# Global Air Navigation Services Performance Report 2012

## [2007-2011 ANSP Performance Results]

We have endeavoured to ensure the integrity of this report insofar as possible. However, please note that the responsibility for the quality, accuracy, and verification of the data and results in this report rests with participating ANSPs.

## Welcome from the CANSO Chairman

Dear Reader,

Welcome to the third public release of the CANSO Global ANS Performance Report.

The publication of this report demonstrates CANSO's commitment to lead the transformation of ATM performance by highlighting what has been achieved and where we still have improvements to make.

CANSO and its members are committed to continuous improvement in performance and to help lead and shape how our industry evolves. As evidence of this, the majority of CANSO ANSP members are active participants in our benchmarking activities across the spectrum of safety, operations, environment and ANS performance.

Like my fellow ANSP CEOs, I value CANSO's benchmarking activities which allow me to gain an extremely valuable perspective on my own organisation's performance, which I can use to drive specific improvements and efficiencies.

The CANSO Global Benchmarking Workgroup would welcome your feedback and comments relating this report.[1]

Best regards,

Paul Riemens

Chairman CANSO

*The NAV CANADA Board of Directors looks forward to this report each year, and has come to depend on its content and insight into the global air navigation system. We are constantly striving to improve operations, without compromising our standard for safety. This report provides the much needed foundation for our comparisons.*

*Since its inception by CANSO in 2005, NAV CANADA has been contributing to Performance Benchmarking, and views this effort as something that provides value to our customers in the long term. For the past eight years I have watched the process mature and the publications improve to the point of producing the first public document for the 2009 reporting year.*

*With this being the third year of the public report I look forward to the expansion of the benchmarking effort to include other aspects of the air navigation system, including; safety, operations and human resources.*

*John Crichton, CEO NAV CANADA*

[1] We welcome your comments and feedback addressed to info@canso.org.

"Safe. Precise. Efficient. – I believe these are the key qualities of air navigation services that make the difference in our profession throughout the skies, both continental and oceanic. For a medium size European Air Navigation Service Provider like HungaroControl, these are also the key coordinates that help position ourselves and keep our course straight on destination towards co-operation, integration and a Single European Sky. CANSO Global ANS Performance Report is of great importance as it gives us the chance to identify best or better practices and recognise areas of opportunity for further improvement. It helps us learn the ability to learn and find our own way to more safety, precision and efficiency to the benefit of all of us."

Kornel Szepessy
CeO HungaroControl

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## 1. Introduction

The Civil Air Navigation Services Organisation (CANSO) Global ANS Performance Report 2012 includes performance data related to productivity, cost effectiveness, price, revenue and profitability for 26 ANSPs around the world. Over the past eight years, CANSO has been encouraging its member Air Navigation Service Providers (ANSPs) to participate in the development of this performance report activity. CANSO's primary goal now is to encourage ANSPs participation in the benchmarking activity from those parts of the World where the growth of air transport is more rapid than in other regions.

Within this frame the Global Benchmarking Working Group (GBWG) presented its performance reporting activity at the CANSO Middle East Conference this spring. The presentation focussed on the importance of the dialogue between and among ANSPs so that best practices can be identified and that ANSPs can share their successes among themselves in an effort to improve the global Air Traffic Management (ATM) industry.

The fact that 26 ANSPs have voluntarily provided data to the CANSO benchmarking effort is testimony to the industry's desire to improve.

The CANSO Global ANS Performance Report is also evidence of the desire of CANSO members to be open and transparent with their customers and other stakeholders. The vast majority of CANSO members have established processes for engaging their customers in dialogue and seeking their advice. This Performance Report is becoming a key component of that dialogue and will assist stakeholders to improve their understanding of ANSP performance and challenges.

The second public report received an overwhelming interest from our customers and stakeholders, with over 2,000 copies (downloads) released, showing that CANSO members have reached a point where we are able to show the world our successes, and acknowledge where we still have improvements to make. We look forward to building on this foundation of interest and positive support with this third public ANS Performance Report.
This Report continues to address key performance indicators (KPIs) in air navigation service productivity, cost-effectiveness, pricing and profitability. We also include an appendix on operational parameters to give readers more background information on ANSPs' contextual characteristics in order to make more meaningful comparisons.

Operational experts from CANSO member ANSPs are also focused on the development of performance metrics in all areas of ANSP activities, including safety, environment, human resources, operational complexity and quality of service.

## 2. Methodology

CANSO's Global ANS Performance Report 2012 is the collective effort of CANSO member ANSPs who participate in this benchmarking effort on a voluntary basis. Since 2005, a core group of ANSPs have worked to develop appropriate global measures for ANSP performance and capture information that supports best practice comparisons.

In each phase of the report, participating ANSPs submit (where available) five years of data for Air Traffic Controllers' (ATCOs) employment costs, operating costs, revenue, IFR flight hours, numbers of ATCOs, and number of working hours. Using this data, the CANSO Global Benchmarking Working Group (GBWG) has synthesised the information to provide key performance indicators that speak to ANSP performance for the most recent year, 2011, as well as trends over a five-year span (2007-2011). CANSO continues to refine the data elements and key performance indicators (KPIs) in the hope of providing a broader picture of ANSP performance across a wider range of ANSP activity.

Readers are reminded that this Global ANS Performance Report is a high-level overview of ANSP performance as it is not possible to provide a comprehensive analysis and commentary on

individual or collective ANSP performance. It is also important to avoid taking specific metrics in isolation without considering the broader context of the environment in which an ANSP operates.

Readers of this Report are encouraged to contact the relevant ANSP directly to discuss individual results and to obtain a full picture of the factors influencing ANSP performance. This Executive Summary provides some good information; however, readers are encouraged to explore the full report and discover the wealth of additional information contained herein it.

# 3. Global Aviation Context

Aviation makes a direct contribution to global GDP. Global business and tourism rely on air transport, and increasing globalization makes worldwide connections essential. The evolution of global aviation is being influenced and driven by a wide range of factors. These factors are mainly outside the control of the air navigation service providers.

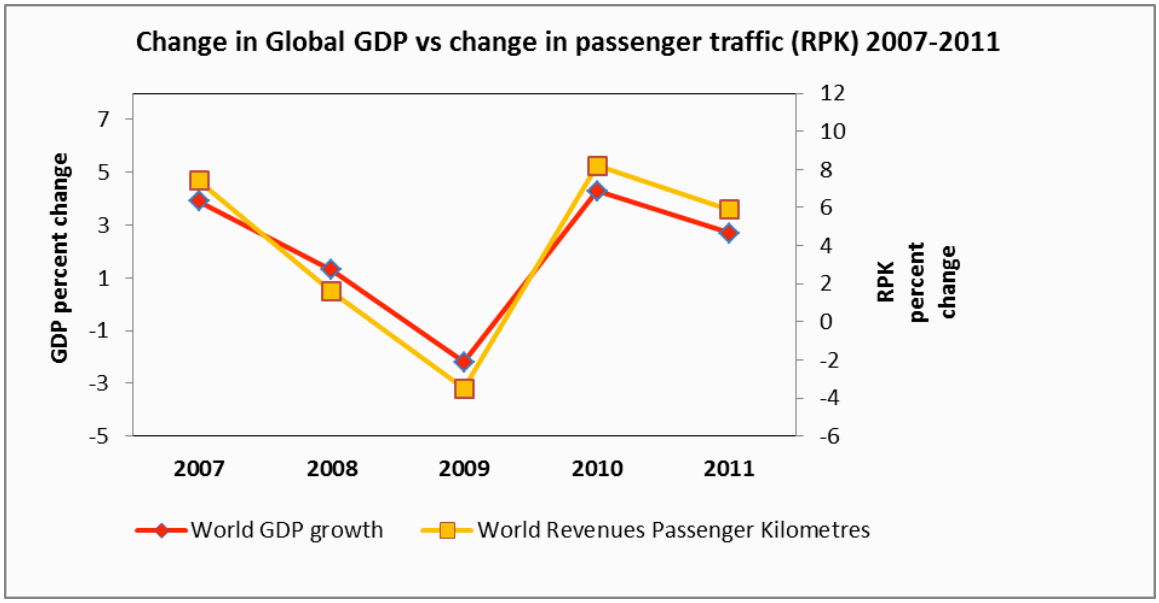
## 3.1. Trend, challenges and performance

Global aviation is still under the impact of the current unstable economic conditions. The output of air transport is often measured in Revenue Passenger Kilometres (RPKs) which is influenced by a number of factors (e.g. number of flights, flight distance, aircraft size etc). Worldwide international and domestic revenue passenger kilometres grew by 5.9% in 2011.

Traffic growth could be observed, but this rebound was not evenly spread across regions and the year-end level still remained under pre-economic crisis levels of 2007. In international markets, European airlines recorded the second fastest growth rates behind Latin America where air traffic is supported by robust economic conditions and continued trade activity. Air traffic demand remained robust in 2011, but some of the observed growth in air traffic is a compensating effect for the cancellations due to adverse events in 2010.

Figure 3-1 World economic and air traffic (RPK) evolution, illustrates the linkage between these two factors

**Figure 3-1 Change in Global GDP vs. Change in Passenger Traffic (RPK)**




Oil price have been relatively stable at a very high level, with fuel accounting for 30-40% (and even more in some areas) of airline costs resulting in loss of profit by almost half compared with 2010.

The emerging markets of Brazil, India and China all showed double-figure growth, while Japan declined by 15.2% as a result of the earthquake in March 2011. Asia/Pacific, the largest international cargo market and the major location for manufacturing activity, declined most, by

4.8% for international traffic and 4.6% in total. Latin America and the Middle East showed significant growth over the year.

ANS performance depends on airlines' performance. Factors such as uncertainties in economic recovery in different regions of the world, the high price of oil and downward revisions of GDP forecasts across the World, and even recent failures of national airlines give major challenges in the forecast of future traffic evolutions.

The GBWG acknowledges that the following sources were used in the creation of this section.

- PRR 2011, Performance Review Report, May 2012
- IATA Air Transport Market Analysis, December 2011
- EuroControl Medium Term Forecast, Flight Movements, February 2012
- IATA 2012 Annual Review

## 4. Performance Results and Focus Areas by ANSP

This Report reflects both ANSP performance and some of the underlying factors such as the behaviour of the economy in general, recovering traffic and increasing costs. The following table is based on the 23 participating ANSPs that included data for both 2010 and 2011, using combined values for continental and oceanic, or ANSP totals, where applicable.

| | Year-over-Year Change 2010 to 2011 |
|---|---|
| Total IFR Hours | 0.6% |
| Total ATCOs in Operations | 2.6% |
| Total Air Navigation Service Costs (USD) | 2.6% |
| Total ANS Revenues (USD)[2] | 8.3% |
| IFR Hours per ATCO | -2.0% |
| Total Cost per IFR Hour | 2.0% |
| Total Revenue per IFR Hour | 5.6% |

The performance results reflected in this report highlight increasing costs and increasing revenues per IFR flight hour. While CANSO members remain committed to cost effective and efficient provision of ANS service, flat IFR flight hour and increasing business costs is proving to be a challenge. Most ANSPs are facing increasing labour costs and ATM lifecycle replacement and technology improvement costs with declining IFR traffic leaving them with no options but increase charges.

One of the unique limitations of air navigation service provision, as compared to other industries, revolves around the difficulty in staffing to demand. ANSPs cannot quickly respond to changes in traffic as the development of new ATCOs requires somewhere between two to three years of training with often high failure rates.

The ATCO workforce reflected in the calculated KPIs does not represent new hires but rather the fully-trained workforce, a result of traffic and hiring decisions two to three years earlier, and while traffic may suddenly dip (or drop) due to external factors – economic downturns, extreme weather conditions, a terror event – the ATCO workforce cannot be right-sized accordingly.

ANSPs cannot quickly or easily reduce that workforce and they are constantly trying work to maintain balance in terms of both age and experience with their ATCOs. Additionally, ATCOs are not particularly mobile as a move requires learning new sectors or areas, another lengthy training process.

[2] FAA does not report ANS revenue, but are included in all other categories. When calculating Revenue per IFR Hour, the FAA IFR Hours are removed from the calculation.

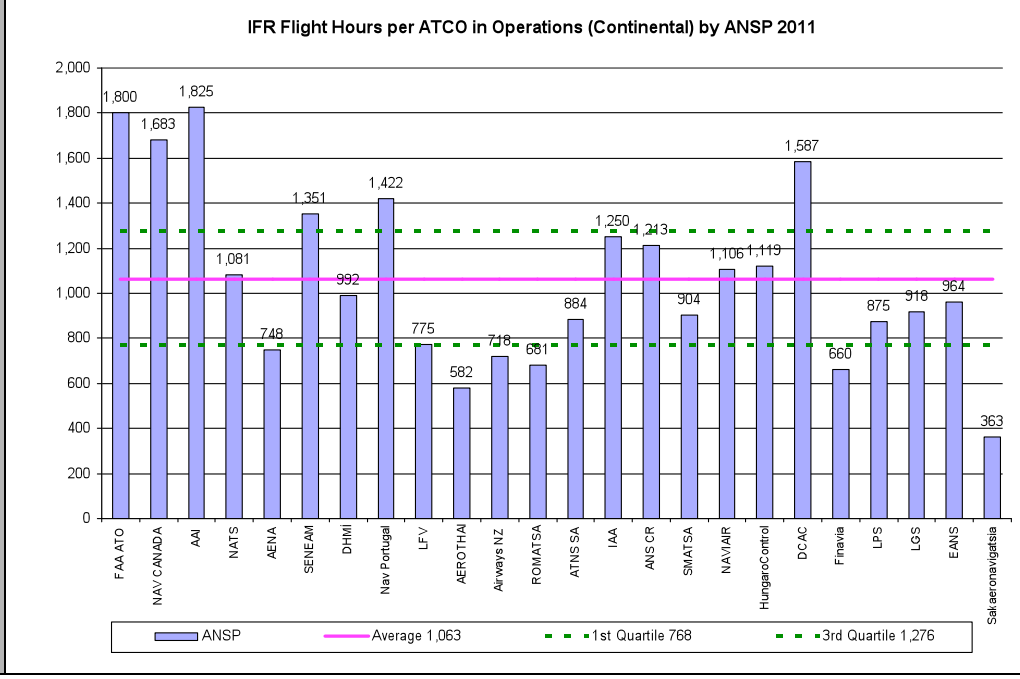
## 5. Key Messages

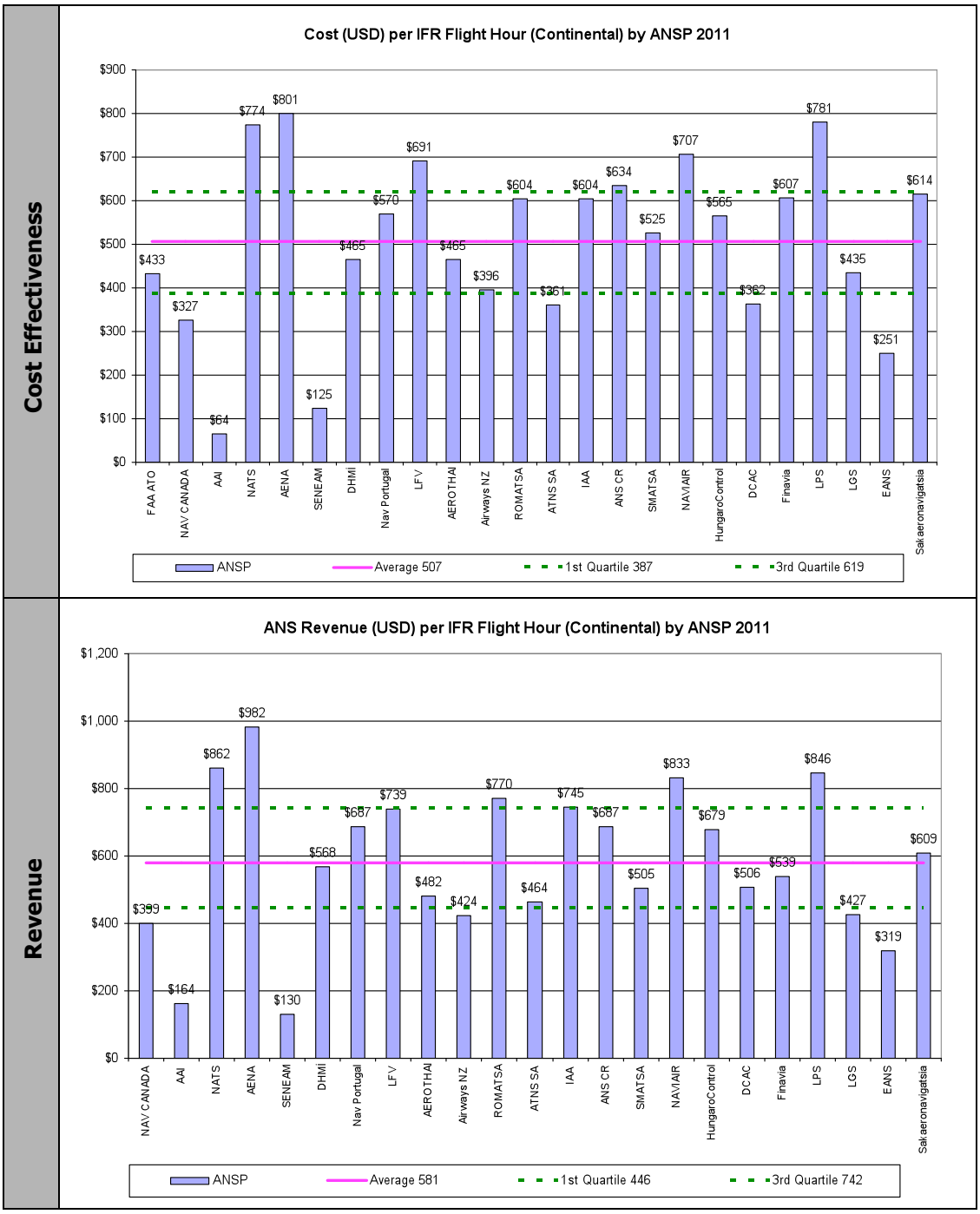
- The CANSO ANS Global Performance Report is the first and only Global ANS Performance Report;
- It demonstrates CANSO's leadership and commitment to continuous improvement in performance. As evidence of this, the majority of CANSO ANSP members are active participants in our benchmarking activities;
- ANSP CEOs value CANSO's benchmarking activities which allow them to gain a valuable perspective on their own ANSP's performance, which they use to drive specific improvements and efficiencies;
- Each year our ANS Performance work attempts to grow its participation. This year we have 26 participants. We have representation from every CANSO region, Europe, North America, Asia Pacific, Latin America, Africa and the Middle East;
- We have had overwhelming interest in the release of our second public ANS Performance Report from our customers and stakeholders, with over 2,000 copies of the Report released. We look forward to building on this foundation of interest and positive support with this third public ANS Performance Report;
- CANSO provides a mature performance measurement framework for productivity, cost effectiveness, price, revenue and profitability;
- This year's Report shows a recovery trend, but this remains fragile based on an uncertain global economy, as well as differing growth in various regions;
- This report shows the effect of both the global economic downturn and the resulting recovery; and
- CANSO remains focused on the development of performance metrics in all areas of ANSP activities, including safety, environment, human resources, operational complexity and quality of service.

The three continental charts below, from Section A of the main report, show a KPI for each focus area by ANSP. These charts provide a snapshot of ANSP performance for 2011.

**Key Performance Indicator**

**Productivity**



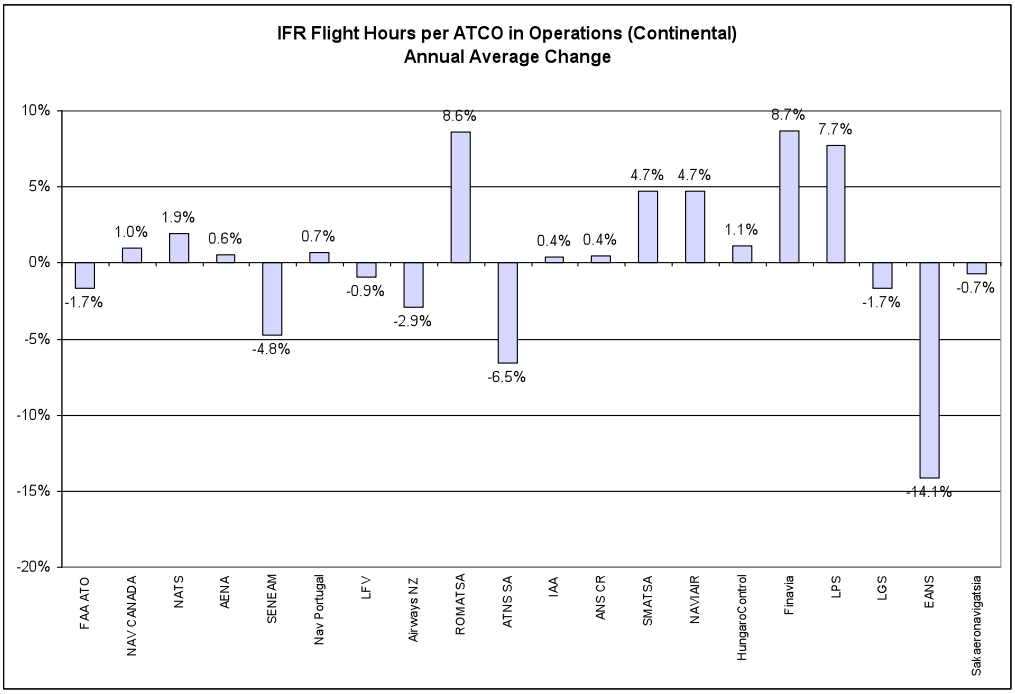



## 6. Key Performance Area Average Annual Change

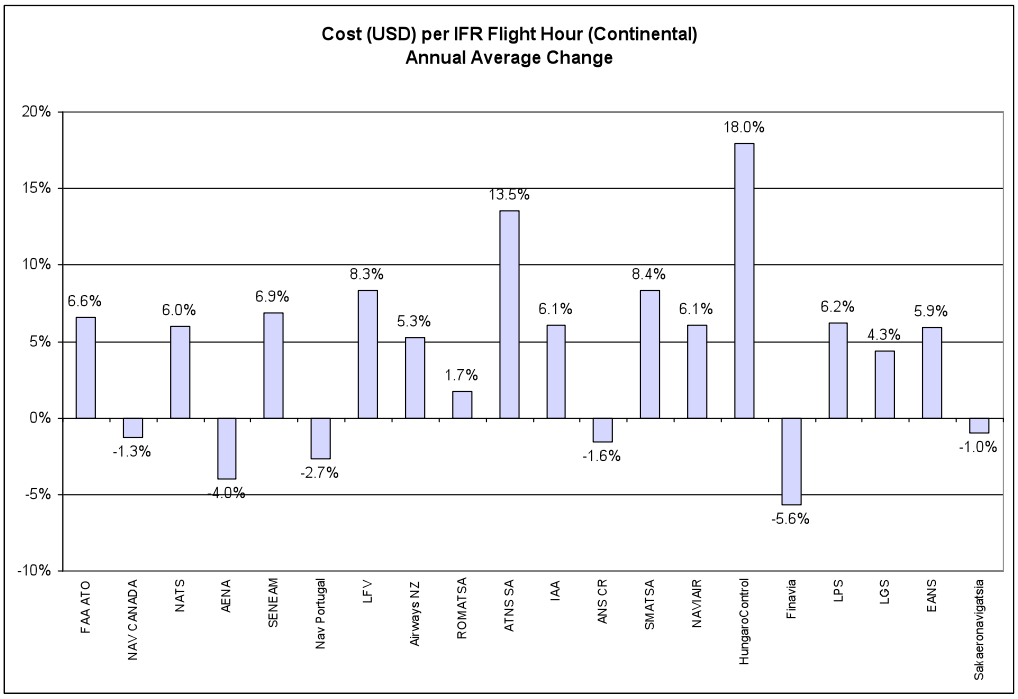
The three charts below, from Part B of the Main Report, summarise trend information for the past five years. The average annual change represents the average of changes within the results year over year. Additional charts can be found by focus area within the main report.

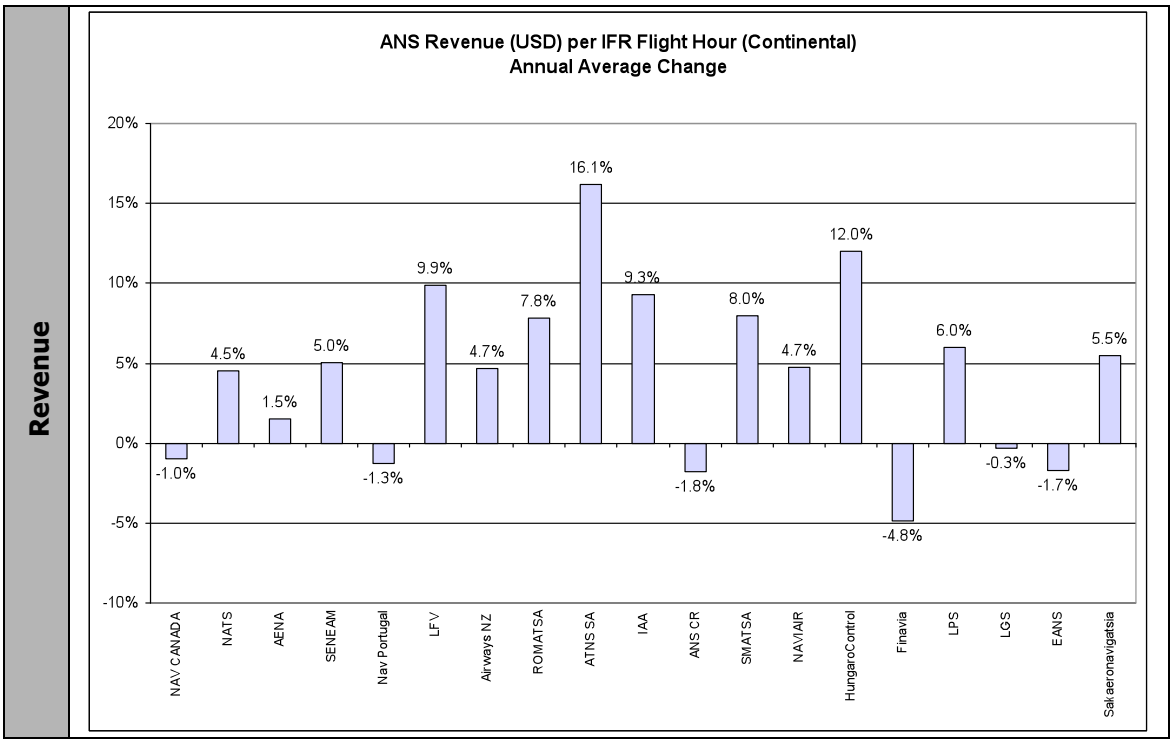
| | Key Performance Indicator |
|---|---|

**Productivity**




**Cost Effectiveness**






## 7. Future Developments

The development of the CANSO Global ANS Performance Report is an iterative process. This report is the third public report issued by CANSO and reflects its members' commitment to transparency and dialogue with stakeholders. The measurement of any individual ANSP's performance is a complex task. There are many more factors at play than are made available in this report. The nature of the ANSP's ownership, its regulatory environment and more, can all impact the performance results reported here and in future reports. As this report matures, it is hoped that other areas of ANS performance will be included in due course as outlined further below.

Readers of the report are encouraged to provide comments to CANSO via email at info@canso.org

## 8. Development of Additional Global ANS Performance Metrics

CANSO's global ANS Performance Report addresses key performance indicators in the three focus areas of air navigation service

- Productivity;
- Cost-efficiency; and
- Price, Revenue and Profitability.

Operational experts from CANSO member ANSPs are now also focused on the development of performance metrics in all areas of ANSP activities, including safety, environment, human resources, operational complexity and quality of service.

### 8.1. Safety

Over the past seven years, the Civil Air Navigation Services Organisation (CANSO) has urged its Member Air Navigation Service Providers (ANSPs) to participate in the development of safety performance metrics by sharing successes, lessons learnt, and best practices between and amongst themselves. The primary goal of this effort is to improve the operational safety of global air traffic services.

A core group of ANSPs have worked to develop appropriate measures for ANSP safety performance. The CANSO Safety Standing Committee (SSC) has developed a suite of four safety performance metrics, to include two leading and two lagging indicators:

- IFR-IFR Losses of Separation
- Runway Incursions
- Safety Management System (SMS) Maturity
- Safety Culture (under development)

Using these data, CANSO has synthesised the information to provide:

- ANSP KPIs for 2011;
- Trends over an eight-year period (2004 – 2011) for IFR-IFR losses of separation;
- Trends over a five–year period (2007 – 2011) for runway incursions; and
- Trends over a four-year period (2008 – 2011) for SMS maturity.

CANSO continues to refine data elements and KPIs in an effort to provide a broader picture of ANSP performance across a wider range of ANSP activities. More detail on the safety performance metrics is provided in section 7.1 of the Main Report.

### 8.1.1. Inclusion of Safety Data in the Performance Report

Presently, safety metric results are not included in the Performance Report due to confidentiality agreements amongst CANSO members. It is anticipated that safety metrics results will be included in future Performance Report publications.

## 8.2. Environment

CANSO has developed a standard approach for ANSPS to evaluate ATM operational efficiency by phase of flight. These procedures are outlined in the CANSO report titled "Accelerating Air Traffic Management Efficiency: A Call to Industry". This report is available on the CANSO website at:

http://www.canso.org/cms/showpage.aspx?id=3935

CANSO has worked closely with ANSPs to estimate the potential improvement pools by phase of flight which in turn, may be used to assess the relative magnitude of fuel improvement opportunities in taxi, climb, cruise, and descent. These measurement indicators are based on comparing actual aircraft trajectories to an ideal unimpeded trajectory. It is recognised that actual performance will depend on the need to maintain safe separation, airline operating practice, weather, airport infrastructure, and interaction with special use airspace. Close collaboration with airlines, airports, and other ANSP's including the military is therefore vital.

Examples of US and European ATM-related operational performance metrics are contained in public reports produced by the FAA and EUROCONTROL. These include:

http://www.faa.gov/air_traffic/publications/media/us_eu_comparison_2010.pdf

http://www.eurocontrol.int/prc/public/standard_page/doc_other_reports.html.

While common definitions have been established for this phase of flight methodology, it is understood that performing these efficiency indicators requires substantial processing of flight trajectory data. Therefore measures may be limited to regions with an established data archive and analysis capability.

## 8.3. Air Traffic complexity, density, and quality of service

Benchmarking ANSP performance also requires consideration of traffic complexity, density, and quality of service issues.

In subsequent reports, the GBWG would like to examine trends in traffic complexity as a factor that may affect ANSP performance. A closer examination of traffic complexity provides a useful measure of examining ATCO workload. This is affected by factors like potential conflicts, number of hand-

offs, heading and speed differences, aircraft proximity to each other and sector boundary, presence of weather, and number of aircraft.

The EUROCONTROL Performance Review Unit (PRU) uses a measure of complexity based on a combination of density (adjusted for spatial concentration of traffic), vertical interactions between aircraft, horisontal interactions, and interactions arising from different aircraft speeds. The GBWG is in the process of developing a global measure of complexity.

In addition, benchmarking quality of service will help identify best practices, support investment decisions, and improve credibility in discussions with customers. ANSPs are currently tracking their service quality using a variety of measures, primarily focused on Air Traffic Management (ATM) delay. While the intent of measures around the world is similar, the actual calculation methods vary.

CANSO has been working to establish measures for quality of service through the creation of consistent definitions of delay by phase of flight. These delays are compared against optimal taxi and flight times as a baseline. A U.S./Europe Comparison of ATM Performance has been completed and is available at either of the following sites:

> http://www.eurocontrol.int/sites/default/files/content/documents/single-sky/pru/publications/other/us-eu-comparison-atm-related-ops-performance-final3-2010.pdf
> or http://www.faa.gov/air_traffic/publications/media/us_eu_comparison_2010.pdf

Data comparability across all CANSO members will improve over time as members are keen to match definitions for their own benefit. Common measures support better decisions and prioritisation of resources across regions.

## 8.4. Human Resources

In the area of human resources, metrics for ATCO remuneration, overtime use, absenteeism, turnover, and retention are under development.

## 8.5. IFRS

Since 2001, the International Financial Reporting Standards (IFRS) has been the accounting standard developed by the International Accounting Standards Board for the preparation of public company financial statements.[3] These standards are being implemented throughout the world and many ANSPs have implemented or are soon to adopt IFRS. The anticipated standardization of financial records across countries and ANSPs in the next few years will allow for an improved basis for comparison among ANSPs but may also impact ANSP results where noted in this Report.

[3] AICPA Resources, <http://www.ifrs.com/Backgrounder_Get_Ready.html>


# CANSO Global ANS Performance Report 2012

# 2007-2011
# Air Navigation Service Provider (ANSP) Performance Results

# Main Report

# MAIN REPORT

The Civil Air Navigation Services Organisation (CANSO) Global ANS Performance Report 2012 includes performance data related to productivity, cost effectiveness, price, revenue and profitability for 26 ANSPs around the world. Over the past eight years, CANSO has been encouraging its member Air Navigation Service providers (ANSPs) to participate in the development of this performance report activity.

CANSO's primary goal is to encourage ANSPs participation in the benchmarking activity from those parts of the World where the development of air transport is more rapid than in other regions. Within this framework the Global Benchmarking Working Group (GBWG) has presented its performance reporting activity at the CANSO Middle East Conference this spring.

The presentation focussed on the importance of the dialogue between and among ANSPs so that best practices can be identified and that ANSPs can share their successes among themselves in an effort to improve the global Air Traffic Management (ATM) industry.

The fact that 26 ANSPs have voluntarily provided data to the CANSO benchmarking effort is testimony to the industry's desire to improve.

The CANSO Global ANS Performance Report is also evidence of the desire of CANSO members to be open and transparent with their customers and other stakeholders. The vast majority of CANSO members have established processes for engaging their customers in dialogue and seeking their advice. This Performance Report is becoming a key component of that dialogue and will assist stakeholders to improve their understanding of ANSP performance.

This report contains performance data, analysis and results covering the fiscal years 2007 to 2011 for participating CANSO members who submitted data for 2011.

CANSO is particularly appreciative of the generous support provided by NAV CANADA for providing assistance with data management, analysis, and report production and the members of the CANSO working group who contributed their time to validate the data of fellow members, analyse KPI results and contribute to the drafting of this Report.

## 1. Purpose and Scope

In producing the Global ANS Performance Report 2012, CANSO strives to provide a set of meaningful global measures for ANSP performance and capture information that supports best practice comparisons. By sharing performance data through a common database and report, ANSPs can identify best practices and set internal targets. This report is the result of a multi-year investment by CANSO members in developing and refining global performance indicators in ANS productivity, cost-effectiveness, price, revenue, and profitability.

The 2012 Report contains performance data and general analysis for 26 CANSO members for the years 2007 to 2011. CANSO selects a five-year period in order to track trends in performance for each of the three focus areas. In doing so, the report provides performance insight and analysis, which allows readers to "look back" in order to "look forward."

The following CANSO members provided data for the Global ANS Performance Report 2012.

| Global ANS Performance Report 2012 – Participating ANSPs | | |
|---|---|---|
| AAI (India)<br>http://www.aai.aero | AENA (Spain)<br>http://www.aena.es | AEROTHAI (Thailand)<br>http://www.aerothai.co.th |
| Airways New Zealand<br>http://www.airways.co.nz | ANS Czech Republic<br>http://www.ans.cz | ATNS (South Africa)<br>http://www.atns.co.za |
| DCAC (Cyprus)<br>http://www.mcw.gov.cy | DHMI (Turkey)<br>http://www.dhmi.gov.tr | Dubai Air Navigation Services<br>http://www.dubaiairnav.gov.ae |
| Dutch-Caribbean<br>http://www.dc-ansp.org | EANS (Estonia)<br>http://www.eans.ee | FAA ATO (USA)<br>http://www.faa.gov |

| | | |
|---|---|---|
| Finavia (Finland)<br>http://www.finavia.fi | HungaroControl (Hungary)<br>http://www.HungaroControl.hu | IAA (Ireland)<br>http://www.iaa.ie |
| LFV (Sweden)<br>http://www.lfv.se | LGS (Latvia)<br>http://www.lgs.lv | LPS (Slovak Republic)<br>http://www.lps.sk |
| NATS (UK)<br>http://www.nats.co.uk | NAV CANADA<br>http://www.navcanada.ca | NAV Portugal<br>http://www.nav.pt |
| NAVIAIR (Denmark)<br>http://www.naviair.dk | ROMATSA (Romania)<br>http://www.romatsa.ro | Sakaeronavigatsia Ltd (Georgia)<br>http://airnav.ge |
| SENEAM (Mexico)<br>http://www.seneam.gob.mx | SMATSA (Serbia & Montenegro)<br>http://www.smatsa.rs | |

## 1.1. Summary of Global Benchmarking Activities

Since 2005, CANSO has tasked ANSPs participating in the ANS benchmarking work with the following:

- Developing appropriate global measures for ANSP performance;
- Capturing information that supports best practice comparisons; and
- Influencing the development of KPIs by third parties, thereby reducing the risk of inappropriate/harmful comparisons.

# 2. Methodology

The CANSO Global ANS Performance Report 2012 looks at five years of data for participating ANSPs, focussing on the most recent year (2011) with additional charts and analysis of trend data over the five-year period. CANSO continues to refine and modify the report, drawing on lessons learned during the data definition, collection, and analysis phases of prior reports and the feedback provided on published reports.

The report includes data submitted by participating ANSPs that has been reviewed by their peers. Due to differences in both business and the availability of data, not all ANSPs participate in each metric. However, CANSO has made an effort to include as many ANSPs as possible. CANSO continues to refine the data elements and KPIs in order to provide as complete a view of global air navigation as possible.

Grouping ANSPs by traffic level allows for peer comparisons that may reflect relative economies of scale. For the Global ANS Performance Report 2012, CANSO agreed that size groupings should be based on number of IFR flight hours (Figure 2-1). To reflect this, ANSPs are positioned on charts throughout the report from those with the greatest number of IFR flight hours to those with the least. Any ANSP that did not or could not provide three years of data was excluded from trend reports. In addition, a comparison of the percentage changes from 2007 to 2011 is reported in the tables in Part B.

**Figure 2-1: Groupings Based on IFR Flight Hours (Including Oceanic Services) for 2011**

| Grouping | ANSP | Total IFR Flight Hours |
|---|---|---|
| A | FAA ATO | 25,047,876 |
| | NAV CANADA | 3,385,086 |
| | AAI | 2,047,587 |
| | NATS | 1,766,551 |
| | AENA | 1,418,944 |
| | SENEAM | 1,222,533 |
| B | DHMİ | 903,599 |
| | Nav Portugal | 518,247 |
| | LFV | 430,699 |
| | AEROTHAI | 372,323 |
| | Airways NZ | 352,605 |
| | ROMATSA | 293,044 |
| | ATNS SA | 290,971 |
| | IAA | 265,101 |
| C | ANS CR | 235,279 |
| | SMATSA | 221,447 |
| | NAVIAIR | 217,839 |
| | HungaroControl | 195,804 |
| | DCAC | 131,701 |
| | Finavia | 128,722 |
| D | LPS | 84,875 |
| | LGS | 73,442 |
| | DC-ANSP | 61,685 |
| | EANS | 61,672 |
| | Sakaeronavigatsia | 45,419 |
| | DANS | N/A |

*Dubai Air Navigation Services do not provide flight hour information*

## 2.1. Cost Comparison

The report uses the U.S. dollar pegged to the 2007 end-of-year exchange rate for trend analyses, and the 2011 end-of-year exchange rate for comparison across ANSPs.

The analysis and performance results for this report have been split into two views, the current year and a five year trend, for each focus area relating to:

- productivity,
- cost effectiveness, and
- price, revenue and profitability.

Part A provides a presentation of the 2011 data expressed in 2011 U.S. Dollars. It is provided for the purpose of comparisons across ANSPs. Part B is a presentation of the 2007 to 2011 historical data expressed in 2007 U.S. Dollars to demonstrate how ANSPs have performed over time.

In order to account for local economic differences, employment costs are represented using Purchasing Power Parity (PPP) exchange rates. The PPP exchange rate is defined as the number of units of a country's currency that is required to buy the same amount of goods and services in the respective country as one U.S. dollar would buy in the United States. PPP as a rate of conversion is a way to compare costs without potential distortions due to the overvaluation or undervaluation of currencies. Using the PPP exchange rate minimises the inconsistencies inherent in non-indexed exchange rate conversions, which are sometimes volatile and fail to properly

reflect the differences in price levels between countries. PPP exchange rates can also help mitigate local, social and economic factors, such as the non-salary costs of employment (e.g., employment taxes, social security and national health insurance). Costs other than employment costs include capital equipment bought at international prices. Additional exchange rate details are provided in Appendix C: Exchange and Purchasing Power Parity (PPP) Rates.

When comparing costs in the trend charts (Part B) it is important to note that the percent changes recorded in the financial indicators are nominal (i.e. not adjusted for inflation), which can be particularly pertinent where text implies a reduction in costs yet the figures appear to show the opposite.

# 3. Ensuring Comparability

## 3.1. Data Consistency

In order to maintain consistency in collected data, CANSO has focused on developing standard definitions for each of the data elements, as included in Appendix A: Data Elements – Definitions. These definitions closely replicate the definitions used by the European Performance Review Unit (PRU). By using commonly understood definitions, where possible, CANSO European members use the information they prepared for the PRU in their submissions to CANSO, thereby reducing the cost of providing such data. CANSO has continuously refined the report's data elements and their definitions over the past years, and these changes have allowed for greater data comparability.

## 3.2. Factors to Consider in Measuring ANSP Performance

There are several factors to consider when examining ANSP performance. Because data-providing members operate in very different settings and serve diverse constituencies, CANSO highlighted several factors that may affect performance. These include, but are not limited to, type of ownership, range of services provided, traffic levels, cost comparison, and traffic complexity.

### 3.2.1. Type of Ownership

ANSP ownership structures are categorised into three types:

- Government Agency
- State-Owned Company
- Private Company

The type of ownership structure may impact various aspects of ANSP operation, including control over resources, access to capital, and customer involvement. Figure 3-1 Participating ANSPs grouped in terms of ownership categories.

**Figure 3-1: ANSP Ownership Categories**

| Government Agency | State-Owned Company | | Private Company |
|---|---|---|---|
| FAA ATO (USA)<br>SENEAM (Mexico) | AAI (India)<br>AENA (Spain)<br>AEROTHAI (Thailand)<br>Airways New Zealand<br>ANS Czech Republic<br>ATNS (South Africa)<br>DCAC (Cyprus)<br>DC-ANSP (Curaçao)<br>DHMI (Turkey)<br>EANS (Estonia)<br>Finavia (Finland) | HungaroControl (Hungary)<br>IAA (Ireland)<br>LFV (Sweden)<br>LGS (Latvia)<br>LPS (Slovak Republic)<br>NAVIAIR (Denmark)<br>NAV Portugal<br>ROMATSA (Romania)<br>Sakaeronavigatsia Ltd (Georgia)<br>SMATSA (Serbia & Montenegro) | Dubai Air Navigation Services<br>NATS (UK) (private public partnership)<br>NAV CANADA |

### 3.2.2. Range of Services

The types of service provided by ANSPs may vary and these differences affect each ANSP's cost structure. For the purposes of this report, other or unusual activities have been removed from cost calculations to allow for a more balanced comparison. For example, the following activities have been removed:

- Meteorological Services
- Flight Services Stations that provide traffic advisories services
- Airport management and related services

### 3.2.3. Limitations

Understanding ANSP performance is inherently complex and requires an appreciation of the necessary tension between the focus areas. This third public report on ANS performance reflects the results of high level Key Performance Indicators for the Cost Effectiveness performance area. Future reports will incorporate additional focus areas and together, the results will enable a more comprehensive view of ANS performance.

Within each focus area, we have selected and reported on several high level KPIs that enable ANSP stakeholders to compare results for any given year and performance change over time.

Many factors can contribute to differences in costs and productivity. These include the technology employed, the nature of the air traffic being managed (e.g. volume, density of operations, terminal or en route operations and airspace complexity), ATC working hours and ATCO capacity (i.e. number of flights handled simultaneously by an ATCO).

Cost Effectiveness is also affected by a range of factors that may not be under the control of each ANSP. These factors include but are not limited to, labour laws within their particular regulatory domain, the timing and volatility of changes to the economy and their impact in a fiscal year. The costs included in this report have been normalised (as far as possible) but have not been adjusted for inflation.

CANSO has utilised member data that is also used in regional benchmarking activities (e.g. PRU) and this data may be subject to minor changes when subsequent validation processes and audits are finalised. Subsequent reports will incorporate any relevant changes.

Due to differences in the KPI definitions used by CANSO and PRU, the results in the performance reports produced by these two bodies cannot be directly compared.

## 4. Performance Measures

The Global ANS Performance Report 2012 covers three focus areas and associated KPIs as shown in Figure 4-1. The KPIs are grouped by continental, oceanic, and continental and oceanic. Cost-based KPIs are indexed at 2007 U.S. exchange rates for trend analysis over time, and the exchange rate for 2011 for comparisons across ANSPs. In addition, all KPIs that use employment costs are also calculated using the PPP exchange rate.

**Figure 4-1: Global ANS Performance Report 2012 – Key Performance Indicators**

| Focus Areas | Continental KPIs | Oceanic KPIs | Continental and Oceanic KPIs |
|---|---|---|---|
| **Productivity** | IFR Flight Hours per ATCO in Operations | IFR Flight Hours per ATCO in Operations | Average Annual Working Hours for ATCOs in Operations |
| | IFR Hours per ATCO in Operations Hour | | |
| | | | |
| **Cost Effectiveness** | Cost per IFR Flight Hour | Cost per IFR Flight Hour | Cost (USD) per IFR Flight Hour |

| Focus Areas | Continental KPIs | Oceanic KPIs | Continental and Oceanic KPIs |
|---|---|---|---|
| | Employment Cost for ATCOs in Operations per IFR Flight Hour | Employment Cost for ATCOs in Operations per IFR Flight Hour | Cost of Capital and Depreciation as a Percent of Total Costs |
| | Employment Cost for ATCOs in Operations per ATCO in Operations | Employment Cost for ATCOs in Operations per ATCO in Operations | Employment Cost of ATCOs in Operations as a Percent of Operating Cost |
| | | | Employment Cost of ATCOs in Operations as a Percent of Total Cost |
| | | | |
| **Price, Revenue, and Profitability** | Example Consolidated Price (USD) per 1000 KM Flight for A320 | ANS Revenue (USD) per IFR Flight Hour | Return on Equity (ROE) |
| | Total ANS Revenue per IFR Flight Hour | | Return on Assets (ROA) |

# 5. Global Aviation Context

Aviation makes a direct contribution to global GDP. Global business and tourism rely on air transport, and increasing globalisation makes worldwide connections essential. The evolution of global aviation is being influenced and driven by a wide range of factors. These factors are mainly outside the control of the air navigation service providers.

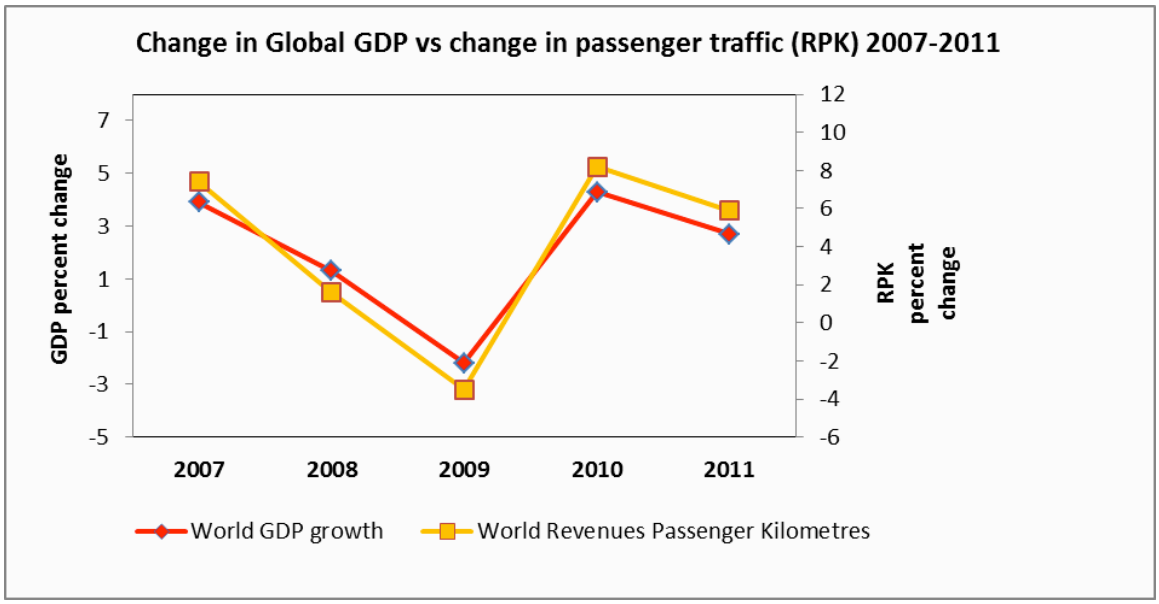
## 5.1. Trend, challenges and performance

Global aviation is still under the impact of the current unstable economic conditions. The output of air transport is often measured in Revenue Passenger Kilometres (RPKs) which is influenced by a number of factors (e.g. number of flights, flight distance, aircraft size, etc). Worldwide international and domestic revenue passenger kilometres grew by 5.9% in 2011.

Traffic growth could be observed, but this rebound was not evenly spread across regions and the year-end level still remained under pre-economic crisis levels of 2007. In international markets, European airlines recorded the second fastest growth rates behind Latin America where air traffic is supported by robust economic conditions and continued trade activity. Air traffic demand remained robust in 2011, but some of the observed growth in air traffic is a compensating effect for the cancellations due to adverse events in 2010.

Figure 5-1 World economic and air traffic (RPK) evolution, illustrates the linkage between these two factors

**Figure 5-1 Change in Global GDP vs Change in Passenger Traffic (RPK)**




Oil price have been relatively stable at a very high level, with fuel accounting for 30-40% (and even more in some areas) of airline costs resulting in loss of profit by almost half compared with 2010.

The emerging markets of Brazil, India and China all showed double-figure growth, while Japan declined by 15.2% as a result of the earthquake in March 2011. Asia/Pacific, the largest international cargo market and the major location for manufacturing activity, declined most, by 4.8% for international traffic and 4.6% in total. Latin America and the Middle East showed significant growth over the year.

ANS performance depends on airlines' performance. Factors such as uncertainties in economic recovery in different regions of the world, the high price of oil and downward revisions of GDP forecasts around the world and recent failures of national airlines give major challenges in the forecast of future traffic evolutions.

The GBWG acknowledges that the following sources were used in the creation of this section.

- PRR 2011, Performance Review Report, May 2012
- IATA Air Transport Market Analysis, December 2011
- EuroControl Medium Term Forecast, Flight Movements, February 2012
- IATA 2012 Annual Review

# 6. Future Developments

The development of the CANSO Global ANS Performance Report is an iterative process. This report is the third public report issued by CANSO and reflects its members' commitment to transparency and dialogue with stakeholders. The measurement of any individual ANSP's performance is a complex task. There are many more factors at play than are made available in this report. The nature of the ANSP's ownership, its regulatory environment and more, can all impact the performance results reported here and in future reports. As this report matures, it is hoped that other areas of ANS performance will be included in due course as outlined further below.

Readers of the report are encouraged to provide comments to CANSO via email at info@canso.org

# 7. Development of Additional Global ANS Performance Metrics

CANSO's global ANS Performance Report addresses key performance indicators in air navigation service productivity; cost-efficiency; as well as price, revenue and profitability. Operational experts from CANSO member ANSPs are now also focused on the development of performance metrics in all areas of ANSP activities, including safety, environment, human resources, operational complexity and quality of service.

## 7.1. Safety

Over the past years CANSO has urged its member ANSPs to participate in the development of safety performance metrics by sharing successes, lessons learnt, and best practices between and amongst themselves. The primary goal of this effort is to improve the operational safety of global air traffic services.

A core group of ANSPs have worked to develop appropriate measures for ANSP safety performance. The CANSO Safety Standing Committee (SSC) has developed a suite of four safety performance metrics, to include two leading and two lagging indicators:

- IFR-IFR Losses of Separation
- Runway Incursions
- Safety Management System (SMS) Maturity
- Safety Culture (under development)

Using these data, CANSO has synthesised the information to provide:

- ANSP KPIs for 2011;
- Trends over an eight-year period (2004 – 2011) for IFR-IFR losses of separation;
- Trends over a five–year period (2007 – 2011) for runway incursions; and
- Trends over a four-year period (2008 – 2011) for SMS maturity.

CANSO continues to refine data elements and KPIs in an effort to provide a broader picture of ANSP performance across a wider range of ANSP activities.

### 7.1.1. IFR-IFR Losses of Separation

Contributing ANSPs provide IFR services based on specific and measurable standards and requirements. All IFR aircraft must operate using minimum separation standards (e.g., three-mile lateral and 1,000-foot vertical separation). ANSPs are required to report to their regulator each occurrence of loss of separation, wherein these standards are infringed. This reporting process serves as the basis for the IFR-IFR loss of separation safety metric and is intended to indicate the residual risk of the system when conducting IFR operations.

For purposes of this initiative the definition of an IFR to IFR loss of separation (LOS) is:

1) The two involved aircraft were both IFR
2) The two involved aircraft were both airborne
3) A separation standard was applicable and the ANSP was responsible for applying that standard
4) The separation standard was not applied 100%
5) The ANSP acknowledges significant ownership of the reason why separation application failed.

The rate of IFR-IFR losses of separation per ANSP is based upon the number of reported losses divided by an activity figure of 1 million IFR hours flown or 100,000 movements.

### 7.1.2. Runway Incursions

Runway incursions represent an area of significant safety risk and have been identified as one of the major areas requiring a performance metric. Identifying and addressing the risks associated with runway incursions requires support from a variety of stakeholders, including ANSPs, aircraft operators and airport operators. The SSC is primarily concerned with identifying and addressing those risks specific to ANSPs; in this case, identifying the commonality of the causal factors between Category A and B runway incursions and working with the aviation community to address these factors.

Data submitted includes the number of runway incursions by severity and attribution (that is, induced by pilot, controller, or vehicle driver).

The commitment of CANSO Member ANSPs to submit runway incursion data supports the ability to understand the issues on a global scale and to develop mitigations that may help to reduce the risk of future runway incursions.

### 7.1.3. SMS Maturity

The CANSO SSC, in concert with EuroControl, has developed a comprehensive questionnaire to measure the SMS maturity level of individual ANSPs. The questionnaire is based on the 11 key elements of an effective SMS. Each of the 11 key elements (also known as Study Areas) is rated on a level from 1 to 5, based upon the EuroControl Capability Maturity Model Integration industry standard, as follows:

- Level 1 is defined as 'Initiating';
- Level 2 is defined as 'Planning/Initial Implementation';
- Level 3 is defined as 'Implementing';
- Level 4 is defined as 'Managing and Measuring'; and
- Level 5 is defined as 'Continuous Improvement'.

An individual maturity level is selected only if all elements of that particular level's objective, as well as all elements of the previous levels, as described in the questionnaire, are fully met. Each level requires specific outputs or achievements which are verified through a survey and follow up.

It should be noted that the levels have been defined and calibrated such that, in principle, an ANSP considered to be at Level 3 would meet all basic regulatory requirements, whereas an ANSP considered to be at Level 5 would be setting industry standards (i.e., best practices) in those particular areas.

The objective of the SMS Maturity Metric is to gauge how well ANSPs are meeting safety requirements and to set a baseline or reference point for future enhancements of the 11 key elements of an effective SMS.

### 7.1.4. Inclusion of Safety Data in the Performance Report

Presently safety metric results are not included in the Performance Report due to confidentiality agreements amongst CANSO members. It is anticipated that safety metrics results will be included in future Performance Report publications.

## 7.2. Environment

CANSO has developed a standard approach for ANSPs to evaluate ATM operational efficiency by phase of flight. These procedures are outlined in the CANSO report titled "Accelerating Air Traffic Management Efficiency: A Call to Industry". This report is available on the CANSO website at:

http://www.canso.org/cms/showpage.aspx?id=3935

CANSO has worked closely with ANSPs to estimate the potential improvement pools by phase of flight which in turn, may be used to assess the relative magnitude of fuel improvement

opportunities in taxi, climb, cruise, and descent. These measurement indicators are based on comparing actual aircraft trajectories to an ideal unimpeded trajectory. It is recognised that actual performance will depend on the need to maintain safe separation, airline operating practice, weather, airport infrastructure, and interaction with special use airspace. Close collaboration with airlines, airports, and other ANSP's including the military is therefore vital.

Examples of US and European ATM-related operational performance metrics are contained in public reports produced by the FAA and EUROCONTROL. These include:

http://www.faa.gov/air_traffic/publications/media/us_eu_comparison_2010.pdf

http://www.eurocontrol.int/prc/public/standard_page/doc_other_reports.html.

While common definitions have been established for this phase of flight methodology, it is understood that performing these efficiency indicators requires substantial processing of flight trajectory data. Therefore measures may be limited to regions with an established data archive and analysis capability.

## 7.3. Air Traffic complexity, density, and quality of service

Benchmarking ANSP performance also requires consideration of traffic complexity, density, and quality of service issues.

In subsequent reports, the GBWG would like to examine trends in traffic complexity as a factor that may affect ANSP performance. A closer examination of traffic complexity provides a useful measure of examining ATCO workload. This is affected by factors like potential conflicts, number of hand-offs, heading and speed differences, aircraft proximity to each other and sector boundary, presence of weather, and number of aircraft.

The EUROCONTROL Performance Review Unit (PRU) uses a measure of complexity based on a combination of density (adjusted for spatial concentration of traffic), vertical interactions between aircraft, horisontal interactions, and interactions arising from different aircraft speeds. The GBWG is developing a global measure of complexity.

In addition, benchmarking quality of service will help identify best practices, support investment decisions, and improve credibility in discussions with customers. ANSPs are currently tracking their service quality using a variety of measures, primarily focused on Air Traffic Management (ATM) delay. While the intent of measures around the world is similar, the actual calculation methods vary.

CANSO has been working to establish measures for quality of service through the creation of consistent definitions of delay by phase of flight. These delays are compared against optimal taxi and flight times as a baseline. A U.S. Europe Comparison of ATM Performance has been completed and is currently being updated. Data comparability across all CANSO members will improve over time as members are keen to match definitions for their own benefit. Common measures support better decisions and prioritisation of resources across regions.

## 7.4. Human Resources

In the area of human resources, metrics for ATCO remuneration, overtime use, absenteeism, turnover, and retention are under development.

## 7.5. IFRS

Since 2001, the International Financial Reporting Standards (IFRS) has been the accounting standard developed by the International Accounting Standards Board for the preparation of public company financial statements.[4] These standards are being implemented throughout the

[4] AICPA Resources, <http://www.ifrs.com/Backgrounder_Get_Ready.html>

world and many ANSPs have implemented or are soon to adopt IFRS. The anticipated standardisation of financial records across countries and ANSPs in the next few years will allow for an improved basis for comparison among ANSPs but may also impact ANSP results where noted in this Report.


# Part A

# CANSO Global ANS Performance Report 2012

# 2007-2011 Air Navigation Service Provider (ANSP) Performance Results

# Summary of 2011 Results

# 8. Part A: KPI Analysis and Performance Results – Summary of 2011 Results

This section shows the participant results for the selected Key Performance Areas and Indicators. As previously explained, KPIs are classified by the focus areas: productivity; cost-effectiveness; as well as price, revenue and profitability and by domain in Continental, Oceanic and Total (Continental and Oceanic).

In this section, graphs provided will allow individual ANSPs to more easily examine their performance in comparison to like-sized ANSPs and draw their own conclusions.

## 8.1. Continental KPI Results

Section 8.1 of this report contains 2010 performance results related to continental KPI measures.

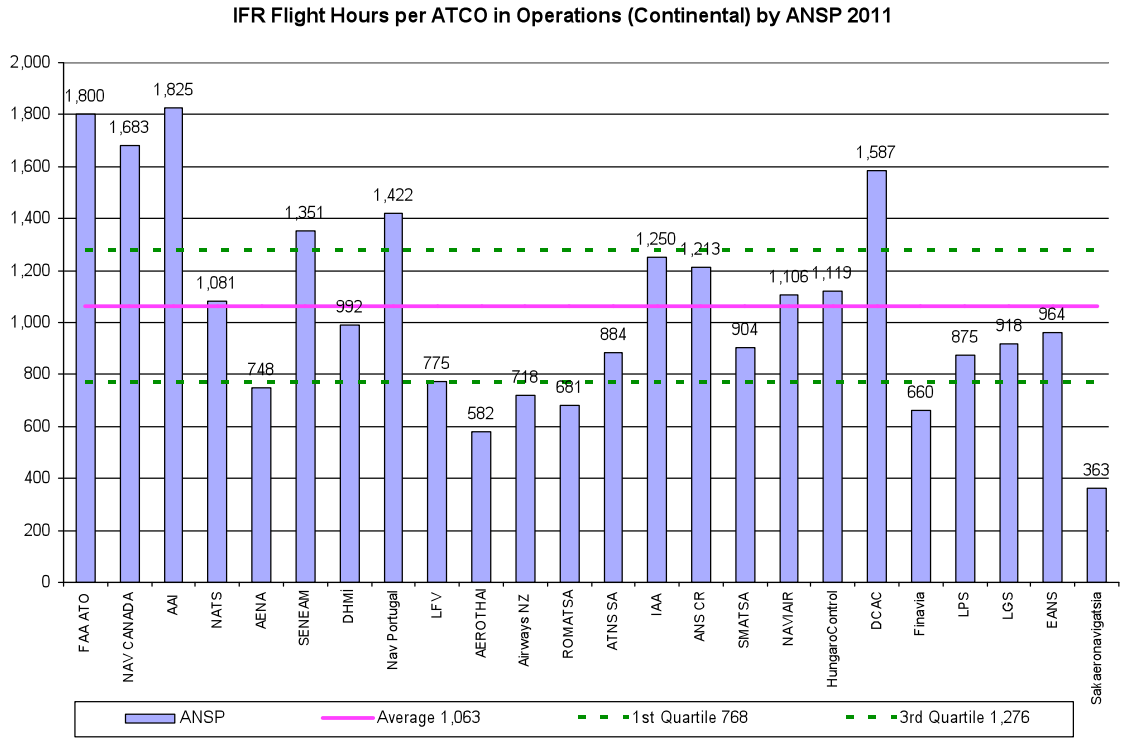
**Figure 8-1: Focus Areas and Indicators**



### 8.1.1. Productivity

The chart below shows the number of continental IFR Flight Hours divided by the number of continental ATCOs in Operations. In this and the following charts, ANSPs are presented in descending order by size as determined by total IFR Flight Hours.

## Figure 8-2: IFR Flight Hours per ATCO in Operations (Continental) by ANSP

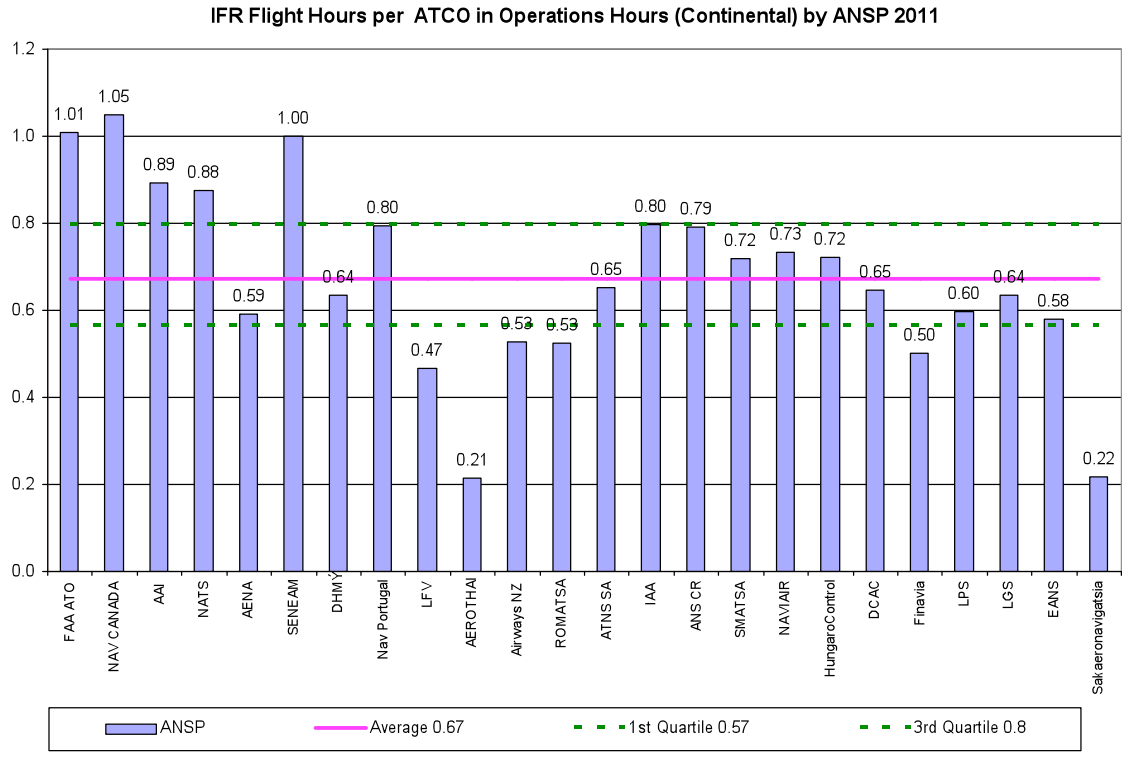



Volume of traffic, as well as size and complexity of airspace can also influence the result of this indicator, especially within ANSPs with a higher concentration of tower activity (which does not accrue flight hours).

Underlying factors impacting ATCO productivity may include labour laws, vacation/leave schedules, seniority within the workforce, working hours per ATCO in Operations, and the resulting economies of scale.

There is also the need to maintain at least a minimum number of ATCOs in Operations on staff, despite the volume of traffic.

**Figure 8-3: IFR Flight Hours per ATCO in Operation Hours (Continental) by ANSP**




The chart above (Figure 8-3) shows the number of continental IFR Flight Hours divided by the number of continental ATCOs in Operations.

The IFR Flight hours per ATCO in Operations (Figure 8-2) provides insight into the productivity of ATCOs in Operations by dividing the continental IFR Flight Hours by the number of ATCOs. This measure does not properly account for the differences in working practices that will occur between countries with respect to the number of hours an ATCO is required to work, or how much work is completed as overtime. In order to account for the first of these differences, this measure of IFR Flight Hour per ATCO hour (as shown in Figure 8-2) was developed. By dividing the continental IFR Flight Hours by the average working hours per ATCO, a productivity measure is derived that relates an amount of activity to an amount of work.

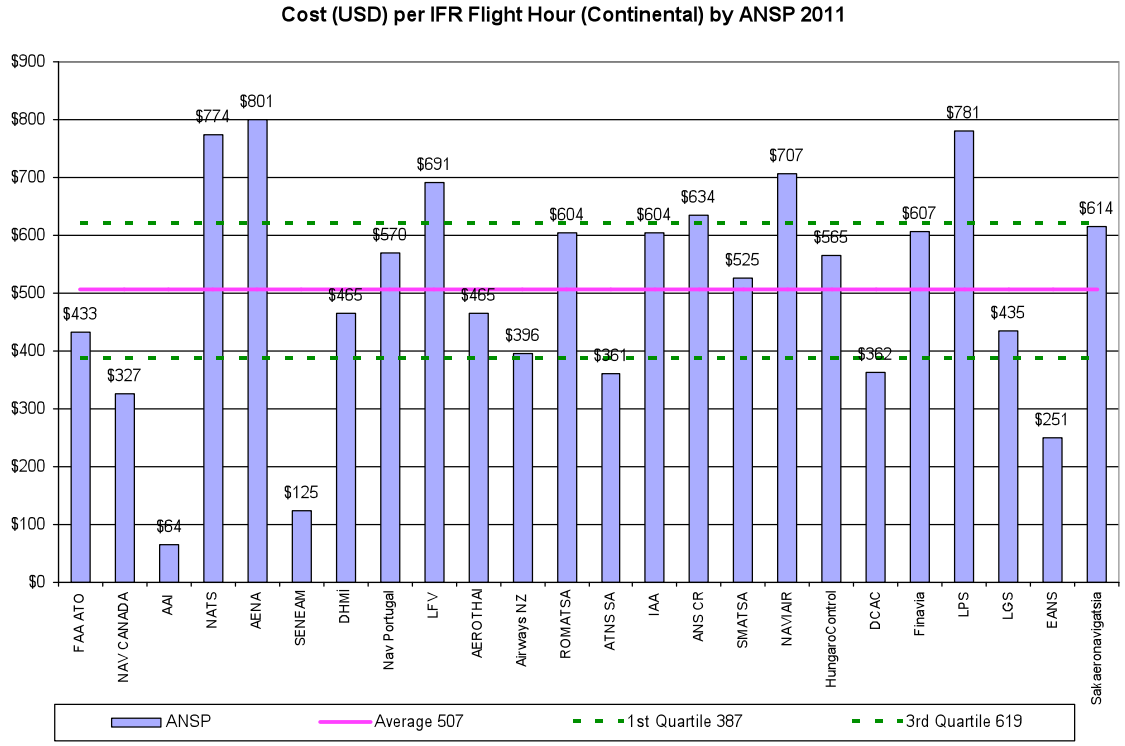
This measure does not yet account for any differences between ANSPs related to the proportion of time spent "on the board", nor does it address the issue of core work time versus overtime.

Similar to other productivity indicators, underlying factors influencing this KPI include size and complexity of airspace, concentration of tower activity and staff roster regulations.

### 8.1.2. Cost-Effectiveness

**Figure 8-4: Cost (USD) per IFR Flight Hour (Continental) by ANSP**

The chart below shows the Continental Cost in U.S. Dollars per Continental IFR Flight Hour.

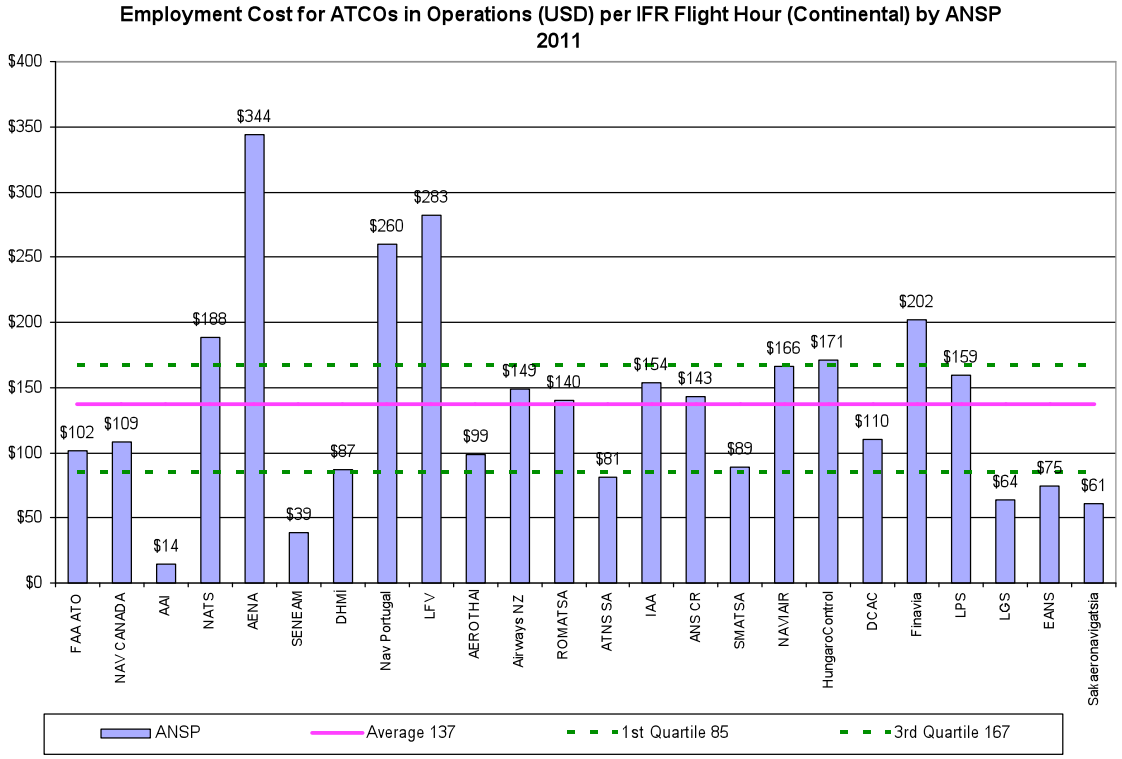



**2011 OANDA Exchange Rates**

For AAI (India), continental costs reflect operating cost only.

## Figure 8-5: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) by ANSP

The chart below shows the Continental Employment Cost for ATCOs in Operations in U.S. Dollars, per Continental IFR Flight Hour.



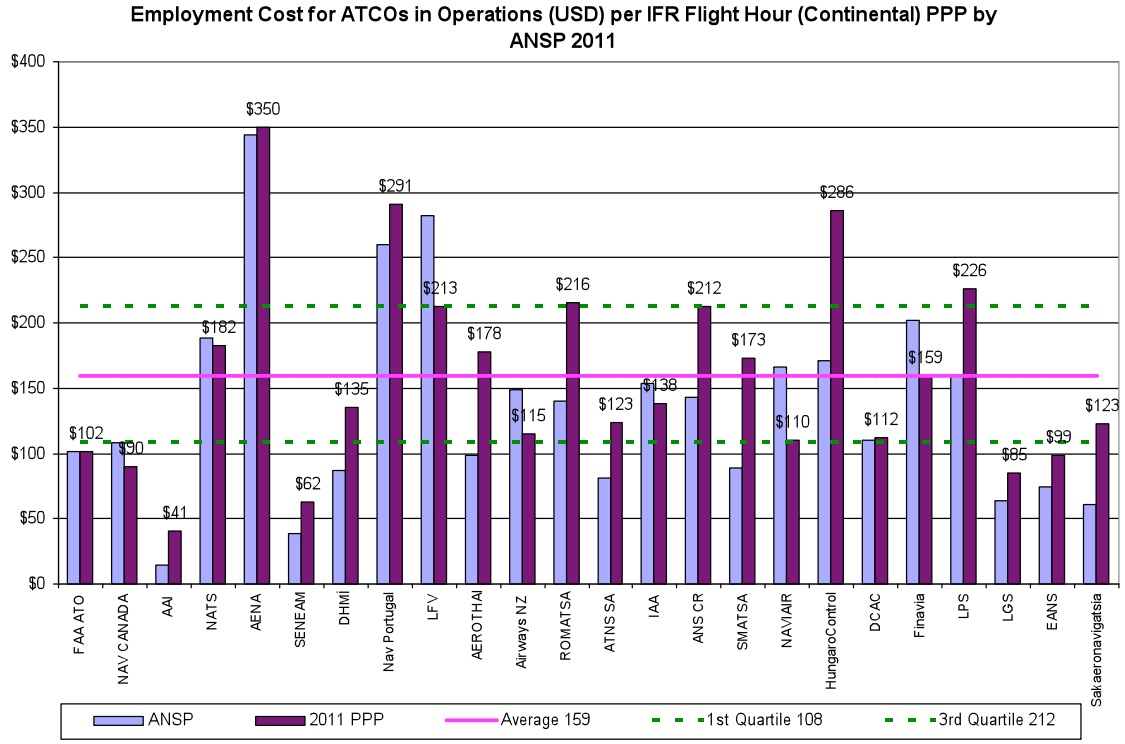

**2011 OANDA Exchange Rates**

Compared to other KPIs, Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) shows more dispersion with respect to the average.

The NAV Portugal value is the result of the significant increase in the pension premiums after the adoption of the new mortality table for the NAV/ATCOs Pensions Fund. This increase has been partially absorbed by the decrease of the remaining components of costs with staff as a consequence of the implementation of measures for the reduction of costs that allowed a decrease in comparison with 2010.

## Figure 8-6: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) applying Purchasing Power Parity (PPP) by ANSP

The chart below shows the Continental Employment Cost for ATCOs in Operations in U.S. Dollars, indexed using the PPP rate for the corresponding year, per Continental IFR Flight Hour against the straight dollar conversion.



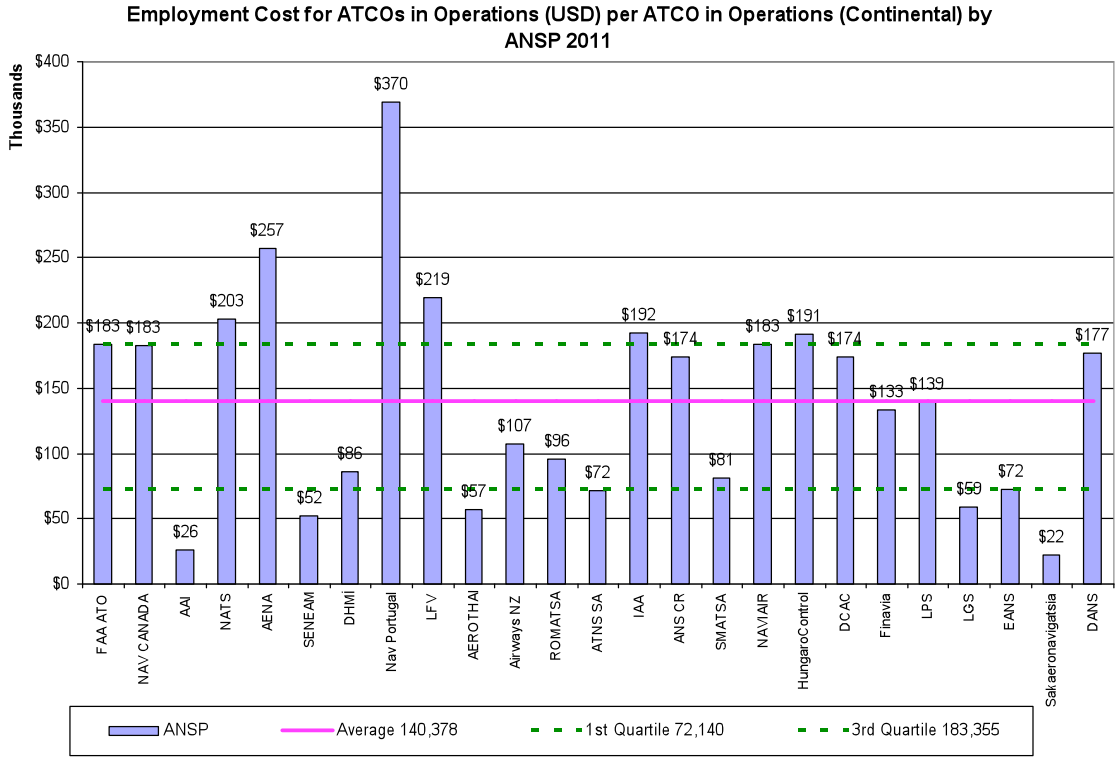

**2011 OANDA Exchange Rates and 2011 IMF PPP**

The average and quartiles were calculated using the IMF PPP values.

The NAV Portugal value is the result of the significant increase in the pension premiums after the adoption of the new mortality table for the NAV/ATCOs Pensions Fund. This increase has been partially absorbed by the decrease of the remaining components of costs with staff as a consequence of the implementation of measures for the reduction of costs that allowed a decrease in comparison with 2010.

## Figure 8-7: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) by ANSP

The chart below shows the Employment Cost for Continental ATCOs in Operations in of U.S. Dollars, using the applicable exchange rate, per Continental ATCO in Operations.

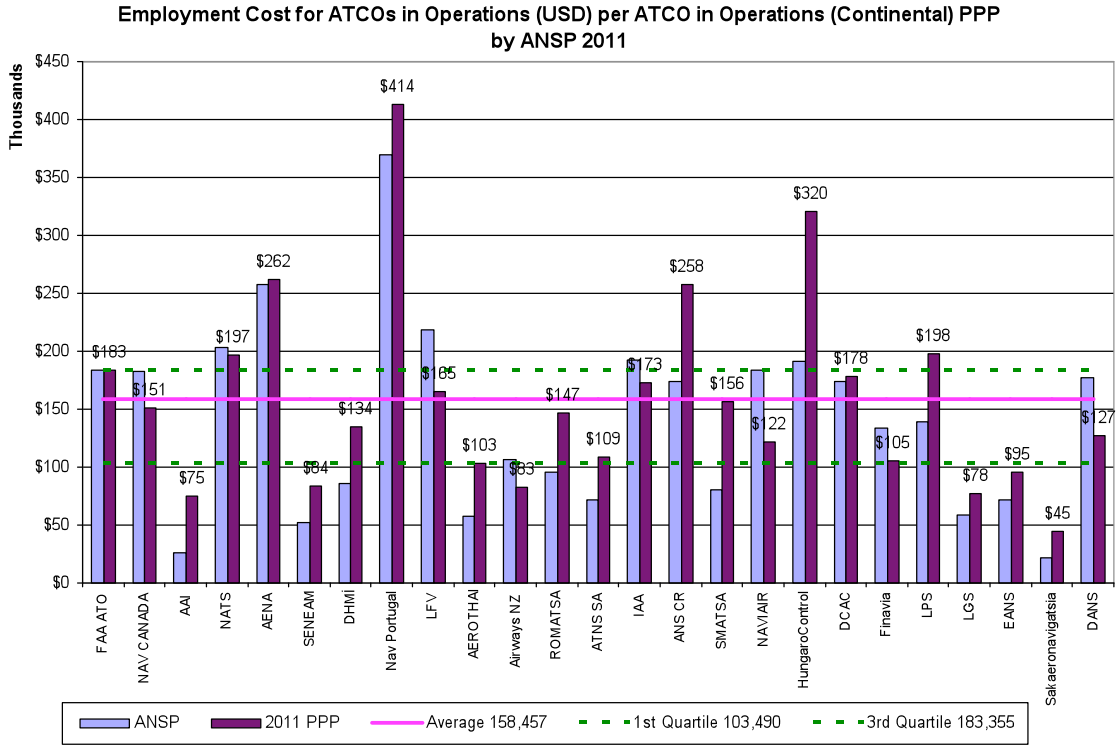



**2011 OANDA Exchange Rates**

The NAV Portugal value is the result of the significant increase in the pension premiums after the adoption of the new mortality table for the NAV/ATCOs Pensions Fund. This increase has been partially absorbed by the decrease of the remaining components of costs with staff as a consequence of the implementation of measures for the reduction of costs that allowed a decrease in comparison with 2010.

## Figure 8-8: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) applying Purchasing Power Parity (PPP) by ANSP

The chart below shows the Employment Cost for Continental ATCOs for Operations in of U.S. Dollars indexed using the PPP rate for the corresponding year, per Continental ATCO in Operations against the straight dollar conversion.




**2011 OANDA Exchange Rates and 2011 IMF PPP**

The average and quartiles were calculated using the IMF PPP values.

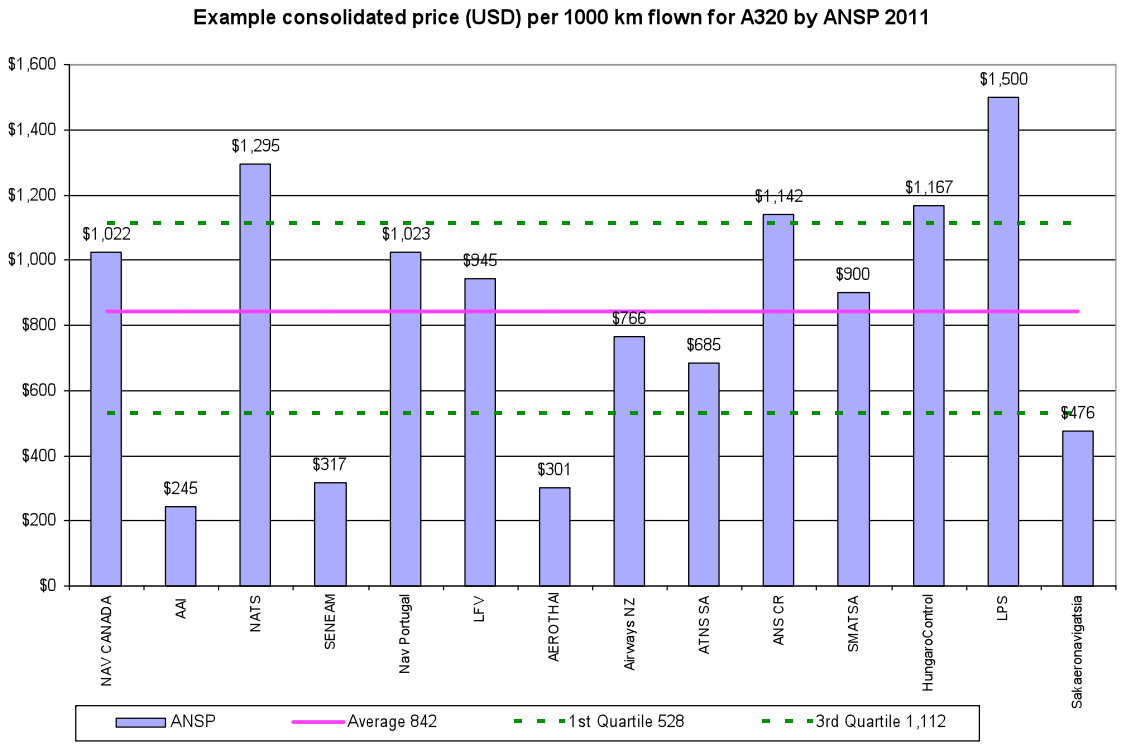
The NAV Portugal value is the result of the significant increase in the pension premiums after the adoption of the new mortality table for the NAV/ATCOs Pensions Fund. This increase has been partially absorbed by the decrease of the remaining components of costs with staff as a consequence of the implementation of measures for the reduction of costs that allowed a decrease in comparison with 2010.

The IMF PPP rates are based on local currency; however, SENEAM submitted data in US Dollars. We've modified to PPP rate to include the OANDA exchange rates and have basically converted the employment costs back to pesos before applying the PPP.

### 8.1.3. Price, Revenue, and Profitability

**Figure 8-9: Example Consolidated Price (USD) per 1000 km Flight for A320 by ANSP**

The chart below shows examples of ANSP charges for a sample 1000 km flown by an A320 aircraft.




**2011 OANDA Exchange Rates**

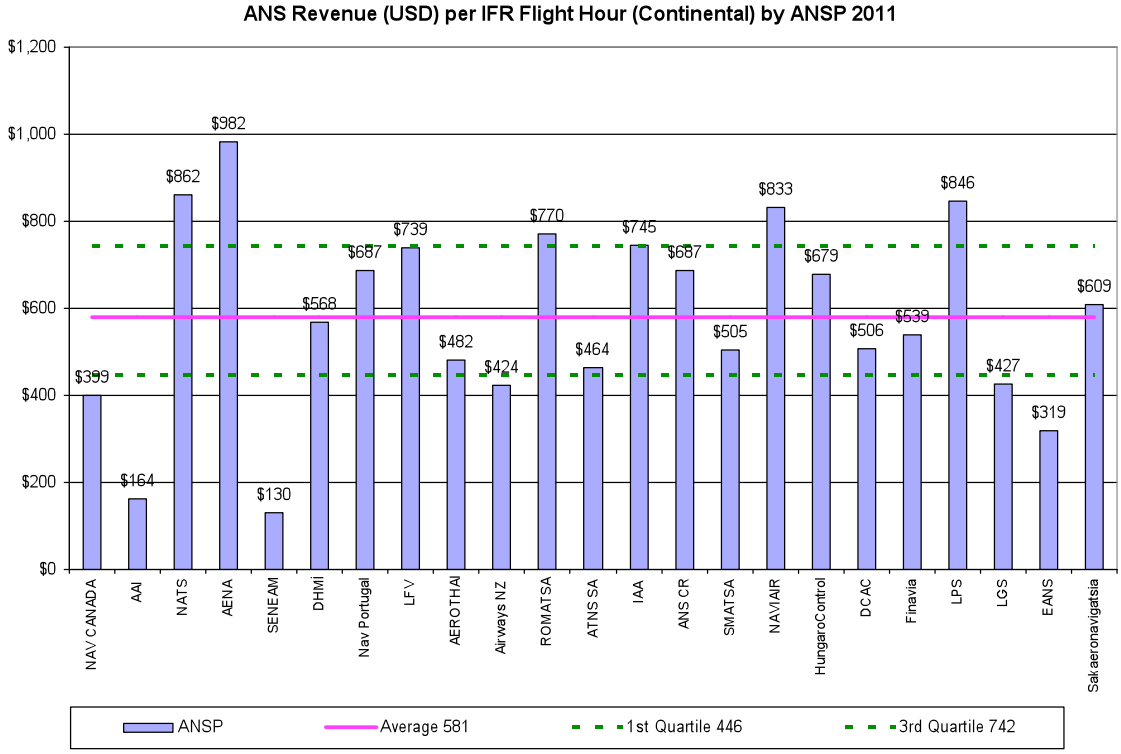
The charging structure in place for each ANSP has been designed with their particular circumstances, and are intended to recover a specific level of costs over a given time period, usually a year. The represented ANSPs who charge for their ANS services do so within the ICAO principles of weight and distance-based charging.

For NATS (UK), the costs include en-route and London Approach charges only. The ANSP does not charge TNC directly to airlines.

AEROTHAI (Thailand) is not comparable to other ANSPs represented in this figure because flight charges are calculated on a per movement basis and not by distance.

**Figure 8-10: ANS Revenue (USD) per IFR Flight Hour (Continental) by ANSP**

The chart below shows the Continental ANS Revenue in U.S. Dollars, using the applicable exchange rate, per IFR Flight Hour.




**2011 OANDA Exchange Rates**

The total revenue figure used in this chart is continental revenue only. While the revenues appear to vary greatly in this graph, most ANSPs are able to cover their costs at their current price structure.

## 8.2. Total Performance (Continental and Oceanic) KPI Results

In section 8.1 of this report, results were presented with respect to costs and IFR hours for the continental operations of each ANSP. In this section, KPIs are presented that are related to both the continental and oceanic operations. While all ANSPs have continental operations that are closely defined by their national borders, only some ANSPs have been assigned oceanic control areas.

Oceanic areas are assigned by ICAO and provide for the total coverage of the world's oceans for air travel purposes. These areas operate differently from continental airspace since this area is outside any radar coverage, and therefore operates under procedural rules. Several ANSPs are expanding oceanic, ADS-B, and WAM to improve services.

The benchmarking methodology separates and/or combines the oceanic data with the continental data at different points of the report in order to allow for the proper comparisons to be made.

Section 8.2 of this report contains the 2011 performance results related to the following continental and oceanic KPI measures.

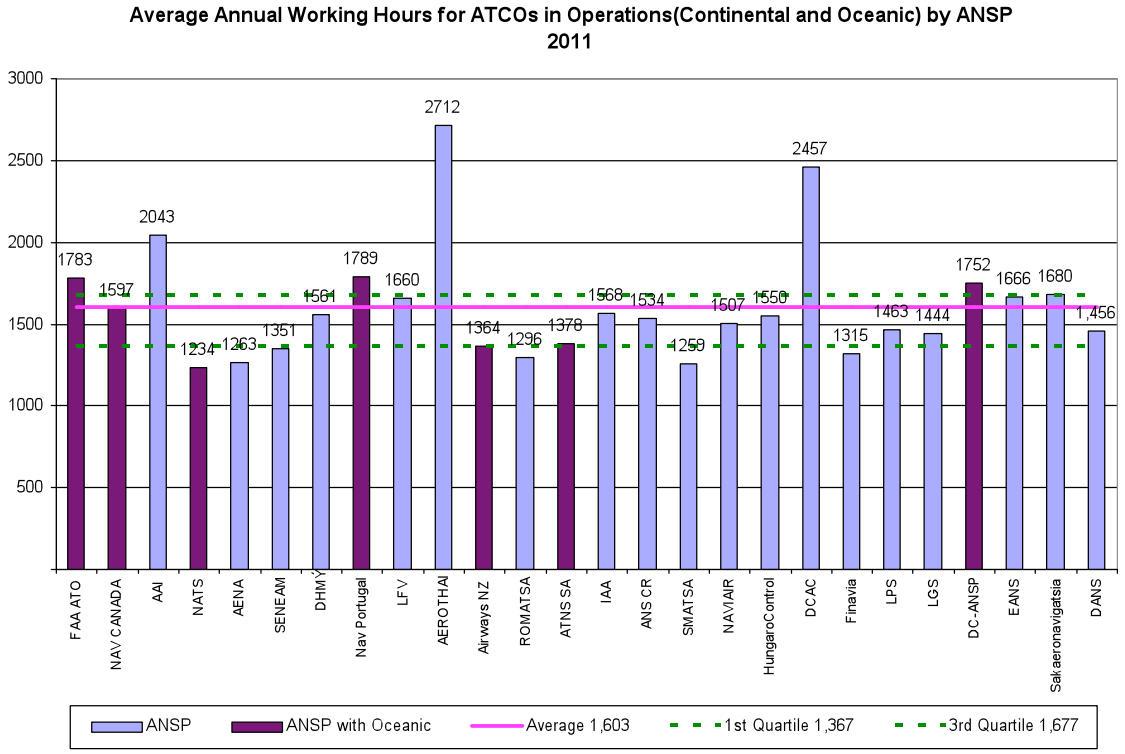
**Figure 8-11: Focus Areas and Indicators**

| Focus Areas | Key Performance Indicators | |
|---|---|---|
| 8.2.1 Productivity | Average Annual Working Hours for ATCOs in Operations (Continental and Oceanic) by ANSP | Page 40 |

### 8.2.1. Productivity

**Figure 8-12: Average Annual Working Hours for ATCOs in Operations (Continental and Oceanic) by ANSP**

The chart below shows the number of hours 'ATCOs in Operations' spend on duty in operations, including breaks and overtime in operations.



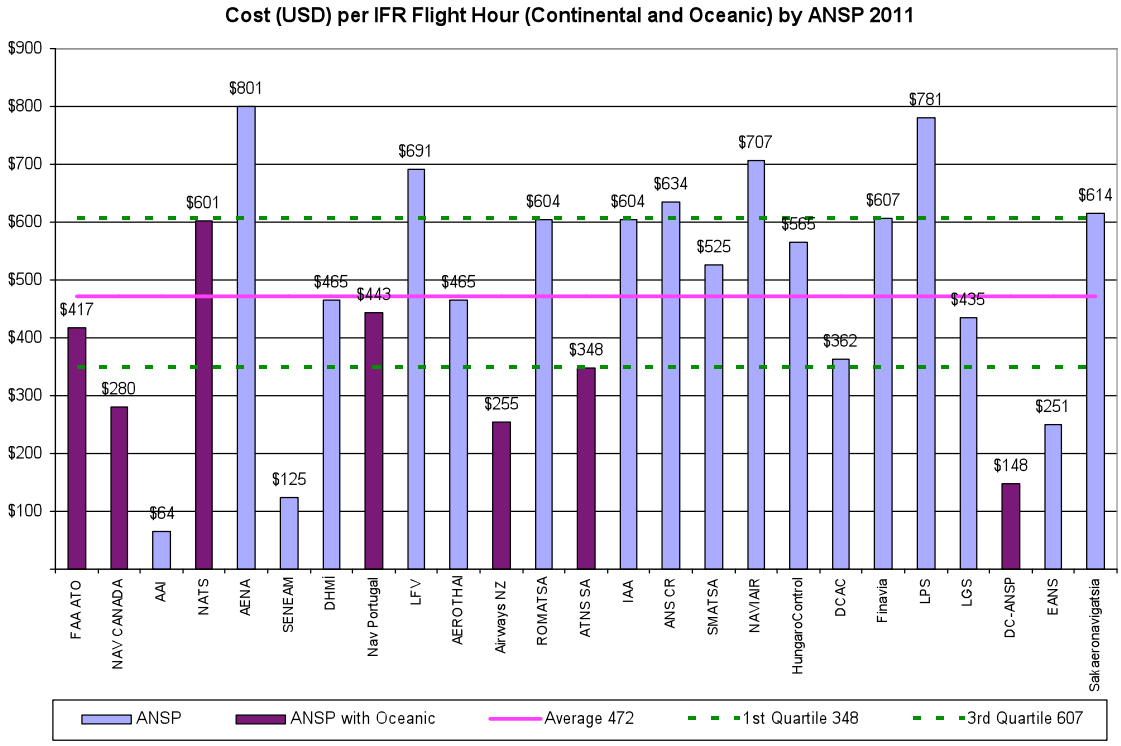

Government regulations and labour laws may affect this KPI as well as standard vacation, holiday schedules seniority of the staff and many other socio-political factors. Some ANSPs could show more stability along the years as a result of these factors, for instance because the number of working hours is fixed or limited to a maximum per year. Variability could reflect some flexibility to adapt to the traffic fluctuations.

AEROTHAI is working towards the improvement of ATC workload allocation by conducting its own internal productivity analysis. However, due to significant growth in traffic, insufficient use of automation in its ATM system combined with the regulation to roster staff to accommodate peak traffic operations and provincial towers with sparse traffic, a number of working hours are still required.

### 8.2.2. Cost-Effectiveness

**Figure 8-13: Cost (USD) per IFR Flight Hour (Continental and Oceanic) by ANSP**

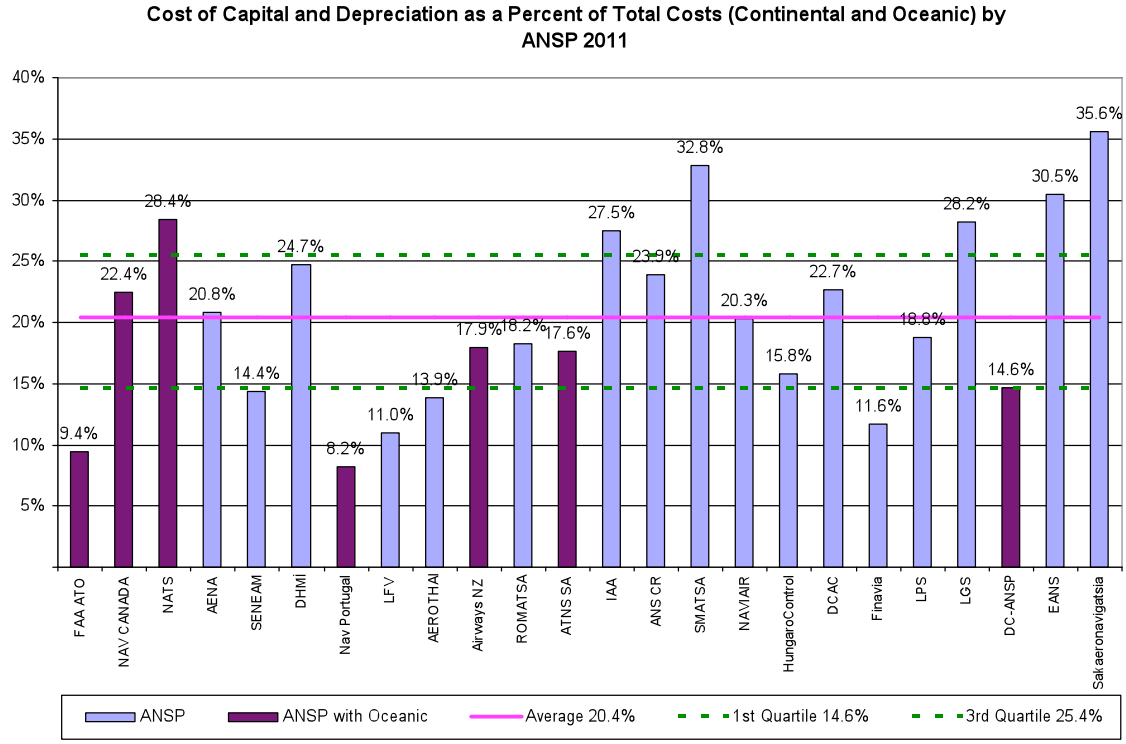
The chart below shows the Continental and Oceanic Cost in U.S. Dollars, using the applicable exchange rate, per IFR Flight Hour.




**2011 OANDA Exchange Rates**

## Figure 8-14: Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic) by ANSP

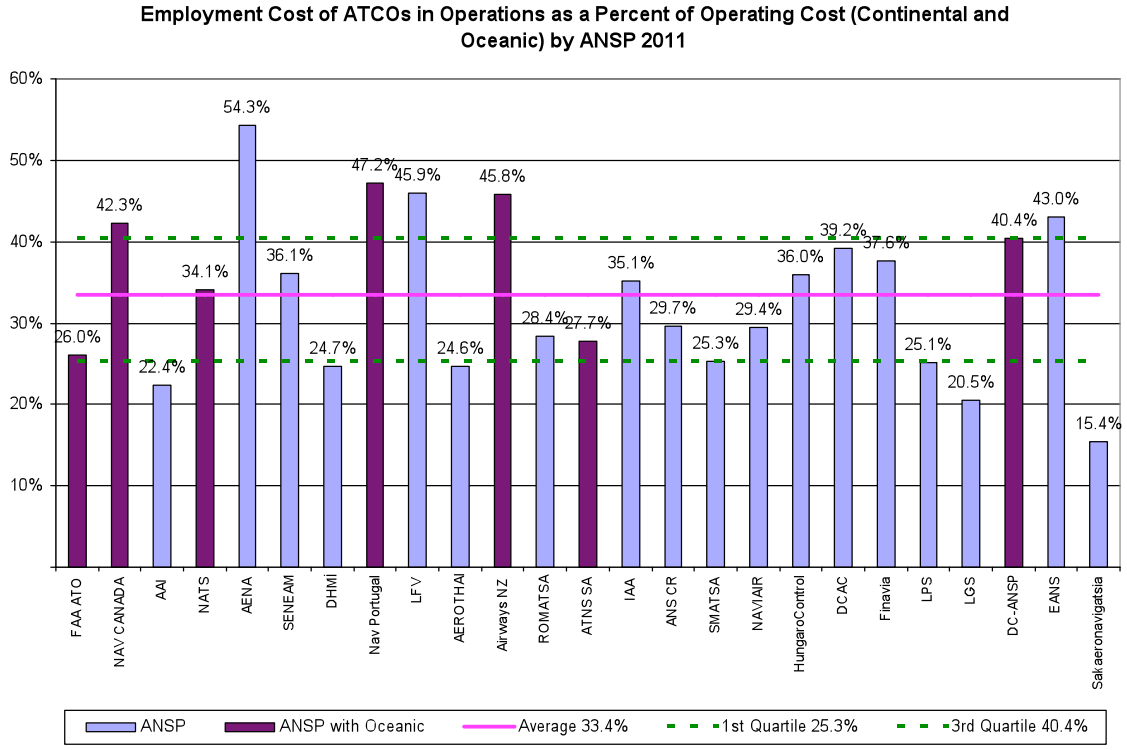
The chart below shows the Cost of Capital and Depreciation as a Percent of Total Continental and Oceanic Cost.




FAA depreciation costs have stayed fairly stable over the 2007 to 2011 time period. However, the FAA's operating costs have increased causing the Depreciation/Operating Cost ration to appear lower than their peers.

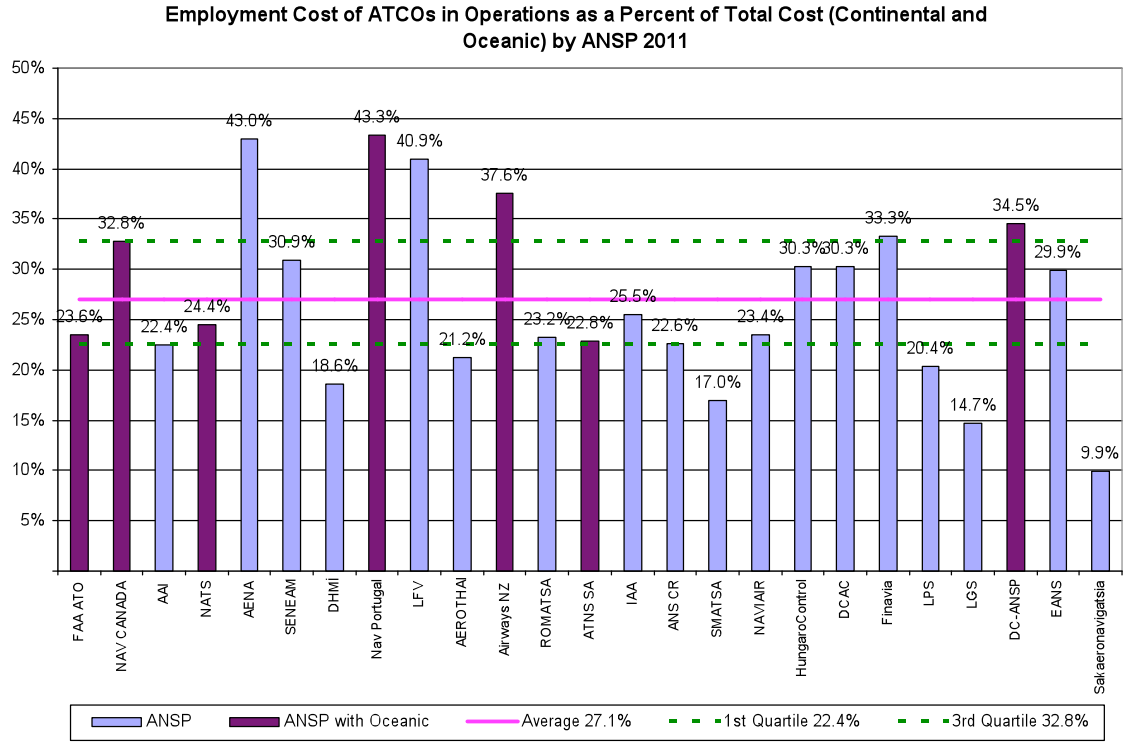
## Figure 8-15: Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic) by ANSP

The chart below shows the Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic).



## Figure 8-16: Employment Cost of ATCOs in Operations as a Percent of Total Cost (Continental and Oceanic) by ANSP

The chart below shows the Employment Cost of ATCOs in Operations as a Percent of Total Continental and Oceanic Cost.




The NAV Portugal value is the result of the significant increase in the pension premiums after the adoption of the new mortality table for the NAV/ATCOs Pensions Fund. This increase has been partially absorbed by the decrease of the remaining components of costs with staff as a consequence of the implementation of measures for the reduction of costs that allowed a decrease in comparison with 2010.

### 8.2.3. Price, Revenue, and Profitability

**Figure 8-17: Return On Assets (ROA) by ANSP**

The chart below shows measure of a company's profitability as calculated by dividing Net Income by Total Assets (Annual Average) or the ROA as submitted by the ANSP

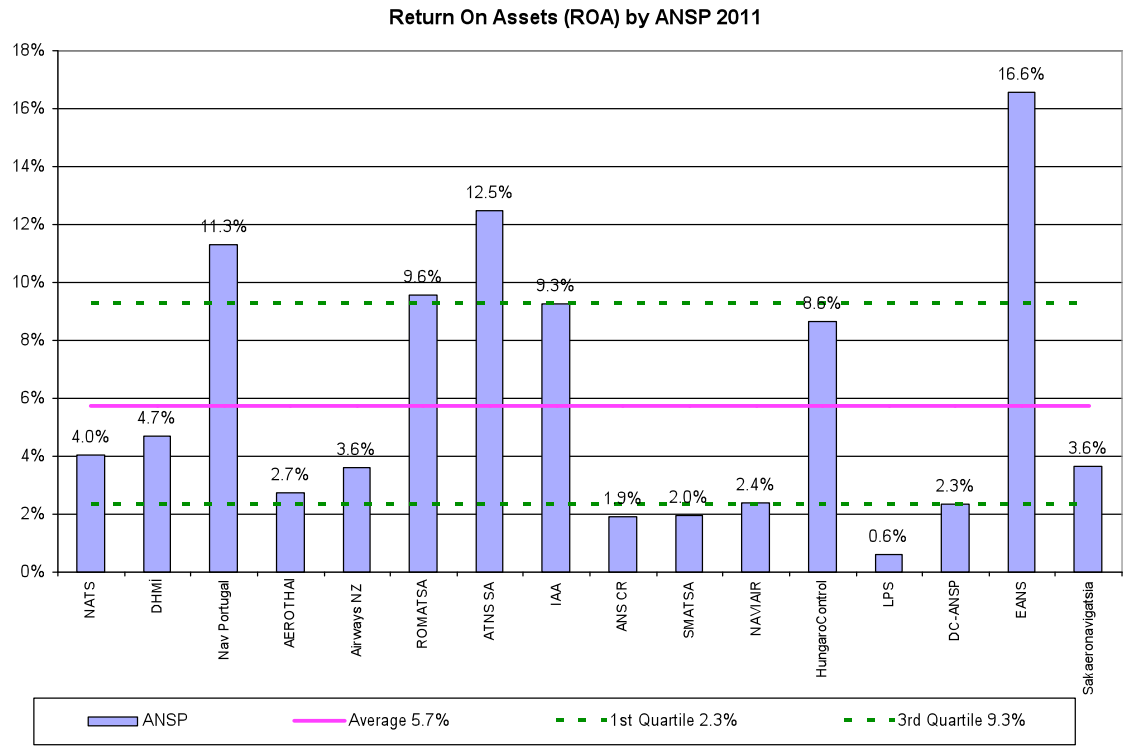
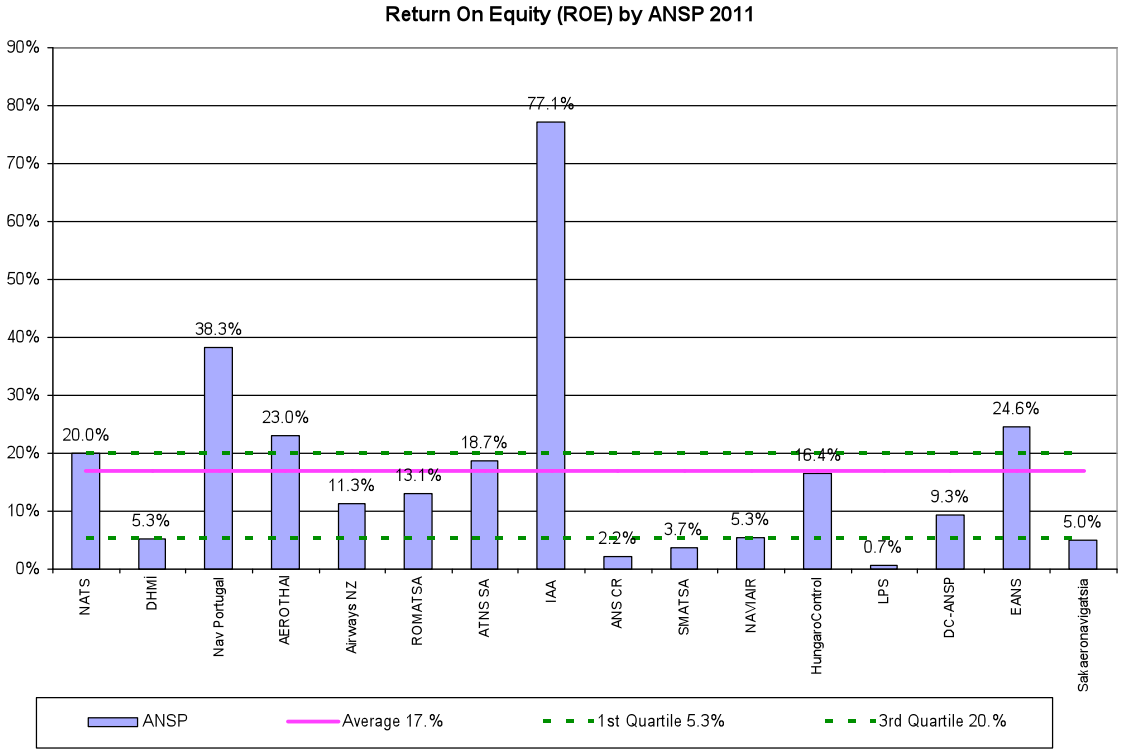


**Figure 8-18: Return On Equity (ROE) by ANSP 2011**

The chart below shows the measure of how well a company used reinvested earnings to generate additional earnings as calculated by dividing Total Equity (Annual Average) into Net Income or using the ROE as submitted by the ANSP.




# Part B

# CANSO Global ANS Performance Report 2012

# 2007-2011 Air Navigation Service Provider (ANSP) Performance Results

# Trend of 2007-2011 Results

# 9. Part B: KPI Analysis and Performance Results – Trend of 2007-2011 Results

Any ANSP that did not provide three years of data was excluded from trend reports. ANSPs are indexed based on their 2007 data; however, if 2007 data was not available, they are indexed using the first available year for all ANSPs within the group. For this year's report this affects the ANSPs reporting in Group C.

In addition, the averages of the annual percentage changes are reported in the tables in Part B. Also the vertical axis ranges on the trend graphics have been held constant across all groups for each KPI. This allows for a comparison across groups.

The global economic downturn at the end of calendar year 2008 and subsequent recession of 2009 resulted in lower air traffic volume, and it impacted KPI results. The impact of the economic downturn may reflect differently across ANSPs, depending on the timing of their fiscal years.

## 9.1. Continental KPI Results

**Figure 9-1: Focus Areas and Indicators**

| Focus Areas | Key Performance Indicators | |
|---|---|---|
| 9.1.1 Productivity | IFR Flight Hours per ATCO in Operations (Continental) | Page 48 |
| 9.1.2 Cost-Effectiveness | Cost (USD) per IFR Flight Hour (Continental) | Page 52 |
| | Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) | Page 55 |
| | Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) | Page 60 |
| 9.1.3 Price, Revenue, and Profitability | Example Consolidated Price (USD) per 1000 km Flight for A320 | Page 63 |
| | ANS Revenue (USD) per IFR Flight Hour (Continental) | Page 66 |

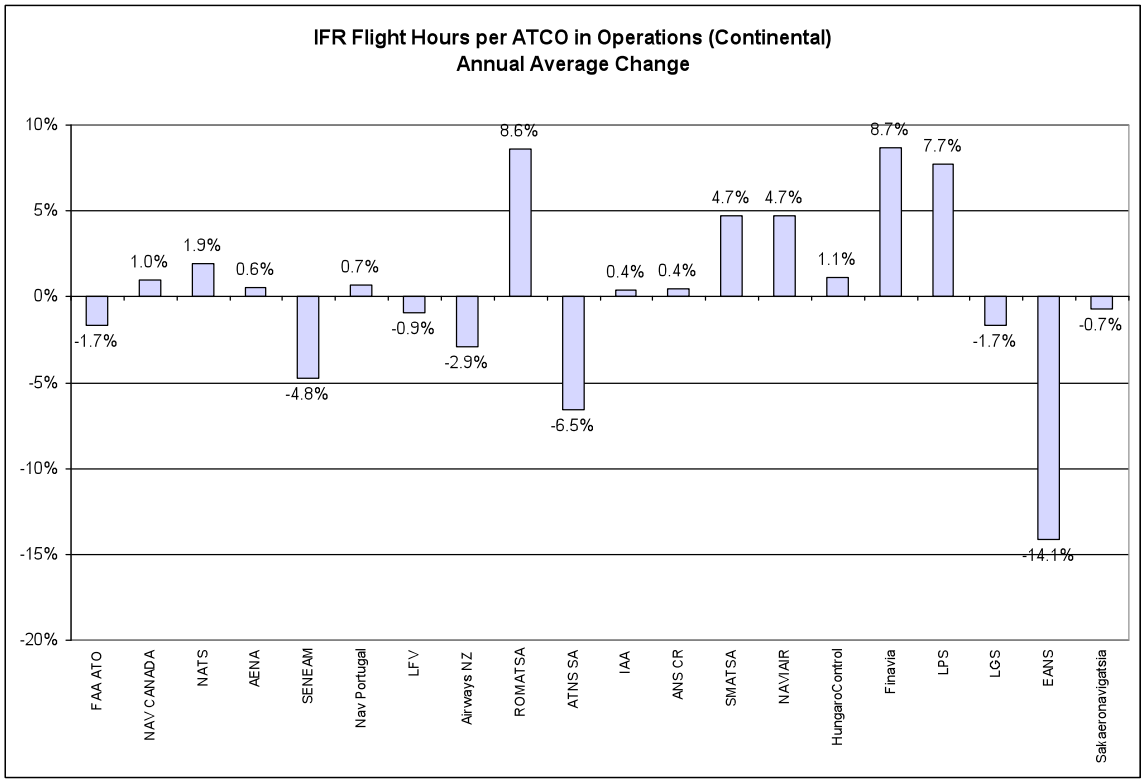
### 9.1.1. Productivity

**Figure 9-2: IFR Flight Hours per ATCO in Operations (Continental) by ANSP**

| IFR Flight Hours per ATCO in Operations (Continental) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | 1,934 | 1,995 | 1,882 | 1,902 | 1,800 | -1.7% |
| NAV CANADA | A | 1,624 | 1,733 | 1,631 | 1,613 | 1,683 | 1.0% |
| NATS | A | 1,028 | 1,092 | 948 | 922 | 1,081 | 1.9% |
| AENA | A | 740 | 720 | 649 | 730 | 748 | 0.6% |
| SENEAM | A | 1,653 | 1,529 | 1,350 | 1,394 | 1,351 | -4.8% |
| Nav Portugal | B | 1,397 | 1,418 | 1,290 | 1,275 | 1,422 | 0.7% |
| LFV | B | 812 | 881 | 784 | 767 | 775 | -0.9% |
| Airways NZ | B | 814 | 872 | 802 | 747 | 718 | -2.9% |
| ROMATSA | B | 498 | 523 | 520 | 652 | 681 | 8.6% |
| ATNS SA | B | 1,161 | 1,128 | 1,080 | 969 | 884 | -6.5% |
| IAA | B | 1,245 | 1,269 | 1,124 | 1,210 | 1,250 | 0.4% |
| ANS CR | C | 1,194 | 1,240 | 1,186 | 1,223 | 1,213 | 0.4% |
| SMATSA | C | 764 | 927 | 928 | 934 | 904 | 4.7% |
| NAVIAIR | C | 943 | 1,158 | 1,045 | 1,066 | 1,106 | 4.7% |
| HungaroControl | C | 1,072 | 1,103 | 1,144 | 1,151 | 1,119 | 1.1% |
| Finavia | C | | | 559 | 591 | 660 | 8.7% |
| LPS | D | 658 | 715 | 689 | 824 | 875 | 7.7% |
| LGS | D | 1,022 | 1,052 | 834 | 790 | 918 | -1.7% |
| EANS | D | 1,792 | 1,647 | 1,326 | 1,046 | 964 | -14.1% |
| Sakaeronavigatsia | D | 376 | 362 | 347 | 384 | 363 | -0.7% |

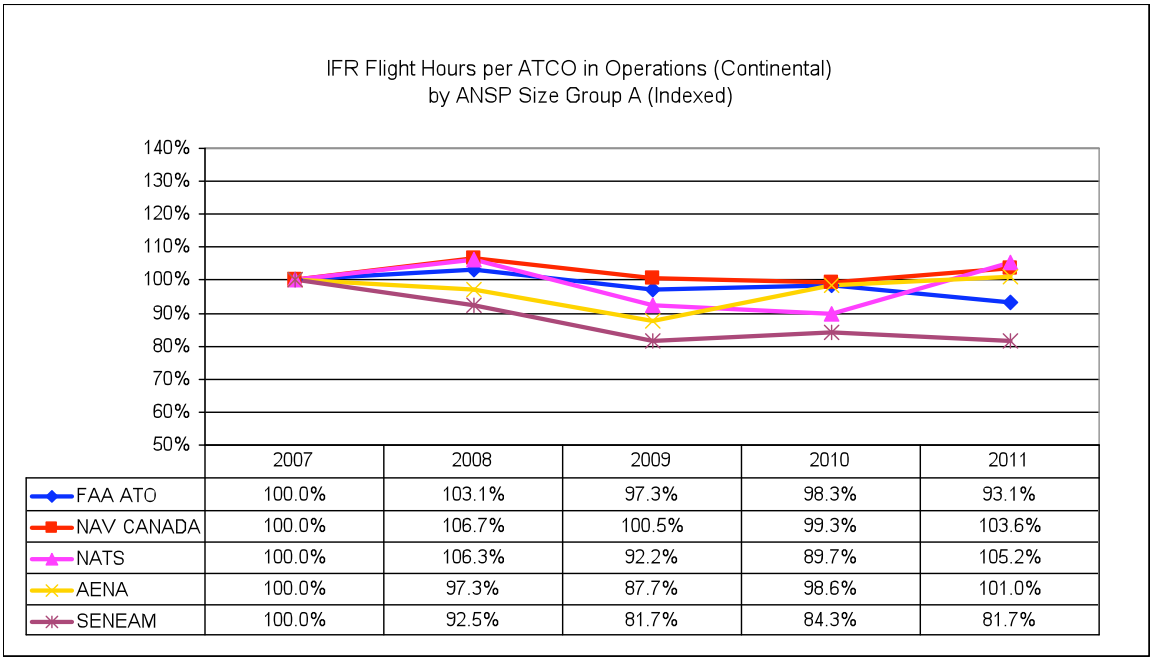
IFR Flight Hours per ATCO in Operations (Continental) appear to show an economy of scale with those ANSPs with the most flight hours yielding the highest results.

**Figure 9-3: IFR Flight Hours per ATCO in Operations (Continental) Average Annual Change**




The average annual change represents the average of changes within the results year over year.

## Figure 9-4: IFR Flight Hours per ATCO in Operations (Continental) by ANSP Size Grouping A (Indexed)

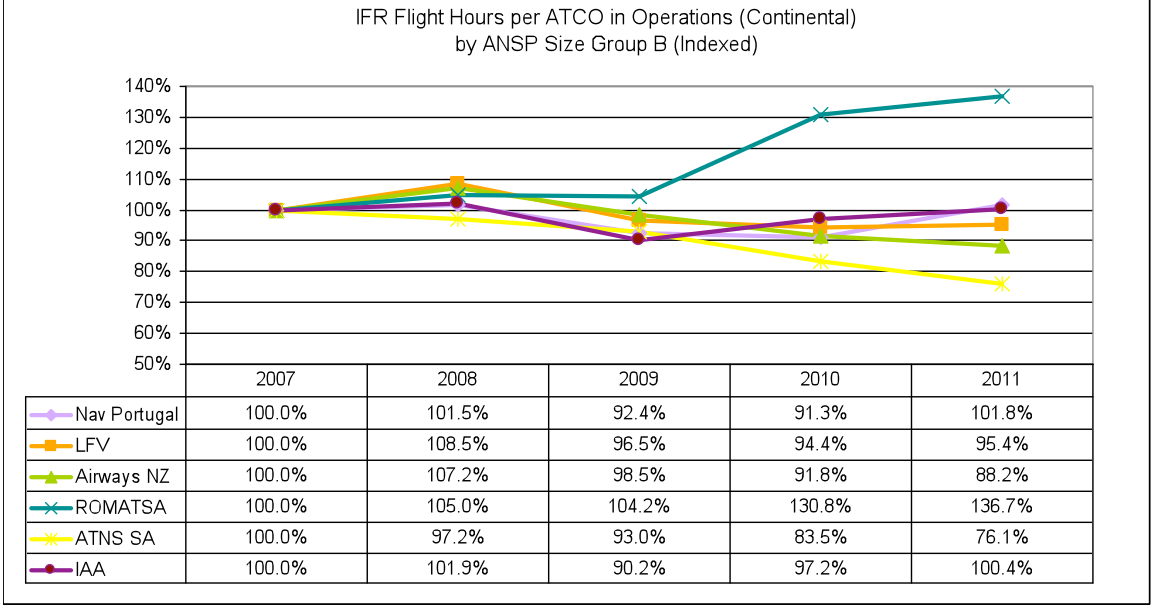



| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 103.1% | 97.3% | 98.3% | 93.1% |
| NAV CANADA | 100.0% | 106.7% | 100.5% | 99.3% | 103.6% |
| NATS | 100.0% | 106.3% | 92.2% | 89.7% | 105.2% |
| AENA | 100.0% | 97.3% | 87.7% | 98.6% | 101.0% |
| SENEAM | 100.0% | 92.5% | 81.7% | 84.3% | 81.7% |

The FAA saw a decrease in this KPI due to the increase in fully certified ATCOs (who were hired in 2008) in Operations by almost 5% combined with a slight decrease in flight hours.

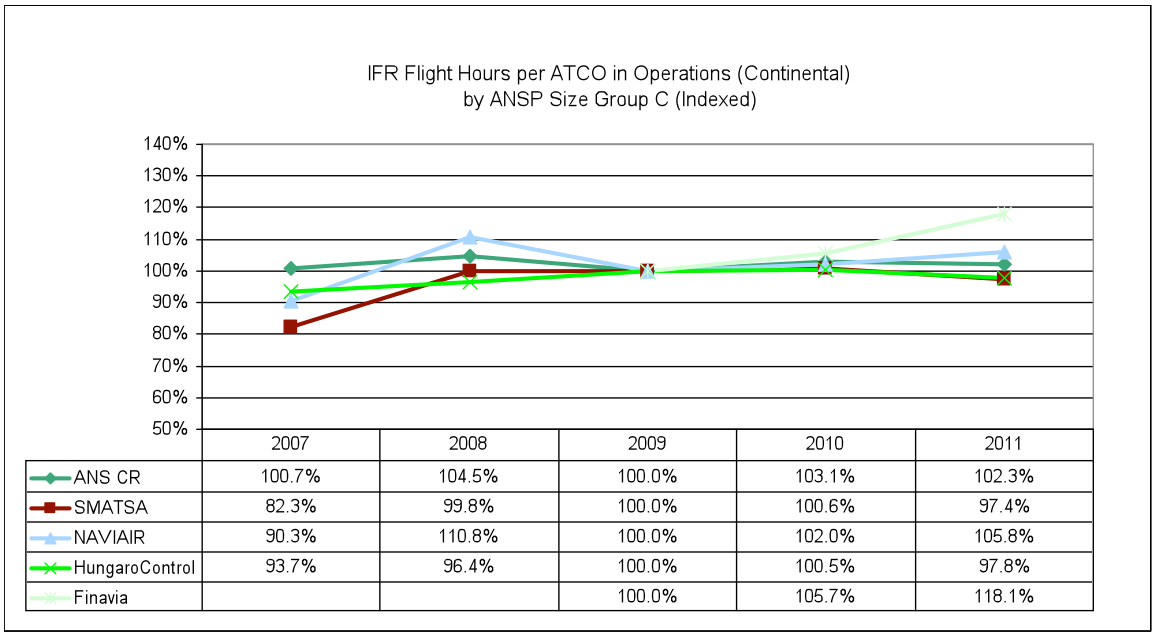
The increase in IFR flight hours per ATCO in Operations for NATS (UK) was due to a combination of increased flight hours and a reduction in ATCO numbers

## Figure 9-5: IFR Flight Hours per ATCO in Operations (Continental) by ANSP Size Grouping B (Indexed)



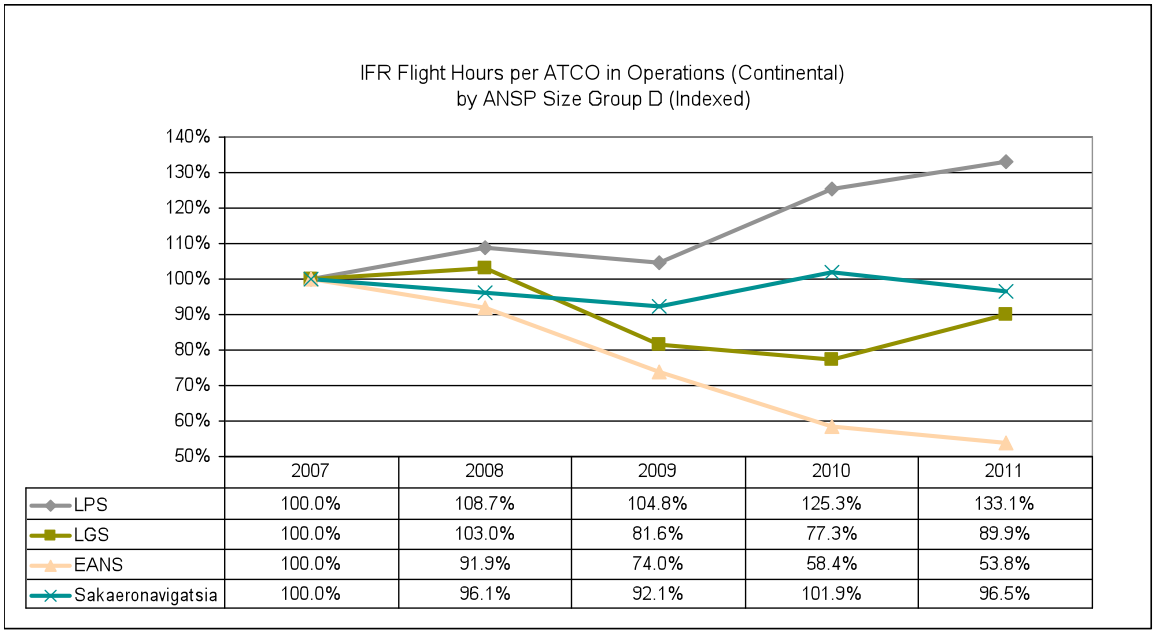

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Nav Portugal | 100.0% | 101.5% | 92.4% | 91.3% | 101.8% |
| LFV | 100.0% | 108.5% | 96.5% | 94.4% | 95.4% |
| Airways NZ | 100.0% | 107.2% | 98.5% | 91.8% | 88.2% |
| ROMATSA | 100.0% | 105.0% | 104.2% | 130.8% | 136.7% |
| ATNS SA | 100.0% | 97.2% | 93.0% | 83.5% | 76.1% |
| IAA | 100.0% | 101.9% | 90.2% | 97.2% | 100.4% |

**Figure 9-6: IFR Flight Hours per ATCO in Operations (Continental) by ANSP Size Grouping C (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| ANS CR | 100.7% | 104.5% | 100.0% | 103.1% | 102.3% |
| SMATSA | 82.3% | 99.8% | 100.0% | 100.6% | 97.4% |
| NAVIAIR | 90.3% | 110.8% | 100.0% | 102.0% | 105.8% |
| HungaroControl | 93.7% | 96.4% | 100.0% | 100.5% | 97.8% |
| Finavia | | | 100.0% | 105.7% | 118.1% |

**Figure 9-7: IFR Flight Hours per ATCO in Operations (Continental) by ANSP Size Grouping D (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| LPS | 100.0% | 108.7% | 104.8% | 125.3% | 133.1% |
| LGS | 100.0% | 103.0% | 81.6% | 77.3% | 89.9% |
| EANS | 100.0% | 91.9% | 74.0% | 58.4% | 53.8% |
| Sakaeronavigatsia | 100.0% | 96.1% | 92.1% | 101.9% | 96.5% |

The increase in productivity for LPS (Slovak Republic) is due to increase in IFR Flight Hours (en route is the driver), while the number of ATCOs in Operations remains almost stable.

For Sakaeronavigatsia Ltd, the relative KPIs have not changed significantly, which is due to the movement of the absolute numbers in each ratio in the same direction. The traffic has increased, but so has the investment, as investing for greater safety quality continued to be one of the priorities of Sakaeronavigatsia Ltd in 2010.

The indicators have been influenced mainly by three aspects; investment in new technologies, increased traffic and strengthening of national currency.

### 9.1.2. Cost-Effectiveness

**Figure 9-8: Cost (USD) per IFR Flight Hour (Continental) by ANSP**

| Cost (USD) per IFR Flight Hour (Continental) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $336 | $363 | $403 | $425 | $433 | 6.6% |
| NAV CANADA | A | $358 | $344 | $344 | $352 | $340 | -1.3% |
| NATS | A | $806 | $739 | $867 | $892 | $1,000 | 6.0% |
| AENA | A | $1,117 | $1,178 | $1,291 | $972 | $910 | -4.0% |
| SENEAM | A | $97 | $108 | $126 | $123 | $125 | 6.9% |
| Nav Portugal | B | $730 | $780 | $763 | $660 | $648 | -2.7% |
| LFV | B | $551 | $542 | $676 | $751 | $744 | 8.3% |
| Airways NZ | B | $323 | $325 | $357 | $378 | $396 | 5.3% |
| ROMATSA | B | $781 | $882 | $905 | $811 | $824 | 1.7% |
| ATNS SA | B | $263 | $282 | $307 | $369 | $434 | 13.5% |
| IAA | B | $542 | $573 | $607 | $647 | $687 | 6.1% |
| ANS CR | C | $743 | $718 | $732 | $735 | $697 | -1.6% |
| SMATSA | C | $581 | $563 | $625 | $710 | $794 | 8.4% |
| NAVIAIR | C | $639 | $725 | $805 | $769 | $802 | 6.1% |
| HungaroControl | C | $412 | $491 | $611 | $756 | $791 | 18.0% |
| Finavia | C | | | $776 | $738 | $691 | -5.6% |
| LPS | D | $706 | $741 | $893 | $872 | $888 | 6.2% |
| LGS | D | $431 | $452 | $498 | $569 | $501 | 4.3% |
| EANS | D | $228 | $262 | $277 | $294 | $285 | 5.9% |
| Sakaeronavigatsia | D | $792 | $849 | $455 | $454 | $615 | -1.0% |

**2007 OANDA Exchange Rates**

The modest (5.3%) rise in Airways New Zealand costs per flight hour was caused by a combination of changes in price and a reduction in IFR flight hours of continental activity.

**Figure 9-9: Cost (USD) per IFR Flight Hour (Continental) Average Annual Change**

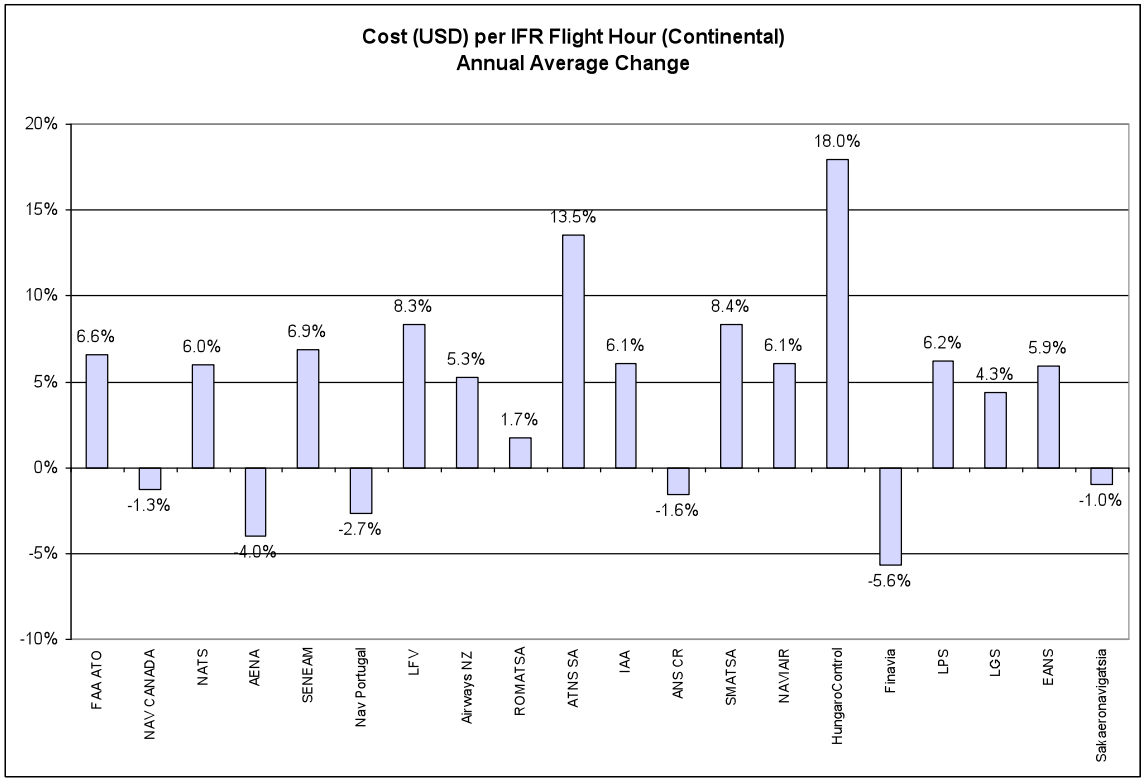
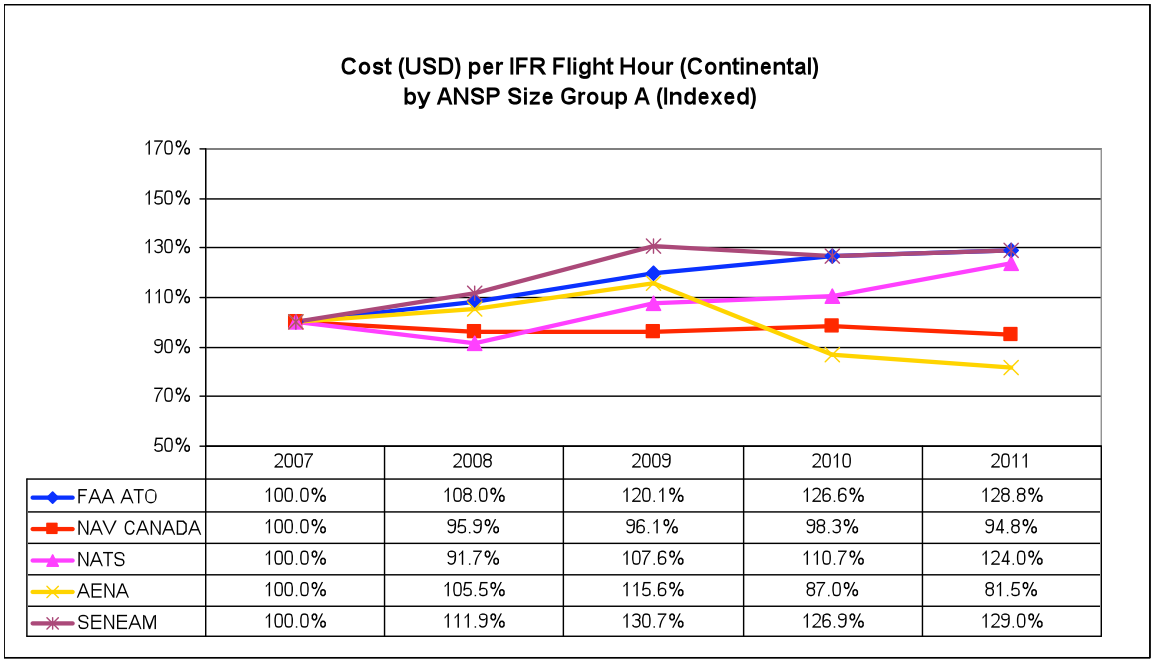



**Figure 9-10: Cost (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping A (Indexed)**

The following charts show the five-year trend evolution of the participant ANSPs. With some exceptions, most of them show a tendency of stability or, in many cases, reduction of the indicator. This tendency could be the result of the implementation of cost containment measures in many ANSPs in reaction to the economic crisis and the traffic downturn that started in 2009.

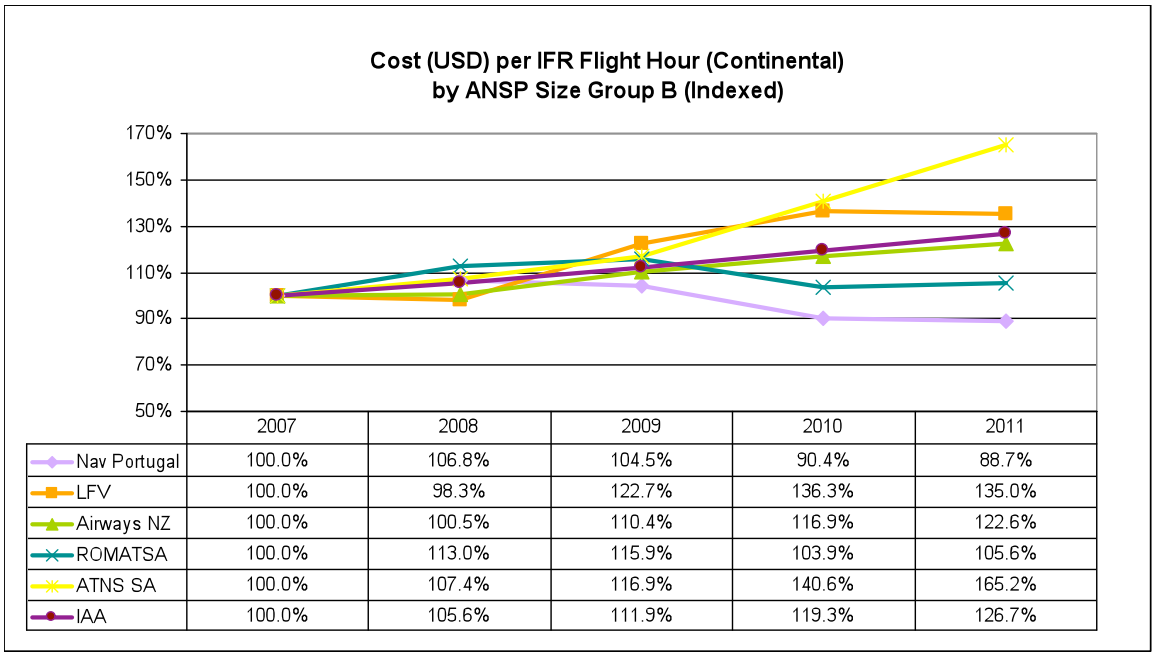



| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 108.0% | 120.1% | 126.6% | 128.8% |
| NAV CANADA | 100.0% | 95.9% | 96.1% | 98.3% | 94.8% |
| NATS | 100.0% | 91.7% | 107.6% | 110.7% | 124.0% |
| AENA | 100.0% | 105.5% | 115.6% | 87.0% | 81.5% |
| SENEAM | 100.0% | 111.9% | 130.7% | 126.9% | 129.0% |

During 2011 AENA (Spain) has maintained a moderated improvement in this KPI.

NAV CANADA has been able to maintain a relatively constant value for this KPI over the course of the past 5 years.

## Figure 9-11: Cost (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping B (Indexed)

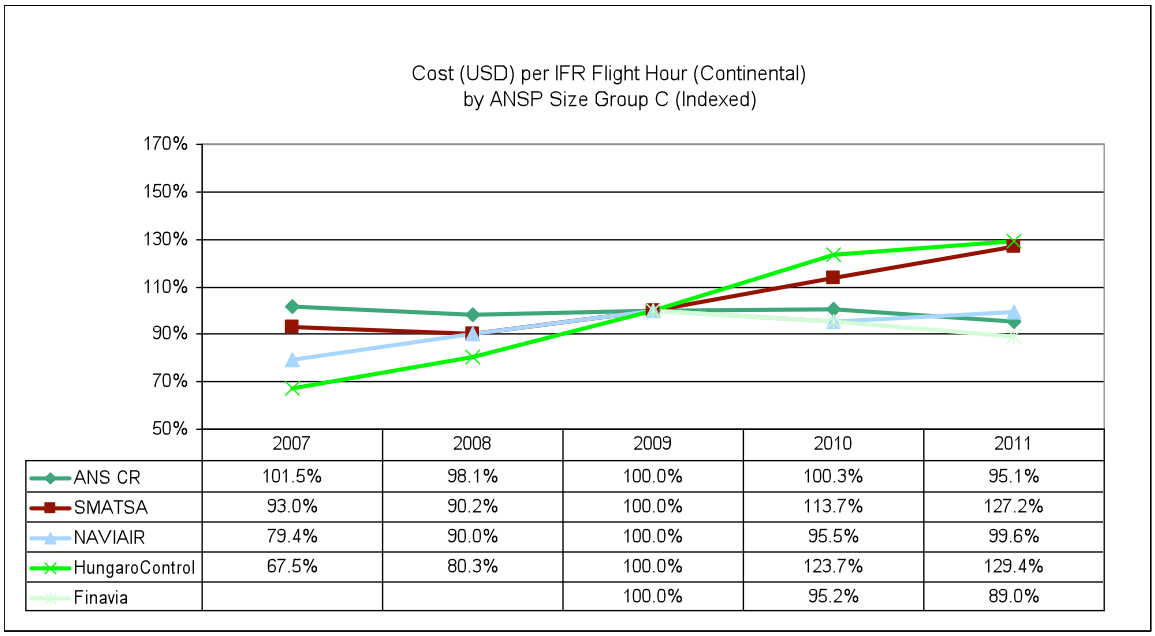



| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Nav Portugal | 100.0% | 106.8% | 104.5% | 90.4% | 88.7% |
| LFV | 100.0% | 98.3% | 122.7% | 136.3% | 135.0% |
| Airways NZ | 100.0% | 100.5% | 110.4% | 116.9% | 122.6% |
| ROMATSA | 100.0% | 113.0% | 115.9% | 103.9% | 105.6% |
| ATNS SA | 100.0% | 107.4% | 116.9% | 140.6% | 165.2% |
| IAA | 100.0% | 105.6% | 111.9% | 119.3% | 126.7% |

The decrease in 2010 and 2011 costs for NAV Portugal reflects the adopted cost containment measures adopted, in line with the Growth and Stability Programme of the Portuguese Government, namely, freezing wages, progressions and promotions and a very strict control on staff admission.

Increase in costs for ATNS SA is attributed to the increase in employment costs due to introduction of new salary agreements.

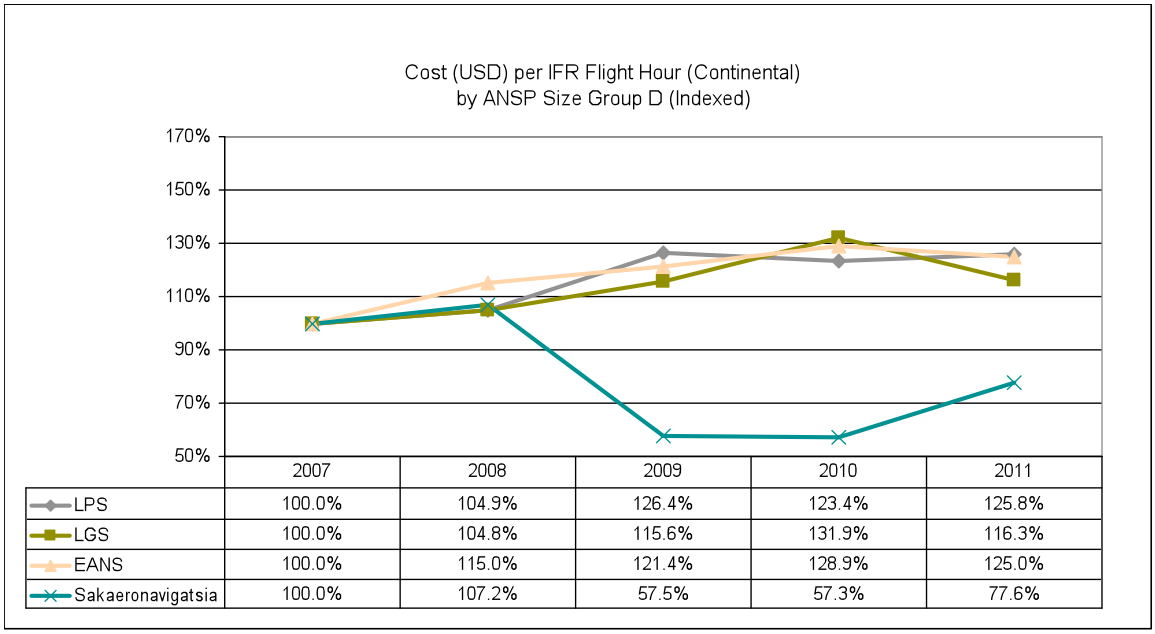
## Figure 9-12: Cost (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping C (Indexed)




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| ANS CR | 101.5% | 98.1% | 100.0% | 100.3% | 95.1% |
| SMATSA | 93.0% | 90.2% | 100.0% | 113.7% | 127.2% |
| NAVIAIR | 79.4% | 90.0% | 100.0% | 95.5% | 99.6% |
| HungaroControl | 67.5% | 80.3% | 100.0% | 123.7% | 129.4% |
| Finavia | | | 100.0% | 95.2% | 89.0% |

The increase of employment costs in 2011 is mainly due to a change in regulations for early retirement, which ceased to be available after 2012. As a result, many more ATCOs (366%) and non-ATCOs (244%) announced retirement in 2011 than was planned. Also the level of early retirement insurance contribution payable by the employer was increased from 9.72% in 2010 to 13% in 2011.

## Figure 9-13: Cost (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping D (Indexed)



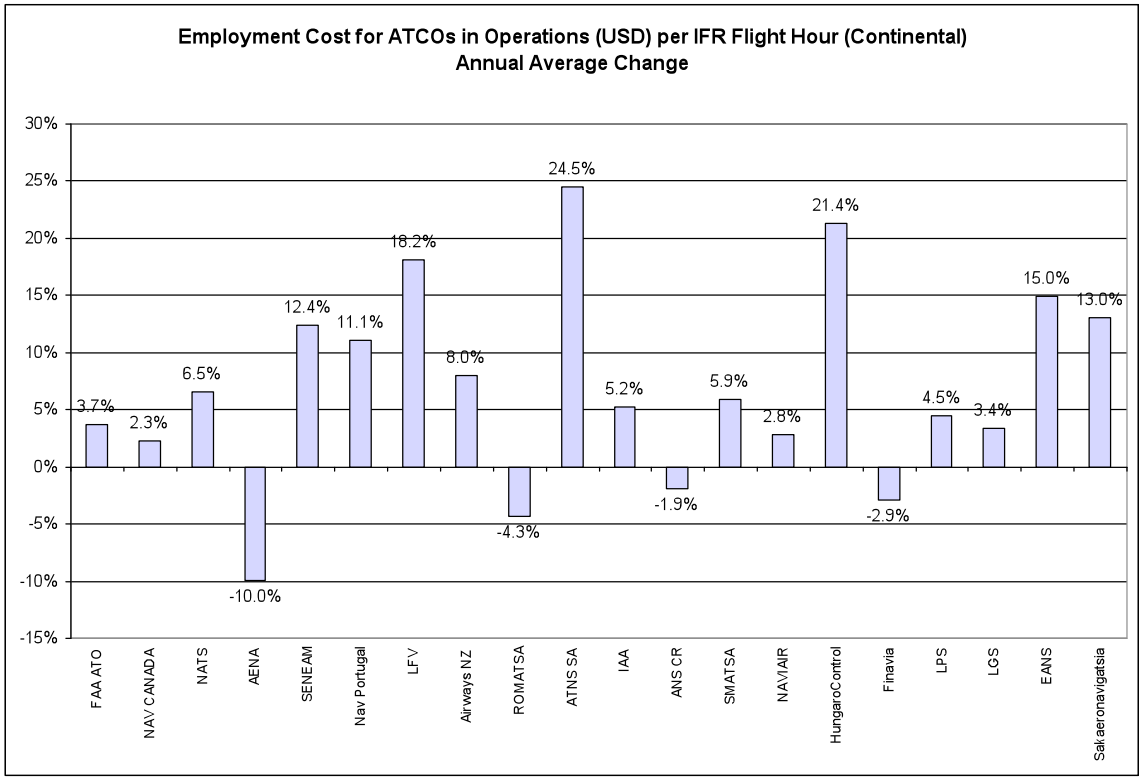

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| LPS | 100.0% | 104.9% | 126.4% | 123.4% | 125.8% |
| LGS | 100.0% | 104.8% | 115.6% | 131.9% | 116.3% |
| EANS | 100.0% | 115.0% | 121.4% | 128.9% | 125.0% |
| Sakaeronavigatsia | 100.0% | 107.2% | 57.5% | 57.3% | 77.6% |

**Figure 9-14: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) by ANSP**

| Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $88 | $86 | $94 | $97 | $102 | 3.7% |
| NAV CANADA | A | $103 | $103 | $111 | $114 | $113 | 2.3% |
| NATS | A | $194 | $186 | $241 | $240 | $243 | 6.5% |
| AENA | A | $657 | $702 | $736 | $445 | $391 | -10.0% |
| SENEAM | A | $25 | $27 | $35 | $35 | $39 | 12.4% |
| Nav Portugal | B | $200 | $240 | $263 | $239 | $296 | 11.1% |
| LFV | B | $159 | $202 | $255 | $261 | $304 | 18.2% |
| Airways NZ | B | $110 | $112 | $129 | $144 | $149 | 8.0% |
| ROMATSA | B | $234 | $239 | $240 | $186 | $191 | -4.3% |
| ATNS SA | B | $41 | $50 | $60 | $68 | $97 | 24.5% |
| IAA | B | $144 | $156 | $177 | $170 | $175 | 5.2% |
| ANS CR | C | $173 | $145 | $142 | $153 | $157 | -1.9% |
| SMATSA | C | $109 | $100 | $112 | $121 | $135 | 5.9% |
| NAVIAIR | C | $181 | $169 | $232 | $193 | $188 | 2.8% |
| HungaroControl | C | $114 | $124 | $150 | $163 | $239 | 21.4% |
| Finavia | C | | | $246 | $262 | $230 | -2.9% |
| LPS | D | $154 | $146 | $172 | $180 | $181 | 4.5% |
| LGS | D | $65 | $69 | $69 | $73 | $74 | 3.4% |
| EANS | D | $51 | $70 | $70 | $88 | $85 | 15.0% |
| Sakaeronavigatsia | D | $39 | $49 | $51 | $47 | $61 | 13.0% |

**2007 OANDA Exchange Rates**

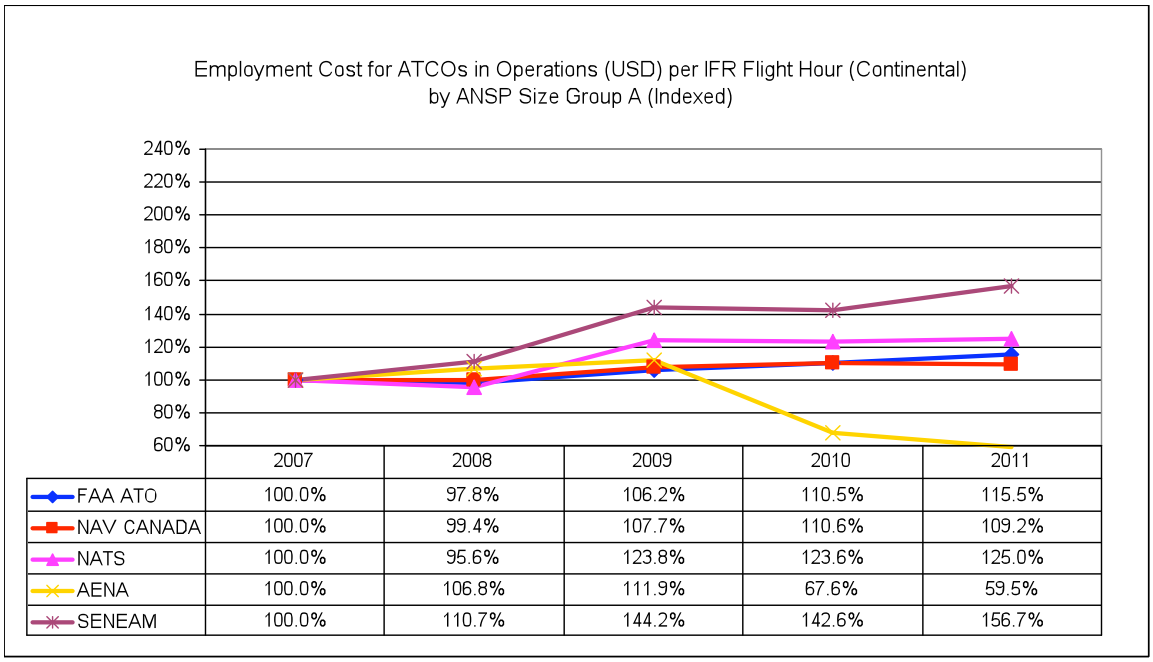
**Figure 9-15: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) Average Annual Change**




ATNS (South Africa) increases in Employment Cost are due, in part, to both increase in staffing levels and restructuring of salary packages.

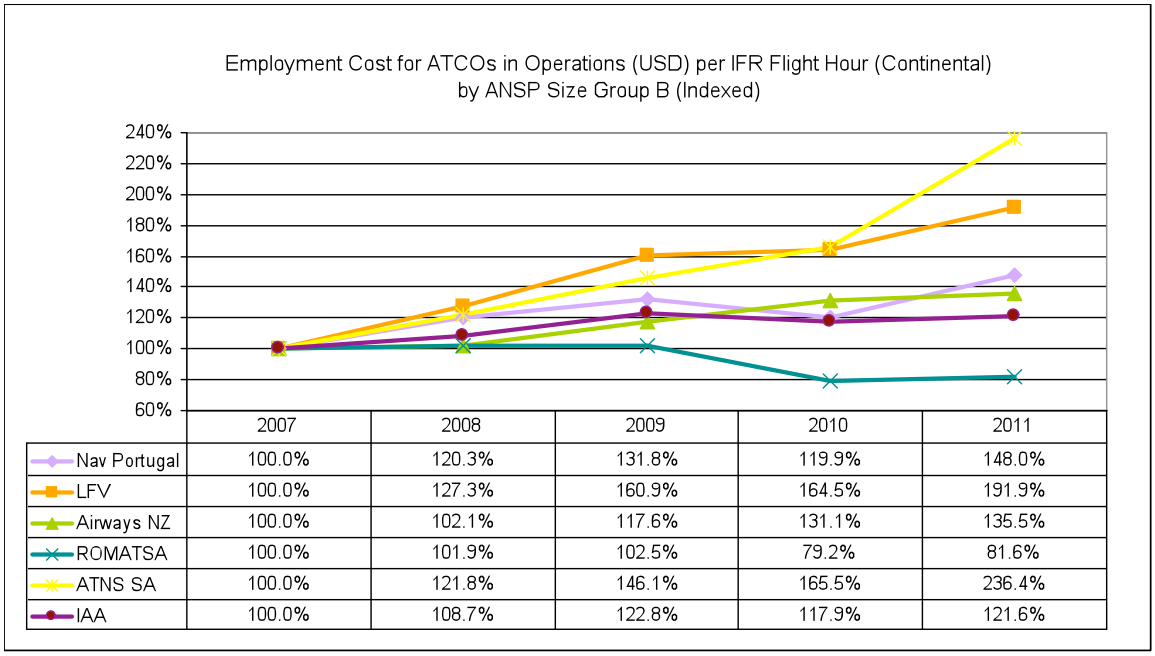
The following charts show the trend evolution along the last five years by groups of ANSPs, according to their volume of traffic.

**Figure 9-16: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping A (Indexed)**



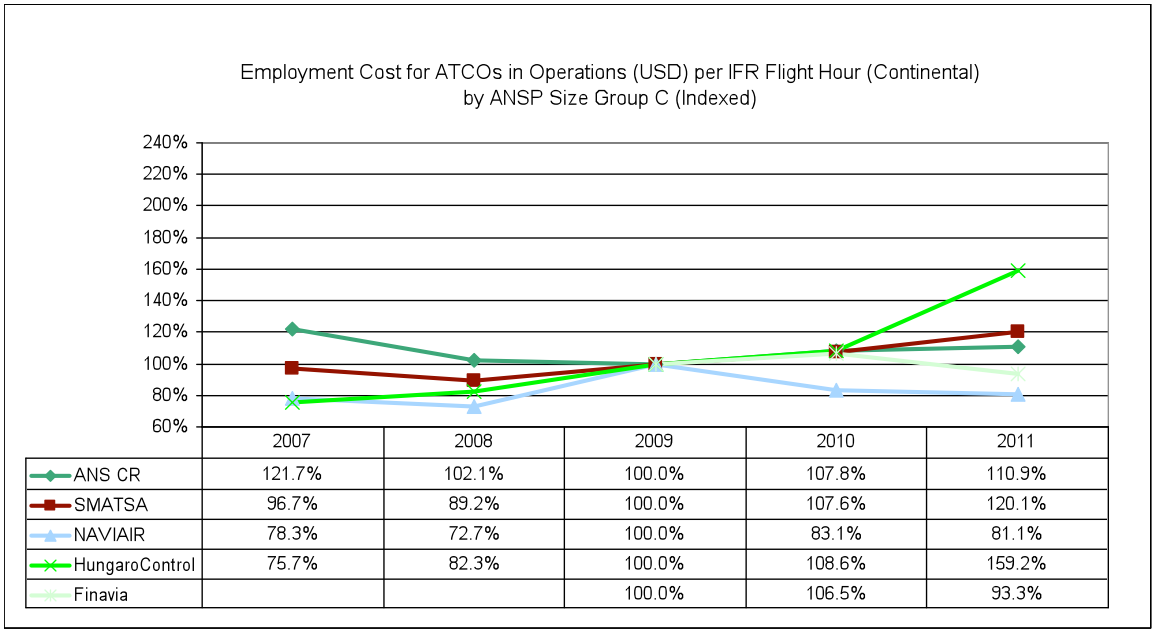

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 97.8% | 106.2% | 110.5% | 115.5% |
| NAV CANADA | 100.0% | 99.4% | 107.7% | 110.6% | 109.2% |
| NATS | 100.0% | 95.6% | 123.8% | 123.6% | 125.0% |
| AENA | 100.0% | 106.8% | 111.9% | 67.6% | 59.5% |
| SENEAM | 100.0% | 110.7% | 144.2% | 142.6% | 156.7% |

**Figure 9-17: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping B (Indexed)**



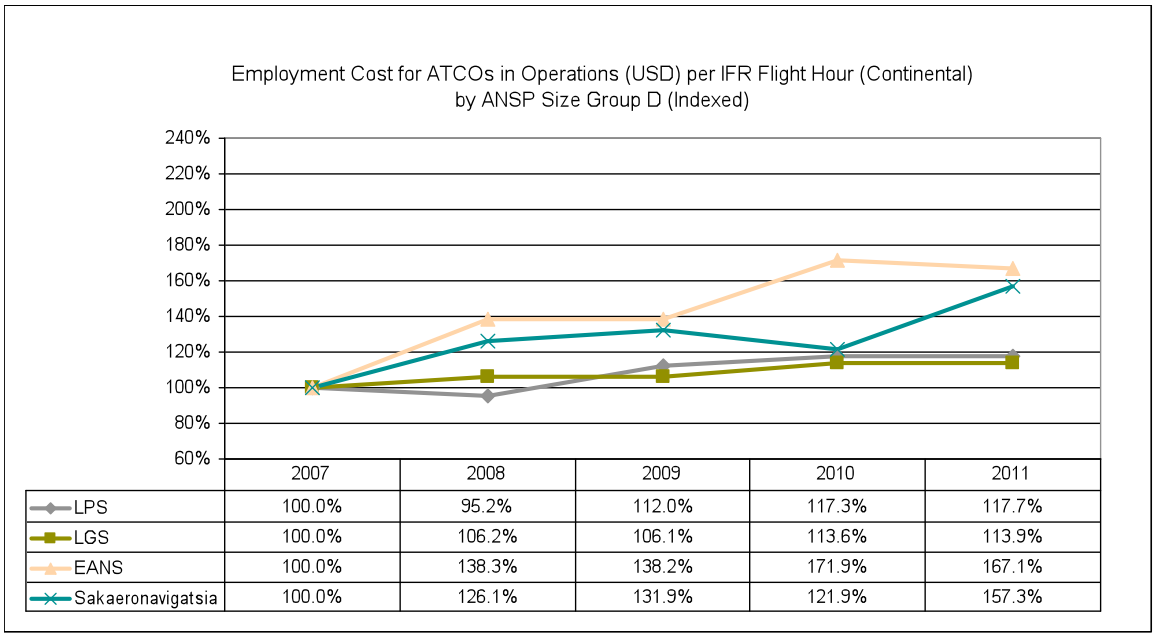

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Nav Portugal | 100.0% | 120.3% | 131.8% | 119.9% | 148.0% |
| LFV | 100.0% | 127.3% | 160.9% | 164.5% | 191.9% |
| Airways NZ | 100.0% | 102.1% | 117.6% | 131.1% | 135.5% |
| ROMATSA | 100.0% | 101.9% | 102.5% | 79.2% | 81.6% |
| ATNS SA | 100.0% | 121.8% | 146.1% | 165.5% | 236.4% |
| IAA | 100.0% | 108.7% | 122.8% | 117.9% | 121.6% |

**Figure 9-18: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping C (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| ANS CR | 121.7% | 102.1% | 100.0% | 107.8% | 110.9% |
| SMATSA | 96.7% | 89.2% | 100.0% | 107.6% | 120.1% |
| NAVIAIR | 78.3% | 72.7% | 100.0% | 83.1% | 81.1% |
| HungaroControl | 75.7% | 82.3% | 100.0% | 108.6% | 159.2% |
| Finavia | | | 100.0% | 106.5% | 93.3% |

**Figure 9-19: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping D (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| LPS | 100.0% | 95.2% | 112.0% | 117.3% | 117.7% |
| LGS | 100.0% | 106.2% | 106.1% | 113.6% | 113.9% |
| EANS | 100.0% | 138.3% | 138.2% | 171.9% | 167.1% |
| Sakaeronavigatsia | 100.0% | 126.1% | 131.9% | 121.9% | 157.3% |

**Figure 9-20: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) applying Purchasing Power Parity (PPP) by ANSP**

| Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) PPP | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $88 | $86 | $94 | $97 | $102 | 3.7% |
| NAV CANADA | A | $84 | $82 | $91 | $92 | $90 | 1.9% |
| NATS | A | $151 | $143 | $184 | $181 | $182 | 5.7% |
| AENA | A | $574 | $612 | $648 | $395 | $350 | -9.5% |
| SENEAM | A | $35 | $47 | $59 | $52 | $62 | 16.6% |
| Nav Portugal | B | $193 | $233 | $256 | $233 | $291 | 11.7% |
| LFV | B | $112 | $141 | $176 | $180 | $213 | 17.9% |
| Airways NZ | B | $91 | $92 | $104 | $113 | $115 | 6.3% |
| ROMATSA | B | $341 | $308 | $300 | $222 | $216 | -10.2% |
| ATNS SA | B | $66 | $76 | $86 | $91 | $123 | 17.3% |
| IAA | B | $97 | $110 | $131 | $130 | $138 | 9.5% |
| ANS CR | C | $221 | $186 | $181 | $201 | $212 | -0.5% |
| SMATSA | C | $184 | $154 | $165 | $165 | $173 | -1.1% |
| NAVIAIR | C | $110 | $100 | $138 | $111 | $110 | 2.1% |
| HungaroControl | C | $148 | $157 | $186 | $198 | $286 | 18.9% |
| Finavia | C | | | $172 | $184 | $159 | -3.2% |
| LPS | D | $187 | $197 | $213 | $224 | $226 | 4.9% |
| LGS | D | $80 | $77 | $79 | $87 | $85 | 1.5% |
| EANS | D | $61 | $80 | $82 | $102 | $99 | 14.0% |
| Sakaeronavigatsia | D | $78 | $92 | $99 | $85 | $103 | 8.1% |

**2007-2011 IMF PPP**

## Figure 9-21: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) by ANSP (in thousands)

| Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) PPP | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $88 | $86 | $94 | $97 | $102 | 3.7% |
| NAV CANADA | A | $84 | $82 | $91 | $92 | $90 | 1.9% |
| NATS | A | $151 | $143 | $184 | $181 | $182 | 5.7% |
| AENA | A | $574 | $612 | $648 | $395 | $350 | -9.5% |
| SENEAM | A | $35 | $47 | $59 | $52 | $62 | 16.6% |
| Nav Portugal | B | $193 | $233 | $256 | $233 | $291 | 11.7% |
| LFV | B | $112 | $141 | $176 | $180 | $213 | 17.9% |
| Airways NZ | B | $91 | $92 | $104 | $113 | $115 | 6.3% |
| ROMATSA | B | $341 | $308 | $300 | $222 | $216 | -10.2% |
| ATNS SA | B | $66 | $76 | $86 | $91 | $123 | 17.3% |
| IAA | B | $97 | $110 | $131 | $130 | $138 | 9.5% |
| ANS CR | C | $221 | $186 | $181 | $201 | $212 | -0.5% |
| SMATSA | C | $184 | $154 | $165 | $165 | $173 | -1.1% |
| NAVIAIR | C | $110 | $100 | $138 | $111 | $110 | 2.1% |
| HungaroControl | C | $148 | $157 | $186 | $198 | $286 | 18.9% |
| Finavia | C | | | $172 | $184 | $159 | -3.2% |
| LPS | D | $187 | $197 | $213 | $224 | $226 | 4.9% |
| LGS | D | $80 | $77 | $79 | $87 | $85 | 1.5% |
| EANS | D | $61 | $80 | $82 | $102 | $99 | 14.0% |
| Sakaeronavigatsia | D | $78 | $92 | $99 | $85 | $103 | 8.1% |

**2007-2011 IMF PPP**

## Figure 9-22: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) Average Annual Change

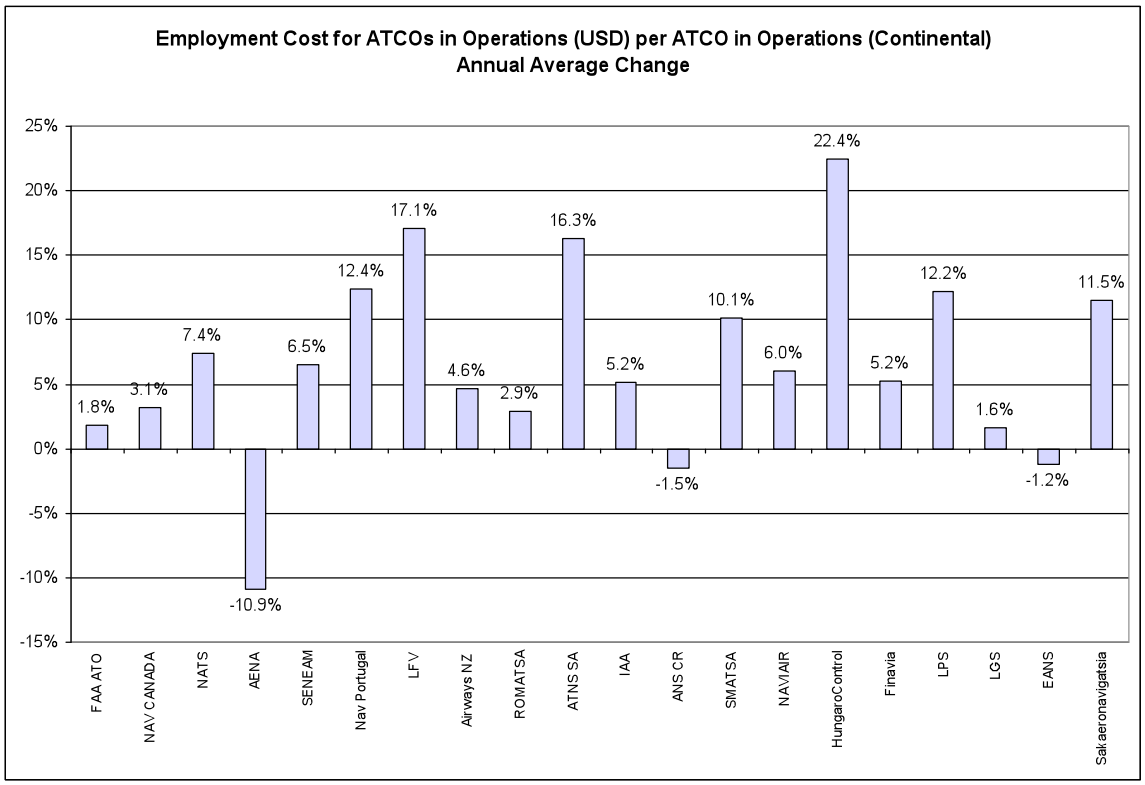
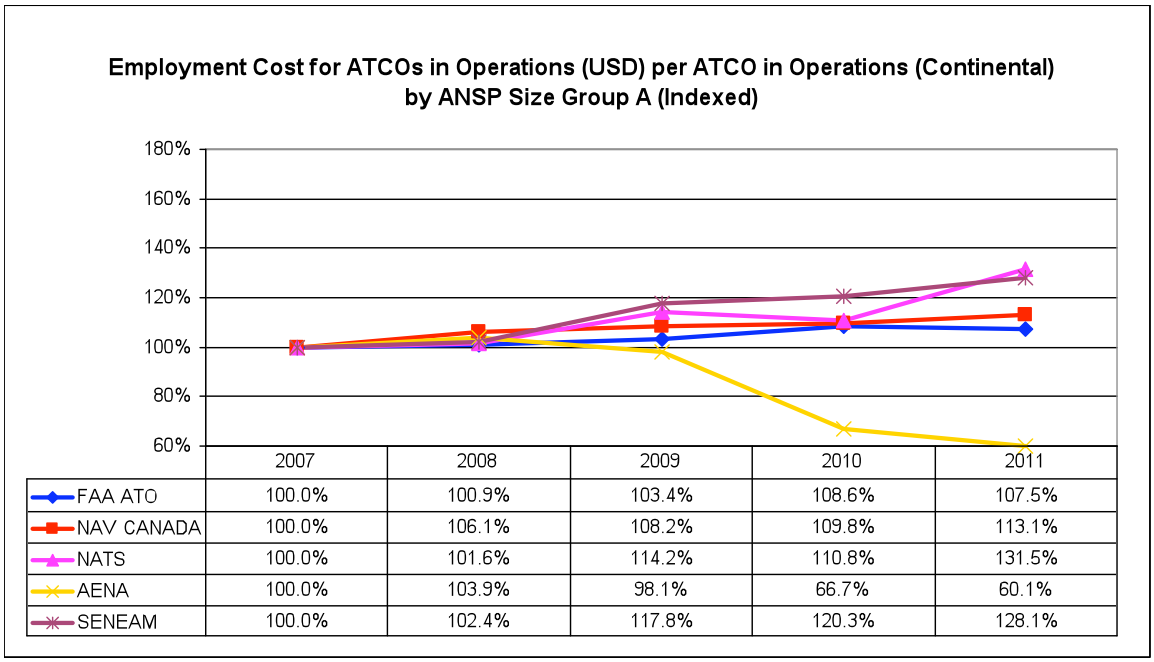
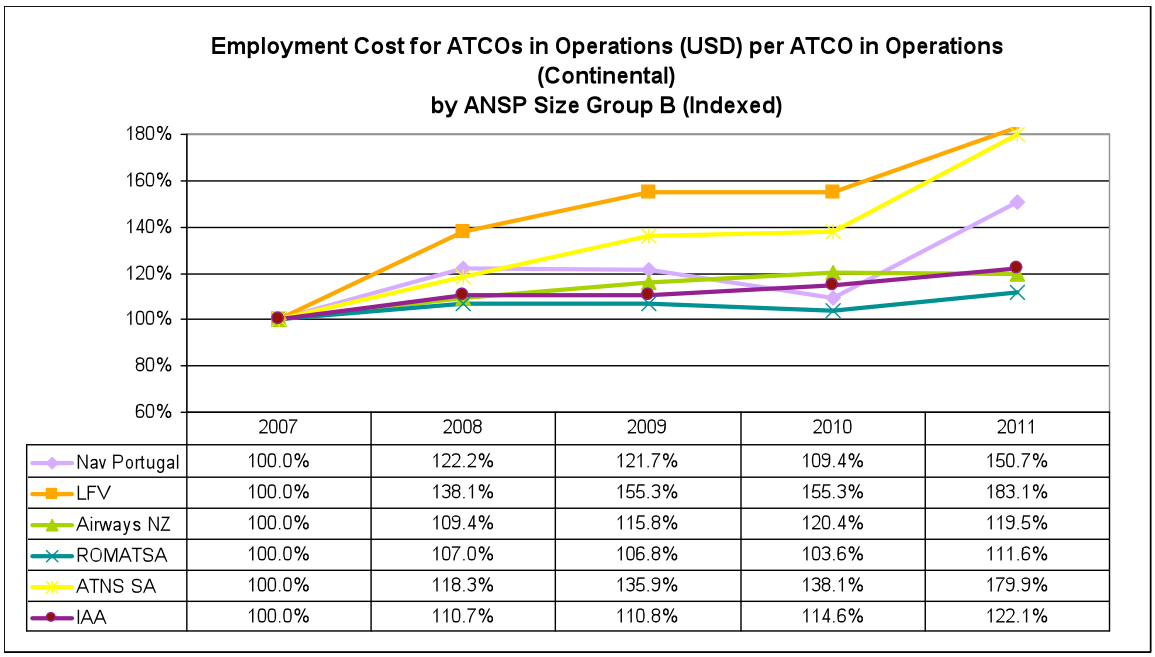


**Figure 9-23: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) by ANSP Size Grouping A (Indexed)**



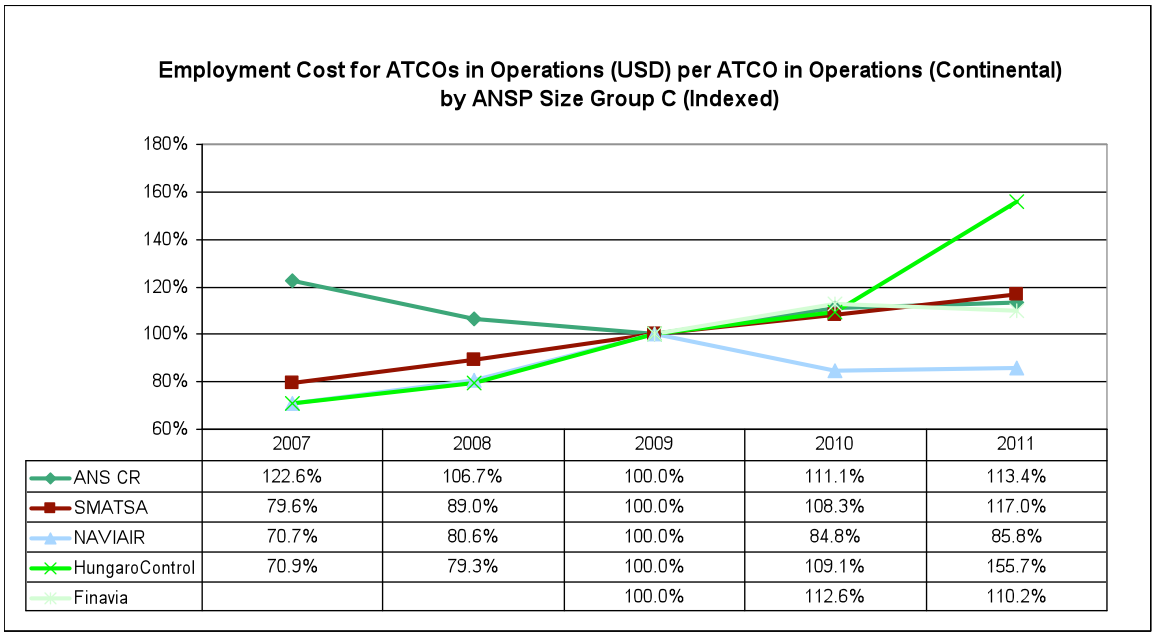

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 100.9% | 103.4% | 108.6% | 107.5% |
| NAV CANADA | 100.0% | 106.1% | 108.2% | 109.8% | 113.1% |
| NATS | 100.0% | 101.6% | 114.2% | 110.8% | 131.5% |
| AENA | 100.0% | 103.9% | 98.1% | 66.7% | 60.1% |
| SENEAM | 100.0% | 102.4% | 117.8% | 120.3% | 128.1% |

**Figure 9-24: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) by ANSP Size Grouping B (Indexed)**



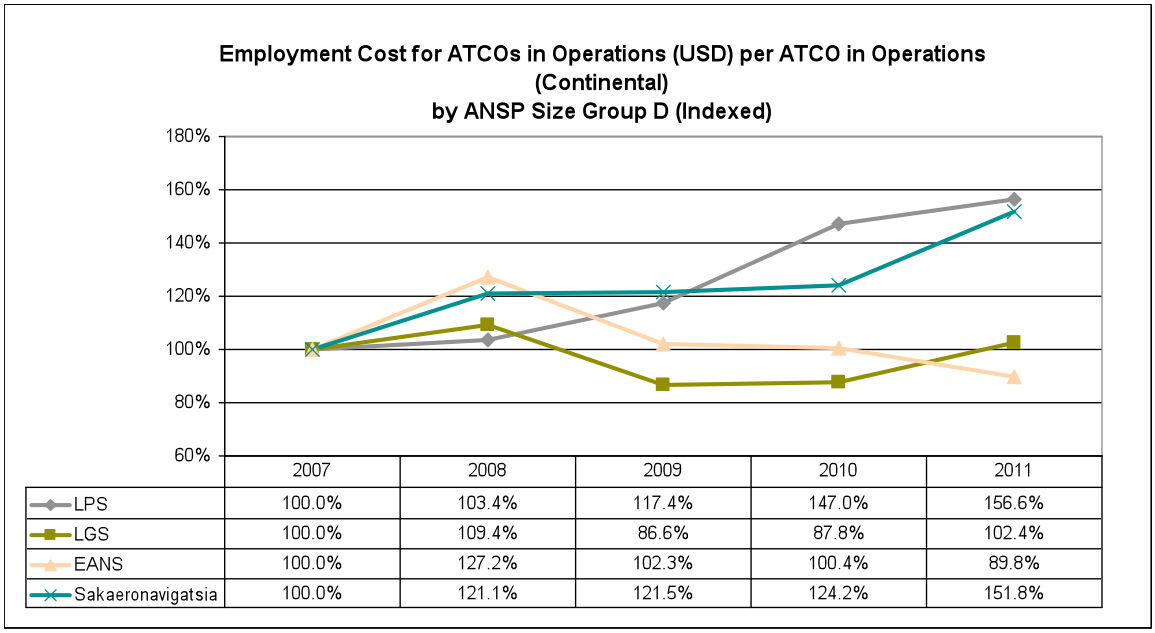

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Nav Portugal | 100.0% | 122.2% | 121.7% | 109.4% | 150.7% |
| LFV | 100.0% | 138.1% | 155.3% | 155.3% | 183.1% |
| Airways NZ | 100.0% | 109.4% | 115.8% | 120.4% | 119.5% |
| ROMATSA | 100.0% | 107.0% | 106.8% | 103.6% | 111.6% |
| ATNS SA | 100.0% | 118.3% | 135.9% | 138.1% | 179.9% |
| IAA | 100.0% | 110.7% | 110.8% | 114.6% | 122.1% |

**Figure 9-25: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) by ANSP Size Grouping C (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| ANS CR | 122.6% | 106.7% | 100.0% | 111.1% | 113.4% |
| SMATSA | 79.6% | 89.0% | 100.0% | 108.3% | 117.0% |
| NAVIAIR | 70.7% | 80.6% | 100.0% | 84.8% | 85.8% |
| HungaroControl | 70.9% | 79.3% | 100.0% | 109.1% | 155.7% |
| Finavia | | | 100.0% | 112.6% | 110.2% |

**Figure 9-26: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) by ANSP Size Grouping D (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| LPS | 100.0% | 103.4% | 117.4% | 147.0% | 156.6% |
| LGS | 100.0% | 109.4% | 86.6% | 87.8% | 102.4% |
| EANS | 100.0% | 127.2% | 102.3% | 100.4% | 89.8% |
| Sakaeronavigatsia | 100.0% | 121.1% | 121.5% | 124.2% | 151.8% |

**Figure 9-27: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) applying Purchasing Power Parity (PPP) by ANSP (in thousands)**

| Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) PPP | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $171 | $172 | $176 | $185 | $183 | 1.8% |
| NAV CANADA | A | $136 | $142 | $149 | $149 | $151 | 2.7% |
| NATS | A | $155 | $156 | $174 | $166 | $197 | 6.6% |
| AENA | A | $425 | $441 | $421 | $288 | $262 | -10.4% |
| SENEAM | A | $58 | $72 | $79 | $72 | $84 | 10.2% |
| Nav Portugal | B | $269 | $331 | $330 | $297 | $414 | 13.0% |
| LFV | B | $91 | $124 | $138 | $138 | $165 | 16.9% |
| Airways NZ | B | $74 | $80 | $83 | $84 | $83 | 2.9% |
| ROMATSA | B | $170 | $161 | $156 | $144 | $147 | -3.5% |
| ATNS SA | B | $77 | $86 | $93 | $88 | $109 | 9.5% |
| IAA | B | $121 | $140 | $147 | $158 | $173 | 9.5% |
| ANS CR | C | $264 | $231 | $214 | $245 | $258 | -0.1% |
| SMATSA | C | $140 | $142 | $153 | $154 | $156 | 2.7% |
| NAVIAIR | C | $103 | $116 | $144 | $119 | $122 | 5.3% |
| HungaroControl | C | $158 | $173 | $213 | $228 | $320 | 20.0% |
| Finavia | C | | | $96 | $109 | $105 | 4.9% |
| LPS | D | $123 | $141 | $147 | $184 | $198 | 12.9% |
| LGS | D | $82 | $81 | $66 | $69 | $78 | -0.6% |
| EANS | D | $109 | $132 | $109 | $107 | $95 | -2.1% |
| Sakaeronavigatsia | D | $29 | $33 | $34 | $33 | $37 | 6.5% |

**2007-2011 IMF PPP**

### 9.1.3. Price, Revenue, and Profitability

**Figure 9-28: Example Consolidated Price (USD) per 1000 km Flight for A320 by ANSP**

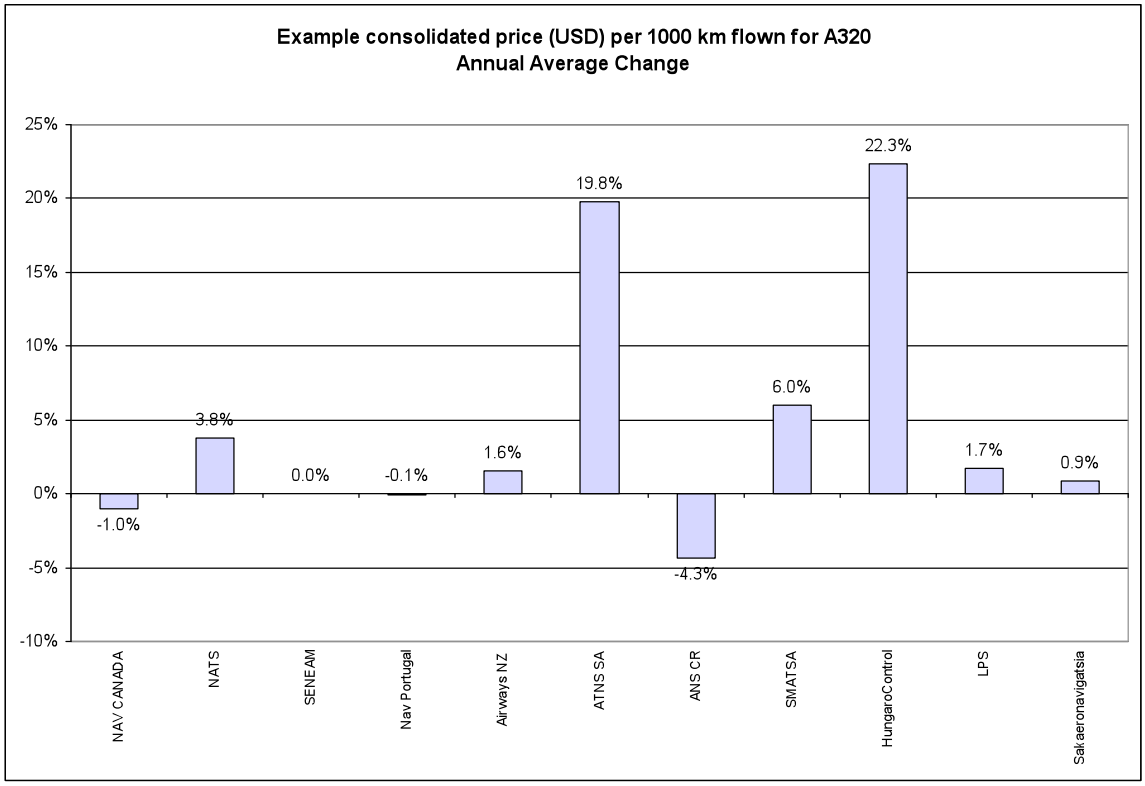
| Example consolidated price (USD) per 1000 km flown for A320 | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| NAV CANADA | A | $1,107 | $1,063 | $1,063 | $1,063 | $1,063 | -1.0% |
| NATS | A | $1,454 | $1,364 | $1,486 | $1,558 | $1,674 | 3.8% |
| SENEAM | A | $317 | $308 | $308 | $319 | $317 | 0.0% |
| Nav Portugal | B | $1,169 | $1,143 | $1,160 | $1,191 | $1,163 | -0.1% |
| Airways NZ | B | $721 | $721 | $767 | $767 | $767 | 1.6% |
| ATNS SA | B | $419 | $435 | $460 | $542 | $823 | 19.8% |
| ANS CR | C | $1,505 | $1,327 | $1,307 | $1,301 | $1,254 | -4.3% |
| SMATSA | C | $1,081 | $1,127 | $1,125 | $1,239 | $1,359 | 6.0% |
| HungaroControl | C | $779 | $1,014 | $1,550 | $1,435 | $1,633 | 22.3% |
| LPS | D | $1,603 | $1,535 | $1,703 | $1,703 | $1,706 | 1.7% |
| Sakaeronavigatsia | D | $470 | $397 | $444 | $477 | $476 | 0.9% |

**2007 OANDA Exchange Rates**

Prices remained unchanged at Airways New Zealand until 1 July 2009 when a 4.15% increase was implemented for the over 5 Tonne aircraft category. This was followed by another overall increase of 3.4% on July 1, 2011, as agreed with customers.

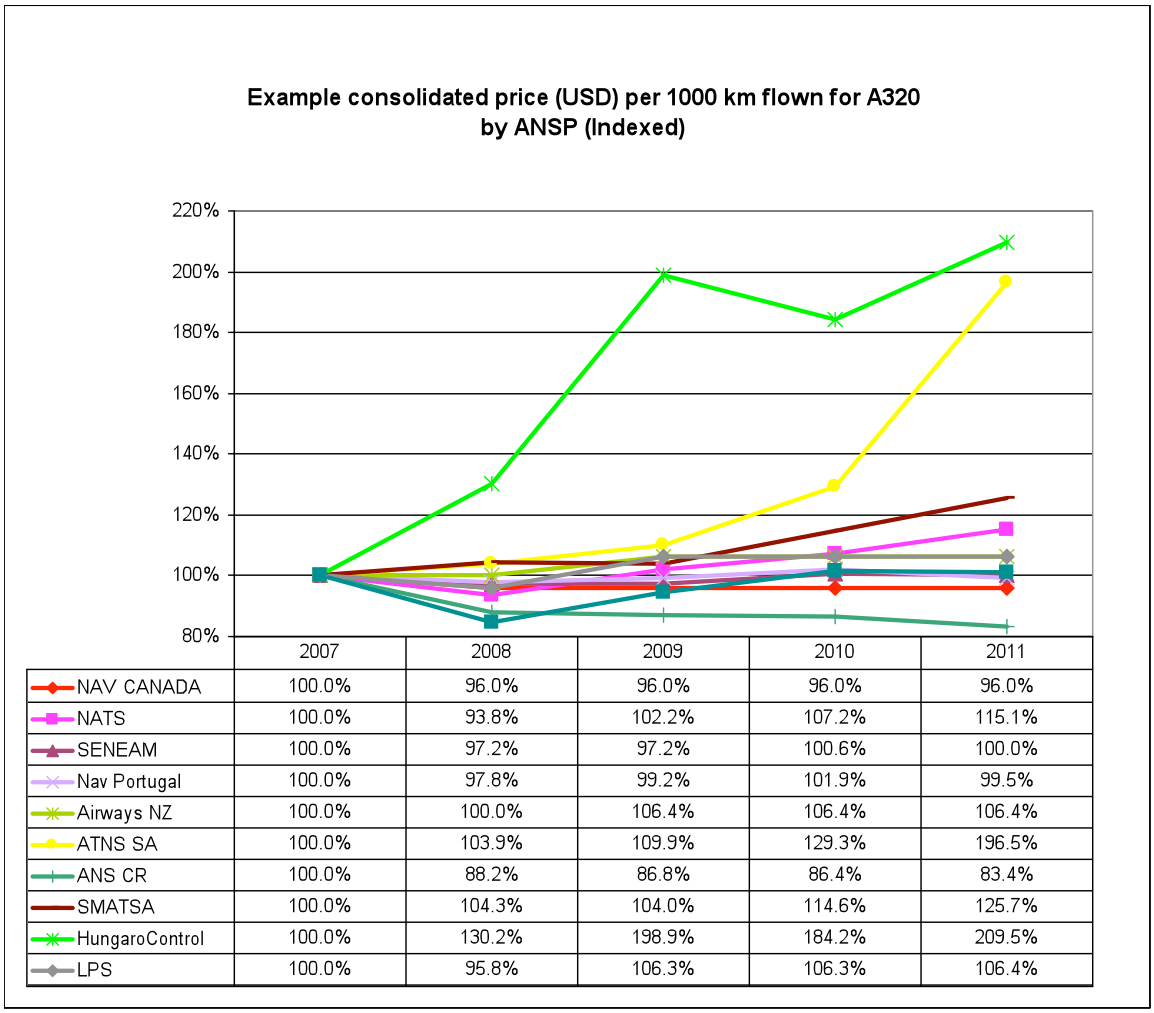
The represented ANSPs who charge for their ANS services do so within the ICAO principles of weight- and distance-based charging.

**Figure 9-29: Example Consolidated Price (USD) per 1000 km Flight for A320 Average Annual Change**




Reduction in NAV CANADA shown in the graph is related to the year 2007. Charges have remained unchanged since September 2008.

**Figure 9-30: Example Consolidated Price (USD) per 1000 km Flight for A320 by ANSP (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| NAV CANADA | 100.0% | 96.0% | 96.0% | 96.0% | 96.0% |
| NATS | 100.0% | 93.8% | 102.2% | 107.2% | 115.1% |
| SENEAM | 100.0% | 97.2% | 97.2% | 100.6% | 100.0% |
| Nav Portugal | 100.0% | 97.8% | 99.2% | 101.9% | 99.5% |
| Airways NZ | 100.0% | 100.0% | 106.4% | 106.4% | 106.4% |
| ATNS SA | 100.0% | 103.9% | 109.9% | 129.3% | 196.5% |
| ANS CR | 100.0% | 88.2% | 86.8% | 86.4% | 83.4% |
| SMATSA | 100.0% | 104.3% | 104.0% | 114.6% | 125.7% |
| HungaroControl | 100.0% | 130.2% | 198.9% | 184.2% | 209.5% |
| LPS | 100.0% | 95.8% | 106.3% | 106.3% | 106.4% |

Prices remained unchanged at Airways New Zealand until July 1, 2009 when a 4.15% increase was implemented for the over 5 Tonne aircraft category.

## Figure 9-31: ANS Revenue (USD) per IFR Flight Hour (Continental) by ANSP

| ANS Revenue (USD) per IFR Flight Hour (Continental) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| NAV CANADA | A | $432 | $420 | $417 | $414 | $415 | -1.0% |
| NATS | A | $939 | $888 | $978 | $1,046 | $1,114 | 4.5% |
| AENA | A | $1,056 | $1,082 | $1,150 | $1,131 | $1,117 | 1.5% |
| SENEAM | A | $109 | $108 | $131 | $126 | $130 | 5.0% |
| Nav Portugal | B | $825 | $796 | $820 | $826 | $781 | -1.3% |
| LFV | B | $551 | $577 | $618 | $654 | $796 | 9.9% |
| Airways NZ | B | $354 | $360 | $369 | $392 | $424 | 4.7% |
| ROMATSA | B | $790 | $971 | $1,085 | $1,074 | $1,049 | 7.8% |
| ATNS SA | B | $316 | $312 | $344 | $399 | $557 | 16.1% |
| IAA | B | $595 | $661 | $719 | $762 | $848 | 9.3% |
| ANS CR | C | $811 | $808 | $808 | $798 | $755 | -1.8% |
| SMATSA | C | $577 | $522 | $542 | $687 | $763 | 8.0% |
| NAVIAIR | C | $791 | $819 | $782 | $834 | $945 | 4.7% |
| HungaroControl | C | $609 | $623 | $675 | $795 | $950 | 12.0% |
| Finavia | C | | | $679 | $617 | $613 | -4.8% |
| LPS | D | $768 | $839 | $957 | $954 | $962 | 6.0% |
| LGS | D | $509 | $445 | $504 | $517 | $493 | -0.3% |
| EANS | D | $389 | $382 | $379 | $367 | $362 | -1.7% |
| Sakaeronavigatsia | D | $495 | $506 | $551 | $623 | $609 | 5.5% |

**2007 OANDA Exchange Rates**

## Figure 9-32: ANS Revenue (USD) per IFR Flight Hour (Continental) Average Annual Change

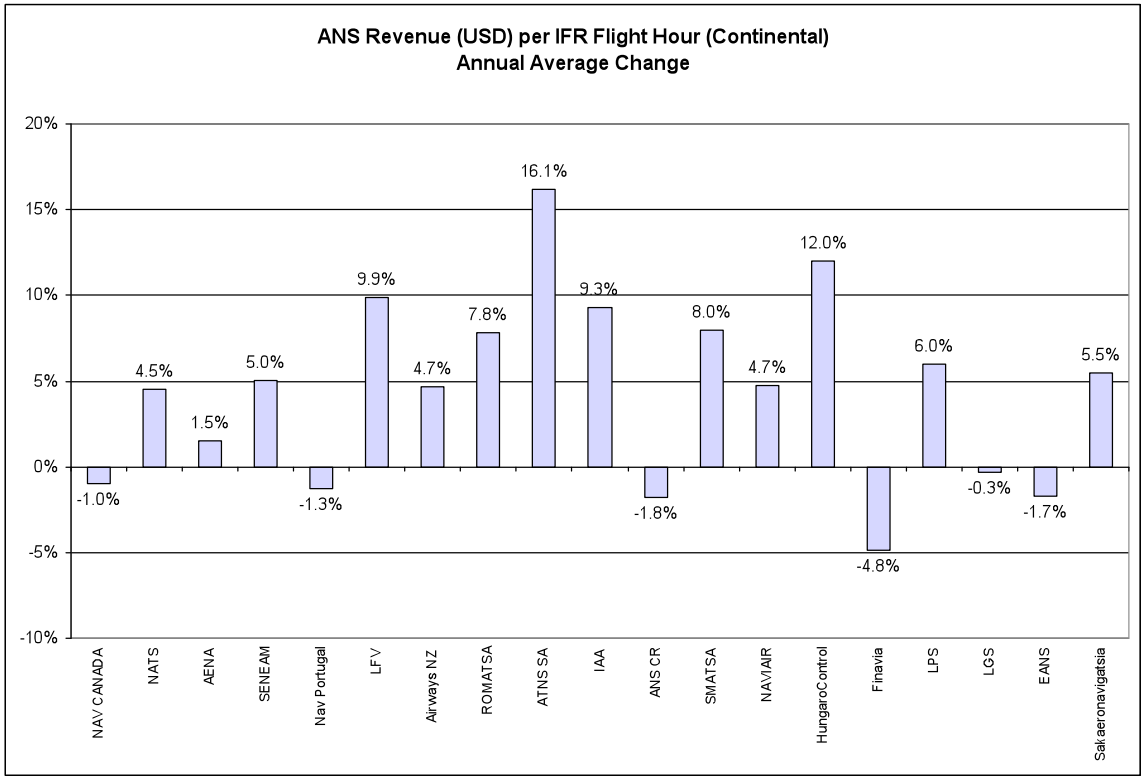
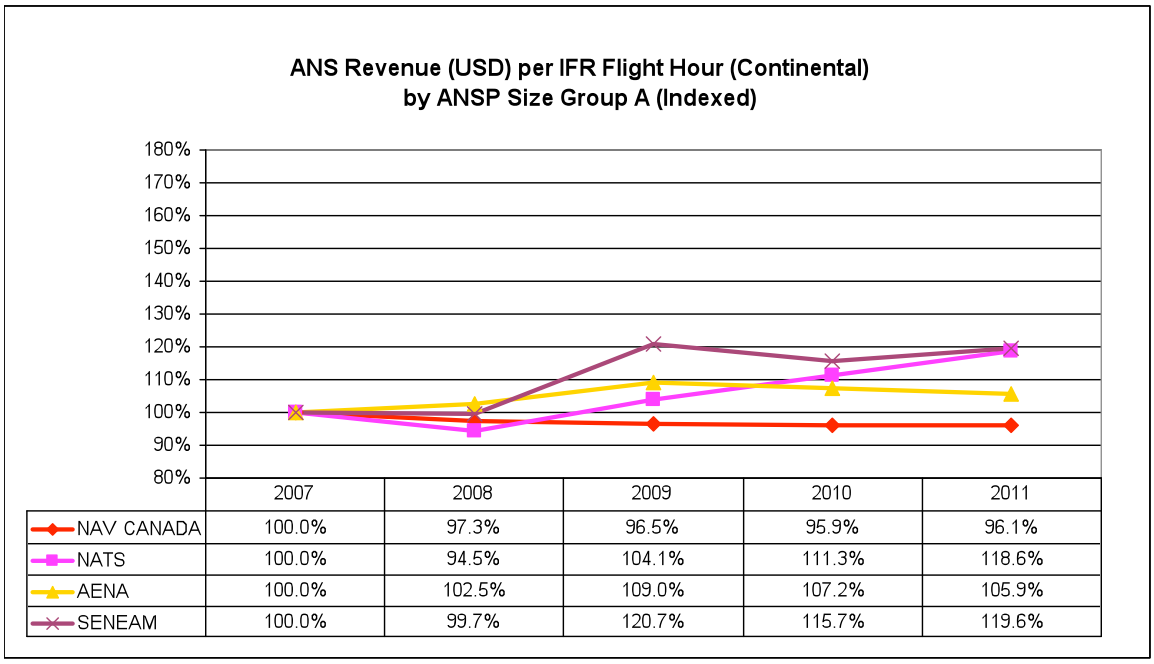


**Figure 9-33: ANS Revenue (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping A (Indexed)**

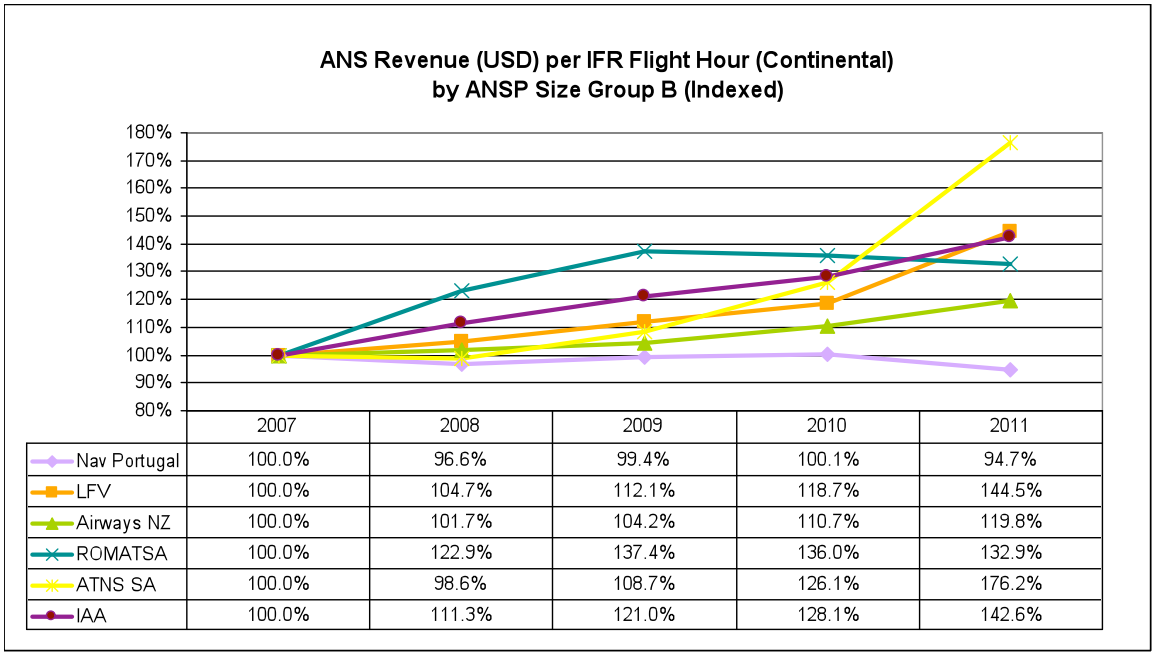
The following charts show the five-year trend for the participant ANSPs. In general, and for all the groups, few and moderate changes are observed with respect to 2009 for the most of the ANSPs.




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| NAV CANADA | 100.0% | 97.3% | 96.5% | 95.9% | 96.1% |
| NATS | 100.0% | 94.5% | 104.1% | 111.3% | 118.6% |
| AENA | 100.0% | 102.5% | 109.0% | 107.2% | 105.9% |
| SENEAM | 100.0% | 99.7% | 120.7% | 115.7% | 119.6% |

NATS (UK) revenue increased by 6.5% from 2010 to 2011; this included the effect of a new price control for UK enroute services from January 2011 (to take account of significantly reduced traffic volumes than previous forecast and higher pension contributions).

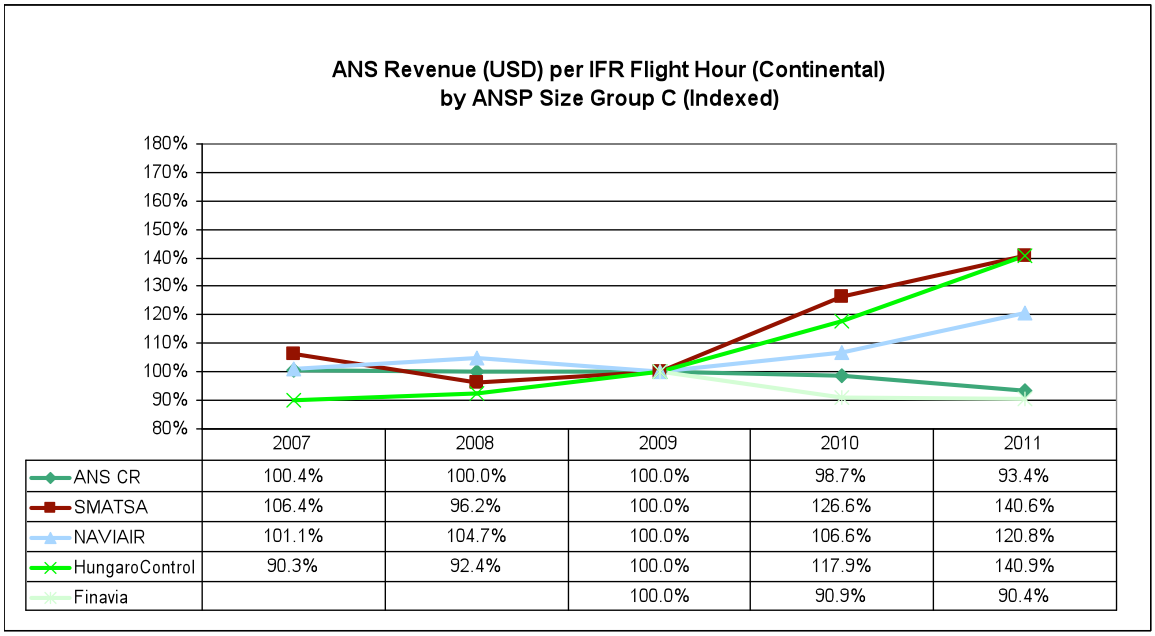
**Figure 9-34: ANS Revenue (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping B (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Nav Portugal | 100.0% | 96.6% | 99.4% | 100.1% | 94.7% |
| LFV | 100.0% | 104.7% | 112.1% | 118.7% | 144.5% |
| Airways NZ | 100.0% | 101.7% | 104.2% | 110.7% | 119.8% |
| ROMATSA | 100.0% | 122.9% | 137.4% | 136.0% | 132.9% |
| ATNS SA | 100.0% | 98.6% | 108.7% | 126.1% | 176.2% |
| IAA | 100.0% | 111.3% | 121.0% | 128.1% | 142.6% |

Revenue increase in ATNS SA is attributed to the 34% increase in ATS tariff and a 3.3% increase in IFR Flight Hours.

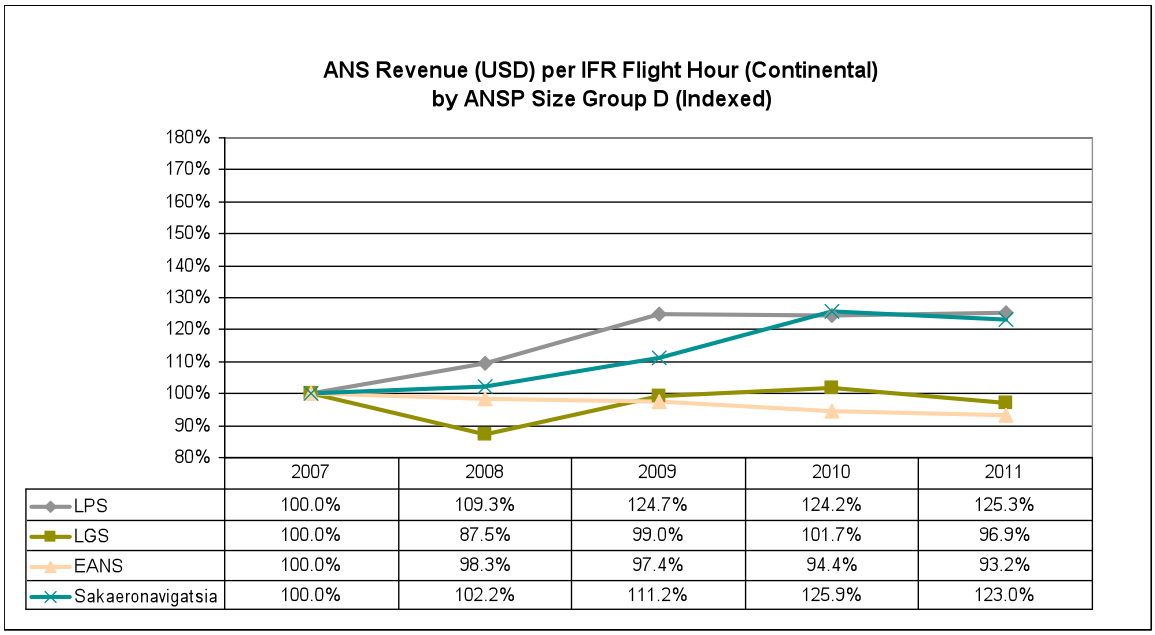
**Figure 9-35: ANS Revenue (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping C (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| ANS CR | 100.4% | 100.0% | 100.0% | 98.7% | 93.4% |
| SMATSA | 106.4% | 96.2% | 100.0% | 126.6% | 140.6% |
| NAVIAIR | 101.1% | 104.7% | 100.0% | 106.6% | 120.8% |
| HungaroControl | 90.3% | 92.4% | 100.0% | 117.9% | 140.9% |
| Finavia | | | 100.0% | 90.9% | 90.4% |

Structural loss (-22M€) due to pricing of air traffic charges is covered by Finavia's commercial income at airports.

**Figure 9-36: ANS Revenue (USD) per IFR Flight Hour (Continental) by ANSP Size Grouping D (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| LPS | 100.0% | 109.3% | 124.7% | 124.2% | 125.3% |
| LGS | 100.0% | 87.5% | 99.0% | 101.7% | 96.9% |
| EANS | 100.0% | 98.3% | 97.4% | 94.4% | 93.2% |
| Sakaeronavigatsia | 100.0% | 102.2% | 111.2% | 125.9% | 123.0% |

## 9.2. Oceanic KPI Results

This section presents results for those ANSPs who manage air traffic in oceanic airspace. There are not many of the participant ANSPs in this area. Thus, they are analysed together, regardless of the group to which they belong according to the volume of traffic managed. Size and volume

of traffic could be important influencing factors in performance, so it is important to keep this in mind when analysing the results.

**Figure 9-37: Focus Areas and Indicators**

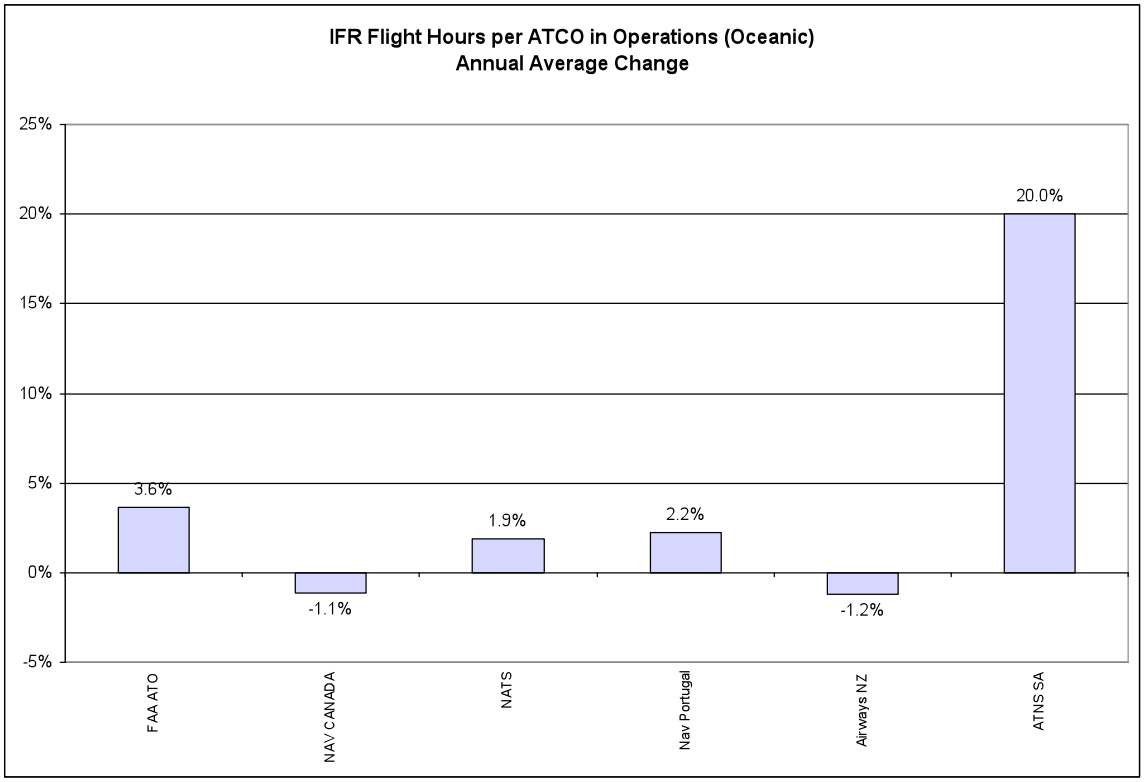
| Focus Areas | Key Performance Indicators | |
|---|---|---|
| 9.2.1 Productivity | IFR Flight Hours per ATCO in Operations (Oceanic) | Page 69 |
| 9.2.2 Cost-Effectiveness | Cost (USD) per IFR Flight Hour (Oceanic) | Page 71 |
| | Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic) | Page 73 |
| | Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic) | Page 75 |
| 9.2.3 Price, Revenue, and Profitability | ANS Revenue (USD) per IFR Flight Hour (Oceanic) | Page 78 |

### 9.2.1. Productivity

**Figure 9-38: IFR Flight Hours per ATCO in Operations (Oceanic) by ANSP**

| IFR Flight Hours per ATCO in Operations (Oceanic) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | 6,372 | 6,747 | 6,548 | 6,787 | 7,323 | 3.6% |
| NAV CANADA | A | 9,573 | 9,357 | 8,816 | 8,164 | 9,059 | -1.1% |
| NATS | A | 8,334 | 8,640 | 9,706 | 8,494 | 8,839 | 1.9% |
| Nav Portugal | B | 3,492 | 3,884 | 2,987 | 3,211 | 3,641 | 2.2% |
| Airways NZ | B | 6,868 | 8,245 | 7,367 | 7,386 | 6,308 | -1.2% |
| ATNS SA | B | 357 | 415 | 530 | 532 | 722 | 20.0% |

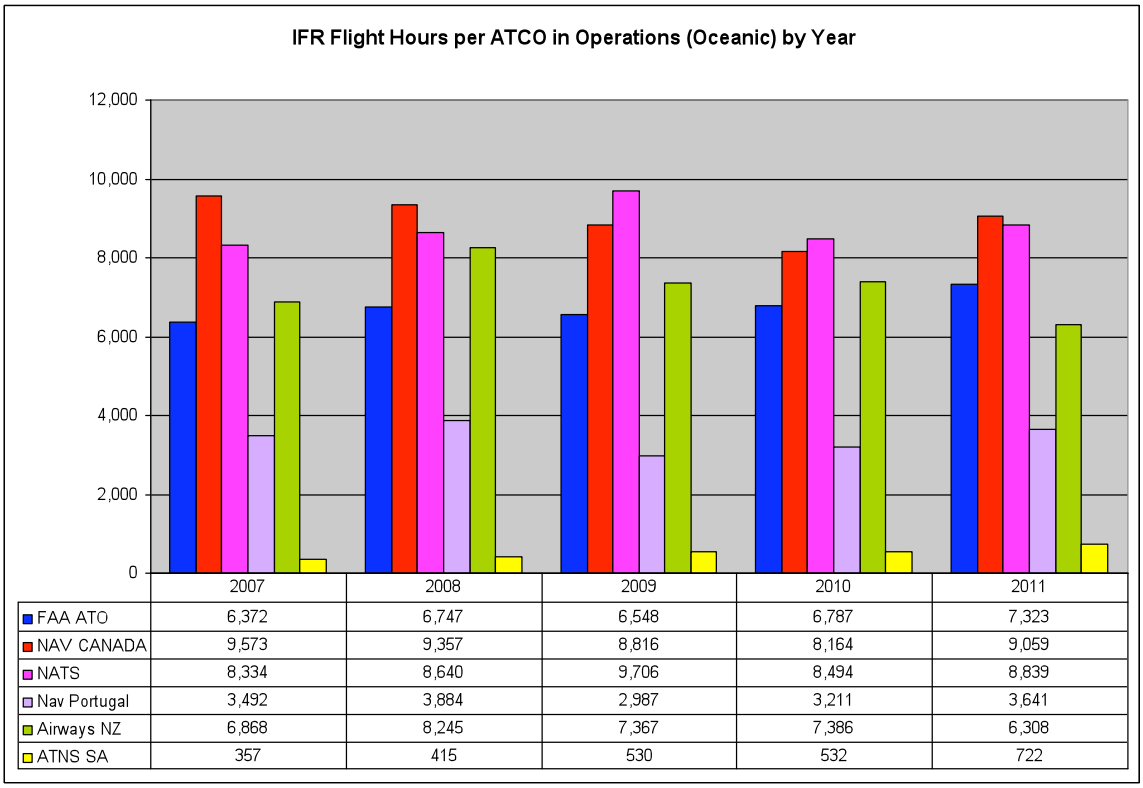
**Figure 9-39: IFR Flight Hours per ATCO in Operations (Oceanic) Average Annual Change**



The apparent decrease in productivity for Airways New Zealand is due to an increase in Oceanic FTE numbers in 2011.

NAV Portugal data refers to services provided within Santa Maria Oceanic FIR (en route and terminal).

## Figure 9-40: IFR Flight Hours per ATCO in Operations (Oceanic) by ANSP by Year

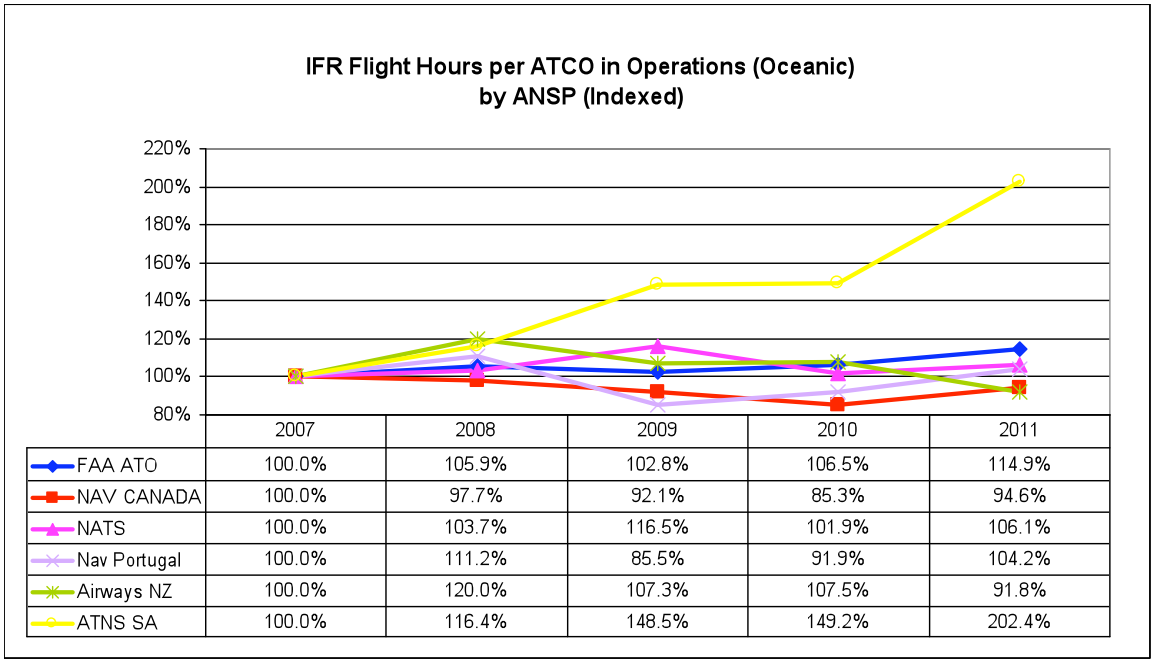



| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 6,372 | 6,747 | 6,548 | 6,787 | 7,323 |
| NAV CANADA | 9,573 | 9,357 | 8,816 | 8,164 | 9,059 |
| NATS | 8,334 | 8,640 | 9,706 | 8,494 | 8,839 |
| Nav Portugal | 3,492 | 3,884 | 2,987 | 3,211 | 3,641 |
| Airways NZ | 6,868 | 8,245 | 7,367 | 7,386 | 6,308 |
| ATNS SA | 357 | 415 | 530 | 532 | 722 |

Regardless the differences between the ANSPs the general trend seems to show some stability in the indicator. The volume of traffic handled could be the main driver for this indicator.

NAV Portugal data refers to services provided within Santa Maria Oceanic FIR (en route and terminal).

**Figure 9-41: IFR Flight Hours per ATCO in Operations (Oceanic) by ANSP (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 105.9% | 102.8% | 106.5% | 114.9% |
| NAV CANADA | 100.0% | 97.7% | 92.1% | 85.3% | 94.6% |
| NATS | 100.0% | 103.7% | 116.5% | 101.9% | 106.1% |
| Nav Portugal | 100.0% | 111.2% | 85.5% | 91.9% | 104.2% |
| Airways NZ | 100.0% | 120.0% | 107.3% | 107.5% | 91.8% |
| ATNS SA | 100.0% | 116.4% | 148.5% | 149.2% | 202.4% |

For ATNS SA increases in IFR Flight Hours per ATCO are attributed to an increase in the IFR Flight Hours of 35.6% while the number of ATCOs remained the same.

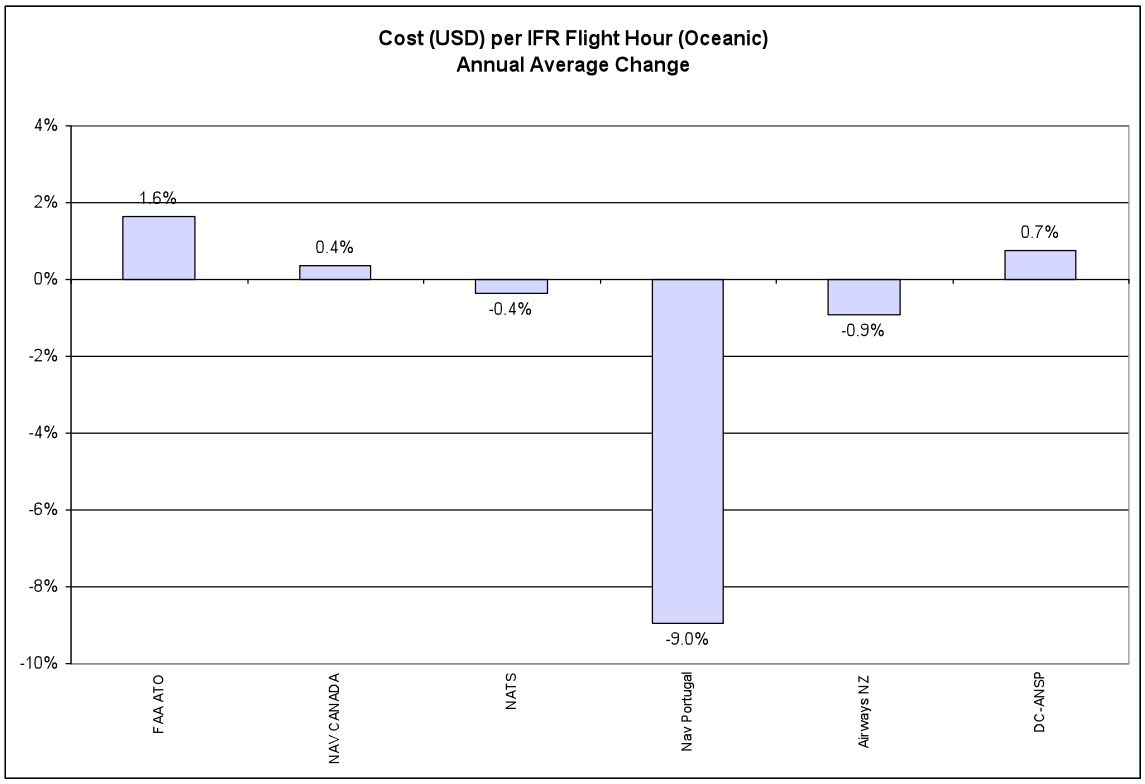
### 9.2.2. Cost-Effectiveness

**Figure 9-42: Cost (USD) per IFR Flight Hour (Oceanic) by ANSP**

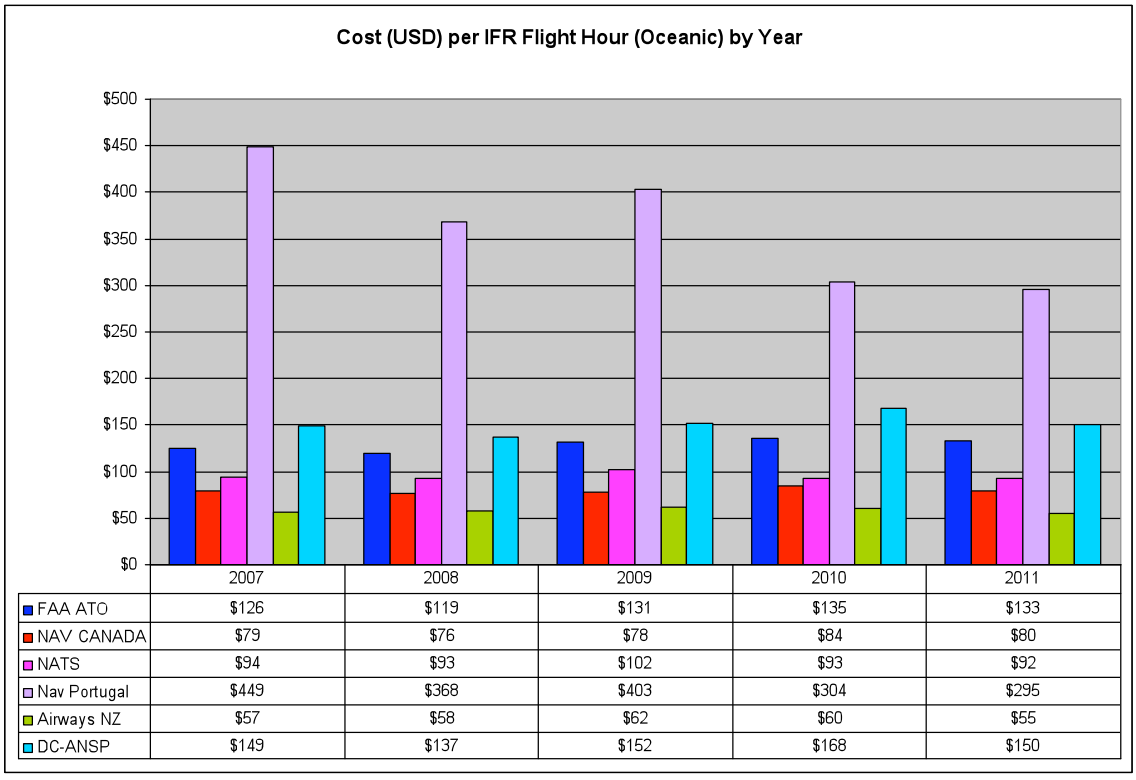
| Cost (USD) per IFR Flight Hour (Oceanic) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $126 | $119 | $131 | $135 | $133 | 1.6% |
| NAV CANADA | A | $79 | $76 | $78 | $84 | $80 | 0.4% |
| NATS | A | $94 | $93 | $102 | $93 | $92 | -0.4% |
| Nav Portugal | B | $449 | $368 | $403 | $304 | $295 | -9.0% |
| Airways NZ | B | $57 | $58 | $62 | $60 | $55 | -0.9% |
| DC-ANSP | D | $149 | $137 | $152 | $168 | $150 | 0.7% |

**2007 OANDA Exchange Rates**

## Figure 9-43: Cost (USD) per IFR Flight Hour (Oceanic) Average Annual Change




## Figure 9-44: Cost (USD) per IFR Flight Hour (Oceanic) by ANSP by Year

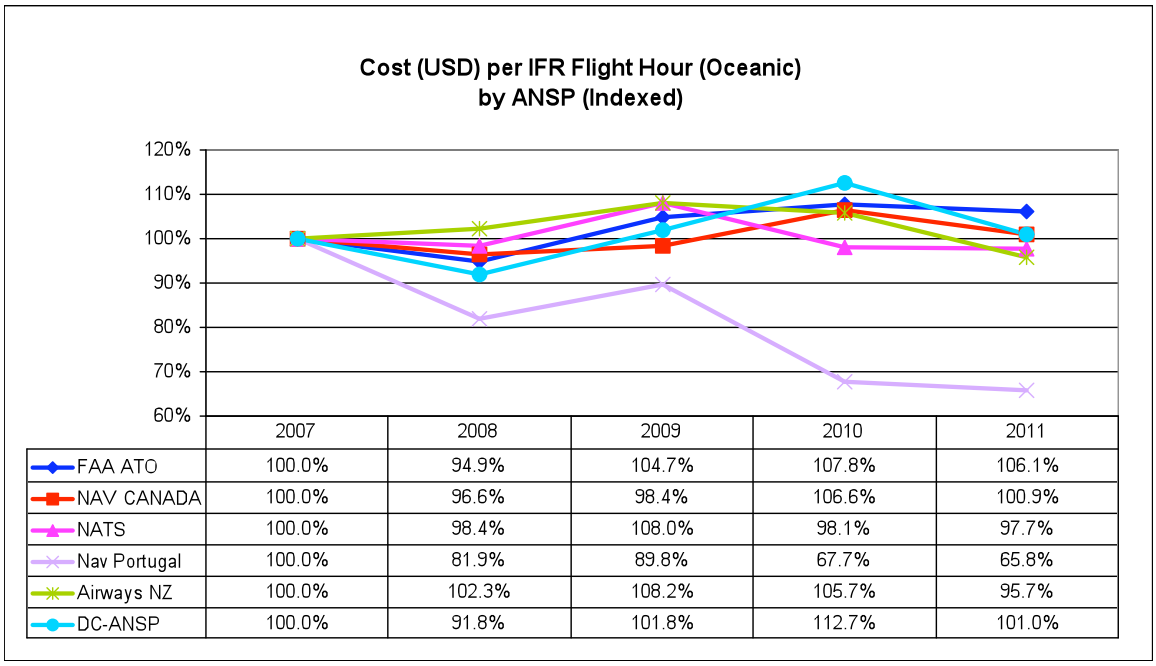



| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | $126 | $119 | $131 | $135 | $133 |
| NAV CANADA | $79 | $76 | $78 | $84 | $80 |
| NATS | $94 | $93 | $102 | $93 | $92 |
| Nav Portugal | $449 | $368 | $403 | $304 | $295 |
| Airways NZ | $57 | $58 | $62 | $60 | $55 |
| DC-ANSP | $149 | $137 | $152 | $168 | $150 |

**2007 OANDA Exchange Rates**

NAV Portugal data refers to services provided within Santa Maria Oceanic FIR (en route and terminal).

## Figure 9-45: Cost (USD) per IFR Flight Hour (Oceanic) by ANSP (Indexed)




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 94.9% | 104.7% | 107.8% | 106.1% |
| NAV CANADA | 100.0% | 96.6% | 98.4% | 106.6% | 100.9% |
| NATS | 100.0% | 98.4% | 108.0% | 98.1% | 97.7% |
| Nav Portugal | 100.0% | 81.9% | 89.8% | 67.7% | 65.8% |
| Airways NZ | 100.0% | 102.3% | 108.2% | 105.7% | 95.7% |
| DC-ANSP | 100.0% | 91.8% | 101.8% | 112.7% | 101.0% |

## Figure 9-46: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic) by ANSP

| Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $30 | $27 | $29 | $29 | $32 | 2.5% |
| NAV CANADA | A | $17 | $17 | $19 | $20 | $19 | 3.5% |
| NATS | A | $34 | $34 | $40 | $38 | $27 | -3.9% |
| Nav Portugal | B | $79 | $84 | $99 | $83 | $106 | 8.7% |
| Airways NZ | B | $15 | $13 | $15 | $16 | $20 | 9.1% |
| ATNS SA | B | $134 | $151 | $134 | $62 | $43 | -20.7% |

**2007 OANDA Exchange Rates**

NAV Portugal data refers to services provided within Santa Maria Oceanic FIR (en route and terminal).

**Figure 9-47: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic) Average Annual Change**

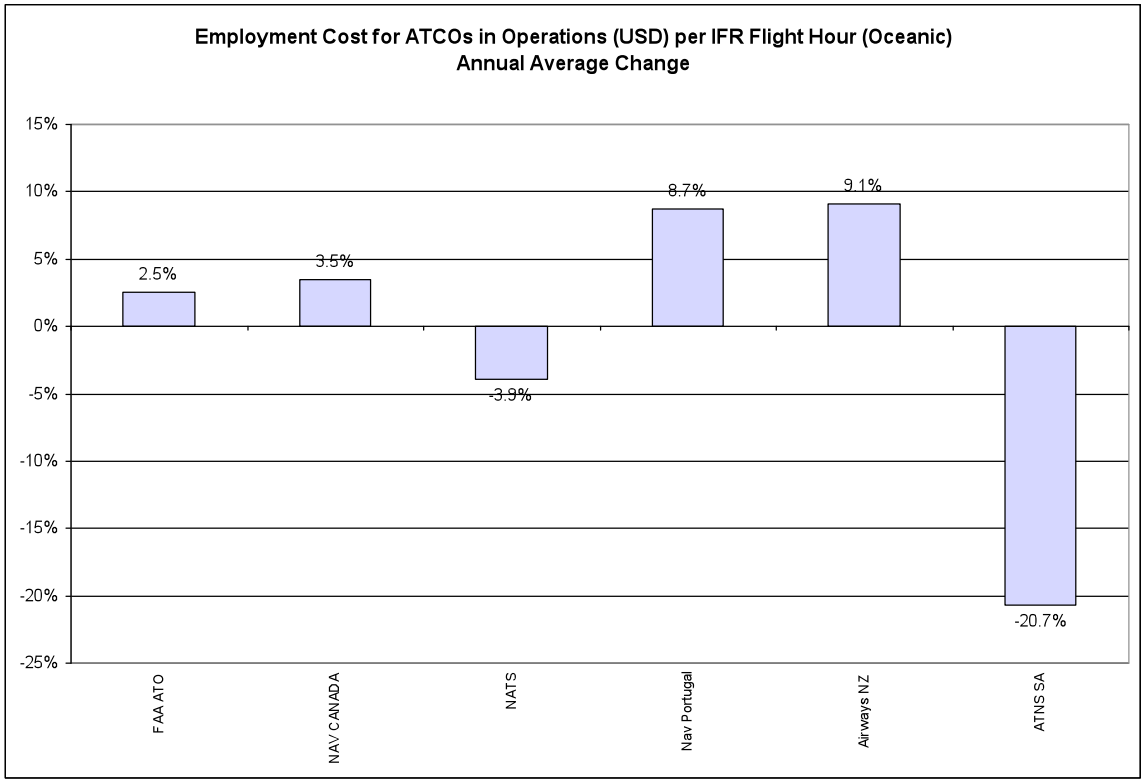
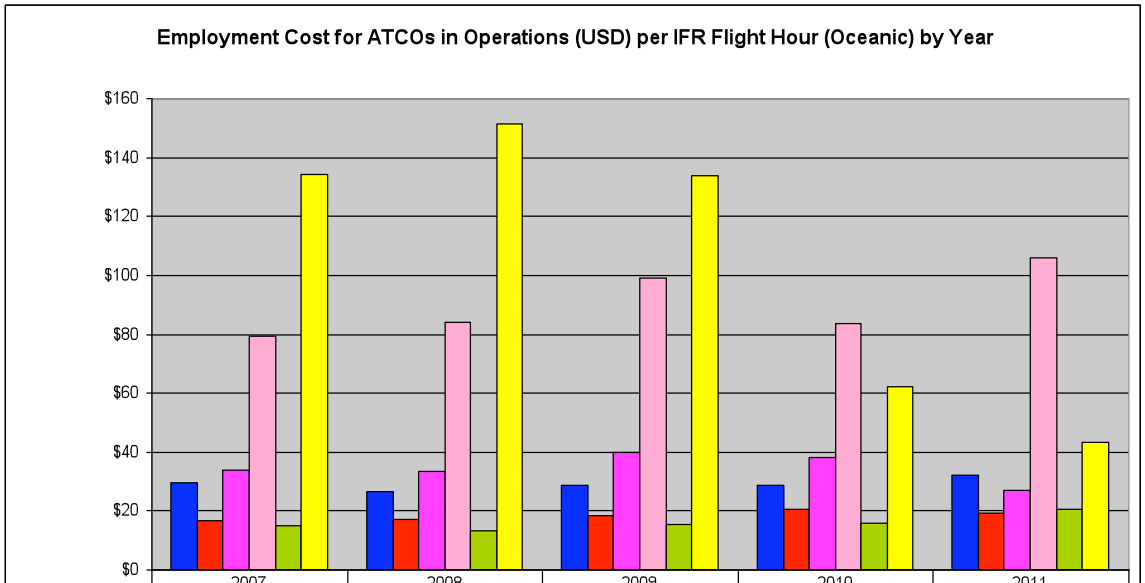



**Figure 9-48: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic) by ANSP by Year**



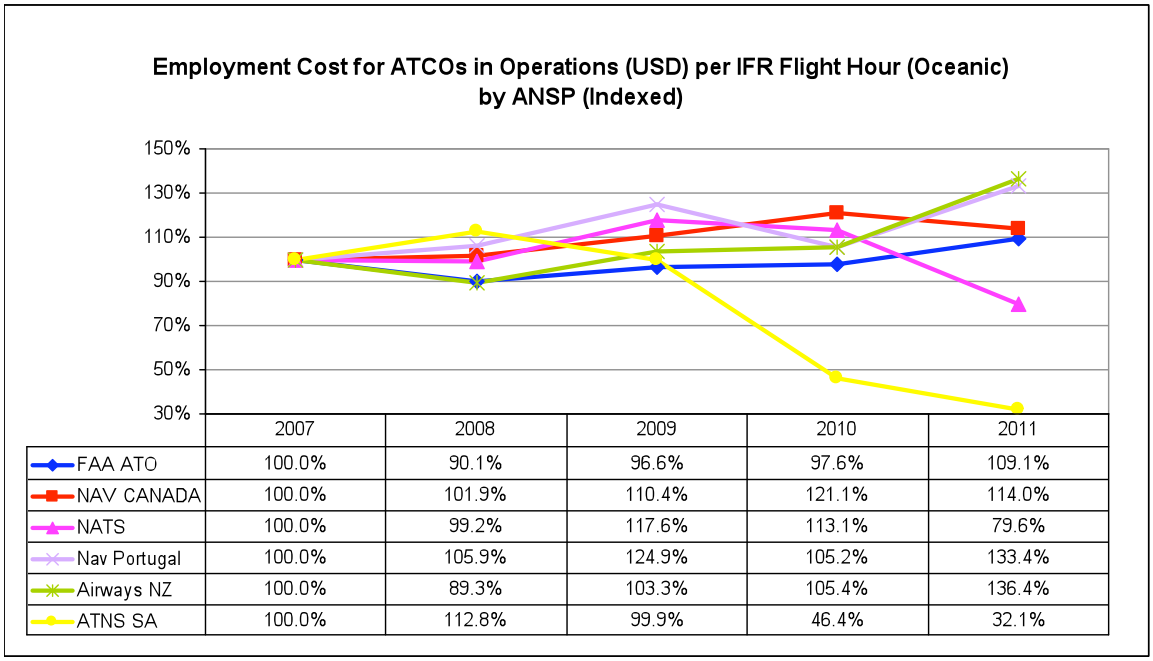

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | $30 | $27 | $29 | $29 | $32 |
| NAV CANADA | $17 | $17 | $19 | $20 | $19 |
| NATS | $34 | $34 | $40 | $38 | $27 |
| Nav Portugal | $79 | $84 | $99 | $83 | $106 |
| Airways NZ | $15 | $13 | $15 | $16 | $20 |
| ATNS SA | $134 | $151 | $134 | $62 | $43 |

**2007 OANDA Exchange Rates**

With the exception of ATNS, which shows significant decrease of the indicator, most of the ANSPs performance for this indicator tends to be very constant. For ATNS (South Africa), the reduction in Employment Cost from 2009 to 2010 was due to the use of ATSOs in the provision of Oceanic service.

NAV Portugal data refers to services provided within Santa Maria Oceanic FIR (en route and terminal).

## Figure 9-49: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic) by ANSP (Indexed)




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 90.1% | 96.6% | 97.6% | 109.1% |
| NAV CANADA | 100.0% | 101.9% | 110.4% | 121.1% | 114.0% |
| NATS | 100.0% | 99.2% | 117.6% | 113.1% | 79.6% |
| Nav Portugal | 100.0% | 105.9% | 124.9% | 105.2% | 133.4% |
| Airways NZ | 100.0% | 89.3% | 103.3% | 105.4% | 136.4% |
| ATNS SA | 100.0% | 112.8% | 99.9% | 46.4% | 32.1% |

FAA ATCO costs have increased in 2010 and 2011 due to an increased number of controllers and a contract pay increase.

## Figure 9-50: Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic) applying Purchasing Power Parity (PPP) by ANSP

| Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic) PPP | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $30 | $27 | $29 | $29 | $32 | 2.5% |
| NAV CANADA | A | $14 | $14 | $15 | $16 | $15 | 3.1% |
| NATS | A | $26 | $26 | $30 | $29 | $20 | -4.7% |
| Nav Portugal | B | $77 | $82 | $96 | $81 | $104 | 9.3% |
| Airways NZ | B | $12 | $11 | $12 | $12 | $16 | 7.3% |
| ATNS SA | B | $216 | $230 | $191 | $83 | $55 | -25.3% |

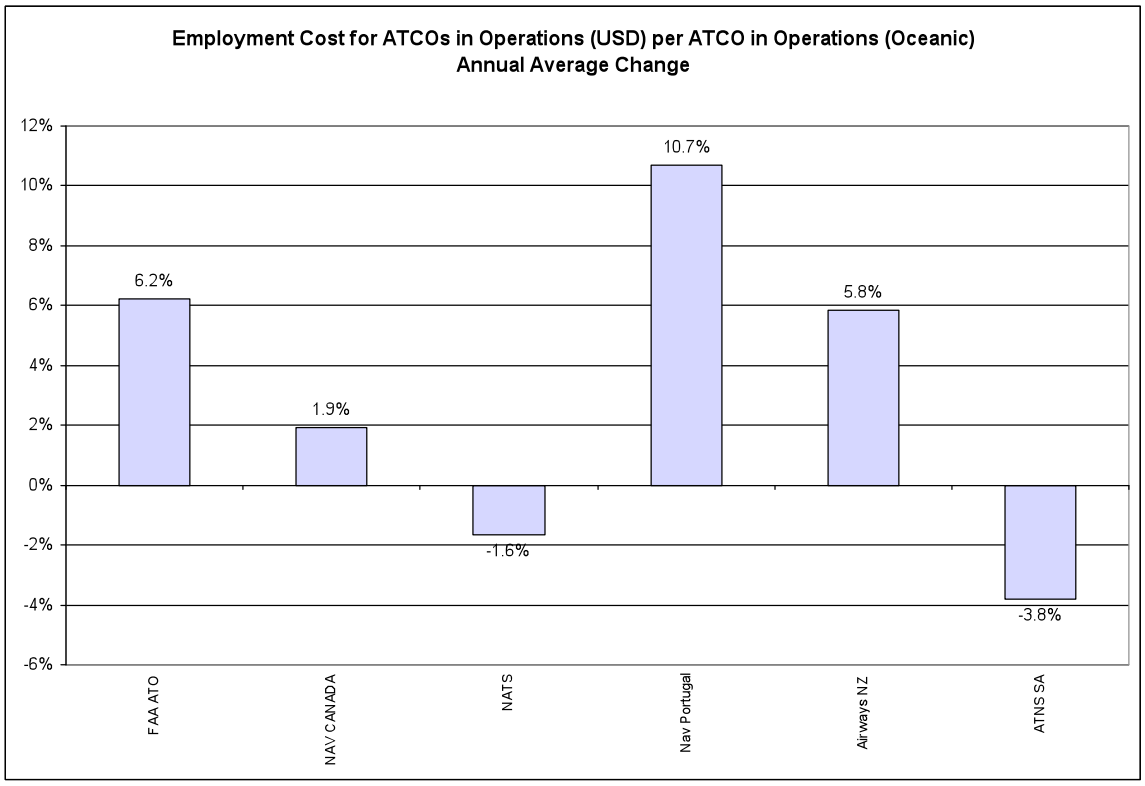
**2007-2011 IMF PPP**

## Figure 9-51: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic) by ANSP

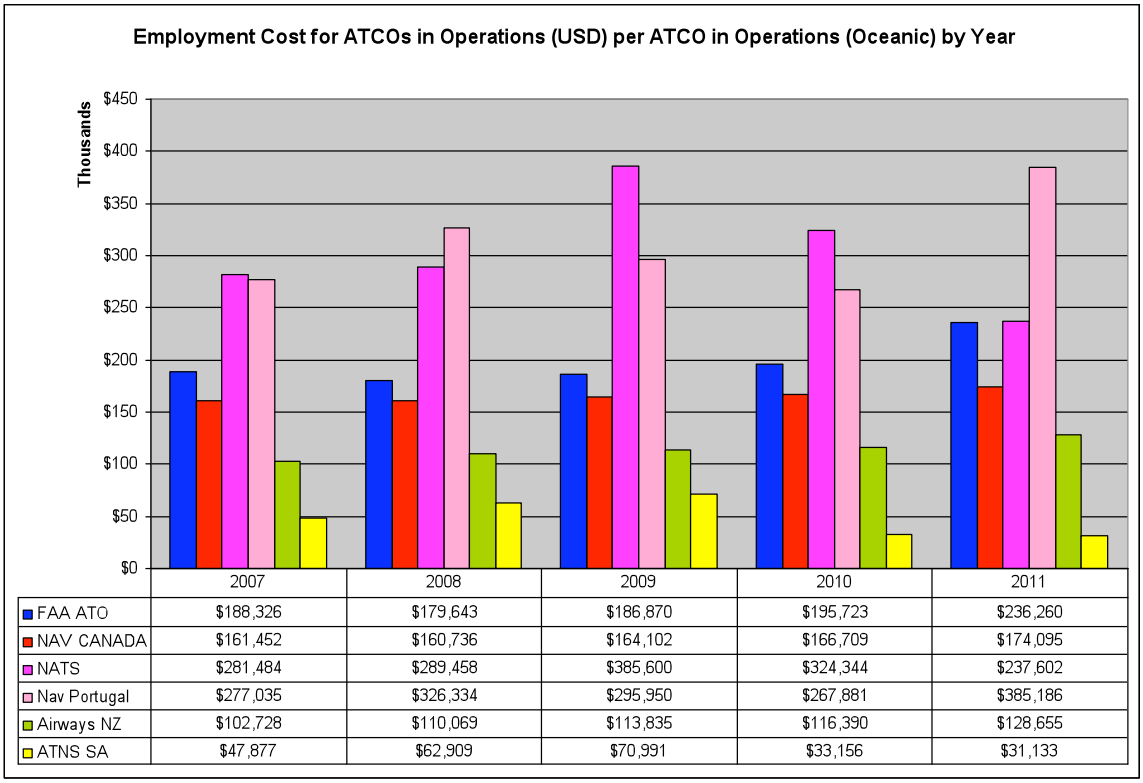
| Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $188,326 | $179,643 | $186,870 | $195,723 | $236,260 | 6.2% |
| NAV CANADA | A | $161,452 | $160,736 | $164,102 | $166,709 | $174,095 | 1.9% |
| NATS | A | $281,484 | $289,458 | $385,600 | $324,344 | $237,602 | -1.6% |
| Nav Portugal | B | $277,035 | $326,334 | $295,950 | $267,881 | $385,186 | 10.7% |
| Airways NZ | B | $102,728 | $110,069 | $113,835 | $116,390 | $128,655 | 5.8% |
| ATNS SA | B | $47,877 | $62,909 | $70,991 | $33,156 | $31,133 | -3.8% |

**2007 OANDA Exchange Rates**

## Figure 9-52: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic) Average Annual Change



## Figure 9-53: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic) by ANSP by Year

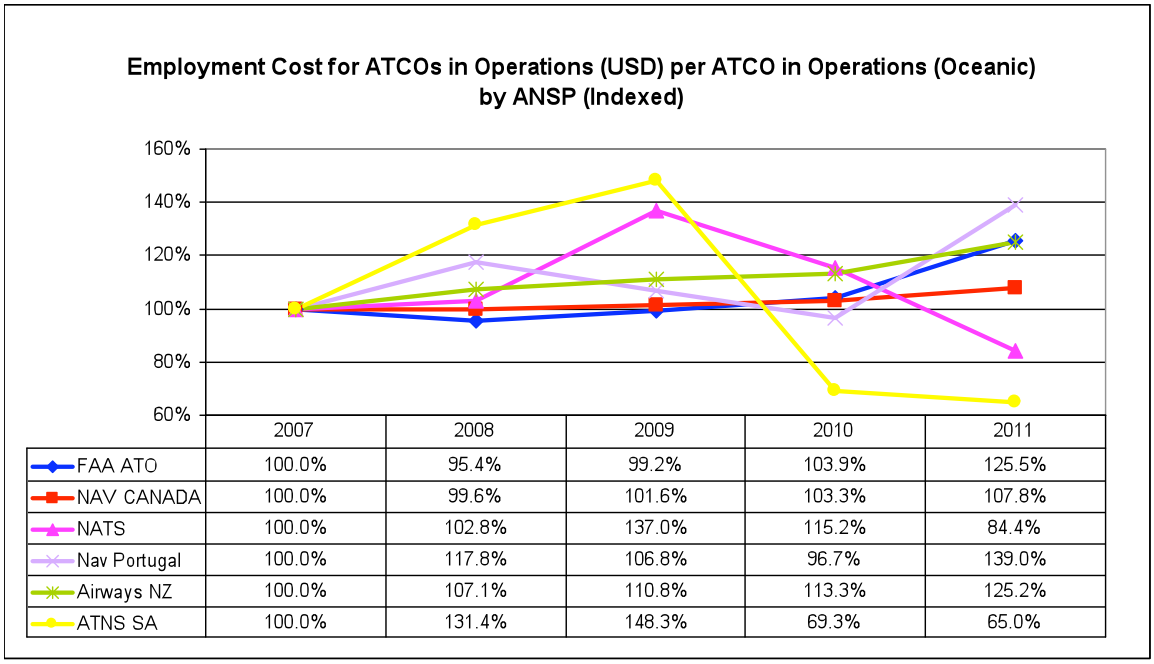



| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | $188,326 | $179,643 | $186,870 | $195,723 | $236,260 |
| NAV CANADA | $161,452 | $160,736 | $164,102 | $166,709 | $174,095 |
| NATS | $281,484 | $289,458 | $385,600 | $324,344 | $237,602 |
| Nav Portugal | $277,035 | $326,334 | $295,950 | $267,881 | $385,186 |
| Airways NZ | $102,728 | $110,069 | $113,835 | $116,390 | $128,655 |
| ATNS SA | $47,877 | $62,909 | $70,991 | $33,156 | $31,133 |

FAA ATCO costs have increased in 2010 and 2011 due to an increased number of controllers and a contract pay increase.

**2007 OANDA Exchange Rates**

## Figure 9-54: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic) by ANSP (Indexed)




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 95.4% | 99.2% | 103.9% | 125.5% |
| NAV CANADA | 100.0% | 99.6% | 101.6% | 103.3% | 107.8% |
| NATS | 100.0% | 102.8% | 137.0% | 115.2% | 84.4% |
| Nav Portugal | 100.0% | 117.8% | 106.8% | 96.7% | 139.0% |
| Airways NZ | 100.0% | 107.1% | 110.8% | 113.3% | 125.2% |
| ATNS SA | 100.0% | 131.4% | 148.3% | 69.3% | 65.0% |

**Figure 9-55: Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic) applying Purchasing Power Parity (PPP) by ANSP**

| Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic) PPP | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $188,326 | $179,643 | $186,870 | $195,723 | $236,260 | 6.2% |
| NAV CANADA | A | $130,892 | $127,881 | $134,485 | $134,267 | $138,735 | 1.5% |
| NATS | A | $218,343 | $222,618 | $294,749 | $243,831 | $178,353 | -2.4% |
| Nav Portugal | B | $267,189 | $316,987 | $287,885 | $260,581 | $379,033 | 11.4% |
| Airways NZ | B | $84,514 | $89,752 | $91,095 | $90,775 | $99,142 | 4.1% |
| ATNS SA | B | $77,078 | $95,605 | $101,282 | $44,352 | $39,452 | -9.3% |

**2007-2011 IMF PPP**

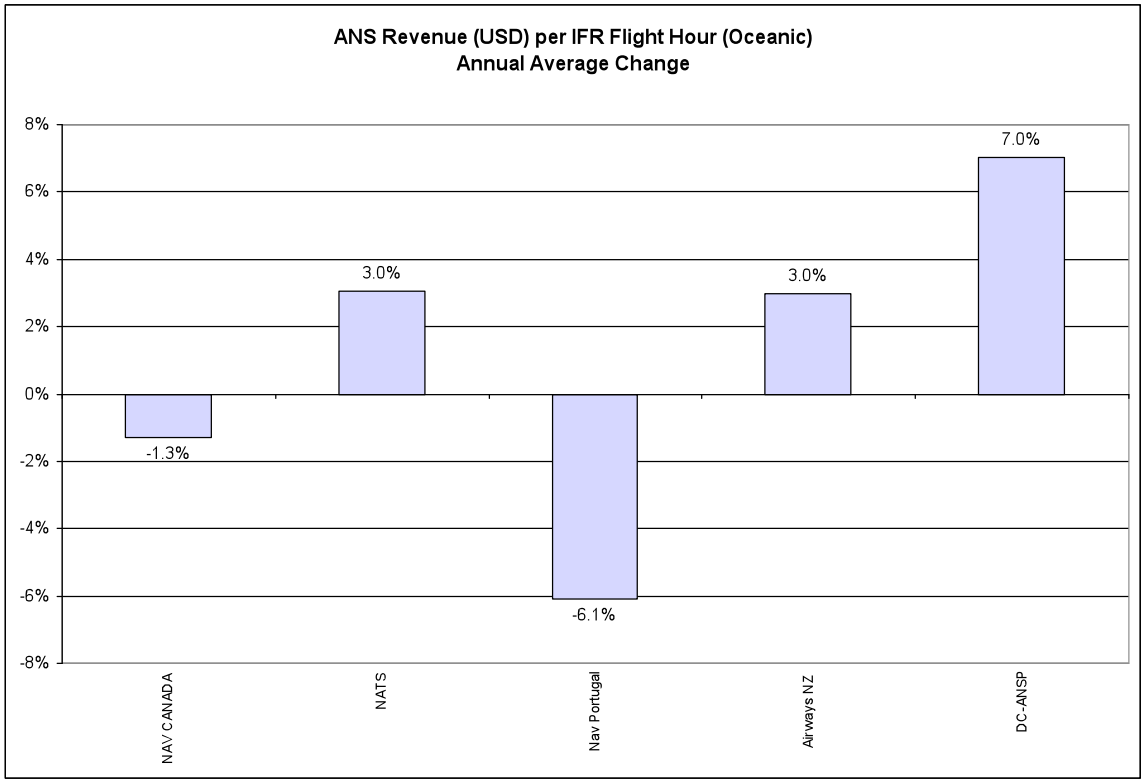
### 9.2.3. Price, Revenue, and Profitability

**Figure 9-56: ANS Revenue (USD) per IFR Flight Hour (Oceanic) by ANSP**

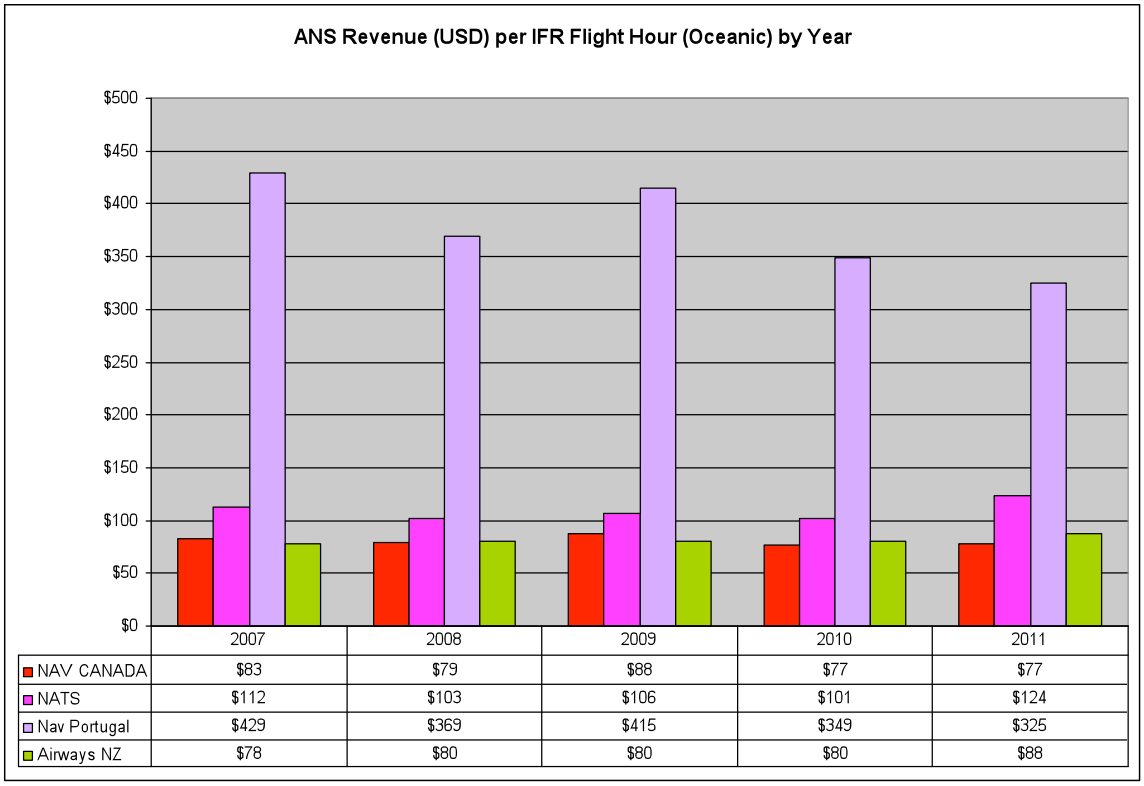
| ANS Revenue (USD) per IFR Flight Hour (Oceanic) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| NAV CANADA | A | $83 | $79 | $88 | $77 | $77 | -1.3% |
| NATS | A | $112 | $103 | $106 | $101 | $124 | 3.0% |
| Nav Portugal | B | $429 | $369 | $415 | $349 | $325 | -6.1% |
| Airways NZ | B | $78 | $80 | $80 | $80 | $88 | 3.0% |
| DC-ANSP | D | $148 | $192 | $200 | $186 | $188 | 7.0% |

**2007 OANDA Exchange Rates**

**Figure 9-57: ANS Revenue (USD) per IFR Flight Hour (Oceanic) Average Annual Change**



## Figure 9-58: ANS Revenue (USD) per IFR Flight Hour (Oceanic) by ANSP by Year

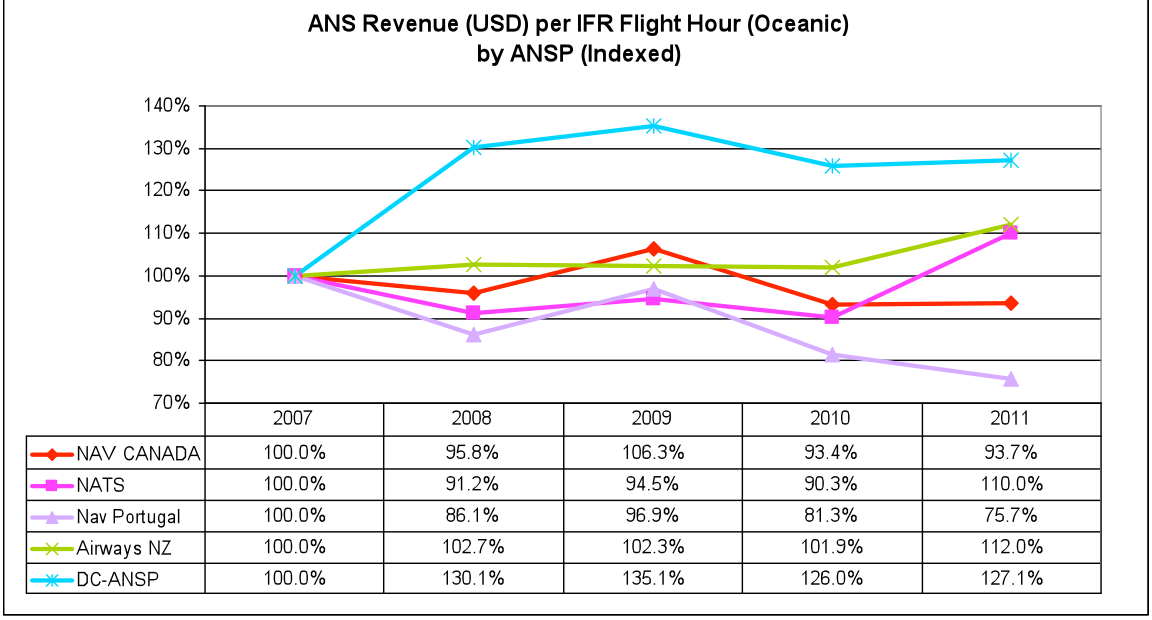



| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| NAV CANADA | $83 | $79 | $88 | $77 | $77 |
| NATS | $112 | $103 | $106 | $101 | $124 |
| Nav Portugal | $429 | $369 | $415 | $349 | $325 |
| Airways NZ | $78 | $80 | $80 | $80 | $88 |

**2007 OANDA Exchange Rates**

NAV Portugal data refers to services provided within Santa Maria Oceanic FIR (en route and terminal).

## Figure 9-59: ANS Revenue (USD) per IFR Flight Hour (Oceanic) by ANSP (Indexed)




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| NAV CANADA | 100.0% | 95.8% | 106.3% | 93.4% | 93.7% |
| NATS | 100.0% | 91.2% | 94.5% | 90.3% | 110.0% |
| Nav Portugal | 100.0% | 86.1% | 96.9% | 81.3% | 75.7% |
| Airways NZ | 100.0% | 102.7% | 102.3% | 101.9% | 112.0% |
| DC-ANSP | 100.0% | 130.1% | 135.1% | 126.0% | 127.1% |

**2007 OANDA Exchange Rates**

## 9.3. Total Performance (Continental and Oceanic) KPI Results

**Figure 9-60: Focus Areas and Indicators**



### 9.3.1. Productivity

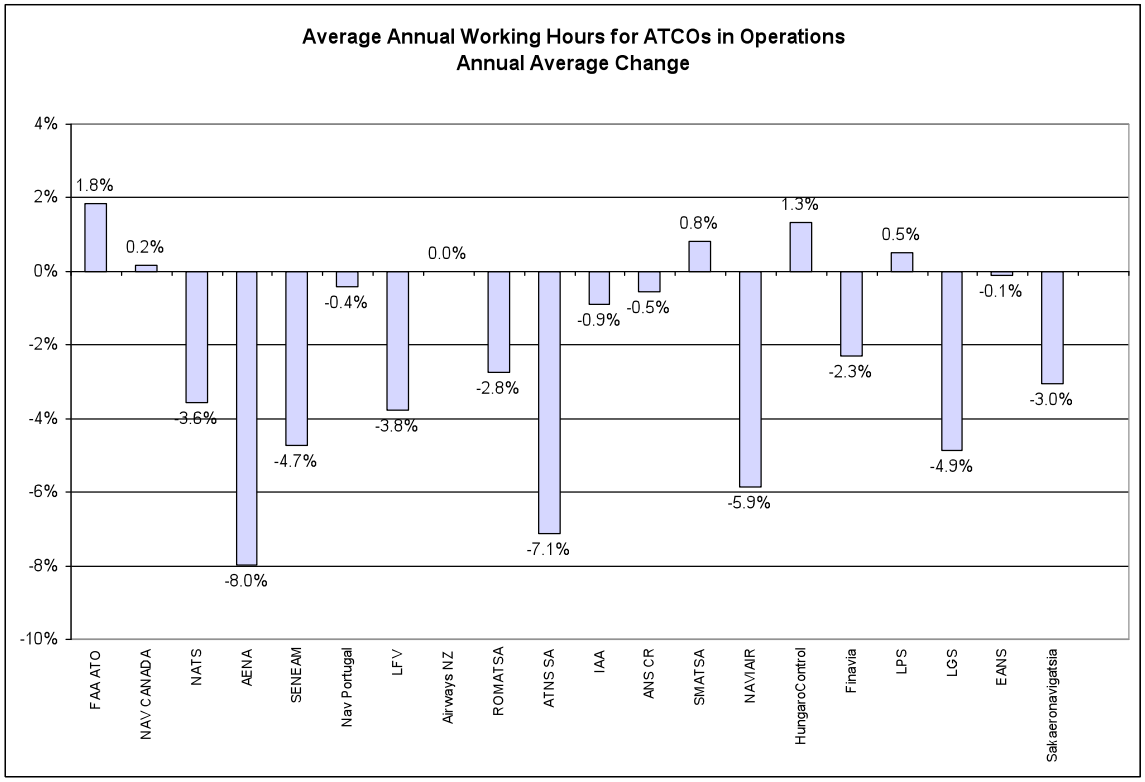
**Figure 9-61: Average Annual Working Hours for ATCOs in Operations (Continental and Oceanic) by ANSP**

| Average Annual Working Hours for ATCOs in Operations | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | 1,660 | 1,754 | 1,784 | 1,779 | 1,783 | 1.8% |
| NAV CANADA | A | 1,587 | 1,634 | 1,604 | 1,597 | 1,597 | 0.2% |
| NATS | A | 1,434 | 1,268 | 1,247 | 1,234 | 1,234 | -3.6% |
| AENA | A | 1,799 | 1,800 | 1,684 | 1,295 | 1,263 | -8.0% |
| SENEAM | A | 1,653 | 1,529 | 1,350 | 1,289 | 1,351 | -4.7% |
| Nav Portugal | B | 1,821 | 1,843 | 1,783 | 1,786 | 1,789 | -0.4% |
| LFV | B | | 1,872 | 1,660 | 1,660 | 1,660 | -3.8% |
| Airways NZ | B | 1,364 | 1,364 | 1,364 | 1,364 | 1,364 | 0.0% |
| ROMATSA | B | 1,450 | 1,394 | 1,384 | 1,360 | 1,296 | -2.8% |
| ATNS SA | B | 1,900 | 1,448 | 1,446 | 1,481 | 1,378 | -7.1% |
| IAA | B | 1,626 | 1,569 | 1,576 | 1,568 | 1,568 | -0.9% |
| ANS CR | C | 1,569 | 1,573 | 1,523 | 1,548 | 1,534 | -0.5% |
| SMATSA | C | 1,224 | 1,328 | 1,336 | 1,275 | 1,259 | 0.8% |
| NAVIAIR | C | | 1,817 | 1,565 | 1,549 | 1,507 | -5.9% |
| HungaroControl | C | 1,473 | 1,545 | 1,545 | 1,555 | 1,550 | 1.3% |
| Finavia | C | | | 1,378 | 1,322 | 1,315 | -2.3% |
| LPS | D | 1,434 | 1,433 | 1,446 | 1,472 | 1,463 | 0.5% |
| LGS | D | | 1,685 | 1,686 | 1,477 | 1,444 | -4.9% |
| EANS | D | | 1,671 | 1,670 | 1,674 | 1,666 | -0.1% |
| Sakaeronavigatsia | D | 1,935 | 1,789 | 1,509 | 1,606 | 1,680 | -3.0% |

The Average Annual Change chart shows a general decrease in the Average Working Hours, which could be a result of the drop of traffic experienced since the beginning of the economic crisis and the reaction of ANSPs to it. Increasing the number of ATCOs may reduce the average working hours per year through a decrease in the amount of overtime.

Regional differences, overtime policies, and other factors contributed to the differences between ANSPs.

**Figure 9-62: Average Annual Working Hours for ATCOs in Operations (Continental and Oceanic) Average Annual Change**



### 9.3.2. Cost-Effectiveness

**Figure 9-63: Cost (USD) per IFR Flight Hour (Continental and Oceanic) by ANSP**

| Cost (USD) per IFR Flight Hour (Continental and Oceanic) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | $327 | $352 | $390 | $411 | $417 | 6.3% |
| NAV CANADA | A | $304 | $291 | $293 | $303 | $291 | -1.0% |
| NATS | A | $643 | $588 | $685 | $697 | $777 | 5.3% |
| AENA | A | $1,117 | $1,178 | $1,291 | $972 | $910 | -4.0% |
| SENEAM | A | $97 | $108 | $126 | $123 | $125 | 6.9% |
| Nav Portugal | B | $620 | $605 | $613 | $506 | $504 | -4.7% |
| LFV | B | $551 | $542 | $722 | $751 | $744 | 8.7% |
| Airways NZ | B | $218 | $223 | $242 | $251 | $256 | 4.1% |
| ROMATSA | B | $781 | $882 | $905 | $811 | $824 | 1.7% |
| ATNS SA | B | $256 | $275 | $300 | $359 | $418 | 13.1% |
| IAA | B | $542 | $573 | $607 | $647 | $687 | 6.1% |
| ANS CR | C | $743 | $718 | $732 | $735 | $697 | -1.6% |
| SMATSA | C | $581 | $563 | $625 | $710 | $794 | 8.4% |
| NAVIAIR | C | $639 | $725 | $805 | $769 | $802 | 6.1% |
| HungaroControl | C | $412 | $491 | $611 | $756 | $791 | 18.0% |
| Finavia | C | | | $776 | $738 | $691 | -5.6% |
| LPS | D | $706 | $741 | $893 | $872 | $888 | 6.2% |
| LGS | D | $431 | $452 | $498 | $569 | $501 | 4.3% |
| DC-ANSP | D | $149 | $137 | $152 | $168 | $150 | 0.7% |
| EANS | D | $228 | $262 | $277 | $294 | $285 | 5.9% |
| Sakaeronavigatsia | D | $792 | $849 | $455 | $454 | $615 | -1.0% |

**2007 OANDA Exchange Rates**

Total Cost for Sakaeronavigatsia Ltd (Georgia) dropped from 2008 to 2009 due to the Write-Off of the property and equipment (such as Radars), which were bombed and destroyed during the Georgian-Russian armed conflict in 2008, which increased Georgian ANSP's costs/losses immensely and Impairment losses on property, plant and equipment due to the revaluation of the fixed assets.

**Figure 9-64: Cost (USD) per IFR Flight Hour (Continental and Oceanic) Average Annual Change**

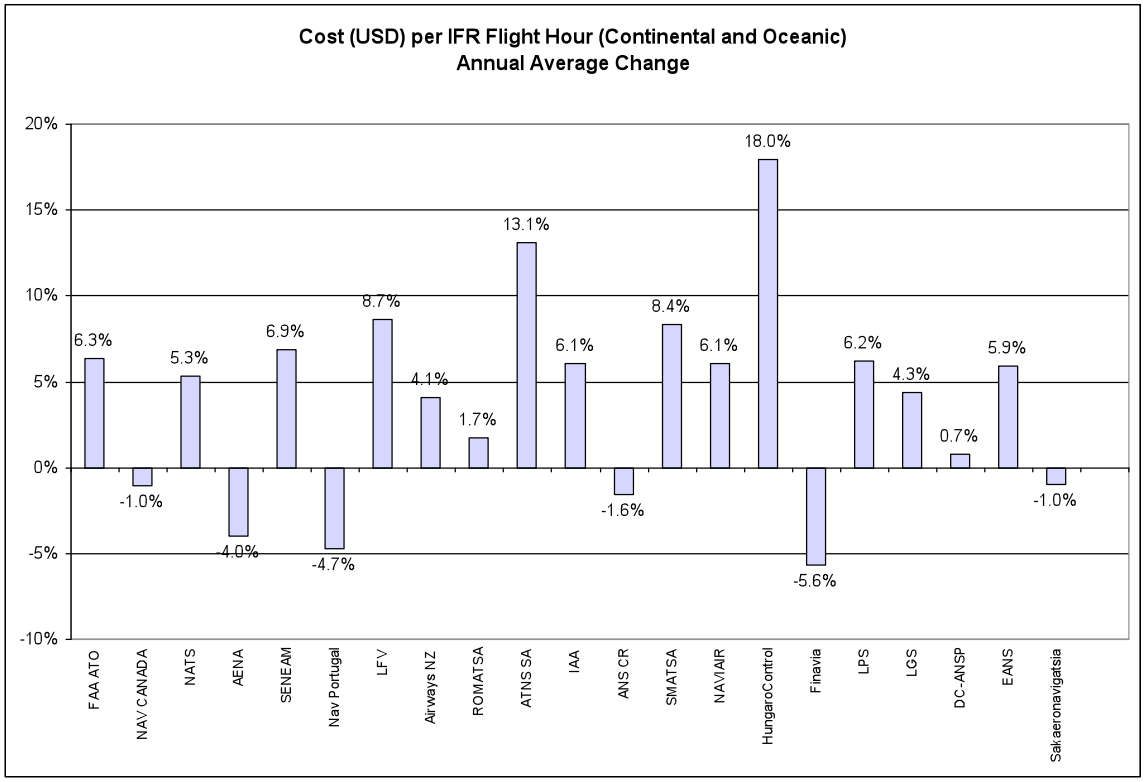
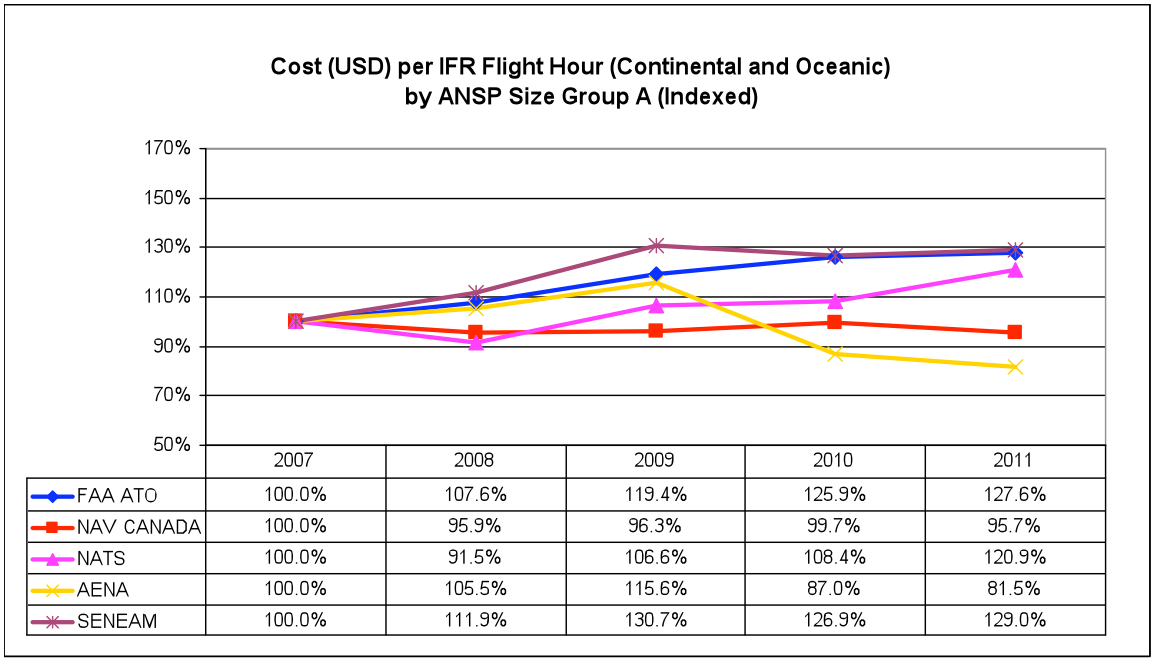



**Figure 9-65: Cost (USD) per IFR Flight Hour (Continental and Oceanic) by ANSP Size Grouping A (Indexed)**

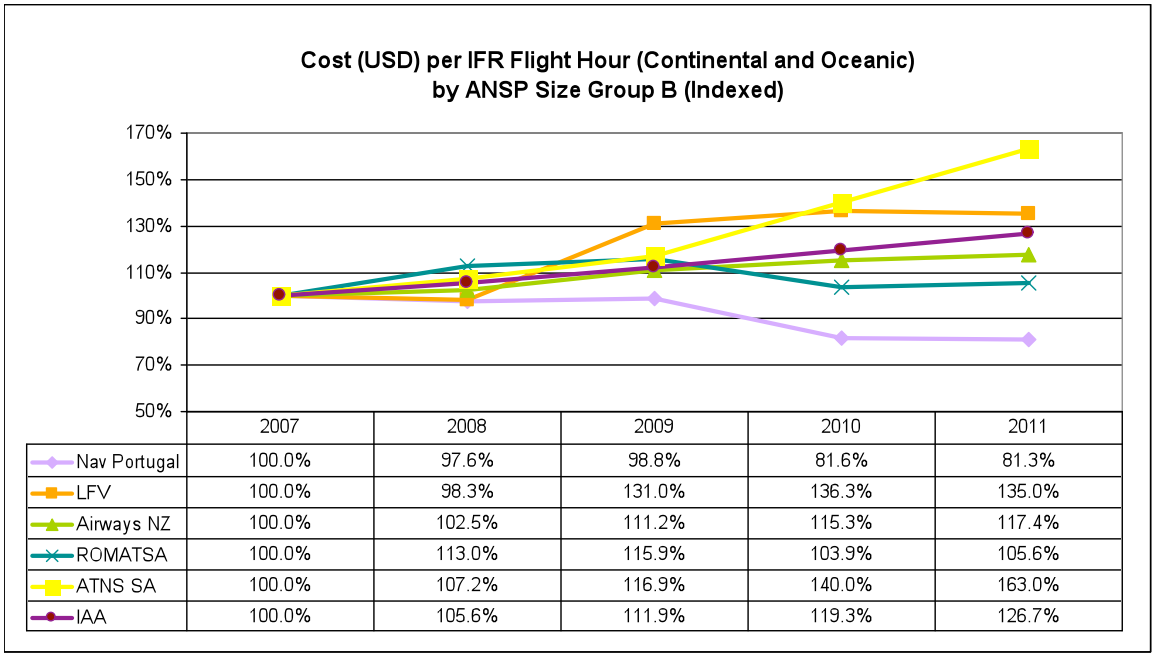



| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 107.6% | 119.4% | 125.9% | 127.6% |
| NAV CANADA | 100.0% | 95.9% | 96.3% | 99.7% | 95.7% |
| NATS | 100.0% | 91.5% | 106.6% | 108.4% | 120.9% |
| AENA | 100.0% | 105.5% | 115.6% | 87.0% | 81.5% |
| SENEAM | 100.0% | 111.9% | 130.7% | 126.9% | 129.0% |

NATS (UK) showed an increase in operating costs but note that the 2011 figures reflect a change in the reporting basis – from the previous statutory accounting basis to a determined cost basis that better reflects the costs charged to

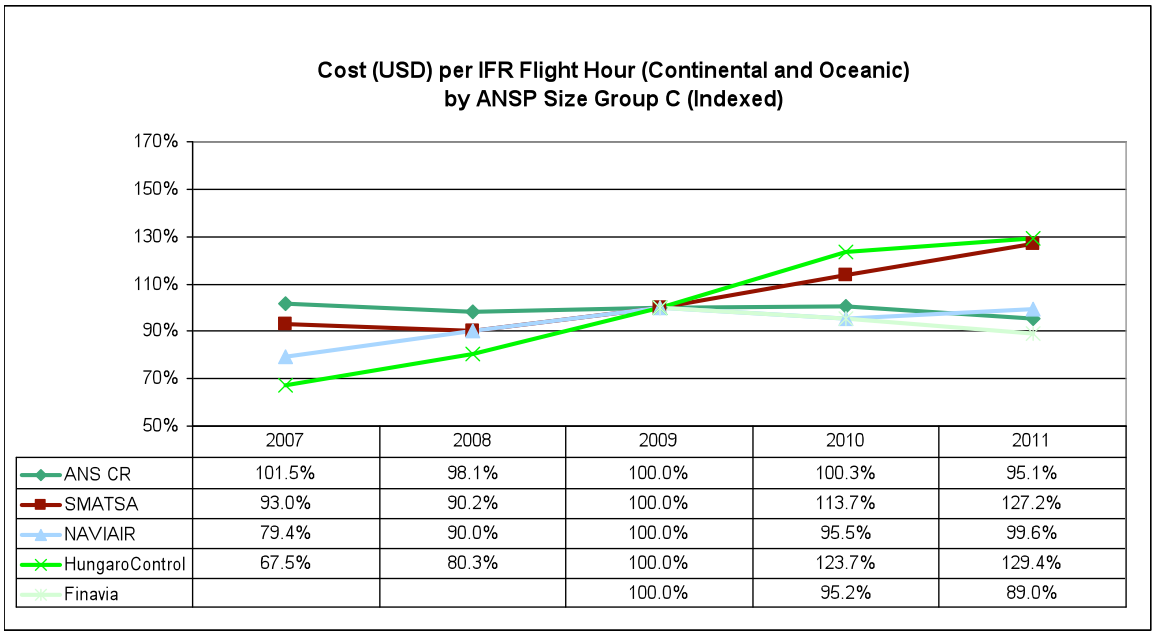
customers. Differences include the replacement of accounting pension costs with cash pension costs and regulatory depreciation instead of accounting depreciation.

**Figure 9-66: Cost (USD) per IFR Flight Hour (Continental and Oceanic) by ANSP Size Grouping B (Indexed)**



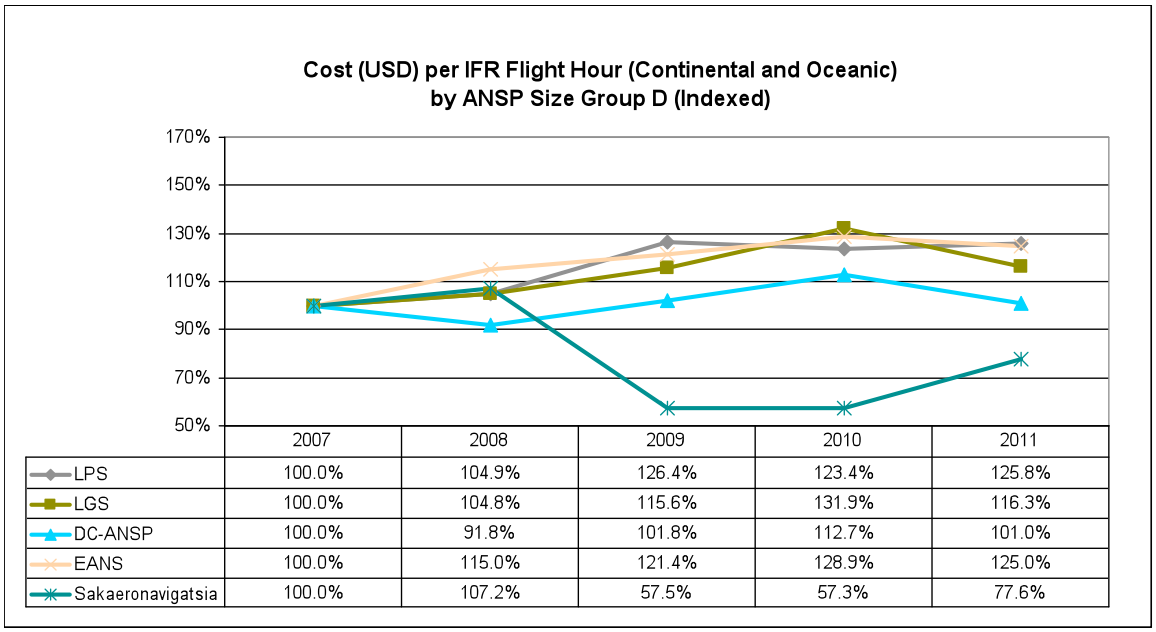

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Nav Portugal | 100.0% | 97.6% | 98.8% | 81.6% | 81.3% |
| LFV | 100.0% | 98.3% | 131.0% | 136.3% | 135.0% |
| Airways NZ | 100.0% | 102.5% | 111.2% | 115.3% | 117.4% |
| ROMATSA | 100.0% | 113.0% | 115.9% | 103.9% | 105.6% |
| ATNS SA | 100.0% | 107.2% | 116.9% | 140.0% | 163.0% |
| IAA | 100.0% | 105.6% | 111.9% | 119.3% | 126.7% |

**Figure 9-67: Cost (USD) per IFR Flight Hour (Continental and Oceanic) by ANSP Size Grouping C (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| ANS CR | 101.5% | 98.1% | 100.0% | 100.3% | 95.1% |
| SMATSA | 93.0% | 90.2% | 100.0% | 113.7% | 127.2% |
| NAVIAIR | 79.4% | 90.0% | 100.0% | 95.5% | 99.6% |
| HungaroControl | 67.5% | 80.3% | 100.0% | 123.7% | 129.4% |
| Finavia | | | 100.0% | 95.2% | 89.0% |

**Figure 9-68: Cost (USD) per IFR Flight Hour (Continental and Oceanic) by ANSP Size Grouping D (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| LPS | 100.0% | 104.9% | 126.4% | 123.4% | 125.8% |
| LGS | 100.0% | 104.8% | 115.6% | 131.9% | 116.3% |
| DC-ANSP | 100.0% | 91.8% | 101.8% | 112.7% | 101.0% |
| EANS | 100.0% | 115.0% | 121.4% | 128.9% | 125.0% |
| Sakaeronavigatsia | 100.0% | 107.2% | 57.5% | 57.3% | 77.6% |

**Figure 9-69: Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic) by ANSP**

| Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | 12% | 11% | 11% | 10% | 9% | -6.6% |
| NAV CANADA | A | 21% | 22% | 22% | 22% | 22% | 1.8% |
| NATS | A | 23% | 22% | 23% | 24% | 28% | 6.1% |
| AENA | A | 15% | 14% | 16% | 21% | 21% | 9.6% |
| SENEAM | A | 13% | 15% | 16% | 15% | 14% | 2.9% |
| Nav Portugal | B | 11% | 10% | 9% | 9% | 8% | -7.3% |
| LFV | B | 14% | 14% | 12% | 11% | 11% | -5.1% |
| Airways NZ | B | 24% | 24% | 22% | 19% | 18% | -6.7% |
| ROMATSA | B | 18% | 15% | 15% | 15% | 18% | 0.8% |
| ATNS SA | B | 20% | 21% | 18% | 18% | 18% | -2.7% |
| IAA | B | 21% | 20% | 21% | 22% | 28% | 7.6% |
| ANS CR | C | 26% | 30% | 27% | 25% | 24% | -1.8% |
| SMATSA | C | 31% | 26% | 28% | 32% | 33% | 2.1% |
| NAVIAIR | C | 16% | 13% | 21% | 18% | 20% | 9.4% |
| HungaroControl | C | 23% | 24% | 21% | 15% | 16% | -8.5% |
| Finavia | C | | | 16% | 12% | 12% | -12.8% |
| LPS | D | 17% | 20% | 24% | 22% | 19% | 4.5% |
| LGS | D | 25% | 29% | 35% | 31% | 28% | 4.5% |
| DC-ANSP | D | 16% | 18% | 15% | 11% | 15% | 0.2% |
| EANS | D | 29% | 26% | 29% | 27% | 30% | 2.1% |
| Sakaeronavigatsia | D | 45% | 28% | 18% | 23% | 36% | 2.5% |

**Figure 9-70: Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic) Average Annual Change**

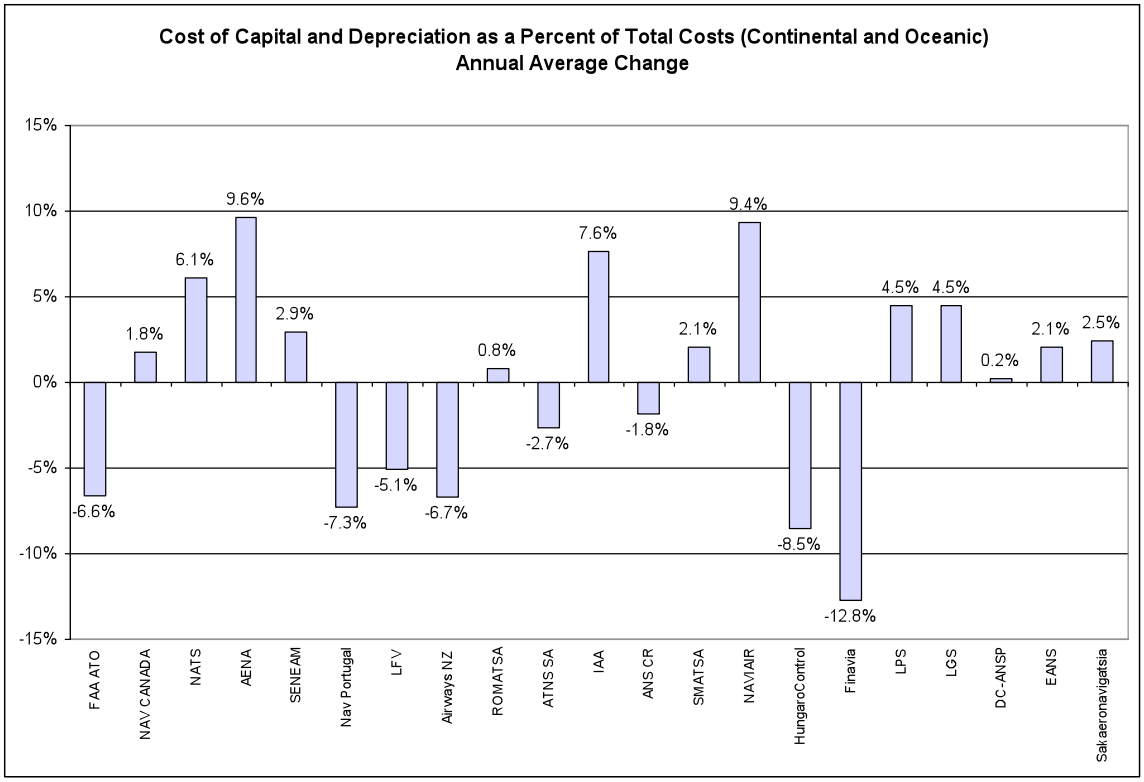
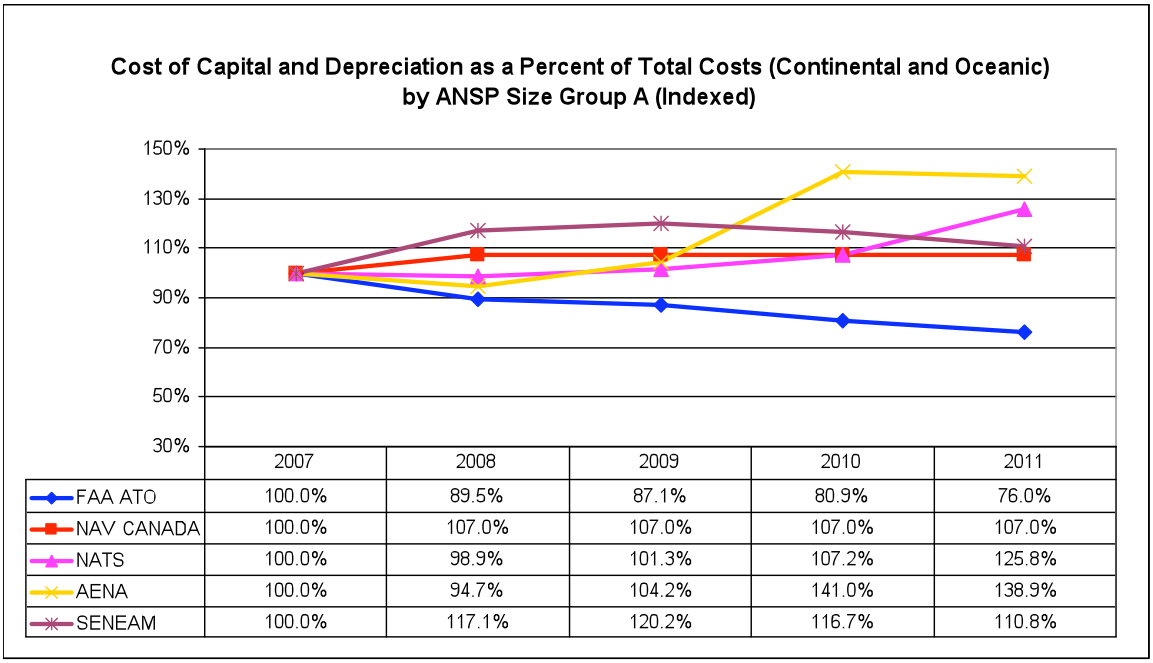
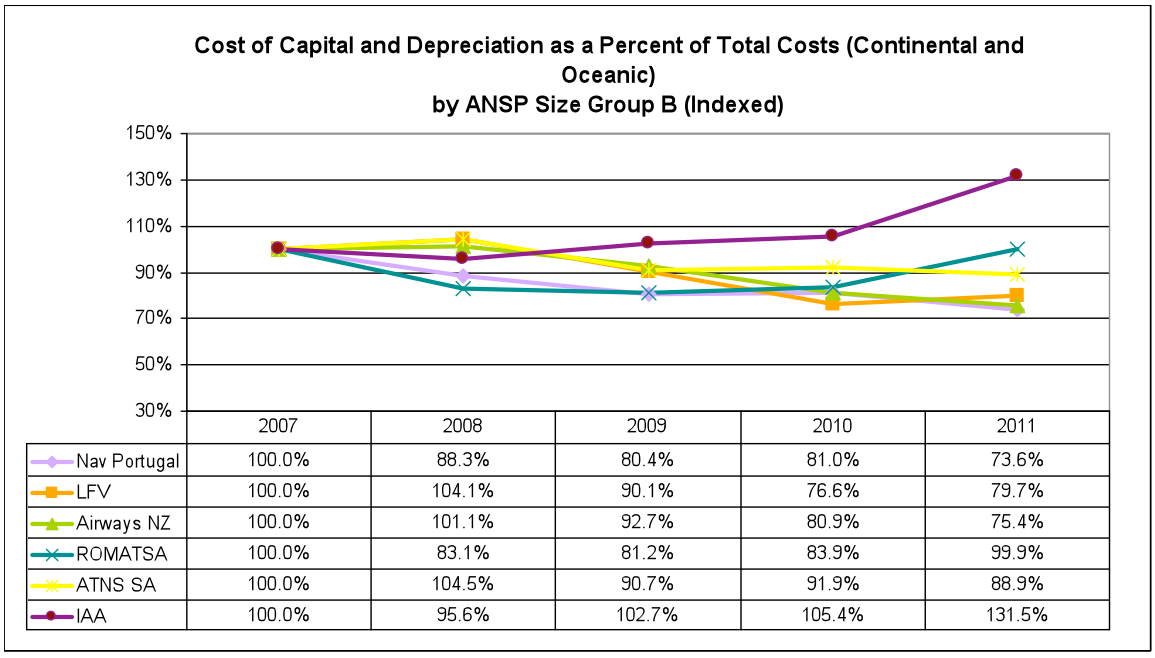



**Figure 9-71: Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic) by ANSP Size Grouping A (Indexed)**



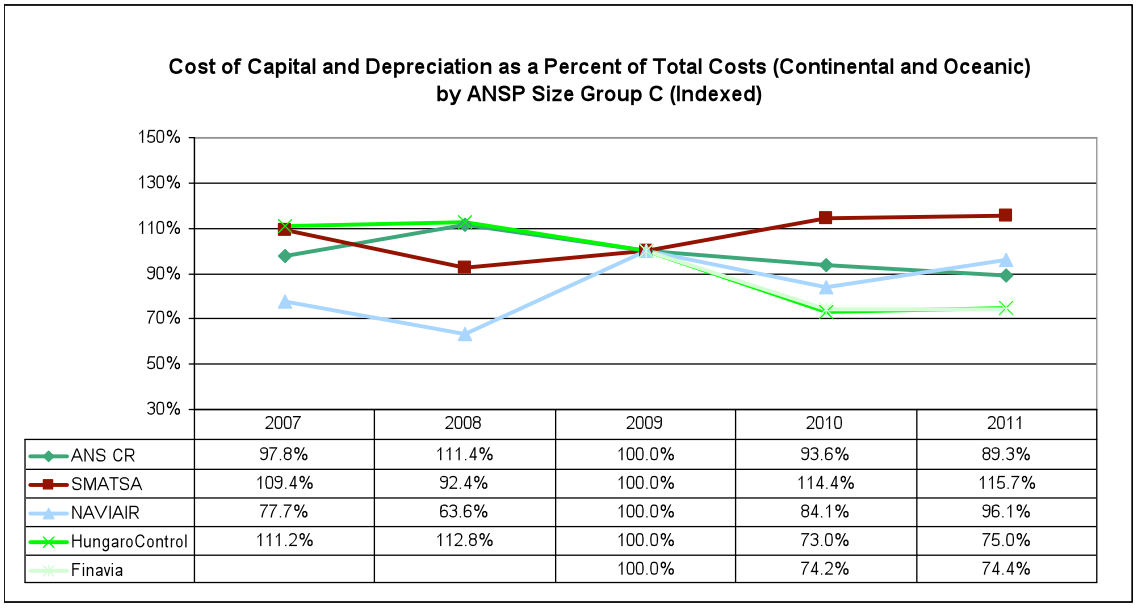

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 89.5% | 87.1% | 80.9% | 76.0% |
| NAV CANADA | 100.0% | 107.0% | 107.0% | 107.0% | 107.0% |
| NATS | 100.0% | 98.9% | 101.3% | 107.2% | 125.8% |
| AENA | 100.0% | 94.7% | 104.2% | 141.0% | 138.9% |
| SENEAM | 100.0% | 117.1% | 120.2% | 116.7% | 110.8% |

**Figure 9-72: Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic) by ANSP Size Grouping B (Indexed)**



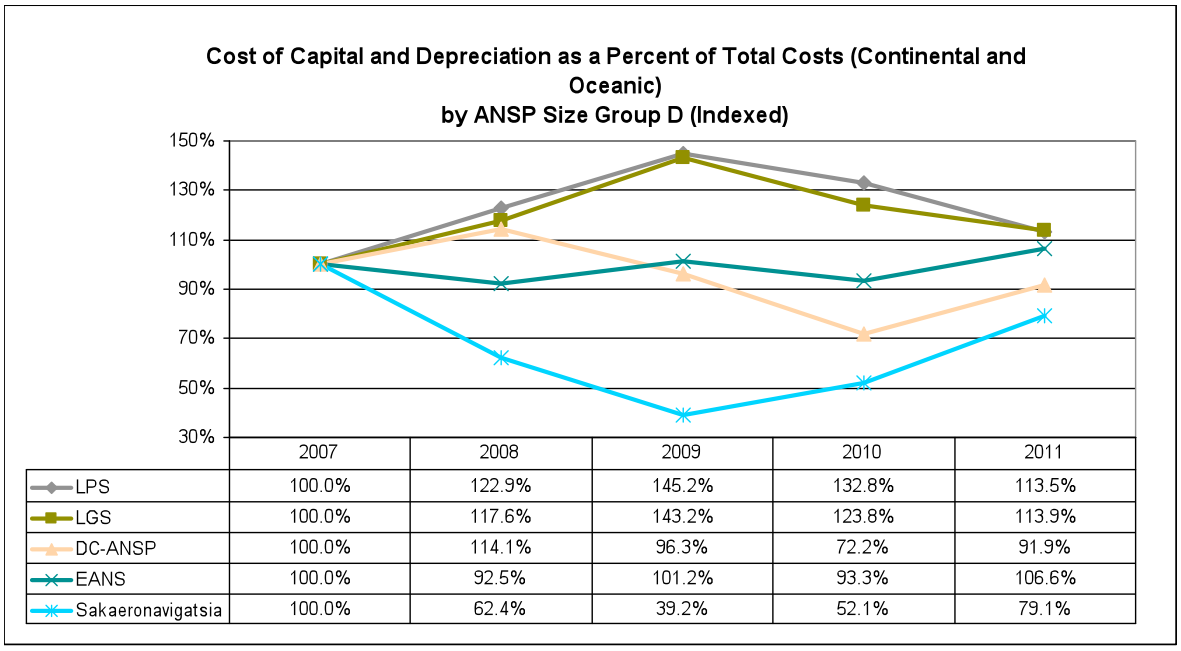

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Nav Portugal | 100.0% | 88.3% | 80.4% | 81.0% | 73.6% |
| LFV | 100.0% | 104.1% | 90.1% | 76.6% | 79.7% |
| Airways NZ | 100.0% | 101.1% | 92.7% | 80.9% | 75.4% |
| ROMATSA | 100.0% | 83.1% | 81.2% | 83.9% | 99.9% |
| ATNS SA | 100.0% | 104.5% | 90.7% | 91.9% | 88.9% |
| IAA | 100.0% | 95.6% | 102.7% | 105.4% | 131.5% |

**Figure 9-73: Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic) by ANSP Size Grouping C (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| ANS CR | 97.8% | 111.4% | 100.0% | 93.6% | 89.3% |
| SMATSA | 109.4% | 92.4% | 100.0% | 114.4% | 115.7% |
| NAVIAIR | 77.7% | 63.6% | 100.0% | 84.1% | 96.1% |
| HungaroControl | 111.2% | 112.8% | 100.0% | 73.0% | 75.0% |
| Finavia | | | 100.0% | 74.2% | 74.4% |

**Figure 9-74: Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic) by ANSP Size Grouping D (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| LPS | 100.0% | 122.9% | 145.2% | 132.8% | 113.5% |
| LGS | 100.0% | 117.6% | 143.2% | 123.8% | 113.9% |
| DC-ANSP | 100.0% | 114.1% | 96.3% | 72.2% | 91.9% |
| EANS | 100.0% | 92.5% | 101.2% | 93.3% | 106.6% |
| Sakaeronavigatsia | 100.0% | 62.4% | 39.2% | 52.1% | 79.1% |

**Figure 9-75: Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic) by ANSP**

| Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | 30% | 27% | 26% | 25% | 26% | -3.3% |
| NAV CANADA | A | 36% | 38% | 41% | 41% | 42% | 4.1% |
| NATS | A | 32% | 33% | 36% | 36% | 34% | 2.1% |
| AENA | A | 69% | 69% | 68% | 58% | 54% | -5.7% |
| SENEAM | A | 29% | 30% | 33% | 34% | 36% | 5.5% |
| Nav Portugal | B | 28% | 32% | 35% | 37% | 47% | 14.5% |
| LFV | B | 33% | 43% | 40% | 39% | 46% | 9.4% |
| Airways NZ | B | 44% | 44% | 45% | 46% | 46% | 1.3% |
| ROMATSA | B | 37% | 32% | 31% | 27% | 28% | -5.9% |
| ATNS SA | B | 21% | 24% | 25% | 23% | 28% | 7.5% |
| IAA | B | 34% | 34% | 37% | 34% | 35% | 1.4% |
| ANS CR | C | 31% | 29% | 26% | 28% | 30% | -1.2% |
| SMATSA | C | 27% | 24% | 25% | 25% | 25% | -1.6% |
| NAVIAIR | C | 34% | 27% | 36% | 30% | 29% | -1.3% |
| HungaroControl | C | 30% | 30% | 31% | 26% | 36% | 6.8% |
| Finavia | C | | | 38% | 40% | 38% | 0.2% |
| LPS | D | 26% | 25% | 25% | 27% | 25% | -0.9% |
| LGS | D | 20% | 21% | 21% | 19% | 20% | 1.1% |
| EANS | D | 31% | 37% | 36% | 41% | 43% | 8.5% |
| Sakaeronavigatsia | D | 9% | 8% | 14% | 14% | 15% | 18.3% |

**Figure 9-76: Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic) Average Annual Change**

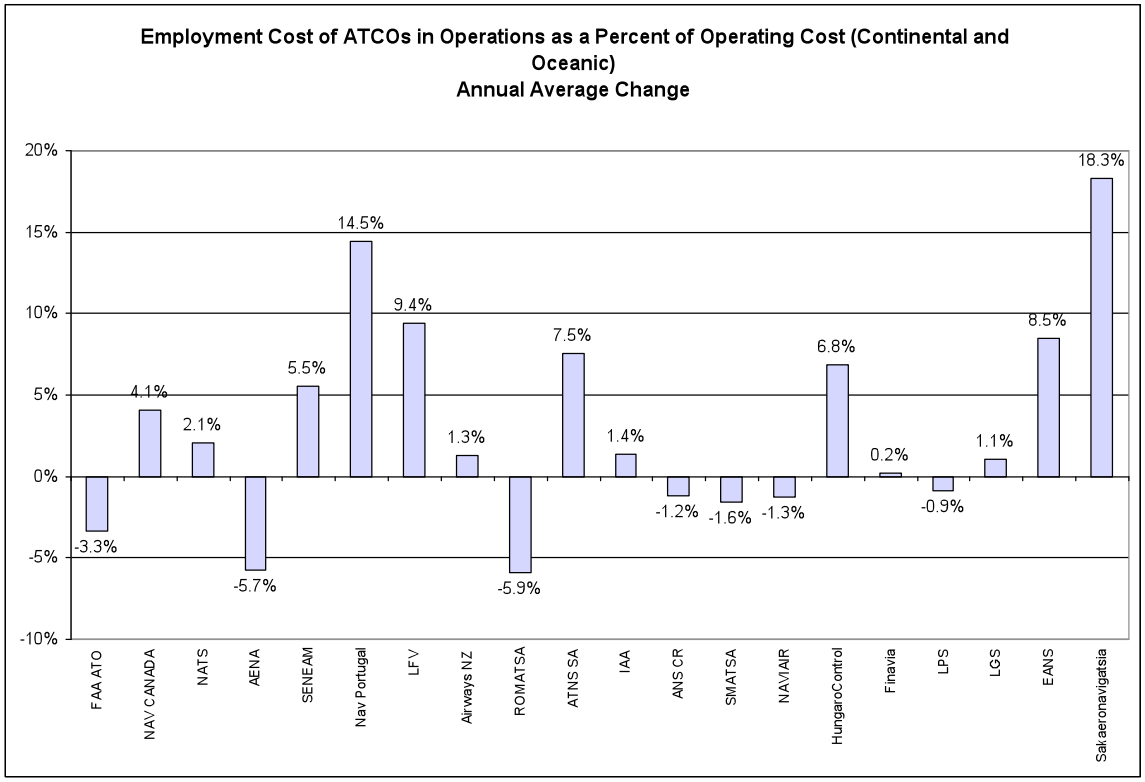
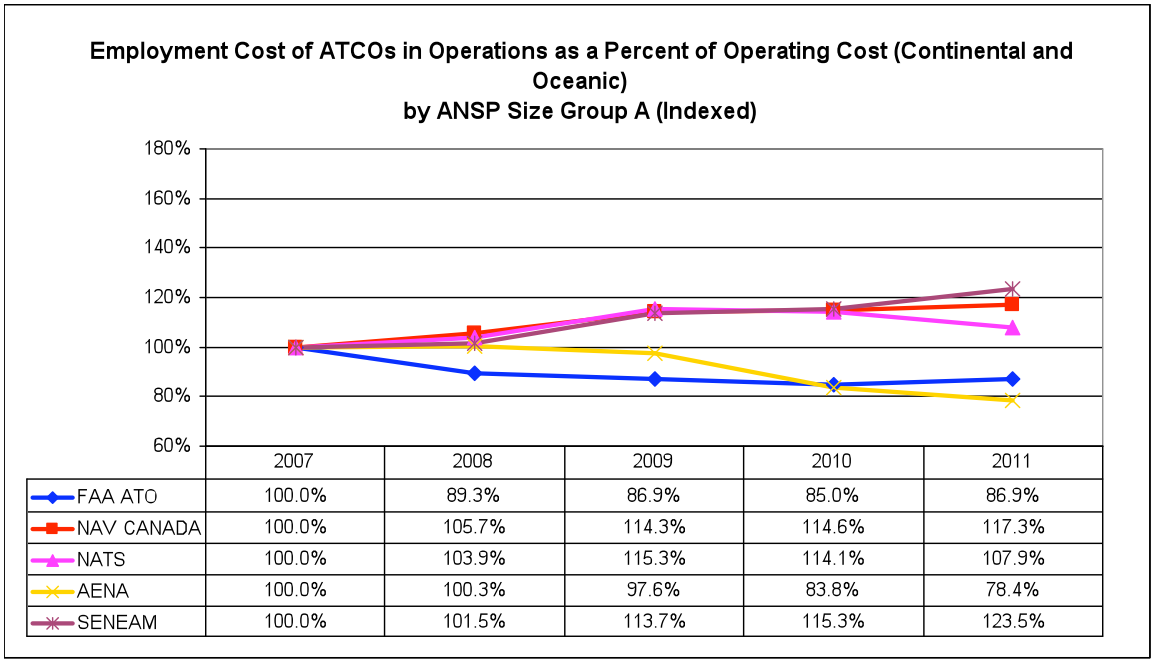
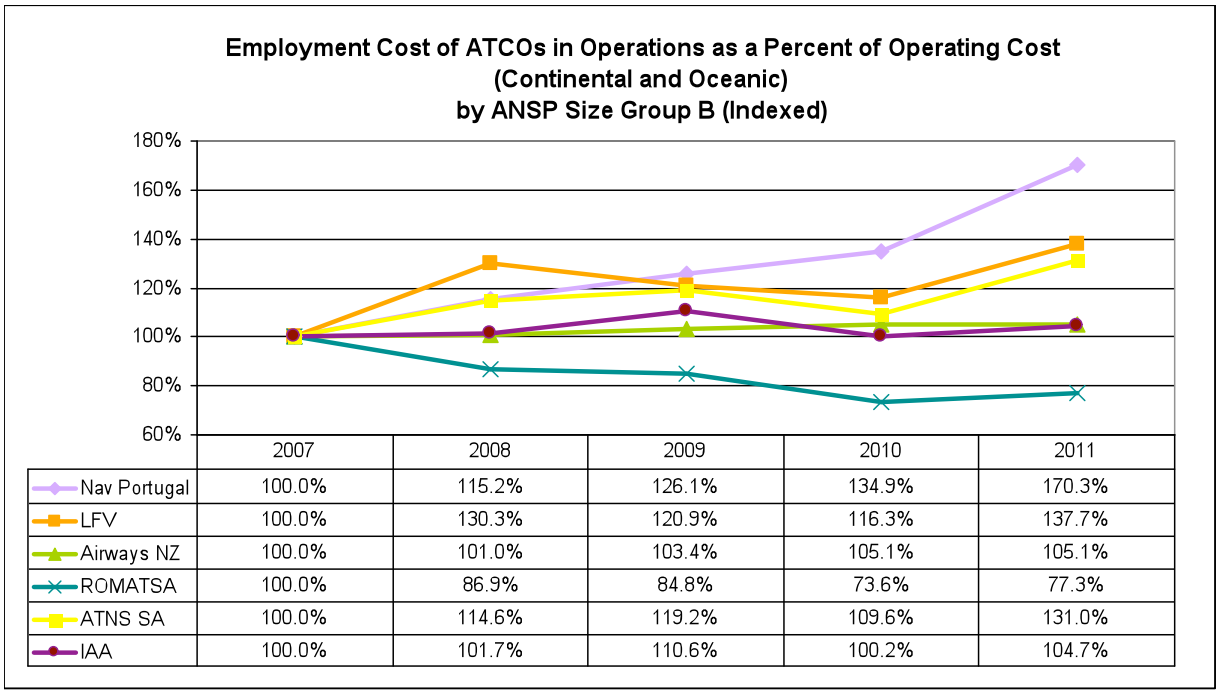



**Figure 9-77: Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic) by ANSP Size Grouping A (Indexed)**



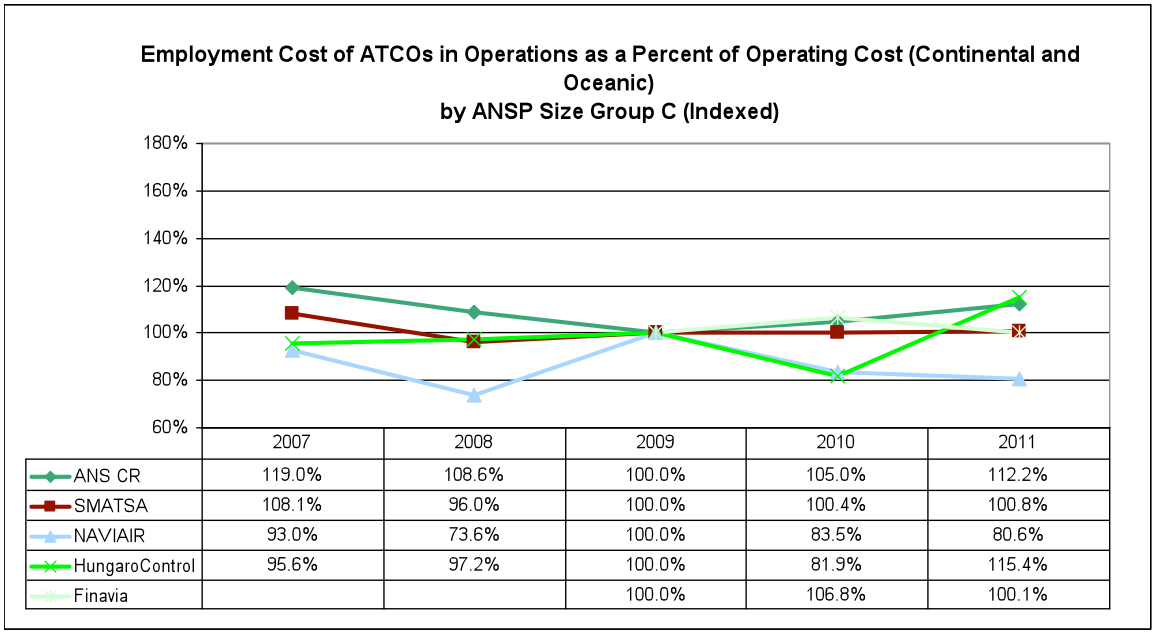

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 89.3% | 86.9% | 85.0% | 86.9% |
| NAV CANADA | 100.0% | 105.7% | 114.3% | 114.6% | 117.3% |
| NATS | 100.0% | 103.9% | 115.3% | 114.1% | 107.9% |
| AENA | 100.0% | 100.3% | 97.6% | 83.8% | 78.4% |
| SENEAM | 100.0% | 101.5% | 113.7% | 115.3% | 123.5% |

**Figure 9-78: Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic) by ANSP Size Grouping B (Indexed)**



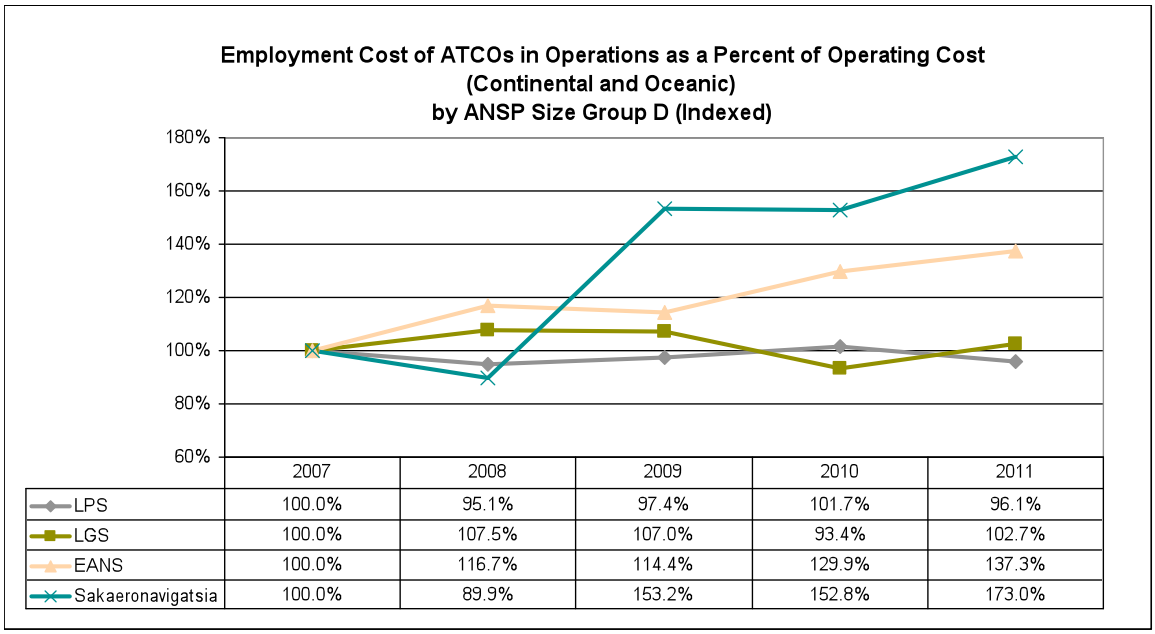

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Nav Portugal | 100.0% | 115.2% | 126.1% | 134.9% | 170.3% |
| LFV | 100.0% | 130.3% | 120.9% | 116.3% | 137.7% |
| Airways NZ | 100.0% | 101.0% | 103.4% | 105.1% | 105.1% |
| ROMATSA | 100.0% | 86.9% | 84.8% | 73.6% | 77.3% |
| ATNS SA | 100.0% | 114.6% | 119.2% | 109.6% | 131.0% |
| IAA | 100.0% | 101.7% | 110.6% | 100.2% | 104.7% |

**Figure 9-79: Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic) by ANSP Size Grouping C (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| ANS CR | 119.0% | 108.6% | 100.0% | 105.0% | 112.2% |
| SMATSA | 108.1% | 96.0% | 100.0% | 100.4% | 100.8% |
| NAVIAIR | 93.0% | 73.6% | 100.0% | 83.5% | 80.6% |
| HungaroControl | 95.6% | 97.2% | 100.0% | 81.9% | 115.4% |
| Finavia | | | 100.0% | 106.8% | 100.1% |

**Figure 9-80: Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic) by ANSP Size Grouping D (Indexed)**

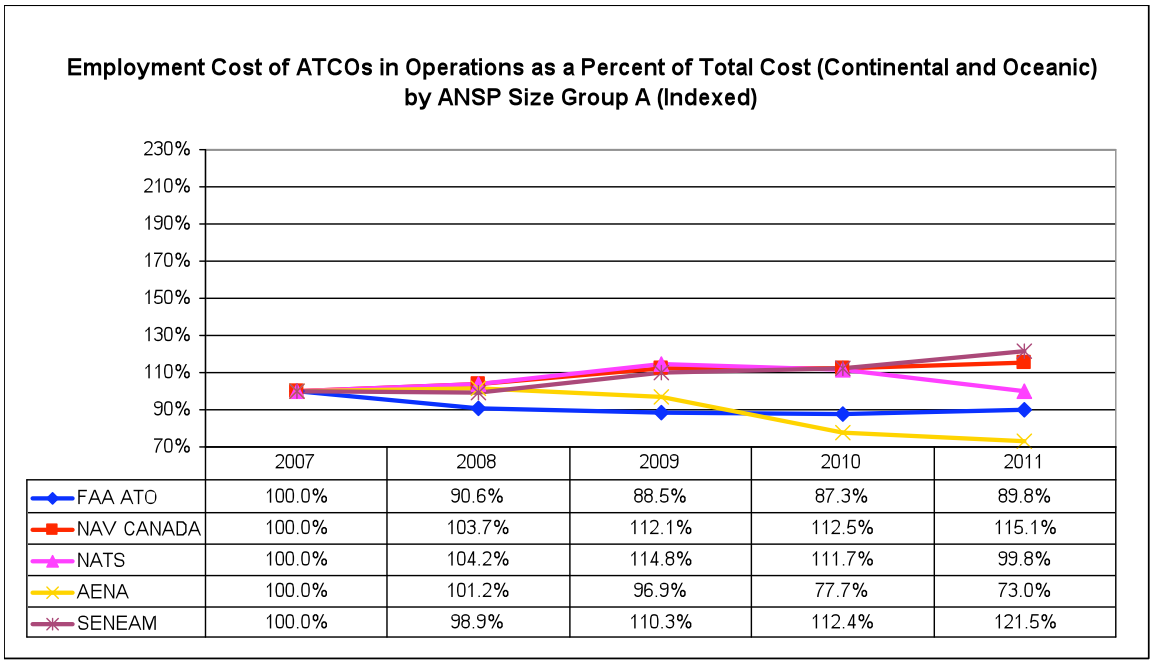



| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| LPS | 100.0% | 95.1% | 97.4% | 101.7% | 96.1% |
| LGS | 100.0% | 107.5% | 107.0% | 93.4% | 102.7% |
| EANS | 100.0% | 116.7% | 114.4% | 129.9% | 137.3% |
| Sakaeronavigatsia | 100.0% | 89.9% | 153.2% | 152.8% | 173.0% |

**Figure 9-81: Employment Cost of ATCOs in Operations as a Percent of Total Cost (Continental and Oceanic) by ANSP**

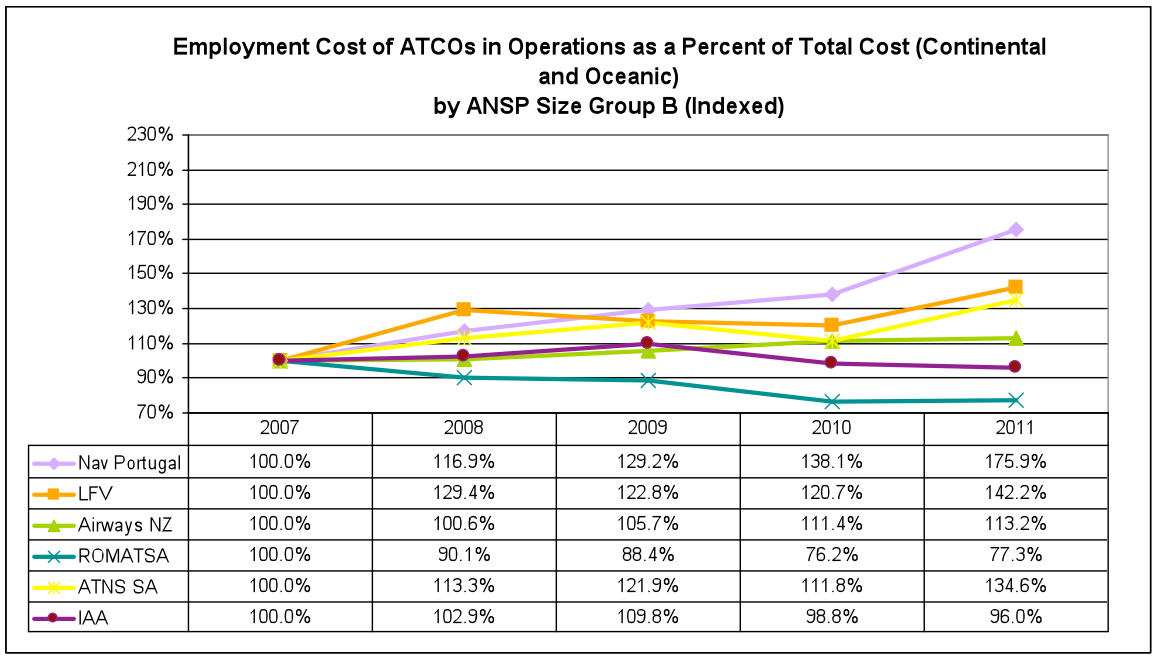
| Employment Cost of ATCOs in Operations as a Percent of Total Cost (Continental and Oceanic) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 | Annual Average Change |
|---|---|---|---|---|---|---|---|
| FAA ATO | A | 26% | 24% | 23% | 23% | 24% | -2.5% |
| NAV CANADA | A | 28% | 30% | 32% | 32% | 33% | 3.6% |
| NATS | A | 25% | 26% | 28% | 27% | 24% | 0.2% |
| AENA | A | 59% | 60% | 57% | 46% | 43% | -7.2% |
| SENEAM | A | 25% | 25% | 28% | 29% | 31% | 5.1% |
| Nav Portugal | B | 25% | 29% | 32% | 34% | 43% | 15.4% |
| LFV | B | 29% | 37% | 35% | 35% | 41% | 10.1% |
| Airways NZ | B | 33% | 33% | 35% | 37% | 38% | 3.2% |
| ROMATSA | B | 30% | 27% | 27% | 23% | 23% | -6.0% |
| ATNS SA | B | 17% | 19% | 21% | 19% | 23% | 8.3% |
| IAA | B | 27% | 27% | 29% | 26% | 25% | -0.8% |
| ANS CR | C | 23% | 20% | 19% | 21% | 23% | -0.3% |
| SMATSA | C | 19% | 18% | 18% | 17% | 17% | -2.3% |
| NAVIAIR | C | 28% | 23% | 29% | 25% | 23% | -3.4% |
| HungaroControl | C | 28% | 25% | 25% | 22% | 30% | 4.2% |
| Finavia | C | | | 32% | 36% | 33% | 2.8% |
| LPS | D | 22% | 20% | 19% | 21% | 20% | -1.5% |
| LGS | D | 15% | 15% | 14% | 13% | 15% | -0.1% |
| EANS | D | 22% | 27% | 25% | 30% | 30% | 8.1% |
| Sakaeronavigatsia | D | 5% | 6% | 11% | 10% | 10% | 25.2% |

**Figure 9-82: Employment Cost of ATCOs in Operations as a Percent of Total Cost (Continental and Oceanic) by ANSP Size Grouping A (Indexed)**



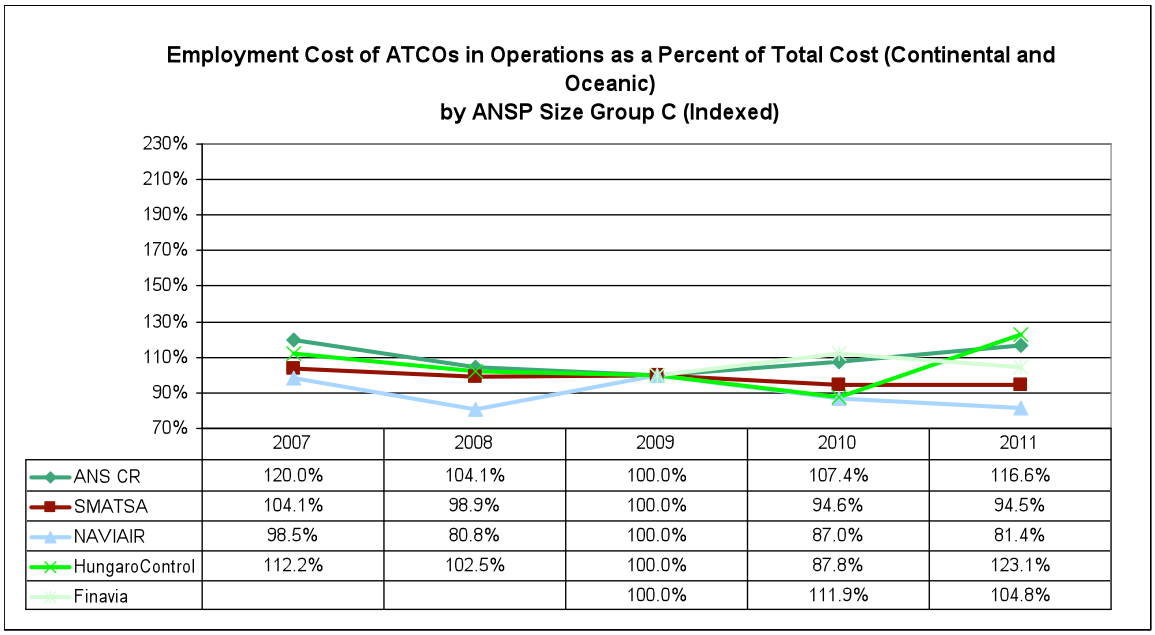

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| FAA ATO | 100.0% | 90.6% | 88.5% | 87.3% | 89.8% |
| NAV CANADA | 100.0% | 103.7% | 112.1% | 112.5% | 115.1% |
| NATS | 100.0% | 104.2% | 114.8% | 111.7% | 99.8% |
| AENA | 100.0% | 101.2% | 96.9% | 77.7% | 73.0% |
| SENEAM | 100.0% | 98.9% | 110.3% | 112.4% | 121.5% |

**Figure 9-83: Employment Cost of ATCOs in Operations as a Percent of Total Cost (Continental and Oceanic) by ANSP Size Grouping B (Indexed)**



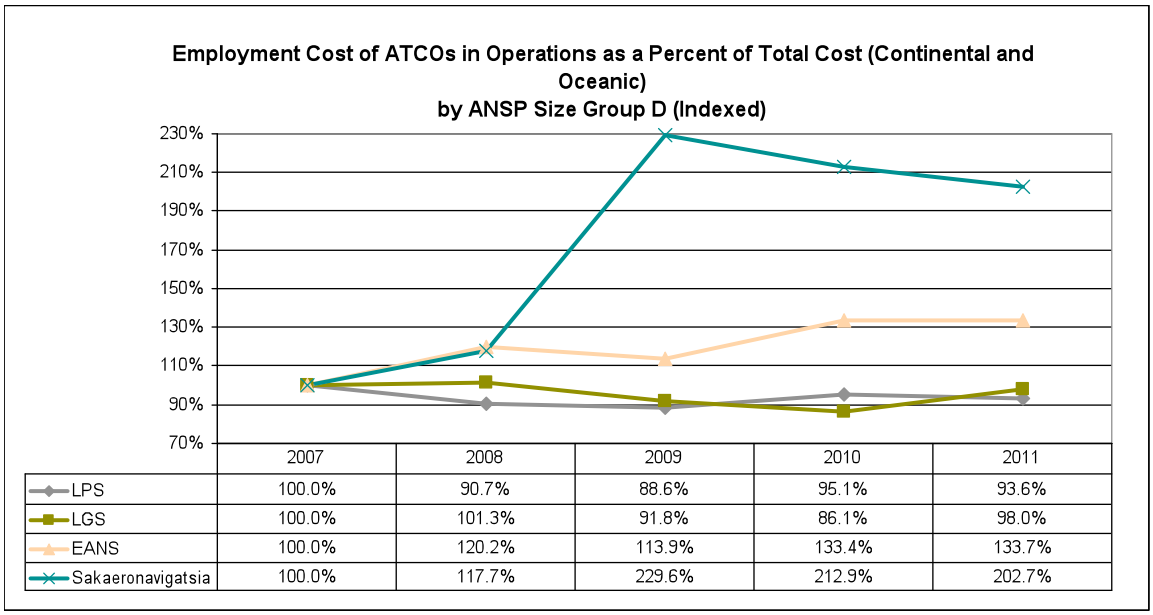

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Nav Portugal | 100.0% | 116.9% | 129.2% | 138.1% | 175.9% |
| LFV | 100.0% | 129.4% | 122.8% | 120.7% | 142.2% |
| Airways NZ | 100.0% | 100.6% | 105.7% | 111.4% | 113.2% |
| ROMATSA | 100.0% | 90.1% | 88.4% | 76.2% | 77.3% |
| ATNS SA | 100.0% | 113.3% | 121.9% | 111.8% | 134.6% |
| IAA | 100.0% | 102.9% | 109.8% | 98.8% | 96.0% |

**Figure 9-84: Employment Cost of ATCOs in Operations as a Percent of Total Cost (Continental and Oceanic) by ANSP Size Grouping C (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| ANS CR | 120.0% | 104.1% | 100.0% | 107.4% | 116.6% |
| SMATSA | 104.1% | 98.9% | 100.0% | 94.6% | 94.5% |
| NAVIAIR | 98.5% | 80.8% | 100.0% | 87.0% | 81.4% |
| HungaroControl | 112.2% | 102.5% | 100.0% | 87.8% | 123.1% |
| Finavia | | | 100.0% | 111.9% | 104.8% |

**Figure 9-85: Employment Cost of ATCOs in Operations as a Percent of Total Cost (Continental and Oceanic) by ANSP Size Grouping D (Indexed)**




| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| LPS | 100.0% | 90.7% | 88.6% | 95.1% | 93.6% |
| LGS | 100.0% | 101.3% | 91.8% | 86.1% | 98.0% |
| EANS | 100.0% | 120.2% | 113.9% | 133.4% | 133.7% |
| Sakaeronavigatsia | 100.0% | 117.7% | 229.6% | 212.9% | 202.7% |

### 9.3.3. Price, Revenue, and Profitability

**Figure 9-86: Return on Assets (ROA) by ANSP**

| Return On Assets (ROA) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| NATS | A | 12.3% | 7.7% | 4.7% | 6.1% | 4.0% |
| Nav Portugal | B | 10.3% | 1.2% | 4.3% | 12.9% | 11.3% |
| LFV | B | (3.3%) | 5.2% | (7.3%) | (4.9%) | 1.9% |
| Airways NZ | B | 7.8% | 7.5% | 5.6% | 5.7% | 3.6% |
| ROMATSA | B | (2.7%) | 0.7% | 3.1% | 9.0% | 9.6% |
| ATNS SA | B | 8.1% | 4.3% | 5.2% | 3.7% | 12.5% |
| IAA | B | 0.5% | 4.8% | 5.1% | 3.9% | 9.3% |
| ANS CR | C | 1.3% | (2.3%) | (0.6%) | (0.2%) | 1.9% |
| SMATSA | C | 0.5% | 1.1% | 0.5% | 3.8% | 2.0% |
| NAVIAIR | C | (4.7%) | (1725.8%) | (6.9%) | 0.1% | 2.4% |
| HungaroControl | C | 9.4% | 5.1% | 0.5% | (1.3%) | 8.6% |
| LPS | D | 0.7% | 4.1% | 0.3% | 0.7% | 0.6% |
| LGS | D | (1.6%) | (7.2%) | (4.1%) | (11.3%) | (11.5%) |
| DC-ANSP | D | | 11.1% | 6.1% | 2.2% | 2.3% |

**Figure 9-87: Return on Equity (ROE) by ANSP**

| Return On Equity (ROE) | Flight Hour Group | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| NATS | A | 15% | 31% | 14% | 19% | 20% |
| Nav Portugal | B | 18% | 4% | 14% | 41% | 38% |
| LFV | B | -3% | 6% | -8% | -91% | 14% |
| Airways NZ | B | 22% | 21% | 15% | 16% | 11% |
| ROMATSA | B | -3% | 1% | 4% | 11% | 13% |
| ATNS SA | B | 12% | 7% | 8% | 6% | 19% |
| IAA | B | 1% | 7% | 7% | 15% | 77% |
| ANS CR | C | 2% | -3% | -1% | 0% | 2% |
| SMATSA | C | 1% | 1% | 1% | 6% | 4% |
| NAVIAIR | C | -130% | -194% | -174% | 0% | 5% |
| HungaroControl | C | 11% | 8% | 1% | -2% | 16% |
| LPS | D | 1% | 5% | 0% | 1% | 1% |
| LGS | D | -1% | -11% | -5% | -14% | -14% |
| DC-ANSP | D | | 72% | 29% | 9% | 9% |

# Appendix A: Glossary

| | |
|---|---|
| ADS-B | Automatic Dependent Surveillance-Broadcast |
| ANS | Air Navigation Services |
| ANSP | Air Navigation Service Provider |
| ATC | Air Traffic Control |
| ATCO | Air Traffic Controller |
| ATM | Air Traffic Management |
| ATS | Air Traffic Services |
| CANSO | Civil Air Navigation Service Organisation |
| EUROCONTROL | The European Organisation for the Safety of Air Navigation |
| FY | Fiscal Year |
| GBWG | Global Benchmarking Working Group |
| GDP | Gross Domestic Product |
| IATA | International Air Transport Association |
| ICAO | International Civil Aviation Organisation |
| IFR | Instrument Flight Rules |
| IFRS | International Financial Reporting Standards |
| IMF | International Monetary Funds |
| LOS | Loss of Separation |
| KPI | Key Performance Indicator |
| OANDA | A recognised organisation and source for international currency exchange rates (www.oanda.com) |
| PPP | Purchasing Power Parity |
| PRU | Performance Review Unit |
| ROA | Return On Assets |
| ROE | Return On Equity |
| RPK | Revenue Passenger Kilometres |
| SMS | Safety Management Systems |
| SSC | Safety Standing Committee |
| TNC | Terminal Air Navigation Services Costs and Charges |
| USD | United States Dollar |
| WAM | Wide Area Multilateration |

## Appendix B: Legend for ANSP Names on Graphs

| Graph Name | Organization Name | Country |
|---|---|---|
| FAA ATO | Air Traffic Organization - FAA | United States |
| NAV CANADA | NAV CANADA | Canada |
| AAI | Airports Authority of India | India |
| NATS | National Air Traffic Services UK | United Kingdom |
| AENA | Aeropuertos Españoles y Navegación Aérea | Spain |
| SENEAM | Servicios a la Navegación en el Espacio Aéreo Mexicano | Mexico |
| DHMİ | General Directorate of State Airports Authority (DHMI) | Turkey |
| Nav Portugal | NAV Portugal | Portugal |
| LFV | Luftfartsverket Svierge | Sweden |
| AEROTHAI | Aeronautical Radio of Thailand | Thailand |
| Airways NZ | Airways New Zealand | New Zealand |
| ROMATSA | Română a Serviciilor de Trafic Aerian | Romania |
| ATNS SA | Air Traffic and Navigation Services South Africa | South Africa |
| IAA | Irish Aviation Authority | Ireland |
| ANS CR | Air Navigation Service | Czech Republic |
| SMATSA | Serbia and Montenegro Air Traffic Servicse Agency | Serbia |
| NAVIAIR | Navidation Via Air | Denmark |
| HungaroControl | HungaroControl | Hungary |
| DCAC | Department of Civil Aviation of Cyprus | Cyprus |
| Finavia | Finavia | Finland |
| LPS | Letové prevádzkové služby | Slovak Republic |
| LGS | Latvijas Gaisa Satiksme | Latvia |
| DC-ANSP | Dutch Caribbean Air Navigation Service Provider | Curaçao |
| EANS | Estonian Air Navigation Services Lennuliiklusteeninduse AS | Estonia |
| Sakaeronavigatsia | Sakaeronavigatsia | Georgia |
| DANS | Dubai Air Navigation Services | United Arab Emirates |

# Appendix C: Data Elements – Definitions

The following data element definitions have been used in this CANSO Global ANS Performance Report 2012.

| Data Element | Definition |
|---|---|
| **ATCOs in Operations (Continental)** | The number of continental Full Time Equivalent (FTE) ATCOs who are participating in an activity that is either directly related to the control of traffic or is a necessary requirement for ATCOs to be able to control traffic. Such activities include manning a position, refresher training, and supervising on the job trainee controllers; activities do not include participating in special projects, teaching at a training academy, or providing instruction in a simulator. Note: See EUROCONTROL Specifications (item C) for further clarification. Includes first-line supervisors. Does not include on-the-job trainees. |
| **ATCOs in Operations (Oceanic)** | The number of oceanic FTE ATCOs who are participating in an activity that is either directly related to the control of traffic or is a necessary requirement for ATCOs to be able to control traffic. Such activities include manning a position, refresher training, and supervising on the job trainee controllers; activities do not include participating in special projects, teaching at a training academy, or providing instruction in a simulator. Note: See EUROCONTROL Specifications (item C) for further clarification. Includes first-line supervisors. Does not include on-the-job trainees. |
| **ATCO in Operations Hours (Continental)** | Average Annual Working Hours for ATCOs in Operations times the number of ATCOs in Operations (Continental). |
| **ATCO in Operations Hours (Oceanic)** | Average Annual Working Hours for ATCOs in Operations times the number of ATCOs in Operations (Oceanic). |
| **Average Annual Working Hours for ATCOs in Operations** | The number of hours 'ATCOs in Operations' spends on duty in operations, including breaks and overtime in operations. This figure could be available from a time recording system (using for example first clock-in and last clock-out times); it could be computed from the roster plan; or it could be calculated by adding the average overtime worked in operations to the contractual working hours and subtracting the average time an ATCO is not on duty in operations. |
| **Cost of Capital and Depreciation** | The Cost of Capital falls into two categories. The first is the interest paid to the providers of debt capital. The second is the appropriate cost of capital applied to equity capital.<br><br>1. For ANSPs with both categories, the cost of capital is the interest expense on debt capital plus the cost of capital on equity built into the ANSP charges.<br><br>2. For ANSPs with only debt capital, the cost of capital is the interest expense.<br><br>3. For ANSPs with only debt capital where the interest expense is born by the government and not reflected in the accounts of the ANSP, the cost of capital can be computed by applying the interest rate on overall government borrowing to the ANSP capital. |
| **Employment Cost for ATCOs in Operations (Continental)** | Total continental employment costs including gross wages and salaries, payments for overtime and other bonuses, employer contribution to social security scheme and taxes, pension contributions, and other benefits for 'ATCOs in Operations.' This should exclude mission-related expenditures, including travel expenditures and training fees, as these should be considered operating costs. |
| **Employment Cost for ATCOs in Operations (Oceanic)** | Total oceanic employment costs including gross wages and salaries, payments for overtime and other bonuses, employer contribution to social security scheme and taxes, pension contributions, and other benefits for 'ATCOs in Operations.' This should exclude mission-related expenditures, including travel expenditures and training fees, as these should be considered operating costs. |
| **Example consolidated price per 1000 km flown for A320** | The sum of en route, approach, and terminal navigation charges for a theoretical continental flight of 1000 km (i.e. distance between two airports is 1000 km). ANSP with location-specific pricing will apply pricing related to highest IFR traffic (high demand) city-pair; ANSPs with national pricing regime will apply these charges to the theoretical continental flight. Amount excludes taxes, such as VAT. |

| Data Element | Definition |
|---|---|
| **IFR Flight Hours (Continental)** | The sum of IFR flight hours (non-oceanic) controlled by an ANSP's En Route Centres (ACCs) and Approach Control Centres (APPs). For any given flight, the flight hours controlled are derived from the difference between the entry time and the exit time (as derived from the last flight plan received) in the controlled airspace. Where measurement entry time and exit time differ from wheels-up and wheels-down, the ANSP may apply a factor of one minute per continental arrival and one minute per continental departure. (Revised from two minutes to one minute May 2007 based on clarification from EUROCONTROL and CANSO Working Group). |
| **IFR Flight Hours (Oceanic)** | The sum of oceanic IFR flight hours controlled by an ANSP's En Route Centres (ACCs). For any given flight, the flight hours controlled are derived from the difference between the entry time and the exit time (as derived from the last flight plan received) in the oceanic controlled airspace. |
| **Return on Assets (ROA)** | Measure of company's profitability.<br>ROA = Net Income/Total Assets (Annual Average) |
| **Return on Equity (ROE)** | Measure of how well a company used reinvested earnings to generate additional earnings.<br>ROE = Net Income/Total Equity (Annual Average) |
| **Total ANS Revenue (Continental)** | ANS Revenue (Continental) is ANS revenue (before adjustments from previous years) from the provision of en route and terminal ANS services. |
| **Total ANS Revenue (Oceanic)** | ANS Revenue (Oceanic) is ANS revenue (before adjustments from previous years) from the provision of oceanic ANS services. |
| **Total Costs (Continental)** | The sum of Operating Costs, Depreciation/Amortisation, and Cost of Capital related to providing Continental ATC/ATFM Services. |
| **Total Costs (Continental and Oceanic)** | The sum of Total Costs (Continental) and Total Costs (Oceanic). |
| **Total Costs (Oceanic)** | The sum of Oceanic Operating Costs, Depreciation/Amortisation, and Cost of Capital related to providing Oceanic ATC/ATFM Services. |
| **Total Employment Cost for ATCOs in Operations** | Total employment costs including gross wages and salaries, payments for overtime and other bonuses, employer contribution to social security scheme and taxes, pension contributions, and other benefits for 'ATCOs in Operations.' This should exclude pension contributions paid by the employer and mission related expenditures, including travel expenditures and training fees, as these should be considered operating costs. |
| **Total IFR Flight Hours** | Total number of controlled IFR flight hours in continental and oceanic airspace. |
| **Total Operating Cost** | Operating costs include direct and indirect employment costs, non-staff operating expenses, and other costs incurred through the purchase of goods and services directly used to provide continental and oceanic ANS services. This should include outsourced services such as communications, IT, and external staff with short term assignments. Other items that are usually included in 'operating costs' include materials; energy; rent; and facilities and maintenance. This excludes the cost of providing Meteorological (MET) services, which should be counted under 'other unique costs.' |

# Appendix D: KPI Definitions

The following key performance indicators have been used in this CANSO Global ANS Performance Report 2012.

**1. Continental Key Performance Indicators**

**1.1 Productivity**

| **Title of KPI** | **IFR Flight Hours per ATCO in Operations (Continental)** |
|---|---|
| Continental IFR Flight Hours per Continental ATCO in Operations. | |
| **Data Elements Required** | 1. IFR Flight Hours (Continental)<br>2. ATCOs in Operations (Continental) |
| **Calculation** | IFR Flight Hours (Continental) divided by ATCOs in Operations (Continental) |

| **Title of KPI** | **IFR Flight Hours per ATCO in Operations Hours (Continental)** |
|---|---|
| Continental IFR Flight Hours per Continental ATCO Hour | |
| **Data Elements Required** | 1. IFR Flight Hours (Continental)<br>2. ATCO in Operations Hours (Continental) |
| **Calculation** | IFR Flight Hours (Continental) divided by ATCOs in Operations Hours (Continental) |

**1.2 Cost-Effectiveness**

| **Title of KPI** | **Cost (USD) per IFR Flight Hour (Continental)** |
|---|---|
| The Continental Cost in U.S. Dollars, per Continental IFR Flight Hour. | |
| **Data Elements Required** | 1. Total Costs (Continental)<br>2. IFR Flight Hours (Continental)<br>3. Exchange Rate |
| **Calculation** | Total Costs (Continental) times the applicable Exchange Rate divided by IFR Flight Hours (Continental) |

| **Title of KPI** | **Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental)** |
|---|---|
| The Continental Employment Cost for ATCOs in Operations in U.S. Dollars, per Continental IFR Flight Hour. | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Continental)<br>2. IFR Flight Hours (Continental)<br>3. Exchange Rate |
| **Calculation** | Employment Cost for ATCOs in Operations (Continental) times the applicable Exchange Rate divided by IFR Flight Hours (Continental) |

| **Title of KPI** | **Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Continental) applying Purchasing Power Parity (PPP)** |
|---|---|
| The Continental Employment Cost for ATCOs in Operations in U.S. Dollars, indexed using the PPP rate for the corresponding year, per Continental IFR Flight Hour. | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Continental)<br>2. IFR Flight Hours (Continental)<br>3. IMF PPP |
| **Calculation** | Employment Cost for ATCOs in Operations (Continental) divided by the IMF PPP divided by IFR Flight Hours (Continental) |

| **Title of KPI** | **Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental)** |
|---|---|
| The Continental Employment Cost for ATCOs in Operations in U.S. Dollars, using the applicable exchange rate, per Continental ATCO in Operations. | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Continental)<br>2. ATCOs in Operations (Continental)<br>3. Exchange Rate |

| | |
|---|---|
| **Calculation** | Employment Cost for ATCOs in Operations (Continental) times the applicable Exchange Rate divided by ATCOs in Operations (Continental) |

| **Title of KPI** | **Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Continental) applying Purchasing Power Parity (PPP)** |
|---|---|
| The Continental Employment Cost for ATCOs in Operations in U.S. Dollars, indexed using the PPP rate for the corresponding year, per Continental ATCO in Operations. | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Continental)<br>2. ATCOs in Operations (Continental)<br>3. IMF PPP |
| **Calculation** | Employment Cost for ATCOs in Operations (Continental) divided by the IMF PPP divided by ATCOs in Operations (Continental) |

**1.3 Price, Revenue, and Profitability**

| **Title of KPI** | **Example consolidated price (USD) per 1000 km flown for A320** |
|---|---|
| Examples of ANSP charges for a sample 1000 km flown by an A320 aircraft. | |
| **Data Elements Required** | 1. Example consolidated price (USD) for a sample 1000 km flight for A320<br>2. Exchange Rate |
| **Calculation** | Example consolidated price (USD) for a sample 1000 km flight for A320 times the applicable Exchange Rate |

| **Title of KPI** | **ANS Revenue (USD) per IFR Flight Hour (Continental)** |
|---|---|
| The Continental ANS Revenue in U.S. Dollars, using the applicable exchange rate, per IFR Flight Hour. | |
| **Data Elements Required** | 1. ANS Revenue (USD) Continental<br>2. IFR Flight Hours (Continental)<br>3. Exchange Rate |
| **Calculation** | ANS Revenue (USD) Continental divided by IFR Flight Hours (Continental) |

**2. <u>Oceanic Key Performance Indicators</u>**

**2.1 Productivity**

| **Title of KPI** | **IFR Flight Hours per ATCO in Operations (Oceanic)** |
|---|---|
| The IFR Flight Hours per ATCO in Operations (Oceanic). | |
| **Data Elements Required** | 1. IFR Flight Hours (Oceanic)<br>2. ATCOs in Operations (Oceanic) |
| **Calculation** | IFR Flight Hours (Oceanic) divided by ATCOs in Operations (Oceanic) |

**2.2 Cost-Effectiveness**

| **Title of KPI** | **Cost (USD) per IFR Flight Hour (Oceanic)** |
|---|---|
| The Oceanic Cost in U.S. Dollars, using the applicable exchange rate, per Oceanic IFR Flight Hour. | |
| **Data Elements Required** | 1. Total Costs (Oceanic)<br>2. IFR Flight Hours (Oceanic)<br>3. Exchange Rate |
| **Calculation** | Total Costs (Oceanic) times the applicable Exchange Rate divided by IFR Flight Hours (Oceanic) |

| **Title of KPI** | **Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic)** |
|---|---|
| The Oceanic Employment Cost for ATCOs in Operations in U.S. Dollars, using the applicable exchange rate, per Oceanic IFR Flight Hour. | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Oceanic)<br>2. IFR Flight Hours (Oceanic)<br>3. Exchange Rate |

| | |
|---|---|
| **Calculation** | Employment Cost for ATCOs in Operations (Oceanic) times the applicable Exchange Rate divided by IFR Flight Hours (Oceanic) |

| **Title of KPI** | **Employment Cost for ATCOs in Operations (USD) per IFR Flight Hour (Oceanic) applying Purchasing Power Parity (PPP)** |
|---|---|
| The Oceanic Employment Cost for ATCOs in Operations in U.S. Dollars, indexed using the PPP rate for the corresponding year, per Oceanic IFR Flight Hour. | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Oceanic)<br>2. IFR Flight Hours (Oceanic)<br>3. IMF PPP |
| **Calculation** | Employment Cost for ATCOs in Operations (Oceanic) divided by the IMF PPP divided by IFR Flight Hours (Oceanic) |

| **Title of KPI** | **Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic)** |
|---|---|
| The Oceanic Employment Cost for ATCOs in Operations in U.S. Dollars, using the applicable exchange rate, per Oceanic ATCO in Operations. | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Oceanic)<br>2. ATCOs in Operations (Oceanic)<br>3. Exchange Rate |
| **Calculation** | Employment Cost for ATCOs in Operations (Oceanic) times the applicable Exchange Rate divided by ATCOs in Operations (Oceanic) |

| **Title of KPI** | **Employment Cost for ATCOs in Operations (USD) per ATCO in Operations (Oceanic) applying Purchasing Power Parity (PPP)** |
|---|---|
| The Oceanic Employment Cost for ATCOs in Operations in U.S. Dollars, indexed using the PPP rate for the corresponding year, per Oceanic ATCO in Operations. | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Oceanic)<br>2. ATCOs in Operations (Oceanic)<br>3. IMF PPP |
| **Calculation** | Employment Cost for ATCOs in Operations (Oceanic) divided by the IMF PPP divided by ATCOs in Operations (Oceanic) |

**2.3 Revenue**

| **Title of KPI** | **ANS Revenue (USD) per IFR Flight Hour (Oceanic)** |
|---|---|
| The Oceanic ANS Revenue in U.S. Dollars, using the applicable exchange rate, per IFR Flight Hour. | |
| **Data Elements Required** | 1. ANS Revenue (USD) Oceanic<br>2. IFR Flight Hours (Oceanic)<br>3. Exchange Rate |
| **Calculation** | ANS Revenue (USD) Oceanic divided by IFR Flight Hours (Oceanic) |

**3. <u>Continental and Oceanic Key Performance Indicators</u>**

**3.1 Productivity**

| **Title of KPI** | **Average Annual Working Hours for ATCOs in Operations** |
|---|---|
| The Average Annual Working Hours for ATCOs in Operations. | |
| **Data Elements Required** | 1. Average Annual Working Hours for ATCOs in Operations |
| **Calculation** | Average Annual Working Hours for ATCOs in Operations |

**3.2 Cost-Effectiveness**

| **Title of KPI** | **Cost (USD) per IFR Flight Hour (Continental and Oceanic)** |
|---|---|
| The Continental and Oceanic Cost in U.S. Dollars, using the applicable exchange rate, per IFR Flight Hour. | |
| **Data Elements** | 1. Total Costs (Continental and Oceanic)<br>2. IFR Flight Hours (Continental and Oceanic) |

| | |
|---|---|
| **Required** | 3. Exchange Rate |
| **Calculation** | Total Costs (Continental and Oceanic) times the applicable Exchange Rate divided by IFR Flight Hours (Continental and Oceanic) |

| **Title of KPI** | **Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic)** |
|---|---|
| The Cost of Capital and Depreciation as a Percent of Total Costs (Continental and Oceanic). | |
| **Data Elements Required** | 1. Cost of Capital and Depreciation<br>2. Total Costs (Continental and Oceanic) |
| **Calculation** | Cost of Capital and Depreciation divided by Total Costs (Continental and Oceanic) |

| **Title of KPI** | **Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic)** |
|---|---|
| The Employment Cost of ATCOs in Operations as a Percent of Operating Cost (Continental and Oceanic). | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Continental and Oceanic)<br>2. Total Operating Cost (Continental and Oceanic) |
| **Calculation** | Employment Cost for ATCOs in Operations (Continental and Oceanic) divided by Total Operating Cost (Continental and Oceanic). |

| **Title of KPI** | **Employment Cost of ATCOs in Operations as a Percent of Total Cost (Continental and Oceanic)** |
|---|---|
| The Employment Cost of ATCOs in Operations as a Percent of Total Cost (Continental and Oceanic). | |
| **Data Elements Required** | 1. Employment Cost for ATCOs in Operations (Continental and Oceanic)<br>2. Total Costs (Continental and Oceanic) |
| **Calculation** | Employment Cost for ATCOs in Operations (Continental and Oceanic) divided by Total Costs (Continental and Oceanic) |

**3.3 Profitability**

| **Title of KPI** | **Return on Assets (ROA)** |
|---|---|
| Measure of a company's profitability. | |
| **Data Elements Required** | 1. Return on Assets |
| **Calculation** | Net Income/Total Assets (Annual Average) or the ROA as submitted by the ANSP |

| **Title of KPI** | **Return on Equity (ROE)** |
|---|---|
| Measure of how well a company used reinvested earnings to generate additional earnings. | |
| **Data Elements Required** | 1. Return on Equity |
| **Calculation** | Net Income/Total Equity (Annual Average) or the ROE as submitted by the ANSP |

## Appendix E: Exchange and Purchasing Power Parity (PPP) Rates

The chart shows the OANDA Exchange and IMF PPP rates used to convert costs, prices, and revenue.

Some ANSPs submitted data in Euros rather than local currency and have been converted directly from Euros to US Dollars for trend reporting.

OANDA Exchange Rates as of December 31 each year

International Monetary Fund, World Economic Outlook Database, April 2012

| ANSP | Country | Currency | OANDA Exchange Rate | | IMF PPP | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 2007 | 2011 | 2007 | 2008 | 2009 | 2010 | 2011 |
| AAI | India | INR | 0.02536 | 0.01842 | 15.323 | 16.13 | 16.692 | 18.073 | 19.129 |
| AENA | Spain | EUR | 1.4728 | 1.295 | 0.777 | 0.778 | 0.771 | 0.765 | 0.759 |
| AEROTHAI | Thailand | THB | 0.03359 | 0.03167 | 16.321 | 16.582 | 16.732 | 17.153 | 17.505 |
| Airways | New Zealand | NZD | 0.7752 | 0.7743 | 1.568 | 1.582 | 1.612 | 1.654 | 1.674 |
| ANSCzech | Czech Republic | CZK | 0.05543 | 0.05046 | 14.076 | 14.034 | 14.158 | 13.755 | 13.368 |
| ATNS | South Africa | ZAR | 0.148 | 0.1232 | 4.197 | 4.446 | 4.736 | 5.051 | 5.332 |
| DANS | United Arab Emirates | AED | 0.2723 | 0.2723 | 4.214 | 4.774 | 4.193 | 4.525 | 5.11 |
| DCAC | Cyprus | EUR | 1.4728 | 1.295 | 0.736 | 0.753 | 0.746 | 0.75 | 0.756 |
| DC-ANSP | Curaçao | ANG | 0.5714 | 0.5618 | 0.876 | 0.876 | 0.863 | 0.864 | 0.858 |
| DHMİ | Turkey | TRY | 0.86 | 0.5258 | 0.949 | 1.04 | 1.084 | 1.139 | 1.215 |
| EANS | Estonia | EEK | 0.09527 | 0.08538 | 0.571 | 0.588 | 0.576 | 0.576 | 0.585 |
| FAA ATO | United States | USD | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Finavia | Finland | EUR | 1.4728 | 1.295 | 0.962 | 0.968 | 0.972 | 0.965 | 0.979 |
| HungaroControl | Hungary | HUF | 0.00581 | 0.00415 | 132.023 | 135.968 | 139.345 | 142.007 | 143.909 |
| IAA | Ireland | EUR | 1.4728 | 1.295 | 1.01 | 0.965 | 0.916 | 0.884 | 0.861 |
| LFV | Sweden | SEK | 0.1563 | 0.1451 | 9.082 | 9.179 | 9.252 | 9.267 | 9.156 |
| LGS | Latvia | LVL | 2.1428 | 1.858 | 0.376 | 0.416 | 0.406 | 0.393 | 0.406 |
| LPS | Slovak Republic | SKK | 0.04393 | 1.295 | 0.559 | 0.563 | 0.55 | 0.547 | 0.544 |
| NATS | United Kingdom | GBP | 1.9973 | 1.5456 | 0.645 | 0.651 | 0.655 | 0.666 | 0.667 |
| NAV CANADA | Canada | CAD | 1.0194 | 0.9807 | 1.21 | 1.233 | 1.197 | 1.218 | 1.231 |
| NAVIAIR | Denmark | DKK | 0.1975 | 0.1742 | 8.375 | 8.54 | 8.537 | 8.766 | 8.66 |
| NavPortugal | Portugal | EUR | 1.4728 | 1.295 | 0.704 | 0.699 | 0.698 | 0.698 | 0.69 |
| ROMATSA | Romania | RON | 0.4093 | 0.3002 | 1.679 | 1.894 | 1.953 | 2.047 | 2.166 |
| Sakaeronavigatsia | Georgia | GEL | 0.599 | 0.5987 | 0.827 | 0.887 | 0.86 | 0.923 | 0.987 |
| SENEAM | Mexico | USD | 1 | 1 | 7.562 | 7.868 | 8.13 | 8.361 | 8.634 |
| SMATSA | Serbia | RSD | 0.01865 | 0.01234 | 31.726 | 34.951 | 36.538 | 39.386 | 41.882 |

## Appendix F: Table of Flight Hours

The chart shows the total flight hours for 2007 to 2011.

| ANSP | Total IFR Flight Hours | | | | |
|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 |
| FAA ATO | 26,846,239 | 27,462,279 | 25,221,016 | 25,158,258 | 25,047,876 |
| NAV CANADA | 3,289,974 | 3,439,142 | 3,239,497 | 3,230,049 | 3,385,086 |
| AAI | N/A | N/A | N/A | 2,163,958 | 2,047,587 |
| NATS | 1,924,850 | 1,962,179 | 1,757,001 | 1,702,890 | 1,766,551 |
| AENA | 1,455,680 | 1,444,567 | 1,300,682 | 1,354,505 | 1,418,944 |
| SENEAM | 1,380,620 | 1,330,288 | 1,147,776 | 1,241,091 | 1,222,533 |
| DHMİ | N/A | N/A | N/A | N/A | 903,599 |
| NavPortugal | 446,949 | 486,586 | 444,469 | 468,728 | 518,247 |
| LFV | 438,587 | 453,070 | 407,653 | 410,242 | 430,699 |
| AEROTHAI | N/A | N/A | N/A | 320,360 | 372,323 |
| Airways | 364,286 | 368,368 | 360,252 | 351,680 | 352,605 |
| ROMATSA | 264,185 | 273,749 | 266,528 | 286,944 | 293,044 |
| ATNS | 279,657 | 302,391 | 290,848 | 281,255 | 290,971 |
| IAA | 286,407 | 289,304 | 259,595 | 256,550 | 265,101 |
| ANSCzech | 213,762 | 226,834 | 221,765 | 231,079 | 235,279 |
| SMATSA | 188,697 | 205,711 | 208,847 | 217,675 | 221,447 |
| NAVIAIR | 220,706 | 222,315 | 202,685 | 209,917 | 217,839 |
| HungaroControl | 202,562 | 204,083 | 196,831 | 197,909 | 195,804 |
| DCAC | N/A | N/A | N/A | 130,669 | 131,701 |
| Finavia | N/A | N/A | 108,449 | 114,645 | 128,722 |
| LPS | 72,995 | 79,341 | 76,493 | 82,382 | 84,875 |
| LGS | 61,300 | 67,357 | 60,849 | 63,951 | 73,442 |
| DC-ANSP | 44,431 | 51,638 | 51,659 | 55,623 | 61,685 |
| EANS | 60,931 | 60,957 | 53,055 | 54,417 | 61,672 |
| Sakaeronavigatsia | 38,021 | 39,774 | 39,884 | 42,590 | 45,419 |
| DANS | N/A | N/A | N/A | N/A | N/A |

# Appendix G: List of Figures

# Appendix H: Contextual Data

**Definitions**

The definitions below were provided as guidance; if ANSP data differed from descriptions below, comments are provided within the ANSP's specific data.

1. IFR hours per sq km
   ANSPs should disclose the size (the surface area) of the airspace for which they are responsible. This should include the area where ANS have been delegated to the ANSP by another provider, and exclude the area in which ANS have been delegated to another ANSP. The sq km here should be consistent with ACC coverage with respect to total area. Differentiation for facilities controlling only upper or lower airspace will be addressed by 3) below.
2. Sq km – Oceanic and Continental
   See 1) above
3. Radar Surveillance Coverage at 29K ft.
   Subset or all of Continental Sq. Km. ANSPs with only lower airspace can input "0".
4. Number of FIRs
   ICAO definition
5. Average flight hours per "flight" (decimal hours) (or the equivalent of PRU D27)
   Calculate average flight hours for all activities (flights) including in flight hour computation
6. IFR Tower Movements
   One movement each for arrivals and departures. Touch and Go or Go Around equates to one movement. Include helicopters (if they are IFR).
7. Controlled VFR Tower Movements
   As defined by the ANSP
8. Total ATCO's in Operations
   Taken directly from base report

Items 9 through 14 are intended to capture types of Facilities and the associated ATCOs working in these facilities.

9. Number of ACCs
   a. Number of ATCOs in ACCs
10. Number of Co-located ACC/Approach Facilities
    a. Number of ATCOs in Co-located ACC/Approach Facilities
11. Number of Approach Control Facilities
    a. Number of ATCOs in Approach Control Facilities
12. Number of Co-located Tower Approach Facilities
    a. Number of ATCOs in Co-located Tower Approach Facilities
13. Number of Stand-alone Towers
    a. Number of ATCOs in Stand-alone Towers
14. Number of Co-located ACC/Tower/Approach Facilities
    a. Number of ATCOs in Co-located ACC/Tower/Approach Facilities

## AENA (Spain)

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 0,63 | | IFR flight hours = 1388029 |
| Sq. km – Oceanic and Continental | 2 190 000 | | |
| Radar Surveillance Coverage at 29K ft. | | | |
| Number of FIRs | 3 | 0 | FIR Madrid, FIR Barcelona and FIR Canarias |
| Average flight hours per "flight" (decimal hours) | 0,78 | | 47 minutes in 2011 |
| IFR Tower Movements | 1 854 896 | | |
| Controlled VFR Tower Movements | 222 729 | | |
| Total ATCOs in Operations | 1 898 | | |
| Number of ACCs | | | |
| Number of ATCOs in Operations | | | |
| Number of Co-located ACC/Approach Facilities | 5 | | APP service is provided in the 5 ACCs |
| Number of ATCOs in Operations | 1 056 | | Includes ATCOs working in the 5 ACCs (route + APP) |
| Number of Approach Control Facilities | 3 | | |
| Number of ATCOs in Operations | see comment in 12a | | |
| Number of Co-located Tower/Approach | 15 | | |
| Number of ATCOs in Operations | 842 | | Information as provided to PRU, thus including all the ATCOS in TWR+APP but the ATCOs APP included in 10a |
| Number of Stand-alone Towers | 21 | | 36 towers in total of which 15 provide TWR + APP |
| Number of ATCOs in Operations | see comment in 12a | | |
| Number of Co-located ACC/Tower/Approach | | | |
| Number of ATCOs in Operations | | | |

## AEROTHAI (Thailand)

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 0,4787 | | |
| Sq. km – Oceanic and Continental | 777 760 | | |
| Radar Surveillance Coverage at 29K ft. | 100% | | |
| Number of FIRs | 1 | | |
| Average flight hours per "flight" (decimal hours) | 0,808 | | |
| IFR Tower Movements | 548 503 | | |
| Controlled VFR Tower Movements | | | Data currently not available |
| Total ATCOs in Operations | 640 | | |
| Number of ACCs | 1 | | |
| Number of ATCOs in Operations | 126,82 | | |
| Number of Co-located ACC/Approach Facilities | 0 | | |
| Number of ATCOs in Operations | 0 | | |
| Number of Approach Control Facilities | 1 | | |
| Number of ATCOs in Operations | 37,45 | | |
| Number of Co-located Tower/Approach | 6 | | |
| Number of ATCOs in Operations | 406,96 | | The number of Co-located Approach/Towers and Stand-alone Towers and their respective numbers of ATCOs do not reflect actual facilities. Theses numbers are split by the currently available data, of which some physical Stand-alone Towers maybe represented |
| Number of Stand-alone Towers | 14 | | |
| Number of ATCOs in Operations | 68,46 | | |
| Number of Co-located ACC/Tower/Approach | 0 | | |
| Number of ATCOs in Operations | 0 | | |

## ANS Czech Republic

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 3 | | PRU D26/D4 |
| Sq. km – Oceanic and Continental | 77 100 | | PRU D4 |
| Radar Surveillance Coverage at 29K ft. | 77 100 | | 100% double coverage above 5000 ft AMSL |
| Number of FIRs | 1 | | FIR Praha |
| Average flight hours per "flight" (decimal hours) | 0,35 | | PRU D27: Average transit time |
| IFR Tower Movements | 165 232 | | PRU D28 |
| Controlled VFR Tower Movements | 39 069 | | PRU D29 |
| Total ATCOs in Operations | 194 | | PRU C4 |
| Number of ACCs | 1 | | LKAAACC |
| Number of ATCOs in Operations | 91 | | PRU E23 (FTE) |
| Number of Co-located ACC/Approach Facilities | | | |
| Number of ATCOs in Operations | | | |
| Number of Approach Control Facilities | | | |
| Number of ATCOs in Operations | | | |
| Number of Co-located Tower/Approach | 4 | | |
| Number of ATCOs in Operations | 103 | | 66 LKPR, 17 LKTB, 14 LKMT, 6 LKKV |
| Number of Stand-alone Towers | | | |
| Number of ATCOs in Operations | | | |
| Number of Co-located ACC/Tower/Approach | | | |
| Number of ATCOs in Operations | | | |

## ATNS (South Africa)

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 0,030 | 0,000851354 | |
| Sq. km – Oceanic and Continental | 9279080 | 12720920 | Continental airspace includes 150nm X 900nm which is over the sea and not really used. This is the 5% not covered by surveillance from a continental point of view but is within the ADS coverage used by oceanic. |
| Radar Surveillance Coverage at 29K ft. | 95,00% | 0,00% | Oceanic airspace 100% covered with ADS-C |
| Number of FIRs | 2 | 1 | |
| Average flight hours per "flight" (decimal hours) | 1,196247604 | 0,320129271 | Number of flights are actually the number of flightplans that were activated, those that contributed to the total Flight hours |
| IFR Tower Movements | 485 572 | | Each local IFR flight count two movements; and that each IFR flight locally count 2 movements (a landing and a take off). International flights counts 1 movement (departure or an arrival) |
| Controlled VFR Tower Movements | 686 645 | | Each local VFR flight count two movements; and that each touch and go count 2 movements (a landing and a take off). |
| Total ATCOs in Operations | 317 | 17 | Oceanic is manned by ATSOs |
| Number of ACCs | 0 | 0 | ATNS does not have standing alone ACC centre. The ACC Centres are co-located within ATS facility which houses ACC and or APP and TWR. |
| Number of ATCOs in Operations | 0 | 0 | |
| Number of Co-located ACC/Approach Facilities | 0 | 0 | ATNS does not have standing alone ACC/APP centres. The ACC and APP Centres are co-located within ATS facility which houses ACC and or APP and TWR. |
| Number of ATCOs in Operations | 0 | 0 | |
| Number of Approach Control Facilities | 0 | 0 | ATNS does not have standing alone APP centres. The APP Centres are co-located within ATS facility which houses ACC and or APP and TWR. |
| Number of ATCOs in Operations | 0 | 0 | |
| Number of Co-located Tower/Approach | 9 | 0 | |
| Number of ATCOs in Operations | 96 | 0 | |
| Number of Stand-alone Towers | 11 | 0 | |
| Number of ATCOs in Operations | 64 | 0 | |
| Number of Co-located ACC/Tower/Approach | 2 | 0 | |
| Number of ATCOs in Operations | 157 | 0 | |

## DHMI (Turkey)

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 1,020 | | |
| Sq. km – Oceanic and Continental | 982000 | | |
| Radar Surveillance Coverage at 29K ft. | 100% | | |
| Number of FIRs | 2 | | Ankara, Istanbul |
| Average flight hours per "flight" (decimal hours) | 54 | | PRU D:27: Average transit time (minutes) |
| IFR Tower Movements | 907 286 | | |
| Controlled VFR Tower Movements | 63 725 | | |
| Total ATCOs in Operations | 911 | | |
| Number of ACCs | 2 | | Ankara and İstanbul |
| Number of ATCOs in Operations | 439 | | |
| Number of Co-located ACC/Approach Facilities | 2 | | |
| Number of ATCOs in Operations | | | |
| Number of Approach Control Facilities | 0 | | |
| Number of ATCOs in Operations | | | |
| Number of Co-located Tower/Approach | 29 | | |
| Number of ATCOs in Operations | 472 | | PRU D:31 ATCO's in OPS (TWR&APP) |
| Number of Stand-alone Towers | 7 | | |
| Number of ATCOs in Operations | | | |
| Number of Co-located ACC/Tower/Approach | | | |
| Number of ATCOs in Operations | | | |

## Dubai Air Navigation Services

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | | | |
| Sq. km – Oceanic and Continental | | | |
| Radar Surveillance Coverage at 29K ft. | 0 | | |
| Number of FIRs | 1 | | |
| Average flight hours per "flight" (decimal hours) | 0,17 | | |
| IFR Tower Movements | 411 219 | | Dubai Approach+Dubai Tower+Maktoum Tower |
| Controlled VFR Tower Movements | 4 422 | | |
| Total ATCOs in Operations | 145 | | |
| Number of ACCs | 0 | | |
| Number of ATCOs in Operations | 0 | | |
| Number of Co-located ACC/Approach Facilities | 0 | | |
| Number of ATCOs in Operations | 0 | | |
| Number of Approach Control Facilities | 1 | | |
| Number of ATCOs in Operations | 66 | | |
| Number of Co-located Tower/Approach | 0 | | |
| Number of ATCOs in Operations | 0 | | |
| Number of Stand-alone Towers | 2 | | Dubai/Al Maktoum Towers |
| Number of ATCOs in Operations | 79 | | Dubai-60 Al Maktoum-19 |
| Number of Co-located ACC/Tower/Approach | 0 | | |
| Number of ATCOs in Operations | 0 | | |

## Finavia (Finland)

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 299 | 0 | ACE-data |
| Sq. km – Oceanic and Continental | 415 000 | 0 | |
| Radar Surveillance Coverage at 29K ft. | 1 | 0 | 100% |
| Number of FIRs | 1 | 0 | |
| Average flight hours per "flight" (decimal hours) | 0,48 | 0,00 | |
| IFR Tower Movements | 277 715 | 0 | ACE-data (excl. Military flights) |
| Controlled VFR Tower Movements | 169 733 | 0 | Excl. military |
| Total ATCOs in Operations | 195 | 0 | Total is 273 if ATCO's for military flights and ATCOs in other duties included |
| Number of ACCs | 1 | 0 | EFIN |
| Number of ATCOs in Operations | 57 | 0 | |
| Number of Co-located ACC/Approach Facilities | 0 | 0 | |
| Number of ATCOs in Operations | 0 | 0 | |
| Number of Approach Control Facilities | 0 | 0 | |
| Number of ATCOs in Operations | 0 | 0 | |
| Number of Co-located Tower/Approach | 6 | 0 | EFHK, EFTP, EFKU, EFRO, EFJY, (Mil: EFKA) |
| Number of ATCOs in Operations | 92 | 0 | |
| Number of Stand-alone Towers | 19 | 0 | |
| Number of ATCOs in Operations | 46 | 0 | |
| Number of Co-located ACC/Tower/Approach | 0 | 0 | |
| Number of ATCOs in Operations | 0 | 0 | |

## Hungarocontrol

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 2 | | 193968 hours |
| Sq. km – Oceanic and Continental | 93 000 | | |
| Radar Surveillance Coverage at 29K ft. | 1 | | |
| Number of FIRs | 1 | | |
| Average flight hours per "flight" (decimal hours) | | | |
| IFR Tower Movements | 0 | | |
| Controlled VFR Tower Movements | 110 168 | | |
| Total ATCOs in Operations | 0* | | * the VFR flights are not registered separatelly |
| Number of ACCs | 184 | | |
| Number of ATCOs in Operations | 0 | | |
| Number of Co-located ACC/Approach Facilities | 0 | | |
| Number of ATCOs in Operations | 1 | | |
| Number of Approach Control Facilities | 140 | | |
| Number of ATCOs in Operations | 0 | | |
| Number of Co-located Tower/Approach | 0 | | |
| Number of ATCOs in Operations | 0 | | |
| Number of Stand-alone Towers | 0 | | |
| Number of ATCOs in Operations | 1 | | |
| Number of Co-located ACC/Tower/Approach | 45 | | |
| Number of ATCOs in Operations | 0 | | |

## LPS (Slovak Republic)

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 2 | | PRU D26/D4 |
| Sq. km – Oceanic and Continental | 48 700 | | PRU D4 |
| Radar Surveillance Coverage at 29K ft. | | | no data available |
| Number of FIRs | 1 | | FIR Bratislava |
| Average flight hours per "flight" (decimal hours) | 13,27 | | PRU D27 |
| IFR Tower Movements | 33 565 | | PRU D28 |
| Controlled VFR Tower Movements | 17 946 | | PRU D29 |
| Total ATCOs in Operations | 97 | | PRU C4 |
| Number of ACCs | 1 | | |
| Number of ATCOs in Operations | 52 | | PRU E23 (FTE) |
| Number of Co-located ACC/Approach Facilities | 0 | | PRU D17 |
| Number of ATCOs in Operations | 0 | | |
| Number of Approach Control Facilities | 0 | | PRU D19 |
| Number of ATCOs in Operations | 0 | | |
| Number of Co-located Tower/Approach | 2 | | PRU D18 |
| Number of ATCOs in Operations | 45 | | PRU D31 (FTE) = total for Co-located TWR/APP & Stand-alone TWR |
| Number of Stand-alone Towers | 5 | | PRU D20 which include also 2 co-located tower/approach facilities |
| Number of ATCOs in Operations | | | see 12a) above |
| Number of Co-located ACC/Tower/Approach | 0 | | |
| Number of ATCOs in Operations | 0 | | |

## LFV (Sweden)

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 1 | | 430699/614000=0,7 |
| Sq. km – Oceanic and Continental | 614,000 | | |
| Radar Surveillance Coverage at 29K ft. | 610,000 | | Full coverage except for mountaineous areas |
| Number of FIRs | 1 | | Sweden FIR with two AOR (former FIRs) |
| Average flight hours per "flight" (decimal hours) | 0.15 | | appr 0,25 minutes |
| IFR Tower Movements | 536,236 | | |
| Controlled VFR Tower Movements | | | no data |
| Total ATCOs in Operations | 556 | | |
| Number of ACCs | 2 | | |
| Number of ATCOs in Operations | 229 | | |
| Number of Co-located ACC/Approach Facilities | 2 | | |
| Number of ATCOs in Operations | 60 | | |
| Number of Approach Control Facilities | 26 | | |
| Number of ATCOs in Operations | 152 | | |
| Number of Co-located Tower/Approach | 24 | | |
| Number of ATCOs in Operations | 152 | | |
| Number of Stand-alone Towers | 7 | | |
| Number of ATCOs in Operations | 80 | | |
| Number of Co-located ACC/Tower/Approach | | | none |
| Number of ATCOs in Operations | | | |

## NAV Portugal

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 27,3minute | 2,44minute | |
| Sq. km – Oceanic and Continental | 665 000 | 5 190 000 | Area controlled: Lisboa IFR and Santa Maria FIR |
| Radar Surveillance Coverage at 29K ft. | 92% | 13% | |
| Number of FIRs | 1 | 1 | |
| Average flight hours per "flight" (decimal hours) | 41,00 | 103,00 | Average transit time |
| IFR Tower Movements | 274 051 | 21 140 | |
| Controlled VFR Tower Movements | 84 253 | 433 | |
| Total ATCOs in Operations | 216 | 58 | |
| Number of ACCs | 1 | 1 | |
| Number of ATCOs in Operations | 89 | 40 | Only en-route |
| Number of Co-located ACC/Approach Facilities | 1 | 0 | |
| Number of ATCOs in Operations | 29 | - | Only approach |
| Number of Approach Control Facilities | 0 | 0 | |
| Number of ATCOs in Operations | - | - | |
| Number of Co-located Tower/Approach | 3 | 4 | |
| Number of ATCOs in Operations | 56 | 18 | |
| Number of Stand-alone Towers | 3 | 0 | |
| Number of ATCOs in Operations | 42 | - | |
| Number of Co-located ACC/Tower/Approach | 0 | 0 | |
| Number of ATCOs in Operations | - | - | |

## NAV CANADA

| Contextual Data Element | Continental | Oceanic | Free Form Comments |
|---|---|---|---|
| IFR hours per sq km | 0,17633 | 0,20652 | |
| Sq. km – Oceanic and Continental | 15 601 538 | 3 070 462 | |
| Radar Surveillance Coverage at 29K ft. | 100% | 100% | |
| Number of FIRs | 7 | 1 | |
| Average flight hours per "flight" (decimal hours) | | | INCLUDED in 2) above.... See defintions |
| IFR Tower Movements | | | Not Applicable |
| Controlled VFR Tower Movements | 2 102 957 | | Data covers Tower traffic only to remain in context with the benchmarking report. FSS traffic is NOT included. Local movements, (Touch and Go's) are NOT included. |
| Total ATCOs in Operations | 1 204 826 | | FSS traffic is NOT included. Local movements NOT included. |
| Number of ACCs | 1 635 | 70 | |
| Number of ATCOs in Operations | 7 | | The Gander ACC is considered as a single Centre that controls both the Gander Domestic FIR and the Gander Oceanic FIR. |
| Number of Co-located ACC/Approach Facilities | 1 077 | 70 | |
| Number of ATCOs in Operations | | | Further division of ATCO's to the Approach level is not appropriate within the NAV CANADA operational environment. |
| Number of Approach Control Facilities | | | |
| Number of ATCOs in Operations | | | |
| Number of Co-located Tower/Approach | | | |
| Number of ATCOs in Operations | | | |
| Number of Stand-alone Towers | | | |
| Number of ATCOs in Operations | 42 | | |
| Number of Co-located ACC/Tower/Approach | 558 | | |
| Number of ATCOs in Operations | | | |

| SMATSA (Serbia & Montenegro) | | | |
|---|---|---|---|
| **Contextual Data Element** | **Continental** | **Oceanic** | **Free Form Comments** |
| IFR hours per sq km | 2 | | Calculated on the basis of Flight Hours excluding IFR Movements |
| Sq. km – Oceanic and Continental | 144 676 | | |
| Radar Surveillance Coverage at 29K ft. | 144 676 | | Full duplicated coverage. Triple coverage for 95% of SMATSA area of responsibility |
| Number of FIRs | 1 | | |
| Average flight hours per "flight" (decimal hours) | 0,40 | | |
| IFR Tower Movements | 75 187 | | Total airport movements controlled in the terminal charging zone |
| Controlled VFR Tower Movements | 8 020 | | VFR airport movements controlled by the ANSP |
| Total ATCOs in Operations | 245 | | |
| Number of ACCs | | | |
| Number of ATCOs in Operations | | | |
| Number of Co-located ACC/Approach Facilities | 1 | | |
| Number of ATCOs in Operations | 163 | | |
| Number of Approach Control Facilities | | | |
| Number of ATCOs in Operations | | | |
| Number of Co-located Tower/Approach | 7 | | |
| Number of ATCOs in Operations | 68 | | |
| Number of Stand-alone Towers | 1 | | |
| Number of ATCOs in Operations | 14 | | |
| Number of Co-located ACC/Tower/Approach | | | |
| Number of ATCOs in Operations | | | |

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CANSO – The Civil Air Navigation Services Organisation – is the global voice of the companies that provide air traffic control, and represents the interests of Air Navigation Services Providers worldwide.

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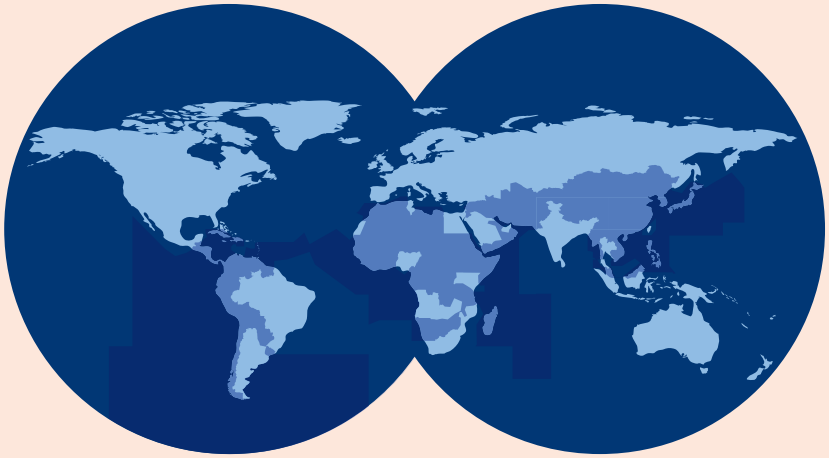

Lighter areas represent airspace covered by CANSO Members

## Full Members - 76

- Aeronautical Radio of Thailand (AEROTHAI)
- Aeroportos de Moçambique
- Air Navigation and Weather Services, CAA (ANWS)
- Air Navigation Services of the Czech Republic (ANS Czech Republic)
- Air Traffic & Navigation Services (ATNS)
- Airports and Aviation Services Limited (AASL)
- Airports Authority of India (AAI)
- Airports Fiji Limited
- Airservices Australia
- Airways New Zealand
- Angkasa Pura I
- Austro Control
- Avinor AS
- AZANS Azerbaijan
- Belgocontrol
- Bulgarian Air Traffic Services Authority (BULATSA)
- CAA Uganda
- Civil Aviation Authority of Bangladesh (CAAB)
- Civil Aviation Authority of Singapore (CAAS)
- Civil Aviation Regulatory Commission (CARC)
- Department of Airspace Control (DECEA)
- Department of Civil Aviation, Republic of Cyprus
- DFS Deutsche Flugsicherung GmbH (DFS)
- Dirección General de Control de Tránsito Aéreo (DGCTA)
- DSNA France
- Dutch Caribbean Air Navigation Service Provider (DC-ANSP)
- ENANA-EP ANGOLA
- ENAV S.p.A: Società Nazionale per l'Assistenza al Volo
- Entidad Pública Aeropuertos Españoles y Navegación Aérea (Aena)
- Estonian Air Navigation Services (EANS)
- Federal Aviation Administration (FAA)
- Finavia Corporation
- GCAA United Arab Emirates
- General Authority of Civil Aviation (GACA)
- Hellenic Civil Aviation Authority (HCAA)
- HungaroControl Pte. Ltd. Co.
- Israel Airports Authority (IAA)
- Iran Airports Co
- Irish Aviation Authority (IAA)
- ISAVIA Ltd
- Kazaeronavigatsia
- Kenya Civil Aviation Authority (KCAA)
- Latvijas Gaisa Satiksme (LGS)
- Letové prevádzkové Služby Slovenskej Republiky, Štátny Podnik
- Luchtverkeersleiding Nederland (LVNL)
- Luxembourg ANA
- Maldives Airports Company Limited (MACL)
- Malta Air Traffic Services (MATS)
- NATA Albania
- National Airports Corporation Ltd.
- National Air Navigation Services Company (NANSC)
- NATS UK
- NAV CANADA
- NAV Portugal
- Naviair
- Nigerian Airspace Management Agency (NAMA)
- Office de l'Aviation Civile et des Aeroports (OACA)
- ORO NAVIGACIJA, Lithuania
- PNG Air Services Limited (PNGASL)
- Polish Air Navigation Services Agency (PANSA)
- Prishtina International Airport JSC
- PT Angkasa Pura II (Persero)
- ROMATSA
- Sakaeronavigatsia Ltd
- S.E. MoldATSA
- SENEAM
- Serbia and Montenegro Air Traffic Services Agency (SMATSA)
- Serco
- skyguide
- Slovenia Control
- State Airports Authority & ANSP (DHMI)
- State ATM Corporation
- Tanzania Civil Aviation Authority
- The LFV Group
- Ukrainian Air Traffic Service Enterprise (UkSATSE)
- U.S. DoD Policy Board on Federal Aviation

## Gold Associate Members - 14

- Abu Dhabi Airports Company
- Airbus ProSky
- Boeing
- BT Plc
- FREQUENTIS AG
- GE Air Traffic Optimization Services
- GroupEAD Europe S.L.
- ITT Exelis
- Lockheed Martin
- Metron Aviation
- Raytheon
- SELEX Sistemi Integrati S.p.A.
- Telephonics Corporation, ESD
- Thales

## Silver Associate Members - 62

- Adacel Inc.
- ARINC
- ATCA – Japan
- ATECH Negócios em Tecnologia S/A
- Aviation Advocacy Sarl
- Avibit Data Processing GmbH
- Avitech AG
- AZIMUT JSC
- Barco Orthogon GmbH
- Booz Allen Hamilton, Inc.
- Brüel & Kjaer EMS
- Comsoft GmbH
- CGH Technologies, Inc
- Abu Dhabi Department of Transport
- Dubai Airports
- EADS Cassidian
- EIZO Technologies GmbH
- European Satellite Services Provider (ESSP SAS)
- Emirates
- Entry Point North
- Era Corporation
- Etihad Airways
- Guntermann & Drunck GmbH
- Harris Corporation
- Helios
- Honeywell International Inc. / Aerospace
- IDS – Ingegneria Dei Sistemi S.p.A.
- Indra Navia AS
- Indra Sistemas
- INECO
- Inmarsat Global Limited
- Integra A/S
- Intelcan Technosystems Inc.
- International Aeronavigation Systems (IANS)
- Iridium Communications Inc.
- Jeppesen
- JMA Solutions
- LAIC Aktiengesellschaft
- LEMZ R&P Corporation
- LFV Aviation Consulting AB
- Micro Nav Ltd
- The MITRE Corporation – CAASD
- MovingDot
- New Mexico State University Physical Science Lab
- NLR
- Northrop Grumman
- NTT Data Corporation
- Project Boost
- Quintiq
- Rockwell Collins, Inc.
- Rohde & Schwarz GmbH & Co. KG
- RTCA, Inc.
- Saab AB
- Saab Sensis Corporation
- Saudi Arabian Airlines
- SENASA
- SITA
- STR-SpeechTech Ltd.
- TASC, Inc.
- Tetra Tech AMT
- Washington Consulting Group
- WIDE

Correct as of 16 January 2013. For the most up-to-date list and organisation profiles go to www.canso.org/cansomembers