REPORT COMMISSIONED BY THE PERFORMANCE REVIEW COMMISSION

ATM Cost-Effectiveness (ACE) 2011 Benchmarking Report with 2012-2016 outlook

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

April 2013

BACKGROUND

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

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

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

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

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

NOTICE

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

The PRU's e-mail address is pru@eurocontrol.int

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Final Report

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DOCUMENT IDENTIFICATION SHEET

DOCUMENT DESCRIPTION

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ATM Cost-Effectiveness (ACE) 2011 Benchmarking Report with 2012-2016 outlook

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ABSTRACT

This report is the eleventh 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 2011, including high level trend analysis for the years 2007-2011. The scope of the report is both en-route and terminal navigation services (i.e. gate-to-gate). The main focus is on the ATM/CNS provision costs as these costs are under the direct control and responsibility of the ANSP. Costs borne by airspace users for less than optimal quality of service are also considered. The report describes a performance framework for the analysis of cost-effectiveness. The framework highlights 3 key performance drivers contributing to cost-effectiveness (productivity, employment costs and support costs). The report also presents detailed productivity comparisons for 63 Area Control Centres (ACCs) grouped in 3 clusters of different traffic complexity characteristics. Finally, the report analyses forward-looking information for the years 2012-2016, inferring on future financial cost-effectiveness performance at both system and ANSP levels, and displaying future capital expenditures and future capacity plans.

Keywords

EUROCONTROL Performance Review Commission - Economic information disclosure – Benchmarking – Target setting – Exogenous factors – Complexity metrics - ATM/CNS cost-effectiveness comparisons - European Air Navigation Services Providers (ANSPs) – Functional Airspace Blocks (FABs) - Gate-to-gate - En-route and Terminal ANS - Inputs and outputs metrics – Performance framework - Quality of service - 2011 data – Traffic downturn - Factual analysis – Historic trend analysis - Costs drivers - Productivity – Employment costs - Support costs – Area Control Centres (ACCs) productivity comparisons – Current and future capital expenditures – ATM systems – Five years forward-looking trend analysis (2012-2016).

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TABLE OF CONTENTS

TABLES

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FIGURES

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. All those who are interested in understanding the differences between the SES II reporting requirements and the ACE analysis in terms of scope, entities and indicators.
Part I: - European ANS data and introduction to ANSP benchmarking	
Chapter 2: **European ANS system data**	Brief summary of the main economic, financial and operational metrics for the whole European ANS system in 2011.
Chapter 3: **Factors affecting performance**	All those who are interested in the main (measurable) factors which affect the observed performance of an ANSP such as size, cost of living, traffic complexity and traffic variability. This chapter is particularly relevant to scholars and economic regulators who are interested in developing econometric methodology to benchmark ANSPs with a view to produce a normative assessment of performance.
Part II: - Financial cost-effectiveness	
Chapter 4: **Financial cost-effectiveness (2011)**	All those who are interested in understanding how ATM/CNS provision cost-effectiveness in 2011 is measured and benchmarked for each ANSP, including its three main economic drivers (productivity, employment costs and support costs). This chapter is particularly relevant to ANSPs' management, regulators and NSAs in order to identify best practices and areas for improvement.
Chapter 5: **Changes in financial cost-effectiveness (2007-2011)**	All those who are interested in trends and dynamic analysis of ATM/CNS cost-effectiveness performance between 2007 and 2011. This chapter is particularly relevant to ANSPs' management, regulators and NSAs in order to identify how cost-effectiveness performance has evolved and which have been the sources of improvement (productivity, employment costs and support costs).
Chapter 6: **Forward looking financial cost-effectiveness (2012-2016)**	All those who are interested in forward-looking expectations of ATM/CNS cost-effectiveness performance for the 2012-2016 period, including capital investment and staff projections. This chapter is particularly relevant for those interested in cost-effectiveness planning, regulators and NSAs, and for airspace users during their consultation processes.
Part III: - Economic cost-effectiveness	
Chapter 7: **Economic cost-effectiveness**	All those who are interested in understanding how the quality of service (currently only ATFM delays) is factually measured, valued in monetary terms and benchmarked for each ANSP. This chapter is particularly relevant to ANSPs' management, regulators and NSAs in order to identify areas for improvement, and understand trade-offs between quality of service and financial cost-effectiveness.
Annexes:	Tables with data used in the report. The annexes also include detailed information on ANSPs individual cost-efficiency performance and capital expenditures.

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EXECUTIVE SUMMARY

Independent benchmarking of the cost-effectiveness of 37 European ANSPs

This ATM Cost-Effectiveness (ACE) 2011 Benchmarking Report, the eleventh in the series, presents a review and comparison of ATM cost-effectiveness for 37 Air Navigation Service Providers (ANSPs) in Europe.

ACE 2011 presents information on performance indicators relating to cost-effectiveness and productivity for the year 2011, and how they changed over time (2007-2011). It examines both individual ANSPs and the European ATM/CNS system as a whole. In addition, ACE 2011 analyses forward-looking information covering the 2012-2016 period based on information provided by ANSPs in November 2012.

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

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

The ACE factual and independent benchmarking has set 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 "intelligence" on ANSPs cost-efficiency performance directly feeds three core processes of the Single European Sky (SES) performance scheme:

1. EU-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.

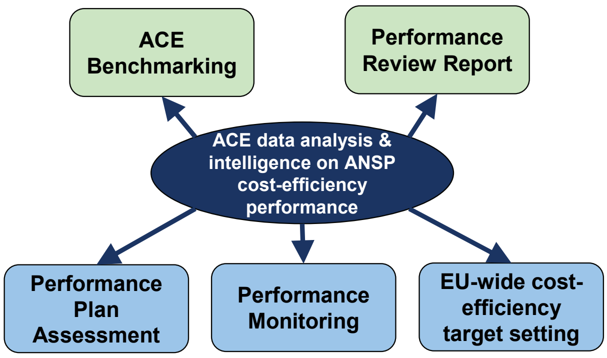


Figure 0.1: ACE data analysis in ANS Performance review

In particular, the ACE 2011 Benchmarking analysis will contribute to provide factual evidence which will be used, among other tools, to determine a range for the EU-wide cost-efficiency target that will be set over RP2 (2015-2019).

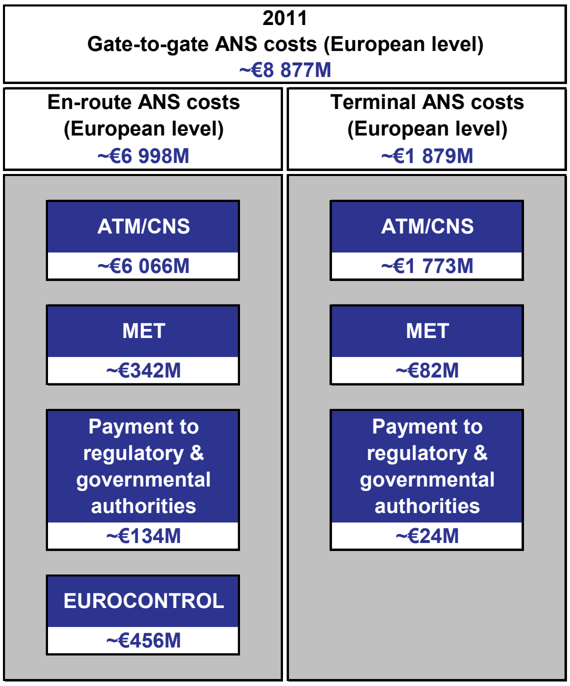
The Pan-European ANS system is a business of €8 900M with some 58 000 staff

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 2011, total ANS costs were around €8 880M (see Table 0.1 below), of which some €7 840M related directly to the provision of gate-to-gate ATM/CNS.

	2010 37 ANSPs	2011 37 ANSPs	10/11 37 ANSPs
Gate-to-gate ANS revenues (not adjusted by over/under recoveries) (in € M):	**8 461**	**8 894**	**5.1%**
En-route ANS revenues	6 740	7 075	5.0%
Terminal ANS revenues	1 721	1 819	5.7%
Gate-to-gate ANS costs (in € M):	**8 830**	**8 877**	**0.5%**
ATM/CNS provision costs	7 702	7 839	1.8%
MET costs	449	424	-5.6%
EUROCONTROL Agency costs	530	456	-13.9%
Payment to national authorities and irrecoverable VAT	148	158	6.4%
Gate-to-gate ATM/CNS costs (in € M):	**7 702**	**7 839**	**1.8%**
En-route ATM/CNS costs	5 939	6 066	2.1%
Terminal ATM/CNS costs	1 763	1 773	0.5%
Gate-to-gate ANS staff:	**58 016**	**57 968**	**-0.1%**
ATCOs in OPS	16 871	17 208	2.0%
ACC ATCOs	9 387	9 573	2.0%
APPs + TWRs ATCOs	7 484	7 635	2.0%
NBV of gate-to-gate fixed assets (in € M)	**7 819**	**7 460**	**-4.6%**
Gate-to-gate capex (in € M)	**1 121**	**1 010**	**-9.9%**
Outputs (in M)			
Distance controlled (km)	9 767	10 092	3.3%
Total flight-hours controlled	13.9	14.5	4.0%
ACC flight-hours controlled	12.2	12.8	5.0%
IFR airport movements controlled	14.8	15.4	3.7%
IFR flights controlled	9.5	9.8	3.1%
Gate-to-gate ATFM delays ('000 min.)	**27 476**	**17 823**	**-35.1%**

Table 0.1: Key system data for 2010 and 2011, real terms

Total ANS revenues in 2011 amounted to some €8 900M. The European ANSPs employed some 58 000 staff, which is slightly larger than the workforce at Airbus worldwide (55 000 employees). Some 17 200 staff (30%) were ATCOs working on operational duty, compared to some 14 600 in the United States (FAA/ATO, including 1 300 for contracted TWRs). On average, in Europe, 2.4 additional staff are required for every ATCO.



ACE 2011 first considers the total costs at State level for providing ANS, however, since some elements of ANS provision are outside the control of individual ANSPs, it then focuses on the specific costs of providing ATM/CNS (€7 839M). These represent 88% of total ANS costs. Other ANS costs include the costs of aeronautical meteorology services (5%), the costs of the EUROCONTROL Agency (5%) and the costs associated to regulatory and governmental authorities (2%).

Table 0.1 indicates that while ATM/CNS provision costs increased by +1.8% in 2011, EUROCONTROL costs significantly decreased (-13.9%) reflecting the impact of a one-off exceptional reduction (€62M) mainly relating to the implementation of IFRS budgeting.

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

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 en-route flight-hours controlled and IFR airport movements controlled. Many factors contribute to observed differences in unit costs between ANSPs. Some of these factors are measurable; others (such as regulatory constraints) are less obviously quantifiable. Ideally, since the 37 ANSPs operate in very diverse environments across Europe, all of these factors 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**.

Nevertheless, this report comprises a high level analysis of the Pan-European system cost-inefficiencies based on an econometric approach. The results of this work will be used, in association with other material, for proposing a range of EU-wide cost efficiency targets in the context of SES II. However, such analysis inevitably has limitations, and the quantification of inefficiencies (and scope for improvement) still requires a combination of various approaches, including expert judgement based on robust technical analysis.

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 €7 460M, which means that overall €0.84 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 2011, the total ANSP capex at Pan-European system level amounted to some €1 010M.

As part of reporting requirements, high level information on the main ATM software for the Flight Data Processing (FDP) and Radar Data Processing (RDP) systems is collected and analysed.

Figure 0.2 provides information on the suppliers of the different FDP systems that are operated across Europe. The fact that a relatively large number of manufacturers compete should contribute to reduce the price of FDP systems. On the other hand, additional costs may arise from the duplication of FDP systems specification, customisation and maintenance, which are typical elements of support costs.

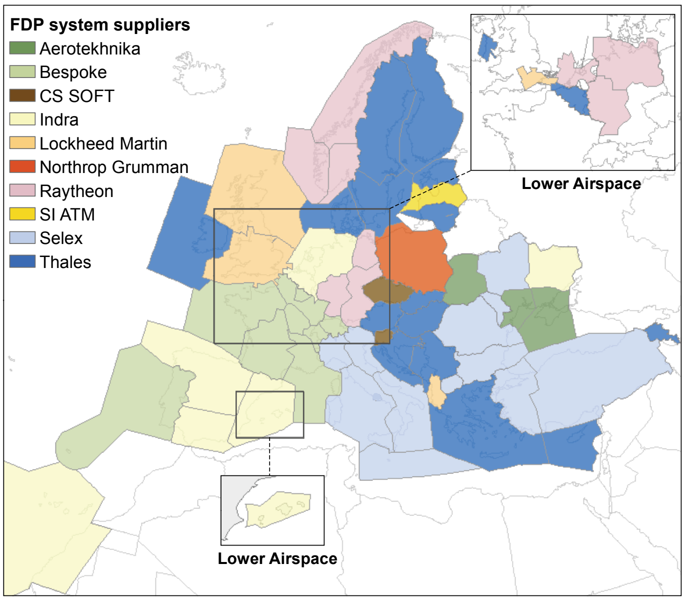


Figure 0.2: FDP systems suppliers, 2011

Similarly, the fact that neighbouring ANSPs operate different FDP systems might contribute to create additional ATCO workload associated with the interface between the different systems. Some ANSPs have established partnerships for the common procurement and development of ATM systems. COOPANS, based on a Thales platform, was initiated by IAA, LFV and NAVIAIR and new partners joined recently (Austro Control and Croatia Control). Another partnership is COFLIGHT (involving DSNA, ENAV and Skyguide). Similarly, the iTEC consortium, based on an Indra platform, involves Aena, DFS, NATS and LVNL (since March 2011). It is noteworthy that these initiatives generally involve ANSPs across several Functional Airspace Blocks (FAB) or even geographical neighbours. With the exception of DK-SE FAB, FAB partners usually operate FDP systems from different suppliers.

Further initiatives towards a higher level of shared infrastructure are encouraged. The bulk of investment is related to software, for which there is a high potential for economy of scale in procurement and maintenance. Higher quality standards, interoperability and upgradability are also expected.

In 2011, European ANSPs reduced unit costs and improved quality of service and as a result, unit economic costs were lower than pre-crisis levels

An assessment of ANS performance should take into account the direct costs (user charges) 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 Performance Review Reports the concept of total economic cost, which can be computed at system level for all KPAs except safety.

As flight-efficiency cannot be readily quantified at ANSP level, the quality of service element of economic cost-effectiveness is expressed in terms of ATFM delays only. This performance indicator reflects trade-offs between en-route capacity and costs.

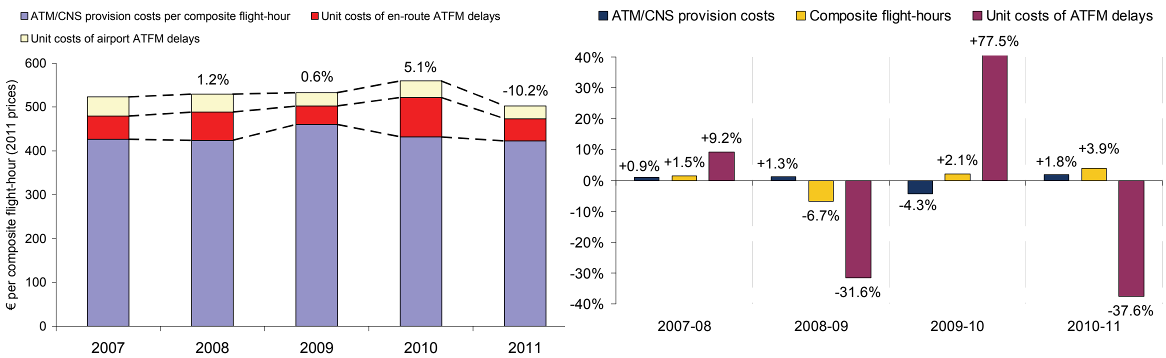


Figure 0.3: Changes in unit economic costs (2007-2011, real terms)

In 2009, traffic volumes significantly fell (-6.7%) reflecting the impact of the economic crisis on the ANS industry. This led to a +8.6% increase in unit ATM/CNS provision costs which was compensated by a sharp decrease in the unit costs of ATFM delays (-31.6%). As a result unit economic costs remained fairly constant in 2009 (+0.6%).

In 2010, the number of composite flight-hours rose by +2.1% while ATM/CNS provision costs fell by -4.3% in real terms. The reduction in ATM/CNS provision costs reflected 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 +5.1% in 2010.

In 2011, the number of composite flight-hours increased faster (+3.9%) than ATM/CNS provision costs (+1.8%), resulting in a -2.1% decrease in unit ATM/CNS provision costs compared to 2010. In the meantime, the unit costs of ATFM delays significantly reduced (-37.6%) contributing to the substantial decrease in unit economic costs in 2011 (-10.2%) which reached a level lower than that achieved before the economic crisis.

The substantial reduction in ATFM delays for two of the five largest ANSPs (DSNA and DFS) contributed to the decrease observed at Pan-European system level. The quality of service improvement for DFS mainly reflects an increase in ATC capacity following the implementation in February 2011 of a new FDP system (VAFORIT) in Rhein ACC. After reaching exceptionally high levels in 2010 mainly due to social tensions, DSNA ATFM delays decreased in 2011 to reach a level close to those observed in 2007 and 2008. Similarly, initiatives to improve sector configurations and additional staff led to significantly lower ATFM delays for Austro Control compared to its peak of 2010.

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

In 2011, the economic cost-effectiveness indicator ranges from €748 (Belgocontrol) to €180 (EANS), a factor greater than four. Although the five largest ANSPs operate in relatively similar economic and operational environments, there is a substantial variation in unit costs, ranging from DFS (€677) to NATS (€430).

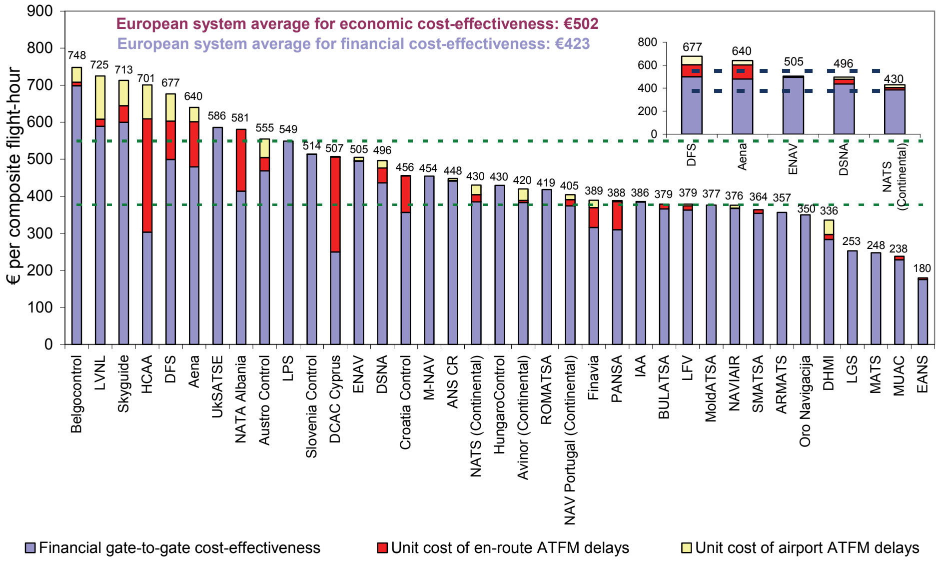


Figure 0.4: Economic gate-to-gate cost-effectiveness indicator, 2011

Differences in cost-effectiveness are more blurred across FABs

When computed at FAB level, unit economic costs range from €602 for the South West FAB to €375 for NEFAB, a much lower dispersion than when unit economic costs are computed at ANSP level.

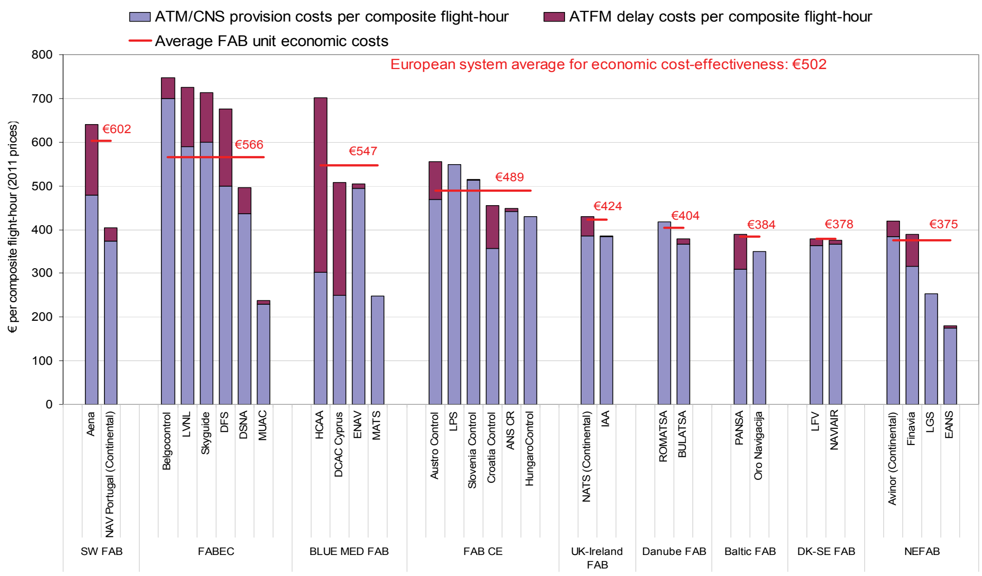


Figure 0.5: Economic cost-effectiveness at FAB level, 2011

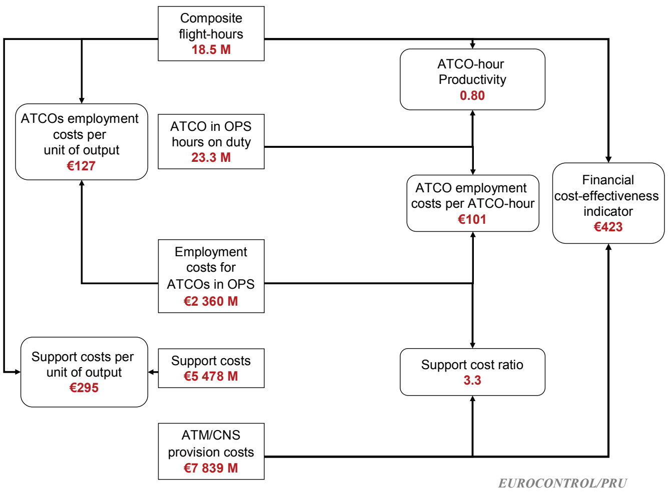
The South West FAB (€602), FABEC (€566) and BLUE MED (€547) show average unit economic costs higher than the European average (€502). On the other hand, DK-SE FAB (€378) and the NEFAB (€375) had lower unit economic costs in 2011.

In 2011, the share of ATFM delays in total economic costs for the South West FAB (23%), FABEC (18%), BLUE MED (23%) and the Baltic FAB (18%) was higher than for the Pan-European system as a whole (16%), indicating issues in terms of quality of service performance for these four FABs. BLUE MED includes the ANSPs which have the two highest unit costs of ATFM delays in 2011 (HCAA and DCAC Cyprus). Although the implementation of capacity enhancement measures contributed to improve quality of service, the share of ATFM delays in DCAC Cyprus unit economic costs remains very high at some 51% in 2011. These two ANSPs have had recurrent ATC capacity issues for several years and could not implement the necessary measures to fully address them in 2011.

Traffic volumes decreased in 2012 and the latest forecasts indicate that traffic growth in 2013 is likely to be lower than in 2010 and 2011. Looking ahead, this situation offers a unique opportunity to better match capacity and demand, and therefore improving economic cost-effectiveness. Furthermore, in the context of SES II, the Network Manager should effectively support ANSPs to improve the quality of service provided at system level.

In 2011, higher productivity and slightly lower unit support costs contributed to improve financial cost-effectiveness

Figure 0.6 shows the analytical framework which is used in the ACE analysis to break down the financial cost-effectiveness indicator into a number of key components. In 2011 at Pan-European system level, the average ATM/CNS provision cost per composite flight-hour is €423.



Key components of the financial cost-effectiveness indicator include:

a) ATCO-hour productivity (0.80 composite flight-hours per ATCO-hour);
b) ATCO employment costs per ATCO-hour (€101); and,
c) support costs per unit output (€295).

Figure 0.6: ACE performance framework, 2011

At system level, unit ATM/CNS provision costs fell by -2.1% in real terms between 2010 and 2011. Figure 0.7 shows that in 2011, ATCO-hour productivity increased slightly faster (+2.7%) than employment costs per ATCO-hour (+2.4%), while unit support costs decreased (-2.8%).

These results are heavily influenced by the structural changes implemented in 2010-2011 by Aena.

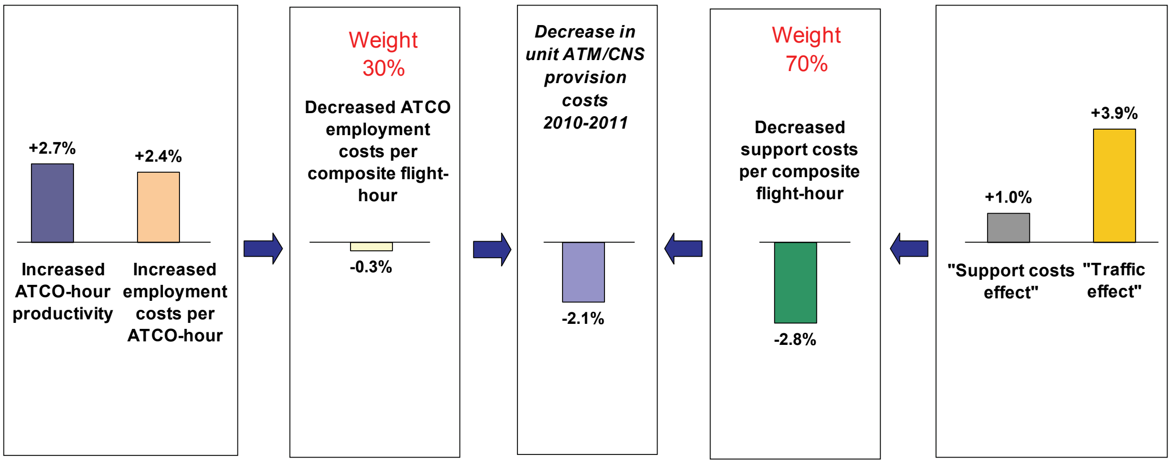


Figure 0.7: Changes in the financial cost-effectiveness indicator, 2010-2011 (real terms)

Between 2010 and 2011, unit ATM/CNS provision costs fell for 23 ANSPs. Figure 0.8 shows that 15 ANSPs could reduce their ATM/CNS provision costs in 2011 (see bottom part of the chart). For most of these ANSPs, the lower ATM/CNS costs were associated with an increase in traffic volumes, resulting in a substantial decrease of unit costs. On the other hand, for M-NAV, the reduction in ATM/CNS provision costs was not sufficient to outweigh the decrease in traffic and to avoid a small increase in unit costs in 2011.

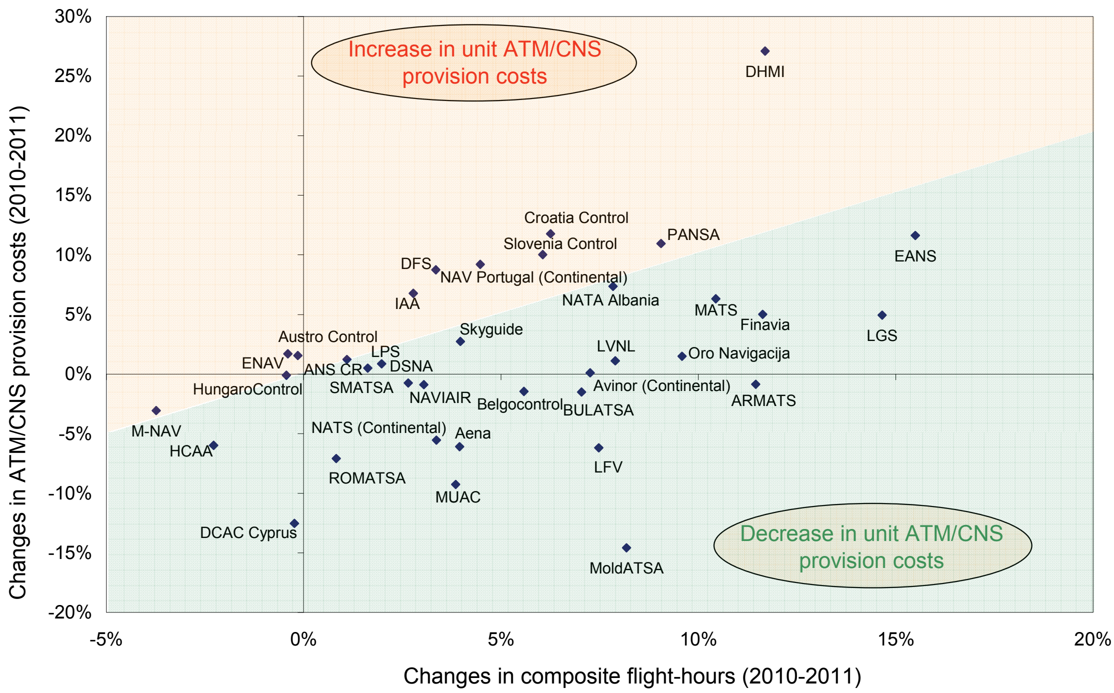


Figure 0.8: Changes in ATM/CNS provision costs and traffic volumes (2010-2011)

For nine ANSPs (Aena, Belgocontrol, BULATSA, DCAC Cyprus, HCAA, M-NAV, NATS, NAVIAIR and ROMATSA), ATM/CNS provision costs decreased for the second consecutive year. At face value, this indicates that the cost-containment measures implemented in 2009 and 2010 generated additional savings in 2011 for these ANSPs.

Out of the five largest ANSPs, Aena (-9.7%), NATS (-8.6%) and DSNA (-3.3%) could achieve a reduction in unit ATM/CNS provision costs in 2011. For these ANSPs, this performance improvement was achieved by reducing ATM/CNS provision costs while traffic volumes increased. In 2011, unit costs increased for DFS (+5.2%) and ENAV (+2.1%). For DFS, this is mainly due to the fact that ATM/CNS costs increased faster (+8.7%) than traffic volumes (+3.3%). The main drivers underlying the increase in DFS unit costs are higher staff costs (+7% or +€41.6M) and exceptional costs (+87% or

+€18.2M). The increase in exceptional costs observed for the year 2011 mainly reflects the fact that 2010 exceptional costs were reduced following a one-off decrease in IFRS pension conversion effects. For ENAV, the increase in unit ATM/CNS provision costs mainly result from higher ATM/CNS provision costs (+1.7%) while traffic slightly decreased in 2011 (-0.4%). In 2011, the political crisis in Northern African countries, including the prolonged closure of the Libyan airspace, has negatively affected the traffic volumes controlled in the Italian airspace.

After the sharp decrease in 2009, the traffic growth in 2010 and 2011 was absorbed using existing resources, leading to substantial productivity increases

Over the five year period (2007-2011), ATCO-hour productivity rose by +6.5% at Pan-European system level. Figure 0.9 indicates that after a significant decrease in 2009 (-6.4% reflecting the fall in traffic which resulted from the economic downturn), ATCO-hour productivity increased for two consecutive years (+6.7% in 2010 and +2.7% in 2011).

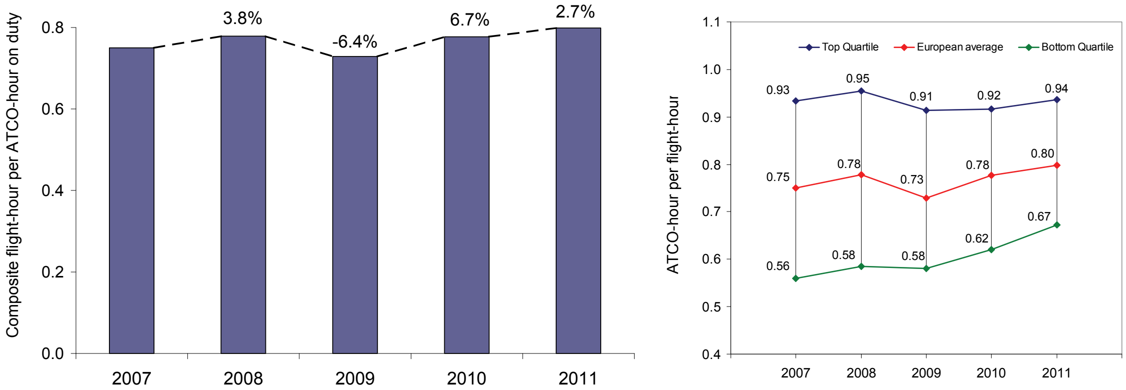


Figure 0.9: Changes in ATCO-hour productivity (2007-2011)

The increases in ATCO-hour productivity observed at Pan-European system level for the years 2010 and 2011 mainly reflect improvements in ANSPs with relatively lower ATCO-hour productivity levels, while the ATCO-hour productivity of ANSPs in the top quartile remained fairly constant.

At Pan-European system level, the increase in productivity achieved in 2011 (+2.1%) is mainly due to the fact that traffic volumes increased faster (+3.9%) than ATCO-hours on duty (+1.2%).

Strong productivity increases were achieved by Central and Eastern Europe ANSPs benefiting from high traffic growth and more effective use of spare capacity and existing resources. However, significant improvements in productivity were also achieved by some ANSPs which started from a higher base in 2010 (MUAC, NAVIAIR and LVNL).

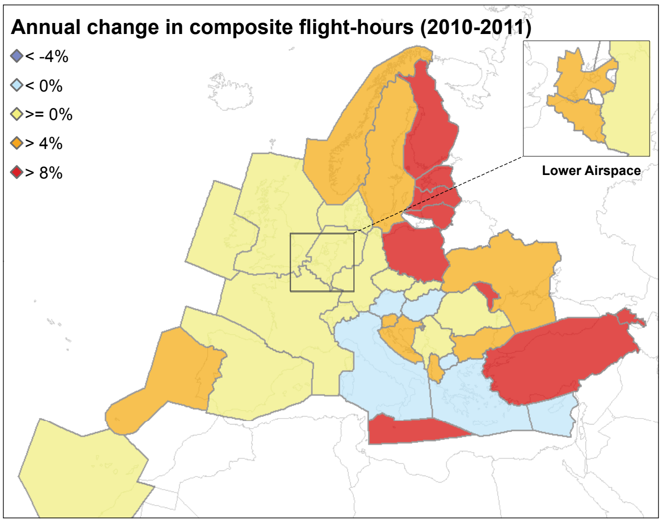


Figure 0.10: Annual change in composite flight-hours between 2010 and 2011

The ACE data analysis allows to identify best practices across ANSPs and also to gather information on the main drivers underlying ATCO-hour productivity improvements. These improvements can result from more effective OPS room management and by making a better use of existing resources, for example through the adaptation of rosters (preferably individually based to enhance flexibility) and shift times, effective management of overtime, and through the adaptation of sector opening times to traffic demand patterns. Traffic growth was negative in 2012, this is likely to negatively affect future years productivity unless ANSPs are able to implement measures to adapt to the new traffic conditions.

ATCO employment costs are catching up in many Central and Eastern Europe ANSPs…

At system level, ATCO employment costs per ATCO-hour slightly increased between 2007 and 2011 (+1.9% in real terms or +0.5% p.a.). Figure 0.11 shows that this overall change is significantly affected by the decrease in Aena ATCO employment costs over the years 2009 and 2010.

Excluding Aena, ATCO employment costs have increased in real terms by +1.9% in 2010 and +4.6% in 2011.

Significant increases in ATCO employment costs per ATCO-hour are observed for ANSPs starting from a relatively low base in 2007. The convergence of unit employment costs between Central and Eastern European economies and Western Europe continues to unfold following the strengthening of the economic integration and the enhanced labour mobility.

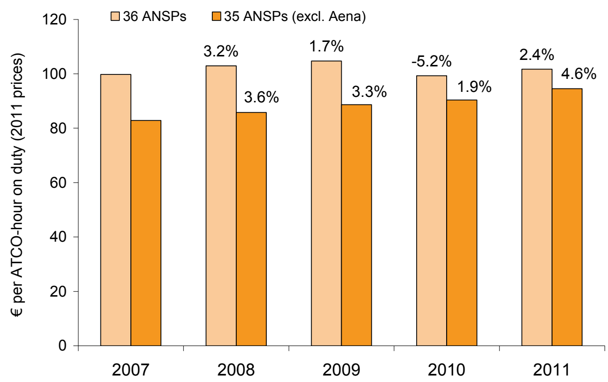


Figure 0.11: Changes in ATCO employment costs per ATCO-hour (2007-2011)

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. 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.

…while in many Western European ANSPs, future pension liabilities are putting a serious strain on costs

Figure 0.12 breaks down ANSPs staff costs (€4 900M) into different categories. Gross wages and salaries are the main component of total staff costs (75.4%). The second largest category, employer contributions to staff pensions, accounts for 14.5%. It should be noted that the proportion of pension contributions in total staff costs can significantly differ across the European ANSPs. This reflects the variety of pension arrangements that are in place locally.

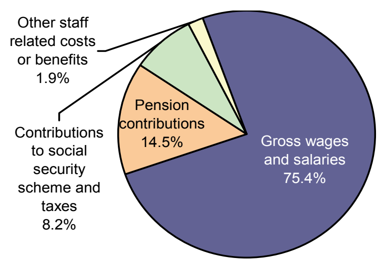


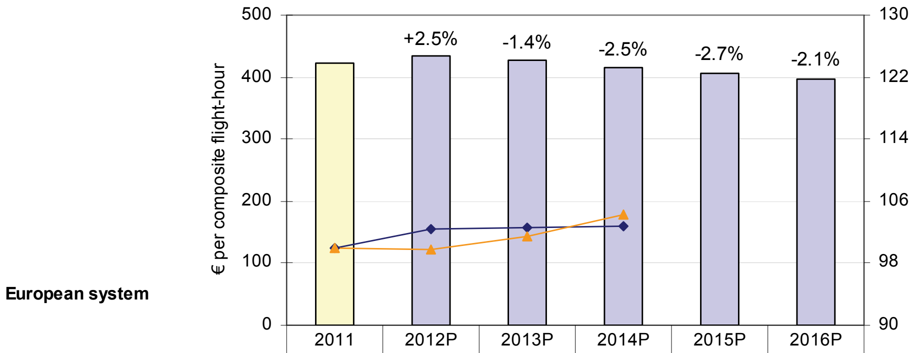
Figure 0.12: Breakdown of ANSPs staff costs, 2011

Employment costs can be profoundly affected by the type of pension arrangements, and particularly whether the pension scheme is defined benefit or defined contribution. In recent years there has been increasing recognition that traditional methods of accounting for future pensions liabilities tend to under-estimate pension costs. For several ANSPs, the implementation of IFRS has resulted in the recognition of larger future pension liabilities and led to very substantial increases in pension costs. The impact of this is likely to spread as it is recognised in more and more ANSPs. 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 a "defined benefit" pension plan.

A revised version of IFRS 19 (i.e. "employee benefits") will be implemented in January 2013. One of the main revisions of IFRS 19 relates to the departure from the "corridor approach". This implies that from 2013 onwards, for ANSPs operating under a defined benefit pension scheme, any actuarial gains and losses arising from a change in actuarial assumptions will have to be reported in the Profit & Loss and Balance Sheet financial statements. Several ANSPs, like Austro Control and DFS have explicitly flagged this issue as they would be significantly impacted by the implementation of the amended IFRS 19. DFS already assessed that in this context, an unplanned change of 1 percentage point in the discount rate used to compute future pension obligations would lead to additional costs of €400M to be recognised in the Profit & Loss statement. This issue requires the utmost attention given the long term consequences of pensions-related decisions and their magnitude in the cost bases.

After a -2.1% decrease in 2011, unit ATM/CNS provision costs are expected to slightly reduce by -1.3% p.a. until 2016

At European system level, after the -2.1% reduction in 2011, gate-to-gate unit ATM/CNS provision costs are planned to increase by +2.5% in 2012 and then to decrease until 2016 (-2.2% p.a.). Overall, gate-to-gate unit ATM/CNS provision costs are planned to decrease by -6.2% between 2011 and 2016 (-1.3% p.a.).



	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	423	433	427	417	405	397
Gate-to-gate costs (index)	100	102	103	103		
Composite flight-hours (index)	100	100	101	104		

Figure 0.13: Forward-looking cost-effectiveness at Pan-European system level (2012-2014, real terms)

Actual 2011 ATM/CNS provision costs were -1.0% lower than planned in ACE 2010, and the actual number of composite flight-hours was slightly lower than ACE 2010 forecasts for 2011 (i.e. -0.5%). As a result, actual 2011 unit ATM/CNS provision costs were -0.5% lower than planned in ACE 2010. The "savings" for the year 2011 compared to the plans are valued at some €70M. This result suggests that some ANSPs managed to generate additional savings in 2011 (after those already achieved in 2009 and 2010) which were not fully reflected in the plans made in November 2011 for the purposes of the ACE 2010 data analysis.

In 2011, ANSPs capital expenditures amounted to some €1 010M at European system level. This is -17.2% (or -€207M) below the plans made in ACE 2010 for the year 2011.

This difference mainly reflects the impact of cost-containment measures initiated by some ANSPs in 2009-2010, relating to the postponement of non-crucial capex projects to future years, which were not fully reflected in ACE 2010 plans.

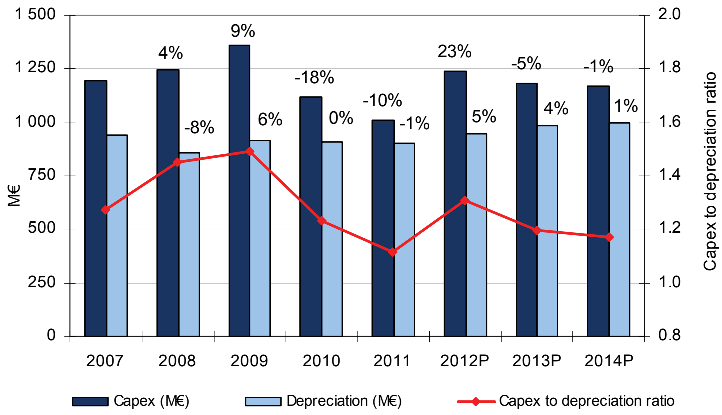


Figure 0.14: Forward-looking capex and depreciation costs at European system level (2007-2014, real terms)

Overall, the cumulative capex planned for the period 2012-2014 amounts to some €3 600M. Figure 0.14 indicates that ANSPs capex are planned to substantially increase in 2012 (+23%), reduce in 2013 (-5%) and then remain fairly constant in 2014 (-1%) to reach a level comparable to the amounts spent in 2007 and 2008.

2011 is the last year of the "full-cost recovery" mechanism for the SES States/ANSPs

For ANSPs operating in SES States, the year 2012 marks the start of RP1 and the end of the "full cost-recovery" mechanism for en-route ANS. Under the full cost-recovery mechanism, all the risks are borne by the airspace users and ANSPs are not sufficiently incentivised to deliver a better cost-efficiency performance since they have to return any over-recoveries, even if these are the result of cost-savings. Over RP1, SES States/ANSPs will operate under the "determined costs" principle which comprises specific risk-sharing arrangements aiming at incentivising ANSPs economic performance. Over the 2012-2014 period, traffic volumes are likely to be much lower than planned in the National Performance Plans. SES ANSPs will therefore have to show a greater reactivity to adjust en-route costs and better adapt to the lower traffic growth in order to avoid financial losses during RP1.

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1 INTRODUCTION

The Air Traffic Management Cost-Effectiveness (ACE) 2011 Benchmarking Report commissioned by EUROCONTROL's independent Performance Review Commission (PRC) is the eleventh in a series of reports comparing the ATM cost-effectiveness of EUROCONTROL Member States' Air Navigation Service Providers (ANSPs)[1].

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

The report is based on information provided by ANSPs in compliance with Decision No. 88 of the Permanent Commission of EUROCONTROL, which makes annual disclosure of ANS information mandatory, according to the Specification for Economic Information Disclosure[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 2011. However, the aviation community is also interested in measuring how cost-effectiveness and productivity at the European and ANSP levels varies over time, and in understanding the reasons why variations occur. Hence, this report makes use of previous years' data from 2007 onwards to examine changes over time, where relevant and valid.

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

1.1 Organisation of the report

This report follows the same structure as the ACE 2010 report with a greater focus on the analysis of the cost-effectiveness performance of the ATM industry at European level. On the other hand, the report introduces some insights of cost-effectiveness performance measured at FAB level (in Chapter 4 and Chapter 7).

The structure of the present ACE 2011 Benchmarking Report is as follows:

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

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

- Chapter 2 presents 2011 key data for the European ATM system;
- Chapter 3 examines the importance of exogenous factors (such as cost of living, traffic variability and traffic complexity) and endogenous factors (such as

[1] Previous reports in the series from ACE 2001 (Sept. 2003) to ACE 2010 (May 2012) 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 2.6, December 2008, can be found on the PRC web site.

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

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

- Chapter 4 compares ANSPs' 2011 financial cost-effectiveness and the various components of cost-effectiveness (productivity, employment costs, and support costs);
- Chapter 5 looks at how financial cost-effectiveness and its components have changed over time (2007-2011);
- Chapter 6 analyses ANSPs' five-year data projections (2012-2016), as disclosed to the PRU by November 2012. This chapter infers on future financial cost-effectiveness performance. It also reports on future capital expenditure as well as planned number of ATCOs in OPS at European level.

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

- Chapter 7 compares ANSPs' 2011 economic cost-effectiveness and considers how it has changed over time (2007-2011).

Finally, this report also comprises several annexes with relevant statistical data used in the analysis. These annexes also include a two pages summary for each ANSP providing further details on ANSPs historic and planned cost-effectiveness as well as future capital expenditures.

1.2 Overview of participating ANSPs

In total, 37 ANSPs reported 2011 data in compliance with the requirement from Decision No. 88 of the Permanent Commission of EUROCONTROL (see Table 1.1). In addition to the EUROCONTROL Member States, the en-route ANSP of one Baltic State (Estonia) provided data on a voluntary basis for inclusion in the analysis. All the reported information relates to the calendar year 2011.

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

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

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

Table 1.1: States and ANSPs[3] participating in ACE 2011

Table 1.1 indicates (coloured yellow) which ANSPs were at 1 January 2011 part of the Single European Sky (SES), and hence subject to relevant SES regulations and obligations. In addition to SES members, a number of States (coloured blue) are committed, following the signing of an agreement relating to the establishment of a European Common Aviation Area (ECAA)[4], to cooperate in the field of ATM, with a view

[3] In Italy, the costs of en-route ATC services provided by ITAF (Italian Air Force) at regional civil/military airports are included in the ACE data analysis.

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

to extending the SES regulations[5] to the ECAA States. Hence, in principle all the en-route ANSPs of EUROCONTROL States and other States disclosing information to the PRC are covered by the SES regulations, except Armenia, Moldova, Turkey and Ukraine.

Table 1.1 also shows the extent to which the ANSPs incur costs relating to services that are not provided by all ANSPs. In order to enhance cost-effectiveness comparison across ANSPs, such costs, relating to oceanic ANS, military operational air traffic (OAT), airport management operations and payment for delegation of ATM services[6] were excluded to the maximum possible extent.

1.3 Data submission

The SEID (see footnote 2) requires that participating ANSPs submit their information to the PRC/PRU by 15 July in the year following the year to which it relates. The SEID became mandatory as part of the SES II legislation. The ACE 2011 data have been submitted in the SEID Version 2.6 which has been used since ACE 2008.

A Version 3.0 of this Specification has been prepared 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 over a two years trial period (ACE 2008 and ACE 2009 cycles). The SEID V3.0 also reflects recent developments arising from the second package of the SES regulations in 2009, the Performance Scheme Regulation and the amended Charging Scheme Regulation.

The SEID V3.0 shall be used to report 2013 data in 2014. This will allow ANSPs to have the required time during 2013 to smoothly introduce the changes into their reporting systems. This transition period should ease the administrative burden on the ANSPs and ensure effective and complete implementation of all the new aspects of the SEID V3.0 by 2014.

Figure 1.1 indicates that 25 out of 37 ANSPs provided ACE 2011 data on time (compared to 28 for ACE 2010). It should be noted that 24 ANSPs delivered ACE 2011 data earlier than for ACE 2010. It is important that the timely submission of ACE data is sustained and improved. The ACE benchmarking analysis must be seen as timely since several stakeholders, most notably ANSPs' management, regulatory authorities (e.g. NSAs) and airspace users, have a keen interest in receiving the information in the ACE reports as early as possible. Clearly, the timescale of the ACE Benchmarking Report production is inevitably delayed if data are not submitted on time.

[5] This includes the second package of SES regulations (EC No 1070/2009), the performance scheme regulation (EC No 691/2010) and the amended charging scheme regulation (EC No 1191/2010).

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

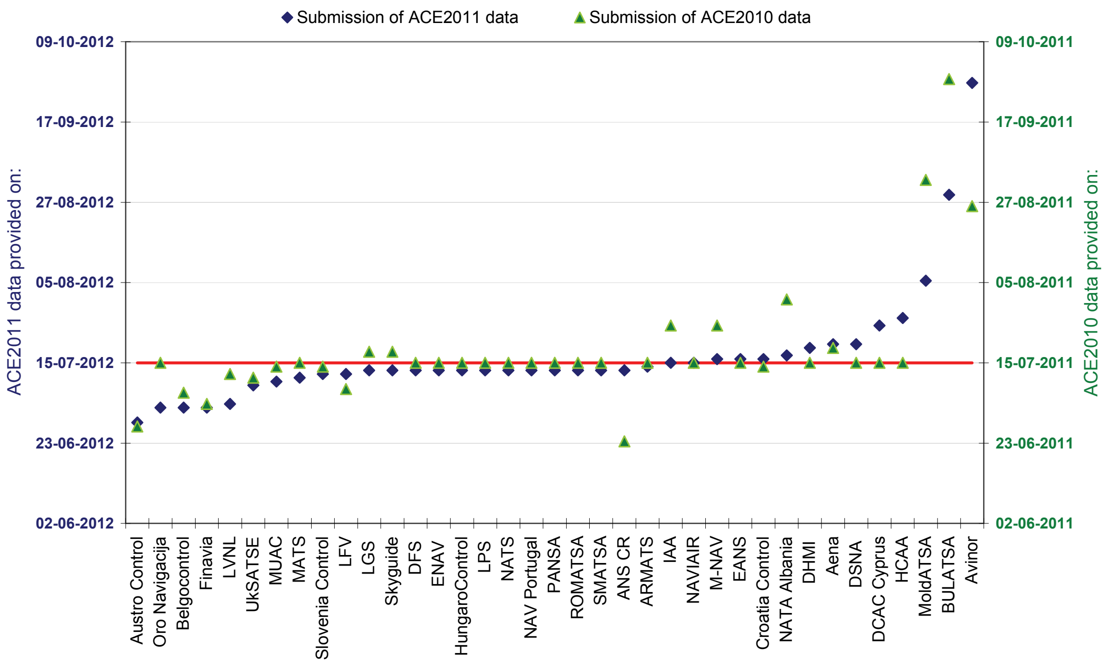


Figure 1.1: Progress with submission of 2011 data

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, even though the quality of HCAA data submissions has recently improved, there are still issues to be addressed. HCAA is still not in a position to provide complete balance-sheet data, although capital-related costs are charged to airspace users. Similarly, the quality of the operational data provided by HCAA (in particular staff numbers and working hours) is not satisfactory.

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.

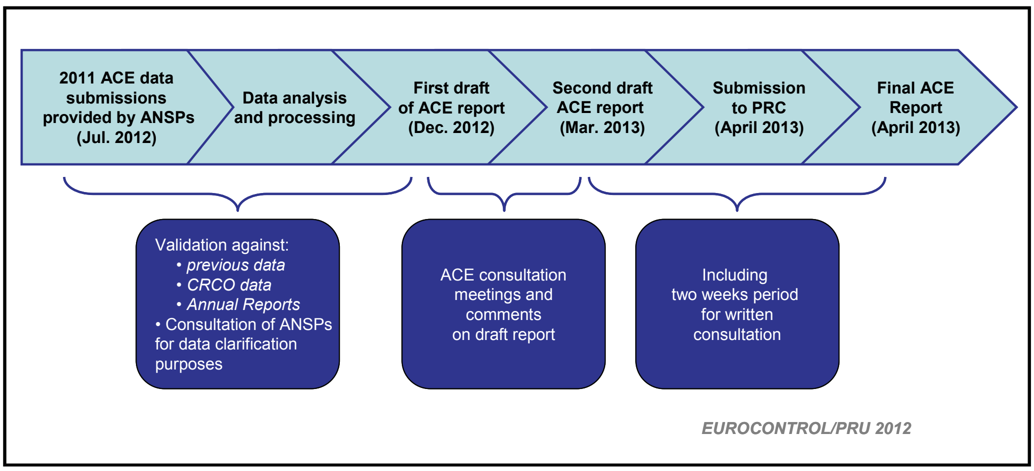


Figure 1.2: Data analysis, processing and reporting

In order to ensure comparability among ANSPs and quality of analysis, the information submitted by the ANSPs is subject to a thorough analysis 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 submitted cannot be validated.

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

In most cases, CFMU data have been used as the basis for the output metrics used in the ACE data analysis, and this practice has been generally accepted, including in cases where in previous years there had been discrepancies.

1.5 ANSPs' Annual Reports

ANSPs' Annual Reports provided a valuable means of validating the 2011 information disclosure data.

The SES Service Provision Regulation (SPR) (EC No 550/2004) came into force on 20 April 2004 and is applicable to 2011 Financial Accounts in all EU Member States (plus Switzerland and Norway) and to associated ANSPs. This Regulation is also applicable to States which have signed the ECAA Agreement (see Section 1.2), although the timing of its implementation is not yet decided for individual States. Among other provisions, the SPR requires that ANSPs meet certain standards of information disclosure (transparency) and reporting, and in particular that:

- ANSPs should draw up, submit to audit and publish their Financial Accounts (Art.12.1);
- in all cases, ANSPs should publish an Annual Report and regularly undergo an independent audit (Art 12.2);
- ANSPs should, in their internal accounting, identify the relevant costs and income for ANS broken down in accordance with EUROCONTROL's principles for establishing the cost-base for route facility charges and the calculation of unit rates and, where appropriate, shall keep consolidated accounts for other, non-air navigation services, as they would be required to do if the services in question were provided by separate undertakings (Art 12.3). The latter requirement is particularly relevant for the ANSPs which are part of an organisation which owns, manages and operates airports, such as Aena[7], Avinor, Finavia, HCAA, and DHMI[8].

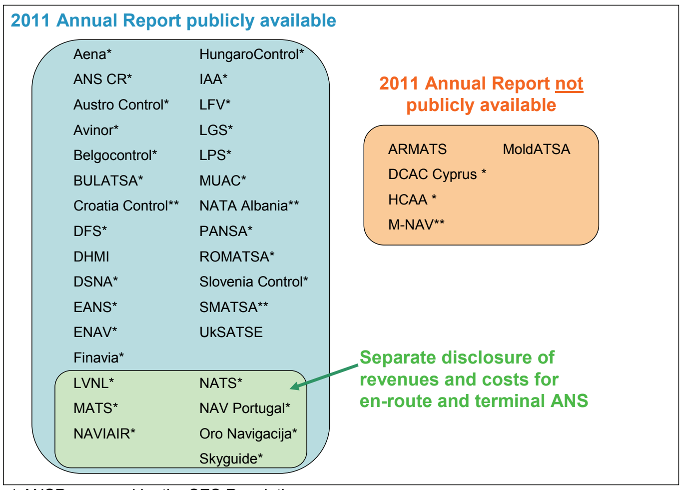
[7] In 2011, Aena went through a restructuration process relating to the separation of the airport division of Aena (creation of a new company Aena Aeropuertos S.A.) from the ANS department.
[8] Although it should be noted that DHMI is not covered by the SES regulations.

Figure 1.3 displays the status of ANSPs 2011 Annual Reports and indicates that 32 out of 37 participating ANSPs[9] have published an Annual Report for the year 2011.

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

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

Five ANSPs (including two which are subject to SES Regulations - namely HCAA and DCAC Cyprus) have not published Annual Reports for 2011.



* ANSPs covered by the SES Regulations
** ANSPs operating in States member of ECAA

Figure 1.3: Status of 2011 Annual Reports

ANSPs' Annual Accounts are drafted in accordance with specific accounting principles. Often, (national) General Accepted Accounting Principles (GAAP) are used. In the context of the SES, Article 12 of the SPR prescribes that ANSPs Annual Accounts shall comply, to the maximum extent possible, with International Financial Reporting Standards (IFRS). Table 1.2 shows the 24 ANSPs whose 2011 Annual Accounts were partly or fully prepared according to IFRS[10].

ANSPs reporting according to IFRS in 2011	
Aena	MATS
ARMATS	MUAC
ANS CR	NATA Albania
Austro Control	NATS
Avinor	NAVIAIR
BULATSA	NAV Portugal
Croatia Control	Oro Navigacija
DFS	PANSA
EANS	ROMATSA
LGS	Skyguide
LPS	SMATSA
LVNL	UkSATSE

Table 1.2: IFRS reporting status

It should be noted that in some cases, the implementation of IFRS may have a significant impact on an ANSPs' cost base[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.

1.6 ANSP benchmarking and the SES Performance Scheme

The SES Performance Scheme includes EU-wide performance targets which are transposed into binding national/FAB targets for which clear accountabilities must be assigned within national/FAB performance plans. Following the PRB recommendations,

[9] Although shown as available in the figure below, at the time of writing this report, DSNA had not yet published its 2011 Annual Report. This document is expected to be released after the Summer 2013.

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

[11] 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.

EU-wide targets for Cost-Efficiency, Capacity and Environment were adopted by the EC on 3 December 2010 for RP1 (2012-2014). It should be noted that the EU-wide Cost-Efficiency target for RP1 is expressed in terms of en-route determined costs per service unit, and is computed at State level (i.e. including ANSPs, MET, EUROCONTROL and NSAs costs).

The ACE factual and independent benchmarking has set the foundation for a normative analysis to quantify the potential scope of cost-efficiency improvements for ANSPs and has been one of the main inputs considered for determining the cost-efficiency targets for RP1. The ACE data analysis had also a significant role in the context of the assessment of national performance plans that was carried out by the PRB during the Summer 2011.

Figure 1.4 below shows how findings from the ACE Benchmarking analysis and the gathering of "intelligence" on ANSPs cost-efficiency performance directly feeds three core processes of the Single European Sky (SES) performance scheme:

1. EU-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.

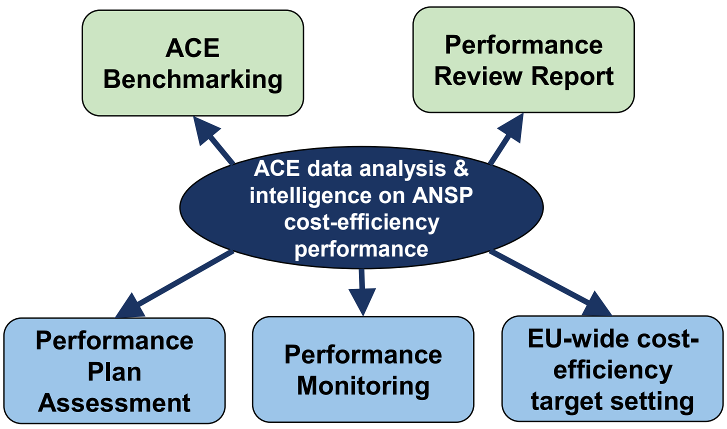


Figure 1.4: Use of ACE data analysis in the SES Performance Scheme context

For ANSPs operating in SES States, the year 2012 marks the start of RP1 and the end of the "full cost-recovery" mechanism for en-route ANS. Under the full cost-recovery mechanism, all the risks are borne by the airspace users and ANSPs are not sufficiently incentivised to deliver a better cost-efficiency performance since they have to return any over-recoveries, even if these are the result of cost-savings. Over RP1, SES States/ANSPs will operate under the "determined costs" principle which comprises specific risk-sharing arrangements aiming at incentivising ANSPs economic performance. It is expected that in this context, SES ANSPs show a greater reactivity to adjust en-route costs and better adapt to the lower traffic growth that is planned for RP1.

In September 2013, the PRB will release a report on the monitoring of SES performance targets for the year 2012. In September 2013, after an extensive public consultation, the PRB will also publish recommendations for the EU-wide targets covering RP2 (2015-2019). ANSP benchmarking will be one of the evidences used to assess the scope for future performance improvements at EU-wide level and to build up the proposal for the cost-efficiency target.

Another important milestone for the PRB will be the assessment of the FAB/national performance plans for RP2 during the Summer 2014. The ACE 2012 data analysis will be an important input to be considered in this context.

PART I: EUROPEAN ANS DATA AND INTRODUCTION TO ANSP BENCHMARKING

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2 EUROPEAN ANS SYSTEM DATA

This chapter provides aggregate information on the European ANS system[12] reported in compliance with the SEID for the year 2011. In addition, it provides a detailed presentation of the different ANS cost categories and explain how ANSP's costs are defined in the context of the ACE analysis in order to provide fair comparisons of performance across ANSPs and across time.

2.1 Coverage of the ACE 2011 Benchmarking Report

This ACE Report includes all EUROCONTROL Member States as of 1st January 2011, with one exception: Bosnia & Herzegovina[13], for which information was not requested. It includes EANS, the ANSP operating in Estonia, which provided information on a voluntary basis.

For the purpose of this report, oceanic airspace was excluded. The geographical area covered by the information disclosed is shown in Figure 2.1.

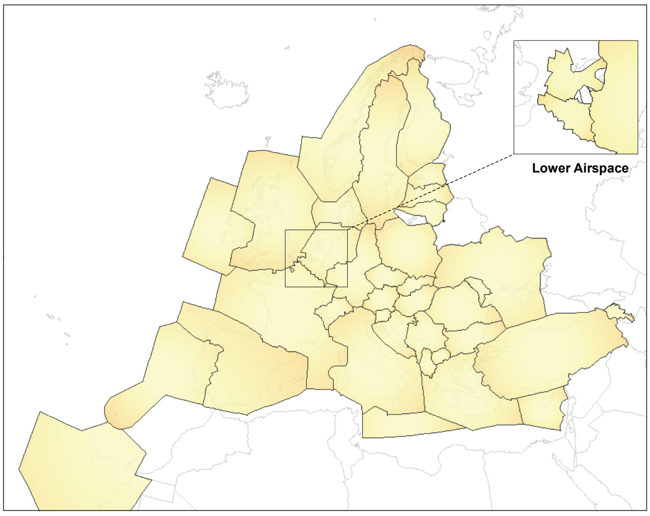


Figure 2.1: Geographic coverage of the ACE 2011 data analysis

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

2.2 European ANS system data for the years 2010 and 2011

In 2010, traffic volumes in terms of flight-hours started to rise again (+2.6%) after the sharp decline experienced in 2009 (-6.5%). In 2011, the total number of flight-hours controlled by the ANSPs increased by some +4.0% to reach a level which is still below that of 2008.

Figure 2.2 shows monthly changes in IFR flights (expressed in average daily flights) between 2010 and 2011.

[12] For the purpose of this report, the "European ANS system" includes all 37 ANSPs that submitted data following the requirement from Decision No. 88 of the Permanent Commission of EUROCONTROL.

[13] Although Bosnia & Herzegovina (BIH) has been a EUROCONTROL Member State since 1 March 2004, its ANSP (BHANSA) was not requested to report data according to the SEID, since the area control services in BIH's airspace were provided in 2011 by Croatia Control and SMATSA. It should be noted that BHANSA will start providing area control services in BIH's airspace gradually in 2013. As a result, the PRU expects that BHANSA starts providing data according to the SEID by 2014 (i.e. ACE 2013).

Figure 2.2 indicates that the +4.0% traffic growth in 2011 was partly attributable to the lower traffic volumes in April 2010 due to cancelled flights following the volcanic eruption in Iceland.

Figure 2.2 also indicates that in October and November 2011, traffic growth slowed down and as a result the number of IFR flights controlled was close to 2010 levels.

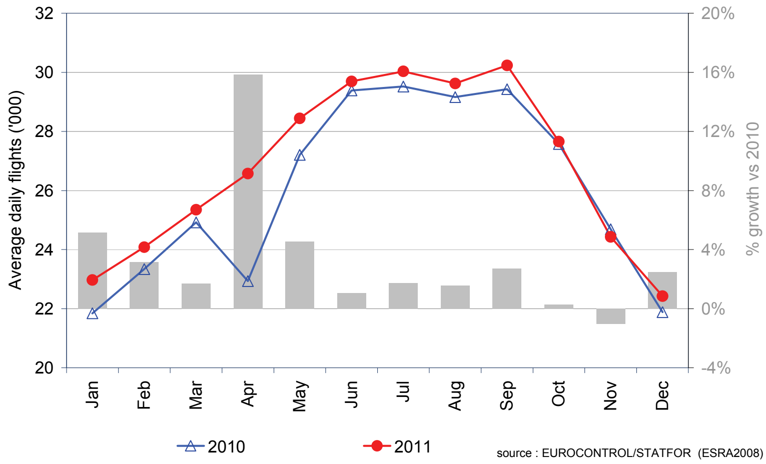


Figure 2.2: Monthly evolution of IFR traffic (2010 vs 2011)

Table 2.1 below comprises high level data for the European ANS system in 2011 and compares this information with 2010 data.

	2010 37 ANSPs	2011 37 ANSPs	11/10 37 ANSPs
Gate-to-gate ANS revenues (not adjusted by over/under recoveries) (in € M):	**8 461**	**8 894**	**5.1%**
En-route ANS revenues	6 740	7 075	5.0%
Terminal ANS revenues	1 721	1 819	5.7%
Gate-to-gate ANS costs (in € M):	**8 830**	**8 877**	**0.5%**
ATM/CNS provision costs	7 702	7 839	1.8%
MET costs	449	424	-5.6%
EUROCONTROL Agency costs	530	456	-13.9%
Payment to national authorities and irrecoverable VAT	148	158	6.4%
Gate-to-gate ATM/CNS costs (in € M):	**7 702**	**7 839**	**1.8%**
En-route ATM/CNS costs	5 939	6 066	2.1%
Terminal ATM/CNS costs	1 763	1 773	0.5%
Gate-to-gate ANS staff:	**58 016**	**57 968**	**-0.1%**
ATCOs in OPS	16 871	17 208	2.0%
ACC ATCOs	9 387	9 573	2.0%
APPs + TWRs ATCOs	7 484	7 635	2.0%
NBV of gate-to-gate fixed assets (in € M)	**7 819**	**7 460**	**-4.6%**
Gate-to-gate capex (in € M)	**1 121**	**1 010**	**-9.9%**
Outputs (in M)			
Distance controlled (km)	9 767	10 092	3.3%
Total flight-hours controlled	13.9	14.5	4.0%
ACC flight-hours controlled	12.2	12.8	5.0%
IFR airport movements controlled	14.8	15.4	3.7%
IFR flights controlled	9.5	9.8	3.1%
Gate-to-gate ATFM delays ('000 min.)	**27 476**	**17 823**	**-35.1%**

Table 2.1: High level data for the European ANS system for 2010 and 2011 (real terms)

Table 2.1 shows that overall, in 2011 ANS revenues rose by +5.1% in real terms while gate-to-gate ANS costs increased by +0.5%. Gate-to-gate ATM/CNS provision costs increased by +1.8% in 2011, this rise was mainly driven by an increase in en-route costs (+2.1%) while terminal costs remained fairly constant (+0.5%). Table 2.1 also indicates that compared to 2010, EUROCONTROL costs (-13.9%) and MET costs (-5.6%) substantially decreased. The significantly lower EUROCONTROL costs in 2011 reflect the impact of a one-off exceptional reduction (€62M) mainly relating to the implementation of IFRS budgeting.

Table 2.1 shows that total gate-to-gate ANS staff remained fairly constant (-0.1%) while ATCOs in OPS increased by +2.0% compared to 2010.

Finally, it is worth noting that following the sharp increase experienced in 2010 (+81%), ATFM delays significantly decreased at Pan-European system level (-35%). Further details on the drivers underlying the reduction in ATFM delays observed in 2011 are provided in Chapter 7 of this Report.

2.3 System outputs

In 2011, European ATC operational units controlled 14.5M flight-hours over a total distance of 10 092M kilometres. The various TWR operational units handled 15.4M IFR airport movements and 3.3M VFR airport movements.

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

Composite gate-to-gate flight-hours = (en-route flight-hours) + (0.27 x IFR airport movements)

According to this definition, the total number of composite flight-hours for the Pan-European system in 2011 is 18.5M. The average weighting factor (0.27) is based on the total monetary value of the outputs over the 2002-2011 period.

En-route flight-hours are computed from the flight plans provided by airspace users to the EUROCONTROL CFMU (so-called "CFMU Model III[14]"). En-route flight-hours comprise the number of flight-hours controlled by ACCs and APPs operational units[15]. Similarly, the number of IFR airport movements controlled by the TWR operational units is used as the output measure for terminal ANS.

2.4 ANS revenues

Total ANS revenues in 2011 were €8 894M. This is higher than the combined revenues of Europe's three largest airport operators (BAA, ADP and Fraport), which amounted to some €7.2B.

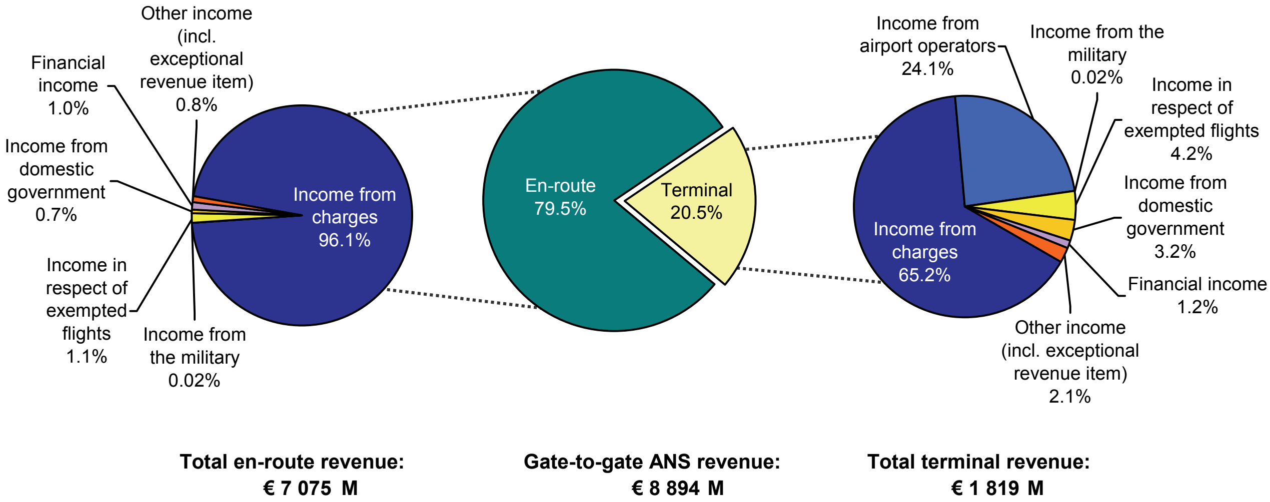
The breakdown of ANS revenues is shown in Figure 2.3. The main share (79.5%) was collected for en-route ANS services and the remainder (20.5%) for terminal services. Overall, this share has remained fairly stable between 2007 and 2011. However, marginal changes can be expected in the forthcoming years with the progressive adoption of the Common Charging Scheme Regulation (EC No. 1794/2006), which *inter alia*, will harmonize the computation of the terminal service units and will enhance the transparency on the financing of terminal ANS.

Almost all en-route revenues come from the collection of charges (96.1%, see left pie chart). The proportion is lower for terminal revenue (65.2%, see right pie chart), as additional income may directly come from airport operators (24.1% e.g. through a

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

[15] Since 2007, en-route flight-hours include time spent in Terminal Manoeuvring Areas (TMAs) and therefore account for airborne holdings.

contractual arrangement between the ANSP and the airport operator) much of which is subsequently recovered from airspace users and passengers. Compared to 2010, the share of the income from charges in total terminal revenues decreased (from 72.1% to 65.2%) while the share of the income from airport operators increased (from 18.0% to 24.1%). These changes are mainly reflecting the structural changes[16] that were implemented in Aena in 2011.



En-route	%	Gate-to-gate revenues (€ M)	Terminal	%
6 799	96.1%	Income from charges	1 187	65.2%
n.a.	n.a.	Income from airport operators	439	24.1%
1.1	0.02%	Income from the military	0.3	0.02%
93	1.3%	Income in respect of exempted flights	77	4.2%
52	0.7%	Income from domestic government	57	3.2%
73	1.0%	Financial income	21	1.2%
57	0.8%	Other income (incl. exceptional revenue item)	38	2.1%
7 075	100.0%		1 819	100.0%

Figure 2.3: Breakdown of gate-to-gate ANS revenues in 2011

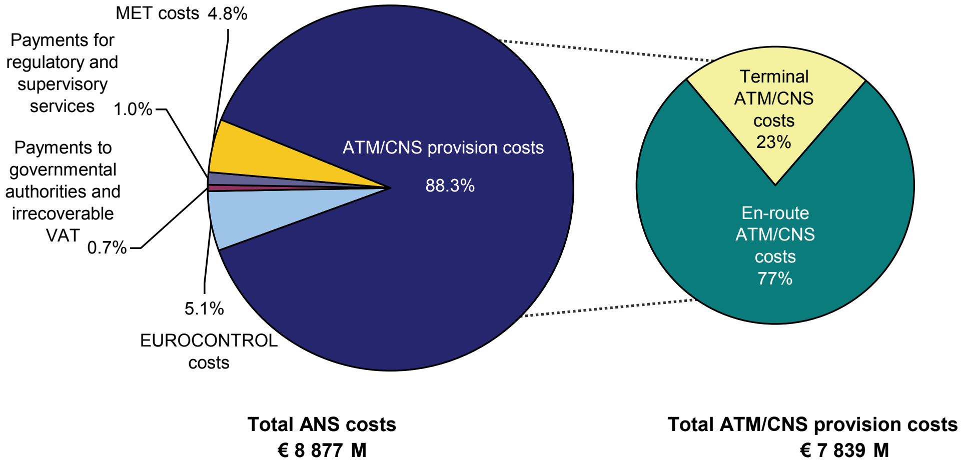
2.5 ANS costs

Total ANS costs for the Pan-European system amounted to €8 877M in 2011, comprising the following five cost categories[17] (see Figure 2.4).

- ATM/CNS provision costs[18] (including MUAC[19]);
- aeronautical Meteorological costs (MET)[20];
- EUROCONTROL costs[21];
- payments for regulatory and supervisory services; and,

[16] The income from terminal ANS charges reported in Aena 2011 data submission corresponds to the TNC income perceived from airspace users between January and May 2011. For the rest of the year, according to the National Law, Aena income from charges only includes revenues relating to ATC services provided in the final approach. The income from airport operators reported in Aena 2011 data submission corresponds to the income received from Aena Aeropuertos (subsidiary of Aena created in June 2011 and which is in charge of airport management activities in Spain) since June 2011 for the provision of ATC services at airports.
[17] Detailed definitions of these costs are given in the SEID.
[18] The costs of providing ATM services and the Communication, Navigation and Surveillance infrastructure. For the purpose of this report this includes the costs for Aeronautical Information Services (AIS) and, if any, Search and Rescue Services (SAR).
[19] Costs for MUAC are included in the ATM/CNS costs in Figure 2.4 as EUROCONTROL MUAC is a certified ANSP and therefore included in the cost-effectiveness analysis.
[20] Including MET costs reported by the UK and Danish CAAs.
[21] Excluding MUAC and CRCO administrative costs.

- payments to governmental authorities (e.g. for the use of government-owned assets).



Gate-to-gate ANS costs (€ M)	2011	% total
ATM/CNS provision costs (including AIS & SAR)	7 839	88.3%
MET costs	424	4.8%
EUROCONTROL costs	456	5.1%
Payment for regulatory and supervisory services	93	1.0%
Payment to governmental authorities and irrecoverable VAT	65	0.7%
Gate-to-gate ANS costs	8 877	100.0%

Figure 2.4: Breakdown of total ANS costs at system level in 2011

Around 88% of the total costs relates to ATM/CNS provision, and is under the direct control and responsibility of the ANSP. These ATM/CNS provision costs amounted to €7 839M in 2011, and form the basis for the analysis of ATM cost-effectiveness in **Part II and Part III** of this report.

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

- Costs relating to services provided to military OAT, Oceanic ANS, AFIS/ATC at smaller regional aerodromes[22], and reported under the "Other" column in the SEID;
- MET costs (whether provided internally or externally);
- Payments to governmental or regulatory authorities;
- EUROCONTROL costs[23]; and
- Payment to other ANSPs or States for delegated services, including payments for MUAC.

ATM/CNS provision costs can be further broken down into the following cost types[24]:

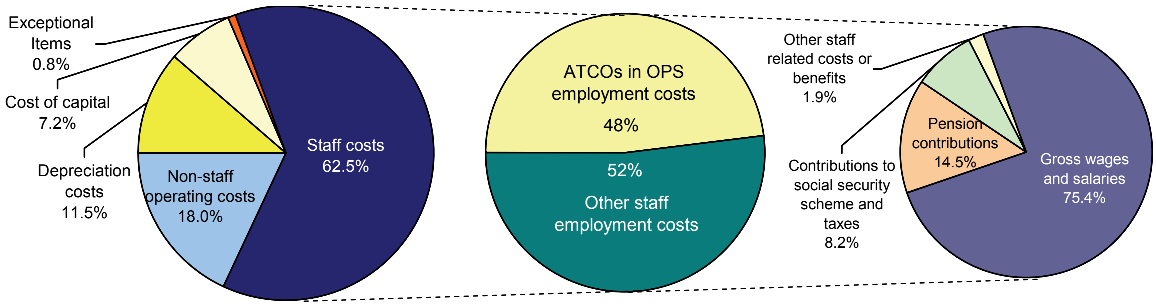
- staff costs, comprising:
  - employment costs for ATCOs in OPS;
  - employment costs for all other staff;
- non-staff operating costs (e.g. rentals, energy, telecom, insurance, outsourced maintenance);
- capital-related costs comprising:
  - depreciation;
  - the cost of capital;

[22] This is the case for Avinor, ENAV, and Finavia.
[23] Excluding MUAC costs.
[24] Detailed definitions of these costs are given in the SEID.

- exceptional items.

The distribution of costs between these categories is shown in Figure 2.5 below. Staff costs are the main element of costs (63%), followed by direct operating costs, depreciation costs and cost of capital. At Pan-European system level, operating costs (including staff costs, non-staff operating costs and exceptional cost items) account for some 81% of total ATM/CNS provision costs, and capital-related costs (cost of capital and depreciation) amount to some 19%.

The pie chart on the right-hand side of Figure 2.5 breaks down ANSPs staff costs (€4 900M) into different categories. Gross wages and salaries is the main component of total staff costs with 75.4%. The second largest category, employer contributions to staff pensions[25], accounts for 14.5% of the total. It should be noted that the proportion of pension contributions in total staff costs can significantly differ across the European ANSPs. This reflects the different pension arrangements that are in place locally. These different pension arrangements (in particular, defined benefit pension schemes) can substantially affect employment costs. The impact of pension costs on ANSPs staff costs is further discussed in Section 5.3.3 of this Report.



ATM/CNS provision costs (€ M)	En-route	%	Terminal	%	Gate-to-gate	%
Staff costs	3 760	62.0%	1 140	64.3%	4 900	62.5%
ATCOs in OPS employment costs	n.a.	n.a.	n.a.	n.a.	2 360	-
Other staff employment costs	n.a.	n.a.	n.a.	n.a.	2 540	-
Non-staff operating costs	1 085	17.9%	325	18.3%	1 410	18.0%
Depreciation costs	715	11.8%	189	10.6%	904	11.5%
Cost of capital	455	7.5%	107	6.0%	562	7.2%
Exceptional Items	51	0.8%	12	0.7%	63	0.8%
Total	6 066	100.0%	1 773	100.0%	7 839	100.0%

Figure 2.5: Breakdown of European ATM/CNS provision costs in 2011

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

The figures reported in the last column of Table 2.2 (gate-to-gate ATM/CNS provision costs, amounting to €7 839M at Pan-European system level) are those which are used for the benchmarking of ATM/CNS cost-effectiveness across ANSPs in **Part II and Part III** of this report. The subset of costs used in the analysis has been chosen to cover, as far as possible, those costs that are under the direct control of the ANSP, and relate to the provision of ATM/CNS services for GAT.

[25] Note that in ANSPs ACE data submissions, costs relating to the implementation of Early Retirement Schemes (ERS) are usually reported as exceptional costs items and not pension contributions.

ANSP	Country	EN-ROUTE ANS COSTS: Total ANS costs (in €'000)	MET costs (%)	Payment for regulatory and supervisory services (%)	EUROCONTROL costs (%)	Irrecoverable value added tax (VAT)	Payment to the State for provision of other services (%)	ATM/CNS en-route costs (%)	ATM/CNS en-route costs (in €'000)	TERMINAL ANS COSTS: Total ANS costs (in €'000)	MET costs (%)	Payment for regulatory and supervisory services (%)	EUROCONTROL costs (%)	Irrecoverable value added tax (VAT)	Payment to the State for provision of other services (%)	ATM/CNS terminal costs (%)	ATM/CNS terminal costs (in €'000)	Gate-to-gate ATM/CNS costs (in €'000)
Aena	Spain	752 312	5.2%	1.1%	7.3%		2.0%	84.3%	634 355	281 811	5.4%					94.6%	266 550	900 904
ANS CR	Czech Republic	105 861	2.1%	0.3%	5.4%			92.1%	97 514	25 051	2.4%	0.2%				97.4%	24 399	121 913
ARMATS	Armenia	4 153			5.7%			94.3%	3 916	3 265						100.0%	3 265	7 181
Austro Control	Austria	173 289	9.4%	0.2%	5.6%			84.8%	146 978	36 971	9.4%	0.3%				90.3%	33 399	180 377
Avinor (Continental)	Norway	99 903	1.5%	0.3%	6.5%			91.7%	91 640	103 114	1.5%	0.1%				98.4%	101 461	193 101
Belgocontrol	Belgium/Lux.	153 605	4.7%	24.9%	7.5%			62.8%	96 489	58 869	7.0%	1.3%				91.7%	53 964	150 453
BULATSA	Bulgaria	75 143	7.3%	0.8%	5.5%	0.3%		86.1%	64 678	11 725	12.8%	1.4%		0.3%		85.6%	10 035	74 713
Croatia Control	Croatia	77 693	5.9%	1.2%	4.3%			88.6%	68 847	8 396						100.0%	8 396	77 243
DCAC Cyprus	Cyprus	44 469	8.0%	14.5%	5.2%			72.3%	32 163	7 433	12.3%	25.2%				62.6%	4 650	36 813
DFS	Germany	931 665	3.5%	7.7%	7.1%			81.7%	761 268	217 630		0.3%				99.7%	217 062	978 330
DHMI	Turkey	293 700	7.3%	0.8%	5.3%			86.6%	254 211	69 977						100.0%	69 977	324 188
DSNA	France	1 149 253	5.7%	4.7%	6.5%	3.2%		79.9%	918 529	271 492	8.2%	0.6%		3.9%		87.2%	236 755	1 155 285
EANS	Estonia	11 706	1.0%	1.5%				97.4%	11 405	1 260	6.0%					94.0%	1 185	12 590
ENAV	Italy	650 459	5.2%	0.5%	6.9%			87.5%	568 974	130 194	10.8%	0.8%				88.3%	115 020	683 994
Finavia	Finland	40 347	6.2%	1.5%	8.0%			84.3%	34 024	31 937	7.9%	3.5%				88.7%	28 327	62 351
M-NAV	F.Y.R Macedonia	10 705	5.8%	3.9%	4.7%			85.5%	9 158	1 571	8.1%	9.4%				82.5%	1 296	10 454
HCAA	Greece	156 185	5.1%	1.4%	7.1%			86.5%	135 055	25 636	3.7%	2.0%				94.3%	24 163	159 218
HungaroControl	Hungary	85 111	1.9%	1.8%	4.9%			91.4%	77 815	19 406	5.7%	1.4%				93.0%	18 038	95 853
IAA	Ireland	115 774	5.3%	1.5%	6.0%		1.9%	85.3%	98 755	25 246	6.1%	1.2%			1.4%	91.3%	23 050	121 805
LFV	Sweden	201 291	3.7%	1.6%	5.8%			88.9%	178 863	29 270		0.7%				99.3%	29 067	207 930
LGS	Latvia	20 609	4.3%	6.7%	5.0%			84.0%	17 308	6 962	10.1%	7.0%				82.9%	5 768	23 076
LPS	Slovak Republic	51 087	2.4%	1.9%	5.4%			90.4%	46 159	5 625	9.1%	1.5%				89.5%	5 032	51 191
LVNL	Netherlands	155 587	4.8%	15.9%	9.3%	-2.9%		72.9%	113 436	53 363	3.1%			-4.1%		101.0%	53 892	167 328
MATS	Malta	14 214		2.5%	6.6%			90.9%	12 927	2 202						100.0%	2 202	15 130
MoldATSA	Moldova	7 200	9.4%	2.8%	4.9%			83.0%	5 977	1 864	20.0%	2.0%				78.1%	1 456	7 433
MUAC		129 069				0.0%		100.0%	129 060	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	129 060
NATA Albania	Albania	19 249	1.7%	2.7%	4.0%			91.6%	17 625	2 295	4.7%					95.3%	2 187	19 812
NATS (Continental)	United Kingdom	618 290	5.4%	1.4%	8.0%		0.9%	84.3%	521 016	162 572	0.0%	2.1%				97.9%	159 183	680 199
NAV Portugal (Continental)	Portugal	120 421	4.3%	0.5%	6.6%			88.7%	106 773	28 279						100.0%	28 279	135 052
NAVIAIR	Denmark	92 926	4.7%	1.6%	7.9%			85.8%	79 759	31 755						100.0%	31 755	111 514
Oro navigacija	Lithuania	20 579	2.0%	1.2%	5.2%			91.5%	18 826	3 306	1.4%	1.0%				97.6%	3 225	22 051
PANSA	Poland	129 829	3.7%	1.5%	5.4%			89.3%	115 993	30 043	6.9%	3.6%				89.5%	26 880	142 872
ROMATSA	Romania	134 181	5.2%	2.2%	5.8%			86.9%	116 549	24 202	5.6%	0.4%				94.0%	22 754	139 304
Skyguide	Switzerland	207 886	4.2%	0.3%	3.9%			91.6%	190 503	90 906	4.4%	0.2%				95.4%	86 728	277 231
Slovenia Control	Slovenia	28 892	4.8%	1.9%	4.5%			88.7%	25 623	3 924	11.4%	2.3%				86.3%	3 384	29 007
SMATSA	Serbia and Montenegro	84 013	5.8%	6.0%	3.5%			84.7%	71 130	14 367	6.3%					93.7%	13 466	84 596
UkSATSE	Ukraine	202 528	0.9%	0.9%	3.0%			95.2%	192 801	56 808		0.9%				99.1%	56 309	249 110
									6 066 101								1 772 560	7 838 660

Table 2.2: Breakdown of en-route and terminal ANS costs, 2011

2.6 Assets, liabilities and capital expenditures

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

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

In ANSPs' balance sheets, assets comprise:

- the net book value (NBV) of fixed assets both in operation[26] and under construction;
- current assets, comprising principally stock, cash and debtors; and,
- long-term financial assets, including investments required to cover provisions for pensions and investments in other companies.

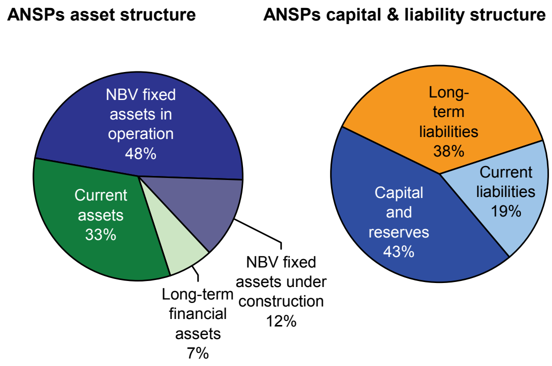
The liabilities (which must be numerically equal to the assets), comprise:

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

The total NBV of the fixed assets used by the European ANSPs to provide ATM/CNS is valued at some €7 460M[27], which means that overall for the ANS industry €0.84 of capital is required to generate €1 of revenue, an indication of relative capital intensity (this ratio is about 2 for airlines and about 3 for main airports operators). Figure 2.6 shows the breakdown of the balance sheet for European ANS, both assets and liabilities.

[26] The NBV is the value of the asset net of cumulative depreciation.

[27] Note that this figure exclusively relates to assets booked in ANSPs accounts. Assets owned by MET service providers and NSAs are not included.



ANSP Fixed Asset Structure (€ M)	Gate-to-gate ANS
Total NBV fixed assets in operation	5 971
Land & Buildings	*2 150*
Systems & Equipments	*2 921*
Intangible assets	*900*
Total NBV fixed assets under construction	1 488
Land & Buildings	*285*
Systems & Equipments	*890*
Intangible assets	*313*
Total NBV of fixed assets	7 460

Figure 2.6: ANSP assets and liabilities structure, 2011

Asset values comprise chiefly fixed assets (60%) either already in operation (48%) or under construction (12%). Current assets amount to 33% and long-term financial assets represent 7% of the total assets. The liability side of the balance-sheet comprises capital and reserves (43%), long-term liabilities (38%) and current liabilities (19%).

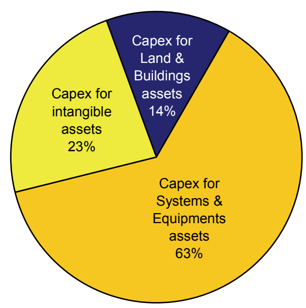
The ANSPs' equity at Pan-European system level substantially exceeds their long-term debt, although this is an area where there is great variance across ANSPs. Understanding the main drivers for the differences in the equity/long-term debt ratio across ANSPs would require further investigation. This is an area of greater importance with the introduction of the risk sharing arrangements in 2012 for SES States/ANSPs, as part of the SES II package.

The ratio of current assets to current liabilities is commonly known as "*current ratio*" and it is used to measure the "liquidity" risk. Therefore, it indicates the capability to cover the current debt by only employing "liquid" resources. For instance, its value at ANSPs' Pan-European system level was some 1.77 at the end of 2011. This is a high value if we consider that, on average, ANSPs would be able to cover up to 177% of their current debt by only using their liquid assets.

Even when using a more stringent measure of liquidity, such as the *"quick ratio"* (retaining only debtors and cash assets instead of all current assets) the value is 1.37. In this case, it indicates that, on average, ANSPs would be able to pay 137% of their current debt by only using their most "liquid" assets.

Figure 2.7 shows the breakdown of 2011 capital expenditure (capex) between land & building, systems & equipments and intangible assets. At Pan-European system level, the capex for the 37 ANSPs amounted to some €1 010M in 2011.

Capex planned for the period 2012-2016 are analysed in Chapter 6 of this ACE Report. Details on the nature of the major investment projects for each ANSPs participating to the ACE 2011 data analysis are provided in Annex 8 of this Report.



Total gate-to-gate capex: € 1 010 M

Figure 2.7: ANSP capex structure, 2011

As part of reporting requirements, high level information on the main softwares for ATM systems is collected and analysed. This information includes the name of the suppliers and the dates of commissioning, upgrades and planned replacement for Flight Data Processing Systems (FDPS), Radar Data Processing Systems (RDPS), Human Machine Interface (HMI) and Voice Communication Systems (VCS).

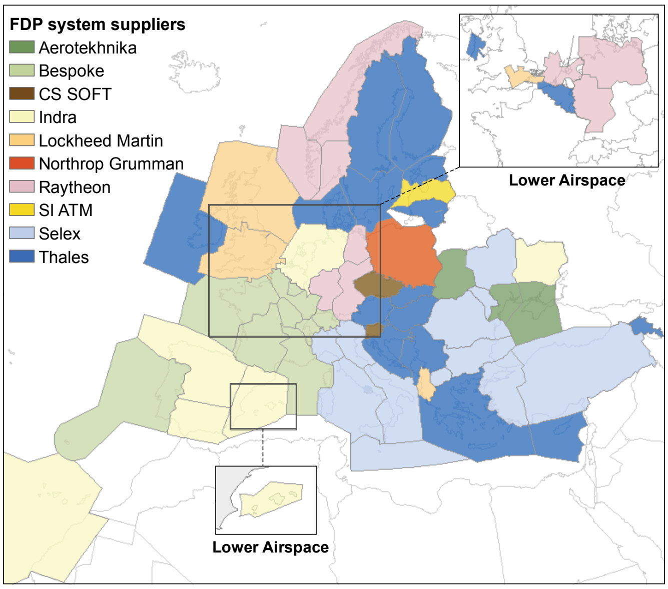


Figure 2.8: FDP systems suppliers, 2011

Figure 2.8 provides information on the suppliers of the different FDP systems that are operated across Europe.

It is noteworthy that in 2011, the FDP systems in operation in the Ukrainian ACCs were not provided by the same supplier. This reflects the progressive replacement of FDP systems in the context of the ANS modernisation programme which is currently on-going in Ukraine.

Figure 2.9 shows how systems from different suppliers serve Europe's flight-hours. In 2011, the largest suppliers in terms of flight-hours controlled were Selex (19%), Thales (19%), Indra (15%) and Raytheon (14%).

The fact that a relatively large number of manufacturers compete should contribute to reduce the price of FDP systems. On the other hand, additional costs may arise from the duplication of FDP systems specification, customisation and maintenance, which are typical elements of support costs.

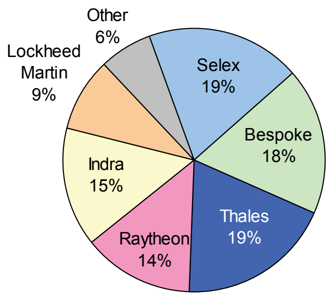


Figure 2.9: Share of FDP systems suppliers in terms of flight-hours controlled, 2011

Similarly, the fact that neighbouring ANSPs operate different FDP systems might contribute to create additional ATCO workload associated with the interface between the different systems.

A number of ACCs use "bespoke" systems, developed in-house specifically for the ACC or the ANSP. This is the case for DSNA and NAV Portugal. It should however be noted that a certain degree of customisation is required even when the FDP system is a commercial off-the-shelf (COTS) solution and not fully developed internally.

Five ANSPs (Austro Control, Croatia Control, IAA, LFV and NAVIAIR) have established a partnership with Thales for the development of harmonised ATM systems (COOPANS). The collective investment relating to COOPANS Build 1 amounts to some €200M. According to COOPANS partners, this investment is estimated to be some 30% lower than if the same systems had to be developed independently. COOPANS is progressively deployed in the different ACCs, first in Shannon and Dublin (2011), then in Malmö, Copenhagen and Stockholm (2012), Vienna (2013) and Zagreb (2014).

Another significant cooperation project for the common development of ATM systems is COFLIGHT, a partnership between DSNA, ENAV, Skyguide and an industrial consortium established by Thales and Selex. The deployment of the new FDPS is planned to start in 2015. Similarly, the iTEC consortium, based on an Indra platform, involves Aena, DFS, NATS and LVNL (since March 2011).

It is noteworthy that these initiatives on the common development of ATM systems involve ANSPs which are not necessarily members of the same FAB or even geographical neighbours. With the exception of DK-SE FAB, FAB partners usually operate FDP systems from different suppliers.

Further initiatives towards a higher level of shared infrastructure are encouraged. The bulk of investment is related to software, for which there is a high potential for economy of scale in procurement and maintenance. Higher quality standards, interoperability and upgradability are also expected.

Data concerning the physical numbers of surveillance and navigation assets have also been collected since the implementation of the SEID V2.6. In 2011, the 37 ANSPs were responsible for 200 primary radars, and 328 secondary surveillance radars (SSRs), Mode S and MSSR, many of which were co-located with primary radars. This represents an average density of 26 SSRs per million km^2. Densities of SSRs tend to be relatively lower in peripheral areas of Europe (although in some cases this is inevitable as the areas include major areas of sea), and higher in the core area.

A rather similar pattern is observed with different types of navaids. On average, there were some 86 DMEs and 54 VORs per million km^2, with in general lower values observed in peripheral areas of Europe. Note that in the table below, no SSRs are displayed for MUAC which uses the CNS infrastructure made available by the Four States contributing to MUAC budget (see lower airspace map).

Surveillance and navigation aids physical assets	2011
Primary radar only	40
Primary radar co-located with Mode S	75
Primary radar co-located with MSSR	85
MSSR only	168
Surface movement radars	91
ADS-B ground stations	84
Wheather radars	35
Other surveillance assets	143
Distance measuring equipment (DME)	1 104
Non-directional beacons (NDBs)	814
Very high frequency omni-directional ranges (VORs)	689
Runway ends with ILS	551
Other navaids assets	201

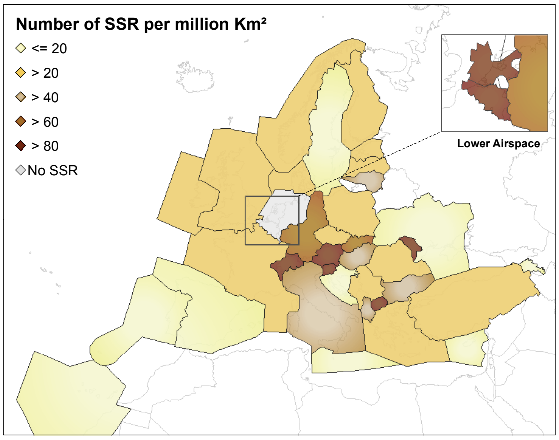


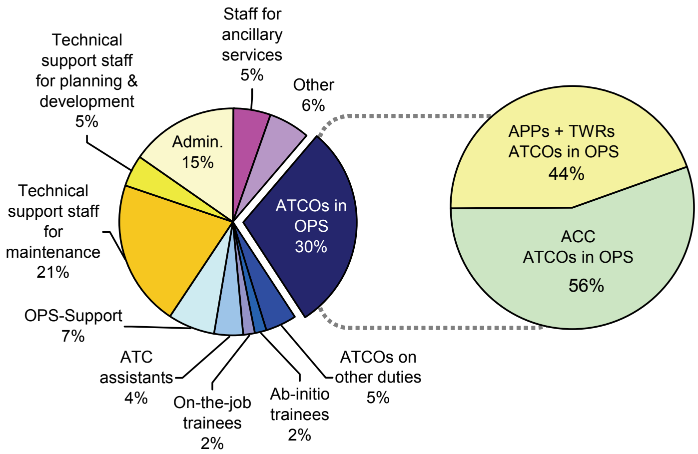
Figure 2.10: Surveillance and navigation aids physical assets, 2011

2.7 Staff

ANSPs are required to disclose information about a number of staff categories[28]. The staff numbers are reported as Full Time Equivalents (FTEs).

The 37 European ANSPs, including MUAC, employed 57 968 staff[29] in 2011. Of these, some 48% are directly involved in operations (blue colours in Figure 2.11 below).

The largest share (30%) relates to air traffic controllers working on operational duty (ATCOs in OPS). Some 56% of ATCOs in OPS work in ACCs and some 44% in APP and TWR operational units, as illustrated in Figure 2.11 below.



Staff	2011	% total
Number of ANSPs	37	
ATCOs in OPS:	17 208	29.7%
ACC ATCOs in OPS	*9 573*	*55.6%*
APPs + TWRs ATCOs in OPS	*7 635*	*44.4%*
ATCOs on other duties	2 618	4.5%
Ab-initio trainees	891	1.5%
On-the-job trainees	1 035	1.8%
ATC assistants	2 479	4.3%
OPS-Support	3 852	6.6%
Technical support staff for maintenance	12 012	20.7%
Technical support staff for planning & development	2 642	4.6%
Administration	8 721	15.0%
Staff for ancillary services	3 082	5.3%
Other	3 429	5.9%
Gate-to-gate ANS Staff	57 968	100%

Figure 2.11: Breakdown of European ANS system staff in 2011

In addition to operational duties, 2 618 FTE ATCOs (4.5% of the total workforce) participate in activities outside the operations room (such as providing training, or working on special projects) which are not directly related to the active control of traffic.

Figure 2.11 above also shows that the second and third largest categories are technical support staff for maintenance (20.7%) and administration staff (15.0%).

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

$$\text{Support Staff Ratio} = \frac{\text{Total Staff}}{\text{Total ATCOs in OPS}} = \frac{57\,968}{17\,208} = 3.4$$

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

[28] Precise definitions of the categories can be found in the SEID.
[29] This excludes EUROCONTROL Agency staff <u>other</u> than MUAC.

Figure 2.12 below shows how traffic, ATCOs in OPS and support staff (i.e. total staff, excluding ATCOs in OPS) have changed for 36 ANSPs between 2007 and 2011. Note that ARMATS has been excluded from this analysis since it started to report data from 2009 onwards.

At Pan-European system, traffic significantly decreased in 2009 following the economic downturn and then increased in 2010-2011 to reach a level comparable to that of 2007. In the meantime, the total number of support staff slightly reduced between 2009 and 2011. On the other hand, the number of ATCOs in OPS remained fairly constant in 2010 and then increased in 2011.

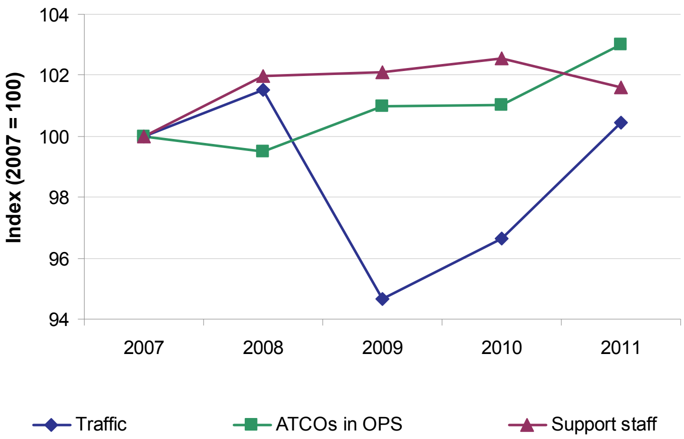


Figure 2.12: Changes in traffic, ATCOs in OPS and support staff, 2007-2011

This indicates that additional ATCOs in OPS were required to handle the additional traffic in 2011, although the total number of flight-hours controlled at system level was lower than in 2007.

Changes in the employment costs for support staff between 2007 and 2011 are analysed in Chapter 5 of this ACE Report.

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3 FACTORS AFFECTING PERFORMANCE

3.1 Introduction

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

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

This chapter is structured as follows:

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

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

3.2 Framework for factors affecting performance

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

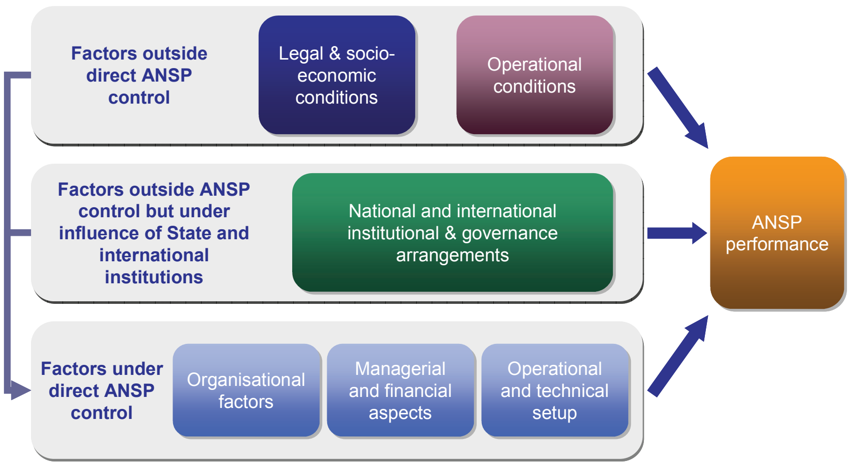

Figure 3.1: Factors affecting cost-effectiveness performance

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

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

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

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

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

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

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

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

3.3 Quantification of some exogenous factors

Exogenous factors are not all observable and measurable, therefore capturing their local impact on ANSPs performance is not a straightforward exercise.

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

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

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

- cost of living;

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

3.3.1 Cost of living

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

There are a number of ways of measuring differences in prevailing wage levels between different countries. In previous ACE reports, unit employment costs have been compared with levels of GDP per head, and with Purchasing Power Parity (PPP[30]) indices.

To demonstrate the variability of PPP across the sample, a cost of living index[31] relative to F.Y.R. Macedonia = 100 (F.Y.R. Macedonia having the lowest index) has been calculated. This cost of living index compares GDP measured at current prices and GDP adjusted for PPPs).

The interpretation of this index is that to achieve the same standard of living, earnings in Norway or in Switzerland (using market exchange rates) will need to be some four times higher than those in F.Y.R Macedonia (see Figure 3.2).

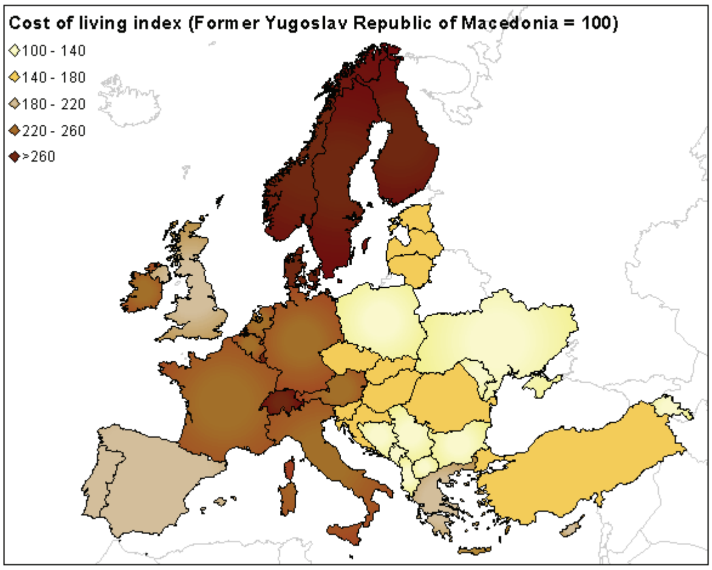

Figure 3.2: Index of cost of living (based on PPPs) in 2011, (source IMF October 2012)

It should be noted that there are some limitations[32] 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.

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

[31] UkSATSE does not agree with the value of the PPPs used for Ukraine. According to UkSATSE the real PPP in Ukraine is significantly higher than the value used in Figure 3.2. According to the information provided in the IMF database (October 2012), PPP exchange rates for Ukraine have increased from 1.868 UAH per current international Dollar in 2006 to 3.998 UAH per current international Dollar in 2011 (+114%). This indicates that the relative cost of living is increasing fast in Ukraine and that the difference in cost of living with the other States is slowly reducing over time. See Annex 6 for further details on the PPPs indices that are used in this report.

[32] 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. Unfortunately, no comprehensive and transparent series exist for all the European regions comprised in the ACE Benchmarking scope.

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

3.3.2 Traffic complexity

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

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

- an **adjusted density**, which is a measure of the concentration of traffic in a given volume of airspace (ANSP/ACC level), and defined in terms of minutes of interaction among aircraft per flight-hour[33]; and,
- a **structural complexity** index, which captures the fact that the traffic in some areas is structurally more complex. The structural complexity index is composed of the sum of three metrics: ascending and descending routes, crossing routes, and variable speeds (a proxy for traffic mix). Clearly, ATC provision in lower airspace will, all other things being equal, face a relatively higher proportion of ascending and descending routes.

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

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

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

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

[33] Interactions are defined as a period in which two aircraft are simultaneously present in a cell of 20×20 Nautical Miles and 3 000 feet in height. Only cells above FL100 are considered in this computation. This allows capturing the complexity of traffic for ANSPs exclusively operating in lower airspace (e.g. below FL245 such as Belgocontrol and LVNL).

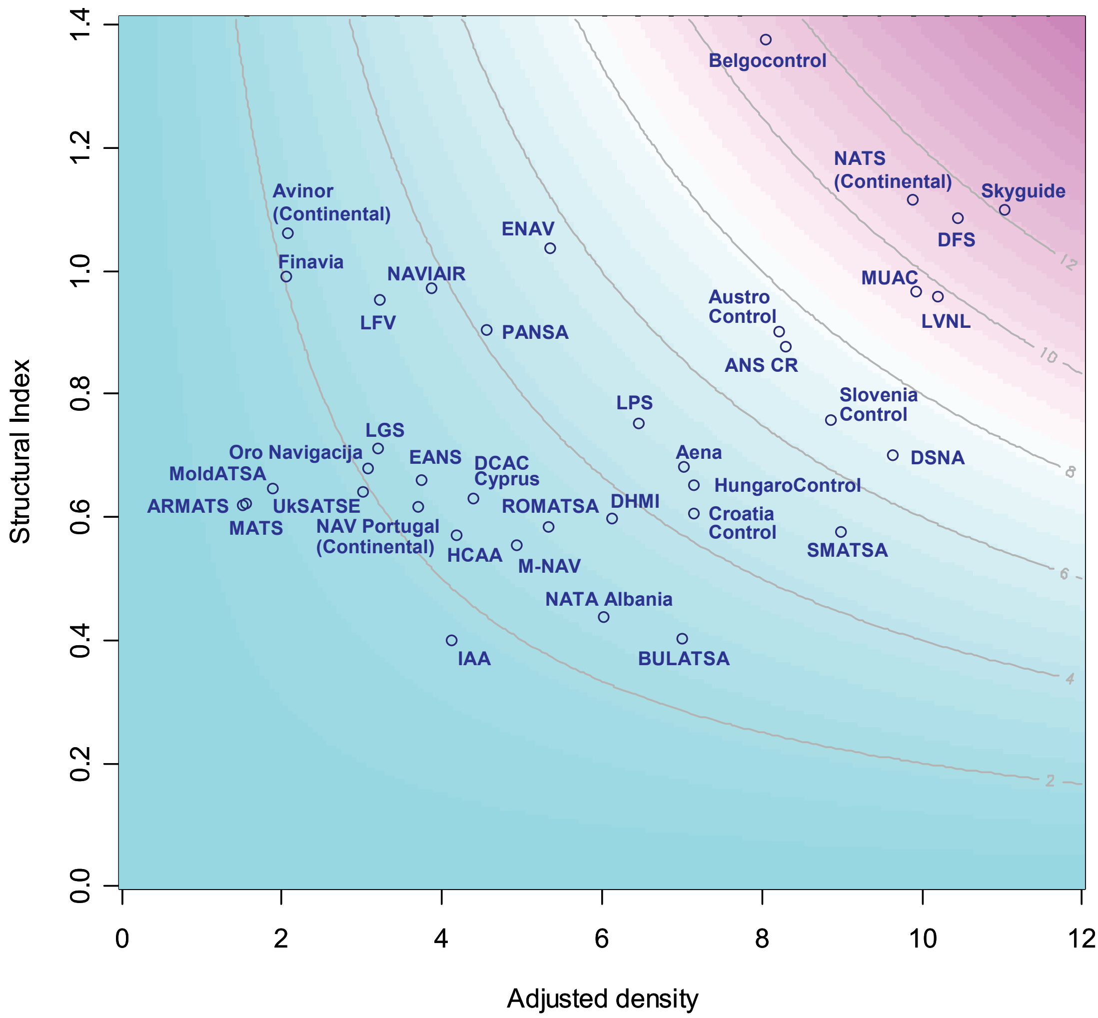

Figure 3.3: Traffic complexity metrics for ANSPs, 2011

Figure 3.3 above shows the structural complexity index and the adjusted density metric calculated at ANSP level (yearly data) for the year 2011[34]. ANSPs with the highest overall complexity score are located in the top right corner. Moving to the left it shows ANSPs (like Avinor) with high structural complexity but lower density. Moving down it shows ANSPs with relatively higher density but lower structural complexity (such as BULATSA).

Figure 3.3 shows that Skyguide traffic complexity score is now ranked as the highest in Europe, followed by DFS and Belgocontrol. The fifteen most "complex" ANSPs (those with an overall complexity score higher than 4.5 minutes of interaction per flight-hour) comprise all the five largest ANSPs. Annex 4 provides the detailed figures of the traffic complexity metrics for each ANSP.

[34] See Annex 4 for a table displaying the traffic complexity indicators for each ANSP.

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

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

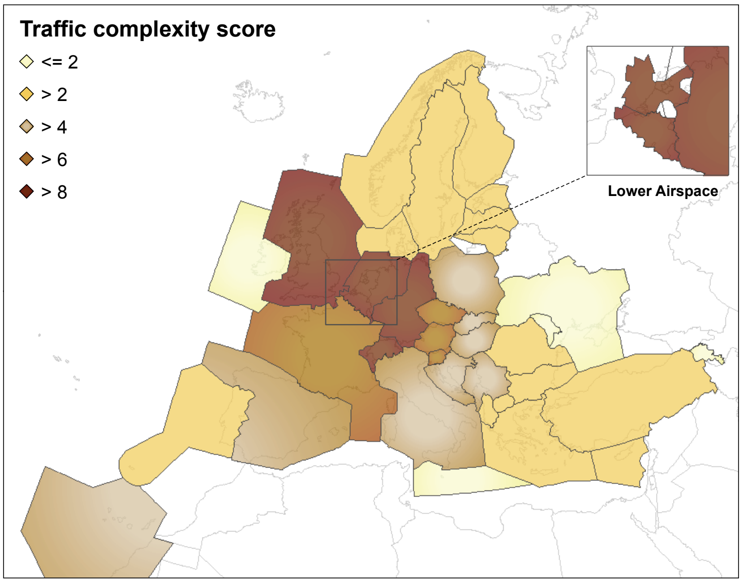

Figure 3.4: Overall complexity scores at ANSP level, 2011

The average complexity score for the Pan-European system is slightly higher than six minutes (6.15) of interaction per flight-hour, this is higher (+1.2%) than in 2010 (i.e. 6.08) and in the same order of magnitude than in 2007. Figure 3.5 below shows how traffic (en-route flight-hours), overall complexity and its two main components (i.e. adjusted density and structural complexity) changed between 2006 and 2011.

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

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

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

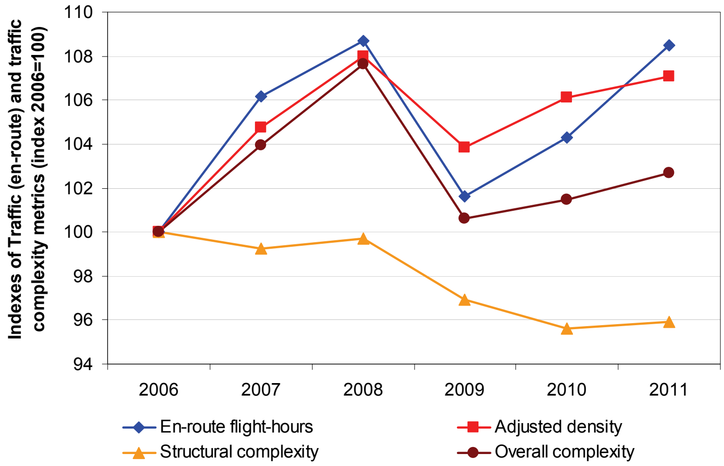

Figure 3.5: Trend in overall complexity metrics and traffic at Pan-European system level, 2006-2011

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

3.3.3 Traffic variability

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

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

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

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

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

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

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

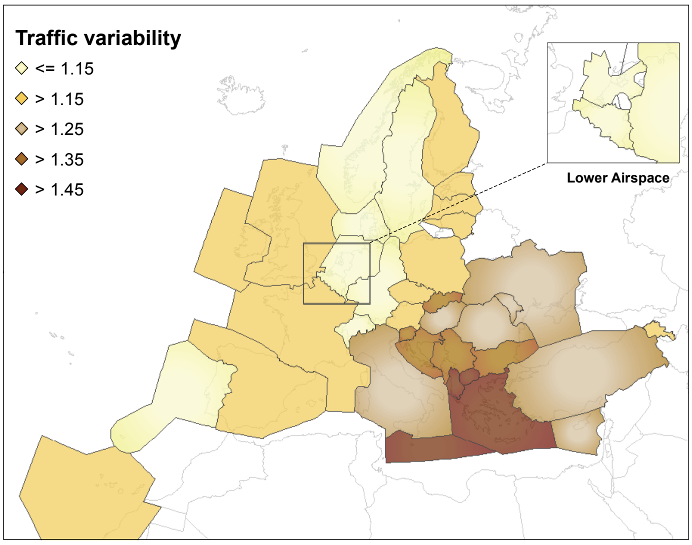

Figure 3.6: Seasonal traffic variations, 2011

3.4 Econometric analysis of ANSPs cost-efficiency

3.4.1 Background and high level results

The PRC has been working for a number of years on the development of a function characterising the relationship between costs, output and inputs for the European ANSP industry. Its initial work was undertaken in-house, and further works[35] were published in 2006 and in 2011. The main results of the latest study were presented in details in the ACE 2009 Benchmarking Report.

As part of the work relating to the preparation of cost-efficiency targets for RP2, the econometric analysis of ANSPs cost-inefficiency at Pan-European system level has been

[35] Technical Notes available on the PRC website: http://www.eurocontrol.int/articles/prc-and-prb-publications?tab_0_6.

updated and further developed. The main objectives of this analysis were: (1) to specify and estimate a cost function for the provision of gate-to-gate ATM/CNS services, and (2) to provide high level estimates of the European system cost-inefficiency.

The quality of the results of an econometric analysis can be affected by a variety of factors, including the completeness and precision of the measures used for the cost drivers (e.g. the traffic complexity score or labour costs). It should also be acknowledged that econometric models are based on a particular set of assumptions which can substantially affect the results.

The ANS industry is characterised by a high level of heterogeneity. It is therefore important to consider econometric models that allow a distinction between true inefficiency and unobserved heterogeneity. This can be achieved, to some extent, by using Stochastic Frontier Analysis (SFA) models, which allow the separation of inefficiency from exogenous factors that are specific to ANSPs. The two estimation models considered in this analysis were the "Pitt & Lee Random Effects" model and the "Greene True Random Effects" model.

- The **Random Effects** model proposed by Pitt and Lee assumes that ANSPs' inefficiency is invariant over time. This implies that non-observed ANSP specificities which do not change over time will be considered as inefficiency. Therefore, inefficiency estimates are likely to be over-estimated when there is a high level of heterogeneity in the industry.

- The **True Random Effects** model proposed by W. Greene assumes that ANSPs inefficiency is variant over time. This means that persistent differences across ANSPs due to inefficiency will be considered as heterogeneity and not as inefficiency. This means that in this model inefficiency is likely to be under-estimated if there is a high level of heterogeneity in the industry.

As expected, given the modelling assumptions, the estimated efficiency level varies significantly between the two models:

- when all the time invariant elements are treated as inefficiency (Pitt & Lee random effects model) then the estimated system level inefficiency is greater (approximately 70%);

- when all the time invariant elements are not considered as inefficiency (True random effects model) then the estimated system level inefficiency is lower (approximately 10%).

Given the different underlying assumptions employed in these two models, it is likely that the "genuine" level of inefficiency is within this threshold (10% to 70%). These results are in the same order of magnitude as those provided in the technical note published in 2011 (i.e. a range of 10% to 60% for the estimated cost-inefficiencies in the Greene and Pitt and Lee models, respectively).

One of the issues identified in previous econometric analysis related to the "endogeneity" of ATCOs in OPS wages. Several options have been tested in order to address this issue. One of these consisted in capping the ATCOs employment costs per ATCO-hour of ANSPs for which this indicator was higher than that of organisations operating in relatively similar economic and operational environments. The sensitivity analyses carried out in the context of this study shown that this adjustment did not provide significantly different results.

3.4.2 Conclusions

The econometric analysis of ANSPs cost-inefficiencies is one of the various evidences considered by the PRB to propose ranges for RP2 EU-wide cost-efficiency targets. Econometric tools are extensively discussed in economic literature and are used by economic regulators, alongside other methods, in other regulated monopoly industries (such as water, electricity, gas supply, and surface transport) to set cost-efficiency targets or to benchmark different operators.

This analysis allowed the specification of a robust cost function for the ANS industry. The econometric model suggests the presence of economies of scale and economies of density in the provision of ATM/CNS services over the 2002-2011 period. High level estimates for the European system cost-inefficiencies range from around 10% to 70%, depending on the model which is used. The lower bound of this large range (10%) appears to be substantially under-estimated, while the upper bound (70%) might be over-estimated and be reflective of underlying modelling assumptions. The econometric analysis and detailed results will be available in a Technical Note[36] that will be published on the PRB website.

[36] European ANSPs cost-efficiency benchmarking and Total Factor Productivity analysis (CEG), forthcoming in 2013.

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PART II: FINANCIAL COST-EFFECTIVENESS

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4 FINANCIAL COST-EFFECTIVENESS (2011)

4.1 Introduction

This chapter examines and compares ANSPs' financial cost-effectiveness for the year 2011.

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

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

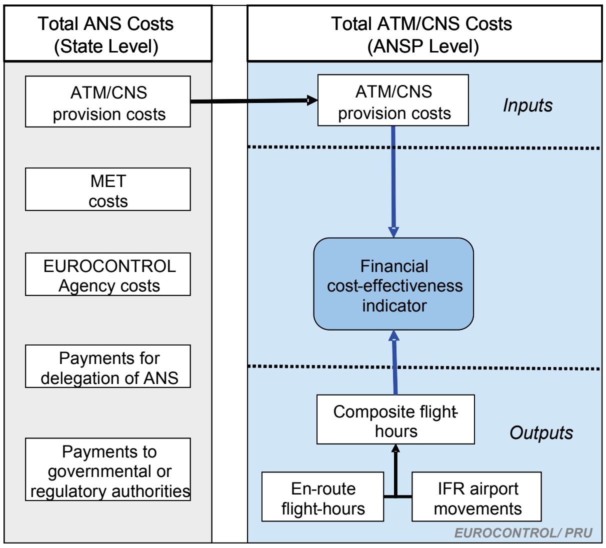


Figure 4.1: Conceptual framework for the analysis of financial cost-effectiveness

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

- Costs relating to services provided to military OAT, Oceanic ANS, AFIS/ATC at smaller regional aerodromes[37], and reported under the "Other" column in the SEID;
- MET costs (whether provided internally or externally);
- Payments to governmental or regulatory authorities;
- EUROCONTROL costs[38]; and,
- Payment to other ANSPs or States for delegated services.

The ANS costs per category for individual ANSPs/States, with a breakdown between en-route and terminal costs, are available in Annex 7 of this Report.

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

Figure 4.2 shows individual ANSPs' total gate-to-gate ATM/CNS provision costs in 2011. These costs are used in subsequent chapters of Part II and Part III for the purposes of comparing ANSPs' ATM/CNS cost-effectiveness.

[37] This is the case for Avinor, ENAV, and Finavia.
[38] Excluding MUAC costs.

Five ANSPs (DSNA, DFS, Aena, ENAV and NATS) bear 56% of total European gate-to-gate ATM/CNS provision costs, while their share of traffic is 52%.

At first sight, this result contrasts with the expectation of some form of increasing returns to scale in the provision of ANS (the performance of larger ANSPs might benefit from their larger size).

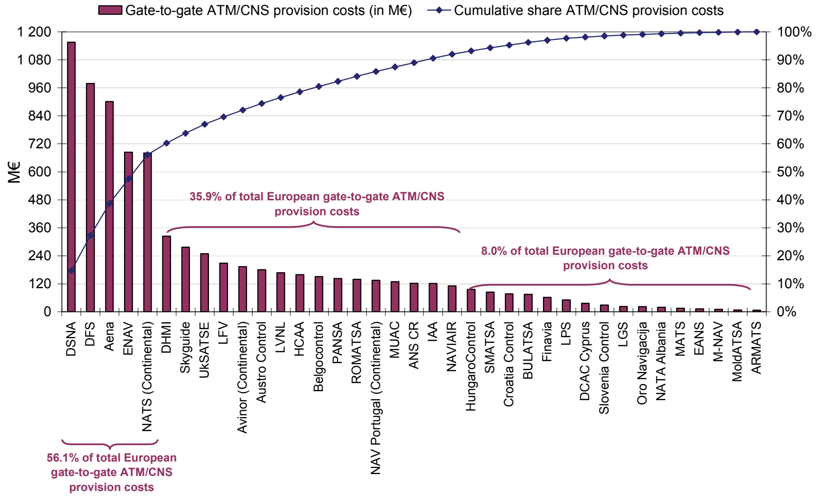


Figure 4.2: Distribution of ATM/CNS provision costs in 2011

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

- Under the full cost recovery regime that applied to most ANSPs until December 2011, there was little incentive to fully exploit scale effects, hence the difficulty to observe them;
- Larger ANSPs tend to develop bespoke ATM systems internally which can be more costly than a commercial off-the-shelf (COTS) solution (see Section 2.6); 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 amended Charging Scheme regulation, ANSPs will have stronger incentives to exploit scale effects in future years.

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), this ACE report places a particular focus on the results of the five largest ANSPs (Aena, DFS, DSNA, ENAV and NATS).

Section 4.2 compares the financial gate-to-gate cost-effectiveness indicator across ANSPs for the year 2011. Section 4.2 also highlights the en-route and terminal components of financial cost-effectiveness indicator. Finally, Section 4.2 presents for the first time in an ACE Report an analysis of financial cost-effectiveness at FAB level.

Section 4.3 presents the analytical framework developed to break down cost-effectiveness into its main economic components. Section 4.4 gives the results obtained from applying this framework to the financial cost-effectiveness indicator, providing insights into differences in ATCO productivity, ATCO employment costs, and support costs.

Note that to facilitate the interpretation of the results, the concept of the "performance ratio" has been introduced and presented in Annex 3 of this Report. Performance ratios are a simple way to capture the relative advantages and weaknesses of an ANSP compared to the European average.

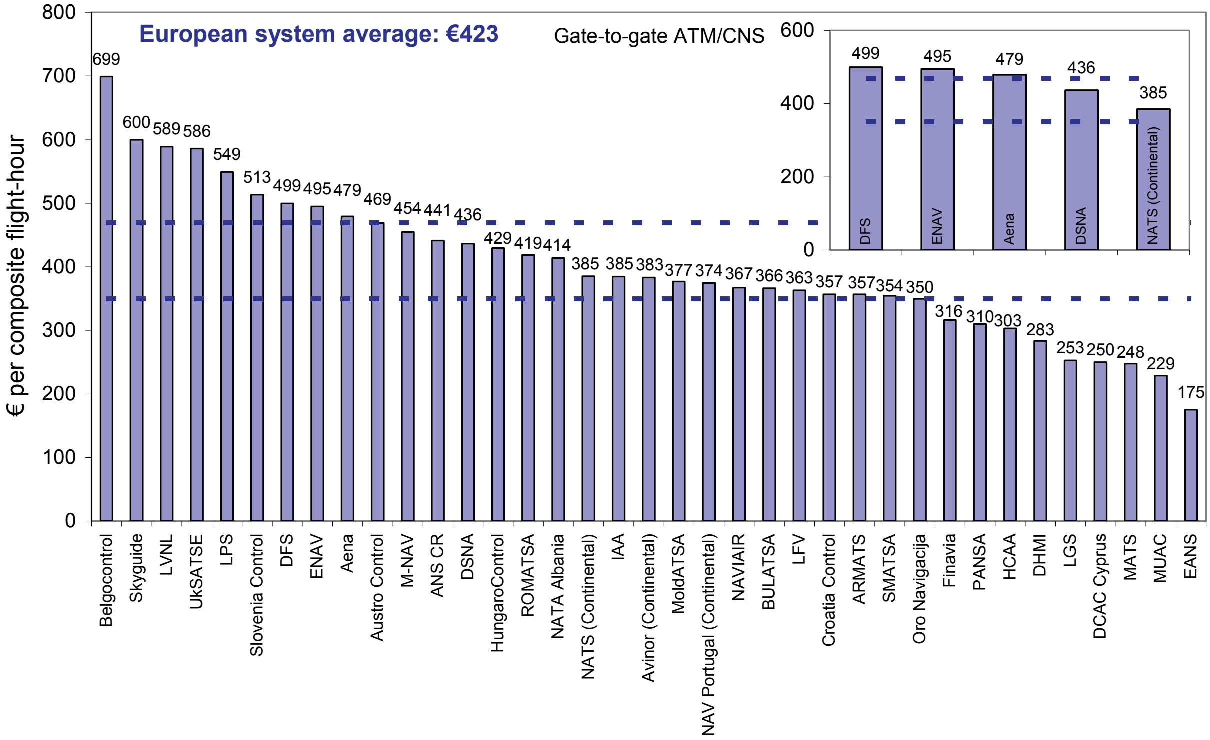
4.2 Financial cost-effectiveness indicator (2011)

4.2.1 Financial cost-effectiveness at ANSP level (2011)

The Pan-European system ATM/CNS provision cost per composite flight-hour for 2011 is €423. The financial cost-effectiveness indicators for each ANSP are shown in Figure 4.3.

The financial cost per composite flight-hour varies between €699 for Belgocontrol and €175 for EANS, a factor of four. EANS, which is among the smallest ANSPs of the European sample, has consistently recorded the lowest unit costs since the inception of this analysis a decade ago. The two dotted lines in Figure 4.3 represent the top and bottom quartiles[39] and provide an indication of the dispersion of unit ATM/CNS provision costs across the sample of 37 ANSPs.

Belgocontrol and LVNL are amongst the ANSPs with the highest unit costs, ranking first and third in Figure 4.3 below. It should be noted that both ANSPs exclusively provide ATC services in lower airspace and own infrastructure which is made available to MUAC[40].



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

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

Figure 4.3: Comparison of the financial cost-effectiveness indicator, 2011

39 25% of observations lie below the bottom quartile, whilst 25% lie above the top quartile; the remaining 50% lie between the two quartiles. Thus in Figure 4.3, 75% of ANSPs have ATM/CNS costs per composite flight-hour lower than €469.

40 In Figure 4.8 on p.44, MUAC costs and outputs are consolidated with the costs and outputs of Belgocontrol, LVNL and DFS. This adjustment allows for computing the cost-effectiveness of ATM/CNS services provided in the Four States national airspaces.

The unit costs for the five largest ANSPs[41] are displayed in the top right corner of Figure 4.3 above. These ANSPs, which operate in relatively similar economic and operational environments, show unit costs ranging from €499 (DFS) to €385 (NATS), a factor of 1.3. While DFS was ranking third among the five largest ANSPs in 2010, it shows now the highest unit costs, closely followed by ENAV (€495). DFS higher unit costs in 2011 mainly reflect increases in staff and non-staff operating costs, as well as exceptional costs. The drivers for changes in ANSPs unit ATM/CNS provision costs are analysed in further details in Chapter 5 of this Report.

Figure 4.3 indicates that in 2011, Aena unit costs (€479) rank third amongst the five largest ANSPs while these were the highest in 2009.

Figure 4.4 shows that Aena unit costs continuously decreased since 2009 to reach in 2011 a level close to the average for the five largest ANSPs (€457). This is in line with a provision of the Law 9/2010 which was adopted in Spain in 2010 and which requires that the chargeable en-route unit rate of Spain converges towards the average of the five largest States by 2013.

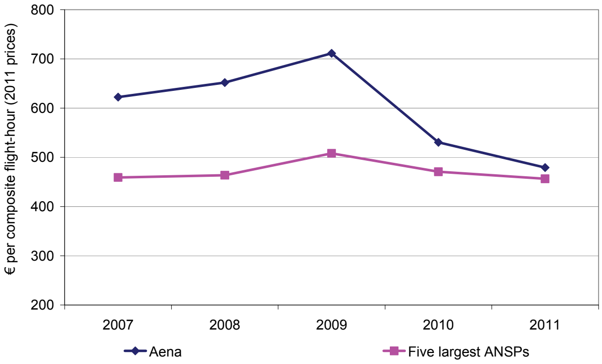


Figure 4.4: Changes in Aena unit ATM/CNS provision costs compared to the five largest ANSPs (2007-2011)

Besides a number of structural changes, Law 9/2010 introduced new working conditions for ATCOs, rising contractual working hours and significantly reducing the number of overtime hours, which was one of the main drivers for high ATCO employment costs in the past.

It is also important to note that, for ANSPs operating outside of the Euro zone, substantial changes of the national currency against the Euro may significantly affect the level of 2011 unit ATM/CNS provision costs[42] when expressed in Euro.

Methodological note on the impact of changes in exchange rates on the level of ANSPs unit ATM/CNS provision costs in 2011

The level of NATS and UkSATSE unit costs in Figure 4.3 benefits from the significant depreciation of the British Pound (21%) and the Ukrainian Hryvnia (39%) over the 2007-2011 period. On the other hand, the level of Skyguide unit costs is negatively affected by the significant appreciation of the Swiss Franc (+33% between 2007 and 2011).

Figure 4.5 also shows substantial variations in exchange rates compared to the Euro such as the depreciation of the Serbian Dinar (23%), of the Romanian Leu (21%) and of the Albanian Lek (13%) while the Czech Koruna appreciated by 13%.

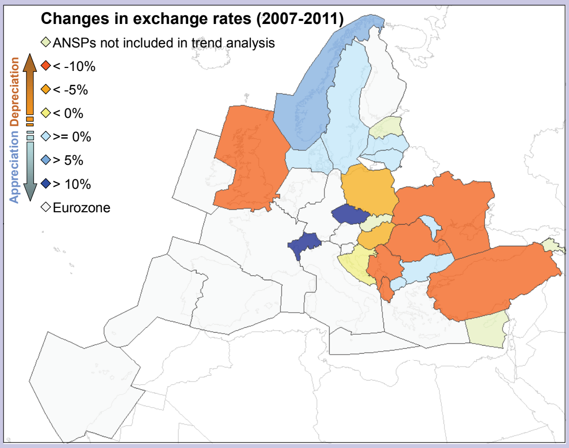


Figure 4.5: Cumulative variation in currency exchange rate (2007-2011)

[41] ENAV 2011 ATM/CNS provision costs comprise costs relating to en-route ATC services (€37.0M) provided by the Italian Air Force (ITAF) mainly at regional civil/military airports. See also Footnote 57.

[42] It should be noted that the changes in unit costs analysed in this Report (see Chapter 5) are not affected by changes in national currency against the Euro. Readers should however be aware of exchange rate fluctuations when comparing the values extracted from different ACE reports. Annex 6 comprises further information on the methodology used to express financial figures in real terms.

Assuming that national currencies had remained at their 2007 level, the ranking of Figure 4.3 would be different. For example, NATS 2011 unit ATM/CNS provision costs would amount to some €473 (instead of €385) and NATS would rank at the second lowest position amongst the five largest ANSPs (just below Aena) instead of the lowest as displayed in the top right corner of Figure 4.3. On the other hand, considering the 2007 exchange rate, Skyguide 2011 unit costs would amount to some €450 and Skyguide would rank around the eleventh position instead of the second as in Figure 4.3.

Figure 4.3 shows that LPS and Slovenia Control unit ATM/CNS provision costs amount to €549 and €513, respectively. This is higher than the unit costs of most of the ANSPs operating in Western European countries where the cost of living is much higher than in Slovakia and Slovenia (see Section 3.3.1). LPS relatively higher unit ATM/CNS provision costs mainly reflect a relatively lower ATCO-hour productivity (see Section 4.4.1) and relatively higher support costs per composite flight-hour (see Section 4.4.4). Similarly, the relatively low ATCO-hour productivity of Slovenia Control negatively affects its financial cost-effectiveness performance.

The gate-to-gate financial cost-effectiveness indicator in Figure 4.3 can be broken down into en-route and terminal components. This is shown in Figure 4.6 below. To facilitate the comparison and interpretation of the results, ANSPs are ranked according to the results obtained in the gate-to-gate financial cost-effectiveness indicator (Figure 4.3). The output units in Figure 4.6 are en-route flight-hours and IFR airport movements, respectively – compared to the gate-to-gate composite flight-hours used in Figure 4.3.

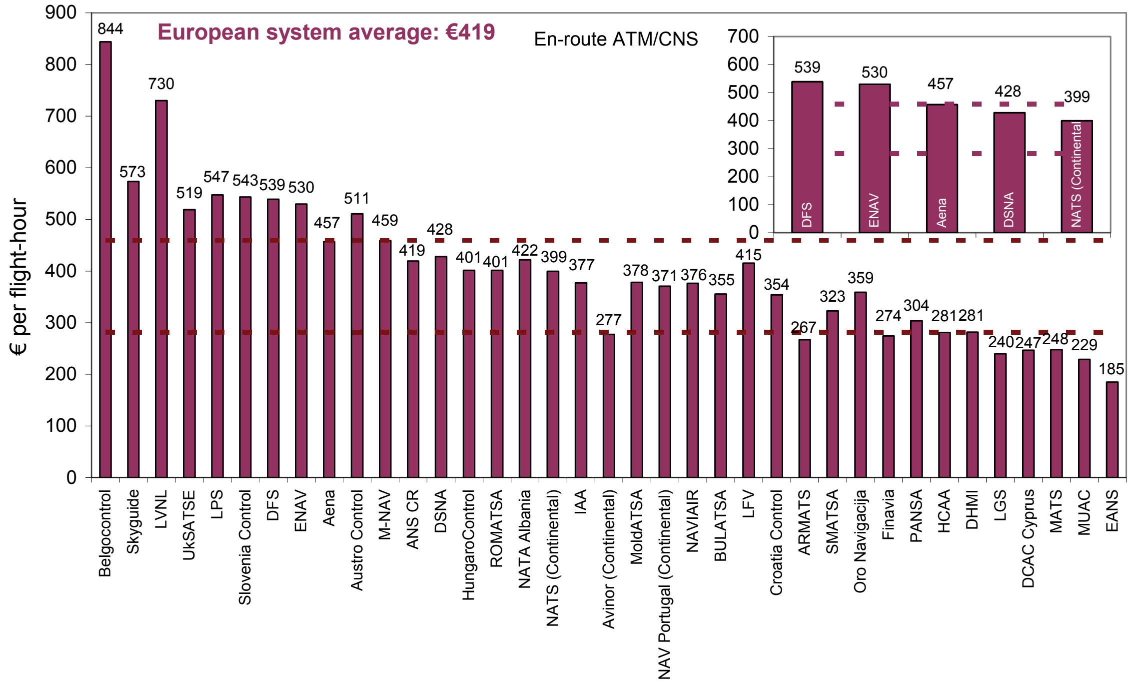
It is difficult to determine whether the differences shown in Figure 4.6 below are driven by economic and operational factors (for example, size of operations, economies of scale, or traffic complexity), or purely cost-allocation differences, which are known to exist across States/ANSPs.

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

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

For ANSPs which own and operate a large number of airports such as Avinor and Finavia differences in terminal unit costs (see Figure 4.6) seem to be mainly due to differences in cost allocation. For Finavia, some approach related costs are now allocated to the en-route cost-base while these costs were previously reported as terminal ANS costs. As a result, Finavia terminal unit ATM/CNS provision costs decreased from €143 in 2010 to €103 in 2011.

LFV terminal unit ATM/CNS provision costs are second lowest in Europe. Terminal ANS assets previously owned by the Airport division of LFV have been transferred to Swedavia after the separation of the airport activities from LFV. The costs relating to these assets are now borne by Swedavia.



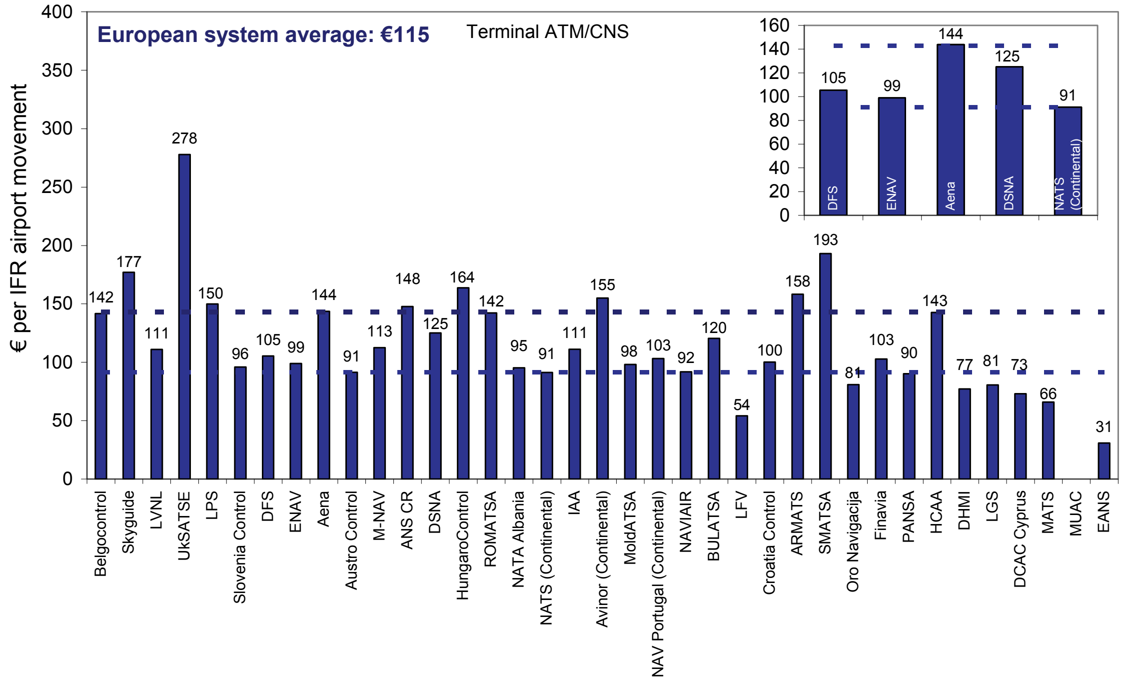


Figure 4.6: Breakdown of financial cost-effectiveness into en-route and terminal, 2011[43,44]

In 2011, Aena went through a restructuring process relating to the separation of the airport division from the ANS department. This process resulted in the creation of a subsidiary (Aena Aeropuertos S.A.) in June 2011. It will be informative to monitor the extent to which Aena cost-effectiveness performance will change in future years.

In September 2011, ferroNATS (a consortium made by NATS and the Spanish company Ferrovial) has been awarded a contract to provide ATC services at 10 airports in Spain[45].

[43] The dotted lines on the graphs represent the bottom and top quartiles.
[44] MUAC operates exclusively in upper airspace and therefore has no terminal ANS costs.

Similarly, ANS CR in partnership with Saerco has been awarded a contract to provide ATC services at three airports in Canarias[46]. The transfer of operations from Aena will be done gradually. The first step started in November 2012 and the transfer of provision of ANS is planned to be completed in the course of 2013.

4.2.2 Financial cost-effectiveness at FAB level (2011)

For the first time in an ACE Benchmarking Report, Figure 4.7 shows the financial cost-effectiveness indicator for the year 2011 computed at FAB level. Note that ANSPs which are not formally part of a FAB initiative are not included in Figure 4.7. The objective of this analysis is to compare unit ATM/CNS provision costs across FABs and not to analyse differences in unit costs for the States/ANSPs that are part of the same FAB initiative and which, in some cases, operate under different economic and operational conditions.

Figure 4.7 indicates that when calculated at FAB level unit costs range from €466 (FABEC) to €315 (Baltic FAB), a factor of less than 1.5. This represents a lower dispersion than when unit costs are computed at ANSP level (Figure 4.3 above shows that there is a factor of four between the highest and lowest ANSP unit costs).

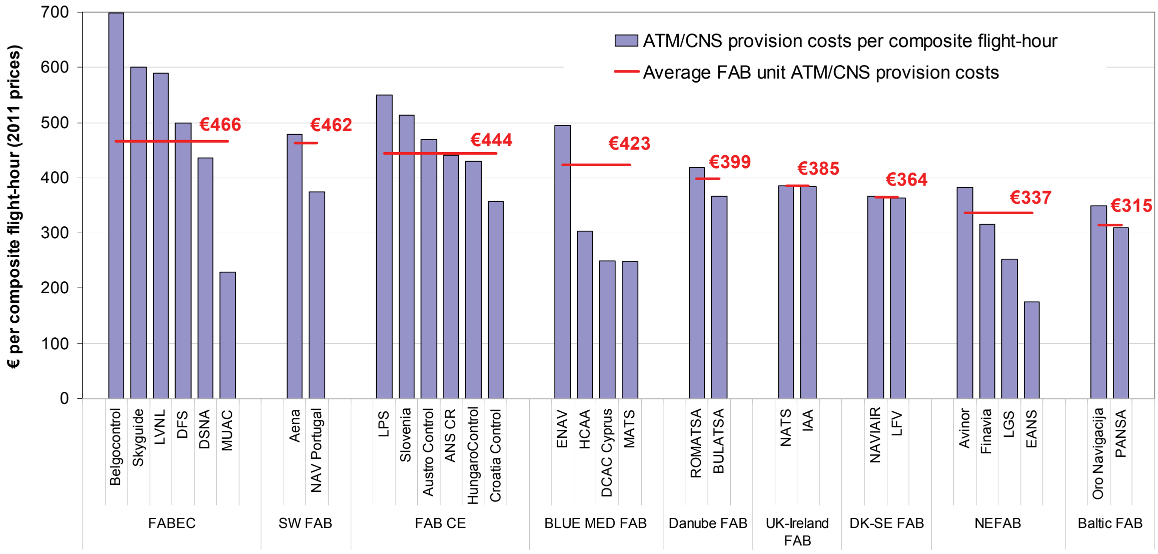


Figure 4.7: ANSPs financial cost-effectiveness aggregated by FAB (2011)

In Figure 4.7, the red lines and labels show the average ATM/CNS provision costs per composite flight-hour measured at FAB level[47]. The blue bars represent ANSPs unit ATM/CNS provision costs (as shown in Figure 4.3 above).

Three FABs show average unit ATM/CNS costs above the European average (€423):

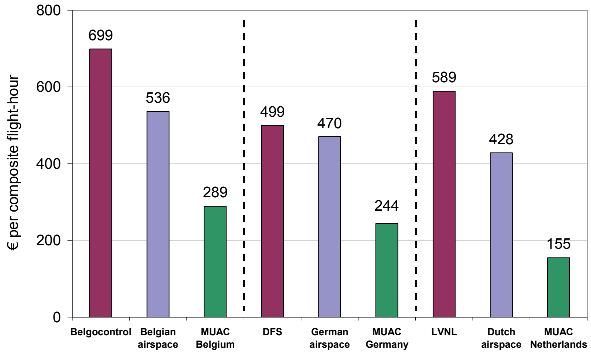
- FABEC ANSPs, which account for some 40% of the Pan-European system ATM/CNS provision costs, show the highest unit costs in 2011 (€466). There is a very wide range in terms of unit costs within FABEC (from €699 for Belgocontrol to €229 for MUAC). This reflects a variety of situations with very large ANSPs and smaller ones, some of which exclusively operate in lower airspace (Belgocontrol and LVNL). It should also be noted that MUAC ATM/CNS provision costs do not include the costs relating to the

[45] Alicante, Valencia, Ibiza, Sabadell, Sevilla, Jerez, Melilla, Madrid Cuatro Vientos, Vigo and A Coruña airports.
[46] La Palma, Lanzarote and Fuerteventura.
[47] The unit ATM/CNS provision costs at FAB level displayed in Figure 4.7 are obtained by summing the ATM/CNS provision costs of all the ANSPs that are part of the FAB initiative and dividing them by the corresponding total number of composite flight-hours. The result of this computation is the weighted average of ANSPs unit costs at FAB level.

infrastructure which is made available for joint use and provided free of charges by the ANSPs operating in the Four States[48] airspace.

To better assess the cost-effectiveness of ATM/CNS provided in each of the Four States national airspaces, MUAC costs and outputs are consolidated with the costs and outputs of the national providers.

The bottom of Figure 4.8 shows the figures which have been used for this "adjustment". The costs figures are based on the cost allocation keys used to establish the Four States cost-base, while the flight-hours are based on those controlled by MUAC in the three FIRs (Belgium, Netherlands and Germany). The top of Figure 4.8 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).



MUAC	Belgium	Germany	Netherlands
Flight-hours allocated to:	141 778	255 167	167 109
Costs allocated to:	€41.0M	€62.2M	€25.9M

Figure 4.8: Adjustment of the financial cost-effectiveness indicator for ANSPs operating in the Four States airspace (2011)

- South West FAB is the second largest FAB representing some 15% of the Pan-European system ATM/CNS provision costs. The ANSPs operating in the South West FAB show the second highest unit ATM/CNS provision costs (€462). The relatively high unit costs for the South West FAB are mainly driven by Aena's higher unit ATM/CNS provision costs compared to NAV Portugal.
- FAB CE is the largest FAB in terms of number of ANSPs involved[49]. The unit ATM/CNS provision costs for FAB CE amount to €444. This is much higher than UK-Ireland FAB (€385) and DK-SE FAB (€364) despite the fact that overall the cost of living associated with the countries where the ANSPs part of FAB CE operate is much lower than in Western Europe and in Nordic countries. In 2011, unit ATM/CNS provision costs range from €549 for LPS to €357 for Croatia Control.

Six FABs show average unit ATM/CNS costs below or in line with the European average (€423):

- BLUE MED is the third largest FAB in terms of ATM/CNS provision costs accounting for some 13% of the Pan-European system costs. BLUE MED unit ATM/CNS provision costs (€423) are in line with the European average in 2011. There is a wide dispersion across BLUE MED ANSPs with unit costs ranging from €495 for ENAV to €248 for MATS.
- Danube FAB account for some 3% of the Pan-European system ATM/CNS provision costs. Danube FAB unit ATM/CNS provision costs amount to €399 per composite flight-hour. In 2011, ROMATSA unit costs (€419) are +14% higher than BULATSA (€366).
- UK-Ireland FAB is the fourth largest FAB in terms of ATM/CNS provision costs representing some 11% of the Pan-European system costs. The unit ATM/CNS provision costs for UK-Ireland FAB amount to €385. At face-value, the UK-Ireland FAB shows less dispersion in terms of financial cost-effectiveness than other FABs. However, the level of NATS unit costs is positively affected by the significant depreciation of the British Pound (21% over the 2007-2011 period). Using the 2007 exchange rate to express NATS

[48] Belgium, Germany, the Netherlands, and Luxembourg. Note that for the purposes of this report Luxembourg figures are not included as they amount to less than 1% of MUAC total costs.
[49] It should be noted that in 2011, area control services in BIH's airspace were provided by Croatia Control and SMATSA. For this reason, the ANSP operating in Bosnia & Herzegovina (BHANSA) is not included in Figure 4.7.

ATM/CNS provision costs in Euro would result in unit ATM/CNS provision costs amounting to some €473 (instead of €385), which is +23% higher than IAA unit costs (€385).

- DK-SE FAB unit ATM/CNS provision costs amount to €364 per composite flight-hour, the third lowest unit costs at FAB level. It is noteworthy that in 2011, the level of LFV and NAVIAIR unit costs was relatively close (i.e. €363 and €367, respectively).
- NEFAB account for some 4% of the Pan-European system ATM/CNS provision costs, a size similar to DK-SE FAB. NEFAB unit costs are the second lowest and amount to €337 per composite flight-hour in 2011. Compared to DK-SE FAB, there is a larger dispersion in unit costs which range from €383 for Avinor to €175 for EANS.
- Baltic FAB is the smallest FAB in terms of ATM/CNS provision costs accounting for some 2% of the Pan-European system costs. Baltic FAB shows the lowest unit ATM/CNS provision costs in 2011 (€315).

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

The PRU has developed an analytical framework that allows cost-effectiveness to be broken down into a number of key components. This framework helps in understanding differences in cost-effectiveness by allowing examination of the detailed factors underlying it. The framework and the 2011 results for each of its components at Pan-European system level are displayed in Figure 4.9 below.

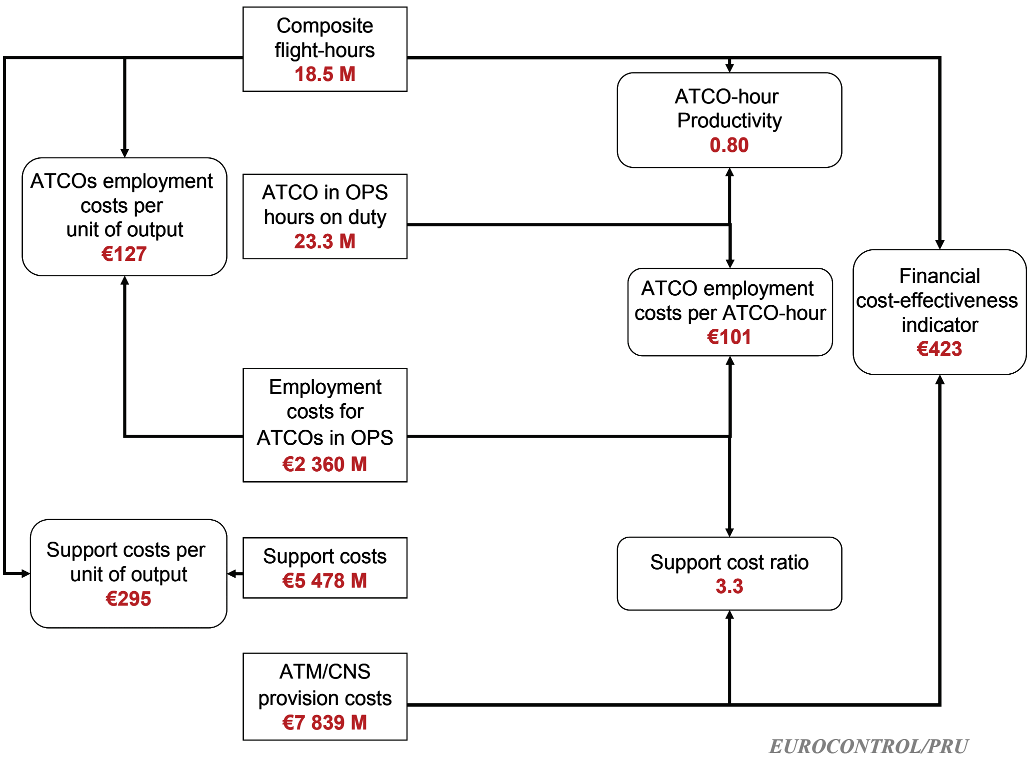


Figure 4.9: Performance framework for gate-to-gate cost-effectiveness analysis (2011)

The right-hand side of Figure 4.9 shows that the financial cost-effectiveness indicator (ATM/CNS provision costs per composite flight-hour) is made up of three component performance **ratios**:

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

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

The financial cost-effectiveness indicator can also be broken down into two additive factors, as shown on left-hand side of Figure 4.9:

- **ATCO employment costs per unit of output** is the ratio of the employment costs for the ATCOs in OPS to the output (measured in composite flight-hours). All other things being equal, lower ATCOs in OPS employment costs per unit of output will improve financial cost-effectiveness. At European level, this component comprises some 30% of the overall financial cost-effectiveness indicator.
- **Support costs per unit of output** is the ratio of support costs[50] to the output. All other things being equal, lower support costs per unit of output will improve financial cost-effectiveness. At European level this component comprises some 70% of the overall financial cost-effectiveness indicator.

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

Because of the critical importance of ATCOs in OPS in the provision of ATC services, the framework presented in Figure 4.9 puts a clear focus on this resource. Important support functions (with and without operational characteristics) are currently embedded in the so-called “support staff”. The employment costs of these support staff represent the majority of support costs and should be seen as an important contributor for cost-effectiveness performance improvement.

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

The breakdown of the overall indicator illustrated in Figure 4.3 into the components discussed above is shown in Figure 4.10, Figure 4.12, Figure 4.14, and Figure 4.17. When displayed, the two dotted lines represent the bottom and top quartiles[51] for the three components.

In the bottom right of each figure a miniature replica of Figure 4.9 is displayed to guide the reader through the framework.

4.4.1 ATCO-hour productivity (2011)

ATCO-hour productivity is the efficiency with which an ANSP deploys and makes use of its ATCOs. In 2011, the Pan-European system as a whole handled 0.80 composite flight-hours per ATCO-hour. ATCO-hour productivity for each ANSP is shown in Figure 4.10.

[50] Support costs are defined as the sum of non-ATCO employment costs, non-staff operating costs and capital-related costs.

[51] 25% of observations lie below the bottom quartile, whilst 75% lie below the top quartile. (Thus, in Figure 4.10, 75% of ANSPs have ATCO-hour productivity less than 0.93).

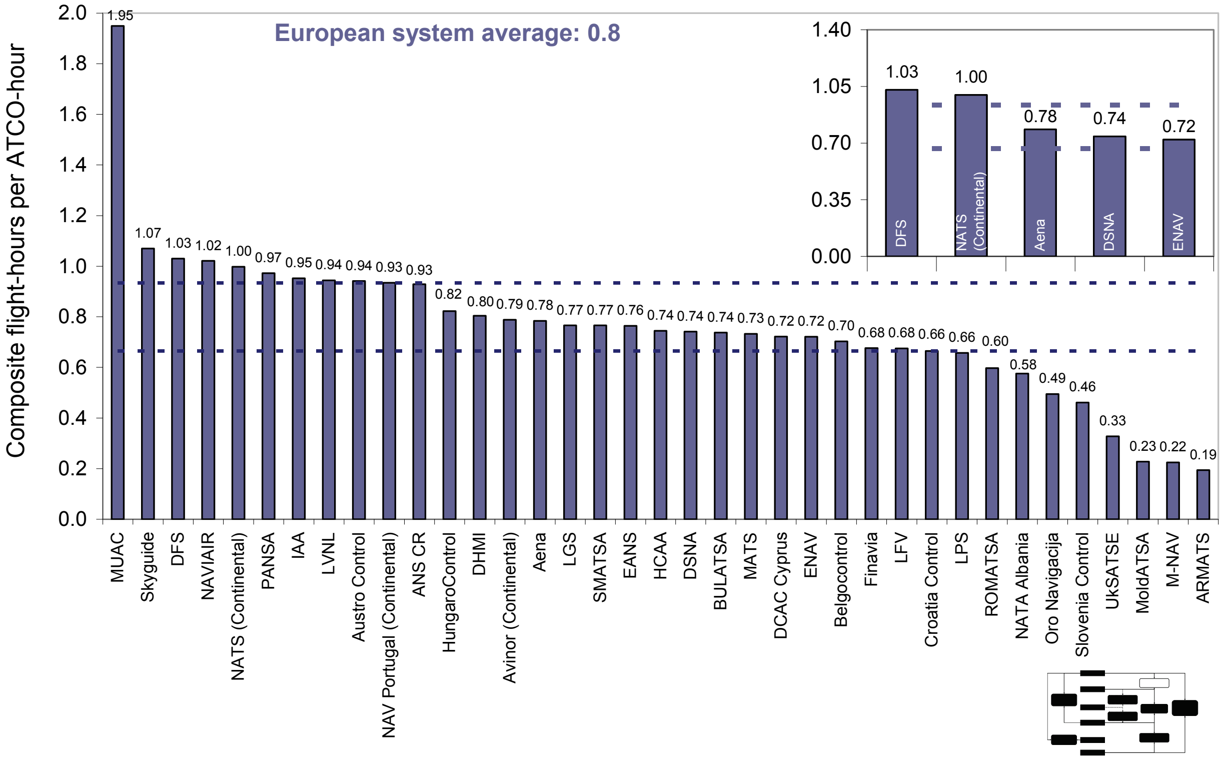


Figure 4.10: ATCO-hour productivity (gate-to-gate), 2011

There is a wide range of ATCO-hour productivity among ANSPs. The ANSP with the highest ATCO-hour productivity is MUAC (1.95), which only provides ATC services in upper airspace, while the ANSP with the lowest ATCO-hour productivity is ARMATS (0.19), i.e. one of the smallest ANSPs in terms of traffic volumes. A more relevant comparison of MUAC ATCO-hour productivity is presented in the comparison of ACC productivity in Figure 4.11 below (see Cluster 2).

Figure 4.10 also indicates that there are substantial differences in ATCO-hour productivity even among the five largest ANSPs. Indeed, DFS ATCO-hour productivity (1.03) is some +43% higher than that of ENAV (0.72).

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

It is important to mention that if the European average productivity (0.80) could be raised to the level of the top quartile in Figure 4.10 (0.93), it would bring significant gains in cost-effectiveness.

ATCO-hour productivity measured at ANSP level reflects an average performance, which can hide large differences among ACCs even for those operating in the same country/ANSP. On the other hand, ACCs belonging to different ANSPs may share similar characteristics. It is therefore important to analyse and compare productivity at ACC level (see Figure 4.11).

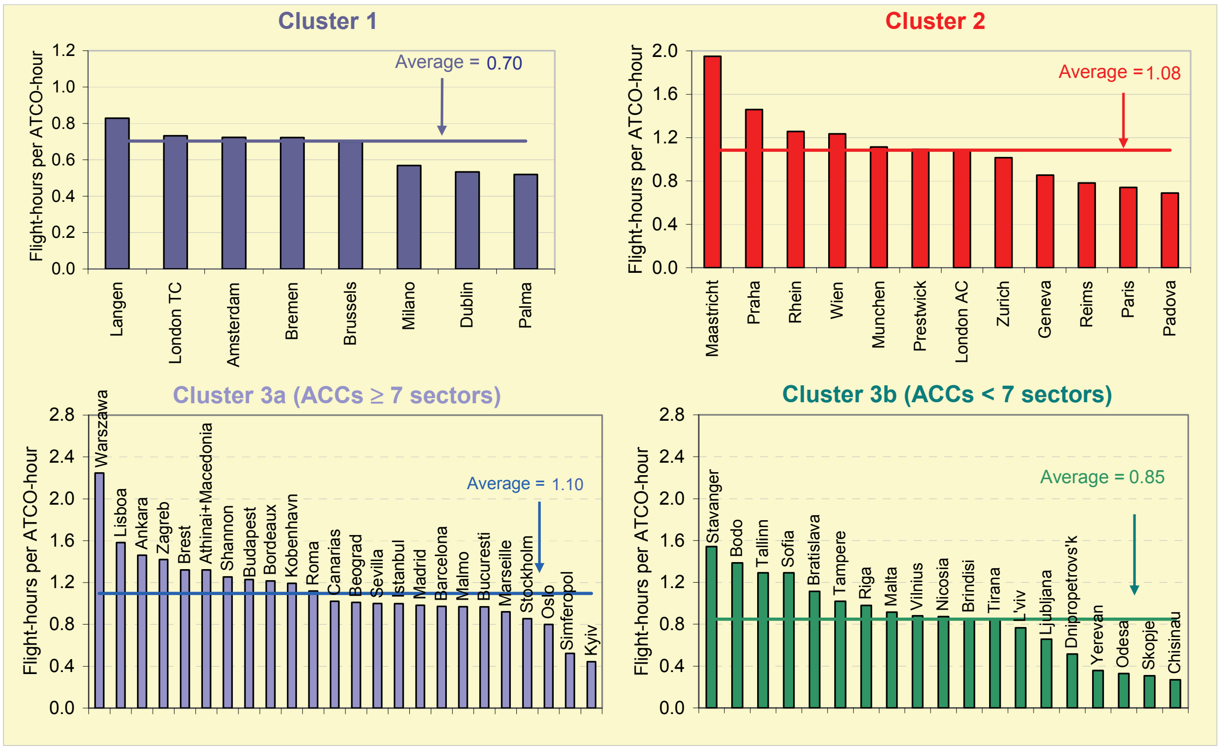


Figure 4.11: Summary of productivity results at ACC level (2011)

In Figure 4.11, ACCs are grouped in clusters based on three operational characteristics: (1) their complexity scores, (2) the average used flight levels, and (3) their number of sectors. More information on the definition of clusters can be found in previous ACE reports[52]. So far, no clear-cut statistical relationship between ATCO productivity, traffic complexity and traffic variability could be inferred because the relationships between all these metrics are not 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 (0.70 flight-hour per ATCO-hour). Palma, with the lowest productivity, has the highest seasonal traffic variability in Cluster 1.
- **Cluster 2 (ACCs serving dense upper airspace)** has an average productivity of 1.08 flight-hour per ATCO-hour. Within this cluster, Maastricht has significantly higher productivity (1.95 flight-hours per ATCO-hour, some +80% above the average in Cluster 2). Trend analysis over 2007-2011 suggests that the gap between the productivity of MUAC and the average value for the other ACCs in Cluster 2 has slightly increased (i.e. from +70% in 2007 to +80% in 2011). Factors that could explain MUAC's higher productivity include:
  - advanced ATC system and procedures: high level of ATM system functionality and reliability allow greater ATCOs confidence in fully exploiting its features. MUAC is using a stripless system for more than 10 years and has a long experience with a "centre" way of working in opposition to the sector based approach[53]. All MUAC ATCOs receive the same information from the Human Machine Interface (HMI), this contributes to an increased shared situational awareness among all the ATCOs in the ACC and a reduction of coordination tasks;

[52] See for example ACE 2008 report, p.104. Report available on the PRC website: (http://www.eurocontrol.int/prc/public/standard_page/doc_ace_reports.html).

[53] Since 2008, with the implementation of a trajectory-based stripless system, air traffic management is focused on the complete flight profile rather than on sector boundaries (i.e. "centre" way of working).

- enhanced flow, airspace and capacity management and progressive introduction of the Tactical Capacity Manager role with the tasks to improve the centre-wide co-ordination of capacity delivery (rather than at sector-group level) and to share best-practice in ATFCM;
- the implementation of much more flexible roster arrangements allowing to better match staff deployment with traffic demand; and,
- high staff qualification and motivation: MUAC staff and management are conscious that delivering high performance is key to safeguard the long-term existence of the ACC.

- **Cluster 3a (ACCs with 7 sectors or more and serving airspace with relatively low complexity)** has an average productivity of 1.10 flight-hour per ATCO-hour. Within this cluster, Warszawa has significantly higher productivity (2.25 flight-hours per ATCO-hour). It should also be noted that within this cluster Brest and Bordeaux have the highest overall complexity, and Canarias, Shannon and Kyiv the lowest.

- **Cluster 3b (ACCs with less than 7 sectors serving airspace with relatively low complexity)** has an average productivity of 0.85 flight-hour per ATCO-hour. While Chisinau shows the lowest productivity, it also has one of the lowest overall traffic complexity.

Changes over time in ATCO-hour productivity for the Pan-European system and for individual ANSPs level are described in Section 5.3 and further analysis of relationship between productivity and quality of service is provided in Chapter 7.

4.4.2 ATCO employment costs per ATCO-hour (2011)

The average unit ATCO employment costs in the Pan-European system amount to €101 per ATCO-hour. Figure 4.12 shows the values for this indicator for all the ANSPs.

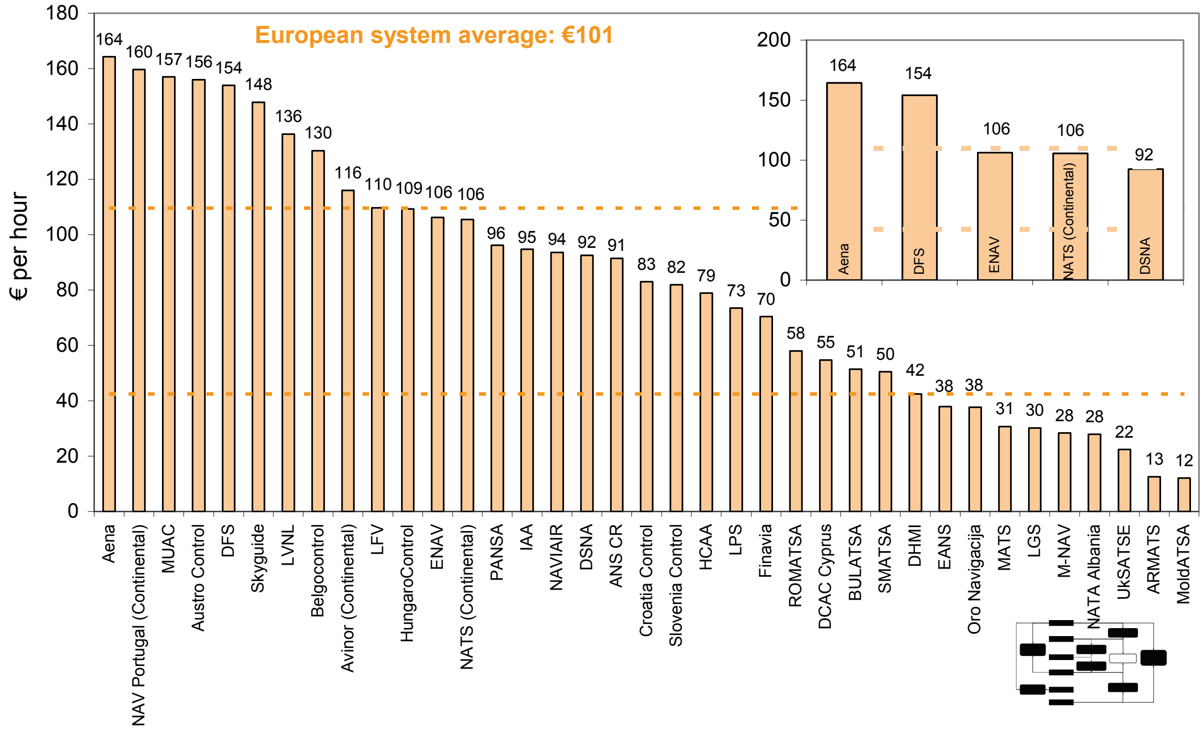


Figure 4.12: ATCO employment costs per ATCO-hour (gate-to-gate), 2011

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.

In 2011, Aena ATCO employment costs per ATCO-hour (€164) are the highest in Europe, just above NAV Portugal (€160). Aena employment costs per ATCO-hour decreased for the second consecutive year in 2011 (-6% after a -13% reduction in 2010). In the meantime, NAV Portugal's ATCO employment costs per ATCO-hour significantly rose by +32%, reflecting large increases in pension contributions while in the meantime staff wages and salaries substantially reduced. The main driver underlying the increase in NAV Portugal pension contributions in 2011 was a change in the actuarial assumptions used to calculate the "defined benefit" future pension obligations (i.e. implementation of a new mortality table).

A major exogenous factor that underlies differences in unit employment costs is the difference in prevailing market wage rates in the national economies in general. This is also associated with differences in the cost of living (see discussion in Chapter 3). To assess the influence of these exogenous differences, employment costs per ATCO-hour have been examined in the context of Purchasing Power Parity (PPP). There are some limitations[54] inherent to the use of PPPs and for this reason the ACE data analysis does not put a significant weight on results obtained with PPPs adjustments.

Figure 4.13 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 €107 (compared to €101 without adjustment). For many Central and Eastern European ANSPs (HungaroControl, PANSA, ANS CR, Croatia Control, BULATSA, ROMATSA, LPS, Slovenia Control and SMATSA) the PPP adjustment brings the unit employment costs close to those in Western Europe.

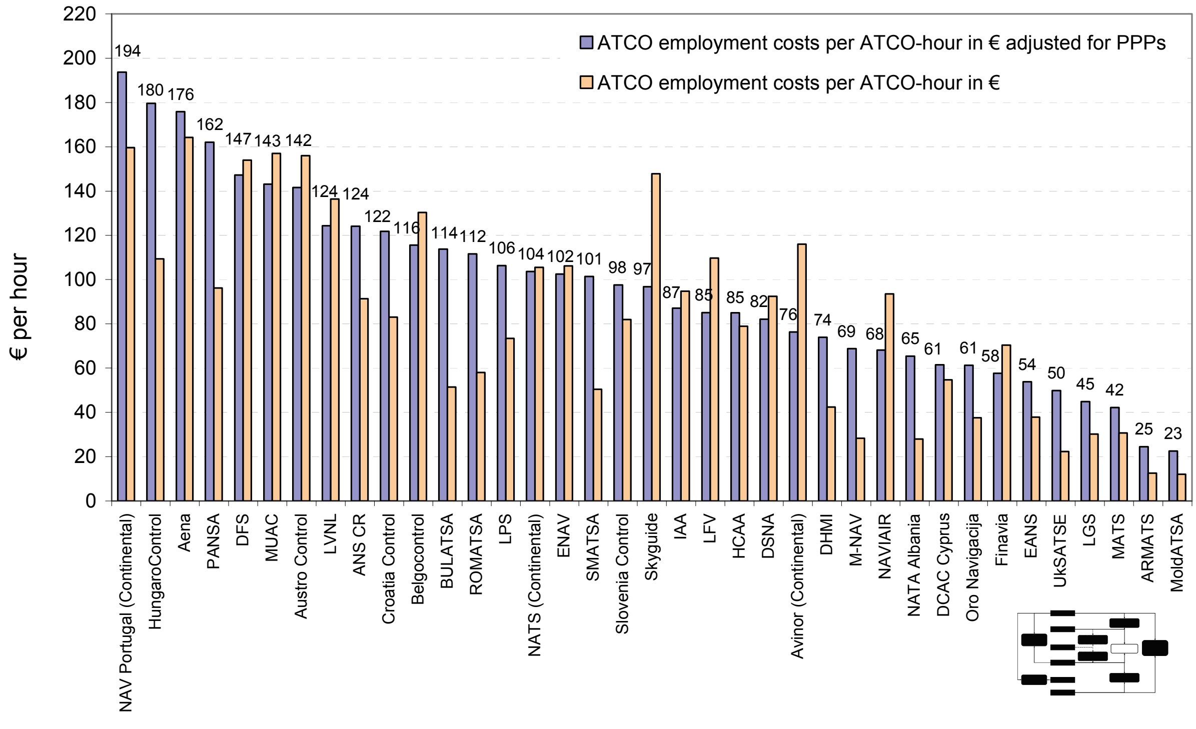


Figure 4.13: Employment costs per ATCO-hour with and without PPPs, 2011

[54] 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.

4.4.3 ATCO employment costs per composite flight-hour (2011)

The ATCO employment costs per composite flight-hour result from the combination of the previous two components: ATCO-hour productivity and employment costs per ATCO-hour. All other things being equal, lower ATCO employment costs per unit output will contribute to greater financial cost-effectiveness. This indicator is displayed in Figure 4.14.

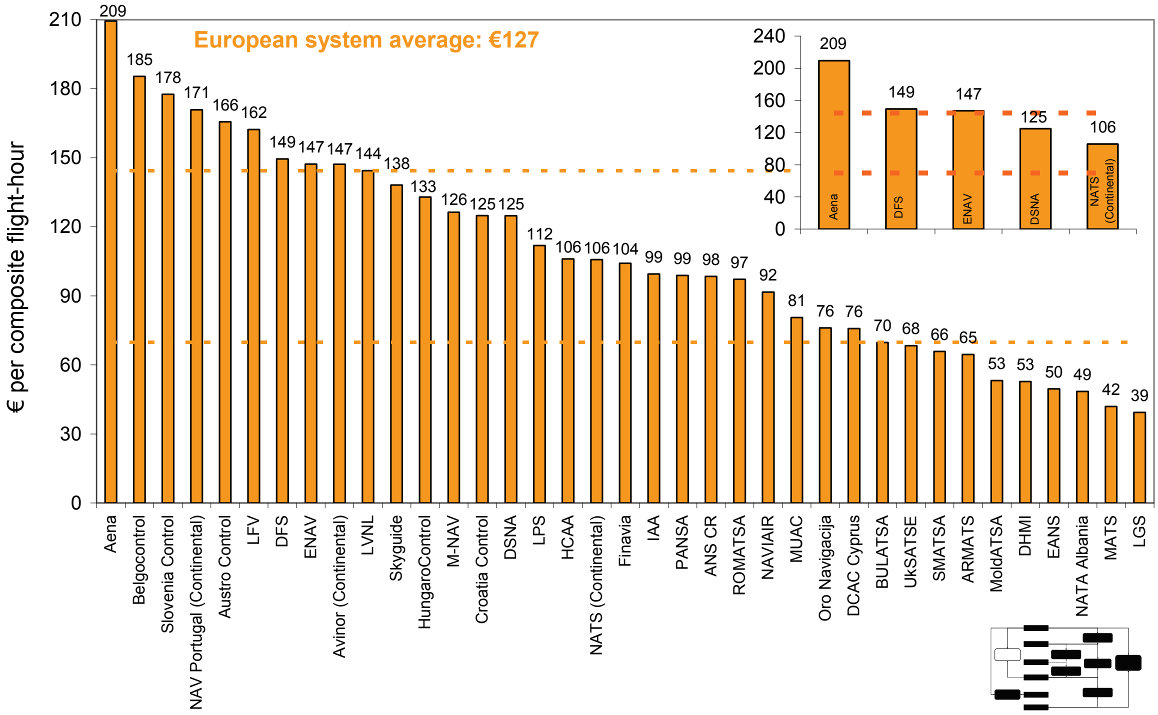


Figure 4.14: ATCO employment costs per composite flight-hour, 2011

In order to provide an insight into the relationship between ATCO-hour productivity and employment costs, Figure 4.15 below presents the ANSPs classified in four quadrants according to their level of ATCO productivity and employment costs. The quadrants are established on the basis of the European average values for these two metrics.

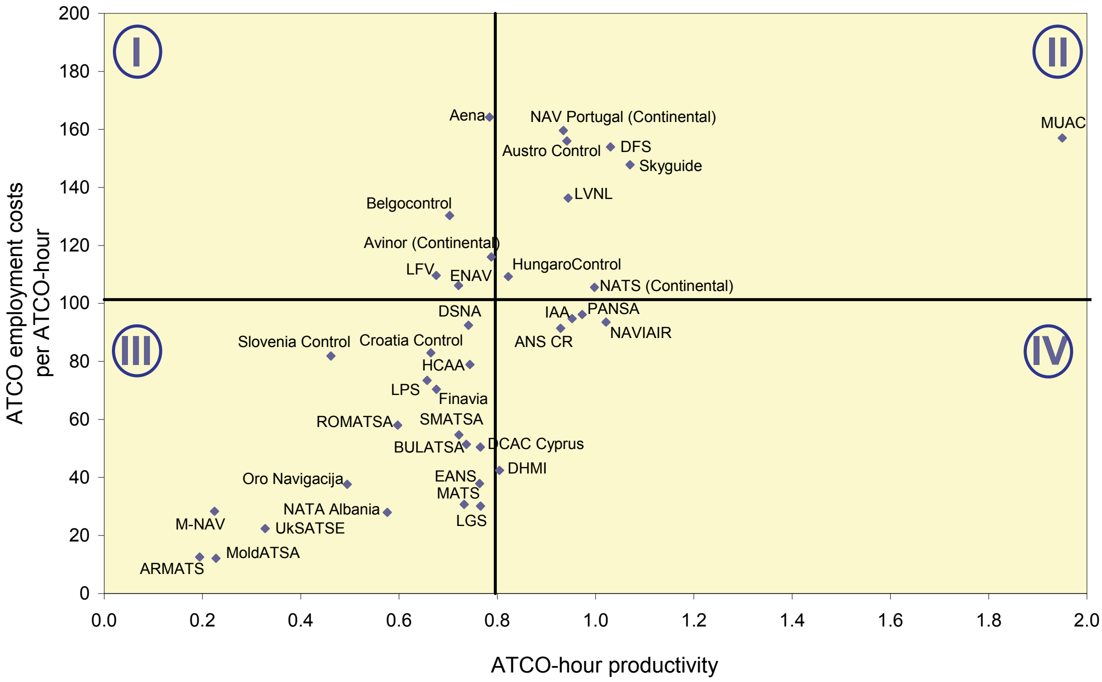


Figure 4.15: Components of ATCO employment costs per unit of output, 2011

An ANSP may have high ATCO employment costs per ATCO-hour but if its ATCOs are highly productive then it will have lower employment costs per composite flight-hour. This is the case for the ANSPs in the top right (Quadrant II) of Figure 4.15 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 4.14 above).

Some ANSPs such as Belgocontrol (Quadrant I) combine higher ATCO employment costs with lower ATCO productivity, resulting in high ATCO employment costs per unit of output (see also Figure 4.14 above).

Other ANSPs such as NAVIAIR (Quadrant IV) have both higher ATCO-hour productivity and lower ATCO employment costs per ATCO-hour.

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

4.4.4 Support costs per composite flight-hour (2011)

Support costs amount to 70% of total ATM/CNS provision costs. Effective management of these costs, especially in a context of traffic increase, would have a major impact on cost-effectiveness. It is therefore important to understand the components of support costs, and what might drive changes in them. A study of ATM/CNS fragmentation throughout Europe suggested that fragmentation contributed to higher support costs[55]. Therefore, reducing the current level of fragmentation (e.g. through joint procurement and rationalisation of investments within FABs) has the potential to decrease support costs and improve cost-effectiveness. For the purposes of analysing differences in support costs, the part of the framework presented in Section 4.3 which is relating to support costs is further developed in Figure 4.16 below.

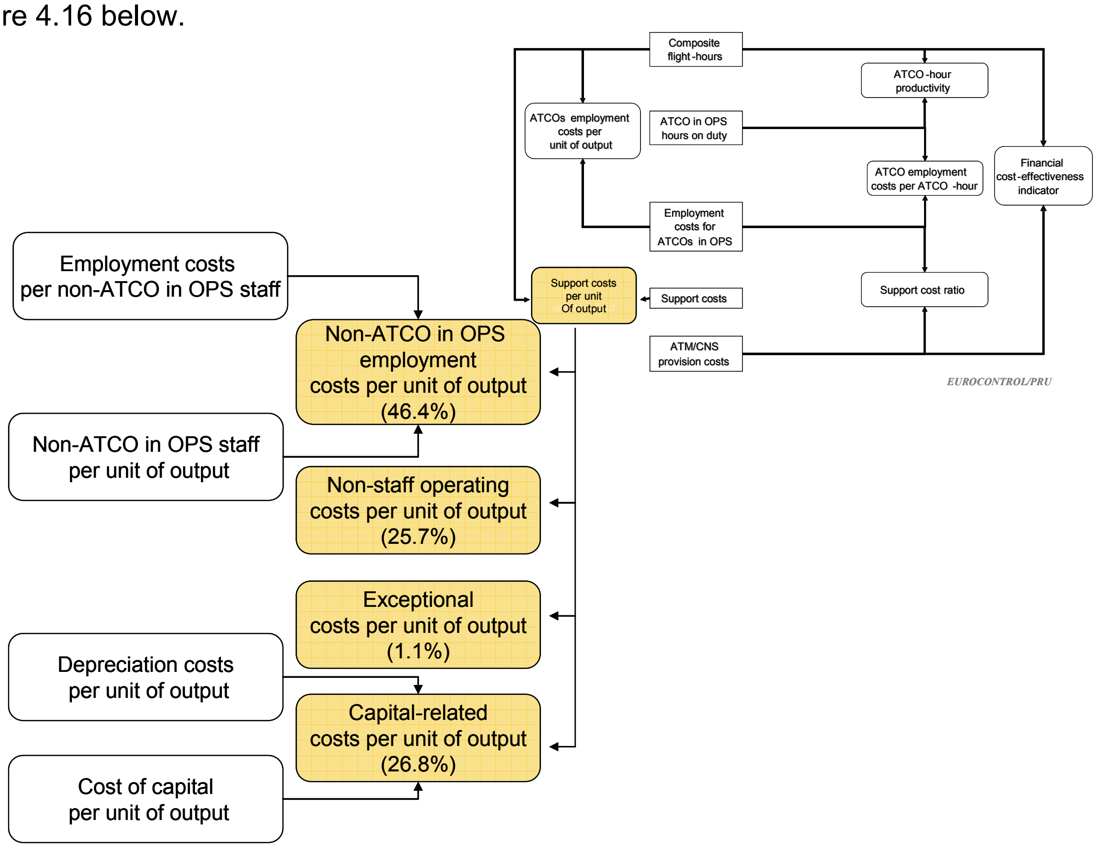


Figure 4.16: Framework for support costs analysis (2011)

[55] The impact of fragmentation in European ATM/CNS, Report commissioned by the EUROCONTROL PRC, April 2006. The report is available on the PRC website: (http://www.eurocontrol.int/prc/public/standard_page/doc_other_reports.html).

As shown in Figure 4.16 support costs can be broken down into four separate components that provide further insight into the nature of support costs:

- **employment costs for non-ATCO in OPS staff**; these cover ATCOs on other duties, trainees, technical support and administrative staff (46.4% of support costs);
- **non-staff operating costs** mostly comprise expenses for energy, communications, contracted services, rentals, insurance, and taxes (25.7% of support costs);
- **exceptional costs** (1.1% of support costs); and,
- **capital-related costs**, comprising depreciation and financing costs for the capital employed (26.8% of support costs).

At system level, employment costs for staff other than ATCOs in OPS account for 46% of total support costs. In the context of planning processes and contract renegotiation for support staff, it is important for ANSPs to monitor this indicator and to set quantitative objectives in terms of employment costs per unit of output.

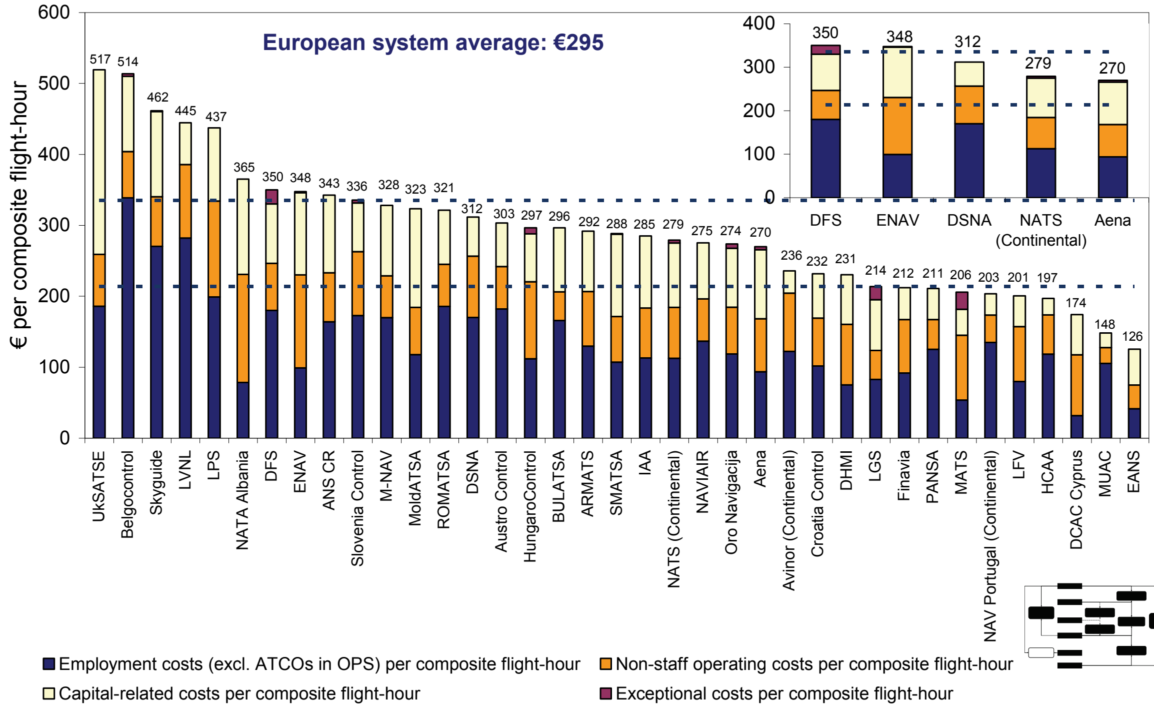


Figure 4.17: Support costs per composite flight-hour[56], 2011

At Pan-European system level, support costs per composite flight-hour amount to €295 in 2011. Figure 4.17 shows that the level of unit support costs varies significantly across ANSPs – a factor greater than four between UkSATSE which has the highest support cost per composite flight-hour in 2011 (€517) and EANS (€126).

Figure 4.17 indicates that for UkSATSE, capital-related costs (see yellow bar) represent some 50% of total support costs, while generally, capital-related costs account for 25% to 30% of ANSPs support costs. The higher share for UkSATSE is mainly due to the fact that its cost of capital is not computed as the product of a weighted average cost of capital (WACC) with the operating capital employed, but that it includes the amount of capital expenditures spent in 2011.

Figure 4.17 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)

[56] It should be noted that, the cost of capital reported by Oro Navigacija and ANS CR in their ACE 2011 data submissions are higher than the costs charged to airspace users. Indeed, Oro Navigacija charged only 40% of the actual terminal ANS cost of capital, and ANS CR did not charge any cost of capital to terminal ANS users.

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. This is particularly the case for the five largest ANSPs. ENAV outsources the maintenance of ATM systems and the corresponding costs are comprised in the non-staff operating costs[57]. For Aena, DSNA, DFS and NATS some activities are carried out by internal staff and the relating costs appear as employment costs or as capital-related costs when, according to IFRS, the employment costs of staff working on research and development projects can be capitalised in the balance-sheet.

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

Like ATCO in OPS employment costs, employment costs for the support staff are also affected by the cost of living[58]. Using the same methodology as in Figure 4.13, Figure 4.18 shows the impact of adjusting the non-ATCO in OPS employment costs per composite flight-hour for PPPs. It is noteworthy that Aena average employment costs per composite flight-hour for support staff are close to the bottom quartile value (i.e. €100), while its ATCO employment costs per composite flight-hour are amongst the highest in Europe (see Figure 4.13).

After PPP adjustment, the average unit employment cost for support staff per composite flight-hour amounts to €150 (compared to €137 without adjustment). Figure 4.18 shows that after adjusting for PPPs, the unit employment costs of many Central and Eastern European ANSPs are much higher than to those in Western Europe.

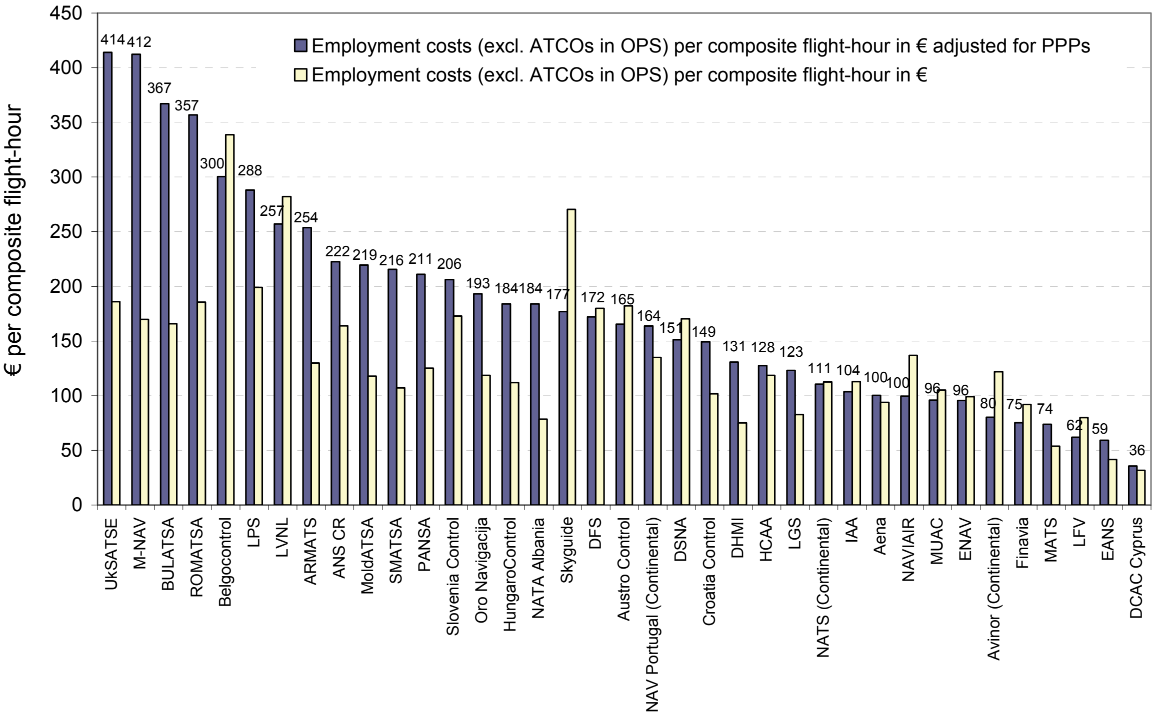


Figure 4.18: Non-ATCO in OPS employment costs with and without adjustment for PPPs, 2011

[57] A non negligible part of ENAV non-staff operating costs (some €37M) relates to en-route ATC services provided by the Italian Air Force mainly at regional civil/military airports. It should also be noted that ENAV en-route and terminal depreciation costs do not include the costs (some €13M in 2011) relating to assets funded through a public mechanism whose objective is the economic development of the Southern regions of Italy in the context of the Cohesion Policy of the European Union.

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

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

As shown in Figure 4.19, which comprises an extract of the framework presented in Figure 4.16, non-ATCO in OPS employment costs per composite flight-hour can be broken down into two indicators:

(1) the employment costs per non-ATCO in OPS staff; and,

(2) the number of non-ATCO in OPS staff required by unit of output.

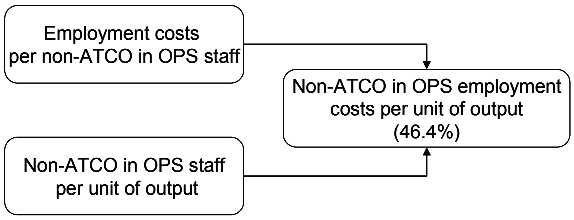


Figure 4.19: Breakdown of non-ATCO in OPS employment costs

In order to provide an insight into the relationship of these two indicators, Figure 4.20 below presents the ANSPs classified in four quadrants according to their level of employment costs per non-ATCO in OPS staff and the number of non-ATCO in OPS staff required per composite flight-hour.

In Figure 4.20, the quadrants are determined by the European averages i.e. some 64 €'000 for the employment costs per non ATCO-staff, and 2.1 non-ATCO staff for 1000 composite flight-hours.

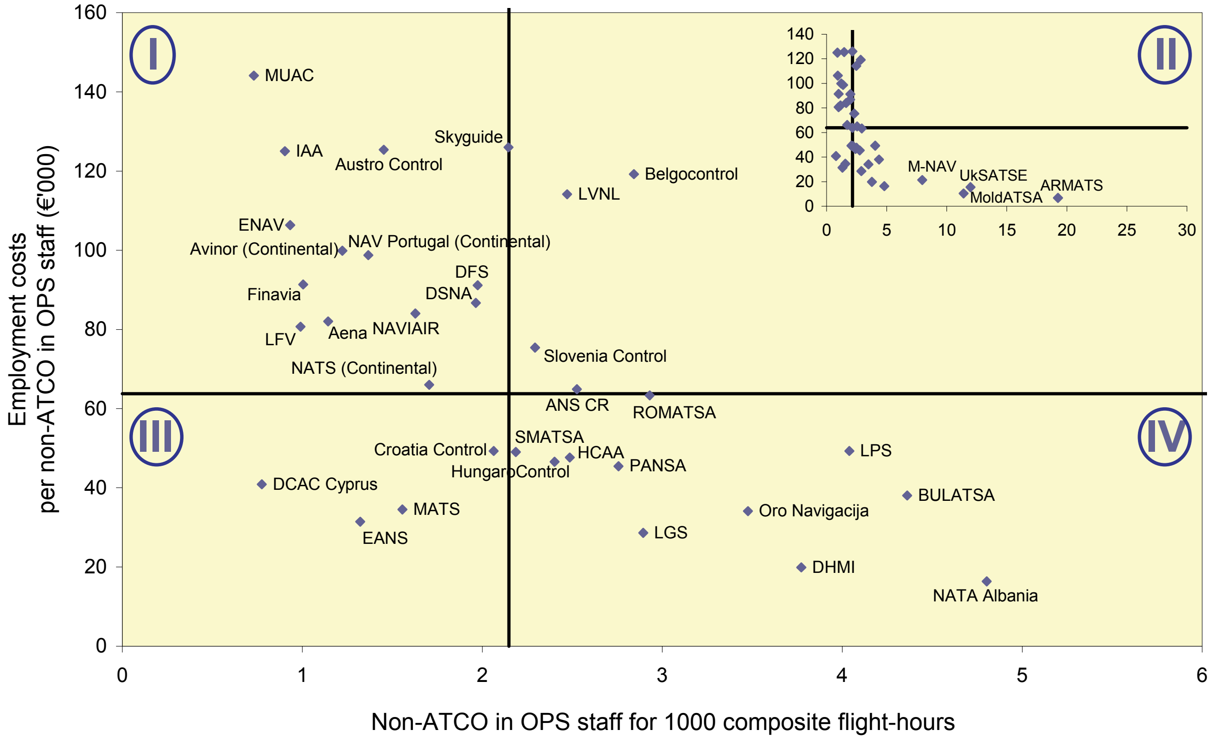


Figure 4.20: Employment costs per non-ATCO in OPS staff and support staff per unit of output[59], 2011

An ANSP may have high employment costs for support staff but if a low number of support staff is required per unit of output it may have lower support staff employment costs per composite flight-hour. This is the case for the ANSPs in the top left of Figure 4.20 such as MUAC and IAA (Quadrant I).

[59] As explained in Section 2.5, MET costs are not included in the ACE benchmarking analysis. Therefore to ensure consistency, for those ANSPs where MET services are provided internally, MET staff are deducted from the total support staff reported in Figure 4.20.

Belgocontrol and LVNL (Quadrant II) combine relatively high unit employment costs for support staff with a relatively higher number of support staff per composite flight-hour, resulting in high support staff costs per unit of output (see also Figure 4.18 above).

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

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

Figure 4.20 indicates that there is no clear-cut relationship between these two indicators. However, ANSPs where the unit employment costs for support staff are lower tend to have a larger number of support staff per unit of output. This is particularly the case for four ANSPs, ARMATS, M-NAV, MoldATSA and UkSATSE. These ANSPs are shown in the miniature replica which is inserted in Figure 4.20 (see top-right corner). For these ANSPs, the large numbers of support staff per unit of output are the main driver for the relatively high unit employment costs for support staff shown in Figure 4.18.

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

Capital-related costs per composite flight-hour

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

As shown in Figure 4.21 capital-related costs can be further broken down into depreciation costs per unit of output and cost of capital per unit of output.

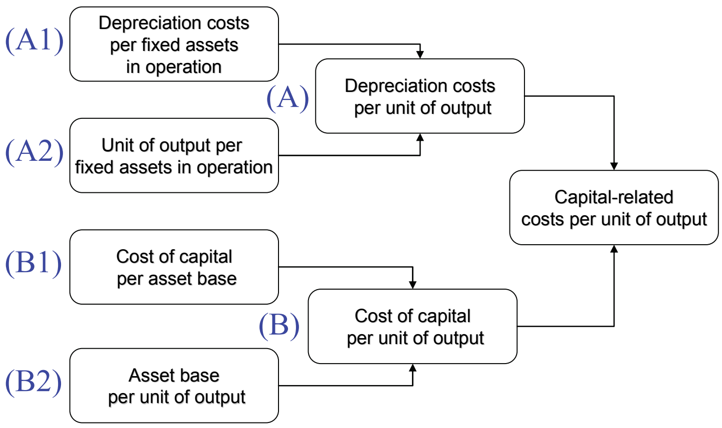


Figure 4.21: Breakdown of capital-related costs

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

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

These two factors are examined in Figure 4.22. The bar, measured on the left-hand scale, shows the asset base to which the cost of capital is applied, divided by the composite flight-hours, to give a fair comparison across ANSPs. At a minimum, the asset base should comprise fixed assets that are employed to provide ATC services (the yellow bar in the diagram). It is also reasonable to include some current assets which are shown as the blue bar. The sum of these two quantities (fixed assets and current assets) is the asset base to which an average rate[60] (see red dots) is applied to calculate the cost of capital[61]. ANSPs are ranked by their ratio of asset base per composite flight-hour.

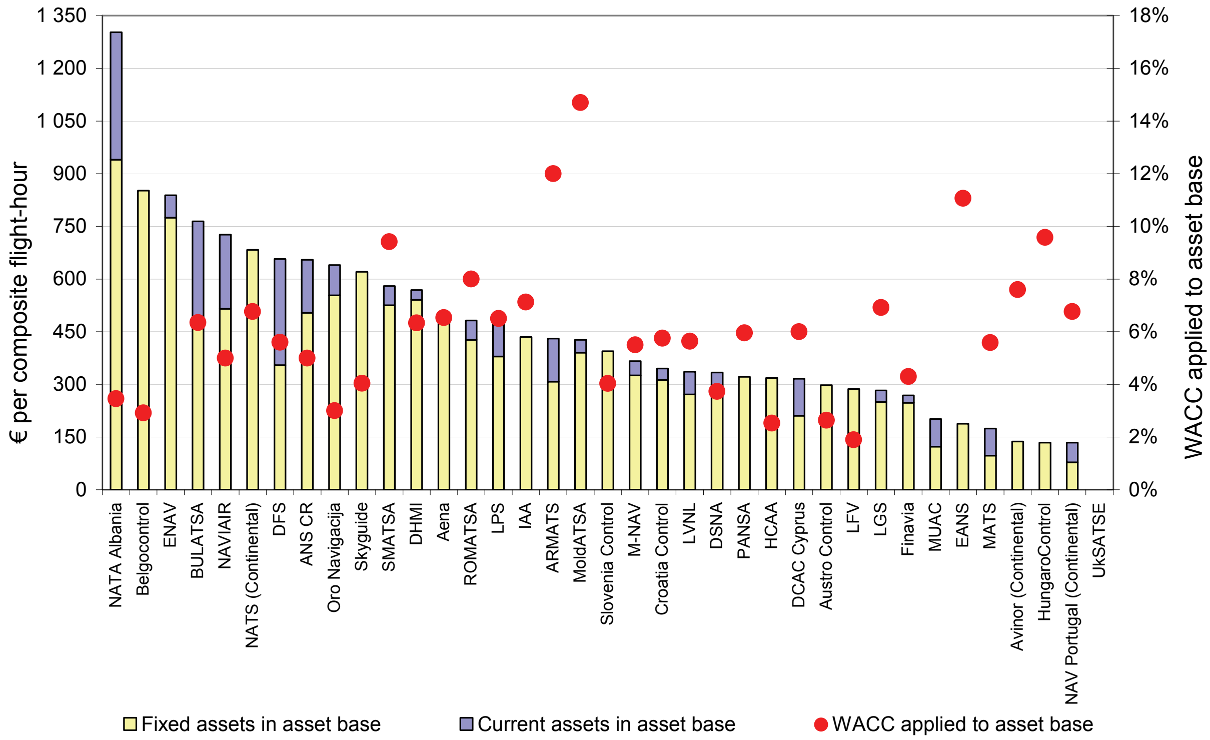


Figure 4.22: Asset bases and average WACCs used to compute the cost of capital, 2011[62]

Figure 4.22 shows that out of the 36 ANSPs[63] reporting complete data on the calculation of the cost of capital, nine calculated a cost of capital based only on the value of fixed assets. Some ANSPs such as Aena, HungaroControl, PANSA and Slovenia Control reported a negative value for the working capital which lowers the asset base used to compute the cost of capital. Out of the remaining ANSPs, 23 included current assets which in some cases represent a significant proportion of the asset base.

Figure 4.22 indicates that NATA Albania has by far the highest asset base in Europe when it is expressed in terms of composite flight-hour. This issue would certainly deserve further attention[64].

WACCs used to calculate the cost of capital are mostly in the range of 3% to 8% per year. Figure 4.22 indicates that the rates for MoldATSA, ARMATS and EANS are over 10% (14.7%, 12.0% and 11.1%, respectively). These higher (nominal) rates shall be seen in the

[60] Commonly referred to the Weighted Average Cost of Capital (WACC).

[61] The information provided in Figure 4.22 relates to the assumptions used to compute an economic cost of capital for the purposes of the ACE Benchmarking analysis. This may differ from the cost of capital that is part of the cost-base **charged** to airspace users, for terminal ANS. See footnote 56.

[62] The WACC reported by NATS in its data submission (6.8%) is expressed in real terms. In the context of NERL economic regulation process, the cost of capital is computed as the product of an average nominal regulatory rate of return with a regulatory asset base which is adjusted for inflation. Considering an inflation rate of 4.5% for the UK in 2011, NATS WACC would amount to some 11.3% in nominal terms (i.e. 6.8% + 4.5%).

[63] It should be noted that in its ACE 2011 data submission, ENAV separately identified WACC values for en-route and terminal ANS but not for gate-to-gate ANS.

[64] It should be noted that the large amount of current assets reported for NATA Albania in Figure 4.22 reflects an exceptional situation due to delays in the implementation of the National Airspace Modernisation Programme, where cash drawn from a bank loan to finance the investments is recorded as current asset by NATA Albania.

light of the higher inflation in these countries (5% to 8% in 2011). On the other hand, some of the WACCs reported in Figure 4.22 appear high considering the low-risk nature of the ANS activity in a context of full-cost recovery for en-route ANS.

Both the magnitude of the asset base and the level of the WACCs (and in particular the return on equity) would require further analysis in order to better understand the differences reported in Figure 4.22.

5 CHANGES IN FINANCIAL COST-EFFECTIVENESS (2007-2011)

5.1 Introduction

This chapter examines the changes in financial cost-effectiveness between 2007 and 2011, both for the Pan-European system level and for individual ANSPs. The indicators presented in this chapter will not be directly comparable to those in individual ACE reports (including this one), for the following reasons:

- The sample of ANSPs must be consistent; this has to be the 36 which disclosed information consistently over the period[65];
- The financial figures in previous years' calculations have been restated in 2011 prices and 2011 exchange rates in order to ensure consistency in time series comparison. At Pan-European system level for the period 2007-2011, price indices increased by +10.2% (i.e. some +2.5% p.a.)[66];
- As part of the experience and understanding gained from the last data validation process, the PRU has made some data adjustments in order to ensure comparability over time. These adjustments have been made in a fully transparent way with the cooperation of the participating ANSPs.

The main objective of this Chapter is to look at the medium term developments in financial cost-effectiveness for 2007-2011 at Pan-European system level and at ANSP level. A five year period forms a solid basis to derive medium term trends.

The period 2007-2011 was rich in changes and analysing the overall variation in cost-effectiveness cannot be done meaningfully without considering the main events characterising this period. In 2008, traffic growth (+1.5%) was much lower than in 2007 (+5.4%), reflecting the early impacts of the financial crisis. In 2009, the economic situation further deteriorated in Europe and the traffic controlled by ANSPs fell by an unprecedented -6.7%. Composite flight-hours rose by +2.1% in 2010, a modest recovery compared to the sharp decrease experienced in 2009. The year 2010 was marked by a volcanic eruption which created severe traffic disruptions across Europe. In 2011, traffic volumes increased by +3.9% to reach a level close to that of 2007.

Figure 5.1 shows that the increase in traffic volumes at Pan-European system level (+3.9% in 2011) results from a combination of contrasted trends at ANSP level.

Indeed, Figure 5.1 also indicates that in 2011, traffic decreased for 6 ANSPs (Austro Control, DCAC Cyprus, ENAV, HCAA, HungaroControl and M-NAV). On the other hand, relatively large traffic increases were observed for the Nordic ANSPs and for some of the organisations operating in the eastern and southern borders of Europe.

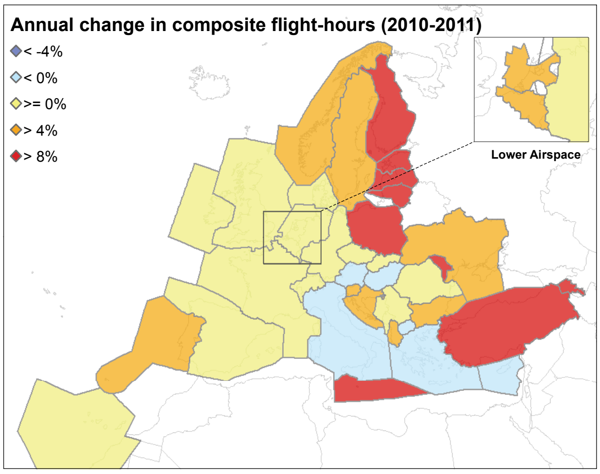


Figure 5.1: Annual change in composite flight-hours between 2010 and 2011

[65] This is not a serious limitation. Only ARMATS is omitted from the historical analysis since it did not start disclosing information until after the start of the period. The ANSPs included in this analysis comprise 99.9% of the 2011 sample in terms of output (composite flight-hours).

[66] Source: Inflation rates (average consumer prices) from IMF database available at http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx.

5.2 Medium-term changes in financial cost-effectiveness (2007-2011)

5.2.1 Changes at Pan-European system level (2007-2011)

Figure 5.2 shows how the financial cost-effectiveness indicator has changed over time for Europe as a whole. The blue bars show the ATM/CNS provision costs per composite flight-hour, with all years expressed in the same price base (€2011), with the scale on the left-hand axis. To show how the indicator is driven by changes in traffic and costs, indices of those variables are plotted as the orange and dark blue lines, respectively, with the scale on the right-hand axis.

At Pan-European system level, unit ATM/CNS provision costs slightly decreased between 2007 and 2011 (-0.9% in real terms[67] over the period or -0.2% p.a.). Figure 5.2 indicates that, after a staggering increase in 2009 (+8.6%), unit ATM/CNS provision costs significantly fell in 2010 (-6.2%) and then further decreased in 2011 (-2.1%). In other words, two years after the sharp traffic decrease in 2009, unit ATM/CNS provision costs reached in 2011 a level close to that achieved in 2007-2008 before the economic crisis.

As indicated on the right-hand side of Figure 5.2, the reduction in unit ATM/CNS provision costs observed for the year 2011 results from the fact that traffic volumes rose faster (+3.9%) than ATM/CNS provision costs (+1.8%).

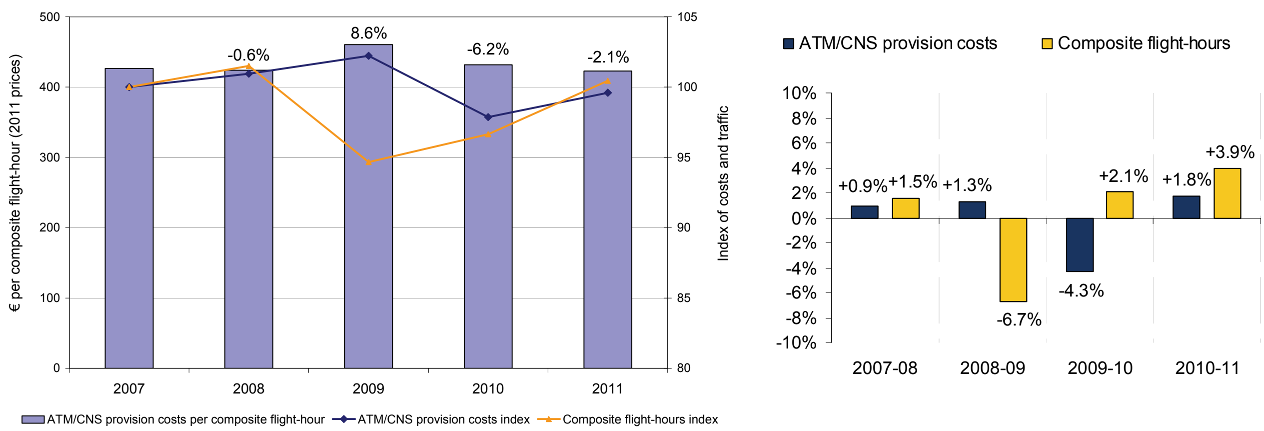


Figure 5.2: Changes in financial cost-effectiveness indicator (2007-2011, real terms)

5.2.2 Changes at ANSP level (2007-2011)

Figure 5.3 shows the annual changes in unit ATM/CNS provision costs for each ANSP, between 2007 and 2011 (yellow bars) and between 2010 and 2011 (blue bars). ANSPs are ranked by the level of 2011 ATM/CNS provision costs. This illustrates the fact that a percentage change in unit costs has a larger impact on the European average when it comes from a larger ANSP (left-hand side) than from a smaller ANSP (right-hand side).

Between 2007 and 2011, unit costs fell for 18 out of 36 ANSPs. Among the five largest ANSPs, unit costs decreased in real terms for Aena (-6.3% p.a.) and to a lower extent NATS (-0.7% p.a.) while they increased for DSNA (+2.3% p.a.), DFS (+3.1% p.a.) and ENAV (+1.6% p.a.). The largest increases in unit costs are observed for UkSATSE (+9.2% p.a.) and HungaroControl (+8.5% p.a.).

[67] It should be noted that in nominal terms, unit ATM/CNS provision costs increased by some +9% between 2007 and 2011, given that at Pan-European system level, price indices increased by +10%.

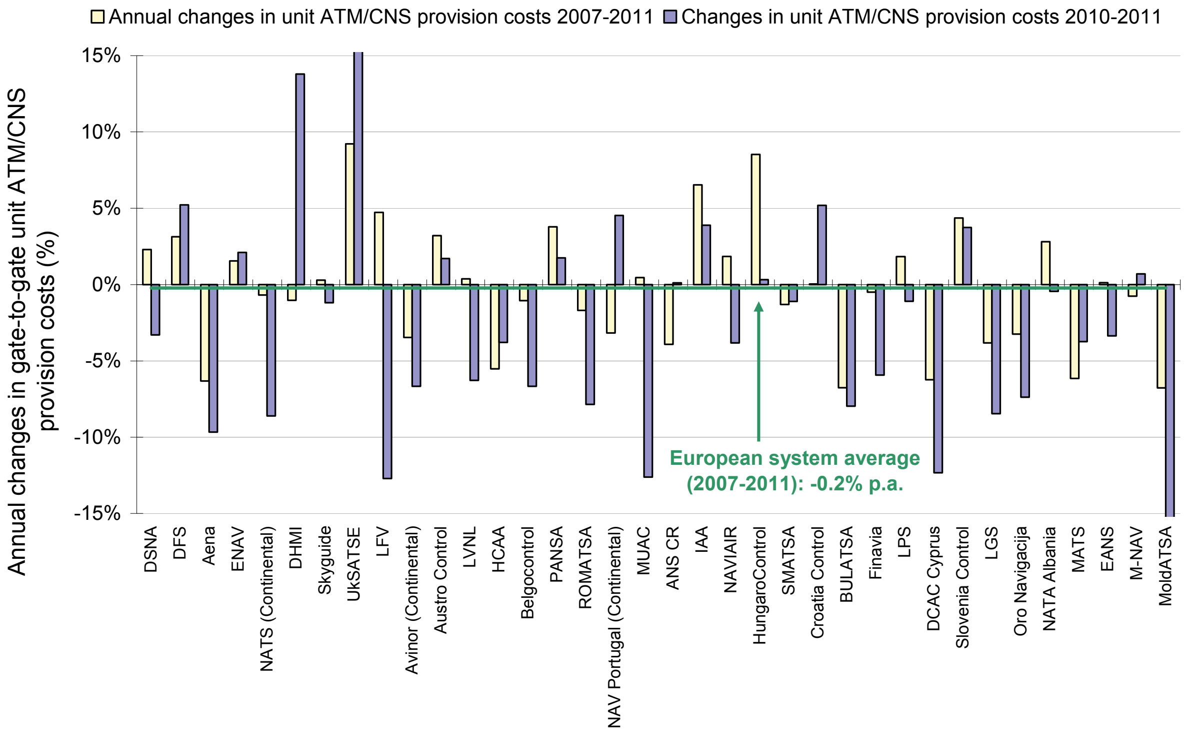


Figure 5.3: Annual changes in gate-to-gate ATM/CNS provision costs per composite flight-hour, 2007-2011 (real terms)

Figure 5.3 also shows that between 2010 and 2011 (see blue bars) unit costs fell for 23 ANSPs out of 36. Significant decreases are observed for MoldATSA (-21%), LFV (-13%), MUAC (-13%), DCAC Cyprus (-12%) and Aena (-10%).

- For MUAC, the decrease in unit ATM/CNS provision costs (-13%) mainly reflects lower staff costs, non-staff operating costs and depreciation costs while traffic increased by +3.9%.
- The reduction in unit ATM/CNS provision costs for MoldATSA (-21%) is mainly due to lower non-staff operating costs and capital-related costs while traffic increased by +8.2%.
- For DCAC Cyprus, ATM/CNS provision costs substantially decreased in 2011 (-12.5%) while traffic volumes remained fairly constant (-0.2%). The reduction in ATM/CNS provision costs reflects lower non-staff operating costs and capital-related costs.
- The significant reduction in Aena 2011 gate-to-gate ATM/CNS provision costs (-6.1%) mainly results from (a) the implementation of cost containment measures in 2011 and (b) from the implementation of Law 9/2010, which introduced new working conditions and resulted in significantly lower ATCO employment costs.
- LFV ATM/CNS provision costs fell by -6.2% in 2011 while traffic rose by +7.5%. The decrease in LFV ATM/CNS provision costs partly reflects a net one-off gain on pension costs realised by LFV following the transfer of a part of its pension liabilities to the National Government Employee Pensions Board.

A more detailed analysis of the changes in cost-effectiveness between 2010 and 2011, identifying the cost and the traffic effects is provided in Figure 5.4. This analysis builds on the ACE 2009 Report findings which concluded that given short term rigidities to adjust costs downwards and unavoidable lead time, it was likely that the cost-containment measures initiated in 2009 would only materialise from 2010 onwards.

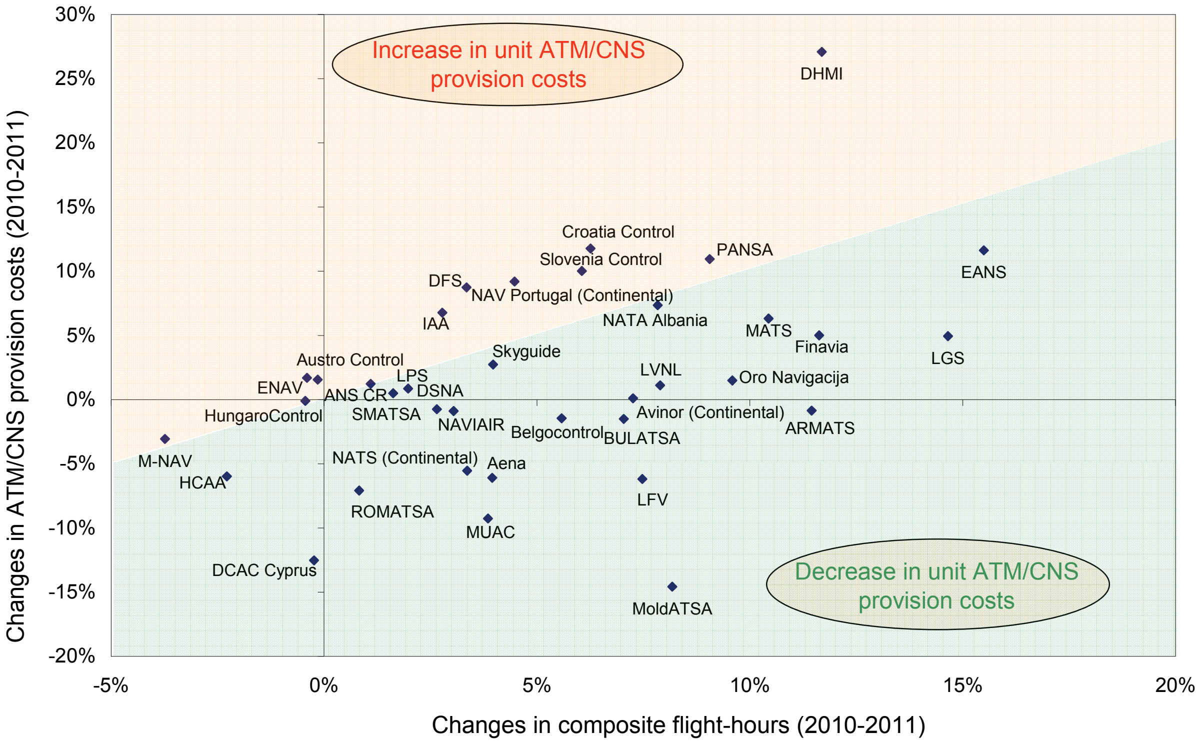


Figure 5.4: Changes in ATM/CNS provision costs and traffic volumes (2010-2011)

Figure 5.4 shows that 15 ANSPs could reduce their ATM/CNS provision costs between 2010 and 2011 (see lower part of the chart). For most of these ANSPs, the lower ATM/CNS costs were associated with an increase in traffic volumes, resulting in a substantial decrease of unit costs in 2011. On the other hand, for M-NAV, the reduction in ATM/CNS provision costs was not sufficient to outweigh the decrease in traffic and to avoid a small increase (+0.7%) in unit costs in 2011.

For nine of these 15 ANSPs (Aena, Belgocontrol, BULATSA, DCAC Cyprus, HCAA, M-NAV, NATS, NAVIAIR and ROMATSA), ATM/CNS provision costs decreased for the second consecutive year. At face value, this indicates that the cost-containment measures implemented in 2009 and 2010 by these ANSPs generated additional savings in 2011.

In 2011, ATM/CNS provision costs increased by more than +10% for six ANSPs (UkSATSE, DHMI, Croatia Control, EANS, PANSA, and Slovenia Control). For UkSATSE which does not appear in Figure 5.4, ATM/CNS provision costs increased by +45% in 2011. This significant increase mainly reflects the fact that UkSATSE reported the amount of capital expenditures spent in 2011 as capital-related costs. For PANSA (+11.0%), the increase in ATM/CNS provision costs should be seen in the light of substantial increases in traffic volumes (+9.1%).

Out of the five largest ANSPs, Aena (-9.7%), NATS (-8.6%) and DSNA (-3.3%) could achieve a reduction in unit ATM/CNS provision costs in 2011. For these ANSPs, this performance improvement was achieved by reducing ATM/CNS provision costs while traffic volumes increased. In 2011, unit costs increased for DFS (+5.2%) and ENAV (+2.1%). For DFS[68], this is mainly due to the fact that ATM/CNS costs increased faster (+8.7%) than traffic volumes (+3.3%). For ENAV, the increase in unit ATM/CNS provision costs mainly result from higher ATM/CNS provision costs (+1.7%) while traffic slightly decreased in 2011 (-

[68] The main drivers underlying the increase in DFS unit costs are higher staff costs (+7% or +€41.6M) and exceptional costs (+87% or +€18.2M). The increase in exceptional costs observed for the year 2011 mainly reflects the fact that 2010 exceptional costs were reduced following a one-off decrease in IFRS pension conversion effects.

0.4%). In 2011, the political crisis in Northern African countries, including the prolonged closure of the Libyan airspace, has negatively affected the traffic volumes controlled in the Italian airspace.

More details on the changes in unit ATM/CNS provision costs for individual ANSPs are provided in Annex 8 of this Report.

5.3 Changes in the components of financial cost-effectiveness (2007-2011)

This section analyses the changes in the components of financial cost-effectiveness between 2007 and 2011 for the 36 ANSPs that have reported ACE data consistently since 2007.

Year-on-year changes that can be observed in the charts mainly reflect genuine changes in performance, but in a few cases these could also be due to changes in ANSPs data reporting. Therefore some caution is needed with the interpretation of these comparisons.

5.3.1 Changes at Pan-European system level (2007-2011)

Figure 5.5 shows how the various component ratios have contributed to the overall change in unit costs between 2007 and 2011 at Pan-European system level[69]:

- The left-hand side indicates that the increase in ATCO-hour productivity (+6.5%) was higher than the increase in ATCO employment costs (+1.9%). This resulted in lower ATCO employment costs per composite flight-hour (-4.3%);
- The right-hand side indicates that support costs (+1.2%) rose faster than traffic (+0.5%), and as a result support costs per composite flight-hour slightly increased (+0.7%) over the 2007-2011 period;
- The central part shows that, given the weights of ATCO employment costs (31%) and support costs (69%), overall unit ATM/CNS provision costs slightly decreased by -0.9% between 2007 and 2011.

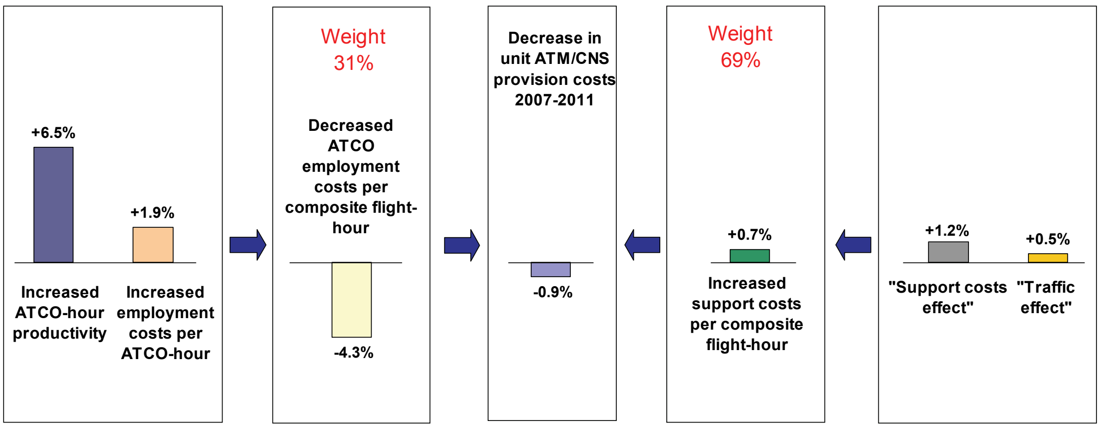


Figure 5.5: Breakdown of changes in financial cost-effectiveness, 2007-2011 (real terms)

The strong traffic decrease in 2009 led to a sharp increase in unit ATM/CNS provision costs (+8.6%) which significantly affects the changes over 2007-2011 as shown in Figure 5.5.

Figure 5.6 below focuses on the changes between 2010 and 2011.

[69] Figure 5.5 does not include ARMATS which was not part of the ACE sample before 2009.

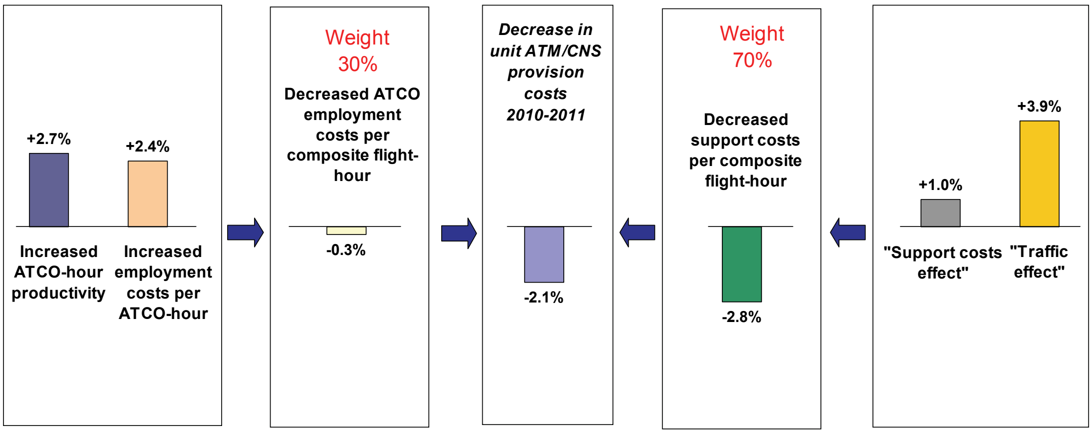


Figure 5.6: Breakdown of changes in financial cost-effectiveness, 2010-2011 (real terms)

Figure 5.6 indicates that in 2011, ATCO-hour productivity increased faster (+2.7%) than employment costs per ATCO-hour (+2.4%), resulting in lower ATCO employment costs per composite flight-hour (-0.3%). This slight improvement combined with the decrease in support costs per composite flight-hour (-2.8%) contributed to the -2.1% reduction in unit ATM/CNS provision costs in 2011.

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

5.3.2 Changes in ATCO-hour productivity at ANSP level (2007-2011)

As indicated in Figure 5.5, between 2007 and 2011 ATCO-hour productivity rose by +6.5% at Pan-European system level.

Figure 5.7 shows that this overall change is driven by:

- +3.8% productivity increase over 2007-2008;
- a significant decrease in 2009, reflecting the -6.7% fall in traffic; and,
- productivity increases in 2010-2011 (+6.7% and +2.7%, respectively), to reach a level (0.80) that is higher than the one achieved in 2008 (0.78) before the traffic downturn.

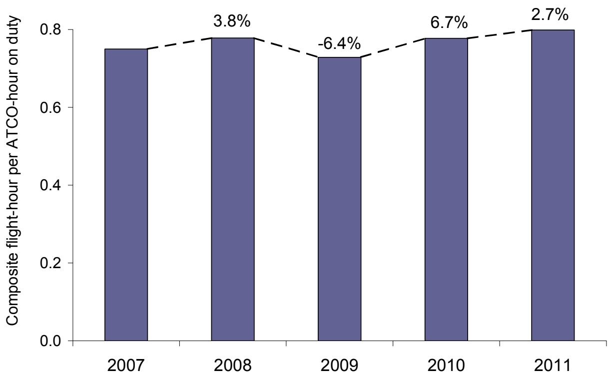


Figure 5.7: Changes in ATCO-hour productivity (2007-2011)

At Pan-European system level, the increase in productivity achieved in 2011 (+2.1%) is mainly due to the fact that traffic volumes increased faster (+3.9%) than ATCO-hours on duty (+1.2%).

Figure 5.8 shows that, over the 2007-2011 period, the productivity increase observed at Pan-European system level mainly results from an increase in the bottom quartile. This indicates that the rise at system level mainly reflects improvements in ANSPs with relatively lower ATCO-hour productivity levels, while the ATCO-hour productivity of ANSPs in the top quartile remained fairly constant.

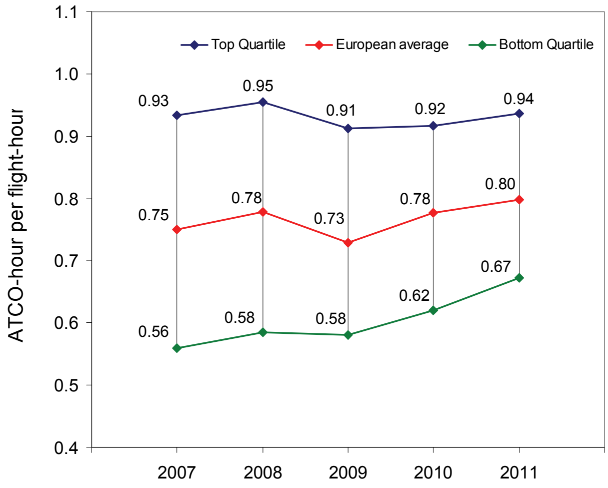


Figure 5.8: Improvement in ATCO-hour productivity (2007-2011)

The information presented in Figure 5.5 and Figure 5.7 for the Pan-European system level masks contrasted trends across ANSPs, hence the importance to look at changes in ATCO-hour productivity at ANSP level.

Figure 5.9 shows the **annual** changes in ATCO-hour productivity for each ANSP, between 2007 and 2011 (yellow bars) and between 2010 and 2011 (blue bars). It also shows the levels of ATCO-hour productivity achieved in 2007 (blue dots).

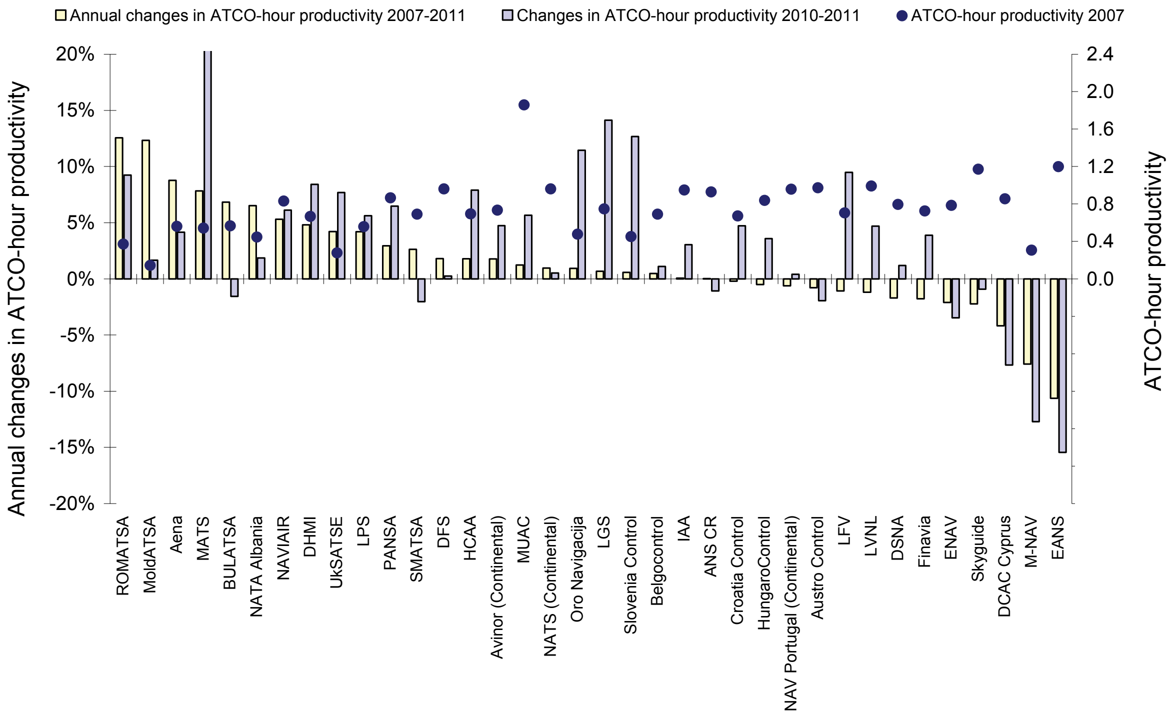


Figure 5.9: Average annual changes in ATCO-hour productivity at ANSP level (2007-2011 and 2010-2011)

Between 2007 and 2011, ATCO-hour productivity rose for 23 out of 36 ANSPs. In general, the largest increases are observed for ANSPs starting from a relatively low level in 2007 and for those that benefited from a solid traffic growth over the period. However, significant increases in ATCO-hour productivity were achieved over the 2007-2011 period by Aena (+8.8% p.a.). These results are heavily influenced by the structural changes implemented in 2010-2011 by Aena following the introduction of Law 9/2010 which was adopted in Spain in 2010. This law introduced new working conditions for Spanish ATCOs, rising contractual working hours and significantly reducing the number of overtime hours, which was one of the main driver for high ATCO employment costs for Aena in the past.

At Pan-European system level, ATCO-hour productivity increased by +2.7% in 2011 since traffic increased by +3.9% while the number of ATCO-hours rose less (by +1.2%). Given that in 2011, the traffic growth was not of the same magnitude across all ANSPs (see Figure 5.1), it is important to analyse the information provided in Figure 5.9 in the light of changes in traffic volumes for each individual ANSP between 2010 and 2011.

It is also important to analyse the information provided in Figure 5.9 by considering the changes in ATCO-hours on duty[70] between 2010 and 2011. This is useful to understand how each individual ANSP reacted to the changes in traffic. This information is provided in Table 5.1 where the change in each ANSP's productivity indicator (A) between 2010 and 2011 has been broken down into a traffic volume effect (B) and an ATCO-hour effect (C).

ANSPs	Country	(A) Changes in ATCO-hour productivity 2010-2011	(B) "Traffic effect"	(C) "ATCO-hour effect"
MATS	MT	33.0%	10.4%	-16.9%
LGS	LV	14.1%	14.7%	0.5%
Slovenia Control	SI	12.7%	6.1%	-5.9%
Oro Navigacija	LT	11.5%	9.6%	-1.7%
LFV	SE	9.5%	7.5%	-1.8%
ROMATSA	RO	9.2%	0.8%	-7.7%
DHMI	TR	8.4%	11.7%	3.0%
HCAA	GR	7.9%	-2.3%	-9.4%
UkSATSE	UA	7.7%	7.0%	-0.7%
PANSA	PL	6.5%	9.1%	2.4%
NAVIAIR	DK	6.1%	3.0%	-2.9%
MUAC		5.7%	3.9%	-1.7%
LPS	SK	5.6%	2.0%	-3.5%
Avinor (Continental)	NO	4.7%	7.3%	2.4%
Croatia Control	HR	4.7%	6.3%	1.5%
LVNL	NL	4.7%	7.9%	3.0%
Aena	ES	4.2%	4.0%	-0.2%
Finavia	FI	3.9%	11.6%	7.5%
HungaroControl	HU	3.6%	-0.4%	-3.9%
IAA	IE	3.0%	2.8%	-0.3%
NATA Albania	AL	1.9%	7.8%	5.9%
MoldATSA	MD	1.7%	8.2%	6.4%
DSNA	FR	1.2%	2.6%	1.4%
Belgocontrol	BE	1.1%	5.6%	4.4%
NATS (Continental)	UK	0.5%	3.4%	2.8%
NAV Portugal (Continental)	PT	0.4%	4.5%	4.1%
DFS	DE	0.3%	3.3%	3.1%
Skyguide	CH	-0.9%	4.0%	4.9%
ANS CR	CZ	-1.1%	1.1%	2.2%
BULATSA	BG	-1.6%	7.0%	8.7%
Austro Control	AT	-1.9%	-0.2%	1.8%
SMATSA	SB	-2.0%	1.6%	3.7%
ENAV	IT	-3.5%	-0.4%	3.2%
DCAC Cyprus	CY	-7.7%	-0.2%	8.1%
M-NAV	MK	-12.7%	-3.7%	10.3%
EANS	EE	-15.4%	15.5%	36.6%
Total European System (36 ANSPs)		2.7%	3.9%	1.2%

<u>Positive</u> values in column (A) mean that productivity <u>improved</u> between 2010 and 2011.

<u>Positive</u> values in column (B) mean that traffic volumes <u>rose</u> between 2010 and 2011.

<u>Positive</u> values in column (C) mean that the number of ATCO-hours <u>rose</u> between 2010 and 2011. All other things being equal, a positive value contributes to lower productivity (hence the red dot).

<u>Productivity improves</u> if traffic grows faster than the ATCO-hours on duty.

<u>For example:</u> NAVIAIR's 2011 productivity is +6.1% higher than in 2010 because the traffic increased by +3.0% while the number of ATCO-hours decreased by -2.9%.

<u>Note</u>: 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).

Table 5.1: Changes in ATCO-hours on duty and traffic volumes (2010-2011)

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

Table 5.1 indicates that 27 ANSPs achieved an increase in ATCO-hour productivity in 2011. The most significant increases in productivity are observed for MATS (+33.0%), LGS (+14.1%), Slovenia Control (+12.7%) and Oro Navigacija (+11.5%). It should be noted that, except for LGS, these increases in ATCO-hour productivity were achieved through a combination of traffic increase and decrease in ATCO-hours on duty.

Table 5.1 also shows that ATCO-hour productivity decreased for nine ANSPs in 2011. The significant reductions observed for EANS (-15.4%) and M-NAV (-12.7%) mainly reflect a significant increase in ATCO-hours on duty compared to 2010 (+36.6% and +10.3%, respectively). For M-NAV, this is mainly due to a change in the reporting of ATCO-hours on duty in their 2011 data submission.

At Pan-European system level, traffic growth was negative in 2012 (-1.6% in terms of IFR flight-hours), this is likely to negatively affect future years productivity unless ANSPs are able to implement measures to adapt to the new traffic conditions.

ATCO productivity improvements can result from more effective OPS room management and by making a better use of existing resources, for example through the adaptation of rosters (preferably individually based to enhance flexibility) and shift times, effective management of overtime, and through the adaptation of sector opening times to traffic demand patterns. 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.

More details on the changes in ATCO-hour productivity for individual ANSPs are provided in Annex 8 of this Report.

5.3.3 Changes in ATCO employment costs at ANSP level (2007-2011)

As indicated in Figure 5.5, between 2007 and 2011 ATCO employment costs per ATCO-hour increased by +1.9% in real terms at Pan-European system level.

Figure 5.10 shows that this is driven by:

- employment costs increases in 2008 (+3.2%) and 2009 (+1.7%);
- a significant decrease in 2010 (-5.2%); and,
- a +2.4% increase in 2011.

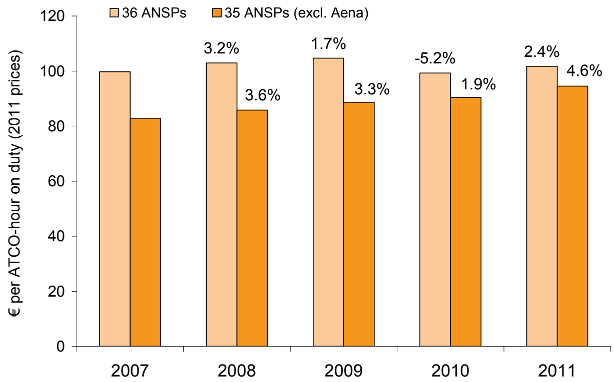


Figure 5.10: Changes in ATCO employment costs per ATCO-hour (2007-2011)

The changes in employment costs per ATCO-hour observed in the 2009-2011 period at Pan-European system level are significantly affected by the reduction of ATCO employment costs for Aena. For this reason, Figure 5.10 also shows that excluding Aena, employment costs per ATCO-hour increased by +1.9% in 2010 and +4.6% in 2011 (i.e. see orange bars). Over the 2007-2011 period, when excluding Aena, ATCO employments costs per ATCO hour rose by +14.1% in real terms.

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. Figure 5.11 shows the **annual** changes for each ANSP between 2007 and 2011 (yellow bars), and between 2010 and 2011 (blue bars).

Between 2007 and 2011, ATCO employment costs per ATCO-hour rose for 27 out of 36 ANSPs. For seven ANSPs (NATA Albania (+21.6% p.a.), DHMI (+18.6% p.a.), UkSATSE (+18.2% p.a.), HungaroControl (+15.8% p.a.), MoldATSA (+15.2% p.a.), PANSA (+10.6% p.a.) and Oro Navigacija (+10.1% p.a.)), these increases were greater than +10% a year. With the exception of HungaroControl and PANSA, these ANSPs had relatively low levels of ATCO employment costs in 2007 (below €30 per hour). The convergence of unit employment costs between Central and Eastern European economies and Western Europe, because of deepening economic interaction and enhanced labour mobility, appears to be continuing.

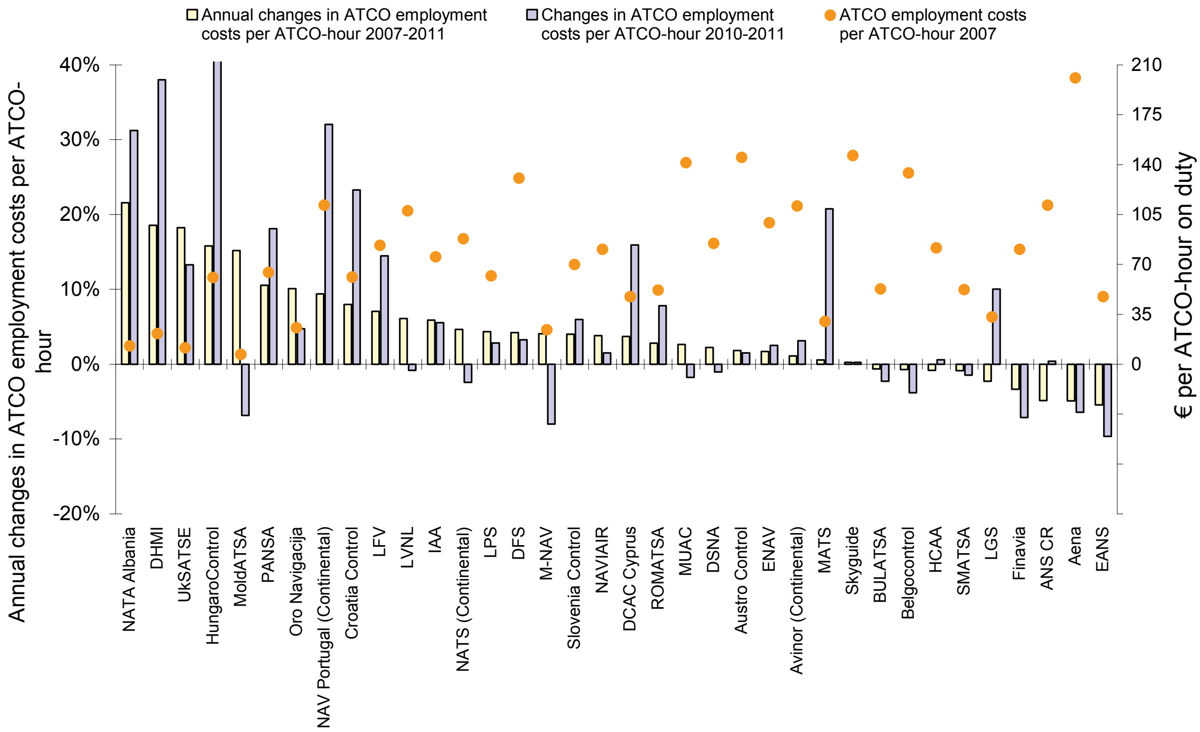


Figure 5.11: Average annual changes in ATCO employment costs per ATCO-hour, 2007-2011 and 2010-2011 (real terms)

Figure 5.11 also indicates that between 2010 and 2011, employment costs per ATCO-hour increased by more than +15% for eight ANSPs, namely HungaroControl (+43%), DHMI (+38%), NAV Portugal (+32%), NATA Albania (+31%), Croatia Control (+23%), MATS (+21%), PANSA (+18%) and DCAC Cyprus (+16%).

The significant increase in NAV Portugal ATCO employment costs per ATCO-hour is due to higher pension contributions while in the meantime staff wages and salaries substantially reduced. This mainly reflects a significant increase in future pension obligations following a change in actuarial assumptions in 2011 (i.e. implementation of a new mortality table).

Employment costs can be profoundly affected by the type of pension arrangements, and particularly whether the pension scheme is a "defined benefit" scheme or a "defined contribution" scheme. In recent years, there has been increasing recognition that traditional methods of accounting for future pensions liabilities tend to under-estimate pension costs. For several ANSPs, the implementation of IFRS has resulted in the recognition of larger future pension liabilities and led to very substantial increases in pension costs. The impact of this is likely to spread as it is recognised in more and more ANSPs. 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 a "defined benefit" pension plan.

A revised version of IFRS 19 (i.e. "employee benefits") has been implemented in January 2013. One of the main revisions of IFRS 19 relates to the departure from the "corridor approach". This implies that from 2013 onwards, for ANSPs operating under a defined benefit pension scheme, any actuarial gains and losses arising from a change in actuarial assumptions will have to be reported in the Profit & Loss and Balance Sheet financial statements. Several ANSPs, like Austro Control and DFS have explicitly flagged this issue as they would be significantly impacted by the implementation of the amended IFRS 19. DFS already assessed that in this context, an unplanned change of 1 percentage point in the discount rate used to compute future pension obligations would lead to additional costs of €400M to be recognised in the Profit & Loss statement. This issue requires the utmost attention given the long term consequences of pensions-related decisions and their magnitude in the cost bases.

Changes in ATCO employment costs per ATCO-hour for individual ANSPs are provided in Annex 8 of this Report.

5.3.4 Changes in support costs per composite flight-hour (2007-2011)

As indicated in Figure 5.5, support costs per composite flight-hours remained fairly constant (+0.7% in real terms) between 2007 and 2011 at Pan-European system level.

Figure 5.12 shows that following the sharp decrease in traffic, support costs per composite flight-hour significantly rose in 2009 (+8.6%). Then, unit support costs fell in 2010 (-4.0%) reflecting the impact of the cost-containment measures implemented by European ANSPs. In 2011, unit support costs further decreased by -2.8%, reaching €295, a level close to that achieved in 2007 (€293).

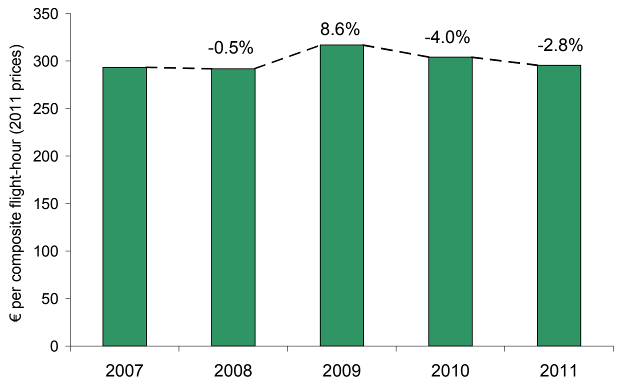


Figure 5.12: Changes in support costs per composite flight-hour (2007-2011)

Figure 5.13 displays the annual changes in unit support costs for each ANSP[71] between 2007 and 2011 (yellow bars) and between 2010 and 2011 (blue bar).

Between 2007 and 2011, unit support costs fell for 20 ANSPs, and for two ANSPs the reduction was around -10% p.a. (NAV Portugal and DCAC Cyprus). The reduction in NAV Portugal unit support costs is mainly driven by (a) the cost-containment measures implemented by NAV Portugal (in line with the "Growing and Stability Programme" of the Portuguese Government), and (b) the fact that the 2007 cost-base included exceptional costs relating to pension costs arising from a change in actuarial assumptions in 2005.

[71] See also footnote 56 on p.53 for information on the cost of capital reported by Oro Navigacija and ANS CR.

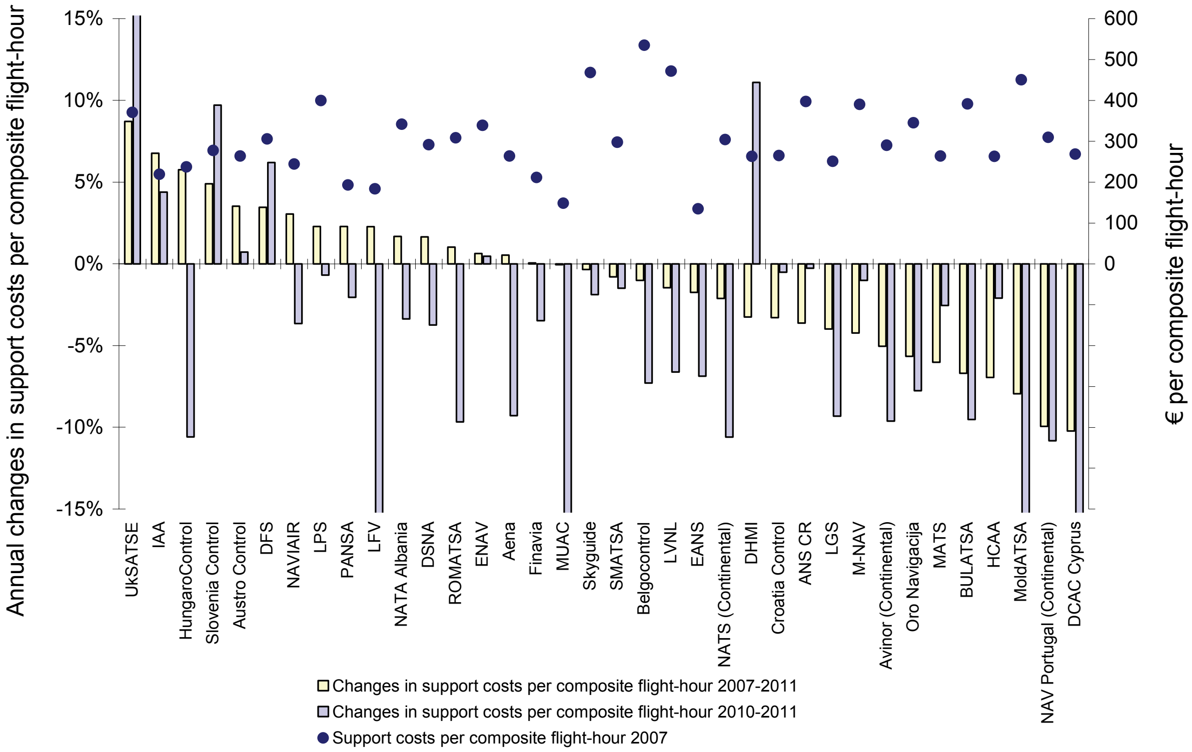


Figure 5.13: Average annual change in support cost per composite flight-hour at ANSP level, 2007-2011 and 2010-2011 (real terms)

Support costs comprise non-ATCO in OPS employment costs, non-staff operating costs and capital-related costs. Some of the factors having an impact on these costs are identified below.

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

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

Non-staff operating costs can be affected by:

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

Capital-related costs can be affected by:

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

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

The right-hand-side of Figure 5.14 below indicates that the -2.8% decrease in unit support costs achieved between 2010 and 2011 results from the fact that traffic volumes increased faster (+3.9%) than support costs (+1.0%). The left-hand-side of Figure 5.14 shows that while unit non-ATCO employment costs and unit non-staff operating costs decreased (by -4.8% and -4.0%, respectively), capital-related costs per composite flight-hour increased by +2.0%.

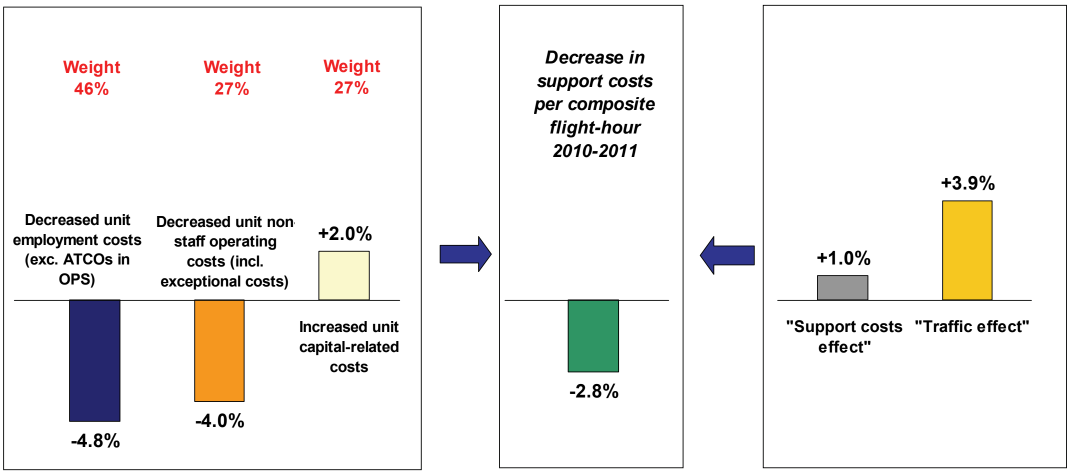


Figure 5.14: Changes in the components of support costs per composite flight-hour, 2010-2011 (real terms)

Figure 5.15 shows the changes in the different components of support costs (see the "support costs effect" bar on the right-hand side of Figure 5.14) between 2010 and 2011.

Figure 5.15 indicates that support staff costs, depreciation costs and exceptional costs decreased, while non-staff operating costs and the cost of capital increased in 2011.

Figure 5.15 also shows that the increase in the cost of capital (+€90M) is the main driver for the higher support costs in 2011.

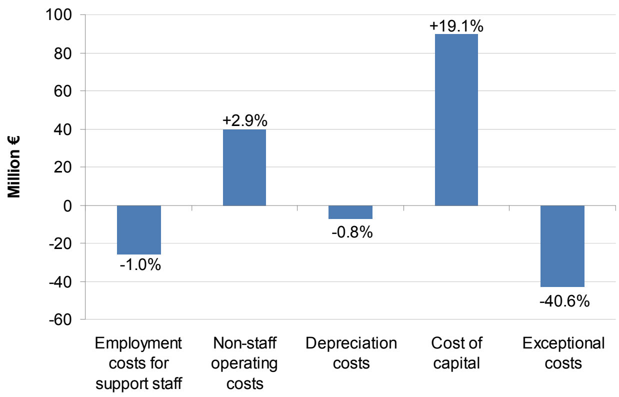


Figure 5.15: Changes in the components of support costs (2010-2011)

This large increase in the cost of capital (+€90M) is mainly driven by the increase in UkSATSE cost of capital (+€61M), which is due to the fact that the cost of capital reported for the year 2011 includes the total amount of capital expenditures spent during the year. Excluding UkSATSE, the observed increase in the cost of capital at Pan-European level between 2010 and 2011 would be +€29M (instead of €90M), and the decrease in unit support costs would be -4.1% (compared to -2.8% when UkSATSE is included).

Table 5.2 below shows the changes in the various components of support costs for individual ANSPs. The right-hand-part of Table 5.2 shows how the four components of support costs (employment costs for "support" staff, non-staff operating costs (excluding exceptional costs), capital-related costs and exceptional costs) have changed over time for individual ANSPs.

ANSPs	Country	Changes in support costs 2010-2011	Staff costs (exc. ATCOs in OPS) 2010-2011	Non-staff operating costs 2010-2011	Capital related costs 2010-2011	Exceptional costs 2010-2011
UkSATSE	UA	50.4%	6.5%	32.7%	143.8%	-124.3%
DHMI	TR	24.1%	41.3%	19.2%	14.8%	
Slovenia Control	SI	16.4%	7.0%	34.2%	18.2%	130.7%
DFS	DE	9.8%	7.3%	10.8%	3.9%	86.6%
Finavia	FI	7.8%	5.9%	0.5%	27.8%	
MATS	AM	7.6%	6.5%	-18.6%	27.4%	
EANS	EE	7.6%	-0.3%	0.8%	20.6%	
IAA	IE	7.3%	-1.4%	-1.6%	27.9%	
PANSA	PL	6.8%	2.7%	7.0%	20.5%	
Croatia Control	HR	5.7%	3.5%	0.8%	15.8%	
NATA Albania	AL	4.2%	8.1%	-1.5%	9.1%	
LGS	LV	4.0%	2.5%	-7.7%	-11.0%	
Skyguide	CH	2.0%	6.1%	3.5%	-6.6%	-24.0%
LPS	SK	1.3%	6.6%	7.8%	-13.8%	
Oro Navigacija	LT	1.1%	-0.3%	8.9%	-2.7%	4.0%
ANS CR	CZ	0.8%	4.4%	2.9%	-5.2%	
LVNL	NL	0.8%	2.4%	0.1%	-5.2%	
Austro Control	AT	0.6%	0.4%	1.8%	-0.1%	
SMATSA	YU	0.1%	-1.9%	0.7%	1.7%	0.1%
ENAV	IT	0.1%	-8.4%	-0.8%	9.7%	5.3%
NAVIAIR	DK	-0.7%	-4.1%	-13.9%	20.4%	
DSNA	FR	-1.2%	-5.9%	7.7%	1.5%	
Belgocontrol	BE	-2.1%	-1.4%	-10.4%	-0.8%	198.3%
Avinor (Continental)	NO	-3.1%	2.5%	-11.9%	2.2%	
BULATSA	BG	-3.2%	2.6%	7.6%	-15.7%	
ARMATS	AM	-4.1%	8.0%	0.4%	-15.0%	
HCAA	GR	-4.3%	-10.3%	10.1%	-1.9%	
M-NAV	MK	-4.7%	-3.0%	0.2%	-10.0%	
Aena	ES	-5.7%	-4.4%	2.0%	-6.2%	-62.6%
NAV Portugal (Continental)	PT	-6.8%	-9.0%	-2.2%	-2.4%	
NATS (Continental)	UK	-7.6%	-3.4%	-3.1%	-5.1%	-75.0%
ROMATSA	RO	-8.9%	-0.9%	-22.1%	16.9%	
HungaroControl	HU	-11.0%	5.3%	28.9%	2.4%	-88.9%
MUAC		-12.1%	-9.4%	-1.5%	-30.8%	
MoldATSA	MD	-16.5%	14.1%	-23.6%	-29.4%	
LFV	SE	-17.3%	-32.9%	0.7%	6.8%	
DCAC Cyprus	CY	-22.7%	3.0%	-32.7%	-15.4%	
Total European System (37 ANSPs)		1.0%	-1.0%	2.9%	6.0%	-40.6%

Table 5.2: Breakdown of changes in support costs, 2010-2011 (real terms)

Table 5.2 shows that in 2011, support costs increased in real terms for 20 ANSPs. In particular, support costs increased by more than +20% in 2011 for UkSATSE (+50%) and DHMI (24%).

For some ANSPs, the increase in support costs in 2011 was compensated by a rise in traffic volumes, therefore resulting in a decrease of unit support costs.

For DFS, support costs rose by +9.8% between 2010 and 2011, as a result of increases in all the components of support costs. The higher non-ATCO employment costs (+7.3%) mainly relate to an increase in pension-related costs associated with the use of a lower discount rate to compute pension obligations in 2011. The increase observed for the capital-related costs (+3.9%) is mainly due to the fact that in 2010, as part of the cost-containment measures implemented by DFS, a lower return on equity (2.3% compared to 4.0% in 2011) was used to compute the cost of capital. Similarly, following the implementation of new collective agreement in 2009, IFRS transition costs were exceptionally reduced by some €26M in 2010. This is the main driver for the substantial increase in exceptional cost items which was observed in 2011 (+86.6%).

For NATS, support costs fell by -7.6% compared to 2010. All the components of support costs fell in 2011, but the largest contribution to the observed decrease arises from a -75.0% reduction in exceptional costs (or -€21M), due to lower impairment of intangible assets as well as lower redundancy and lower relocation costs.

For Aena, the -5.7% decrease in support costs is mainly due to the fact that capital-related costs and exceptional costs were substantially lower than in 2010. These lower exceptional costs are due to the revision of the Special Paid Leave obligations which became more restrictive and specify lower benefits for the concerned staff.

For DSNA the decrease in support costs (-1.2%) mainly reflects lower non-ATCO employment costs (-5.9%). It should be noted that this reduction partly reflect the fact that some costs which were previously reported as staff costs in DSNA cost-base are now disclosed under non-staff operating costs.

Finally, Table 5.2 indicates that between 2010 and 2011, ENAV support costs remained fairly constant (+0.1%) since higher capital-related costs were compensated by lower non-ATCO employment costs.

In 2011, non-ATCOs in OPS employment costs (which are the largest component of support costs with 46.4% of the total) increased for DFS (+7.3%), while they substantially reduced for ENAV (-8.4%), DSNA (-5.9%), Aena (-4.4%) and NATS (-3.4%).

Figure 5.16 indicates that the +6.0% increase in the number of support staff for DFS contributed to the rise in non-ATCOs in OPS employment costs in 2011.

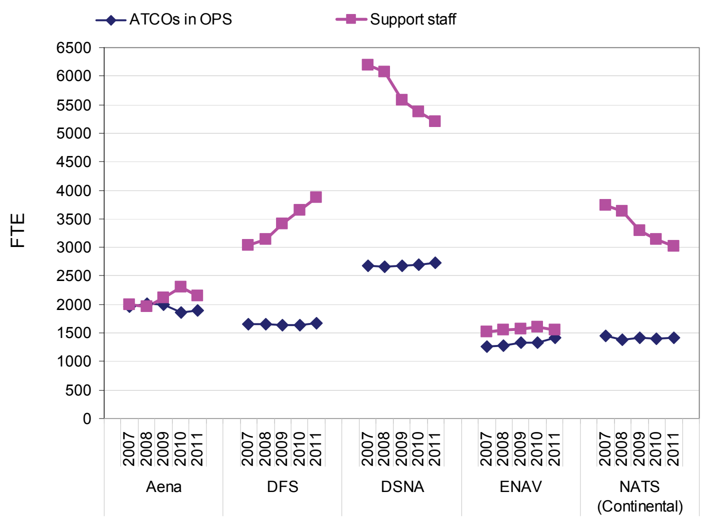


Figure 5.16: Changes in ATCOs in OPS and "support" staff for the five largest ANSPs (2007-2011)

Figure 5.16 also shows that for Aena, DSNA and ENAV, decreases in support staff between 2010 and 2011 (-6.6%, -3.3% and -3.2%, respectively) contributed to the reductions in non-ATCOs in OPS employment costs (-4.4%, -5.9% and -8.4%, respectively).

More details on the changes in support costs for individual ANSPs are provided in Annex 8 of this Report.

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6 FORWARD-LOOKING FINANCIAL COST-EFFECTIVENESS (2012-2016)

6.1 Introduction

Besides the disclosure of 2011 data, the SEID requires ANSPs to report five years forward-looking data on plans and projections of traffic demand, costs, staff, capital expenditure and ATC capacity. The production of realistic and complete plans is an important element of ANSPs' performance. The EC Regulation 1070/2009 on SES II (21 October 2009) in respect to the Performance Scheme, and its implementing rule (EC N°691/2010) effectively contribute to enhance the level of maturity of ANSPs planning processes.

The objective of this chapter is to aggregate ANSP forward-looking plans and projections in order to assess the cost-effectiveness of the European ATM system as a whole over the 2012-2016 period.

Unfortunately, some ANSPs did not provide complete forward-looking data covering the 2012-2016 period, limiting the ability to compute the forward-looking gate-to-gate financial cost-effectiveness KPIs until 2016, and/or the factors affecting future economic performance, namely the planned capital expenditures (capex) and the planned staff and capacity data. The map on the left-hand side of Figure 6.1 shows the status of forward-looking data submissions to compute the gate-to-gate ATM/CNS provision costs over the 2012-2016 period. Figure 6.1 indicates that two ANSPs (Aena and Austro Control) did not provide a complete set of planned traffic and cost data covering the 2012-2016 period. In fact, these two ANSPs submitted complete forward-looking data only until 2014.

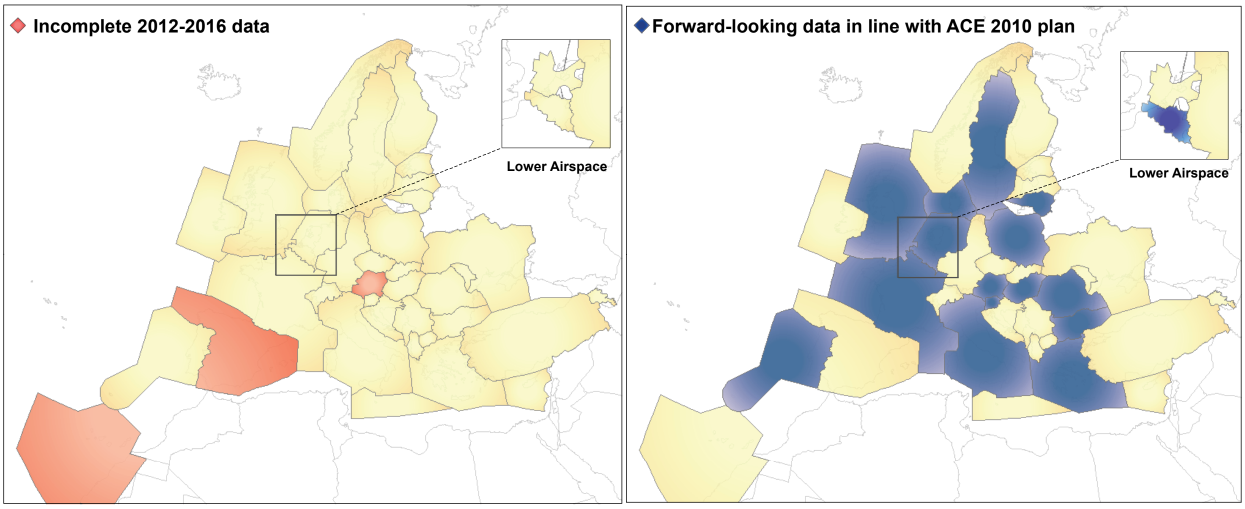


Figure 6.1: Status of ANSPs complete forward-looking submission and of updated forecast for RP1 compared to ACE 2010

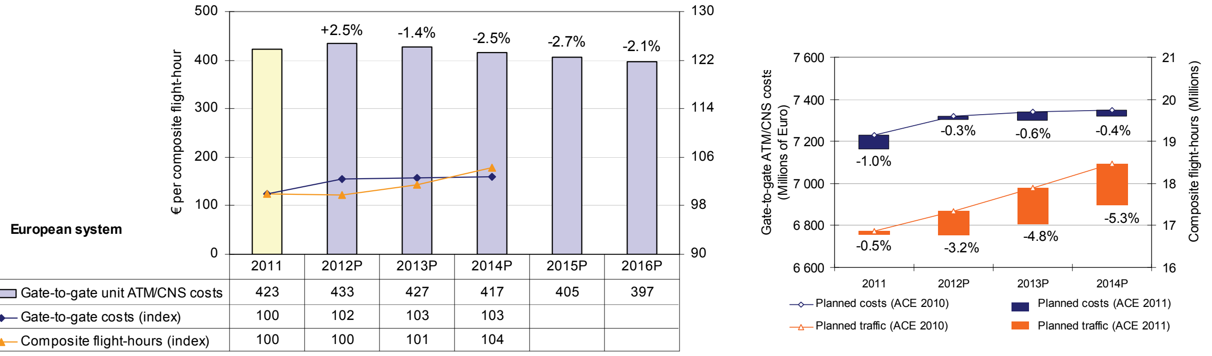
In 2011, the 29 States bound by SES regulations submitted their National Performance Plan for the first reference period (RP1 covering the years 2012-2014). For the ANSPs operating in these States, the forward-looking data provided in their ACE 2010 data submission were in line with the information disclosed in the National Performance Plans. The map on the right-hand side of Figure 6.1 indicates that for the purposes of ACE 2011, 15 ANSPs have chosen to report planned en-route costs data in line with the information provided in their ACE 2010 submission.

It is clear that the analysis carried out in this chapter would benefit from the reporting of updated forward-looking information in all ANSPs ACE data submissions. In particular, this would allow:

- Supporting more effective monitoring of the gate-to-gate cost-efficiency performance taking into account historical, actual and updated forecast data;
- Supporting more meaningful EU-wide cost-efficiency target setting taking into account latest (updated) information originating from ANSPs (bottom-up inference);
- Supporting more effective performance analysis of ANSP reactivity at times of crisis (e.g. sharp and sudden traffic downturn leading to cost containment measures), e.g. by comparing the various forecast and deviations from the forecasts;
- Using the same planning assumptions/information (economic, traffic, etc.) and horizon for every ANSP ensures greater comparability of data and more effective analysis at System level;
- No different reporting requirements amongst SES versus non-SES ANSPs, as the latter are required to provide high level forward-looking information on a rolling basis for charging purposes (i.e. same requirements for all EUROCONTROL Member States).

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

This Section provides information for the ANSPs that consistently reported planned gate-to-gate forward-looking information until 2016.



	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	423	433	427	417	405	397
Gate-to-gate costs (index)	100	102	103	103		
Composite flight-hours (index)	100	100	101	104		

Figure 6.2: Forward-looking cost-effectiveness at European system level (2011-2016, real terms)

The left-hand side of Figure 6.2 shows that, at European system level, gate-to-gate unit ATM/CNS provision costs are planned to increase by +2.5% in 2012 and then to slightly decrease until 2014 (-2.0% p.a.). Overall, gate-to-gate unit ATM/CNS provision costs are planned to reduce by -1.4% (-0.5% p.a.) over the 2011-2014 period[72]. This is due to the fact that ATM/CNS provision costs are planned to increase at a lower rate (+0.9% p.a.) than composite flight-hours (+1.4% p.a.) between 2011 and 2014.

Unit ATM/CNS provision costs are then expected to reduce in 2015 (-2.7%) and 2016 (-2.1%). This implies that gate-to-gate unit ATM/CNS provision costs are planned to decrease by -6.2% (-1.3% p.a.) over the 2011-2016 period[73].

The right-hand side of Figure 6.2 compares the plans in terms of ATM/CNS provision costs and traffic prepared by ANSPs in November 2011 (ACE 2010) with the projections provided in November 2012 (ACE 2011). For the years 2012-2014 which correspond to the SES

[72] 15 ANSPs have chosen not to provide updated planned en-route costs data in their ACE 2011 submission and to report figures in line with the information provided for the purposes of the ACE 2010 benchmarking analysis. This issue shall be taken into account when interpreting the changes in unit ATM/CNS provision costs planned for the years 2012-2014 in Figure 6.2.

[73] It should also be noted that forward-looking data submissions are incomplete for Aena (2015-2016) and Austro Control (2015-2016). These ANSPs are included in the analysis, but for consistency purposes, costs and traffic indexes are not computed for the years 2015 and 2016 in Figure 6.2. This issue shall be taken into account when interpreting the planned changes in unit ATM/CNS provision costs provided for the years 2015 and 2016 in Figure 6.2.

Performance Scheme RP1, the unit costs profile provided in ACE 2010 by the ANSPs operating in SES States is in line with the information disclosed in adopted National Performance Plans.

Figure 6.2 shows that actual 2011 ATM/CNS provision costs were -1.0% lower than planned in ACE 2010. Figure 6.2 also shows that in 2011, the actual number of composite flight-hours was slightly below ACE 2010 forecasts for 2011 (i.e. -0.5%). As a result, actual 2011 unit ATM/CNS provision costs were -0.5% lower than planned in ACE 2010. The “savings” for the year 2011 compared to the plans are valued at some €70M. This result suggests that some ANSPs managed to generate additional savings in 2011 (after those already achieved in 2009 and 2010) which were not fully reflected in the plans made in November 2011 for the purposes of the ACE 2010 data analysis.

Figure 6.2 indicates that over the 2012-2014 period, the traffic forecasts have been revised downwards in greater proportion than the ATM/CNS provision costs[74]. This implies that the unit ATM/CNS provision costs profile reported in ACE 2011 for the period 2011-2014 (-1.4%) is much more pessimistic than the profile planned in ACE 2010 for the same period (-7.2%). The main driver for this difference is due to the fact that although 15 ANSPs did not provide updated planned en-route costs data in their ACE 2011 submission, most of them revised traffic forecasts substantially downwards in order to reflect the latest situation. Indeed, the unit ATM/CNS provision costs profile provided in ACE 2010 for the period 2011-2014 was based on a +9.6% increase in traffic volumes, while in ACE 2011 plans, traffic volumes are forecast to rose by +4.3% between 2011 and 2014.

For ANSPs operating in SES States, the year 2012 marks the start of RP1 and the end of the “full cost-recovery” mechanism for en-route ANS. Under the full cost-recovery mechanism, all the risks are borne by the airspace users and ANSPs are not sufficiently incentivised to deliver a better cost-efficiency performance since they have to return any over-recoveries, even if these are the result of cost-savings. Over RP1, SES States/ANSPs will operate under the “determined costs” principle which comprises specific risk-sharing arrangements aiming at incentivising ANSPs economic performance. The information provided in Figure 6.2 shows that over the 2012-2014 period, traffic volumes are likely to be much lower than planned in November 2011. SES ANSPs will therefore have to show a greater reactivity to adjust en-route costs and better adapt to the lower traffic growth in order to avoid financial losses during RP1.

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

The overall trend in planned ATM/CNS unit cost at European level (see graph in Figure 6.2) is not uniform across Europe. Planned changes in real ATM/CNS unit costs at ANSP level for the period 2011-2016 are displayed in Figure 6.3 for the 35 ANSPs that reported planned unit ATM/CNS provision costs until 2016.

Unit ATM/CNS provision costs are planned to rise for seven ANSPs between 2011 and 2016. Two ANSPs, EANS (+18%) and DFS (+11%) plan for unit costs increases greater than +10% over the 2011-2016 period.

Figure 6.3 indicates that 27 ANSPs planned for unit ATM/CNS provision costs reductions over the 2011-2016 period. The largest decreases are observed for SMATSA (-26%) and HCAA (-22%).

[74] It should be noted that 15 ANSPs did not provide updated forward-looking data in their ACE 2011 submission and reported planned figures in line with ACE 2010 plans. This issue shall be taken into account when comparing ATM/CNS provision costs and traffic figures in Figure 6.2.

Among the five largest ANSPs, between 2011 and 2016, unit ATM/CNS provision costs are planned to increase for DFS (+11%) and to decrease for ENAV (-10%) and DSNA (-7%).

The planned en-route costs provided by NATS reflect the figures provided in UK National Performance Plan for RP1. This is different from the methodology used to report historic and actual ATM/CNS provision costs which are based on IFRS accounting. For this reason, the planned changes in NATS unit ATM/CNS provision costs are not shown in Figure 6.3.

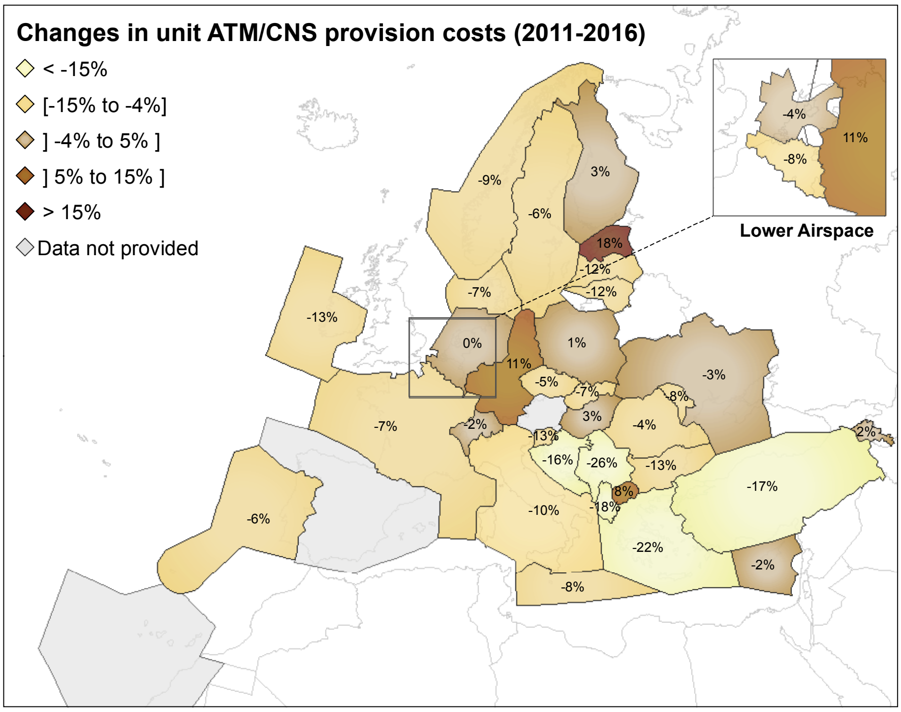


Figure 6.3: ANSPs planned changes in gate-to-gate unit ATM/CNS provision costs (2011-2016, real terms)

For Aena, which only reported planned costs data until 2014, unit ATM/CNS provision costs are planned to increase by +4% between 2011 and 2014. Similarly, for Austro Control, unit ATM/CNS provision costs are expected to decrease by -5% between 2011 and 2014.

More details on the planned costs and traffic profiles for individual ANSPs are provided in Annex 8 of this Report.

6.3 Changes in fixed assets and capital expenditure (capex)

Figure 6.4 shows the proportion of fixed assets which are in operation and the average remaining accounting life of the asset base, for the ANSPs that consistently reported information on the net book value (NBV) of their fixed assets[75], between 2007 and 2011. Figure 6.4 indicates that the share of assets under construction remained close to 20% over the whole 2007-2011 period.

The value of the assets under construction in 2011 amounted to some €1 488M at European system level, a value which is above the 2011 capex (€1 010M) indicating that assets relating to previous years capex are still not in operation. Among the five largest ANSPs, ENAV and NATS are those with the largest share of assets under construction (36% and 26% respectively). At European system level, the average remaining accounting life of fixed assets did not change compared to 2010 and stayed at the same 6.5 years in 2011.

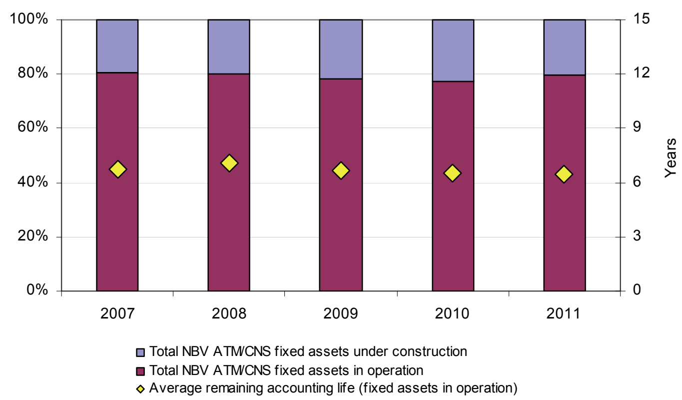


Figure 6.4: Asset structure at European system level (2007-2011)

[75] No data for ARMATS and HCAA are available for the 2007-2008 period. These two ANSPs are therefore excluded from Figure 6.4.

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

Figure 6.5 shows the changes in capital expenditure (capex) and depreciation costs at European system level[76]. Since Aena, Austro Control, EANS and HCAA did not provide planned depreciation costs or capex data for the year 2015 and/or 2016, the analysis carried out in this section focuses on the 2007-2014 period.

In 2011, capex amounted to some €1 010M. It is noteworthy that some 58% of this capex originated from the five largest ANSPs. Overall, the cumulative capex planned for the period 2012-2014 amounts to some €3 600M and represents some 40% of the 2011 total ANS revenues (i.e. €8 894M, see Section 2.4). Figure 6.5 indicates that ANSPs capex are planned to substantially increase in 2012 (+23%), reduce in 2013 (-5%) and then remain fairly constant in 2014 (-1%) to reach an amount comparable those spent in 2007 and 2008.

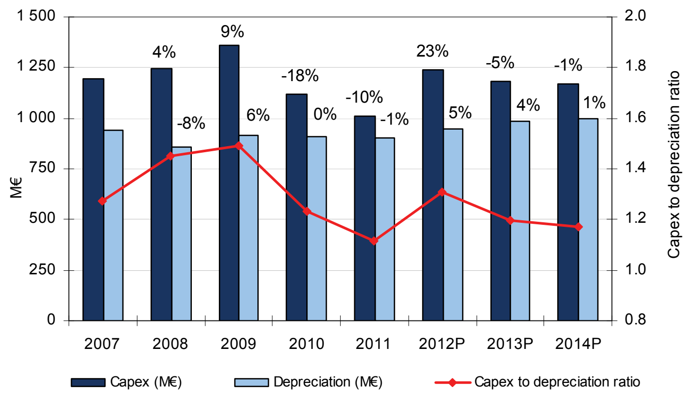


Figure 6.5: Forward-looking capex and depreciation costs at European system level (2007-2016, real terms)

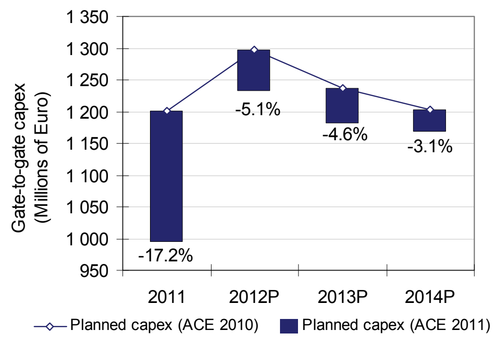


Figure 6.6: Changes in planned capex at European system level (2011-2014, real terms)

Figure 6.6 compares the capex planned in ACE 2010 with the plans provided in ACE 2011 for the years 2011-2014 for the 35 ANSPs that provided planned capex figures consistently throughout this period[77].

Figure 6.6 shows that the actual 2011 capex were -17.2% (or -€207M) below ACE 2010 plans. This difference mainly reflects the impact of cost-containment measures initiated by some ANSPs in 2009-2010, relating to the postponement of non-crucial capex projects to future years, which were not fully reflected in ACE 2010 plans. Figure 6.6 also shows that over the 2012-2014 period, the planned capex in ACE 2011 is 3-5% below the ACE 2010 plans.

[76] Note that in Figure 6.5, information on capex and depreciation costs are missing for ARMATS (2007-2008), DCAC Cyprus (2007) and HCAA (2007 and 2013-2014).
[77] Note that HCAA and NATA Albania are excluded from Figure 6.6. The planned capex profile provided by NATA Albania for the period 2012-2016 is affected by data reporting issues.

6.3.1 Ratio of cumulative capex (2012-2014) to 2011 revenues at ANSP level

The cumulative capex (2012-2014) to 2011 revenues ratio is displayed in Figure 6.7 for each ANSP[78].

For 18 ANSPs, the cumulative capex to revenues ratio is higher than for the European system as a whole (41%). In particular, this ratio is higher than 70% for 6 ANSPs, including, inter alia: LPS (96%), MoldATSA (95%), LGS (87%), UkSATSE (84%), ANS CR (74%) and HungaroControl (71%).

This undoubtedly indicates substantial investments over the 2012-2014 period for these ANSPs, either as an extension of the present investment cycle (e.g. UkSATSE) or the start of a new investment cycle (e.g. LGS).

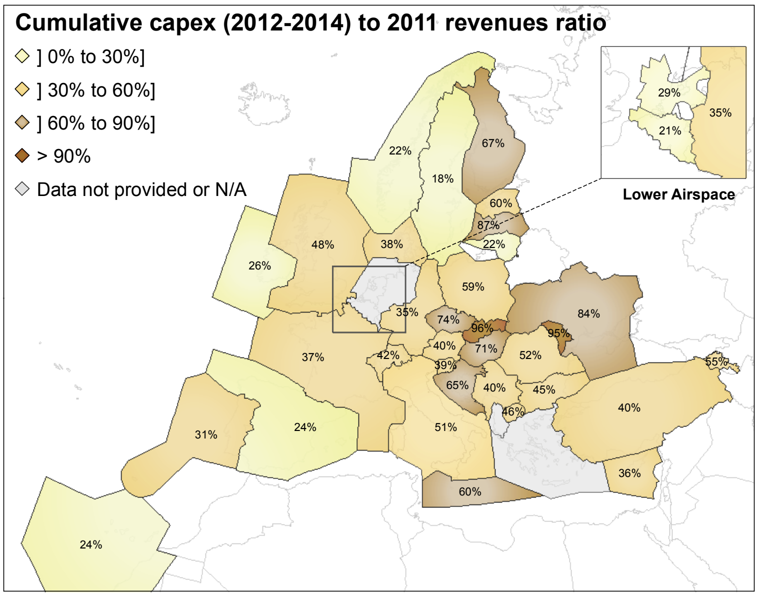


Figure 6.7: Ratio of ANSPs cumulative capex (2012-2014) to 2011 revenues

Additional details on the nature of the major investment projects for each ANSPs are provided in Annex 8 of this Report.

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

Figure 6.8 shows historic data and forward-looking projections for ATCOs in OPS with a breakdown into those that are operational in ACCs and those that are working in terminal operational units (APPs+TWRs)[79]. Since Austro Control did not provide planned ATCOs in OPS data for the years 2015 and 2016, the analysis carried out in this section focuses on the 2007-2014 period.

It should be noted that the sharp decreases for ACCs and APPs+TWRs ATCOs in 2012 (i.e. -13% and -12%, respectively) are mainly due to the fact that Aena did not report the planned number of ACC and APP+TWR ATCOs in OPS.

Figure 6.8 indicates that at European system level, the total number of ATCOs in OPS is planned to increase by +4% over the 2012-2014 period.

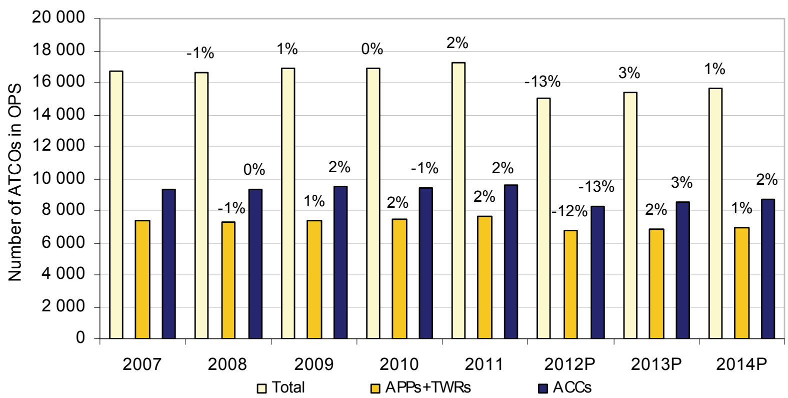


Figure 6.8: Planned number of ATCOs in OPS at European system level (2007-2014)

[78] Note that HCAA, NATA Albania and MUAC (which did not provide revenues data in its submission) are not included in this analysis.

[79] Note that in Figure 6.8, data are missing for Aena (2012-2014) and ARMATS (2007-2008).

Figure 6.9 shows historic data and forward-looking projections for the number of en-route sectors and corresponding sector-hours[80]. Since Austro Control, LVNL and PANSA did not provide planned capacity data for the year 2015 and/or 2016, the analysis carried out in this section focuses on the 2007-2014 period.

Note that the significant drop in sector-hours in 2010 compared to 2009 (i.e. -9%) is mostly attributable to a substantial reduction in sector-hours for DFS following a change in data reporting.

It should also be noted that the apparent drop of sector-hours in 2012 (-8%) is mainly due to the fact that Croatia Control and DHMI did not report planned sector-hours data for the 2012-2016 period.

Figure 6.9 indicates that at European system level, the total number of sector-hours is planned to increase by +2.4% over the 2012-2014 period.

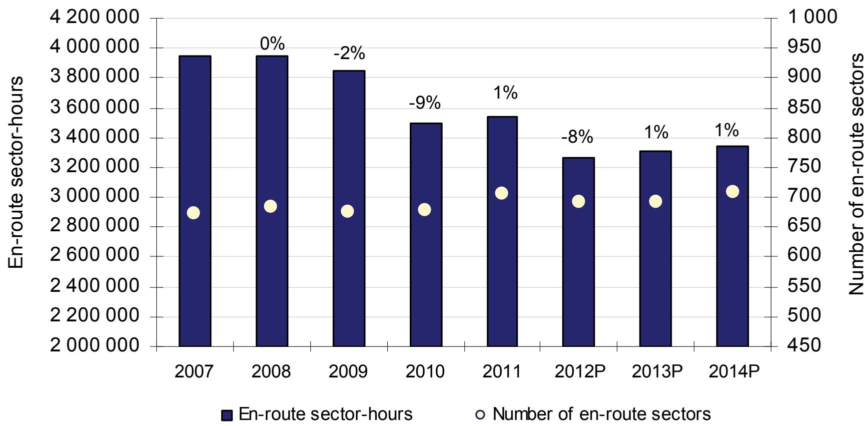


Figure 6.9: Planned number of en-route sectors and sector-hours at European system level (2007-2014)

80 In Figure 6.9, data is missing for ARMATS (2007-2008), Croatia Control (2012-2014) and DHMI (2012-2014).

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PART III: ECONOMIC COST-EFFECTIVENESS

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7 ECONOMIC COST-EFFECTIVENESS

7.1 Introduction

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

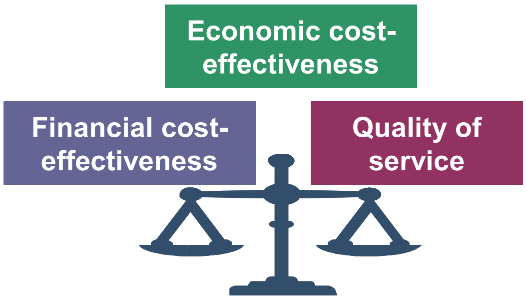

Figure 7.1: Trade-off between cost-effectiveness and quality of service

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

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

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

Economic assessment & interdependencies

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

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

7.2 The measures of quality of service

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

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

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

Because of the close link between fuel burn and gaseous emissions[81], the last three factors have also an environmental impact in terms of additional green house gases emissions (CO_2, N_2O, etc.) and emissions affecting local air quality (NO_X, CO, PM, etc.), and hence external costs to society at large.

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

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

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

For the present report, however, the ANS-related inefficiencies in the airborne phase are not sufficiently mature to permit full consideration in the evaluation of economic cost-effectiveness. As a consequence of this limitation, the quality of service associated with ATM/CNS provision by ANSPs is, for the time being, assessed only in terms of **ATFM ground delays**, which are calculated consistently for all EUROCONTROL States by the CFMU[82].

To incorporate ATFM delays into the measure of cost-effectiveness, the costs of ATFM delays in this report are approximated to be **€83 per minute.**

ATFM delay costs

The cost of ATFM delay is based on the findings of the study "European airline delay cost reference values" by the University of Westminster[83] in March 2011. This study is an update of the report published in May 2004. It is based on more recent data and also brings a number of methodological improvements. One of the most important changes compared to the previous study is the consideration of "tactical" delays on the ground (engine off) below 15 minutes. Intuitively, this should reduce the average cost per minute, however other factors have significantly increased, and the overall result is a cost of €83 per minute (applicable to all ATFM delays), which is close to the €81 used in the ACE 2010 report and €82 used in the ACE 2009 report (although before ACE 2010 only applicable to ATFM delays above 15 minutes).

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

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

[81] The emissions of CO_2 are directly proportional to fuel consumption (3.15 kg CO_2/ kg fuel).
[82] EUROCONTROL Central Flow Management Unit (CFMU).
[83]http://www.eurocontrol.int/sites/default/files/content/documents/single-sky/pru/publications/other/european-airline-delay-cost-reference-values-final-report-v3.2.pdf.

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

In this report, the indicator of economic cost-effectiveness is defined as ATM/CNS provision costs plus the costs of ATFM delay, all expressed per composite flight-hour[84]. The conceptual framework is illustrated in Figure 7.2.

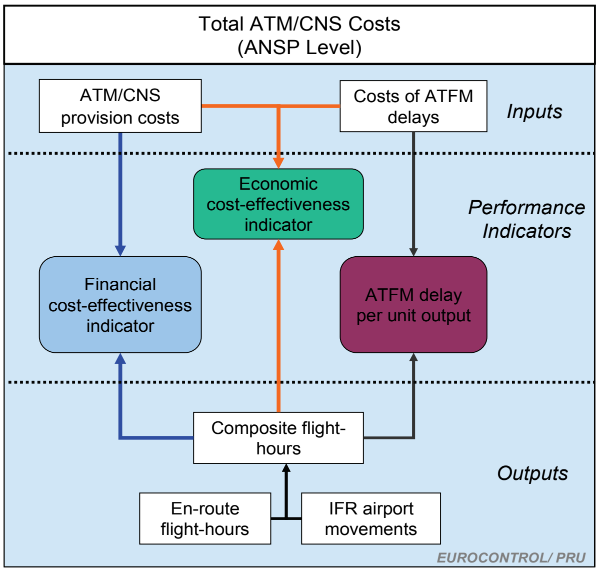

Figure 7.2: Conceptual framework for the analysis of economic cost-effectiveness

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

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

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

Table 7.1 also indicates the share of each ANSP in the Pan-European system ATFM delays (see column 5). In 2011, the five largest ANSPs which handled 52% of the Pan-European system traffic accounted for 61% of the total ATFM delays. DFS, Aena and DSNA were the main contributors with 23%, 20% and 11% of the Pan-European system ATFM delays. On the other hand, NATS[85] and ENAV contributed to 5% and 1%, respectively. It is noteworthy that HCAA, with a relatively low share of traffic (i.e. representing some 3% of the system) contributed to more than 14% of the total ATFM delays.

[84] As defined in Annex 2 of this ACE Benchmarking Report.

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

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

ANSPs	(1) 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€83 Costs of ATFM delays (in €'000)	(7) Composite flight-hours (in '000)	(8)=(1)/(7) Financial gate-to-gate cost-effectiveness	(9)=(6)/(7) Cost of delay per composite flight-hour	(10)=(8)+(9) Economic cost per composite flight-hour
Aena	900 904	2 771	873	3 644	20.4%	302 420	1 880	479	161	640
ANS CR	121 913	4	18	22	0.1%	1 862	276	441	7	448
ARMATS	7 181	0	0	0	0.0%	0	20	357	0	357
BULATSA	74 713	32	0	32	0.2%	2 635	204	366	13	379
Austro Control	180 377	166	233	399	2.2%	33 106	385	469	86	555
Avinor (Continental)	193 101	34	190	225	1.3%	18 660	504	383	37	420
Belgocontrol	150 453	23	104	127	0.7%	10 563	215	699	49	748
Croatia Control	77 243	257	2	259	1.5%	21 487	217	357	99	456
DCAC Cyprus	36 813	454	2	457	2.6%	37 895	147	250	257	507
DFS	978 330	2 447	1 732	4 180	23.5%	346 914	1 959	499	177	677
DHMI	324 188	184	543	727	4.1%	60 322	1 144	283	53	336
DSNA	1 155 285	1 282	633	1 915	10.7%	158 943	2 647	436	60	496
EANS	12 590	4	0	4	0.0%	330	72	175	5	180
ENAV	683 994	21	153	174	1.0%	14 459	1 382	495	10	505
Finavia	62 351	126	48	174	1.0%	14 422	197	316	73	389
HCAA	159 218	1 935	582	2 517	14.1%	208 932	525	303	398	701
HungaroControl	95 853	0	0	0	0.0%	19	223	429	0	430
IAA	121 805	1	3	4	0.0%	326	317	385	1	386
LFV	207 930	80	31	111	0.6%	9 181	573	363	16	379
LGS	23 076	0	0	0	0.0%	10	91	253	0	253
LPS	51 191	0	0	0	0.0%	0	93	549	0	549
LVNL	167 328	65	400	465	2.6%	38 603	284	589	136	725
MATS	15 130	0	0	0	0.0%	6	61	248	0	248
M-NAV	10 454	0	0	0	0.0%	0	23	454	0	454
MoldATSA	7 433	0	0	0	0.0%	0	20	377	0	377
MUAC	129 060	63	n/appl	63	0.4%	5 220	564	229	9	238
NATA Albania	19 812	96	0	96	0.5%	7 995	48	414	167	581
NATS (Continental)	680 199	414	556	971	5.4%	80 582	1 767	385	46	430
NAV Portugal (Continental)	135 052	72	59	132	0.7%	10 919	361	374	30	405
NAVIAIR	111 514	3	29	33	0.2%	2 707	304	367	9	376
Oro Navigacija	22 051	0	0	0	0.0%	0	63	350	0	350
PANSA	142 872	422	13	436	2.4%	36 159	461	310	78	388
ROMATSA	139 304	0	0	0	0.0%	0	333	419	0	419
Skyguide	277 231	249	381	630	3.5%	52 260	462	600	113	713
Slovenia Control	29 007	1	0	1	0.0%	47	57	513	1	514
SMATSA	84 596	28	0	28	0.2%	2 301	239	354	10	364
UkSATSE	249 110	0	0	0	0.0%	0	425	586	0	586
Total European System	7 838 660	11 238	6 585	17 823	100%	1 479 285	18 544	423	80	502

Table 7.1: Economic cost-effectiveness indicator, 2011

7.4 Comparison of economic cost-effectiveness at ANSP level (2011)

Figure 7.3 displays the comparison of the gate-to-gate economic cost per composite flight-hour by ANSP[86].

The economic cost effectiveness indicator at Pan-European system level amounts to €502 per composite flight-hour in 2011. The two dotted lines displayed in Figure 7.3 represent the bottom and top quartiles which provide an indication of the dispersion in economic unit costs across ANSPs. There is a difference of some €173 between the bottom and top quartile in Figure 7.3. This is slightly higher than in 2010 (€162).

The economic cost-effectiveness indicator ranges from €748 for Belgocontrol to €180 for EANS, a factor greater than four.

[86] ENAV 2011 ATM/CNS provision costs comprise costs relating to en-route ATC services (€37.0M) provided by the Italian Air Force (ITAF) mainly at regional civil/military airports.

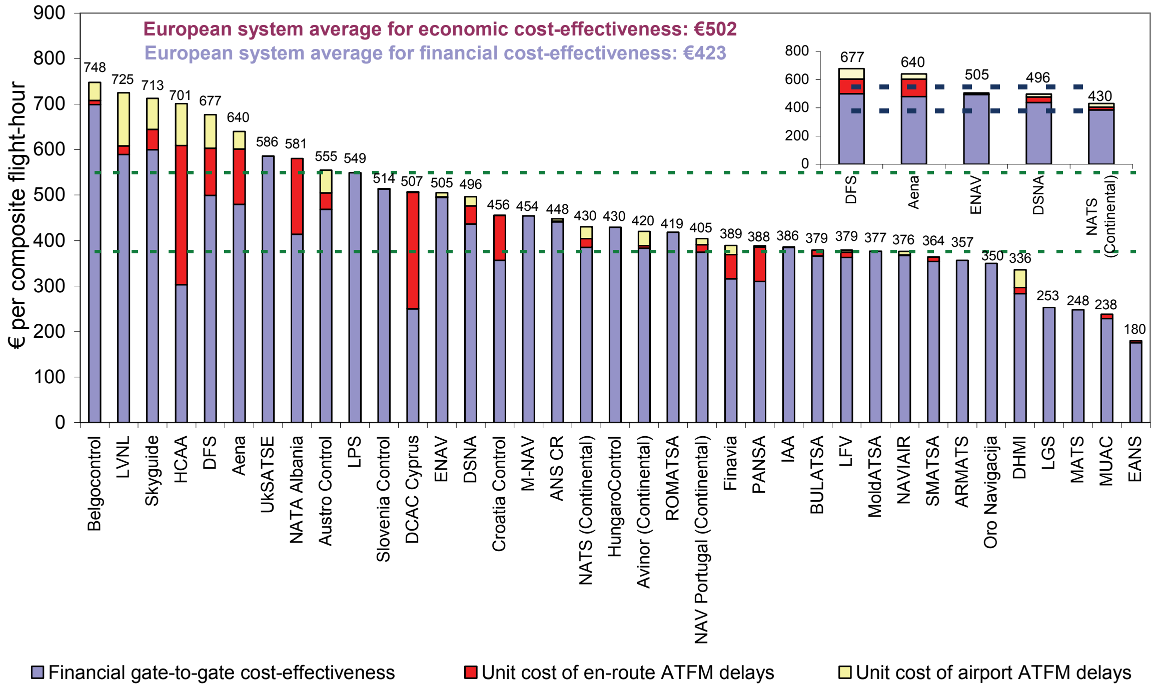

Figure 7.3: Economic gate-to-gate cost-effectiveness indicator, 2011

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

Across Europe, ATFM delays represented some 16% of the total economic gate-to-gate cost in 2011. This is lower than in 2010 (23%).

Figure 7.4 shows the geographical distribution of the share of ATFM delays in economic gate-to-gate unit costs by ANSP in 2011.

For seven ANSPs (Aena, Croatia Control, DCAC Cyprus, DFS, HCAA, NATA Albania and PANSA) the costs of ATFM delays account for more than 20% of the economic unit costs in 2011.

It is important to note that some of these ANSPs experienced a substantial traffic increase in 2011 (PANSA (+9%), NATA Albania (+8%) and Croatia Control (+6%)).

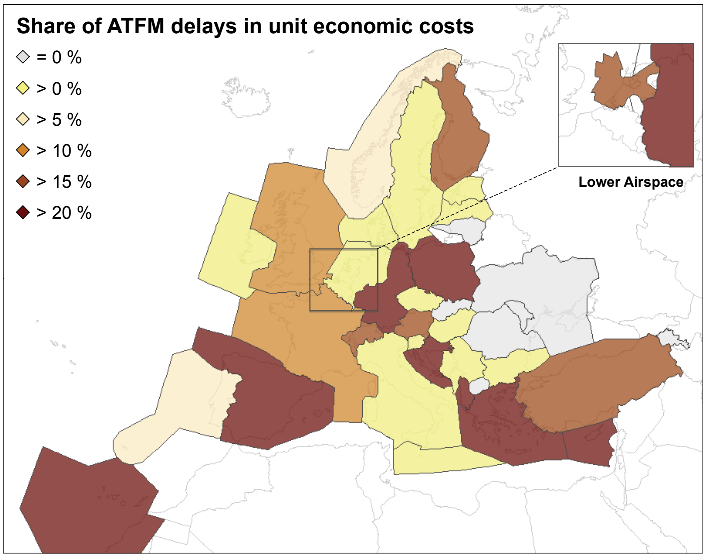

Figure 7.4: Share of ATFM delays in unit economic costs, 2011

Several ANSPs such as HCAA and DCAC Cyprus have had recurrent capacity issues for several years and could not implement the necessary measures to fully address them in 2011.

The share of ATFM delays in HCAA economic costs significantly increased from 33% in 2010 to 57% in 2011. This is due to the fact that the unit costs of ATFM delays generated by HCAA rose by 161% in 2011, mainly reflecting social tensions in Greece.

For DCAC Cyprus, the implementation of capacity enhancement measures contributed to reduce ATFM delays in 2011. However, it should be noted that the share of ATFM delays in DCAC Cyprus unit economic costs remains very high at some 51% in 2011. The share of ATFM delays in PANSA economic costs amounts to 20% in 2011 (compared to 30% in 2010). ATFM delays in PANSA are mainly relating to the technical limitations of the current ATM system and to a shortage of ATCOs. It is expected that the new ATM system Pegasus-21, which is planned to be commissioned in 2013, will contribute to improve this situation.

Amongst the five largest ANSPs, for DFS (26%) and Aena (25%) the share of ATFM delays amounts to more than 20% of the economic costs. For DFS, ATFM delays mainly reflect staffing issues in Langen ACC. It should be noted that the share of ATFM delays in DFS economic costs substantially reduced from a height of 34% in 2010. This mainly reflects an increase in capacity following the implementation of the VAFORIT system in Rhein ACC in February 2011. The large share for Aena reflects ATFM delays mainly relating to social tensions (for Aena this is mainly due to the transition period that was on-going in Spain in 2010 and 2011). The share of ATFM delays in economic costs was abnormally high in 2010 for DSNA (36%) mainly due to social tensions, as well. In 2011, it appears that this issue was addressed since the share of ATFM delays in DSNA economic costs reduced to a level (12%) close to those observed in 2007 and 2008.

Similarly, initiatives to improve sector configurations and additional staff contributed to significantly decrease the share of ATFM delays in Austro Control economic costs (i.e. from 40% in 2010 to 16% in 2011).

Figure 7.5 shows the breakdown of ATFM delays by type and delay cause. Airport ATFM delays represent 37% of the total ATFM delays of which 50% are caused by weather and environment issues which may be difficult for the ANSP to influence.

However, 40% of airport ATFM delays result from aerodrome or ATC capacity problems. This can rise up to 90% in individual ANSPs (see Figure 7.6 below).

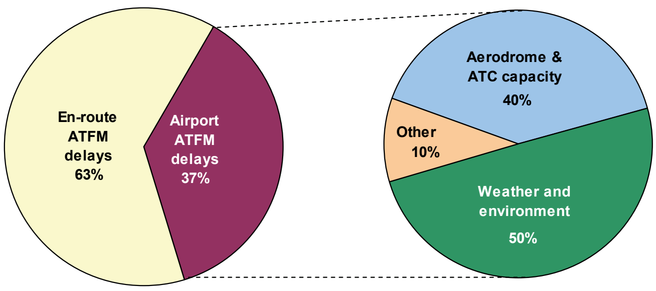

Figure 7.5: Breakdown of ATFM delays, 2011

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

Figure 7.6 shows the distribution of delays by cause for the 18 ANSPs which generated more than 100 000 minutes of ATFM delays in 2011.

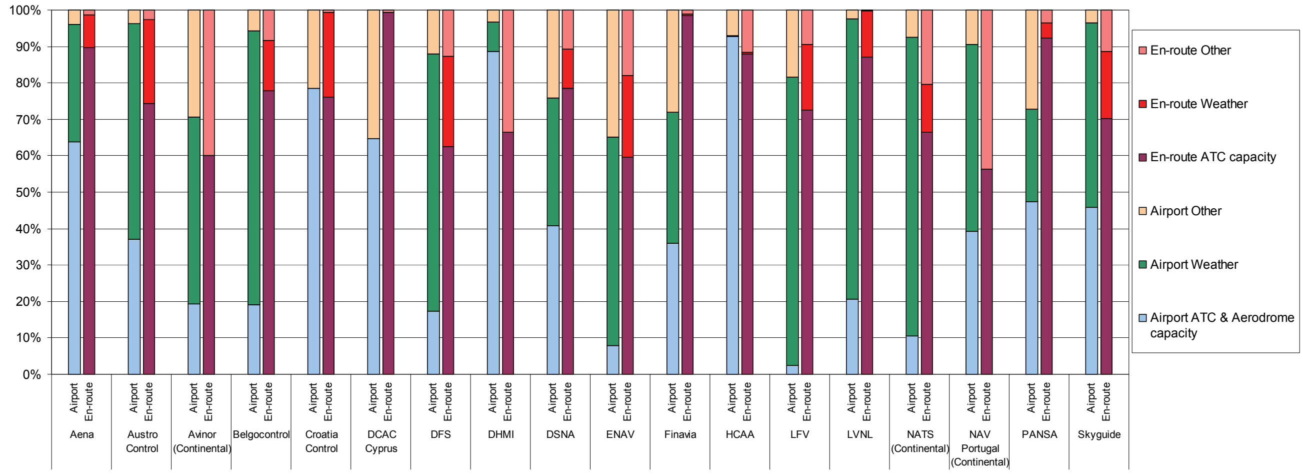

Figure 7.6: Causes of en-route and airport ATFM delays, 2011

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

On the other hand, the airport ATFM delays for Austro Control, Avinor, Belgocontrol, DFS, ENAV, LFV, LVNL, NATS and Skyguide are mainly due to weather (see green bar). This reflects the impact of the adverse weather conditions faced by these ANSPs during the 2011 winter season.

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

Between 2007 and 2011, ANSPs invested some €5.9 billion with different investment cycles and magnitudes across ANSPs.

Average ANSPs "capex to revenue" ratios – a measure of the magnitude of the investment - for the period 2007-2011 are shown in Figure 7.7.

For 14 ANSPs, the "capex to revenue" ratio is higher than 15% indicating substantial investments on the period.

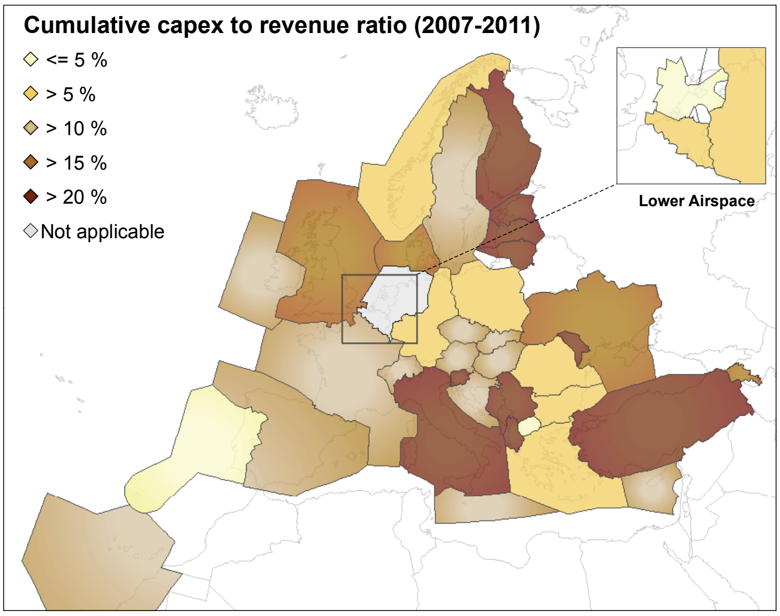

Figure 7.7: ANSPs cumulative capex (2007-2011)

7.5 Comparison of economic cost-effectiveness at FAB level (2011)

Figure 7.8 shows the economic cost-effectiveness indicator for the year 2011 computed at ANSP and FAB level. Note that ANSPs which are not formally part of a FAB initiative are not included in Figure 7.8. The objective of this analysis is to compare unit economic costs across FABs and not to analyse differences in unit costs for the States/ANSPs that are part of the same FAB initiative and which, in some cases, operate under different economic and operational conditions.

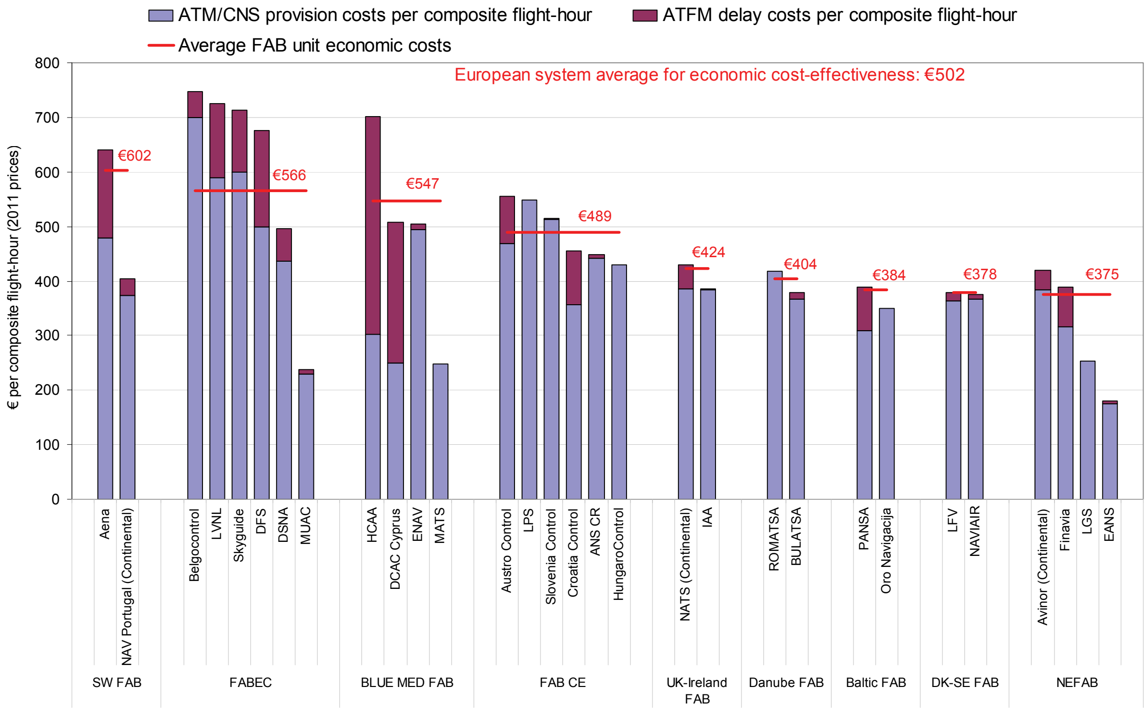

Figure 7.8: Economic cost-effectiveness at ANSP and FAB level, 2011

Figure 7.8 indicates that, when computed at FAB level, unit economic costs range from €602 for the South West FAB to €375 for NEFAB, a factor of 1.6. This represents a lower dispersion than when unit economic costs are computed at ANSP level (i.e. a factor of more than four between Belgocontrol and EANS).

Figure 7.8 indicates that three FABs show average unit economic costs higher than the European average (€502):

- The ANSPs operating in the South West FAB show the highest unit economic costs in 2011 at €602, around 23% of this amount is associated with ATFM delays (i.e. significantly higher than the Pan-European system average of 16%). The relatively high unit economic costs for the South West FAB are mainly driven by Aena higher unit ATM/CNS provision costs and unit costs of ATFM delays compared to NAV Portugal.
- FABEC ANSPs show unit economic costs of €566. In 2011, all ANSPs that are part of the FABEC initiative generated ATFM delays. On average, the costs of ATFM delays represent some 18% of FABEC economic costs (a share ranging from 26% for DFS to 4% for MUAC). This is higher than the Pan-European system average (16%) and indicates that there were capacity issues in 2011 for some of the ANSPs that are part of this FAB initiative.
- BLUE MED unit economic costs amounts to €547 per composite flight-hour in 2011, with unit economic costs ranging from €701 for HCAA to €248 for MATS. For BLUE MED, the share of ATFM delays in economic costs (23%) is significantly higher than for the Pan-European system as a whole (i.e. 16%). In fact, BLUE MED includes the ANSPs which had the two highest unit costs of ATFM delays in 2011 (€398 for

HCAA and €257 for DCAC Cyprus). These two ANSPs have had recurrent capacity issues for several years and could not implement the necessary measures to effectively address them.

Figure 7.8 indicates that six FABs show average unit economic costs lower than the European average (€502):

- The unit economic costs in FAB CE amount to €489. The dispersion in terms of unit economic costs within FAB CE is lower than for FABEC or BLUE MED. In 2011, two ANSPs (LPS and HungaroControl) which are part of the FAB CE initiative did not generate ATFM delays;
- UK-Ireland FAB unit economic costs amount to €424 per composite flight-hour. The share of ATFM delays in UK-Ireland FAB unit costs amount to 9% in 2011, which is lower than the European average (16%);
- Danube FAB unit economic costs amount to €404 per composite flight-hour. ATFM delays were not an issue in 2011 for Danube since these represent around 1% of the FAB total economic costs;
- Baltic FAB unit economic costs amount to €384 per composite flight-hour. The share of ATFM delays in 2011 in Baltic FAB unit economic costs amounts to 18% which is higher than the European average (16%). This relatively high share reflects the prevailing capacity issues for PANSA, while no ATFM delays were generated by Oro Navigacija in 2011;
- DK-SE FAB unit economic costs amount to €378 per composite flight-hour. Similarly to Danube, ATFM delays were not an issue in 2011 for DK-SE since these represent some 4% of the FAB total economic costs. In 2011, the level of LFV and NAVIAIR unit economic costs was close at €379 and €376, respectively.
- NEFAB is the FAB with the lowest unit economic costs in 2011 (€375 per composite flight-hour). The share of ATFM delays in NEFAB unit economic costs amounts to 10% which is lower than the European average (16%);

7.6 Trends in economic cost-effectiveness (2007-2011)

This section analyses the changes of the economic gate-to-gate cost-effectiveness indicator between 2007 and 2011 at Pan-European system level. Note that, for the reasons detailed in Chapter 5, the indicators presented in this section are not directly comparable to those in previous ACE reports.

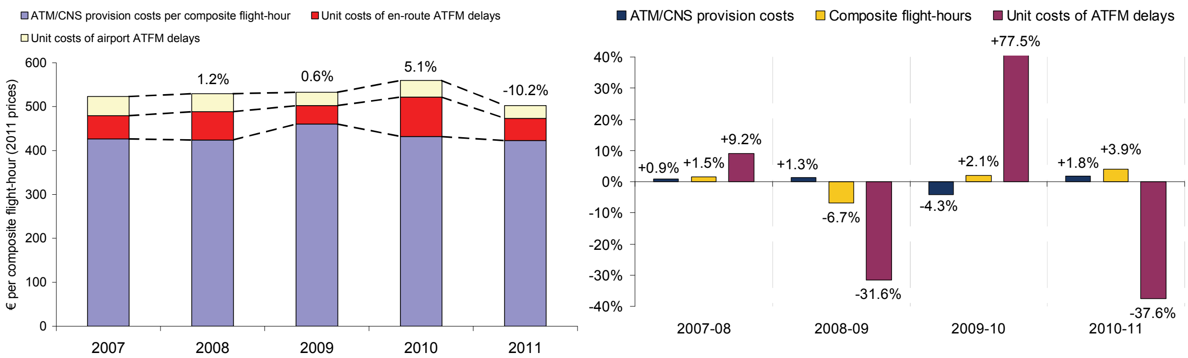

Figure 7.9: Trend in gate-to-gate economic cost-effectiveness (2007-2011, real terms)

The right-hand side of Figure 7.9 indicates that in 2009, traffic volumes significantly fell by -6.7%, reflecting the impact of the economic crisis on the ANS industry. In the meantime, gate-to-gate ATM/CNS provision costs slightly increased (+1.3% in real terms), leading to a +8.6% increase in unit ATM/CNS provision costs. Figure 7.9

indicates that this significant increase was compensated by a sharp decrease in the unit costs of ATFM delays (-31.6%) and as a result unit economic costs remained fairly constant in 2009 (+0.6%).

In 2010, the number of composite flight-hours rose by +2.1% while ATM/CNS provision costs fell by -4.3% in real terms. Detailed analysis in the ACE 2010 Benchmarking Report indicates that the reduction in ATM/CNS provision costs reflected the impact of cost-containment measures implemented by several European ANSPs which generated genuine cost savings in 2010. 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 +5.1% in 2010.

In 2011, the number of composite flight-hours increased faster (+3.9%) than ATM/CNS provision costs (+1.8%), resulting in a decrease in unit ATM/CNS provision costs (-2.1%) compared to 2010. In the meantime, the unit costs of ATFM delays significantly reduced (-37.6%) contributing to a substantial decrease in unit economic costs in 2011 (-10.2%).

The changes in economic gate-to-gate unit costs at Pan-European system level mask a contrasted picture for the 36 ANSPs that consistently reported ACE data since 2007.

Between 2007 and 2011, economic gate-to-gate costs per composite flight-hour fell for 24 ANSPs:

- For 13 ANSPs, the performance improvement was mainly due to a reduction in unit ATM/CNS provision costs;
- For 11 ANSPs, the main driver for the decrease in economic gate-to-gate unit cost was a reduction in ATFM delays.

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

The top of Figure 7.10 shows the evolution of economic gate-to-gate cost-effectiveness for ANSPs with a complexity score **higher** than 4.5 minutes of interaction per flight-hour and the bottom of Figure 7.10 for those ANSP with a complexity score **below** 4.5 minutes. It is important to note that changes in traffic volumes between 2010 and 2011 significantly differ between these two groups. Indeed, in 2011 traffic volumes increased faster (+6.4%) for the 22 less “complex” ANSPs than for the 15 most “complex” ANSPs (+2.8%).

The <u>top</u> chart in Figure 7.10 suggests that:

- 11 out of the 15 most complex ANSPs, could reduce their unit economic costs in 2011. For ANS CR (-7.1%), Austro Control (-28.1%), DFS (-6.6%), DSNA (-29.7%), LPS (-6.6%) and Skyguide (-8.7%) this is mainly due to a decrease of ATFM delays in 2011. For LVNL (-6.1%), MUAC (-12.8%) and NATS (-9.7%), the decrease in unit economic costs mainly results from a reduction in ATM/CNS provision costs per composite flight-hours. For Aena (-13.6%) and Belgocontrol (-14.6%), the improvement in economic cost-effectiveness results from a decrease in both ATFM delays and unit ATM/CNS provision costs.
- In 2011, the rise in unit economic costs for ENAV (+1.5%) and Slovenia Control (+3.6%) mainly results from an increase in unit ATM/CNS provision costs. For SMATSA, the increase in unit economic costs (+1.1%) is mainly due to higher ATFM delays.
- Unit economic costs remained fairly constant between 2010 and 2011 for HungaroControl (+0.2%).

The bottom chart in Figure 7.10 indicates that:

- Five ANSPs experienced no ATFM delays throughout the 2007-2011 period despite high traffic growth for many of them.
- 14 ANSPs managed to reduce their economic unit costs between 2010 and 2011, of which some through lower ATFM delays. This is particularly the case for DCAC Cyprus (-40.5%), Croatia Control (-14.1%) and PANSA (-11.3%). Nevertheless, the quality of service provided is still an issue for these ANSPs for which the share of ATFM delays in total economic costs is higher than 20% (see also Figure 7.4 above).
- In 2011, unit economic costs increased for eight ANSPs and in particular for HCAA (+49.8%), UkSATSE (+33.6%), NATA Albania (+26.1%) and Finavia (+11.8%). For Finavia, HCAA and NATA Albania the significant increase in unit economic costs is mainly due to higher ATFM delays in 2011, while their unit ATM/CNS provision costs decreased. The significant increase in UkSATSE unit economic costs mainly reflect higher ATM/CNS provision costs in 2011.

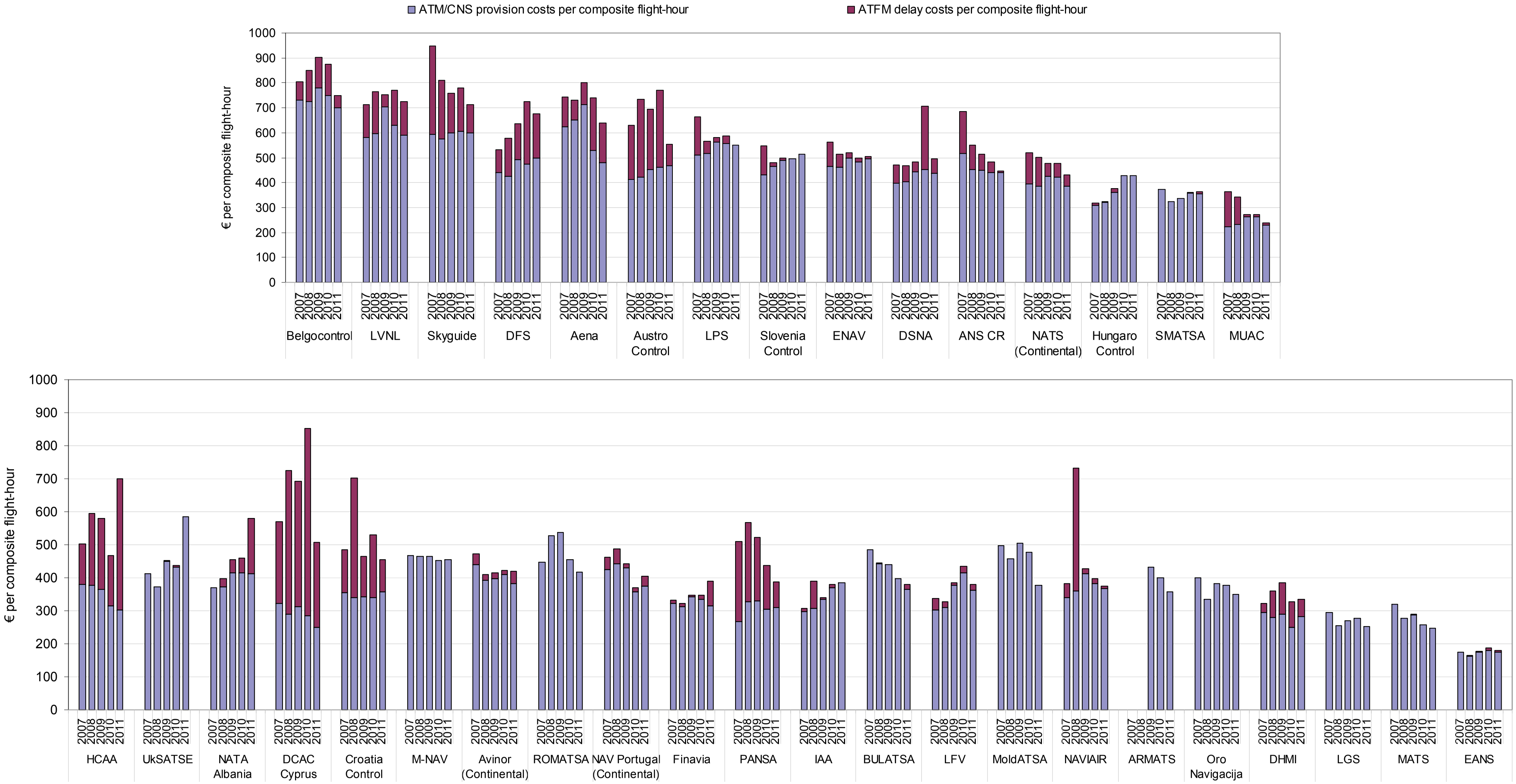

Figure 7.10: Changes in economic cost-effectiveness by ANSP (2007-2011)

ANNEX 1 – STATUS ON ANSPs YEAR 2011 ANNUAL REPORTS

	Availability of a public Annual Reports (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
Aena	✔	✔	✔	✔	No	✔	Includes airport activities.
ANS CR	✔	✔	✔	✔	No	✔	
ARMATS	No	No	No	No	No	No	PRU received an extract of the financial statements comprising an Income and a Balance Sheet statement.
Austro Control	✔	✔	✔	✔	No	✔	
Avinor	✔	✔	✔	✔	No	✔	
Belgocontrol	✔	✔	✔	✔	No	✔	Audit performed by the “Collège des Commissaires”. No cash flow statement.
BULATSA	✔	✔	✔	✔	No	✔	
Croatia Control	✔	✔	✔	✔	No	✔	
DCAC Cyprus	No	No	No	No	No	No	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	✔	At the time of writing this report, DSNA had not yet released its Annual Report comprising the financial statements for the year 2011. It is expected that this document will be published after the Summer 2013.
EANS	✔	✔	✔	✔	No	✔	
ENAV	✔	✔	✔	✔	No	No	
Finavia	✔	✔	✔	✔	No	✔	Detailed accounts only available for total Finavia.
HCAA	No	No	No	No	No	No	
HungaroControl	✔	✔	✔	✔	No	✔	
IAA	✔	✔	✔	✔	No	✔	
LFV	✔	✔	✔	✔	No	✔	
LGS	✔	✔	✔	✔	No	✔	
LPS	✔	✔	✔	✔	No	✔	
LVNL	✔	✔	✔	✔	✔	No	Separate Income Statement for en-route and terminal ANS
MATS	✔	✔	✔	✔	✔	✔	Separate Income Statement for en-route and terminal ANS.
M-NAV	No	No	No	No	No	No	
MoldATSA	No	No	No	No	No	No	PRU received an extract of the financial statements comprising a Balance Sheet statement.
MUAC	✔	✔	✔	✔	n/appl	✔	
NATA Albania	✔	✔	✔	✔	No	✔	
NATS	✔	✔	✔	✔	✔	✔	Several ARs for individual group companies.
NAV Portugal	✔	✔	✔	✔	✔	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	✔	✔	✔	✔	No	✔	
ROMATSA	✔	✔	✔	✔	No	✔	
Skyguide	✔	✔	✔	✔	✔	✔	Separate accounts for en-route, terminal and military OAT services.
Slovenia Control	✔	✔	✔	✔	No	✔	
SMATSA	✔	✔	✔	✔	No	✔	
UkSATSE	✔	✔	✔	✔	No	✔	Annual Report does not include a balance-sheet statement. UkSATSE provided a separate document which comprises a balance-sheet statement.

Annex 1 - Table 0.1: Status on ANSP’s 2011 Annual Reports

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ANNEX 2 – PERFORMANCE INDICATORS USED FOR THE COMPARISON OF ANSPs

The output measures for ANS provision are, for en-route, the en-route flight-hours controlled[87] and, for terminal ANS, the number of IFR airport movements controlled. Those output measures can be derived from the EUROCONTROL database and therefore readily available and consistent across the ANSPs included in the analysis.

In addition to those output metrics, it is important to consider a "gate-to-gate" perspective, because the boundaries used to allocate costs between en-route and terminal ANS vary between ANSPs and might introduce a bias in the cost-effectiveness analysis[88].

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 2002-2011 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[89].

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

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

[89] 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).

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ANNEX 3 – PERFORMANCE RATIOS

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

The **performance ratios** represent the relationship between the value for an ANSP of an indicator and the value of that indicator for the 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*
Aena	ES	0.88	0.99	0.62	1.45	0.61	1.09
ANS CR	CZ	0.96	1.17	1.11	0.74	1.29	0.86
ARMATS	AM	1.19	0.24	8.08	0.60	1.97	1.01
Austro Control	AT	0.90	1.18	0.65	1.17	0.77	0.97
Avinor (Continental)	NO	1.10	0.99	0.87	1.28	0.86	1.25
Belgocontrol	BE	0.60	0.88	0.78	0.88	0.69	0.58
BULATSA	BG	1.15	0.93	1.97	0.63	1.82	1.00
Croatia Control	HR	1.19	0.84	1.22	1.16	1.02	1.27
DCAC Cyprus	CY	1.69	0.91	1.85	1.01	1.68	1.70
DFS	DE	0.85	1.29	0.66	0.99	0.85	0.84
DHMI	TR	1.49	1.01	2.39	0.62	2.41	1.28
DSNA	FR	0.97	0.93	1.10	0.95	1.02	0.95
EANS	EE	2.41	0.96	2.67	0.94	2.57	2.35
ENAV	IT	0.85	0.91	0.95	0.99	0.86	0.85
Finavia	FI	1.34	0.85	1.44	1.09	1.22	1.39
HCAA	GR	1.39	0.94	1.28	1.16	1.20	1.50
HungaroControl	HU	0.98	1.03	0.93	1.03	0.96	1.00
IAA	IE	1.10	1.20	1.07	0.86	1.28	1.04
LFV	SE	1.16	0.85	0.92	1.48	0.78	1.47
LGS	LV	1.67	0.96	3.36	0.52	3.23	1.38
LPS	SK	0.77	0.83	1.38	0.68	1.14	0.68
LVNL	NL	0.72	1.19	0.74	0.81	0.88	0.66
MATS	MT	1.71	0.92	3.30	0.56	3.04	1.43
M-NAV	MK	0.93	0.28	3.57	0.92	1.01	0.90
MoldATSA	MD	1.12	0.29	8.36	0.47	2.39	0.91
MUAC		1.85	2.45	0.65	1.17	1.58	1.99
NATA Albania	AL	1.02	0.72	3.63	0.39	2.62	0.81
NATS (Continental)	UK	1.10	1.25	0.96	0.91	1.20	1.06
NAV Portugal (Continental)	PT	1.13	1.17	0.63	1.52	0.75	1.45
NAVIAIR	DK	1.15	1.28	1.08	0.83	1.39	1.07
Oro Navigacija	LT	1.21	0.62	2.69	0.72	1.67	1.08
PANSA	PL	1.36	1.22	1.05	1.06	1.29	1.40
ROMATSA	RO	1.01	0.75	1.75	0.77	1.31	0.92
Skyguide	CH	0.70	1.34	0.69	0.77	0.92	0.64
Slovenia Control	SI	0.82	0.58	1.24	1.15	0.72	0.88
SMATSA	RS/ME	1.19	0.96	2.01	0.62	1.93	1.02
UkSATSE	UA	0.72	0.41	4.53	0.39	1.86	0.57
Total European System		1.00	1.00	1.00	1.00	1.00	1.00

Annex 3 - Table 0.1: The components of gate-to-gate cost-effectiveness, 2011[90]

[90] 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.

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

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

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

0.98	HungaroControl's gate-to-gate **ATM/CNS costs per composite flight-hour** are **+2% higher** (1/0.98 - 1) than the European average.
= 1.03	**ATCO-hour productivity** is **+3% higher** than the European average.
x 0.93	The **ATCO employment costs per ATCO-hour** of HungaroControl are **+8% higher** (1/0.93 - 1) than the European average.
x 1.03	**Support cost ratio** is **-3% lower** (1/1.03 - 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):

0.96	HungaroControl's **ATCOs in OPS employment costs per composite flight-hour** are **+4% higher** (1/0.96 - 1) than the European average, while
1.00	the **support costs per composite flight-hour** are **in line with** the European average.

ANNEX 4 – 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	11.04	0.28	0.60	0.22	1.10	12.14
DFS	10.45	0.28	0.55	0.26	1.09	11.36
Belgocontrol	8.04	0.41	0.55	0.42	1.38	11.06
NATS (Continental)	9.89	0.38	0.44	0.30	1.12	11.05
LVNL	10.20	0.20	0.41	0.35	0.96	9.78
MUAC	9.92	0.26	0.53	0.17	0.97	9.58
Austro Control	8.21	0.19	0.51	0.20	0.90	7.40
ANS CR	8.30	0.17	0.52	0.19	0.88	7.27
DSNA	9.64	0.15	0.41	0.14	0.70	6.77
Slovenia Control	8.86	0.13	0.52	0.11	0.76	6.72
ENAV	5.35	0.28	0.57	0.19	1.04	5.56
SMATSA	8.99	0.04	0.47	0.06	0.58	5.19
LPS	6.47	0.12	0.47	0.16	0.75	4.87
Aena	7.03	0.17	0.39	0.13	0.68	4.80
HungaroControl	7.16	0.07	0.45	0.13	0.65	4.68
Croatia Control	7.14	0.05	0.48	0.08	0.61	4.33
PANSA	4.57	0.14	0.51	0.25	0.91	4.13
NAVIAIR	3.87	0.19	0.56	0.22	0.97	3.77
DHMI	6.13	0.14	0.35	0.11	0.60	3.66
ROMATSA	5.32	0.06	0.40	0.12	0.58	3.11
LFV	3.23	0.23	0.48	0.24	0.95	3.08
BULATSA	7.01	0.05	0.29	0.06	0.40	2.81
DCAC Cyprus	4.38	0.14	0.37	0.12	0.63	2.77
M-NAV	4.95	0.09	0.41	0.05	0.55	2.74
NATA Albania	6.03	0.05	0.35	0.04	0.44	2.64
EANS	3.74	0.15	0.30	0.21	0.66	2.47
HCAA	4.19	0.11	0.38	0.09	0.57	2.39
LGS	3.21	0.09	0.46	0.16	0.71	2.29
NAV Portugal (Continental)	3.71	0.16	0.38	0.08	0.62	2.28
Avinor (Continental)	2.08	0.31	0.48	0.27	1.06	2.21
Oro Navigacija	3.08	0.07	0.42	0.18	0.68	2.09
Finavia	2.05	0.28	0.34	0.37	0.99	2.04
UkSATSE	3.02	0.06	0.40	0.18	0.64	1.93
IAA	4.12	0.07	0.22	0.11	0.40	1.64
MoldATSA	1.89	0.04	0.41	0.20	0.65	1.22
MATS	1.55	0.08	0.37	0.17	0.62	0.97
ARMATS	1.50	0.07	0.38	0.17	0.62	0.93
Average	7.28	0.21	0.46	0.18	0.84	6.15

Annex 4 - Table 0.1: Traffic complexity indicators at ANSP level, 2011

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	London TC	25.6	0.47	0.52	0.32	1.31	33.5	148
DFS	Langen	10.3	0.39	0.54	0.43	1.36	14.1	179
Skyguide	Geneva	11.5	0.23	0.60	0.18	1.01	11.6	312
DFS	Rhein	12.1	0.20	0.59	0.16	0.95	11.5	348
Skyguide	Zurich	9.8	0.30	0.58	0.25	1.13	11.1	284
Belgocontrol	Brussels	8.0	0.41	0.55	0.42	1.38	11.1	177
DFS	Munchen	9.6	0.31	0.49	0.28	1.09	10.4	269
LVNL	Amsterdam	10.2	0.20	0.41	0.35	0.96	9.8	168
MUAC	Maastricht	9.9	0.26	0.53	0.17	0.97	9.6	342
DSNA	Reims	10.9	0.19	0.45	0.15	0.79	8.6	334
ENAV	Milano	5.9	0.44	0.62	0.37	1.43	8.5	213
NATS	London AC	8.7	0.31	0.36	0.24	0.91	7.9	308
DSNA	Paris	9.3	0.24	0.33	0.27	0.84	7.8	243
ENAV	Padova	6.6	0.27	0.65	0.18	1.10	7.2	308
ANS CR	Praha	8.3	0.16	0.52	0.18	0.86	7.1	323
Austro Control	Wien	8.5	0.17	0.50	0.17	0.84	7.1	325
Slovenia Control	Ljubljana	8.9	0.13	0.52	0.11	0.76	6.7	321
Aena	Palma	6.5	0.26	0.41	0.27	0.95	6.2	167
DSNA	Bordeaux	10.6	0.10	0.39	0.08	0.58	6.1	337
IAA	Dublin	5.3	0.31	0.41	0.41	1.13	6.0	162
DSNA	Brest	9.7	0.09	0.44	0.07	0.60	5.8	351
DSNA	Marseille	8.1	0.16	0.42	0.12	0.71	5.7	320
DFS	Bremen	4.3	0.31	0.54	0.41	1.26	5.4	182
NATS	Prestwick	4.6	0.34	0.43	0.40	1.17	5.4	259
SMATSA	Beograd	9.2	0.04	0.47	0.06	0.57	5.3	349
Aena	Barcelona	6.9	0.20	0.43	0.11	0.74	5.1	307
LPS	Bratislava	6.5	0.12	0.47	0.16	0.75	4.9	326
ENAV	Roma	5.2	0.25	0.53	0.14	0.91	4.8	306
HungaroControl	Budapest	7.3	0.07	0.45	0.12	0.64	4.6	336
Croatia Control	Zagreb	7.3	0.05	0.48	0.07	0.60	4.4	345
Aena	Madrid	7.5	0.11	0.35	0.07	0.53	4.0	336
DHMI	Istanbul	6.3	0.18	0.29	0.11	0.58	3.7	301
PANSA	Warszawa	4.3	0.10	0.52	0.19	0.82	3.5	335
DHMI	Ankara	5.7	0.11	0.39	0.10	0.59	3.4	343
NAVIAIR	Kobenhavn	3.6	0.17	0.56	0.19	0.92	3.3	318
ROMATSA	Bucuresti	5.4	0.06	0.40	0.12	0.58	3.1	340
Aena	Sevilla	4.9	0.18	0.34	0.09	0.61	3.0	311
LFV	Malmo	3.5	0.17	0.50	0.16	0.83	2.9	325
BULATSA	Sofia	7.2	0.05	0.29	0.06	0.40	2.8	347
M-NAV	Skopje	5.1	0.09	0.41	0.05	0.55	2.8	331
DCAC Cyprus	Nicosia	4.4	0.14	0.37	0.12	0.63	2.8	319
LFV	Stockholm	2.3	0.36	0.41	0.38	1.15	2.6	247
NATA Albania	Tirana	6.0	0.05	0.35	0.04	0.44	2.6	340
EANS	Tallinn	3.7	0.15	0.30	0.21	0.66	2.5	311
ENAV	Brindisi	3.3	0.14	0.50	0.10	0.74	2.5	317
Avinor	Oslo	2.4	0.30	0.44	0.22	0.97	2.3	261
NAV Portugal (FIR Lisboa)	Lisboa	3.8	0.16	0.38	0.07	0.61	2.3	323
UkSATSE	L'viv	3.1	0.02	0.54	0.20	0.75	2.3	347
LGS	Riga	3.2	0.09	0.46	0.16	0.71	2.3	322
HCAA	Athinai+Macedonia	4.2	0.09	0.37	0.07	0.52	2.2	330
Oro Navigacija	Vilnius	3.1	0.07	0.42	0.18	0.68	2.1	310
UkSATSE	Simferopol	3.8	0.02	0.38	0.13	0.53	2.0	350
UkSATSE	Kyiv	2.7	0.11	0.35	0.22	0.68	1.8	328
UkSATSE	Dnipropetrovs'k	3.1	0.06	0.33	0.14	0.53	1.6	344
Aena	Canarias	2.8	0.17	0.26	0.13	0.56	1.6	292
Finavia	Tampere	1.6	0.29	0.30	0.34	0.93	1.5	258
UkSATSE	Odesa	2.0	0.04	0.47	0.13	0.64	1.3	336
IAA	Shannon	4.0	0.04	0.20	0.07	0.31	1.2	344
MoldATSA	Chisinau	1.9	0.04	0.41	0.20	0.65	1.2	329
Avinor	Stavanger	1.1	0.26	0.43	0.30	0.99	1.1	274
ARMATS	Yerevan	1.6	0.06	0.39	0.16	0.62	1.0	326
Avinor	Bodo	1.0	0.30	0.41	0.25	0.97	1.0	250
MATS	Malta	1.5	0.06	0.36	0.17	0.59	0.9	325
European system average		7.2	0.2	0.5	0.2	0.8	6.0	310

Annex 4 - Table 0.2: Traffic complexity indicators at ACC level, 2011

ANSPs	Traffic variability indicators		
	Variability based on three-months periods (2011)	Peak month / Average month (2011)	Peak week / Average week (2011)
Aena	1.17	1.20	1.21
ANS CR	1.18	1.21	1.22
ARMATS	1.06	1.10	1.17
Austro Control	1.20	1.21	1.21
Avinor (Continental)	1.04	1.11	1.12
Belgocontrol	1.09	1.13	1.14
BULATSA	1.39	1.42	1.45
Croatia Control	1.37	1.43	1.45
DCAC Cyprus	1.18	1.21	1.29
DFS	1.10	1.13	1.14
DHMI	1.23	1.24	1.27
DSNA	1.15	1.18	1.19
EANS	1.12	1.14	1.16
ENAV	1.22	1.25	1.28
Finavia	1.05	1.09	1.15
HCAA	1.42	1.51	1.54
HungaroControl	1.29	1.33	1.34
IAA	1.11	1.15	1.21
LFV	1.05	1.12	1.14
LGS	1.15	1.17	1.18
LPS	1.30	1.36	1.38
LVNL	1.09	1.10	1.10
MATS	1.10	1.11	1.46
M-NAV	1.55	1.63	1.69
MoldATSA	1.25	1.28	1.34
MUAC	1.10	1.11	1.13
NATA Albania	1.37	1.45	1.46
NATS (Continental)	1.12	1.14	1.15
NAV Portugal (Continental)	1.10	1.13	1.14
NAVIAIR	1.06	1.09	1.14
Oro Navigacija	1.13	1.15	1.18
PANSA	1.17	1.19	1.19
ROMATSA	1.28	1.31	1.32
Skyguide	1.11	1.13	1.15
Slovenia Control	1.31	1.36	1.39
SMATSA	1.36	1.41	1.43
UkSATSE	1.22	1.26	1.26

Annex 4 - Table 0.3: Traffic variability indicators at ANSP level, 2011

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ANNEX 5 – COST OF CAPITAL REPORTED BY ANSPs

ANSPs	Comments
Aena	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 6.5%.
ANS CR	Gross cost of capital computed as the product of an average rate of 5.0% and an asset base comprising the NBV of fixed assets and net current assets.
ARMATS	Corresponds to the product of an asset base comprising the NBV of fixed assets and net current assets with an average rate of 12.0%.
Austro Control	Corresponds to the product of an asset base comprising the NBV of fixed assets (excluding assets under construction, land and financial assets) with an average rate of 2.64%.
Avinor	Corresponds to the product of an asset base comprising the NBV of fixed assets in operations at year-end with a weighted average cost of capital (calculated at Avinor Group level) of 7.6%.
Belgocontrol	Gross cost of capital which comprises the financial cost of debt and the product of the yearly average Belgian OLO rate (linear bonds, 2.9%) with an asset base corresponding to the total NBV of fixed assets less the borrowings.
BULATSA	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 6.4%.
Croatia Control	Corresponds to the product of the asset base comprising the NBV of fixed assets and the current assets with an average rate of 5.8%.
DCAC Cyprus	Corresponds to the product of the asset base comprising the NBV of fixed assets in operation and the current assets with an average rate of 6.0%.
DFS	Corresponds to the product of an asset base comprising the NBV of fixed assets in operation and the net current assets with an average rate of 5.6%.
DHMİ	Corresponds to the product of an asset base comprising the NBV of fixed assets and net current assets with an average rate of 6.3%.
DSNA	Corresponds to the product of an asset base comprising the NBV of fixed assets in operation and net current assets with an average rate of 3.7%.
EANS	Computed as the product of an asset base comprising the NBV of fixed assets with an average rate of 11.1%.
ENAV	Corresponds to the product of an asset base comprising the NBV of fixed assets and net current assets with an average rate of 3.2% for en-route ANS and 2.0% for terminal ANS.
Finavia	Corresponds to the product of an asset base comprising the NBV of fixed assets and net current assets with an average rate of 4.3% including the rate of return on equity (7.0%) and the cost of debt (1.7%).
HCAA	Corresponds to the product of the average operating capital employed with an average rate of 2.5%.
HungaroControl	Gross cost of capital calculated using the return on equity (i.e. 9.6%) applied to the average NBV of fixed assets and net current assets.
IAA	Corresponds to the product of an asset base comprising the NBV of fixed assets with an average rate of 7.1%.
LFV	Corresponds to the product of an asset base comprising the NBV of fixed assets with an average rate of 1.9%.
LGS	Corresponds to the product of an asset base comprising the NBV of fixed assets and the current assets with an average rate of 6.9%.
LPS	Corresponds to the product of an asset base comprising the NBV of fixed assets and the current assets with an average rate of 6.5%.
LVNL	Corresponds to the product of an asset base comprising the NBV of fixed assets and net current assets with an average rate of 5.6%.
MATS	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 5.6%.
M-NAV	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 5.5%.
MoldATSA	Corresponds to the product of an asset base comprising the NBV of fixed assets in operation and the net current assets with an average rate of 14.7%, plus a part of the capital expenditures spent during the year.
MUAC	Corresponds to the product of the actual interest paid by EUROCONTROL to the banks (1.0%) with the proportion of EUROCONTROL NBV assets belonging to MUAC.
NATA Albania	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 3.5%.
NATS	Economic cost of capital computed as the product of the regulatory rate of return (6.8%) with the average regulatory asset base for en-route ANS and with the average capital employed for terminal ANS.

NAV Portugal (FIR Lisboa)	Corresponds to the product of an asset base comprising the NBV of fixed assets and the current assets with an average rate of 6.8%.
NAVIAIR	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 5.0%.
Oro Navigacija	Corresponds to the product of an asset base comprising the average NBV of fixed assets and average current assets (including “stocks, prepayments and contract in progress” and “amounts receivable within one year”) with an average rate of 3.0%.
PANSA	Corresponds to the product of an asset base comprising long-term assets and net current assets (excluding the provision for over/under recoveries) with an average rate of 6.0%.
ROMATSA	Gross cost of capital calculated using the return on equity (i.e. 8%) applied to the average NBV of fixed assets and the average net current assets, excluding interest bearing accounts.
Skyguide	Corresponds to the product of an asset base comprising the NBV of fixed assets with an average WACC capped at 2.5%.
Slovenia Control	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 4.0%.
SMATSA	Corresponds to the product of an asset base comprising the NBV of fixed assets and the net current assets with an average rate of 9.4%.
UkSATSE	Includes the amount of capital expenditure spent in 2011.

Annex 5 - Table 0.1: Comments on cost of capital reported by ANSPs, 2011

ANNEX 6 – EXCHANGE RATES, INFLATION RATES AND PURCHASING POWER PARITIES (PPPs) 2011 DATA

ANSPs	Countries	2011 Exchange rate (1 €=)	2011 Inflation rate (%)	2011 PPPs	Comments
Aena	Spain	1	3.1	0.93	
ANS CR	Czech Republic	24.6	2.1	18.09	
ARMATS	Armenia	474.1	7.7	265.50	PPPs from IMF database
Austro Control	Austria	1	3.6	1.10	
Avinor (Continental)	Norway	7.8	1.2	11.84	
Belgocontrol	Belgium	1	3.5	1.13	
BULATSA	Bulgaria	2.0	3.4	0.88	
Croatia Control	Croatia	7.4	2.2	5.07	
DCAC Cyprus	Cyprus	1	3.5	0.89	
DFS	Germany	1	2.5	1.05	
DHMI	Turkey	2.3	6.5	1.34	
DSNA	France	1	2.3	1.13	
EANS	Estonia	1	5.1	0.70	
ENAV	Italy	1	2.9	1.04	
Finavia	Finland	1	3.3	1.22	
HCAA	Greece	1	3.1	0.93	
HungaroControl	Hungary	278.9	3.9	169.65	
IAA	Ireland	1	1.2	1.09	
LFV	Sweden	9.0	1.4	11.63	
LGS	Latvia	0.7	4.2	0.47	
LPS	Slovak Republic	1	4.1	0.69	
LVNL	Netherlands	1	2.5	1.10	
MATS	Malta	1	2.5	0.73	
M-NAV	F.Y.R. Macedonia	61.1	3.9	25.19	
MoldATSA	Moldova	15.9	7.7	8.56	PPPs from IMF database
MUAC		1	2.5	1.10	Netherlands PPPs and inflation rate used for MUAC
NATA Albania	Albania	139.8	3.4	59.69	
NATS (Continental)	United Kingdom	0.9	4.5	0.88	
NAV Portugal (Continental)	Portugal	1	3.6	0.82	
NAVIAIR	Denmark	7.4	2.7	10.23	
Oro Navigacija	Lithuania	3.5	4.1	2.12	
PANSA	Poland	4.1	3.9	2.44	
ROMATSA	Romania	4.2	5.8	2.20	
Skyguide	Switzerland	1.2	0.1	1.88	
Slovenia Control	Slovenia	1	2.1	0.84	
SMATSA	Serbia and Montenegro	101.9	11.1	50.69	Data for Serbia only since ACE data is provided in Serbian Dinar
UkSATSE	Ukraine	11.1	8.0	4.99	PPPs from IMF database

Annex 6 - Table 0.1: 2011 Exchange rates, inflation rates and PPPs data

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

For this reason, the following approach has been adopted in this Report for allowing for inflation and exchange rate variation. The financial elements of performance are assessed, for each year, in national currency. They are then converted to national currency in 2011 prices using national inflation rates. Finally, for comparison purposes in 2011, all national currencies are converted to Euros using the 2011 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 2011 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 2011 data.

The exchange rates used in this Report to convert the 2011 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[91] or from the International Monetary Fund[92] when the information was not available in EUROSTAT website. For the projections (2012-2016), 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 4 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 4.43 between the PPPs for Ukraine (4.00 UAH per international dollar in 2011) and the PPPs for France (0.902 Euro per international Dollar). This factor is applied to the PPPs for France as disclosed in the EUROSTAT database (i.e. 1.127) to express the PPPs for Ukraine in PPS (4.99 = 1.127 × 4.43). A similar methodology is used to express Moldova and Armenia PPPs in PPS.

[91] EUROSTAT December 2012 database available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home
[92] IMF October 2012 database available at: http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx.

ANNEX 7 – KEY DATA

En-route 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**
Aena	794 710	0	0	0	18 437	7 261	333	24 045	1 506	846 292
ANS CR	104 423	0	0	0	1 845	741	0	0	0	107 009
ARMATS	4 229	0	0	0	4	32	0	0	0	4 266
Austro Control	173 446	0	0	0	450	1 793	691	0	0	176 380
Avinor (Continental)	106 590	0	0	0	0	0	0	0	0	106 590
Belgocontrol	155 805	0	0	0	0	10 377	415	4 129	42	170 767
BULATSA	79 490	0	0	0	0	553	0	0	0	80 043
Croatia Control	59 819	0	7 851	0	0	0	0	0	0	67 669
DCAC Cyprus	44 038	0	0	0	0	0	0	0	0	44 038
DFS	739 112	0	0	0	0	0	41 402	0	0	780 514
DHMI	287 916	0	0	0	7 295	2 073	0	0	0	297 284
DSNA	1 167 138	0	0	0	24 136	0	0	10 208	0	1 201 482
EANS	13 949	0	0	0	0	0	0	0	0	13 949
ENAV	543 376	0	0	0	26 135	22 782	0	7 340	301	599 933
Finavia	33 364	0	0	209	0	440	0	0	0	34 013
HCAA	167 035	0	0	0	0	0	0	0	0	167 035
HungaroControl	82 225	0	0	0	1 669	653	4 978	0	0	89 527
IAA	122 479	0	0	0	2 001	0	380	0	0	124 860
LFV	188 246	0	888	0	598	0	4 622	0	0	194 353
LGS	20 670	0	0	0	0	0	30	216	0	20 916
LPS	48 110	0	0	705	474	369	68	672	31	50 429
LVNL	169 365	0	0	0	2 182	0	216	2 235	0	173 998
MATS	9 651	0	0	0	0	0	19	0	0	9 671
M-NAV	10 468	0	0	0	0	0	28	0	0	10 496
MoldATSA	7 191	0	0	0	0	47	8	0	0	7 246
MUAC										
NATA Albania	18 895	0	0	0	0	0	1 312	217	0	20 424
NATS (Continental)	651 366	0	0	0	556	0	4 036	0	-1 123	654 834
NAV Portugal (Continental)	131 804	0	0	0	0	1 063	0	3 014	0	135 881
NAVIAIR	82 412	0	0	0	1 760	0	179	1 733	0	86 082
Oro navigacija	20 747	0	0	175	75	0	101	191	0	21 288
PANSA	140 117	0	0	0	681	0	2 736	267	0	143 801
ROMATSA	153 502	0	0	0	4 392	1 038	819	493	0	160 243
Skyguide	163 769	0	39 889	0	0	2 910	6 400	2 668	355	215 991
Slovenia Control	30 844	0	0	0	129	0	8	168	-1 500	29 650
SMATSA	69 738	0	6 630	0	0	0	4 035	0	0	80 403
UkSATSE	203 240	0	0	0	0	0	0	0	0	203 240

Terminal 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**
Aena	93 036	121 810	0	0	0	0	137	14 662	621	230 267
ANS CR	23 250	0	0	0	208	0	0	0	0	23 458
ARMATS	3 823	0	0	0	0	0	0	0	0	3 823
Austro Control	39 113	0	0	0	0	0	484	0	0	39 597
Avinor (Continental)	0	94 524	0	0	0	0	0	3 717	0	98 240
Belgocontrol	26 444	0	0	0	0	0	244	4 233	23	30 943
BULATSA	5 582	0	0	0	0	0	1 515	137	0	7 234
Croatia Control	7 812	0	0	0	0	0	0	0	0	7 812
DCAC Cyprus	0	0	0	0	0	7 434	0	0	0	7 434
DFS	207 365	0	0	0	0	0	11 616	0	0	218 980
DHMI	99 067	0	0	0	0	0	0	0	0	99 067
DSNA	231 631	0	0	0	42 873	0	0	2 927	0	277 431
EANS	1 226	0	0	0	0	0	0	0	0	1 226
ENAV	44 249	0	0	0	32 076	39 628	0	1 387	124	117 465
Finavia	17 744	0	0	0	0	362	0	1 499	0	19 605
HCAA	11 975	0	0	0	0	0	0	0	0	11 975
HungaroControl	23 691	137	0	0	64	0	1 434	0	0	25 326
IAA	27 517	0	0	0	0	0	173	0	0	27 690
LFV	0	28 457	0	0	0	0	0	0	0	28 457
LGS	2 894	0	0	0	0	0	28	203	0	3 126
LPS	4 838	0	0	0	64	0	7	75	3	4 987
LVNL	54 739	0	0	0	0	0	0	1 836	0	56 575
MATS	0	1 448	0	0	0	2 197	3	0	0	3 647
M-NAV	820	0	0	3	0	0	0	0	0	823
MoldATSA	1 827	0	0	0	0	0	0	0	0	1 827
MUAC	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl	n/appl
NATA Albania	1 303	0	0	0	0	0	162	27	0	1 492
NATS (Continental)	11 676	189 763	0	0	0	0	1 246	0	0	202 684
NAV Portugal (Continental)	26 310	0	0	0	0	0	0	817	0	27 126
NAVIAIR	29 106	2 977	0	0	0	0	112	71	0	32 266
Oro navigacija	3 201	0	0	31	162	0	18	34	0	3 445
PANSA	33 856	0	0	0	1 088	0	35	56	0	35 036
ROMATSA	17 131	0	0	0	0	0	4	0	0	17 135
Skyguide	91 167	0	0	0	0	7 689	3 012	4 174	167	106 208
Slovenia Control	3 185	101	0	301	50	0	0	261	-8	3 891
SMATSA	4 935	0	0	0	0	0	779	0	991	6 705
UkSATSE	36 000	0	0	0	0	0	0	0	0	36 000

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**
Aena	887 746	121 810	0	0	18 437	7 261	470	38 707	2 127	1 076 559
ANS CR	127 673	0	0	0	2 053	741	0	0	0	130 467
ARMATS	8 052	0	0	0	4	32	0	0	0	8 088
Austro Control	212 559	0	0	0	450	1 793	1 175	0	0	215 977
Avinor (Continental)	106 590	94 524	0	0	0	0	0	3 717	0	204 830
Belgocontrol	182 248	0	0	0	0	10 377	658	8 362	64	201 711
BULATSA	85 071	0	0	0	0	553	1 515	137	0	87 277
Croatia Control	67 631	0	7 851	0	0	0	0	0	0	75 481
DCAC Cyprus	44 038	0	0	0	0	7 434	0	0	0	51 472
DFS	946 477	0	0	0	0	0	53 017	0	0	999 494
DHMI	386 983	0	0	0	7 295	2 073	0	0	0	396 350
DSNA	1 398 769	0	0	0	67 008	0	0	13 135	0	1 478 913
EANS	15 175	0	0	0	0	0	0	0	0	15 175
ENAV	587 625	0	0	0	58 212	62 410	0	8 727	426	717 398
Finavia	51 108	0	0	209	0	802	0	1 499	0	53 618
HCAA	179 010	0	0	0	0	0	0	0	0	179 010
HungaroControl	105 916	137	0	0	1 734	653	6 413	0	0	114 853
IAA	149 996	0	0	0	2 001	0	553	0	0	152 550
LFV	188 246	28 457	888	0	598	0	4 622	0	0	222 811
LGS	23 564	0	0	0	0	0	58	420	0	24 042
LPS	52 948	0	0	705	538	369	75	747	34	55 416
LVNL	224 104	0	0	0	2 182	0	216	4 071	0	230 573
MATS	9 651	1 448	0	0	0	2 197	22	0	0	13 318
M-NAV	11 288	0	0	3	0	0	28	0	0	11 319
MoldATSA	9 019	0	0	0	0	47	8	0	0	9 073
MUAC										
NATA Albania	20 198	0	0	0	0	0	1 474	243	0	21 916
NATS (Continental)	663 041	189 763	0	0	556	0	5 282	0	-1 123	857 519
NAV Portugal (Continental)	158 113	0	0	0	0	1 063	0	3 831	0	163 008
NAVIAIR	111 517	2 977	0	0	1 760	0	291	1 803	0	118 348
Oro navigacija	23 948	0	0	205	236	0	119	224	0	24 732
PANSA	173 974	0	0	0	1 769	0	2 772	323	0	178 837
ROMATSA	170 633	0	0	0	4 392	1 038	823	493	0	177 378
Skyguide	254 936	0	39 889	0	0	10 599	9 412	6 841	522	322 200
Slovenia Control	34 029	101	0	301	180	0	8	429	-1 507	33 541
SMATSA	74 673	0	6 630	0	0	0	4 814	0	991	87 108
UkSATSE	239 239	0	0	0	0	0	0	0	0	239 239

Annex 7 - Table 0.1: Breakdown of total ANS revenues (en-route, terminal and gate-to-gate), 2011

En-route ANS costs (in €'000)

ANSPs	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**
Aena	634 355	39 263	8 495	15 222	54 979	0	0	752 312
ANS CR	97 514	2 273	314	0	5 760	0	0	105 861
ARMATS	3 916	0	0	0	237	0	0	4 153
Austro Control	146 978	16 239	368	0	9 704	0	0	173 289
Avinor (Continental)	91 640	1 486	308	0	6 470	0	0	99 903
Belgocontrol	96 489	7 274	1 346	0	11 576	36 920	0	153 605
BULATSA	64 678	5 504	619	0	4 150	0	192	75 143
Croatia Control	68 847	4 574	0	0	0	0	0	73 421
DCAC Cyprus	32 163	3 550	6 428	0	2 328	0	0	44 469
DFS	761 268	0	0	0	0	0	0	761 268
DHMI	254 211	21 539	2 427	0	15 523	0	0	293 700
DSNA	918 529	65 283	7 268	0	74 642	46 587	36 943	1 149 253
EANS	11 405	122	0	0	0	0	0	11 527
ENAV	568 974	33 546	0	0	44 827	0	0	647 347
Finavia	34 024	2 510	241	0	3 211	361	0	40 347
HCAA	135 055	7 919	2 186	0	11 025	0	0	156 185
HungaroControl	77 815	1 635	1 522	0	4 140	0	0	85 111
IAA	98 755	6 149	1 699	2 204	6 967	0	0	115 774
LFV	178 863	7 425	399	0	0	0	0	186 687
LGS	17 308	879	1 386	0	1 036	0	0	20 609
LPS	46 159	1 209	952	0	2 767	0	0	51 087
LVNL	113 436	7 529	1 400	0	14 507	23 300	-4 585	155 587
MATS	12 927	0	0	0	934	0	0	13 861
M-NAV	9 158	624	0	0	503	0	0	10 285
MoldATSA	5 977	674	198	0	350	0	0	7 200
MUAC	129 060	0	0	0	0	0	9	129 069
NATA Albania	17 625	325	522	0	776	0	0	19 249
NATS (Continental)	521 016	54	5 394	0	0	795	0	527 259
NAV Portugal (Continental)	106 773	5 143	552	0	7 953	0	0	120 421
NAVIAIR	79 759	0	1 453	0	0	0	0	81 212
Oro navigacija	18 826	421	253	0	1 078	0	0	20 579
PANSA	115 993	4 858	1 309	0	6 979	690	0	129 829
ROMATSA	116 549	6 927	2 978	0	7 726	0	0	134 181
Skyguide	190 503	8 790	0	0	8 071	0	0	207 364
Slovenia Control	25 623	1 398	559	0	1 313	0	0	28 892
SMATSA	71 130	4 834	0	0	2 974	0	0	78 938
UkSATSE	192 801	1 781	1 787	0	6 158	0	0	202 528

Terminal ANS costs (in €'000)

ANSPs	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**
Aena	266 550	0	0	0	0	0	0	266 550
ANS CR	24 399	599	53	0	0	0	0	25 051
ARMATS	3 265	0	0	0	0	0	0	3 265
Austro Control	33 399	3 478	94	0	0	0	0	36 971
Avinor (Continental)	101 461	1 529	124	0	0	0	0	103 114
Belgocontrol	53 964	4 118	787	0	0	0	0	58 869
BULATSA	10 035	1 496	163	0	0	0	30	11 725
Croatia Control	8 396	0	0	0	0	0	0	8 396
DCAC Cyprus	4 650	912	1 871	0	0	0	0	7 433
DFS	217 062	0	568	0	0	0	0	217 630
DHMI	69 977	0	0	0	0	0	0	69 977
DSNA	236 755	22 358	1 706	0	0	0	10 673	271 492
EANS	1 185	75	0	0	0	0	0	1 260
ENAV	115 020	14 081	0	0	0	0	0	129 101
Finavia	28 327	2 508	1 102	0	0	0	0	31 937
HCAA	24 163	953	520	0	0	0	0	25 636
HungaroControl	18 038	1 097	271	0	0	0	0	19 406
IAA	23 050	1 538	307	351	0	0	0	25 246
LFV	29 067	0	203	0	0	0	0	29 270
LGS	5 768	706	488	0	0	0	0	6 962
LPS	5 032	510	83	0	0	0	0	5 625
LVNL	53 892	1 653	0	0	0	0	-2 182	53 363
MATS	2 202	0	0	0	0	0	0	2 202
M-NAV	1 296	127	148	0	0	0	0	1 571
MoldATSA	1 456	372	37	0	0	0	0	1 864
MUAC	0	0	0	0	0	0	0	n/appl
NATA Albania	2 187	108	0	0	0	0	0	2 295
NATS (Continental)	159 183	53	3 336	0	0	0	0	162 572
NAV Portugal (Continental)	28 279	0	0	0	0	0	0	28 279
NAVIAIR	31 755	0	0	0	0	0	0	31 755
Oro navigacija	3 225	47	34	0	0	0	0	3 306
PANSA	26 880	2 078	1 085	0	0	0	0	30 043
ROMATSA	22 754	1 352	95	0	0	0	0	24 202
Skyguide	86 728	3 975	0	0	0	203	0	90 906
Slovenia Control	3 384	448	91	0	0	0	0	3 924
SMATSA	13 466	900	0	0	0	0	0	14 367
UkSATSE	56 309	0	500	0	0	0	0	56 808

Gate-to-gate ANS costs (in €'000)

ANSPs	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**
Aena	900 904	39 263	8 495	15 222	54 979	0	0	1 018 862
ANS CR	121 913	2 872	367	0	5 760	0	0	130 911
ARMATS	7 181	0	0	0	237	0	0	7 418
Austro Control	180 377	19 717	462	0	9 704	0	0	210 260
Avinor (Continental)	193 101	3 015	432	0	6 470	0	0	203 018
Belgocontrol	150 453	11 392	2 133	0	11 576	36 920	0	212 474
BULATSA	74 713	7 000	782	0	4 150	0	222	86 867
Croatia Control	77 243	4 574	0	0	0	0	0	81 817
DCAC Cyprus	36 813	4 462	8 299	0	2 328	0	0	51 902
DFS	978 330	0	568	0	0	0	0	978 898
DHMI	324 188	21 539	2 427	0	15 523	0	0	363 677
DSNA	1 155 285	87 642	8 974	0	74 642	46 587	47 615	1 420 745
EANS	12 590	197	0	0	0	0	0	12 787
ENAV	683 994	47 627	0	0	44 827	0	0	776 448
Finavia	62 351	5 018	1 343	0	3 211	361	0	72 284
HCAA	159 218	8 872	2 706	0	11 025	0	0	181 821
HungaroControl	95 853	2 732	1 793	0	4 140	0	0	104 517
IAA	121 805	7 687	2 006	2 555	6 967	0	0	141 020
LFV	207 930	7 425	602	0	0	0	0	215 956
LGS	23 076	1 585	1 874	0	1 036	0	0	27 571
LPS	51 191	1 719	1 035	0	2 767	0	0	56 712
LVNL	167 328	9 182	1 400	0	14 507	23 300	-6 767	208 950
MATS	15 130	0	0	0	934	0	0	16 064
M-NAV	10 454	751	148	0	503	0	0	11 856
MoldATSA	7 433	1 046	235	0	350	0	0	9 064
MUAC	129 060	0	0	0	0	0	9	129 069
NATA Albania	19 812	434	522	0	776	0	0	21 544
NATS (Continental)	680 199	107	8 730	0	0	795	0	689 831
NAV Portugal (Continental)	135 052	5 143	552	0	7 953	0	0	148 700
NAVIAIR	111 514	0	1 453	0	0	0	0	112 967
Oro navigacija	22 051	468	287	0	1 078	0	0	23 884
PANSA	142 872	6 936	2 394	0	6 979	690	0	159 871
ROMATSA	139 304	8 279	3 073	0	7 726	0	0	158 383
Skyguide	277 231	12 765	0	0	8 071	203	0	298 270
Slovenia Control	29 007	1 846	650	0	1 313	0	0	32 816
SMATSA	84 596	5 734	0	0	2 974	0	0	93 304
UkSATSE	249 110	1 781	2 287	0	6 158	0	0	259 336

Annex 7 - Table 0.2: Breakdown of total ANS costs (en-route, terminal and gate-to-gate), 2011

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**
Aena	388 307	104 458	93 031	42 567	5 991	634 355	181 688	35 608	28 577	18 734	1 942	266 550	569 996	140 066	121 608	61 302	7 933	900 904
ANS CR	56 105	15 707	18 102	7 601	0	97 514	16 403	3 434	3 116	1 446	0	24 399	72 509	19 140	21 218	9 047	0	121 913
ARMATS	2 122	880	348	566	0	3 916	1 794	664	334	473	0	3 265	3 915	1 543	683	1 039	0	7 181
Austro Control	110 572	19 289	14 912	2 205	0	146 978	23 219	3 732	5 629	819	0	33 399	133 791	23 021	20 541	3 024	0	180 377
Avinor (Continental)	59 216	22 462	6 531	3 430	0	91 640	76 496	19 124	4 017	1 824	0	101 461	135 713	41 586	10 548	5 254	0	193 101
Belgocontrol	72 509	9 572	10 845	3 038	524	96 489	40 312	4 444	7 164	1 815	229	53 964	112 820	14 016	18 010	4 853	754	150 453
BULATSA	40 760	7 231	9 093	7 593	0	64 678	7 335	1 044	1 253	402	0	10 035	48 095	8 276	10 347	7 995	0	74 713
Croatia Control	43 491	13 542	8 188	3 627	0	68 847	5 581	1 074	1 066	675	0	8 396	49 071	14 616	9 254	4 302	0	77 243
DCAC Cyprus	13 436	11 541	4 888	2 298	0	32 163	2 384	1 098	678	490	0	4 650	15 820	12 639	5 566	2 788	0	36 813
DFS	503 966	95 753	71 496	57 789	32 264	761 268	141 163	34 691	19 939	14 301	6 968	217 062	645 129	130 444	91 435	72 090	39 232	978 330
DHMI	118 236	76 549	26 061	33 365	0	254 211	28 131	21 218	12 810	7 818	0	69 977	146 367	97 767	38 871	41 183	0	324 188
DSNA	628 777	175 876	88 587	25 290	0	918 529	152 336	52 715	24 510	7 194	0	236 755	781 113	228 591	113 096	32 484	0	1 155 285
EANS	6 013	2 270	1 803	1 319	0	11 405	541	127	342	175	0	1 185	6 554	2 397	2 145	1 494	0	12 590
ENAV	287 050	151 156	99 505	29 506	1 757	568 974	53 580	30 121	26 082	4 748	489	115 020	340 630	181 277	125 587	34 254	2 246	683 994
Finavia	22 059	8 336	2 421	1 208	0	34 024	16 581	6 561	4 029	1 156	0	28 327	38 640	14 897	6 450	2 364	0	62 351
HCAA	103 334	21 512	6 839	3 371	0	135 055	14 602	7 441	1 266	854	0	24 163	117 936	28 952	8 105	4 225	0	159 218
HungaroControl	43 018	20 139	10 361	2 438	1 859	77 815	11 616	4 088	1 856	434	45	18 038	54 634	24 226	12 216	2 872	1 904	95 853
IAA	57 197	18 584	16 021	6 953	0	98 755	10 058	3 815	6 312	2 865	0	23 050	67 255	22 399	22 333	9 818	0	121 805
LFV	113 581	40 351	21 929	3 002	0	178 863	25 142	3 925	0	0	0	29 067	138 723	44 276	21 929	3 002	0	207 930
LGS	8 547	2 767	3 092	1 219	1 682	17 308	2 597	947	1 658	566	0	5 768	11 144	3 715	4 750	1 786	1 682	23 076
LPS	25 861	11 620	6 108	2 570	0	46 159	3 117	988	642	285	0	5 032	28 978	12 608	6 750	2 855	0	51 191
LVNL	82 090	19 968	7 577	3 801	0	113 436	39 071	9 508	3 607	1 706	0	53 892	121 161	29 476	11 184	5 507	0	167 328
MATS	5 081	4 556	1 302	505	1 483	12 927	758	1 009	195	241	0	2 202	5 839	5 565	1 496	746	1 483	15 130
M-NAV	5 986	1 171	1 653	348	0	9 158	826	187	239	43	0	1 296	6 812	1 359	1 892	391	0	10 454
MoldATSA	2 667	989	774	1 547	0	5 977	711	325	205	215	0	1 456	3 378	1 314	979	1 762	0	7 433
MUAC	104 791	12 572	10 490	1 207	0	129 060	0	0	0	0	0	0	104 791	12 572	10 490	1 207	0	129 060
NATA Albania	4 605	7 096	3 347	2 577	0	17 625	1 477	196	295	219	0	2 187	6 083	7 292	3 642	2 796	0	19 812
NATS (Continental)	278 850	84 523	74 268	78 733	4 642	521 016	107 089	42 231	4 654	2 869	2 340	159 183	385 939	126 754	78 921	81 602	6 982	680 199
NAV Portugal (Continental)	85 870	12 726	5 509	2 668	0	106 773	24 449	1 215	2 009	606	0	28 279	110 318	13 942	7 518	3 274	0	135 052
NAVIAIR	48 884	13 449	10 550	6 875	0	79 759	20 534	4 581	2 330	4 311	0	31 755	69 418	18 030	12 880	11 186	0	111 514
Oro navigacija	10 450	3 431	3 579	1 052	314	18 826	1 820	740	536	62	68	3 225	12 270	4 171	4 115	1 114	382	22 051
PANSA	84 467	15 417	9 147	6 962	0	115 993	18 878	3 929	2 211	1 862	0	26 880	103 345	19 346	11 358	8 824	0	142 872
ROMATSA	78 493	15 894	10 803	11 359	0	116 549	15 629	3 919	1 563	1 643	0	22 754	94 122	19 813	12 366	13 003	0	139 304
Skyguide	128 741	22 038	34 125	5 076	522	190 503	60 079	10 364	14 177	2 109	0	86 728	188 820	32 402	48 302	7 185	522	277 231
Slovenia Control	17 048	4 569	2 901	877	228	25 623	2 760	515	74	22	12	3 384	19 808	5 084	2 975	899	241	29 007
SMATSA	35 094	13 117	9 889	12 878	152	71 130	6 240	2 230	2 575	2 393	29	13 466	41 333	15 347	12 465	15 271	180	84 596
UkSATSE	82 845	24 054	9 154	77 344	-596	192 801	25 303	6 997	2 584	21 623	-199	56 309	108 149	31 051	11 738	98 967	-795	249 110
Total	3 760 120	1 085 165	715 228	454 765	50 822	6 066 101	1 140 298	324 805	188 533	107 000	11 924	1 772 560	4 900 418	1 409 970	903 761	561 765	62 746	7 838 660

Annex 7 - Table 0.3: Breakdown of ATM/CNS provision costs (en-route, terminal and gate-to-gate), 2011

ANSPs	ANSP BALANCE SHEET in (€'000)								
	NBV fixed assets in operation	NBV fixed assets under construction	Long-term financial assets	Current assets	**Total assets**	Capital and reserves	Long-term liabilities	Current liabilities	**Total liabilities**
Aena	704 036	178 069	133 939	195 208	1 211 252	580 383	244 473	386 396	1 211 252
ANS CR	118 634	18 456	208	64 240	201 538	174 703	13 755	13 079	201 538
ARMATS	4 948	1 797	0	3 566	10 311	7 879	339	2 093	10 312
Austro Control	189 925	35 898	29 261	93 463	348 547	66 235	207 844	74 468	348 547
Avinor (Continental)	83 858	17 846	0	0	101 705				
Belgocontrol	159 638	8 919	501	83 456	252 515	162 591	30 341	59 583	252 515
BULATSA	96 169	3 453	1 887	91 157	192 666	145 865	20 246	26 556	192 666
Croatia Control	52 590	16 739	5 441	31 522	106 291	60 110	20 510	25 671	106 291
DCAC Cyprus	23 108	7 858	0	15 513	46 479	20 297	26 182	0	46 479
DFS	708 848	36 459	92 868	841 320	1 679 495	498 055	988 314	193 126	1 679 495
DHMI	539 313	82 784	1 021	70 377	693 495	614 788	29 621	49 085	693 495
DSNA	633 196	175 115	166	287 136	1 095 613	340 478	637 107	118 028	1 095 613
EANS	9 822	7 617	0	6 217	23 656	14 493	5 984	3 179	23 656
ENAV	861 312	481 538	114 817	906 539	2 364 206	1 250 706	343 969	769 530	2 364 206
Finavia	42 838	14 066	0	17 359	74 263	36 537	25 398	12 328	74 263
HCAA	167 194	0	0	0	167 194				
HungaroControl	50 653	14 588	13 091	77 952	156 285	79 448	50 790	26 047	156 285
IAA	98 306	3 095	0	105 727	207 128	24 914	142 352	39 862	207 128
LFV	102 301	60 959	59 740	252 926	475 927	63 176	369 968	42 782	475 927
LGS	20 300	2 644	16	8 439	31 399	26 178	1 451	3 769	31 399
LPS	30 416	4 610	0	36 720	71 746	60 847	3 426	7 473	71 746
LVNL	79 419	20 316	0	51 838	151 573	-19 035	120 305	50 303	151 573
MATS	6 527	0	524	8 880	15 931	2 002	7 000	6 930	15 931
M-NAV	7 544	0	0	7 006	14 550	12 375	1 322	853	14 550
MoldATSA	5 873	2 036	63	4 490	12 462	12 195	0	267	12 462
MUAC	72 997	2 961	0	48 642	124 600	0	75 958	48 642	124 600
NATA Albania	28 982	17 415	90	21 378	67 866	40 801	23 584	3 480	67 866
NATS (Continental)	758 851	255 230	405 490	490 186	1 909 756	385 068	1 199 019	325 670	1 909 756
NAV Portugal (Continental)	51 637	13 750	60 672	157 051	283 110	83 535	136 204	63 371	283 110
NAVIAIR	118 509	41 836	11	65 889	226 245	100 667	97 426	28 151	226 245
Oro navigacija	31 609	2 548	1 158	13 238	48 554	44 528	2 295	1 731	48 554
PANSA	123 019	22 289	13 839	70 638	229 786	154 002	22 666	53 117	229 786
ROMATSA	125 157	25 377	297	134 504	285 336	208 408	55 881	21 047	285 336
Skyguide	274 247	26 505	24 465	158 297	483 514	258 532	160 561	64 421	483 514
Slovenia Control	9 089	17 596	387	9 714	36 785	4 942	20 739	11 105	36 785
SMATSA	128 119	5 778	0	34 057	167 955	89 479	57 193	21 283	167 955
UkSATSE	114 871	83 422	3 860	101 347	303 500	276 776	4 780	21 944	303 500
Total	6 633 856	1 709 568	963 813	4 565 993	13 873 231	5 881 958	5 147 004	2 575 371	13 604 333

Annex 7 - Table 0.4: Balance Sheet data at ANSP level, 2011

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	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)
Aena	1 898	265	0	2	198	55	553	395	506	30	145	4 047	1 056	1 362 779	842	1 034 197	393 697
ANS CR	194	15	12	25	98	40	118	28	263	31	68	892	91	138 993	103	158 558	27 205
ARMATS	70	0	6	7	20	23	170	0	53	22	87	458	23	33 120	47	70 500	1 300
Austro Control	275	21	63	50	19	78	107	94	92	108	0	907	116	167 968	159	240 567	63 727
Avinor (Continental)	392	74	27	35	159	0	212	30	30	31	18	1 008	144	237 112	248	402 590	74 199
Belgocontrol	221	28	6	16	0	71	186	43	164	94	67	895	83	111 695	138	194 552	39 903
BULATSA	215	49	15	22	37	46	405	8	165	127	95	1 184	102	130 356	113	146 448	14 237
Croatia Control	232	24	12	11	47	26	108	22	149	118	0	749	92	124 936	140	200 900	27 039
DCAC Cyprus	83	9	2	0	40	0	2	0	33	28	0	197	55	140 580	28	63 392	11 157
DFS	1 664	127	199	185	366	556	949	524	474	114	372	5 530	1 293	1 433 391	371	467 924	292 708
DHMI	911	35	36	34	36	184	1 354	27	1 136	462	1 012	5 227	439	685 718	472	736 320	60 403
DSNA	2 738	382	185	243	124	1 143	1 335	406	1 152	230	0	7 938	1 412	1 842 635	1 326	1 727 923	330 259
EANS	56	6	0	1	1	4	26	12	19	26	0	151	26	43 680	30	50 400	3 565
ENAV	1 412	168	50	30	23	20	125	93	537	391	119	2 968	893	1 190 036	519	726 965	203 575
Finavia	195	28	0	1	20	0	70	9	38	64	0	425	55	79 420	140	212 240	20 532
HCAA	480	110	0	0	0	48	470	88	90	0	500	1 786	215	316 050	265	389 550	55 688
HungaroControl	175	8	12	13	39	53	130	22	190	66	24	732	91	141 414	84	129 948	29 658
IAA	212	34	24	30	24	22	37	24	72	16	3	498	146	228 344	66	104 214	31 508
LFV	521	105	0	42	37	125	89	47	91	31	0	1 088	229	380 140	292	467 784	92 969
LGS	79	0	11	0	0	37	102	2	90	27	1	349	51	73 644	28	45 472	3 591
LPS	97	23	5	7	48	19	117	12	117	30	0	474	52	71 004	45	70 867	10 426
LVNL	189	31	25	22	89	146	118	73	165	7	26	891	65	103 194	124	197 656	41 023
MATS	48	0	0	0	0	0	43	0	24	19	9	143	27	49 626	21	33 726	2 559
M-NAV	70	13	0	13	8	8	46	0	42	50	24	274	41	60 024	29	42 456	2 905
MoldATSA	58	8	1	2	5	2	67	7	44	47	68	309	35	52 255	23	34 477	1 051
MUAC	240	30	35	5	54	88	130	0	62	0	8	652	240	289 297	n/appl	n/appl	45 429
NATA Albania	52	5	0	0	9	0	82	0	72	36	41	297	31	49 228	21	33 915	2 323
NATS (Continental)	1 422	282	58	38	507	320	844	230	720	15	0	4 435	928	1 156 849	493	614 826	186 950
NAV Portugal (Continental)	216	38	0	6	26	62	87	57	152	43	22	709	89	156 373	127	229 743	61 635
NAVIAIR	198	76	9	17	116	20	88	38	120	12	0	692	87	131 579	111	165 935	27 841
Oro navigacija	83	11	0	0	0	24	76	9	71	28	0	302	34	53 049	49	74 450	4 796
PANSA	422	8	34	48	87	263	341	61	318	111	0	1 693	122	136 484	299	337 512	45 596
ROMATSA	430	108	0	13	0	0	371	0	413	200	0	1 535	218	279 912	212	277 296	32 348
Skyguide	347	68	58	52	89	194	128	140	186	66	11	1 339	214	267 922	133	164 111	63 866
Slovenia Control	86	13	0	2	11	7	27	10	34	25	0	216	48	68 555	38	53 988	10 035
SMATSA	245	69	6	8	38	41	119	92	88	158	0	864	163	205 184	82	106 666	15 733
UkSATSE	984	347	0	55	104	126	2 781	39	748	221	710	6 115	567	720 090	417	577 545	29 047
Total	17 208	2 618	891	1 035	2 479	3 852	12 012	2 642	8 721	3 082	3 429	57 968	9 573	12 712 638	7 635	10 585 611	2 360 486

Annex 7 - Table 0.5: Total staff and ATCOs in OPS data, 2011

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 mov controlled by the ANSP	Composite flight-hours
Aena	2 190 000	5	18	36	0	1 774 607	959 818 500	1 388 029	1 854 896	1 879 866
ANS CR	77 100	1	4	4	0	678 054	169 405 718	232 525	165 232	276 337
ARMATS	29 800	1	2	2	2	57 173	11 176 459	14 668	20 641	20 141
Austro Control	80 400	1	6	6	0	910 560	195 824 268	287 738	365 725	384 712
Avinor (Continental)	720 000	3	17	17	28	565 333	172 416 303	330 489	654 572	504 053
Belgocontrol	39 500	1	4	5	0	572 095	56 399 688	114 337	380 572	215 248
BULATSA	146 000	1	3	5	0	539 295	142 344 581	181 981	83 307	204 071
Croatia Control	158 000	1	7	10	0	497 247	149 214 890	194 395	83 807	216 617
DCAC Cyprus	174 000	1	2	2	0	281 403	102 236 339	130 396	63 560	147 250
DFS	388 000	4	0	16	0	2 844 889	905 419 485	1 412 603	2 059 372	1 958 658
DHMI	982 000	2	29	37	0	1 003 692	682 415 111	903 599	907 286	1 144 171
DSNA	1 010 000	5	12	81	0	2 869 230	1 523 985 165	2 145 379	1 892 868	2 647 284
EANS	77 102	1	2	2	0	176 651	45 283 885	61 672	38 499	71 880
ENAV	734 000	4	23	12	11	1 594 589	748 366 728	1 074 307	1 162 015	1 382 423
Finavia	415 000	1	7	15	6	257 591	73 387 517	124 093	275 765	197 214
HCAA	538 000	1	16	18	15	655 638	357 947 224	480 362	169 431	525 288
HungaroControl	93 000	1	1	1	2	616 579	146 902 938	193 968	110 168	223 180
IAA	457 000	2	3	3	0	527 026	203 919 783	261 641	207 586	316 684
LFV	626 000	2	26	35	2	709 463	285 870 497	430 699	536 236	572 885
LGS	95 600	1	2	2	0	233 276	52 718 286	72 249	71 583	91 230
LPS	48 700	1	2	5	0	381 213	64 652 490	84 316	33 565	93 216
LVNL	52 300	1	3	4	0	527 333	69 948 840	155 347	485 525	284 087
MATS	231 000	1	2	1	1	81 382	37 422 229	52 190	33 445	61 058
M-NAV	24 800	1	2	2	1	124 467	15 635 458	19 951	11 507	23 002
MoldATSA	33 700	1	1	4	3	60 415	11 869 916	15 803	14 838	19 737
MUAC	260 000	1	0	0	0	1 607 817	462 334 175	564 053	n/appl	564 053
NATA Albania	36 000	1	1	1	1	197 505	33 012 661	41 803	22 949	47 888
NATS (Continental)	880 000	3	16	16	0	2 193 730	808 463 826	1 304 342	1 746 362	1 767 400
NAV Portugal (Continental)	665 000	1	4	6	0	448 012	215 226 774	288 109	274 051	360 775
NAVIAIR	158 000	1	7	6	1	635 932	140 520 646	212 073	345 967	303 808
Oro navigacija	74 700	1	3	4	0	199 358	34 342 664	52 480	39 890	63 057
PANSA	334 000	1	4	11	0	642 410	276 842 418	381 898	298 342	461 006
ROMATSA	254 000	1	3	16	0	487 327	224 267 697	290 377	159 999	332 802
Skyguide	73 400	2	4	7	0	1 201 673	217 256 246	332 283	490 131	462 244
Slovenia Control	19 600	1	3	3	0	272 914	34 322 936	47 156	35 308	56 518
SMATSA	145 566	1	7	7	0	555 109	174 978 316	220 284	69 789	238 789
UkSATSE	776 442	5	11	31	0	453 077	286 139 428	371 527	202 638	425 258
Total		63	257	433	73		10 092 290 085	14 469 126	15 367 427	18 543 889

Annex 7 - Table 0.6: Operational data (ANSP and State level), 2011

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 (m^2)	Number of sectors	Sum of sector-hours
Aena	Canarias	173 134	169 559	1.02	35	297 043	1 370 000	132	624	9	46 307
Aena	Barcelona	334 054	343 505	0.97	26	779 785	267 000	273	1 485	18	94 473
Aena	Madrid	550 624	559 654	0.98	33	995 517	439 000	430	1 013	26	154 078
Aena	Palma	67 600	130 246	0.52	15	261 683	51 200	99	783	7	35 728
Aena	Sevilla	160 044	159 815	1.00	26	365 341	179 000	122	574	8	41 988
ANS CR	Praha	202 660	138 993	1.46	18	672 020	77 100	91	950	8	30 980
ARMATS	Yerevan	11 801	33 120	0.36	13	53 580	29 800	23	70	1	8 760
Austro Control	Wien	207 262	167 968	1.23	17	735 501	78 200	116	900	11	39 228
Avinor (Continental)	Bodo	66 352	47 885	1.39	20	198 438	399 000	29	328	4	28 470
Avinor (Continental)	Oslo	114 768	143 820	0.80	21	322 501	115 000	87	605	15	77 380
Avinor (Continental)	Stavanger	70 036	45 408	1.54	20	214 612	205 000	28	270	3	21 000
Belgocontrol	Brussels	78 088	111 695	0.70	8	564 663	39 500	83	1 054	7	25 143
BULATSA	Sofia	168 116	130 356	1.29	19	517 597	145 000	102	1 183	7	31 690
Croatia Control	Zagreb	177 321	124 936	1.42	23	469 801	158 000	92	800	9	31 598
DCAC Cyprus	Nicosia	122 483	140 580	0.87	26	280 860	174 000	55	124	4	20 155
DFS	Rhein	435 513	346 494	1.26	19	1 411 959	200 000	316	1 079	28	112 560
DFS	Langen	387 690	468 002	0.83	19	1 252 962	108 000	417	1 689	36	141 627
DFS	Munchen	404 236	362 805	1.11	16	1 488 797	116 000	328	1 262	31	119 758
DFS	Bremen	185 165	256 090	0.72	18	623 812	174 000	232	1 050	20	94 999
DHMI	Ankara	543 255	371 756	1.46	47	698 647	776 000	238	295	11	83 220
DHMI	Istanbul	313 309	313 962	1.00	26	730 776	228 900	201	420	11	96 360
DSNA	Bordeaux	423 667	348 430	1.22	30	834 784	212 000	267	1 295	19	115 466
DSNA	Reims	220 227	281 876	0.78	17	799 719	96 400	216	1 040	14	73 839
DSNA	Paris	349 833	472 404	0.74	17	1 224 568	166 000	362	1 250	19	120 043
DSNA	Marseille	375 356	408 459	0.92	22	1 025 791	298 000	313	1 310	27	122 109
DSNA	Brest	438 191	331 466	1.32	30	868 270	400 000	254	850	18	92 281
EANS	Tallinn	56 361	43 680	1.29	20	168 225	77 102	26	269	3	10 710
ENAV	Brindisi	113 760	132 961	0.86	21	318 230	244 000	101	550	6	24 272
ENAV	Milano	183 048	321 828	0.57	18	627 372	73 300	234	593	17	58 435
ENAV	Padova	198 833	288 287	0.69	18	680 834	95 600	204	375	12	54 751
ENAV	Roma	500 348	446 960	1.12	31	970 577	502 000	353	1 600	26	91 600
Finavia	Tampere	81 050	79 420	1.02	25	194 707	415 000	55	550	5	24 820
HCAA	Athinai+Macedonia	417 378	316 050	1.32	39	635 668	538 000	215	1 000	12	59 400
HungaroControl	Budapest	173 706	141 414	1.23	18	581 740	93 000	91	700	7	20 938
IAA	Dublin	29 192	54 740	0.53	10	177 980	23 500	35	441	2	11 680
IAA	Shannon	217 582	173 604	1.25	33	397 602	449 000	111	576	9	51 374
LFV	Malmo	215 694	222 440	0.97	26	507 503	225 000	134	841	11	44 348
LFV	Stockholm	134 698	157 700	0.85	20	399 310	479 000	95	828	11	46 720
LGS	Riga	72 197	73 644	0.98	18	233 251	95 600	51	169	3	18 220
LPS	Bratislava	79 125	71 004	1.11	13	367 181	48 700	52	335	5	13 867
LVNL	Amsterdam	74 733	103 194	0.72	9	527 333	52 300	65	1 800	5	29 493
MATS	Malta	45 460	49 626	0.92	34	80 923	231 000	27	121	2	11 680
M-NAV	Skopje	18 480	60 024	0.31	9	124 045	24 800	41	202	3	9 476
MoldATSA	Chisinau	14 007	52 255	0.27	14	59 159	33 700	35	144	2	17 520
MUAC	Maastricht	564 053	289 297	1.95	21	1 607 817	260 000	240	1 050	19	66 247
NATA Albania	Tirana	41 803	49 228	0.85	13	197 505	36 000	31	36	3	21 370
NATS (Continental)	Prestwick	352 230	322 365	1.09	24	894 255	631 000	259	918	24	108 563
NATS (Continental)	London AC	508 439	468 110	1.09	17	1 813 767	285 000	376	2 000	19	79 799
NATS (Continental)	London TC	268 501	366 374	0.73	13	1 248 089	40 600	294	766	30	175 158
NAV Portugal (Continental)	Lisboa	247 439	156 373	1.58	34	431 992	665 000	89	663	7	54 791
NAVIAIR	Kobenhavn	156 803	131 579	1.19	17	538 885	158 000	87	600	7	31 208
Oro Navigacija	Vilnius	46 622	53 049	0.88	14	194 582	74 700	34	336	3	18 624
PANSA	Warszawa	306 746	136 484	2.25	30	613 199	334 000	122	1 300	8	32 887
ROMATSA	Bucuresti	270 836	279 912	0.97	33	486 446	255 000	218	1 391	9	75 807
Skyguide	Geneva	115 031	134 509	0.86	11	656 443	35 300	107	1 113	9	31 240
Skyguide	Zurich	135 510	133 413	1.02	10	779 762	38 100	107	960	10	40 449
Slovenia Control	Ljubljana	45 069	68 555	0.66	10	270 299	19 900	48	200	4	16 015
SMATSA	Beograd	207 379	205 184	1.01	23	548 146	145 566	163	744	8	42 520
UkSATSE	Kyiv	106 857	241 300	0.44	29	222 080	185 000	190	883	11	96 360
UkSATSE	Dnipropetrovs'k	60 051	116 840	0.51	24	147 104	167 000	92	415	5	43 800
UkSATSE	Simferopol	94 231	180 340	0.52	28	198 536	209 000	142	358	7	61 320
UkSATSE	L'viv	72 944	95 250	0.77	25	176 088	133 000	75	202	5	43 800
UkSATSE	Odesa	28 423	86 360	0.33	18	94 799	82 200	68	235	5	43 800
Total		12 835 403	12 712 638	1.01		35 860 461	13 957 068	9 573		705	3 542 301

Annex 7 - Table 0.7: Operational data at ACC level, 2011

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ANNEX 8 – FOCUS ON ANSPs INDIVIDUAL COST-EFFECTIVENESS PERFORMANCE

This Annex comprises two pages for each ANSP. The first page examines the historical development of the key performance indicators defined in Chapter 4. The second summarises the projections and plans provided by each ANSP and provides some insights on ANSPs asset structure and on the main capital investment projects that are planned for the next five years.

To facilitate the reading of this section, the table below displays the page number of the historical and forward-looking analysis of ANSPs cost-effectiveness performance.

Aena (Spain) – Cost-effectiveness KPIs (€2011)

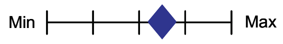
Contextual economic information

Exchange rate: Spain is within the EURO Zone

Aena represents 11.5% of European system gate-to-gate ATM/CNS provision costs

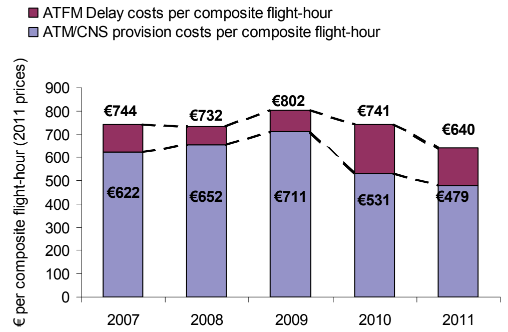
Operational conditions

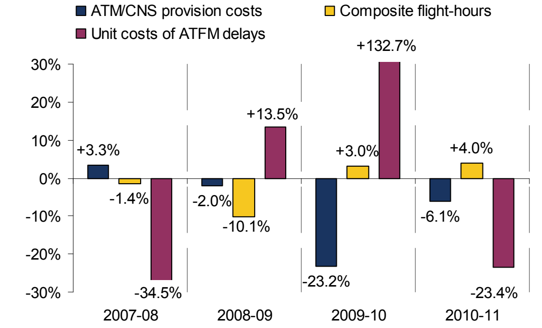
Aggregated complexity score:



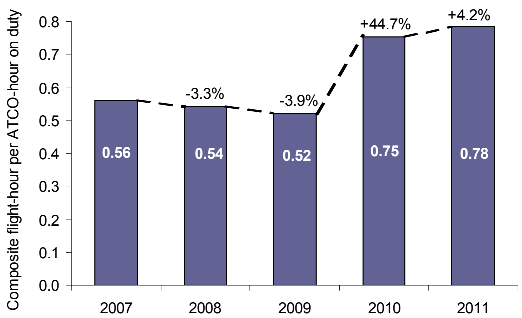
Seasonal traffic variability:

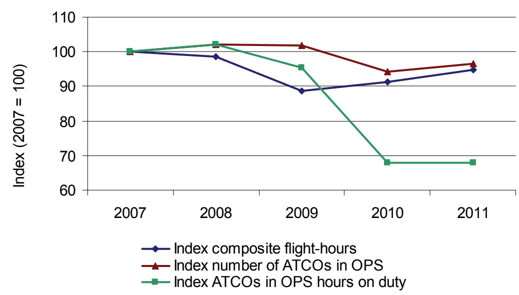
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



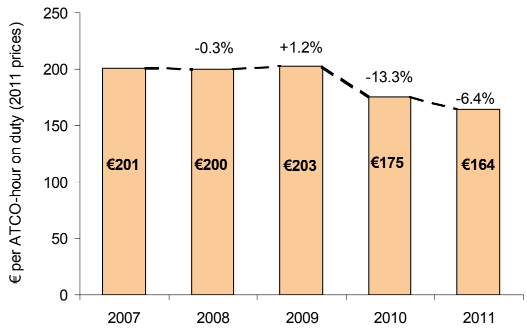


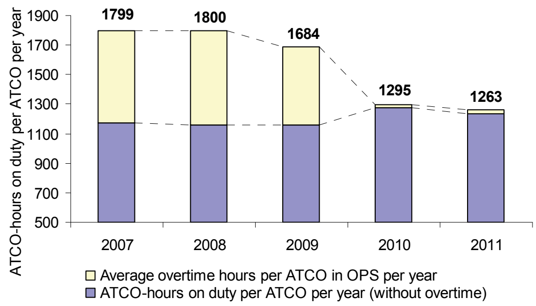
Trend in gate-to-gate ATCO-hour productivity



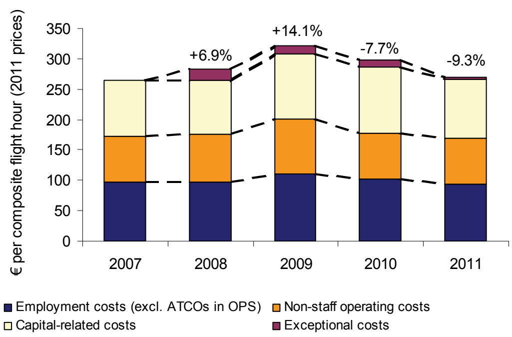


Trend in gate-to-gate employment costs per ATCO-hour

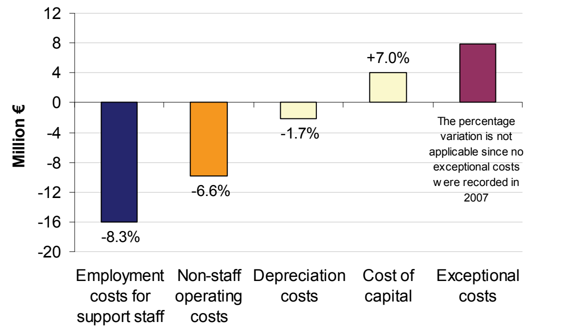




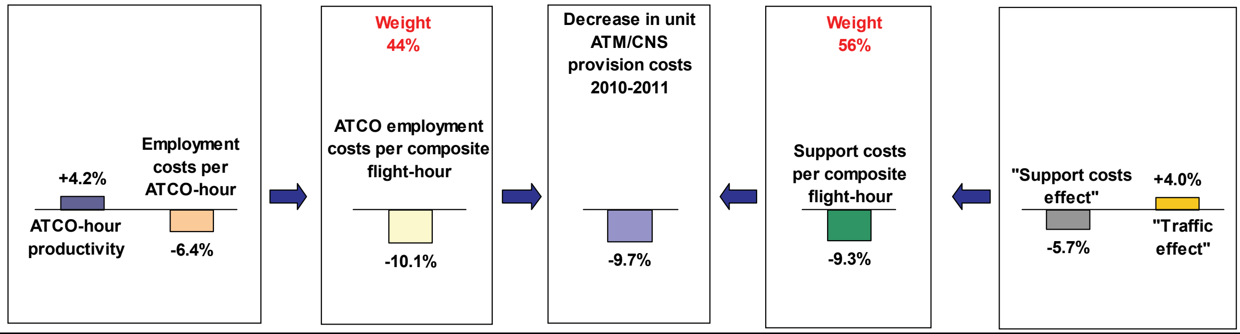
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

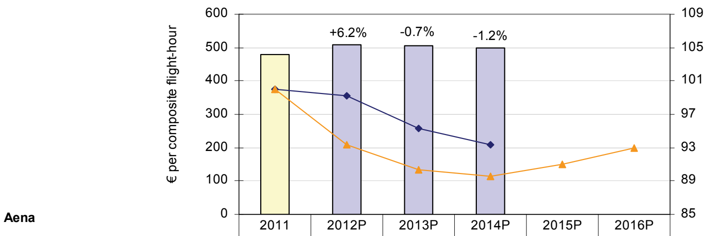


Changes in financial cost-effectiveness (2010-2011)

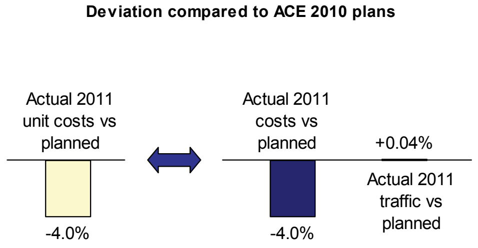


Aena (Spain) – (€2011)

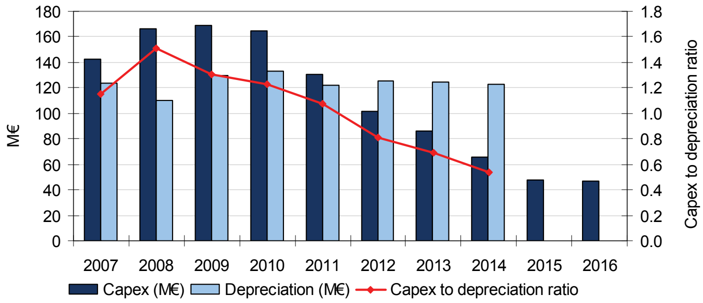
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

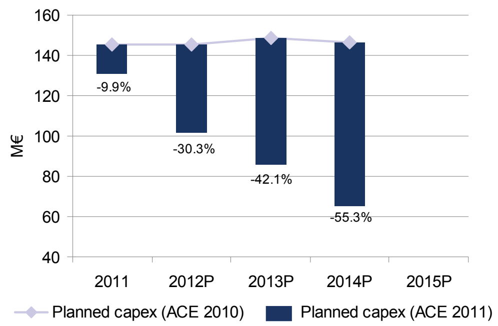


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	479	509	506	499		
Gate-to-gate costs (index)	100	99	95	93		
Composite flight-hours (index)	100	93	90	90	91	93



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)*
						2006	All ACCs	All ACCs	All ACCs	
						2007				
						2008				
						2009				Canarias, Palma
						2010	All ACCs	All ACCs	All ACCs	Barcelona
						2011				Madrid, Sevilla
						2012	All ACCs	All ACCs	All ACCs	
						2013				
€23.2M	€6.6M		€4.3M			2014	All ACCs	All ACCs	All ACCs	Canarias
						2015				Madrid
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	iTEC (evolution of flight plan and interoperability)*	ATM	10.6	2012	2016
2	VoIP (Voice over IP)	ATM	7.3	2012	2016
3	8.33 below FL 195	COM	6.6	2012	2016
4	ATM Information System	ATM	5.4	2012	2016
5	Surveillance Evolution en.route/TMA	SUR	4.3	2012	2016

*It should be noted that the project #1 is part of a larger ATM modernisation investment plan whose total capex is much higher than the figure provided in the table above (€10.6M).

ANS CR (Czech Republic) – Cost-effectiveness KPIs (€2011)

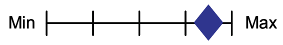
Contextual economic information

Exchange rate: 1 EUR = 24.550 CZK

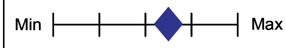
ANS CR represents 1.6% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

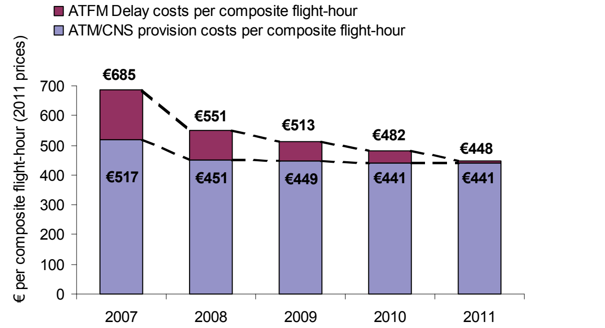
Aggregated complexity score:

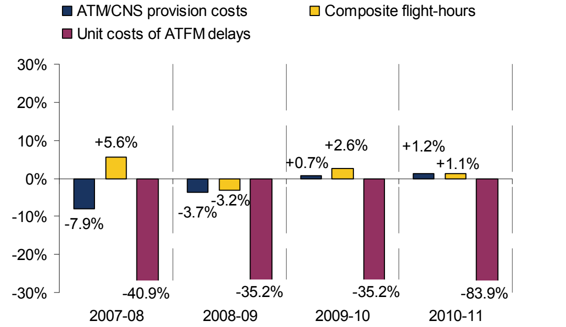


Seasonal traffic variability:

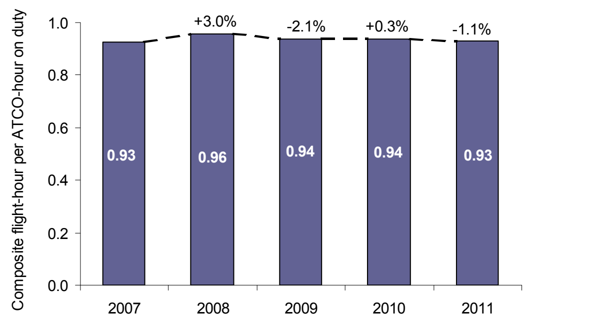


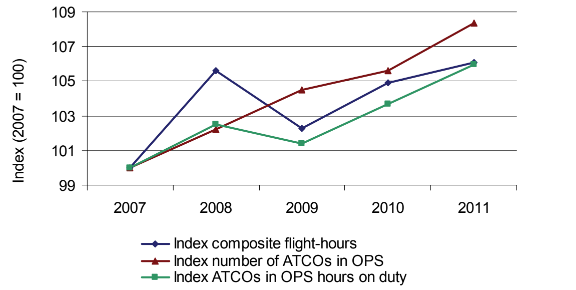
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



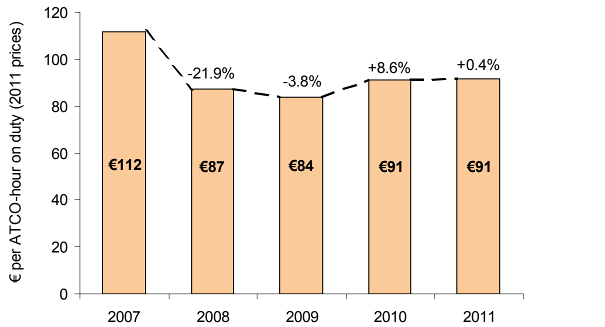


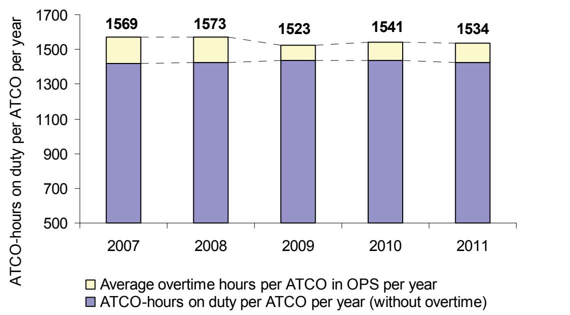
Trend in gate-to-gate ATCO-hour productivity



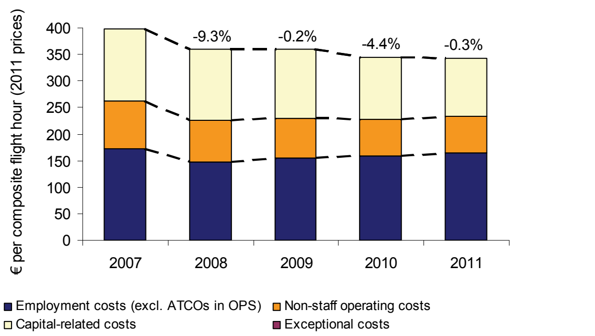


Trend in gate-to-gate employment costs per ATCO-hour

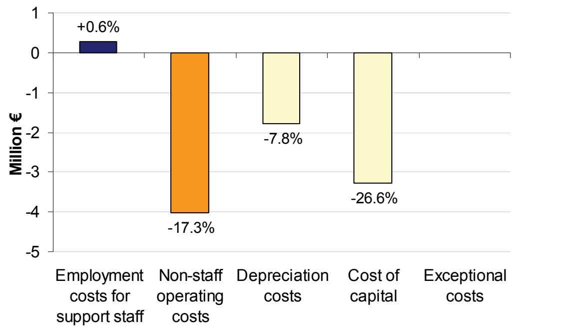




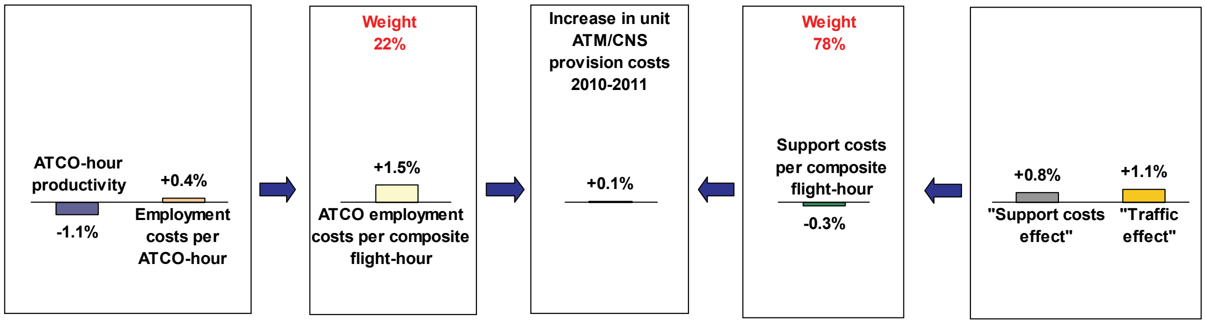
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

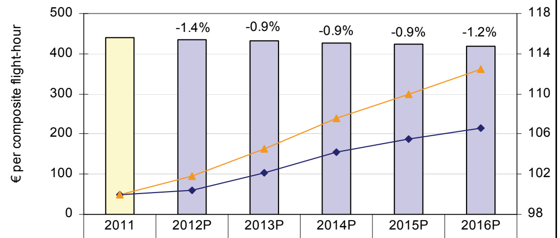


Changes in financial cost-effectiveness (2010-2011)

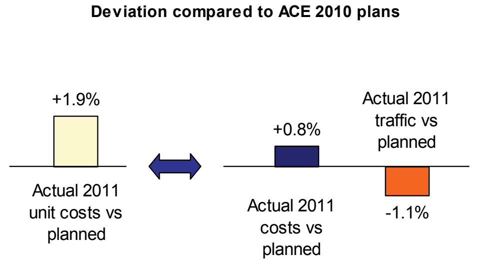


ANS CR (Czech Republic) – (€2011)

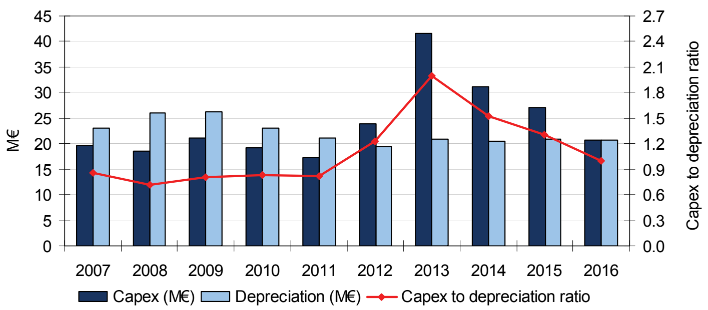
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

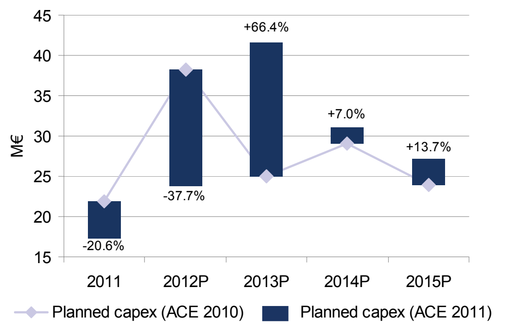


ANS CR	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	441	435	431	427	423	418
Gate-to-gate costs (index)	100	100	102	104	105	107
Composite flight-hours (index)	100	102	105	108	110	112

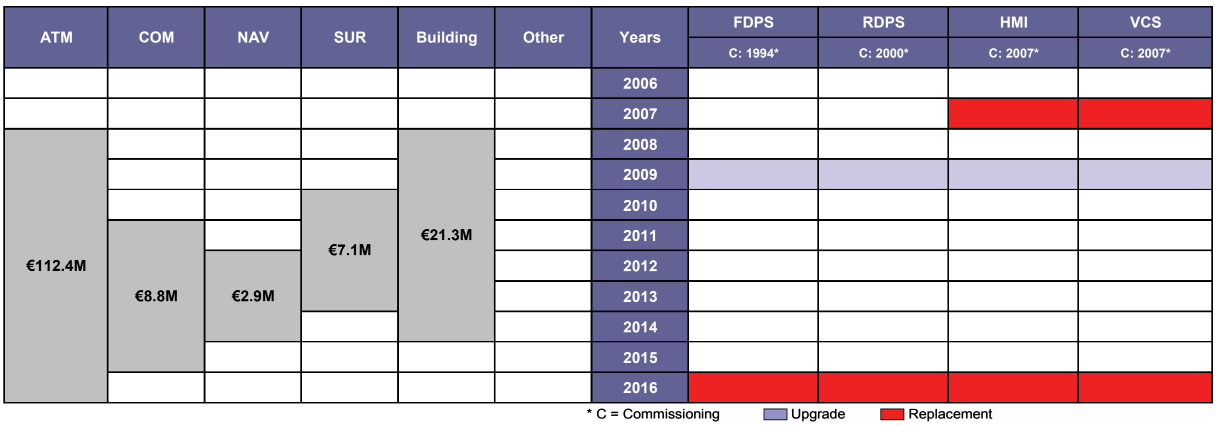


Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements



Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Replacement of RDP and FDP systems in Praha ACC (Neopteryx)	ATM	53.0	2011	2016
2	Upgrade of RDP and FDP systems	ATM	38.0	2010	2010
3	"TB 2007" Project involving the complete renovation of the "Technical Block Building" at Prague airport	Building	13.5	2008	2011
4	Replacement of radio communication equipments	COM	5.7	2012	2014
5	Re-construction of the training centre	Building	3.7	2010	2013

ARMATS (Armenia) – Cost-effectiveness KPIs (€2011)

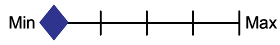
Contextual economic information

Exchange rate: 1 EURO = 518.721 AMD

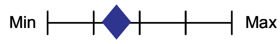
ARMATS represents 0.1% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

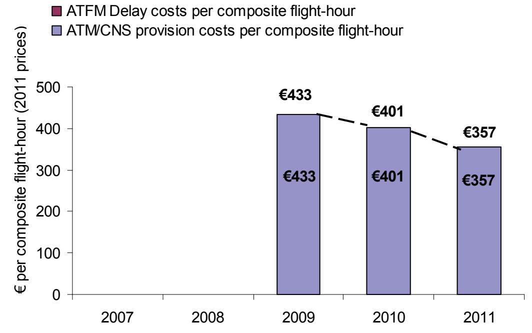
Aggregated complexity score:

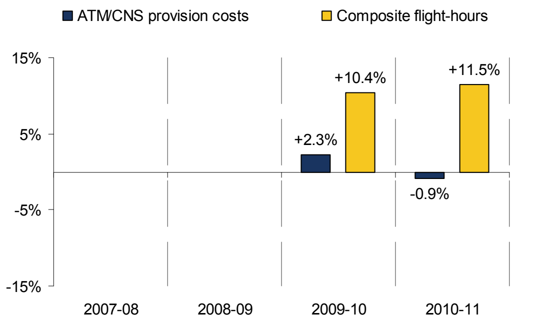


Seasonal traffic variability:

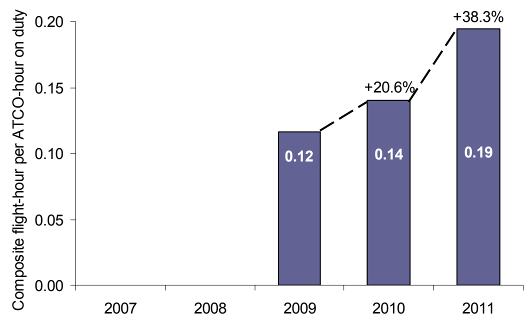


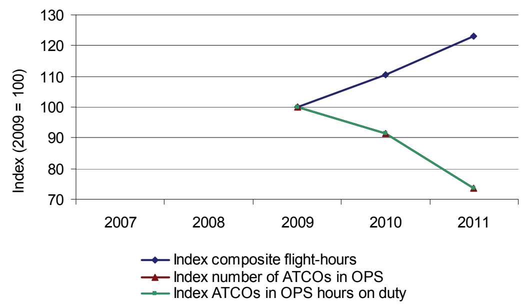
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



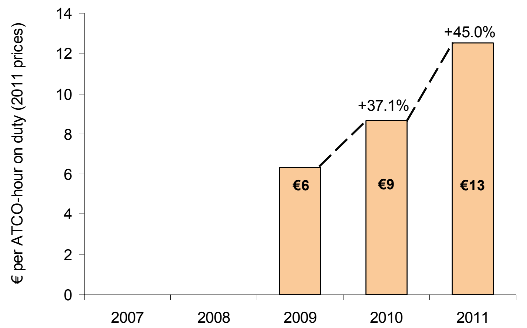


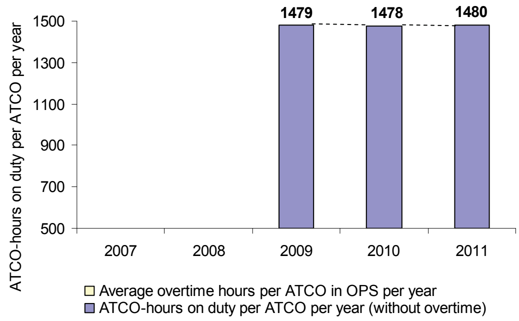
Trend in gate-to-gate ATCO-hour productivity



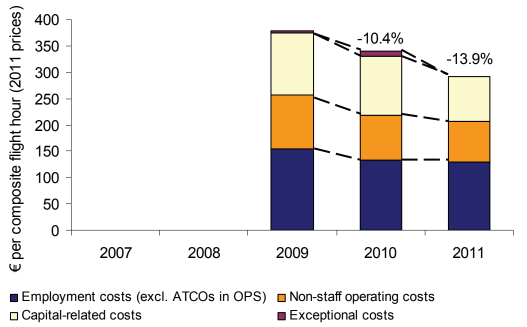


Trend in gate-to-gate employment costs per ATCO-hour

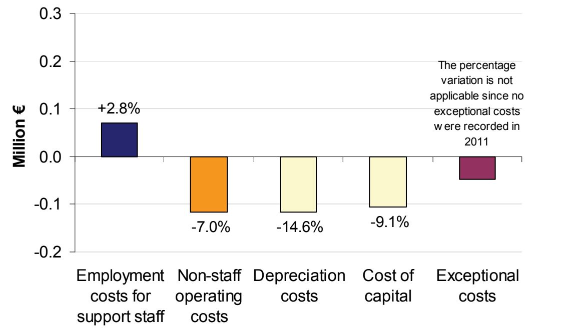




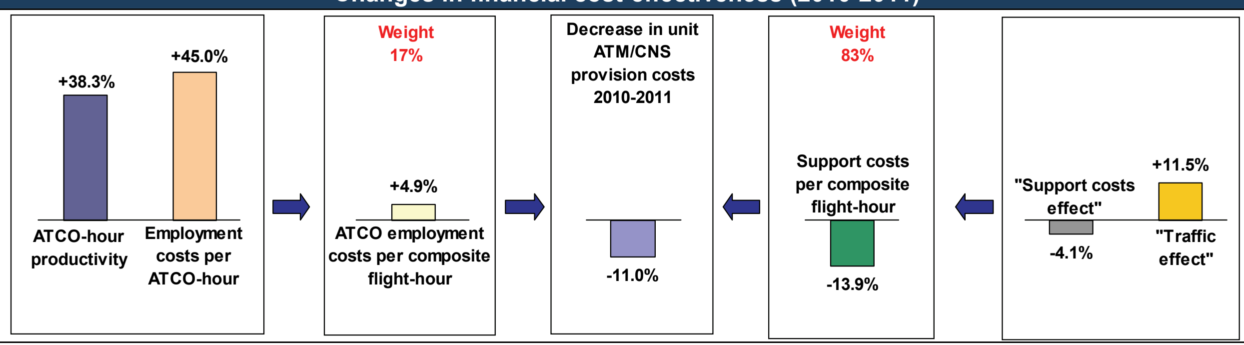
Trend in support costs per composite flight-hour



Changes in components of support costs (2009-2011)

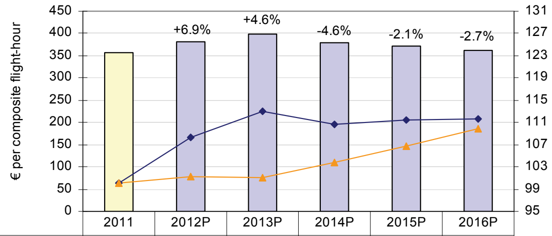


Changes in financial cost-effectiveness (2010-2011)



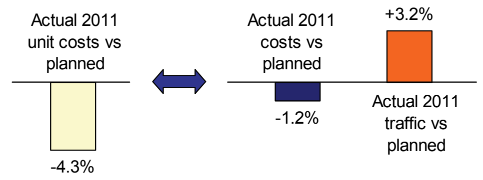
ARMATS (Armenia) – (€2011)

Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

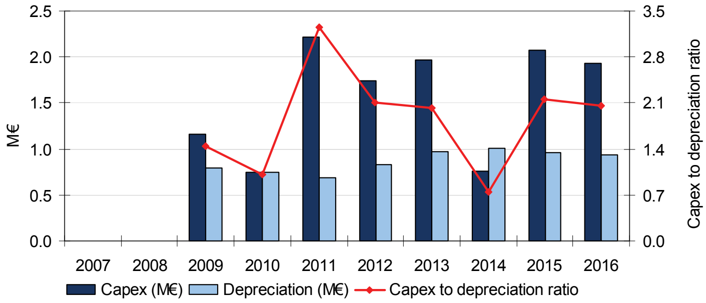


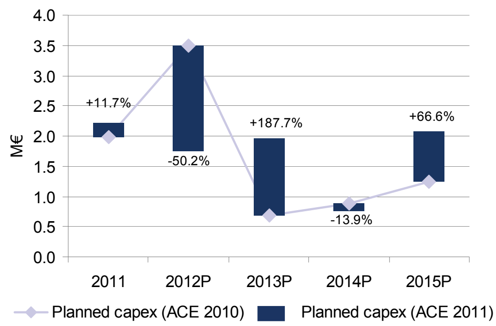
	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	357	381	399	380	372	363
Gate-to-gate costs (index)	100	108	113	111	112	112
Composite flight-hours (index)	100	101	101	104	107	110

Deviation compared to ACE 2010 plans



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*
						2006				
						2007				
						2008				
						2009				
						2010				
			€4.3M (2011-2017)			2011				
€3.2M	€0.9M	€1.4M				2012				
						2013	(2013-2014)	(2013-2015)	(2013-2016)	(2013-2017)
						2014				
						2015				
						2016				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Modernisation of ATC centre / ATC automated system, VCSS	ATM	2.3	2012	2013
2	Modernisation of secondary en-route radar TRLK-11	SUR	1.7	2011	2012
3	Acquisition of a monopulse radar	SUR	1.6	2016	2017
4	Replacement of the en-route radar antenna	SUR	1.0	2015	2016
5	New DVOR/DME for airport "Zvartnots"	NAV	0.8	2015	2015

Austro Control (Austria) – Cost-effectiveness KPIs (€2011)

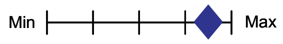
Contextual economic information

Exchange rate: Austria is within the EURO Zone

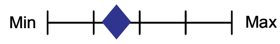
Austro Control represents 2.3% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

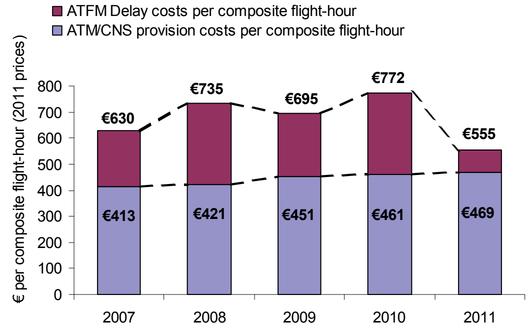
Aggregated complexity score:

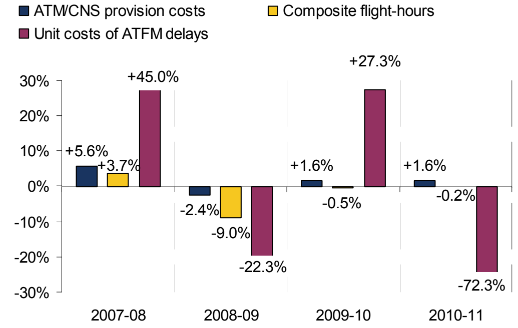


Seasonal traffic variability:

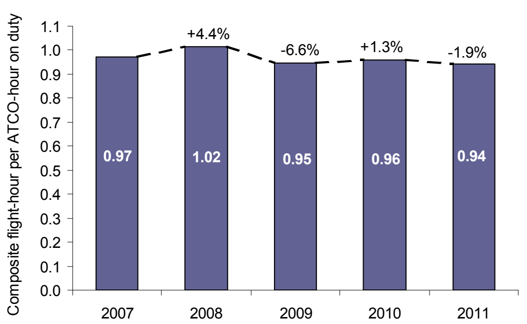


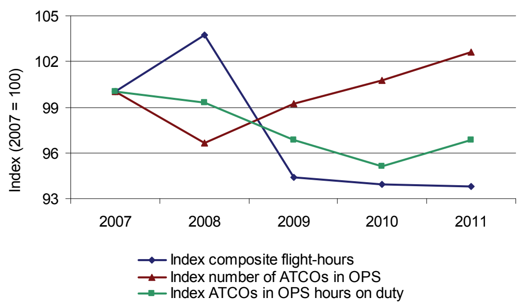
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



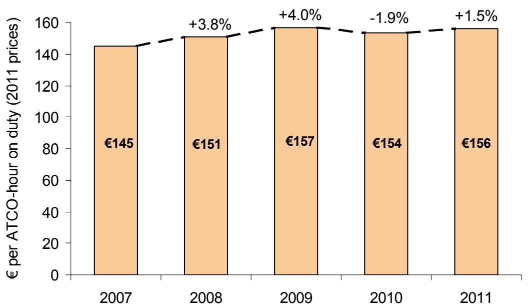


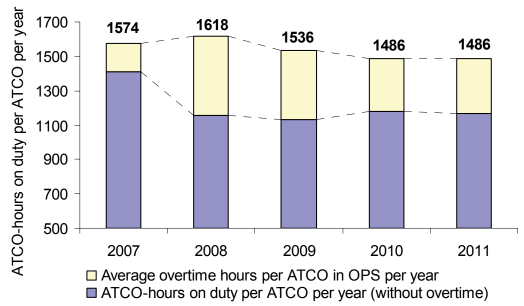
Trend in gate-to-gate ATCO-hour productivity



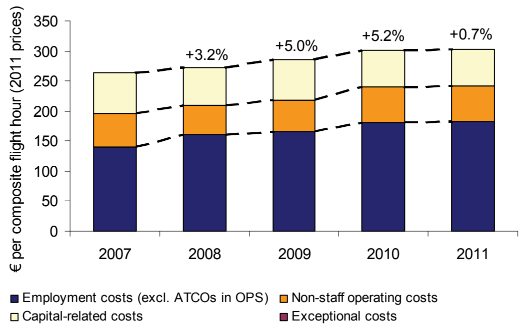


Trend in gate-to-gate employment costs per ATCO-hour

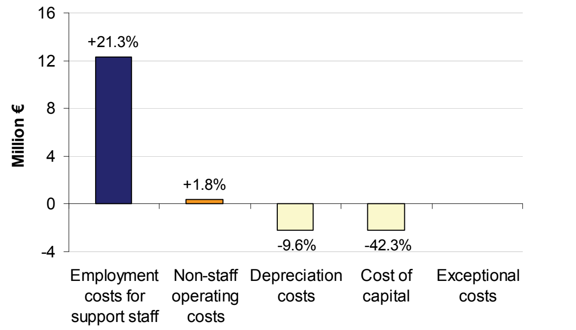




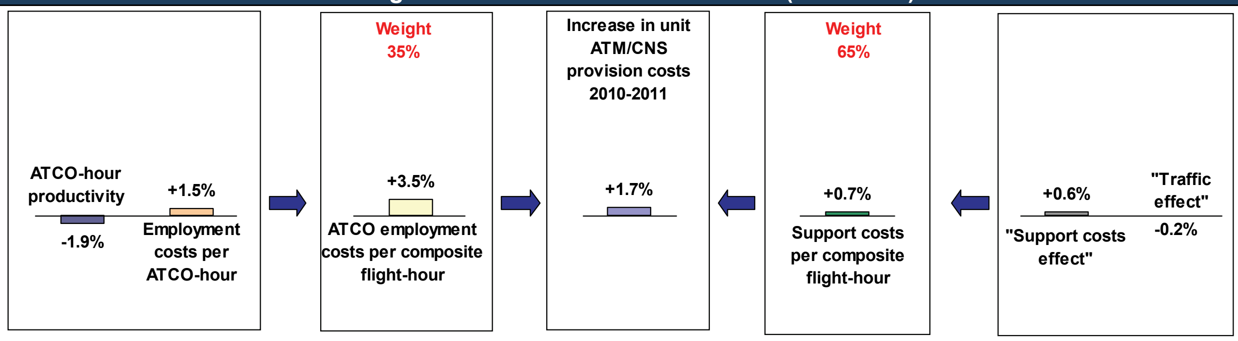
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

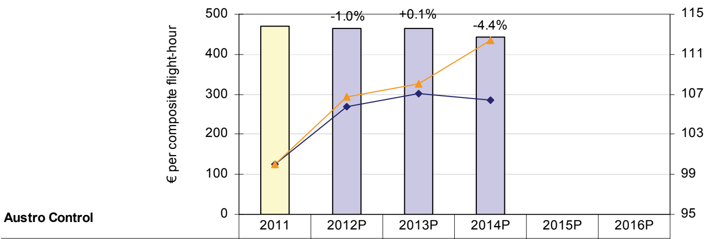


Changes in financial cost-effectiveness (2010-2011)

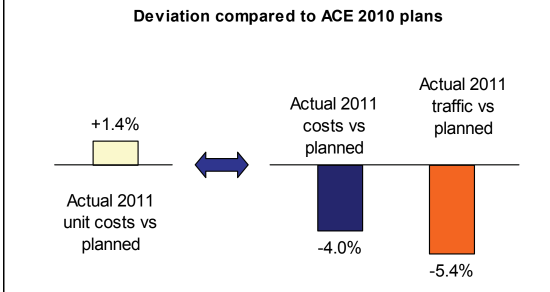


Austro Control (Austria) – (€2011)

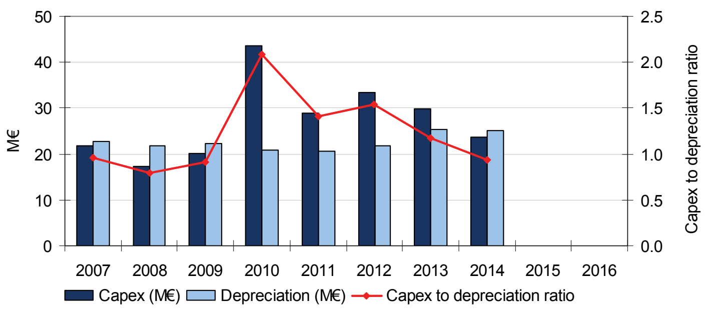
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

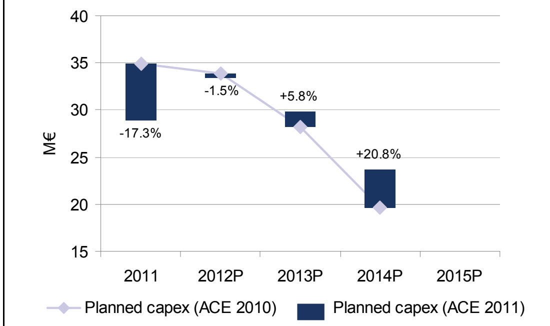


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	469	464	465	444		
Gate-to-gate costs (index)	100	106	107	106		
Composite flight-hours (index)	100	107	108	112		



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: 1986*	C: 1986*	C: 1986*	C: 1996*
						2006				
						2007				
						2008				
						2009				
						2010				
						2011				
				€13.6M		2012				
€36.1M		€5.2M	€10.9M		€108.4M	2013				
						2014				
						2015				
						2016				

* C = Commissioning　Upgrade　Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Commissioning of the ATM System New Generation	ATM	36.1	2011	2015
2	Construction of the new tower in Salzburg (LOWS) airport	Building	13.6	2011	2013
3	Expenditures in Surveillance infrastructure	SUR	6.7	2011	2015
4	Expenditures in Navigation	NAV	5.2	2011	2015
5	Procurement of MLAT Austria	SUR	4.2	2011	2013
6	Other expenditures	Other	108.4	2011	2015

Avinor Continental (Norway) – Cost-effectiveness KPIs (€2011)

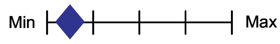
Contextual economic information

Exchange rate: 1 EUR = 7.793 NOK

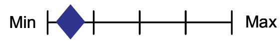
Avinor Continental represents 2.5% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

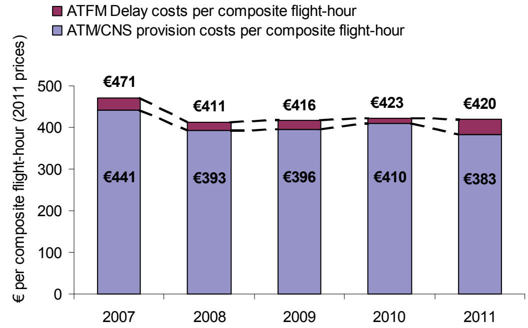
Aggregated complexity score:

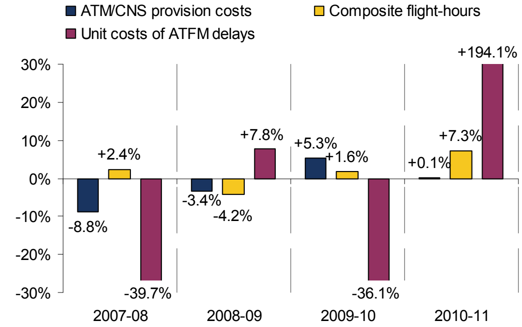


Seasonal traffic variability:

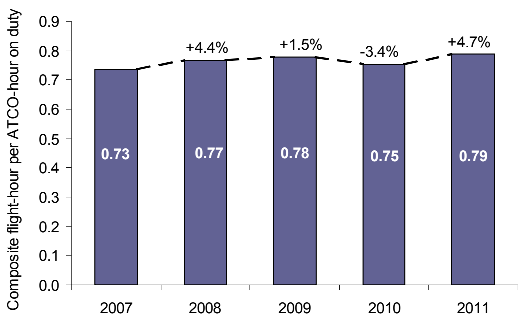


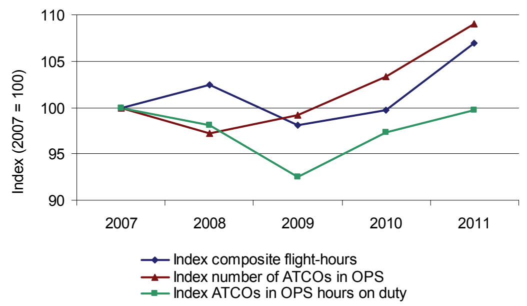
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



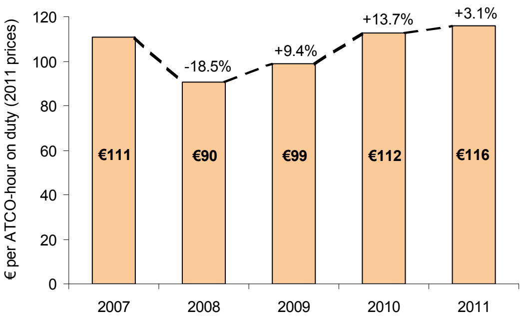


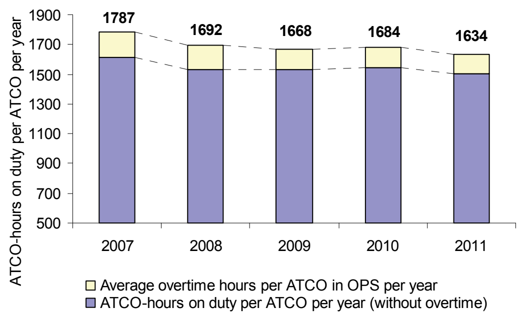
Trend in gate-to-gate ATCO-hour productivity



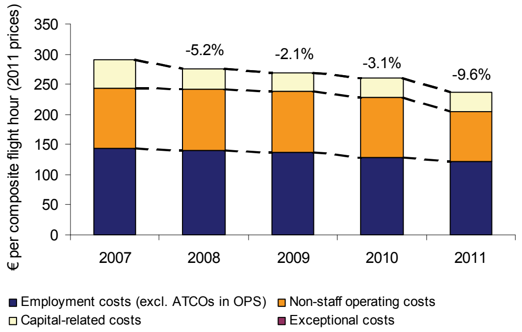


Trend in gate-to-gate employment costs per ATCO-hour

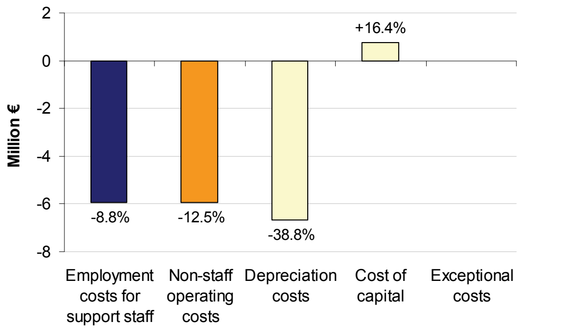




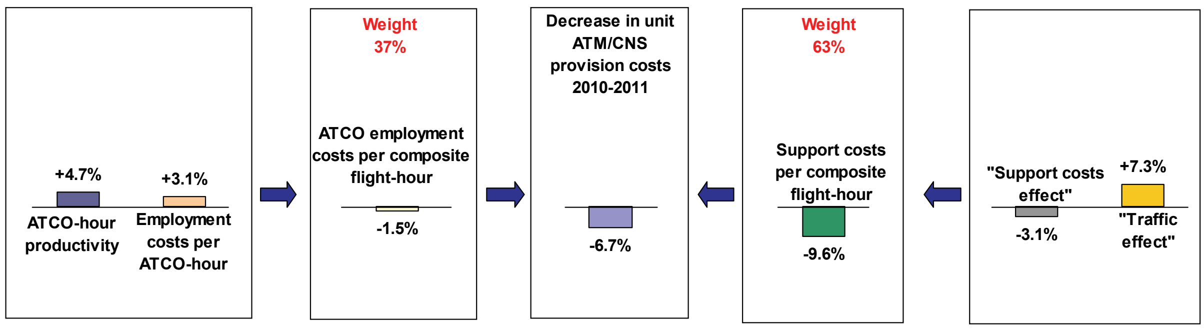
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

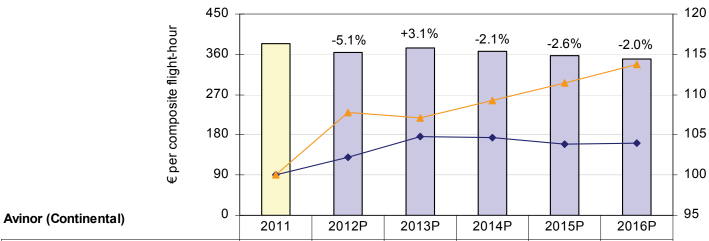


Changes in financial cost-effectiveness (2010-2011)

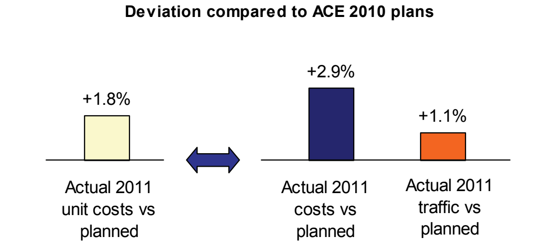


Avinor Continental (Norway) – (€2011)

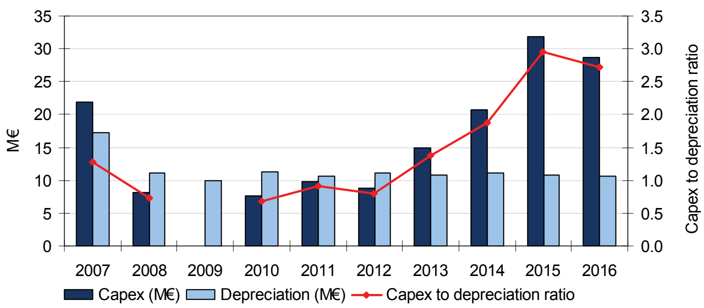
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

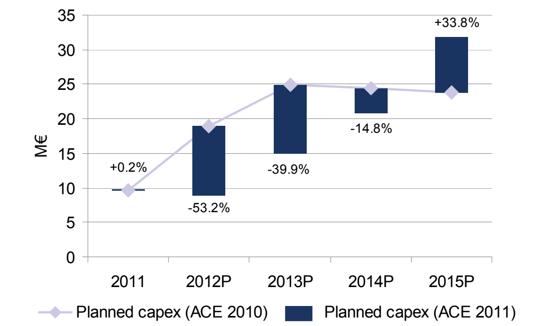


Avinor (Continental)	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	383	364	375	367	357	350
Gate-to-gate costs (index)	100	102	105	105	104	104
Composite flight-hours (index)	100	108	107	109	111	114



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: 1996 (Oslo) 2004 (Stav.) 2008 (Bodo)*	C: 1996 (Oslo) 2004 (Stav.) 2008 (Bodo)*		C: 2007 (Bodo) 2009 (Oslo)*
						2006				
						2007				Bodo
						2008	Bodo	Bodo		
						2009	Oslo	Oslo		Oslo
					€1.1M	2010				
			€44.4M			2011				
€114.6M						2012	Stavanger	Stavanger		Oslo
						2013				Bodo
						2014				
						2015				
						2016				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Replacement of ATM systems	ATM	80.5	2012	2016
2	NORAP (MSSR and PSR radars)	SUR	36.2	2009	2012
3	ASAP (Advanced Sectorisation and Automation Project, Oslo) project, including OASE (Oslo ATCC System Enhancement) project	ATM	23.0	2009	2011
4	SNAP (Southern Norway Airspace Project) project	ATM	11.1	2010	2014
5	BOAS - Surveillance and flight plan data processing system for Oceanic operations	SUR	4.5	2011	2013

Belgocontrol (Belgium) – Cost-effectiveness KPIs (€2011)

Contextual economic information

Exchange rate: Belgium is within the EURO Zone

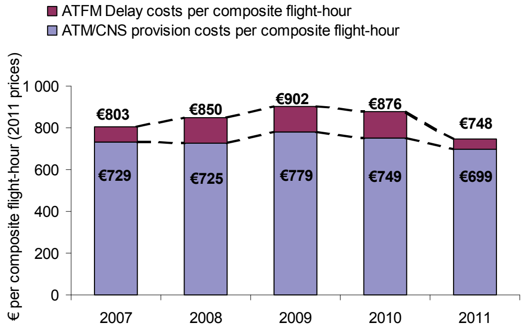
Belgocontrol represents 1.9% of European system gate-to-gate ATM/CNS provision costs

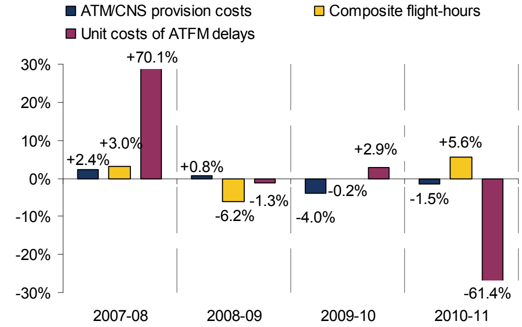
Operational conditions

Aggregated complexity score: Min Max

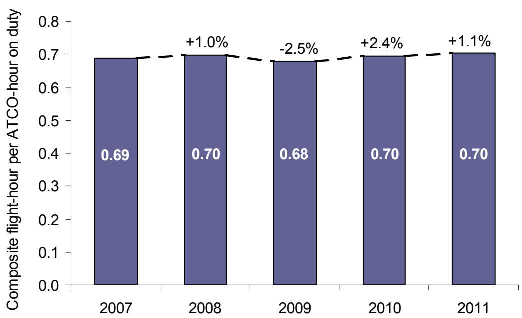
Seasonal traffic variability: Min Max

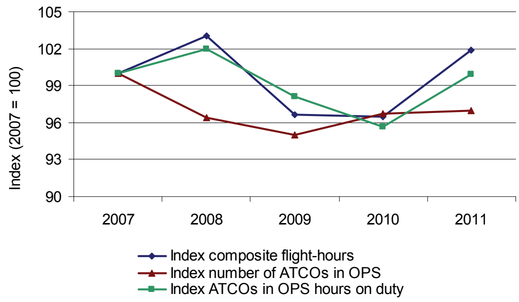
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



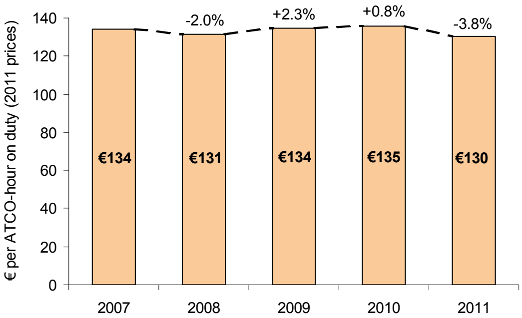


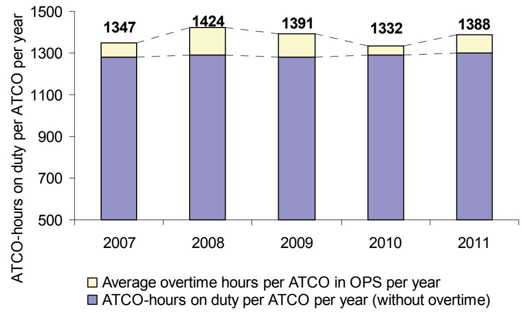
Trend in gate-to-gate ATCO-hour productivity



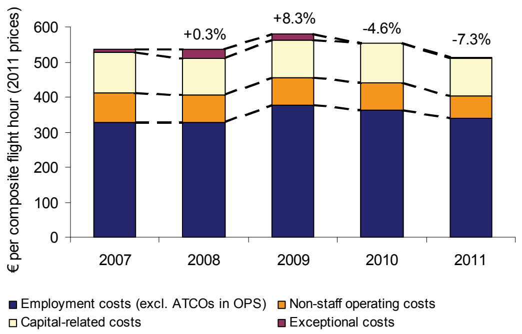


Trend in gate-to-gate employment costs per ATCO-hour

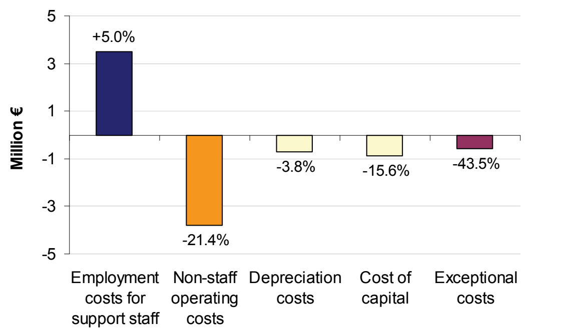




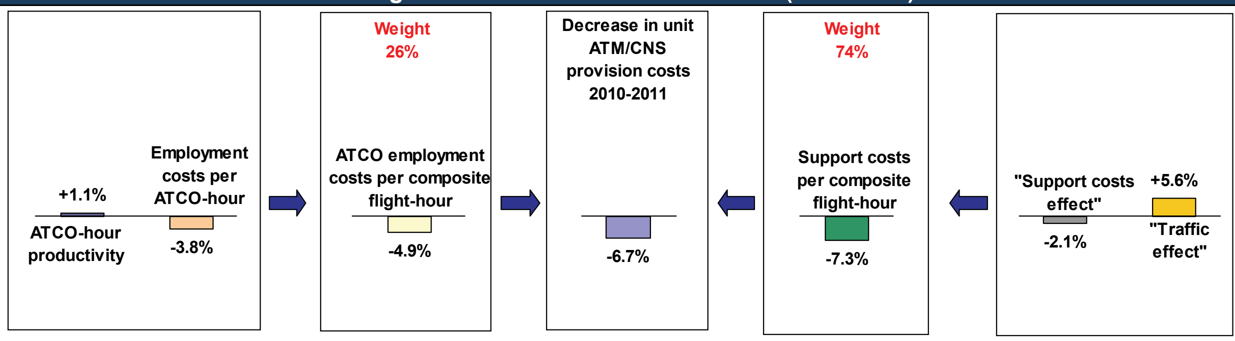
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

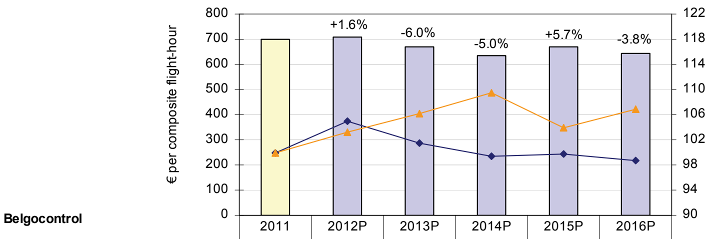


Changes in financial cost-effectiveness (2010-2011)

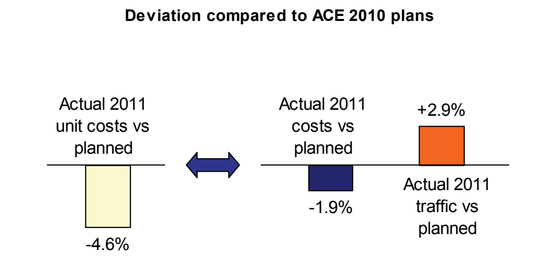


Belgocontrol (Belgium) – (€2011)

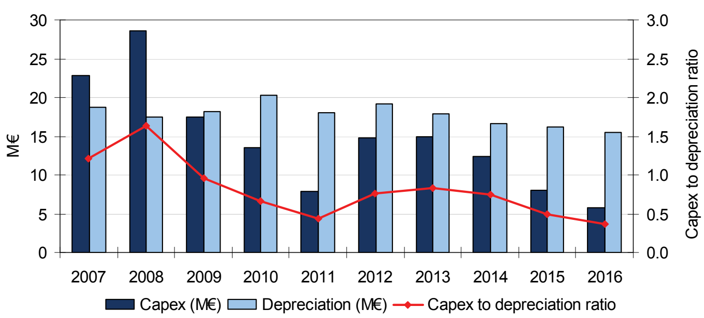
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

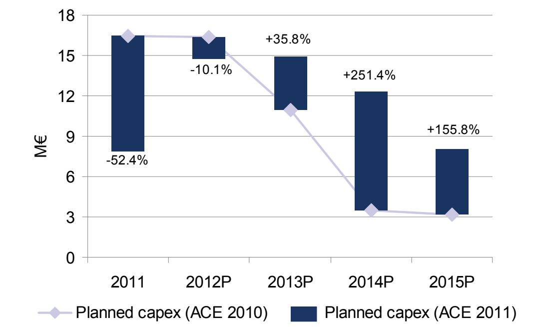


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	699	710	668	634	671	645
Gate-to-gate costs (index)	100	105	102	99	100	99
Composite flight-hours (index)	100	103	106	110	104	107



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: 2009*	RDPS C: 2003*	HMI C: 2009*	VCS C: 2008-2009*
						2006				
						2007				
						2008				(2008-2009)
						2009	Replacement	Upgrade	Replacement	(2008-2009)
		€11.1M	€19.1M			2010				
€6.2M	€2.4M	€11.1M	€19.1M			2011				
€6.2M	€2.4M	€11.1M	€19.1M			2012				
€6.2M	€2.4M	€11.1M	€19.1M			2013				
€6.2M	€2.4M	€11.1M				2014				
€6.2M		€11.1M				2015				
€6.2M		€11.1M				2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Replacement and overhaul of VOR and DME equipments	NAV	8.0	2010	2016
2	Purchase of PSR/Mode S radars	SUR	7.8	2010	2013
3	Request for changes in CANAC 2	ATM	5.8	2011	2013
4	Replacement and upgrade of approach radars at Charleroi (EBCI) airport	SUR	5.6	2010	2013
5	Replacement and upgrade of approach radars at Ostende (EBOS) airport	SUR	5.4	2010	2012

BULATSA (Bulgaria) – Cost-effectiveness KPIs (€2011)

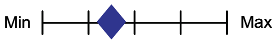
Contextual economic information

Exchange rate: 1 EUR = 1.955 BGN

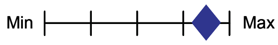
BULATSA represents 1.0% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

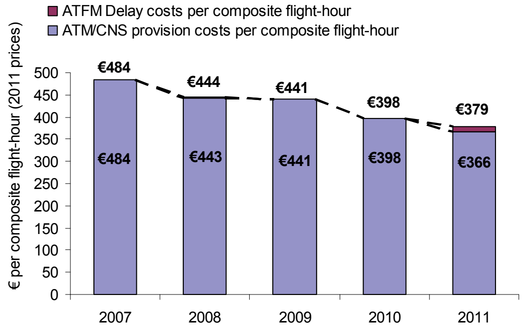
Aggregated complexity score:

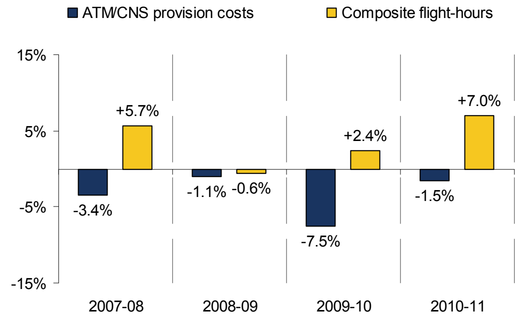


Seasonal traffic variability:

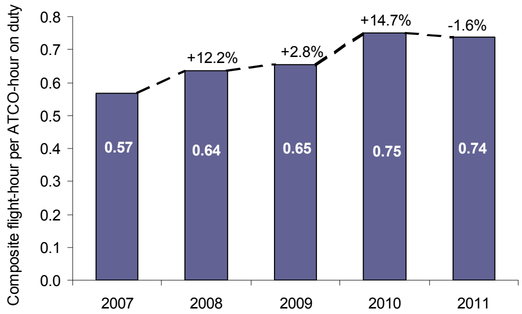


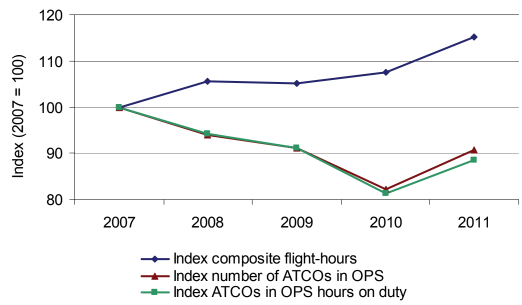
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



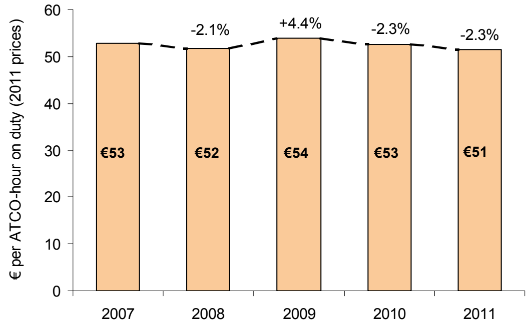


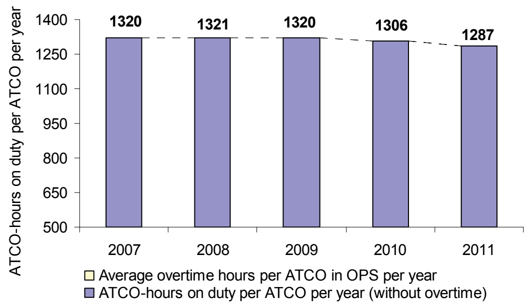
Trend in gate-to-gate ATCO-hour productivity



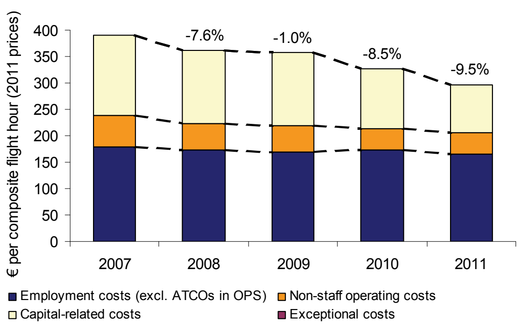


Trend in gate-to-gate employment costs per ATCO-hour

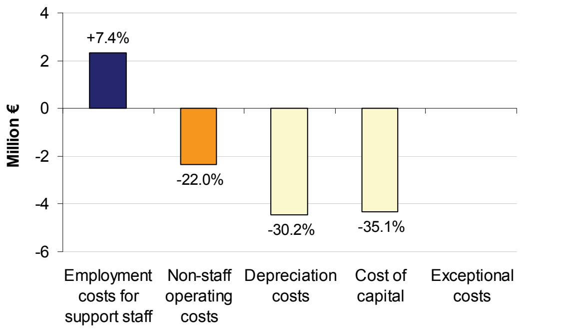




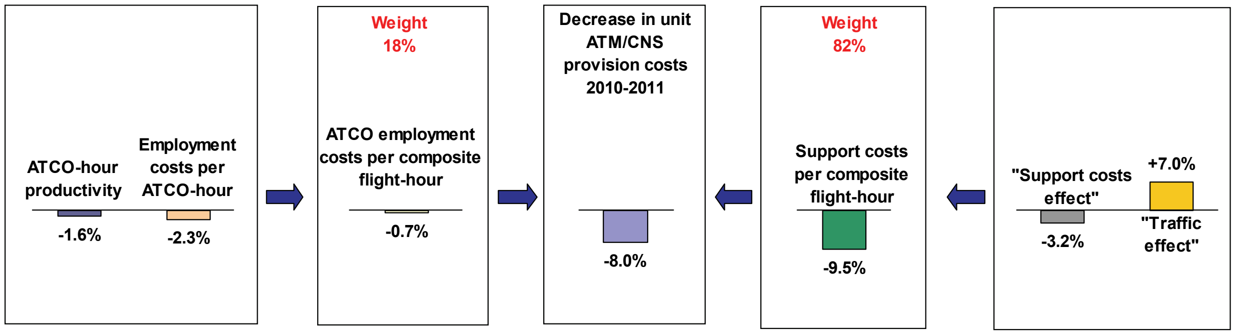
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

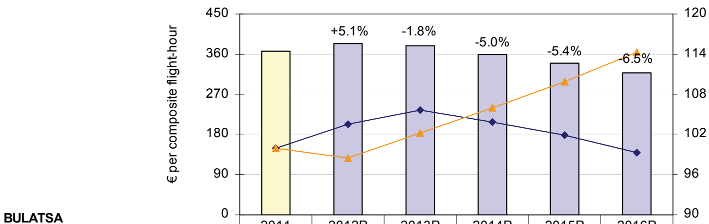


Changes in financial cost-effectiveness (2010-2011)

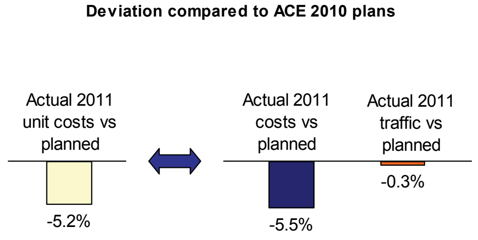


BULATSA (Bulgaria) – (€2011)

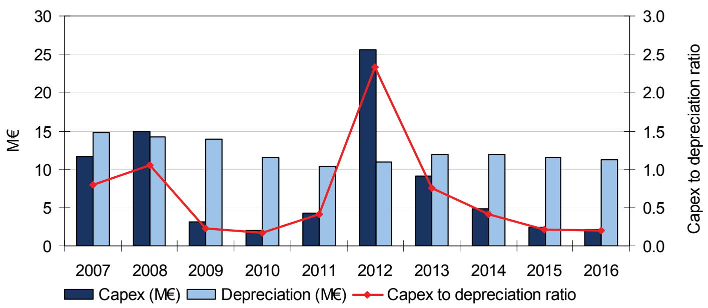
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

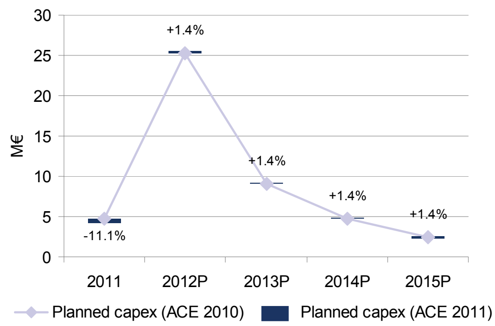


BULATSA	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	366	385	378	359	340	318
Gate-to-gate costs (index)	100	103	106	104	102	99
Composite flight-hours (index)	100	98	102	106	110	114



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: 2008*	RDPS C: 2008*	HMI C: 2008*	VCS C: 2003*
						2006				
						2007				
						2008				
						2009				
						2010				
			€19.6M			2011				
€8.7M	€6.1M	€6.0M		€9.4M		2012				
						2013				
						2014				
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	New en-route PSR and MSSRs	SUR	10.2	2011	2012
2	Extension and upgrade of the SACTAS system	ATM	8.7	2009	2015
3	New tower at Sofia airport and its adjacent structure	Building	8.1	2009	2013
4	New DMEs-VORs	NAV	6.0	2011	2014
5	New TMA PSR and MSSR at Sofia Airport	SUR	4.1	2011	2012

Croatia Control (Croatia) – Cost-effectiveness KPIs (€2011)

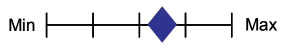
Contextual economic information

Exchange rate: 1 EUR = 7.435 HRK

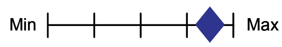
Croatia Control represents 1.0% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

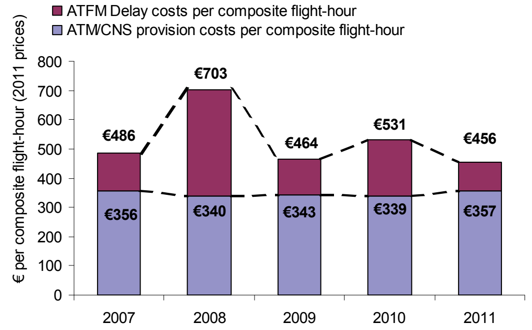
Aggregated complexity score:

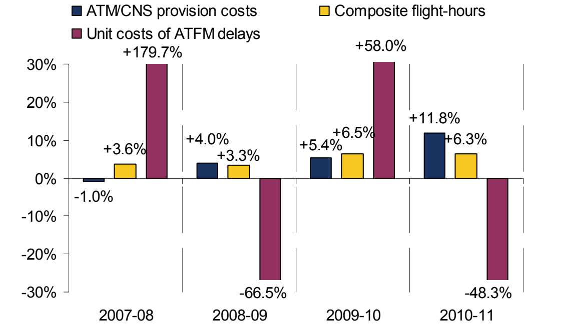


Seasonal traffic variability:

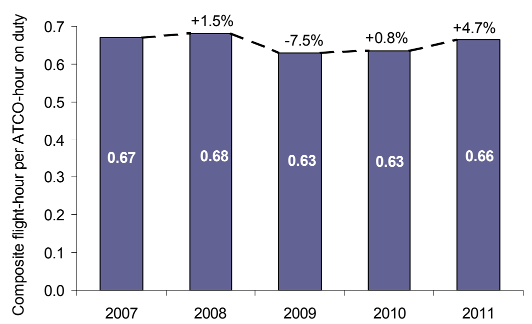


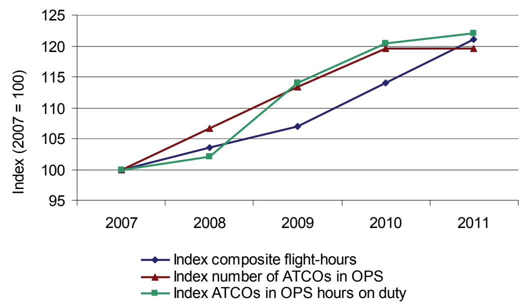
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



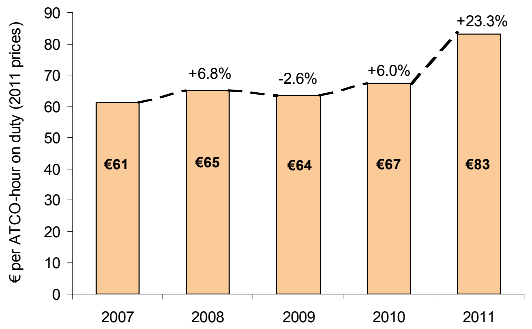


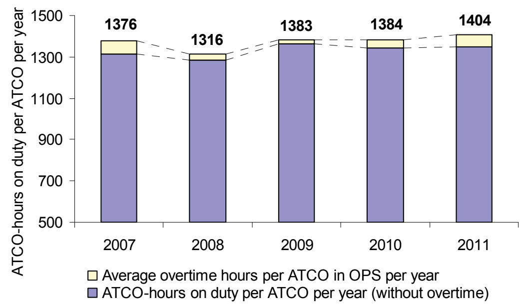
Trend in gate-to-gate ATCO-hour productivity



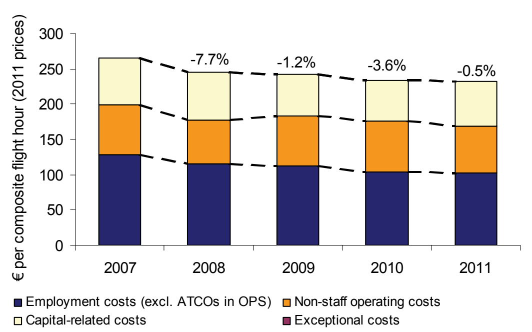


Trend in gate-to-gate employment costs per ATCO-hour

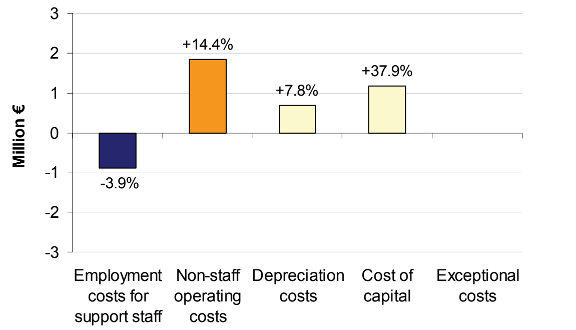




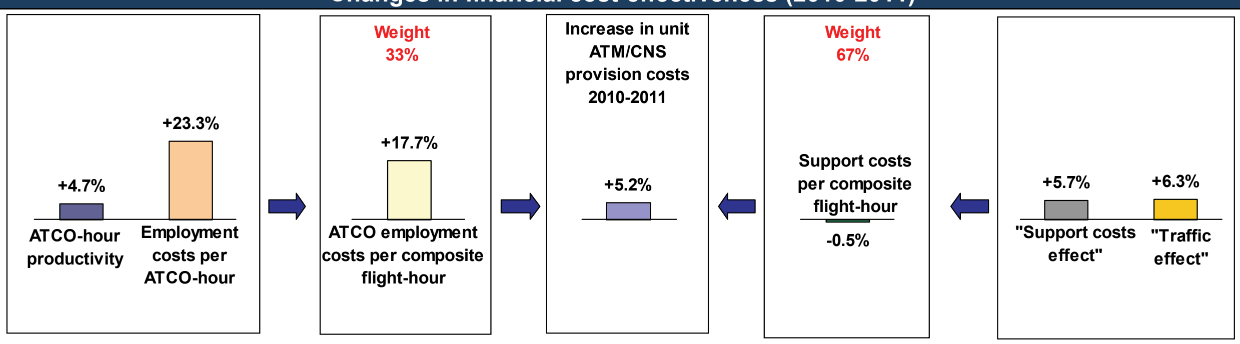
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

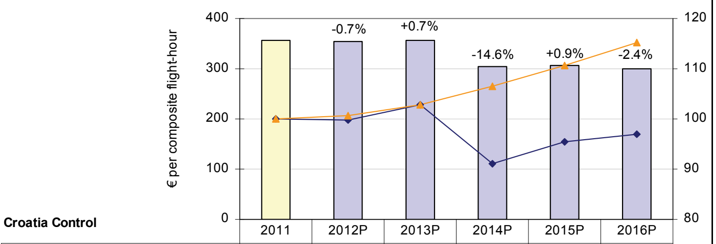


Changes in financial cost-effectiveness (2010-2011)

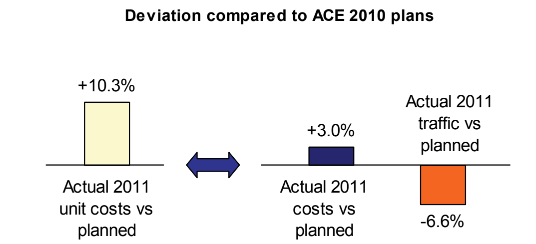


Croatia Control (Croatia) – (€2011)

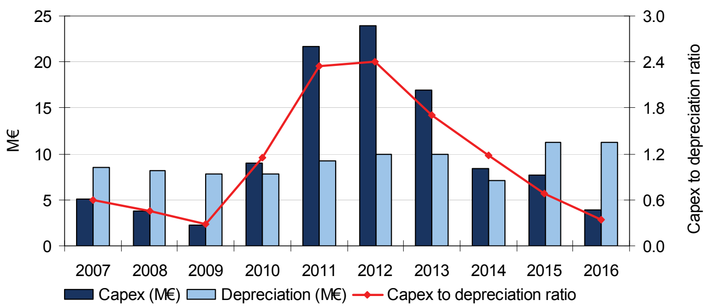
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

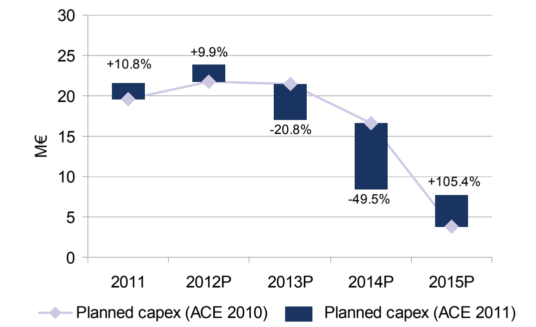


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	357	354	357	305	307	300
Gate-to-gate costs (index)	100	100	103	91	95	97
Composite flight-hours (index)	100	101	103	107	111	115

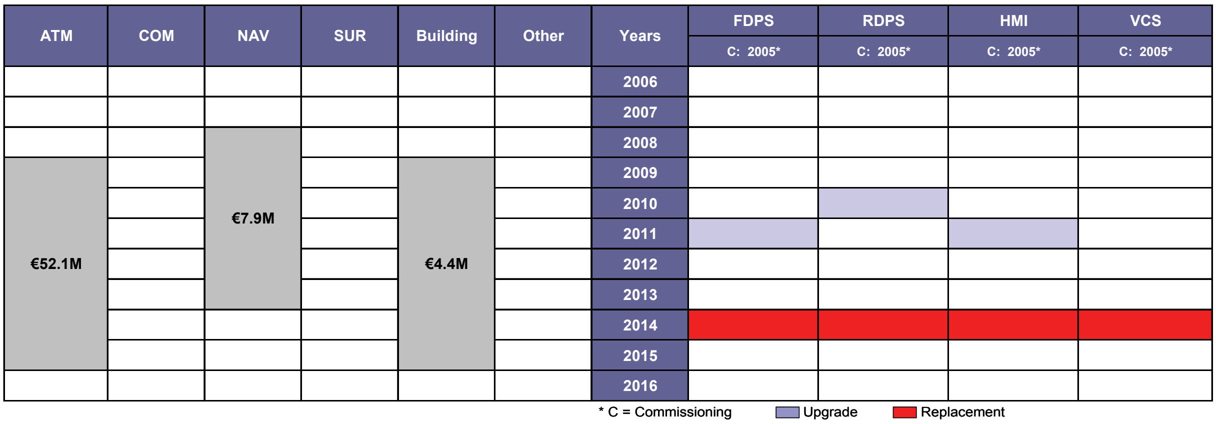


Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements



Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	CroATMS/COOPANS Upgrade	ATM	39.0	2011	2014
2	CroATM(FMTP) Upgrade and Extension to Regional ATC Centres-Phase 1	ATM	8.1	2009	2011
3	Modernisation and Replacement of VCCS and Redundant VCSs	ATM	5.0	2011	2015
4	Reconstruction of the ACC Old Building	Building	4.4	2009	2015
5	Replacement and upgrade of the NAV Systems	NAV	4.0	2008	2013

DCAC Cyprus (Cyprus) – Cost-effectiveness KPIs (€2011)

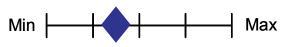
Contextual economic information

Exchange rate: Cyprus is within the EURO Zone

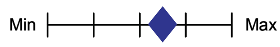
DCAC Cyprus represents 0.5% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

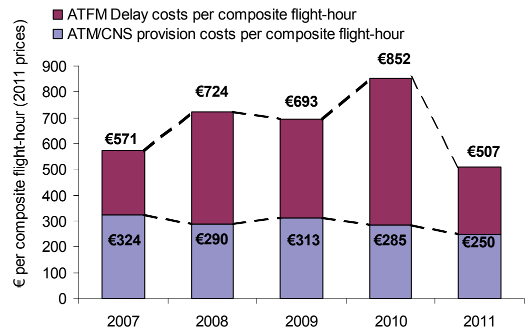
Aggregated complexity score:

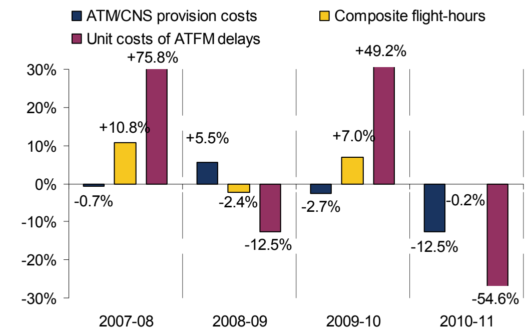


Seasonal traffic variability:

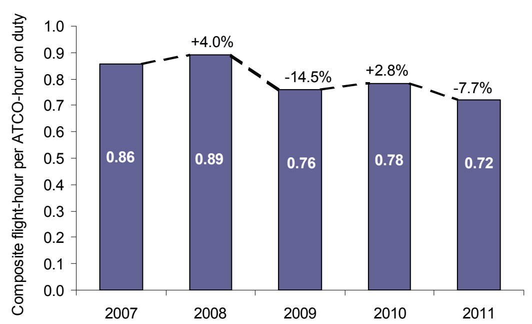


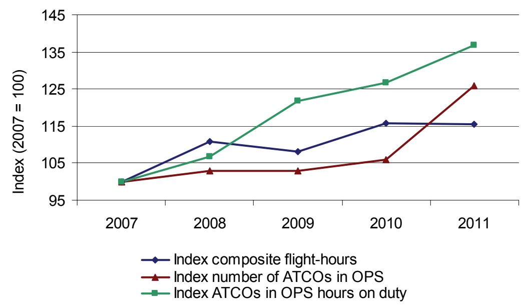
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



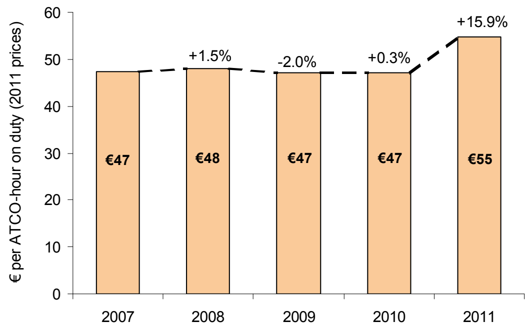


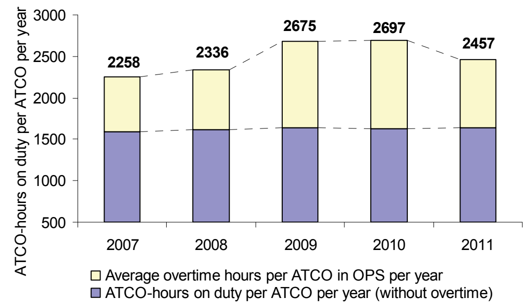
Trend in gate-to-gate ATCO-hour productivity



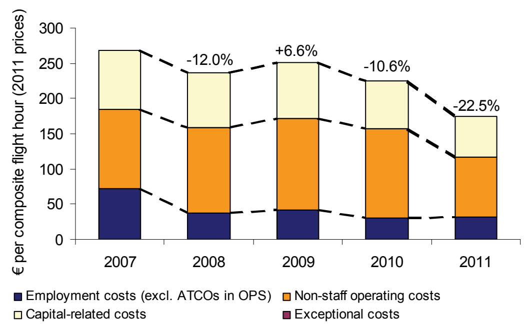


Trend in gate-to-gate employment costs per ATCO-hour

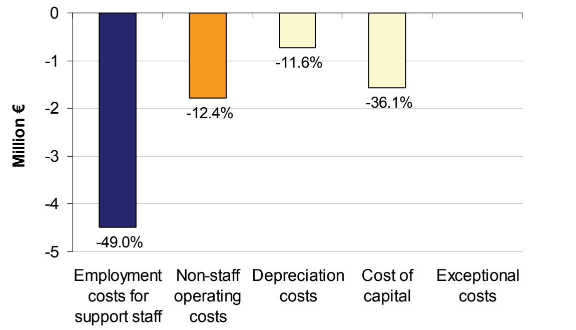




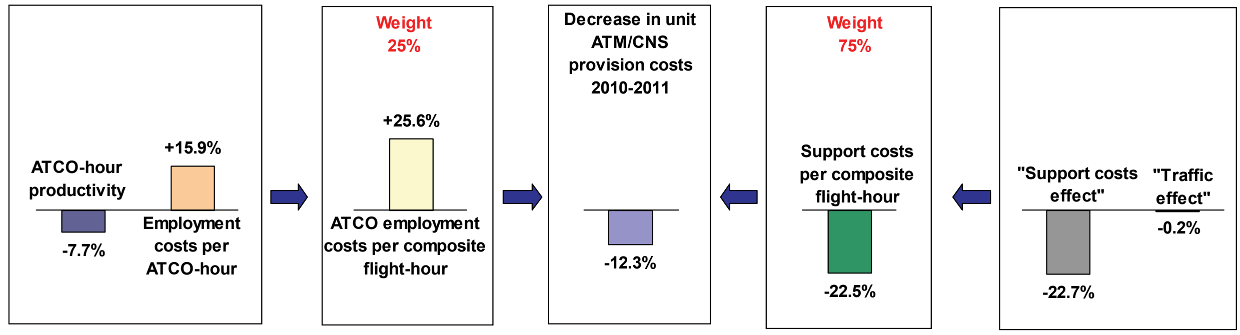
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

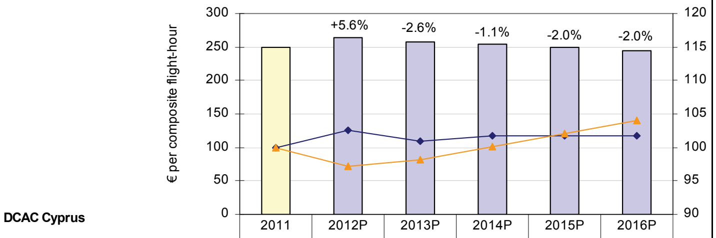


Changes in financial cost-effectiveness (2010-2011)

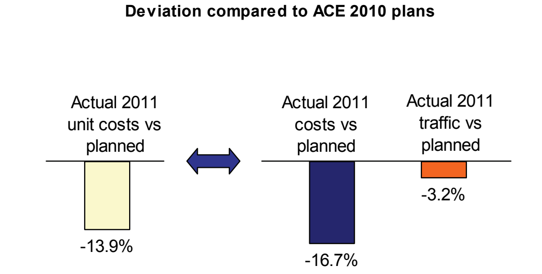


DCAC Cyprus (Cyprus) – (€2011)

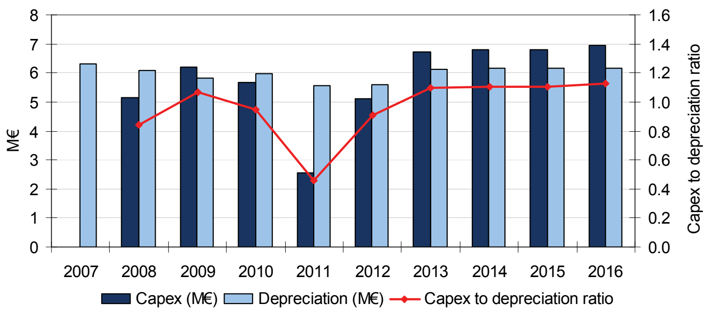
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

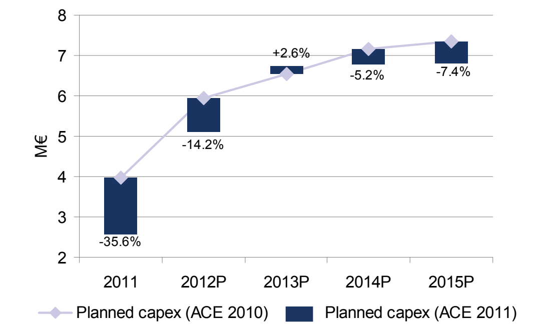


DCAC Cyprus	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	250	264	257	254	249	244
Gate-to-gate costs (index)	100	103	101	102	102	102
Composite flight-hours (index)	100	97	98	100	102	104



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*
						2006				
						2007				
				€8.9M		2008				
€25.1M (2003-2013)						2009				
						2010				
						2011				
	€8.0M		€5.0M			2012				
		€1.8M				2013				
						2014				
						2015				
						2016				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Implementation of new ATM systems and purchase of new equipment in Nicosia ACC (LEFCO)	ATM	20.5	2003	2010
2	New Air Traffic Control Building in Nicosia	Building	8.9	2006	2010
3	Replacement of VHF/UHF Radios	COM	3.0	2011	2013
4	New SSR Radars in Lara and Pafos	SUR	2.8	2013	2014
5	Committment of new ground to air Tx/Rx	COM	2.4	2012	2014

DFS (Germany) – Cost-effectiveness KPIs (€2011)

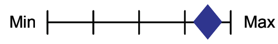
Contextual economic information

Exchange rate: Germany is within the EURO Zone

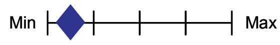
DFS represents 12.5% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

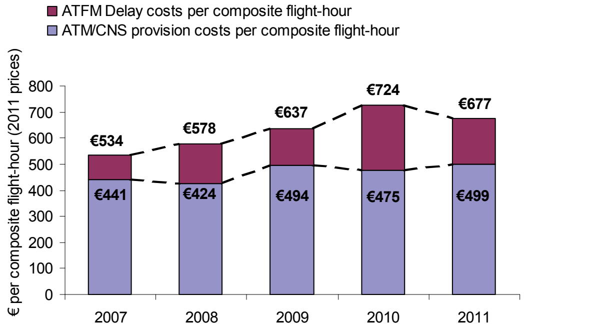
Aggregated complexity score:

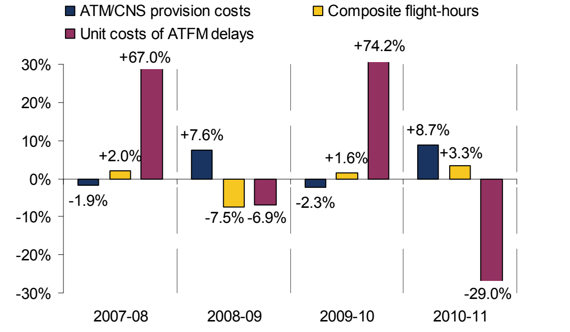


Seasonal traffic variability:

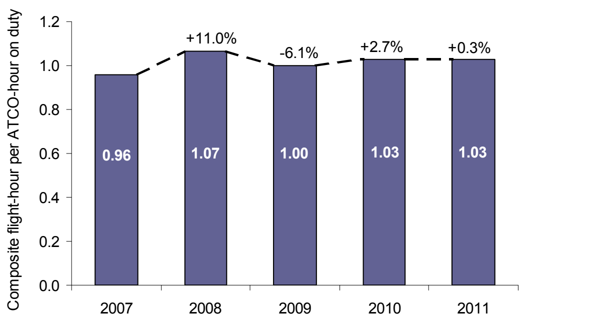


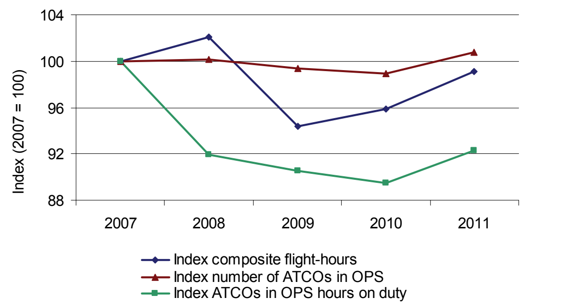
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



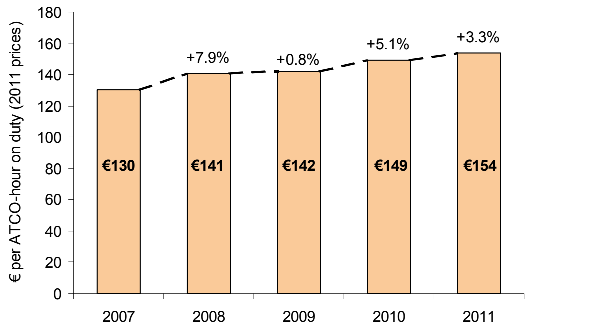


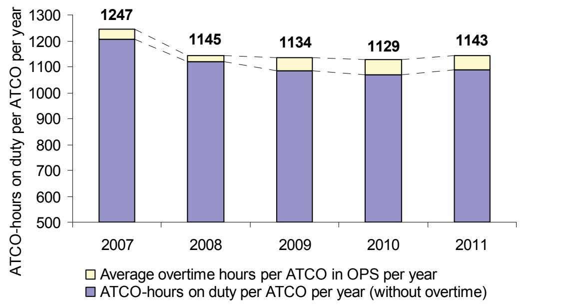
Trend in gate-to-gate ATCO-hour productivity



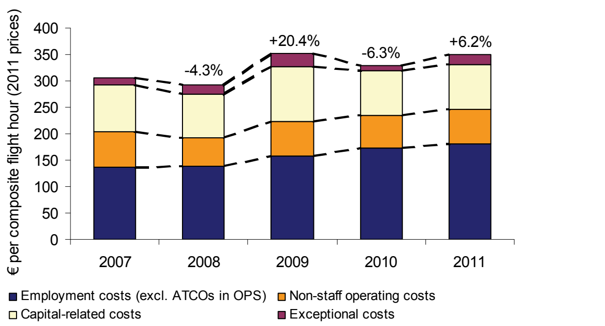


Trend in gate-to-gate employment costs per ATCO-hour

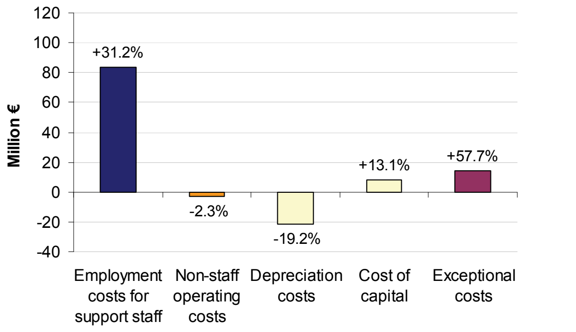




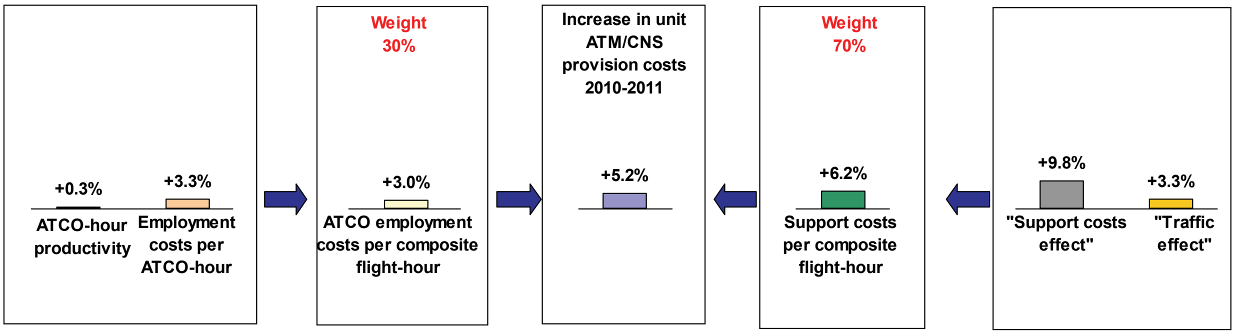
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

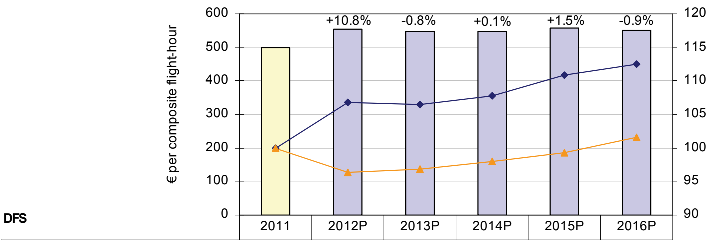


Changes in financial cost-effectiveness (2010-2011)

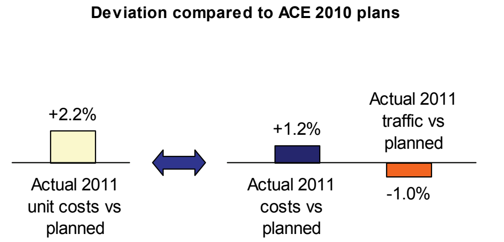


DFS (Germany) – (€2011)

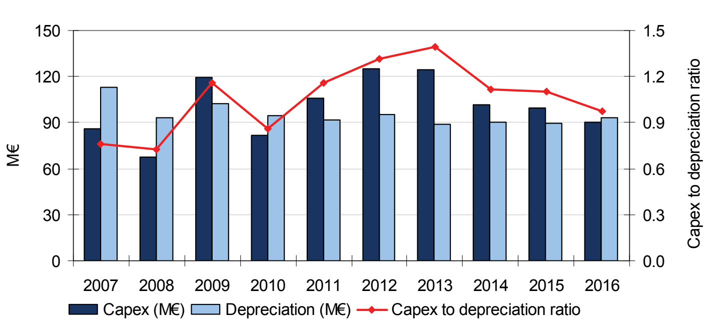
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

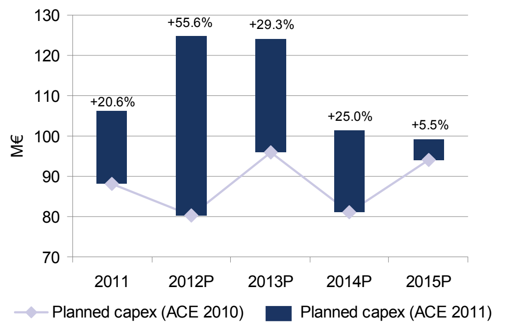


DFS	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	499	554	549	549	557	553
Gate-to-gate costs (index)	100	107	106	108	111	112
Composite flight-hours (index)	100	96	97	98	99	102



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: 2011 (Karl.) 2004 (Bremen) 1999 (Langen) 1999 (München)*	RDPS C: 2011 (Karl.) 2004 (Bremen) 1999 (Langen) 1999 (München)*	HMI C: 2011 (Karl.) 2004 (Bremen) 1999 (Langen) 1999 (München)*	VCS C: 2009 (Karl.) 2003 (Bremen) 2002 (Langen) 2002 (München)*
€158.9M (2004-2018)			€10.7M	€107.2M (2002-2014)		2006	Karlsruhe			
						2007				
	€90.6M (2008-2018)					2008	Bremen, Langen, München		Langen	
		€10.0M				2009				Karlsruhe
						2010			Bremen	
						2011	Karlsruhe	Karlsruhe	München Karlsruhe	
						2012				Langen (2012-2013) München (2013-2014)
						2013				
						2014				
						2015	Langen (2015-2016) München (2016-2017)	Langen (2015-2016) München (2016-2017)	Langen (2015-2016) München (2016-2017)	
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Programme iCAS	ATM	93.3	2009	2018
2	Rasum 8.33 kHz	COM	68.5	2008	2018
3	Extension of München ACC	Building	53.4	2008	2014
4	Implementation of P1/VAFORIT in Karlsruhe	ATM	39.0	2007	2011
5	New control tower at Berlin Brandenburg International	Building	28.4	2005	2012

DHMI (Turkey) – Cost-effectiveness KPIs (€2011)

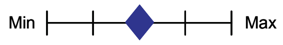
Contextual economic information

Exchange rate: 1 EUR = 2.334 TRL

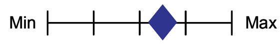
DHMI represents 4.1% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

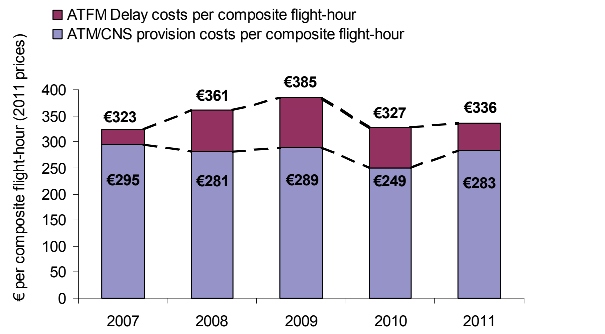
Aggregated complexity score:

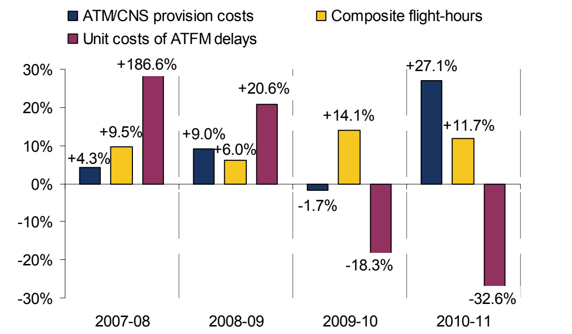


Seasonal traffic variability:

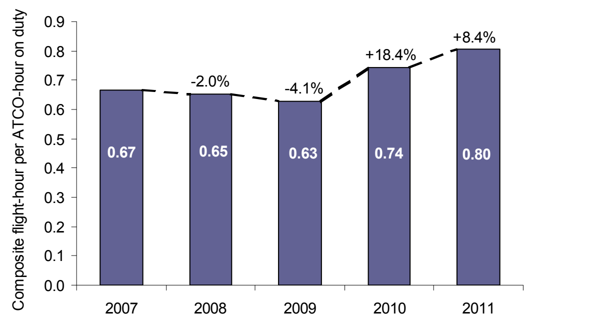


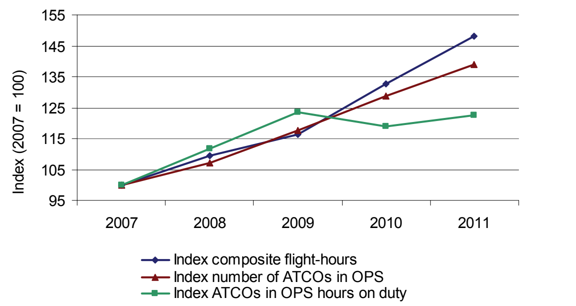
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



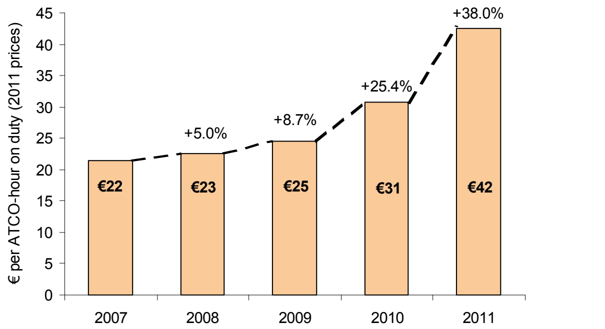


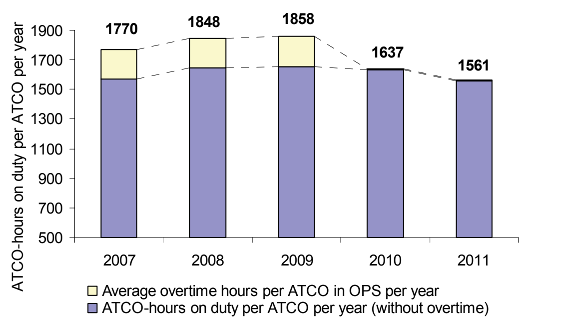
Trend in gate-to-gate ATCO-hour productivity



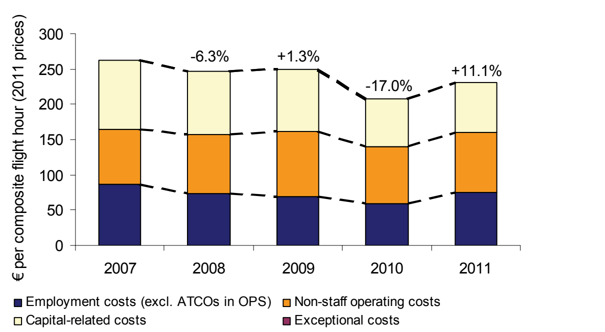


Trend in gate-to-gate employment costs per ATCO-hour

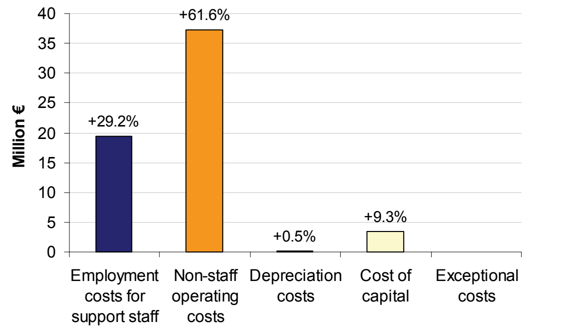




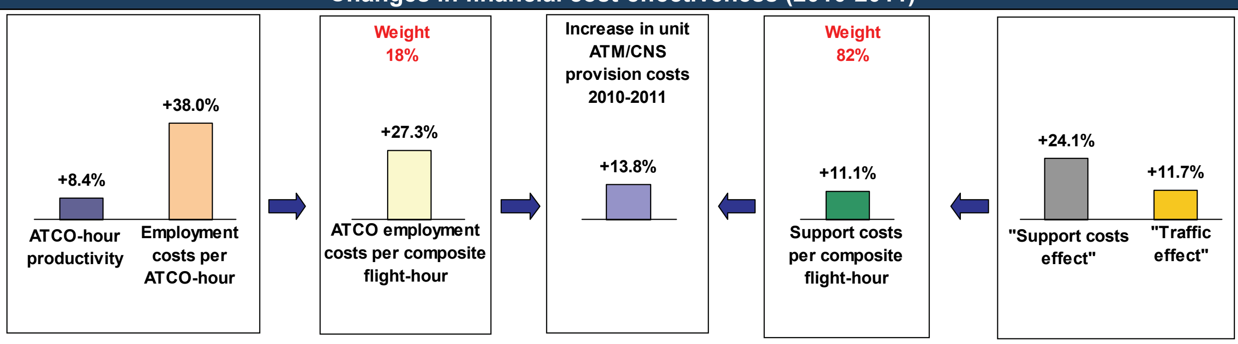
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

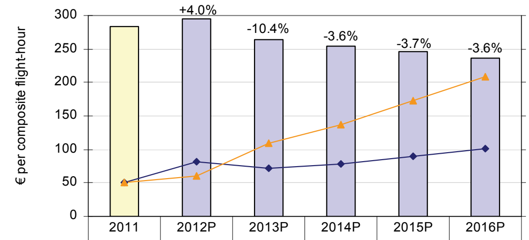


Changes in financial cost-effectiveness (2010-2011)

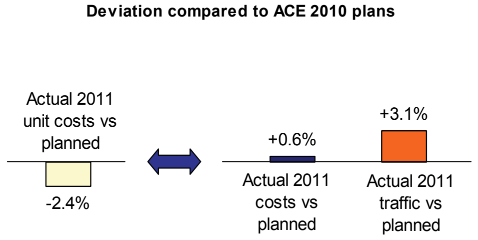


DHMI (Turkey) – (€2011)

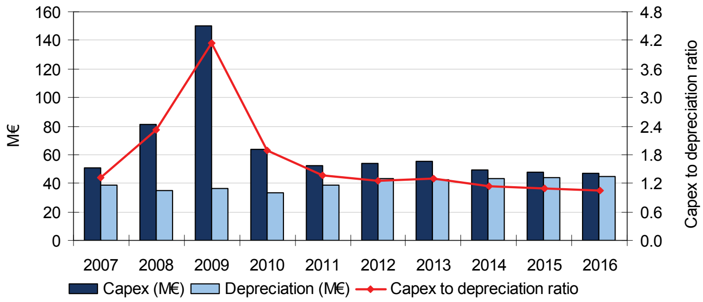
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

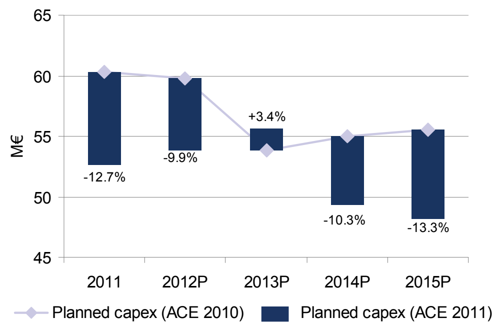


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	283	295	264	255	245	236
Gate-to-gate costs (index)	100	106	104	106	108	110
Composite flight-hours (index)	100	102	112	117	124	132



Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements

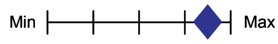
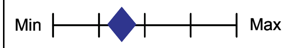
ATM	COM	NAV	SUR	Building	Other	Years	FDPS C: 2008 (All ACCs)*	RDPS C: 2008 (All ACCs)*	HMI C: 2008 (All ACCs)*	VCS C: 2005 (All ACCs)*
						2006				
						2007				
						2008	All ACCs	All ACCs	All ACCs	
						2009				
						2010				
			€89.9M			2011				All ACCs
€54.1M				€76.1M		2012				
	€42.4M	€19.7M				2013	All ACCs	All ACCs	All ACCs	
						2014				Ankara
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

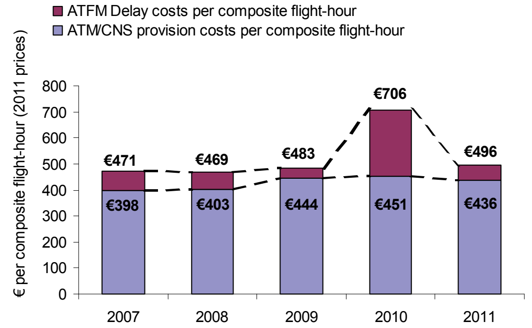
Focus on the top five capex projects

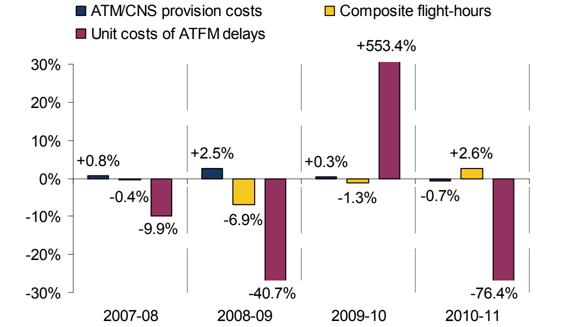
Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Air navigation communication and terminal systems periodic modernisation	COM	42.4	2010	2015
2	Replacement of existing radars and procurement of additional radars	SUR	41.4	2008	2014
3	Purchase of new Radar Data Processing and Flight Data Processing systems, new Human Machine Interface and Controller Working Positions	ATM	41.0	2009	2013
4	Purchase of 2 calibration aircrafts and 2 helicopters	SUR	40.3	2009	2012
5	Central Ankara ACC and ATC Complexes, including SMART complexes	Building	34.8	2008	2014

DSNA (France) – Cost-effectiveness KPIs (€2011)

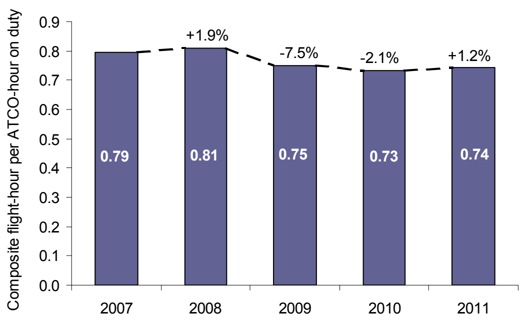
Contextual economic information	Operational conditions	
Exchange rate: France is within the EURO Zone DSNA represents 14.7% of European system gate-to-gate ATM/CNS provision costs	Aggregated complexity score: 	Seasonal traffic variability: 

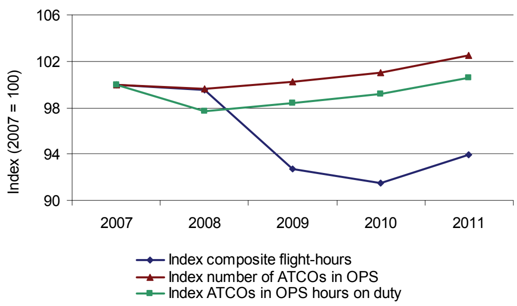
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



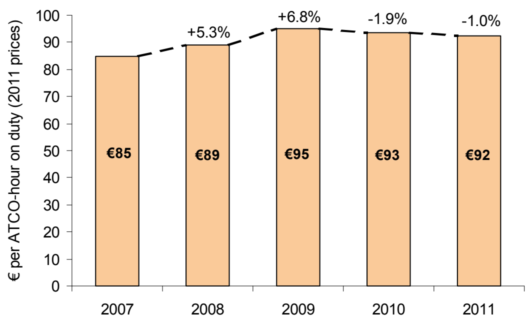


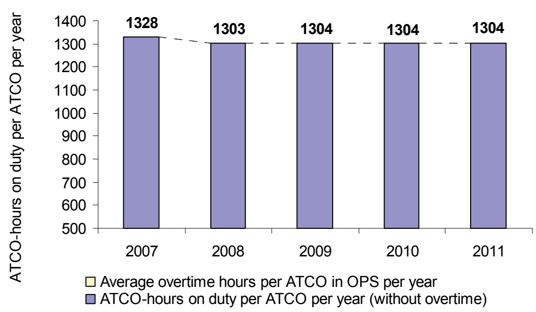
Trend in gate-to-gate ATCO-hour productivity



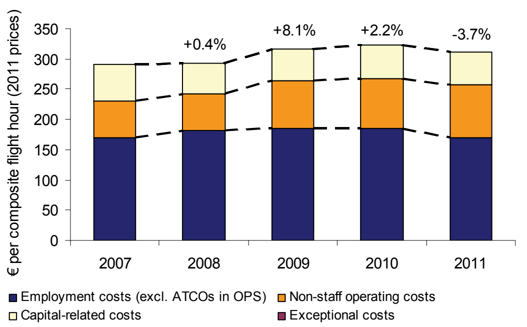


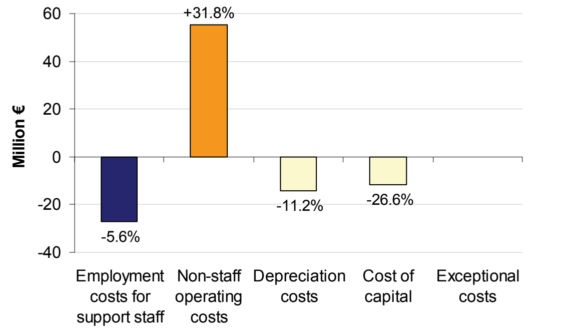
Trend in gate-to-gate employment costs per ATCO-hour



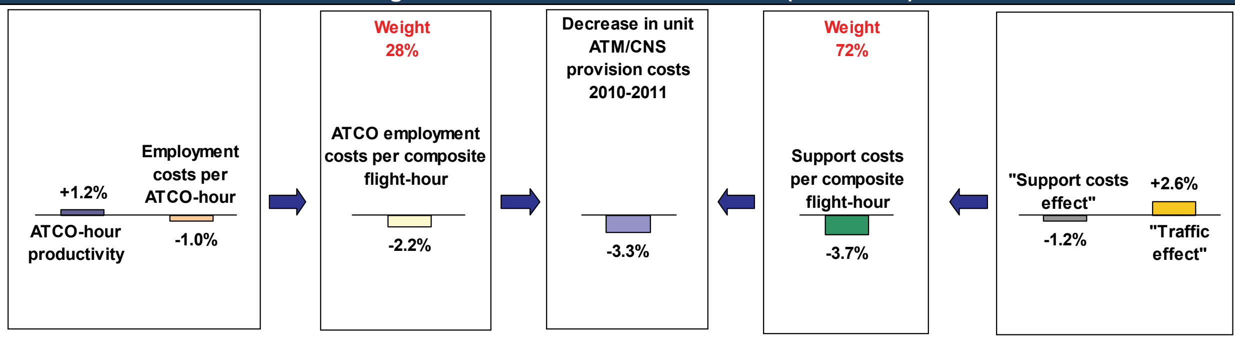


Trend in support costs per composite flight-hour	Changes in components of support costs (2007-2011)



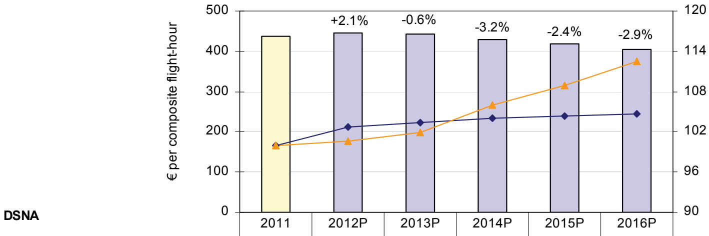


Changes in financial cost-effectiveness (2010-2011)

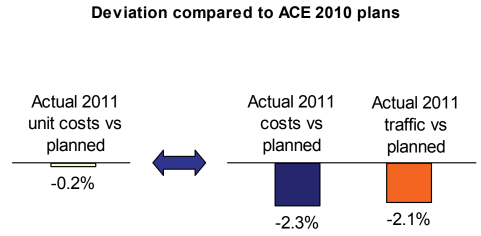


DSNA (France) – (€2011)

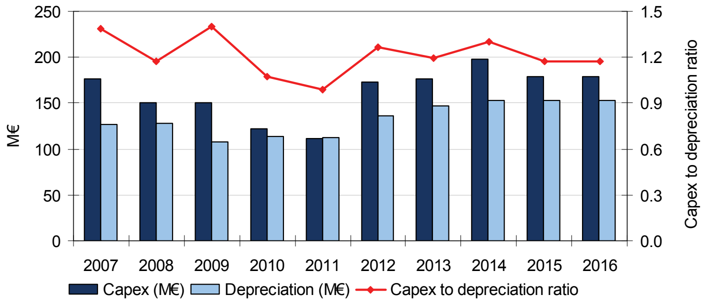
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

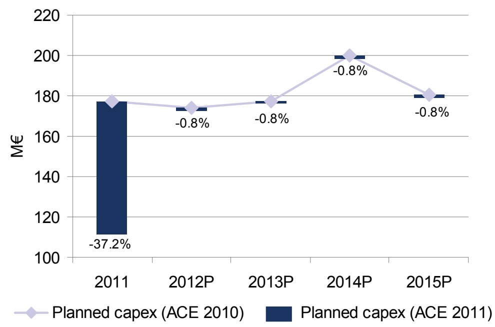


DSNA	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	436	445	443	428	418	406
Gate-to-gate costs (index)	100	103	103	104	104	105
Composite flight-hours (index)	100	101	102	106	109	112



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: 1982*	C: 1982*	C: 2000*	C: 2000 (Marseille) 2000/2003 (Brest) 2002/2005 (Reims) 2002/2006 (Paris) 2003 (Bordeaux)*
						2006				Paris (2002/2006)
						2007		All ACCs		
						2008				
						2009			All ACCs	
	€80.0M (2005-2015)					2010				
€694M-€734M (2003-2016)						2011				
						2012				
						2013				
					€50.0M (2012-2017)	2014				
						2015				
						2016	Marseille, Reims	Marseille, Reims	Marseille, Reims	

**The amount provided under "Other" (i.e. €50.0M) relates to the new airport Notre Dame de Landes in Nantes and includes capex relating to ATM C/N/S and building

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	4FLIGHT, including COFLIGHT (EFDP) and ERATO (MTCD)	ATM	560.0	2003	2016
2	SYSAT: New ATM system for APP and TWR operational units	ATM	84 -124	2012	2015
3	CSSIP: Renewal of LAN and WAN to use IP standard (integrates the former project ISOCRATE)	COM	80.0	2005	2015
4	Notre Dame Des Landes (New airport for Nantes)	Other	50.0	2012	2017
5	VCS : Voice Communication Systems (FABEC cooperation)	ATM	50.0	2012	2015

EANS (Estonia) – Cost-effectiveness KPIs (€2011)

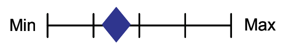
Contextual economic information

Exchange rate: Estonia is within the EURO Zone

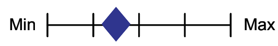
EANS represents 0.2% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

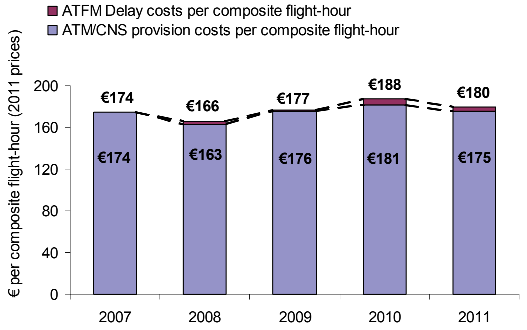
Aggregated complexity score:

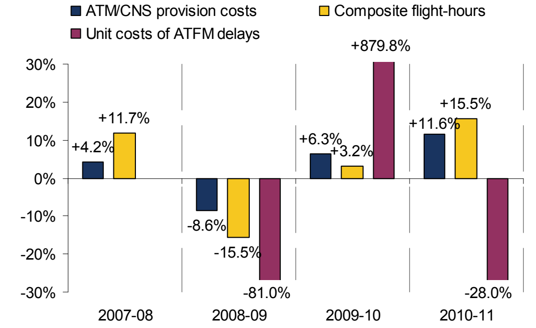


Seasonal traffic variability:

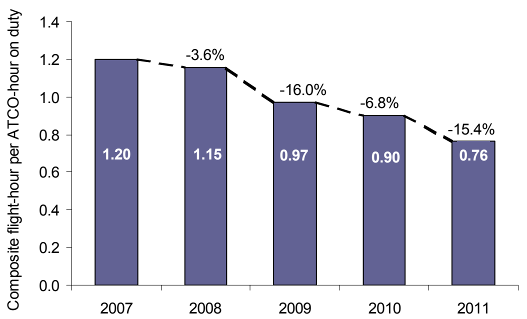


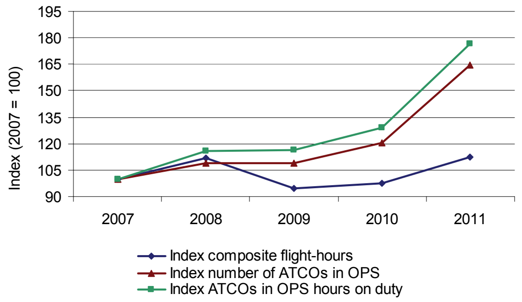
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



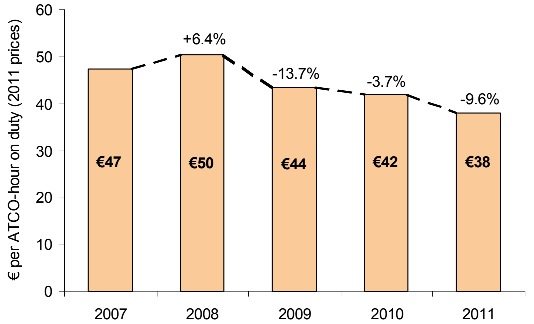


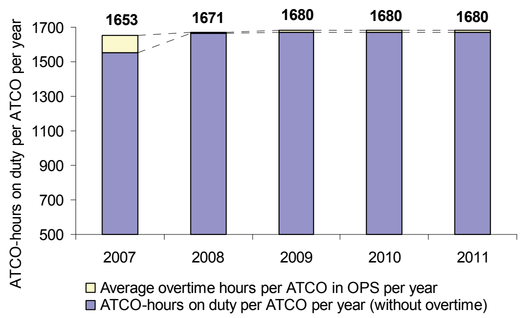
Trend in gate-to-gate ATCO-hour productivity



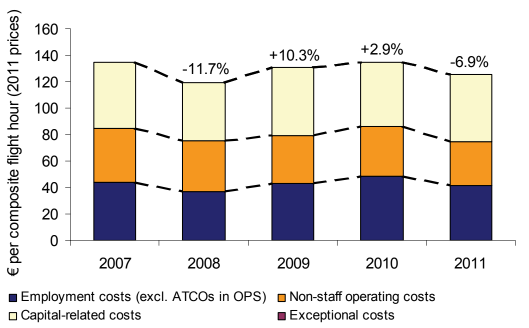


Trend in gate-to-gate employment costs per ATCO-hour

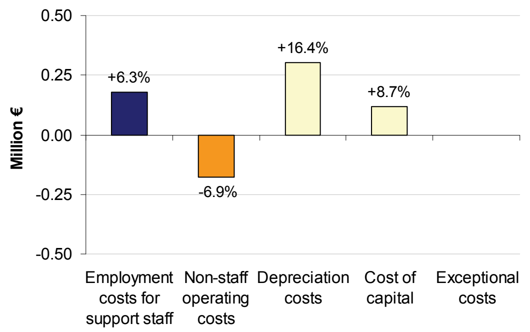




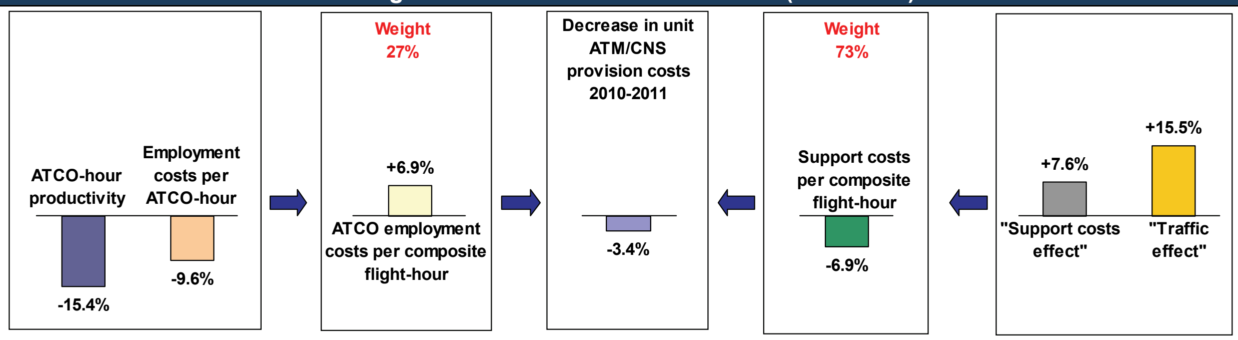
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

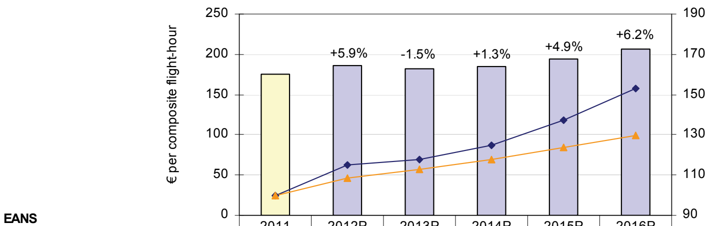


Changes in financial cost-effectiveness (2010-2011)

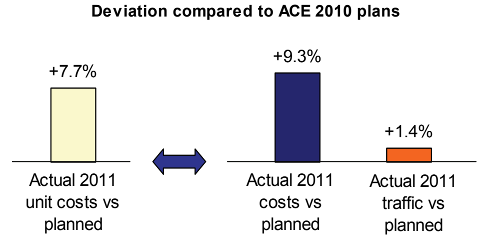


EANS (Estonia) – (€2011)

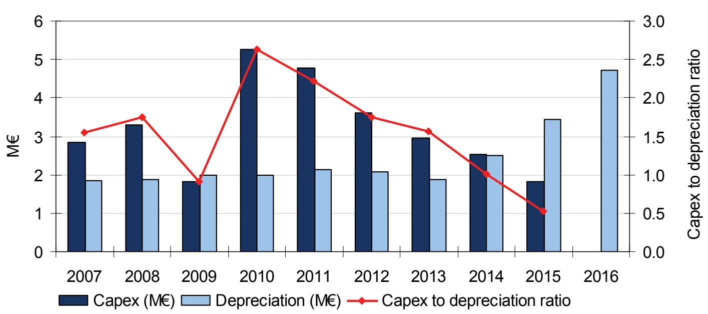
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

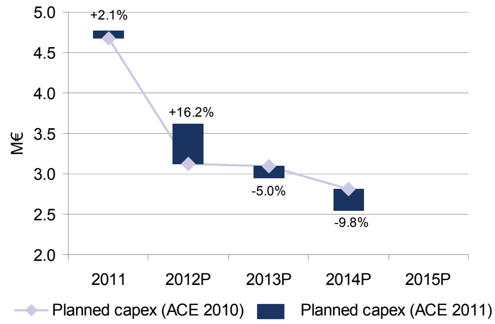


EANS	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	175	186	183	185	194	206
Gate-to-gate costs (index)	100	115	118	125	137	153
Composite flight-hours (index)	100	109	113	118	124	130



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: 2002*	RDPS C: 2002*	HMI C: 2002*	VCS C: 1998*
						2006				
						2007				
						2008				
						2009				
€9.0M						2010				
				€0.2M		2011				
	€2.7M	€2.5M				2012				
			€2.9M			2013				
						2014				
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Replacement EUROCAT ATM system in Tallinn ACC (including new ATCO HMI)	ATM	8.0	2009	2012
2	Expenses in Surveillance	SUR	2.9	2011	2015
3	Communication*, including: - €0.3M capex related to the new VCS - €0.5M implementation of Aeronautical Message Handling System (AMHS)	COM	2.7	2010	2015
4	Expenses in Navigation	NAV	1.5	2012	2015
5	New Tallinn TWR ATM system	ATM	1.0	2009	2010

ENAV (Italy) – Cost-effectiveness KPIs (€2011)

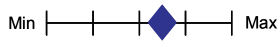
Contextual economic information

Exchange rate: Italy is within the EURO Zone

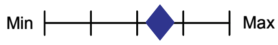
ENAV represents 8.7% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

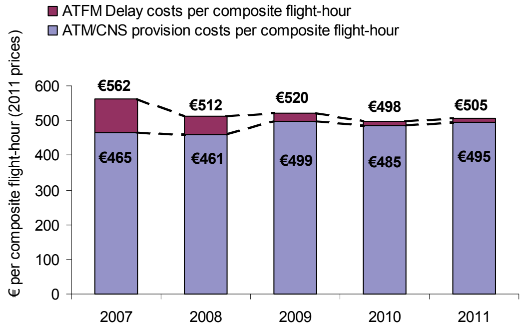
Aggregated complexity score:

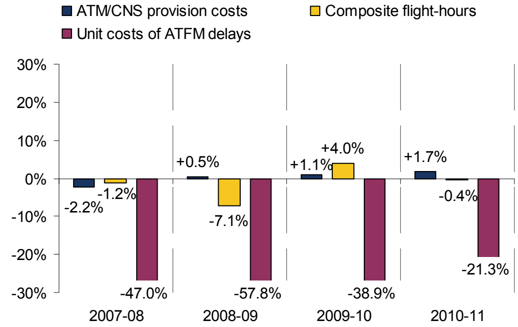


Seasonal traffic variability:

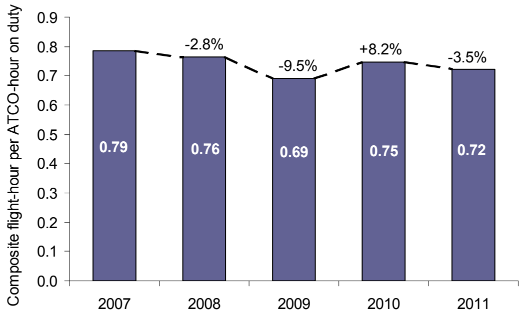


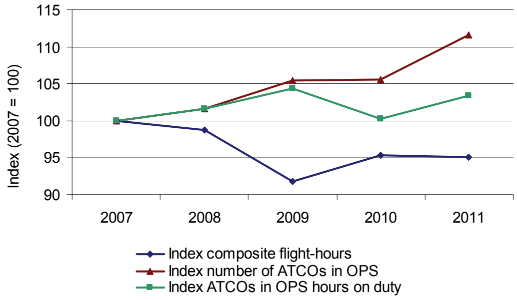
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



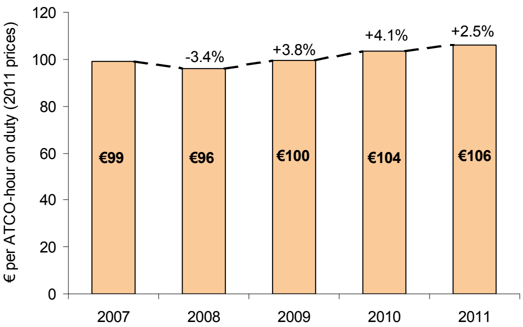


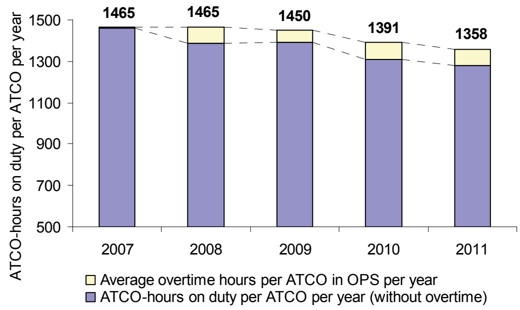
Trend in gate-to-gate ATCO-hour productivity



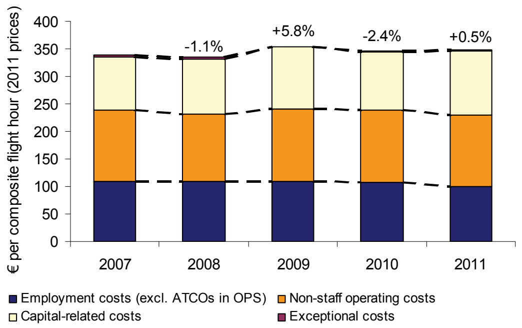


Trend in gate-to-gate employment costs per ATCO-hour

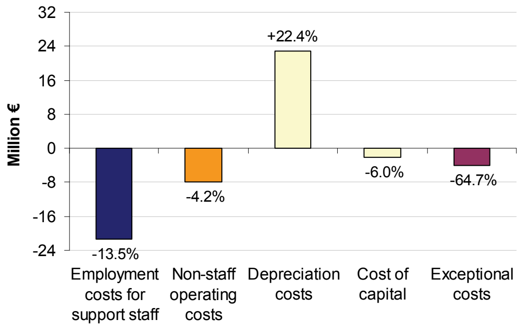




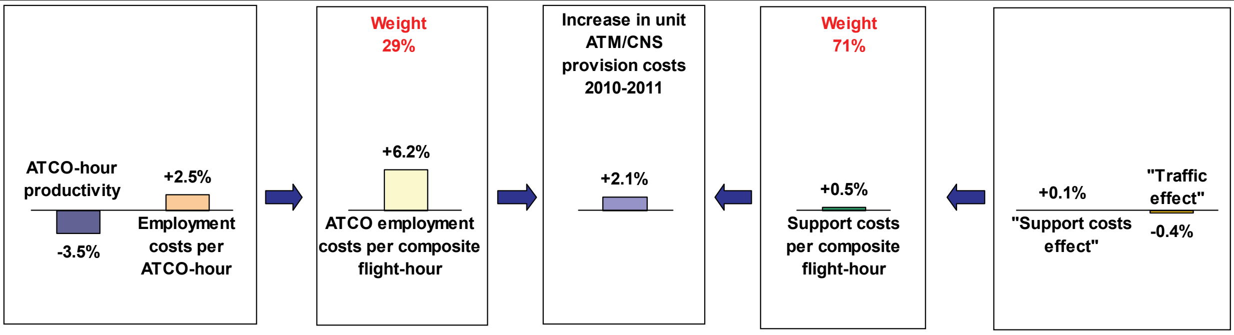
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

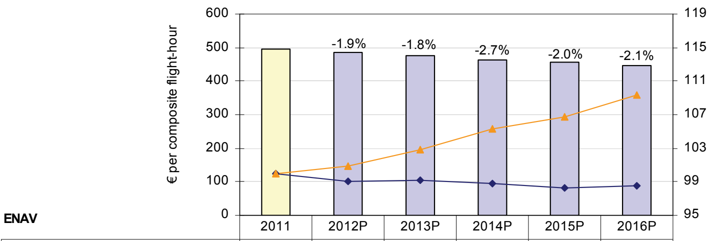


Changes in financial cost-effectiveness (2010-2011)

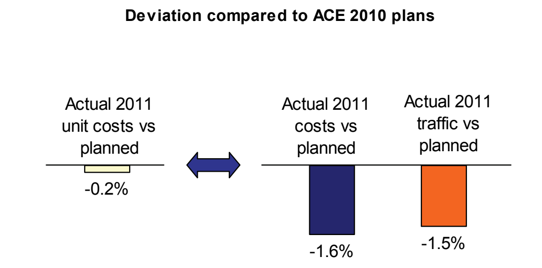


ENAV (Italy) – (€2011)

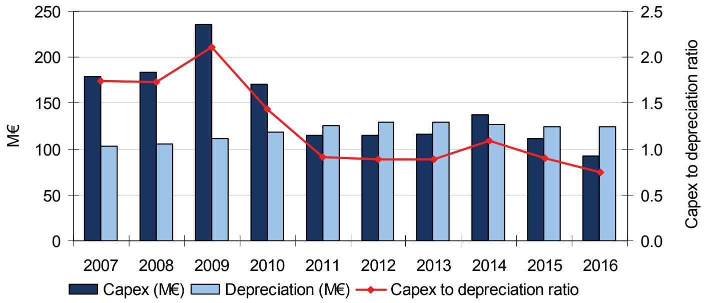
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

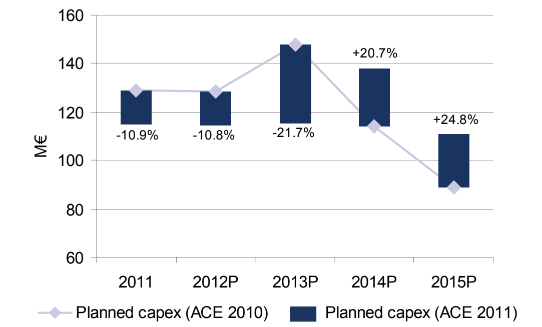


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	495	485	477	464	455	446
Gate-to-gate costs (index)	100	99	99	99	98	98
Composite flight-hours (index)	100	101	103	105	107	109



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.)*
						2006				Roma
						2007				
						2008				Brindisi, Milano, Padova
						2009				Roma
						2010				
						2011				
€272.4M	€87.5M	€64.7M	€6.0M	€178.8M	€17.0M	2012				
						2013				
						2014				
						2015	All ACCs	All ACCs	All ACCs	
						2016				

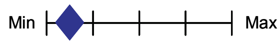
* C = Commissioning   Upgrade   Replacement

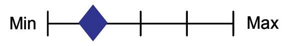
Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Development of an integrated platform for the management of ATM procedures and aeronautical data (program 4-FLIGHT)	ATM	156.4	2009	2015
2	Realisation of civil infrastructures	Building	146.8	2009	2015
3	Modernisation of the radio assistance equipment	NAV	64.7	2009	2015
4	Automation of the operating system	ATM	64.1	2009	2015
5	Implementation of the new airspace design system	ATM	51.9	2009	2015

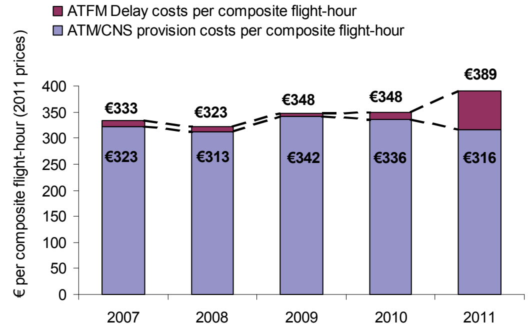
Finavia (Finland) – Cost-effectiveness KPIs (€2011)

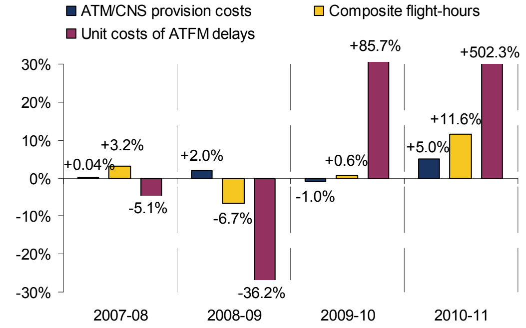
Contextual economic information	Operational conditions	
Exchange rate: Finland is within the EURO Zone Finavia represents 0.8% of European system gate-to-gate ATM/CNS provision costs	Aggregated complexity score:	Seasonal traffic variability:



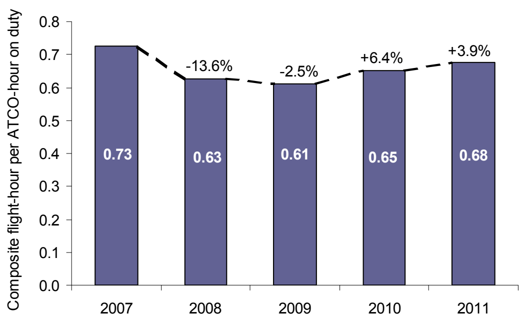


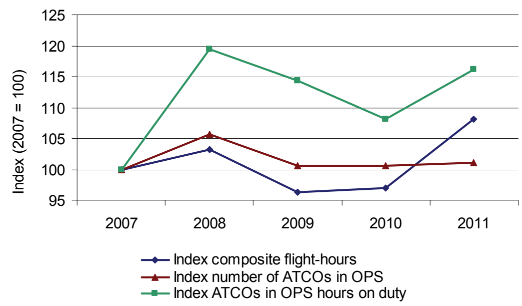
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



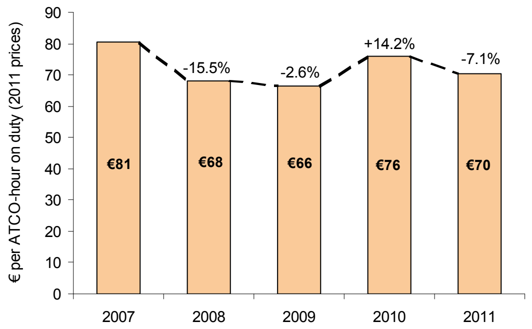


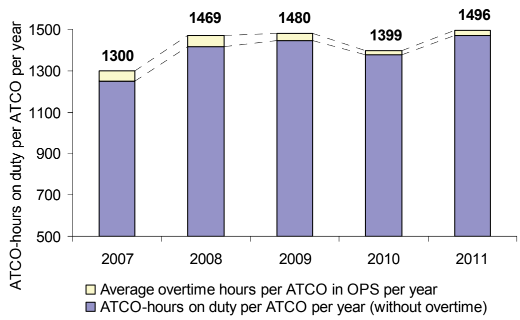
Trend in gate-to-gate ATCO-hour productivity



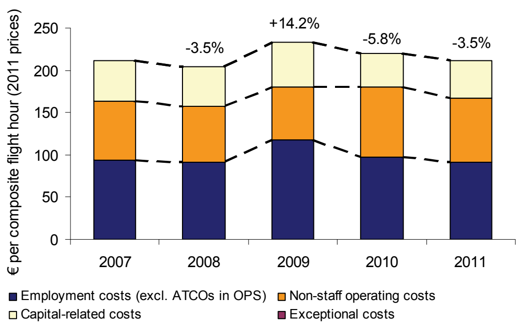


Trend in gate-to-gate employment costs per ATCO-hour

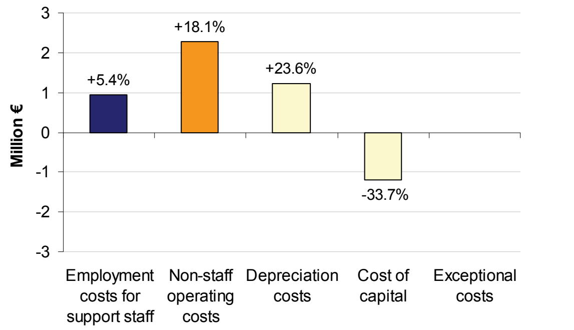




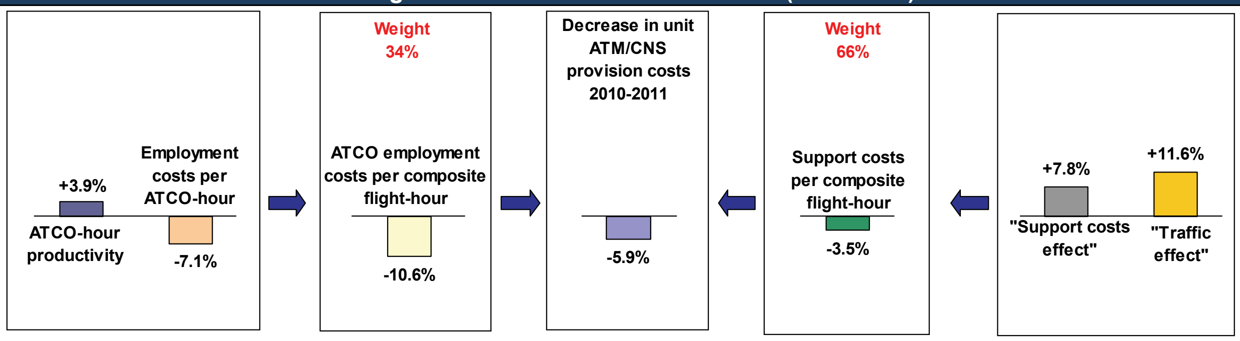
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

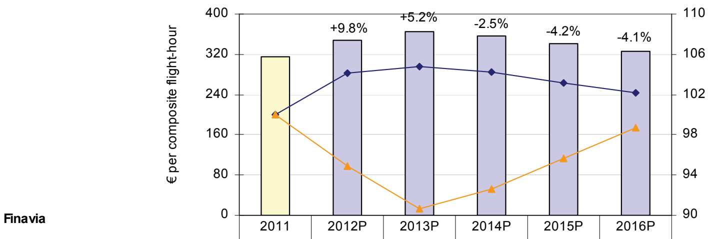


Changes in financial cost-effectiveness (2010-2011)

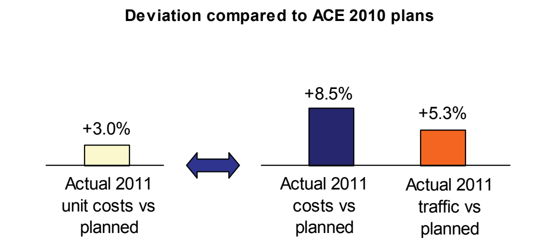


Finavia (Finland) – (€2011)

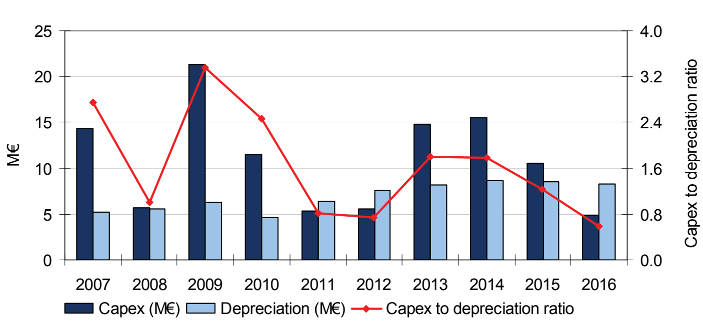
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

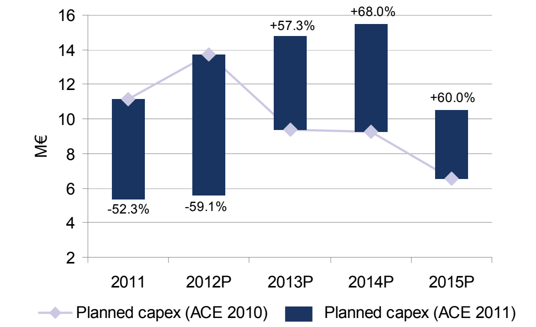


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	316	347	365	356	341	327
Gate-to-gate costs (index)	100	104	105	104	103	102
Composite flight-hours (index)	100	95	91	93	96	99

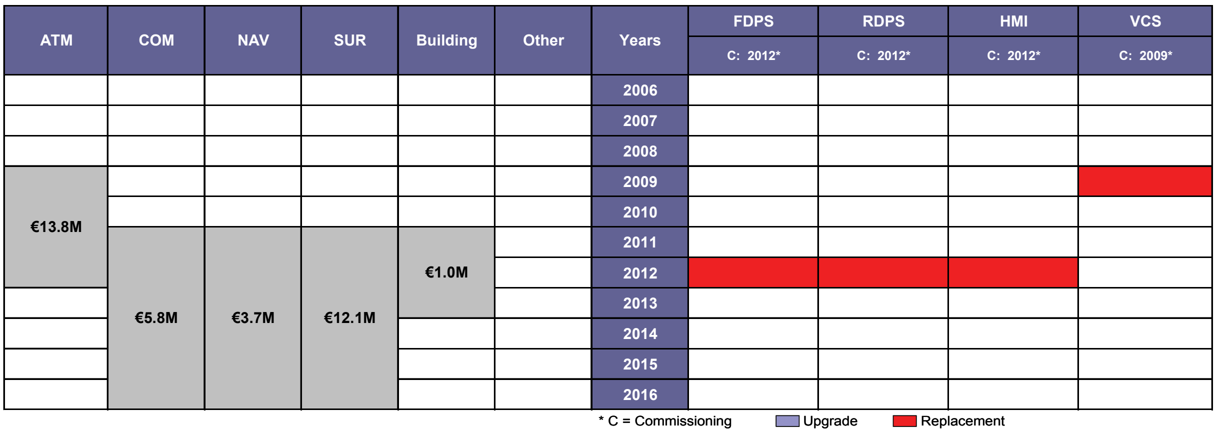


Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements



Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Replacement of Eurocat ATM system in Tampere ACC and Helsinki (EFHK), including CCAMS and FPL2012)	ATM	13.8	2009	2012
2	Investments to Wide area multilateration technology	SUR	7.5	2011	2014
3	Replacement/purchase of RNAV/DME equipment	NAV	3.7	2011	2016
4	MSSR renewal	SUR	3.0	2014	2016
5	Controller Pilot Datalink	COM	2.5	2014	2014

HCAA (Greece) – Cost-effectiveness KPIs (€2011)

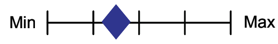
Contextual economic information

Exchange rate: Greece is within the EURO Zone

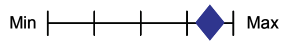
HCAA represents 2.0% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

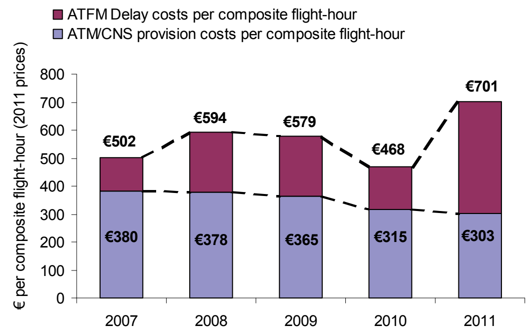
Aggregated complexity score:

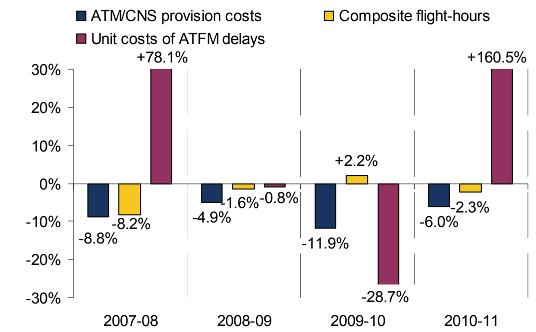


Seasonal traffic variability:

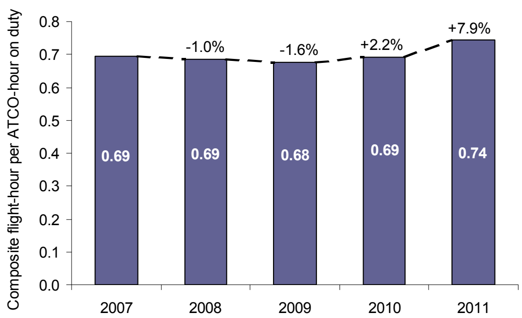


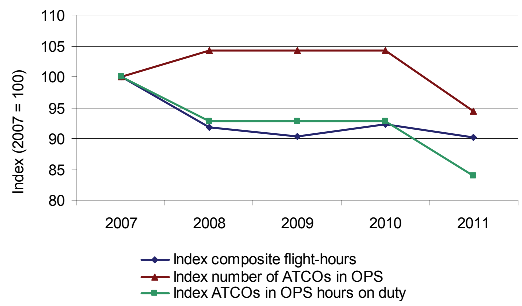
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



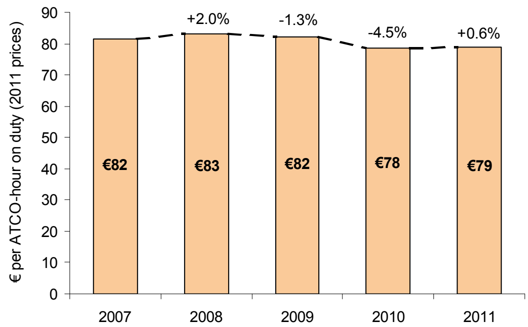


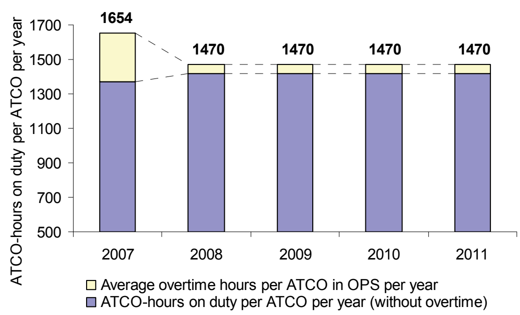
Trend in gate-to-gate ATCO-hour productivity



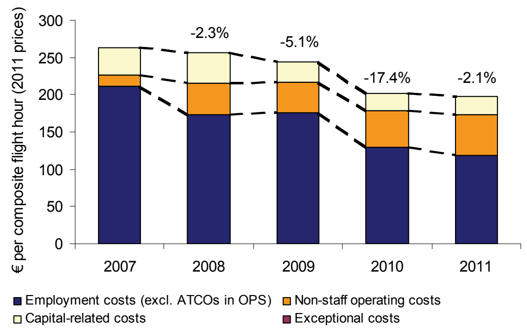


Trend in gate-to-gate employment costs per ATCO-hour

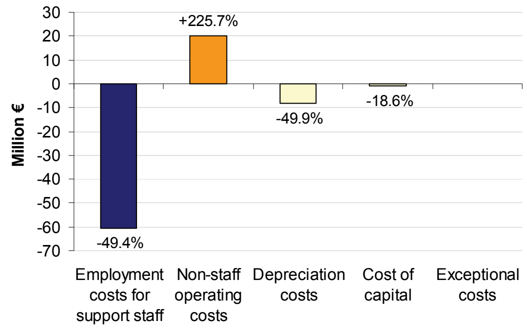




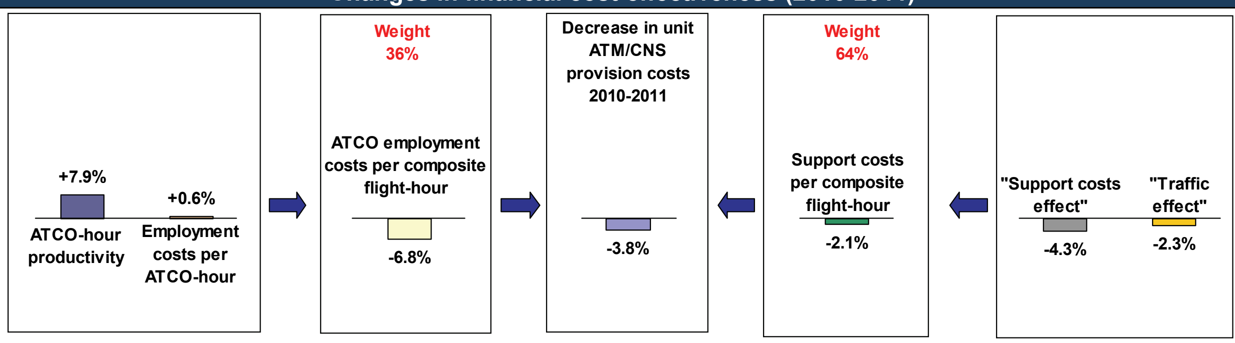
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

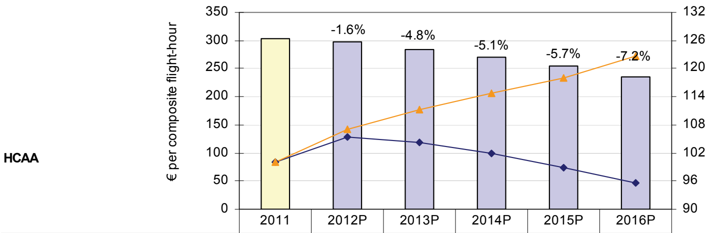


Changes in financial cost-effectiveness (2010-2011)

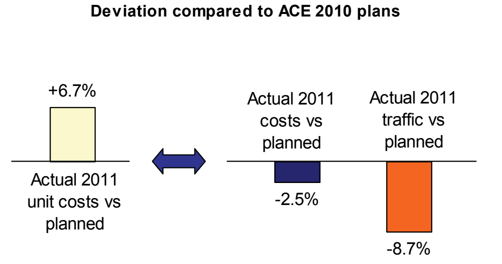


HCAA (Greece) – (€2011)

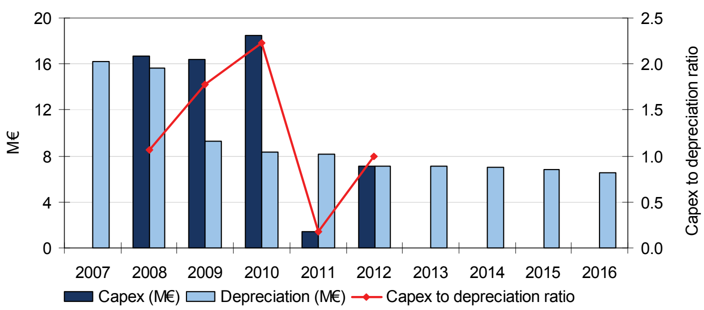
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

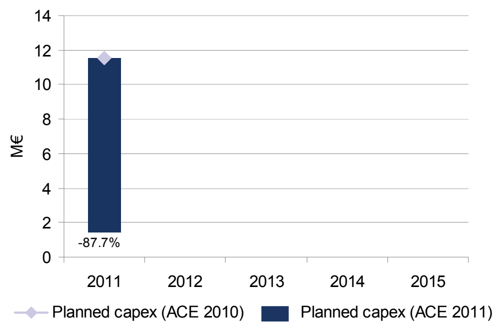


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	303	298	284	269	254	236
Gate-to-gate costs (index)	100	105	104	102	99	95
Composite flight-hours (index)	100	107	111	115	118	123



Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements

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</table>

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Purchase of VCS/RCS systems for Athinai/Makedonia ACC	COM	8.5	2012	2014
2	Upgrade of PALLAS system (FDPS, RDPS, ODS, HMI)	ATM	8.0	2012	2014
3	Purchase of a surface radar (SMR/A-SMGCS) at Thessaloniki/Makedonia International airports	SUR	3.8	2009	2012
4	Purchase of VCS/RCS systems for 5 main airports	COM	2.6	2012	2014
5	Upgrade of major airports FDP system (PATROCLOS)	ATM	2.2	2009	2013

HungaroControl (Hungary) – Cost-effectiveness KPIs (€2011)

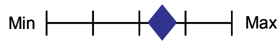
Contextual economic information

Exchange rate: 1EUR = 278.889 HUF

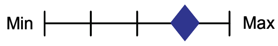
HungaroControl represents 1.2% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

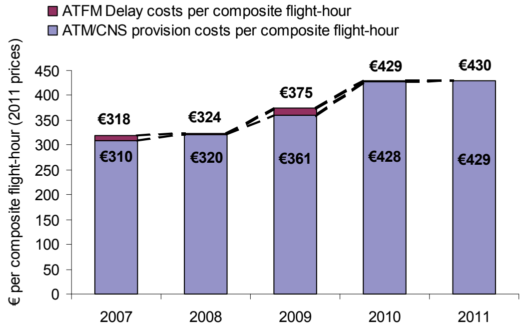
Aggregated complexity score:

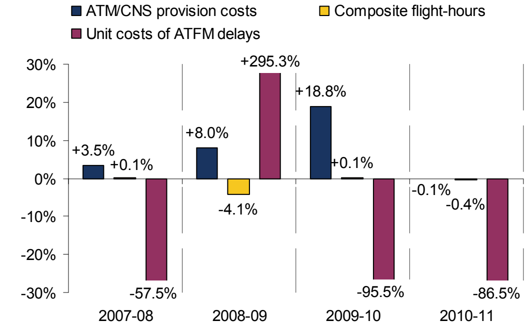


Seasonal traffic variability:

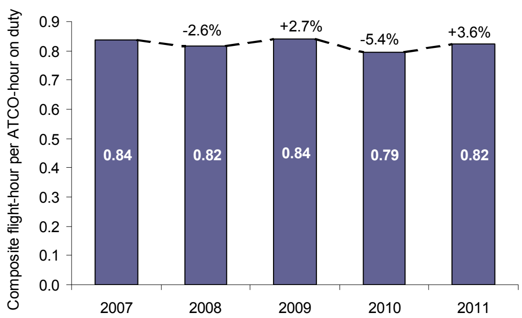


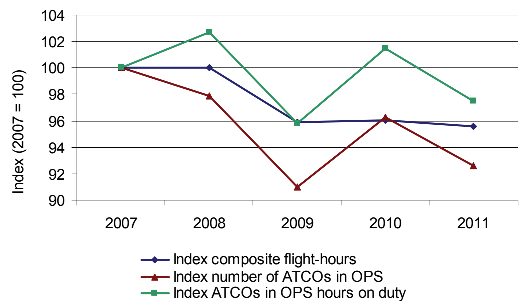
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



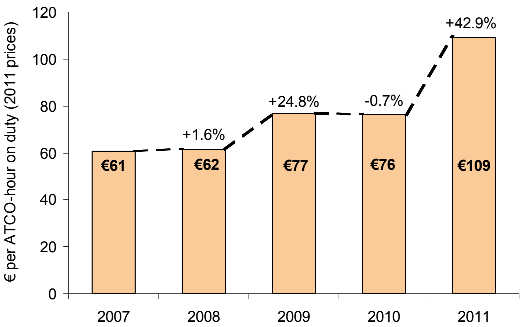


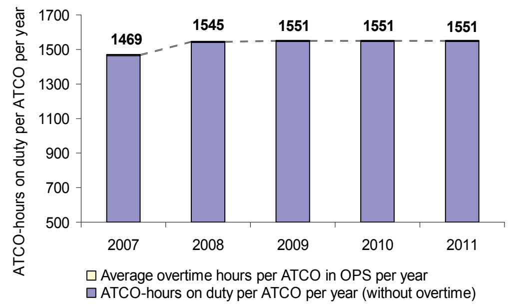
Trend in gate-to-gate ATCO-hour productivity



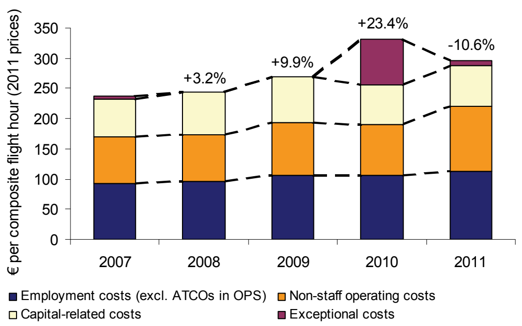


Trend in gate-to-gate employment costs per ATCO-hour

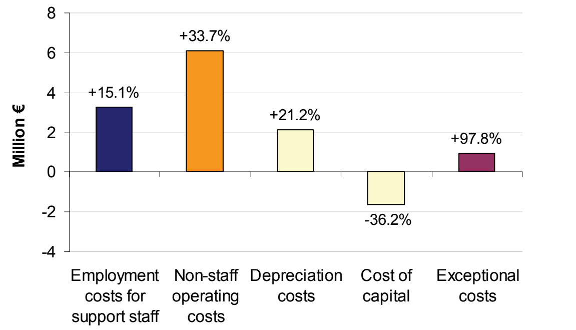




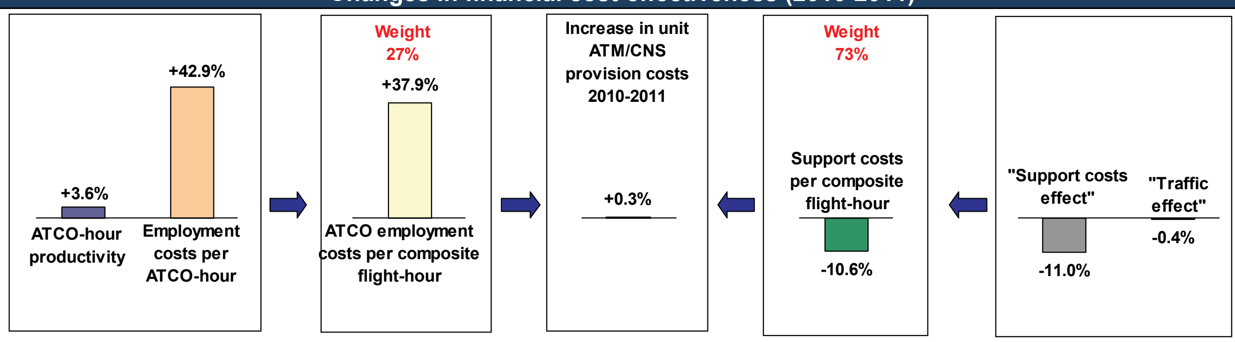
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

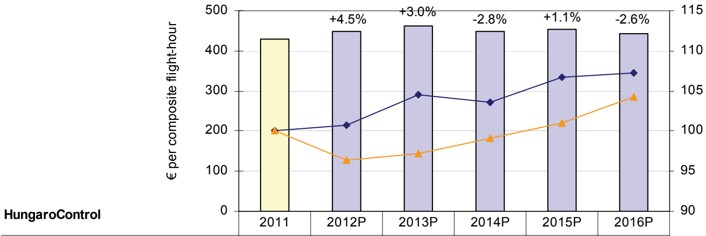


Changes in financial cost-effectiveness (2010-2011)



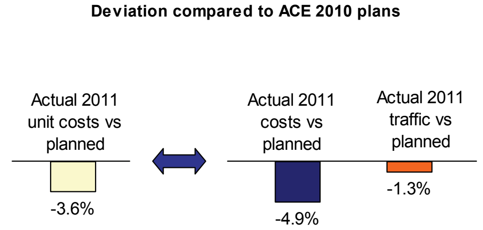
HungaroControl (Hungary) – (€2011)

Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

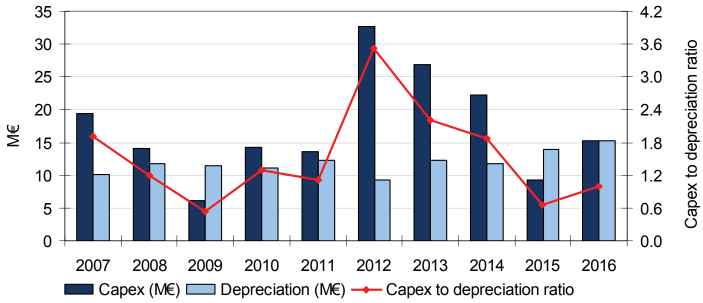


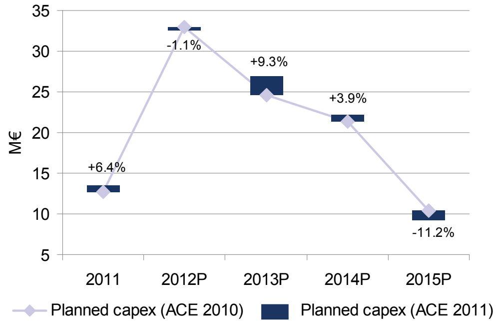
HungaroControl	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	429	449	462	449	454	442
Gate-to-gate costs (index)	100	101	105	104	107	107
Composite flight-hours (index)	100	96	97	99	101	104

Deviation compared to ACE 2010 plans



Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements

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</table>

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	MATIAS HW and SW upgrade	ATM	16.0	2009	2012
2	CPDLC implementation	COM	15.1	2012	2014
3	ANS III Building	Building	11.5	2010	2012
4	G/G COM infrastructure deployment	COM	2.8	2010	2012
5	3D TWR simulator	ATM	2.0	2008	2014

IAA (Ireland) – Cost-effectiveness KPIs (€2011)

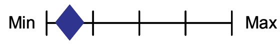
Contextual economic information

Exchange rate: Ireland is within the EURO Zone

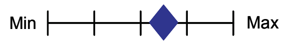
IAA represents 1.6% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

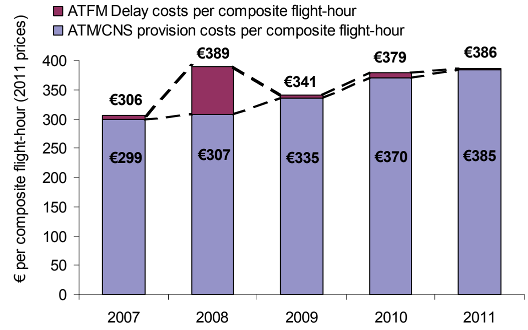
Aggregated complexity score:

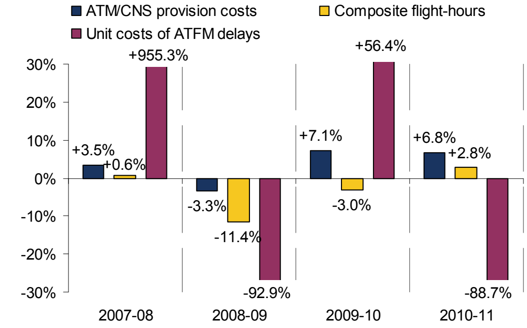


Seasonal traffic variability:

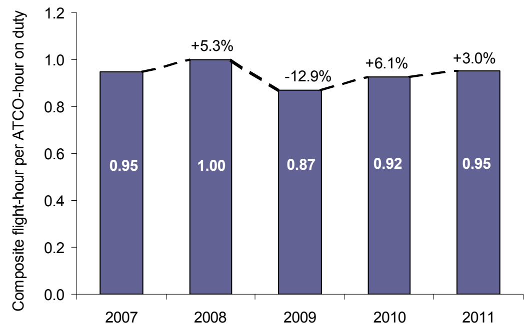


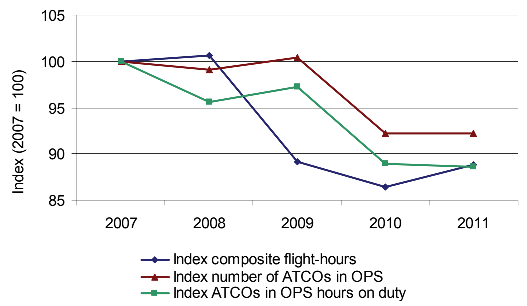
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



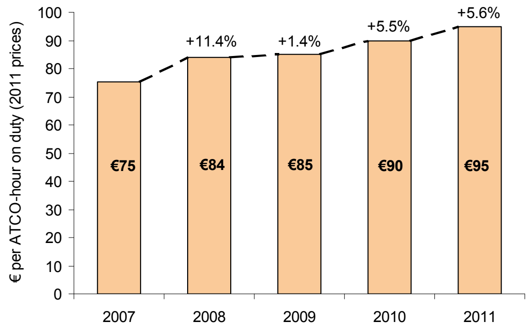


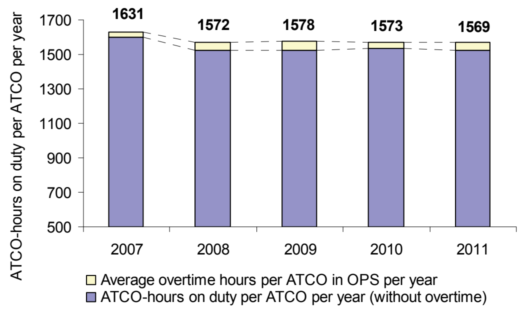
Trend in gate-to-gate ATCO-hour productivity



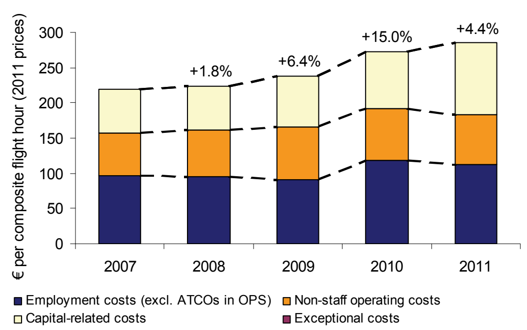


Trend in gate-to-gate employment costs per ATCO-hour

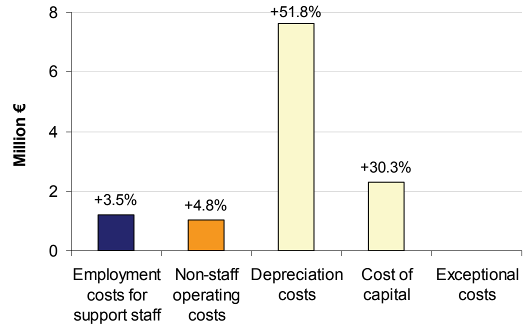




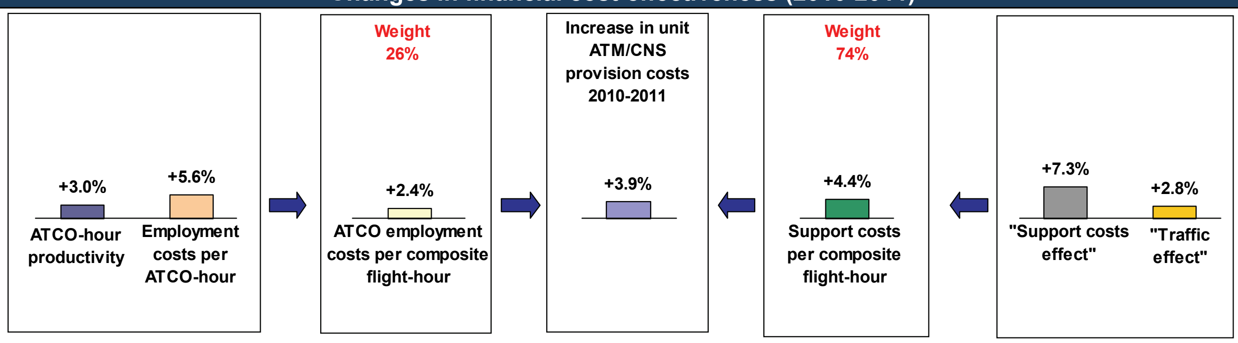
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

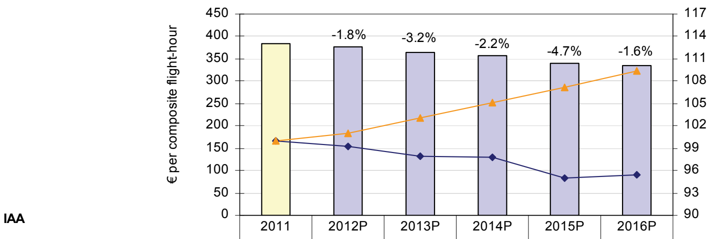


Changes in financial cost-effectiveness (2010-2011)

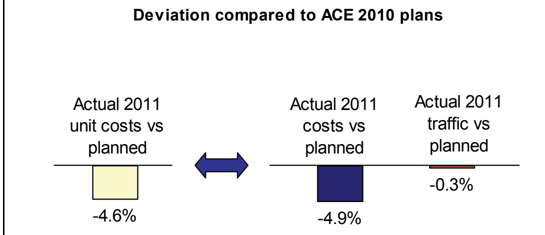


IAA (Ireland) – (€2011)

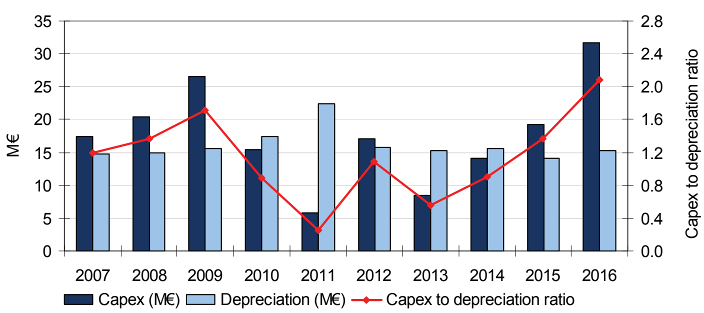
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

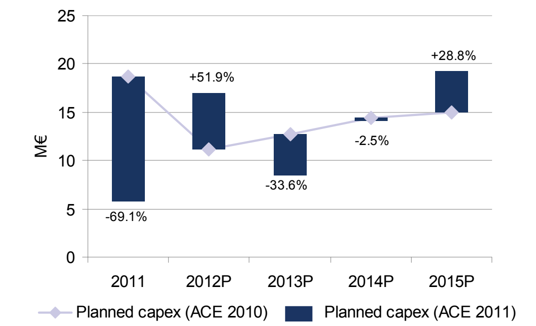


IAA	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	385	378	366	358	341	336
Gate-to-gate costs (index)	100	99	98	98	95	95
Composite flight-hours (index)	100	101	103	105	107	109



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 (All ACCs)*	C: 2003 (All ACCs)*	C: 2003 (All ACCs)*	C: 2003 (All ACCs)*
						2006				
						2007				
						2008				
						2009	All ACCs	All ACCs	All ACCs	All ACCs
			€23.0M			2010				
€70.0M						2011	All ACCs	All ACCs	All ACCs	
						2012				
	€12.0M					2013				All ACCs
						2014				
						2015				
						2016				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	COOPANS (BUILD 1) initiative, including the replacement of the current FDP and RDP systems	ATM	50.0	2006	2011
2	Radar Replacement	SUR	20.0	2006	2011
3	Commitment of Voice Communications System Switch	COM	12.0	2010	2016
4	COOPANS (BUILD 2) initiative	ATM	8.0	2010	2014
5	COOPANS (BUILD 3) initiative	ATM	8.0	2013	2016

LFV (Sweden) – Cost-effectiveness KPIs (€2011)

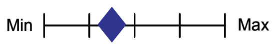
Contextual economic information

Exchange rate: 1 EUR = 9.022 SEK

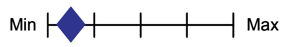
LFV represents 2.7% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

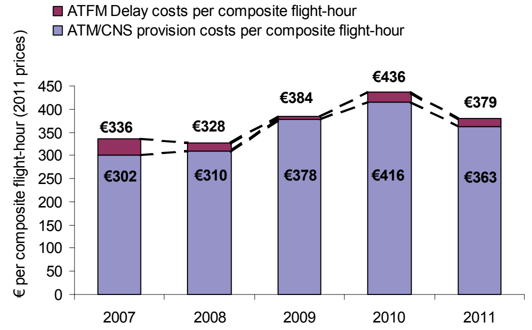
Aggregated complexity score:

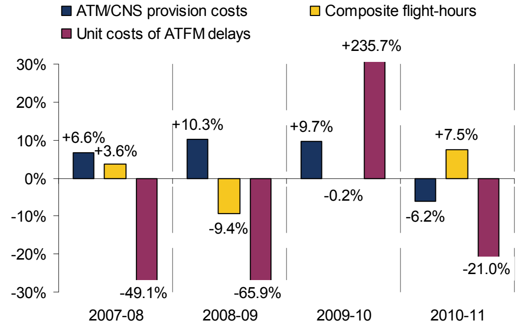


Seasonal traffic variability:

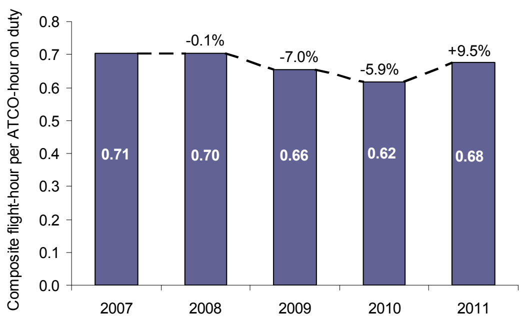


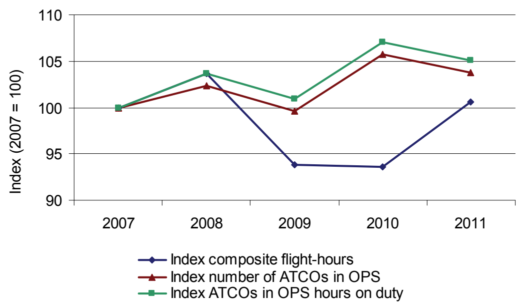
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



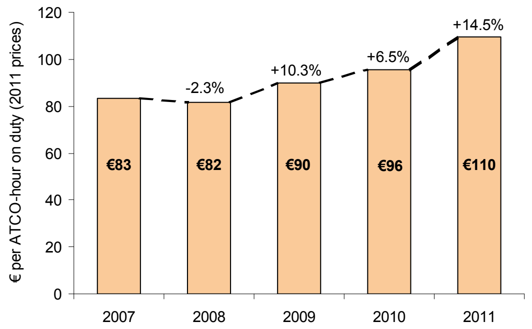


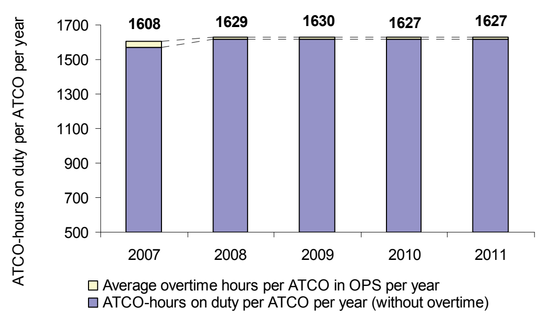
Trend in gate-to-gate ATCO-hour productivity



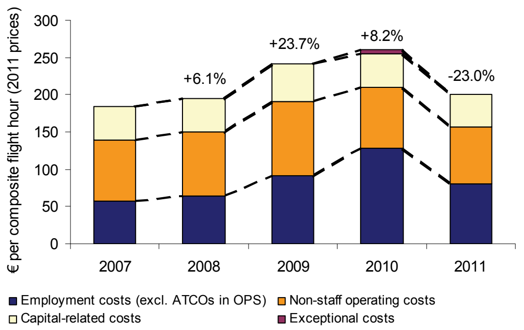


Trend in gate-to-gate employment costs per ATCO-hour

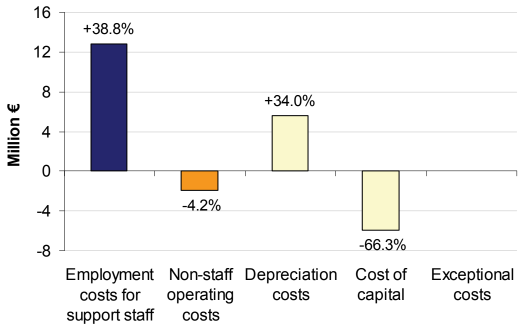




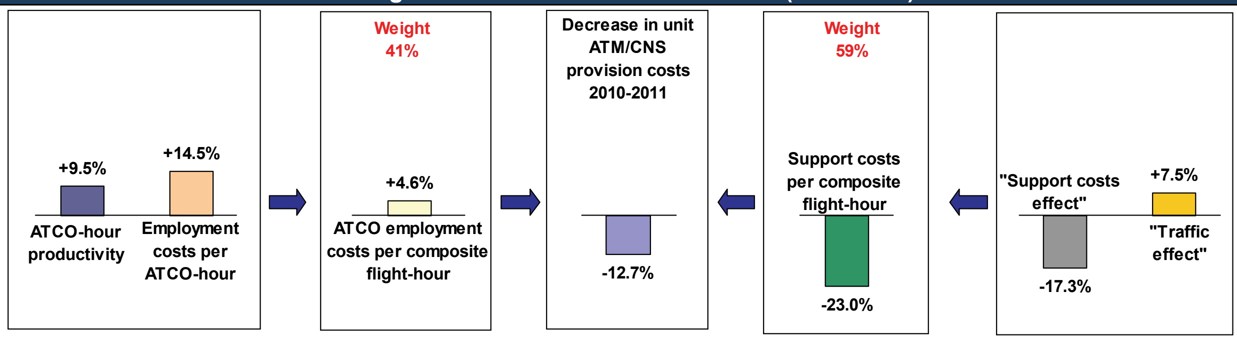
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

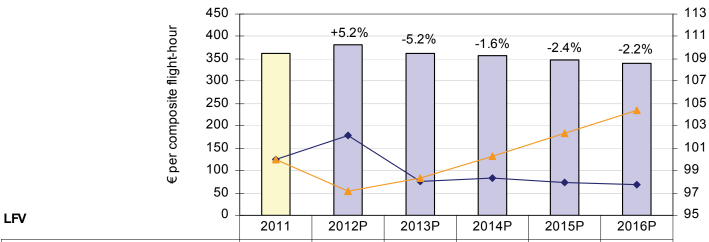


Changes in financial cost-effectiveness (2010-2011)

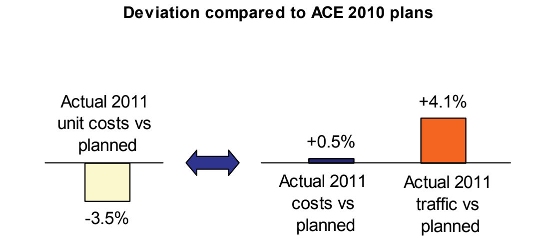


LFV (Sweden) – (€2011)

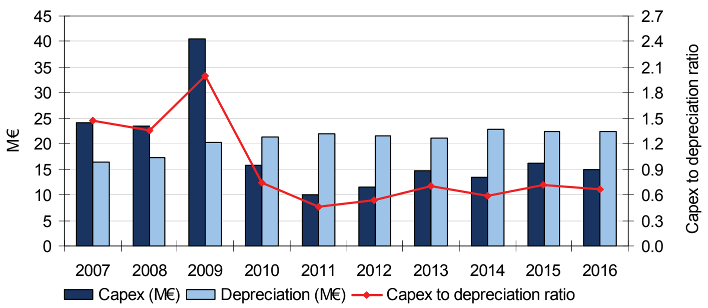
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

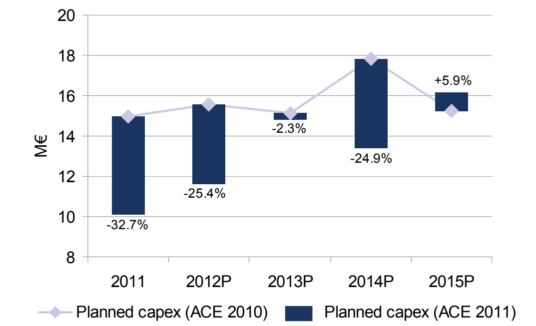


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	363	382	362	356	348	340
Gate-to-gate costs (index)	100	102	98	98	98	98
Composite flight-hours (index)	100	97	98	100	102	104



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: 2005 (All ACCs)*	RDPS C: 2009 (All ACCs)*	HMI C: 2005 (All ACCs)*	VCS C: 2010 (All ACCs)*
						2006				
						2007				
						2008				
				€11.2M		2009	All ACCs	All ACCs	All ACCs	
€80.0M						2010				All ACCs
	€5.5M (2007-2018)					2011				
			€7.3M			2012	Malmo			
						2013	Stockholm			
						2014				
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	ATM systems upgrades (COOPANS)	ATM	69.7	2006	2015
2	Training and support building in Malmo	Building	11.2	2007	2011
3	Surveillance Upgrade Program (WAM)	SUR	7.3	2009	2015
4	Implementation of the Remote Tower Centre (RTC) system	ATM	6.3	2010	2013
5	Commissioning of the new VHF Radio / UHF / 8,33kHz	COM	5.5	2007	2018

LGS (Latvia) – Cost-effectiveness KPIs (€2011)

Contextual economic information

Exchange rate: 1 EUR = 0.703 LVL

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

Operational conditions

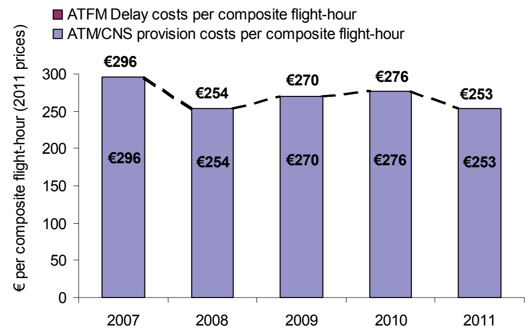
Aggregated complexity score:

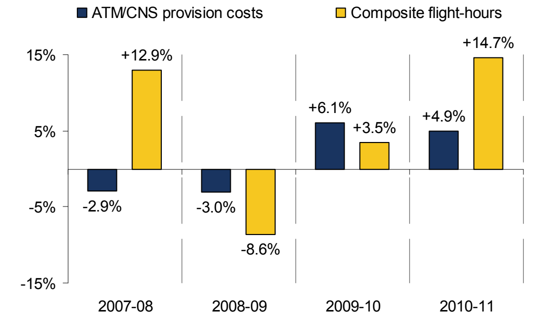
Min ◆ Max

Seasonal traffic variability:

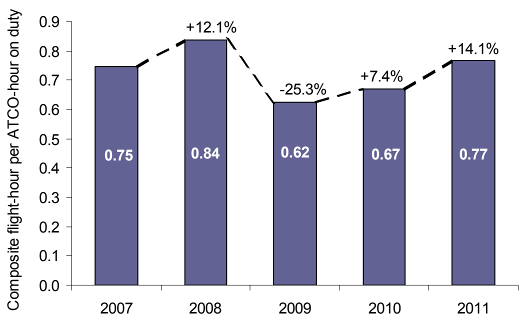
Min ◆ Max

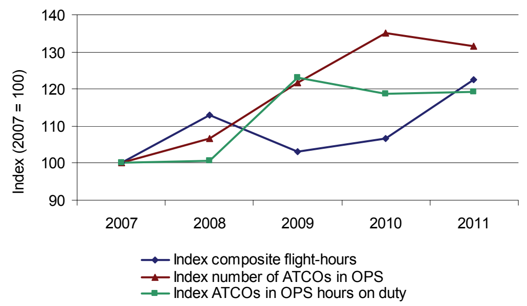
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



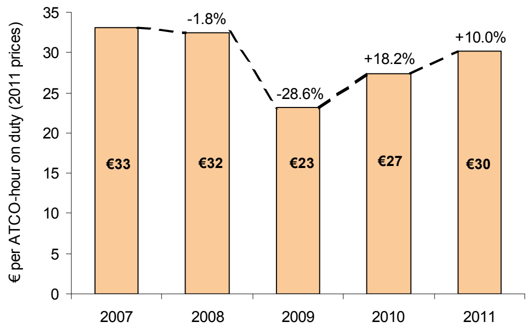


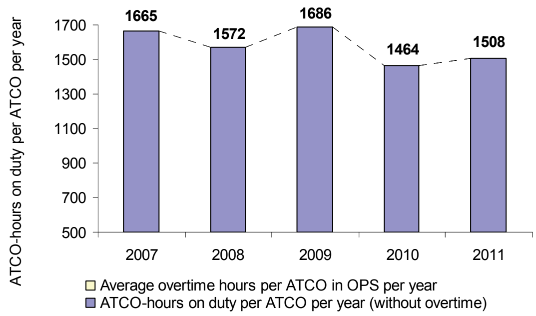
Trend in gate-to-gate ATCO-hour productivity



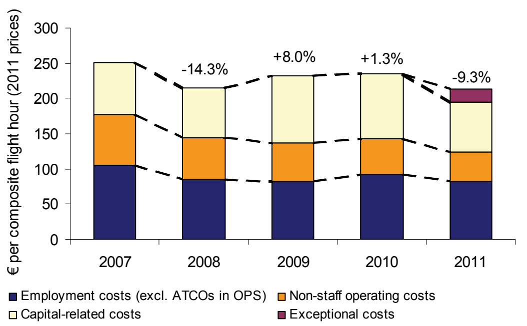


Trend in gate-to-gate employment costs per ATCO-hour

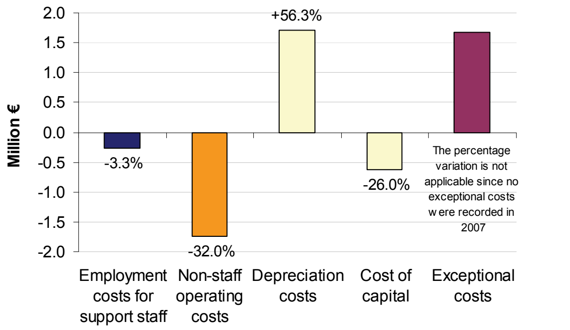




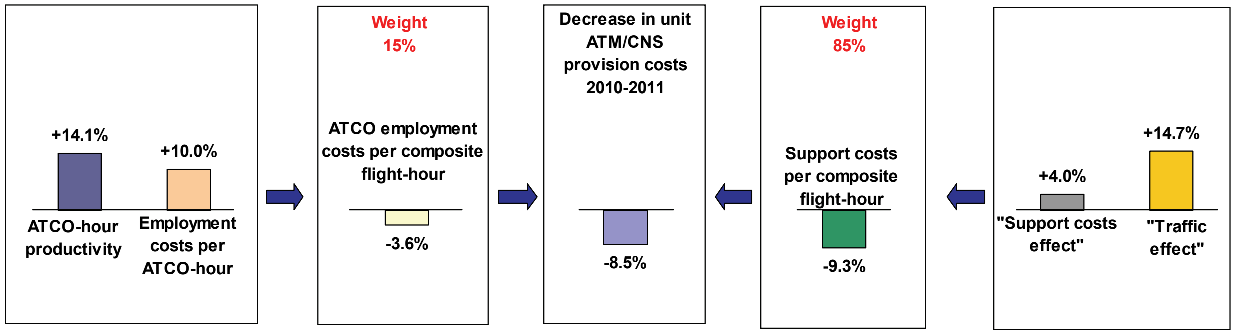
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

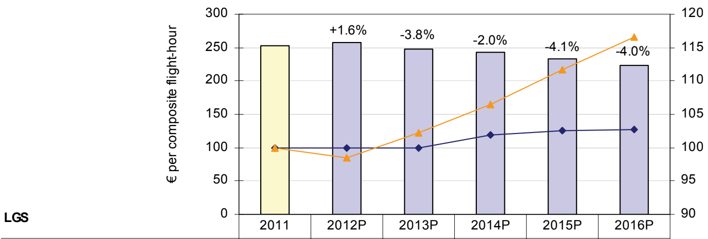


Changes in financial cost-effectiveness (2010-2011)

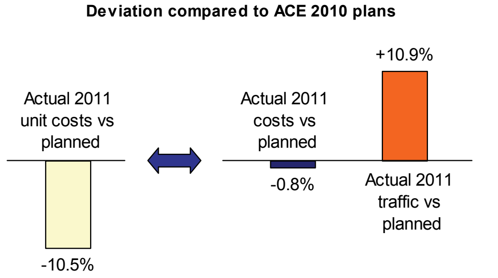


LGS (Latvia) – (€2011)

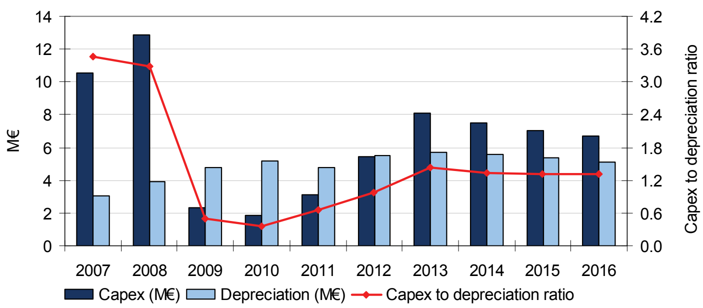
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

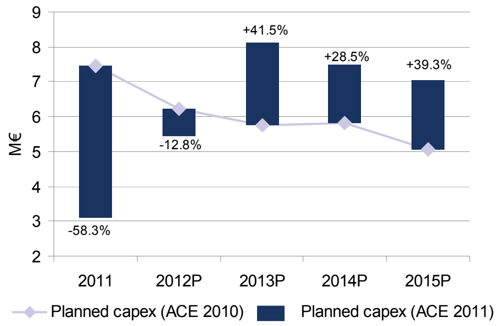


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	253	257	247	242	232	223
Gate-to-gate costs (index)	100	100	100	102	103	103
Composite flight-hours (index)	100	98	102	106	112	117



Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements

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<tr><th>C: 1999*</th><th>C: 1999*</th><th>C: 1999*</th><th>C: 2004*</th></tr>
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<tr><td rowspan="10">€15.2M</td><td></td><td></td><td rowspan="10">€13.4M</td><td></td><td></td><td>2007</td><td></td><td></td><td></td><td></td></tr>
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</table>

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Modernization of surveillance system for provision of ATS in Latvia (MSSAL project) - 3 radars exchange	SUR	9.2	2007	2009
2	Modernization of Automated ATC system (ATRACC)	ATM	5.4	2010	2016
3	PBN Implementation	ATM	4.1	2013	2016
4	Modernization of VHF in Riga FIR	COM	2.7	2012	2016
5	ILS/DME RWY18 Riga	NAV	2.3	2008	2009

LPS (Slovak Republic) – Cost-effectiveness KPIs (€2011)

Contextual economic information

Exchange rate: Slovak Republic is within the EURO Zone

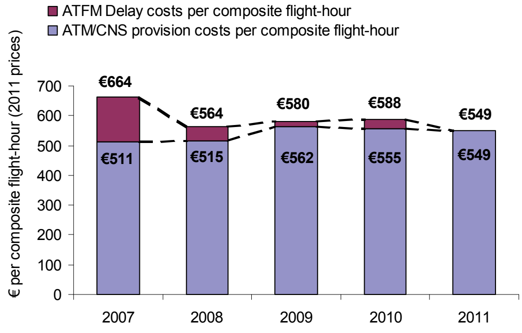
LPS represents 0.7% of European system gate-to-gate ATM/CNS provision costs

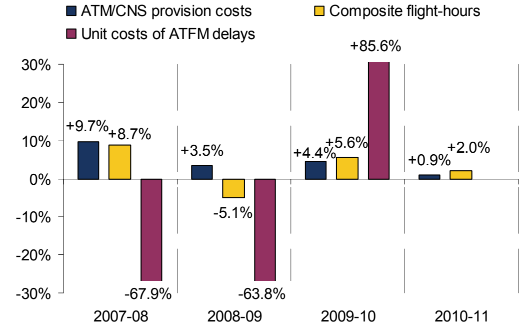
Operational conditions

Aggregated complexity score: Min Max

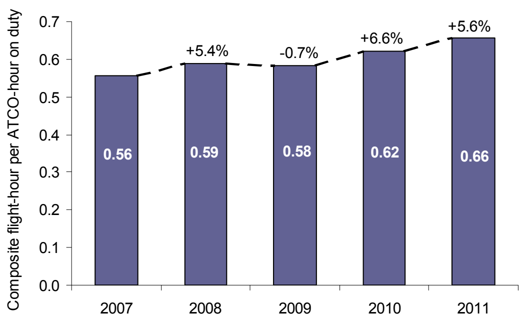
Seasonal traffic variability: Min Max

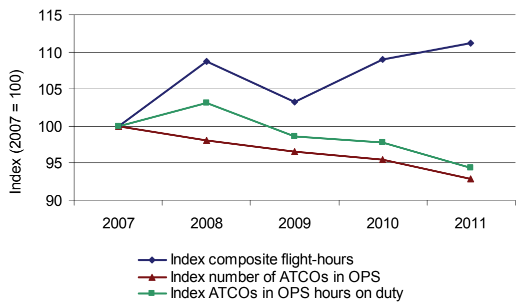
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



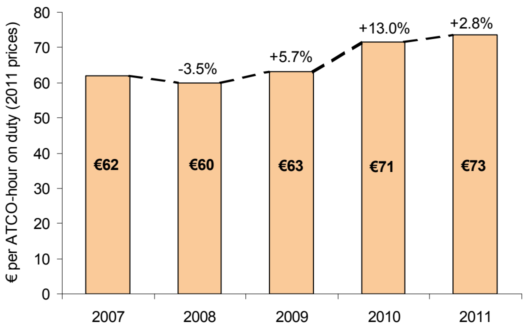


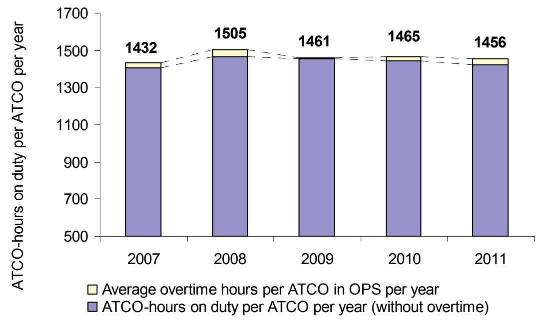
Trend in gate-to-gate ATCO-hour productivity



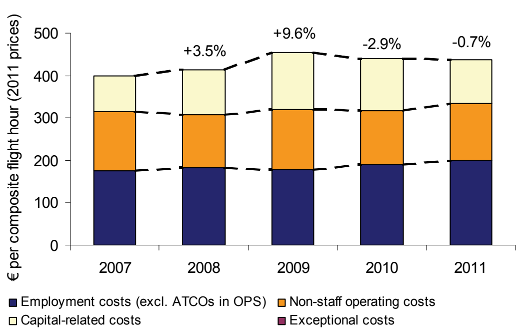


Trend in gate-to-gate employment costs per ATCO-hour

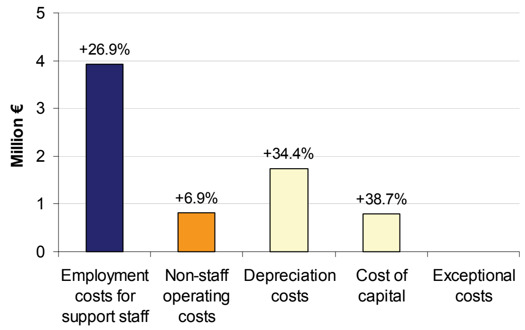




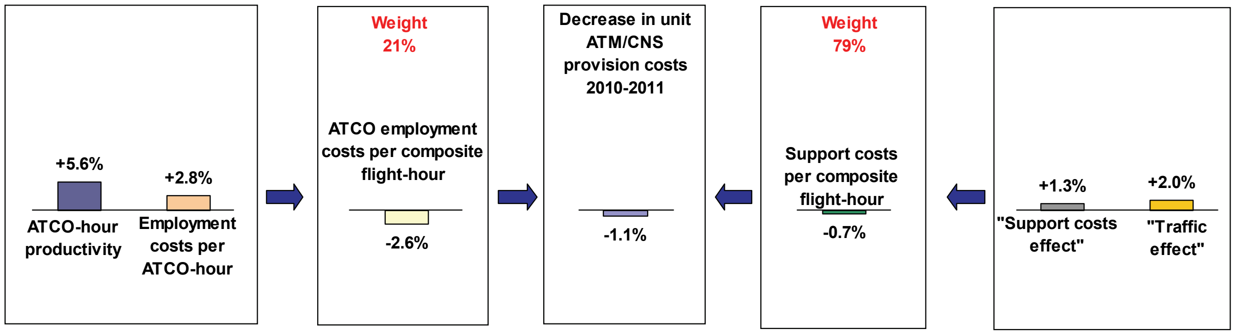
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

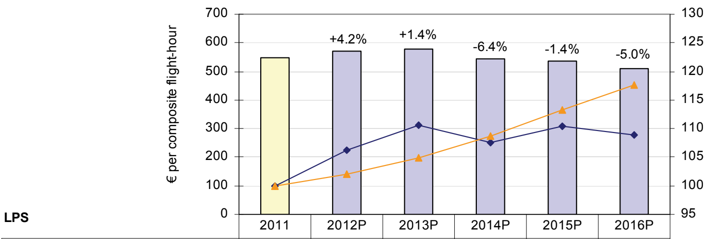


Changes in financial cost-effectiveness (2010-2011)



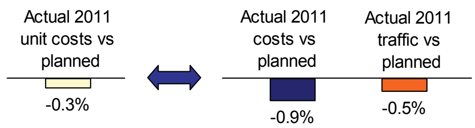
LPS (Slovak Republic) – (€2011)

Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

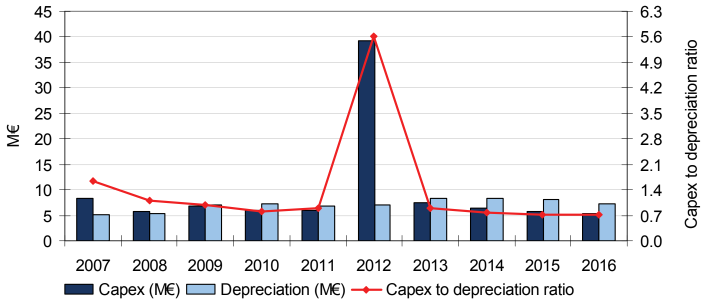


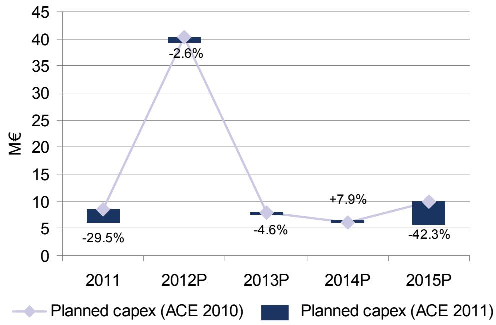
	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	549	572	580	543	535	508
Gate-to-gate costs (index)	100	106	111	107	110	109
Composite flight-hours (index)	100	102	105	109	113	118

Deviation compared to ACE 2010 plans



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: 1999*	RDPS C: 2005*	HMI C: 1999*	VCS C: 2009*
						2006				
						2007				
						2008				
						2009				
				€34.1M		2010				
			€5.2M			2011				
	€2.2M					2012				
€13.5M (2010-2018)						2013				
						2014				
						2015				
						2016				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Construction of the new ACC in Bratislava	Building	29.9	2007	2012
2	E2000-Upgrade	ATM	10.0	2014	2018
3	Construction of infrastructure related to the new MSSR in Mošnik	Building	4.2	2009	2013
4	Upgrade of communication system	COM	2.2	2012	2012
5	Upgrade of the E2000 PLCA system	ATM	2.2	2010	2012

LVNL (Netherlands) – Cost-effectiveness KPIs (€2011)

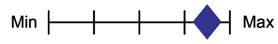
Contextual economic information

Exchange rate: Netherlands is within the EURO Zone

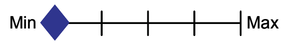
LVNL represents 2.1% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

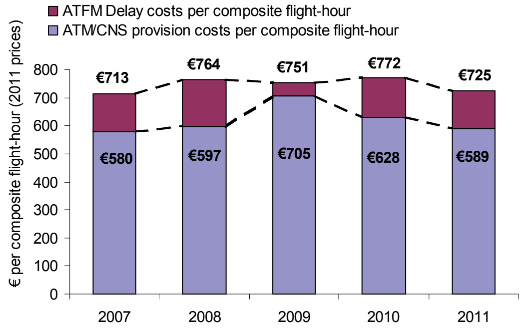
Aggregated complexity score:

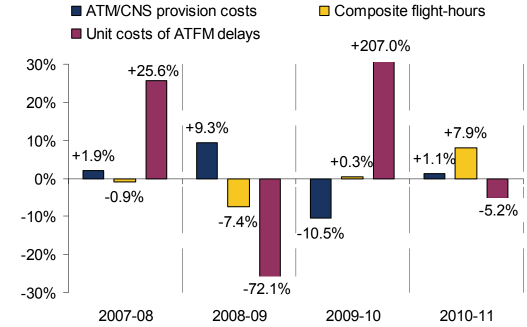


Seasonal traffic variability:

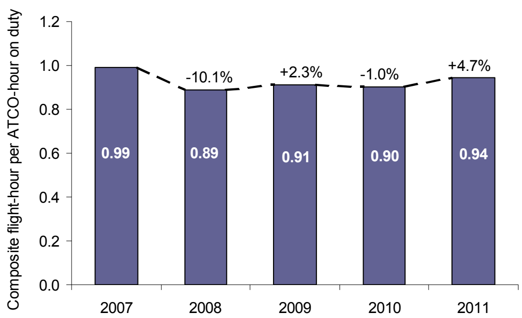


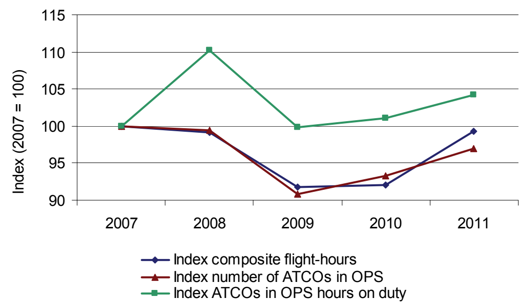
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



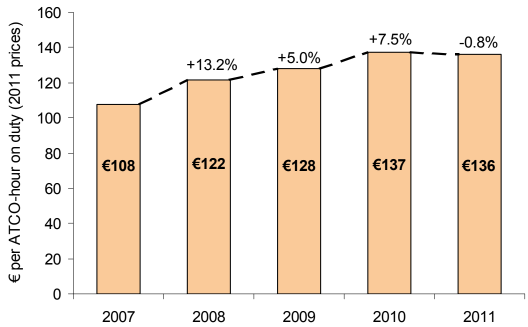


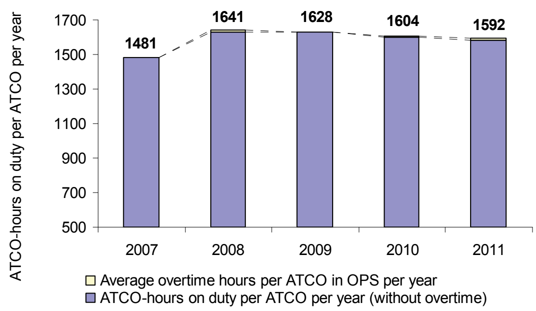
Trend in gate-to-gate ATCO-hour productivity



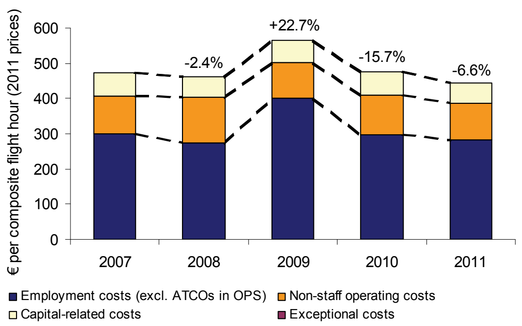


Trend in gate-to-gate employment costs per ATCO-hour

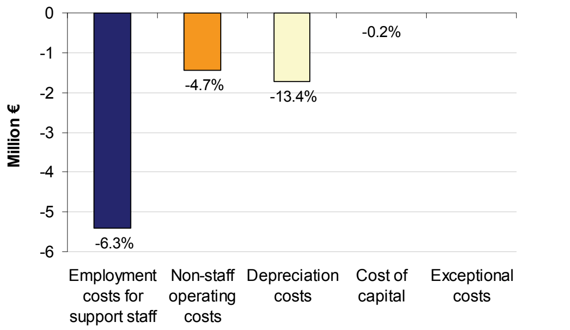




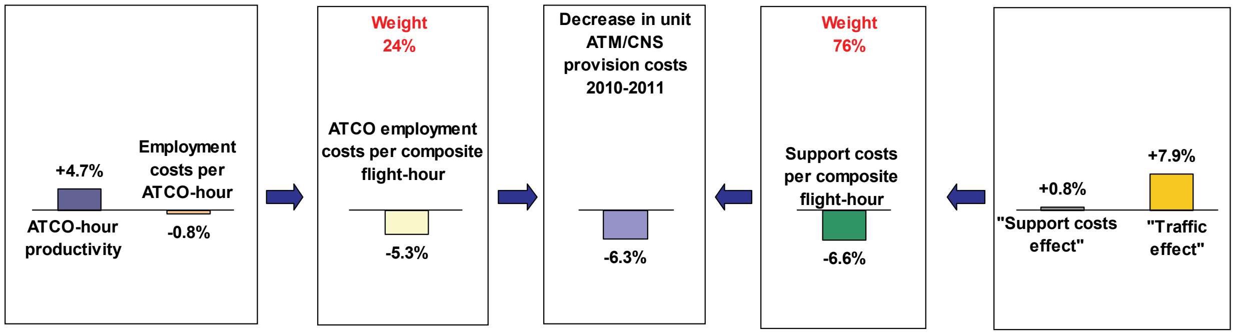
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

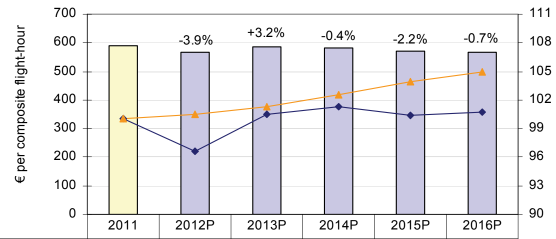


Changes in financial cost-effectiveness (2010-2011)

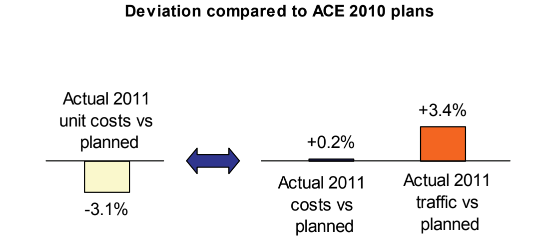


LVNL (Netherlands) – (€2011)

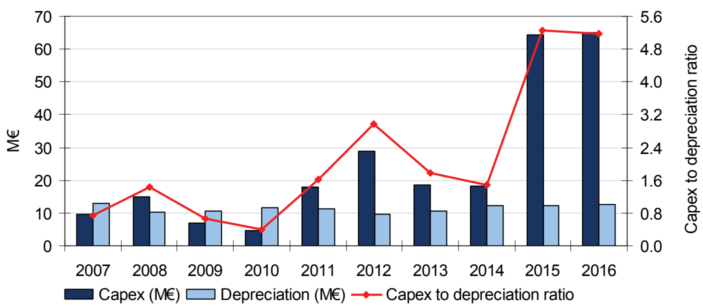
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

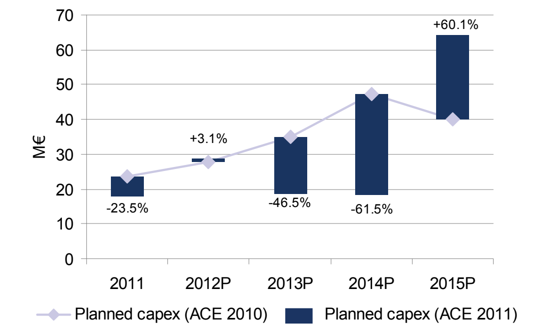


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	589	566	584	582	569	565
Gate-to-gate costs (index)	100	97	101	101	100	101
Composite flight-hours (index)	100	100	101	103	104	105



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: 1998*	RDPS C: 1998*	HMI C: 1998*	VCS C: 1988* /upgraded in 1995
						2006				
						2007				
						2008			Upgrade	
€130.6M (2009-2018)			€6.0M		€51.4M	2009		Upgrade		
				€33.0M		2010				
	€9.8M					2011				
						2012		Replacement		
						2013				
						2014				Replacement
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Replacement AAA	ATM	96.0	2011	2018
2	Other investments	Other	47.9	2009	2015
3	VCS	ATM	25.0	2009	2014
4	Adjustment facilities	Building	25.0	2015	2015
5	Fallback air-ground | ground-ground voice	COM	7.2	2013	2015

MATS (Malta) – Cost-effectiveness KPIs (€2011)

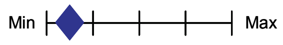
Contextual economic information

Exchange rate: Malta is within the EURO Zone

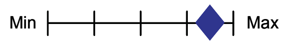
MATS represents 0.2% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

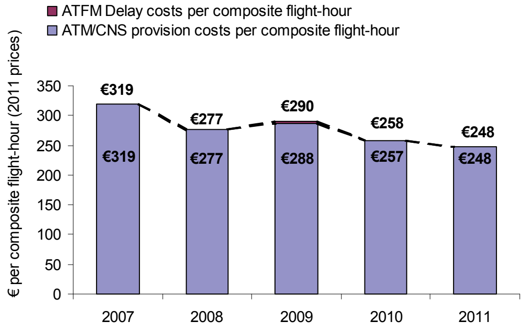
Aggregated complexity score:

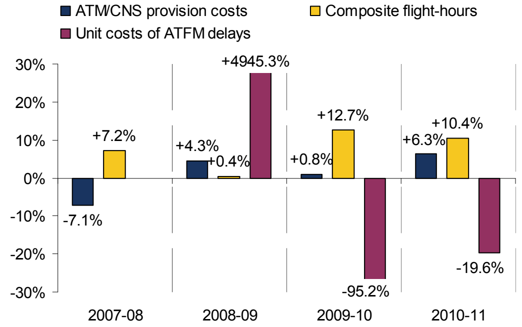


Seasonal traffic variability:

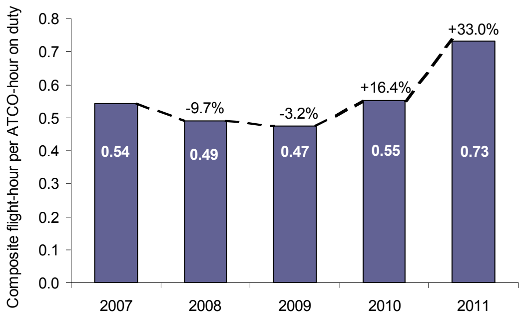


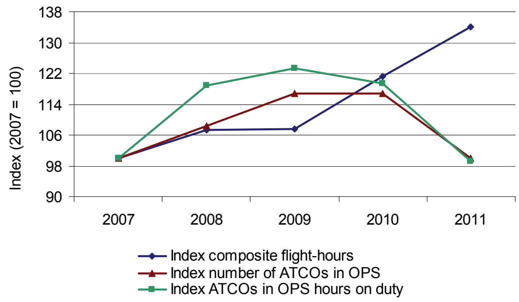
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



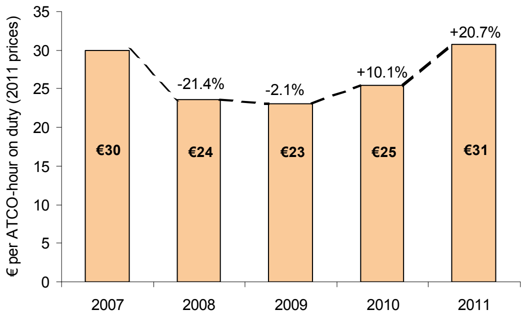


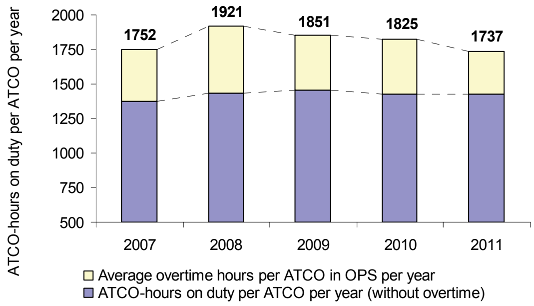
Trend in gate-to-gate ATCO-hour productivity



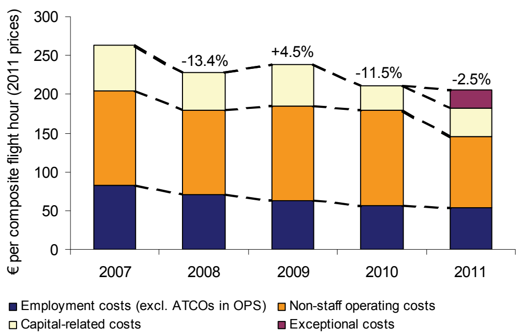


Trend in gate-to-gate employment costs per ATCO-hour

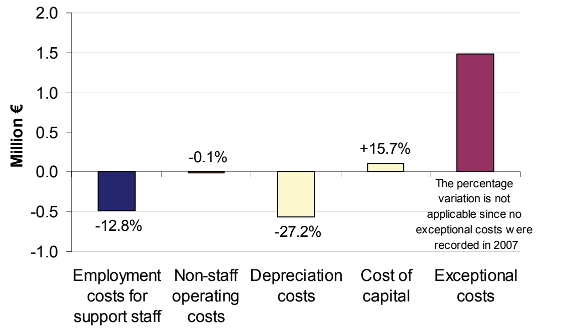




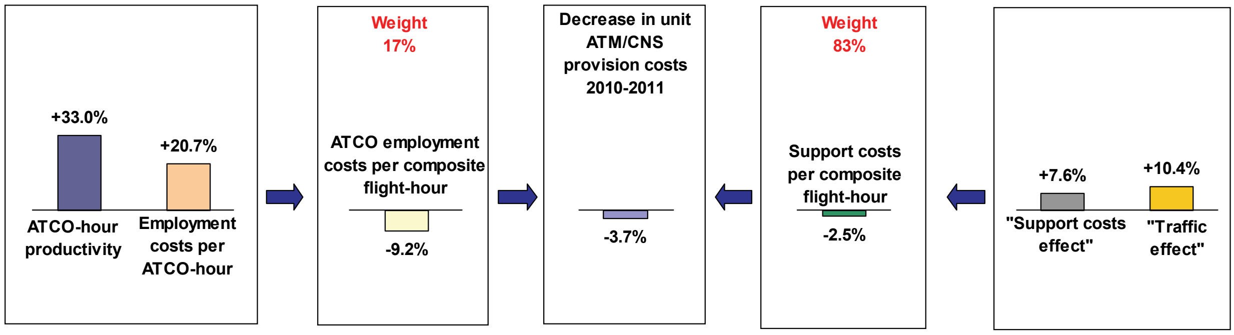
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

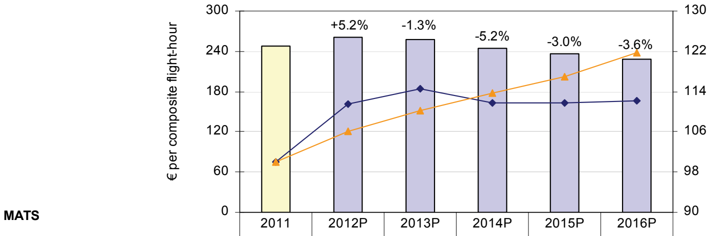


Changes in financial cost-effectiveness (2010-2011)

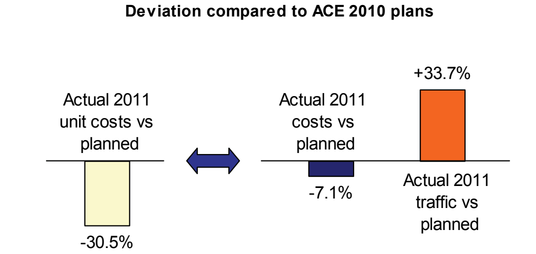


MATS (Malta) – (€2011)

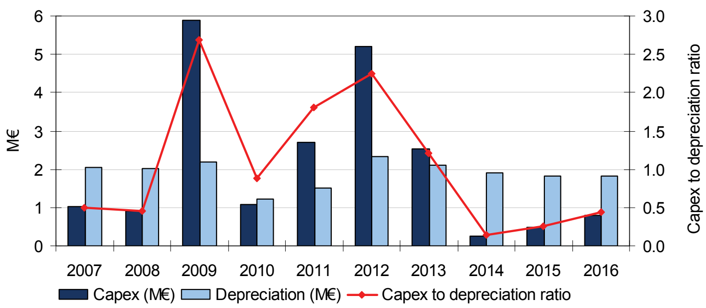
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

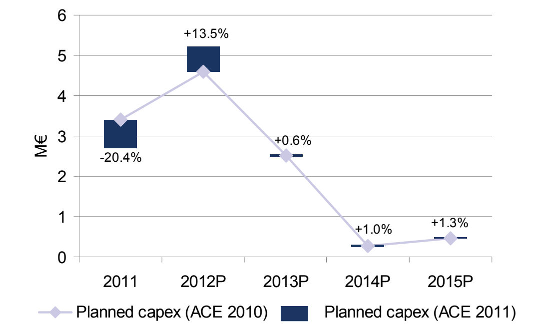


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	248	261	257	244	237	228
Gate-to-gate costs (index)	100	112	115	112	112	112
Composite flight-hours (index)	100	106	110	114	117	122



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: 1996*	C: 1996*	C: 1996*	C: 1996*
						2006				
						2007				
						2008				
						2009				
						2010				
			€4.8M	€1.3M		2011				
€7.5M		€0.26M				2012				
						2013				
						2014				
						2015				
						2016				

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	ATS system upgrade	ATM	6.5	2011	2013
2	Purchase and installation of MSSR (1)	SUR	2.4	2009	2013
3	Purchase and installation of MSSR (2)	SUR	2.4	2010	2013
4	VCS system upgrade	ATM	1.0	2011	2013
5	Improvements to premises	Building	0.7	2010	2012

M-NAV (F.Y.R. Macedonia) – Cost-effectiveness KPIs (€2011)

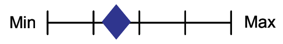
Contextual economic information

Exchange rate: 1 EUR = 61.133 MKD

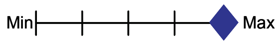
M-NAV represents 0.1% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

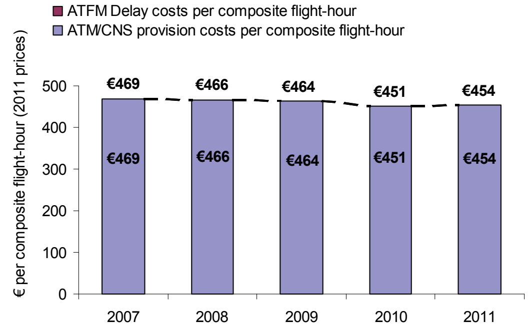
Aggregated complexity score:

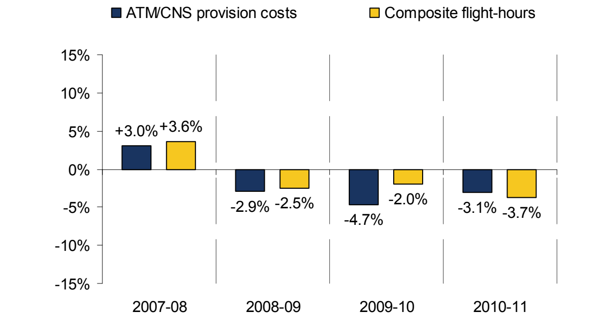


Seasonal traffic variability:

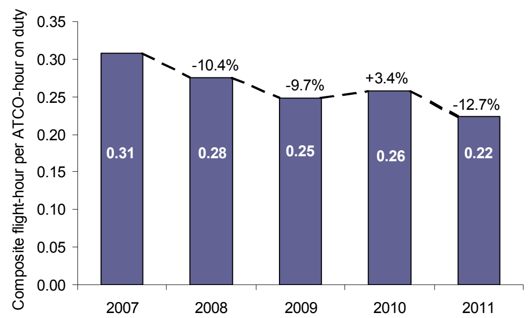


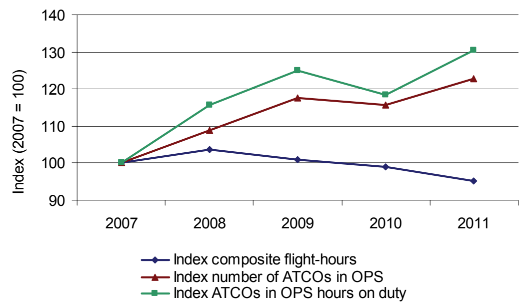
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



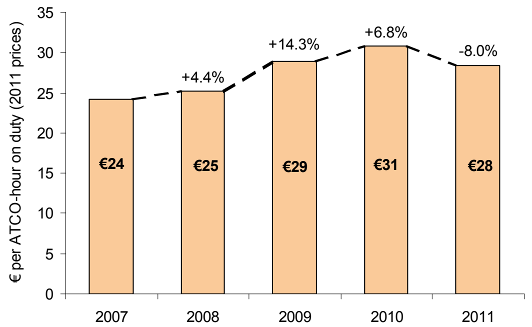


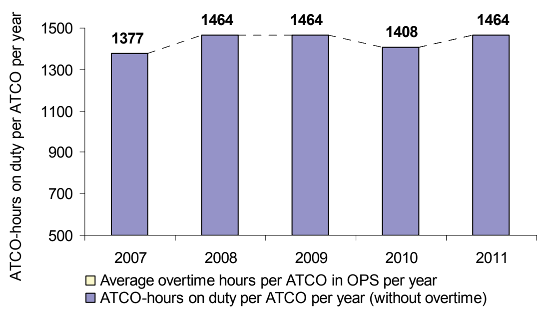
Trend in gate-to-gate ATCO-hour productivity



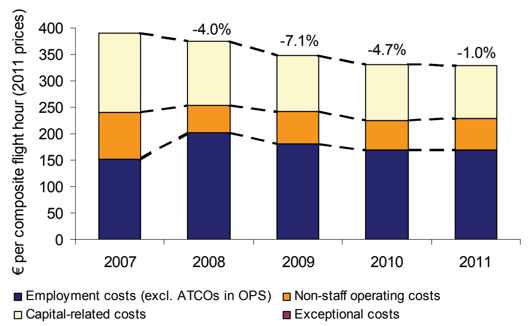


Trend in gate-to-gate employment costs per ATCO-hour

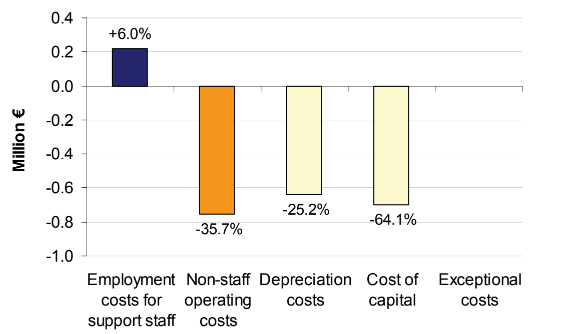




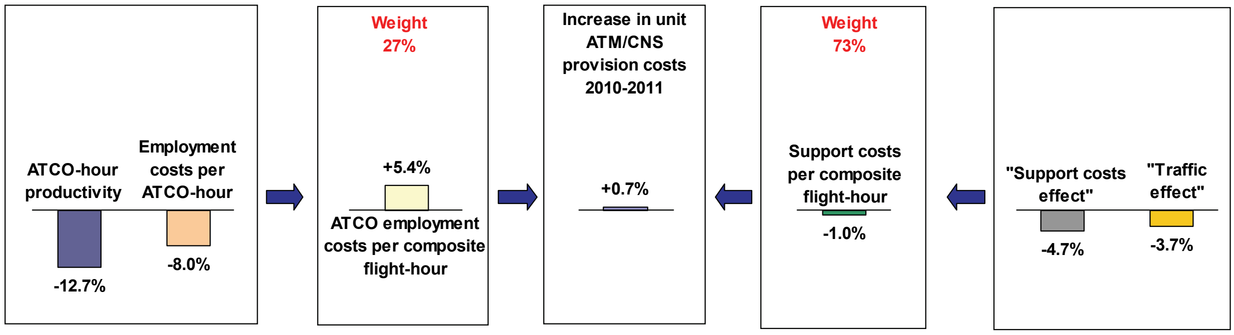
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

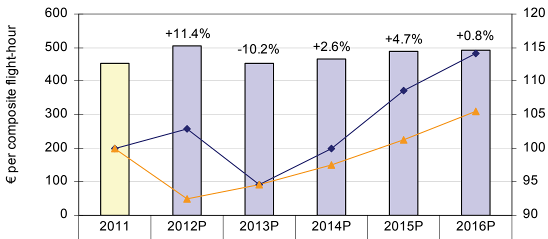


Changes in financial cost-effectiveness (2010-2011)

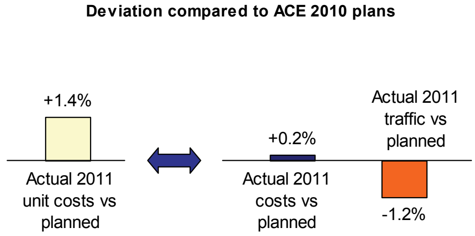


M-NAV (F.Y.R. Macedonia) – (€2011)

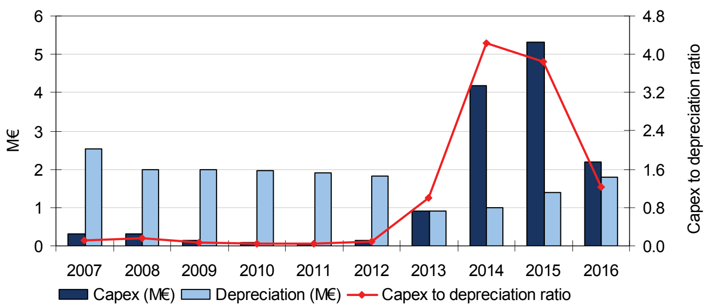
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

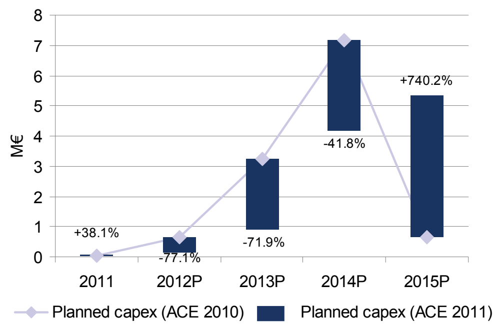


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	454	506	454	466	488	492
Gate-to-gate costs (index)	100	103	95	100	109	114
Composite flight-hours (index)	100	92	95	97	101	105



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: 2003*
						2006				
						2007				
						2008				
						2009				
						2010				
						2011				
						2012				
€7.6M	€1.1M		€2.9M	€0.7M		2013				
						2014				
		€0.1M				2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Procurement of new ATC systems	ATM	6.0	2014	2016
2	Mode-S enhanced surveillance ground station implementation	SUR	2.2	2013	2015
3	Purchase of new VHF radio system and MW link	COM	0.8	2013	2015
4	Upgrade of MSSR to enhance Mode-S radar	SUR	0.7	2014	2015
5	Commissioning of the new system for commutation	ATM	0.7	2015	2016

MoldATSA (Moldova) – Cost-effectiveness KPIs (€2011)

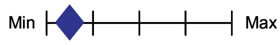
Contextual economic information

Exchange rate: 1 EUR = 15.930 MDL

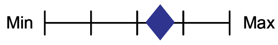
MoldATSA represents 0.1% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

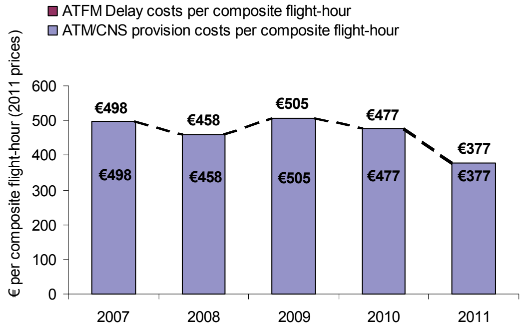
Aggregated complexity score:

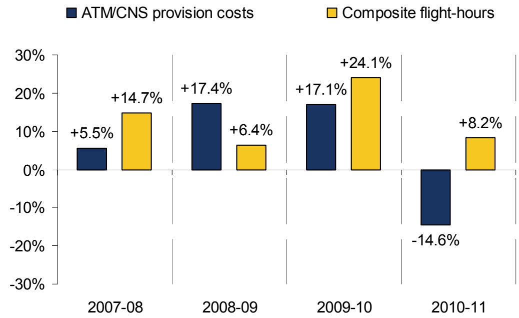


Seasonal traffic variability:

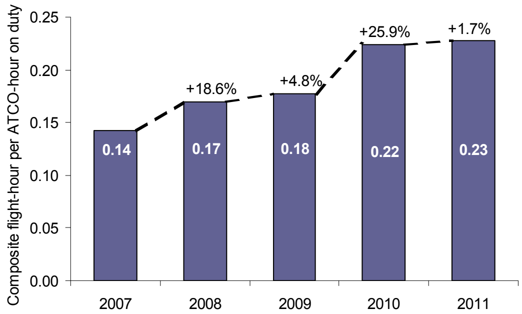


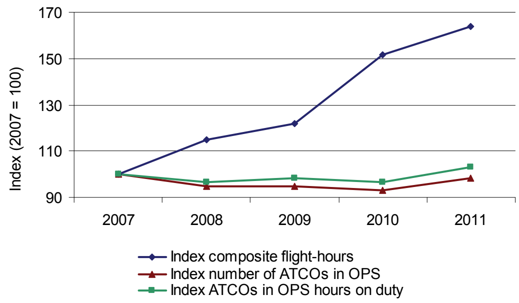
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



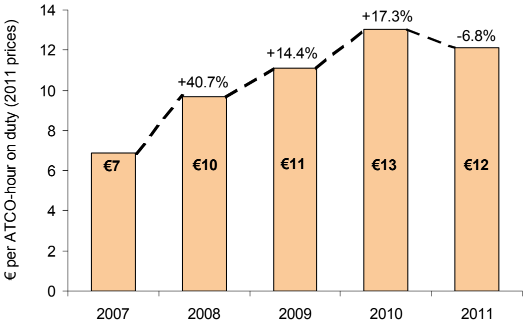


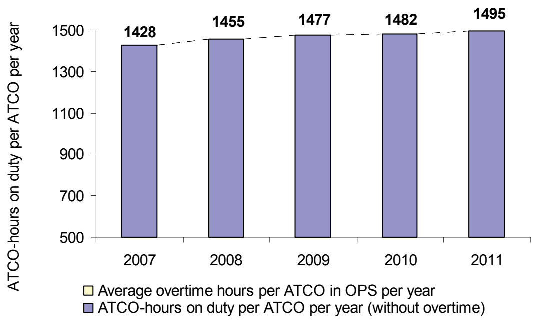
Trend in gate-to-gate ATCO-hour productivity



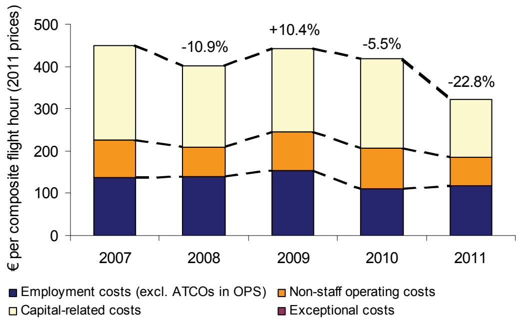


Trend in gate-to-gate employment costs per ATCO-hour

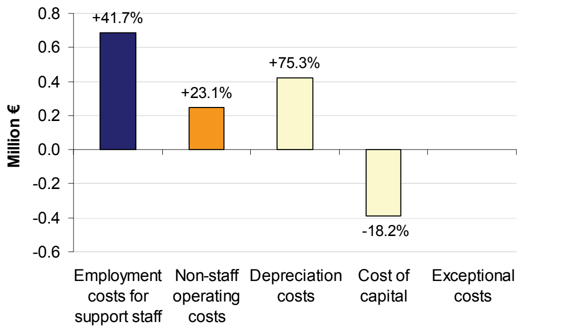




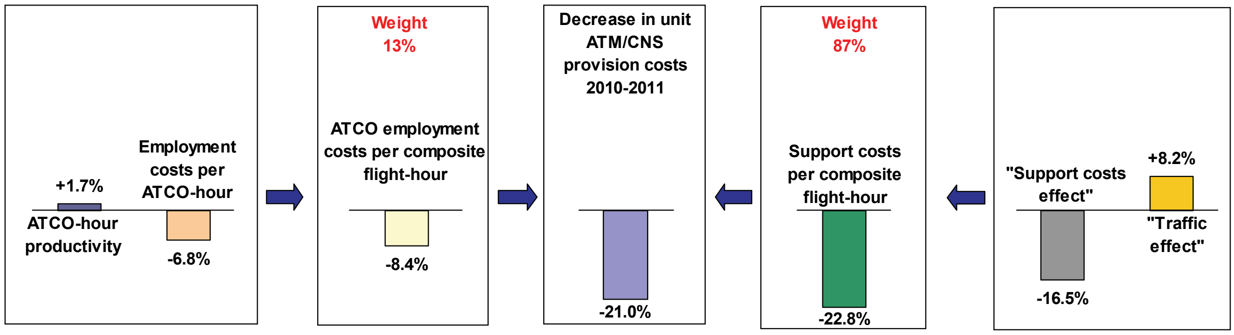
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

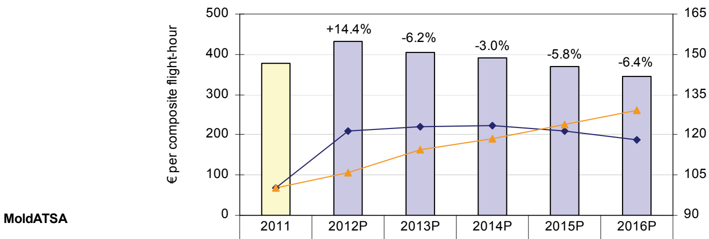


Changes in financial cost-effectiveness (2010-2011)

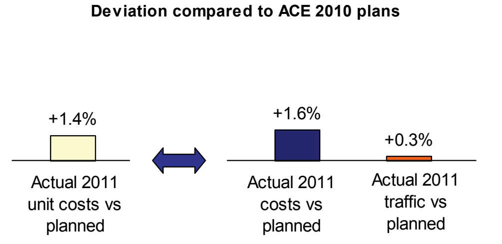


MoldATSA (Moldova) – (€2011)

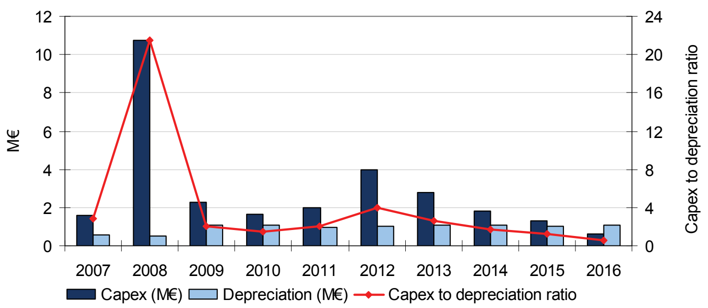
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

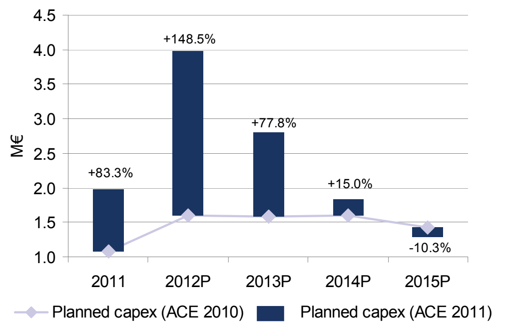


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	377	431	404	392	369	345
Gate-to-gate costs (index)	100	121	123	123	121	118
Composite flight-hours (index)	100	106	115	119	124	129



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: 1998*	RDPS C: 1998*	HMI C: 1998*	VCS C: 2001*
						2006				
						2007				
						2008				
						2009				
	€1.1M				€0.9M**	2010				Upgrade
€4.6M						2011				
						2012				
			€1.5M (2013-2017)	€5.1M (2013-2020)		2013	Replacement	Replacement	Replacement	Replacement
		€1.0M				2014				
						2015				
						2016				

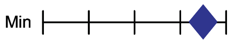
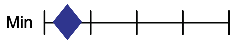
** The amount provided under "Other" (i.e. €0.5M) relates to MET

* C = Commissioning   Upgrade   Replacement

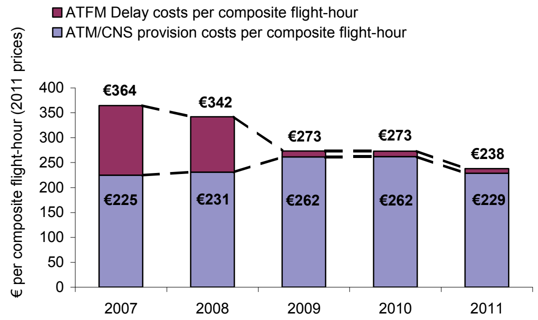
Focus on the top five capex projects

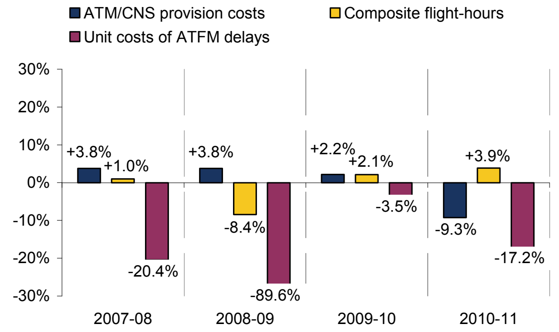
Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Construction and modernisation Tower building in Chisinau	Building	5.1	2013	2020
2	Replacement of FDP, RDP and HMI systems (Si ATM Sweden)	ATM	3.0	2011	2013
3	Implementation of multilateration equipment	SUR	1.5	2013	2017
4	Replacement of VCS (VCS 2030)	ATM	0.8	2011	2013
5	Commissioning of DVOR/DME units	NAV	0.6	2014	2014

MUAC (Maastricht) – Cost-effectiveness KPIs (€2011)

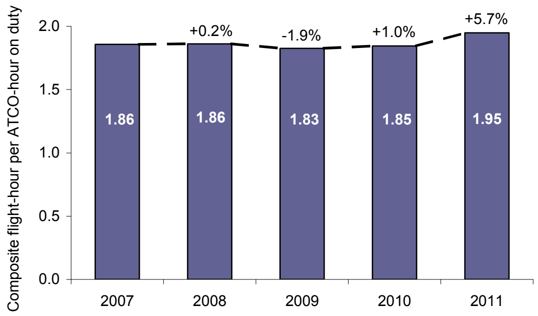
Contextual economic information	Operational conditions	
Exchange rate: Maastricht is within the EURO Zone MUAC represents 1.6% of European system gate-to-gate ATM/CNS provision costs	Aggregated complexity score: 	Seasonal traffic variability: 

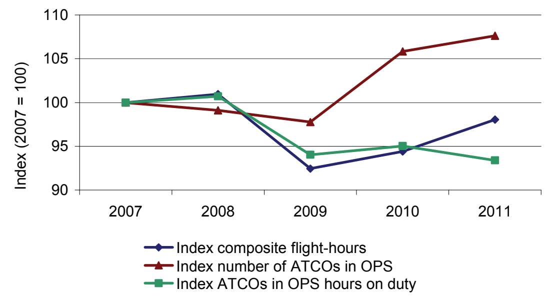
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



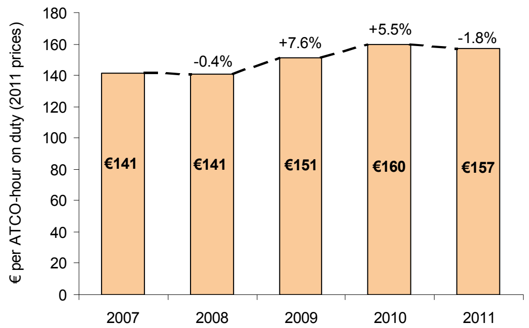


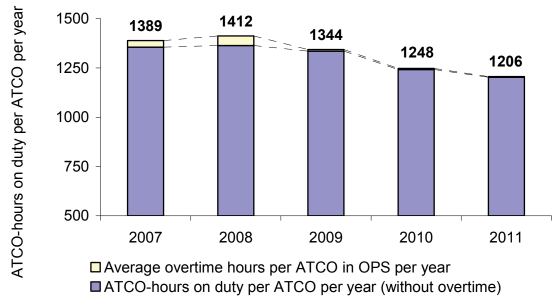
Trend in gate-to-gate ATCO-hour productivity



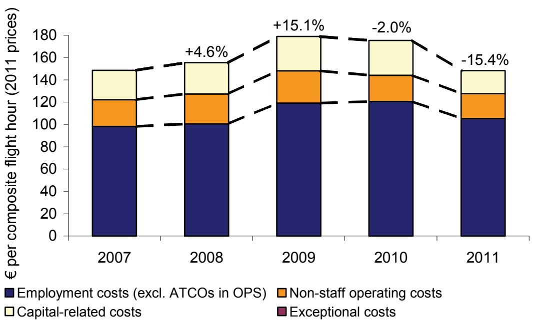


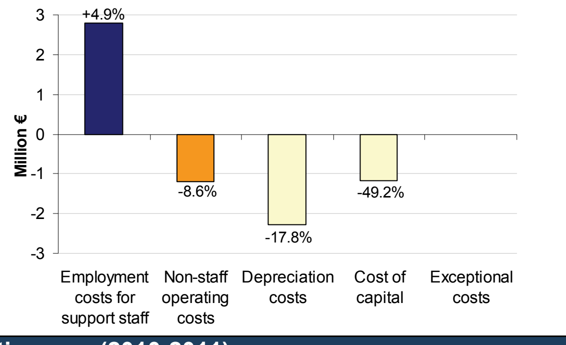
Trend in gate-to-gate employment costs per ATCO-hour



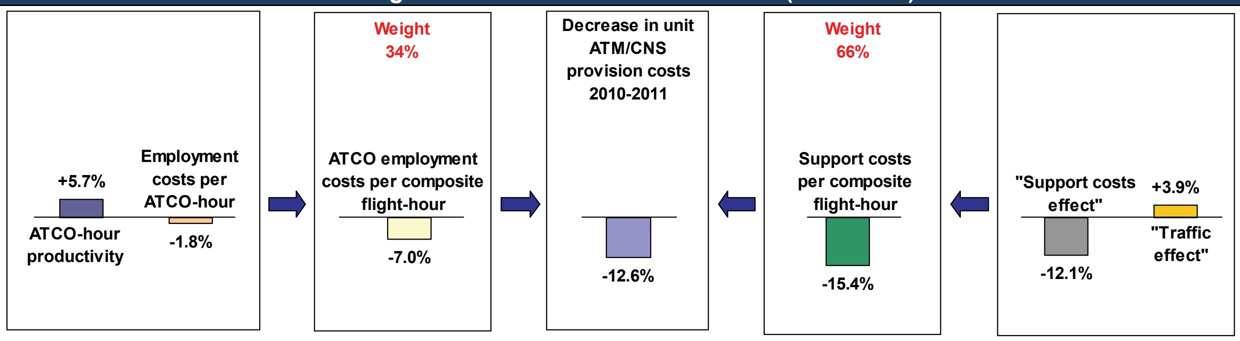


Trend in support costs per composite flight-hour	Changes in components of support costs (2007-2011)



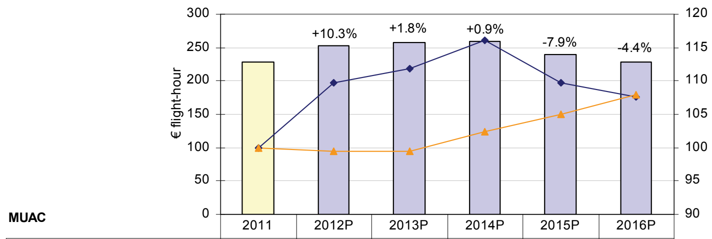


Changes in financial cost-effectiveness (2010-2011)

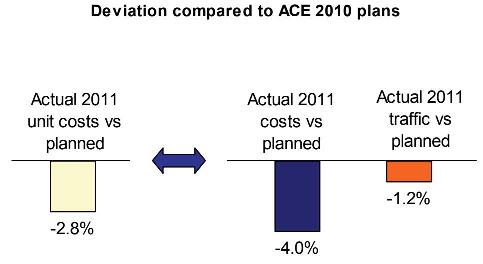


MUAC (Maastricht) – (€2011)

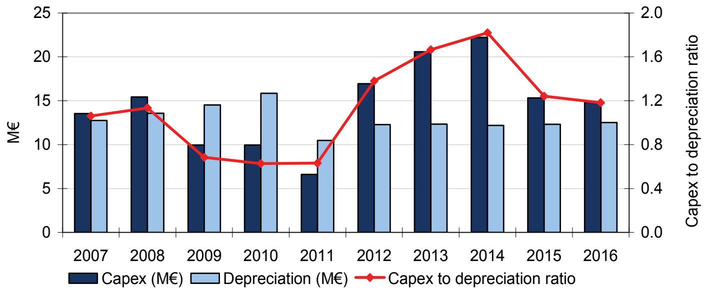
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

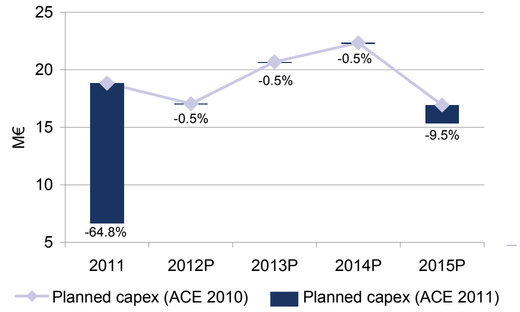


	2011	2012P	2013P	2014P	2015P	2016P
En-route unit ATM/CNS costs	229	252	257	259	239	228
En-route costs (index)	100	110	112	116	110	108
Flight-hours (index)	100	100	100	102	105	108



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: 2008*	RDPS C: 2008*	HMI C: 2002*	VCS C: 1995*
						2006				
						2007				
						2008				
						2009				
						2010				
€115.1M (2003-2016)				€22.1M		2011				
						2012				
						2013				
					€30.7M	2014				
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

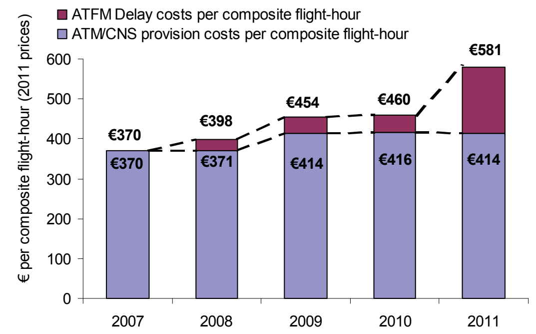
Focus on the top five capex projects

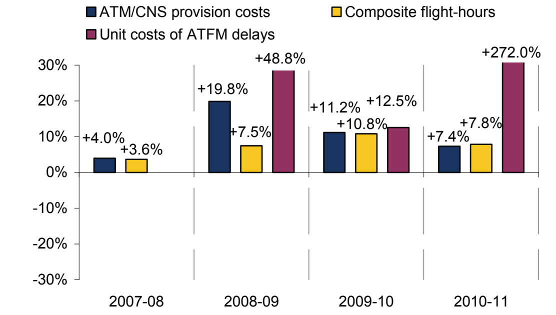
Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Procurement of new FDPS	ATM	50.0	2003	2011
2	Other (i.e. 60% IT systems, 28% building, 5% household, 6% Misc)	Other	30.7	2012	2016
3	Implementation of the new CWP system	ATM	22.3	2012	2016
4	Renewal of infrastructure (i.e. parking slots and a building extension)	Building	18.5	2012	2014
5	Replacement of the VCS system	ATM	13.3	2011	2016

NATA Albania (Albania) – Cost-effectiveness KPIs (€2011)

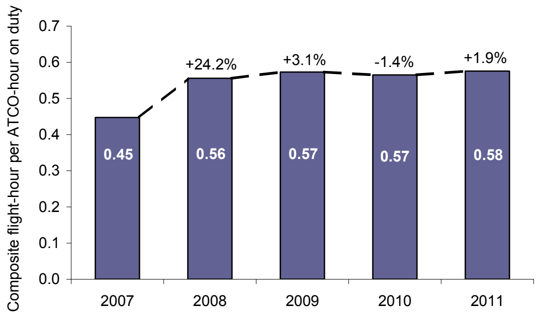
Contextual economic information	Operational conditions	
Exchange rate: 1 EUR = 139.822 LEK NATA Albania represents 0.3% of European system gate-to-gate ATM/CNS provision costs	Aggregated complexity score: Min Max	Seasonal traffic variability: Min Max

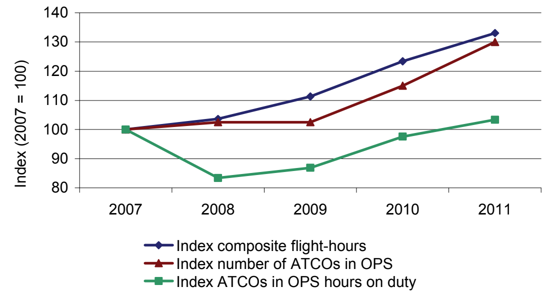
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



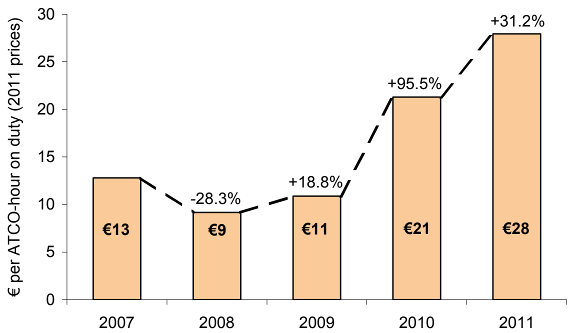


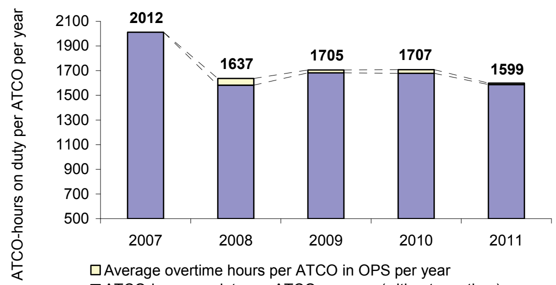
Trend in gate-to-gate ATCO-hour productivity



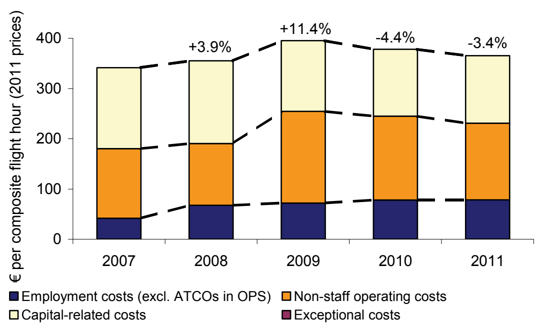


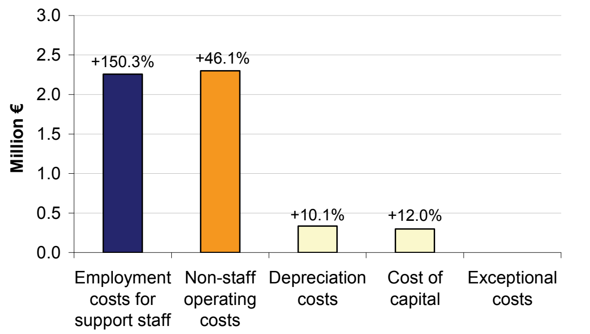
Trend in gate-to-gate employment costs per ATCO-hour



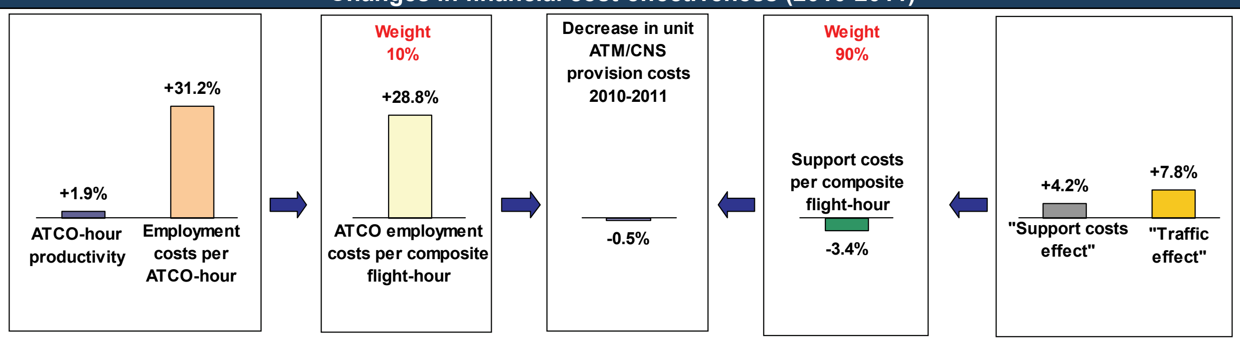


Trend in support costs per composite flight-hour	Changes in components of support costs (2007-2011)



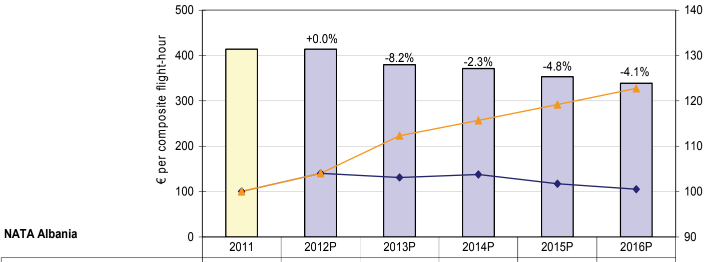


Changes in financial cost-effectiveness (2010-2011)

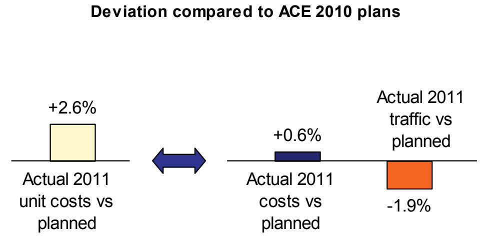


NATA Albania (Albania) – (€2011)

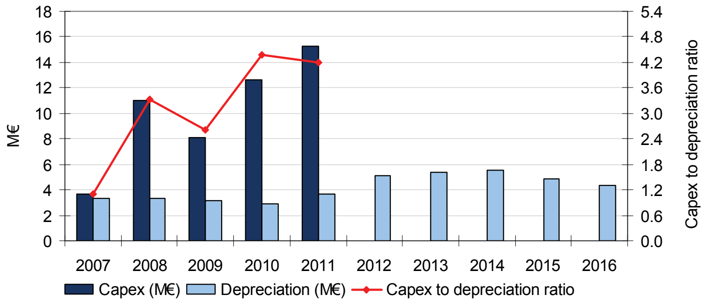
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

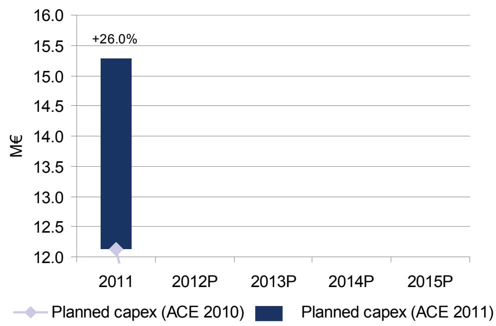


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	414	414	380	371	353	339
Gate-to-gate costs (index)	100	104	103	104	102	100
Composite flight-hours (index)	100	104	112	116	119	123



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: 2004*	C: 2004*	C: 2004*	C: 2008*
						2006				
						2007				
€17.7M	€2.0M			€13.5M		2008				
						2009				
		€1.6M			€0.3M	2010				
						2011				
						2012				
						2013				
						2014				
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €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	Building	13.5	2008	2011
3	Remote radio facility (RXTX radio for VHF)	COM	2.0	2008	2012
4	Purchase of a Voice Communication System	ATM	1.8	2008	2011
5	Purchase and installation of the ILS equipment.	NAV	1.6	2010	2011

NATS Continental (United Kingdom) – Cost-effectiveness KPIs (€2011)

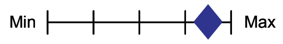
Contextual economic information

Exchange rate: 1 EUR = 0.868 GBP

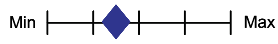
NATS Continental represents 8.7% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

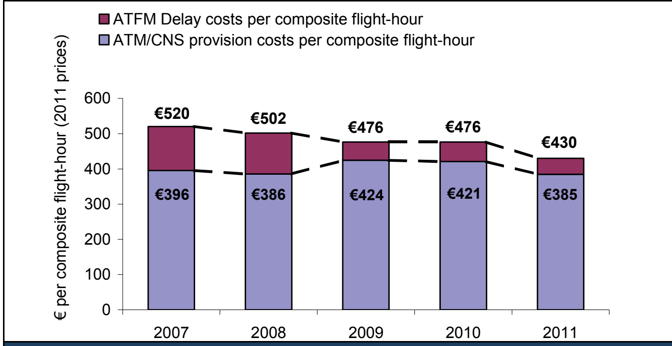
Aggregated complexity score:

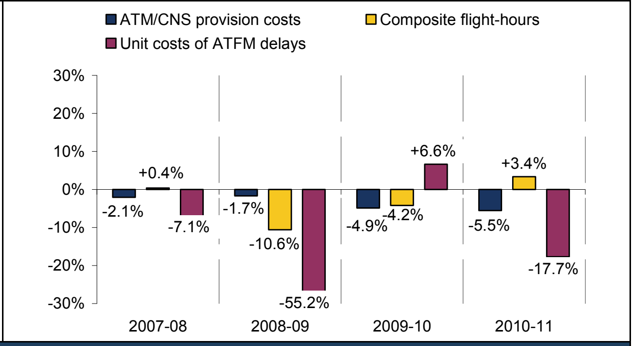


Seasonal traffic variability:

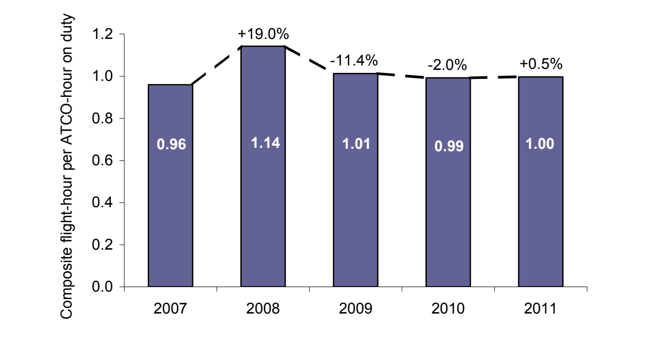


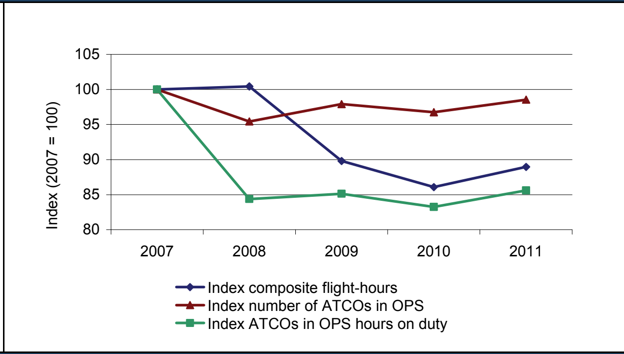
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



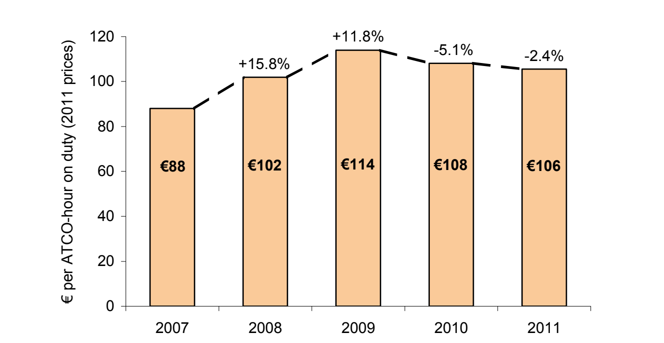


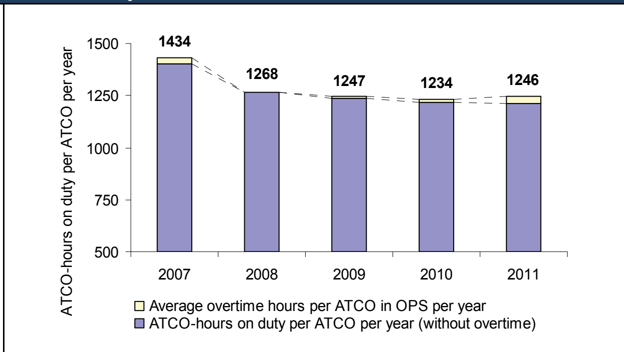
Trend in gate-to-gate ATCO-hour productivity



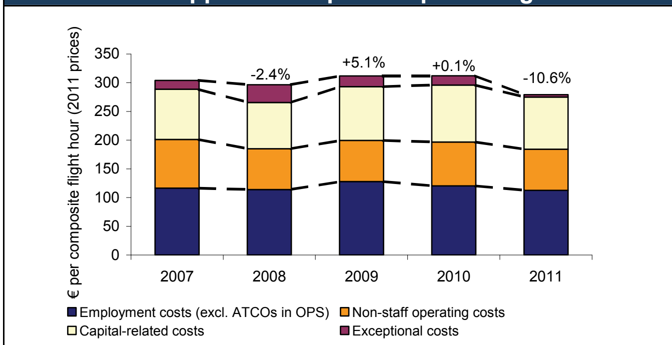


Trend in gate-to-gate employment costs per ATCO-hour

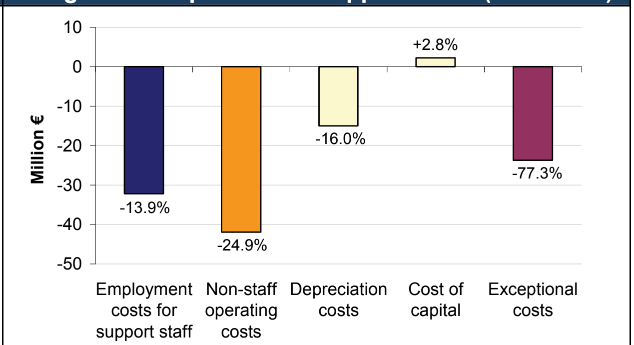




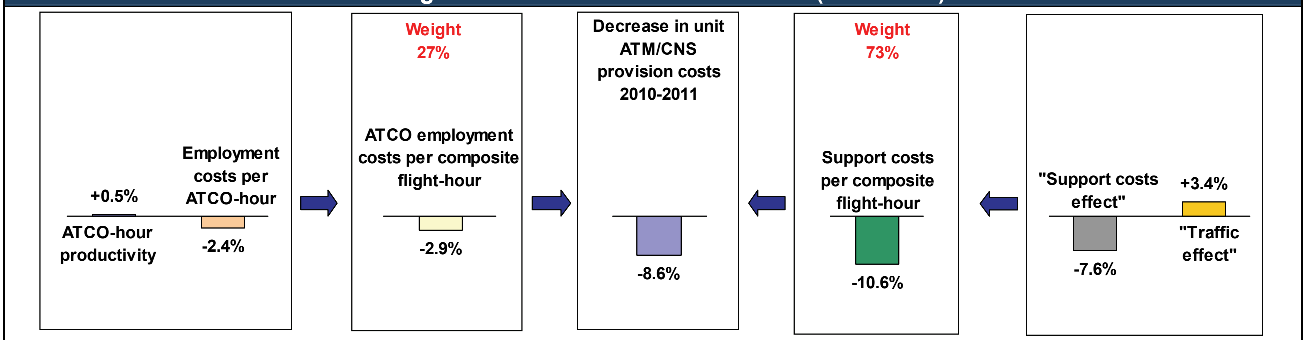
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)



Changes in financial cost-effectiveness (2010-2011)

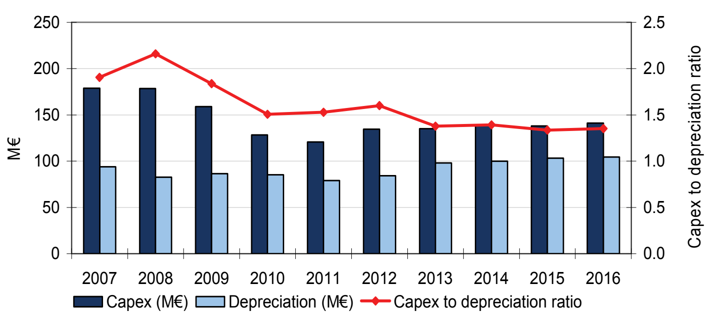


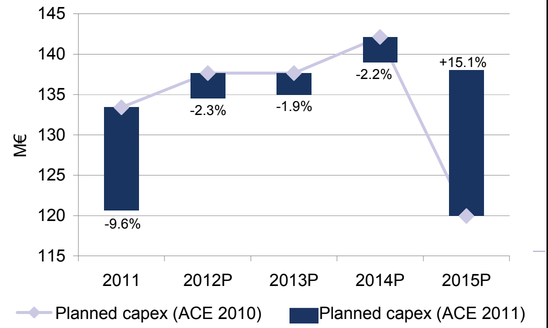
NATS Continental (United Kingdom) – (€2011)

Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

The planned en-route costs provided by NATS reflect the figures provided in UK National Performance Plan for RP1. This is different from the methodology used to report historic and actual ATM/CNS provision costs which are based on IFRS accounting. For this reason, the planned changes in NATS unit ATM/CNS provision costs are not shown in this Annex.

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: 2001 (London AC and TC) 2012 (Prest.)*	C: 1996 (Lon. AC) 2007 (Lon. TC) 2009 (Prest.)*	C: 2001 (Lon. AC) 2007 (Lon. TC) 2009 (Prest.)*	C: 2002 (Lon. AC) 2007 (Lon. TC) 2008 (Prest.)*
€636.9M (2003-2016)						2006				
						2007		London TC	London TC	London TC
				€18.0M		2008				London AC Prestwick
						2009		Prestwick	Prestwick	
						2010				
		€13.9M				2011	London TC		London AC and London TC	London TC and Prestwick
						2012	London AC Prestwick	All ACCs		
						2013				
						2014		London AC		
						2015				
						2016	Prest. (2016-2019, upper sectors)		Prest. (2016-2019, upper sectors)	

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	iTEC	ATM	233.8	2011	2016
2	iFACTS	ATM	191.0	2003	2011
3	NERC Software builds	ATM	131.9	2011	2016
4	Electronic Flight Data – Prestwick & Swanwick TC	ATM	29.0	2008	2011
5	London Airspace Management Programme (LAMP)	ATM	27.1	2011	2016

NAV Portugal Continental (Portugal) – Cost-effectiveness KPIs (€2011)

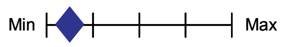
Contextual economic information

Exchange rate: Portugal is within the EURO Zone

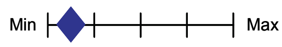
NAV Portugal Continental represents 1.7% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

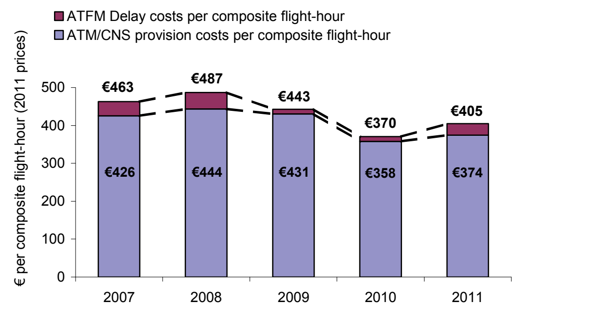
Aggregated complexity score:

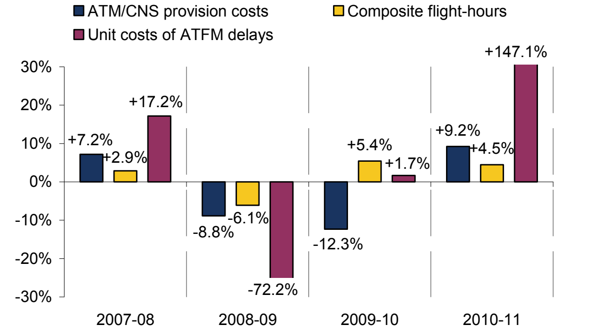


Seasonal traffic variability:

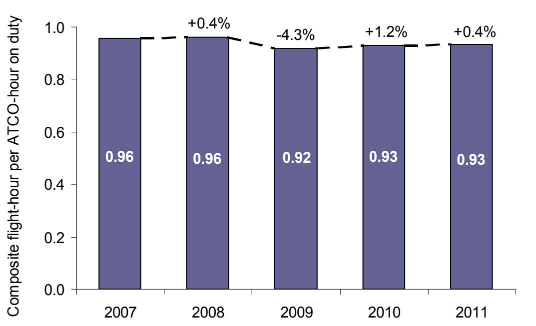


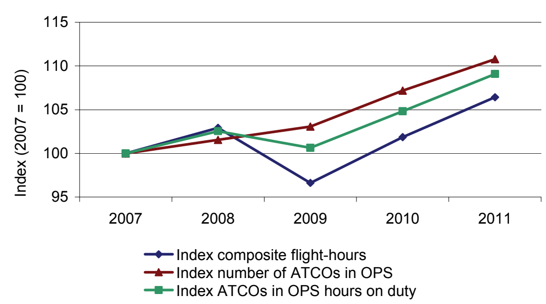
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



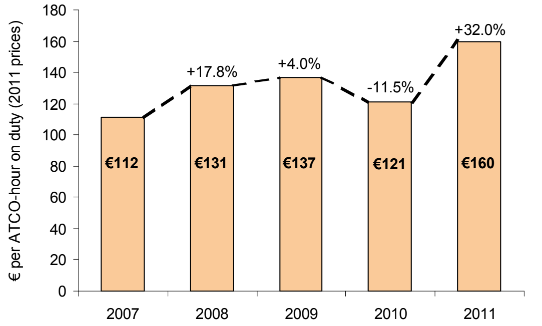


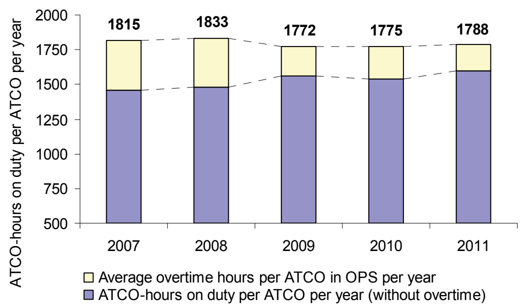
Trend in gate-to-gate ATCO-hour productivity



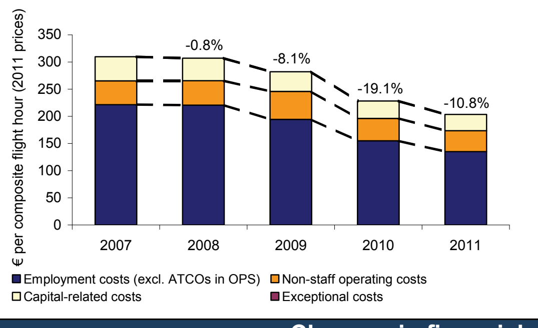


Trend in gate-to-gate employment costs per ATCO-hour

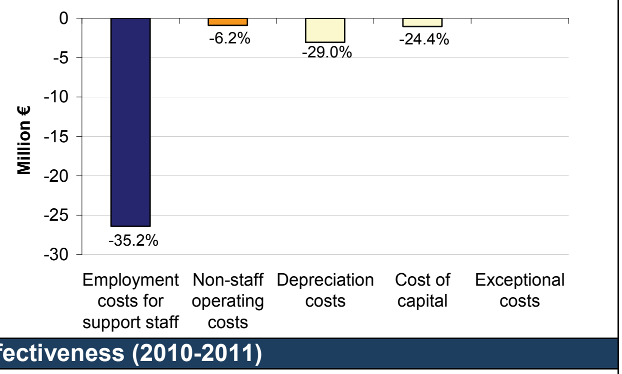




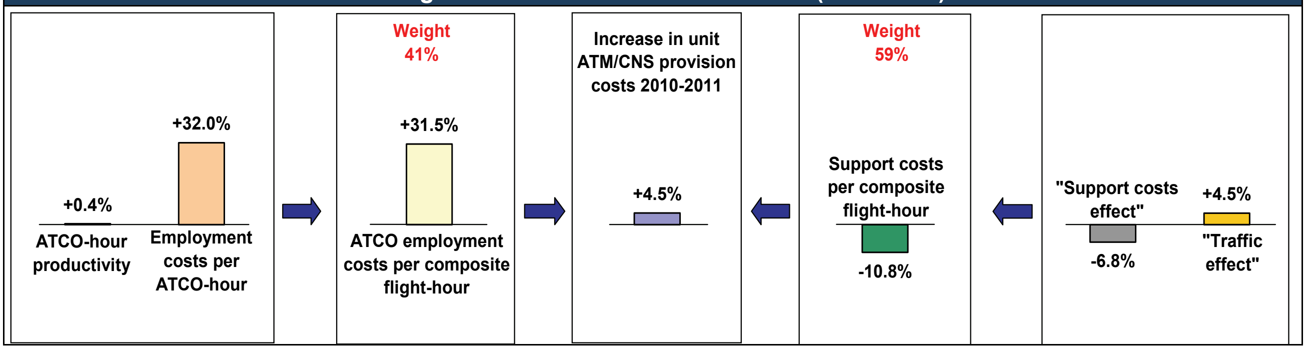
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

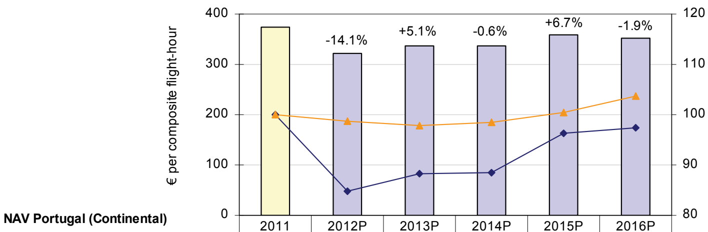


Changes in financial cost-effectiveness (2010-2011)

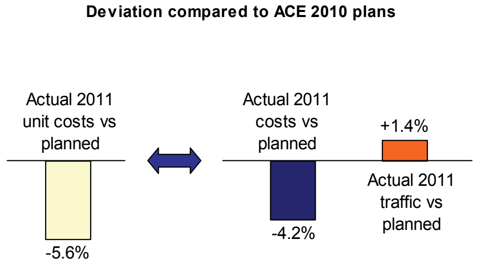


NAV Portugal Continental (Portugal) – (€2011)

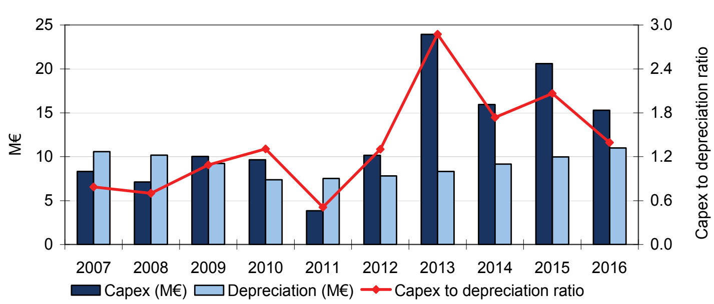
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

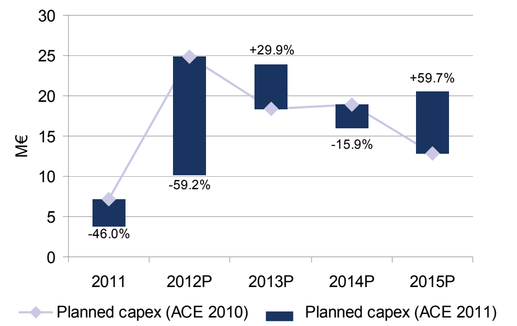


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	374	322	338	336	359	352
Gate-to-gate costs (index)	100	85	88	88	96	97
Composite flight-hours (index)	100	99	98	98	100	104



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: 2001*	C: 2001*	C: 2001*	C: 1999*
						2006				
						2007				
						2008				
						2009				
						2010				
€55.49M	€7.08M	€6.90M	€16.13M	€7.60M		2011				
						2012				
						2013				
						2014				
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	ATM systems program (mainly including the evolution of the LISATM system into LISATM-iTEC)	ATM	55.5	2011	2016
2	SURVEILLANCE program (mainly including New MLAT equipment FIR Lisboa and Santa Maria, new MSSRs, replacement of Lisboa radar)	SUR	16.1	2011	2016
3	Building program (mainly including new Tower Centre in Horta)	Building	7.6	2011	2016
4	Communication program (mainly including new VCS system and purchase or tape recorders)	COM	7.1	2011	2016
5	NAVAIDS program (mainly including new DMEs and PRNAV, Replacement of VORs, TACAN and DMEs, precision approach system in Oporto and Faro and GBAS)	NAV	6.9	2011	2016

NAVIAIR (Denmark) – Cost-effectiveness KPIs (€2011)

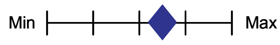
Contextual economic information

Exchange rate: 1 EUR = 7.445 DKK

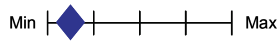
NAVIAIR represents 1.4% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

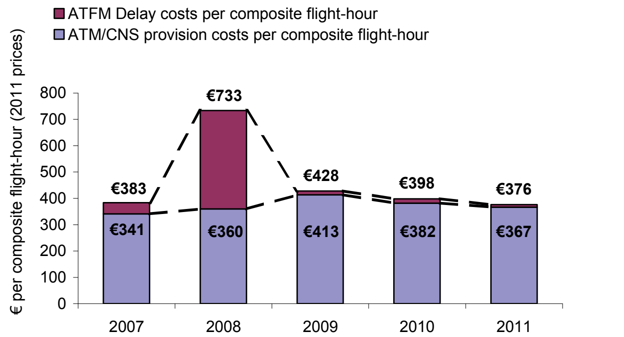
Aggregated complexity score:

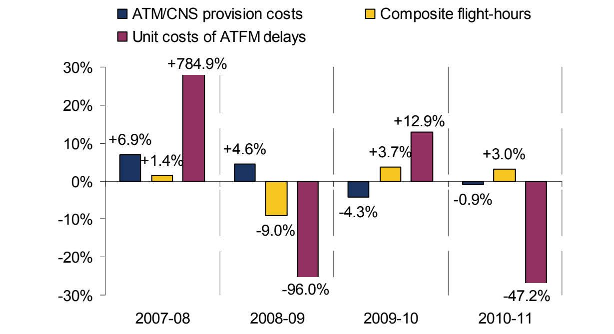


Seasonal traffic variability:

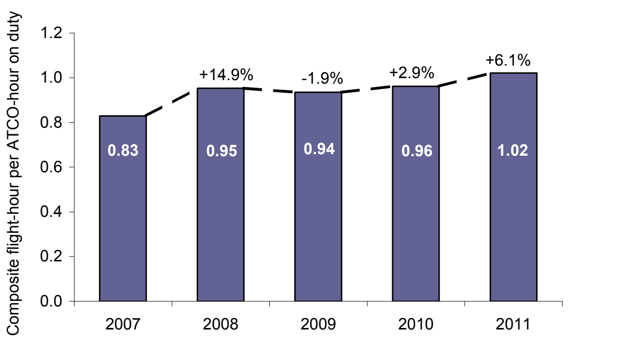


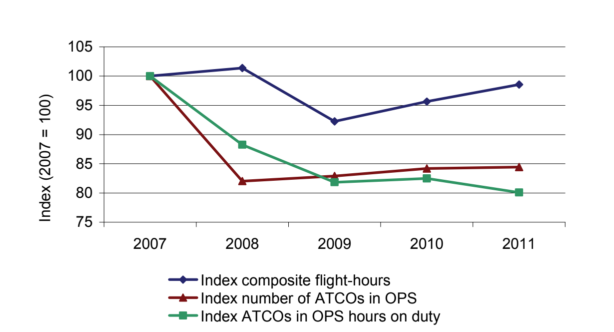
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



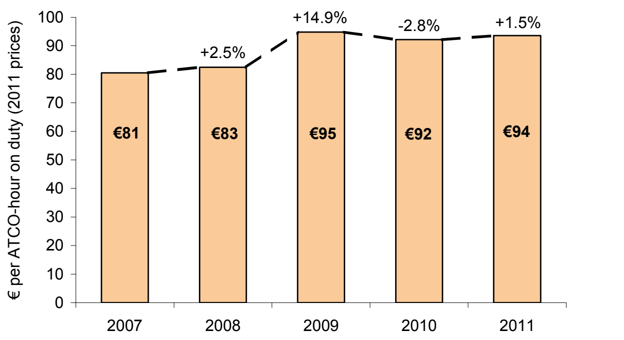


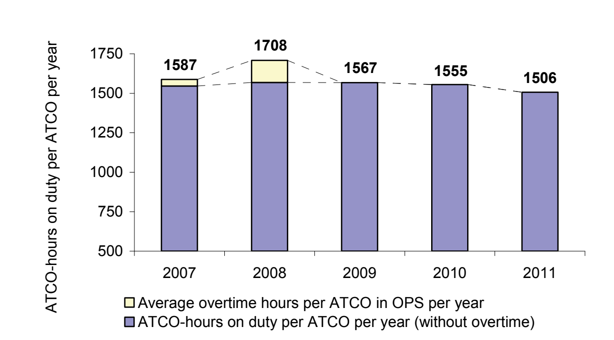
Trend in gate-to-gate ATCO-hour productivity



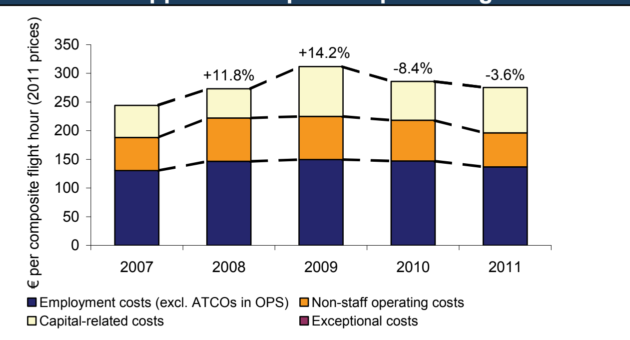


Trend in gate-to-gate employment costs per ATCO-hour

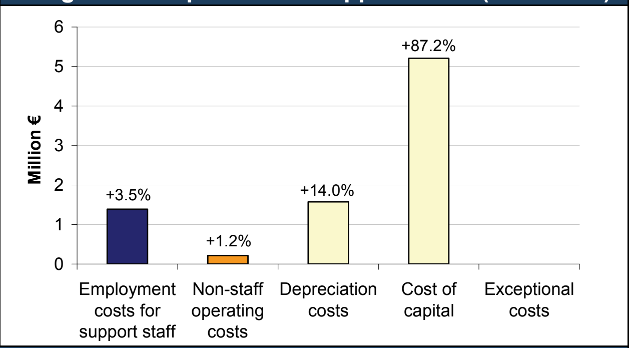




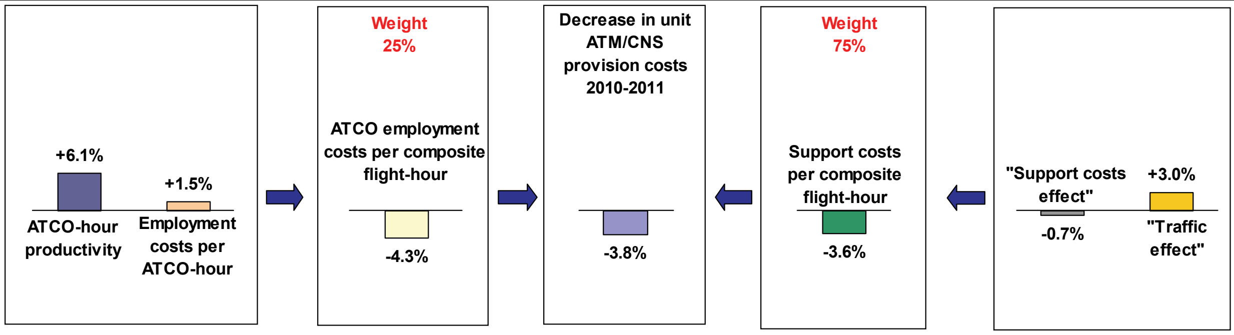
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

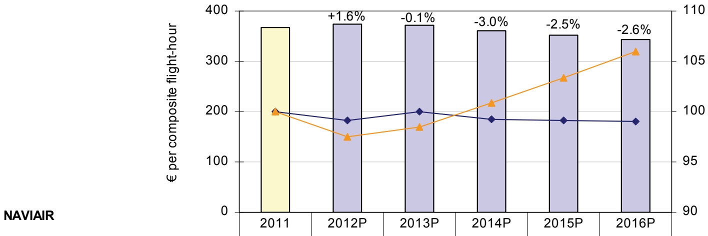


Changes in financial cost-effectiveness (2010-2011)

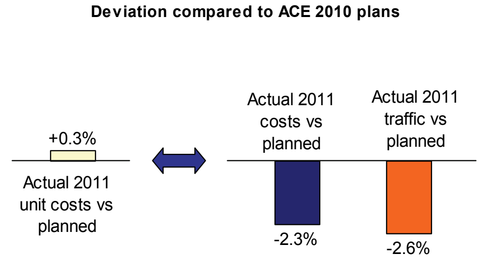


NAVIAIR (Denmark) – (€2011)

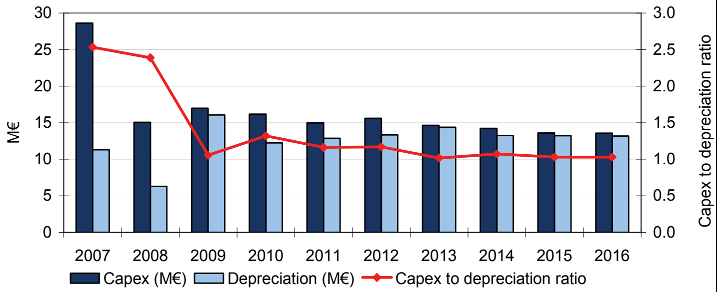
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

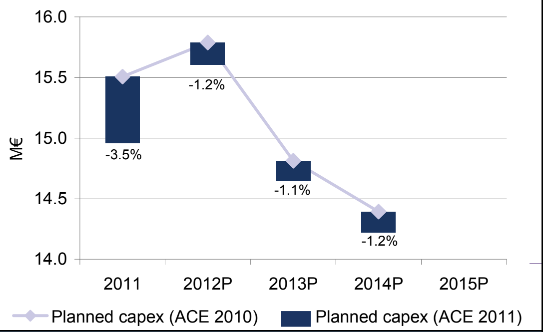


NAVIAIR	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	367	373	373	361	352	343
Gate-to-gate costs (index)	100	99	100	99	99	99
Composite flight-hours (index)	100	98	99	101	103	106



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: 2007*	RDPS C: 2007*	HMI C: 2007*	VCS C: 2007*
						2006				
						2007				
						2008				
						2009				
						2010				
						2011				
€22.7M	€4.3M	€1.7M	€3.0M	€10.6M	€8.7M	2012				
						2013				
						2014				
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

NAVIAIR did not provide the list of main projects relating to the capex for the period 2011-2016

Oro Navigacija (Lithuania) – Cost-effectiveness KPIs (€2011)

Contextual economic information

Exchange rate: 1 EUR = 3.453 LTL

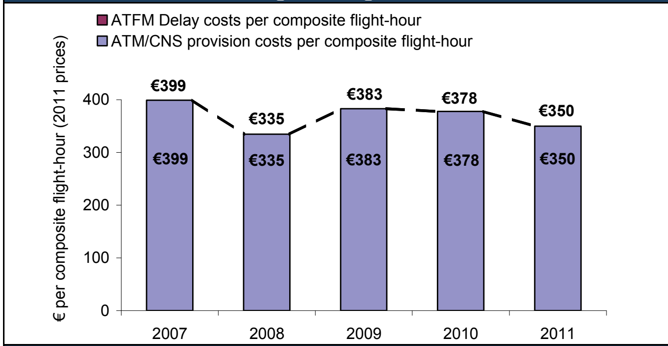
Oro Navigacija represents 0.3% of European system gate-to-gate ATM/CNS provision costs

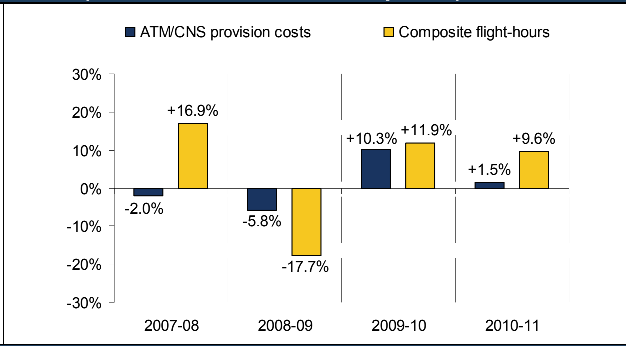
Operational conditions

Aggregated complexity score: Min Max

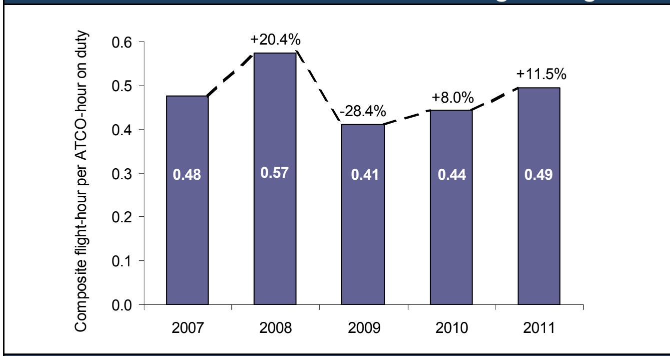
Seasonal traffic variability: Min Max

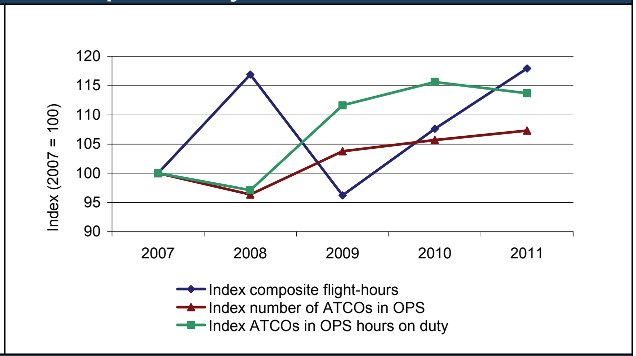
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



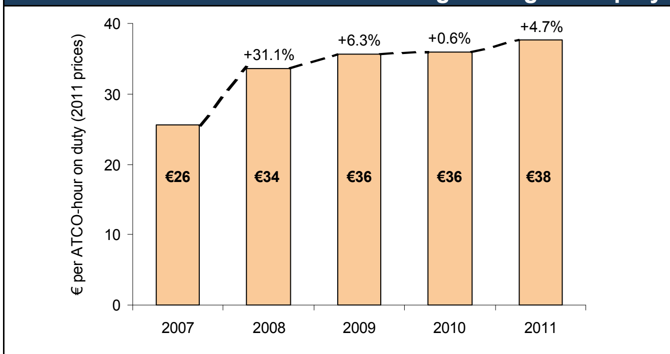


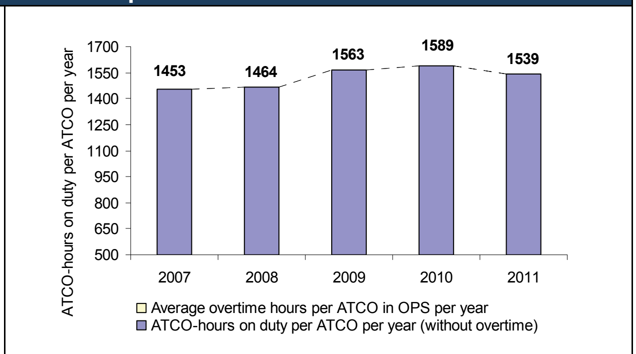
Trend in gate-to-gate ATCO-hour productivity



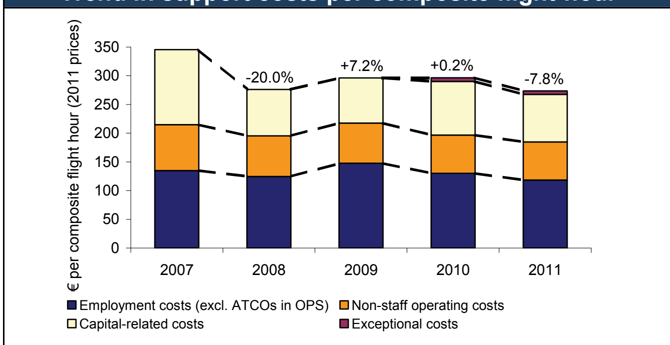


Trend in gate-to-gate employment costs per ATCO-hour

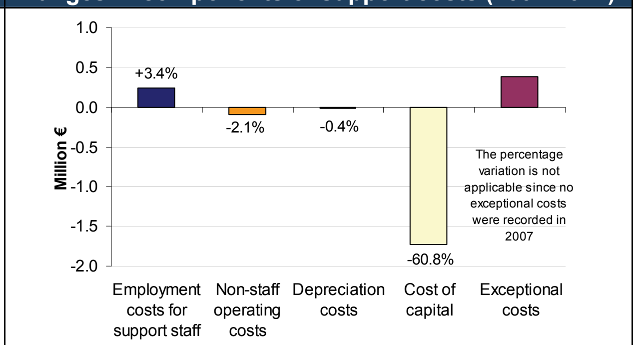




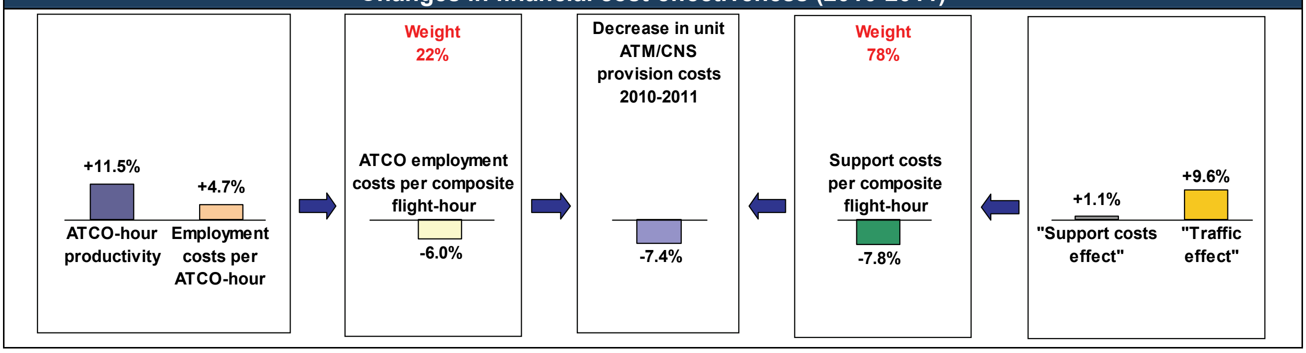
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

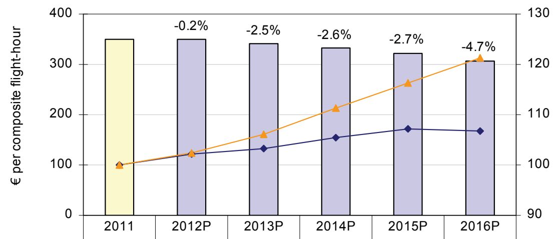


Changes in financial cost-effectiveness (2010-2011)



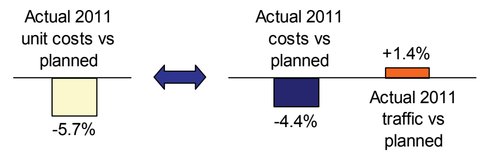
Oro Navigacija (Lithuania) – (€2011)

Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

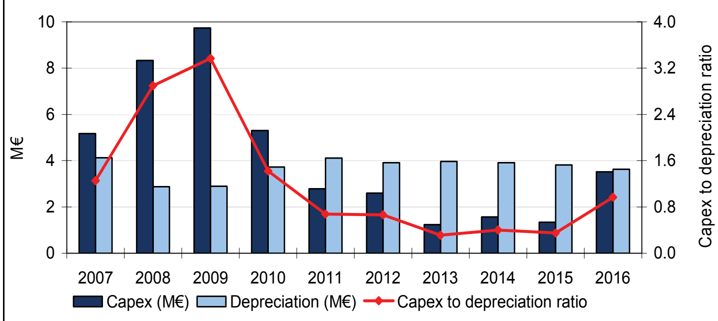


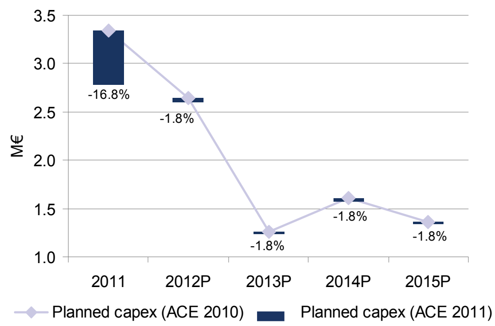
	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	350	349	340	332	323	307
Gate-to-gate costs (index)	100	102	103	105	107	107
Composite flight-hours (index)	100	102	106	111	116	121

Deviation compared to ACE 2010 plans



Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements

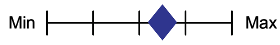
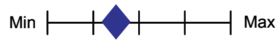
ATM	COM	NAV	SUR	Building	Other	Years	FDPS C: 2005*	RDPS C: 2005*	HMI C: 2005*	VCS C: 2005*
						2006				
						2007				
						2008				
						2009				
			€16.3M			2010				
€6.0M	€2.7M					2011				
		€3.2M			€1.4M	2012				
						2013				
						2014				
						2015				
						2016	(2016-2018)	(2016-2018)	(2016-2018)	(2016-2018)

* C = Commissioning   Upgrade   Replacement

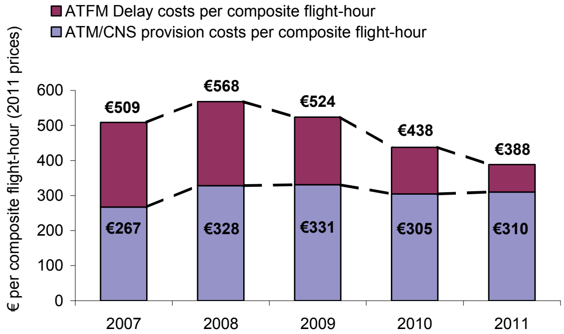
Focus on the top five capex projects

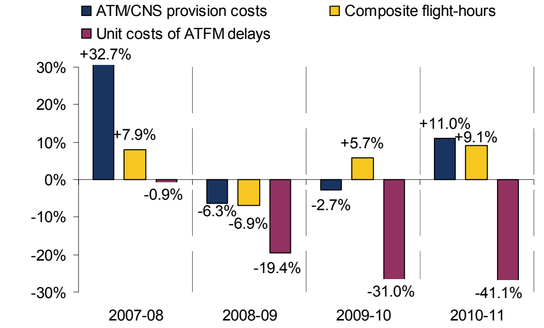
Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Replacement of radar (Kaunas)	SUR	4.8	2008	2010
2	Replacement of radar (Palanga)	SUR	4.8	2008	2010
3	Replacement of radar (Vilnius - 2007/2008)	SUR	3.7	2007	2008
4	ATCC equipment modernisation (Vilnius) (ICAO FPL2012 model implementation; Automated Assistance to Controller for Seamless Coordination, Transfer and Dialogue; Safety Nets Level II; and others)	ATM	3.7	2008	2014
5	Improvement of the transmission network	COM	2.5	2009	2012

PANSA (Poland) – Cost-effectiveness KPIs (€2011)

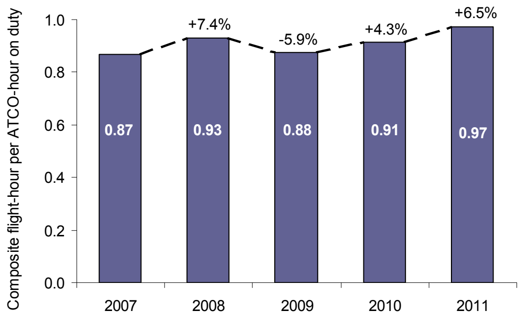
Contextual economic information	Operational conditions	
Exchange rate: 1 EURO = 4.115 PLN PANSA represents 1.8% of European system gate-to-gate ATM/CNS provision costs	Aggregated complexity score: 	Seasonal traffic variability: 

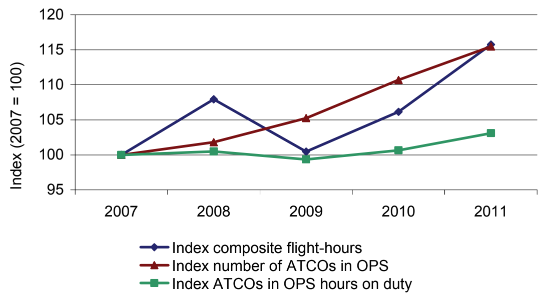
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



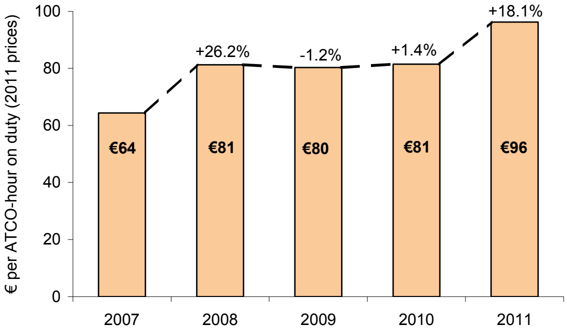


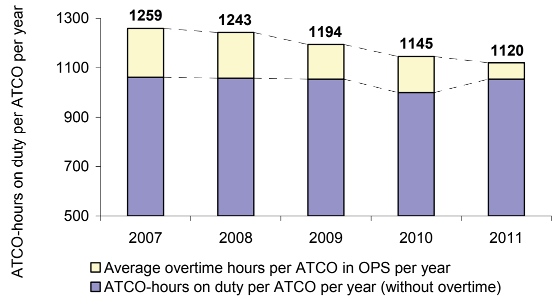
Trend in gate-to-gate ATCO-hour productivity



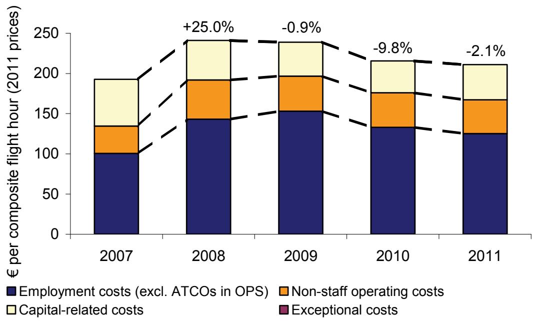


Trend in gate-to-gate employment costs per ATCO-hour

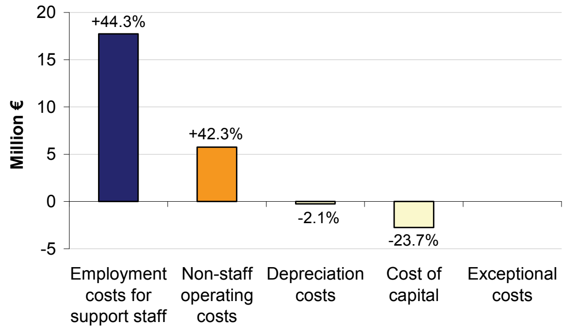




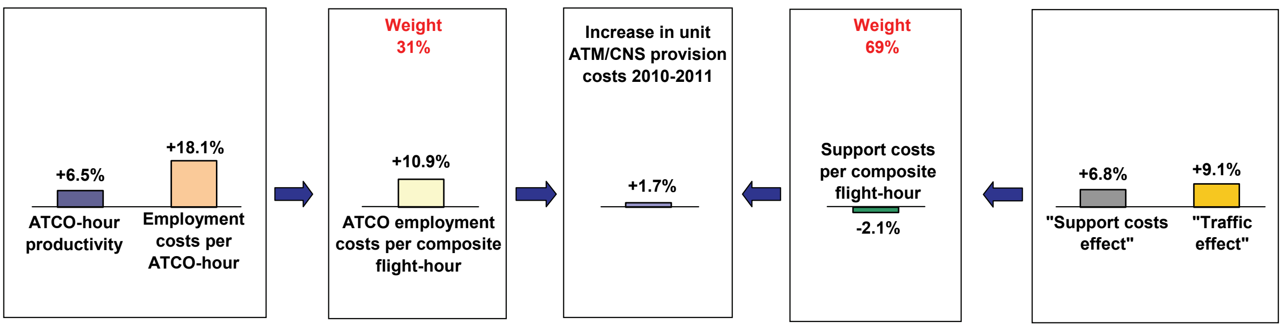
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

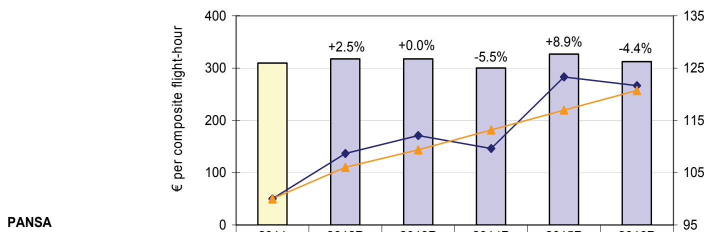


Changes in financial cost-effectiveness (2010-2011)

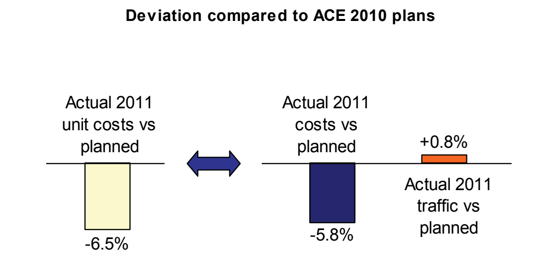


PANSA (Poland) – (€2011)

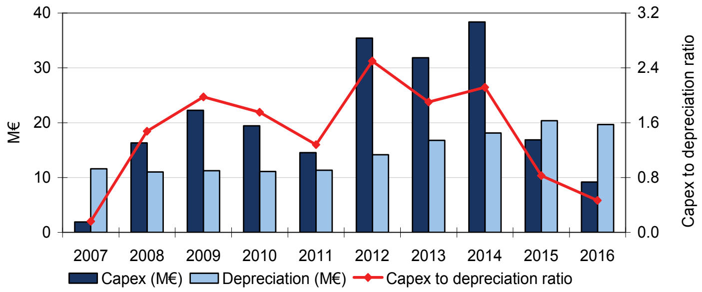
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

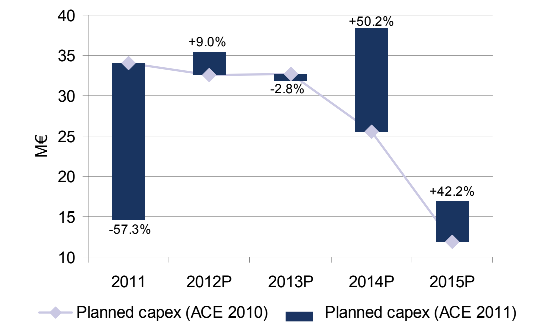


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	310	318	318	300	327	312
Gate-to-gate costs (index)	100	109	112	110	123	122
Composite flight-hours (index)	100	106	109	113	117	121



Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements

<table>
<tr><th rowspan="2">ATM</th><th rowspan="2">COM</th><th rowspan="2">NAV</th><th rowspan="2">SUR</th><th rowspan="2">Building</th><th rowspan="2">Other</th><th rowspan="2">Years</th><th>FDPS</th><th>RDPS</th><th>HMI</th><th>VCS</th></tr>
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</table>

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Replacement of the ATM systems (FDP, RDP, HMI and VoIP) with the new PEGASUS 21 system	ATM	25.6	2008	2013
2	Purchase of new PSR MSSR radars at Warszawa, Poznań, Kraków, Wrocław, and North-East Poland	SUR	23.1	2009	2016
3	TWRs in Lodz, Rzeszow, Poznan - Land purchase, construction and design process	Building	18.5	2009	2015
4	Modernization and develop of the navigation infrastructure in FIR Warsaw (modernization 4 DME and 2 DVOR/DME; develop 9 DME and 5 DVOR/DME)	NAV	11.6	2010	2014
5	Construction of 17 ground stations	COM	10.5	2009	2013

ROMATSA (Romania) – Cost-effectiveness KPIs (€2011)

Contextual economic information

Exchange rate: 1 EUR = 4.236 RON

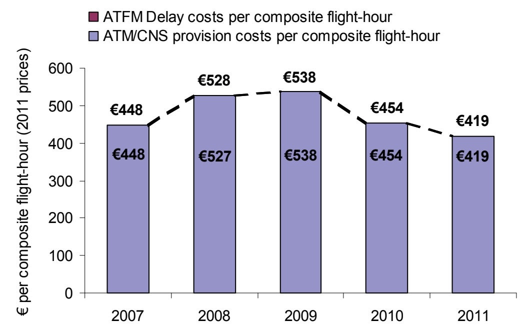
ROMATSA represents 1.8% of European system gate-to-gate ATM/CNS provision costs

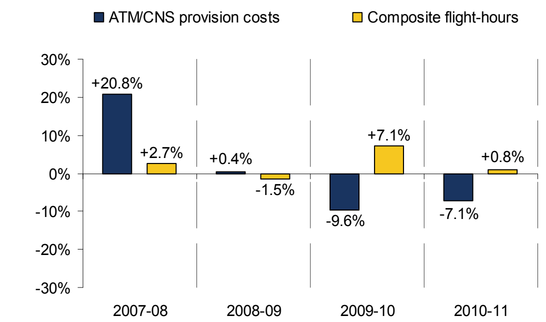
Operational conditions

Aggregated complexity score: Min Max

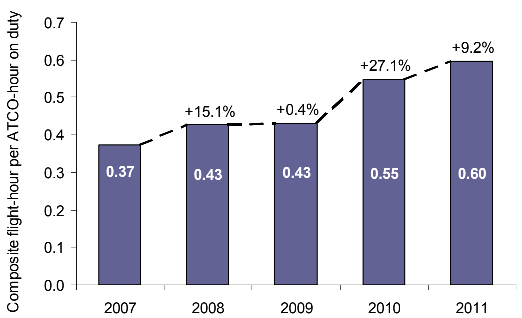
Seasonal traffic variability: Min Max

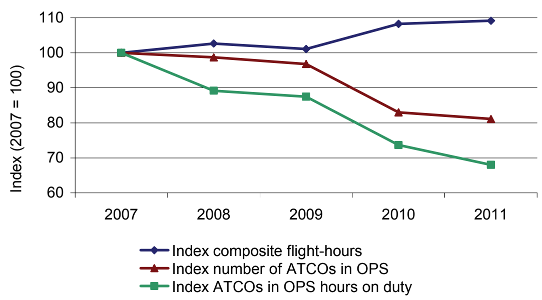
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



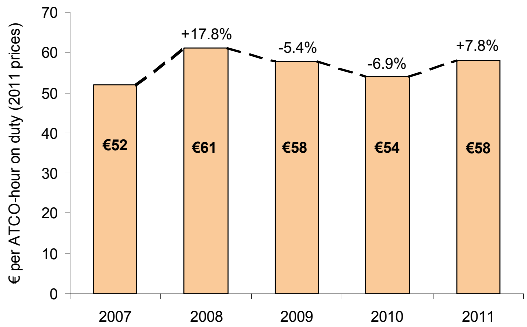


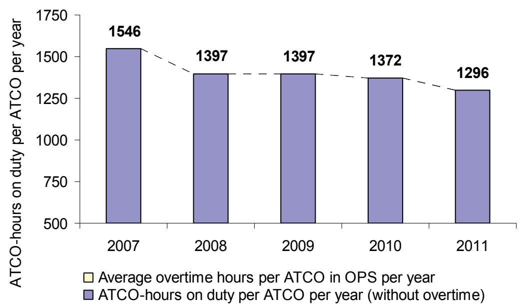
Trend in gate-to-gate ATCO-hour productivity



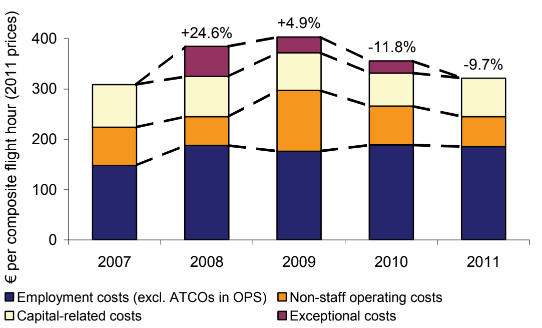


Trend in gate-to-gate employment costs per ATCO-hour

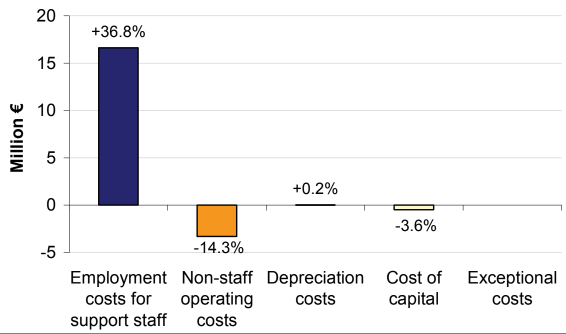




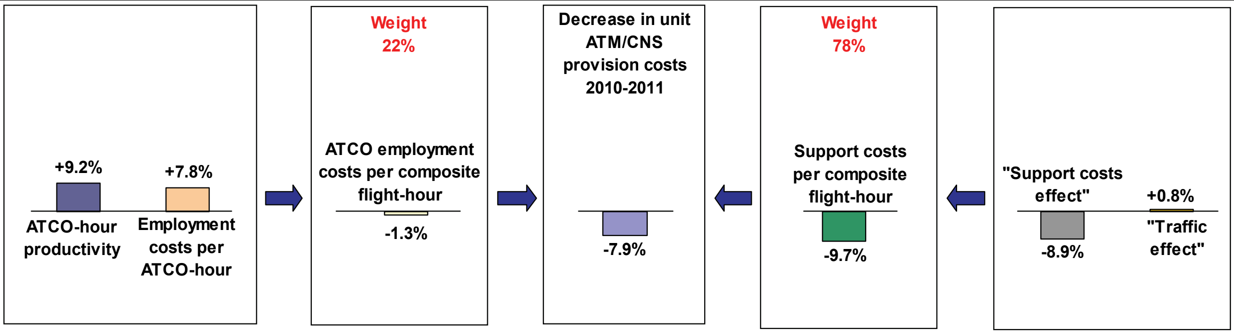
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

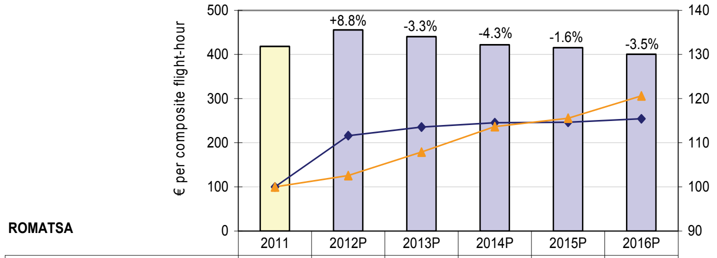


Changes in financial cost-effectiveness (2010-2011)

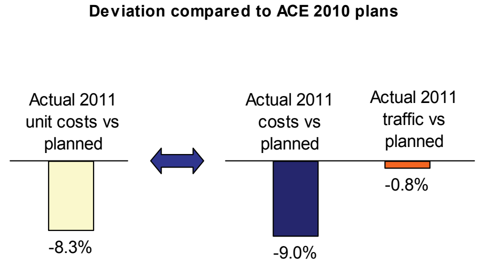


ROMATSA (Romania) – (€2011)

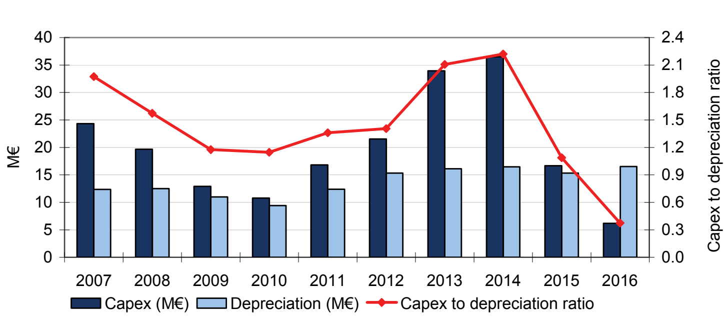
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

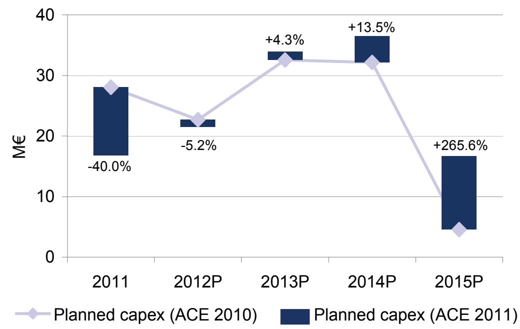


ROMATSA	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	419	456	441	422	415	401
Gate-to-gate costs (index)	100	112	114	115	115	115
Composite flight-hours (index)	100	103	108	114	116	121



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: 2003*	RDPS C: 2003*	HMI C: 2003*	VCS C: 2004*
						2006				
						2007				
						2008				
						2009				
						2010				
				€0.1M		2011				
						2012				
€64.4M (2011-2017)	€8.5M		€16.8M		€41.4M (2011-2017)	2013				
						2014				
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	ATM System ROMATSA 2015+	ATM	64.4	2011	2017
2	Other CAPEX	Other	37.9	2011	2017
3	Mode S radars installation	SUR	7.2	2011	2015
4	VCSS Replacement	COM	6.2	2012	2013
5	A-SMGCS	SUR	4.2	2011	2013

Skyguide (Switzerland) – Cost-effectiveness KPIs (€2011)

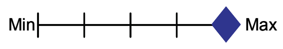
Contextual economic information

Exchange rate: 1 EUR = 1.233 CHF

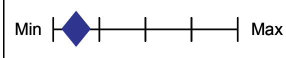
Skyguide represents 3.5% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

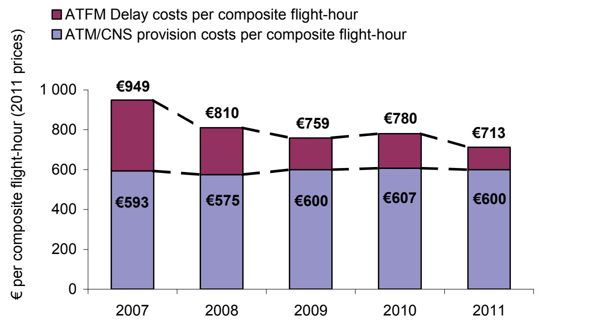
Aggregated complexity score:

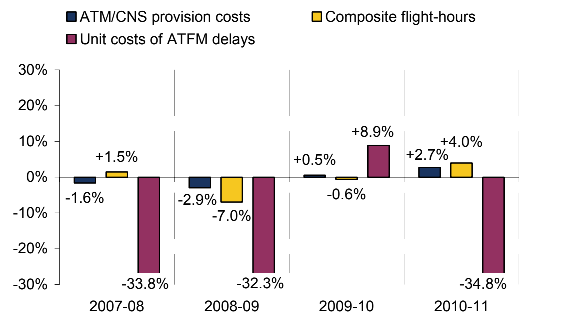


Seasonal traffic variability:

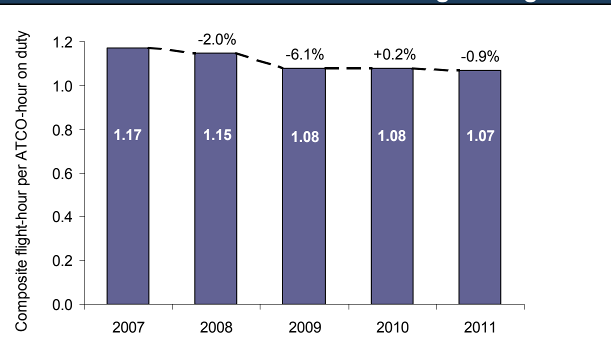


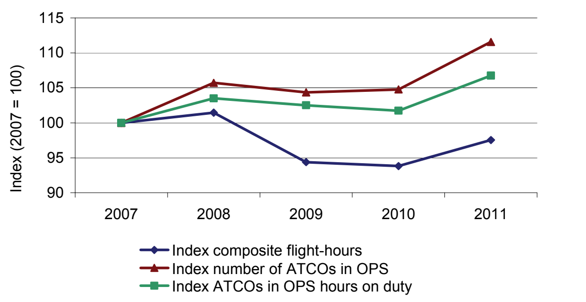
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



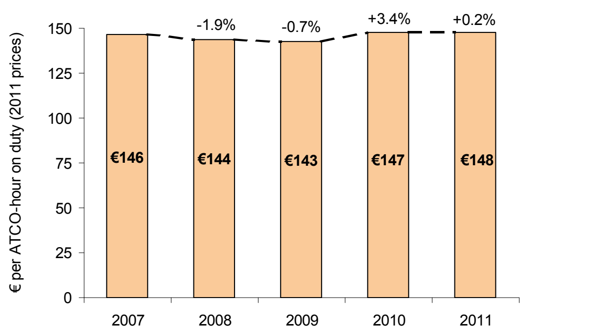


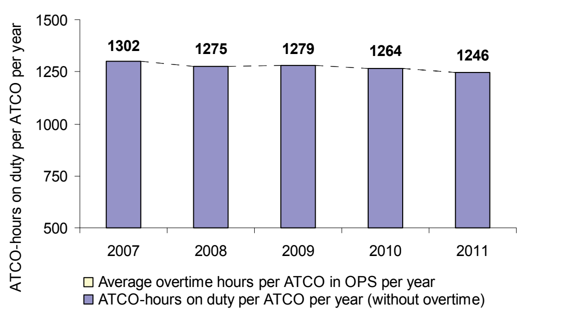
Trend in gate-to-gate ATCO-hour productivity



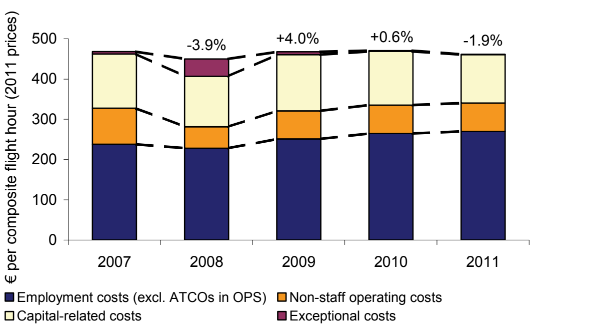


Trend in gate-to-gate employment costs per ATCO-hour

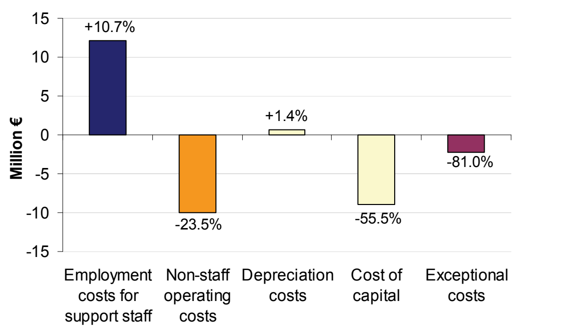




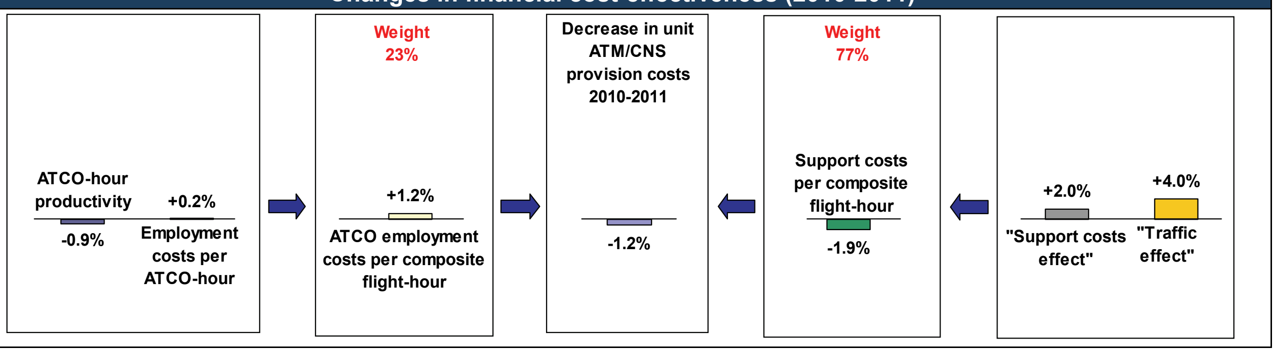
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

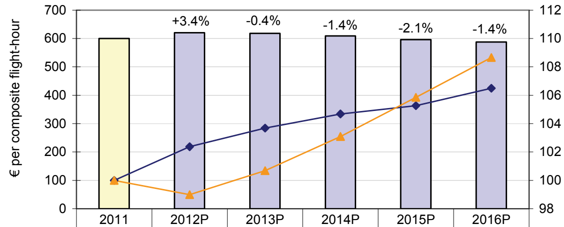


Changes in financial cost-effectiveness (2010-2011)



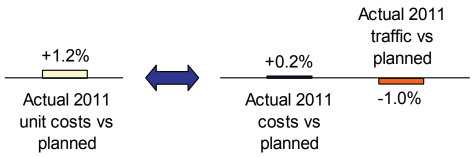
Skyguide (Switzerland) – (€2011)

Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

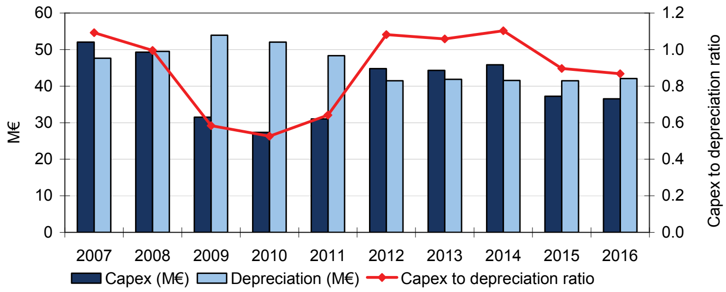


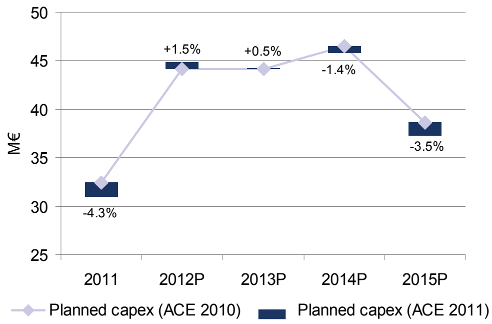
Skyguide	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	600	620	618	609	596	588
Gate-to-gate costs (index)	100	102	104	105	105	106
Composite flight-hours (index)	100	99	101	103	106	109

Deviation compared to ACE 2010 plans



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: 1999 (Geneva) 2007 (Zurich)*	RDPS C: 2004 (All ACCs)*	HMI C: 2003/06 (All ACCs)*	VCS C: 2004/05 (All ACCs)*
						2006	Geneva		All ACCs	
						2007	Zurich			
						2008				
	€11.4M (2005-2013)					2009				
						2010				
€55.5M					€5.7M**	2011	Zurich			
						2012		All ACCs	All ACCs	All ACCs
						2013				
						2014				
						2015			All ACCs	
						2016				

**Expenses relating to AIS

* C = Commissioning Upgrade Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	Implementation of stripless environment	ATM	27.4	2011	2015
2	TACO (Tower – Approach – Communication) system integration into the new FDP in Zurich	ATM	19.1	2008	2015
3	Implementation of LINK2K+/CPDLC (Controller Pilot Data Link Communications)	COM	6.9	2010	2013
4	Realisation of web Portal IBS	Other	5.7	2010	2013
5	MESANGE (implementation of Aeronautical Message Handling Service)	COM	4.5	2005	2010

Slovenia Control (Slovenia) – Cost-effectiveness KPIs (€2011)

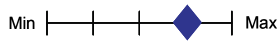
Contextual economic information

Exchange rate: Slovenia is within the EURO Zone

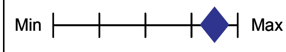
Slovenia Control represents 0.4% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

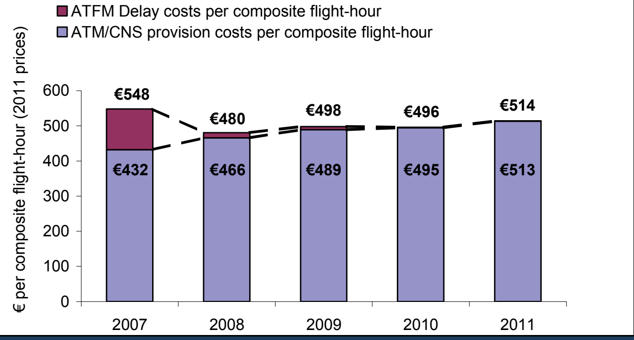
Aggregated complexity score:

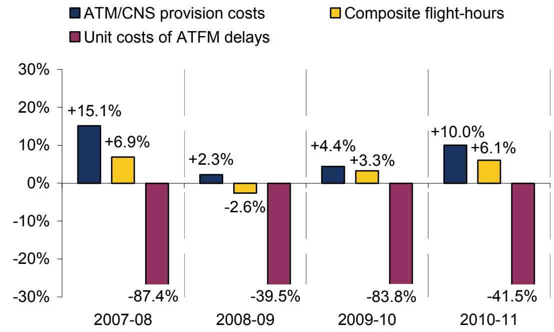


Seasonal traffic variability:

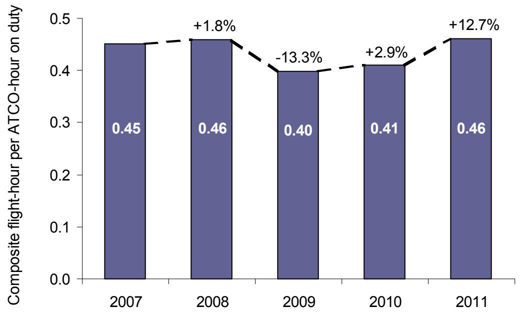


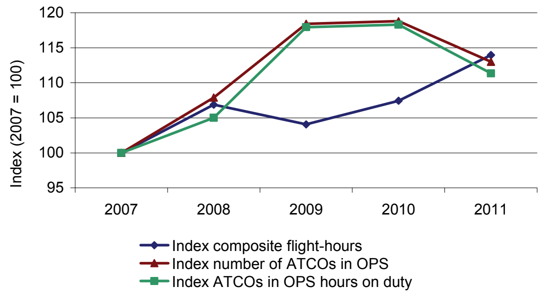
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



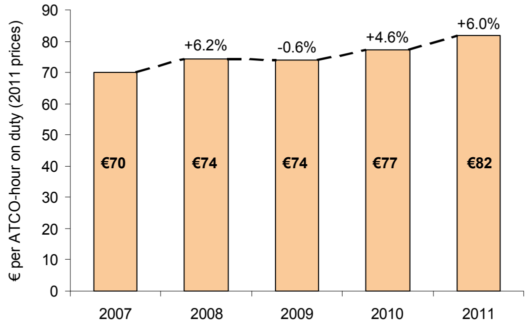


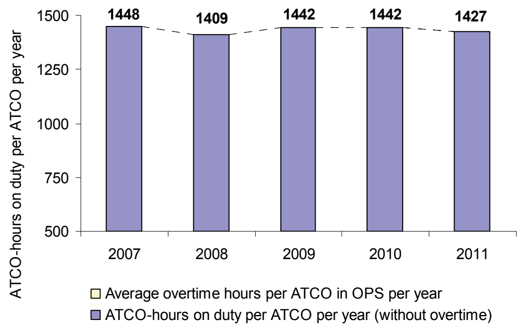
Trend in gate-to-gate ATCO-hour productivity



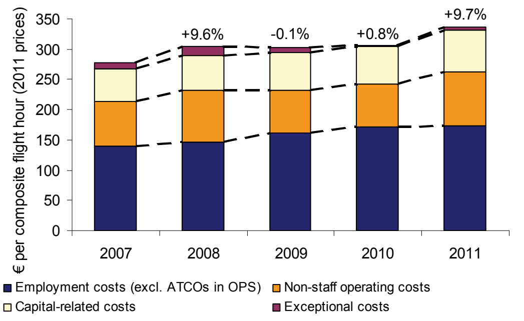


Trend in gate-to-gate employment costs per ATCO-hour

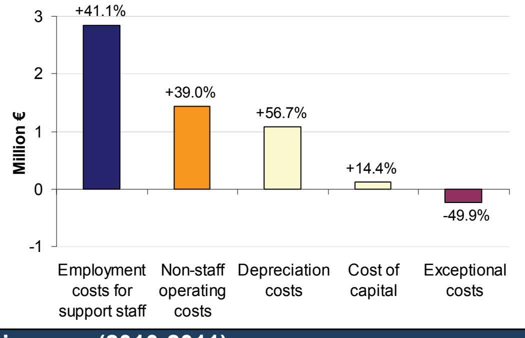




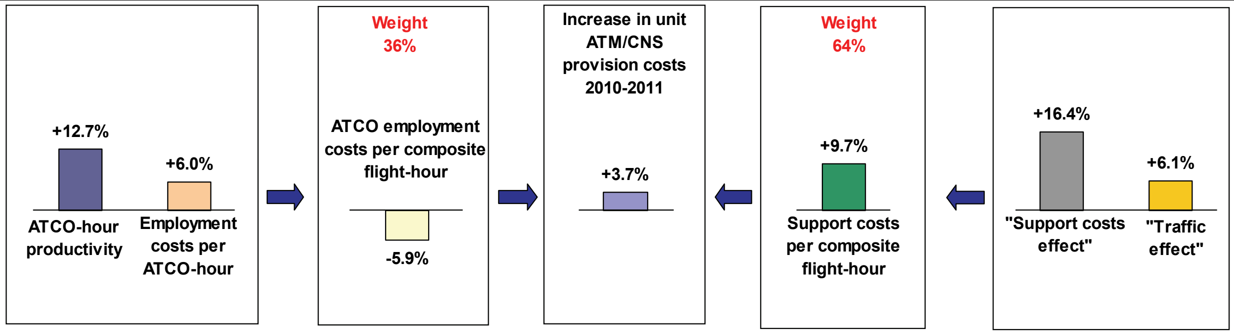
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

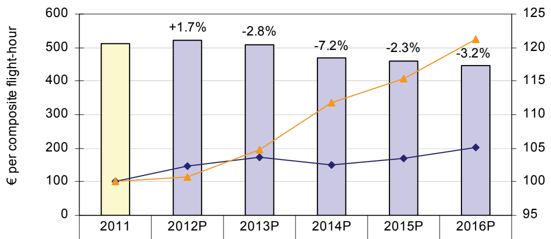


Changes in financial cost-effectiveness (2010-2011)

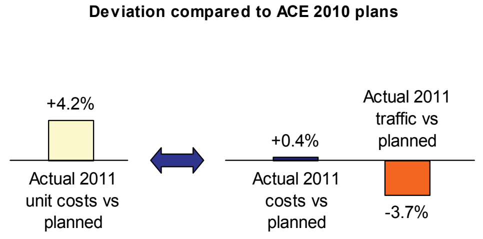


Slovenia Control (Slovenia) – (€2011)

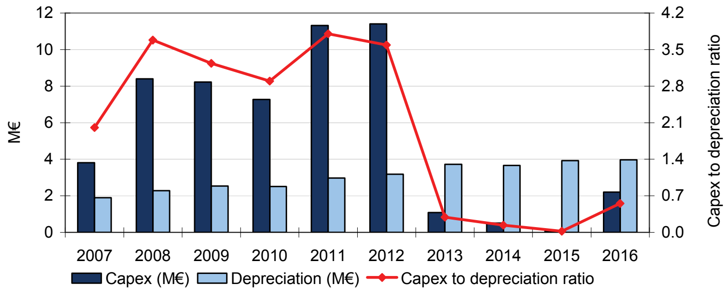
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

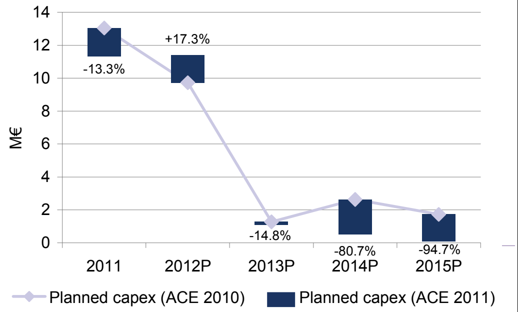


	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	513	522	507	471	460	445
Gate-to-gate costs (index)	100	102	104	102	103	105
Composite flight-hours (index)	100	101	105	112	115	121

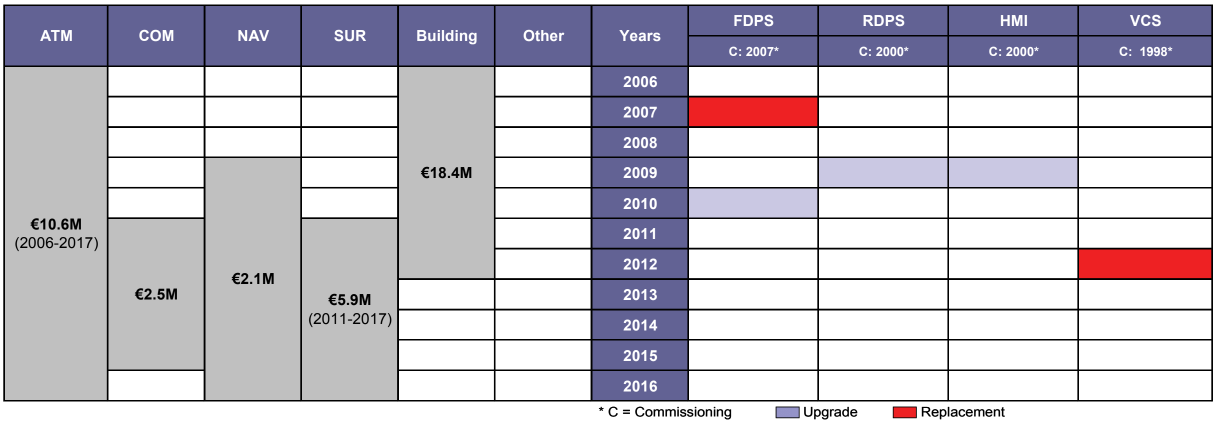


Planned capital expenditures and depreciation costs





Information on major capex projects and ATM systems upgrades/replacements



Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	New ATCC building in Ljubljana (including general equipment)	Building	18.4	2006	2012
2	New ATCC technical systems	ATM	7.5	2006	2012
3	Implementation of Multilateration and ADS-B systems	SUR	3.2	2012	2017
4	Upgrade of FDP system	ATM	3.1	2008	2017
5	Changing location of radars	SUR	2.7	2011	2013

SMATSA (Serbia and Montenegro) – Cost-effectiveness KPIs (€2011)

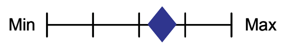
Contextual economic information

Exchange rate: 1 EUR = 101.887 RSD

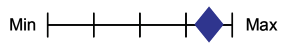
SMATSA represents 1.1% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

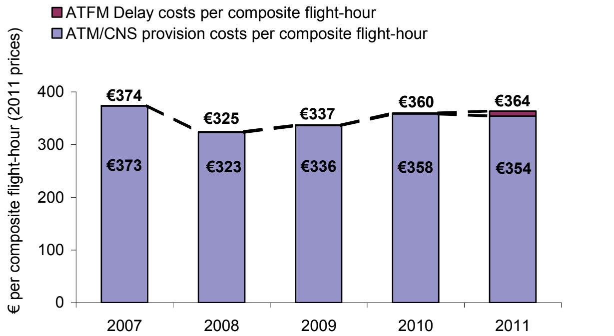
Aggregated complexity score:

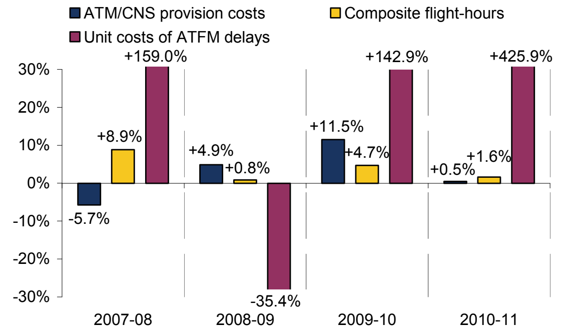


Seasonal traffic variability:

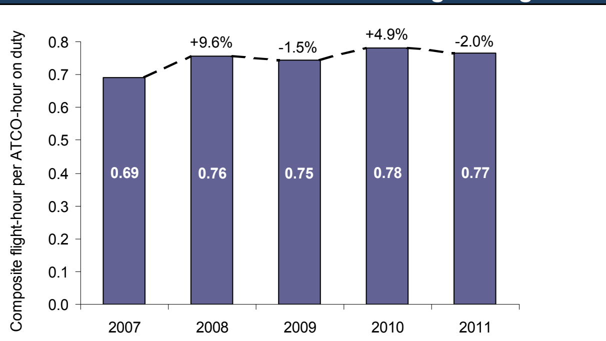


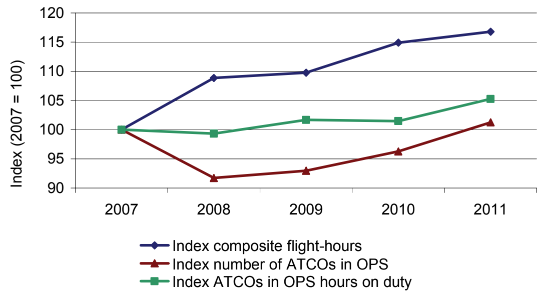
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



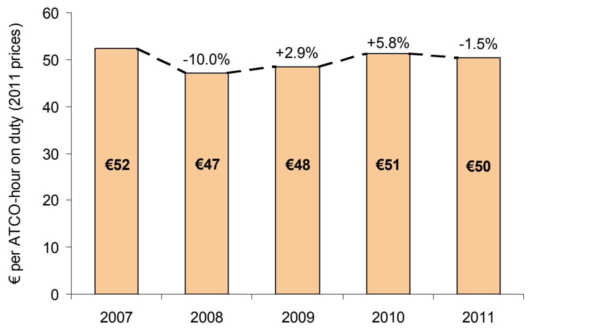


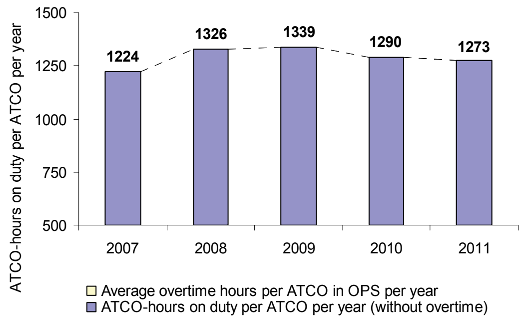
Trend in gate-to-gate ATCO-hour productivity



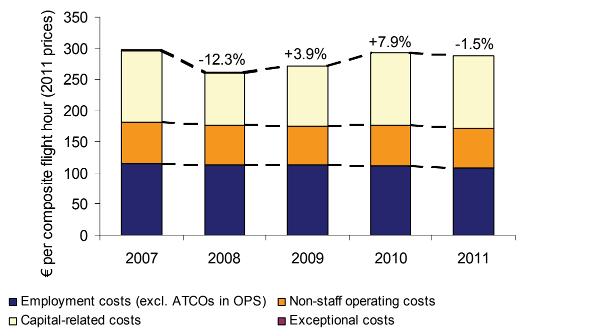


Trend in gate-to-gate employment costs per ATCO-hour

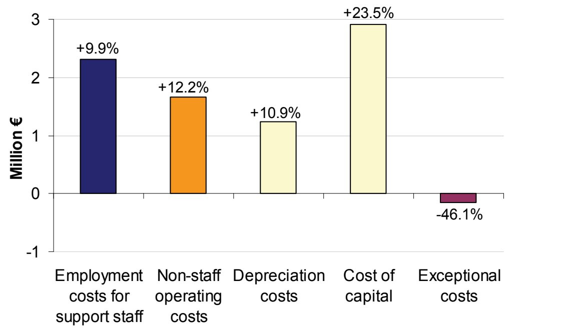




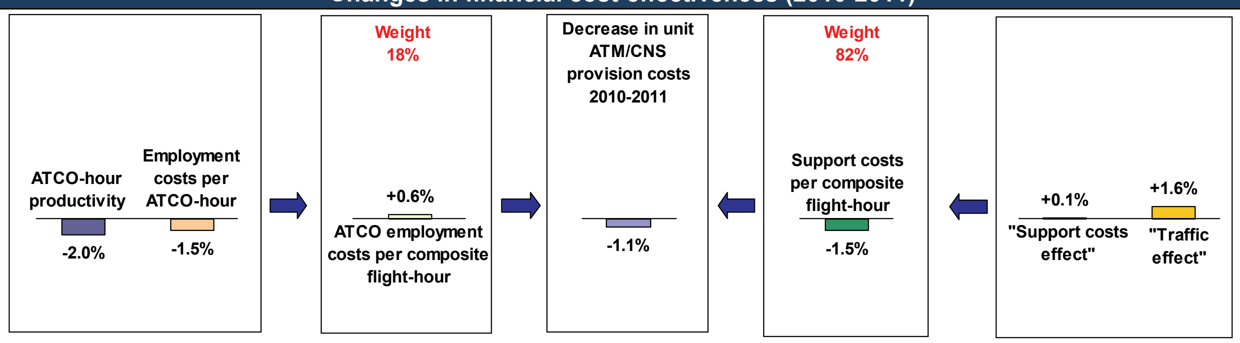
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

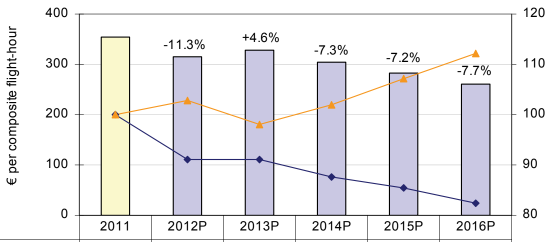


Changes in financial cost-effectiveness (2010-2011)



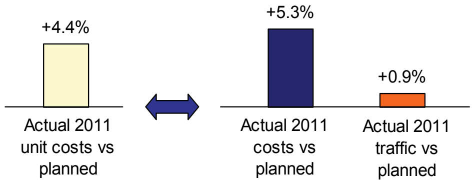
SMATSA (Serbia and Montenegro) – (€2011)

Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

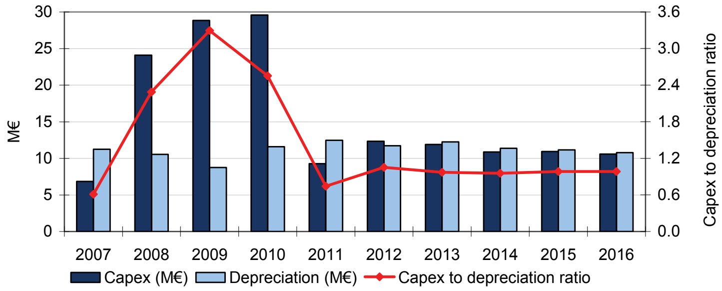


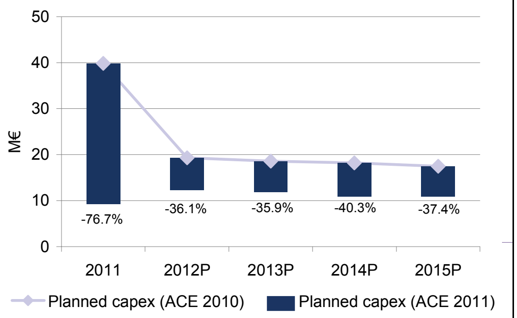
SMATSA	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	354	314	329	304	282	261
Gate-to-gate costs (index)	100	91	91	88	85	82
Composite flight-hours (index)	100	103	98	102	107	112

Deviation compared to ACE 2010 plans



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: 2011*	RDPS C: 2011*	HMI C: 2011*	VCS C: 2011*
						2006				
						2007				
€41.8M	€4.9M					2008				
				€19.8M		2009				
						2010				
			€2.8M		€0.5M	2011				
						2012				
						2013				
						2014				
						2015				
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €M	Start date	End date
1	New ATM System for Belgrade ACC and SMATSA communications network	ATM	30.9	2009	2011
2	New ATCC in Belgrade	Building	17.6	2009	2010
3	Aircraft equipped with Automatic Flight Inspection System	ATM	10.0	2008	2010
4	VHF and UHF radio system for air-ground communication	COM	4.9	2008	2010
5	TCL Kraljevo construction	Building	2.2	2011	2012

UkSATSE (Ukraine) – Cost-effectiveness KPIs (€2011)

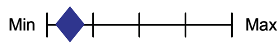
Contextual economic information

Exchange rate: 1 EUR = 11.117 UAH

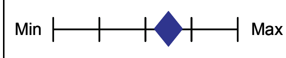
UkSATSE represents 3.2% of European system gate-to-gate ATM/CNS provision costs

Operational conditions

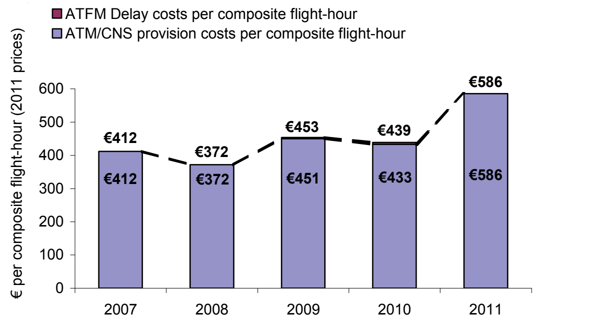
Aggregated complexity score:

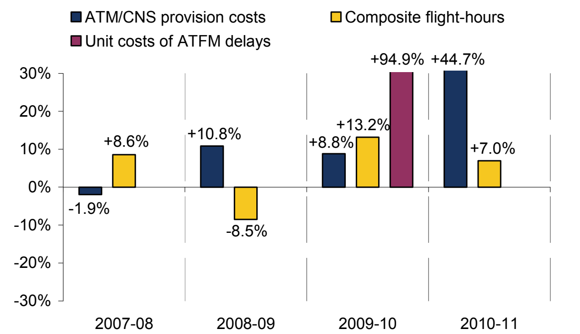


Seasonal traffic variability:

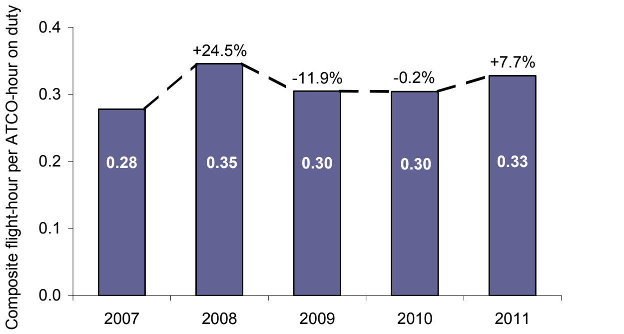


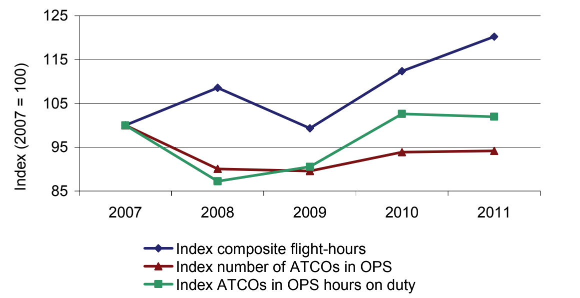
Trend in gate-to-gate economic cost-effectiveness (all financial data in €2011 prices)



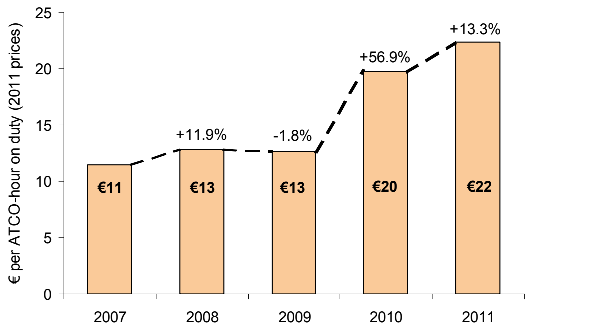


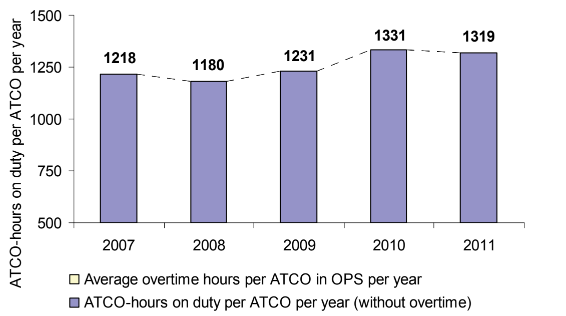
Trend in gate-to-gate ATCO-hour productivity



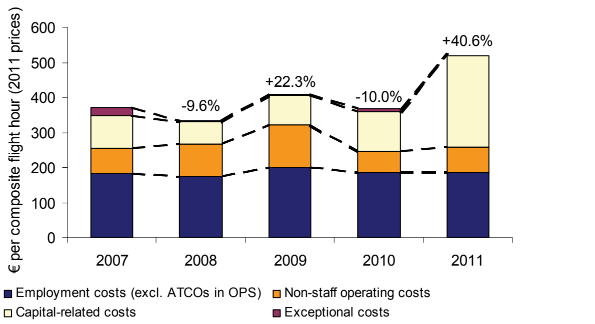


Trend in gate-to-gate employment costs per ATCO-hour

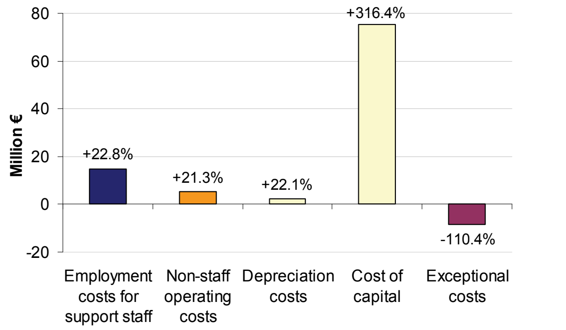




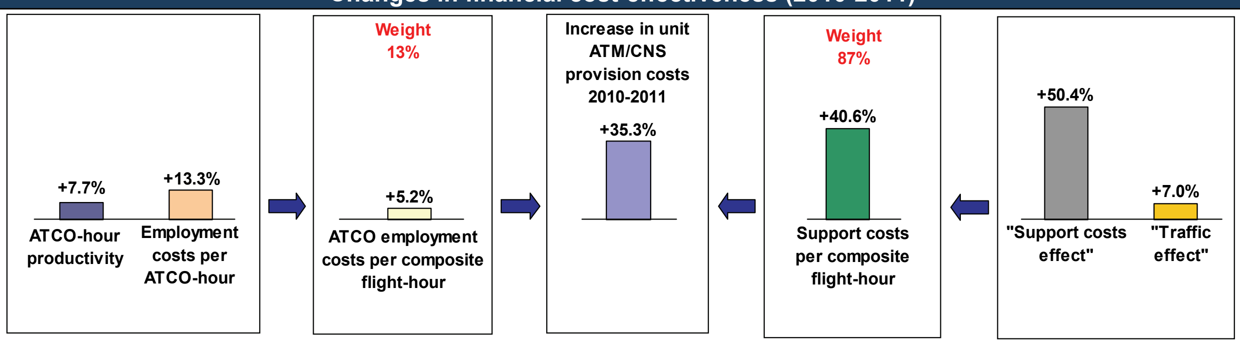
Trend in support costs per composite flight-hour



Changes in components of support costs (2007-2011)

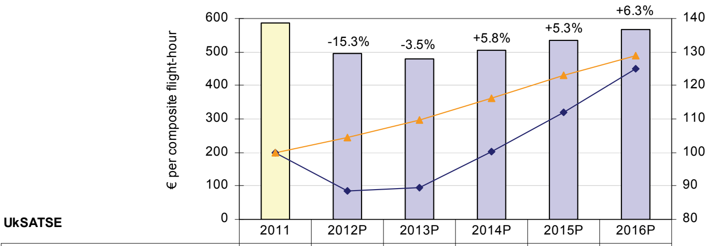


Changes in financial cost-effectiveness (2010-2011)

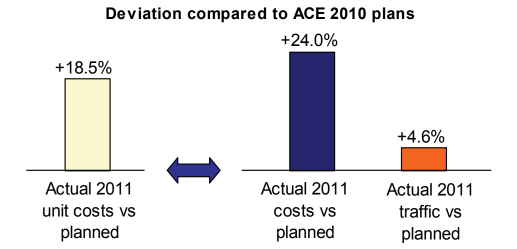


UkSATSE (Ukraine) – (€2011)

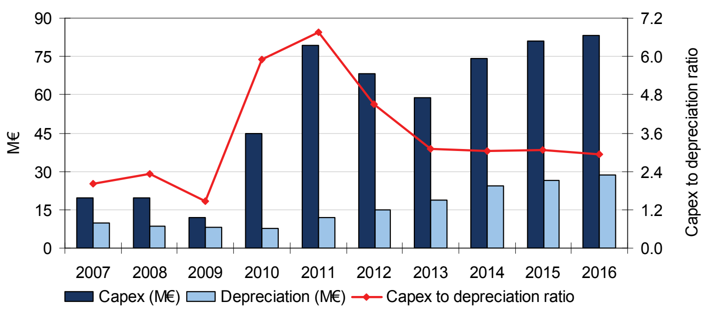
Planned changes in gate-to-gate ATM/CNS provision costs per composite flight-hour

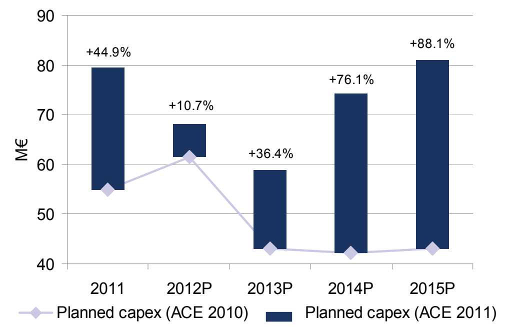


UkSATSE	2011	2012P	2013P	2014P	2015P	2016P
Gate-to-gate unit ATM/CNS costs	586	496	479	506	533	567
Gate-to-gate costs (index)	100	88	90	100	112	125
Composite flight-hours (index)	100	104	110	116	123	129



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:1997 (L'viv) 2000 (Odesa, Kyiv) 2007 (Simf., Kyiv, Dnip.)*	RDPS C: 1997 (L'viv) 2000 (Odesa, Kyiv) 2007 (Simf., Kyiv, Dnip.)*	HMI C: 1997 (L'viv) 2000 (Odesa, Kyiv) 2007 (Simf., Kyiv, Dnip.)*	VCS C:2003 (Odesa, L'viv) 2006 (Simf., Dnip.) 2011 (Kyiv)*
						2006				S, D
						2007	S, K, D	S, K, D	S, K, D	
						2008	K			
						2009				
€27.0M				€42.6M		2010				
	€18.0M		€6.0M			2011				K
						2012	S, K	K	K	
						2013	O, L	S, O, L	S, O, L	L
						2014				
						2015				O
						2016				

* C = Commissioning   Upgrade   Replacement

Focus on the top five capex projects

Project number	Name of the project	Domain	Financial amount in €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	Building	42.6	2008	2013
2	Upgrade of ATM systems for L'viv ACC/APP/TWR, Kyiv ACC/APP/TWR, Donets'k APP/TWR, Kharkiv APP/TWR, Dnipropetrovs'k TWR	ATM	27.0	2008	2013
3	Upgrade of radio equipment for Dnipropetrovs'k ACC, L'viv ACC, Kyiv ACC, Simferopol' TWR, Zhuliany (Kyiv) TWR, Donets'k APP/TWR	COM	18.0	2010	2013
4	3 stand-alone Weather Radars (L'viv, Kharkiv and Simferopol')	SUR	5.0	2010	2012
5	Multilateration surveillance system for air traffic in CTR Boryspil', CTR Kyiv/Zhuliany and aerodrome surface movement zone at Boryspil' airport	SUR	1.0	2010	2013

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ANNEX 9 - ANSP FACT SHEETS

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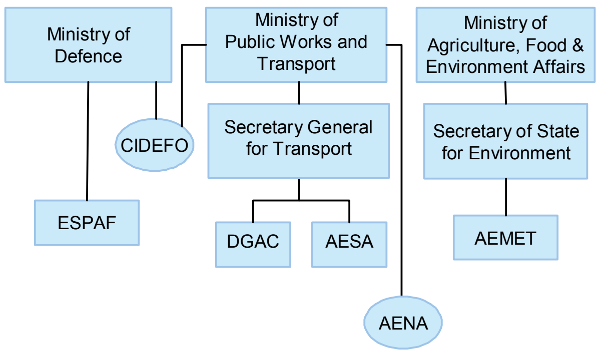
Aena, Spain

Aeropuertos Españoles y Navegación Aérea

www.aena.es

Institutional arrangements and links (2013)



Status (2013)

- 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)

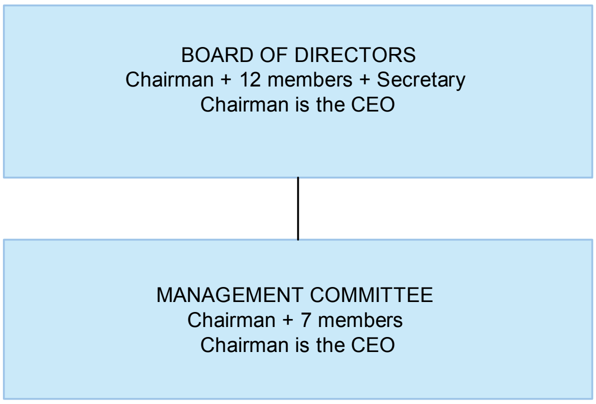
Body responsible for:

Safety Regulation
Spanish Civil Aviation Authority - Government
AESA - Government

Airspace Regulation
Spanish Civil Aviation Authority - Government
AESA - Government

Economic Regulation
Government

Corporate governance structure (2013)



Aena (2013)

CHAIRMAN OF THE BOARD OF DIRECTORS:
José Manuel Vargas Gómez

DIRECTOR GENERAL (CEO):
José Manuel Vargas Gómez

DIRECTOR OF AIR NAVIGATION:
Ignacio González Sánchez

Scope of services

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

Operational ATS units:

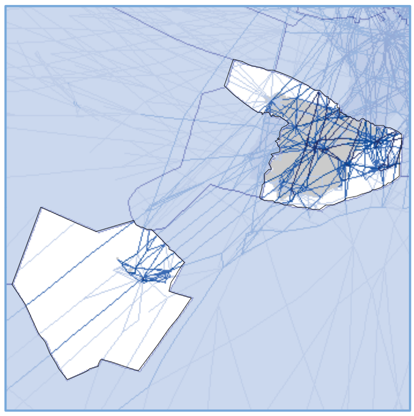
5 ACCs (Madrid, Barcelona, Canary Islands, Palma, Sevilla)
18 APPs (3 stand-alone APPs + 15 APPs co-located with TWR units)
36 TWRs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	1 077
Gate-to-gate total costs (M€)	1 019
Gate-to-gate ATM/CNS provision costs (M€)	901
Gate-to-gate total ATM/CNS assets(M€)	836
Gate-to-gate ANS total capex (M€)	131
ATCOs in OPS	1 898
Gate-to-gate total staff	4 047
Total IFR flight-hours controlled by ANSP ('000)	1 388
IFR airport movements controlled by ANSP ('000)	1 855
En-route sectors	68
Minutes of ATFM delays ('000)	3 644

Size

Size of controlled airspace: 2 190 000 km²



ANS CR, Czech Republic

Air Navigation Services of the Czech Republic

www.rlp.cz

Institutional arrangements and links (2013)

Ministry of Defence (M of D) Military Aviation Department

FUA Level 1 Body for Strategic ASM

Ministry of Transport (M of T) Civil Aviation Department

Civil Aviation Authority (CAA) ⇨NSA

Airport Authority

Private Providers of ATS

Air Navigation Services of the Czech Republic (ANS CR)

Status (2013)

- 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 (2013)

SUPERVISORY BOARD (6 members)

Chairman + 5 members
Members appointed by:
4 M of T
2 ANS CR employees

DIRECTOR GENERAL
appointed by the M of T

ANS CR (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Lukáš Hampl

DIRECTOR GENERAL (CEO):
Jan Klas

Scope of services

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

Operational ATS units:

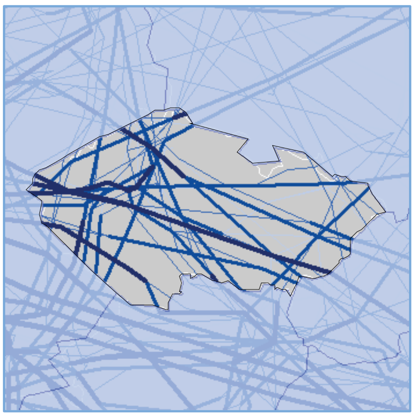
1 ACC (Praha)
4 APPs (Praha, Karlovy Vary, Brno, Ostrava)
4 TWRs (Praha, Karlovy Vary, Brno, Ostrava)
1 AFIS (located in Praha ACC)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	130
Gate-to-gate total costs (M€)	131
Gate-to-gate ATM/CNS provision costs (M€)	122
Gate-to-gate total ATM/CNS assets(M€)	137
Gate-to-gate ANS total capex (M€)	17
ATCOs in OPS	194
Gate-to-gate total staff	892
Total IFR flight-hours controlled by ANSP ('000)	233
IFR airport movements controlled by ANSP ('000)	165
En-route sectors	8
Minutes of ATFM delays ('000)	22

Size

Size of controlled airspace: 77 100 km²

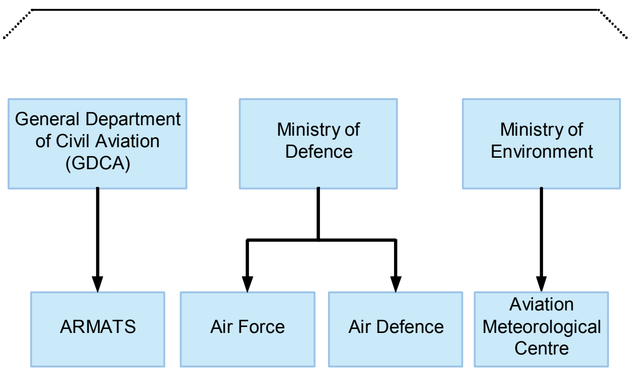


ARMATS, Armenia

Armenian Air Traffic Services

www.armats.com

Institutional arrangements and links (2013)



Status (2013)

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

National Supervisory Authority (NSA):
General Department of Civil Aviation (GDCA)

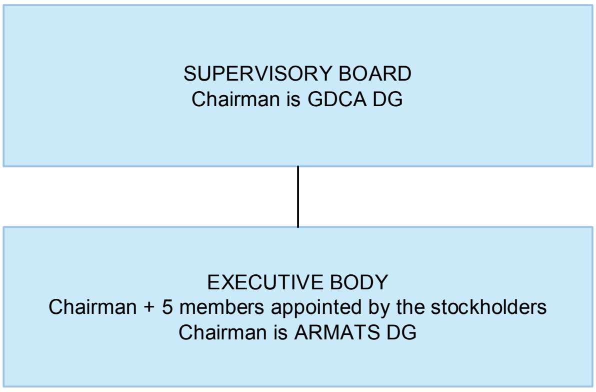
Body responsible for:

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 (2013)



ARMATS (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Artyom Movsesyan

CHAIRMAN OF THE EXECUTIVE BODY:
Eduard Musoyan

DIRECTOR OF AIR TRAFFIC SERVICES:
Artur Gasparyan

Scope of services

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

Operational ATS units:

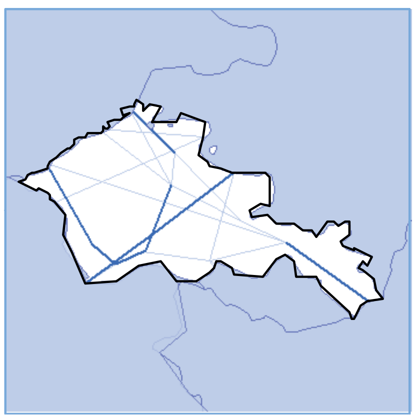
1 ACC (Yerevan)
2 APPs (Yerevan, Gyumri)
2 TWRs (Shirak, Zvartnots)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	8
Gate-to-gate total costs (M€)	7
Gate-to-gate ATM/CNS provision costs (M€)	7
Gate-to-gate total ATM/CNS assets(M€)	7
Gate-to-gate ANS total capex (M€)	2
ATCOs in OPS	70
Gate-to-gate total staff	458
Total IFR flight-hours controlled by ANSP ('000)	15
IFR airport movements controlled by ANSP ('000)	21
En-route sectors	1
Minutes of ATFM delays ('000)	0

Size

Size of controlled airspace: 29 800 km²

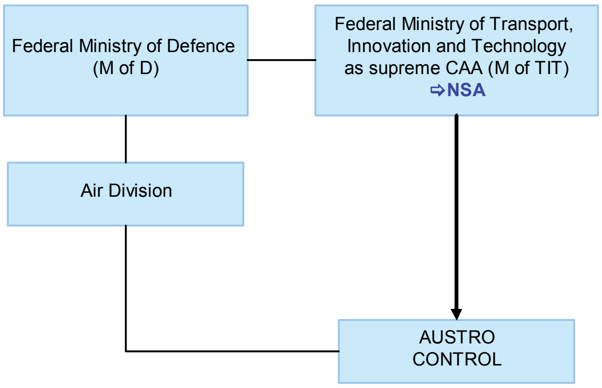


Austro Control, Austria

Österreichische Gesellschaft für Zivilluftfahrt mbH

www.austrocontrol.at

Institutional arrangements and links (2013)



Status (2013)

- 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

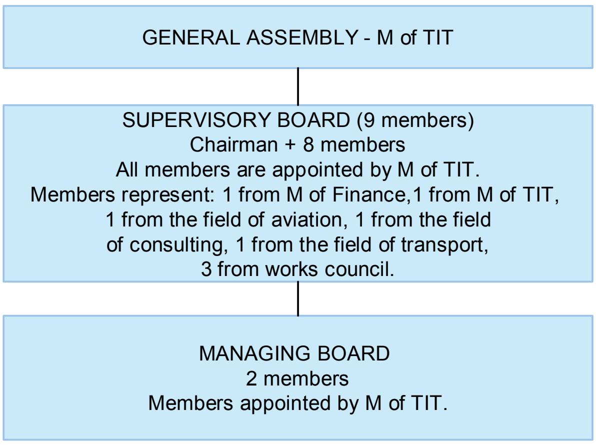
Airspace Regulation

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

Economic Regulation

Covered by the National Supervisory Authority

Corporate governance structure (2013)



Austro Control (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:

Dr. Caspar Einem

MANAGING BOARD:

Dr. Heinz Sommerbauer
Mag. Johann Zemsky

Scope of services

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

Operational ATS units:

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

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	216
Gate-to-gate total costs (M€)	210
Gate-to-gate ATM/CNS provision costs (M€)	180
Gate-to-gate total ATM/CNS assets(M€)	174
Gate-to-gate ANS total capex (M€)	29
ATCOs in OPS	275
Gate-to-gate total staff	907
Total IFR flight-hours controlled by ANSP ('000)	288
IFR airport movements controlled by ANSP ('000)	366
En-route sectors	11
Minutes of ATFM delays ('000)	399

Size

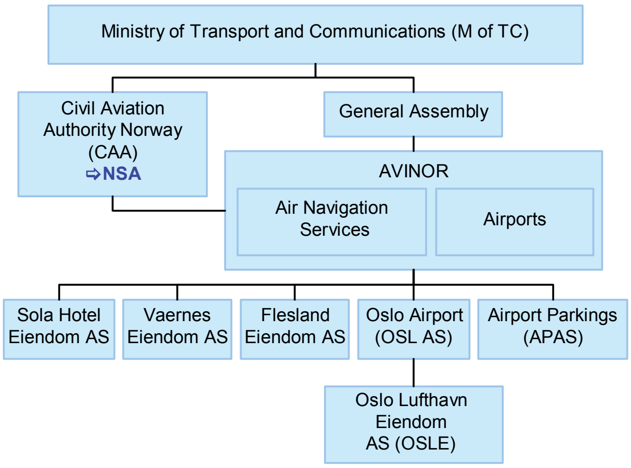
Size of controlled airspace: 80 400 km²

Avinor, Norway

AVINOR

www.avinor.no

Institutional arrangements and links (2013)



Status (2013)

- State owned limited company.
- Civil ANSP and airport owner/ operator
- Independent of CAA

National Supervisory Authority (NSA):

Civil Aviation Authority Norway (CAA)

Body responsible for:

Safety Regulation

Civil Aviation Authority Norway

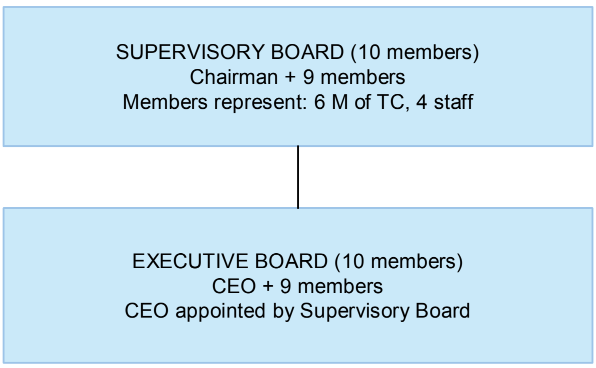
Airspace Regulation

Civil Aviation Authority Norway

Economic Regulation

Aeronautic charges are set annually by the Ministry of Transport and Communications

Corporate governance structure (2013)



Avinor (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:

Ola Mørkved Rinnan

CHIEF EXECUTIVE OFFICER:

Dag Falk-Petersen

Scope of services

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

- AVINOR owns and operates 46 airports, 12 in association with Armed Forces

Operational ATS units:

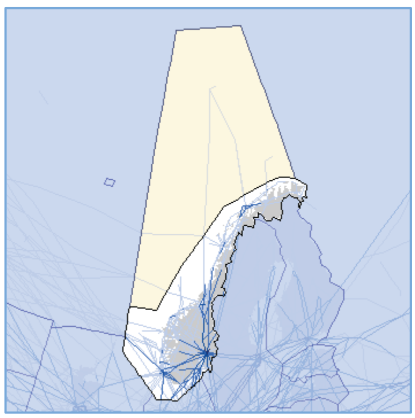
3 ACCs Oslo (ACC + APP), Stavanger (ACC), Bodo (ACC + APP + Oceanic)
17 APPs (1 APP combined with Oslo ACC + 16 TWRs/APPs)
17 TWRs
28 AFISs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	205
Gate-to-gate total costs (M€)	203
Gate-to-gate ATM/CNS provision costs (M€)	193
Gate-to-gate total ATM/CNS assets(M€)	96
Gate-to-gate ANS total capex (M€)	10
ATCOs in OPS	392
Gate-to-gate total staff	1 008
Total IFR flight-hours controlled by ANSP ('000)	330
IFR airport movements controlled by ANSP ('000)	655
En-route sectors	22
Minutes of ATFM delays ('000)	225

Size

Size of controlled airspace: 2 170 000 km²



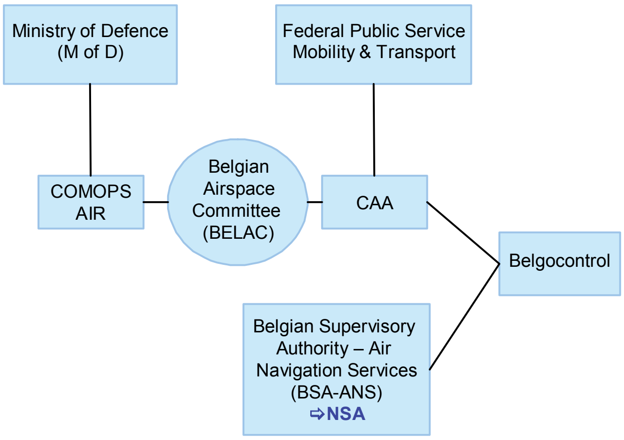
Continental: 720 000 km² - Oceanic:1 450 000 km²

Belgocontrol, Belgium

Belgocontrol

www.belgocontrol.be

Institutional arrangements and links (2013)



Status (2013)

- 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)

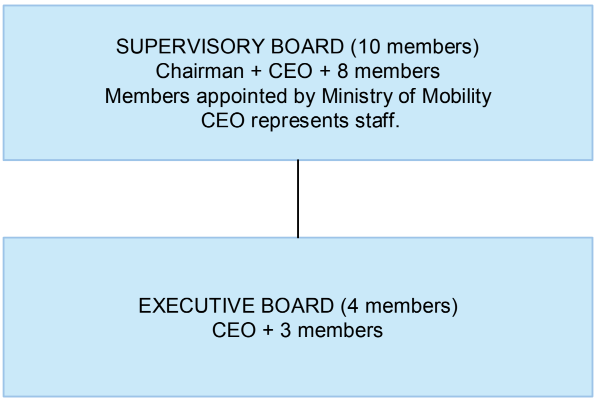
Body responsible for:

Safety Regulation
Civil Aviation Authority

Airspace Regulation
Belgian Airspace Committee

Economic Regulation
Federal Public Service of Mobility and Transport

Corporate governance structure (2013)



Belgocontrol (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Charles-Louis d'Arenberg

DIRECTOR GENERAL (CEO):
Jean-Claude Tintin

Scope of services

☑ 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:

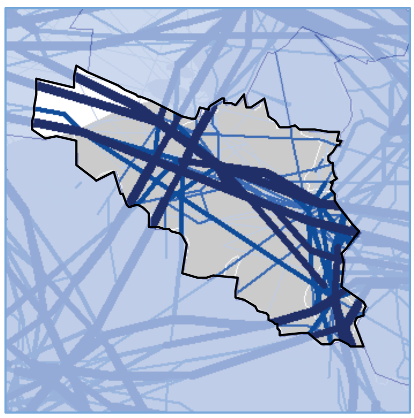
1 ACC (Brussels)
4 APPs (Brussels, Liege, Charleroi, Oostende)
5 TWRs (Brussels, Antwerp, Liege, Charleroi, Oostende)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	202
Gate-to-gate total costs (M€)	212
Gate-to-gate ATM/CNS provision costs (M€)	150
Gate-to-gate total ATM/CNS assets(M€)	149
Gate-to-gate ANS total capex (M€)	8
ATCOs in OPS	221
Gate-to-gate total staff	895
Total IFR flight-hours controlled by ANSP ('000)	114
IFR airport movements controlled by ANSP ('000)	381
En-route sectors	7
Minutes of ATFM delays ('000)	127

Size

Size of controlled airspace: 39 500 km²

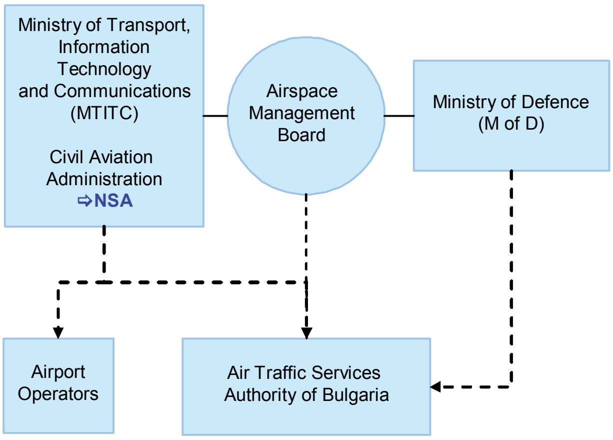


BULATSA, Bulgaria

Bulgarian Air Traffic Services Authority

www.atsa.bg

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

MANAGEMENT BOARD (3 members)
DG + 2 members

All members appointed by the MTITC.

BULATSA (2013)

CHAIRMAN OF THE MANAGEMENT BOARD:
Veselina Karamileva

DIRECTOR GENERAL (CEO):
Diyan Dinev

Scope of services

- [x] GAT
- [ ] OAT
- [x] Upper Airspace
- [x] Lower Airspace
- [ ] Oceanic ANS
- [x] MET

- Training of ATCOs

Operational ATS units:

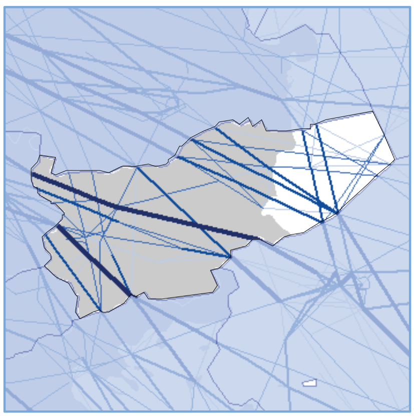
1 ACCs (Sofia)
3 APPs (Sofia, Varna, Burgas)
5 TWRs (Sofia, Varna, Burgas, Gorna Oriahovitza, Plovdiv)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	87
Gate-to-gate total costs (M€)	87
Gate-to-gate ATM/CNS provision costs (M€)	75
Gate-to-gate total ATM/CNS assets(M€)	97
Gate-to-gate ANS total capex (M€)	4
ATCOs in OPS	215
Gate-to-gate total staff	1 184
Total IFR flight-hours controlled by ANSP ('000)	182
IFR airport movements controlled by ANSP ('000)	83
En-route sectors	7
Minutes of ATFM delays ('000)	32

Size

Size of controlled airspace: 146 000 km²



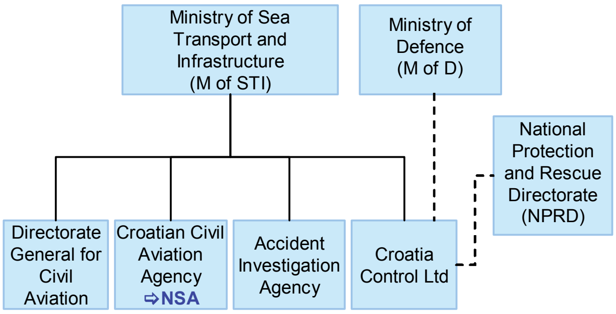
118 000 km² plus 28 000 km² over the Black Sea.

Croatia Control, Croatia

Croatia Control Ltd, Croatian Air Navigation Services

www.crocontrol.hr

Institutional arrangements and links (2013)



Status (2013)

- 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 STI

Economic Regulation
State Law and Croatia Control Ltd

Corporate governance structure (2013)

ASSEMBLY (3 members)
The President represents Ministry of STI (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 STI, M of D, M of F, and employees. They are appointed for a 4-year period. The member representing the employees is elected and appointed pursuant to the Company Statute and Labour Relations Act.

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 (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Darko Prebežac

DIRECTOR GENERAL:
Dragan Bilać

Scope of services

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

- ATS provision within entire Sarajevo FIR (Bosnia & Herzegovina) from FL 100 to FL 285 and within western part of Sarajevo FIR (west of the line: GUBOK-DER-BOSNA-VRANA-VELIT) from FL 285 to FL 660

Operational ATS units:

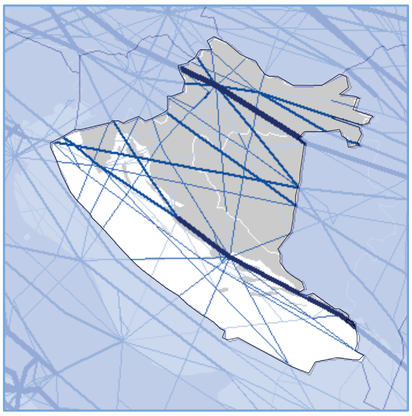
1 ACC/APP (Zagreb)
6 APPs/TWRs (Osijek, Rijeka, Pula, Zadar, Split, Dubrovnik)
4 TWRs (Zagreb, Brač, Lošinj, Lučko)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	75
Gate-to-gate total costs (M€)	82
Gate-to-gate ATM/CNS provision costs (M€)	77
Gate-to-gate total ATM/CNS assets(M€)	68
Gate-to-gate ANS total capex (M€)	22
ATCOs in OPS	232
Gate-to-gate total staff	749
Total IFR flight-hours controlled by ANSP ('000)	194
IFR airport movements controlled by ANSP ('000)	84
En-route sectors	9
Minutes of ATFM delays ('000)	259

Size

Size of controlled airspace: 158 000 km²

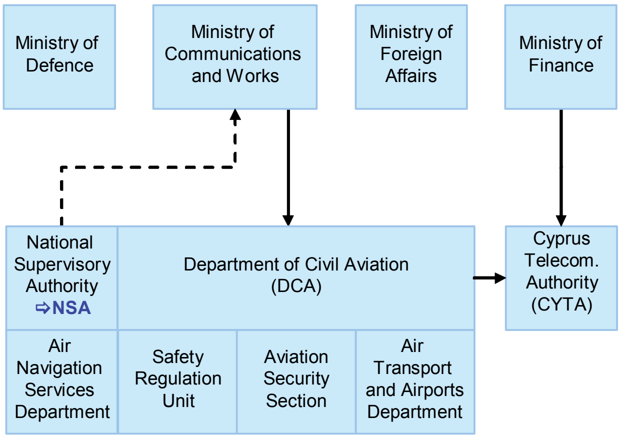


DCAC Cyprus, Cyprus

Department of Civil Aviation of Cyprus

www.mcw.gov.cy

Institutional arrangements and links (2013)



Status (2013)

- State body
- 100% State-owned

National Supervisory Authority (NSA):
Department of Civil Aviation

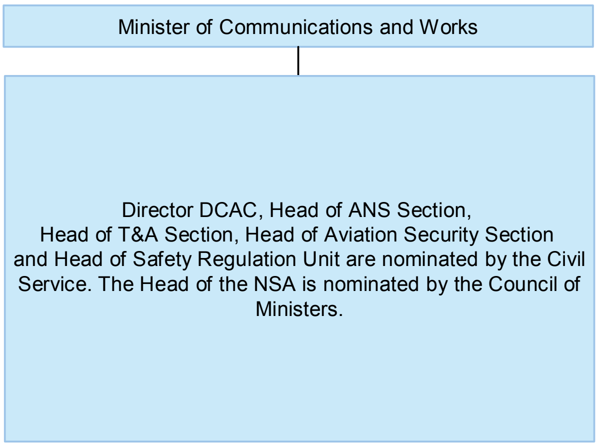
Body responsible for:

Safety Regulation
Department of Civil Aviation of Cyprus

Airspace Regulation
Department of Civil Aviation of Cyprus

Economic Regulation
Ministry of Finance

Corporate governance structure (2013)



DCAC Cyprus (2013)

DIRECTOR OF DCAC:
Iacovos Demetriou

ACTING HEAD OF NSA:
Panayiota Demetriou

HEAD OF ANS SECTION (COO):
Nicos Nicolaou (ACC, Airspace, ATFM)
Persephone Papadopoulou (APPs, TWRs, AIS, Training)

ACTING HEAD OF TRANSPORT AND AIRPORTS SECTION:
Antonis Lemesianos

Scope of services

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

- DCAC Cyprus owns and operates 2 airports

Operational ATS units:

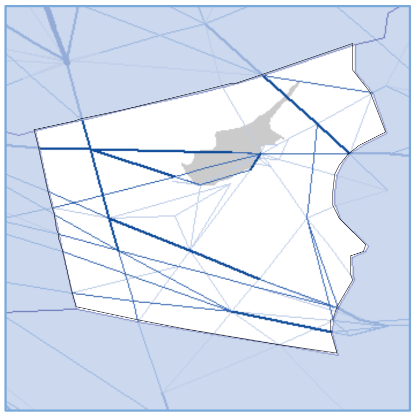
1 ACC (Nicosia)
2 APPs (Larnaca, Paphos)
2 TWRs (Larnaca, Paphos)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	51
Gate-to-gate total costs (M€)	52
Gate-to-gate ATM/CNS provision costs (M€)	37
Gate-to-gate total ATM/CNS assets(M€)	31
Gate-to-gate ANS total capex (M€)	3
ATCOs in OPS	83
Gate-to-gate total staff	197
Total IFR flight-hours controlled by ANSP ('000)	130
IFR airport movements controlled by ANSP ('000)	64
En-route sectors	4
Minutes of ATFM delays ('000)	457

Size

Size of controlled airspace: 174 000 km²

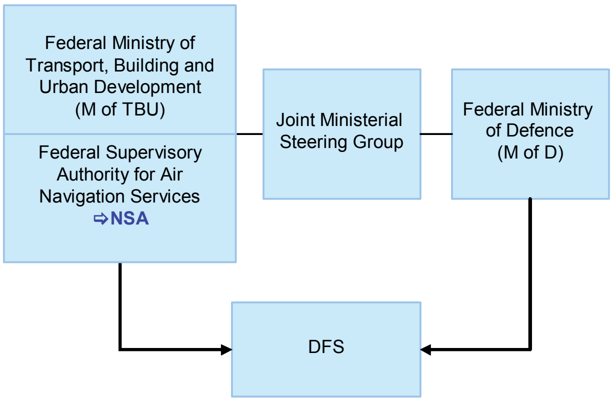


DFS, Germany

Deutsche Flugsicherung GmbH

www.dfs.de

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

SHAREHOLDER Meeting with M of TBU

Supervisory Board (12 Members)
Chairman + 11 Members
Chairman appointed by the Government
Members represent: 1 (Chairman) from M of TBU
1 M of TBU
2 M of D, 1 M of F, 1 KFW*, 6 staff reps
Chairman has a double voting right

EXECUTIVE BOARD (3 members)
CEO + 2 members
Executive Board is appointed by the Supervisory Board.

* KFW = KFW-Bankengruppe

DFS (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Sts. Michael Odenwald

CHAIRMAN OF THE EXECUTIVE BOARD:
Prof. Klaus-Dieter Scheurle

Scope of services

☑ 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:

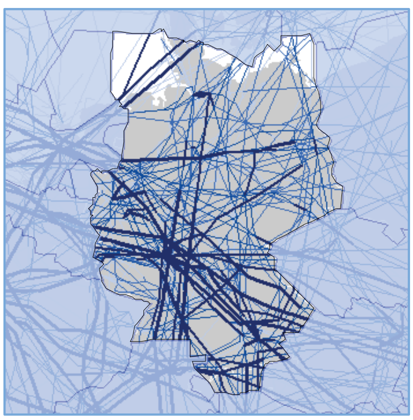
1 UAC (Karlsruhe)
1 ACC/UAC/APP (München)
2 ACCs/APPs (Bremen, Langen)
1 ACC (co-located with Maastricht UAC) for OAT in upper airspace in North-Western Germany
16 TWRs (Berlin Tempelhof closed in Nov.08)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	999
Gate-to-gate total costs (M€)	979
Gate-to-gate ATM/CNS provision costs (M€)	978
Gate-to-gate total ATM/CNS assets(M€)	657
Gate-to-gate ANS total capex (M€)	106
ATCOs in OPS	1 664
Gate-to-gate total staff	5 530
Total IFR flight-hours controlled by ANSP ('000)	1 413
IFR airport movements controlled by ANSP ('000)	2 059
En-route sectors	115
Minutes of ATFM delays ('000)	4 180

Size

Size of controlled airspace: 388 000 km²

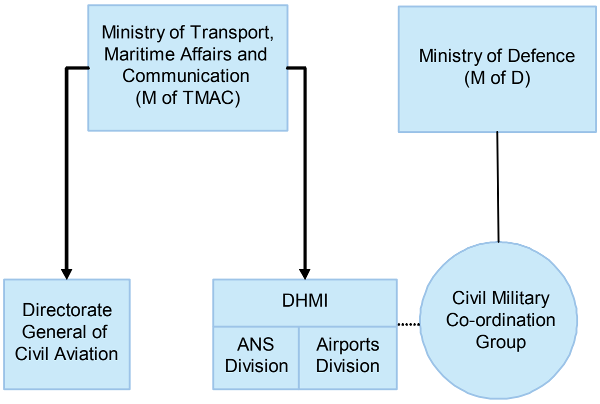


DHMI, Turkey

General Directorate of State Airports Authority

www.dhmi.gov.tr

Institutional arrangements and links (2013)



Status (2013)

- Autonomous State body
- 100% State-owned

National Supervisory Authority (NSA):
Not applicable since Turkey is not bound by SES Regulations

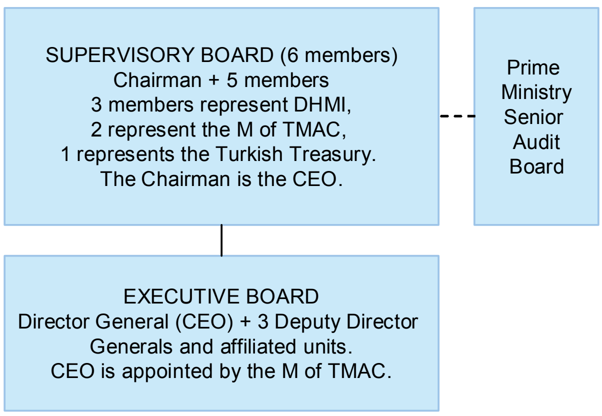
Body responsible for:

Safety Regulation
Directorate General of Civil Aviation

Airspace Regulation
General Directorate of DHMI

Economic Regulation
General Directorate of DHMI

Corporate governance structure (2013)



DHMI (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Mr. Orhan Birdal

DIRECTOR GENERAL (CEO):
Mr. Orhan Birdal

DIRECTOR ANS DIVISION:
Mr. Mustafa Kiliç

Scope of services

☑ 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 44 Airports

Operational ATS units:

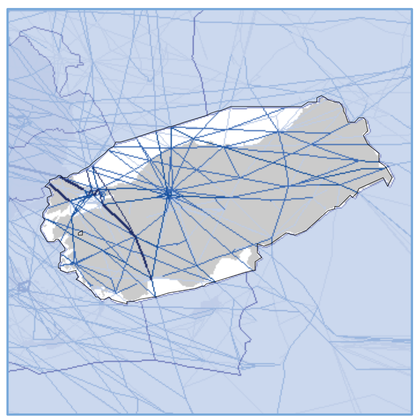
2 ACCs (Ankara, Istanbul)
29 APPs
37 TWRs
2 FICs/RCCs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	396
Gate-to-gate total costs (M€)	364
Gate-to-gate ATM/CNS provision costs (M€)	324
Gate-to-gate total ATM/CNS assets(M€)	622
Gate-to-gate ANS total capex (M€)	53
ATCOs in OPS	911
Gate-to-gate total staff	5 227
Total IFR flight-hours controlled by ANSP ('000)	904
IFR airport movements controlled by ANSP ('000)	907
En-route sectors	22
Minutes of ATFM delays ('000)	727

Size

Size of controlled airspace: 982 000 km²

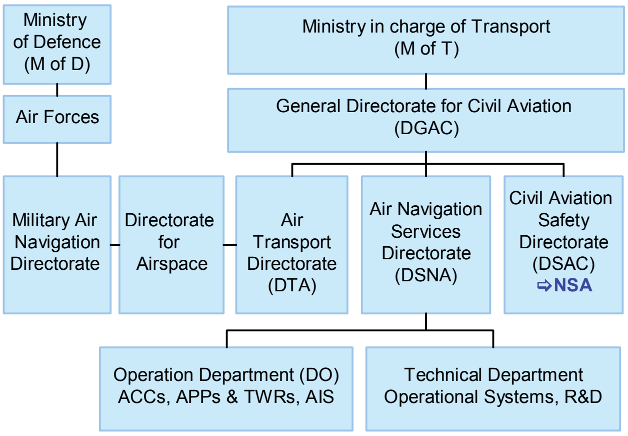


DSNA, France

Directorate of Air Navigation Services

www.aviation-civile.gouv.fr

Institutional arrangements and links (2013)



Status (2013)

- DSNA is a division of DGAC
- 100% State-owned

National Supervisory Authority (NSA):
Directorate for Civil Aviation Safety (DSAC)

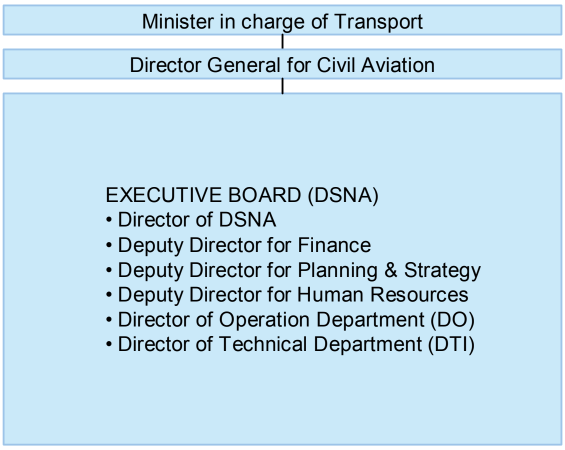
Body responsible for:

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 (2013)



DSNA (2013)

DIRECTOR OF DSNA:
M. Georges

DIRECTOR OF OPERATION DEPARTEMENT (DO):
M. Bruneau

DIRECTOR OF TECHNICAL DEPARTEMENT (DTI):
P. Planchon

Scope of services

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

- Delegation of airspace to Skyguide and Jersey

Operational ATS units:

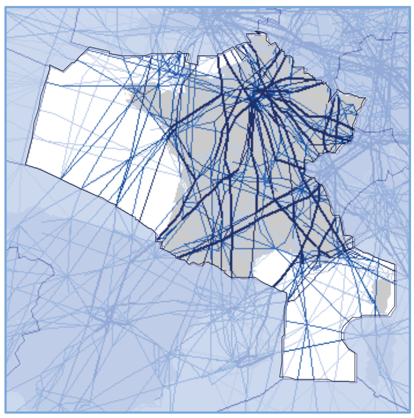
5 ACCs
12 APPs/TWRs (i.e. Paris Orly, Paris CDG, Marseille, Lyon, Nice, Bordeaux, Toulouse, Clermont Ferrand, Montpellier, Strasbourg, Bâle-Mulhouse, Nantes)
69 TWRs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	1 479
Gate-to-gate total costs (M€)	1 421
Gate-to-gate ATM/CNS provision costs (M€)	1 155
Gate-to-gate total ATM/CNS assets(M€)	728
Gate-to-gate ANS total capex (M€)	111
ATCOs in OPS	2 738
Gate-to-gate total staff	7 938
Total IFR flight-hours controlled by ANSP ('000)	2 145
IFR airport movements controlled by ANSP ('000)	1 893
En-route sectors	97
Minutes of ATFM delays ('000)	1 915

Size

Size of controlled airspace: 1 010 000 km²



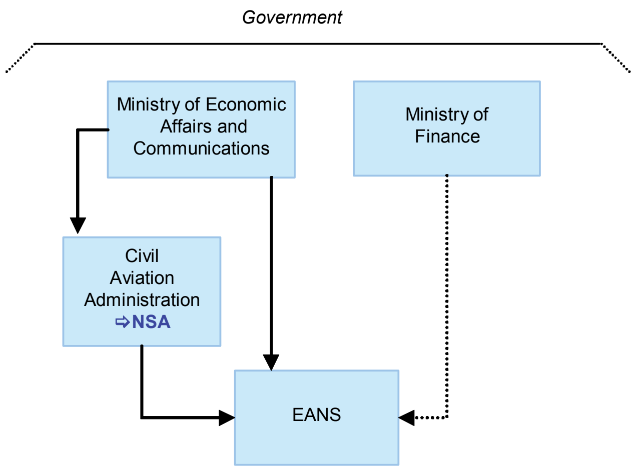
EANS, Estonia

Estonian Air Navigation Services

www.eans.ee

LENNULIIKLUSTEENINDUSE AS
ESTONIAN AIR NAVIGATION SERVICES

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

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 (2 members)
CEO + 1 member
CEO appointed by the Supervisory Board

EANS (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Andres Uusma

CHAIRMAN OF THE MANAGEMENT BOARD & CEO:
Tanel Rautits

Scope of services

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

- Tech. serv. (NAV/COMM/SUR), Aeronautical info serv.
- Consultancy services
- Control Tallinn Aerodrome
- Estonia is not member of EUROCONTROL
- Estonia belongs to IFPS zone

Operational ATS units:

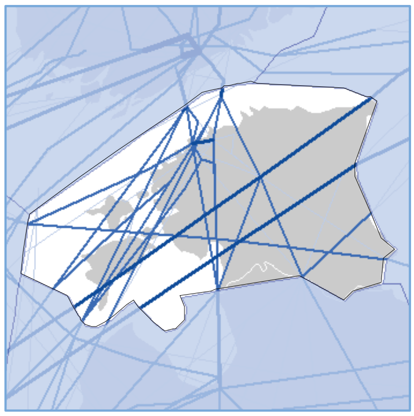
1 ACC (Tallinn)
2 APPs/TWRs (Tallinn, Tartu)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	15
Gate-to-gate total costs (M€)	13
Gate-to-gate ATM/CNS provision costs (M€)	13
Gate-to-gate total ATM/CNS assets(M€)	17
Gate-to-gate ANS total capex (M€)	5
ATCOs in OPS	56
Gate-to-gate total staff	151
Total IFR flight-hours controlled by ANSP ('000)	62
IFR airport movements controlled by ANSP ('000)	38
En-route sectors	3
Minutes of ATFM delays ('000)	4

Size

Size of controlled airspace: 77 102 km²

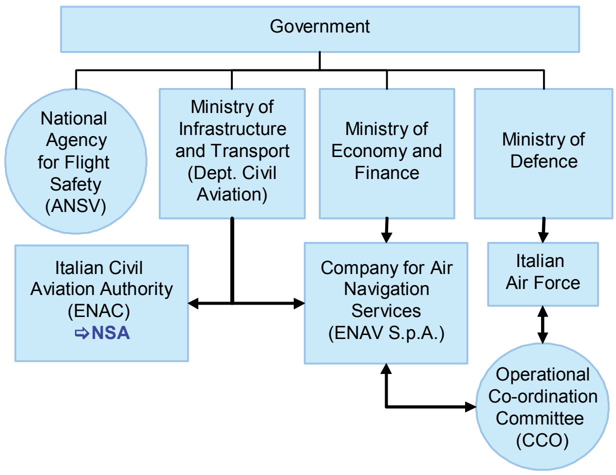


ENAV, Italy

Company for Air Navigation Services

www.enav.it

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

CHIEF EXECUTIVE OFFICER
The CEO has been appointed by the Ministry of Economy and Finance in consultation with the Ministry of Infrastructure and Transport.

Reciprocal obligations between the Ministry of Infrastructure and Transport and ENAV are regulated through programme contract and service contract.

ENAV (2013)

CHIEF EXECUTIVE OFFICER (CEO):
Massimo Garbini

DIRECTOR GENERAL:
Massimo Bellizzi

Scope of services

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

- Aeronautical Information service
- Training and licensing of ATCO's
- R&D consultancy services
- Aerodrome weather services, ATM and CNS
- Flight inspection

Operational ATS units:

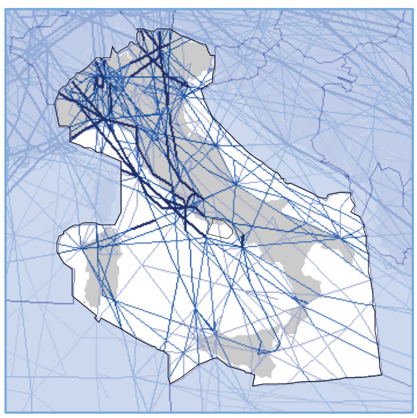
4 ACCs (Milan, Padua, Rome, Brindisi)
18 APPs co-located within TWR units + 1 APP stand-alone + 4 APPs co-located within ACC units
28 TWRs (including 16 low traffic airports which are not included in ACE data analysis)
11 AFISs (low traffic airports not included in ACE data analysis)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	717
Gate-to-gate total costs (M€)	759
Gate-to-gate ATM/CNS provision costs (M€)	684
Gate-to-gate total ATM/CNS assets(M€)	1 019
Gate-to-gate ANS total capex (M€)	115
ATCOs in OPS	1 412
Gate-to-gate total staff	2 968
Total IFR flight-hours controlled by ANSP ('000)	1 074
IFR airport movements controlled by ANSP ('000)	1 162
En-route sectors	61
Minutes of ATFM delays ('000)	174

Size

Size of controlled airspace: 734 000 km²

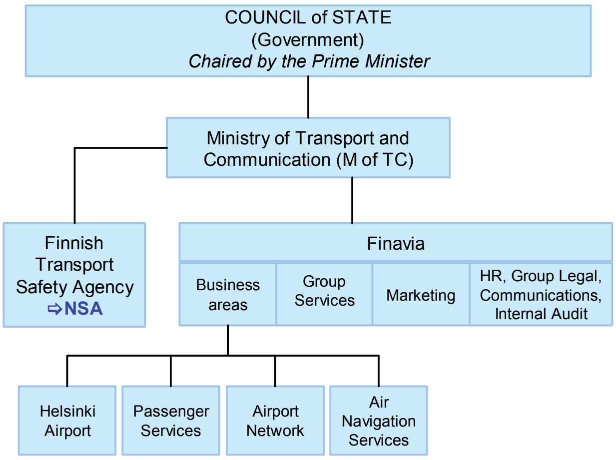


Finavia, Finland

Finavia

www.finavia.fi

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

The BOARD (7 members)
Chairman + 6 members (1 member represents staff)
All members are appointed by the Council of State.
Chief Executive Officer of Finavia is not a member of the Board.

Chief Executive Officer

Finavia (2013)

CHAIRMAN OF THE FINAVIA BOARD:
Soili Suonoja

CHIEF EXECUTIVE OFFICER:
Kari Savolainen

VICE PRESIDENT - AIR NAVIGATION SERVICES:
Raine Luojus

Scope of services

☑ 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
- 195 ATCOs in OPS reported below do not include those providing services to military OAT flights

Operational ATS units:

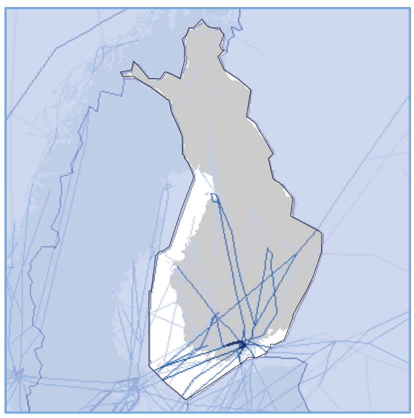
1 ACC (Tampere)
5 APPs/TWRs (Helsinki, Jyväskylä, Kuopio, Tampere-Pirkkala, Rovaniemi)
3 Mil-APPs/TWRs (Halli, Kauhava, Utti)
10 TWRs
1 General Aviation Airport (Malmi)
6 AFISs (Enontekiö, Kittilä, Kajaani, Savonlinna, Kuusamo, Varkaus)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	54
Gate-to-gate total costs (M€)	72
Gate-to-gate ATM/CNS provision costs (M€)	62
Gate-to-gate total ATM/CNS assets(M€)	49
Gate-to-gate ANS total capex (M€)	5
ATCOs in OPS	195
Gate-to-gate total staff	425
Total IFR flight-hours controlled by ANSP ('000)	124
IFR airport movements controlled by ANSP ('000)	276
En-route sectors	5
Minutes of ATFM delays ('000)	174

Size

Size of controlled airspace: 415 000 km²

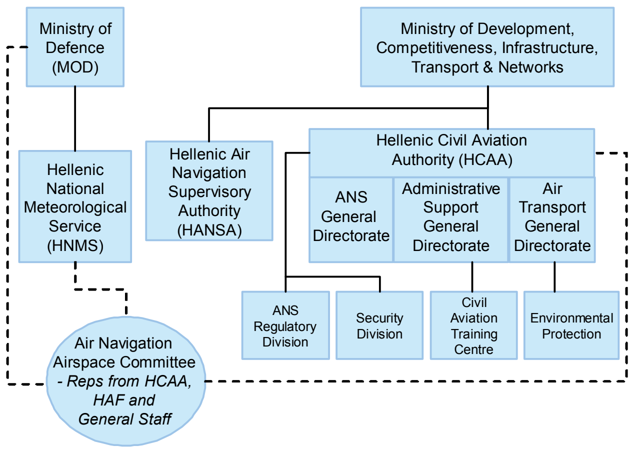


HCAA, Greece

Hellenic Civil Aviation Authority

www.hcaa.gr

Institutional arrangements and links (2013)



Status (2013)

- 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 Development, Competitiveness, Infrastructure, Transport & Networks and HCAA for charges

Ministry of Finance for HCAA Budget

Corporate governance structure (2013)

Minister of Development, Competitiveness, Infrastructure, Transport & Networks

HCAA Governor and two HCAA Deputy Governors appointed by the Minister

Three Directors General, one of which is responsible for central and regional HCAA/ANS units

HCAA (2013)

GOVERNOR:
F. Papadimitropoulou

DEPUTY GOVERNORS:
G. Nanidis
S. Konsolakis

DIRECTOR GENERAL OF AIR NAVIGATION:
G. Kontogiannis

Scope of services

- [x] GAT
- [ ] OAT
- [x] Upper Airspace
- [x] Lower Airspace
- [ ] Oceanic ANS
- [ ] MET

Operational ATS units:

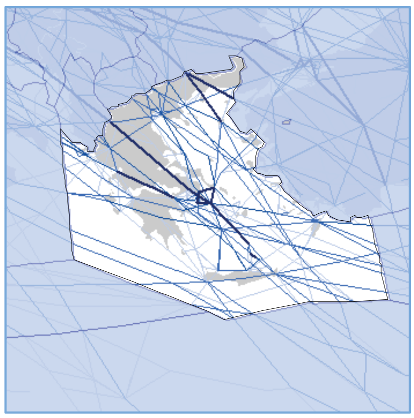
1 ACC
16 APPs
18 TWRs
15 AFISs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	179
Gate-to-gate total costs (M€)	182
Gate-to-gate ATM/CNS provision costs (M€)	159
Gate-to-gate total ATM/CNS assets(M€)	167
Gate-to-gate ANS total capex (M€)	1
ATCOs in OPS	480
Gate-to-gate total staff	1 786
Total IFR flight-hours controlled by ANSP ('000)	480
IFR airport movements controlled by ANSP ('000)	169
En-route sectors	12
Minutes of ATFM delays ('000)	2 517

Size

Size of controlled airspace: 538 000 km²



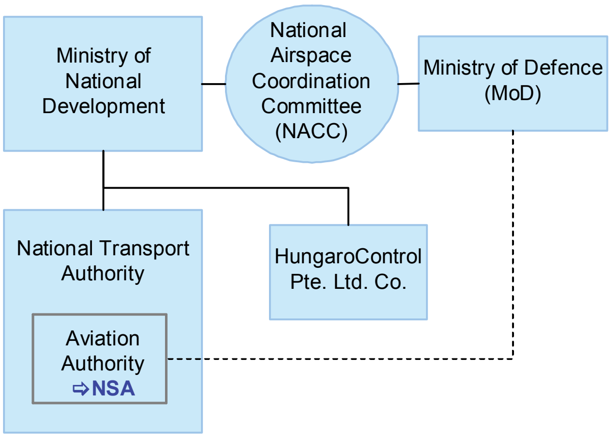
HungaroControl, Hungary

Hungarian Air Navigation Services

HungaroControl
Hungarian Air Navigation Services Pte. Ltd. Co.

www.hungarocontrol.hu

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

SHAREHOLDER
The Minister responsible for transport exercises the rights of the shareholder on behalf of the State

CHIEF EXECUTIVE OFFICER
The CEO is appointed by the Minister responsible for transport

SUPERVISORY BOARD
President + 5 members
The President and all members are appointed by the Minister responsible for transport
2 members are representatives of the employees

HungaroControl (2013)

CHIEF EXECUTIVE OFFICER (CEO):
Kornél Szepessy

CHAIRMAN OF THE SUPERVISORY BOARD:
Zoltán Schváb

Scope of services

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

- HungaroControl provides Training activities (ATM training courses, language courses) in its Civil Aviation Training Centre (CATC)

Operational ATS units:

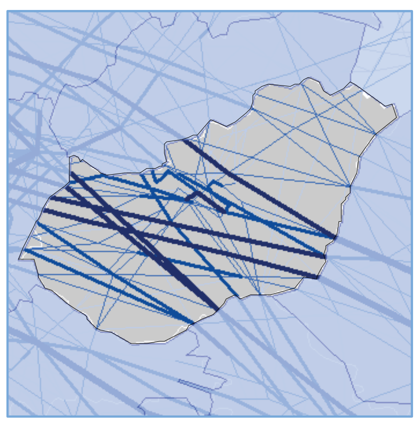
1 ACC (Budapest)
1 APP (Budapest)
1 TWR (Budapest)
2 AFISs (Sármellék/Balaton, Debrecen)

Key financial and operational figures (ACE 2011)

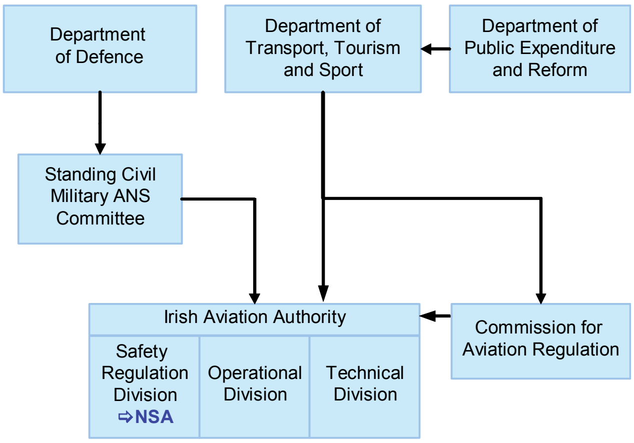
Gate-to-gate total revenues (M€)	115
Gate-to-gate total costs (M€)	105
Gate-to-gate ATM/CNS provision costs (M€)	96
Gate-to-gate total ATM/CNS assets(M€)	65
Gate-to-gate ANS total capex (M€)	14
ATCOs in OPS	175
Gate-to-gate total staff	732
Total IFR flight-hours controlled by ANSP ('000)	194
IFR airport movements controlled by ANSP ('000)	110
En-route sectors	7
Minutes of ATFM delays ('000)	0

Size

Size of controlled airspace: 93 000 km²



Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

BOARD OF THE AUTHORITY (9 members)
Chairman + CEO + 7 members

EXECUTIVE BOARD (Senior Management Board) (8 members)
CEO + 7 senior executives

IAA (2013)

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

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

Operational ATS units:

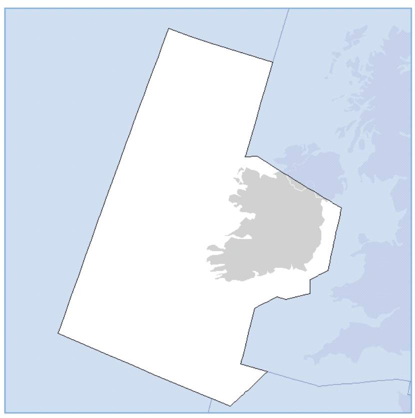
2 ACCs (Dublin, Shannon)
3 APPs (Dublin, Shannon, Cork)
3 TWRs (Dublin, Shannon, Cork)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	153
Gate-to-gate total costs (M€)	141
Gate-to-gate ATM/CNS provision costs (M€)	122
Gate-to-gate total ATM/CNS assets(M€)	98
Gate-to-gate ANS total capex (M€)	6
ATCOs in OPS	212
Gate-to-gate total staff	498
Total IFR flight-hours controlled by ANSP ('000)	262
IFR airport movements controlled by ANSP ('000)	208
En-route sectors	11
Minutes of ATFM delays ('000)	4

Size

Size of controlled airspace: 457 000 km²

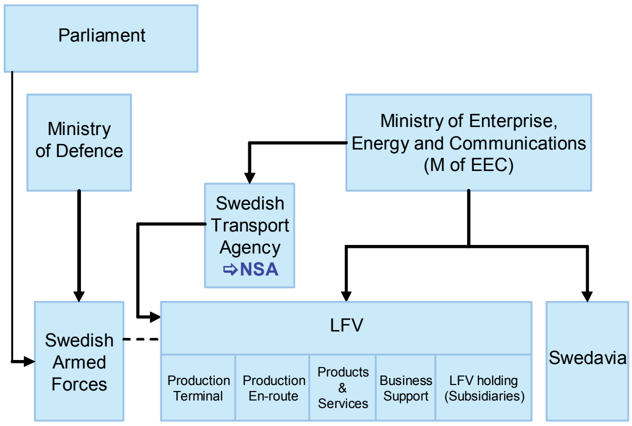


LFV, Sweden

LFV, Swedish Air Navigation Services

www.lfv.se

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

BOARD OF DIRECTORS (8 members)
Chairman + DG + 6 members
6 members (Chairman + DG + 4 members) are appointed by the Government; 2 members are appointed by Trade Unions.

EXECUTIVE BOARD (8 members)
DG + 7 members
DG appointed by the Government

LFV (2013)

CHAIRMAN OF THE BOARD OF DIRECTORS:
Nils Gunnar Billinger

DIRECTOR GENERAL:
Thomas Allard

Scope of services

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

Operational ATS units:

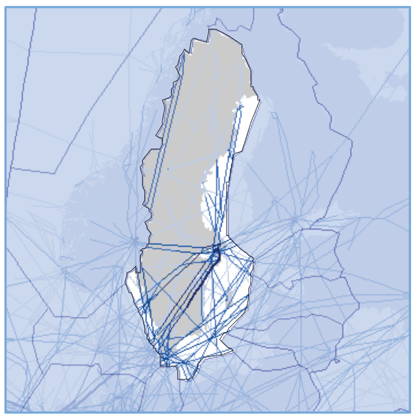
2 ACCs (Stockholm and Malmö)
26 APPs (2 APPs combined with ACCs + 24 APPs combined with TWRs)
35 TWRs
2 AFISs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	223
Gate-to-gate total costs (M€)	216
Gate-to-gate ATM/CNS provision costs (M€)	208
Gate-to-gate total ATM/CNS assets(M€)	163
Gate-to-gate ANS total capex (M€)	10
ATCOs in OPS	521
Gate-to-gate total staff	1 088
Total IFR flight-hours controlled by ANSP ('000)	431
IFR airport movements controlled by ANSP ('000)	536
En-route sectors	22
Minutes of ATFM delays ('000)	111

Size

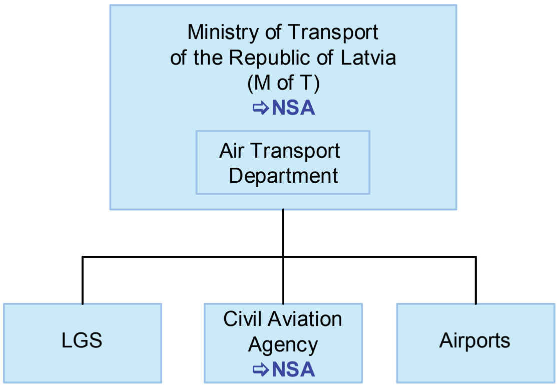
Size of controlled airspace: 626 000 km²



SJSC Latvijas Gaisa Satiksme

www.lgs.lv

Institutional arrangements and links (2013)



Status (2013)

- 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)

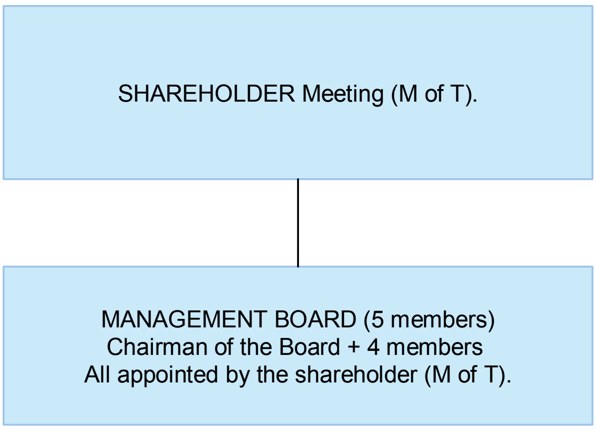
Body responsible for:

Safety Regulation
Civil Aviation Agency

Airspace Regulation
Civil Aviation Agency

Economic Regulation
Air Transport Department and Cabinet of Ministers (Government)

Corporate governance structure (2013)



LGS (2013)

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

☑ 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:

1 ACC (Riga)
2 APPs (Riga, Liepaja)
2 TWRs (Riga, Liepaja)
1 AFIS/FIC* (Liepaja)

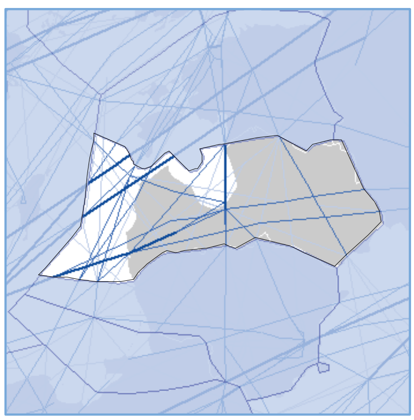
*FIC for western part of Riga FIR

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	24
Gate-to-gate total costs (M€)	28
Gate-to-gate ATM/CNS provision costs (M€)	23
Gate-to-gate total ATM/CNS assets(M€)	22
Gate-to-gate ANS total capex (M€)	3
ATCOs in OPS	79
Gate-to-gate total staff	349
Total IFR flight-hours controlled by ANSP ('000)	72
IFR airport movements controlled by ANSP ('000)	72
En-route sectors	3
Minutes of ATFM delays ('000)	0

Size

Size of controlled airspace: 95 600 km²

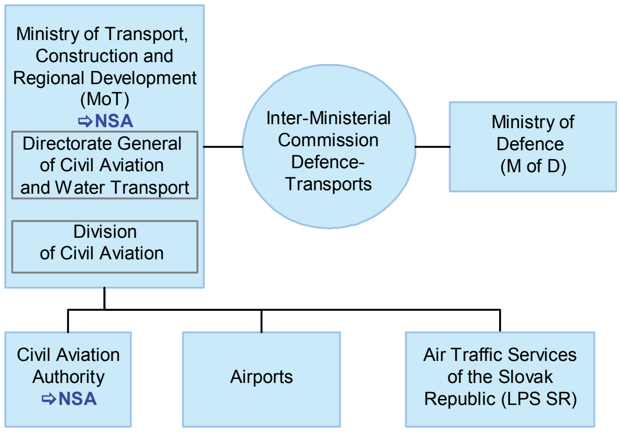


LPS, Slovak Republic

Letové Prevádzkové Služby Slovenskej Republiky

www.lps.sk

Institutional arrangements and links (2013)



Status (2013)

- State-owned enterprise as of January 2000
- 100% State-owned

National Supervisory Authority (NSA):
Civil Aviation Authority

Body responsible for:

Safety Regulation
Ministry of Transport, Construction and Regional Development

Airspace Regulation
Ministry of Transport, Construction and Regional Development

Economic Regulation
Ministry of Transport, Construction and Regional Development and other State bodies

Corporate governance structure (2013)

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 (2013)

CHAIRPERSON OF THE SUPERVISORY BOARD:
Peter Horal

DIRECTOR GENERAL (CEO):
Miroslav Bartoš

Scope of services

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

Operational ATS units:

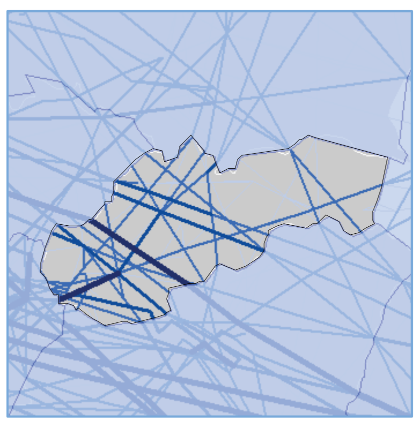
1 ACC (Bratislava)
2 APPs (Bratislava, Kosice)
5 TWRs (Bratislava, Kosice, Piestany, Poprad and Zilina)
1 Central ATS Reporting Office (Bratislava)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	55
Gate-to-gate total costs (M€)	57
Gate-to-gate ATM/CNS provision costs (M€)	51
Gate-to-gate total ATM/CNS assets(M€)	35
Gate-to-gate ANS total capex (M€)	6
ATCOs in OPS	97
Gate-to-gate total staff	474
Total IFR flight-hours controlled by ANSP ('000)	84
IFR airport movements controlled by ANSP ('000)	34
En-route sectors	5
Minutes of ATFM delays ('000)	0

Size

Size of controlled airspace: 48 700 km²



LVNL, Netherlands

Luchtverkeersleiding Nederland

www.lvnl.nl

Institutional arrangements and links (2013)

Ministry of Infrastructure and the Environment (MIE)

Directorate - General for Mobility and Transport (DGB)

The Human Environment and Transport Inspectorate (ILenT)
⇨NSA

LVNL

Status (2013)

- 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 (2013)

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 (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:

G.J.N.H. Cerfontaine

CHAIRMAN OF THE EXECUTIVE BOARD (CEO):

Ir. P. Riemens (CEO)

Scope of services

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

- Controls lower airspace up to FL 245

Operational ATS units:

1 ACC (Amsterdam)
3 APPs (Schiphol, Eelde, Beek)
4 TWRs (Schiphol, Rotterdam, Eelde, Beek)

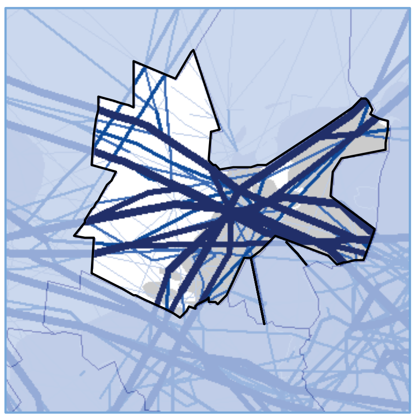
- New Millingen ACC (Military ACC) is not included in ACE data analysis
- Rotterdam APP has been located in Schiphol since 2002

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	231
Gate-to-gate total costs (M€)	210
Gate-to-gate ATM/CNS provision costs (M€)	167
Gate-to-gate total ATM/CNS assets(M€)	97
Gate-to-gate ANS total capex (M€)	18
ATCOs in OPS	189
Gate-to-gate total staff	891
Total IFR flight-hours controlled by ANSP ('000)	155
IFR airport movements controlled by ANSP ('000)	486
En-route sectors	5
Minutes of ATFM delays ('000)	465

Size

Size of controlled airspace: 52 300 km²



MATS, Malta

Malta Air Traffic Services Limited

www.maltats.com

Institutional arrangements and links (2013)

Ministry for Infrastructure, Transport & Communications (MITC)

Civil Aviation Directorate ⇨NSA

Ministry of Finance, Economy and Investment (MFEI)

Malta Air Traffic Services Ltd (MATS)

Status (2013)

- 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 (2013)

BOARD of DIRECTORS (5 members)
Chairman + 4 Directors
Members appointed by the Government, representing the MFEI.

The Board of Directors appoints the CEO.

MATS (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Maj. Vanni Ganado

CEO:
Brig. Carmel Vassallo

HEAD OF ATS DIVISION:
Robert Sant

Scope of services

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

- MATS controls portions of airspace delegated to Malta ACC by Rome ACC

Operational ATS units:

1 ACC/APP (Malta)
1 TWR/APP (Luqa)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	13
Gate-to-gate total costs (M€)	17
Gate-to-gate ATM/CNS provision costs (M€)	15
Gate-to-gate total ATM/CNS assets(M€)	7
Gate-to-gate ANS total capex (M€)	3
ATCOs in OPS	48
Gate-to-gate total staff	143
Total IFR flight-hours controlled by ANSP ('000)	52
IFR airport movements controlled by ANSP ('000)	33
En-route sectors	2
Minutes of ATFM delays ('000)	0

Size

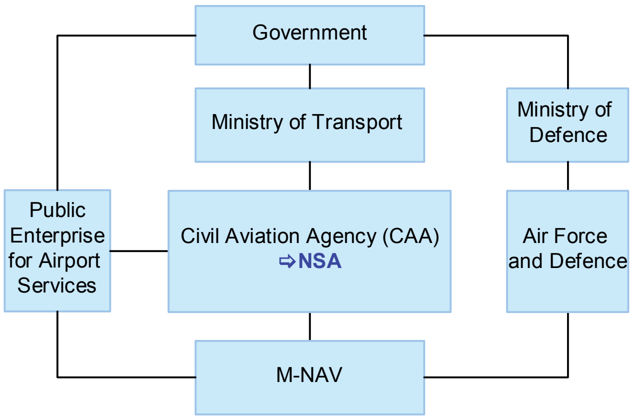
Size of controlled airspace: 231 000 km²

M-NAV, Former Yugoslav Republic of Macedonia

Air Navigation Services

www.mnavigation.mk

Institutional arrangements and links (2013)



Status (2013)

- Joint-stock company
- 100% State-owned

National Supervisory Authority (NSA):
Civil Aviation Agency (CAA)

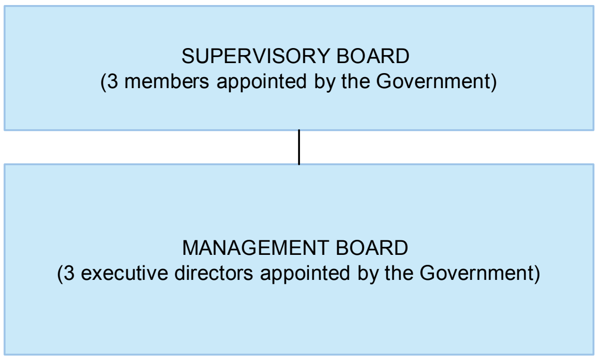
Body responsible for:

Safety Regulation
Safety Dept. of Civil Aviation Agency

Airspace Regulation
ATM Dept. of Civil Aviation Agency

Economic Regulation
Government, Civil Aviation Agency

Corporate governance structure (2013)



M-NAV (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Dragan Andreevski

DIRECTOR GENERAL OF CAA:
Dejan Mojsoski

DIRECTOR OF ANS DEPARTEMENT:
Nikolet Tagarinski

Scope of services

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

Operational ATS units:

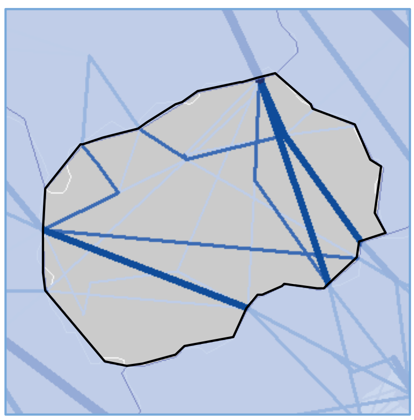
1 ACC (Skopje)
2 APPs (Skopje and Ohrid)
2 TWRs (Skopje and Ohrid)
1 AFIS (Skopje)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	11
Gate-to-gate total costs (M€)	12
Gate-to-gate ATM/CNS provision costs (M€)	10
Gate-to-gate total ATM/CNS assets(M€)	7
Gate-to-gate ANS total capex (M€)	0
ATCOs in OPS	70
Gate-to-gate total staff	274
Total IFR flight-hours controlled by ANSP ('000)	20
IFR airport movements controlled by ANSP ('000)	12
En-route sectors	3
Minutes of ATFM delays ('000)	0

Size

Size of controlled airspace: 24 800 km²

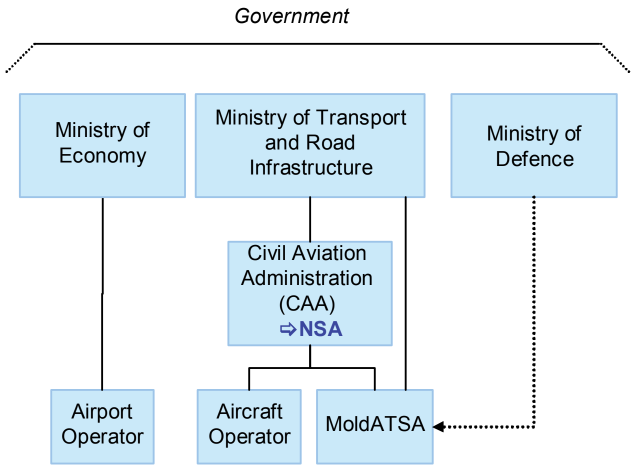


MoldATSA, Moldova

Moldavian Air Traffic Services Authority

www.moldatsa.md

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

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 (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Valentin Dogotari

DIRECTOR GENERAL (CEO):
Sorin Stati

HEAD OF ATM DIVISION:
Serghei Gheorghita

Scope of services

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

Operational ATS units:

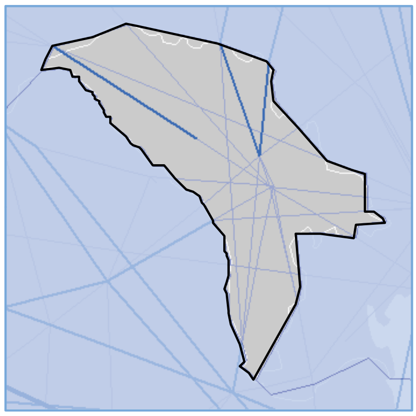
1 ACC (Chisinau)
1 APP (Chisinau)
4 TWRs (Chisinau, Balti, Cahul, Marculesti)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	9
Gate-to-gate total costs (M€)	9
Gate-to-gate ATM/CNS provision costs (M€)	7
Gate-to-gate total ATM/CNS assets(M€)	8
Gate-to-gate ANS total capex (M€)	2
ATCOs in OPS	58
Gate-to-gate total staff	309
Total IFR flight-hours controlled by ANSP ('000)	16
IFR airport movements controlled by ANSP ('000)	15
En-route sectors	2
Minutes of ATFM delays ('000)	0

Size

Size of controlled airspace: 33 700 km²



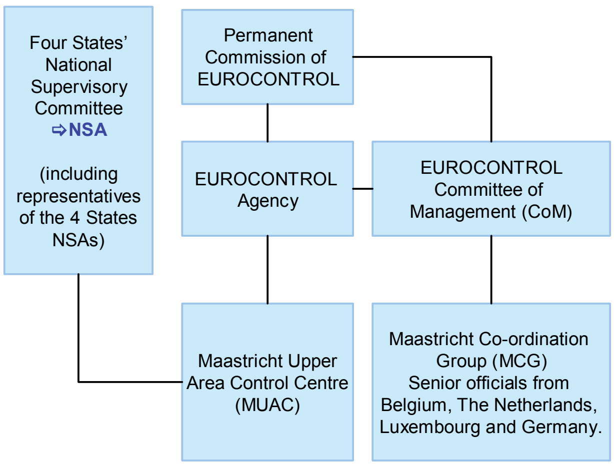
MUAC, Maastricht

Maastricht Upper Area Control Centre

www.eurocontrol.int

EUROCONTROL

Institutional arrangements and links (2013)



Status (2013)

- 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

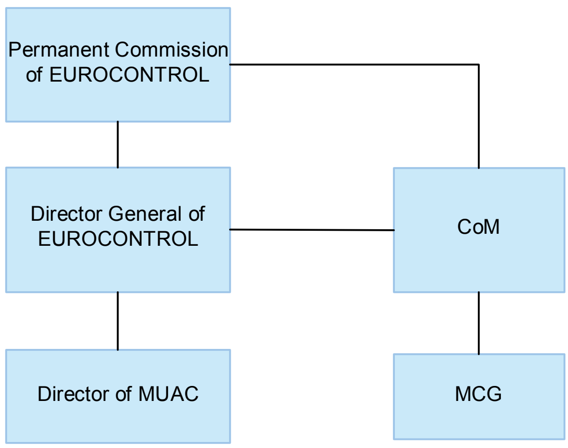
Airspace Regulation

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 (2013)



MUAC (2013)

DIRECTOR GENERAL OF EUROCONTROL:

Frank Brenner

DIRECTOR OF MUAC:

Jac Jansen

Scope of services

☑ 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:

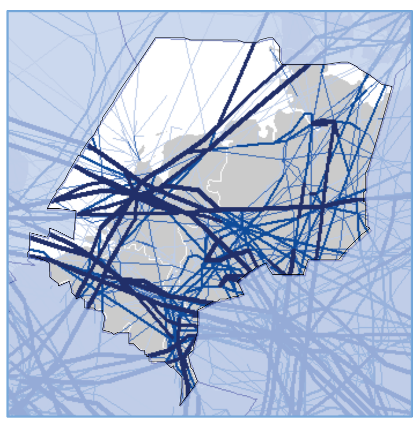
1 ACC (Maastricht)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	
Gate-to-gate total costs (M€)	129
Gate-to-gate ATM/CNS provision costs (M€)	129
Gate-to-gate total ATM/CNS assets(M€)	69
Gate-to-gate ANS total capex (M€)	7
ATCOs in OPS	240
Gate-to-gate total staff	652
Total IFR flight-hours controlled by ANSP ('000)	564
IFR airport movements controlled by ANSP ('000)	n/appl
En-route sectors	19
Minutes of ATFM delays ('000)	63

Size

Size of controlled airspace: 260 000 km²

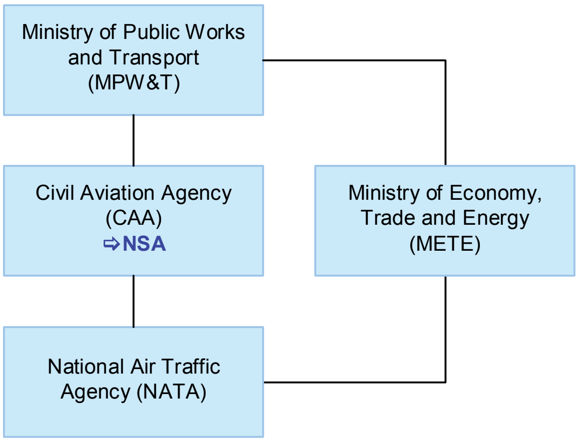


NATA Albania, Albania

National Air Traffic Agency

http://www.anta.com.al/

Institutional arrangements and links (2013)



Status (2013)

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

National Supervisory Authority (NSA):
Civil Aviation Agency (CAA)

Body responsible for:

Safety Regulation
MPW&T and Civil Aviation Agency (CAA)

Airspace Regulation
MPW&T and Civil Aviation Agency (CAA)

Economic Regulation
Ministry of Economy, Trade and Energy (METE)

Corporate governance structure (2013)

SUPERVISORY BOARD (6 members)
Chairman + 5 members
Chairman is the Director of Transport (MPW&T)

All 6 members are nominated by the METE.
2 members are proposed by the MPW&T, 2 members by the METE and 2 members by the Ministry of Finance.

MANAGEMENT BOARD (3 members)
Director General + 2 V/Directors

Director General appointed by MPW&T through the Supervisory Board of NATA

NATA Albania (2013)

CHAIRMAN OF SUPERVISORY BOARD:
Ervin Minarolli

DIRECTOR GENERAL (CEO) OF NATA:
Petrit Sulaj

DIRECTOR OF THE ATS DEPARTMENT:
Edmond Metaj

Scope of services

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

Operational ATS units:

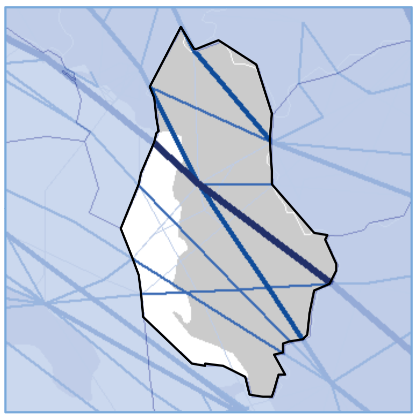
1 ACC (Tirana)
1 APP (Tirana)
1 TWR (Tirana)
1 AFIS (Tirana)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	22
Gate-to-gate total costs (M€)	22
Gate-to-gate ATM/CNS provision costs (M€)	20
Gate-to-gate total ATM/CNS assets(M€)	45
Gate-to-gate ANS total capex (M€)	15
ATCOs in OPS	52
Gate-to-gate total staff	297
Total IFR flight-hours controlled by ANSP ('000)	42
IFR airport movements controlled by ANSP ('000)	23
En-route sectors	3
Minutes of ATFM delays ('000)	96

Size

Size of controlled airspace: 36 000 km²

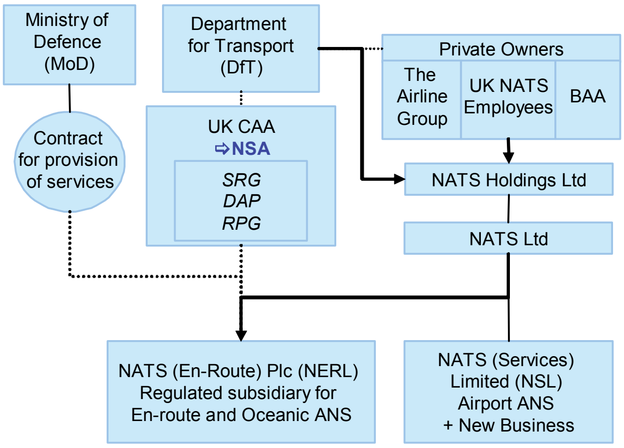


NATS, United Kingdom

NATS Ltd

www.nats.co.uk

Institutional arrangements and links (2013)



Status (2013)

- Public Private Partnership as of 2001
  - 49% State-owned (Govt retains a Golden Share)
  - 51% private-owned (42% by the Airline Group, 4% by BAA and 5% by UK NATS employees)
- The Airline Group comprises 7 airlines: BA, Virgin Atlantic, Lufthansa, EasyJet, Thomas Cook, Thomson Airways and Monarch Airlines

National Supervisory Authority (NSA):

UK CAA

Body responsible for:

Safety Regulation

UK CAA, Safety Regulation Group (SRG)

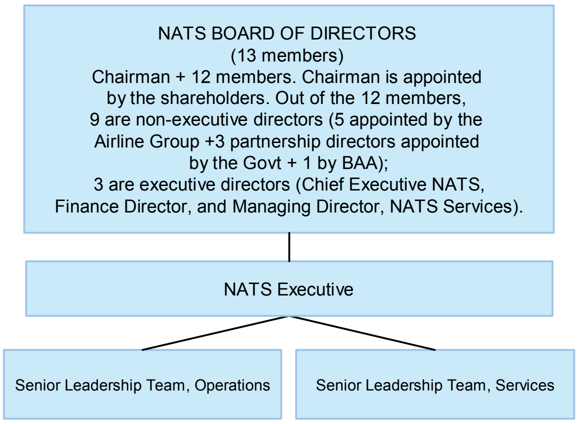
Airspace Regulation

UK CAA, Directorate of Airspace Policy (DAP)

Economic Regulation

UK CAA, Regulatory Policy Group (RPG) which sets charges through a formula linked to the Retail Price Index (RPI) where "RPI minus X" targets for En-route and Oceanic
Charges are usually set for 5 years at a time (although CP3 was set at 4 years to align with RP1)

Corporate governance structure (2013)



NATS (2013)

CHAIRMAN OF THE NATS BOARD:
John Devaney

CEO of NATS:
Richard Deakin

MANAGING DIRECTOR, NATS SERVICES:
Paul Reid

MANAGING DIRECTOR, NATS OPERATIONS
Martin Rolfe

Scope of services

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

Operational ATS units:

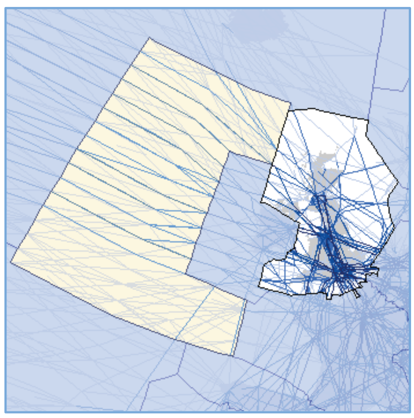
1 OAC (Shanwick)
3 ACCs (London AC, London TC, Prestwick)
16 APPs
16 TWRs (including Gibraltar TWR)
2 AFISs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	858
Gate-to-gate total costs (M€)	690
Gate-to-gate ATM/CNS provision costs (M€)	680
Gate-to-gate total ATM/CNS assets(M€)	860
Gate-to-gate ANS total capex (M€)	121
ATCOs in OPS	1 422
Gate-to-gate total staff	4 435
Total IFR flight-hours controlled by ANSP ('000)	1 304
IFR airport movements controlled by ANSP ('000)	1 746
En-route sectors	73
Minutes of ATFM delays ('000)	971

Size

Size of controlled airspace: 3 000 000 km²



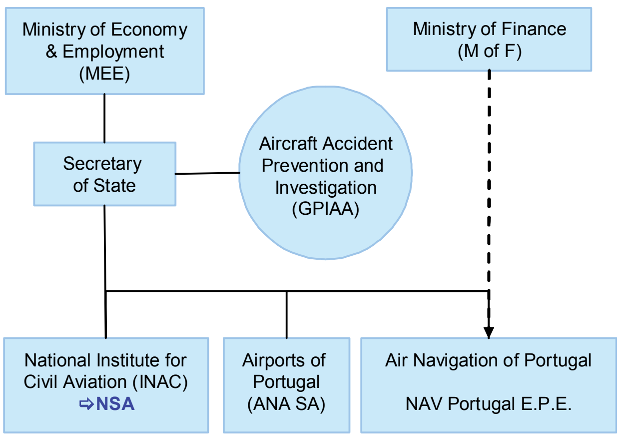
Continental: 880 000 km² - Oceanic: 2 120 000 km²

NAV Portugal, Portugal

Navegação Aérea de Portugal - NAV Portugal, E.P.E.

www.nav.pt

Institutional arrangements and links (2013)



Status (2013)

- Public Entity Corporation as of December 1998
- 100% State-owned

National Supervisory Authority (NSA):
National Institute for Civil Aviation (INAC)

Body responsible for:

Safety Regulation
National Institute of Civil Aviation (INAC)

Airspace Regulation
INAC+FA (Portuguese Air Force) + NAV Portugal in close permanent co-ordination

Economic Regulation
National Institute of Civil Aviation (INAC)

Corporate governance structure (2013)

BOARD OF ADMINISTRATION (3 members)
Chairman + 2 members

All members are appointed by the MEE for a 3 year term. Each member has executive functions within NAV Portugal. Each member is responsible to supervise one or several NAV Portugal Directorates and Advisory Bodies to the Board. There are 8 Directorates and 5 Advisory Bodies.

NAV Portugal has also a Board of Auditors composed of 3 members who are appointed by MEE for a 3 year term.

NAV Portugal (2013)

CHAIRMAN OF THE BOARD OF ADMINISTRATION:
Luis Ottolini Coimbra

CEO:
Luis Ottolini Coimbra

Scope of services

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

Operational ATS units:

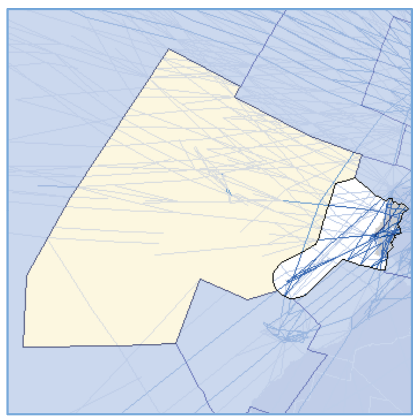
2 ACCs (Lisboa, Santa Maria)
8 APPs (Lisboa, Porto, Faro, Madeira, Santa Maria, Ponta Delgada, Horta, Flores)
10 TWRs (Lisboa, Cascais, Porto, Faro, Funchal, Porto Santo, Ponta Delgada, Santa Maria, Horta, Flores)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	163
Gate-to-gate total costs (M€)	149
Gate-to-gate ATM/CNS provision costs (M€)	135
Gate-to-gate total ATM/CNS assets(M€)	38
Gate-to-gate ANS total capex (M€)	4
ATCOs in OPS	216
Gate-to-gate total staff	709
Total IFR flight-hours controlled by ANSP ('000)	288
IFR airport movements controlled by ANSP ('000)	274
En-route sectors	7
Minutes of ATFM delays ('000)	132

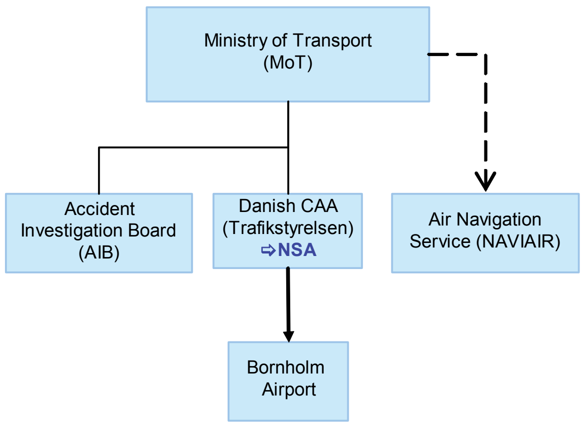
Size

Size of controlled airspace: 5 855 000 km²



Continental: 665 000 km² - Oceanic: 5 190 000 km² www.naviair.dk

Institutional arrangements and links (2013)



Status (2013)

- Company owned by the state
- 100% State-owned

National Supervisory Authority (NSA):
Danish Transport Authority (Trafikstyrelsen)

Body responsible for:

Safety Regulation
Danish Transport Authority (Trafikstyrelsen)

Airspace Regulation
Danish Transport Authority (Trafikstyrelsen)

Economic Regulation
Danish Transport Authority (Trafikstyrelsen)

Corporate governance structure (2013)

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 (2013)

CHAIRMAN OF BOARD OF DIRECTORS
Anne Birgitte Lundholt

CHIEF EXECUTIVE OFFICER (CEO):
Morten Dambæk

Scope of services

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

Note: ANS Greenland upper airspace is delegated to Isavia and NAV Canada

Operational ATS units:

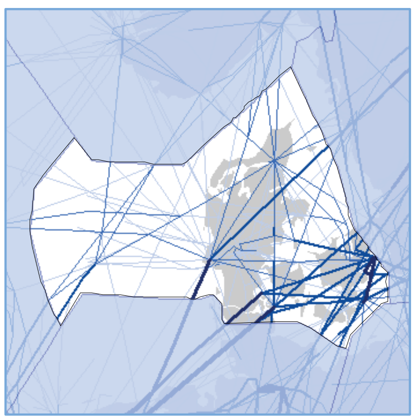
(Excluding Greenland)
1 ACC (Copenhagen)
6 APPs/TWRs (Kastrup, Roskilde, Rønne, Billund, Aarhus, Aalborg)
1 AFIS (Vagar)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	118
Gate-to-gate total costs (M€)	113
Gate-to-gate ATM/CNS provision costs (M€)	112
Gate-to-gate total ATM/CNS assets(M€)	156
Gate-to-gate ANS total capex (M€)	15
ATCOs in OPS	198
Gate-to-gate total staff	692
Total IFR flight-hours controlled by ANSP ('000)	212
IFR airport movements controlled by ANSP ('000)	346
En-route sectors	7
Minutes of ATFM delays ('000)	33

Size

Size of controlled airspace: 158 000 km²

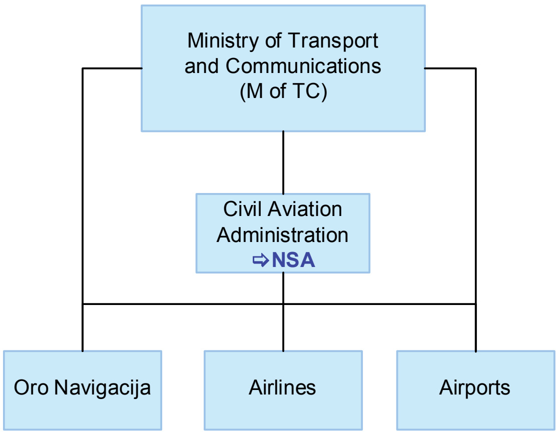


Oro Navigacija, Lithuania

State Enterprise Oro Navigacija

www.ans.lt

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

SUPERVISORY BOARD (5 members)
Chairman + 4 members
(Chairman + 3) represent M of TC
1 represent Oro Navigacija.

MANAGEMENT BOARD
Duties taken up by Director General
DG is appointed by the Minister.

Oro Navigacija (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Arijandas Šliupas (from 4th March 2013)

DIRECTOR GENERAL (CEO):
Algimantas Raščius

DIRECTOR ATM:
Sergej Smirnov

Scope of services

☑ 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:

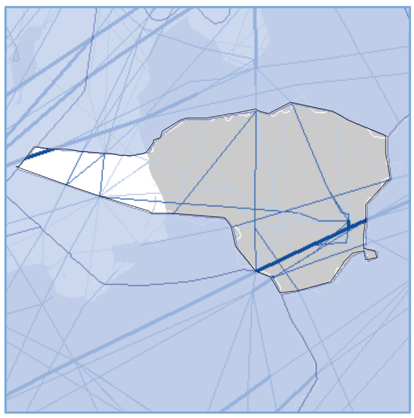
1 ACC (Vilnius)
3 APPs
4 TWRs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	25
Gate-to-gate total costs (M€)	24
Gate-to-gate ATM/CNS provision costs (M€)	22
Gate-to-gate total ATM/CNS assets(M€)	34
Gate-to-gate ANS total capex (M€)	3
ATCOs in OPS	83
Gate-to-gate total staff	302
Total IFR flight-hours controlled by ANSP ('000)	52
IFR airport movements controlled by ANSP ('000)	40
En-route sectors	3
Minutes of ATFM delays ('000)	0

Size

Size of controlled airspace: 74 700 km²

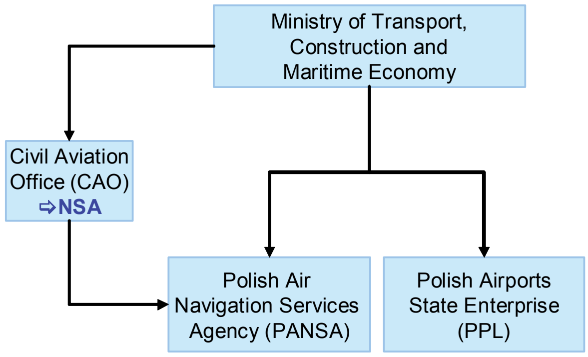


PANSA, Poland

Polish Air Navigation Services Agency (PANSA)

www.pansa.pl

Institutional arrangements and links (2013)



Status (2013)

- 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 (2013)

NO SUPERVISORY BOARD

ADMINISTRATION
According to the Act establishing PANSA, the Agency is managed by the President and his two Vice-Presidents.
The President is nominated by the Prime Minister.
The two Vice-Presidents are nominated by the MoT

PANSA (2013)

PRESIDENT OF PANSA:
Krzysztof Banaszek

VICE PRESIDENT- AIR NAVIGATION DEPARTMENT:
Maciej Rodak

VICE PRESIDENT- FINANCE AND ADMINISTRATION DEPARTMENT:
Maciej Piotrowski

Scope of services

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

- APP Kraków is providing ATC services for Kraków and Katowice
- Katowice TWR is providing only aerodrome control when APP Kraków is providing radar services for Katowice

Operational ATS units:

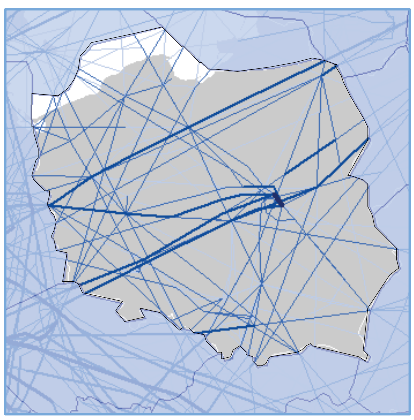
1 ACC with 8 sectors
4 APPs (Warszawa, Gdańsk, Kraków, Poznań) providing radar control
5 TWRs (Warszawa, Gdańsk, Kraków, Poznań, Katowice) providing aeodrome control
6 TWRs (Wrocław, Szczecin, Rzeszów, Łódź, Zielona Góra, Bydgoszcz) providing aeodrome control and non-radar approach control
4 FIS units (Warszawa, Kraków, Gdańsk, Poznań)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	179
Gate-to-gate total costs (M€)	160
Gate-to-gate ATM/CNS provision costs (M€)	143
Gate-to-gate total ATM/CNS assets(M€)	143
Gate-to-gate ANS total capex (M€)	15
ATCOs in OPS	422
Gate-to-gate total staff	1 693
Total IFR flight-hours controlled by ANSP ('000)	382
IFR airport movements controlled by ANSP ('000)	298
En-route sectors	8
Minutes of ATFM delays ('000)	436

Size

Size of controlled airspace: 334 000 km²

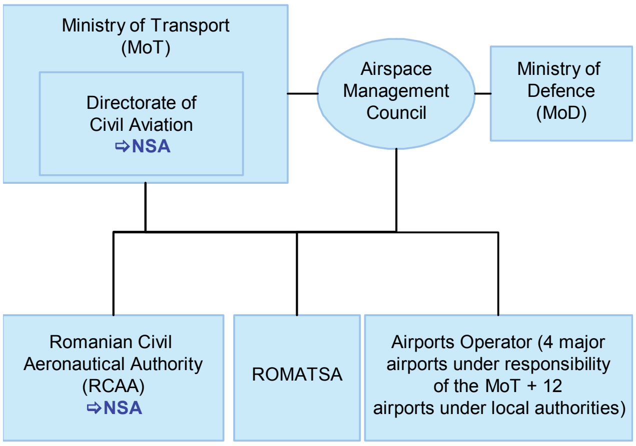


ROMATSA, Romania

Romanian Air Traffic Services Administration

www.romatsa.ro

Institutional arrangements and links (2013)



Status (2013)

- 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)

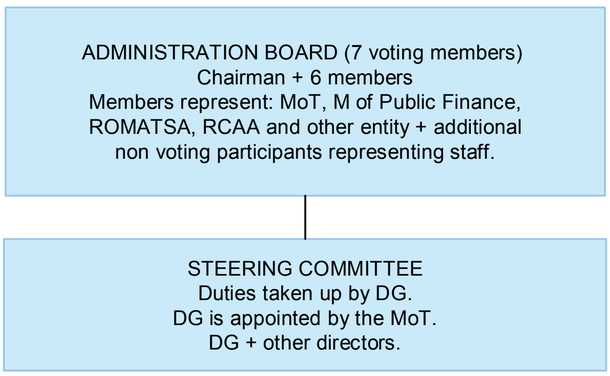
Body responsible for:

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 (2013)



ROMATSA (2013)

CHAIRMAN OF THE ADMINISTRATION BOARD:
Mihai Ionescu

DIRECTOR GENERAL (CEO):
Aleodor Marian Francu

Scope of services

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

Operational ATS units:

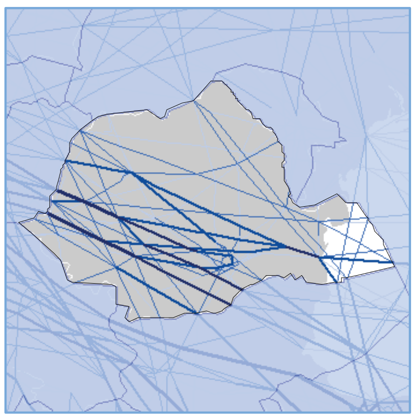
1 ACC (Bucharest + 1 secondary location - Arad)
3 APPs
16 TWRs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	177
Gate-to-gate total costs (M€)	158
Gate-to-gate ATM/CNS provision costs (M€)	139
Gate-to-gate total ATM/CNS assets(M€)	142
Gate-to-gate ANS total capex (M€)	17
ATCOs in OPS	430
Gate-to-gate total staff	1 535
Total IFR flight-hours controlled by ANSP ('000)	290
IFR airport movements controlled by ANSP ('000)	160
En-route sectors	9
Minutes of ATFM delays ('000)	0

Size

Size of controlled airspace: 254 000 km²

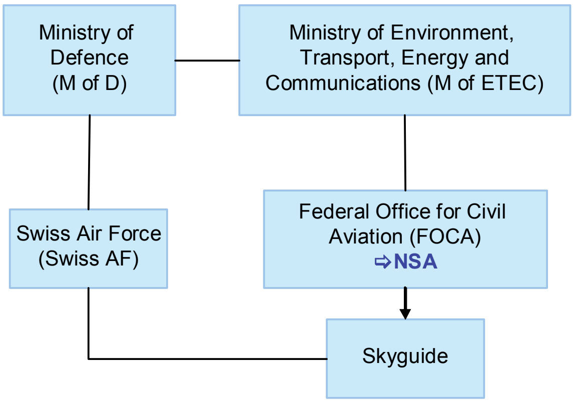


Skyguide, Switzerland

Skyguide

www.skyguide.ch

Institutional arrangements and links (2013)



Status (2013)

- 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)

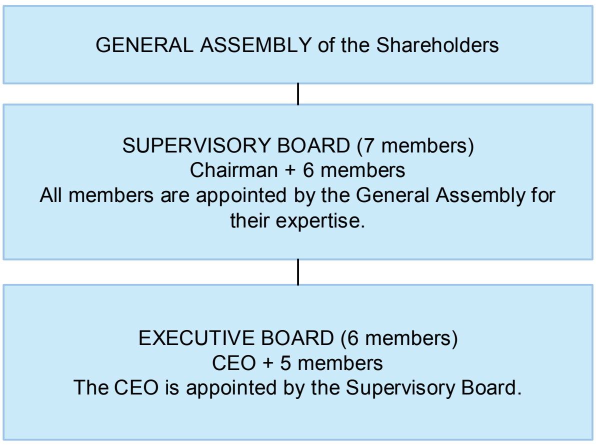
Body responsible for:

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 (2013)



Skyguide (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Guy Emmenegger

DIRECTOR GENERAL (CEO):
Daniel Weder

Scope of services

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

- ATC services delegated to Geneva ACC by France

Operational ATS units:

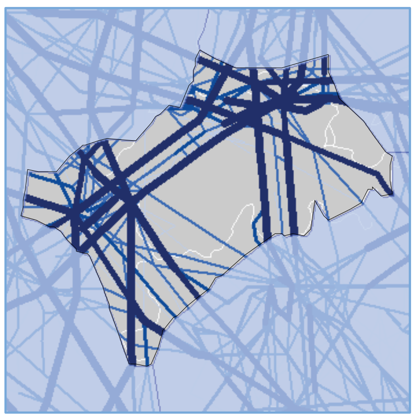
2 ACCs (Geneva, Zurich)
4 APPs (Geneva, Zurich, Lugano, Bern)
7 TWRs (Geneva, Zurich, Lugano, Bern, Buochs, Altenrhein, Grenchen)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	322
Gate-to-gate total costs (M€)	298
Gate-to-gate ATM/CNS provision costs (M€)	277
Gate-to-gate total ATM/CNS assets(M€)	287
Gate-to-gate ANS total capex (M€)	31
ATCOs in OPS	347
Gate-to-gate total staff	1 339
Total IFR flight-hours controlled by ANSP ('000)	332
IFR airport movements controlled by ANSP ('000)	490
En-route sectors	19
Minutes of ATFM delays ('000)	630

Size

Size of controlled airspace: 73 400 km²

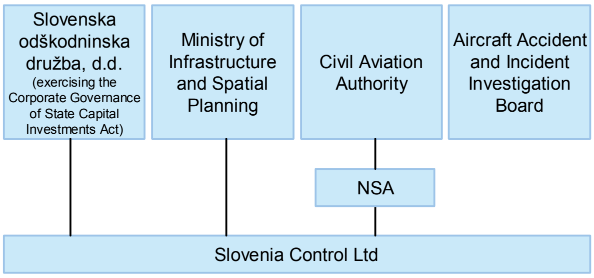


Slovenia Control, Slovenia

Slovenia Control Ltd

www.sloveniacontrol.si

Institutional arrangements and links (2013)



Status (2013)

- 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

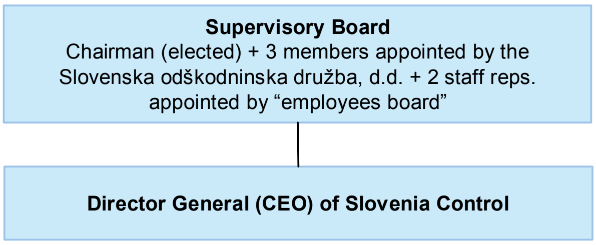
Body responsible for:

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 (2013)



Slovenia Control (2013)

CHAIRMAN OF THE SUPERVISORY BOARD:
Dušan Hočevar

DIRECTOR GENERAL (CEO):
Franc Željko Županič, Ph.D.

Scope of services

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

Operational ATS units:

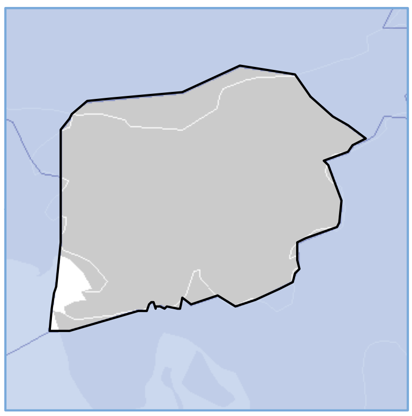
1 ACC (Ljubljana)
3 APPs (Ljubljana, Maribor, Portorož)
3 TWRs (Ljubljana, Maribor, Portorož)

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	34
Gate-to-gate total costs (M€)	33
Gate-to-gate ATM/CNS provision costs (M€)	29
Gate-to-gate total ATM/CNS assets(M€)	27
Gate-to-gate ANS total capex (M€)	11
ATCOs in OPS	86
Gate-to-gate total staff	216
Total IFR flight-hours controlled by ANSP ('000)	47
IFR airport movements controlled by ANSP ('000)	35
En-route sectors	4
Minutes of ATFM delays ('000)	1

Size

Size of controlled airspace: 19 600 km²

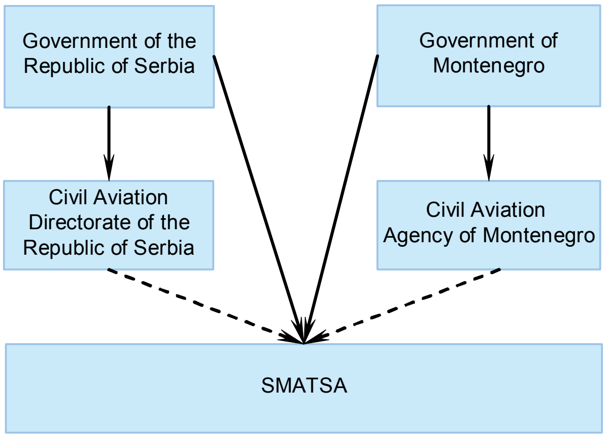


SMATSA, Serbia and Montenegro

Serbia and Montenegro Air Traffic Services SMATSA llc

http://www.smatsa.rs

Institutional arrangements and links (2013)



Status (2013)

- Limited liability company founded in 2003
- 92% owned by Serbia and 8% owned by Montenegro
- Integrated civil/military ANSP

Note: This Fact Sheet reflects the situation as of April 2013

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 (2013)

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 (2013)

PRESIDENT OF THE ASSEMBLY:
To be appointed

PRESIDENT OF THE SUPERVISORY BOARD:
Bratislav Grubacic

ACTING CHIEF EXECUTIVE OFFICER
Slobodan Cvijan

Scope of services

☑ 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:

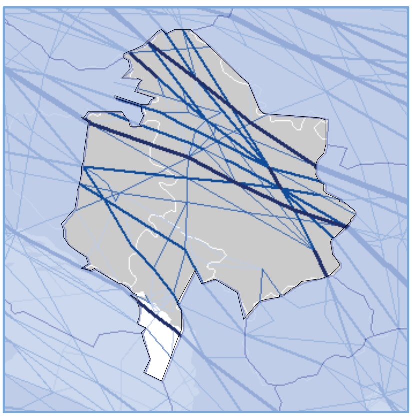
1 ACC (Belgrade)
1 APP collocated with ACC Belgrade
6 APPs/TWRs (Batajnica, Kraljevo, Nis, Vrsac, Podgorica, Tivat)
1 TWR

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	87
Gate-to-gate total costs (M€)	93
Gate-to-gate ATM/CNS provision costs (M€)	85
Gate-to-gate total ATM/CNS assets(M€)	114
Gate-to-gate ANS total capex (M€)	9
ATCOs in OPS	245
Gate-to-gate total staff	864
Total IFR flight-hours controlled by ANSP ('000)	220
IFR airport movements controlled by ANSP ('000)	70
En-route sectors	8
Minutes of ATFM delays ('000)	28

Size

Size of controlled airspace: 145 566 km²



UkSATSE, Ukraine

Ukrainian State Air Traffic Service Enterprise

www.uksatse.ua

УКРАЕРОРУХ
UkSATSE

Institutional arrangements and links (2013)

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 (2013)

- 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 (2013)

No Supervisory Board

MANAGEMENT BOARD

DIRECTOR GENERAL

UkSATSE (2013)

DIRECTOR GENERAL OF UkSATSE:
Yuriy Cherednichenko

Scope of services

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

Operational ATS units:

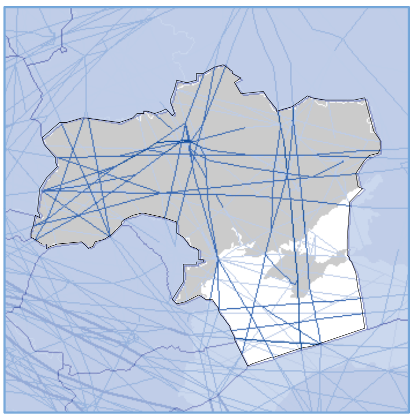
5 ACCs/APPs (Kyiv, Simferopol', Dnipropetrovs'k, Odesa, L'viv)
6 APPs (Donetsk, Kharkiv, Luhansk, Ivano-Frankivs'k, Zaporizhzhia, Uzghorod)
31 TWRs
6 AFISs

Key financial and operational figures (ACE 2011)

Gate-to-gate total revenues (M€)	239
Gate-to-gate total costs (M€)	259
Gate-to-gate ATM/CNS provision costs (M€)	249
Gate-to-gate total ATM/CNS assets(M€)	189
Gate-to-gate ANS total capex (M€)	79
ATCOs in OPS	984
Gate-to-gate total staff	6 115
Total IFR flight-hours controlled by ANSP ('000)	372
IFR airport movements controlled by ANSP ('000)	203
En-route sectors	33
Minutes of ATFM delays ('000)	0

Size

Size of controlled airspace: 776 442 km²



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GLOSSARY

ACC	Area Control Centre
ACE	Air Traffic Management Cost-Effectiveness
ADS-B	Automatic Dependent Surveillance-Broadcast
Aena	Aeropuertos Españoles y Navegación Aérea, Spain
AFIS	Airport/Aerodrome Flight Information Service
AIS	Aeronautical Information Services
ANS	Air Navigation Services
ANS CR	Air Navigation Services of the Czech Republic
ANSP	Air Navigation Service Provider
APP	Approach Control Unit
ARMATS	Armenian Air Traffic Services
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
BULATSA	Air Traffic Services Authority, Bulgaria
Austro Control	Austro Control Österreichische Gesellschaft für Zivilluftfahrt mbH, Austria
Avinor	Avinor, Norway
B	Billion
Belgocontrol	Belgocontrol, Belgium
CAPEX	Capital Expenditure
CFMU	Central Flow Management Unit
CNS	Communications, Navigation and Surveillance
CRCO	Central Route Charges Office
Croatia Control	Hrvatska kontrola zračne plovidbe d.o.o., Croatian Air Navigation Services
DCAC Cyprus	Department of Civil Aviation of Cyprus
DFS	Deutsche Flugsicherung GmbH, Germany
DHMİ	Devlet Hava Meydanları 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
ENAV	Ente Nazionale di Assistenza al Volo S.p.A., Italy
ERC	EUROCONTROL Research Centre
ETS	Early Termination of Service
EU	European Union
FAB	Functional Airspace Block
FDP	Flight Data Processing system
Finavia	Finavia, Finland
FIS	Flight Information Service
FL	Flight Level
FTE	Full-Time Equivalent
GDP	Gross Domestic Product
HCAA	Hellenic Civil Aviation Authority, Greece
HMI	Human-Machine Interface

HQ	Headquarters
HungaroControl	HungaroControl, Hungary
IAA	Irish Aviation Authority, Ireland
IFR	Instrument Flight Rules
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
NATA Albania	National Air Traffic Agency, Albania
NATS	National Air Traffic Services, UK
NAV Portugal	Navegação Aérea de Portugal – NAV Portugal, EPE
NAVIAIR	Air Navigation Services – Flyvesikringstjenesten, Denmark
NBV	Net Book Value
NDB	Non-Directional Beacon
OAT	Operational air traffic
OPS	Operations
Oro Navigacija	State Enterprise Oro Navigacija, Lithuania
PANSA	Polish Air Navigation Services Agency
PPPs	Purchasing power parities
PRB	Performance Review Body
PRC	Performance Review Commission
PRR	Performance Review Report
PRU	Performance Review Unit
RDP	Radar Data Processing system
RP1	Reference Period 1
RPI	Retail Price Index
ROMATSA	Romanian Air Traffic Services Administration
SAR	Search and Rescue
SES	Single European Sky
SESAR IP1	Single European Sky ATM Research Implementation Package 1
SEID	Specification for Economic Information Disclosure
Skyguide	Skyguide, Switzerland
Slovenia Control	Slovenia Control, Slovenia
SMATSA	Serbia and Montenegro Air Traffic Services Agency
TC	Terminal Control
TWR	Traffic Controlled Tower
UK CAA	United Kingdom Civil Aviation Authority
UkSATSE	Ukrainian State Air Traffic Service Enterprise
VFR	Visual Flight Rules
VOR	Very high frequency Omni-directional Range


BCE ECB EZB EKT EKP 2001