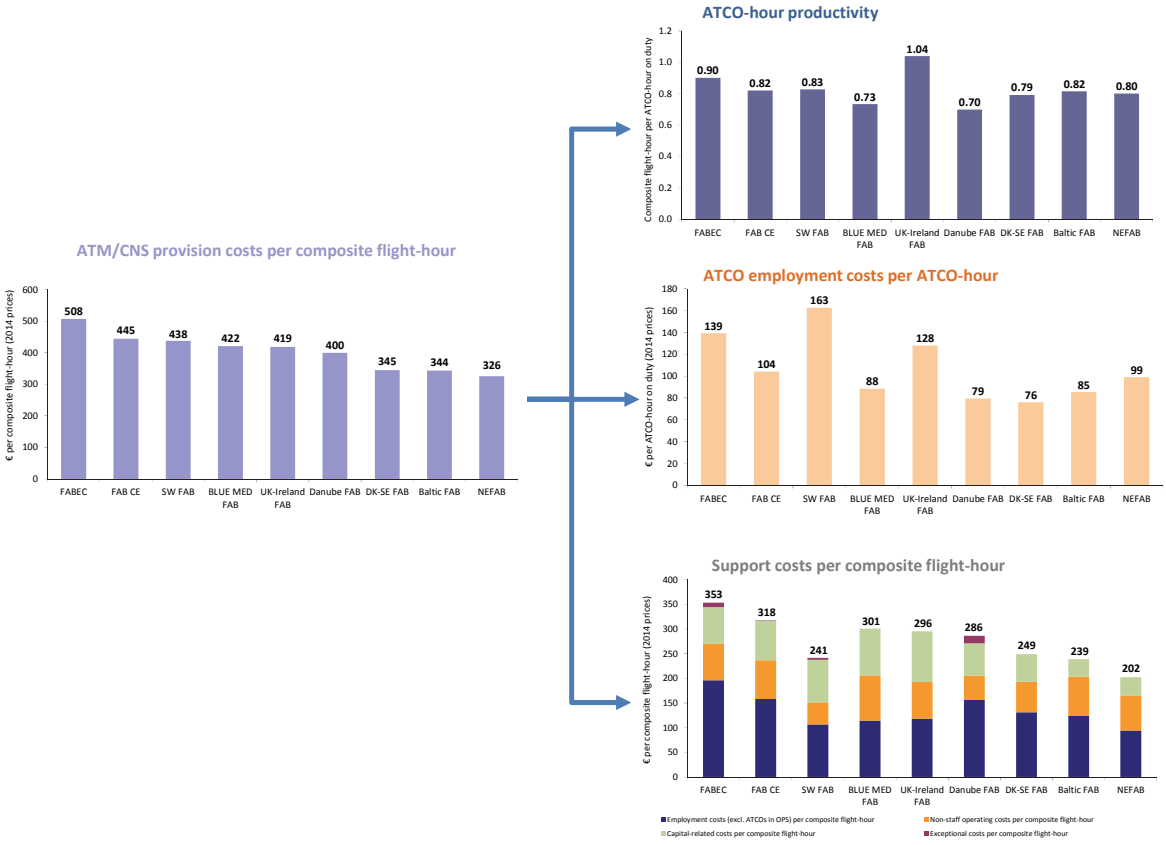
The first part of this Annex provides a breakdown of the **financial** cost-effectiveness indicator at FAB level by ATCO-hour productivity, ATCO employment costs per ATCO-hour and support costs per composite flight-hour. The second part provides an initial estimate of economic cost-effectiveness at FAB level including both the costs of ATFM delays and the costs of horizontal en-route flight inefficiency. It also provides a brief description of the methodology used to estimate the costs of flight inefficiencies.

The figures shown at FAB level have been computed taking into account the ANSPs participating to the ACE analysis in 2014 and which were formally part of a FAB initiative:

- FABEC: Belgocontrol, DFS, DSNA, LVNL, MUAC and Skyguide.
- FAB CE: ANS CR, Austro Control, Croatia Control, HungaroControl, LPS and Slovenia Control.
- SW FAB: ENAIRE and NAV Portugal.
- BLUE MED: DCAC Cyprus, ENAV, HCAA and MATS.
- UK-Ireland: IAA and NATS.
- Danube: BULATSA and ROMATSA.
- DK-SE: LFV and NAVIAIR.
- Baltic: Oro Navigacija and PANSA.
- NEFAB: Avinor, EANS, Finavia and LGS.

Breakdown of financial cost-effectiveness indicator by FAB (2014)

The Figure below represents a break-down of unit ATM/CNS provision costs into ATCO-hour productivity, ATCO employment costs per ATCO-hour and unit support costs at FAB level.



Annex 9 - Figure 0.1: Breakdown of cost-effectiveness indicator at FAB level, 2014 [TBU]

Estimated costs of horizontal en-route flight inefficiencies by FAB (2014)

The analysis of horizontal en-route flight efficiency is based on the length of the actual flight trajectory. In order to enable consistent comparisons between city pairs and between different areas (which include only a portion of the trajectory), the length is expressed as additional distance with respect to the corresponding achieved distance (see blue box).

For instance, an "inefficiency" of 5% for a flight of 1 000 NM means that the extra distance was 50 NM.

The actual flown trajectory is based on processed radar track data (Correlated Position Reports) submitted by ANSPs to the EUROCONTROL Enhanced Tactical Flow Management System (ETFMS).

Horizontal en-route flight efficiency

Horizontal en-route flight efficiency compares the length of actual flight trajectories to the corresponding "achieved" distance. The achieved distance apportions the Great Circle Distance (GCD) between two points within the European airspace. For the vast majority of flights, the origin and destination coincide with the airports. If the origin/destination airport is located outside of European airspace, the entry/exit point into the reference area is used for the calculation.

The methodology enables to better quantify between local inefficiency (deviations between entry and exit point within a respective airspace such as FAB, ANSP, ACC) and the contribution to the network (deviation from GCD between origin and destination airport).

The methodology for the calculation of horizontal en-route flight efficiency applied in this Annex is fully consistent with the Single European Sky (SES) Performance Scheme.

En-route flight inefficiencies are predominantly driven by:

- route network design;
- route availability;
- route utilisation (route selected by airspace users); and,
- ATC measures.

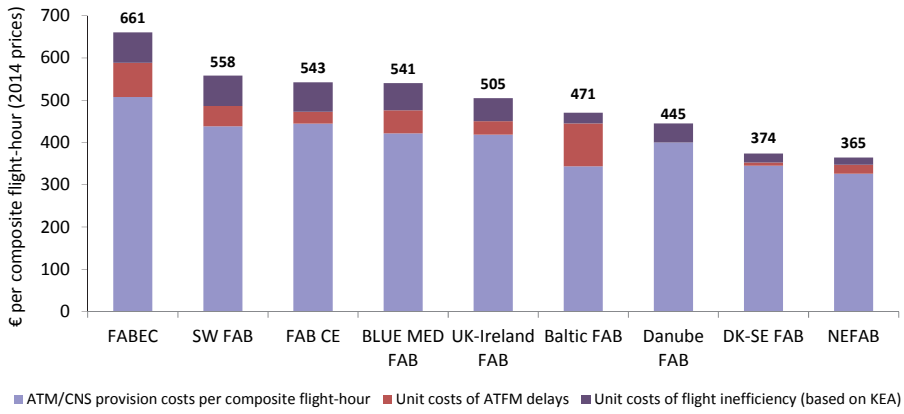
It is acknowledged that the distance-based flight efficiency indicators only serve as proxies for fuel efficiency as the most fuel efficient route depends on wind. However, even the wind-optimal route might not necessarily correspond to the choice of the airspace users because they might use different measures based on total costs (time, unit rates, etc.).

Despite their limitations, the flight efficiency indicators used in this section provide consistent and stable measures at Pan-European system level to identify areas for improvement and to monitor progress over time.

Further information on the methodology used to compute the horizontal en-route flight efficiency indicator can be found online at: www.ansperformance.eu.

The Figure below presents the unit economic cost-effectiveness at FAB level when adding both the costs of ATFM delay[43] and the estimated costs of flight inefficiency to ATM/CNS provision costs.

[43] Information on the assumptions underlying the calculation of costs of ATFM delays can be found in Annex 2 of this Report.



Annex 9 - Figure 0.2: Unit economic cost-effectiveness at FAB level including flight inefficiencies, 2014 [TBU]

Estimating the costs to airspace users of ANS-related flight inefficiencies is a complex exercise including numerous assumptions and expert judgement. A first step is to convert the additional distances into additional times and additional fuel consumptions (see Table below).

	Flight inefficiency (% additional distance)	Additional distance (M km)	Additional time (days)	Additional fuel (ktons)
UK-Ireland FAB	3.6%	22	1 287	79
FABEC	3.2%	90	4 942	289
SW FAB	3.1%	30	1 628	98
BLUE MED FAB	2.5%	28	1 527	94
FAB CE	1.9%	18	930	61
Baltic FAB	1.8%	3	160	10
NEFAB	1.4%	3	181	10
Danube FAB	1.3%	5	255	21
DK-SE FAB	1.2%	4	214	12

Annex 9 - Table 0.1: Estimated impact of flight inefficiencies on time and fuel consumption

Then, in order to translate additional time and additional fuel consumption into monetary terms, two main sources of information are used:

- The **cost of time** is estimated using the University of Westminster study[44] (the same study as that used to estimate the cost of ATFM delays). However, although the same reference study is used, the value of one minute of ATFM delay is not the same as the value of one minute of flight inefficiency as the cost items entering in the calculations have to reflect the different nature and specificities of the two indicators.
- The **cost of fuel** is estimated from information provided by IATA. It is based on the average annual spot price and also includes an estimated average premium paid by airspace users on top of the spot price as well as a provision for fuel carriage penalties.

As explained above, estimates of the cost of flight inefficiencies at FAB level have not yet reached the same level of maturity as the other ACE performance indicators and further work will be required before validating the inclusion of fight inefficiencies in the ACE economic cost-effectiveness indicator (which currently only adds the cost of ATFM delays to the financial cost-effectiveness indicator).

[44] European airline delay cost reference values (University of Westminster), Final report (Version 3.2), (March 2011) available at: http://www.eurocontrol.int/documents/european-airline-delay-cost-reference-values.

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ANNEX 10 – INDIVIDUAL ANSP FACT SHEETS

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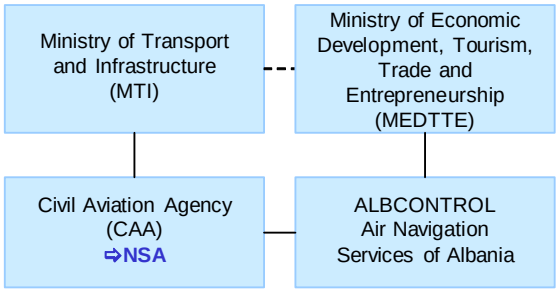
Albcontrol, Albania

National Air Traffic Agency

http://www.albcontrol.com.al/

Institutional arrangements and links (2016)



Status (2016)

- Since May 1999 NATA, now ALBCONTROL, is a joint-stock company
- 100% State owned

National Supervisory Authority (NSA):

Civil Aviation Agency (CAA)

Body responsible for:

Safety Regulation

MTI and Civil Aviation Agency (CAA)

Airspace Regulation

MTI and Civil Aviation Agency (CAA)

Economic Regulation

Ministry of Economic Development, Tourism, Trade and Entrepreneurship (MEDTTE)

Corporate governance structure (2016)

SUPERVISORY BOARD (6 members)
Chairman + 5 members

All 6 members are nominated by the MEDTTE.
2 members are proposed by the MEDTTE, 2 members by the MTI and 2 members by the Ministry of Finance.

MANAGEMENT BOARD (6 members)
Director General + 5 Head of Divisions

Director General is appointed by MEDTTE through the Supervisory Board of ALBCONTROL

Albcontrol (2016)

CHAIRMAN OF SUPERVISORY BOARD:

Genci Gjonçaj

DIRECTOR GENERAL OF ALBCONTROL:

Belinda Balluku

HEAD OF THE ATS DEPARTMENT:

Sokol Reveli

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☑ MET

Operational ATS units (2014)

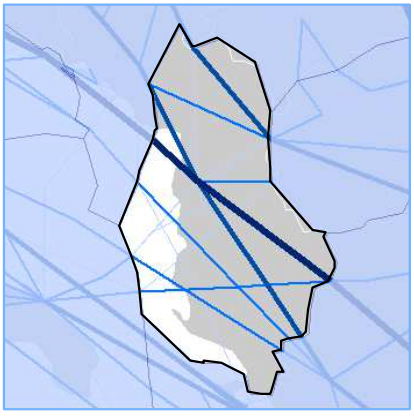
1 ACC (Tirana)
1 APP (Tirana)
1 TWR (Tirana)
1 AFIS (Tirana)

Key financial and operational figures (ACE 2014)

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€)	35
Gate-to-gate ANS total capex (M€)	6
ATCOs in OPS	49
Gate-to-gate total staff	312
Total IFR flight-hours controlled by ANSP ('000)	43
IFR airport movements controlled by ANSP ('000)	18
En-route sectors	4
Minutes of ATFM delays ('000)	0

Size (2014)

Size of controlled airspace: 36 000 km²

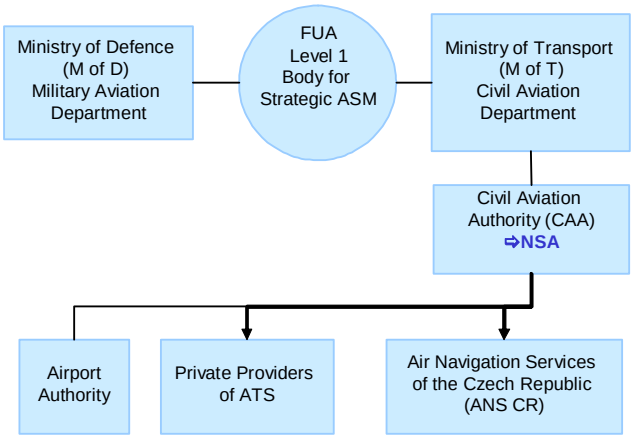


ANS CR, Czech Republic

Air Navigation Services of the Czech Republic

www.rlp.cz

Institutional arrangements and links (2016)



Status (2016)

- 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

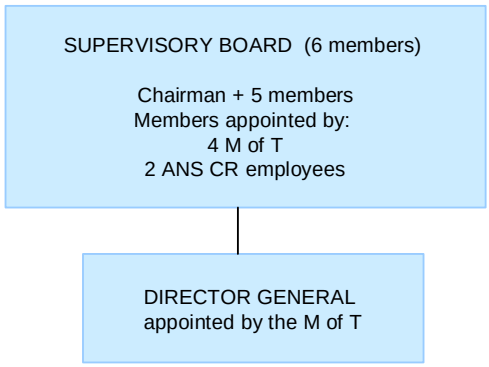
Airspace Regulation

Body for Strategic ASM

Economic Regulation

Ministry of Transport

Corporate governance structure (2016)



ANS CR (2016)

CHAIRWOMAN OF THE SUPERVISORY BOARD:

Magdalena Faltýsková

DIRECTOR GENERAL (CEO):

Jan Klas

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☐ MET

- OAT compatible only

Operational ATS units (2014)

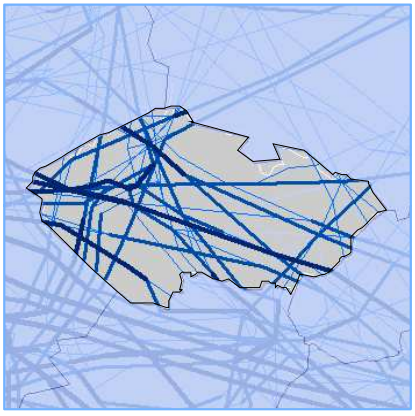
1 ACC (Praha)
4 APPs (Praha, Karlovy Vary, Brno, Ostrava)
4 TWRs (Praha, Karlovy Vary, Brno, Ostrava)
1 AFIS (located in Praha ACC)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	121
Gate-to-gate total costs (M€)	121
Gate-to-gate ATM/CNS provision costs (M€)	111
Gate-to-gate total ATM/CNS assets(M€)	117
Gate-to-gate ANS total capex (M€)	19
ATCOs in OPS	192
Gate-to-gate total staff	880
Total IFR flight-hours controlled by ANSP ('000)	227
IFR airport movements controlled by ANSP ('000)	137
En-route sectors	9
Minutes of ATFM delays ('000)	20

Size (2014)

Size of controlled airspace: 76 100 km²

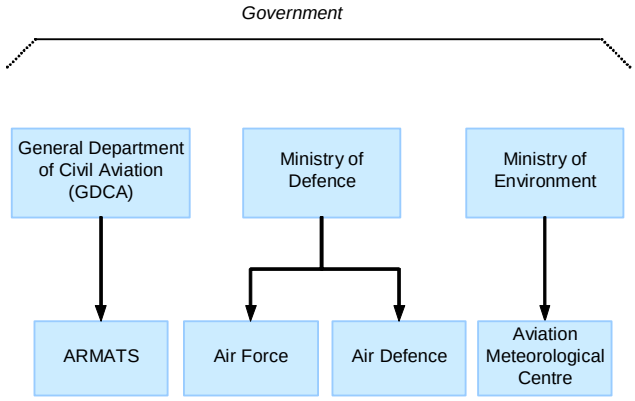


ARMATS, Armenia

Armenian Air Traffic Services

www.armats.com

Institutional arrangements and links (2016)



Status (2016)

- Joint-stock company as of 1997
- 100% State-owned

National Supervisory Authority (NSA):

General Department of Civil Aviation (GDCA)

Body responsible for:

Safety Regulation

General Department of Civil Aviation (GDCA)

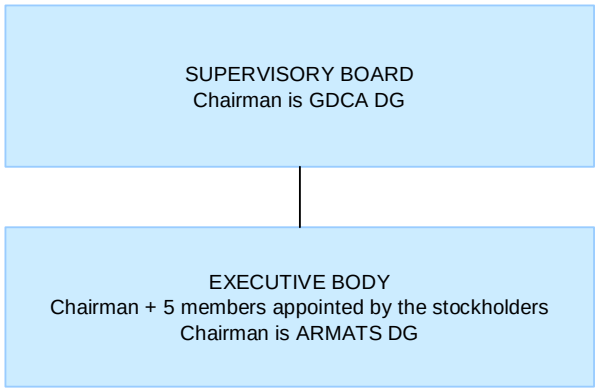
Airspace Regulation

General Department of Civil Aviation (GDCA) and Ministry of Defence

Economic Regulation

Tax Authorities

Corporate governance structure (2016)



ARMATS (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Artyom Movsesyan

CHAIRMAN OF THE EXECUTIVE BODY:

Artur Gasparyan

DIRECTOR OF AIR TRAFFIC SERVICES:

Artur Papoyan

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

Operational ATS units (2014)

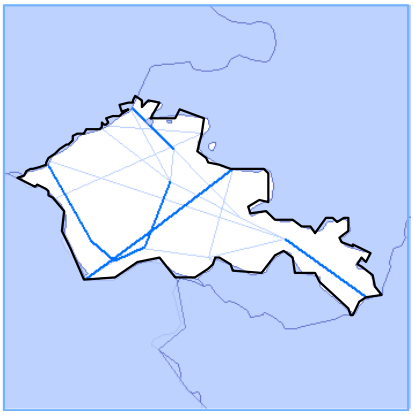
1 ACC (Yerevan)
2 APPs (Yerevan, Gyumri)
2 TWRs (Shirak, Zvartnots)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	9
Gate-to-gate total costs (M€)	8
Gate-to-gate ATM/CNS provision costs (M€)	8
Gate-to-gate total ATM/CNS assets(M€)	11
Gate-to-gate ANS total capex (M€)	1
ATCOs in OPS	82
Gate-to-gate total staff	395
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

Size (2014)

Size of controlled airspace: 29 700 km²

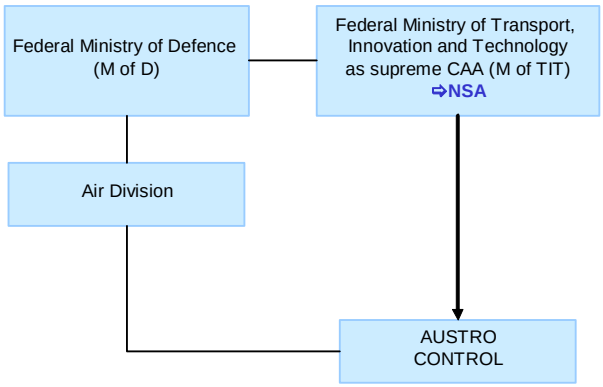


Austro Control, Austria

Österreichische Gesellschaft für Zivilluftfahrt mbH

www.austrocontrol.at

Institutional arrangements and links (2016)



Status (2016)

- Private limited company as of 1994
- 100% State-owned (Law makes provision for Austrian Airports to own up to 49 %)

National Supervisory Authority (NSA):

Federal Ministry of Transport, Innovation and Technology (M of TIT)

Body responsible for:

Safety Regulation

The power for regulatory decisions including safety oversight lies within the M of TIT

Airspace Regulation

M of TIT, normally on basis of proposals of Austro Control

Economic Regulation

Covered by the National Supervisory Authority

Corporate governance structure (2016)

GENERAL ASSEMBLY - M of TIT

SUPERVISORY BOARD (9 members)
Chairman + 8 members
6 members are appointed by M of TIT.
Members represent: 1 from M of Finance,1 from M of TIT, 1 from the field of aviation, 1 from the field of consulting, 1 from the field of transport, 3 from works council.

MANAGING BOARD
2 members
Members appointed by M of TIT.

Austro Control (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Mag. Karin Zipperer

MANAGING BOARD:

Dr. Heinz Sommerbauer
Thomas Hoffmann, MSc

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☑ MET

Operational ATS units (2014)

1 ACC (Wien)
6 APPs (Wien, Graz, Innsbruck, Klagenfurt, Linz, Salzburg)
6 TWRs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	236
Gate-to-gate total costs (M€)	217
Gate-to-gate ATM/CNS provision costs (M€)	184
Gate-to-gate total ATM/CNS assets(M€)	180
Gate-to-gate ANS total capex (M€)	20
ATCOs in OPS	291
Gate-to-gate total staff	763
Total IFR flight-hours controlled by ANSP ('000)	277
IFR airport movements controlled by ANSP ('000)	337
En-route sectors	13
Minutes of ATFM delays ('000)	125

Size (2014)

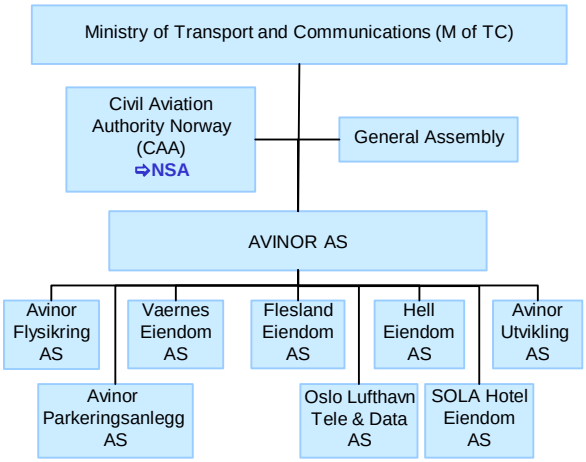
Size of controlled airspace: 79 500 km²

Avinor Flysikring, Norway

Avinor Flysikring AS

www.avinor.no

Institutional arrangements and links (2016)



Status (2016)

- 100% owned by Avinor AS (state-owned)
- Civil ANSP
- 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 (2016)

SUPERVISORY BOARD (8 members)
Chairman + 7 members
Members represent: 5 M of TC, 3 staff

EXECUTIVE BOARD (10 members)
CEO + 9 members
CEO appointed by Supervisory Board

Avinor Flysikring (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Dag Falk-Petersen

CHIEF EXECUTIVE OFFICER:

Anders Kirsebom

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☑ Oceanic ANS
☑ OAT	☑ Lower Airspace	☐ MET

Operational ATS units (2014)

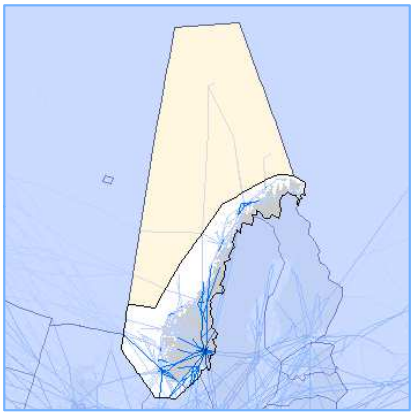
3 ACCs Oslo (ACC + APP), Stavanger (ACC), Bodo (ACC + APP + Oceanic)
17 APPs (2 APPs combined with ACCs + 14 TWRs/APPs + 1 stand alone APP)
19 TWRs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	207
Gate-to-gate total costs (M€)	202
Gate-to-gate ATM/CNS provision costs (M€)	189
Gate-to-gate total ATM/CNS assets(M€)	n/a
Gate-to-gate ANS total capex (M€)	n/a
ATCOs in OPS	409
Gate-to-gate total staff	978
Total IFR flight-hours controlled by ANSP ('000)	376
IFR airport movements controlled by ANSP ('000)	699
En-route sectors	19
Minutes of ATFM delays ('000)	165

Size (2014)

Size of controlled airspace: 724 000 km²



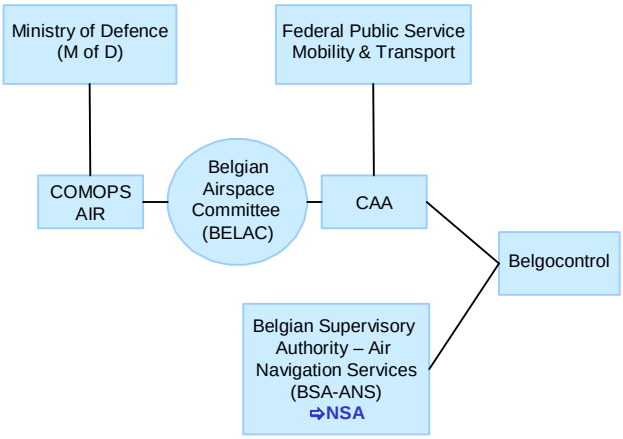
Continental: 724 000 km² - Oceanic:1 450 000 km²

Belgocontrol, Belgium

Belgocontrol

www.belgocontrol.be

Institutional arrangements and links (2016)



Status (2016)

- 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

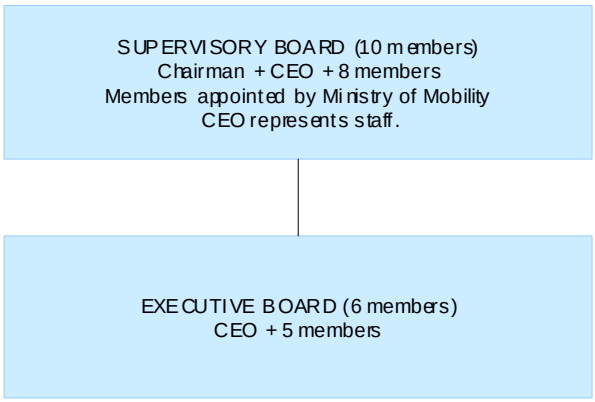
Airspace Regulation

Belgian Airspace Committee

Economic Regulation

Federal Public Service of Mobility and Transport

Corporate governance structure (2016)



Belgocontrol (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Renaud Lorand

DIRECTOR GENERAL (CEO):

Johan Decuyper

Scope of services (2014)

☑ GAT	☐ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☑ 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 (2014)

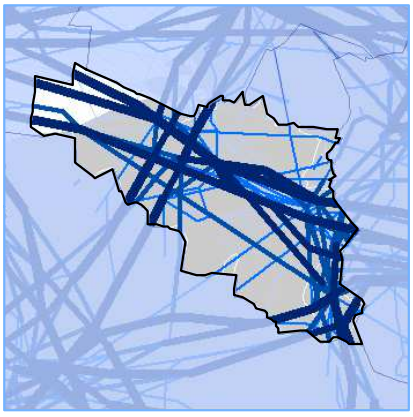
1 ACC (Brussels)
4 APPs (Brussels, Liege, Charleroi, Oostende)
5 TWRs (Brussels, Antwerp, Liege, Charleroi, Oostende)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	210
Gate-to-gate total costs (M€)	213
Gate-to-gate ATM/CNS provision costs (M€)	153
Gate-to-gate total ATM/CNS assets(M€)	106
Gate-to-gate ANS total capex (M€)	2
ATCOs in OPS	232
Gate-to-gate total staff	691
Total IFR flight-hours controlled by ANSP ('000)	108
IFR airport movements controlled by ANSP ('000)	365
En-route sectors	7
Minutes of ATFM delays ('000)	114

Size (2014)

Size of controlled airspace: 39 500 km²

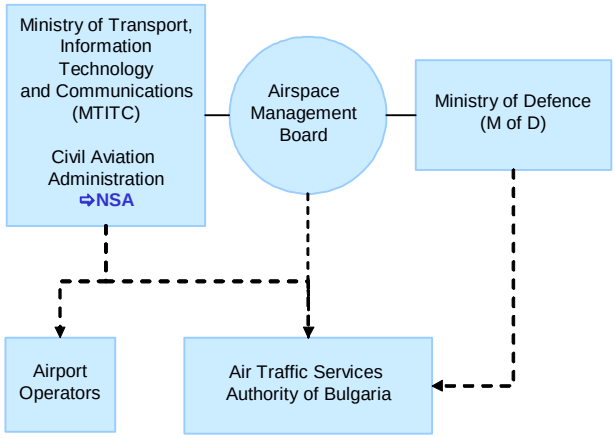


BULATSA, Bulgaria

Bulgarian Air Traffic Services Authority

www.atsa.bg

Institutional arrangements and links (2016)



Status (2016)

- 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 (2016)

MANAGEMENT BOARD (3 members)
DG + 2 members

All members appointed by the MTITC.

BULATSA (2016)

CHAIRMAN OF THE MANAGEMENT BOARD:

Vaselina Karamileva

DIRECTOR GENERAL (CEO):

Georgi Peev

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☑ MET

- Training of ATCOs

Operational ATS units (2014)

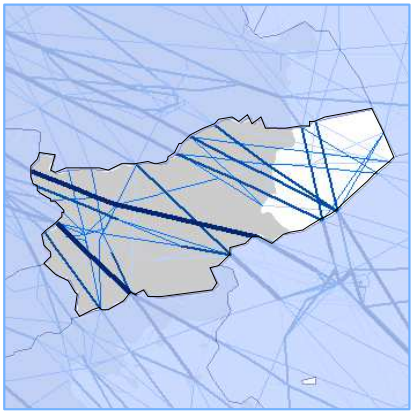
1 ACCs (Sofia)
3 APPs (Sofia, Varna, Burgas)
5 TWRs (Sofia, Varna, Burgas, Gorna Oriahovitza, Plovdiv)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	111
Gate-to-gate total costs (M€)	89
Gate-to-gate ATM/CNS provision costs (M€)	79
Gate-to-gate total ATM/CNS assets(M€)	87
Gate-to-gate ANS total capex (M€)	9
ATCOs in OPS	248
Gate-to-gate total staff	1 032
Total IFR flight-hours controlled by ANSP ('000)	219
IFR airport movements controlled by ANSP ('000)	76
En-route sectors	12
Minutes of ATFM delays ('000)	0

Size (2014)

Size of controlled airspace: 146 000 km²



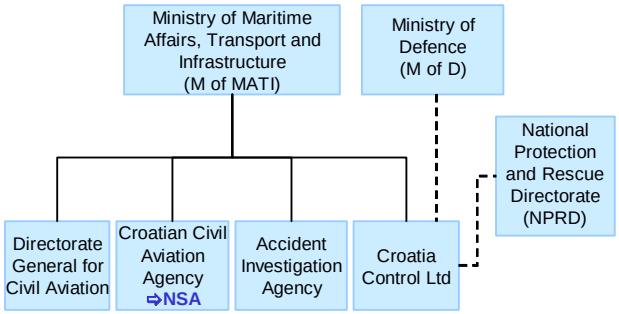
118 000 km² plus 28 000 km² over the Black Sea.

Croatia Control, Croatia

Croatia Control Ltd, Croatian Air Navigation Services

www.crocontrol.hr

Institutional arrangements and links (2016)



Status (2016)

- Limited liability company as of 1st January 2000
- 100% State-owned
- Integrated civil/military ANSP

National Supervisory Authority (NSA):

Croatian Civil Aviation Agency (CCAA)

Body responsible for:

Safety Regulation

Directorate General for Civil Aviation

Airspace Regulation

M of MATI

Economic Regulation

State Law and Croatia Control Ltd

Corporate governance structure (2016)

ASSEMBLY (3 members)
The President represents Ministry of MATI (Minister), the other Two members represent M of D (Minister) and M of F (Minister).

SUPERVISORY BOARD (5 members)
The Chairman + 4 members
The members represent the M of MATI, 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.

MANAGEMENT
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.

Croatia Control (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Darko Prebežac

DIRECTOR GENERAL:

Dragan Bilać

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☑ MET

- ATS provision within western part of Sarajevo FIR (west of the line: GUBOK-DER-BOSNA-VRANA-VELIT) from FL 325 to FL 660 until 13-11-2014.
- After opening of Sarajevo ACC on 13-11-2014, ATS provision in a big part of lower airspace has been taken over by BHANSA.

Operational ATS units (2014)

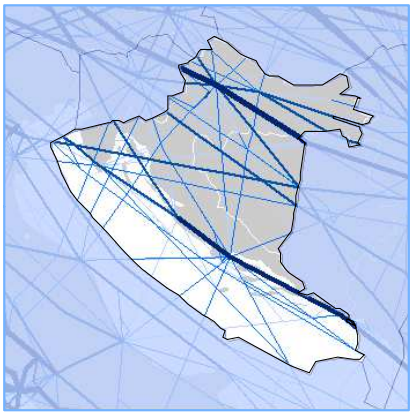
1 ACC (Zagreb)
1 APP (Zagreb)
8 APPs/TWRs (Osijek, Rijeka, Pula, Zadar, Split, Dubrovnik, Brač, Lošinj)
2 TWRs (Lučko, Zagreb)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	88
Gate-to-gate total costs (M€)	90
Gate-to-gate ATM/CNS provision costs (M€)	85
Gate-to-gate total ATM/CNS assets(M€)	74
Gate-to-gate ANS total capex (M€)	7
ATCOs in OPS	235
Gate-to-gate total staff	644
Total IFR flight-hours controlled by ANSP ('000)	205
IFR airport movements controlled by ANSP ('000)	88
En-route sectors	10
Minutes of ATFM delays ('000)	164

Size (2014)

Size of controlled airspace: 158 000 km²

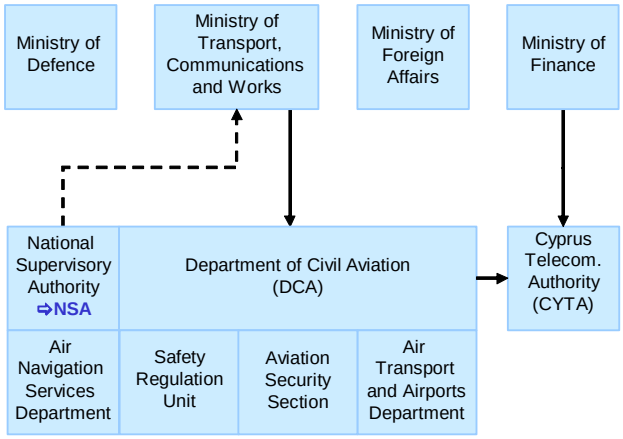


DCAC Cyprus, Cyprus

Department of Civil Aviation of Cyprus

www.mcw.gov.cy

Institutional arrangements and links (2016)



Status (2016)

- State body
- 100% State-owned

National Supervisory Authority (NSA):

Department of Civil Aviation

Body responsible for:

Safety Regulation

Department of Civil Aviation of Cyprus

Airspace Regulation

Department of Civil Aviation of Cyprus

Economic Regulation

Ministry of Finance

Corporate governance structure (2016)

Minister of Transport, Communications and Works

Director DCAC, Head of ANS Section, Head of T&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 also nominated by the Civil Service.

DCAC Cyprus (2016)

HEAD OF ANS SECTION (COO):

Nicos Nicolaou (ACC, Airspace, ATFM)
Persephone Papadopoulou (APPs, TWRs, AIS, Training)

ACTING HEAD OF AVIATION SECURITY SECTION:

Antonis Lemesianos

ACTING HEAD OF TRANSPORT AND AIRPORTS SECTION:

Antonis Lemesianos

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

- DCAC Cyprus owns and operates 2 airports

Operational ATS units (2014)

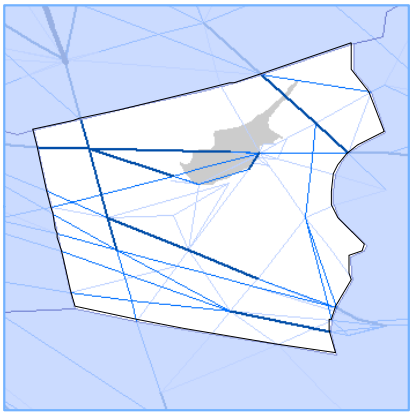
1 ACC (Nicosia)
2 APPs (Larnaca, Paphos)
2 TWRs (Larnaca, Paphos)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	60
Gate-to-gate total costs (M€)	56
Gate-to-gate ATM/CNS provision costs (M€)	39
Gate-to-gate total ATM/CNS assets(M€)	24
Gate-to-gate ANS total capex (M€)	1
ATCOs in OPS	86
Gate-to-gate total staff	197
Total IFR flight-hours controlled by ANSP ('000)	147
IFR airport movements controlled by ANSP ('000)	57
En-route sectors	5
Minutes of ATFM delays ('000)	585

Size (2014)

Size of controlled airspace: 174 000 km²

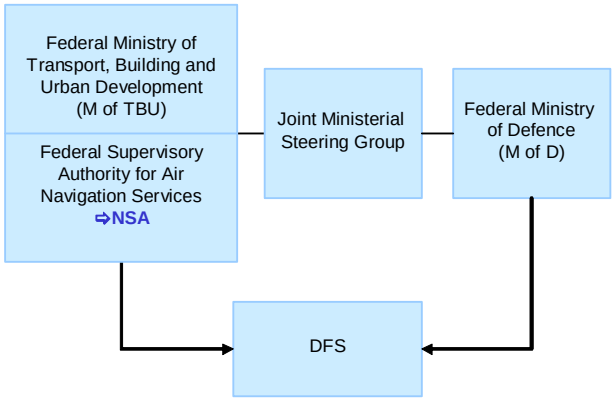


DFS, Germany

Deutsche Flugsicherung GmbH

www.dfs.de

Institutional arrangements and links (2016)



Status (2016)

- 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 (2016)

SHAREHOLDER Meeting with M of TBU

Supervisory Board (12 Members)
Chairman + 11 Members
Chairman is recommended by the Government, elected by the Supervisory Board.
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 (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Sts. Michael Odenwald

CHAIRMAN OF THE EXECUTIVE BOARD:

Prof. Klaus-Dieter Scheurle

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☐ MET

- DFS controls both upper and lower airspace, except GAT for the upper airspace in North-Western Gerrmany
- Other ANS
- Consulting, training, engineering & maintenance services

Operational ATS units (2014)

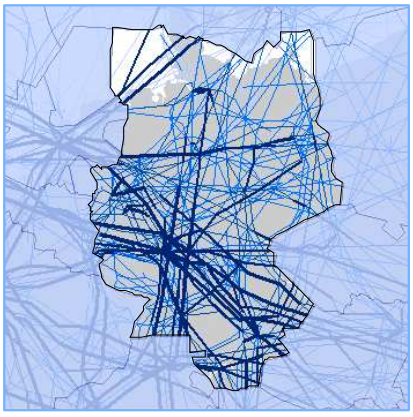
1 UAC (Karlsruhe)
3 ACCs/APPs (Bremen, Langen, München)
1 UAC (co-located with Maastricht UAC) for OAT in upper airspace in North-Western Germany
16 TWRs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	1 100
Gate-to-gate total costs (M€)	1 045
Gate-to-gate ATM/CNS provision costs (M€)	1 045
Gate-to-gate total ATM/CNS assets(M€)	694
Gate-to-gate ANS total capex (M€)	107
ATCOs in OPS	1 777
Gate-to-gate total staff	5 465
Total IFR flight-hours controlled by ANSP ('000)	1 362
IFR airport movements controlled by ANSP ('000)	1 948
En-route sectors	109
Minutes of ATFM delays ('000)	1 224

Size (2014)

Size of controlled airspace: 390 000 km²

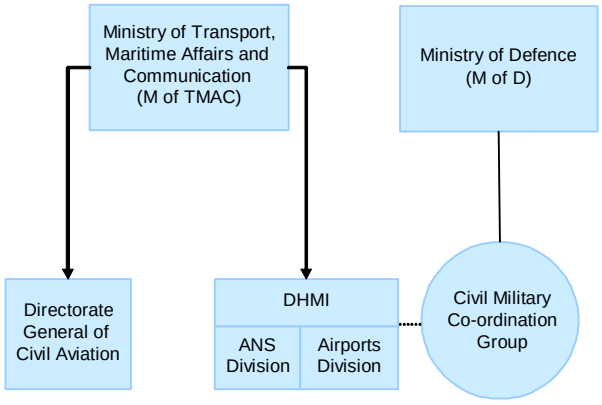


DHMI, Turkey

General Directorate of State Airports Authority

www.dhmi.gov.tr

Institutional arrangements and links (2016)



Status (2016)

- 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

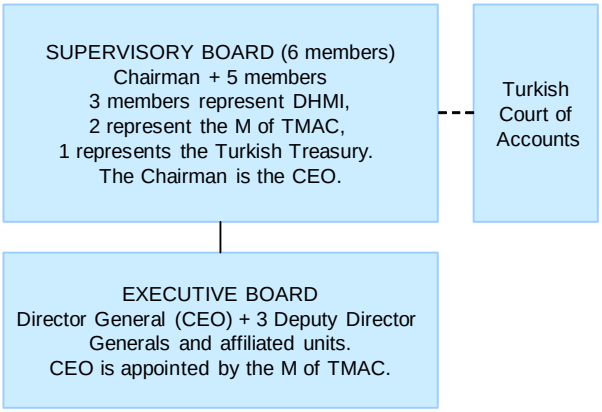
Airspace Regulation

General Directorate of DHMI

Economic Regulation

General Directorate of DHMI

Corporate governance structure (2016)



DHMI (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Mr. Orhan Birdal

DIRECTOR GENERAL (CEO):

Mr. Orhan Birdal

DIRECTOR ANS DIVISION:

Mr. Mustafa Kiliç

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

- DHMI is responsible for the administration of 47 State Airports. ATS services are provided by DHMI in 52 Airports

Operational ATS units (2014)

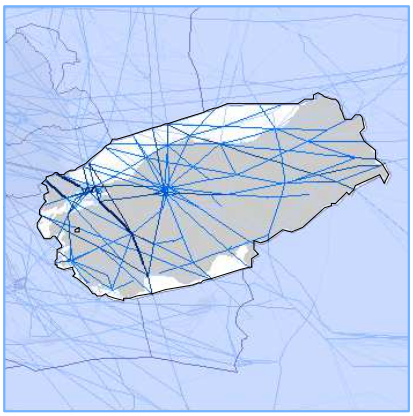
2 ACCs (Ankara, Istanbul)
34 APPs
44 TWRs
2 FICs/RCCs
46 AIS/ARO
44 SAR sub-center units

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	436
Gate-to-gate total costs (M€)	433
Gate-to-gate ATM/CNS provision costs (M€)	386
Gate-to-gate total ATM/CNS assets(M€)	651
Gate-to-gate ANS total capex (M€)	232
ATCOs in OPS	1 120
Gate-to-gate total staff	5 883
Total IFR flight-hours controlled by ANSP ('000)	1 195
IFR airport movements controlled by ANSP ('000)	1 173
En-route sectors	22
Minutes of ATFM delays ('000)	745

Size (2014)

Size of controlled airspace: 982 000 km²

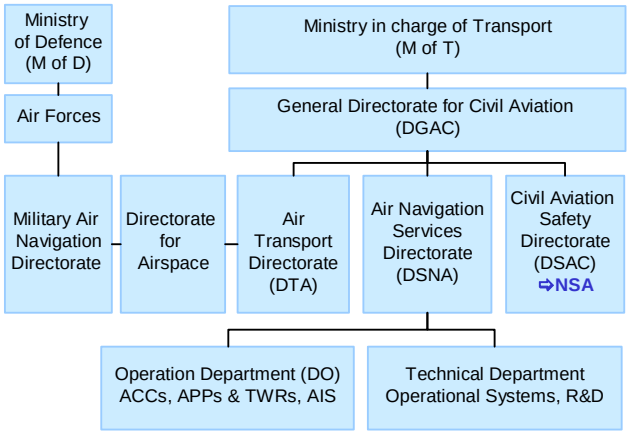


DSNA, France

Directorate of Air Navigation Services

www.aviation-civile.gouv.fr

Institutional arrangements and links (2016)



Status (2016)

- 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)

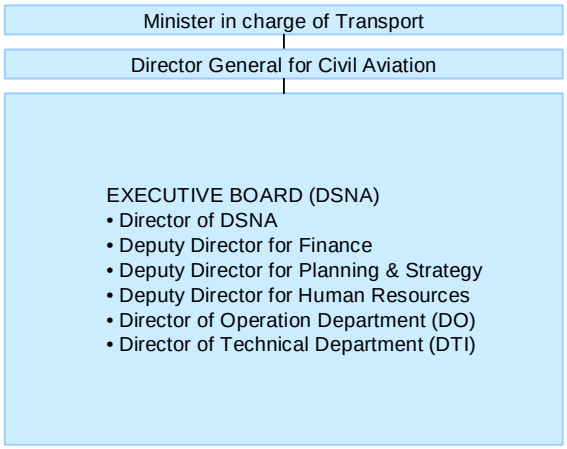
Airspace Regulation

Air Transport Directorate (DTA)
Direction de la circulation aérienne militaire (DIRCAM)

Economic Regulation

Air Transport Directorate (DTA)

Corporate governance structure (2016)



DSNA (2016)

DIRECTOR OF DSNA:

M. Georges

DIRECTOR OF OPERATION DEPARTEMENT (DO):

M. Bruneau

DIRECTOR OF TECHNICAL DEPARTEMENT (DTI):

P. Planchon

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

- Delegation of airspace to Skyguide and Jersey

Operational ATS units (2014)

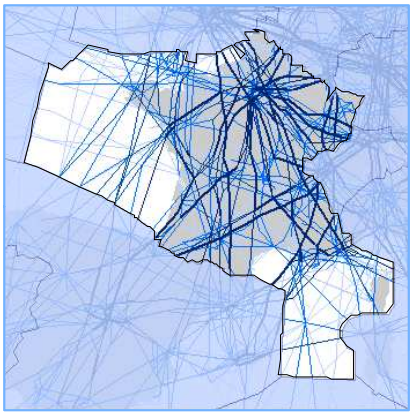
5 ACCs
12 APPs/TWRs (i.e. Paris Orly, Paris CDG, Marseille, Lyon, Nice, Bordeaux, Toulouse, Clermont Ferrand, Montpellier, Strasbourg, Bâle-Mulhouse, Nantes)
69 TWRs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	1 514
Gate-to-gate total costs (M€)	1 487
Gate-to-gate ATM/CNS provision costs (M€)	1 260
Gate-to-gate total ATM/CNS assets(M€)	n/a
Gate-to-gate ANS total capex (M€)	n/a
ATCOs in OPS	2 782
Gate-to-gate total staff	7 746
Total IFR flight-hours controlled by ANSP ('000)	2 154
IFR airport movements controlled by ANSP ('000)	1 821
En-route sectors	102
Minutes of ATFM delays ('000)	2 173

Size (2014)

Size of controlled airspace: 1 010 000 km²

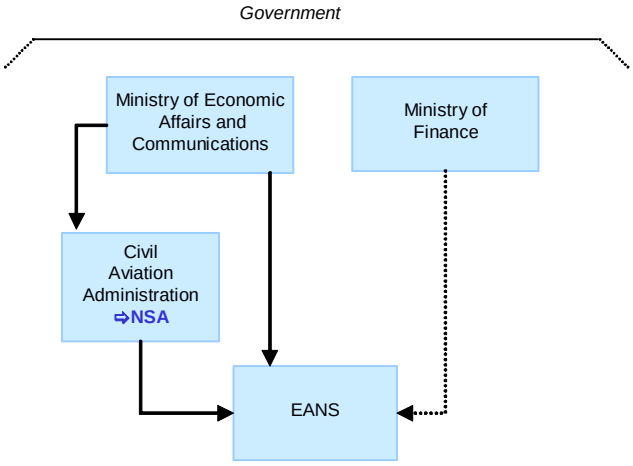


EANS, Estonia

Estonian Air Navigation Services

www.eans.ee

Institutional arrangements and links (2016)



Status (2016)

- Joint-stock company as of 1998
- 100% State-owned

National Supervisory Authority (NSA):

Civil Aviation Administration

Body responsible for:

Safety Regulation

Government of the Republic of Estonia
Safety Supervision is done by the Civil Aviation Administration (CAA)

Airspace Regulation

Government of the Republic of Estonia

Economic Regulation

Government of the Republic of Estonia
(Ministry of Economic Affairs and Communications & Ministry of Finance)

Corporate governance structure (2016)

SUPERVISORY BOARD (6 members)
Chairman + 5 members
Members: 3 appointed by M of EC of which 1 is elected Chairman by the members of the Supervisory Board;
3 appointed by M of F.

MANAGEMENT BOARD (3 members)
CEO + 2 members
CEO appointed by the Supervisory Board

EANS (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Andres Uusma

CHAIRMAN OF THE MANAGEMENT BOARD & CEO:

Tanel Rautits

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

- Tech. serv. (NAV/COMM/SUR), Aeronautical info serv.
- Consultancy services
- Control Tallinn Aerodrome
- Estonia is member of EUROCONTROL since 1st of January 2015

Operational ATS units (2014)

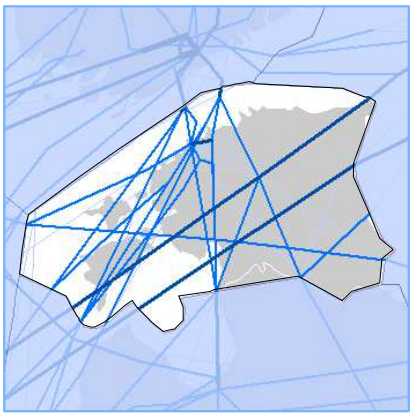
1 ACC (Tallinn)
2 APPs/TWRs (Tallinn, Tartu)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	20
Gate-to-gate total costs (M€)	16
Gate-to-gate ATM/CNS provision costs (M€)	16
Gate-to-gate total ATM/CNS assets(M€)	19
Gate-to-gate ANS total capex (M€)	3
ATCOs in OPS	52
Gate-to-gate total staff	163
Total IFR flight-hours controlled by ANSP ('000)	65
IFR airport movements controlled by ANSP ('000)	35
En-route sectors	3
Minutes of ATFM delays ('000)	6

Size (2014)

Size of controlled airspace: 77 102 km²

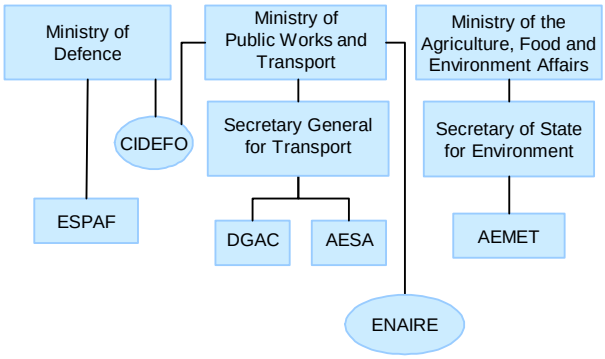


ENAIRE, Spain

ENAIRE

www.enaire.es

Institutional arrangements and links (2016)



Status (2016)

- 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

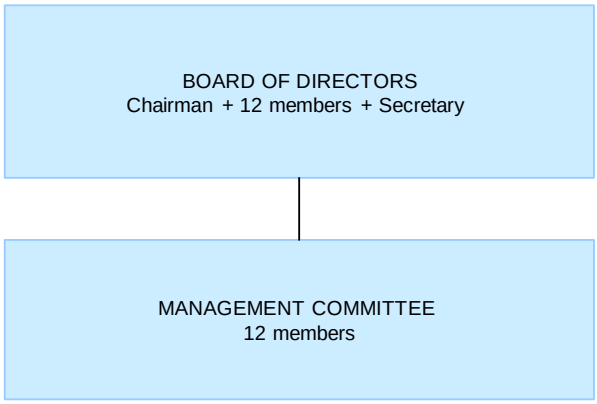
Airspace Regulation

Spanish Civil Aviation Authority - Government
AESA - Government

Economic Regulation

Government

Corporate governance structure (2016)



ENAIRE (2016)

CHAIRMAN OF THE BOARD OF DIRECTORS:

Julio Gómez Pomar-Rodríguez

DIRECTOR GENERAL OF ENAIRE:

Ángel Luis Arias Serrano

DIRECTOR OF AIR NAVIGATION:

Ignacio González Sánchez

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

Operational ATS units (2014)

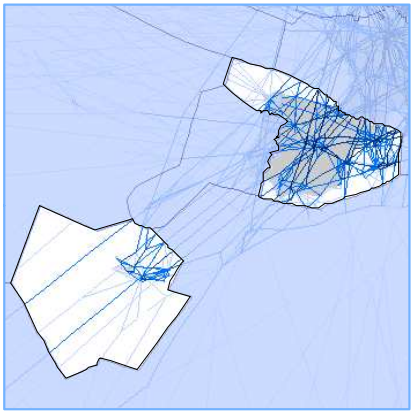
5 ACCs (Madrid, Barcelona, Canary Islands, Palma, Sevilla)
17 APPs (3 stand-alone APPs + 14 APPs co-located with TWR units)
22 TWRs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	879
Gate-to-gate total costs (M€)	877
Gate-to-gate ATM/CNS provision costs (M€)	776
Gate-to-gate total ATM/CNS assets(M€)	664
Gate-to-gate ANS total capex (M€)	45
ATCOs in OPS	1 779
Gate-to-gate total staff	3 682
Total IFR flight-hours controlled by ANSP ('000)	1 267
IFR airport movements controlled by ANSP ('000)	1 283
En-route sectors	68
Minutes of ATFM delays ('000)	693

Size (2014)

Size of controlled airspace: 2 190 000 km²

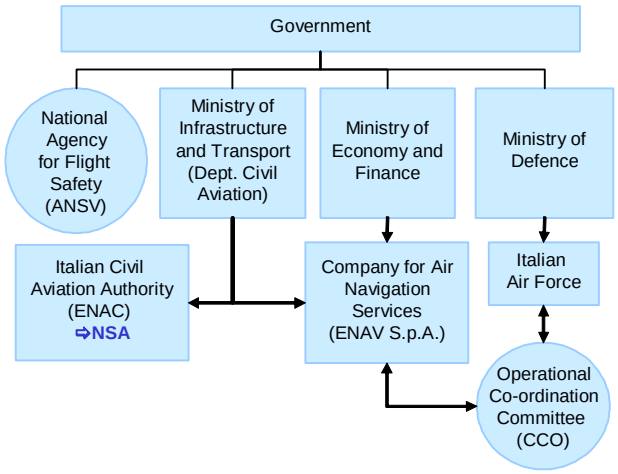


ENAV, Italy

Company for Air Navigation Services

www.enav.it

Institutional arrangements and links (2016)



Status (2016)

- 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 (2016)

ADMINISTRATION BOARD:

Chairman + CEO + 3 members

The Administration Board has been appointed by the Ministry of Economy in consultation with the Ministry of Transport.

Reciprocal obligations between the Ministry of Transport and ENAV are regulated through programme contract and service contract.

ENAV (2016)

CHAIRMAN:

Ferdinando Franco Falco Beccalli

CEO:

Roberta Neri

MEMBERS OF THE ADMINISTRATION BOARD:

Maria Teresa Di Matteo
Nicola Maione
Alessandro Tonett

DIRECTOR GENERAL:

Massimo Bellizzi

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☑ MET

- AIS, ATM and CNS
- Training and licensing of ATCO's
- R&D consultancy services
- Cartography and Airspace design
- Aerodrome weather services, Flight Calibration services

Operational ATS units (2014)

4 ACCs (Milan, Padua, Rome, Brindisi)
19 APPs co-located within TWR units + 5 APPs co-located within ACC units
30 TWRs (including 14 low traffic airports which are not included in ACE data analysis)
11 AFIUs (low traffic airports not included in ACE data analysis)

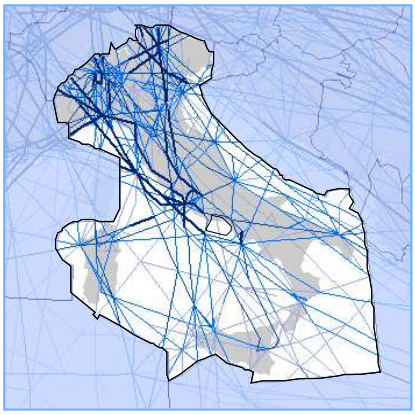
*data above reflects situation at the end of 2014

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	807
Gate-to-gate total costs (M€)	775
Gate-to-gate ATM/CNS provision costs (M€)	704
Gate-to-gate total ATM/CNS assets(M€)	971
Gate-to-gate ANS total capex (M€)	87
ATCOs in OPS	1 414
Gate-to-gate total staff	2 840
Total IFR flight-hours controlled by ANSP ('000)	1 016
IFR airport movements controlled by ANSP ('000)	1 176
En-route sectors	59
Minutes of ATFM delays ('000)	137

Size (2014)

Size of controlled airspace: 733 000 km²

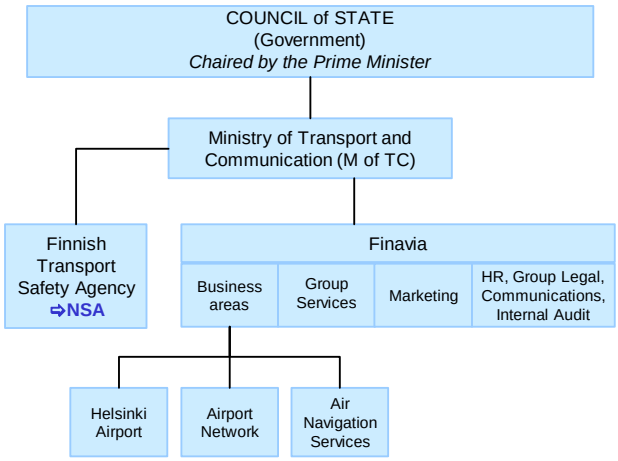


Finavia, Finland

Finavia

www.finavia.fi

Institutional arrangements and links (2016)



Status (2016)

- 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 (2016)

The BOARD (temporarily 4 members)
Chairman + 3 members (1 member represents staff)
All members are appointed
by the General Meeting of Shareholders.
Chief Executive Officer of Finavia is not a member of the Board.

President and CEO

Finavia (2016)

CHAIRMAN OF THE FINAVIA BOARD:

Harri Sailas (as of 21.12.2015)

PRESIDENT AND CEO:

Kari Savolainen

SENIOR VICE PRESIDENT - AIR NAVIGATION SERVICES:

Raine Luojus

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☐ MET

- Finavia owns and operates 25 airports
- Delegation of ATS in certain areas to LFV and Avinor
- 183 ATCOs in OPS reported below do not include those providing services to military OAT flights

Operational ATS units (2014)

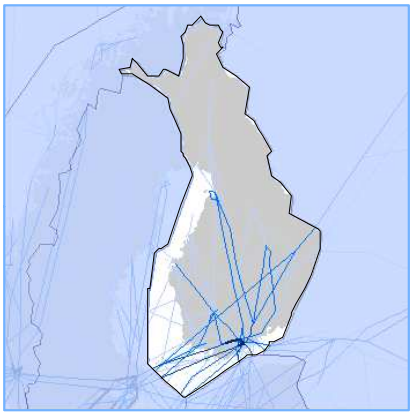
1 ACC (Tampere)
5 APPs/TWRs (Helsinki, Jyväskylä, Kuopio, Tampere-Pirkkala, Rovaniemi)
2 Mil-APPs/TWRs (Halli, Utti)
10 TWRs
1 General Aviation Airport (Malmi)
6 AFISs (Enontekiö, Kittilä, Kajaani, Savonlinna, Kuusamo, Varkaus)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	59
Gate-to-gate total costs (M€)	74
Gate-to-gate ATM/CNS provision costs (M€)	67
Gate-to-gate total ATM/CNS assets(M€)	44
Gate-to-gate ANS total capex (M€)	7
ATCOs in OPS	183
Gate-to-gate total staff	374
Total IFR flight-hours controlled by ANSP ('000)	108
IFR airport movements controlled by ANSP ('000)	236
En-route sectors	6
Minutes of ATFM delays ('000)	44

Size (2014)

Size of controlled airspace: 411 000 km²

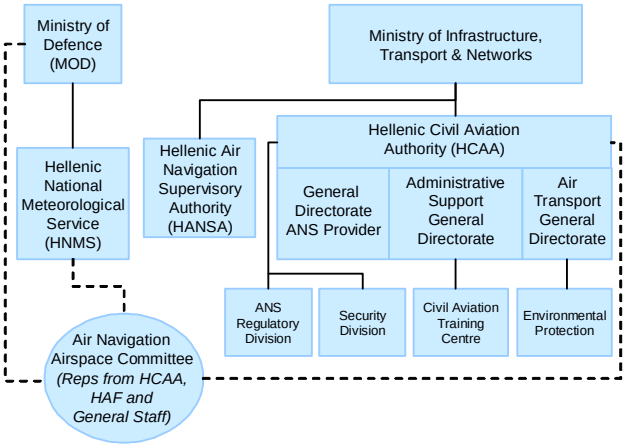


HCAA, Greece

Hellenic Civil Aviation Authority

www.hcaa.gr

Institutional arrangements and links (2016)



Status (2016)

- 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

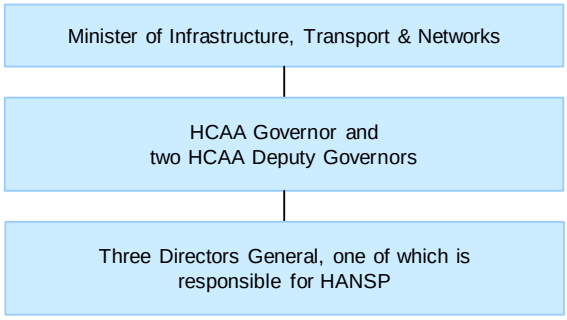
Air Navigation Airspace Committee

Economic Regulation

Ministry of Infrastructure, Transport & Networks and HCAA for charges

Ministry of Finance for HCAA Budget

Corporate governance structure (2016)



HCAA (2016)

GOVERNOR:

K. Lintzerakos

DIRECTOR GENERAL OF HANSP:

G. Kontogiannis

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

Operational ATS units (2014)

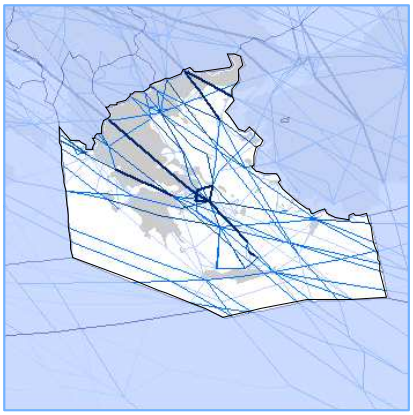
1 ACC
16 APPs
18 TWRs
15 AFISs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	170
Gate-to-gate total costs (M€)	170
Gate-to-gate ATM/CNS provision costs (M€)	151
Gate-to-gate total ATM/CNS assets(M€)	104
Gate-to-gate ANS total capex (M€)	n/a
ATCOs in OPS	496
Gate-to-gate total staff	1 660
Total IFR flight-hours controlled by ANSP ('000)	480
IFR airport movements controlled by ANSP ('000)	388
En-route sectors	12
Minutes of ATFM delays ('000)	509

Size (2014)

Size of controlled airspace: 538 000 km²



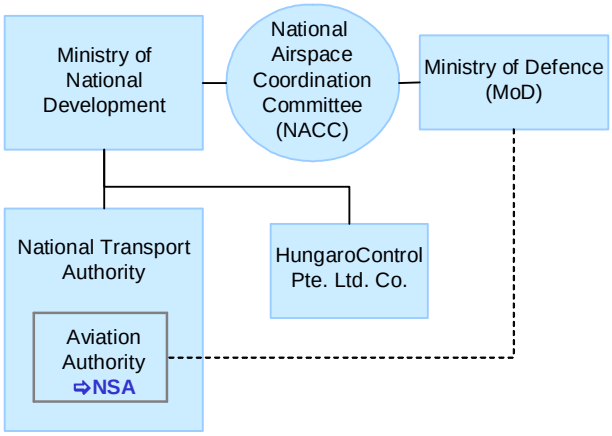
HungaroControl, Hungary

Hungarian Air Navigation Services

www.hungarocontrol.hu

HungaroControl
Hungarian Air Navigation Services Pte. Ltd. Co.

Institutional arrangements and links (2016)



Status (2016)

- 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 1st 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 (2016)

SHAREHOLDER
The Minister responsible for transport exercises the rights of the shareholder on behalf of the State

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

BOARD OF DIRECTORS
5 members including CEO
All members appointed by the Minister responsible for transport

CHIEF EXECUTIVE OFFICER
The CEO is appointed by the Minister responsible for transport

HungaroControl (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

dr. Alex Bozóky

CHAIRMAN OF THE BOARD OF DIRECTORS:

Attila Márton

CHIEF EXECUTIVE OFFICER (CEO):

Kornél Szepessy

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☑ MET

- Entry Point Central Ltd. (49% HungaroControl owned company) provides training activities.
- HungaroControl provides ATM unit training.
- From 3rd of April 2014 HungaroControl provides air traffic services in the KFOR sector.

Operational ATS units (2014)

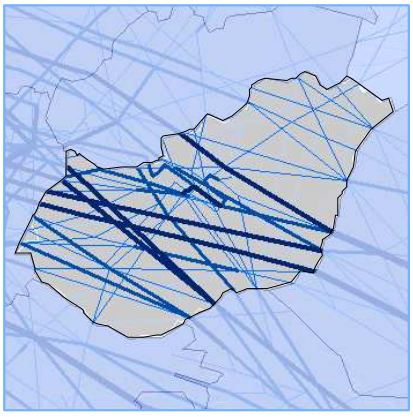
1 ACC (Budapest)
1 APP (Budapest)
1 TWR (Budapest)
8 AFISs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	129
Gate-to-gate total costs (M€)	98
Gate-to-gate ATM/CNS provision costs (M€)	88
Gate-to-gate total ATM/CNS assets(M€)	68
Gate-to-gate ANS total capex (M€)	20
ATCOs in OPS	173
Gate-to-gate total staff	703
Total IFR flight-hours controlled by ANSP ('000)	214
IFR airport movements controlled by ANSP ('000)	86
En-route sectors	9
Minutes of ATFM delays ('000)	1

Size (2014)

Size of controlled airspace: 104 000 km²

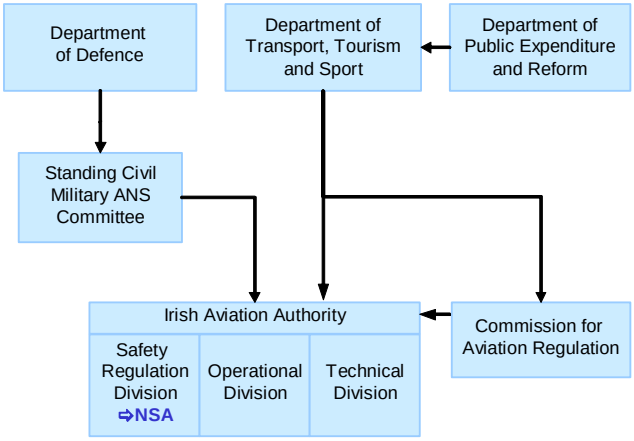


IAA, Ireland

Irish Aviation Authority

www.iaa.ie

Institutional arrangements and links (2016)



Status (2016)

- Commercial company as of 1994 governed by Companies Acts, 1963 to 2009
- 100% State-owned (Department of Public Expenditure and Reform) - 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 (2016)

BOARD OF THE AUTHORITY (9 members)
Chairman + CEO + 7 members

EXECUTIVE BOARD (Senior Management Board)
(8 members)
CEO + 7 senior executives

IAA (2016)

CHAIRMAN OF THE BOARD OF AUTHORITY:

Anne Nolan

CHIEF EXECUTIVE OFFICER:

Eamonn Brennan

DIRECTOR OF OPERATIONS DIVISION:

Peter Kearney

DIRECTOR OF TECHNICAL DIVISION:

Philip Hughes

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☑ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

Operational ATS units (2014)

2 ACCs (Dublin, Shannon)
3 APPs (Dublin, Shannon, Cork)
3 TWRs (Dublin, Shannon, Cork)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	146
Gate-to-gate total costs (M€)	128
Gate-to-gate ATM/CNS provision costs (M€)	109
Gate-to-gate total ATM/CNS assets(M€)	76
Gate-to-gate ANS total capex (M€)	5
ATCOs in OPS	204
Gate-to-gate total staff	430
Total IFR flight-hours controlled by ANSP ('000)	277
IFR airport movements controlled by ANSP ('000)	226
En-route sectors	12
Minutes of ATFM delays ('000)	4

Size (2014)

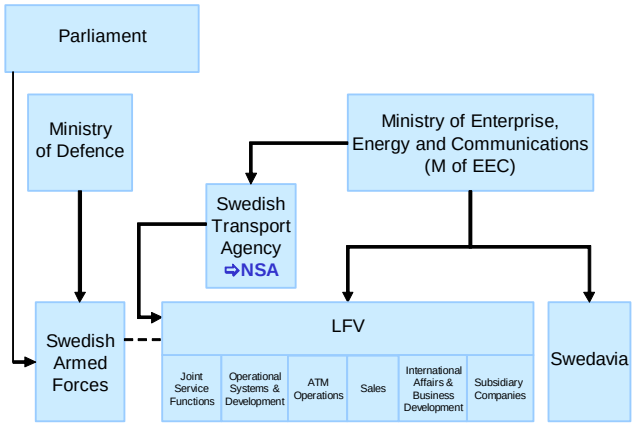
Size of controlled airspace: 481 000 km²

LFV, Sweden

LFV, Swedish Air Navigation Services

www.lfv.se

Institutional arrangements and links (2016)



Status (2016)

- Public Enterprise
- 100% State-owned

National Supervisory Authority (NSA):

Swedish Transport Agency

Body responsible for:

Safety Regulation

Swedish Transport Agency

Airspace Regulation

Swedish Transport Agency

Economic Regulation

Swedish Transport Agency

Corporate governance structure (2016)

BOARD OF DIRECTORS (10 members)
Chairman + DG + 8 members
8 members are appointed by the Government
(Chairman + DG + 6 members)
2 members appointed by Trade Unions

EXECUTIVE BOARD (11 members)
DG + 10 members
DG is appointed by the Government

LFV (2016)

CHAIRMAN OF THE BOARD OF DIRECTORS:

Jan Olson

DIRECTOR GENERAL:

Olle Sundin

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☑ MET

Operational ATS units (2014)

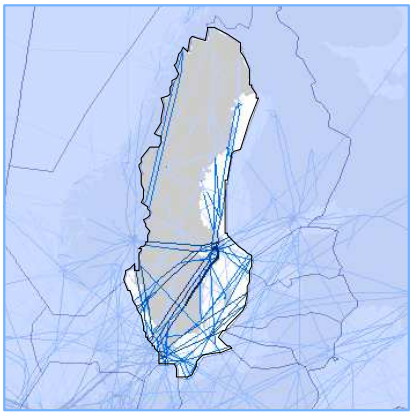
2 ACCs (Stockholm and Malmö)
25 APPs (2 combined with ACCs, 1 separate unit, 22 combined with TWRs)
25 TWRs
1 AFIS

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	266
Gate-to-gate total costs (M€)	189
Gate-to-gate ATM/CNS provision costs (M€)	186
Gate-to-gate total ATM/CNS assets(M€)	130
Gate-to-gate ANS total capex (M€)	15
ATCOs in OPS	470
Gate-to-gate total staff	998
Total IFR flight-hours controlled by ANSP ('000)	423
IFR airport movements controlled by ANSP ('000)	496
En-route sectors	22
Minutes of ATFM delays ('000)	67

Size (2014)

Size of controlled airspace: 626 000 km²

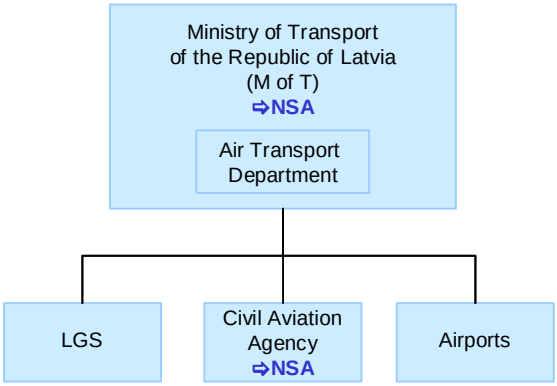


LGS, Latvia

SJSC Latvijas Gaisa Satiksme

www.lgs.lv

Institutional arrangements and links (2016)



Status (2016)

- Joint-stock company since 1997
- 100% State-owned (Ministry of Transport)

National Supervisory Authority (NSA):

- MoT (for policy and economic issues)
- Civil Aviation Agency (for safety, operational aspects, certification and licensing issues)

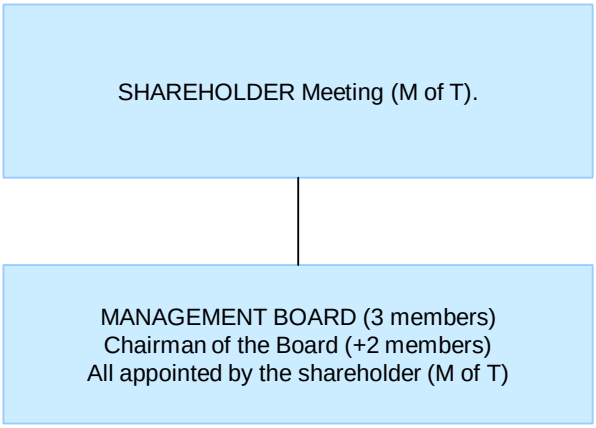
Body responsible for:

Safety Regulation
Civil Aviation Agency

Airspace Regulation
Civil Aviation Agency

Economic Regulation
Air Transport Department and Cabinet of Ministers (Government)

Corporate governance structure (2016)



LGS (2016)

SHAREHOLDER'S REPRESENTATIVE:
Dzineta Innusa (Ministry of Transport, Deputy State Secretary for Legal and Administrative Affairs)

CHAIRMAN OF THE BOARD:
Davids Taurins

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☑ MET

- ATC services delegated to Latvia by Lithuania over a part of the Baltic Sea

Operational ATS units (2014)

1 ACC (Riga)
2 APPs (Riga, Liepaja)
2 TWRs (Riga, Liepaja)
1 AFIS/FIC* (Liepaja)

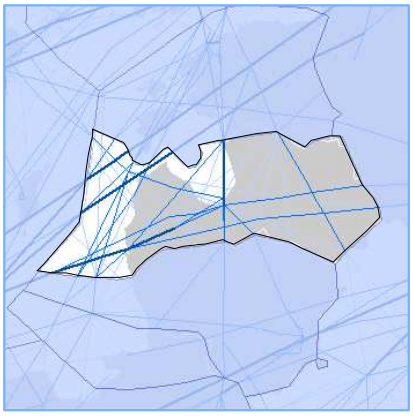
*FIC for western part of Riga FIR

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	25
Gate-to-gate total costs (M€)	26
Gate-to-gate ATM/CNS provision costs (M€)	22
Gate-to-gate total ATM/CNS assets(M€)	21
Gate-to-gate ANS total capex (M€)	5
ATCOs in OPS	93
Gate-to-gate total staff	350
Total IFR flight-hours controlled by ANSP ('000)	74
IFR airport movements controlled by ANSP ('000)	66
En-route sectors	4
Minutes of ATFM delays ('000)	0

Size (2014)

Size of controlled airspace: 95 600 km²

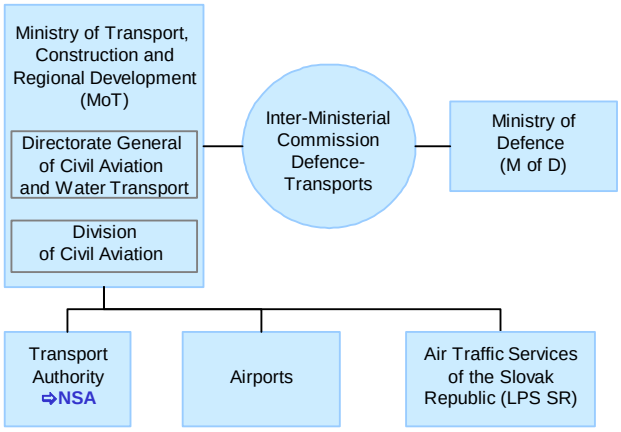


LPS, Slovak Republic

Letové Prevádzkové Služby Slovenskej Republiky

www.lps.sk

Institutional arrangements and links (2016)



Status (2016)

- State-owned enterprise as of January 2000
- 100% State-owned

National Supervisory Authority (NSA):

Transport 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 (2016)

SUPERVISORY BOARD (9 members)
Chairman + 8 members
Members represent: 5 MoT,
3 staff reps., 1 trade union association rep.

EXECUTIVE BOARD (10 members)
CEO + 9 members
The CEO is appointed by the MoT.

LPS (2016)

CHAIRPERSON OF THE SUPERVISORY BOARD:

Martin Čatloš

DIRECTOR GENERAL (CEO):

Miroslav Bartoš

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

Operational ATS units (2014)

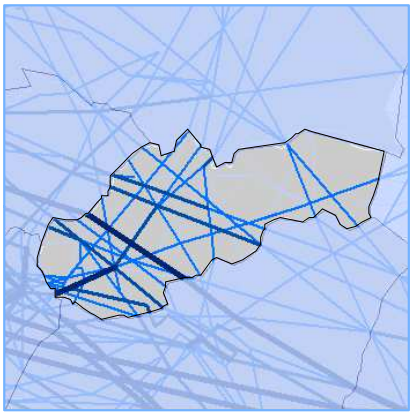
1 ACC (Bratislava)
2 APPs (Bratislava, Kosice)
5 TWRs (Bratislava, Kosice, Piestany, Poprad and Zilina)
1 Central ATS Reporting Office (Bratislava)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	69
Gate-to-gate total costs (M€)	66
Gate-to-gate ATM/CNS provision costs (M€)	59
Gate-to-gate total ATM/CNS assets(M€)	55
Gate-to-gate ANS total capex (M€)	4
ATCOs in OPS	82
Gate-to-gate total staff	474
Total IFR flight-hours controlled by ANSP ('000)	93
IFR airport movements controlled by ANSP ('000)	27
En-route sectors	5
Minutes of ATFM delays ('000)	61

Size (2014)

Size of controlled airspace: 48 700 km²

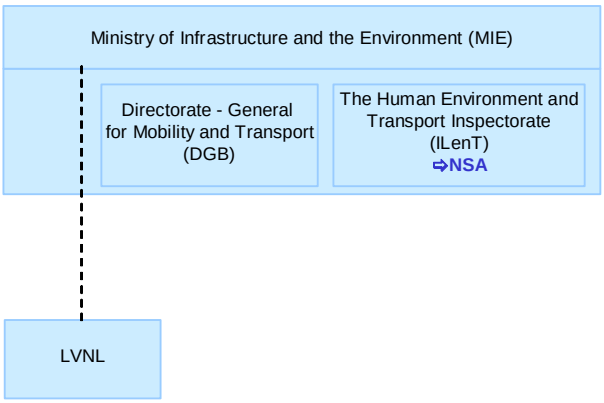


LVNL, Netherlands

Luchtverkeersleiding Nederland

www.lvnl.nl

Institutional arrangements and links (2016)



Status (2016)

- 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 Mobility and Transport (DGB)

Airspace Regulation

Directorate-General for Mobility and Transport (DGB)

Economic Regulation

Directorate-General for Mobility and Transport (DGB)

Corporate governance structure (2016)

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 (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

G.J.N.H. Cerfontaine

CHAIRMAN OF THE EXECUTIVE BOARD (CEO):

Dr.ir. P. Riemens (CEO)

Scope of services (2014)

☑ GAT	☐ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

- Controls lower airspace up to FL 245

Operational ATS units (2014)

1 ACC (Amsterdam)
3 APPs (Schiphol, Eelde, Beek)
4 TWRs (Schiphol, Rotterdam, Eelde, Beek)

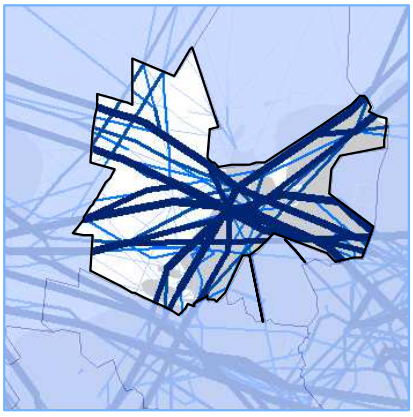
- New Millingen ACC (Military ACC) is not included in ACE data analysis
- Rotterdam APP has been located in Schiphol since 2002

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	191
Gate-to-gate total costs (M€)	186
Gate-to-gate ATM/CNS provision costs (M€)	172
Gate-to-gate total ATM/CNS assets(M€)	110
Gate-to-gate ANS total capex (M€)	5
ATCOs in OPS	178
Gate-to-gate total staff	851
Total IFR flight-hours controlled by ANSP ('000)	154
IFR airport movements controlled by ANSP ('000)	497
En-route sectors	5
Minutes of ATFM delays ('000)	495

Size (2014)

Size of controlled airspace: 53 000 km²

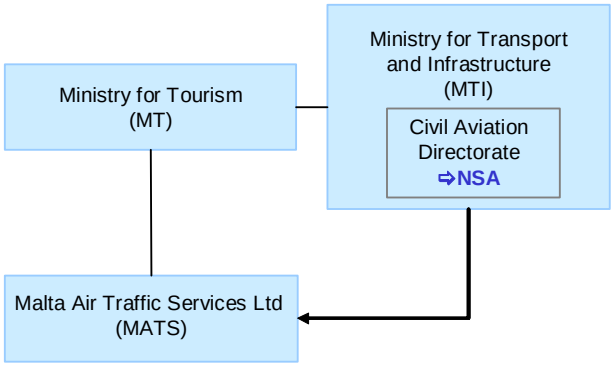


MATS, Malta

Malta Air Traffic Services Limited

www.maltats.com

Institutional arrangements and links (2016)



Status (2016)

- 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 (2016)

BOARD of DIRECTORS (5 members)
Chairman + 4 Directors
Members are appointed by the Government

The Board of Directors appoints the CEO

MATS (2016)

CHAIRMAN OF BOARD OF DIRECTORS:

Maj. Tony Abela

CEO:

Brig. Carmel Vassallo

HEAD OF ATS DIVISION:

Mr. Robert Sant

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

- MATS controls portions of airspace delegated to Malta ACC by Rome ACC

Operational ATS units (2014)

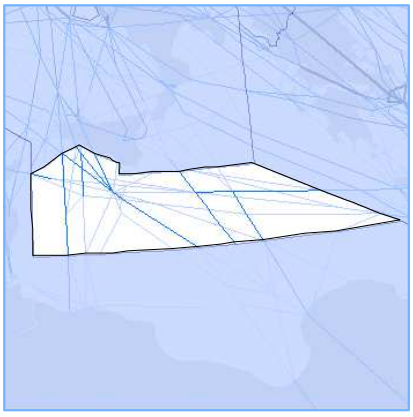
1 ACC/APP (Malta)
1 TWR/APP (Luqa)
1 AFIS

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	23
Gate-to-gate total costs (M€)	16
Gate-to-gate ATM/CNS provision costs (M€)	14
Gate-to-gate total ATM/CNS assets(M€)	13
Gate-to-gate ANS total capex (M€)	2
ATCOs in OPS	54
Gate-to-gate total staff	150
Total IFR flight-hours controlled by ANSP ('000)	68
IFR airport movements controlled by ANSP ('000)	38
En-route sectors	2
Minutes of ATFM delays ('000)	1

Size (2014)

Size of controlled airspace: 231 000 km²

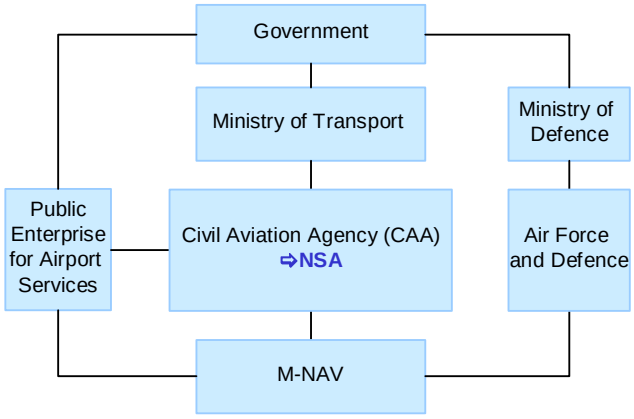


M-NAV, Former Yugoslav Republic of Macedonia

Air Navigation Services

www.mnavigation.mk

Institutional arrangements and links (2016)



Status (2016)

- 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

Civil-military Aviation Committee

Economic Regulation

Government, Civil Aviation Agency

Corporate governance structure (2016)

SUPERVISORY BOARD
(3 members appointed by the Government)

MANAGEMENT BOARD
(3 executive directors appointed by the Government)

M-NAV (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Ilir Mehmedi

DIRECTOR GENERAL OF CAA:

Goran Jandreoski

DIRECTOR OF ANS DEPARTEMENT:

Nikolet Tagarinski

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☑ MET

Operational ATS units (2014)

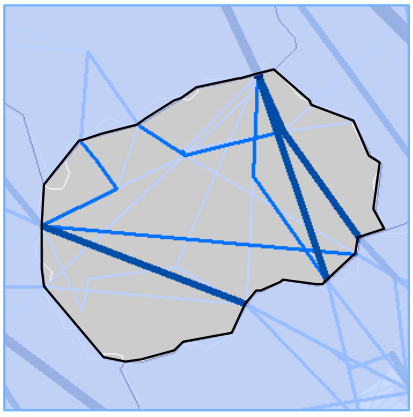
1 ACC (Skopje)
2 APPs (Skopje and Ohrid)
2 TWRs (Skopje and Ohrid)
1 AFIS (Skopje)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	14
Gate-to-gate total costs (M€)	13
Gate-to-gate ATM/CNS provision costs (M€)	12
Gate-to-gate total ATM/CNS assets(M€)	7
Gate-to-gate ANS total capex (M€)	0
ATCOs in OPS	65
Gate-to-gate total staff	254
Total IFR flight-hours controlled by ANSP ('000)	24
IFR airport movements controlled by ANSP ('000)	14
En-route sectors	3
Minutes of ATFM delays ('000)	1

Size (2014)

Size of controlled airspace: 24 700 km²

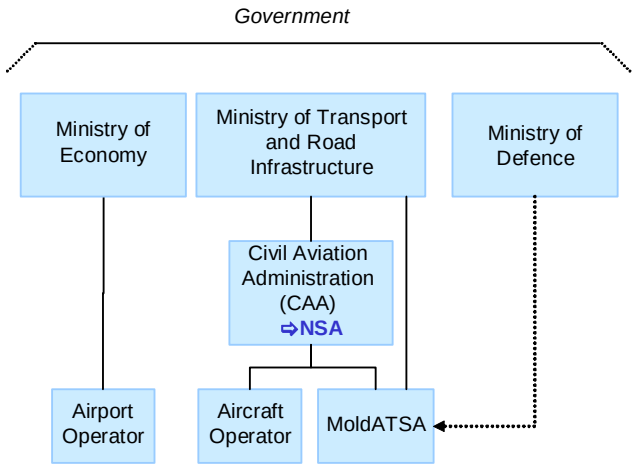


MoldATSA, Moldova

Moldavian Air Traffic Services Authority

www.moldatsa.md

Institutional arrangements and links (2016)



Status (2016)

- 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 (2016)

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 (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Mr. Vitalie Rapcea

DIRECTOR GENERAL (CEO):

Mr. Vadim Gugea

HEAD OF ATM DIVISION:

Mr. Sergei Fedoseev

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☑ MET

Operational ATS units (2014)

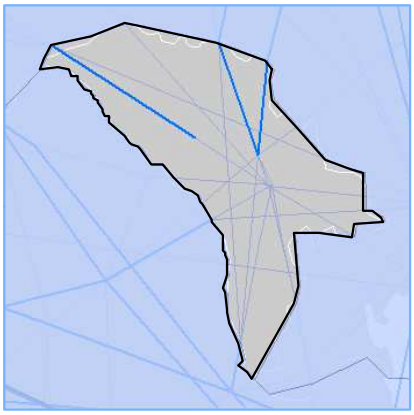
1 ACC (Chisinau)
1 APP (Chisinau)
4 TWRs (Chisinau, Balti, Cahul, Marculesti)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	8
Gate-to-gate total costs (M€)	11
Gate-to-gate ATM/CNS provision costs (M€)	10
Gate-to-gate total ATM/CNS assets(M€)	8
Gate-to-gate ANS total capex (M€)	2
ATCOs in OPS	73
Gate-to-gate total staff	309
Total IFR flight-hours controlled by ANSP ('000)	13
IFR airport movements controlled by ANSP ('000)	19
En-route sectors	2
Minutes of ATFM delays ('000)	0

Size (2014)

Size of controlled airspace: 34 800 km²



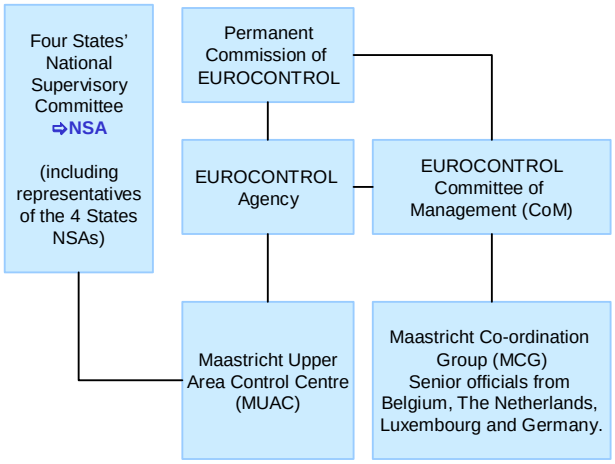
MUAC, Maastricht

Maastricht Upper Area Control Centre

www.eurocontrol.int

EUROCONTROL

Institutional arrangements and links (2016)



Status (2016)

- 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

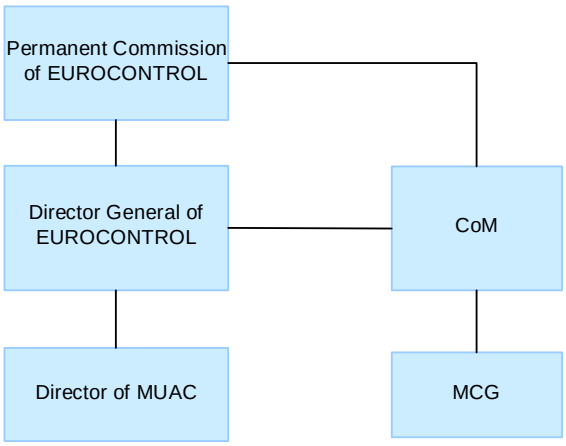
Airspace Regulation

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 (2016)



MUAC (2016)

DIRECTOR GENERAL OF EUROCONTROL:

Frank Brenner

DIRECTOR OF MUAC:

Jac Jansen

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☐ Lower Airspace	☐ 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

Operational ATS units (2014)

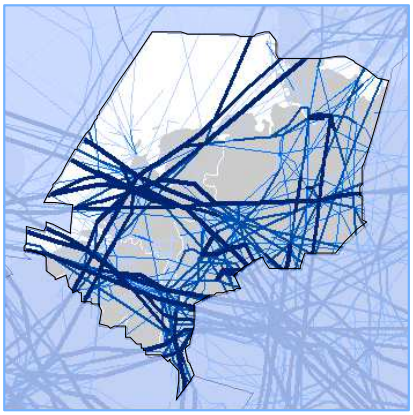
1 ACC (Maastricht)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	
Gate-to-gate total costs (M€)	145
Gate-to-gate ATM/CNS provision costs (M€)	145
Gate-to-gate total ATM/CNS assets(M€)	67
Gate-to-gate ANS total capex (M€)	5
ATCOs in OPS	268
Gate-to-gate total staff	586
Total IFR flight-hours controlled by ANSP ('000)	587
IFR airport movements controlled by ANSP ('000)	n/appl
En-route sectors	20
Minutes of ATFM delays ('000)	281

Size (2014)

Size of controlled airspace: 260 000 km²

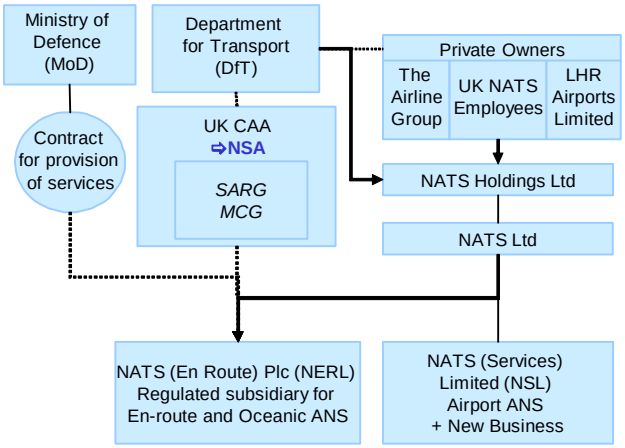


NATS, United Kingdom

NATS Ltd

www.nats.aero

Institutional arrangements and links (2016)



Status (2016)

- Public Private Partnership as of 2001
  - 49% State-owned (Govt retains a Golden Share)
  - 51% private-owned (42% by the Airline Group, 4% by LHR Airports Limited and 5% by UK NATS employees)
- The Airline Group comprises 8 airlines: BA, Virgin Atlantic, Lufthansa, EasyJet, Thomas Cook, Thomson Airways, Monarch Airlines and USS Sherwood Limited.

National Supervisory Authority (NSA):

UK CAA

Body responsible for:

Safety Regulation

UK CAA, Safety and Airspace Regulation Group (SARG)

Airspace Regulation

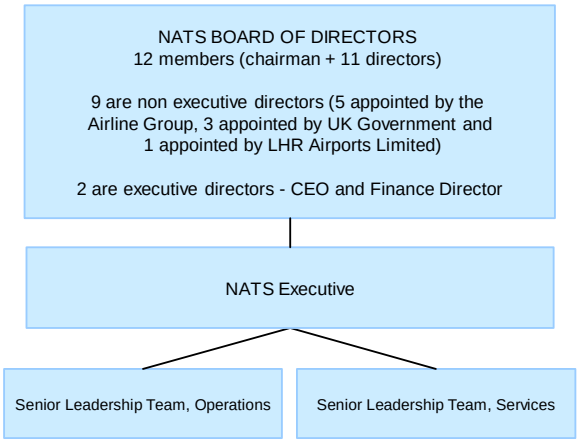
UK CAA, Safety and Airspace Regulation Group (SARG)

Economic Regulation

UK CAA, Markets and Consumers Group (MCG).

Charges control in RP2 linked to CPI (formerly RPI in CP3/PR1)

Corporate governance structure (2016)



NATS (2016)

CHAIRMAN OF THE NATS BOARD:

Paul Golby

CEO of NATS:

Martin Rolfe

OPERATIONS DIRECTOR:

Juliet Kennedy

COMMERCIAL DIRECTOR:

Guy Adams

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☑ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

Operational ATS units (2014)

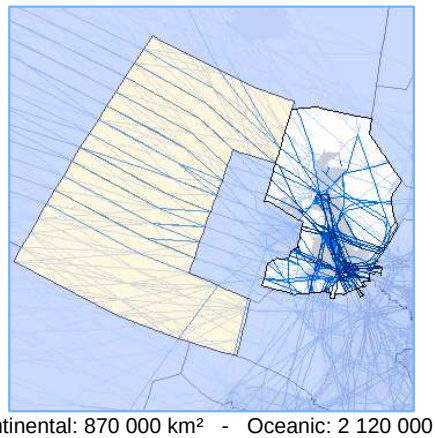
1 OAC (Shanwick)
3 ACCs (London AC, London TC, Prestwick)
16 APPs
16 TWRs (including Gibraltar TWR)
2 AFISs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	1 014
Gate-to-gate total costs (M€)	789
Gate-to-gate ATM/CNS provision costs (M€)	778
Gate-to-gate total ATM/CNS assets(M€)	1 044
Gate-to-gate ANS total capex (M€)	148
ATCOs in OPS	1 415
Gate-to-gate total staff	4 069
Total IFR flight-hours controlled by ANSP ('000)	1 309
IFR airport movements controlled by ANSP ('000)	1 772
En-route sectors	64
Minutes of ATFM delays ('000)	754

Size (2014)

Size of controlled airspace: 870 000 km²



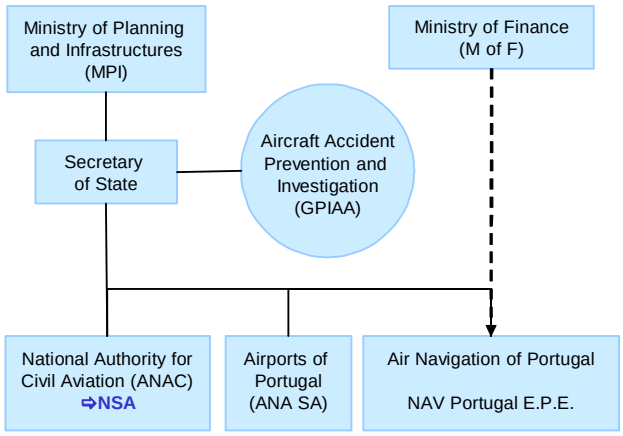
Continental: 870 000 km² - Oceanic: 2 120 000 km²

NAV Portugal, Portugal

Navegação Aérea de Portugal - NAV Portugal, E.P.E.

www.nav.pt

Institutional arrangements and links (2016)



Status (2016)

- Public Entity Corporation as of December 1998
- 100% State-owned

National Supervisory Authority (NSA):

National Authority for Civil Aviation (ANAC)

Body responsible for:

Safety Regulation

National Authority for Civil Aviation (ANAC)

Airspace Regulation

ANAC+FA (Portuguese Air Force) + NAV Portugal in close permanent co-ordination

Economic Regulation

National Authority for Civil Aviation (ANAC)

Corporate governance structure (2016)

BOARD OF ADMINISTRATION (2 members)
Chairman + 1 member

All members are appointed by the MPI for a 3 year term. Each member has executive functions within NAV Portugal. Each member is responsible to supervise several Directorates and Advisory Bodies to the Board.

There are 7 Directorates and 3 Advisory Bodies.

NAV Portugal has also a Board of Auditors composed of 3 members who are appointed by MPI for a 3 year term.

NAV Portugal (2016)

CHAIRMAN OF THE BOARD OF ADMINISTRATION:

Luis Ottolini Coimbra

CEO:

Luis Ottolini Coimbra

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☑ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

Operational ATS units (2014)

2 ACCs (Lisboa, Santa Maria)
8 APPs (Lisboa, Porto, Faro, Madeira, Santa Maria, Ponta Delgada, Horta, Flores)
10 TWRs (Lisboa, Cascais, Porto, Faro, Funchal, Porto Santo, Ponta Delgada, Santa Maria, Horta, Flores)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	145
Gate-to-gate total costs (M€)	130
Gate-to-gate ATM/CNS provision costs (M€)	112
Gate-to-gate total ATM/CNS assets(M€)	41
Gate-to-gate ANS total capex (M€)	8
ATCOs in OPS	220
Gate-to-gate total staff	704
Total IFR flight-hours controlled by ANSP ('000)	339
IFR airport movements controlled by ANSP ('000)	292
En-route sectors	8
Minutes of ATFM delays ('000)	321

Size (2014)

Size of controlled airspace: 671 000 km²

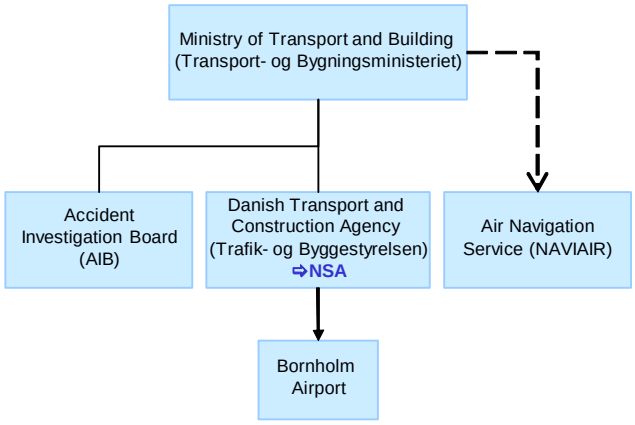
Continental: 671 000 km² - Oceanic: 5 180 000 km²

NAVIAIR, Denmark

Air Navigation Services

www.naviair.dk

Institutional arrangements and links (2016)



Status (2016)

- Company owned by the state
- 100% State-owned

National Supervisory Authority (NSA):

Danish Transport and Construction Agency (Trafik- og Byggestyrelsen)

Body responsible for:

Safety Regulation

Danish Transport and Construction Agency (Trafik- og Byggestyrelsen)

Airspace Regulation

Danish Transport and Construction Agency (Trafik- og Byggestyrelsen)

Economic Regulation

Danish Transport and Construction Agency (Trafik- og Byggestyrelsen)

Corporate governance structure (2016)

BOARD OF DIRECTORS
1 Chairman + 8 Members
(three members elected by the employees)

EXECUTIVE BOARD (2 members)
CEO + CFO
The CEO and CFO are appointed by the Board of Directors.

NAVIAIR (2016)

CHAIRMAN OF BOARD OF DIRECTORS

Anne Birgitte Lundholt

CHIEF EXECUTIVE OFFICER (CEO):

Morten Dambæk

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☐ MET

Note: ANS Greenland upper airspace is delegated to Isavia and NAV Canada

Operational ATS units (2014)

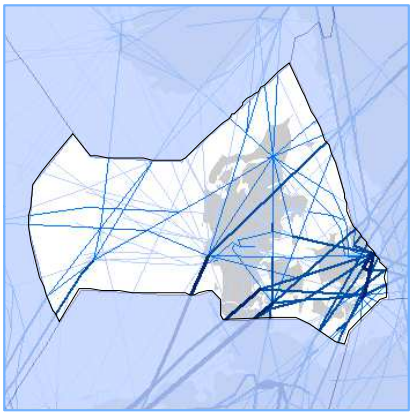
(Excluding Greenland)
1 ACC (Copenhagen)
6 APPs/TWRs (Kastrup, Roskilde, Rønne, Billund, Aarhus, Aalborg)
1 APP co-located with ACC
1 AFIS (Vagar)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	127
Gate-to-gate total costs (M€)	108
Gate-to-gate ATM/CNS provision costs (M€)	108
Gate-to-gate total ATM/CNS assets(M€)	147
Gate-to-gate ANS total capex (M€)	12
ATCOs in OPS	214
Gate-to-gate total staff	618
Total IFR flight-hours controlled by ANSP ('000)	210
IFR airport movements controlled by ANSP ('000)	333
En-route sectors	7
Minutes of ATFM delays ('000)	5

Size (2014)

Size of controlled airspace: 158 000 km²

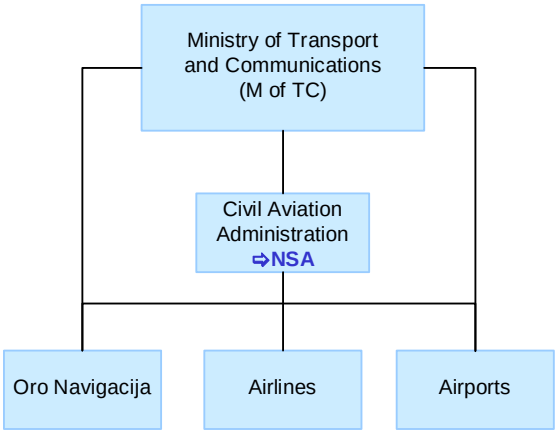


Oro Navigacija, Lithuania

State Enterprise Oro Navigacija

www.ans.lt

Institutional arrangements and links (2016)



Status (2016)

- 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 (2016)

MANAGEMENT BOARD (5 members)
Chairman
2 members represent M of TC
2 independent members

No Supervisory Board

DG is appointed by the Minister.

Oro Navigacija (2016)

CHAIRMAN OF THE MANAGEMENT BOARD:

Arijandas Šliupas

DIRECTOR GENERAL (CEO):

Algimantas Raščius

DIRECTOR ATM:

Sergej Smirnov

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

- Air Navigation Services are delegated to LGS (Latvia) above some part of the Baltic sea

Operational ATS units (2014)

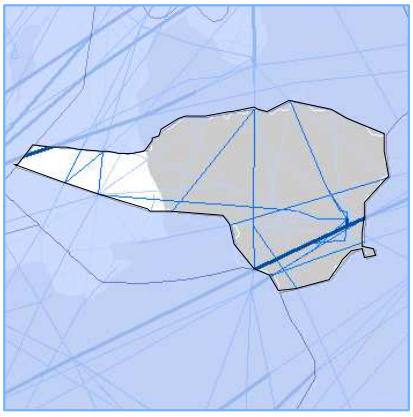
1 ACC (Vilnius)
3 APPs
4 TWRs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	28
Gate-to-gate total costs (M€)	27
Gate-to-gate ATM/CNS provision costs (M€)	25
Gate-to-gate total ATM/CNS assets(M€)	26
Gate-to-gate ANS total capex (M€)	2
ATCOs in OPS	87
Gate-to-gate total staff	291
Total IFR flight-hours controlled by ANSP ('000)	53
IFR airport movements controlled by ANSP ('000)	48
En-route sectors	3
Minutes of ATFM delays ('000)	0

Size (2014)

Size of controlled airspace: 74 600 km²

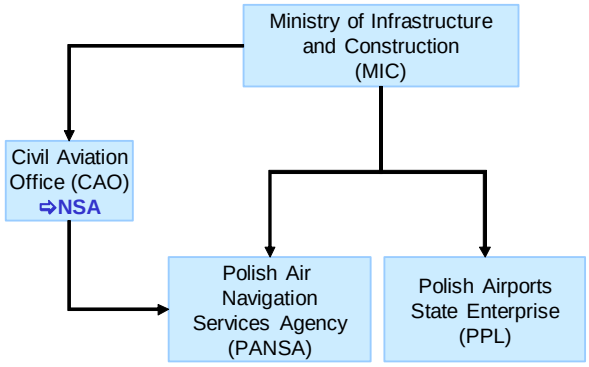


PANSA, Poland

Polish Air Navigation Services Agency (PANSA)

www.pansa.pl

Institutional arrangements and links (2016)



Status (2016)

- 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 (2016)

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 MIC

PANSA (2016)

ACTING PRESIDENT OF PANSA:

Magdalena Jaworska

VICE PRESIDENT- AIR NAVIGATION DEPARTMENT:

Maciej Rodak

VICE PRESIDENT - FINANCE AND ADMINISTRATION DEPARTMENT:

Magdalena Jaworska

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☐ MET

- APP Kraków provides ATC services for Kraków and Katowice
- Katowice TWR provides aerodrome control
- APP Poznań provides ATC services for Poznań and Wrocław
- Wrocław TWR provides aerodrome control

Operational ATS units (2014)

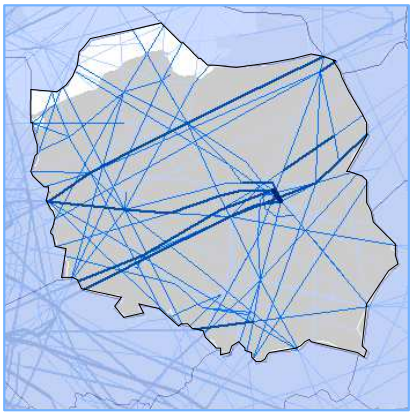
1 ACC with 9 sectors
4 APPs (Warszawa, Gdańsk, Kraków, Poznań) providing radar control
7 TWRs (Warszawa Chopin and Modlin, Gdańsk, Kraków, Poznań, Katowice, Wrocław) providing aeodrome control
6 TWRs (Lublin, Szczecin, Rzeszów, Łódź, Zielona Góra, Bydgoszcz) providing aeodrome control and non-radar approach control
4 FIS units (Warszawa, Kraków, Gdańsk, Poznań)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	166
Gate-to-gate total costs (M€)	188
Gate-to-gate ATM/CNS provision costs (M€)	167
Gate-to-gate total ATM/CNS assets(M€)	159
Gate-to-gate ANS total capex (M€)	25
ATCOs in OPS	482
Gate-to-gate total staff	1 775
Total IFR flight-hours controlled by ANSP ('000)	409
IFR airport movements controlled by ANSP ('000)	317
En-route sectors	9
Minutes of ATFM delays ('000)	571

Size (2014)

Size of controlled airspace: 334 000 km²

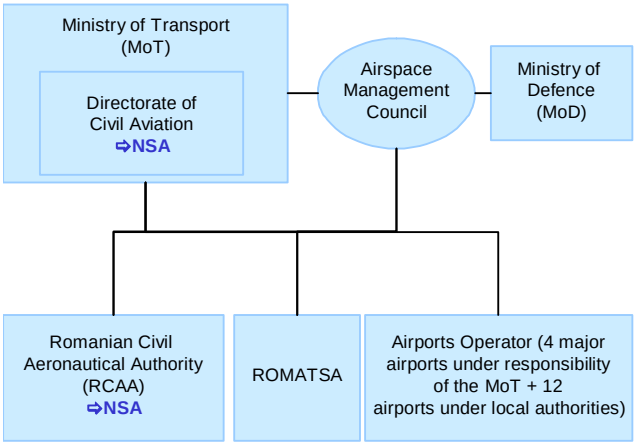


ROMATSA, Romania

Romanian Air Traffic Services Administration

www.romatsa.ro

Institutional arrangements and links (2016)



Status (2016)

- Autonomous and self-financing organisation as of 1991 (Government Resolution GR74/1991 ammended by GR731/1992, GR75/2005, GR1090/2006, GR1251/2007, GR741/2008)
- 100% State-owned

National Supervisory Authority (NSA):

- Directorate of Civil Aviation
- Romanian Civil Aeronautical Authority (RCAA)

Body responsible for:

Safety Regulation

Ministry of Transport (MoT)
Enforcement and safety oversight is delegated and discharged through the RCAA

Airspace Regulation

Both Ministry of Transport (MoT) and Ministry of Defence (MoD), and discharged through the RCAA and Air Force Staff

Economic Regulation

Ministry of Transport (MoT)

Corporate governance structure (2016)

ADMINISTRATION BOARD (7 voting members)
Chairman + 6 members
Members represent: MoT (3 members), MoF (1 member), Financial Supervisory Authority (1 member), S.C. AVIATIA UTILITARA BUCURESTI S.A (1 member) and Bucharest Airports (1 member) + additional non-voting participants representing staff

STEERING COMMITTEE

DG + other directors

ROMATSA (2016)

CHAIRMAN OF THE ADMINISTRATION BOARD:

Petre Neacșa

DIRECTOR GENERAL (CEO):

Cârnu Fănică

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☑ MET

Operational ATS units (2014)

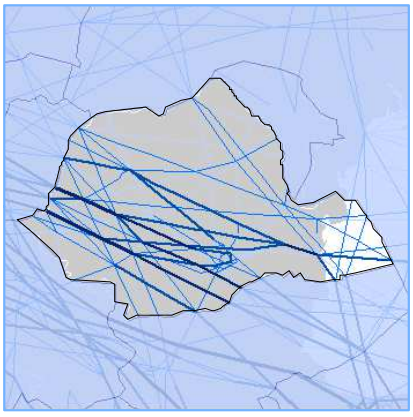
1 ACC (Bucharest)
3 APPs
16 TWRs

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	190
Gate-to-gate total costs (M€)	185
Gate-to-gate ATM/CNS provision costs (M€)	164
Gate-to-gate total ATM/CNS assets(M€)	91
Gate-to-gate ANS total capex (M€)	18
ATCOs in OPS	448
Gate-to-gate total staff	1 421
Total IFR flight-hours controlled by ANSP ('000)	328
IFR airport movements controlled by ANSP ('000)	142
En-route sectors	11
Minutes of ATFM delays ('000)	0

Size (2014)

Size of controlled airspace: 254 000 km²

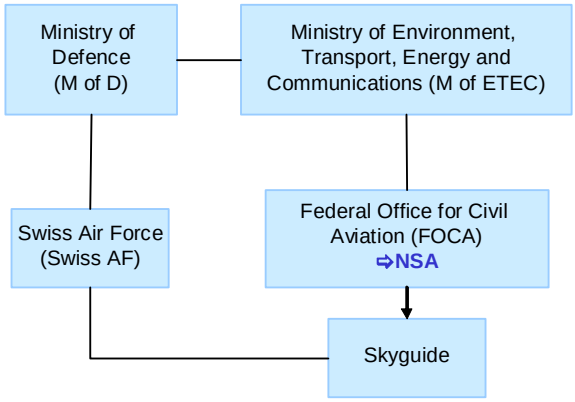


Skyguide, Switzerland

Skyguide

www.skyguide.ch

Institutional arrangements and links (2016)



Status (2016)

- 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 (2016)

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 (7 members)
CEO + 6 members
The CEO is appointed by the Supervisory Board.

Skyguide (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Walter T. Vogel

DIRECTOR GENERAL (CEO):

Daniel Weder

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☐ MET

- ATC services delegated to Geneva ACC by France

Operational ATS units (2014)

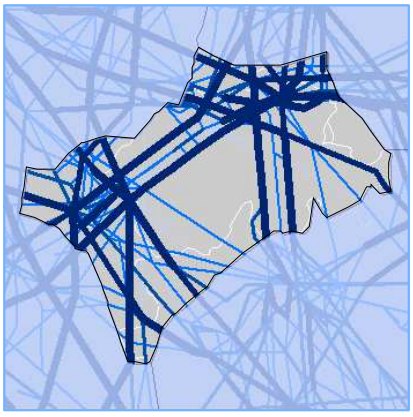
2 ACCs (Geneva, Zurich)
4 APPs (Geneva, Zurich, Lugano, Bern)
7 TWRs (Geneva, Zurich, Lugano, Bern, Buochs, Altenrhein, Grenchen)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	331
Gate-to-gate total costs (M€)	321
Gate-to-gate ATM/CNS provision costs (M€)	298
Gate-to-gate total ATM/CNS assets(M€)	301
Gate-to-gate ANS total capex (M€)	48
ATCOs in OPS	362
Gate-to-gate total staff	1 347
Total IFR flight-hours controlled by ANSP ('000)	323
IFR airport movements controlled by ANSP ('000)	481
En-route sectors	18
Minutes of ATFM delays ('000)	611

Size (2014)

Size of controlled airspace: 42 800 km²

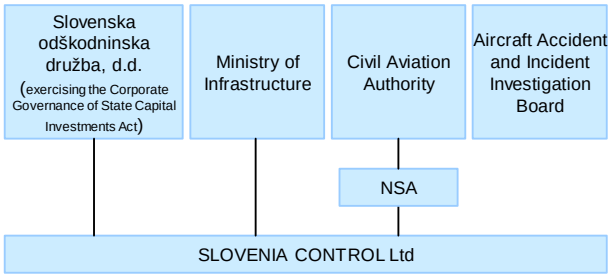


SLOVENIA CONTROL, Slovenia

Slovenia Control Ltd

www.sloveniacontrol.si

Institutional arrangements and links (2016)



Status (2016)

- Since 2004 the SLOVENIA CONTROL, Slovenian Air Navigation Services, Ltd, as a 100% state-owned enterprise is independent of national supervisory authorities.

National Supervisory Authority (NSA):

Civil Aviation Authority

Body responsible for:

Safety Regulation

Ministry of Infrastructure and Spatial Planning

Airspace Regulation

Ministry of Infrastructure and Spatial Planning

Economic Regulation

Slovenska odškodninska družba, d.d. (exercising the Corporate Governance of State Capital Investments Act)

Corporate governance structure (2016)

Supervisory Board
Chairman (elected) + 3 members appointed by the Slovenska odškodninska družba, d.d. + 2 staff reps. appointed by "employees board"

Director General (CEO) of SLOVENIA CONTROL Ltd

SLOVENIA CONTROL (2016)

CHAIRMAN OF THE SUPERVISORY BOARD:

Dušan Hočevar

DIRECTOR GENERAL (CEO):

Franc Željko Županič, Ph.D.

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☐ MET

Operational ATS units (2014)

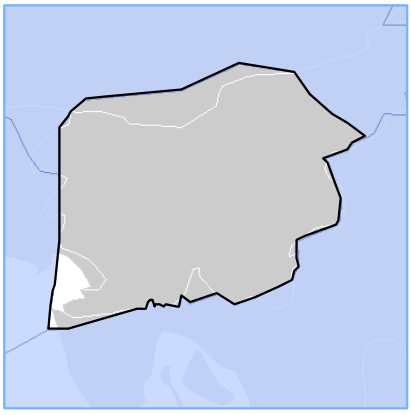
1 ACC (Ljubljana)
3 APPs (Ljubljana, Maribor, Portorož)
3 TWRs (Ljubljana, Maribor, Portorož)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	36
Gate-to-gate total costs (M€)	34
Gate-to-gate ATM/CNS provision costs (M€)	30
Gate-to-gate total ATM/CNS assets(M€)	34
Gate-to-gate ANS total capex (M€)	3
ATCOs in OPS	91
Gate-to-gate total staff	217
Total IFR flight-hours controlled by ANSP ('000)	50
IFR airport movements controlled by ANSP ('000)	29
En-route sectors	4
Minutes of ATFM delays ('000)	1

Size (2014)

Size of controlled airspace: 20 400 km²

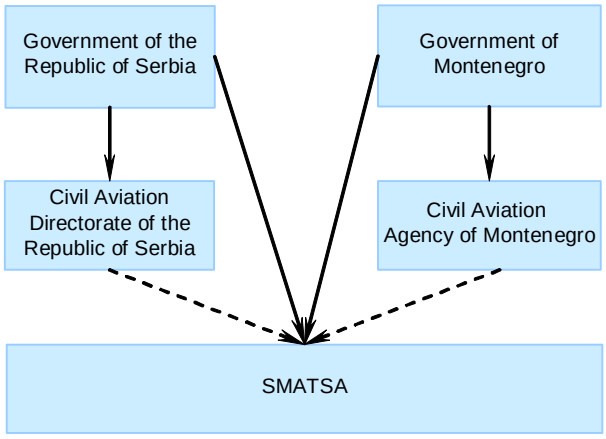


SMATSA, Serbia and Montenegro

Serbia and Montenegro Air Traffic Services SMATSA llc

http://www.smatsa.rs

Institutional arrangements and links (2016)



Status (2016)

- Limited liability company founded in 2003
- 92% owned by Serbia and 8% owned by Montenegro
- Integrated civil/military ANSP

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 (2016)

ASSEMBLY

6 members representing founders (Government of the Republic of Serbia and Government of Montenegro) selected from the Ministries in charge of transport, finance, and defence)

SUPERVISORY BOARD

5 members appointed by the Assembly for a period of 4 years, upon proposals of the Government of the Republic of Serbia (4) and Government of Montenegro (1)
CEO is appointed by the Supervisory Board.

SMATSA (2016)

PRESIDENT OF THE ASSEMBLY:

Mirel Radić Ljubisavljević

PRESIDENT OF THE SUPERVISORY BOARD:

Bratislav Grubačić

CEO:

Radojica Rovčanin

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☑ OAT	☑ Lower Airspace	☑ 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 (2014)

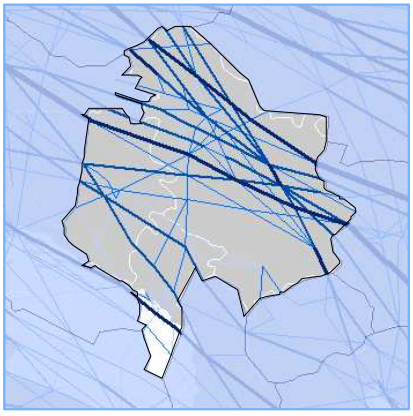
1 ACC (Belgrade)
1 APP collocated with ACC Belgrade
6 APPs/TWRs (Batajnica, Kraljevo, Nis, Vrsac, Podgorica, Tivat)
1 TWR (Belgrade)

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	93
Gate-to-gate total costs (M€)	85
Gate-to-gate ATM/CNS provision costs (M€)	77
Gate-to-gate total ATM/CNS assets(M€)	97
Gate-to-gate ANS total capex (M€)	19
ATCOs in OPS	277
Gate-to-gate total staff	765
Total IFR flight-hours controlled by ANSP ('000)	207
IFR airport movements controlled by ANSP ('000)	83
En-route sectors	9
Minutes of ATFM delays ('000)	3

Size (2014)

Size of controlled airspace: 129 099 km²



UkSATSE, Ukraine

Ukrainian State Air Traffic Service Enterprise

www.uksatse.ua

Institutional arrangements and links (2016)

Ministry of Infrastructure of Ukraine

(State Aviation Administration)

Ukrainian State Air Traffic Service Enterprise (UkSATSE)

- Regional branches
- AIS
- Ukraerocenter (Ukrainian Airspace Management and Planning Center)
- Training & Certification Center of UkSATSE
- UkSATSE Flight Calibration Service
- Medical Certification Center

Status (2016)

- Self-financing enterprise
- 100% State-owned

National Supervisory Authority (NSA):

State Aviation Administration (SAAU) acts as NSA

Body responsible for:

Safety Regulation

State Aviation Administration

Airspace Regulation

State Aviation Administration

Economic Regulation

Ministry of Infrastructure of Ukraine

Corporate governance structure (2016)

Director of UkSATSE (CEO) has been appointed by the Ministry of Infrastructure of Ukraine

Reciprocal obligations between Ministry of Infrastructure of Ukraine and Director of UkSATSE are regulated by the contract

UkSATSE (2016)

DIRECTOR OF UkSATSE (CEO):

Dmytro Babeichuk

Scope of services (2014)

☑ GAT	☑ Upper Airspace	☐ Oceanic ANS
☐ OAT	☑ Lower Airspace	☑ MET

Operational ATS units (2014)

4 ACCs/APPs (Dnipropetrovs'k, Kyiv, L'viv, Odesa)
4 APPs (Ivano-Frankivs'k, Kharkiv, Uzghorod, Zaporizhzhia)
18 TWRs
5 AFISs

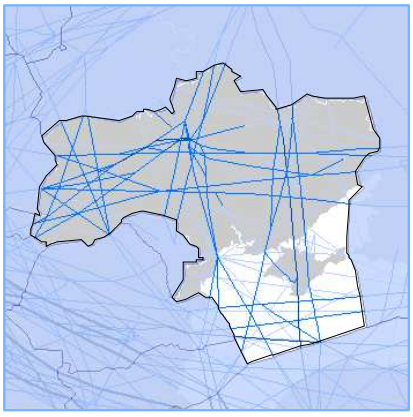
*data above reflects the situation as from July 2014

Key financial and operational figures (ACE 2014)

Gate-to-gate total revenues (M€)	151
Gate-to-gate total costs (M€)	168
Gate-to-gate ATM/CNS provision costs (M€)	156
Gate-to-gate total ATM/CNS assets(M€)	203
Gate-to-gate ANS total capex (M€)	57
ATCOs in OPS	910
Gate-to-gate total staff	5 425
Total IFR flight-hours controlled by ANSP ('000)	253
IFR airport movements controlled by ANSP ('000)	143
En-route sectors	22
Minutes of ATFM delays ('000)	2

Size (2014)

Size of controlled airspace: 777 000 km²



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GLOSSARY

ACC	Area Control Centre
ACE	Air Traffic Management Cost-Effectiveness
ADS-B	Automatic Dependent Surveillance-Broadcast
AFIS	Airport/Aerodrome Flight Information Service
AIS	Aeronautical Information Services
Albcontrol	National Air Traffic Agency, Albania
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 Flysikring, Norway
B	Billion
Belgocontrol	Belgocontrol, Belgium
CAPEX	Capital Expenditure
CNS	Communications, Navigation and Surveillance
COOPANS	Industrial partnership between 5 ANSPs (Austro Control, Croatia Control, IAA, LFV and NAVIAIR)
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 İsletmesi, 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
ENAIRE	Air Navigation Service Provider of Spain
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
GBAS	Ground Based Augmentation System

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
IFRS	International Financial Reporting Standards
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
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
NM	EUROCONTROL Network Manager
OAT	Operational air traffic
ODS	Operational Display System
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
VoIP	Voice over Internet Protocol
VOR	Very high frequency Omni-directional Range