



GLOBAL AIR NAVIGATION SERVICES PERFORMANCE REPORT

2018 – 2022 ANSP Performance Results

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Acknowledgements

This publication is a product of the CANSO Global Benchmarking Workgroup, produced with the assistance of Egis. The workgroup is grateful for the continued analytical support provided by Egis.

We also thank EUROCONTROL and their Performance Review Unit (PRU) for their collaboration in providing the data from their ANSP Cost Effectiveness (ACE) Report. This has enabled our CANSO Air Navigation Services Performance Report to continue to reflect a broader scope of air navigation service providers.



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Foreword

With many regions of the world today well along the path to full traffic recovery from the COVID-19 pandemic, this report reflects on a time when we were in the midst of those challenges.

In 2022, countries steadily lifted travel constraints, while the global economy continued to confront significant hurdles. The resurgence of COVID-19 in specific regions triggered successive lockdowns. Additionally, the war in Ukraine disrupted global financial markets and increased debt levels. Throughout 2022, there was a notable upswing in global air passenger traffic as travel restrictions were lifted. Industry-wide, the demand for passenger seats was met by available seat capacity, with available seat kilometres (ASKs) recovering to 71.9 per cent of the 2019 levels.

While grappling with capacity challenges driven by growth, lessons from COVID-19 emphasise the need for insights into ANSP performance. To provide evidence and build a comprehensive picture of how Air Navigation Service Providers (ANSPs) were performing before, during, and after the pandemic, data is essential. This is where the work of the CANSO Global Benchmarking Workgroup (GBWG) proves invaluable.

This year, CANSO delivers the fourteenth edition of the *Global Air Navigation Services Performance Report*, which now includes 47 ANSPs from all across the globe. The report is a key output of the work of the GBWG and acts as a tool for ANSPs to compare, contrast and identify good practices and best efforts in ANS performance, particularly in the areas of cost efficiency and productivity, which were severely impacted by the decline in traffic.

In this edition, we look back on the performance in 2022, how participating ANSPs were being affected by global events, and how it reflects in our key performance metrics.

I would like to thank the CANSO GBWG and all the participating CANSO members. I also thank EUROCONTROL for their support in increasing the scope, scale, and utility of our report. In addition, I would like to thank Egis for twelve years' of effort in data collection and analysis, and their continued dedication in supporting CANSO and the GBWG with this work.



Simon Hocquard

Director General CANSO

Executive Summary

Coverage

The CANSO Global Air Navigation Services (ANS) Performance Report is produced annually by CANSO's Global Benchmarking Workgroup (GBWG) with the support of Egis. Through agreement with EUROCONTROL's Performance Review Unit (PRU), data regarding European Air Navigation Service Providers (ANSPs) taken from the ATM Cost-Effectiveness (ACE) Benchmarking Report has been included. ACE Report data collected by the PRU since 2002 is available in the [ACE dashboard](#).

This year's report provides data for 47 ANSPs and contains performance indicators for the year 2022, along with trend data between 2018 and 2022. For a credible comparison of performance, the ANSPs that shared their data with CANSO were divided into three comparator groups based on the number of IFR hours managed, ensuring that the analysis takes into account the varying scales and complexities of their operations.

In line with CANSO's ambitions for the Global ANS Performance Report to reflect a broader picture of performance, data provided by the CANSO Safety Intelligence Workgroup (SIWG) examining key safety metrics in 2022 has been included. Collaboration between CANSO workgroups aim to enable interdependencies between data to be analysed and ultimately drive better insights into the reasons behind performance trends.

Pandemic Recovery, and Their Impact on Key Performance Indicators

Analysis of how the ATM system performed during its recovery is complex, however, maintaining service and preserving safety remains a top priority for ANSPs. Following the removal of travel restrictions in 2022, demand surged across many markets.

As the COVID-19 pandemic influenced numerous short-term policy decisions over the past three years, the global economy faces several other challenges. Ongoing issues such as the war in Ukraine and a potential economic slowdown in major economies pose risks that could hinder the pandemic recovery. A key manifestation of these risks is the notable rise in inflation across many economies. The interaction between geopolitical conflicts and increasing prices is a significant economic threat. Aviation is closely tied to such macroeconomic factors; like other goods and services, air transport demand is influenced by price levels and disposable income. Therefore, uncertainty about a swift recovery for the aviation industry remains prevalent, particularly in the near term.

The year 2022 witnessed a partial recovery in the ATM system, with air traffic volumes rebounding as travel restrictions were lifted. Continental IFR hours increased by nearly 19 per cent, and oceanic IFR hours surged by over 40 per cent. This significant growth in traffic reflects a notable resurgence in demand for air travel, indicating progress towards pre-crisis operational levels, though a full recovery has not yet been achieved.

Despite the increase in traffic, ANSPs faced rising operational costs driven by inflation and the need to adapt to post-pandemic conditions. Such cost increases were largely influenced by factors such as higher fuel prices, increased labour costs, and the implementation of enhanced health and safety measures, all essential for managing the renewed traffic volumes and maintaining safety standards.

The increase in IFR hours has helped reduce the overall cost per IFR hour, particularly in oceanic airspace. The average decrease in cost per IFR hour is about 23 per cent for continental airspace and about 41 per cent for oceanic airspace. However, an upward trend in the total cost per IFR hour was observed for six ANSPs providing continental navigation services. A similar situation was noted for the costs excluding ATCO costs in OPS per IFR hour.

The operational efficiency of air traffic controllers also showed significant improvement. Hourly productivity for ATCOs in continental airspace increased by an average of 32 per cent, while ANSPs in oceanic airspace saw annual productivity gains of up to 64 per cent. Compared to the 30 per cent decrease in 2020-2021, this represents the largest year-over-year percentage change across all KPIs. Despite overall improvements, some ANSPs in both airspace segments experienced declines in ATCO productivity.

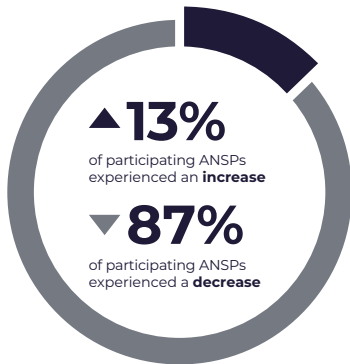
Amid the ongoing challenges of recovering from the COVID-19 pandemic, ANSPs have demonstrated a notable ability to quickly adapt to post-pandemic conditions while striving to return to pre-pandemic trends in operational efficiency.

It is important to note that the reporting periods for ANSPs submitting data to CANSO vary. Some include data within the 2021 calendar year, some for the 2022 calendar year and others include some of 2023. The PRU data for European ANSPs aligns with the 2022 calendar year. The impact of the reporting period is still notable in this year's report due to the pandemic restrictions and their lifting. To highlight this, the graphs representing the KPIs are ordered and colour-coded by the reporting period. The reporting periods span from April 2021 to June 2023.

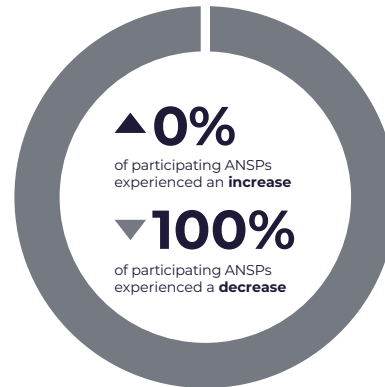
Key findings of the report¹

Cost Efficiency (Indicator 1)

Continental and oceanic cost efficiency improves amidst a growth in traffic



in **continental**
other cost per
IFR flight hour



in **oceanic**
other cost per
IFR flight hour

With an overall increase in IFR traffic the KPI 1 total cost per IFR flight hour in continental airspace decreased by 23 per cent compared to 2021. Compared to the year 2020, at the peak of the pandemic, the total cost per IFR hour in 2022 was 37 per cent lower.

The decrease in the global average of KPI 1 in oceanic airspace was driven by an increase in oceanic IFR flight hours, with the most significant growth coming from Isavia ANS and Airways NZ. Notably, Airways NZ reported an increase in oceanic flight hours exceeding 100 per cent.

When examining the fiscal years, most ANSPs with oceanic airspace (although there are few) do not align with the calendar year 2022. Instead, their reporting periods primarily cover the last third of 2021. The end of 2021 and the beginning of 2022 were significant due to the easing of international restrictions, which likely contributed to increased air traffic, particularly intercontinental flights. This shift probably had a substantial impact on the data for ANSPs in oceanic airspace compared to those in the continental airspace. Additionally, a gradual increase in IFR hours was observed over the course of the reporting periods.

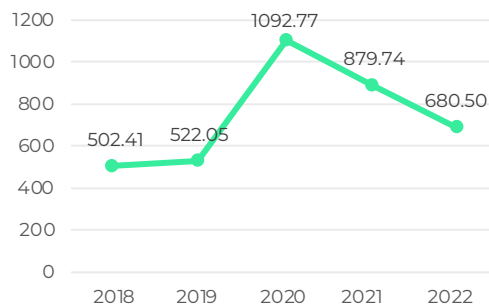
Average global percentage change – Total cost per IFR flight hour (2021-2022):

CONTINENTAL: -23%

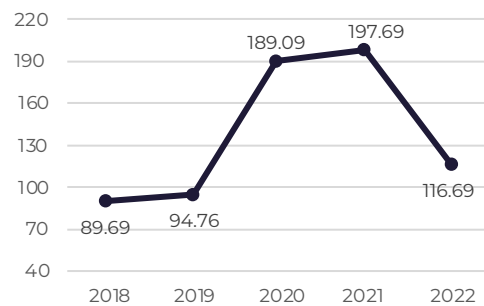
OCEANIC: -41%

Average KPI values – Total cost per IFR flight hour (USD) (2018-2022):

CONTINENTAL:

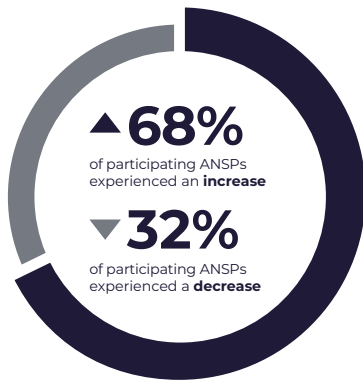


OCEANIC:

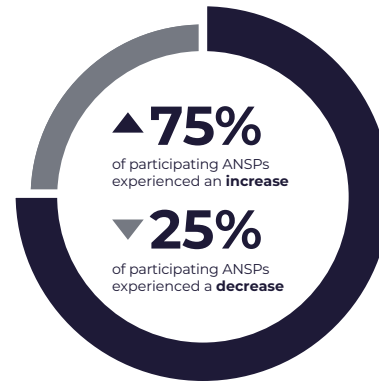


¹ For identified results supporting these key findings, see 2022 Performance data section. For this reason, there are also small differences between the numbers presented in both sections

ATCO in OPS employment cost per ATCO hour (Indicator 2A)
Growing trend in ATCO employment costs per ATCO hour



in **continental**
employment cost
per ATCO hour



in **oceanic**
employment cost
per ATCO hour

The air transport sector is still recovering from the pandemic crisis, causing a fluctuation in operational and financial performance, especially in the oceanic airspace due to slower bounce-back in intercontinental traffic levels due to prolonged border shut-down and associated health and safety measures.

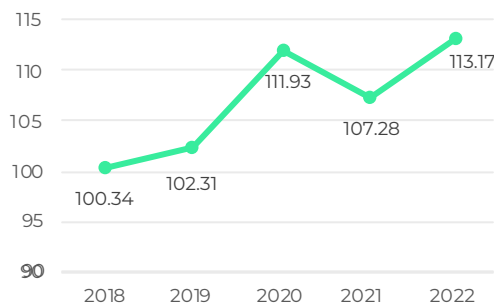
Average global percentage change – Employment cost per ATCO hour (2021-2022):

CONTINENTAL: +5%

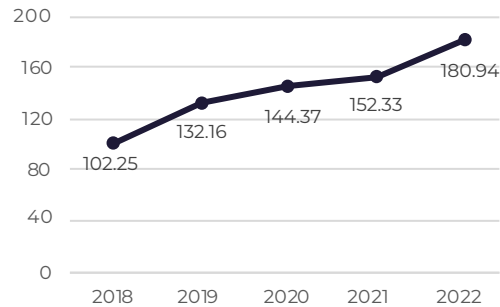
OCEANIC: +19%

Average KPI values – Employment cost per ATCO hour (USD) (2018-2022):

CONTINENTAL:

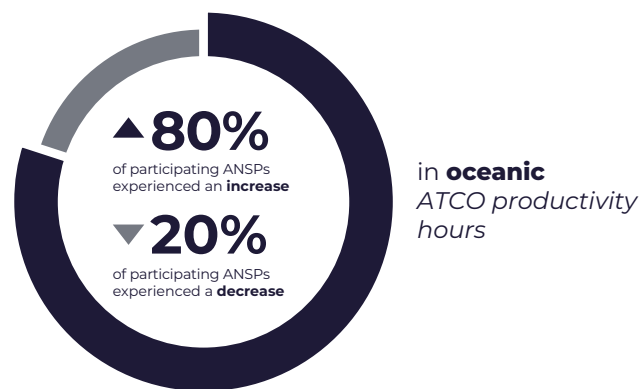
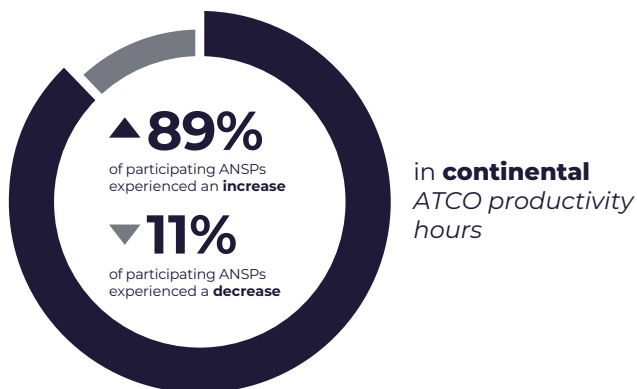


OCEANIC:



ATCO in OPS hour productivity (Indicator 2B)

Productivity soared for both continental and oceanic ANSPs, with oceanic ANSPs rebounding significantly after last year's setback



The increase in global average KPI 2B ATCO productivity in both oceanic and continental airspace was primarily driven by a rise in IFR flight hours, which increased across the majority of participating ANSPs during the reporting period. Since KPI 2B is directly derived from IFR flight hours, this led to a significant boost in ATCO productivity, in oceanic airspace surpassing the levels observed prior to the pandemic.

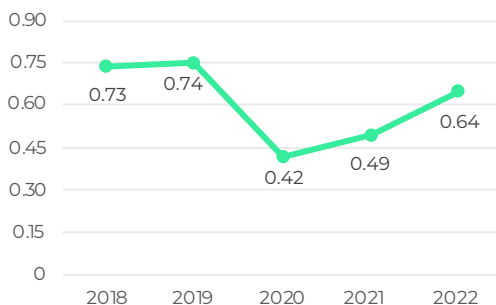
Average global percentage change – ATCO productivity (2021-2022):

CONTINENTAL: +32%

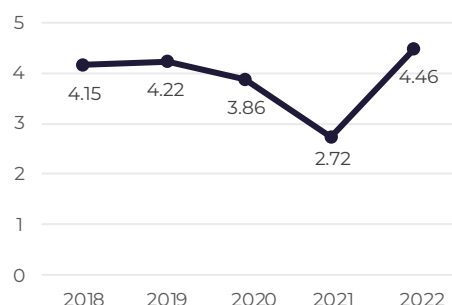
OCEANIC: +64%

Average KPI values – ATCO productivity (2018-2022):

CONTINENTAL:

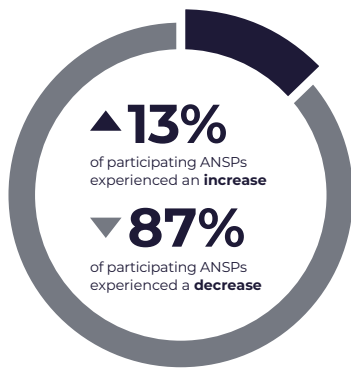


OCEANIC:

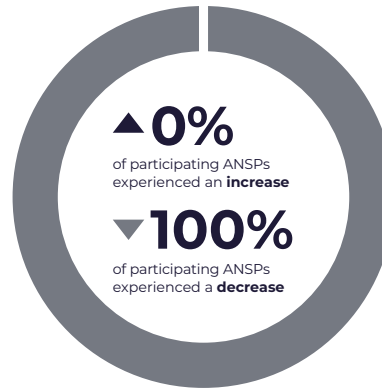


Other costs per IFR flight hour (Indicator 2C)

Continental & oceanic costs show signs of returning to pre-pandemic levels



in **continental** other cost per IFR flight hour



in **oceanic** other cost per IFR flight hour

Most ANSPs in continental airspace saw a decrease in KPI 2C (other costs per IFR flight hour), largely due to an increase in IFR hours. However, six ANSPs reported an increase in this KPI, mainly attributed to a significant rise in other costs. Notably, DHMI and KCAA experienced increases in these costs exceeding 100 per cent.

Other costs per IFR flight hour in oceanic airspace decreased for all the ANSPs, driven by an increase in IFR hours.

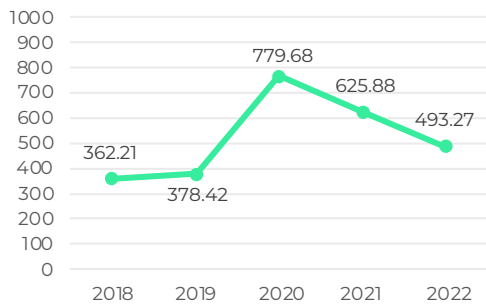
Average global percentage change – Other costs per IFR flight hour (2021-2022):

CONTINENTAL: -21%

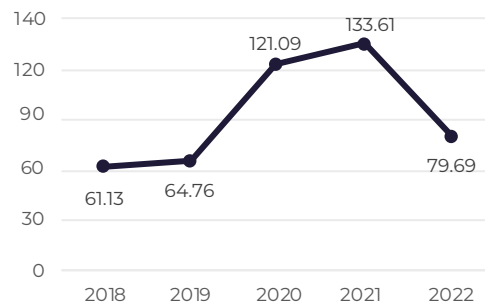
OCEANIC: -40%

Average KPI values – Other costs per IFR flight hour (USD) (2018-2022):

CONTINENTAL:



OCEANIC:



Introduction

Comparing ANSP Performance

Air navigation service providers (ANSPs) are responsible for managing global air traffic safely, efficiently, and cost-effectively. This includes managing and enhancing airspace capacity through improvements to infrastructure and technology, improving efficiency through a skilled and productive workforce, and an innovative approach to airspace management.

The performance of the air navigation system impacts stakeholders throughout the aviation ecosystem. From boosting connectivity and minimising delays to upholding the highest standards of safety in aviation, efficient and effective air navigation services are a critical component of a high-performance aviation industry. To that end, CANSO has devised benchmarking exercises that aggregate and review global performance accordingly.

Comparing and benchmarking key financial and productivity indicators enables ANSPs to make informed decisions when pursuing increased cost-effectiveness and productivity, without impacting safety – the industry's top priority. The understanding gained from benchmarking helps ANSPs to work together to address both their own performance and that of the Air Traffic Management (ATM) industry worldwide. The annual CANSO *Global ANS Performance Report* has served to highlight global performance trends for over 13 years.

Measuring Cost Efficiency and Productivity

Cost-efficiency and productivity are two key performance indicators of air navigation services that enable this monitoring of performance. They demonstrate how ANSPs are delivering value and serve as indicators of operational efficiency. The *CANSO ANS Performance Framework* identifies the factors that determine cost efficiency and productivity, including employment costs, hours worked and other costs, and is used to create a clear, common model for understanding global ANS performance.

Global Air Navigation Services Performance Report

This year's *Global Air Navigation Services Performance Report* contains performance indicators for identified ANSPs for the year 2022, along with trend data between 2018 and 2022.

ANSPs submitting to CANSO have also provided contextual comments, including any exceptional events during the year or items that may impact the comparability of their data. Additional comments on important events are included within the contextual data, providing insight into the results of the participating ANSPs.

The detailed results for each ANSP can be found in the *CANSO Global Benchmarking Workgroup Performance Dashboard*, which is available to participating GBWG members.

Incorporation of PRU data

A key objective for CANSO and the members of CANSO's GBWG is to continue to increase the global coverage of the data included in the annual Performance Report. To support this, started in 2013, CANSO, with the agreement of EUROCONTROL, has incorporated public data collected by EUROCONTROL's Performance Review Unit (PRU) to complete the representation of European ANSPs in the dataset.

It should be noted that while the raw data extracted from the ACE Report is directly comparable, the final KPIs expressed in the CANSO report are not directly comparable to those reported in the ACE report.

Primarily, this is because the KPIs use different inputs. In particular, the CANSO report uses Instrument Flight Rules (IFR) flight hours and extracts "total flight hours controlled by the ANSP" as a comparable data point from the ACE dataset, while the ACE Report uses "composite flight hours". These comparable data points were validated as part of a comparison exercise undertaken by Egis, which was presented in 2020.

Differences in indicators between the two reports go beyond the use of a different flight hour measurement. Two key examples are highlighted below:

- *CANSO's Performance Report* converts all cost data into USD instead of EUR.
- *CANSO's Performance Report* primarily uses the World Bank as a source for exchange rate, inflation rate and purchasing power parity (PPP) information, whereas EUROCONTROL's *ACE Report* uses a combination of EUROSTAT and (International Monetary Fund) IMF data.

European GBWG members have been allowed to request, with justification, to use the GBWG submission for this benchmarking exercise. For further details please see *Global Air Navigation Services Performance Report 2018-2022: Participation*.

2022 Industry Trends²

PASSENGER GROWTH REBOUNDS, BUT AIR CARGO SLUMPS



Global passenger increase of
42% in all regions
however 29% below 2019



Air cargo volume decreased by
8% in 2022,
declining 1.6% on 2019 levels

+14.8% in Aircraft Movements in 2022 (recovery of 82.4% from 2019)



Domestic passenger numbers

rose to **78%**
of 2019 levels



International passenger numbers

rose to **66%**
of 2019 levels



Passenger traffic at the
top 10 airports increased by
51.7% in 2022,
and represents 82.5% of the 2019
level of aircraft movements

SIGNIFICANT ENVIRONMENTAL IMPLICATIONS AS A RESULT OF THE PANDEMIC

In 2022 aviation accounted for

2%

of global energy-related CO₂ emissions



CO₂ emissions rose in 2022 to reach

nearly **80%**

of their pre-pandemic peak in 2019



UN Member States agreed to develop a legally binding deal to **end plastic pollution**



The surge in SAF offtake agreements between fuel suppliers and airlines saw an **increase to 22 billion litres** in 2022 compared to 9 billion litres in 2021



CORSIA baseline revised

to **85%**

of 2019 level



ICAO member states have adopted a Long-Term Aspirational Goal (LTAG) aiming to attain

net-zero CO₂ emissions by 2050

2022 Industry Trends²

FINANCIAL PERFORMANCE

 **\$3.5bn**
net loss in 2022
compared to a
\$31bn net profit in 2019



In 2022, global airlines experienced reduced losses compared to 2021, their revenues remained

13% below the 2019 level, reaching **\$730bn**, as opposed to the **\$840bn** recorded in 2019

Cargo yields continued to improve,

+7.4%
during 2022

replacing

\$207bn
in revenue,
surpassing **\$100bn** in 2019



Although passenger revenues increased, there were still

25% less seats available than in 2019



Jet fuel price increased by around

75% to USD 136/bb in 2022

accounting for almost 30% of operating expenses in 2022

SUPPLY AND DEMAND STARTS TO SHOW SIGNS OF RECOVERY

RPK increased alongside ASK for a load factor of

78.25%

compared to 67.6% in 2021



Europe

accounted for majority world traffic in

2022 at 31%,

up from 25% in 2021

RPK ▲ / ASK ▲ =
10.57% increase in load factor



North America

provided the highest passenger load factor at

83% of ASK

² For sources of 2022 Industry Trends data please refer to Annex 8: Sources

Post-Pandemic Recovery

The traffic increases but ANSPs carry the financial debt over

The aviation industry has demonstrated a rapid recovery, with global air transport capacity, seat availability, and passenger numbers now reaching 80 per cent of pre-pandemic levels, according to [ICAO analysis](#). In 2022, the total number of passengers worldwide surpassed 6.6 billion, accounting for 72.5 per cent of pre-pandemic figures. Additionally, global aircraft movements have recovered to 82.4 per cent of pre-pandemic levels³.

This report primarily focuses on performance data from 2022. However, the reporting periods of member organisations vary, with some ANSPs covering the second half of 2021 or extending into the first quarter of 2023. As a result, certain data sets include parts of 2021, others encompass 2022, and some even extend into 2023. ANSPs reporting data from 2022 and 2023 have shown significant recovery, while those incorporating data from 2021 and early 2022 have exhibited less improvement. Consequently, the impact of the COVID-19 pandemic has not been uniformly reflected across all ANSPs due to these differing reporting periods.

Figure 1 illustrates that aircraft movements during 2022 generally remained above those of 2021, with traffic more than doubling compared to the first half of 2021, which was still affected by COVID-19 restrictions. Throughout 2022, many nations relaxed travel restrictions. Consequently, the number of air passengers continued to rise globally, nearing levels seen before the pandemic. Globally, full year 2022 traffic was at 68.5 per cent of pre-pandemic (2019) levels. Aircraft movements increased by 14.8 per cent in 2022. The post pandemic high remains July 2022, when 244,000 flight hours were operated globally⁴.

The 2022 summer season brought about a period of increased travel demand for North America and Europe as a result of relaxed restrictions. The gradual reopening of global travel markets was aided by vaccine distribution and findings indicating the limited effectiveness of travel restrictions in managing COVID-19. In 2022, the relaxation of travel policies notably enhanced international passenger

traffic, especially in the Asia-Pacific region, which experienced the slowest recovery in traffic growth in both 2021 and 2022⁵.

Several regions experienced a reduction in air traffic in January, with Europe and the North Atlantic witnessing the most significant declines. In Europe, daily flights dropped by over 4,000 in late January compared to late December, while the North Atlantic saw a decrease of 300 flights per day during the same period. Traffic levels in North America remained strong. Asia, which remains the most significantly impacted region, continued to see slight gains in air traffic.

The war in Ukraine had a great influence on the global aviation industry. It has resulted not only in closed airspace over Ukraine but also in the cancellation of many flights to or from Russia and the restricted use of Russian airspace. Rising inflation from the ongoing situation has driven up the costs for ANSPs, including higher salaries.

As 2022 unfolded, travel restrictions were lifted, and global economies showed signs of recovery following the end of COVID-19 policies, along with the removal of most testing requirements for international travellers. These developments have driven a surge in global air traffic demand, leading to a recovery in air passenger volumes. These advancements boosted global air traffic demand. The strong recovery in air passenger demand has resulted in 2022 passenger numbers reaching an estimated 74 per cent of pre-pandemic levels⁶.

³ ACI Annual World Airport Traffic Report 2023

⁴ CANSO ATM Traffic Analysis Report 2023

⁵ IATA Annual review 2023

⁶ ICAO Aviation data and statistics

The traffic increases but ANSPs carry the debt over (continued)

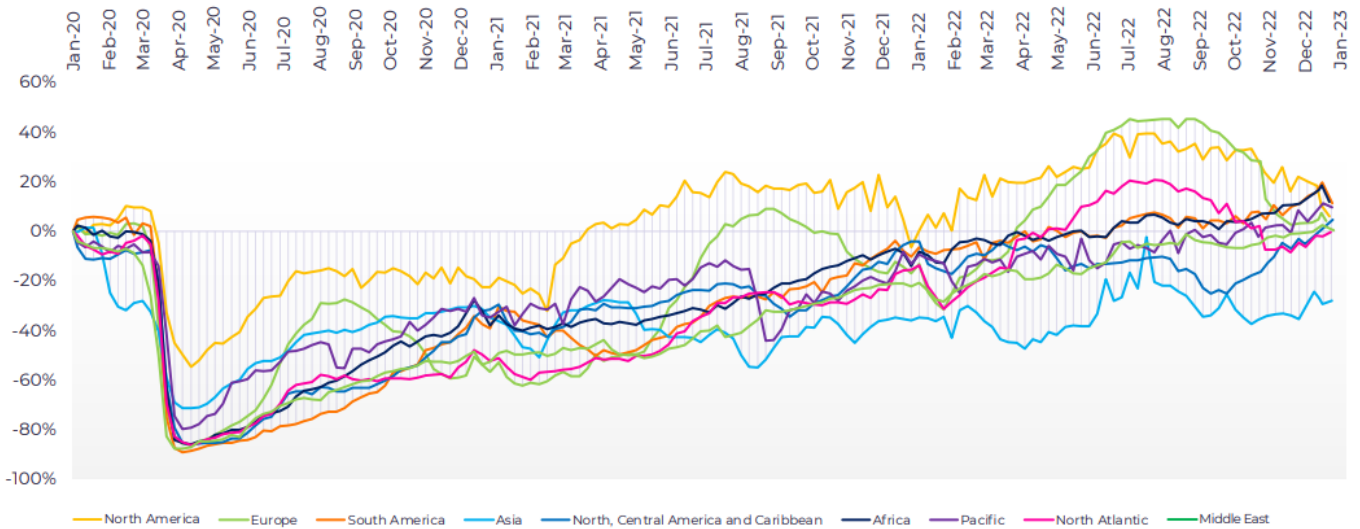


Figure 1 - Percentage change in aircraft movements by region, from Jan 2020 towards Jan 2023. Taken from [CANSO ATM Traffic Analysis Report](#) (December 2022)

Impact of COVID-19 and varied reporting periods

Figure 2 illustrates, the reporting periods for the ANSPs submitting to CANSO differ, with some ANSPs submitting data within the 2021 calendar year, and some reporting periods ending in 2023; European ANSPs submit data spanning the full 2022 calendar year.

Some trends displayed by ANSPs reporting data for 2021 and the beginning of 2022 will therefore be mostly affected by the lifting of pandemic restrictions and the implementation of health and safety measures. Trends reflecting costs incurred in 2022 will be impacted by increased inflation⁷ due to the war in Ukraine. The most significant differences are expected to occur between ATNS, KCAA, NAV CANADA, AEROTHAI, and FAA-ATO, whose reporting periods started in 2021, and CAAS and Airways NZ, which reporting periods started later in 2022 and ended in 2023. Consideration should be made towards this, and thus, the KPI graphs have been ordered by the reporting period, with the earliest month being April 2021 for ATNS, and the latest reporting period by Airways NZ in June 2023.

Whilst the majority of the submitting ANSPs have reporting periods during 2022, anomalous KPIs may be indicative of the varying reporting period. For instance, in terms of Oceanic data the majority of Oceanic ANSPs have financial years that are not aligned with the calendar year 2022 but include a significant portion of data captured in the year 2021. Therefore, the data has more impact on the Oceanic ANSPs than the Continental ANSPs.

⁷ [The Inflation Crisis | Statista](#)

Impact of COVID-19 and varied reporting periods (continued)

Fiscal Years

Apr 2021 - Jun 2023

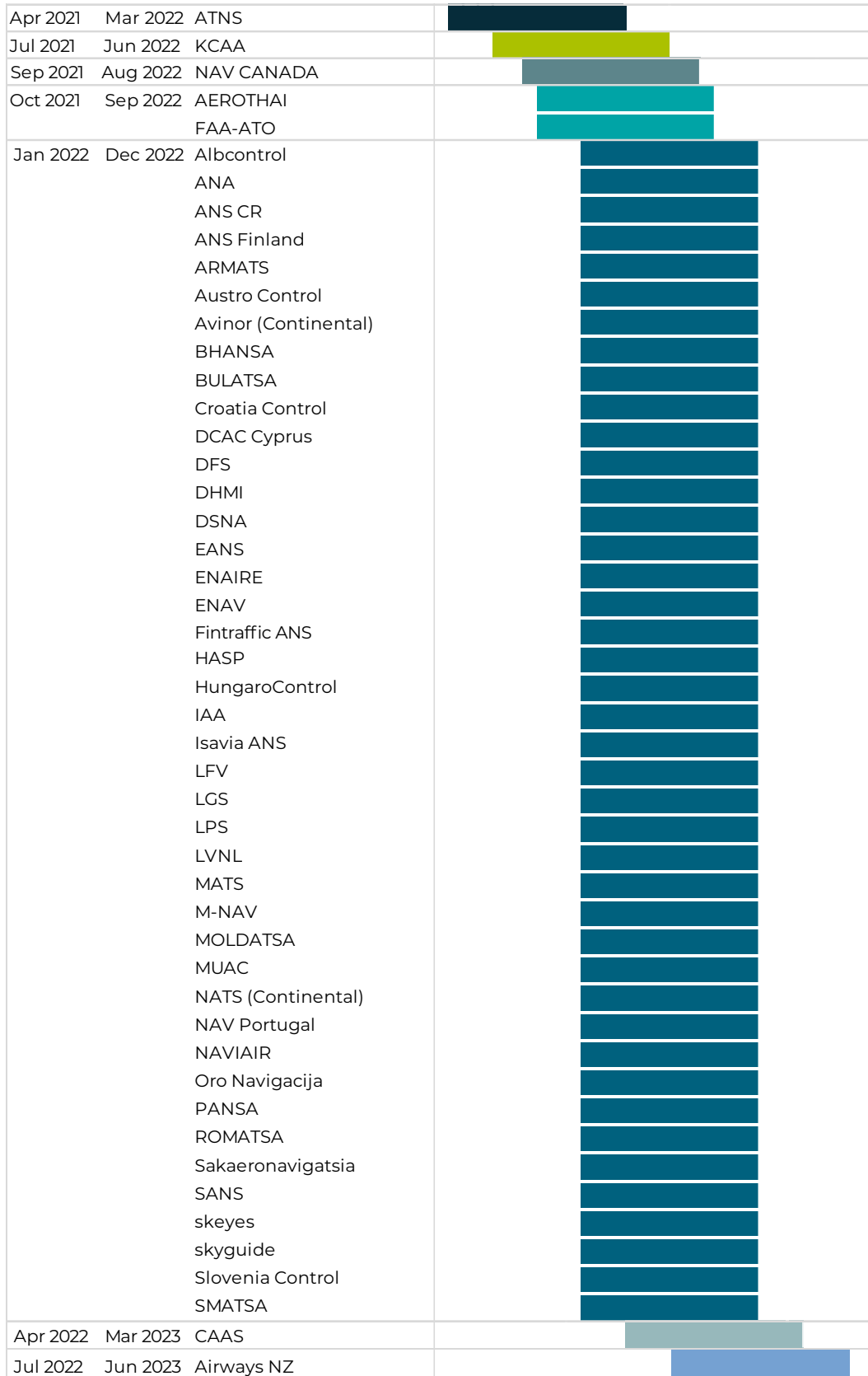


Figure 2 - Reporting Periods

Operational Performance

The CANSO GBWG commenced collecting data on operational performance metrics in 2023 to explore the possibility of expanding the list of metrics currently monitored. At the 38th GBWG meeting in Ottawa in February 2024, several new metric proposals were reviewed. However, data completeness remains a significant challenge, as not all participating ANSPs have submitted data. To assess operational performance ANSPs were asked to submit data for 3 operational KPIs as a trial.

For trial operational KPIs, only seven ANSPs submitted data for all three KPIs.

Only seven ANSPs submitted data for all three operational trial KPIs. This indicates that the flights are, on average, deviating slightly from their planned routes, potentially due to factors such as weather conditions, or airspace restrictions.

DSNA monitors all three trial operational KPIs. The KEP value i.e. Horizontal flight efficiency of the planned route indicates that the planned routes are 5.68 per cent less efficient than the optimal (Great Circle) distance; the routes planned by the airline or flight planners are, on average, 5.68 per cent longer than the shortest possible path. The KPI 1 value of -2.40 per cent indicates that the actual en-route distance flown is shorter than the planned routes by 2.40 per cent.

ENAIRE monitors all three-trial operational KPIs with a KPI 1 the actual en-route distance flown versus the planned route distance is 0.741 per cent.

HungaroControl monitors all three trial operational KPIs with a KPI 1 the actual en-route distance flown versus the planned route distance is 99.2 per cent. HungaroControl reported a higher value than the other ANSPs that submitted data. HungaroControl KEA value deteriorated mainly due to traffic flow changes resulting from the closure of Ukraine - invasion airspace.

NAV Portugal monitors all three trial operational KPIs. For KPI 1, the actual en-route distance flown versus the planned route distance is 1.52 per cent.

PANSA monitors all three trial operational KPIs. For KPI 1, the actual en-route distance flown versus the planned route distance is 4.79 per cent.

The Global Benchmarking Workgroup will continue to assess operational performance and encourage greater participation through submission of data.

2022 Global ANS Report Participation

CANSO GBWG Submissions

Together with the data from the PRU, the report provides data for 47 ANSPs. All ANSPs which submitted to PRU, CANSO or both are indicated in the table below.

Note: For those who submitted both CANSO and PRU data, CANSO data has been used as the default in this report.

The 2022 data submission covers⁸:

Total IFR flight hours: 46,280,602

Total costs: 24,100,758,423.87 USD

Total ATCOs in operations: 32,605

Region	Country/ Territory	Organisation	Acronym	Submitted		
				CANSO	PRU	Both
Africa	Kenya	Kenya Civil Aviation Authority	KCAA	X		
	South Africa	Air Traffic and Navigation Services	ATNS	X		
Americas	Canada	NAV CANADA	NAV CANADA	X		
	USA	Federal Aviation Administration - Air Traffic Organisation	FAA-ATO	X		
Asia Pacific	New Zealand	Airways New Zealand	Airways NZ	X		
	Singapore	Civil Aviation Authority of Singapore	CAAS	X		
	Thailand	Aeronautical Radio of Thailand	AEROTHAI	X		
Europe	Albania	Air Navigation Services of Albania	Albcontrol		X	
	Armenia	Armenia Air Traffic Services	ARMATS		X	
	Austria	Austro Control	Austro Control		X	
	Belgium	skeyes	skeyes		X	
	Bosnia and Herzegovina	Bosnia and Herzegovina Air Navigation Services Agency	BHANSA			X

⁸ As some ANSPs did not submit data for every field, this is not the total of participating ANSPs rather it's a total of the data submitted. For instance, AAI and Airservices did not submit data for 2022.

CANSO GBWG Submissions (continued)

Region	Country/ Territory	Organisation	Acronym	Submitted		
				CANSO	PRU	Both
Europe	Bulgaria	Bulgarian Air Traffic Services Authority	BULATSA		X	
	Croatia	Croatia Control Ltd	Croatia Control		X	
	Cyprus	Department of Civil Aviation of Cyprus	DCAC Cyprus		X	
	Czech Republic	Air Navigation Services of the Czech Republic	ANS CR		X	
	Denmark	Navigation Via Air	NAVIAIR		X	
	Estonia	Estonian Air Navigation Services	EANS			X
	Finland	Fintraffic Air Navigation Services	Fintraffic ANS		X	
	France	Direction des Services de la navigation aérienne	DSNA			X
	Georgia	Sakaeronavigatsia Ltd.	Sakaeronavigatsia		X	
	Germany	DFS Aviation Services GmbH	DFS		X	
	Greece	Hellenic Civil Aviation Authority	HASP		X	
	Hungary	HungaroControl Pte. Ltd. Co.	HungaroControl			X
	Iceland	Isavia Air Navigation Services	Isavia ANS	X		
	Ireland	Irish Aviation Authority	IAA		X	
	Italy	ENAV S.p.A	ENAV		X	
	Latvia	Latvijas gaisa satiksme	LGS		X	
	Lithuania	SE Oro Navigacija	Oro Navigacija		X	
	Luxembourg	Administration de la navigation aérienne	ANA	X		
	Macedonia	Macedonian Air Navigation Service Provider, GOJSC	M-NAV		X	
	Malta	Malta Air Traffic Services	MATS		X	

CANSO GBWG Submissions (continued)

Region	Country/ Territory	Organisation	Acronym	Submitted		
				CANSO	PRU	Both
Europe	Moldova	Moldovian Air Traffic Services Authority	MOLDATSA		X	
	Netherlands	Luchtverkeersleiding Nederland	LVNL		X	
	Norway	Avinor Air Navigation Services	Avinor (Continental)		X	
	Poland	Polish Air Navigation Services Agency	PANSA			X
	Portugal	Navegação Aérea de Portugal - NAV Portugal, E.P.E.	NAV Portugal			X
	Romania	Romanian Air Traffic Services Administration	ROMATSA		X	
	Serbia and Montenegro	Serbia and Montenegro Air Traffic Services SMATSA Ilc	SMATSA			X
	Slovakia	Letové prevádzkové služby	LPS		X	
	Slovenia	Kontrola zračnega prometa Slovenije	Slovenia Control			X
	Spain	ENAIRES	ENAIRES			X
	Sweden	Luftfartsverket	LFV		X	
	Switzerland	skyguide	skyguide		X	
	Turkey	General Directorate of State Airports Authority	DHMI			X
	United Kingdom	NATS Holdings	NATS (Continental)		X	
-	Maastricht Upper Areal Control Centre	MUAC		X		

Table 1 - CANSO global ANS report participation

Reporting Periods

While the GBWG encourages ANSPs with reporting periods that do not run between January and December to submit their most recent dataset, it is noted this is not possible for some providers due to data validation and availability. Readers are therefore encouraged to check reporting periods when comparing individual ANSPs. These are outlined in the table below.

Region	Organisation	Reporting Period
Africa	ATNS	Apr 2021 - Mar 2022
	KCAA	Jul 2021 - Jun 2022
Americas	NAV CANADA	Sep 2021 - Aug 2022
	FAA-ATO	Oct 2021 - Sep 2022
Asia Pacific	AEROTHAI	Oct 2021 - Sep 2022
	CAAS	Apr 2022 - Mar 2023
	Airways NZ	Jul 2022 - June 2023
Europe	Albcontrol	Jan 2022 - Dec 2022
	ANA	Jan 2022 - Dec 2022
	ANS CR	Jan 2022 - Dec 2022
	ARMATS	Jan 2022 - Dec 2022
	Austro Control	Jan 2022 - Dec 2022
	Avinor (Continental)	Jan 2022 - Dec 2022
	BHANSA	Jan 2022 - Dec 2022
	BULATSA	Jan 2022 - Dec 2022
	Croatia Control	Jan 2022 - Dec 2022
	DCAC Cyprus	Jan 2022 - Dec 2022
	DFS	Jan 2022 - Dec 2022
	DHMI	Jan 2022 - Dec 2022
	DSNA	Jan 2022 - Dec 2022
	EANS	Jan 2022 - Dec 2022
	ENAIRE	Jan 2022 - Dec 2022
	ENAV	Jan 2022 - Dec 2022
	Fintraffic ANS	Jan 2022 - Dec 2022
HASP	Jan 2022 - Dec 2022	
HungaroControl	Jan 2022 - Dec 2022	
IAA	Jan 2022 - Dec 2022	

Reporting Periods (continued)

Region	Organisation	Reporting Period
Europe	Isavia ANS	Jan 2022- Dec 2022
	LFV	Jan 2022 - Dec 2022
	LGS	Jan 2022 - Dec 2022
	LPS	Jan 2022 - Dec 2022
	LVNL	Jan 2022 - Dec 2022
	MATS	Jan 2022 - Dec 2022
	M-NAV	Jan 2022 - Dec 2022
	MOLDATSA	Jan 2022 - Dec 2022
	MUAC	Jan 2022 - Dec 2022
	NATS (Continental)	Jan 2022 - Dec 2022
	NAV Portugal	Jan 2022 - Dec 2022
	NAVIAIR	Jan 2022 - Dec 2022
	Oro Navigacija	Jan 2022 - Dec 2022
	PANSA	Jan 2022 - Dec 2022
	ROMATSA	Jan 2022 - Dec 2022
	Sakaeronavigatsia	Jan 2022 - Dec 2022
	skeyes	Jan 2022 - Dec 2022
	skyguide	Jan 2022 - Dec 2022
	Slovenia Control	Jan 2022 - Dec 2022
	SMATSA	Jan 2022 - Dec 2022

Table 2 - Participating ANSP's reporting periods

Total IFR flight hours

Organisation	Comparator Group ⁹ (based on IFR flight hours)	Total IFR Flight Hours 2022 (Continental)	Growth IFR Flight Hours (Continental)	Total IFR Flight Hours 2022 (Oceanic)	Growth IFR Flight Hours (Oceanic)
AEROTHAI	CG2	335,199.67	60%	-	
Airways NZ	CG2	229,240.00	34%	93,122.00	136%
Albcontrol	-	51,932.00	60%	-	
ANA	CG3	17,665.00	46%	-	
ANS CR	-	178,983.00	36%	-	
ARMATS	-	18,834.12	111%	-	
ATNS	CG2	201,345.58	90%	309.83	-77%
Austro Control	-	317,434.00	68%	-	
Avinor (Continental)	-	333,849.00	34%	-	
BHANSA	CG3	85,364.53		-	
BULATSA	-	290,421.55	65%	-	
CAAS	CG2	320,744.00	99%	-	
Croatia Control	-	249,018.13	48%	-	
DCAC Cyprus	-	167,670.40	44%	-	
DFS	-	1,263,985.22	57%	-	
DHMI	CG1	1,334,763.67	39%	-	
DSNA	CG1	2,178,853.00	60%	-	
EANS	CG3	48,360.00	29%	-	
ENAIRES	CG1	1,582,961.82	69%	-	
ENAV	-	1,141,849.07	61%	-	
FAA-ATO	CG1	24,140,028.55	19%	2,033,755.39	32%
Fintraffic ANS	-	88,850.00	48%	-	
HASP	-	650,415.15	57%	-	
HungaroControl	CG2	278,836.00	73%	-	
IAA	-	288,261.00	86%	-	
Isavia ANS	CG2	9,611.00	-49%	270,410.00	84%

⁹ Comparator Group 1: (>1mil IFR flight hours: DHMI, DSNA, ENAIRES, FAA ATO, NAV Canada)

Comparator Group 2: (100k-1mil IFR flight hours: AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSA, SMATSA)

Comparator Group 3: (<100k IFR flight hours: ANA, EANS, Slovenia Control, BHANSA)

Total IFR flight hours (continued)

Organisation	Comparator Group ⁹ (based on IFR flight hours)	Total IFR Flight Hours 2022 (Continental)	Growth IFR Flight Hours (Continental)	Total IFR Flight Hours 2022 (Oceanic)	Growth IFR Flight Hours (Oceanic)
KCAA	CG2	121,944.00	16%	-	
LFV	-	333,262.00	54%	-	
LGS	-	52,501.00	11%	-	
LPS	-	86,170.73	59%	-	
LVNL	-	141,002.00	50%	-	
MATS	-	62,700.28	28%	-	
M-NAV	-	40,619.00	53%	-	
MOLDATSA	-	4,416.00	-40%	-	
MUAC	-	545,651.33	75%	-	
NATS (Continental)	-	1,271,793.38	99%	-	
NAV CANADA	CG1	2,650,257.00	56%	604,464.40	83%
NAV Portugal	CG2	413,363.00	83%	-	
NAVIAIR	-	183,042.82	71%	-	
Oro Navigacija	-	47,285.50	1%	-	
PANSA	CG2	361,376.42	33%	-	
ROMATSA	-	384,582.23	57%	-	
Sakaeronavigatsia	-	55,780.00	75%	-	
skeyes	-	97,088.52	38%	-	
Skyguide	-	318,606.12	63%	-	
Slovenia Control	CG3	61,705.00	54%	-	
SMATSA	CG2	240,919.05	69%	-	

Table 3 - Participating ANSP's IFR flight hours

2022 Performance Data

The following section presents 2022 performance data and 2018-2022 trend data for both continental and oceanic activities in line with the *CANSO ANS Performance Framework* levels 1-3 (see Figure 35) and list of KPIs below.

KPI		Numerator	Denominator	Figure	
Cost Efficiency and Productivity Performance Indicators				Continental 2022/Trend	Oceanic 2022
1	Cost per IFR flight hour	Total costs	IFR flight hours	Figure 3	Figure 14
2A	ATCO in OPS employment cost per ATCO in OPS hour	Employment costs for ATCOs in OPS	ATCOs in OPS hours	Figure 4, Figure 5	Figure 15,16
2B	ATCO in OPS hour productivity	IFR flight hours	ATCOs in OPS hours	Figure 6	Figure 17
2C	Cost excluding ATCOs in OPS employment costs per IFR flight hours	Costs excluding employment costs for ATCOs in OPS	IFR flight hours	Figure 7	Figure 18
2D	Employment costs of ATCOs in OPS as a percentage of Total costs	Employment costs for ATCOs in OPS	Total costs	Figure 8	Figure 19
3A	Annual employment cost per ATCO in OPS	Employment cost for ATCOs in OPS	No. of ATCOs in OPS (FTE)	Figure 9, Figure 10	Figure 20, Figure 21
3B	Annual Working hours per ATCO in OPS	ATCOs in OPS hours	No. of ATCOs in OPS (FTE)	Figure 11	Figure 22
3C	Annual IFR hours per ATCO in OPS	IFR flight hours	No. of ATCOs in OPS (FTE)	Figure 12	Figure 23
3D	Ratio of frontline service staff to ATCO in OPS	No. of frontline service support staff (FTE)	No. of ATCOs in OPS (FTE)	Figure 13	Figure 24
Joint Continental and Oceanic Cost Efficiency Performance Indicators				Continental and Oceanic 2022/Trend	
CO1	Cost per IFR flight hour	Total costs	IFR flight hours	Figure 25	
CO2D	Employment costs of ATCOs in OPS as a percentage of Total costs	Employment costs for ATCOs in OPS	Total costs	Figure 26	

Table 4 - List of key performance indicators

Note that KPI CO1 is the combination of continental and oceanic metric for KPI 1. Likewise, KPI CO2D is the combination of continental and oceanic metric for KPI 2D.

Continental Cost Efficiency and Productivity: 2022

Indicator 1: Cost per IFR flight hour (USD) (Formula: Total costs / IFR flight hours)

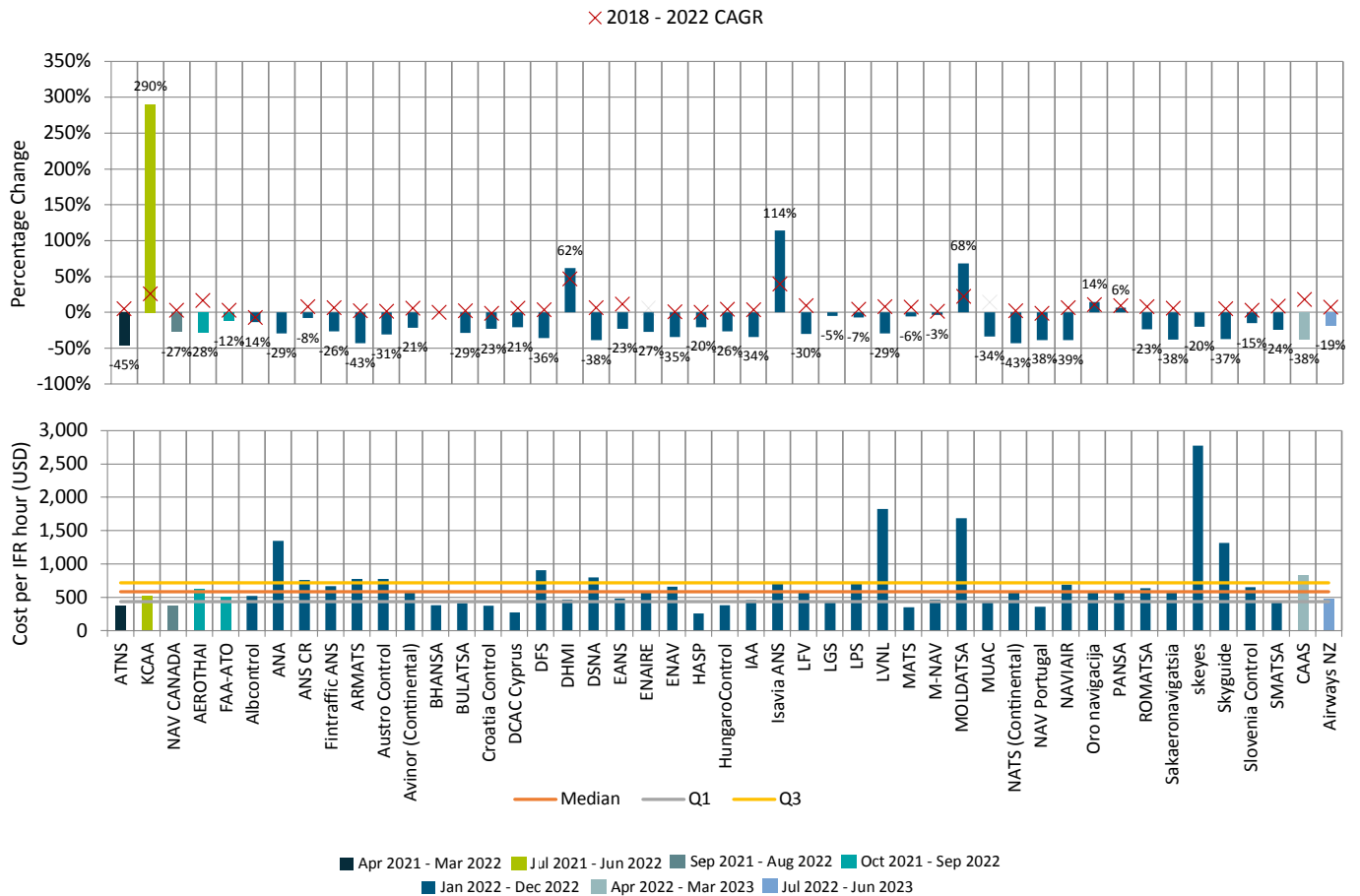


Figure 3 - Cost per IFR flight hour (USD)

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median cost per IFR flight hour was USD 584. The 2022 weighted average (taking into account total continental IFR flight hours per ANSP cost per IFR flight hour) was USD 681. For comparison, the 2021 median for the same set of ANSPs was USD 721 per IFR hour, with a weighted average of USD 880 per IFR hour.

In terms of total costs in continental airspace, 95.65 per cent of ANSPs experienced an increase, with a rise of median by 25 per cent between 2021 and 2022.

KCAA experienced the most significant change of the year, with a 290 per cent increase in Cost per IFR hour as other costs rose sharply as a proportion of the total. The second highest change, an increase of over 100 per cent, was seen by Isavia ANS, driven by an almost 50 per cent drop in IFR hours in continental airspace.

It should be noted that differences between the operational characteristics of ANSPs' airspaces may significantly influence their 'Cost per IFR flight hour'. For example, skeyes and LVNL have delegated control of their upper airspace to MUAC. Skeyes and LVNL therefore have a higher 'Cost per IFR flight hour', than if they controlled both the upper and the lower airspace as traffic for the latter is generally more complex. MUAC, meanwhile, makes use of infrastructure provided by skeyes and LVNL, which reduces its 'Cost per IFR flight hour'. Furthermore, since the upper airspace does not include VFR flights, MUAC's ATCO in OPS productivity is fully reflected in this KPI, while the values for skeyes and LVNL does include VFR workload, which reduces the ATCO in OPS productivity.

The total costs per IFR hour (KPI) remain relatively high for ANSPs such as Skeyes, LVNL, Skyguide, and ANA, though there has been an improvement largely driven by an increase in IFR hours due to rising traffic levels. On the other hand, MOLDATSA recorded a significant increase in its cost per IFR flight hours, due to a 40 per cent decrease in IFR hours. This drop was caused by the reduction in air traffic resulting from the war in Ukraine, with safety concerns leading to airspace restrictions, rerouted flights, and heightened military activity. Despite the substantial reduction in IFR hours, MOLDATSA's total costs remained relatively stable.

Regarding the 2018-2022 CAGR for KPI 1, DHMI, Isavia ANS, and MOLDATSA saw higher growth rates compared to other ANSPs. For DHMI, the key factor was a more than twofold increase in total costs, while for Isavia ANS and MOLDATSA, the primary contributing factor was a decline in IFR hours.

Specific ANSP comments are outlined below.

DHMI (Turkiye)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For DHMI, costs increased significantly by 30.6 per cent or €139.4 million. This included substantial rises in the cost of capital (up 92.0 per cent or €87.7 million), non-staff operating costs (up 23.6 per cent or €35.2 million), and staff costs (up 15.6 per cent or €25.3 million). The notable increase in non-staff operating costs was primarily due to a significant rise in energy prices and other expenses denominated in foreign currencies.

M-NAV (Macedonia)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For M-NAV, the costs rose by 30.1 per cent or €4.2 million, primarily due to an increase in staff costs (up 31.4 per cent or €3.5 million) and non-staff operating costs (up 36.5 per cent or €0.6 million). The significantly higher energy costs and other expenses incurred in 2022 also contributed to this increase.

PANSA (Poland)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

The rise in ATM/CNS provision costs for PANSA, up 26.2 per cent or €42.0 million, is largely due to higher staff costs. The cost of capital also significantly increased by 70.3 per cent or €5.9 million, primarily because of a higher WACC (up 2.4 percentage points) driven by a substantial rise in the annual interest rate on debt and its proportion of financing.

EANS (Estonia)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For EANS, the 18.0 per cent decrease (or €4.8 million) is primarily driven by lower depreciation costs, which dropped by 41.7 per cent (or €2.7 million) due to adjustments in the implementation of new investments. Additionally, reductions in ATCO in OPS employment costs (down 17.2 per cent or €1.4 million) and the cost of capital (down 29.4 per cent or €0.6 million) also contributed to this decrease.

DFS (Germany)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For DFS, the 7.3 per cent decrease (or €86.5 million) is primarily due to the absence of exceptional items in 2022, which fell by €64.8 million. Over the past 15 years, DFS reported exceptional costs as accounting losses on balance sheet items due to the conversion from the German Commercial Code (HGB) to IFRS in 2007. These losses were amortised over the period from 2007 to 2021.

DSNA (France)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

DSNA experienced a 3.3 per cent decrease (or €46.1 million) in costs, with all categories except the cost of capital declining in real terms. In 2022, DSNA underwent a re-organisation of its central services and restructuring of its investment portfolios. Depreciation costs decreased by 13.5 per cent (or €18.9 million) due to the postponement of project commissioning until 2023 and the redirection of investments towards service-oriented solutions.

ENAV (Italy)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

ENAV recorded a 2.7 per cent decrease (or €20.2 million), primarily attributable to reductions in depreciation costs (down 10.4 per cent or €12.0 million) and the cost of capital (down 12.2 per cent or €8.1 million). These reductions were mainly driven by delays in investment plans and the application of a lower WACC for calculating the cost of capital.

ENAIRES (Spain)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

ENAIRES reported a 13.5 per cent increase (or €105.2 million) in ATM/CNS provision costs in 2022, which includes an exceptional expense of €137.0 million. This expense is related to future liabilities for air traffic controllers (ATCOs) under a specific regime known as “Special Active Reserve” following the application of Law 26/2022. Further to this justification, ENAIRES notes that the law is aimed at resolving the differences in retirement age between the ENAIRES ATCOs Staff Labour Agreement and Spanish Social Security Pension Scheme however, this law does not indicate how to do so from an accounting perspective.

LPS (Slovakia)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

LPS experienced a 32.2 per cent increase in costs (€14.5 million), mainly due to a 48.7 per cent rise in staff costs (€13.4 million) from higher employment costs. This increase contrasts with previous years' reductions due to COVID-19 measures and changes in retirement benefits.

MOLDATSA (Moldova)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

MOLDATSA recorded a decrease of 21.9 per cent (or €2.0M), primarily driven by lower ATCO in OPS employment costs, which decreased by 33.2 per cent (or €0.8M). This reduction is influenced by the fact that part of MOLDATSA ATCOs' compensation is tied to traffic volumes and associated complexity. The significant reduction in traffic flows resulted from airspace closures and reciprocal sanctions on air carriers issued by Western countries and Russia since February 2022, leading to a substantial decline in MOLDATSA's traffic (18.3 per cent decrease compared to 2021 and 51.5 per cent decrease compared to 2019). Additionally, the cost of capital decreased by 64.8 per cent (or €0.6M) from 2021 to 2022, primarily due to a reduction in the asset base.

NATS (UK)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

NATS reported a 4.8 per cent increase (or €32.5M) in total ATM/CNS provision costs, primarily driven by a substantial rise in non-staff operating costs, which increased by 45.0 per cent (or €28.6M). In 2021, these costs were influenced by exceptional factors, resulting in a significantly lower figure compared to 2020, attributed to the implementation of cost containment measures and the release of a bad debt provision. In 2022, additional costs were also required to deliver large engineering projects, pay technical infrastructure costs and higher energy prices.

Indicator 2A: ATCO in OPS employment cost per ATCO in OPS hour (USD) (Formula: ATCOs in OPS employment costs / ATCOs in OPS hours)

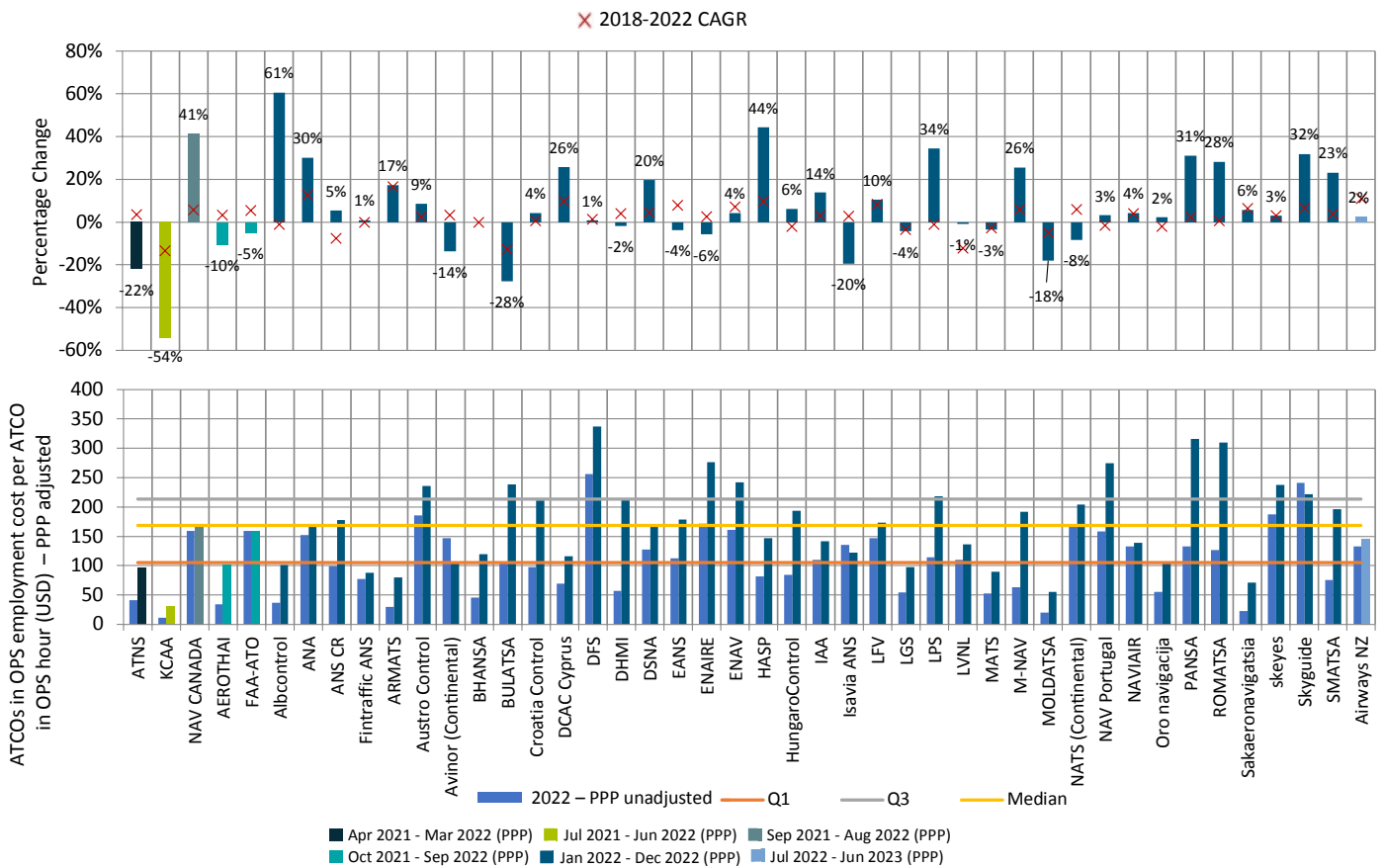


Figure 4 - ATCO in OPS Employment cost per ATCO is OPS hour (USD)

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median ATCO in OPS employment cost per ATCOs in OPS hour was USD 110. The same poll of ANSPs submitting data in 2021 showed a median of USD 97 per ATCO hour.

ANSPs with reporting periods starting in mid-2021 were likely affected by cost-cutting measures due to the pandemic, particularly through the implementation of part-time work as part of their staffing contracts. KCAA, which saw the largest decrease of 55 per cent in ATCO employment costs per ATCO hour in 2022, had experienced a significant 33 per cent increase in these costs per ATCO hour the previous year.

DHMI saw the largest increase in this metric, with an 80 per cent rise compared to 2021, largely driven by a significant rise in ATCO costs. This substantial increase was likely influenced by high inflation in Turkey, although inflation did not account for the entire change. In comparison, Albcontrol experienced the second-largest increase of 61 per cent in this metric, primarily due to nearly doubling its ATCO costs, despite a less significant rise in ATCO hours. Unlike DHMI, inflation had a less pronounced impact on Albcontrol's performance.

Slovenia Control and CAAS are not displayed on the chart because the required data for this KPI are missing.

Specific ANSP comments are outlined below.

LPS SR (Slovakia)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

The rise in staff costs should be considered in relation to the significant reductions in staff costs achieved in 2020 (down 38.5 per cent) and 2021 (down 18.0 per cent). These reductions were a result of temporary measures implemented in response to the COVID-19 crisis and adjustments made to long-term reserves for retirement benefits.

DHMI (Türkiye)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For DHMI, the rapid inflation surge in 2022 prompted two rounds of salary increases.

M-NAV (Macedonia)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

The increase in staff cost comes after two consecutive years of decreasing average employment costs, which were attributed to withheld funds from employees' salaries between 2020 and 2022, as well as higher gross wages resulting from changes in the employment status of newly hired ATCOs.

PANSA (Poland)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For PANSA, the increase in staff costs (+33.4 per cent or +€33.8M), particularly in ATCO in OPS costs (+52.1 per cent or +€24.5M), primarily stems from the discontinuation of COVID-19 measures implemented during 2020 and 2021, along with subsequent adjustments to the remuneration scheme in 2022. Additionally, in 2022 the level of ATCO employment costs was affected by the utilisation of unspent budget in 2021, along with further changes to the remuneration scheme implemented during the year.

Indicator 2A: ATCO in OPS employment cost per ATCO in OPS hour (USD) – PPP adjusted

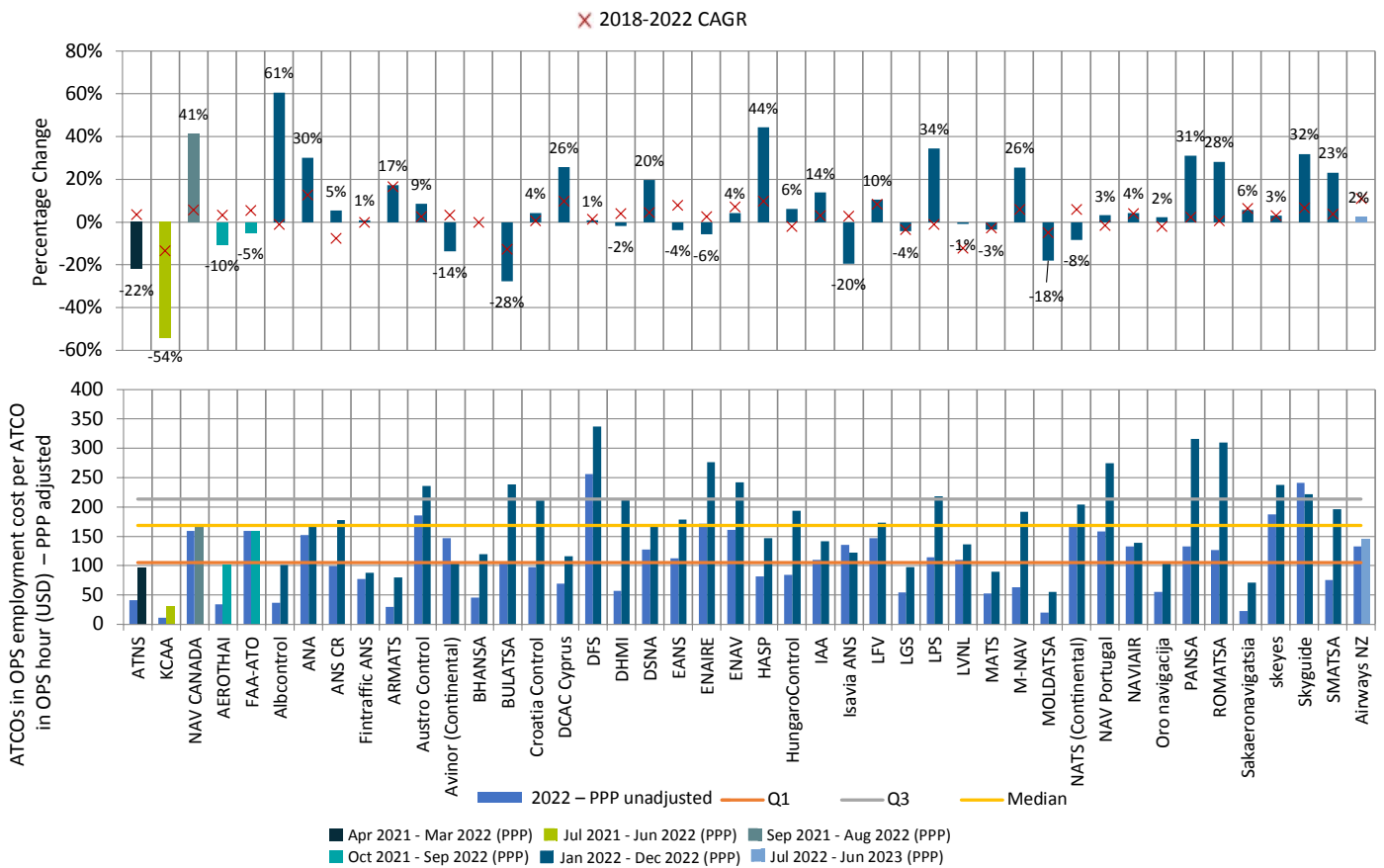


Figure 5 - ATCO in OPS Employment cost per ATCO in OPS hour (USD) - PPP Adjusted

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median ATCOs in OPS employment cost per ATCOs in OPS hour, after PPP adjustment was USD 169. The same ANSPs that submitted continental data for 2021 reached a median of USD 152 per ATCO hour.

Albcontrol experienced a significant increase of 61 per cent in PPP adjusted ATCO in OPS employment cost per ATCO in OPS hour in 2022. This followed a larger reduction in staffing numbers relative to other ANSPs and a 22 per cent decrease in PPP-adjusted value in 2021. Many ANSPs relaxed cost containment measures and eased cost reduction methods that were aimed at managing staffing costs due to the pandemic, resulting in increased ATCOs' employment costs in 2022 compared to the previous year.

Significant differences, exceeding 20 per cent, were noted between PPP-adjusted and unadjusted trends for DHMI and Avinor. DHMI experienced an 80 per cent increase in ATCO in OPS employment cost per ATCO in OPS hour; however, after adjusting for PPP, the actual year-over-year change, accounting for real prices of goods and services, was a 2 per cent decrease. For Avinor, PPP-adjusted figures revealed a 14 per cent decrease in ATCO employment costs per ATCO hour, whereas the unadjusted data showed a reported increase of 6 per cent. Other ANSPs showed differences of less than 20 per cent between PPP-adjusted and unadjusted changes for the 2021-2022 period.

MUAC, Slovenia Control and CAAS are not displayed on the chart because the required data for this KPI are missing.

Indicator 2B: ATCO in OPS hour productivity (Formula: IFR flight hours / ATCOs in OPS hours)

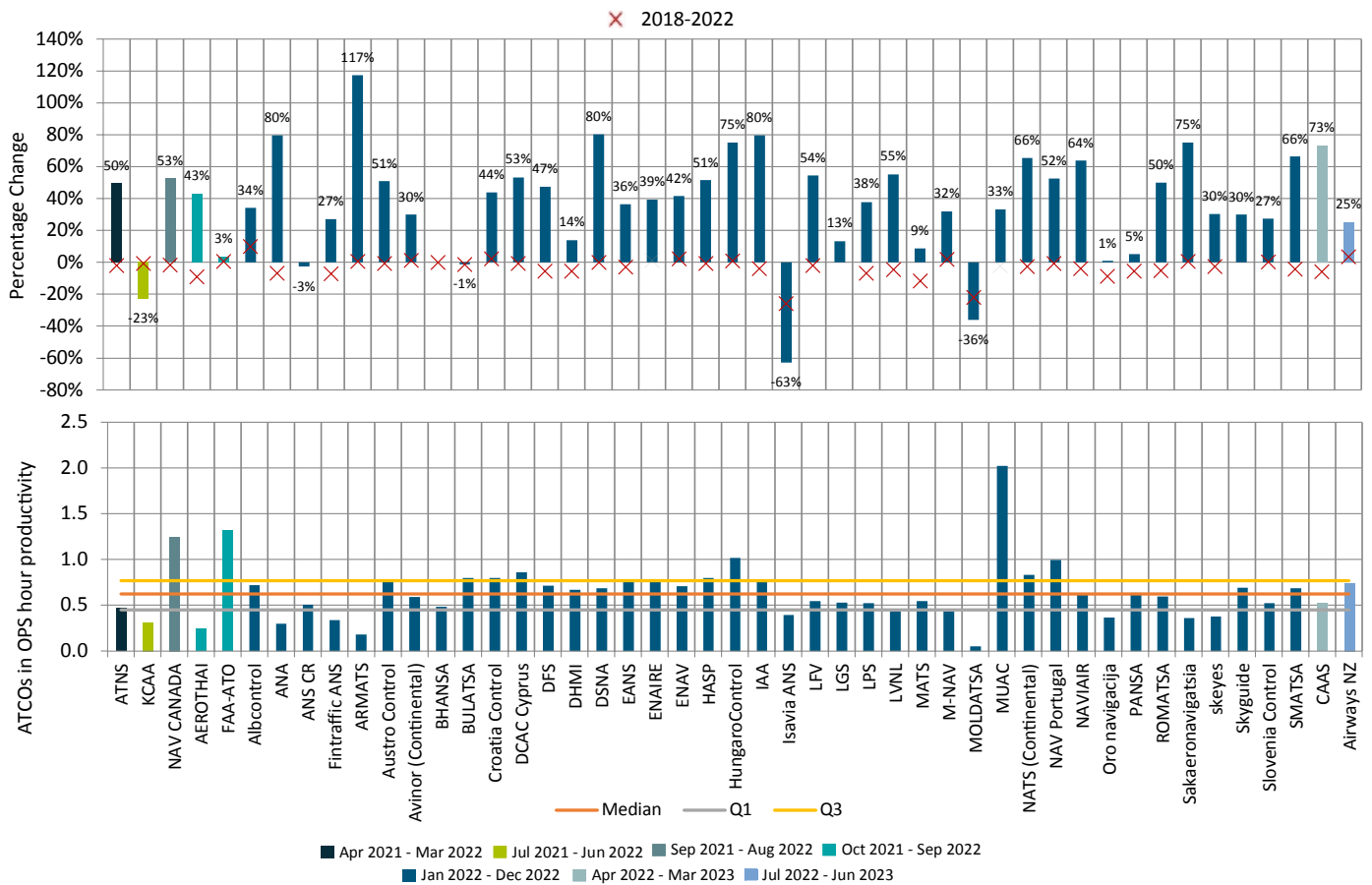


Figure 6 - ATCO in OPS hour productivity

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSNA was introduced as a new submission for the year 2022.

The 2022 median ATCOs in OPS hour productivity was 0.62. The same poll of ANSPs submitting data in 2021 showed a median of 0.46.

ARMATS, as the ANSP with the largest growth in IFR hours, also achieved the highest increase in ATCO in OPS hour productivity, driven by this rise in IFR hours. In contrast, Isavia ANS and MOLDATSA were most negatively impacted by a decrease in IFR hours, leading to the most significant declines compared to other ANSPs. The decrease in ATCO hour productivity at Isavia ANS was further influenced by an increase in ATCO in OPS hours.

As highlighted in the 2021 report, MUAC maintained the highest productivity among all submitting ANSPs. It is important to note, however, that MUAC's scope of services typically excludes the more complex lower airspace, which contributes to its higher productivity levels.

Indicator 2C: Cost excluding ATCOs in OPS employment costs per IFR hours (USD)
 (Formula: Costs excluding ATCOs in OPS employment costs / IFR flight hours)

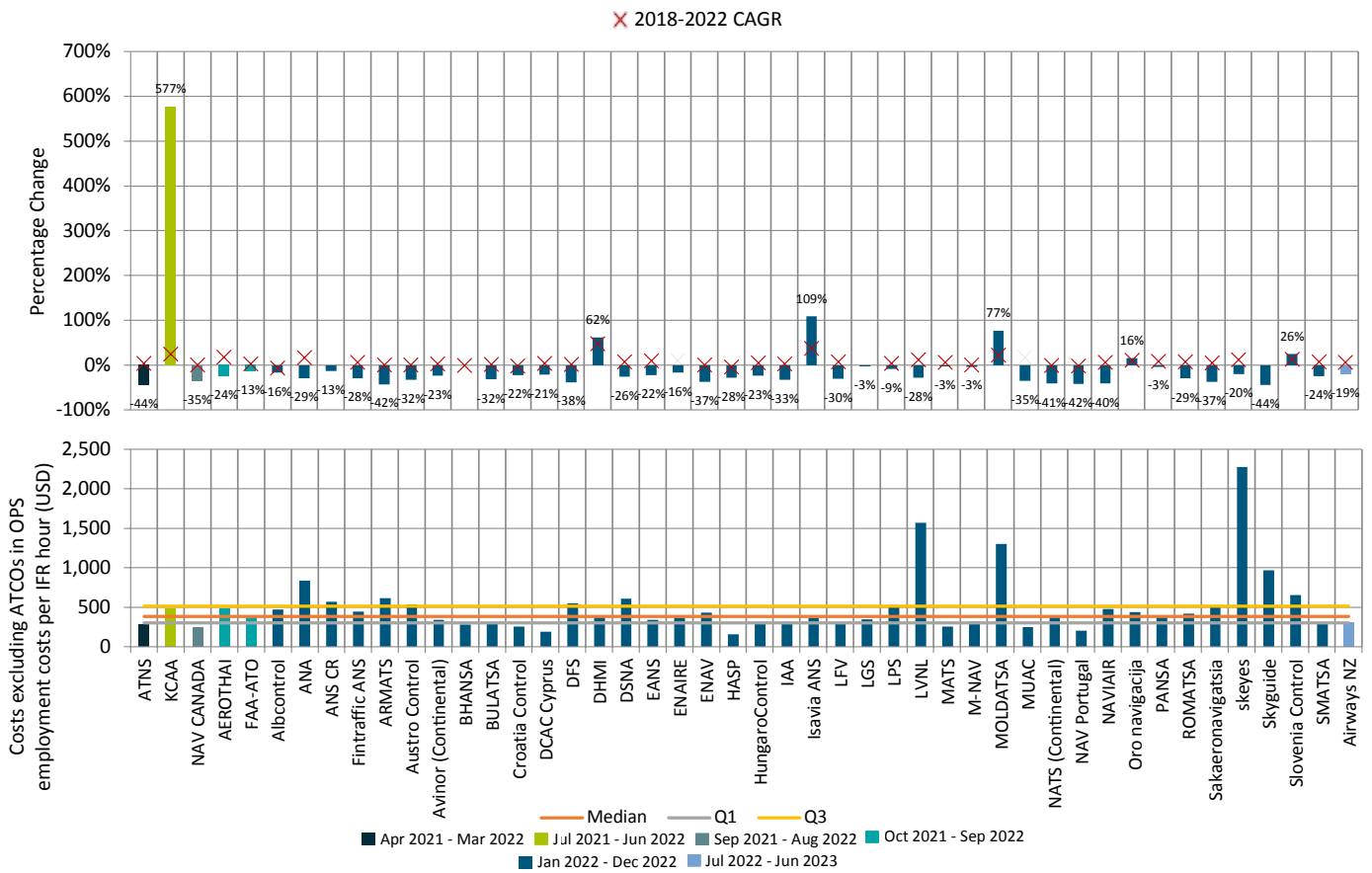


Figure 7 - Cost excluding ATCO in OPS employment costs per IFR hours

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSNA was introduced as a new submission for the year 2022.

The 2022 median cost excluding ATCOs in operations employment cost per IFR flight hour was USD 383. The same poll of ANSPs submitting data in 2021 showed a median of USD 462 per IFR hour.

KCAA experienced a significant increase in costs per IFR hour excluding ATCOs in OPS employment, because of an increase in other expenses. Although IFR flight hours grew by 16 per cent, this factor had less impact on the KPI (costs per IFR hour excluding ATCOs in OPS employment), compared to the increase in other expenses. Meanwhile, most other ANSPs experienced a decline in this metric as their IFR flight hours increased.

All European ANSPs submitting to CANSO saw a decrease in costs per flight hour, as a result of increased traffic volumes during 2022. With skeyes' infrastructure made available to MUAC as part of their agreements, and therefore, combined with the fact that skeyes provides services in more complex lower airspace only, skeyes and LVNL (for similar reasons) typically have larger costs per flight hour.

It should be noted that, for the same reasons stated in the description of Indicator 1 'Cost per IFR flight hour', differences between the operational characteristics of ANSPs' airspaces may significantly influence their 'Costs excluding ATCOs in OPS employment costs per IFR hour'.

CAAS is not displayed on the chart because the required data for this KPI are missing.

Specific ANSP comments are outlined below.

EANS (Estonia)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For EANS, the decrease in support costs primarily stems from significant reductions in depreciation costs (down 41.7 per cent or -€2.7M) and the cost of capital (down 29.4 per cent or -€0.6M).

MOLDATSA (Moldova)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

MOLDATSA saw reductions across all support cost categories, particularly in the cost of capital (decreased by 64.8 per cent, or -€0.6M), non-staff operating costs (decreased by 24.3 per cent, or -€0.4M), and support staff costs (decreased by 5.1 per cent, or -€0.2M).

Skyguide (Switzerland)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

Skyguide's significant decrease primarily results from reductions in support staff costs (down 24.2 per cent, or -€46.6M). This substantial decrease is primarily attributed to the reassignment of ATCOs from other roles to operational duties. Depreciation costs also decreased by 12.3 per cent (or -€7.2M), and to a lesser extent, exceptional costs decreased by 7.9 per cent (or -€0.1M). However, these reductions were partly offset by increases in the cost of capital (up 55.1 per cent, or +€7.5M) and non-staff operating costs (up 12.2 per cent, or +€7.7M).

DFS (Germany)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

DFS experienced a reduction primarily attributed to the absence of exceptional costs in 2022 (down -€64.8M). Over the past 15 years, DFS has reported losses under exceptional costs, stemming from the conversion from German Commercial Code (HGB) to IFRS in 2007, which were spread over the period from 2007 to 2021.

Indicator 2D: Employment costs of ATCOs in OPS as a proportion of Total costs (Formula: ATCO in OPS employment costs/Total Costs)

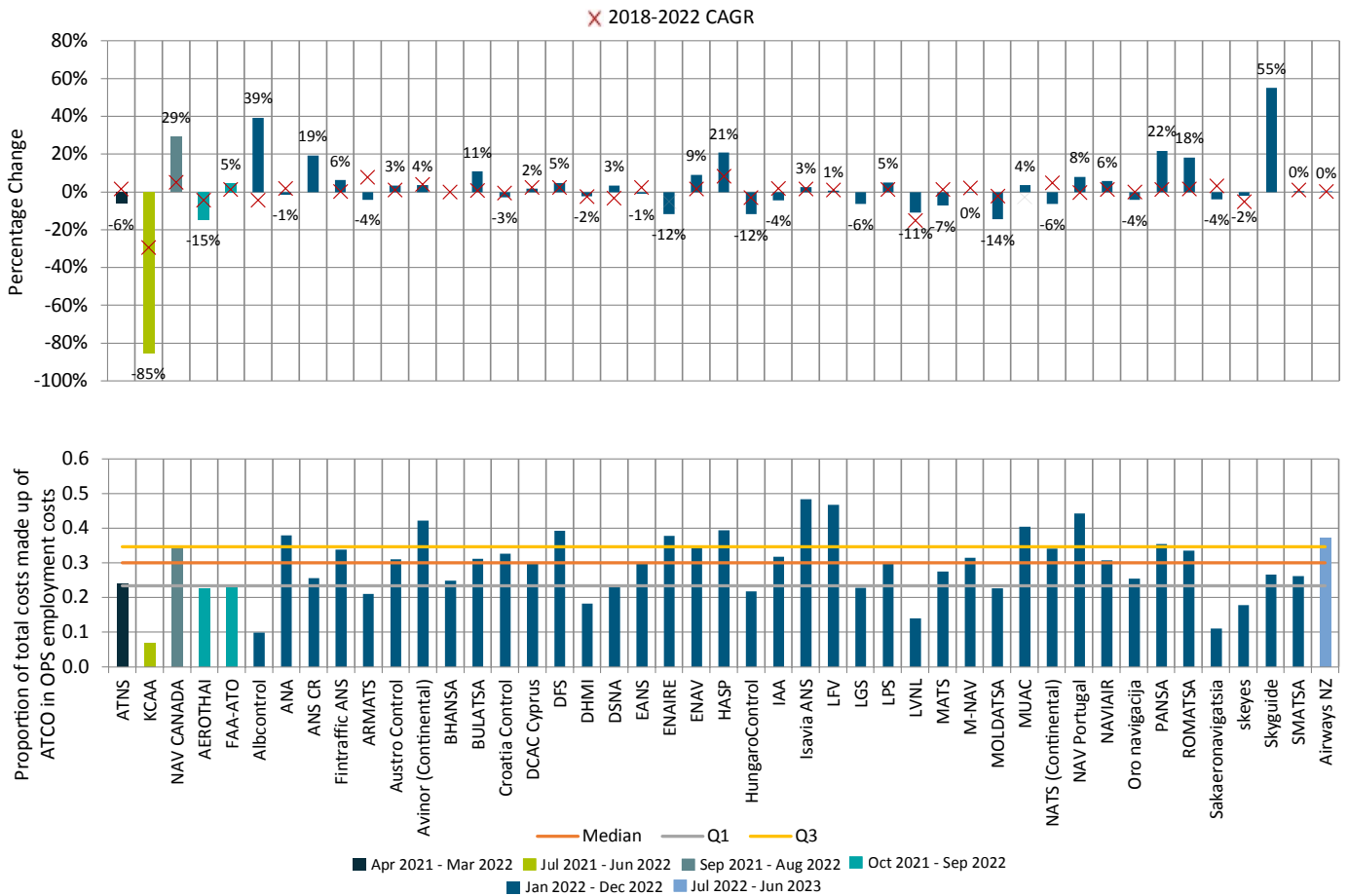


Figure 8 - Employment costs of ATCOs in OPS as a proportion of total costs

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

In 2022, the median of the total ANS costs spent on employing ATCO in OPS was 30 per cent. The same poll of ANSPs submitting data in 2021 showed a median of 29 per cent that year.

For KCAA, the 85 per cent decrease in employment costs of ATCOs in OPS as a proportion of total costs was influenced by a reduction in employment costs alongside an increase in other costs, both contributing to changes in total costs.

Skyguide experienced a 55 per cent rise in ATCO employment costs as a proportion of total costs, following a trend of decreasing costs in earlier years (e.g., 31 per cent decrease from 2019 to 2020 and 2 per cent decrease from 2020 to 2021). Albcontrol experienced an overall increase in costs, with employment costs nearly doubling and other costs also rising as a proportion of total expenses. This contributed to a 39 per cent increase in employment costs of ATCOs in OPS as a proportion of total costs, compared to the previous year.

Slovenia Control and CAAS are not displayed on the chart because the required data for this KPI are missing.

Indicator 3A: Annual employment cost per ATCO in OPS (USD) (Formula: ATCOs in OPS employment costs / No. ATCOs in OPS)

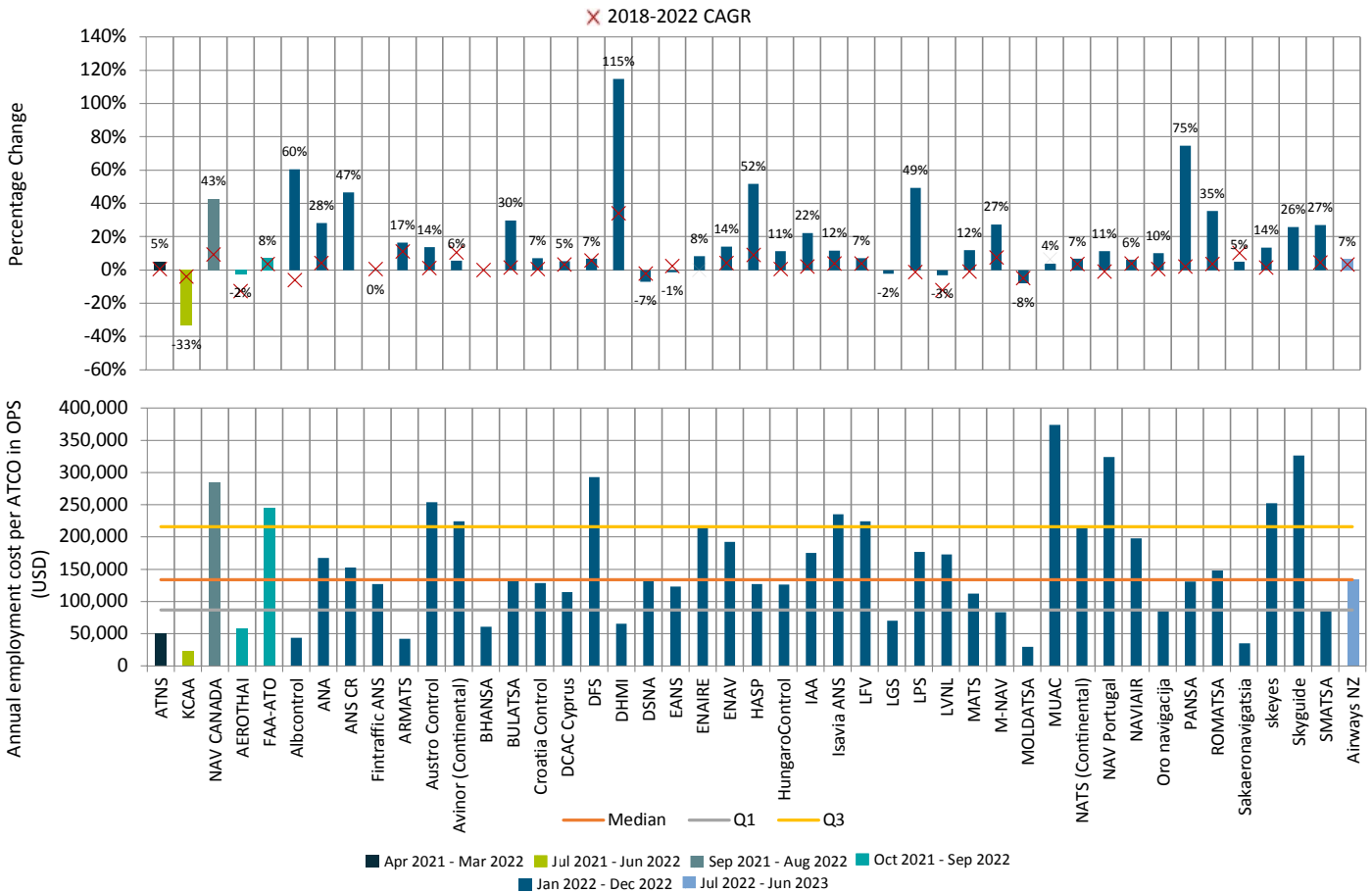


Figure 9 - Annual employment cost per ATCO in OPS

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median unit ATCO in OPS employment cost was USD 133,770. The same poll of ANSPs submitting data in 2021 showed a median of USD 120,402 per ATCO.

DHMI experienced a 115 per cent increase in annual employment cost per ATCO in OPS. This increase was driven by higher ATCO employment costs. DHMI also increased its number of ATCOs by 42, a 2 per cent increase from the previous year. However, this increase is relatively small compared to the 120 per cent rise in ATCO employment costs, largely due to inflation, making the growth in ATCO numbers negligible by comparison.

PANSA saw a 75 per cent increase in annual employment cost per ATCO in OPS. This increase was mainly due to a 72 per cent rise in ATCO employment costs, despite a 1.4 per cent decrease in the number of ATCOs. The decrease observed for KCAA in annual employment cost per ATCO in OPS was primarily influenced by the previously mentioned reduction in ATCO employment costs.

Slovenia Control and CAAS are not displayed on the chart because the required data for this KPI is not available.

Specific ANSP comments are outlined below.

HASP (Greece)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For HASP, the increase in employment costs for ATCOs primarily stems from contributions to the occupational pension fund of ATCOs and an expansion of the contractual working hours for ATCOs in operations.

ENAV (Spain)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For ENAV, increased ATCOs in operations employment costs are attributed to the renewal of the financial aspects of the National Collective Labour Agreement and the increased need for staff presence and availability at sites to manage summer season traffic.

ROMATSA (Romania)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

For ROMATSA, the rise in ATCO employment cost is driven by an increased number of ATCOs in operations (+5.3 per cent, or +28 FTEs), coupled with higher pension expenses and one-time payments recorded for managing unexpectedly high traffic volumes and meeting capacity performance targets.

Skyguide (Switzerland)

The following justification is taken from the [ACE Benchmarking report \(2024 edition\)](#)

Skyguide experienced higher ATCO employment costs due to a 26 per cent increase in the number of ATCOs in operations, equivalent to 70 full-time equivalents (FTEs). This increase was in response to increased air traffic levels and the conclusion of short-time work arrangements implemented during the COVID-19 crisis.

Indicator 3A: Annual employment cost per ATCO in OPS (USD) – PPP adjusted

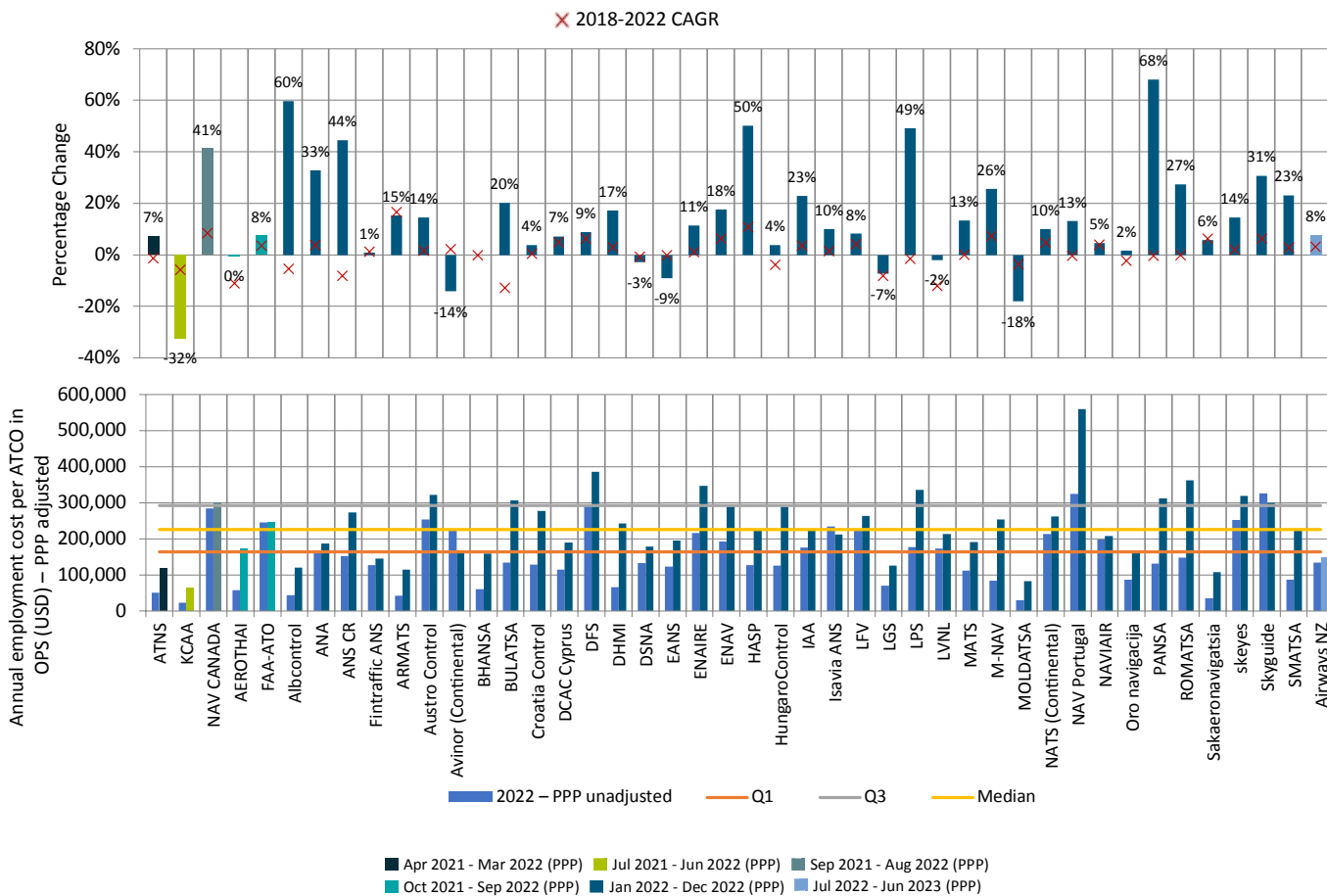


Figure 10 - Annual employment cost per ATCO in OPS (USD)

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSa was introduced as a new submission for the year 2022.

The 2022 median unit ATCO in OPS employment cost, after PPP adjustment, was USD 225,808. The same poll of ANSPs submitting data in 2021 showed a median of USD 195,395 per ATCO.

When comparing the PPP-adjusted and unadjusted changes from 2021 to 2022, the most significant difference is observed for DHMI, which is largely due to the high inflation in the country where it operates.

MUAC, Slovenia Control and CAAS are not displayed on the chart because the required data for this KPI are missing.

Indicator 3B: Annual Working hours per ATCO in OPS (Formula: ATCOs in OPS hours / No. ATCOs in OPS)

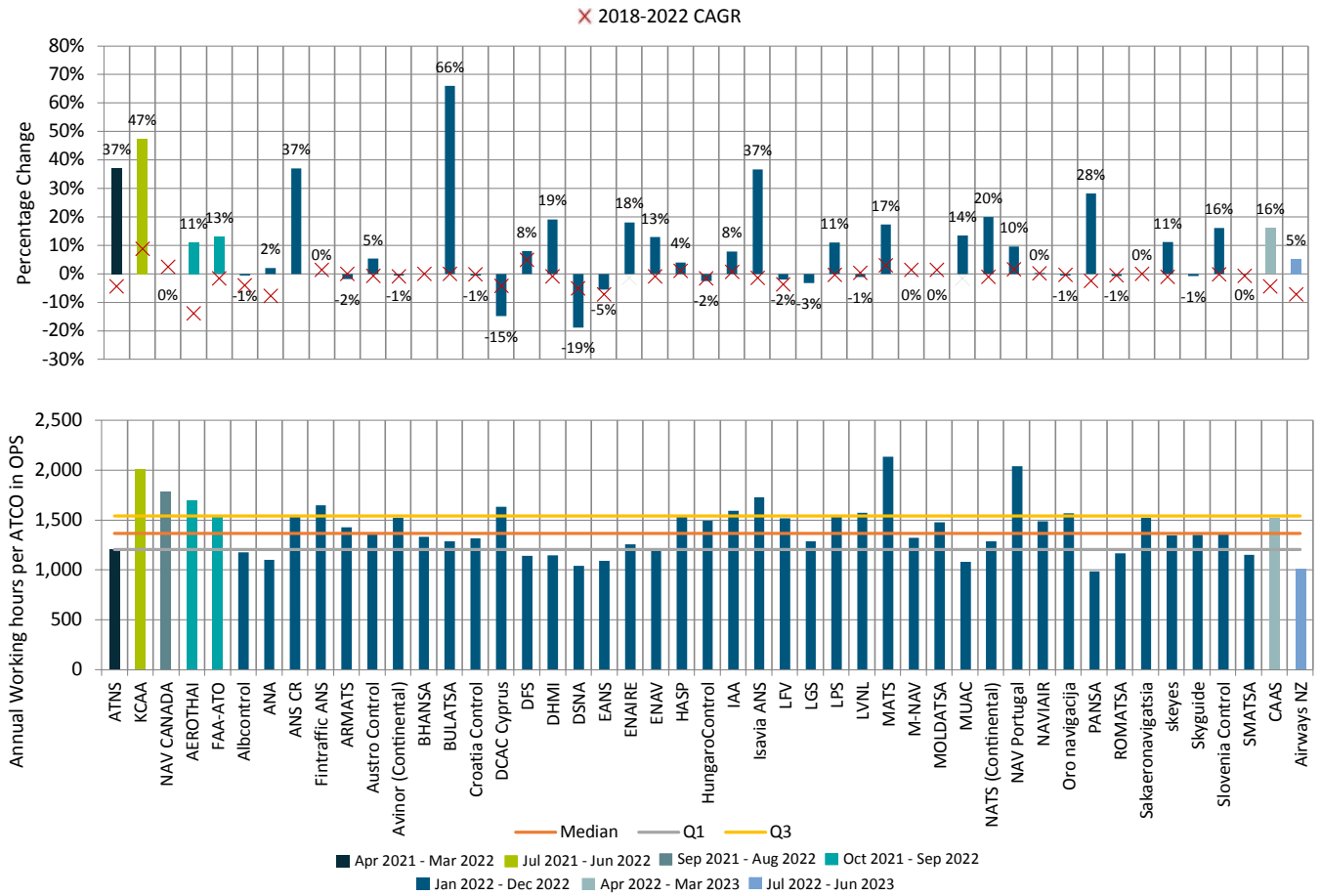


Figure 11 - Annual working hours per ATCO in OPS

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSNA was introduced as a new submission for the year 2022.

The 2022 median annual working hours per ATCO in OPS was 1,366 hours. The differences recorded for this metric were influenced by the number of staff working full-time. The same poll of ANSPs submitting data in 2021 showed a median of 1,328 hours per ATCO.

Most ANSPs, especially those operating in European airspace, saw an increase in Annual Working Hours per ATCO in OPS. BULATSA experienced the largest increase in this indicator, rising by 66 per cent due to an increase in annual working hours. With this increase, their value is now close to the median, leading to a smaller difference compared to the workload of ATCOs at other ANSPs than in the previous year.

Indicator 3C: Annual IFR hours per ATCO in OPS (Formula: IFR flight hours / No. ATCOs in OPS)

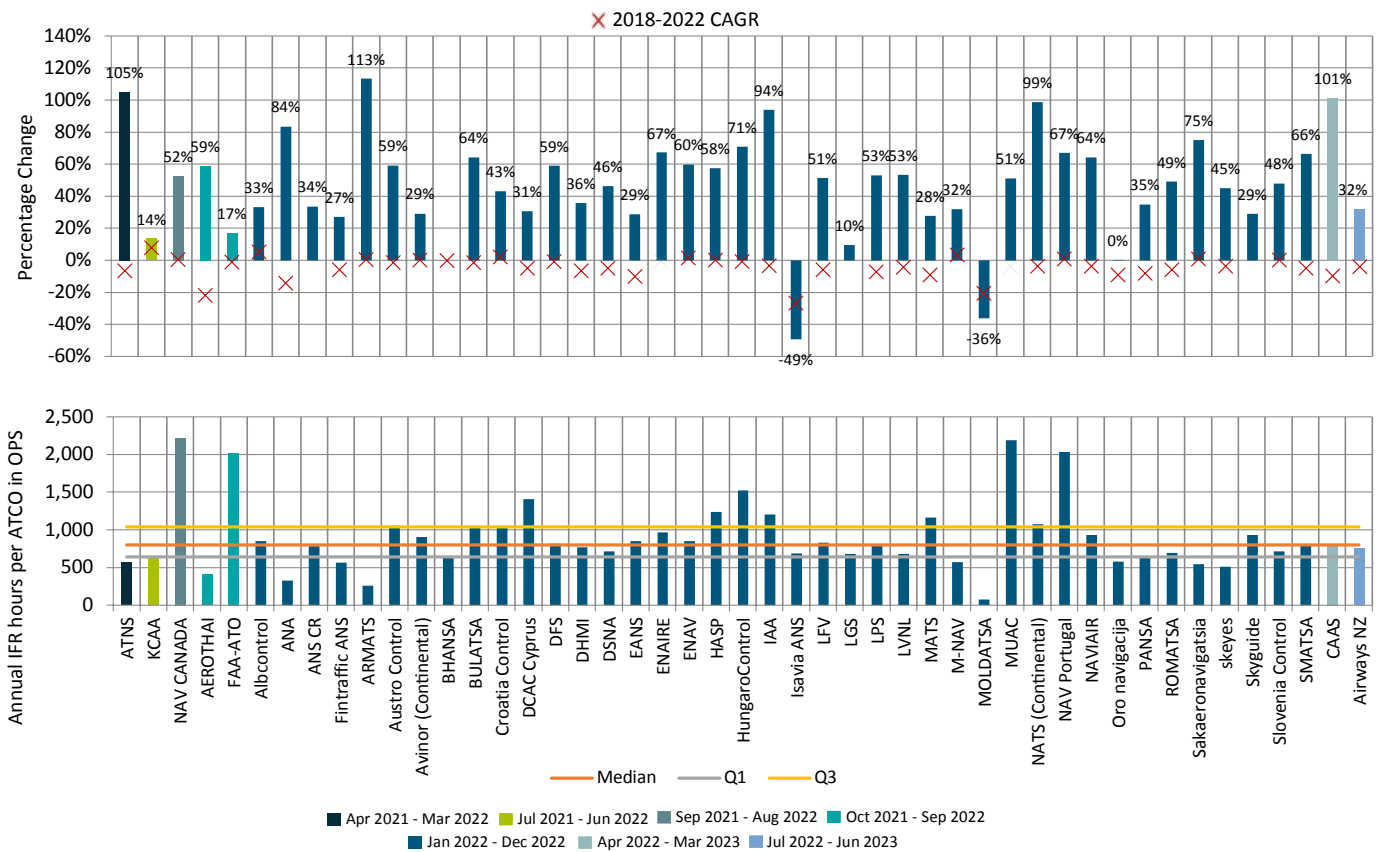


Figure 12 - Annual IFR hours per ATCO in OPS

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSNA was introduced as a new submission for the year 2022.

The 2022 median annual IFR hours per ATCO in OPS was 800 hours. The same poll of ANSPs submitting data in 2021 showed a median of 565 hours per ATCO.

Nearly all ANSPs with reporting periods covering 2022 except for Isavia ANS and MOLDATSA, saw an increase in Annual IFR hours per ATCO, demonstrating a recovery from the pandemic and the subsequent increase in operations. Although the average increase in this KPI is 42 per cent, the 2022 median has not yet recovered to pre-pandemic levels.

ARMATS recorded the highest increase of 113 per cent in annual IFR Hours per ATCO in OPS, reflecting the increase in IFR hours. ATNS, IAA, NATS, and CAAS also saw substantial increases, comparable to ARMATS.

Indicator 3D: Ratio of Frontline Service Staff to ATCO in OPS (Formula: No. Frontline Service Support Staff / No. ATCOs in OPS)

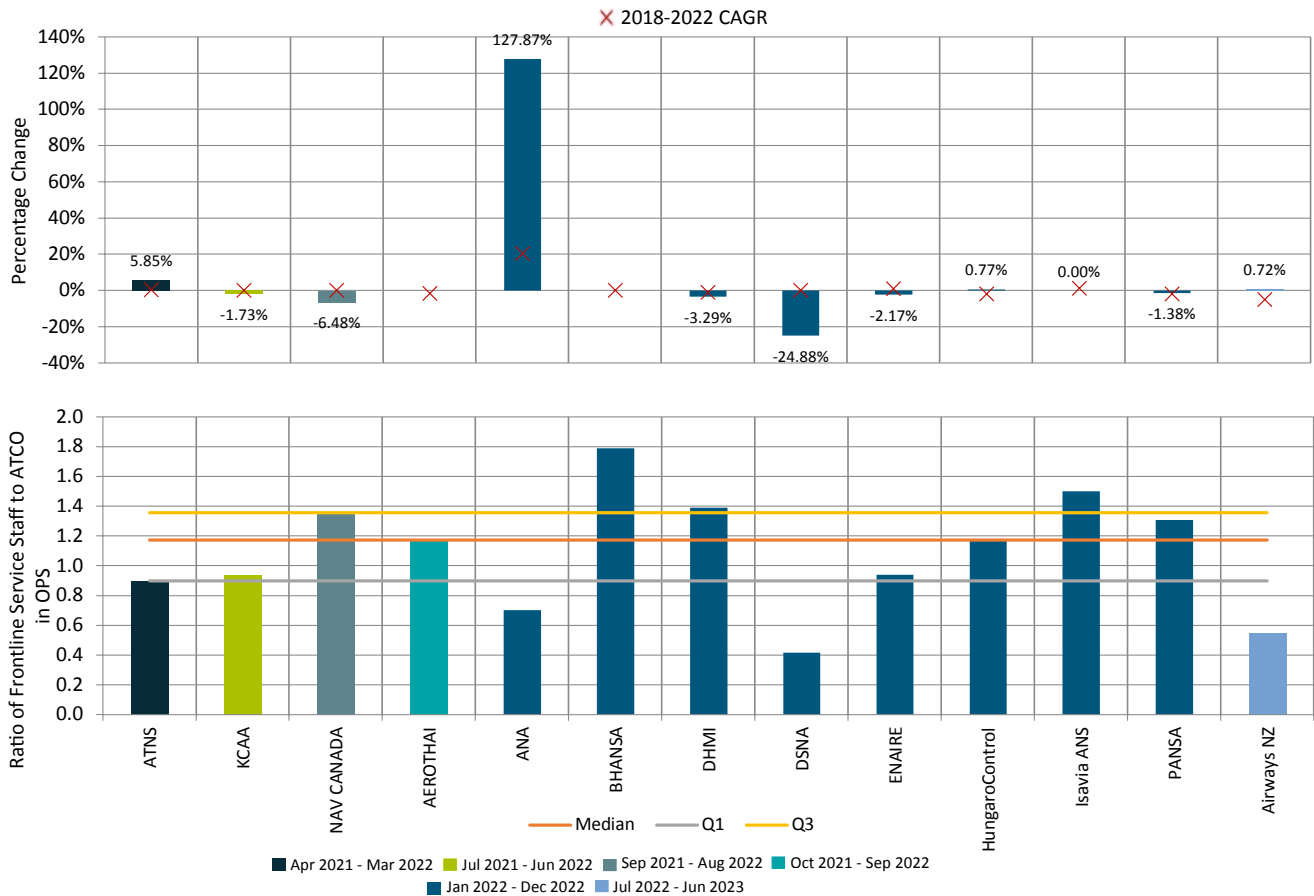


Figure 13 - Ratio of frontline service staff to ATCO in OPS

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSVA was introduced as a new submission for the year 2022.

The 2022 median ratio of frontline service staff to ATCO in OPS was 1.17. The same poll of ANSPs submitting data in 2021 showed a median of 1.07.

The largest increase in the Ratio of Frontline Service Staff to ATCO in OPS came from ANA at 127.87 per cent, and the largest decrease was reported by DSNVA at 24.88 per cent decrease in 2022. The previous reporting period saw more changes in the Ratio of Frontline Service Staff to ATCO in OPS compared to 2022. This was likely due to adjustments made during the pandemic in 2020-2021. However, in 2022 the situation has stabilised for most ANSPs.

Most ANSPs are not displayed on the chart because the required data for this KPI is not available.

Oceanic Cost Efficiency and Productivity: 2022

Indicator 1: Cost per IFR flight hour (USD) (Formula: Total costs / IFR flight hours)

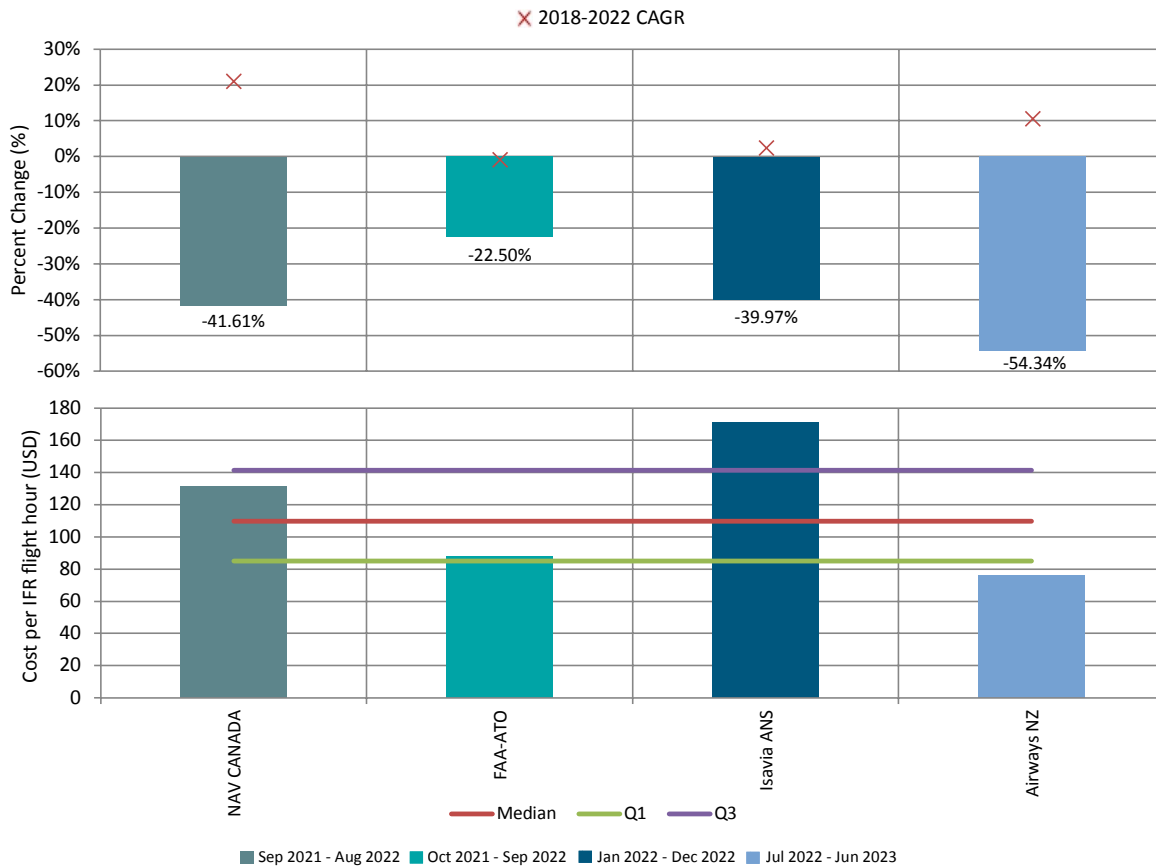


Figure 14 - Cost per IFR flight hour

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median cost per IFR flight hour was USD 110. The 2022 weighted average (taking into account total oceanic IFR flight hours per ANSP) cost per IFR flight hour was USD 117. The same poll of ANSPs submitting data in 2021 showed a median of USD 196 per IFR hour and a weighted average of USD 198 per IFR hour for that year.

Cost efficiency increased more than for continental airspace due to the greater increase in IFR hours in oceanic airspace. The most notable change was observed with Airways NZ, the ANSP that experienced the largest increase in IFR hours.

On the other hand, FAA-ATO experienced the smallest decrease in Total costs per IFR hour, with IFR hours increasing by just 19 per cent. In absolute terms, the volume of traffic in their control area saw the most significant growth compared to other ANSPs. However, when viewed as a percentage change over the years, the trend appears less pronounced.

ATNS is not displayed on this chart because the required data for this KPI is not available.

Indicator 2A: ATCO in OPS employment cost per ATCO in OPS hour (USD)
 (Formula: ATCOs in OPS employment costs / ATCOs in OPS hours)

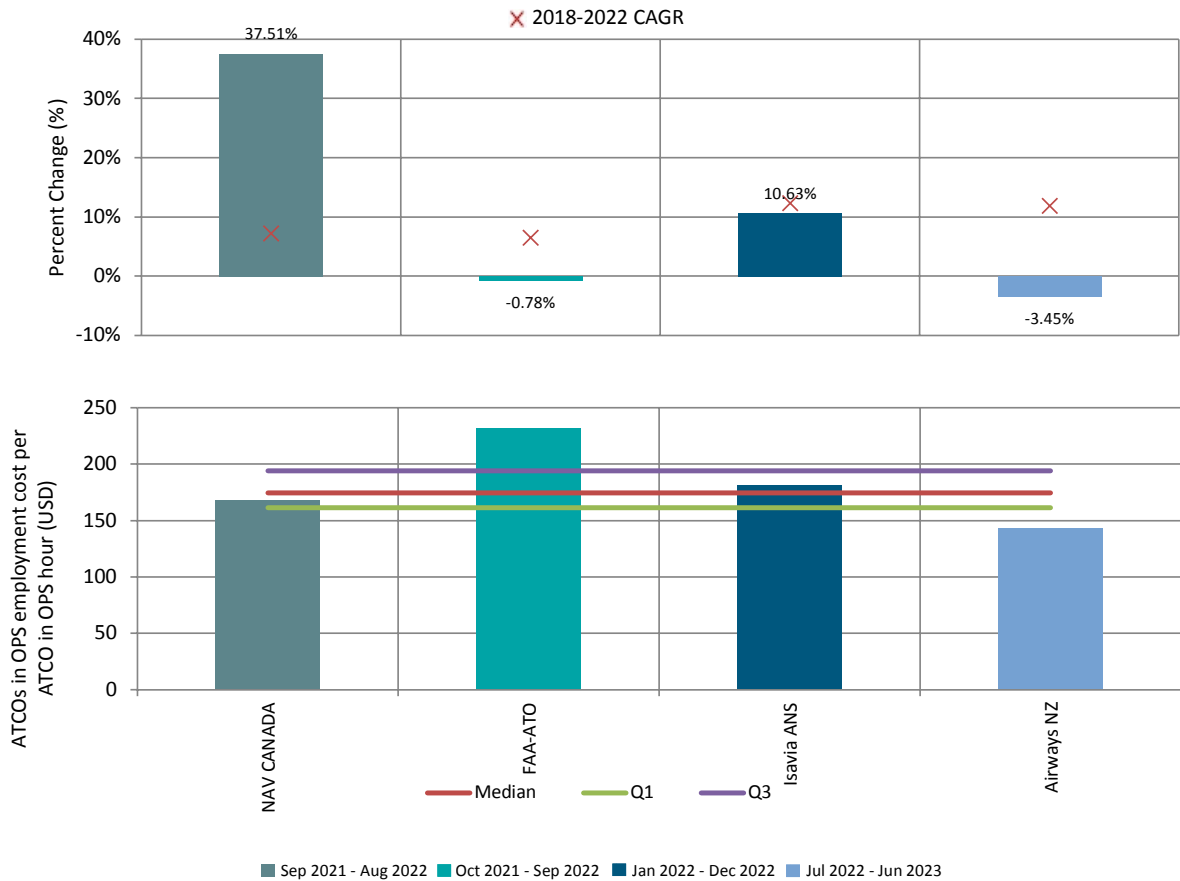


Figure 15 - ATCO in OPS employment cost per ATCO in OPS

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 oceanic median employment cost per ATCO in OPS hour was USD 175. The same poll of ANSPs submitting data in 2021 showed a median of USD 145 per ATCO hour.

All ANSPs except FAA-ATO and Airways NZ saw an increase in ATCO in OPS employment cost per ATCO in OPS hour, driven by a combination of rising ATCO employment costs and a decrease in ATCO hours.

When comparing this KPI to performance in continental airspace, Isavia ANS exhibited a slight disparity. This difference is attributed to an increase in ATCO hours in continental airspace, while oceanic airspace saw a decrease. Otherwise, KPI trends among the other ANSPs were consistent across both airspaces.

ATNS is not displayed on this chart because the required data for this KPI is not available.

Indicator 2A: ATCO in OPS employment cost per ATCO in OPS hour (USD) – PPP adjusted)

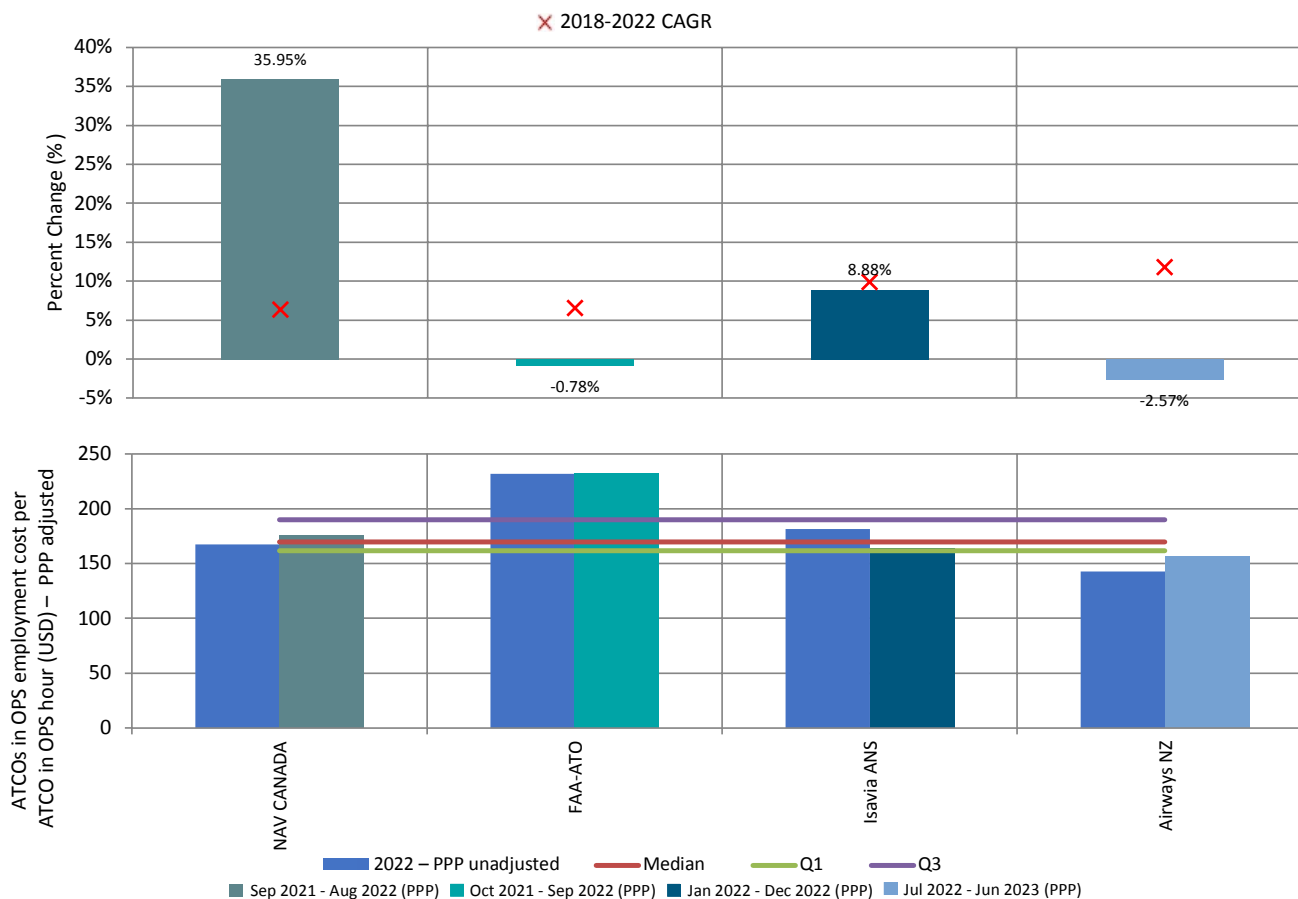


Figure 16 - ATCO in OPS employment cost per ATCO in OPS hour - PPP adjusted

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

In 2022, the median employment cost per ATCO (PPP-adjusted) in oceanic airspace was USD 170 per OPS hour, while the average for oceanic airspace was USD 182 per ATCO hour. For comparison, the same poll of ANSPs submitting data in 2021 showed a median of USD 150 per ATCO hour.

ATNS is not displayed on this chart because the required data for this KPI is not available.

Indicator 2B: ATCO in OPS hour productivity (Formula: IFR flight hours / ATCOs in OPS hours)

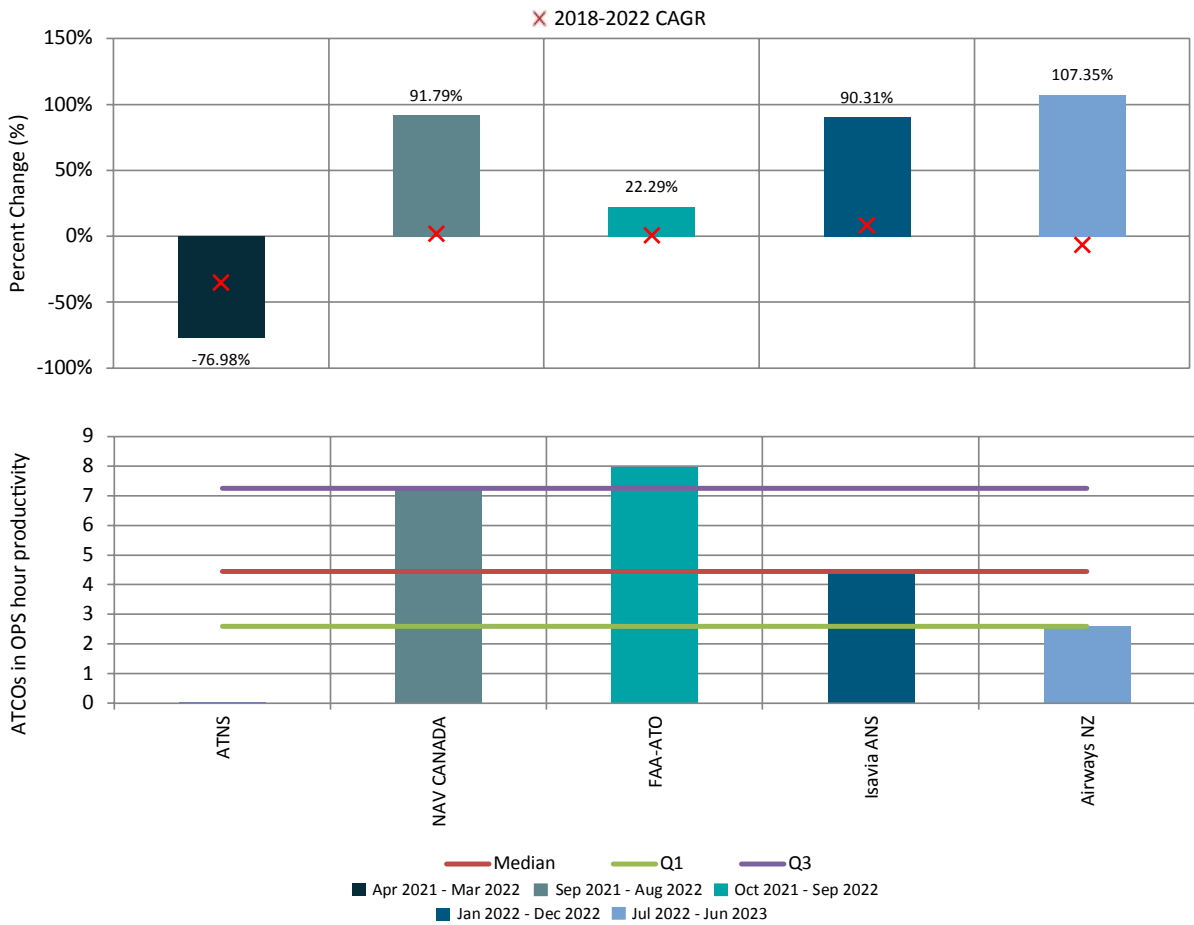


Figure 17 - ATCO in OPS hour productivity

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median ATCOs in OPS hour productivity was 4.45, which is significantly higher than the continental figure of 0.62. The same poll of ANSPs submitting data in 2021 showed a median of 2.34.

All ANSPs except ATNS experienced an increase in ATCO in OPS hour productivity due to the rise in IFR hours in oceanic airspace. ATNS IFR flight hours are low compared to other ANSPs (309 hours in 2022). The significant 77% decrease may be attributed to the already low absolute values, making the percentage decline appear disproportionately high.

On the other hand, Airways NZ experienced a rise of over 130 per cent in IFR hours in oceanic airspace which led to a significant increase in ATCO in OPS hour productivity.

Indicator 2C: Costs excluding ATCOs in OPS employment costs per IFR flight hours (USD) (Formula: Costs excluding ATCOs in OPS employment costs / IFR flight hours)

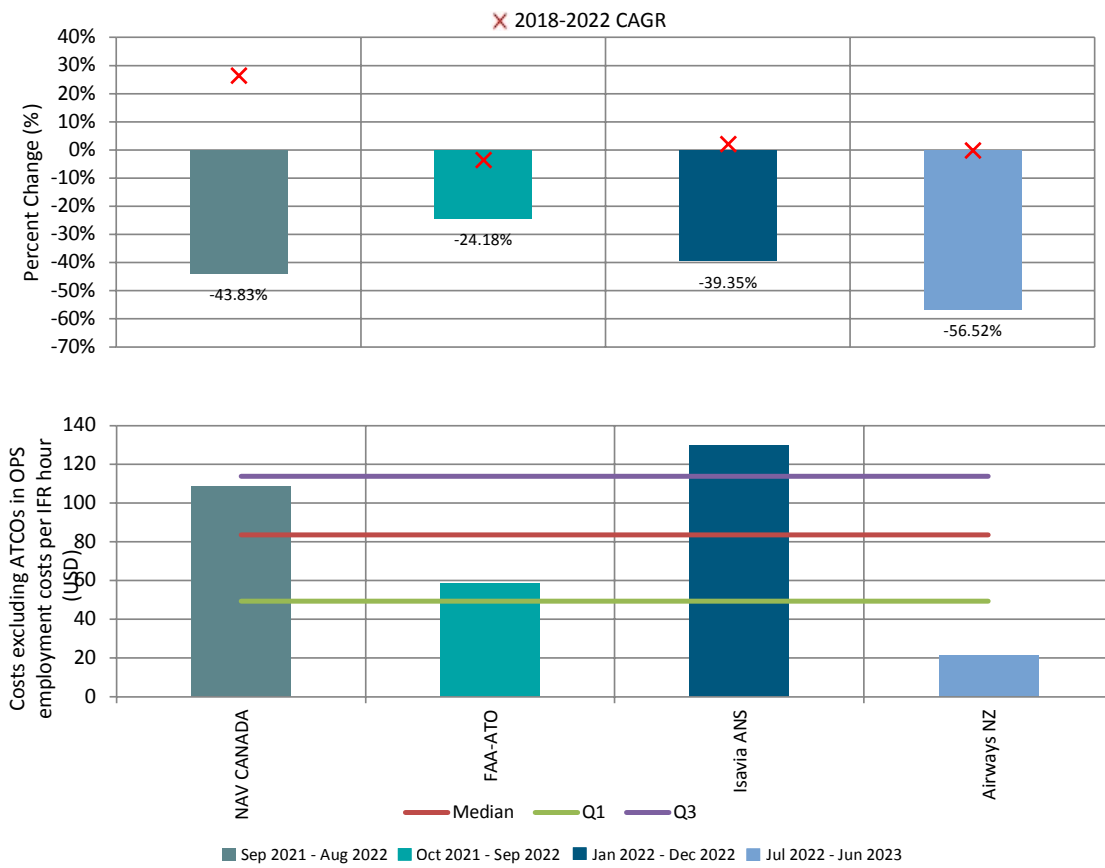


Figure 18 - Costs excluding ATCOs in OPS employment costs per IFR flight hours

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median cost excluding ATCOs in operations employment cost per IFR flight hour was USD 84. The same poll of ANSPs submitting data in 2021 showed a median of USD 135 per IFR hour.

The rise in IFR hours in oceanic airspace generally led to a decreasing trend in this metric across all reporting ANSPs. However, Isavia ANS reported a 12 per cent increase in other costs, which also impacted its KPI. Consequently, the KPI trend for Isavia ANS diverges from the pattern of increasing IFR hours seen in other ANSPs' KPIs.

ATNS is not displayed on this chart because the required data for this KPI is not available.

Indicator 2D: Employment costs of ATCOs in OPS as a proportion of Total costs
 (Formula: ATCO in OPS employment costs / Total Costs)

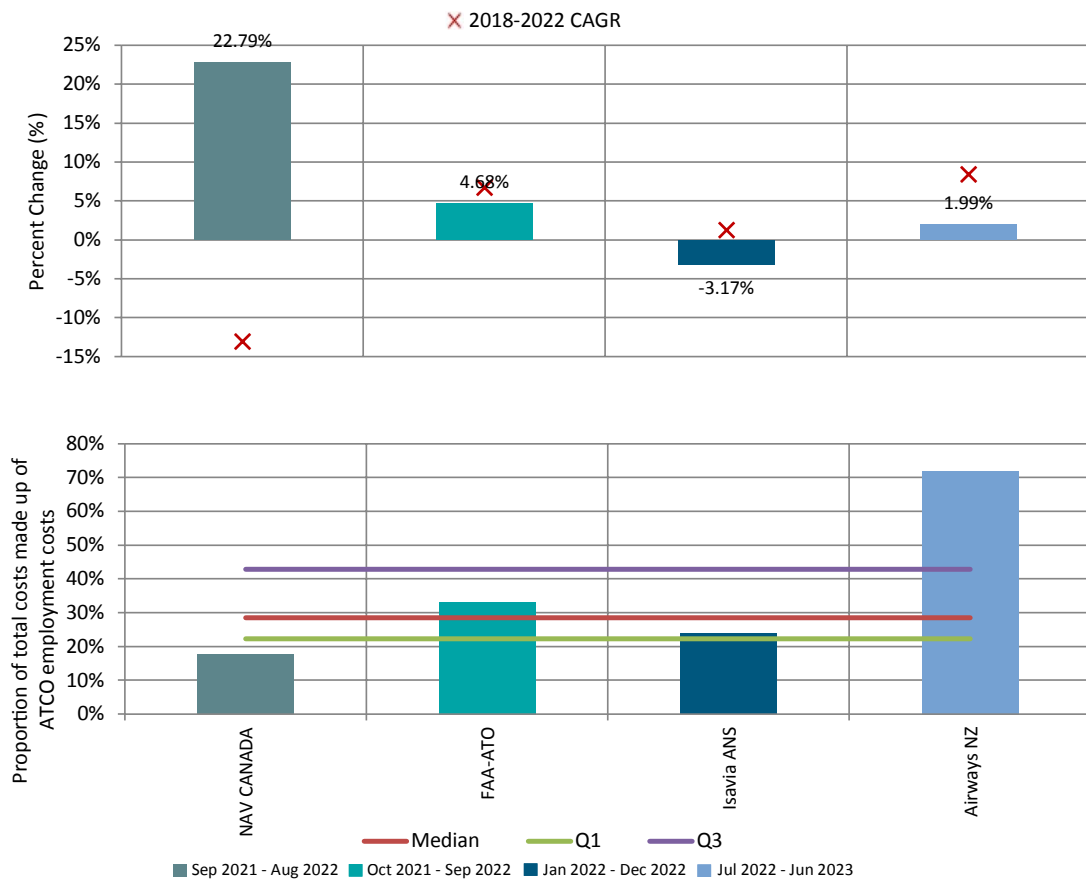


Figure 19 - Employment costs of ATCOs in OPS as a proportion of total costs

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median for the proportion of total costs made up of ATCO in OPS employment costs was 29 per cent. For comparison, the same poll of ANSPs submitting data in 2021 showed a median of 25 per cent. The 2022 median of 29 per cent marks a return to pre-pandemic levels.

The largest difference compared to the previous year was observed by NAV CANADA, with a 23 per cent increase. When comparing trends from previous reports, NAV CANADA experienced fluctuations in this KPI, primarily due to NAV CANADA reduced ATCO costs during low traffic periods of the pandemic and then increased with traffic. In contrast, the trends for other ANSPs remained relatively stable, as shown in Figure 19 above.

ATNS is not displayed on this chart because the required data for this KPI are missing.

Indicator 3A: Annual employment cost per ATCO in OPS (USD)
 (Formula: ATCOs in OPS employment costs / No. ATCOs in OPS)



Figure 20 - Annual employment costs per ATCO in OPS

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median of Annual ATCO in OPS employment cost was USD 251,183. For comparison the 2021 median was USD 205,943 per ATCO.

Most ANSPs submitting data for this KPI remained stable compared to the previous reporting period. However, this was not the case for NAV CANADA, who experienced significant increases (34 per cent). This was mostly driven by a rise in ATCO employment costs. Similar to the previous KPI, NAV CANADA reduced ATCO costs during low traffic periods of the pandemic and then increased with traffic.

ATNS is not displayed on this chart because the required data for this KPI is not available.

Indicator 3A: Annual employment cost per ATCO in OPS (USD) – PPP adjusted

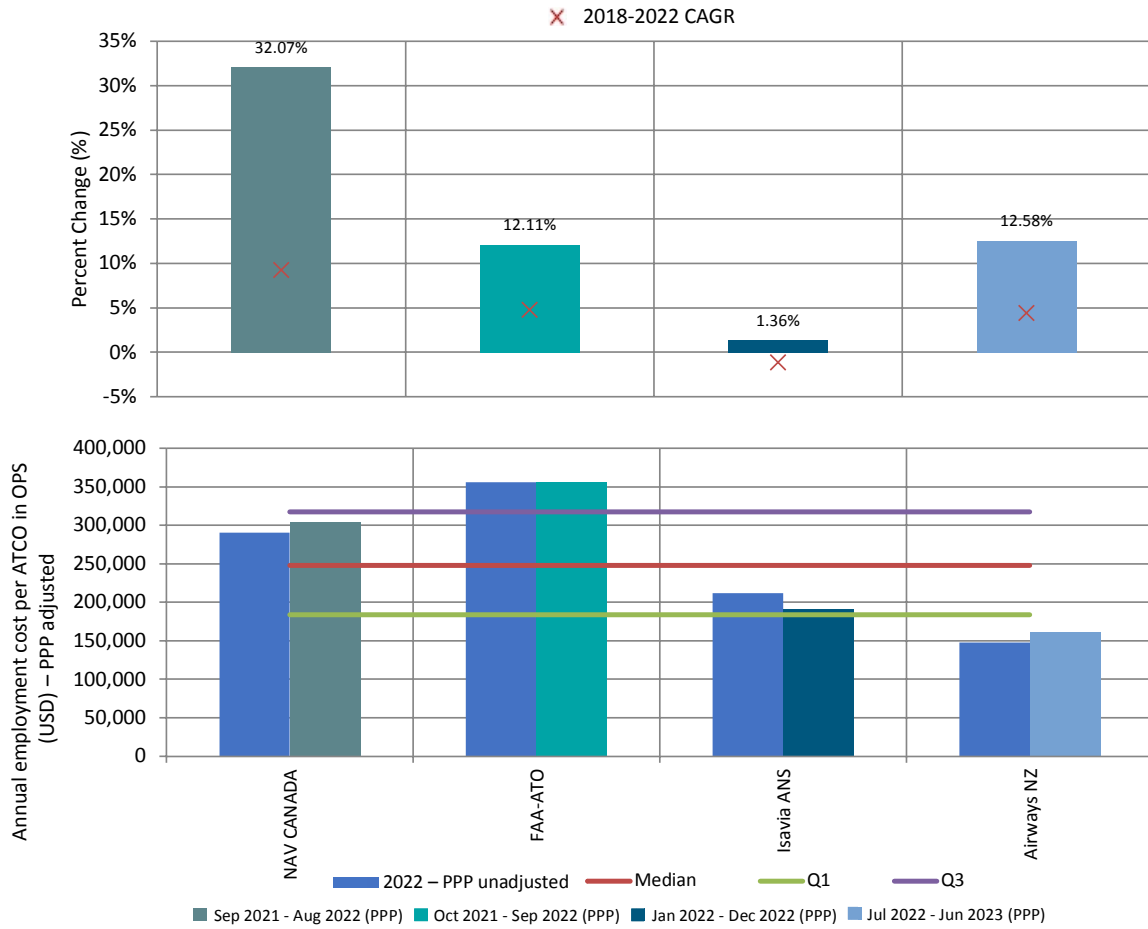


Figure 21 - Annual employment costs per ATCO in OPS - PPP adjusted

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median unit cost for ATCO in OPS employment, after PPP adjustment, was USD 247,935. The same poll of ANSPs submitting data in 2021 showed a median of USD 230,683 per ATCO.

ATNS is not displayed on this chart because the required data for this KPI is not available.

Indicator 3B: Annual Working hours per ATCO in OPS (Formula: ATCOs in OPS hours / No. ATCOs in OPS)

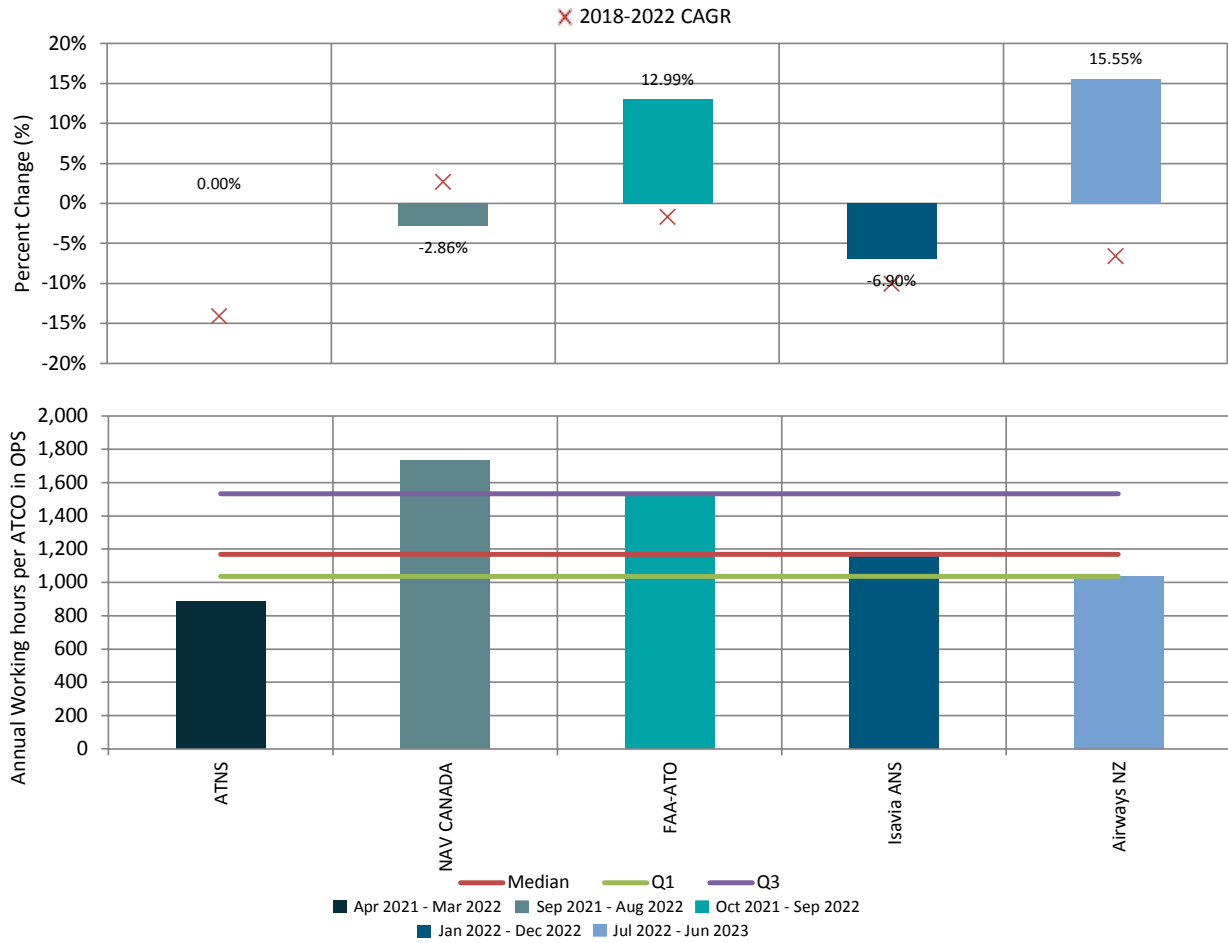


Figure 22 - Annual working hours per ATCO in OPS

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The median annual working hours per ATCO in OPS in 2022 were 1,169, marking a 10 per cent decrease compared to the previous year. During the pandemic, the median remained stable at over 1,300 hours per ATCO, although this was up to 16 per cent lower than pre-pandemic levels, with even greater differences in the earlier years.

Isavia ANS experienced the largest decrease in annual working hours per ATCO in OPS, dropping by nearly 7 per cent. In contrast, Airways NZ saw the largest increase, with a rise of 16 per cent. Meanwhile, ATNS reported no change in this metric between 2021 and 2022.

Indicator 3C: Annual IFR hours per ATCO in OPS (Formula: IFR flight hours / No. ATCOs in OPS)

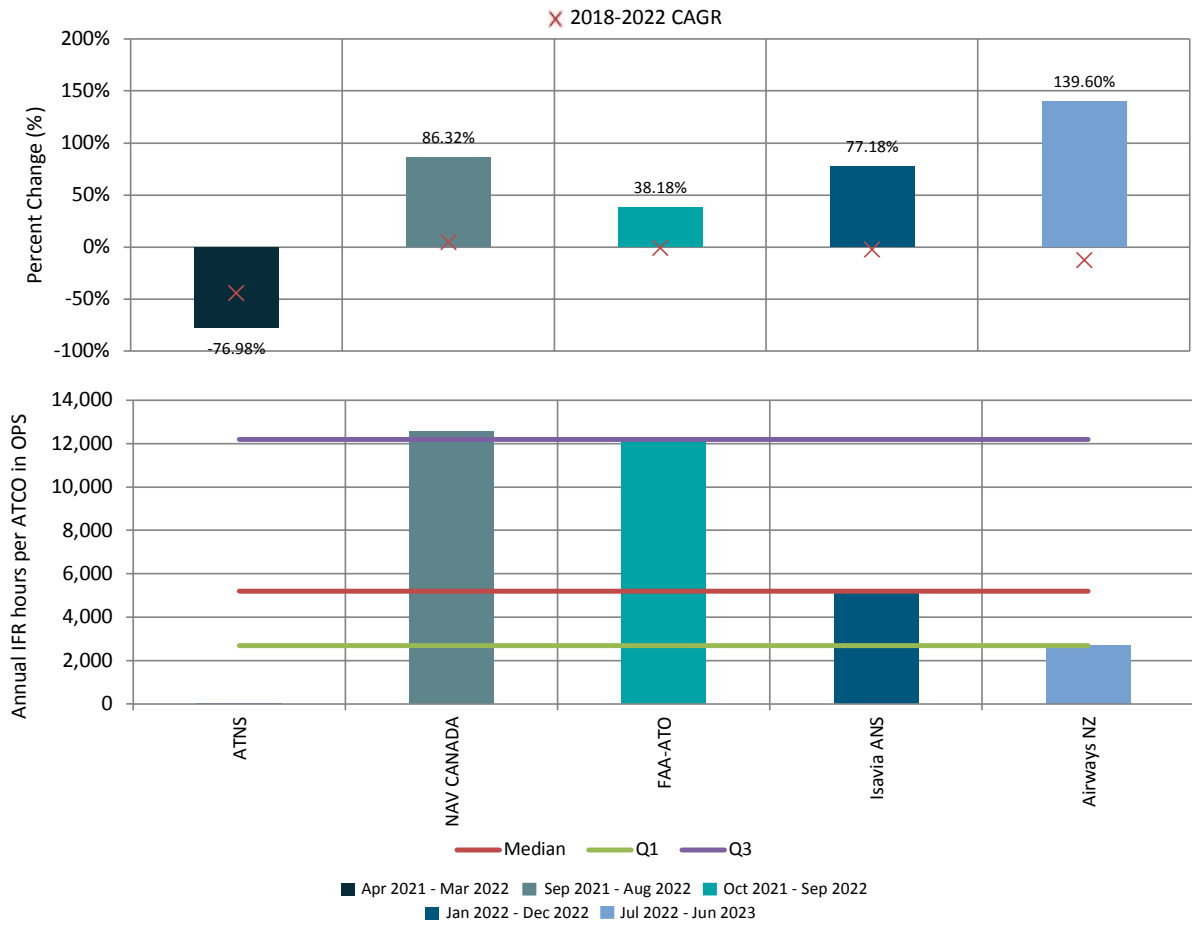


Figure 23 - Annual IFR hours per ATCO in OPS

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median annual IFR hours per ATCO in OPS was 5,200 hours. For comparison, the same poll of ANSPs submitting data in 2021 showed a median of 2,935 hours per ATCO.

The changes in this KPI mirror the fluctuations in IFR hours experienced by ANSPs operating in oceanic airspace, as the number of ATCOs in OPS saw only slight changes. Compared to other ANSPs, ATNS reported such a low value for this KPI (34 IFR hours per ATCO) that it is not displayed on the chart. In contrast, NAV CANADA had the highest workload in oceanic airspace, with 12,560 IFR hours per ATCO.

When examining changes from the previous year, Airways NZ saw the largest increase, with a 139 per cent rise. In terms of absolute numbers, NAV CANADA’s ATCOs experienced the most significant workload increase, with over 5,800 additional IFR hours per ATCO, which is the highest within the sample.

Indicator 3D: Ratio of Frontline Service Staff to ATCO in OPS
 (Formula: No. Frontline Service Support Staff / No. ATCOs in OPS)

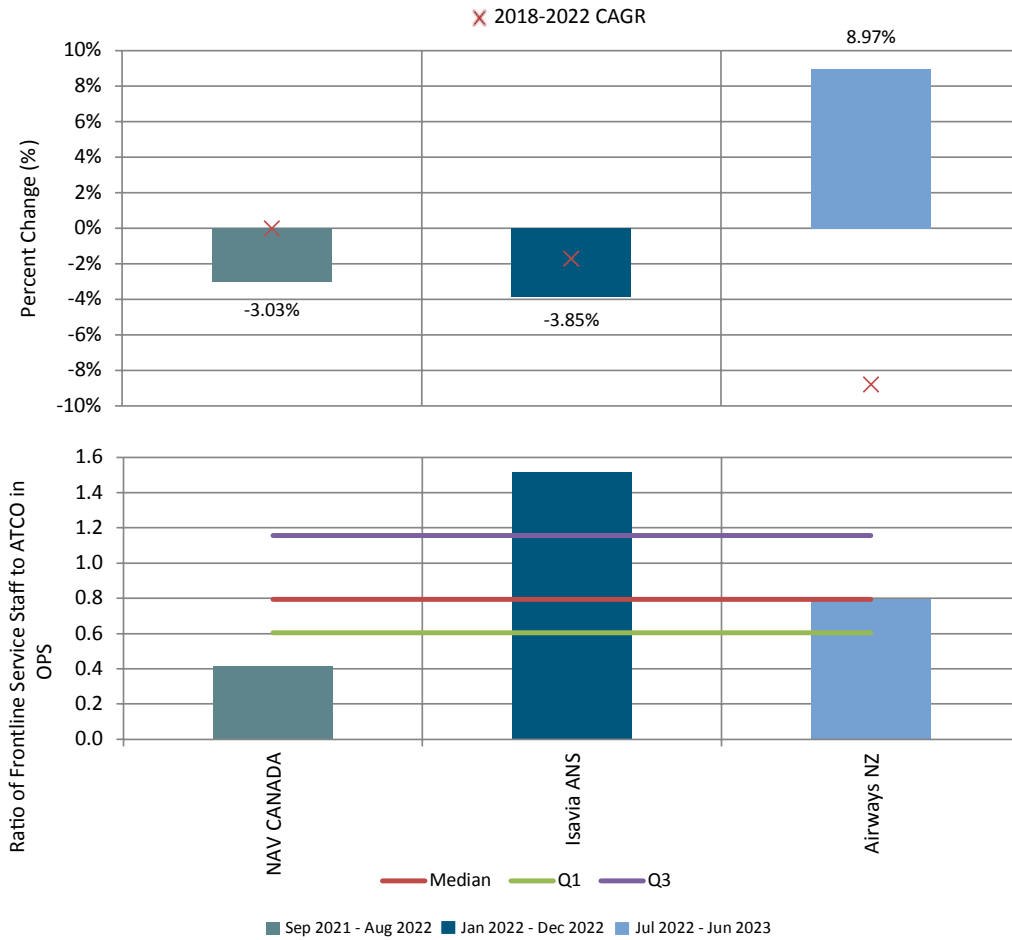


Figure 24 - Ratio of frontline service staff to ATCO in OPS

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median ratio of frontline service staff to ATCO in OPS was 0.79. For comparison, the median ratio for the same ANSPs that submitted oceanic data in 2021 was 0.70.

For the Ratio of Frontline Service Staff to ATCO in OPS, Airways NZ had the largest increase during their reporting period at 8.97 per cent. Isavia ANS' operations were dominated by oceanic flights, and therefore the ratio of frontline support staff is relatively high compared to other ANSPs, whose continental operations represent a larger proportion of their total service.

ATNS and FAA-ATO are not displayed on this chart because the required data for this KPI is not available.

Joint Continental and Oceanic Cost Efficiency: 2022

Indicator CO1: Cost per IFR flight hour (USD)
 (Formula: Total costs / IFR flight hours)

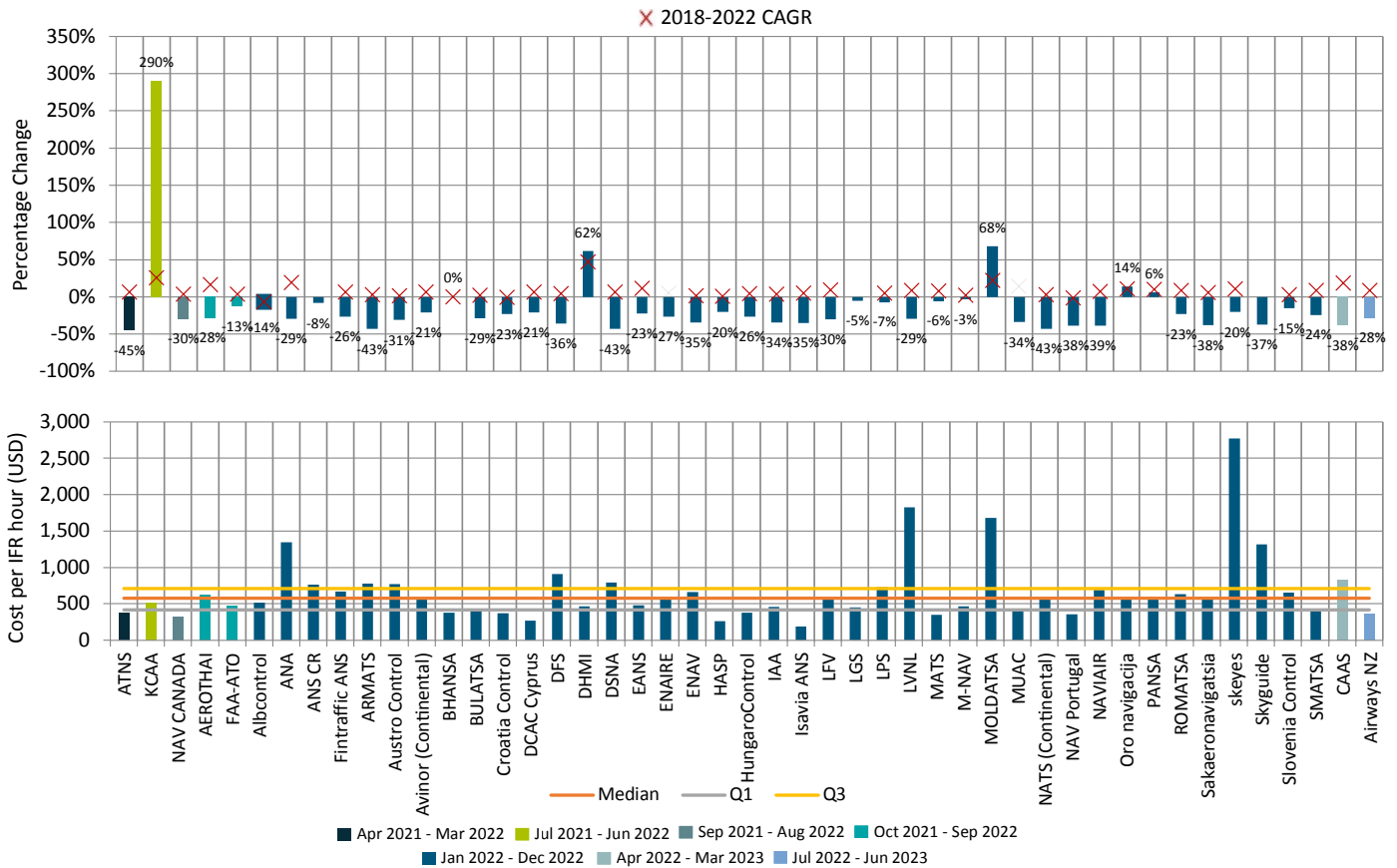


Figure 25 - Cost per IFR flight hour

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSA was introduced as a new submission for the year 2022.

The 2022 median cost per IFR flight hour was USD 579. The 2022 weighted average (taking into account total continental and oceanic IFR flight hours per ANSP) cost per IFR flight hour was USD 665. The 2021 median was USD 721 per IFR hour, and the weighted average was USD 877 per IFR hour.

An analysis of trends in joint KPI 1, Cost per IFR Flight Hour, reveals a significant change for Isavia ANS. While total costs increased in both airspaces, traffic volumes differed: oceanic airspace saw an 84 per cent increase, while continental airspace experienced a 49 per cent decrease. This led to a net difference of 35 per cent for the 2021-2022 period, causing KPI 1 to drop significantly below the median value.

Indicator CO2D: Employment cost of ATCOs in OPS as a percentage of total costs

Formula: ATCOs in OPS employment costs / Total costs

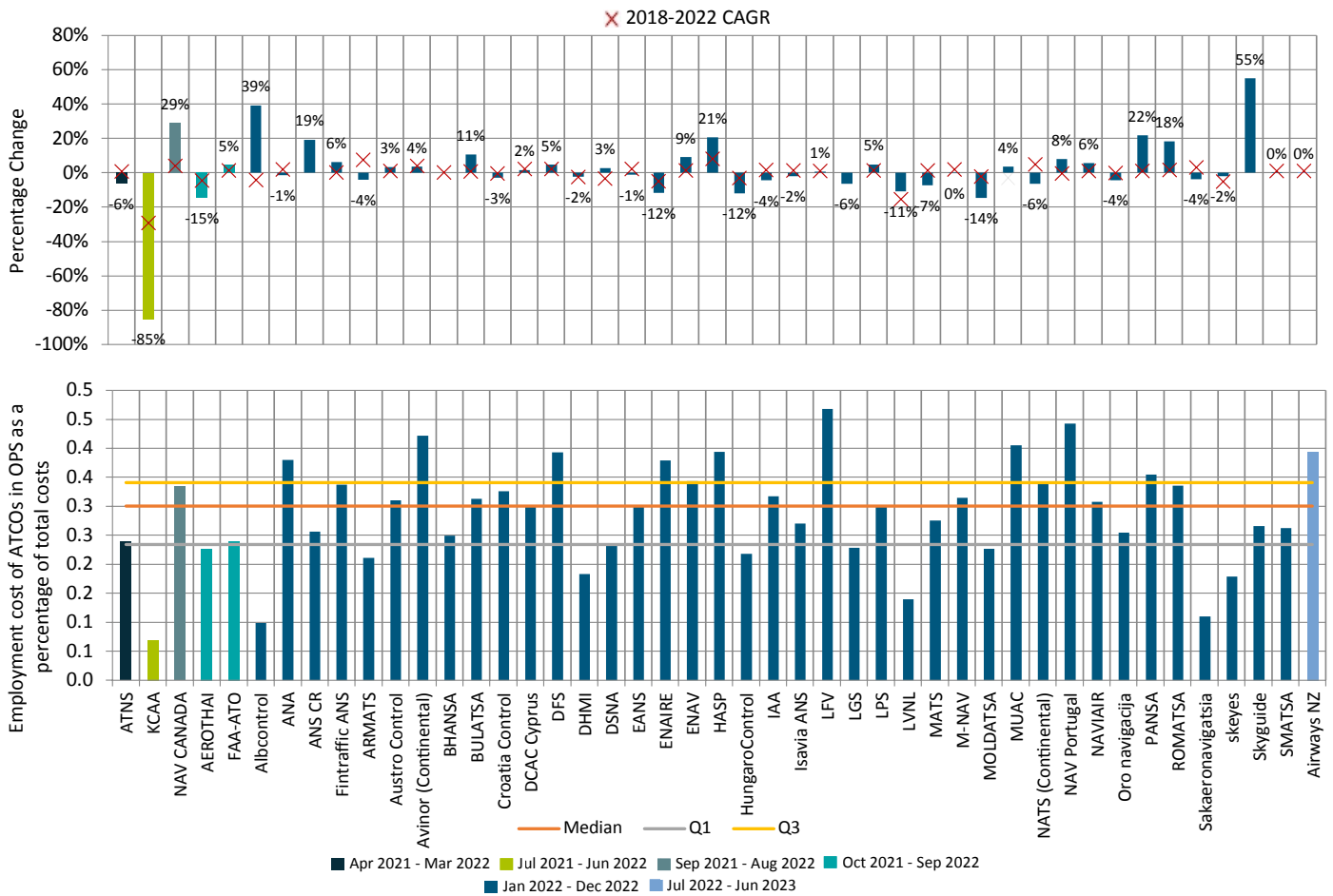


Figure 26 - Employment cost of ATCOs in OPS as a percentage of total costs

Note 1: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

Note 2: Not all ANSPs from previous years provided data for 2022; therefore, the metrics have been adjusted and comparisons are made within the same set of ANSPs. Additionally, BHANSAs was introduced as a new submission for the year 2022.

The 2022 median employment cost of ATCOs in OPS as a percentage of total costs was 30 per cent. The same poll of ANSPs submitting data in 2021 showed a median of 29 per cent.

Data are available for only four ANSPs operating in oceanic airspace—NAV CANADA, FAA-ATO, Isavia ANS, and Airways NZ. For these ANSPs, the trends in this KPI have remained relatively stable when combining data from both airspaces. The notable percentage change is a 5 per cent difference observed with Isavia ANS, which suggests that KPI 2D behaves similarly in both airspaces for ANSPs that cater to both continental and oceanic flights.

Slovenia Control and CAAS are not displayed on this chart because the required data for this KPI is not available.

Summary of Performance Trends

Key findings

- Significant performance improvements in oceanic airspace compared to continental airspace;
- Cost efficiency and ATCO productivity are improving and show signs of returning to pre-pandemic levels as traffic rises; ATCO productivity in oceanic airspace has reached a higher level than before the pandemic;
- ATCO employment costs per hour in continental airspace are rising again, while the increase in costs in oceanic airspace closely mirroring the pre-pandemic levels;
- The majority of ANSPs in continental airspace and all ANSPs in oceanic airspace reported a decrease in both total costs and costs excluding ATCO in OPS employment costs per IFR flight hour.

In 2022, the ATM system experienced a continued recovery, although challenges persisted. Air traffic volumes rebounded significantly as travel restrictions were lifted, with continental IFR hours increasing by nearly 19 per cent and oceanic IFR hours by over 40 per cent. This growth contributed to reductions in cost per IFR hour, particularly in oceanic airspace. However, rising inflation due to the war in Ukraine impacted operational costs, with fuel and labour expenses driving these increases.

The analysis reflected the varying reporting periods among ANSPs, ranging from 2021 to mid-2023, which influenced the observed trends. While inflation affected the performance of ANSPs in later reporting periods, the recovery from the pandemic had a more pronounced impact on the data, particularly in driving the positive trends seen in IFR hours and cost efficiencies.

Cost Efficiency

In terms of cost efficiency, only six ANSPs in continental airspace saw an increase in cost per IFR flight hour, while 40 reported a decrease. There are no historical data for one new submission. With a significant rise in IFR traffic, the total cost per IFR flight hours in continental airspace decreased by 22.65 per cent compared to 2021. Conversely, all four ANSPs in oceanic airspace experienced a reduction in cost per IFR hour, with the total cost per IFR flight hours decreasing by 40.97 per cent compared to 2021.

Productivity

Among the 47 ANSPs in continental airspace, 41 reported an increase, 5 reported a decrease in ATCO productivity and for one ANSP, there are no historical data. In oceanic airspace, 4 ANSPs experienced a rise, while only one saw a decrease in ATCO productivity. When comparing the same set of ANSPs, ATCO productivity in continental airspace increased by 31.77 per cent from 2021 to 2022, and in oceanic airspace by 63.7 per cent.

Future performance

Navigating the post-pandemic recovery remains a complex challenge for the ATM system. To ensure that gains in ATCO productivity and cost efficiency are sustainable, it is crucial to adopt strategies that enhance the resilience of ANSPs against future fluctuations in traffic demand.

As the industry moves forward, the data from 2019 will continue to be used as a reference point for pre-pandemic traffic levels. However, it is important to note that the pandemic's impact led to significant shifts in key trends, emphasising the need for ongoing adaptation and strategic planning to address the evolving dynamics of air traffic.

If you are interested in participating in next year's report or the CANSO GBWG, then please get in touch via info@canso.org.

Related CANSO Benchmarking Activities

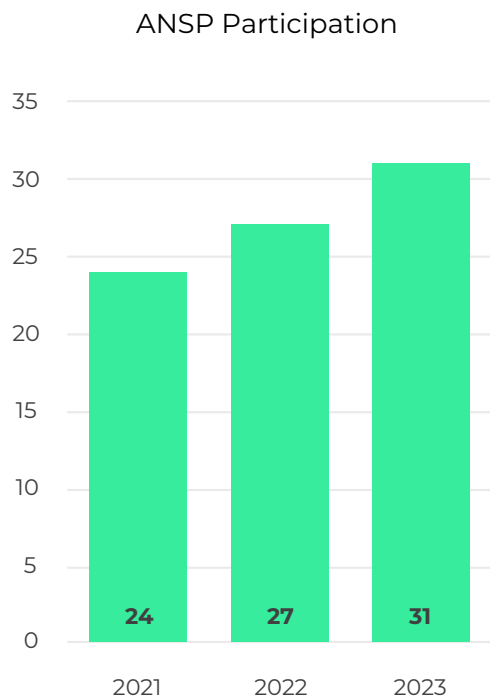
CANSO conducts a variety of benchmarking exercises to examine developments in the industry. Combining these allow for a greater understanding of the current initiatives and trends occurring across the aviation industry, contextualising the ANS performance analysis within this report. The following input has kindly been provided by the CANSO Safety Intelligence Work Group (SIWG).

CANSO Safety Intelligence Workgroup

The CANSO SIWG champions safety measurement and continuous improvement of safety performance. Consisting of representatives from ANSPs across the globe, this group works to analyse, advise, and advance safety performance measurement, and reports to the CANSO Safety Forum¹⁰.

Safety Performance

Safety is critical for the trust and confidence of the flying public. As a result, CANSO measures key safety performance indicators to contribute to improvements in safety and efficiency of air traffic control.



¹⁰ In the context of this report, “global” means the “participating ANSPs”

¹¹ ATM Ground IFR-IFR Losses of Separation is a specific term that implies a loss of separation where the ANSP (its systems, personnel actions, processes, etc.) had a level of contribution, either direct or indirect, to the sequence of events leading up to, or recovering from, the occurrence

When productivity and cost efficiency are measured, it becomes crucial to measure safety benchmarks, which rely on the interdependencies these three facets represent. Improvements in productivity and cost efficiency should never come at the cost of reduced safety.

Safety and safety performance are measured in several ways. This report focuses on event-based indicators of loss of separation and runway incursions.

Participation has gradually increased since the Pandemic hiatus, with 31 ANSPs submitting 2022 safety data.

The data is still very European-biased. CANSO continues to encourage ANSPs to join important safety sharing initiatives like this one for a holistic understanding of the industry performance.

ATM Ground IFR-IFR Losses of Separation¹¹

A loss of separation is a key performance indicator for assuring compliance with applicable separation standards. This measure focuses on IFR-IFR losses (both aircraft flying under instrument flight rules). There are multiple measures for safety performance, CANSO has prioritised this measure over others as a benchmark based on the risk profiling around potential loss of life.

The monthly average rate for the participating ANSPs in 2022 was 83.76 IFR-IFR losses of separation per 1 million IFR flight hours and 3.59 per 100,000 IFR flights.

99.996% of IFR traffic was not involved in a loss of separation, which is a testament to the resiliency of the global ATM system.

ATM Ground IFR-IFR Losses of Separation (continued)

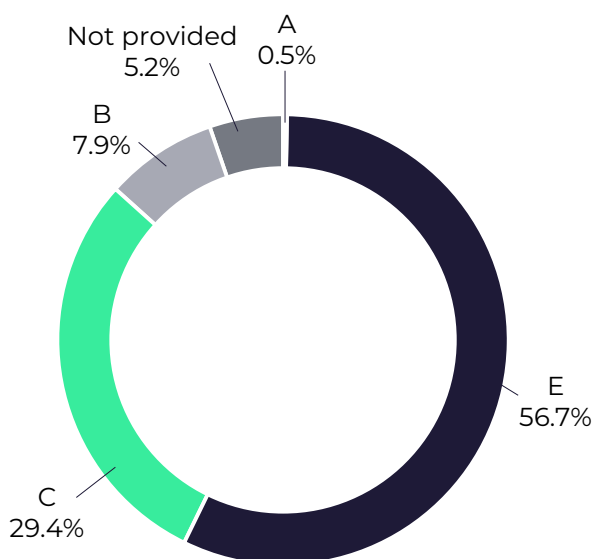
Five, out of 966 events, or 0.5% of reported losses, were considered as high severity in the Risk Analysis Tool¹² (RAT) classification (which differs from the ICAO runway incursion severity classification). In relation to traffic, this represents 0.0002% of the operation.

The RAT severity classification describes the level of consequences of hazards on the safety of flight operations. It combines the level of loss of separation and the degree of ability to recover from a hazardous situation. The overall severity of one occurrence is composed of risk of collision/proximity (separation and rate of closure) and the degree of controllability over the incident.

From the diagram above, 56.8% of the IFR-IFR losses of separation had the lowest RAT severity (E).

In addition, 49% of losses occurred in Terminal/Control Zone environment and 30% in Enroute. The remaining 21% were not provided for analysis.

RAT Severity Breakdown (ATM Ground IFR-IFR LOS)



Runway Incursions (RIs)

A high proportion of safety events take place around the vicinity of an airport's runway(s). Again, there are multiple measurements for safety around an aerodrome. Here, CANSO has selected to measure runway incursions due to the increased likelihood that an ANSP may have contributed to the event.

In 2022, the monthly average rate of runway incursions for the ANSPs who submitted data was 4.58 RIs per 100,000 runway movements (one runway incursion for approx. every 22,000 take offs and landings).

The proportion of traffic that did not experience a Runway Incursion in 2022 was 99.995%. When focusing on those occurrences that had some level of ATM contribution, this proportion increases to 99.999%, at an average rate of 0.79 RIs per 100,000 runway movements.

More than half of the reported RIs (51%) did not contain information on the ICAO severity¹³, but for the remaining 49% of events, none reported an occurrence assessed as an ICAO Severity A (the highest ICAO severity). However, 2 occurrences were categorized as RAT A (the highest RAT severity). This shows how the two severity classification schemes, or perhaps their interpretation and application, can vary slightly.

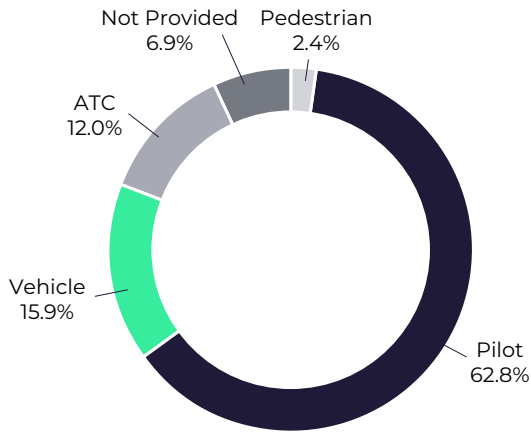
¹² Please refer to <https://skybrary.aero/articles/risk-analysis-tool-rat> for a description of the RAT framework

¹³ Please refer to ICAO Doc 9870 Manual on the Prevention of Runway Incursions for the ICAO Runway Incursion Severity definition: https://www.icao.int/safety/RunwaySafety/Documents%20and%20Toolkits/ICAO_manual_prev_RI.pdf

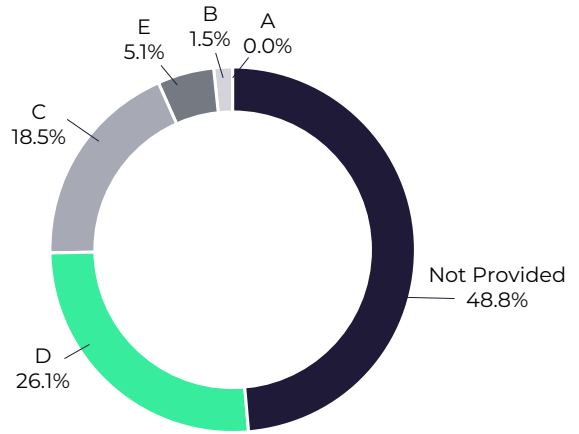
Runway Incursions (RIs) (continued)

Below are graphs summarising various contextual data related to the reported RIs, including the attribution (the primary causal element), severity (based on ICAO and RAT classification schemes. Note: for the RAT severity classification scheme, only ATM Ground Runway Incursions are assessed in this report), lighting conditions, weather, and involved aviation sector.

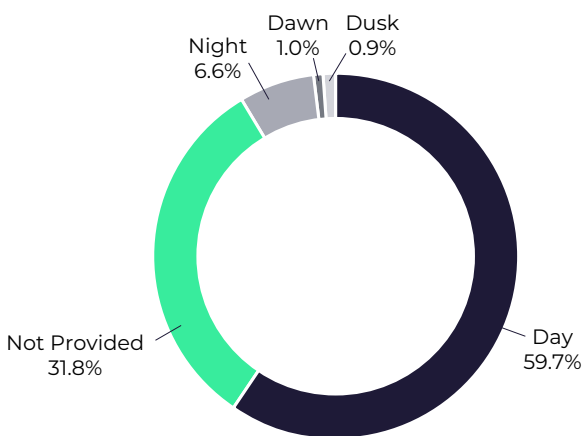
Attribution Breakdown (All RIs)



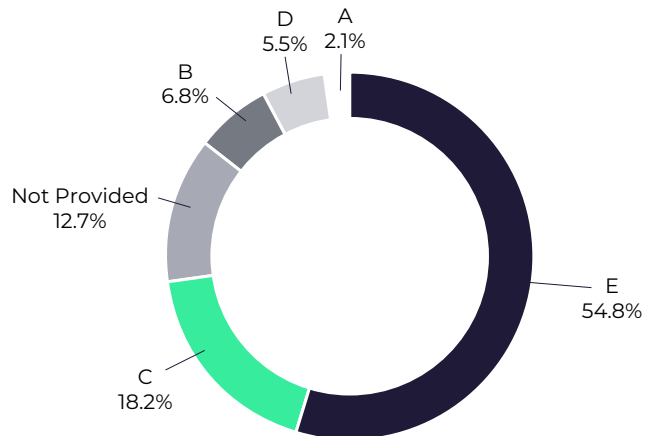
ICAO Severity Breakdown (All RIs)



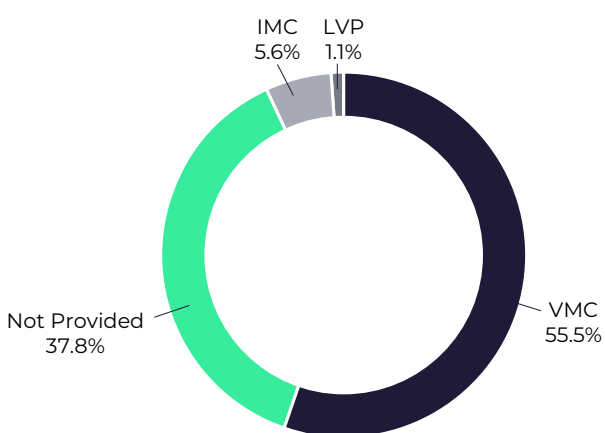
Light Conditions Breakdown (All RIs)



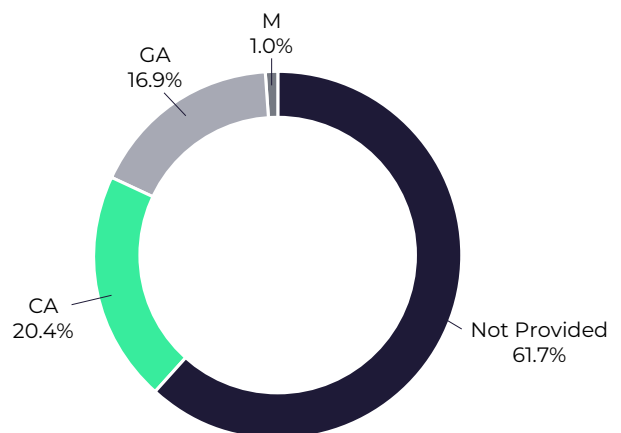
RAT Severity Breakdown (ATM Ground RIs Only)



Weather Conditions Breakdown (All RIs)



Involved Aviation Sector Breakdown (All RIs)



ANSP Factsheets

Continental

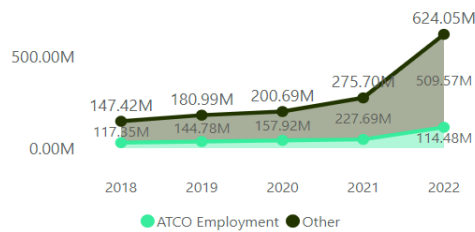


DHMI, Turkey
Continental data

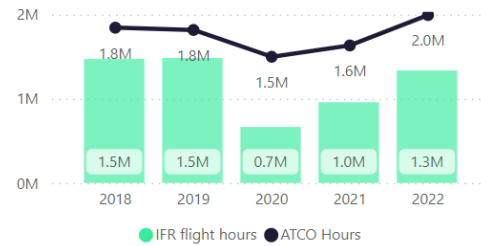


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

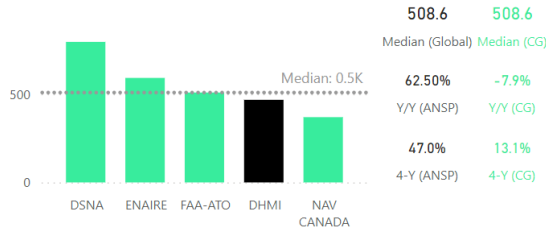


DHMI's total costs (USD) in 2022 increased significantly by 121.4% when compared to 2021. ATCO in employment costs accounted for 17.7% of costs during 2022 at 0.11bn USD, an increase of 120% from 2021. IFR flight hours increased by 30% during 2022 remaining only 0.2M below 2019 levels. ATCO hours increased by 0.4M (25%), 11.1% above 2019 levels.

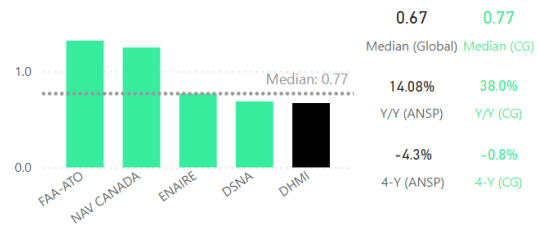
Performance in 2022 (key KPIs compared to CG)

Comparator Group 1 (>1mil IFR flight hours; DHMI, DSNA, ENAIRE, FAA-ATO, NAV CANADA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



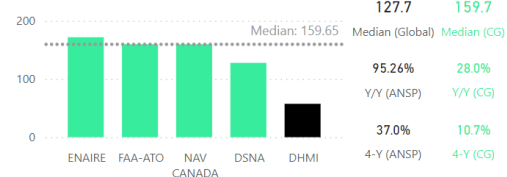
KPI 2B: ATCO in OPS hour productivity



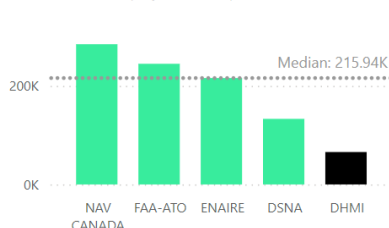
Comparing DHMI with other ANSPs in Comparator Group 1, DHMI had a Total cost per IFR flight hours sitting at 467.54 USD for 2022 below the CG median value. For KPI 2B, ATCO in OPS hour productivity, DHMI was under the CG's median value (0.77) at 0.67.

For ATCO in OPS costs per ATCO in OPS hour DHMI had CG's lowest values, returning 57.41 USD for 2022.

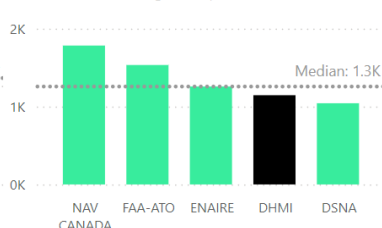
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



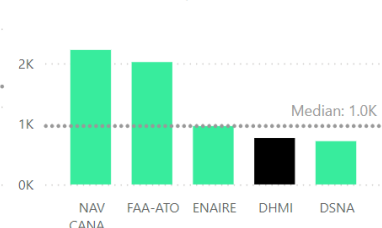
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



DHMI's Annual employment cost per ATCO in OPS was the lowest in the CG at 65.7K USD for 2022. Annual working hours per ATCO in OPS for 2022 were at 1.1K. Annual IFR working hours per ATCO in OPS was at 0.76K for 2022.

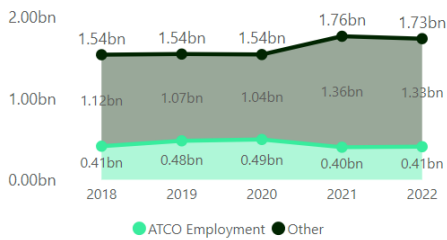


DSNA, France
Continental data

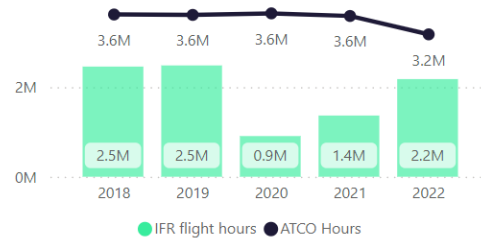


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

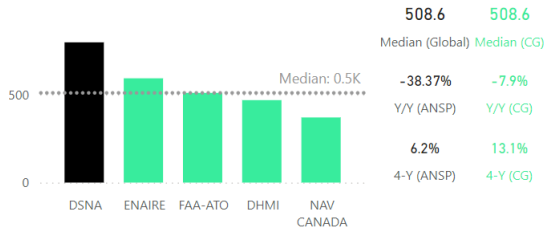


DSNA's Total costs (USD) in 2022 decreased by 1.7% compared to 2021 costs. IFR flight hours increased by 57.14% during 2022, remaining only 0.3 million below 2019 levels. ATCO hours decreased by 38.8% in 2022.

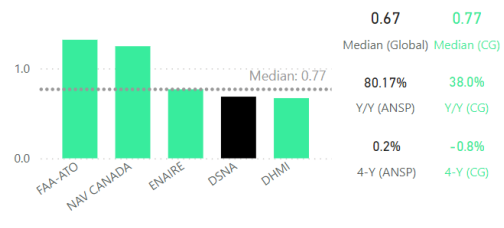
Performance in 2022 (key KPIs compared to CG)

Comparator Group 1 (>1mil IFR flight hours; DHMI, DSNA, ENAIRE, FAA-ATO, NAV CANADA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



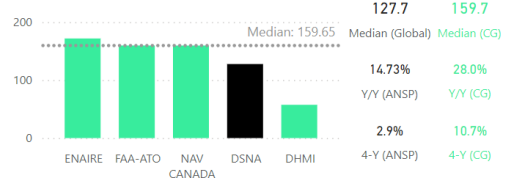
KPI 2B: ATCO in OPS hour productivity



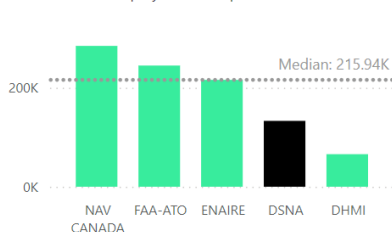
Comparing DSNA with other ANSPs in Comparator Group 1, DSNA's total cost per IFR flight hour was comparator group leader at 795.42 USD. For ATCO in OPS hour productivity, DSNA was 0.69.

For ATCO in OPS cost per ATCO in OPS hour, DSNA was 127.72 USD.

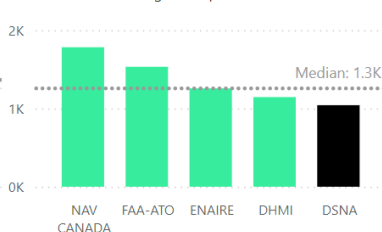
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



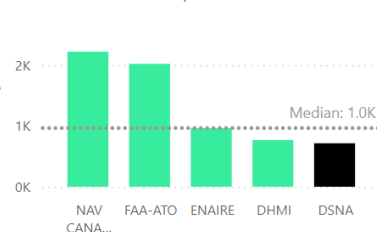
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



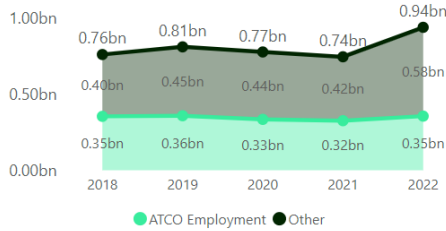
KPI 3C: Annual IFR hours per ATCO in OPS



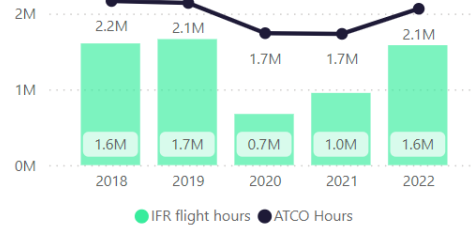
DSNA's Annual employment cost per ATCO in OPS was 133K USD. Annual working hours per ATCO in OPS were 1K. Annual IFR hours per ATCO in OPS was at 0.71K.

Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

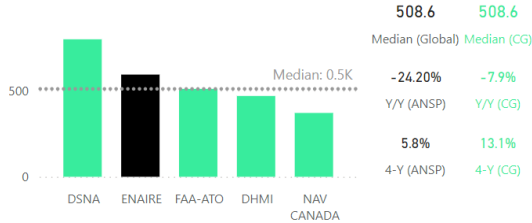


ENAIRe's Total costs (USD) in 2022 increased by 27% compared to 2021 costs. IFR flight hours increased by 60% during 2022, remaining only 0.1 million below 2019 levels. ATCO hours increased by 17.64% in 2022.

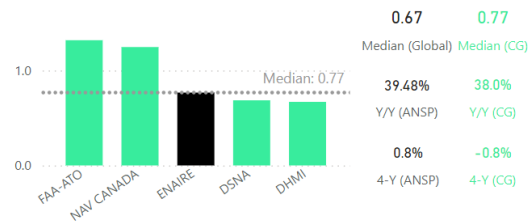
Performance in 2022 (key KPIs compared to CG)

Comparator Group 1 (>1mil IFR flight hours; DHMI, DSNA, ENAIRe, FAA-ATO, NAV CANADA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



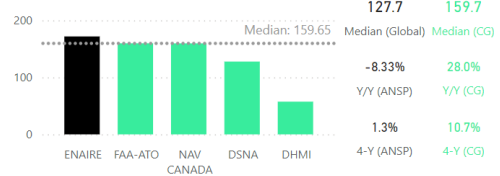
KPI 2B: ATCO in OPS hour productivity



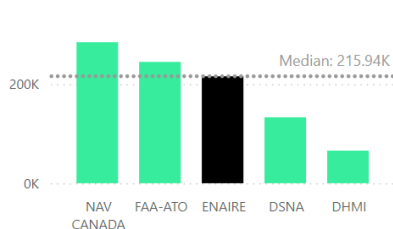
Comparing ENAIRe with other ANSPs in Comparator Group 1, ENAIRe's total cost per IFR flight hour was 591.40 USD, above the median cost of the CG. For ATCO in OPS hour productivity, ENAIRe was same as the median cost at 0.77.

For ATCO in OPS cost per ATCO in OPS hour, ENAIRe was comparator group leader at 171.82 USD.

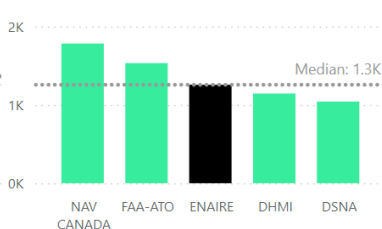
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



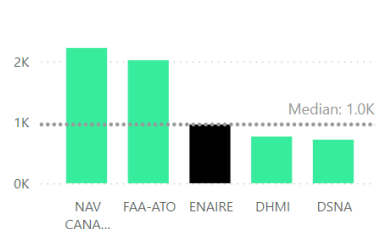
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



ENAIRe's Annual employment cost per ATCO in OPS was 215K USD. Annual working hours per ATCO in OPS were 1.2K. Annual IFR hours per ATCO in OPS was at 0.96K.

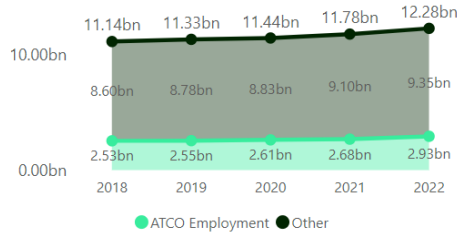


FAA-ATO, United States
Continental data

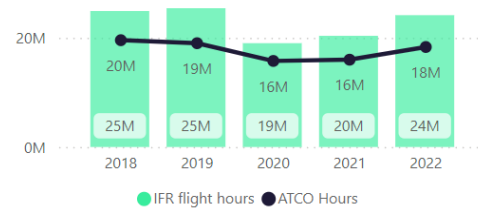


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

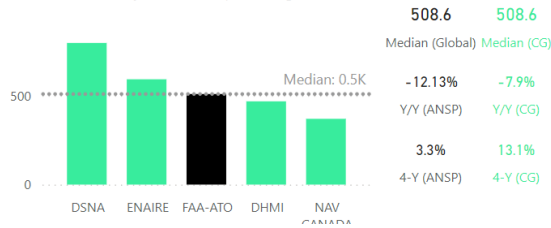


FAA-ATO's Total costs (USD) in 2022 increased by 4.1% compared to 2021 costs. IFR flight hours increased by 20% during 2022, remaining 1M below 2019 levels. ATCO hours increased by 38.4% in 2022.

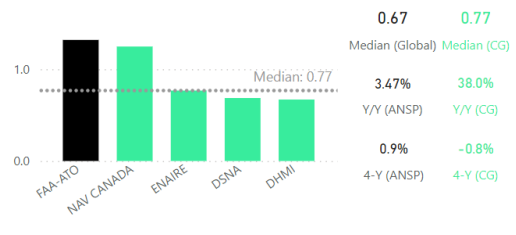
Performance in 2022 (key KPIs compared to CG)

Comparator Group 1 (>1mil IFR flight hours; DHMI, DSNA, ENAIRE, FAA-ATO, NAV CANADA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



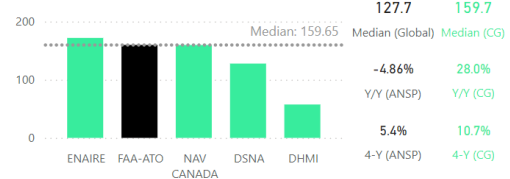
KPI 2B: ATCO in OPS hour productivity



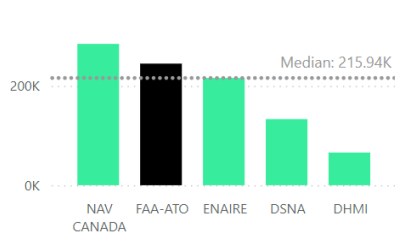
Comparing FAA-ATO with other ANSPs in Comparator Group 1, FAA-ATO's total cost per IFR flight hour was 508.64 USD, the same as the median cost of the CG. For ATCO in OPS hour productivity, FAA-ATO was the comparator group leader at 1.32.

For ATCO in OPS cost per ATCO in OPS hour, FAA-ATO was 159.75 USD.

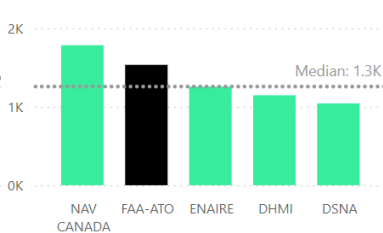
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



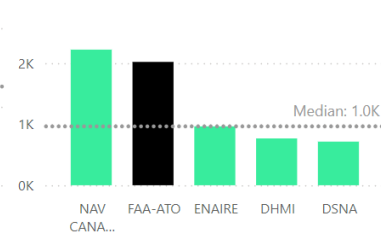
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



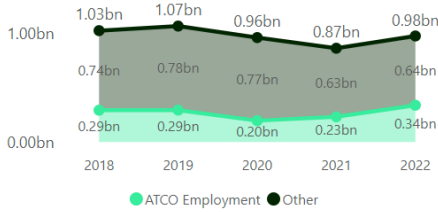
KPI 3C: Annual IFR hours per ATCO in OPS



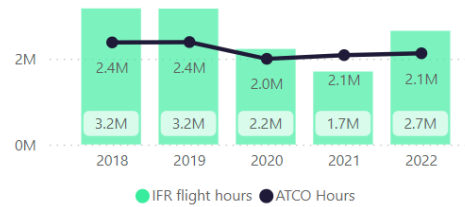
FAA-ATO's Annual employment cost per ATCO in OPS was 244K USD. Annual working hours per ATCO in OPS were 1.5K. Annual IFR hours per ATCO in OPS was at 2K.

Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

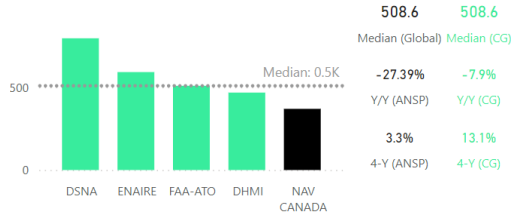


NAV CANADA's total costs (USD) increased by 12.6% in 2022. ATCO employment costs accounted for 34.7% of total costs during 2022. IFR hours increased by 58.8% compared to 2021 remaining 0.5M below 2019 levels. ATCO hours in 2022 were similar to 2021.

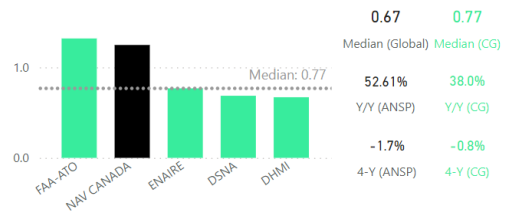
Performance in 2022 (key KPIs compared to CG)

Comparator Group 1 (>1mil IFR flight hours; DHMI, DSNA, ENAIRE, FAA-ATO, NAV CANADA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



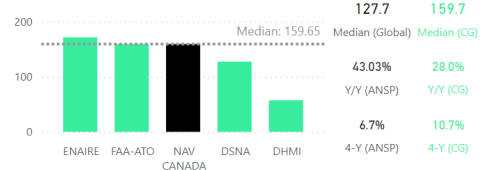
KPI 2B: ATCO in OPS hour productivity



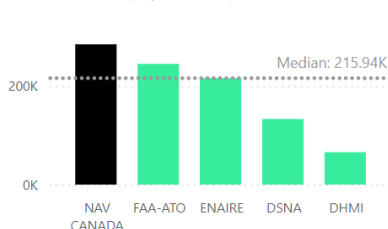
Comparing NAV CANADA with other ANSPs in Comparator Group 1, NAV CANADA had below the median Total cost per IFR flight hour (369.44 USD). For ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours), NAV CANADA performed above the CG's median at 1.25.

NAV CANADA's ATCO in OPS costs per ATCO in OPS hour was 159.65 USD.

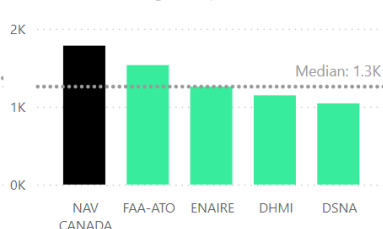
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



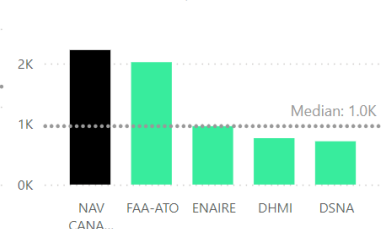
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



NAV CANADA's Annual employment cost per ATCO in OPS was above the median at 285K USD for 2022. Annual working hours per ATCO in OPS were 1.7K around 0.4K above the median for the CG. Annual IFR hours per ATCO in OPS was at 2.2K.

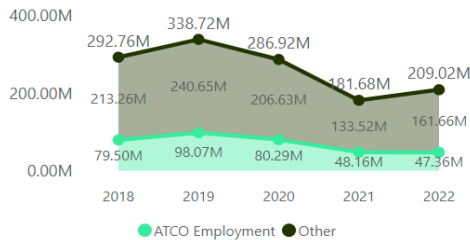


AEROTHAI, Thailand
Continental data

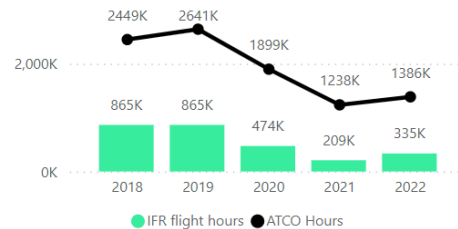


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

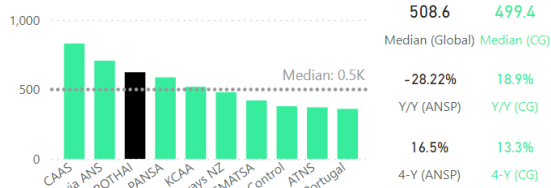


AEROTHAI's Total costs (USD) in 2022 increased by 16.67% compared to 2021 costs. IFR flight hours increased by 16.67% during 2022, remaining 1.2 million below 2019 levels. ATCO hours increased by 50% in 2022.

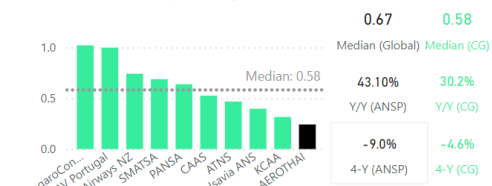
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours; AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSA, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



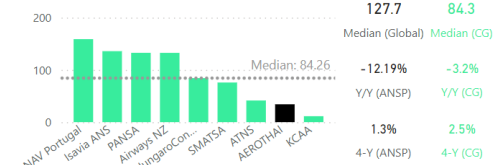
KPI 2B: ATCO in OPS hour productivity



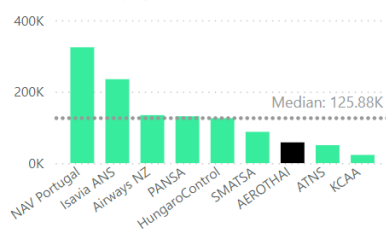
Comparing AEROTHAI with other ANSPs in Comparator Group 2, AEROTHAI's total cost per IFR flight hour was 623.56 USD, above the median cost of the CG. For ATCO in OPS hour productivity, AEROTHAI was the comparator group last at 0.24.

For ATCO in OPS cost per ATCO in OPS hour, AEROTHAI was 34.17 USD.

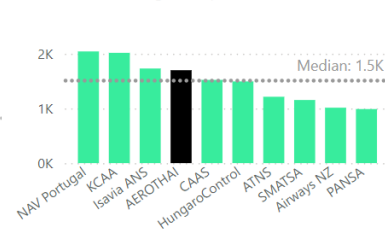
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



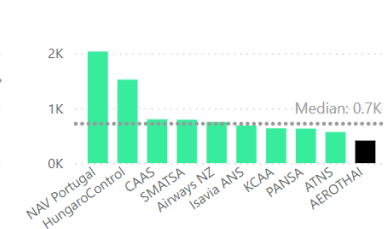
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



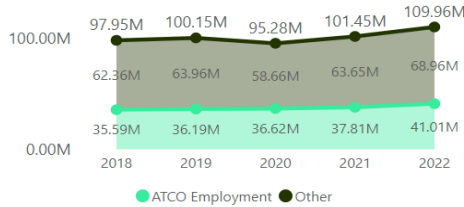
KPI 3C: Annual IFR hours per ATCO in OPS



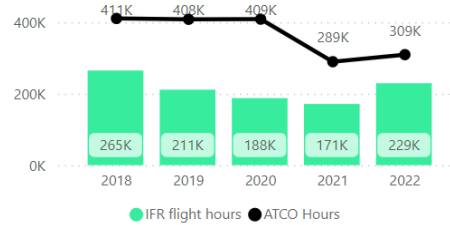
AEROTHAI's Annual employment cost per ATCO in OPS was 58K USD. Annual working hours per ATCO in OPS were 1.6K. Annual IFR hours per ATCO in OPS was at 0.4K.

Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

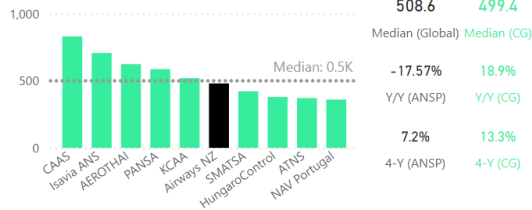


Airways NZ's Total costs (USD) in 2022 increased by 10% compared to 2021 costs. IFR flight hours increased by 35.29% during 2022, 0.02 million above 2019 levels. ATCO hours increased by 6.90% in 2022.

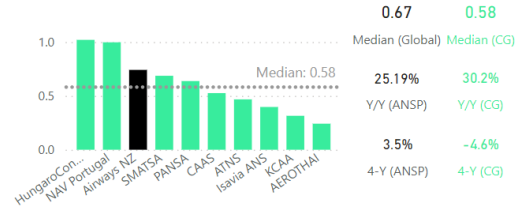
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours; AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSA, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours

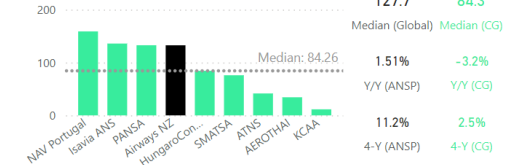


KPI 2B: ATCO in OPS hour productivity



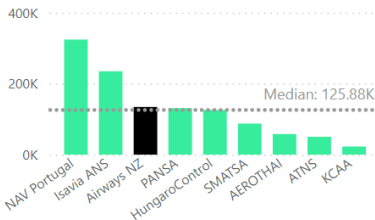
Comparing Airways NZ with other ANSPs in Comparator Group 2, Airways NZ's total cost per IFR flight hour was 479.69 USD, slightly below the median cost of the CG. For ATCO in OPS hourly productivity, Airways NZ was at 0.74.

KPI 2A: ATCO in OPS cost per ATCO in OPS hour

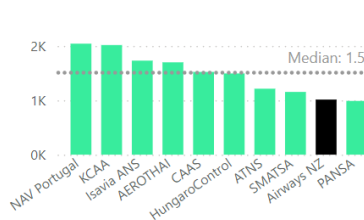


For ATCO in OPS cost per ATCO in OPS hour, Airways NZ was 132.57 USD.

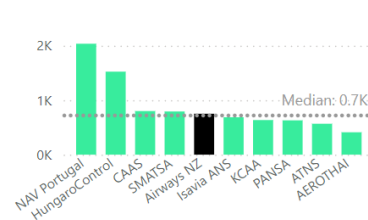
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Airways NZ's Annual employment cost per ATCO in OPS was 134K USD. Annual working hours per ATCO in OPS were 1K. Annual IFR hours per ATCO in OPS was at 0.75K.

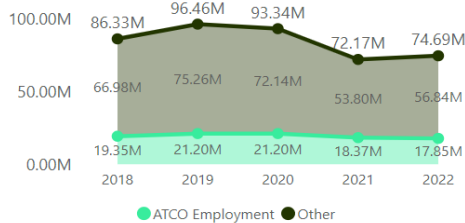


ATNS, South Africa
Continental data

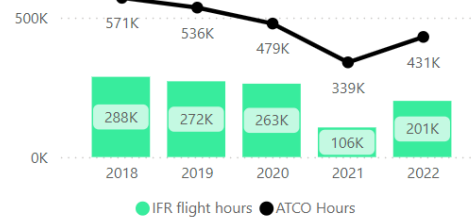


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

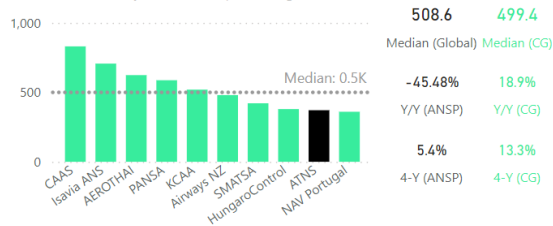


ATNS's Total costs (USD) in 2022 increased by 3.49% compared to 2021 costs. IFR flight hours increased by 81.8% during 2022, remaining only 0.07 million below 2019 levels. ATCO hours increased by 26.47% in 2022.

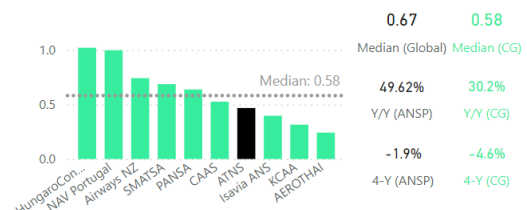
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours; AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSA, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



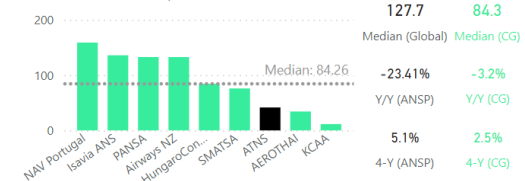
KPI 2B: ATCO in OPS hour productivity



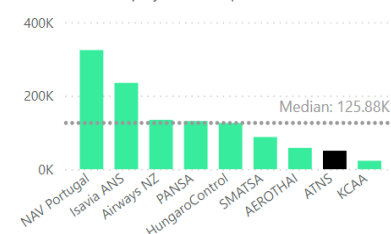
Comparing ATNS with other ANSPs in Comparator Group 2, ATNS's total cost per IFR flight hour was 370.93 USD, below the median cost of the CG. For ATCO in OPS hour productivity, ATNS was at 0.47.

For ATCO in OPS cost per ATCO in OPS hour, ATNS was 41.45 USD.

KPI 2A: ATCO in OPS cost per ATCO in OPS hour



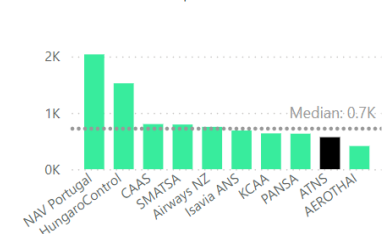
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



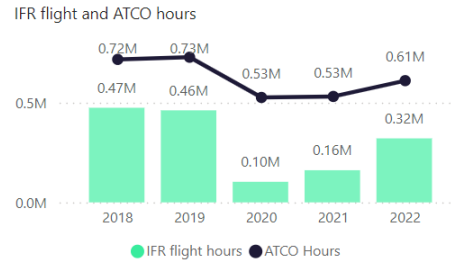
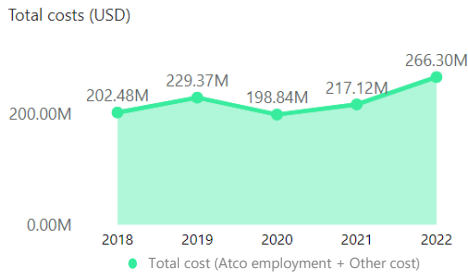
KPI 3C: Annual IFR hours per ATCO in OPS



ATNS's Annual employment cost per ATCO in OPS was 50K USD. Annual working hours per ATCO in OPS were 1.2K. Annual IFR hours per ATCO in OPS was at 0.56K.



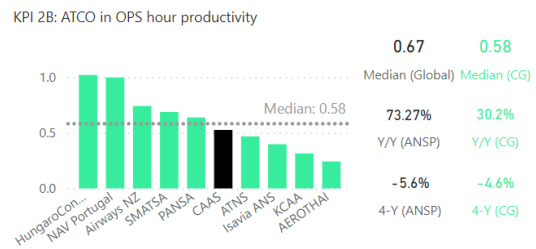
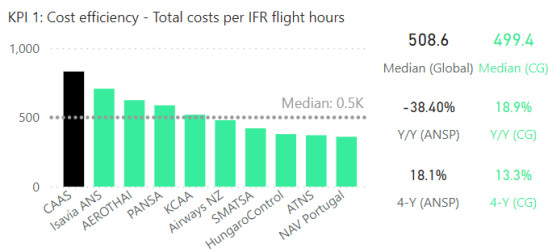
Statistics (2018-2022)



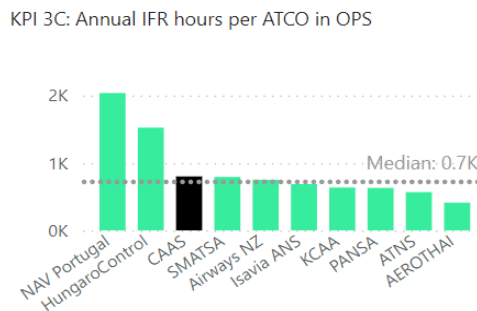
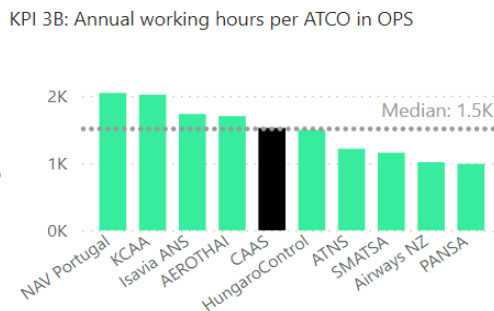
CAAS submitted cost data (as used for KPI 1) but without breakdown into ATCO employment cost and other costs. IFR flight hours increased by 99% during 2022, remaining only 0.14 million below 2019 levels. ATCO hours increased by 15% in 2022.

Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours; AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSA, SMATSA)



Comparing CAAS with other ANSPs in Comparator Group 2, CAAS's total cost per IFR flight hour, was the highest at 830.26 USD. For ATCO in OPS hour productivity, CAAS was at 0.53, close to the CG median value.



CAAS's Annual working hours per ATCO in OPS were 1.5K and Annual IFR hours per ATCO in OPS was at 0.8K.

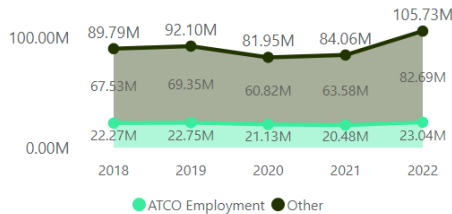


HungaroControl, Hungary Continental data

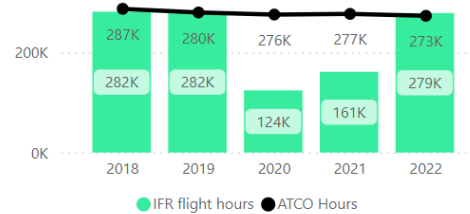


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

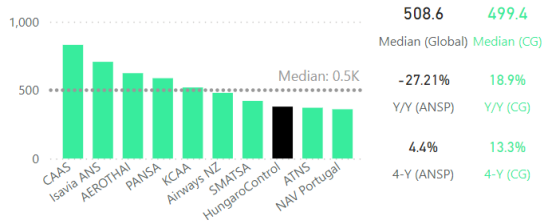


HungaroControl's total costs (USD) in 2022 increased by 37.5%, with other costs rising by 0.02bn to 0.08bn during the year. ATCO in Employment costs remained almost at the same level. IFR flight hours saw a significant increase of 75% compared to 2021, reaching almost the same as 2019 levels. ATCO employment in operations remained nearly the same as the previous year.

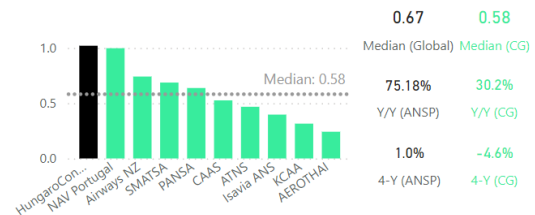
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours: AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSa, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



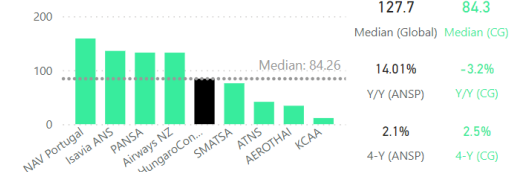
KPI 2B: ATCO in OPS hour productivity



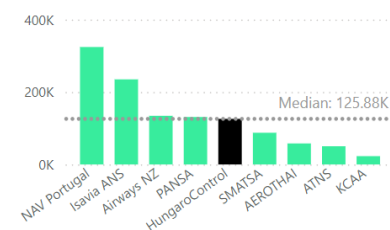
Comparing HungaroControl with other ANSPs in Comparator Group 2, HungaroControl had below the median Total costs per IFR flight hour (379.18 USD). ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of HungaroControl was the CG leader with median at 1.02.

HungaroControl's ATCO in OPS cost per ATCO in OPS hour was 84.26 same as the median CG value.

KPI 2A: ATCO in OPS cost per ATCO in OPS hour



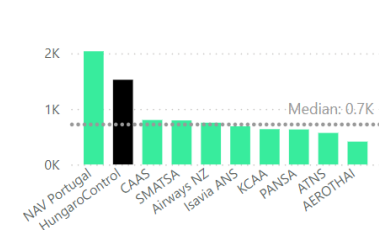
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



HungaroControl's Annual employment cost per ATCO was 125K same as the CG median value. Annual working hours per ATCO in OPS came in below the median at 1.4K. HungaroControl's Annual IFR hours per ATCO in OPS had a relatively large yearly increase to 1.5K in 2022.

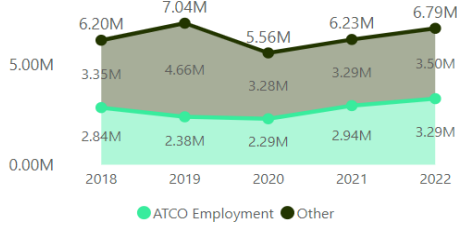


Isavia ANS, Iceland
Continental data

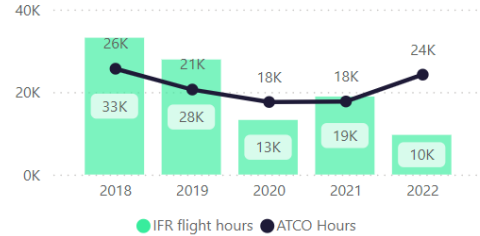


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

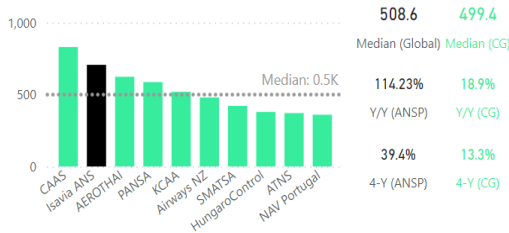


Isavia ANS's total costs (USD) in 2022 increased by 8.9% compared to 2021 costs. ATCO costs increased by 0.4M, accounting for 48.6% of Isavia ANS's Total costs. IFR flight hours decreased by 44.4% to 10K the lowest figure during the five reporting years. ATCO hours for Isavia ANS increased by 26.3% in 2022.

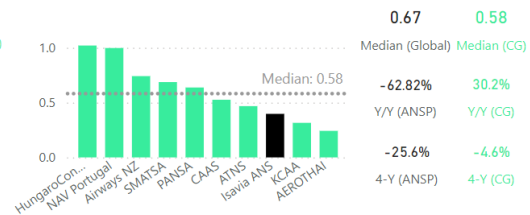
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours: AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANS, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hour



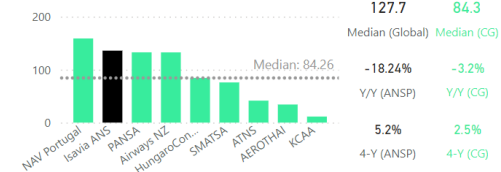
KPI 2B: ATCO in OPS hour productivity



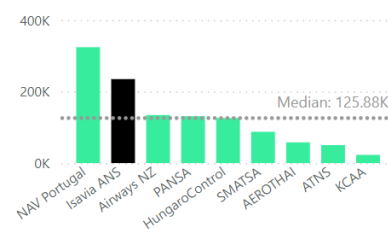
Comparing Isavia ANS with other ANSPs in Comparator Group 2, Isavia ANS' Total cost per IFR flight hours during 2022 was 706.41 USD, above the CG median value. On the other hand, ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) was one of the lowest in the group at 0.40, below the CG median value.

Isavia ANS' ATCO in OPS cost per ATCO in OPS hour was 135.81 USD.

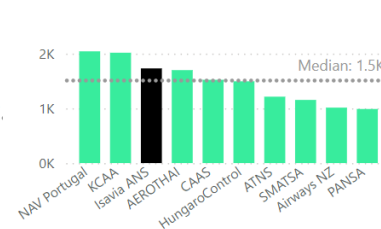
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



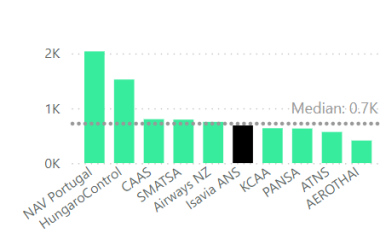
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



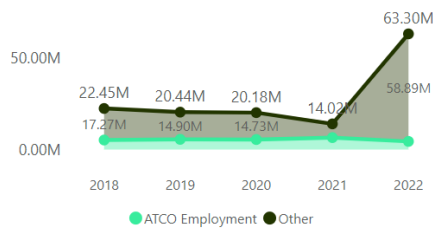
KPI 3C: Annual IFR hours per ATCO in OPS



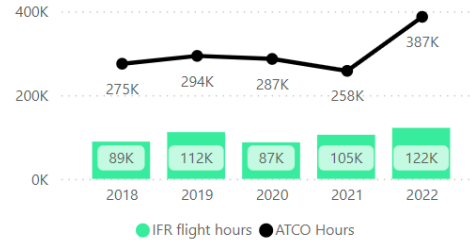
The Annual employment cost per ATCO in OPS for Isavia ANS in 2022 was 234K USD, above the median for the CG. Annual working hours per ATCO in OPS for Isavia ANS was 1.7K, higher than CG median value. Isavia ANS Annual IFR hours per ATCO in OPS was at 0.68K in 2022.

Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

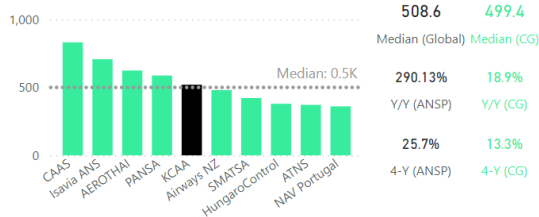


KCAA's total costs (USD) in 2022 increased significantly by 351.4%, from 14.02M to 63.30M. Other costs make up around 93.2% of the total costs. IFR flight hours increased by 9% from 2021 and exceeded 2019 levels. ATCO hours increased by 50% in 2022.

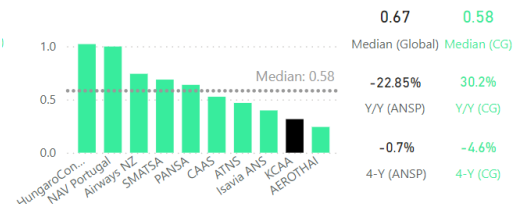
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours: AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANS, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



KPI 2B: ATCO in OPS hour productivity

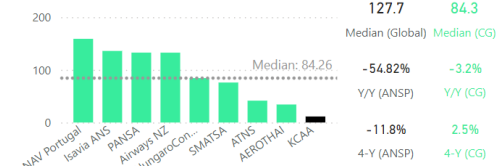


Comparing KCAA with other ANSPs in Comparator Group 2, KCAA's total cost per IFR flight hour was 519.07 USD higher than CG median value 499.4 USD.

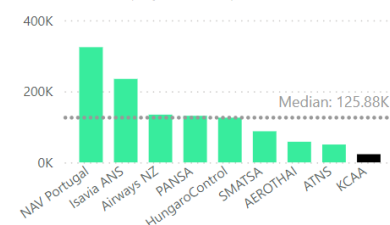
ATCO in OPS hour productivity was 0.32, lower than the CG median value.

ATCO in OPS cost per ATCO in OPS hour was the lowest of the CG at 11.39 USD.

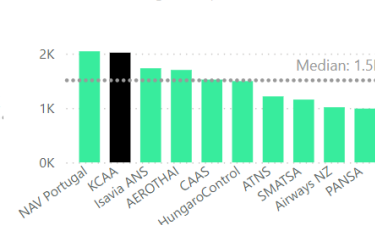
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



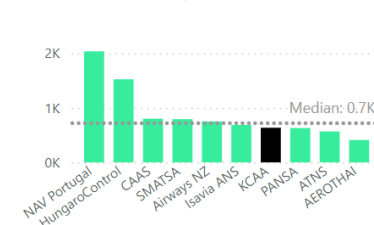
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



KCAA's annual employment cost per ATCO in OPS was the lowest in the CG, at 22K USD in 2022. The annual working hours per ATCO in operations for KCAA were above the CG median, totaling 2,016 hours. However, KCAA's annual working IFR hours per ATCO in operations were below the CG median, at 635.13 hours.

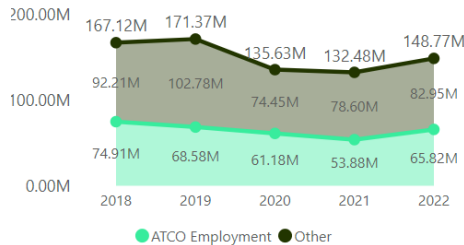


NAV Portugal, Portugal
Continental data

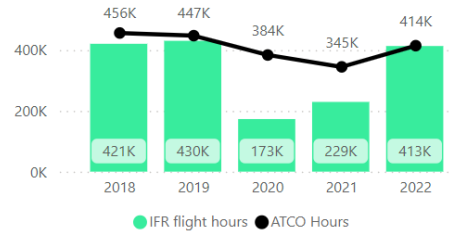


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

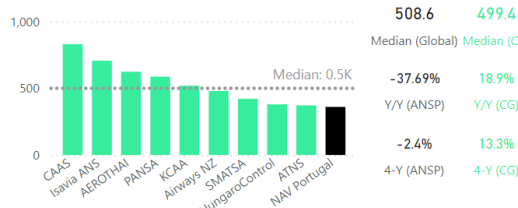


NAV Portugal's total costs in 2022 (USD) increased by 15.3%. ATCO employment costs increased by 40% and accounted for 46.6% of total costs. ATCO hours increased by 20.6% in 2022, remaining just 4.7% below 2019 levels. IFR flight hours increased significantly by 78.2% in 2022, remaining just 0.02M below 2019 figures.

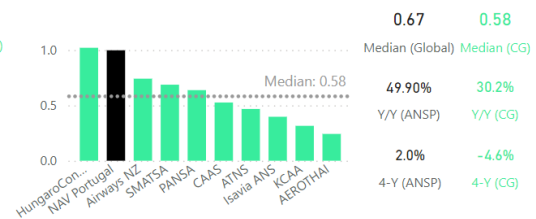
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours: AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSA, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



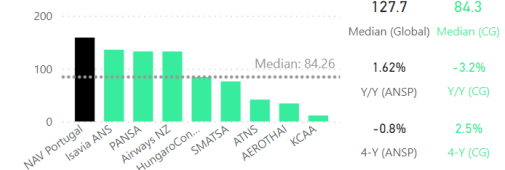
KPI 2B: ATCO in OPS hour productivity



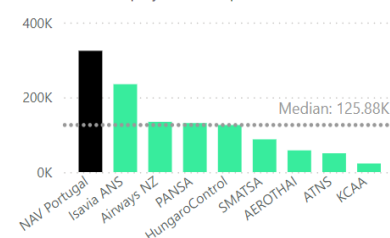
Comparing NAV Portugal with other ANSPs in Comparator Group 2, NAV Portugal had the lowest Total costs per IFR flight hours in the CG, at 359.90 USD. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) for NAV Portugal was the second largest in the CG, at 1.0.

NAV Portugal's ATCO in OPS costs per ATCO in OPS hour were the highest in the CG, at 158.81 USD.

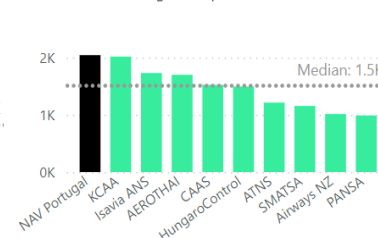
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



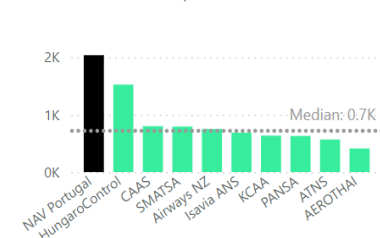
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



NAV Portugal was the group leader for annual employment cost per ATCO in operations, at 324K USD. For annual working hours per ATCO in operations, NAV Portugal led the CG at 2,041.75 hours. Additionally, NAV Portugal had the highest annual IFR hours per ATCO in operations, at 2K, the highest in the CG.

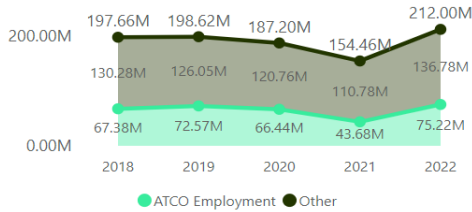


PANSA, Poland
Continental data

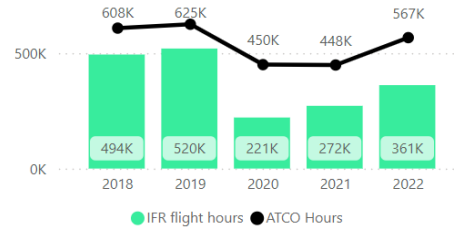


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

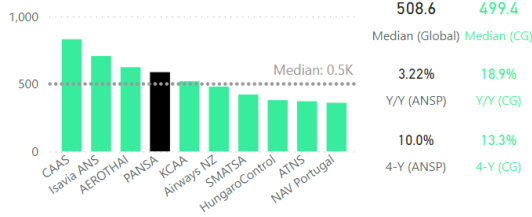


PANSA's total costs (USD) in 2022 increased by 40% during the year. ATCO costs increased by 100% and accounted for 38% of the total costs in 2022. IFR flight hours increased by 33.3% in 2022, however these remained 0.16M lower than 2019 levels. ATCO hours increased by 26.7% but remained below 2019 levels.

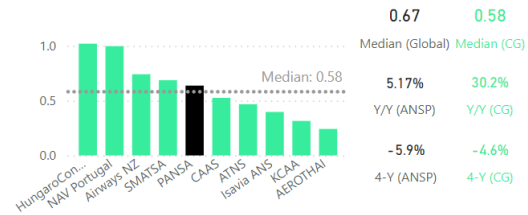
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours: AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSA, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



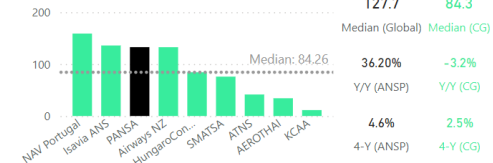
KPI 2B: ATCO in OPS hour productivity



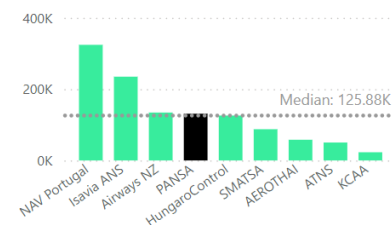
Comparing NAV Portugal with other ANSPs in Comparator Group 2, PANSA had a Total costs per IFR flight hour (586.64 USD) higher than CG median value of 499.4 USD. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of PANSA was higher than the CG's median at 0.64.

PANSA's ATCO in OPS cost per ATCO in OPS hour was 132.65 USD.

KPI 2A: ATCO in OPS cost per ATCO in OPS hour



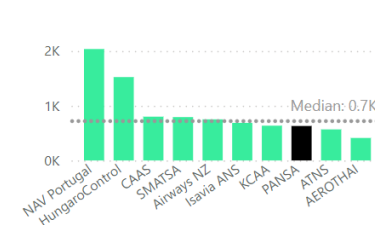
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS

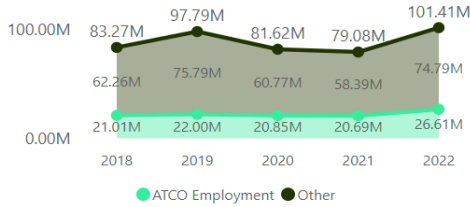


The Annual employment cost per ATCO in OPS for PANSA in 2022 was 131K USD, higher than the median for the CG. Annual working hours per ATCO in OPS for PANSA were the lowest of the CG at 987.95. PANSA's Annual IFR hours per ATCO in OPS were below the CG median value at 629.65.

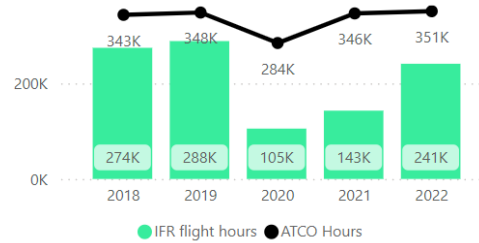


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

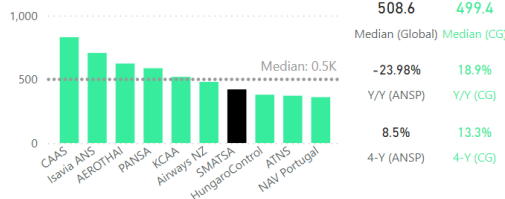


SMATSA's total costs in 2022 increased by 25% in comparison to 2021 figures, with ATCO employment costs accounting for 30% of total costs during 2021. Whilst IFR flight hours showed growth for SMATSA in 2022, increasing by 71.4%, this still remained 0.05M below 2019 levels. ATCO hours remained at the same level as the previous year exceeding the 2019 levels.

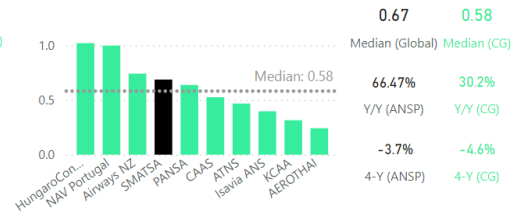
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours: AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSA, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



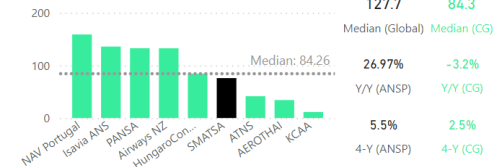
KPI 2B: ATCO in OPS hour productivity



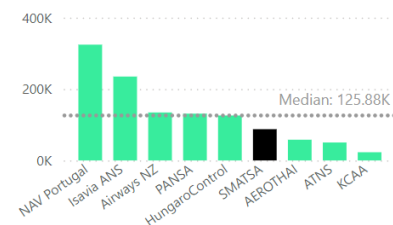
Comparing SMATSA with other ANSPs in Comparator Group 1, SMATSA had Total costs per IFR flight hours at 420.92 USD, under the CG median. For ATCO in OPS hour productivity, SMATSA was above the CG median at 0.69.

In ATCO in OPS cost per ATCO in OPS hour, SMATSA was at 75.86 USD.

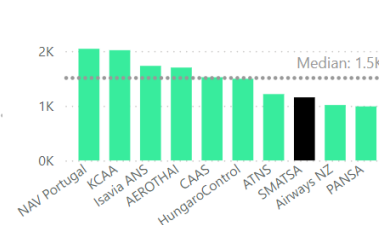
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



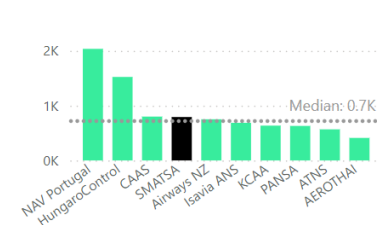
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Annual employment cost per ATCO in OPS for SMATSA was at 87.5K USD, below the CG's median. Annual working hours per ATCO in OPS were below the CG's median value at 1.1K. SMATSA was slightly above the CG's median for Annual IFR hours per ATCO in OPS, at 792.50 for 2022.

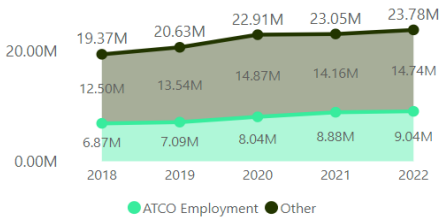


ANA, Luxembourg
Continental data

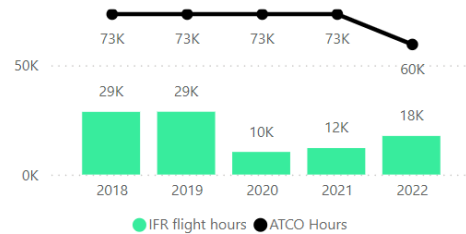


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

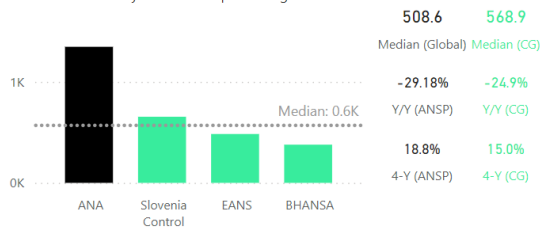


ANA's Total costs (USD) in 2022 increased by 3.1% compared to 2021 costs. IFR flight hours increased by 50% during 2022, remaining 11K below 2019 levels. ATCO hours decreased by 17.8% in 2022.

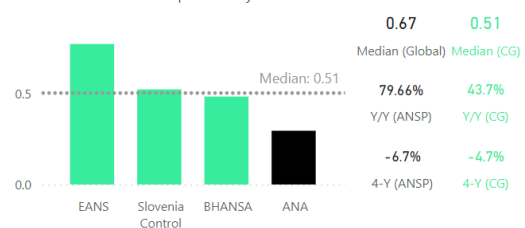
Performance in 2022 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, Slovenia Control, BHANSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



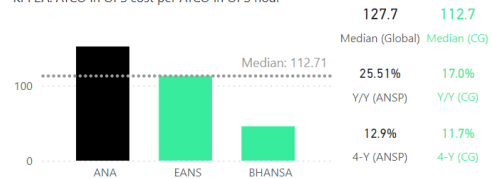
KPI 2B: ATCO in OPS hour productivity



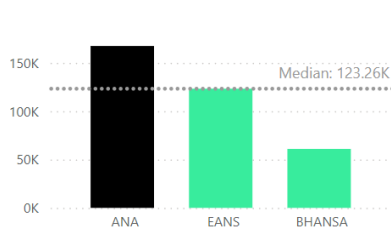
Comparing ANA with other ANSPs in Comparator Group 3, ANA's total cost per IFR flight hour, comparator group leader at 1346 USD. For ATCO in OPS hour productivity, ANA was last in the comparator group at 0.30.

For ATCO in OPS cost per ATCO in OPS hour, ANA was comparator group leader at 151.91 USD.

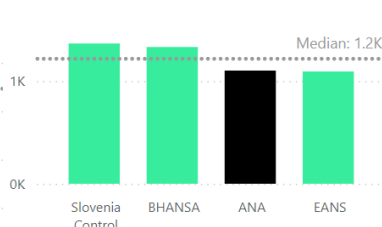
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



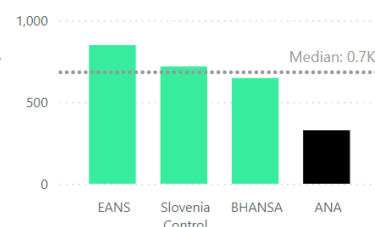
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



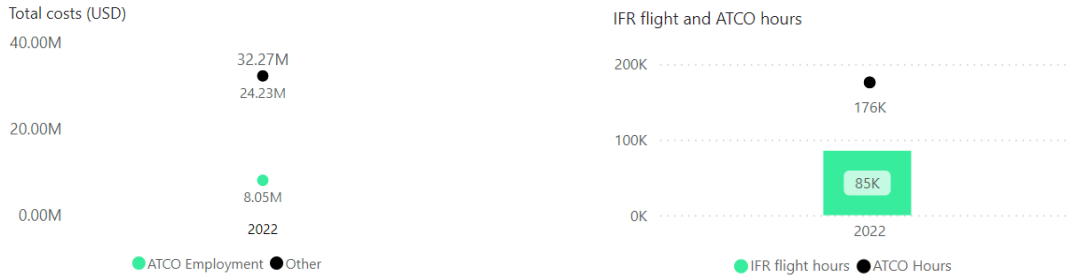
ANA's Annual employment cost per ATCO in OPS was 167K USD. Annual working hours per ATCO in OPS were 1.1K. Annual IFR hours per ATCO in OPS was at 0.3K.



BHANSA, Bosnia & Herzegovina
Continental data



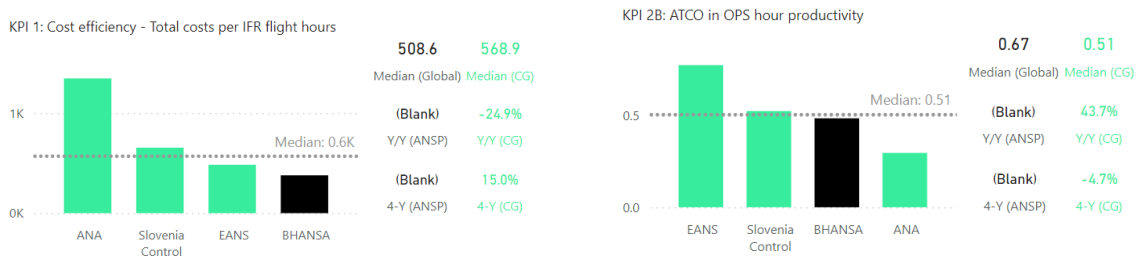
Statistics (2018-2022)



BHANSA’s Total costs (USD) in 2022 was 32.27M, they did not submit data for 2021. IFR flight hours was 0.09M during 2022, with no submissions for the previous years. ATCO hours was 0.18M in 2022.

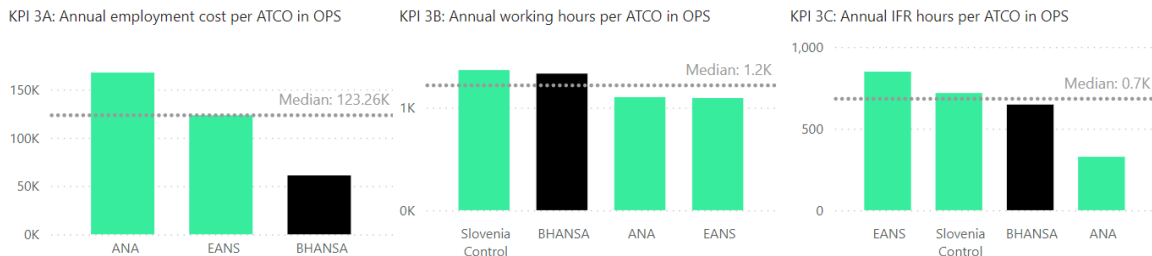
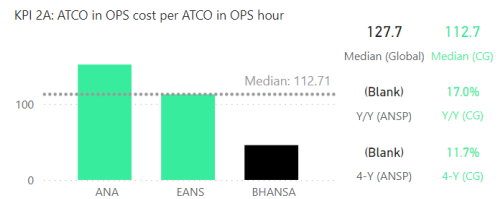
Performance in 2022 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, Slovenia Control, BHANSA)



Comparing BHANSA with other ANSPs in Comparator Group 3, BHANSA’s total cost per IFR flight hour was 378.08 USD, below the median cost of the CG. For ATCO in OPS hour productivity, BHANSA was the comparator group leader at 0.49.

For ATCO in OPS cost per ATCO in OPS hour, BHANSA was 45.79 USD.



BHANSA’s Annual employment cost per ATCO in OPS was 60K USD. Annual working hours per ATCO in OPS were 1.3K. Annual IFR hours per ATCO in OPS was at 0.64K.

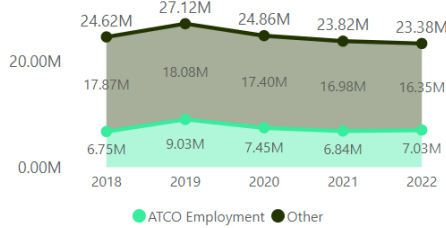


EANS, Estonia
Continental data



Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

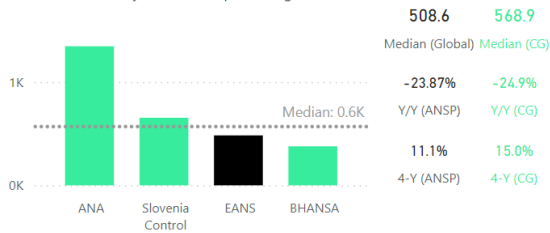


EANS's Total costs (USD) in 2022 increased by 1.8% compared to 2021 costs. IFR flight hours increased by 26.31% during 2022, remaining 1.3 million below 2019 levels. ATCO hours decreased by 6.06% in 2022.

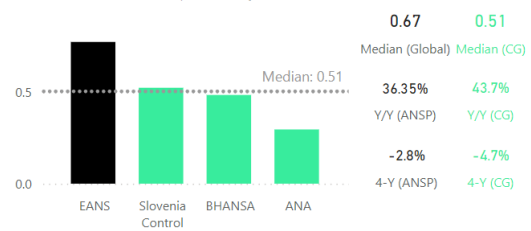
Performance in 2022 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, Slovenia Control, BHANSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours

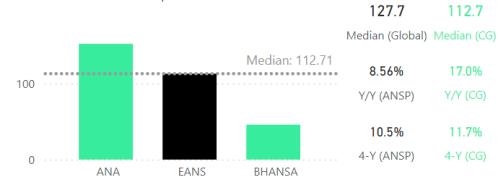


KPI 2B: ATCO in OPS hour productivity



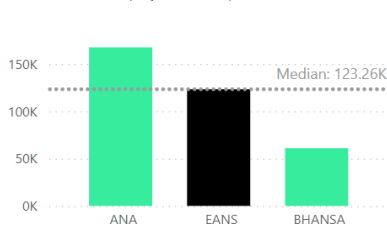
Comparing EANS with other ANSPs in Comparator Group 3, EANS's total cost per IFR flight hour was 483.46 USD, slightly below the median cost of the CG. For ATCO in OPS hour productivity, the EANS was the comparator group leader at 0.78.

KPI 2A: ATCO in OPS cost per ATCO in OPS hour

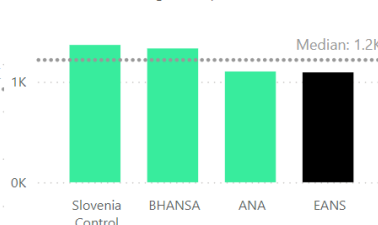


For ATCO in OPS cost per ATCO in OPS hour EANS was 112.71 USD, same as the median cost of the CG.

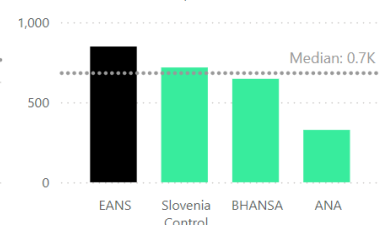
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



EANS's Annual employment cost per ATCO in OPS was 123K USD. Annual working hours per ATCO in OPS were 1K. Annual IFR hours per ATCO in OPS was at 0.84K.

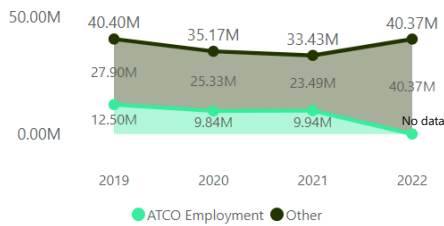


Slovenia Control, Slovenia
Continental data

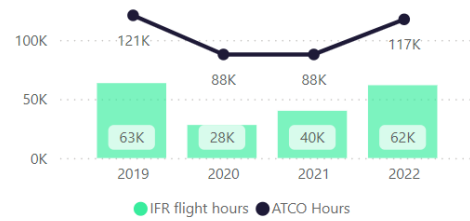


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

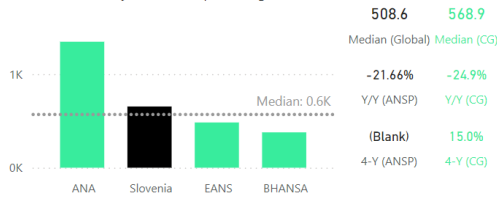


Slovenia Control's total costs (USD) in 2022 increased by 20.7% compared to 2021 (2021 submitted data included other costs and ATCO employment costs whereas 2022 contained only other costs) IFR flight hours increased by 55% just remained 1K below 2019 values. ATCO hours increased by 32.9% in 2022, trailing just 3.3% below the levels of 2019. As 2018 data is unavailable, the charts represent a four-year period starting from 2019.

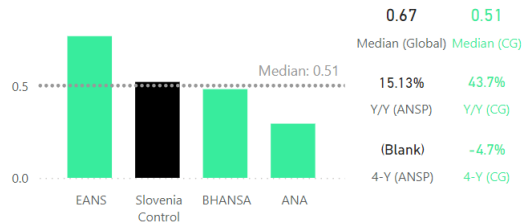
Performance in 2022 (key KPIs compared to CG)

Comparator Group 3 (< 100k IFR flight hours: ANA, EANS, Slovenia Control, BHANSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours

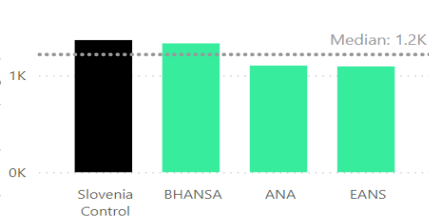


KPI 2B: ATCO in OPS hour productivity

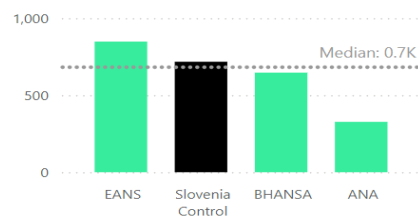


Comparing Slovenia Control with other ANSPs in Comparator Group 3, in terms of Total cost per IFR flight hour (654.27 USD), Slovenia Control was above the median value (568.9) calculated for the CG. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of Slovenia Control was at 0.53, higher than CG median value.

KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Annual working hours per ATCO in OPS were the highest in the CG at 1.3K. Annual IFR hours per ATCO in OPS reached 717.50 higher than CG median value.

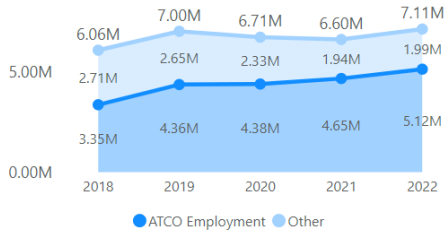


Airways NZ, New Zealand
Oceanic data

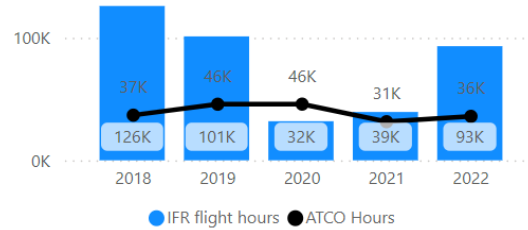


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

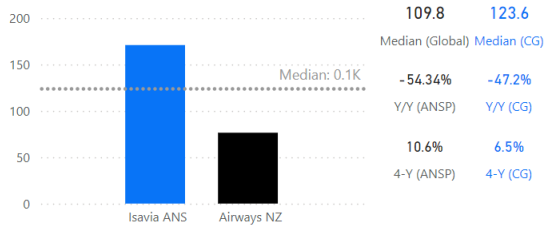


Total costs in USD during 2022 for Airways NZ increased by 7.7% compared to 2021. ATCO in OPS employment costs increased by 8.51% over the year to a peak over the reporting period. ATCO hours decreased by 20% when compared to 2021 levels. IFR flight hours increased by 125% in 2022 but remained 10% under 2019 levels.

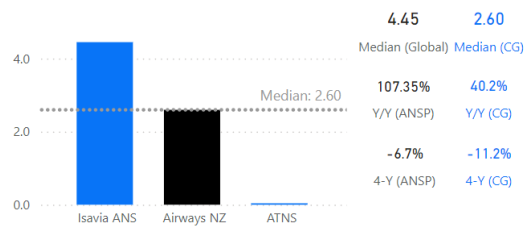
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours: AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSA, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



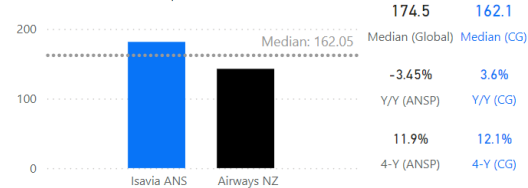
KPI 2B: ATCO in OPS hour productivity



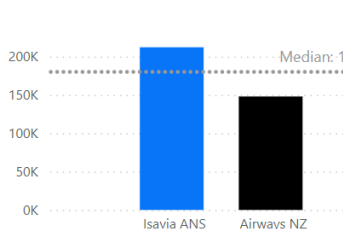
Comparing Airways NZ with other ANSPs in Comparator Group 2, Airways NZ had lower Total cost per IFR flight hour (76.4 USD). In ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours), Airways NZ was at the CG's median value of 2.60.

Airways NZ's ATCO in OPS cost per ATCO in OPS hour was 143 USD.

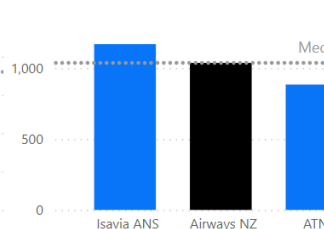
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



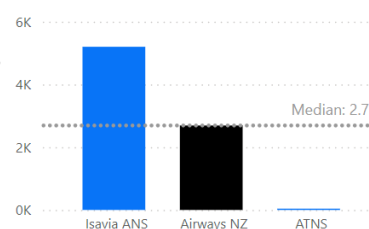
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Airways NZ held the lower value of 148K USD for Annual employment per ATCO in OPS. For Annual working hours per ATCO in OPS, Airways NZ had the value at 1K. Airways NZ was at the CG's median value in terms of Annual IFR hours per ATCO in OPS at 2.7K.

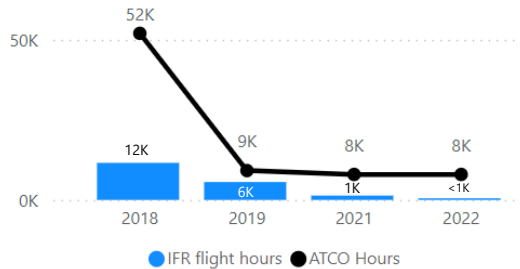


ATNS, South Africa
Oceanic data



Statistics (2018-2022)

IFR flight and ATCO hours

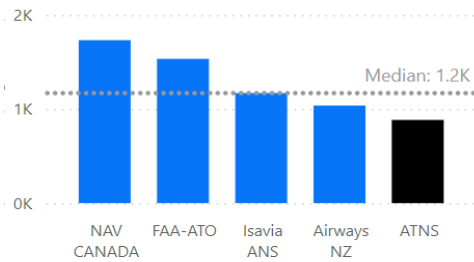


ATNS did not submit data for ATCO in OPS employment costs in 2022. IFR flight hours in 2022 decreased by 76.9% from 2021. ATCO hours remained at the same level as previous year.

Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours: AEROTHAI, Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSO, SMATSA)

KPI 3B: Annual working hours per ATCO in OPS

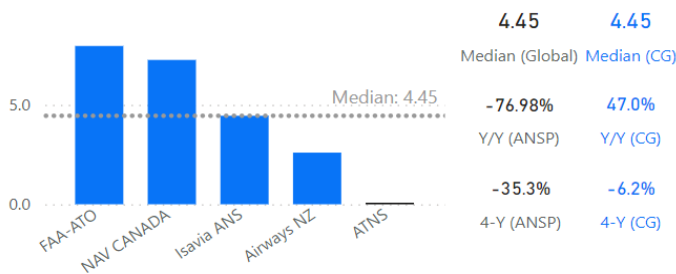


KPI 3C: Annual IFR hours per ATCO in OPS



For Annual working hours per ATCO in OPS, ATNS had the lowest value at 0.8K. Annual IFR hours per ATCO in OPS at 0.03K. KPI 3A could not be calculated due to insufficient data.

KPI 2B: ATCO in OPS hour productivity



For ATCO in OPS hour productivity, ATNS had the value at 0.04K. KPI 1 and KPI 2A could not be calculated due to insufficient data.

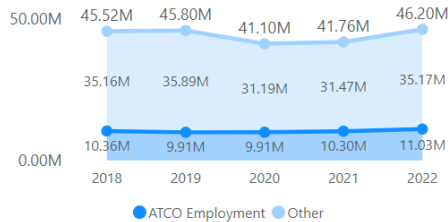


Isavia ANS, Iceland
Oceanic data

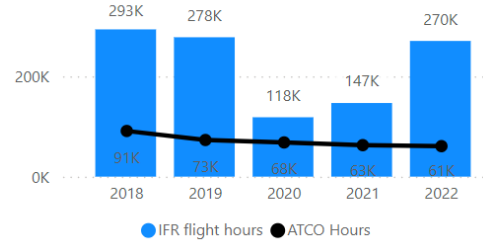


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

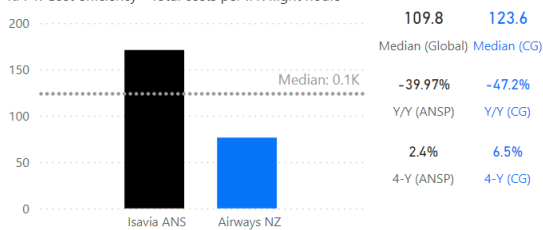


Total costs in USD during 2022 for Isavia ANS increased by 10.6% compared to 2021. ATCO in OPS employment costs increased by 10%. IFR flight hours increased by 80% from 2021 remaining only 0.01M below 2019 levels. ATCO hours remained at the same level as previous year.

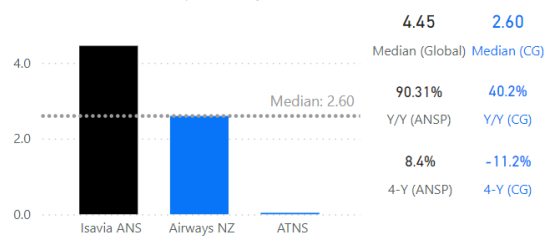
Performance in 2022 (key KPIs compared to CG)

Comparator Group 2 (100k - 1mil IFR flight hours: Airways NZ, ATNS, CAAS, HungaroControl, Isavia ANS, KCAA, NAV Portugal, PANSAs, SMATSA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



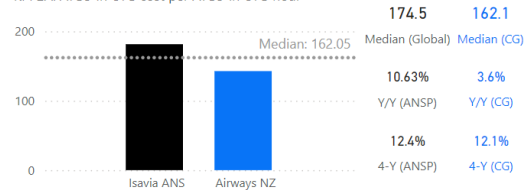
KPI 2B: ATCO in OPS hour productivity



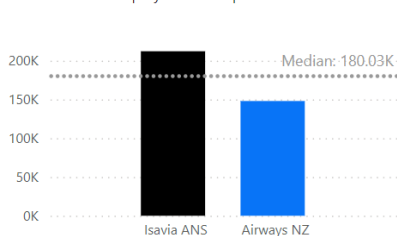
Comparing Isavia ANS with other ANSPs in Comparator Group 2, Isavia ANS had a higher Total cost per IFR flight hour (170.8 USD). ATCO in OPS hour productivity, Isavia ANS was at 4.45, higher than the CG median value.

Isavia ANS's ATCO in OPS cost per ATCO in OPS hour was 181 USD.

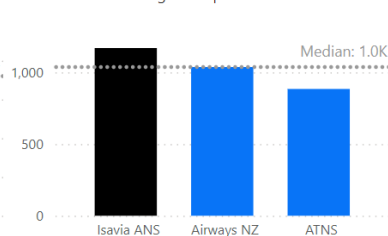
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



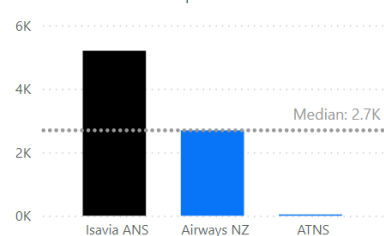
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Isavia ANS held the highest value of 212K USD for Annual employment per ATCO in OPS. For Annual working hours per ATCO in OPS, Isavia ANS had the largest value at 1.1K, Isavia ANS's median value in terms of Annual IFR hours per ATCO in OPS was higher than the CG's median value. Isavia ANS was above the CG's median value in terms of Annual IFR hours per ATCO in OPS at 5.2K.

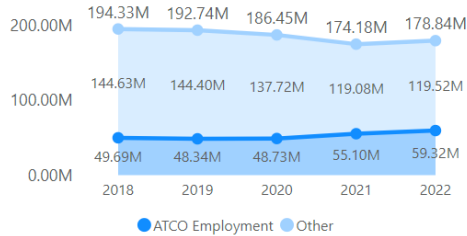


FAA-ATO, United States Oceanic data

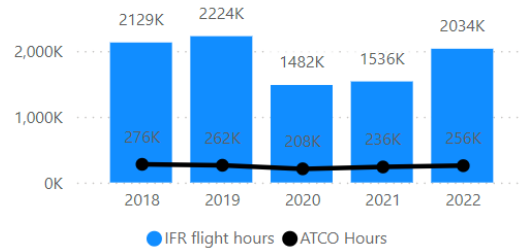


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

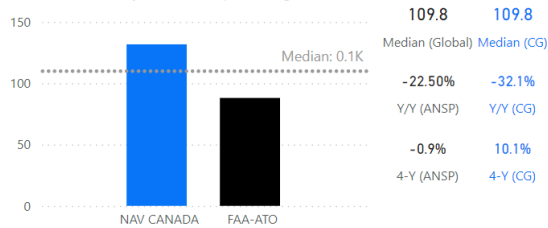


Total costs in USD during 2022 for FAA-ATO increased by 5.88% compared to 2021. ATCO in OPS employment costs remained consistent with 2021 levels. ATCO hours increased by 50% in 2022 compared to the previous year. IFR flight hours increased by 33.33% from 2021 remaining only 0.2M below 2019 levels.

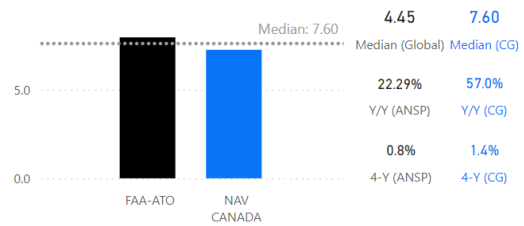
Performance in 2022 (key KPIs compared to CG)

Comparator Group 1 (>1mil IFR flight hours: DHMI, DSNA, ENAIRE, FAA-ATO, NAV CANADA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



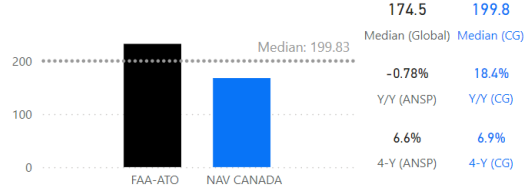
KPI 2B: ATCO in OPS hour productivity



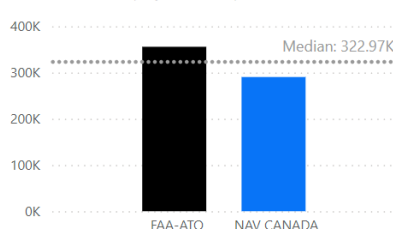
Comparing FAA-ATO with other ANSPs in Comparator Group 1, FAA-ATO had lower Total cost per IFR flight hour (87.9 USD). In ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours), FAA-ATO was above the CG's median value of 7.60.

FAA-ATO's ATCO in OPS cost per ATCO in OPS hour was 232 USD.

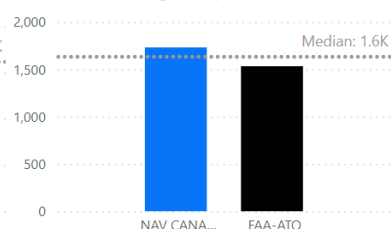
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



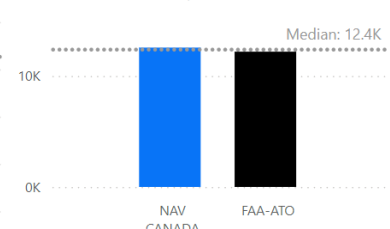
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



FAA-ATO held the highest value of 356K USD for Annual employment per ATCO in OPS. For Annual working hours per ATCO in OPS, FAA-ATO had the lowest value at 1.5K. FAA-ATO was below the CG's median value in terms of Annual IFR hours per ATCO in OPS at 12.2K.

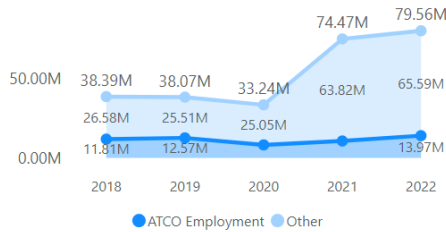


NAV CANADA, Canada
Oceanic data

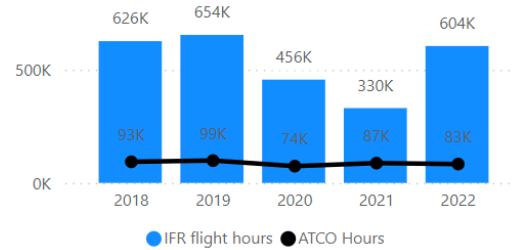


Statistics (2018-2022)

Total costs (USD)



IFR flight and ATCO hours

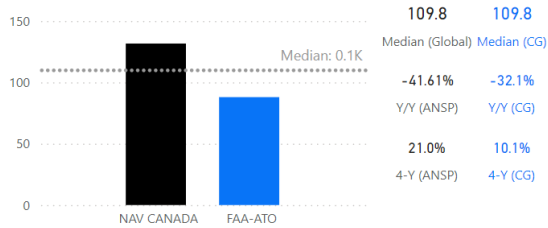


Total costs in USD during 2022 for NAV Canada increased by 6.8% compared to 2021. ATCO in OPS employment costs increased by 31.20% compared to the previous year. ATCO hours decreased slightly by 11.1% in 2022. IFR flight hours increased by 81.8% from 2021 remaining only 0.05M below 2019 levels.

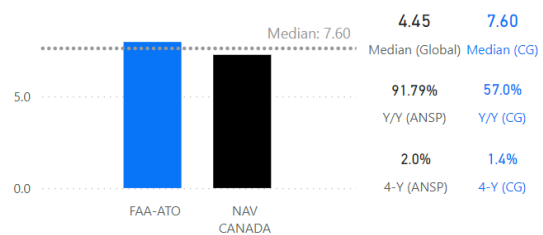
Performance in 2022 (key KPIs compared to CG)

Comparator Group 1 (>1mil IFR flight hours: DHMI, DSNA, ENAIRE, FAA-ATO, NAV CANADA)

KPI 1: Cost efficiency - Total costs per IFR flight hours



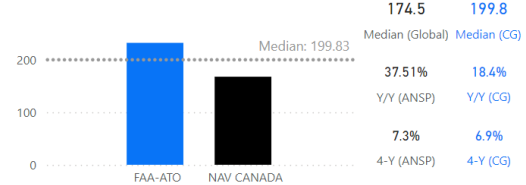
KPI 2B: ATCO in OPS hour productivity



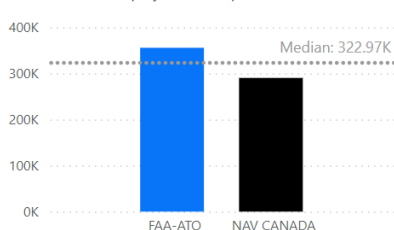
Comparing NAV Canada with other ANSPs in Comparator Group 1, NAV Canada had a higher Total cost per IFR flight hour (131.6 USD). In ATCO in OPS hour productivity, NAV Canada was at 7.25, slightly lower than the CG median value.

NAV Canada's ATCO in OPS cost per ATCO in OPS hour was 168 USD.

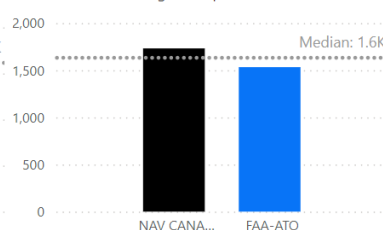
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



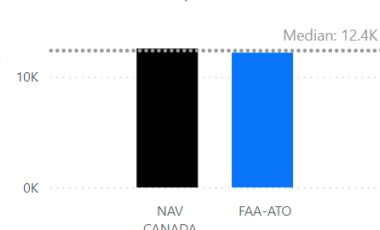
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



NAV Canada held the lower value of 290K USD for Annual employment per ATCO in OPS. For Annual working hours per ATCO in OPS, NAV Canada had the largest value at 1.7K. NAV Canada's median value in terms of Annual IFR hours per ATCO in OPS was higher than the CG median value. NAV Canada was above the CG's median value in terms of Annual IFR hours per ATCO in OPS at 12.6K.

Annex 1: Methodology

Measuring Performance

Cost efficiency and productivity are two key indicators of measuring the performance of air navigation service provision. They demonstrate how ANSPs are delivering value and serve as indicators of operational efficiency. These KPIs are all part of the *CANSO ANS Performance Framework*.

Cost Efficiency

Cost efficiency provides an indication of the balance between operational effectiveness (i.e. ATCO productivity) and the cost of providing the service.

The simplest indicator of cost efficiency is the **cost of providing ANS services per IFR flight hour**. A lower cost per flight hour, however, is not necessarily indicative of greater overall performance.

Economic differences outside of the control of ANSPs can drive differences in costs. This includes labour contracts, salary scales and working conditions (such as hours), as well as government regulations on pension management and mandatory financial controls. Furthermore, ANSPs do not control the volume of traffic, which is a function of economic activity and other air passenger demands. Where a minimum level of service is required, there is a limit to how activities can be scaled down in response to lower demand. This was particularly evident in 2022, the year considered in this report.

Cost indicators do not reflect external factors, other performance areas or the quality of service. Moreover, there are costs associated with providing a safer and more punctual, predictable, and efficient service, which can deliver savings to air operators flying in the airspace that offset higher ANSP costs.

Costs are broken down into ATCOs in OPS employment and other costs. Other costs include operating costs (excluding ATCO in OPS employment costs), depreciation/amortisation and costs of capital related to providing ATC/ATFM services. They do not include MET costs.

Productivity

The key indicator of ANS productivity is **IFR flight hours per ATCO in OPS hour**, often described as 'ATCO in OPS productivity'.

Although generally reflective of ANSPs' performance, factors beyond the control of the ANSP can cause low levels of productivity – for example a geopolitical event that alters traffic demand.

ATCO in OPS productivity is driven by traffic levels and an ANSP's ability to utilise its ATCOs in operations (OPS) resources. Although they cannot affect traffic demand, ANSPs may improve productivity by utilising flexible rostering and adapting airspace configuration to open and close sectors according to evolving traffic patterns.

Furthermore, advances in technology are now focusing more than ever on reducing the workload of ATCOs in OPS to enable them to safely manage higher levels of traffic in a given volume of airspace. Training associated with the introduction of technology, however, can lead to short-term reductions in productivity.

Airspace complexity also affects ATCO in OPS productivity. Lower airspace will typically have lower levels of ATCO in OPS productivity than upper airspace where aircraft are flying at more consistent altitudes and on non-crossing routes. Therefore, an ANSP operating a high proportion of sectors in lower airspace, or with numerous busy airports with complex approach sectors, is likely to have lower ATCO in OPS productivity than an ANSP with more overflights at higher altitude.

Data Processing

Data collection: ANSPs who are members of the CANSO GBWG provided data for this analysis. ANSPs either submit the minimum dataset required for participation in the report (the basic data), or additional data to inform the analysis of advanced KPIs (*the advanced data*).

ANSPs can also revise data submitted in previous years. The data submission workbook includes validation calculations that ANSPs are encouraged to consult in the data collection phase.

The entire dataset is available to all participating ANSPs to enable closer analysis and evaluation of performance trends. The advanced KPI dataset is only available to ANSPs submitting advanced data.

Data Processing (continued)

To extend the spectrum of provided ANSPs' performance data and ensure the validity of any trend analysis, EUROCONTROL has kindly provided 2022 performance data for European ANSPs, alongside data for the years 2018-2021 to facilitate historical trend analysis. European ANSP members of the CANSO GBWG who also submit data to EUROCONTROL have their CANSO data used in this analysis, unless otherwise agreed.

It should be noted that Indicator 2B 'ATCO productivity' is not directly comparable to the ATCO productivity KPI used in the ACE report. This is because the CANSO ANS Performance Framework uses IFR flight hours to calculate this KPI, rather than composite flight hours as used in the ACE report ATCO productivity KPI.

Finally, as part of the data sharing agreement with EUROCONTROL, CANSO data is only available to the core EUROCONTROL analysts and is not shared with the wider ACE report ANSP community.

Data Dashboard: As part of the CANSO 2018-2022 data collection cycle, a PowerBi dashboard was produced in November 2023, which allowed CANSO members a first look at trends in their data. This dashboard and accompanying underlying data document provided members the opportunity to thoroughly review and validate their data submission and notify Egis of any amendments if necessary.

The Data Dashboard additionally offers a more credible comparison of performance between participating ANSPs by dividing them into three comparator groups (CGs) based on the number of IFR hours managed, ensuring that the varying scales of their operations are taken into account.

Data processing: Data has been processed by Egis subject to a data processing agreement with CANSO and in accordance with European data privacy laws. It was subject to a one-step quality check for significant changes, potential errors or omissions and is subject to continued revision by participating ANSPs.

Separation of continental and oceanic data:

Information is provided both for continental and oceanic air navigation services, where applicable. Each of these environments has different challenges associated with providing ANS. For example, it is more straightforward to provide ground infrastructure for communications and surveillance services in continental airspace than it is over oceans.

Exchange rate conversion: ANSPs submit data in their chosen currency. For KPI comparison, data is presented in USD. 2022 KPI data is converted using exchange rates gathered from organisation World Bank.

For ANSPs that operate in a currency other than the USD, the assumption of lower cost may be caused in part by the strengthening USD. The change in the relative value of the dollar effectively lowers the price that ANSPs incur in USD.

Growth rates: Data is presented for 2022 and then for the one-year and four-year trends. The trend over four years is calculated as the compound annual growth rate (4 yr. CAGR). This shows the overall trend between 2018 and 2022 but masks the fluctuations that may have taken place over the intervening years. In addition, if 2018 was an outlier, this trend may not be representative of the trend over this timeframe. Individual ANSP results for 4 Year CAGR should therefore be interpreted alongside contextual information.

The trend analysis is presented above the 2022 KPI data and is based on the data submitted in the ANSP's chosen currency.

Inflation: The growth rates are not adjusted for inflation, and local inflation rates should therefore be considered when interpreting CAGR trends.

PPP correction: Salaries and the cost of living vary extensively around the world. One way to correct for this is by using purchasing power parity (PPP). Employment costs for ATCOs in OPS are corrected using World Bank data. There are, of course, limitations to this approach, as the cost of living can vary widely within a country and may be higher or lower in the region where ANS offices are located.

Median: The median is the middle number of the data set.

Q1 and Q3: The first quartile (Q1) is defined as the middle number between the smallest number and the median of the data set. The third quartile (Q3) is the middle value between the median and the highest value of the data set.

Annex 2: Data Definitions

Contextual Data Element Definitions

Data Element	Definitions
IFR hours per sq. km	This is the result of dividing the number of IFR flight hours for the current year of data by surface area (in square kilometres).
Sq. km – oceanic and continental	The size (the surface area) of the airspace for which an ANSP is 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 item 3 below. (Source: PRU D1).
Percentage surveillance coverage at 30,000ft - Primary radar	Surveillance coverage from primary radar.
Percentage surveillance coverage at 30,000ft - secondary radar	Surveillance coverage from secondary radar.
Percentage surveillance coverage at 30,000ft - ADS-B	Surveillance coverage from ADS-B.
Percentage surveillance coverage at 30,000ft - Space based ADS-B	Surveillance coverage from space-based ADS-B.
Number of FIRs	A Flight Information Region is airspace of defined dimensions within which flight information service and alerting service are provided.
Number of ACC facilities	ACC facilities are the ATC units providing ATC services to en-route traffic in control areas under its jurisdiction. Part of an ACC may also provide approach services.
Number of co-located ACC and approach facilities	An ACC unit is described above. An approach control unit is an ATC unit providing ATC services to arriving, departing and over-flying flights within the airspace in the vicinity of an airport.
Number of stand-alone approach facilities	Definition of an approach control unit is above.
Number of co-located approach and tower facilities	Definition of an approach control unit is above. Tower facilities, or a tower control unit, is an ATC unit at an airport responsible for the provision of ATC services in respect of flights that are landing and taking off and other traffic that is on the active runway(s).
Number of co-located approach, tower, and ACC facilities	For definitions see above.
Number of stand-alone towers	Definition of a tower control unit is above.

Input Data Definitions

Data Element	Definitions
Total costs	The sum of operating costs, depreciation/amortisation and cost of capital related to providing continental and oceanic ATC/ATFM services. Meteorological costs and EUROCONTROL costs (if applicable) are not included.
Total employment cost for ATCOs in operations	Total employment costs (staff 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 employee (unless included within employment costs), mission related expenditures, including travel expenditures and training fees, as these should be considered operating costs.
Other costs	Total operating costs minus ATCO in operation employment costs.
IFR flight hours	Total number of controlled IFR flight hours in continental and oceanic airspace.
ATCO in operation hours	Total annual working hours for ATCOs in operations – including breaks and overtime. Holiday is not included. Calculated as average annual working hours for ATCO in operations times the number of total number of ATCOs in operations.
Number of ATCOs in operations (expressed in FTE)	<p>The number (expressed in FTE) of 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, but do not include participating in special projects, teaching at a training academy, or providing instruction in a simulator. Includes first-line supervisors. Does not include on-the-job training. An ATCO in operations should hold a valid ATCO license.</p> <p>The number (expressed in FTE) should be calculated as an average based on the FTE number at the start of the year and the FTE number at the end of the year.</p> <p>Definition of Full Time Equivalent (FTE) (Source: EUROCONTROL Specification for Information Disclosure – Version 2, October 2001): The equivalent of a single person carrying out a particular job or activity working on a full-time basis during a year. A part time ATCO working half the hours of a normal ATCO, should be counted as a 0.5FTE. A full time ATCO working two thirds of his time on duty in OPS and one third of his time on teaching at a training academy would be counted as a 0.67 FTE ATCO in OPS and a 0.33 FTE ATCO on other duties.</p>
Number of Frontline Service Support Staff (expressed in FTE)	Sum of ATC assistants, ops support, OPS support (non-ATCOs), technical support staff for operational maintenance monitoring and control, technical support staff for planning and development, ATCOs on other duties, and outsourced frontline service support.

Trial Operational Performance KPIs

Data Element	Definitions
KPI 1: Actual en-route extension vs. planned route (KEA/KEP)	<p>Definition: Actual en-route distance flown compared to planned route. Might be split in actual vs GCD and planned vs GCD.</p> <p>Measured in: The % excess distance or NM.</p> <p>Data requirements for each actual flight trajectory: Departure and Destination airport; Entry and Exit points in the 'Measured Areas' (for which the KPI is computed, e.g. a State); Entry and Exit point in the 'Reference Area' (defined as a (sub)regional boundary considered, containing all 'Measured areas', e.g. States within the same ICAO Region); Distance flown / actual flight trajectory, derived from surveillance data (radar, ADS-B...).</p> <p>Measurement: From the departure airport 40 NM ring to 40 NM ring around the arrival airport.</p> <p>Alternative metric(s): PRU's Horizontal en-route flight inefficiency in actual flown trajectories (KEA); CANSO's En-Route Direct Route Extension KPI.</p>
KPI 2: Additional time in terminal airspace	<p>Definition: as per ICAO KPI 08: Actual terminal airspace transit time compared to an unimpeded time.</p> <p>Measured in: Minutes/flight (or NM per flight if not possible in min) and provided as yearly average.</p> <p>Required data: Terminal airspace entry time, computed from surveillance data (radar, ADS-B...) and Actual landing time (ALDT) for each arriving flight.</p> <p>Measurement: Provide name of airport(s) and number of movements – report for airports above 80k movements, but up to a maximum of the top 5 airports.</p> <p>Alternative metric(s): PRUs' Additional Arrival Sequencing and Metering Area (ASMA) Time; CANSO's Arrival Flight Distance/Time Efficiency KPI.</p>
KPI 3: Additional taxi-out time	<p>Definition: as per ICAO KPI 02: Actual taxi-out time compared to an unimpeded/reference taxi-out time.</p> <p>Measured in: Minutes/flight and provided as yearly average.</p> <p>Required data: Actual off-block time (AOBT) and Actual take-off time (ATOT) for each departing flight.</p> <p>Measurement: Provide name of airport(s) and number of movements – report for airports above 80k movements, but up to a maximum of the top 5 airports</p> <p>Alternative metric(s): PRU's Additional Taxi-out Time; CANSO's Taxi-out Delay KPI.</p>

Annex 3: Key Performance Indicators

The detailed metrics for determining the cost efficiency and productivity of continental and oceanic air navigation services are set out in Figure 35. These performance indicators are derived from the *CANSO ANS Performance Framework*.

Determining Performance Metrics

The *CANSO ANS Performance Framework* was established to create common performance indicators for global ANS data. Based on a tiered structure, the framework was developed in 2014 by the CANSO Global Benchmarking Workgroup (GBWG). It aims to demonstrate the drivers of cost efficiency.

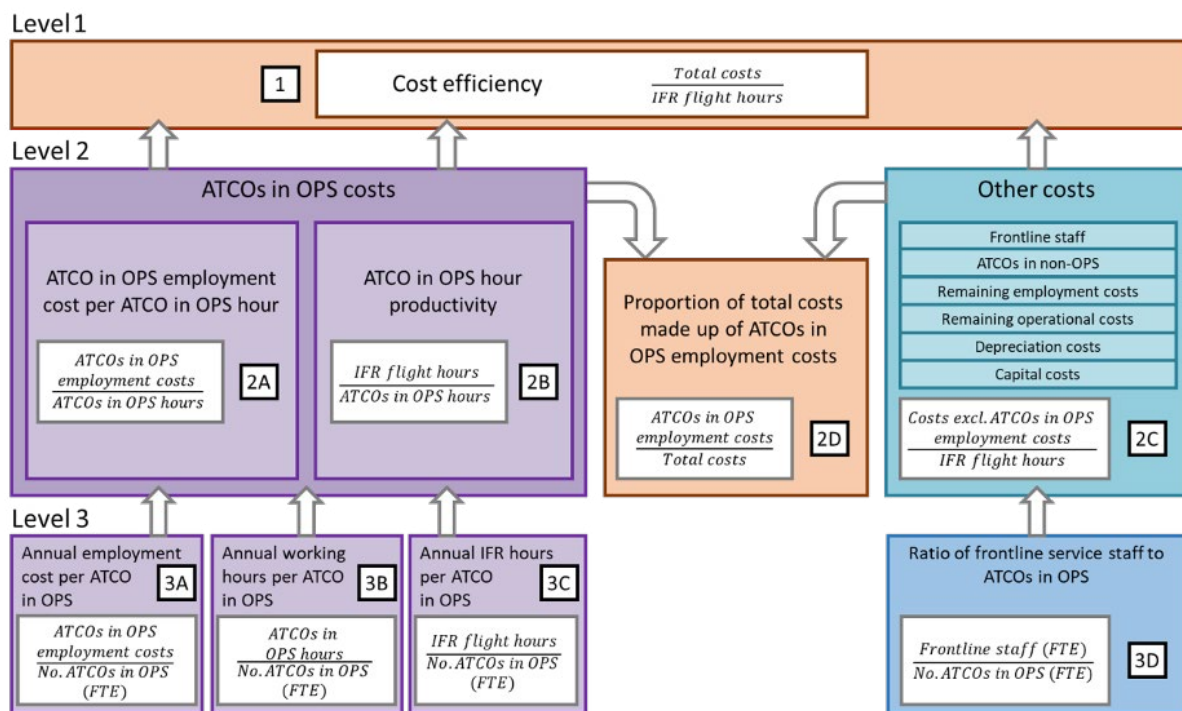


Figure 35 - CANSO ANS Performance Framework

Over the years, the GBWG has worked to identify alternative KPIs to investigate the drivers of the KPIs in the framework, in particular KPI 2C. In 2020, KPI 3D was added to the framework to better understand the proportion of ‘frontline service support staff’ to ATCO in OPS in an ANSP.

It is important to note the dependence of the higher tier metrics on the lower tier. This can be established as follows:

$$\text{KPI 1} = \frac{\text{KPI 2A}}{\text{KPI 2B}} + \text{KPI 2C}$$

$$\text{KPI 2A} = \frac{\text{KPI 3A}}{\text{KPI 3B}}$$

$$\text{KPI 2B} = \frac{\text{KPI 3C}}{\text{KPI 3B}}$$

$$\text{KPI 2D} = \frac{\left(\frac{\text{KPI 2A}}{\text{KPI 2B}}\right)}{\text{KPI 1}} = \frac{\text{KPI 1} - \text{KPI 2C}}{\text{KPI 1}}$$

Overview of Average Performance

The average performance for all the CANSO Key Performance Indicators (KPIs), when comparing 2021 and 2022 ANSP continental (C) and oceanic (O) data, are detailed in the summary table below.

KPI	Continental/ Oceanic	2021 Average	2022 Average	Year-on-Year Change	
Continental and Oceanic Cost Efficiency and Productivity Performance Indicators					
1	Cost per IFR flight hour	C	USD 880	USD 681	-22.65%
		O	USD 198	USD 117	-40.97%
2A	ATCO in OPS employment cost per ATCO in OPS hour	C	USD 107	USD 113	5.49%
		O	USD 152	USD 181	18.78%
2B	ATCO in OPS hour productivity	C	0.49	0.64	31.77%
		O	2.72	4.46	63.70%
2C	Cost excluding ATCOs in OPS employment costs per IFR flight hours	C	USD 626	USD 493	-21.19%
		O	USD 134	USD 80	-40.36%
2D	Employment costs of ATCOs in OPS as a percentage of Total costs	C	30%	29%	-0.92%
		O	33%	37%	10.41%
3A	Annual employment cost per ATCO in OPS	C	USD 136,884	USD 155,071	13.29%
		O	USD 210,993	USD 251,498	19.20%
3B	Annual Working hours per ATCO in OPS	C	1,328	1,417	6.72%
		O	1,318	1,271	-3.60%
3C	Annual IFR hours per ATCO in OPS	C	635	901	41.77%
		O	3,933	6,536	66.18%
3D	Ratio of frontline service staff to ATCO in OPS	C	1.19	1.09	-8.69%
		O	0.85	0.91	6.73%
Joint Continental and Oceanic Cost Efficiency Performance Indicators					
CO1	Cost per IFR flight hour	C + O	USD 877	USD 665	-24.17%
CO2D	Employment costs of ATCOs in OPS as a percentage of Total costs	C + O	29%	29%	-1.10%

Table 5 - Average performance for all KPIs in 2021 and 2022

Annex 4: Contextual Data

Please note contextual data is only included for CANSO GBWG submitters.

ANSP: AEROTHAI

Does your ANSP have stated objectives? If so, what are they?	We have 10 strategic objectives supporting our vision of “a sustainable quality excellent air navigation service provider.”
In your opinion what are the main drivers or issues for performance within your region?	Traffic reduction due to COVID-19 pandemic and states regulation due to COVID-19.
What are the main initiatives you are undertaking to improve your performance?	Cost reduction.
Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic	In 2022, air traffic volume in Thailand started to resume due to the Thai government's relaxation of travel restrictions in the second half of 2022. The change in policy urged travellers to travel by air transport which caused an increase in both domestic and international flights.

Legal status: A company established as a public-private partnership that remains part-owned by the government and provides services on behalf of the government.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	777,760	0	
Percentage surveillance coverage at 30,000ft - primary radar	5%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	0%	0%	
Number of FIRs	1	0	
Facilities			
Number of ACC facilities	1	0	
Number of co-located ACC and approach facilities	0	0	
Number of stand-alone approach facilities	1	0	
Number of co-located approach and tower facilities	6	0	
Number of stand-alone towers	14	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: Airways New Zealand (NZ)

Does your ANSP have stated objectives? If so, what are they?	Safety. Creating flexible and responsive operations. Focus on sustainability. Implementing new ATM platform. Integrated reporting. Focus on core services (ATS).
In your opinion what are the main drivers or issues for performance within your region?	“Responsiveness to customer demand especially with fluctuation in traffic levels as COVID-19 impacts recovery. Greater focus on sustainability from and for our customers.”
What are the main initiatives you are undertaking to improve your performance?	Re-invigorated the projects on hold during COVID-19 which included a new ATM platform and preparing to move into new operational buildings. Electronic flight strips into all towers.. Reviewing digital tower operations. Airspace optimisation review.
Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic	Faster than predicted recovery from COVID-19 traffic levels, particularly Continental. Oceanic recovery building but slightly slower than Continental. New pricing model came into effect this FY.

Legal status: A corporatised entity wholly owned by the government with special status (not governed by normal commercial law but by a specific founding law or statute).

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	863,100	28,790,000	
Percentage surveillance coverage at 30,000ft - primary radar	23%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	94%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	100%	5%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	95%	100%	
Number of FIRs	1	0	
Facilities			
Number of ACC facilities	0	1	
Number of co-located ACC and approach facilities	1	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	6	0	
Number of stand-alone towers	11	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: Administration de la navigation aérienne (ANA)

Does your ANSP have stated objectives? If so, what are they?

Yes, ST01: Provide En-route and terminal ANS.

In your opinion what are the main drivers or issues for performance within your region?

In 2020, the pandemic crises led to a significant drop in traffic which means a loss of income of -41 per cent. However, in 2021 the TNSUs increased again by 13 per cent compared to 2020 actual TNSUs, while the En route service units increased by 8 per cent. This is also reflected by the higher income which increased by 13,7 per cent compared to 2021. In 2022, the TNSUs increased again by 19,2 per cent compared to 2021.

What are the main initiatives you are undertaking to improve your performance?

We are conducting studies to reduce the separation minima in the approach sector and to reduce the RWY separation for TWR. We are also conducting a cost benefit analysis to reduce costs where we can by reducing or delay projects.

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic

Traffic increased again in 2022 which is also reflected by the higher income compared to 2021.

Legal status: A government department or authority that is subject to government accounting and treasury rules, and staff are employed under civil service pay and conditions.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	4000	0	
Percentage surveillance coverage at 30,000ft - primary radar	0%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	0%	0%	
Number of FIRs	1	0	
Facilities			
Number of ACC facilities	0	0	
Number of co-located ACC and approach facilities	0	0	
Number of stand-alone approach facilities	1	0	
Number of co-located approach and tower facilities	1	0	
Number of stand-alone towers	0	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: Air Traffic and Navigation Services, South Africa (ATNS)

Does your ANSP have stated objectives? If so, what are they?

Yes, efficiency and safety targets against the number of movements.

In your opinion what are the main drivers or issues for performance within your region?

- The adoption of new technologies can significantly enhance efficiency, safety, and capacity. However, integrating these technologies can be challenging due to high costs, technical complexities, and the need for staff training.
- Maintaining and improving safety standards is paramount. This includes managing air traffic, preventing collisions, and ensuring all operational aspects meet stringent safety criteria.
- Increasing air traffic can strain existing systems, necessitating more efficient airspace management and possibly infrastructure expansion to handle the volume without compromising safety or efficiency.
- Having skilled personnel is crucial. Challenges include recruiting, retaining, and continuously training staff to keep up with technological advancements and regulatory changes.
- Economic conditions affect airline operations, impacting the volume of air traffic and, consequently, the workload and financial health of ANSPs. Economic downturns or upswings can lead to significant fluctuations.
- Addressing noise, emissions, and other environmental impacts is increasingly important. Implementing environmentally friendly practices can be challenging but is becoming a priority.
- Operational Efficiency or constraints.

What are the main initiatives you are undertaking to improve your performance?

- Infrastructure updates.
- Increased investment in ATCO training and development.
- Operational Efficiency Programme.
- Customer Service Enhancements.
- Research and innovation.

ANSP: Air Traffic and Navigation Services, South Africa (ATNS) (continued)

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic

The tail end of the COVID-19 pandemic had a profound impact on air travel, with fluctuating demand, travel restrictions, and varying rates of recovery in our regions affecting air traffic volumes and, consequently, our operations and revenues.

The pace of economic recovery would have influenced air travel demand, affecting the volume of air traffic managed by ATNS and its financial performance.

Staffing challenges, including the need for recruitment, training, or retention of skilled personnel, especially in the context of the pandemic's impact on the workforce, has influenced operational effectiveness.

The recovery of air travel demand was likely uneven, with significant fluctuations, affecting the predictability of traffic volumes and, thus, the planning and resource allocation for ATNS.

Legal status: A government entity empowered to manage and use the revenues it generates through charges for the services it provides.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	9,279,080	12,720,920	
Percentage surveillance coverage at 30,000ft - primary radar	92%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	98%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	95%	
Percentage surveillance coverage at 30,000ft - ADS-C	2	1	
Number of FIRs	0	0	
Facilities			
Number of ACC facilities	0	0	
Number of co-located ACC and approach facilities	0	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	9	0	
Number of stand-alone towers	8	0	
Number of co-located ACC, approach, and tower facilities	2	0	

ANSP: Bosnia and Herzegovina (BHANSA)

Does your ANSP have stated objectives? If so, what are they?

BHANSA's mission is to enable safe, efficient, and expeditious air traffic operations in all phases of flight, by managing air traffic and providing services tailored to the requirements of airspace users.

The vision represents the path that BHANSA intends to follow in the future. BHANSA's vision is to enhance the levels of its services through collaboration and an active role in the Central European Functional Airspace Block (FAB CE) and by working on the harmonization and standardization of methods and procedures in air traffic management within the Single European Sky (SES) project.

In your opinion what are the main drivers or issues for performance within your region?

Air Traffic Growth, Weather - particularly storms and fog.

What are the main initiatives you are undertaking to improve your performance?

We have prepared Capacity Development Plan for BHACC (Bosnia and Herzegovina Area Control Centre) for the Period 2023 - 2025 that includes airspace changes, infrastructure changes including upgrade of Data Processing System, introduction of CPDLC and Traffic complexity tool, employment of new ATCOs, training and improvement of ATFM procedures.

Legal status: A government entity empowered to manage and use the revenues it generates through charges for the services it provides.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	38,900		
Percentage surveillance coverage at 30,000ft - primary radar			
Percentage surveillance coverage at 30,000ft - secondary radar	100%		
Percentage surveillance coverage at 30,000ft - ADS-B			
Percentage surveillance coverage at 30,000ft - Space based ADS-B			
Percentage surveillance coverage at 30,000ft - ADS-C			
Number of FIRs			
Facilities			
Number of ACC facilities			
Number of co-located ACC and approach facilities	0		
Number of stand-alone approach facilities	0		
Number of co-located approach and tower facilities	4		
Number of stand-alone towers	0		
Number of co-located ACC, approach, and tower facilities	0		

ANSP: Civil Aviation Authority of Singapore (CAAS)

<p>Does your ANSP have stated objectives? If so, what are they?</p>	<p>CAAS' mission is to grow a safe, vibrant air hub and civil aviation system, making a key contribution to Singapore's success. CAAS does so via six areas of focus, namely:</p> <ul style="list-style-type: none"> • Growing Singapore as a Global Air Hub • Ensuring Safe and Efficient Air Traffic Flows Upholding a Safe Aviation Environment • Developing the Industry • Contributing to International Aviation • Contingency Planning & Crisis Management
<p>In your opinion what are the main drivers or issues for performance within your region?</p>	<p>There is a need to strengthen our resilience while making continuous improvements to build a safe, efficient and sustainable air hub amid anticipated traffic growth beyond the pre-pandemic level.</p>
<p>What are the main initiatives you are undertaking to improve your performance?</p>	<ul style="list-style-type: none"> • ATM modernisation to handle future traffic growth and improve safety and efficiency. • Develop the Sustainable Air Hub Blueprint to identify practical and tangible pathways to build a sustainable air hub.
<p>Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic</p>	<p>Continued traffic recovery led to improved cost-effectiveness and ATCO productivity in FY22.</p>

Legal status: A government entity empowered to manage and use the revenues it generates through charges for the services it provides.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	840,000	0	
Percentage surveillance coverage at 30,000ft - primary radar	35%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	35%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	95%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	100%	0	
Number of FIRs	1		

Contextual data element	Continental	Oceanic	Comments
Facilities			
Number of ACC facilities	1	0	
Number of co-located ACC and approach facilities	0	0	
Number of stand-alone approach facilities	1	0	
Number of co-located approach and tower facilities	0	0	
Number of stand-alone towers	3	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: Lennuliiklusteeninduse Aktsiaselts (EANS)

Does your ANSP have stated objectives? If so, what are they?

In your opinion what are the main drivers or issues for performance within your region?

What are the main initiatives you are undertaking to improve your performance?

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic

Legal status: A corporatised entity wholly owned by the government, governed by normal commercial law.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	77,400	0	
Percentage surveillance coverage at 30,000ft - primary radar	0%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	100%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	1	0%	
Number of FIRs	1	0	
Facilities			
Number of ACC facilities	1	0	
Number of co-located ACC and approach facilities	1	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	1	0	
Number of stand-alone towers	0	0	
Number of co-located ACC, approach, and tower facilities	2	0	

ANSP: Kenya Civil Aviation Authority (KCAA)

Does your ANSP have stated objectives? If so, what are they? Enhanced capacity, efficiency, safety and security of air navigation.

In your opinion what are the main drivers or issues for performance within your region?

- Timely project implementation
- Strong revenue base
- Qualified, competent, and productive staff
- Internationally recognized accreditations and approvals by relevant regulatory and certification bodies

What are the main initiatives you are undertaking to improve your performance? System Automation and aligning CANS/ATM System Implementation to KCAA Airspace Masterplan and the ICAO ASBU Blocks.

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic Government Budget Rationalization.

Legal status: A government entity empowered to manage and use the revenues it generates through charges for the services it provides.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	77,052	0	
Percentage surveillance coverage at 30,000ft - primary radar	40%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	100%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	100%	0	
Number of FIRs			
Facilities			
Number of ACC facilities	1	0	
Number of co-located ACC and approach facilities	1	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	3	0	
Number of stand-alone towers	5	0	
Number of co-located ACC, approach, and tower facilities	1	0	

ANSP: Direction des Services de la navigation aérienne (DSNA)

Does your ANSP have stated objectives? If so, what are they?

Objectives provided in the Performance Plan as stated in the EU regulation 2019/317.

In your opinion what are the main drivers or issues for performance within your region?

What are the main initiatives you are undertaking to improve your performance?

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic

Legal status: A government entity empowered to manage and use the revenues it generates through for the services it provides.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	1,010,000	15,437,214	
Percentage surveillance coverage at 30,000ft - primary radar			
Percentage surveillance coverage at 30,000ft - secondary radar			
Percentage surveillance coverage at 30,000ft - ADS-B			
Percentage surveillance coverage at 30,000ft - Space based ADS-B			
Percentage surveillance coverage at 30,000ft - ADS-C			
Number of FIRs	5	2	
Facilities			
Number of ACC facilities	5	0	
Number of co-located ACC and approach facilities	0	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	12	6	
Number of stand-alone towers	74	4	
Number of co-located ACC, approach, and tower facilities	0	2	

Does your ANSP have stated objectives? If so, what are they?

Spain (and, therefore, ENAIRE) is subject to regulated performance objectives through the Performance framework (Reg 317/2019; Reg 2020/1627; Decision 2021/891), PRB monitoring dashboards, etc). Additionally, ENAIRE establishes, in its strategic plan other objectives for priority areas.

In your opinion what are the main drivers or issues for performance within your region?

ENAIRE establishes its priorities and main initiatives in its Strategic Plan. Digitalisation, airspace restructuration and an ambitious investment plan are at the core of ENAIRE's expectations to improve future performance.

What are the main initiatives you are undertaking to improve your performance?

ENAIRE establishes its priorities and main initiatives in its Strategic Plan. Digitalisation, airspace restructuration and an ambitious investment plan are at the core of ENAIRE's expectations to improve future performance.

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic

After the drop in traffic in 2020 caused by COVID-19, the recovery started in 2021, has accelerated during 2022. Because of this significant recovery the en route Capacity and Environment KPIs failed to meet the targets set in the Spanish Performance Plan. However, their values improve compared to 2019. ATFM Arrival Delay, achieves the goal set for RP3. It should be taken into account that during 2022, en route traffic had a recovery factor of +67 per cent compared to 2021 while the recovery factor for arrivals traffic was +60 per cent compared to this year.

On the other hand significant variations in traffic flows have been observed in 2022, but it is difficult to identify Russia's war against Ukraine as the main causal factor.

Legal status: A government entity empowered to manage and use the revenues it generates through charges for the services it provides.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	2,190,000	0	
Percentage surveillance coverage at 30,000ft - primary radar			
Percentage surveillance coverage at 30,000ft - secondary radar			
Percentage surveillance coverage at 30,000ft - ADS-B			
Percentage surveillance coverage at 30,000ft - Space based ADS-B			
Percentage surveillance coverage at 30,000ft - ADS-C			
Number of FIRs	3		
Facilities			
Number of ACC facilities	5	0	
Number of co-located ACC and approach facilities	0	0	
Number of stand-alone approach facilities	3	0	
Number of co-located approach and tower facilities	14	0	
Number of stand-alone towers	7	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: HungaroControl

Does your ANSP have stated objectives? If so, what are they?	Cost efficient operation, keeping safety first while improving service quality.
In your opinion what are the main drivers or issues for performance within your region?	The main driver of the European performance is the performance scheme.
What are the main initiatives you are undertaking to improve your performance?	The ANSPs have to bear cost and traffic risk however they do not have influence on traffic. Having incentives on the level of delays as well, HungaroControl is interested in the further development of capacities (technological investments, airspace management procedures, training).
Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic	The war in Ukraine had a significant impact on our traffic and also capacity and environmental performance.

Legal status: A corporatised entity wholly owned by the government with special status (not governed by normal commercial law but by a specific founding law or statute).

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	104,000	0	
Percentage surveillance coverage at 30,000ft - primary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	100%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	0%	0%	
Number of FIRs	2	0	
Facilities			
Number of ACC facilities	0	0	
Number of co-located ACC and approach facilities	1	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	0	0	
Number of stand-alone towers	1	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: Isavia ANS

Does your ANSP have stated objectives? If so, what are they?	Being a known organisation with a positive image, having outstanding core business and happy employees.
In your opinion what are the main drivers or issues for performance within your region?	The main drivers are keeping our capacity to meet the demand at any time, ensuring safety, keeping costs as low as possible while still upholding necessary standards of service and minimizing negative effects on the environment.
What are the main initiatives you are undertaking to improve your performance?	These years our main initiatives are strengthening our partnership and cooperation with companies that we do business with, making our company a family friendly workplace for our employees, promote managers and encourage good team spirit and emphasising a good flow of information.
Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic	Volcanic eruption in August impacted our performance slightly, changing the traffic organisation in the area.

Legal status: A corporatised entity wholly owned by the government with special status (not governed by normal commercial law but by a specific founding law or statute).

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	103,000	5,400,000	
Percentage surveillance coverage at 30,000ft - primary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	100%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	0%	0%	
Number of FIRs	1	2	
Facilities			
Number of ACC facilities	1	1	
Number of co-located ACC and approach facilities	1	1	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	1	0	
Number of stand-alone towers	2	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: Devlet Hava Meydanları İşletmesi Genel Müdürlüğü (DHMI)

Does your ANSP have stated objectives? If so, what are they?

In your opinion what are the main drivers or issues for performance within your region?

What are the main initiatives you are undertaking to improve your performance?

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic

Legal status: A government entity empowered to manage and use the revenues it generates through charges for the services it provides.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	982,000	0	
Percentage surveillance coverage at 30,000ft - primary radar	25%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	0%	0%	
Number of FIRs	2	0	
Facilities			
Number of ACC facilities	2	0	
Number of co-located ACC and approach facilities	3	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	47	0	
Number of stand-alone towers	0	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: NAV CANADA

Does your ANSP have stated objectives? If so, what are they?

In your opinion what are the main drivers or issues for performance within your region?

What are the main initiatives you are undertaking to improve your performance?

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic

Legal status: A government entity empowered to manage and use the revenues it generates through charges for the services it provides.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental			
Percentage surveillance coverage at 30,000ft - primary radar			
Percentage surveillance coverage at 30,000ft - secondary radar			
Percentage surveillance coverage at 30,000ft - ADS-B			
Percentage surveillance coverage at 30,000ft - Space based ADS-B			
Percentage surveillance coverage at 30,000ft - ADS-C			
Number of FIRs			
Facilities			
Number of ACC facilities			
Number of co-located ACC and approach facilities			
Number of stand-alone approach facilities			
Number of co-located approach and tower facilities			
Number of stand-alone towers			
Number of co-located ACC, approach, and tower facilities			

ANSP: NAV Portugal

Does your ANSP have stated objectives? If so, what are they?	Yes. We have a 5-year Business Plan with objectives and targets stemming from EU regulation (EU Reg. 2019/317) for Capacity, Environment, Cost-Efficiency and Safety.
In your opinion what are the main drivers or issues for performance within your region?	SES Regulations and specifically Performance scheme works as the main driver to improve efficiency as well as traffic demand and customer satisfaction.
What are the main initiatives you are undertaking to improve your performance?	Implement new ATM systems to respond to the increase digitalisation of the sector, as well the CNS infrastructure.
Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic	The impact of the COVID-19 pandemic in 2022 was still significant in the first quarter of 2022, in the remaining months the traffic has recovered significantly compared to 2019, however the difference was -6.1 per cent, at the Lisbon FIR. In service units, the drop was greater in En-route (-9.0 per cent).

Legal status: A corporatised entity wholly owned by the government with special status (not governed by normal commercial law but by a specific founding law or statute).

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	671,000	5,180,000	
Percentage surveillance coverage at 30,000ft - primary radar	0%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	86%	15%	
Percentage surveillance coverage at 30,000ft - ADS-B	91%	26%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	0%	100%	
Number of FIRs	1	1	
Facilities			
Number of ACC facilities	1	1	
Number of co-located ACC and approach facilities	1	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	3	4	
Number of stand-alone towers	3	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: Polish Air Navigation Services Agency (PANSA)

Does your ANSP have stated objectives? If so, what are they?

Objectives related to the Performance Plan/SES Regulations and 4 Key Performance Areas: Safety, Environment, Capacity, Cost-Efficiency.

In your opinion what are the main drivers or issues for performance within your region?

SES Regulations, Performance Plans requirements, Performance and Charging scheme regulations; Changes in traffic routes/flows due to the war in Ukraine.

What are the main initiatives you are undertaking to improve your performance?

Airspace modernisation including TMA; Changes in the sectorization of airspace; Shortening the flight routes; Reducing CO2 emissions; Cooperation with the military (war in Ukraine from February 2022); and improving the competitiveness offered by the PANSA for users of Polish airspace.

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic

The aggression of the Russian Federation against Ukraine has a significant impact on the air navigation services in Poland due to the closure of the airspace beyond the eastern border of Poland, changes in air traffic flows and increased military activity in Polish airspace. A direct consequence of this situation was a significant increase in en-route delays in Polish airspace in 2022. The war in Ukraine has particularly affected the overflight segment (significant loss of heavy traffic) - we expect these effects to be long-term, meaning they will be felt even after the war is over.

Legal status: A state legal entity empowered to manage and use the revenues it generates through charges for the services it provides.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	333,000	0	
Percentage surveillance coverage at 30,000ft - primary radar	0%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	0%	0%	
Number of FIRs	1	0	

Contextual data element	Continental	Oceanic	Comments
Facilities			
Number of ACC facilities	1	0	
Number of co-located ACC and approach facilities	1	0	
Number of stand-alone approach facilities	3	0	
Number of co-located approach and tower facilities	0	0	
Number of stand-alone towers	15	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: Slovenia Control

In your opinion what are the main drivers or issues for performance within your region? Capacity.

What are the main initiatives you are undertaking to improve your performance? Carefully planned capacity (staff, technology) and cost efficiency.

Legal status: A corporatised entity wholly owned by the government with special status (not governed by normal commercial law but by a specific founding law or statute).

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	20,000	0	
Percentage surveillance coverage at 30,000ft - primary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - secondary radar	100%	0%	
Percentage surveillance coverage at 30,000ft - ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - Space based ADS-B	0%	0%	
Percentage surveillance coverage at 30,000ft - ADS-C	0%	0%	
Number of FIRs	1	0	
Facilities			
Number of ACC facilities	0	0	
Number of co-located ACC and approach facilities	1	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	2	0	
Number of stand-alone towers	2	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: Serbia and Montenegro Air Traffic Services Agency (SMATSA)

Does your ANSP have stated objectives? If so, what are they?

Yes. SMATSA 5 years Strategic Business Plan contains a set of Strategic Objectives. Those were set in order to improve general performance of the company, but basically performance of services provided. The objectives are focused on infrastructure modernization/investments and HR performance improvements.

In your opinion what are the main drivers or issues for performance within your region?

The performance is influenced by various factors and issues that are specific to the aviation industry and the unique characteristics of the region. Main drivers and potential issues affecting ANSP performance in South East Europe are: Safety and Security, Air Traffic Growth, Infrastructure and Technology, Capacity and Congestion, Collaboration and Coordination, Regulatory Compliance, Environmental Concerns, Funding and Financial Sustainability, Human Resources, Adaptation to Future Trends.

What are the main initiatives you are undertaking to improve your performance?

The completion of infrastructure modernization program. At the same time continuation of ATCO and other staff training, and finalization of on-going projects in the ATM/CNS domain.

Were there any factors that impacted your individual ANSP performance in your fiscal year 2020, as shown in the KPIs in this report? For example, exceptional events in the year related to traffic

A substantial rise in air traffic demand has led to delays caused by both capacity limitations and adverse weather conditions.

Legal status: Other.

Contextual data element	Continental	Oceanic	Comments
Operational Data			
Sq. km. – oceanic and continental	99,400	0	
Percentage surveillance coverage at 30,000ft - primary radar	100%		
Percentage surveillance coverage at 30,000ft - secondary radar			
Percentage surveillance coverage at 30,000ft - ADS-B			
Percentage surveillance coverage at 30,000ft - Space based ADS-B			
Percentage surveillance coverage at 30,000ft - ADS-C			
Number of FIRs	1	0	
Facilities			
Number of ACC facilities	1	0	
Number of co-located ACC and approach facilities	1	0	
Number of stand-alone approach facilities	0	0	
Number of co-located approach and tower facilities	7	0	
Number of stand-alone towers	0	0	
Number of co-located ACC, approach, and tower facilities	0	0	

Annex 5: KPI Data

Continental

1. Continental Cost per IFR hour (USD)

Formula: Total costs (USD) / IFR flight hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	623.56	-28.22%	16.50%
Airways NZ	479.69	-18.97%	7.17%
Albcontrol	519.23	-13.66%	-6.85%
ANA	1346.42	-29.18%	18.83%
ANS CR	762.32	-8.04%	7.97%
ARMATS	777.79	-43.12%	2.48%
ATNS	370.93	-45.48%	5.43%
Austro Control	775.57	-30.94%	1.47%
Avinor (Continental)	587.98	-21.12%	6.11%
BHANSA	378.08	-	-
BULATSA	415.69	-28.72%	2.01%
CAAS	830.26	-38.40%	18.08%
Croatia Control	375.74	-23.00%	-1.19%
DCAC Cyprus	270.32	-20.76%	5.93%
DFS	909.22	-35.91%	3.90%
DHMI	467.54	61.55%	47.01%
DSNA	795.42	-38.37%	6.37%
EANS	483.46	-22.55%	11.15%
ENAIRE	591.40	-26.81%	5.38%
ENAV	660.34	-34.53%	1.18%
FAA-ATO	508.64	-12.13%	3.27%
Fintraffic ANS	670.16	-26.31%	6.26%
HASP	259.96	-20.36%	0.36%
HungaroControl	379.18	-26.20%	4.36%
IAA	459.03	-34.11%	3.55%
Isavia ANS	706.41	114.23%	39.44%
KCAA	519.07	290.13%	25.70%
LFV	574.41	-29.70%	9.12%

Continental

1. Continental Cost per IFR hour (USD) (continued)

Formula: Total costs (USD) / IFR flight hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
LGS	449.83	-4.80%	11.10%
LPS	729.07	-6.94%	4.74%
LVNL	1825.77	-29.07%	8.25%
MATS	350.98	-5.52%	7.34%
M-NAV	464.32	-3.19%	1.82%
MOLDATSA	1683.73	68.25%	22.25%
MUAC	421.32	-33.68%	14.29%
NATS (Continental)	584.05	-42.62%	2.50%
NAV CANADA	369.44	-27.39%	3.33%
NAV Portugal	359.90	-38.32%	-1.53%
NAVIAIR	692.91	-38.89%	6.77%
Oro Navigacija	590.40	14.33%	10.70%
PANSA	586.64	6.31%	9.52%
ROMATSA	635.34	-23.23%	8.18%
Sakaeronavigatsia	578.55	-37.69%	5.88%
skeys	2773.41	-20.03%	10.56%
Skyguide	1315.01	-37.05%	5.25%
Slovenia Control	654.27	-14.92%	3.04%
SMATSA	420.92	-23.98%	8.45%

2a. Continental ATCOs in OPS employment cost per ATCO in OPS hour (USD)

Formula: ATCOs in OPS employment costs / ATCOs in OPS hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	34.17	-12.19%	1.29%
Airways NZ	132.57	1.51%	11.21%
Albcontrol	36.96	61.20%	-1.94%
ANA	151.91	25.51%	12.87%
ANS CR	99.34	6.96%	-6.36%
ARMATS	29.73	18.64%	11.03%
ATNS	41.45	-23.41%	5.15%
Austro Control	185.97	7.85%	1.91%

2a. Continental ATCOs in OPS employment cost per ATCO in OPS hour (USD) (continued)

Formula: ATCOs in OPS employment costs / ATCOs in OPS hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Avinor (Continental)	147.02	6.30%	11.68%
BHANSA	45.79	-	-
BULATSA	103.96	-21.82%	1.44%
Croatia Control	97.83	7.69%	0.64%
DCAC Cyprus	69.92	23.55%	7.98%
DFS	255.87	-1.06%	0.68%
DHMI	57.41	95.26%	35.38%
DSNA	127.72	14.72%	2.94%
EANS	112.71	8.56%	10.52%
ENAIRE	171.82	-8.33%	1.32%
ENAV	160.84	1.18%	5.07%
FAA-ATO	159.75	-4.86%	5.38%
Fintraffic ANS	77.27	-0.42%	-0.93%
HASP	82.19	45.73%	7.91%
HungaroControl	84.26	14.01%	2.11%
IAA	110.09	13.29%	1.35%
Isavia ANS	135.81	-18.24%	5.21%
KCAA	11.39	-54.82%	-11.82%
LFV	147.40	9.25%	7.94%
LGS	54.33	0.96%	-1.66%
LPS	114.75	34.66%	-1.06%
LVNL	110.35	-1.84%	-12.52%
MATS	52.75	-4.61%	-3.77%
M-NAV	63.11	27.46%	5.95%
MOLDATSA	20.37	-7.95%	-6.33%
MUAC	345.18	-8.51%	8.18%
NATS (Continental)	166.16	-11.06%	4.79%
NAV CANADA	159.65	43.03%	6.71%
NAV Portugal	158.81	1.62%	-2.52%
NAVIAIR	133.23	5.80%	3.92%
Oro navigacija	55.39	10.71%	0.93%
PANSA	132.65	36.20%	4.61%

2a. Continental ATCOs in OPS employment cost per ATCO in OPS hour (USD) (continued)

Formula: ATCOs in OPS employment costs / ATCOs in OPS hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
ROMATSA	126.85	36.35%	4.18%
Sakaeronavigatsia	22.88	5.03%	10.10%
skeyes	187.52	2.21%	2.46%
Skyguide	241.58	26.94%	3.86%
SMATSA	75.86	26.97%	5.24%

2a. Continental ATCOs in OPS employment cost per ATCO in OPS hour (USD), PPP adjusted

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	102.05	-10.41%	3.35%
Airways NZ	145.20	2.43%	11.13%
Albcontrol	101.65	60.59%	-1.15%
ANA	169.72	30.08%	12.70%
ANS CR	177.39	5.36%	-7.60%
ARMATS	80.25	17.32%	16.68%
ATNS	97.40	-21.90%	3.45%
Austro Control	235.47	8.57%	2.49%
Avinor (Continental)	105.41	-13.63%	3.33%
BHANSA	119.90	-	-
BULATSA	238.75	-27.71%	-12.67%
Croatia Control	211.15	4.26%	0.64%
DCAC Cyprus	116.49	25.72%	9.80%
DFS	337.47	0.86%	1.39%
DHMI	212.05	-1.67%	4.03%
DSNA	170.82	19.73%	4.57%
EANS	178.39	-3.81%	7.80%
ENAIRE	276.54	-5.69%	2.67%
ENAV	242.44	4.23%	7.20%
FAA-ATO	159.75	-4.86%	5.38%
Fintraffic ANS	88.40	0.90%	-0.07%
HASP	147.26	44.36%	9.75%
HungaroControl	193.51	6.31%	-2.09%

2a. Continental ATCOs in OPS employment cost per ATCO in OPS hour (USD), PPP adjusted (continued)

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
IAA	141.28	13.90%	2.96%
Isavia ANS	122.43	-19.54%	2.91%
KCAA	31.25	-54.15%	-13.28%
LFV	173.16	10.45%	8.28%
LGS	97.34	-4.18%	-3.47%
LPS	217.94	34.39%	-1.01%
LVNL	136.09	-0.82%	-12.23%
MATS	89.44	-3.42%	-2.75%
M-NAV	191.84	25.63%	5.96%
MOLDATSA	55.72	-17.97%	-4.91%
NATS (Continental)	204.25	-8.37%	5.85%
NAV CANADA	167.58	41.41%	5.80%
NAV Portugal	274.20	3.28%	-1.64%
NAVIAIR	139.46	4.33%	3.98%
Oro navigacija	105.20	2.30%	-1.91%
PANSA	316.23	31.03%	2.40%
ROMATSA	309.75	28.25%	0.60%
Sakaeronavigatsia	70.97	5.82%	6.41%
skeyes	237.43	3.02%	3.12%
Skyguide	221.79	31.82%	6.64%
SMATSA	196.08	23.17%	3.67%

2b. Continental ATCOs in OPS hour productivity

Formula: IFR flight hours / ATCOs in OPS hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	0.24	43.10%	-9.03%
Airways NZ	0.74	25.19%	3.53%
Albcontrol	0.72	34.08%	10.13%
ANA	0.30	79.66%	-6.65%
ANS CR	0.51	-2.50%	-14.27%
ARMATS	0.18	117.33%	0.71%
ATNS	0.47	49.62%	-1.85%
Austro Control	0.77	51.02%	-0.53%
Avinor (Continental)	0.59	30.05%	1.31%
BHANSA	0.49	-	-
BULATSA	0.80	-1.04%	-1.21%
CAAS	0.53	73.27%	-5.59%
Croatia Control	0.80	43.81%	2.47%
DCAC Cyprus	0.86	53.37%	-0.39%
DFS	0.72	47.30%	-5.25%
DHMI	0.67	14.08%	-5.43%
DSNA	0.69	80.15%	0.25%
EANS	0.78	36.35%	-2.77%
ENAIRE	0.77	39.48%	0.85%
ENAV	0.71	41.60%	2.40%
FAA-ATO	1.32	3.47%	0.87%
Fintraffic ANS	0.34	27.07%	-6.94%
HASP	0.80	51.50%	-0.58%
HungaroControl	1.02	75.18%	1.01%
IAA	0.76	79.69%	-3.70%
Isavia ANS	0.40	-62.82%	-25.57%
KCAA	0.32	-22.85%	-0.69%
LFV	0.55	54.45%	-1.98%
LGS	0.53	13.36%	-9.61%
LPS	0.52	37.93%	-6.77%
LVNL	0.43	55.24%	-4.55%
MATS	0.54	8.84%	-11.42%
M-NAV	0.43	31.84%	2.10%

2b. Continental ATCOs in OPS hour productivity (continued)

Formula: IFR flight hours / ATCOs in OPS hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
MOLDATSA	0.05	-36.07%	-21.65%
MUAC	2.02	33.20%	-2.34%
NATS (Continental)	0.83	65.58%	-2.48%
NAV CANADA	1.25	52.61%	-1.67%
NAV Portugal	1.00	52.45%	-0.52%
NAVIAIR	0.62	63.82%	-3.73%
Oro navigacija	0.37	1.01%	-8.68%
PANSA	0.64	5.17%	-5.53%
ROMATSA	0.60	50.11%	-5.13%
Sakaeronavigatsia	0.36	75.20%	0.83%
skeyes	0.38	30.48%	-2.34%
Skyguide	0.69	30.09%	-1.90%
Slovenia Control	0.53	27.43%	0.48%
SMATSA	0.69	66.47%	-3.96%

2c. Continental Costs excluding ATCOs in OPS employment costs per IFR hour (USD)

Formula: Costs excluding ATCOs in OPS employment costs / IFR flight hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	482.27	-24.46%	18.26%
Airways NZ	300.82	-19%	6.32%
Albcontrol	468.04	-16.25%	-6.34%
ANA	834.53	-28.58%	17.64%
ANS CR	566.89	-12.89%	7.55%
ARMATS	613.50	-42.47%	0.81%
ATNS	282.28	-44.34%	4.92%
Austro Control	534.61	-31.95%	1.04%
Avinor (Continental)	339.74	-23.08%	3.53%
BHANSA	283.78	-	-
BULATSA	285.68	-31.75%	1.72%
Croatia Control	253.18	-21.93%	-0.90%
DCAC Cyprus	189.20	-21.31%	4.96%
DFS	552.18	-37.76%	2.51%

2c. Continental Costs excluding ATCOs in OPS employment costs per IFR hour (USD) (continued)

Formula: Costs excluding ATCOs in OPS employment costs / IFR flight hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
DHMI	381.77	62.35%	47.95%
DSNA	609.16	-26.02%	7.64%
EANS	338.18	-22.21%	10.15%
ENAIRE	367.41	-16.38%	9.88%
ENAV	433.39	-37.28%	0.47%
FAA-ATO	387.45	-13.33%	2.91%
Fintraffic ANS	443.79	-28.49%	6.16%
HASP	157.47	-28.38%	-3.60%
HungaroControl	296.57	-23.34%	5.37%
IAA	313.43	-32.70%	2.80%
Isavia ANS	364.23	109.18%	37.76%
KCAA	482.92	577.16%	25.63%
LFV	305.54	-30.07%	8.27%
LGS	347.08	-2.82%	11.83%
LPS	510.01	-8.76%	4.17%
LVNL	1571.01	-27.64%	12.85%
MATS	254.12	-2.62%	6.87%
M-NAV	318.29	-3.13%	0.99%
MOLDATSA	1302.17	76.99%	23.10%
MUAC	250.71	-35.20%	17.04%
NATS (Continental)	384.95	-40.52%	0.34%
NAV CANADA	241.35	-35.14%	1.02%
NAV Portugal	200.66	-41.77%	-1.14%
NAVIAIR	479.54	-40.32%	6.27%
Oro navigacija	440.02	16.04%	10.76%
PANSA	378.49	-3.22%	8.88%
ROMATSA	422.19	-28.80%	7.41%
Sakaeronavigatsia	514.80	-37.39%	5.50%
skeyes	2276.85	-19.66%	12.01%
Skyguide	965.43	-44.22%	5.03%
Slovenia Control	654.27	25.66%	14.02%
SMATSA	310.45	-24.06%	8.06%

2d. Continental Proportion of total costs made up of ATCO in OPS employment costs

Formula: ATCO in OPS employment Costs / Total Costs.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	0.22658	-14.52%	-4.43%
Airways NZ	0.37290	0.07%	0.23%
Albcontrol	0.09860	39.25%	-4.41%
ANA	0.38019	-1.35%	1.75%
ANS CR	0.25636	19.29%	1.17%
ARMATS	0.21123	-4.03%	7.58%
ATNS	0.23900	-6.11%	1.61%
Austro Control	0.31069	3.41%	0.97%
Avinor (Continental)	0.42220	3.62%	3.89%
BHANSA	0.24940	-	-
BULATSA	0.31275	10.83%	0.65%
Croatia Control	0.32618	-2.75%	-0.59%
DCAC Cyprus	0.30009	1.66%	2.33%
DFS	0.39269	4.81%	2.27%
DHMI	0.18344	-2.16%	-2.62%
DSNA	0.23417	3.33%	-3.46%
EANS	0.30050	-0.99%	2.27%
ENAIRE	0.37874	-11.61%	-5.04%
ENAV	0.34369	9.14%	1.41%
FAA-ATO	0.23827	4.64%	1.16%
Fintraffic ANS	0.33779	6.35%	0.19%
HASP	0.39427	20.78%	8.15%
HungaroControl	0.21788	-11.81%	-3.13%
IAA	0.31717	-4.31%	1.64%
Isavia ANS	0.48440	2.64%	1.37%
KCAA	0.06964	-84.99%	-29.36%
LFV	0.46809	0.61%	0.92%
LGS	0.22843	-6.45%	-2.07%
LPS	0.30046	4.90%	1.32%
LVNL	0.13953	-10.85%	-15.33%
MATS	0.27598	-7.23%	1.20%
M-NAV	0.31450	-0.14%	1.92%

2d. Continental Proportion of total costs made up of ATCO in OPS employment costs (continued)

Formula: ATCO in OPS employment Costs / Total Costs.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
MOLDATSA	0.22661	-14.42%	-2.21%
MUAC	0.40494	3.57%	-3.08%
NATS (Continental)	0.34090	-6.39%	4.83%
NAV CANADA	0.34673	29.07%	5.03%
NAV Portugal	0.44245	8.07%	-0.49%
NAVIAIR	0.30793	5.69%	1.10%
Oro navigacija	0.25470	-4.13%	-0.15%
PANSA	0.35480	21.81%	1.11%
ROMATSA	0.33549	18.32%	1.51%
Sakaeronavigatsia	0.11019	-3.78%	3.14%
skeyes	0.17904	-2.05%	-5.11%
Skyguide	0.26584	55.01%	0.59%
SMATSA	0.26243	0.33%	1.04%

3a. Continental Annual employment cost per ATCO in OPS (USD)

Formula: ATCOs in OPS employment costs / No. ATCOs in OPS.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	58038.89	-2.38%	-12.75%
Airways NZ	134335.62	6.85%	3.24%
Albcontrol	43585.12	60.36%	-6.00%
ANA	167453.91	28.19%	4.00%
ANS CR	152745.88	46.62%	-6.77%
ARMATS	42388.24	16.51%	11.03%
ATNS	50280.50	5.10%	0.46%
Austro Control	254117.08	13.70%	1.13%
Avinor (Continental)	224127.33	5.63%	10.58%
BHANSA	60979.36	-	-
BULATSA	133770.99	29.86%	1.45%
Croatia Control	128775.34	7.15%	0.42%
DCAC Cyprus	114297.74	5.30%	3.32%
DFS	292517.91	6.84%	5.58%
DHMI	65754.26	114.86%	34.11%
DSNA	133089.52	-6.90%	-2.29%
EANS	123258.64	-1.13%	2.43%
ENAIRE	215935.26	8.28%	-0.29%
ENAV	192569.39	14.23%	4.18%
FAA-ATO	244870.25	7.50%	3.62%
Fintraffic ANS	127298.92	-0.36%	0.39%
HASP	126737.86	51.63%	8.99%
HungaroControl	125880.75	11.23%	0.44%
IAA	175599.16	22.26%	2.00%
Isavia ANS	234910.88	11.78%	3.71%
KCAA	22959.88	-33.42%	-4.08%
LFV	224015.59	7.12%	3.86%
LGS	70061.92	-2.28%	-6.39%
LPS	176759.49	49.46%	-1.41%
LVNL	173346.29	-2.95%	-12.19%
MATS	112472.09	11.93%	-0.92%
M-NAV	83542.25	27.43%	7.39%
MOLDATSA	30088.20	-7.98%	-4.98%

3a. Continental Annual employment cost per ATCO in OPS (USD) (continued)

Formula: ATCOs in OPS employment costs / No. ATCOs in OPS.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
MUAC	373558.31	3.91%	6.33%
NATS (Continental)	213718.76	6.79%	3.69%
NAV CANADA	284588.44	42.92%	9.36%
NAV Portugal	324252.85	11.34%	-1.08%
NAVIAIR	198226.46	6.11%	3.99%
Oro navigacija	86841.45	10.11%	0.55%
PANSA	131055.73	74.74%	1.94%
ROMATSA	148289.36	35.41%	3.56%
Sakaeronavigatsia	34862.72	5.03%	10.10%
skeyes	252409.32	13.58%	1.38%
Skyguide	326286.46	25.90%	3.66%
SMATSA	87540.79	26.96%	4.49%

3a. Continental Annual employment cost per ATCO in OPS (USD), PPP adjusted

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	173332.37	-0.40%	-10.97%
Airways NZ	147133.26	7.81%	3.17%
Albcontrol	119876.75	59.76%	-5.24%
ANA	187080.25	32.87%	3.85%
ANS CR	272758.84	44.42%	-8.01%
ARMATS	114411.27	15.21%	16.68%
ATNS	118158.11	7.18%	-1.16%
Austro Control	321754.15	14.46%	1.70%
Avinor (Continental)	160685.87	-14.17%	2.31%
BHANSA	159690.85	-	-
BULATSA	307201.24	20.08%	-12.66%
Croatia Control	277927.56	3.74%	0.42%
DCAC Cyprus	190420.79	7.15%	5.07%
DFS	385808.27	8.92%	6.33%
DHMI	242892.41	17.17%	3.06%
DSNA	178006.99	-2.83%	-0.74%
EANS	195082.22	-9.04%	-0.09%

3a. Continental Annual employment cost per ATCO in OPS (USD), PPP adjusted (continued)

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
ENAIRE	347554.66	11.40%	1.03%
ENAV	290267.41	17.67%	6.29%
FAA-ATO	244870.25	7.50%	3.62%
Fintraffic ANS	145645.87	0.96%	1.26%
HASP	227081.67	50.20%	10.84%
HungaroControl	289076.39	3.72%	-3.70%
IAA	225342.08	22.92%	3.62%
Isavia ANS	211759.32	10.01%	1.45%
KCAA	62993.21	-32.44%	-5.66%
LFV	263153.31	8.30%	4.19%
LGS	125532.96	-7.25%	-8.11%
LPS	335710.01	49.16%	-1.36%
LVNL	213784.10	-1.94%	-11.90%
MATS	190725.30	13.33%	0.13%
M-NAV	253940.67	25.61%	7.40%
MOLDATSA	82284.01	-18.00%	-3.55%
NATS (Continental)	262712.72	10.02%	4.73%
NAV CANADA	298715.68	41.31%	8.43%
NAV Portugal	559851.29	13.16%	-0.19%
NAVIAIR	207497.12	4.64%	4.05%
Oro navigacija	164933.41	1.74%	-2.28%
PANSA	312414.31	68.11%	-0.21%
ROMATSA	362109.87	27.37%	0.00%
Sakaeronavigatsia	108156.03	5.82%	6.41%
skeyes	319591.84	14.48%	2.04%
Skyguide	299566.27	30.75%	6.43%
SMATSA	226273.04	23.16%	2.93%

3b. Continental Annual working hours per ATCO in OPS

Formula: ATCOs in OPS hours / No. ATCOs in OPS.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	1698.52	11.17%	-13.86%
Airways NZ	1013.31	5.25%	-7.16%
Albcontrol	1179.30	-0.52%	-4.14%
ANA	1102.31	2.14%	-7.85%
ANS CR	1537.60	37.08%	-0.44%
ARMATS	1425.74	-1.80%	0.00%
ATNS	1213.12	37.23%	-4.46%
Austro Control	1366.44	5.42%	-0.77%
Avinor (Continental)	1524.42	-0.63%	-0.99%
BHANSA	1331.82	-	-
BULATSA	1286.72	66.10%	0.01%
CAAS	1521.54	16.07%	-4.37%
Croatia Control	1316.25	-0.51%	-0.22%
DCAC Cyprus	1634.63	-14.77%	-4.31%
DFS	1143.25	7.99%	4.87%
DHMI	1145.43	19.16%	-0.94%
DSNA	1042.06	-18.84%	-5.09%
EANS	1093.56	-5.44%	-7.32%
ENAIRE	1256.78	18.11%	-1.60%
ENAV	1197.26	12.90%	-0.85%
FAA-ATO	1532.85	12.99%	-1.67%
Fintraffic ANS	1647.51	0.06%	1.33%
HASP	1542.00	4.05%	1.00%
HungaroControl	1493.87	-2.44%	-1.64%
IAA	1595.00	7.92%	0.64%
Isavia ANS	1729.64	36.72%	-1.42%
KCAA	2016.00	47.37%	8.78%
LFV	1519.73	-1.95%	-3.78%
LGS	1289.62	-3.21%	-4.81%
LPS	1540.37	10.99%	-0.35%
LVNL	1570.89	-1.13%	0.38%
MATS	2132.33	17.33%	2.96%
M-NAV	1323.68	-0.02%	1.36%

3b. Continental Annual working hours per ATCO in OPS (continued)

Formula: ATCOs in OPS hours / No. ATCOs in OPS.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
MOLDATSA	1476.79	-0.04%	1.44%
MUAC	1082.20	13.58%	-1.71%
NATS (Continental)	1286.25	20.07%	-1.05%
NAV CANADA	1782.56	-0.08%	2.48%
NAV Portugal	2041.75	9.57%	1.48%
NAVIAIR	1487.83	0.29%	0.07%
Oro navigacija	1567.74	-0.54%	-0.38%
PANSA	987.95	28.30%	-2.55%
ROMATSA	1169.03	-0.69%	-0.59%
Sakaeronavigatsia	1524.00	0.00%	0.00%
skeyes	1346.05	11.12%	-1.05%
Skyguide	1350.66	-0.82%	-0.19%
Slovenia Control	1366.19	16.15%	-0.30%
SMATSA	1153.97	-0.01%	-0.72%

3c. Continental Annual IFR hours per ATCO in OPS

Formula: IFR flight hours / No. ATCOs in OPS.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	410.78	59.09%	-21.63%
Airways NZ	750.99	31.77%	-3.88%
Albcontrol	851.34	33.39%	5.57%
ANA	327.13	83.51%	-13.98%
ANS CR	781.59	33.65%	-14.65%
ARMATS	258.00	113.43%	0.70%
ATNS	567.17	105.32%	-6.23%
Austro Control	1054.60	59.20%	-1.30%
Avinor (Continental)	902.86	29.23%	0.31%
BHANSA	646.70	-	-
BULATSA	1028.95	64.37%	-1.20%
CAAS	799.86	101.11%	-9.71%
Croatia Control	1050.71	43.08%	2.24%
DCAC Cyprus	1408.99	30.71%	-4.68%

3c. Continental Annual IFR hours per ATCO in OPS (continued)

Formula: IFR flight hours / No. ATCOs in OPS.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
DFS	819.28	59.07%	-0.63%
DHMI	766.66	35.94%	-6.32%
DSNA	714.52	46.21%	-4.85%
EANS	848.42	28.92%	-9.89%
ENAIRE	964.04	67.38%	-0.36%
ENAV	848.51	59.86%	1.53%
FAA-ATO	2020.50	16.92%	-0.82%
Fintraffic ANS	562.34	27.15%	-5.70%
HASP	1236.53	57.63%	0.41%
HungaroControl	1523.69	70.90%	-0.65%
IAA	1206.11	93.91%	-3.08%
Isavia ANS	686.50	-49.16%	-26.63%
KCAA	635.13	13.69%	8.02%
LFV	833.16	51.44%	-5.69%
LGS	681.83	9.72%	-13.96%
LPS	806.92	53.10%	-7.10%
LVNL	680.45	53.48%	-4.19%
MATS	1161.12	27.70%	-8.79%
M-NAV	572.10	31.81%	3.49%
MOLDATSA	78.86	-36.10%	-20.52%
MUAC	2189.56	51.29%	-4.01%
NATS (Continental)	1073.39	98.81%	-3.51%
NAV CANADA	2221.71	52.50%	0.77%
NAV Portugal	2036.27	67.03%	0.95%
NAVIAIR	929.03	64.30%	-3.66%
Oro navigacija	577.50	0.46%	-9.03%
PANSA	629.65	34.94%	-7.94%
ROMATSA	695.70	49.07%	-5.70%
Sakaeronavigatsia	546.86	75.20%	0.83%
skeyes	508.32	44.99%	-3.36%
Skyguide	933.38	29.02%	-2.09%
Slovenia Control	717.50	48.01%	0.18%
SMATSA	792.50	66.46%	-4.65%

3d. Continental Ratio of Frontline Service Staff to ATCO in OPS

Formula: No. Frontline Service Staff / No. ATCOs in OPS.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	1.17	-	10.73%
Airways NZ	0.54	0.72%	-5.07%
ANA	0.70	127.87%	20.54%
ATNS	0.90	5.85%	0.30%
BHANSA	1.79	-	-
DHMI	1.39	-3.29%	-1.10%
DSNA	0.42	-24.88%	-
ENAIRE	0.94	-2.17%	0.92%
HungaroControl	1.18	0.77%	-1.86%
Isavia ANS	1.50	0.00%	1.23%
KCAA	0.94	-1.73%	-
NAV CANADA	1.36	-6.48%	-
PANSA	1.31	-1.38%	-1.85%

Oceanic

1. Oceanic Cost per IFR hour (USD)

Formula: Total costs / IFR flight hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	76.38	-54.34%	10.62%
FAA-ATO	87.94	-22.50%	-0.93%
Isavia ANS	170.84	-39.97%	2.44%
NAV CANADA	131.62	-41.61%	21.03%

2a. Oceanic ATCO in OPS employment cost per ATCO in OPS hour (USD)

Formula: ATCOs in OPS employment costs / ATCOs in OPS Hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	142.69	-3.45%	11.91%
FAA-ATO	232.04	-0.78%	6.58%
Isavia ANS	181.42	10.63%	12.37%
NAV CANADA	167.62	37.51%	7.28%

2a. Oceanic ATCO in OPS employment cost per ATCO in OPS hour (USD), PPP adjusted

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	156.28	-2.57%	11.83%
FAA-ATO	232.04	-0.78%	6.58%
Isavia ANS	163.54	8.88%	9.93%
NAV CANADA	175.95	35.95%	6.36%

2b. Oceanic ATCO in OPS hour productivity

Formula: IFR flight hours / ATCOs in OPS hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	2.60	107.35%	-6.65%
ATNS	0.04	-76.98%	-35.31%
FAA-ATO	7.96	22.29%	0.81%
Isavia ANS	4.45	90.31%	8.38%
NAV CANADA	7.25	91.79%	1.98%

2c. Oceanic Costs excluding ATCOs in OPS employment costs per IFR hour (USD)

Formula: Costs excluding ATCOs in OPS employment costs / IFR flight hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	21.41	-56.52%	-0.15%
FAA-ATO	58.77	-24.18%	-3.56%
Isavia ANS	130.05	-39.35%	2.07%
NAV CANADA	108.51	-43.83%	26.44%

2d. Oceanic Proportion of total costs made up of ATCO in OPS employment costs

Formula: ATCO in OPS employment costs / Total Costs.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	0.72	1.99%	8.37%
FAA-ATO	0.33	4.68%	6.72%
Isavia ANS	0.24	-3.17%	1.21%
NAV CANADA	0.18	22.79%	-13.09%

3a. Oceanic Annual employment cost per ATCO in OPS (USD)

Formula: ATCOs in OPS employment costs / No. ATCOs in OPS

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	147944.23	11.57%	4.49%
FAA-ATO	355680.70	12.11%	4.79%
Isavia ANS	212112.19	3.00%	1.10%
NAV CANADA	290254.25	33.58%	10.19%

3a. Oceanic Annual employment cost per ATCO in OPS (USD), PPP adjusted

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	162038.31	12.58%	4.42%
FAA-ATO	355680.70	12.11%	4.79%
Isavia ANS	191207.54	1.36%	-1.11%
NAV CANADA	304662.75	32.07%	9.25%

3b. Oceanic Annual working hours per ATCO in OPS

Formula: ATCOs in OPS hours / No. ATCOs in OPS.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	1036.84	15.55%	-6.63%
ATNS	884.00	0.00%	-14.12%
FAA-ATO	1532.85	12.99%	-1.67%
Isavia ANS	1169.19	-6.90%	-10.04%
NAV CANADA	1731.58	-2.86%	2.72%

3c. Oceanic Annual IFR hours per ATCO in OPS

Formula: IFR flight hours / No. ATCOs in OPS

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	2691.39	139.60%	-12.84%
ATNS	34.43	-76.98%	-44.45%
FAA-ATO	12194.42	38.18%	-0.88%
Isavia ANS	5200.19	77.18%	-2.50%
NAV CANADA	12560.50	86.32%	4.75%

3d. Oceanic Ratio of Frontline Service Staff to ATCOs in OPS

Formula: No. Frontline Service Staff / No. ATCOs in OPS

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
Airways NZ	0.79	8.97%	-8.79%
Isavia ANS	1.52	-3.85%	-1.71%
NAV CANADA	0.42	-3.03%	-

Joint Continental and Oceanic

CO1: Combined Cost per IFR hour (USD)

Formula: Total costs / IFR flight hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	623.56	-28.22%	16.50%
Airways NZ	363.19	-29.14%	8.41%
Albcontrol	519.23	-13.66%	-6.85%
ANA	1346.42	-29.18%	18.83%
ANS CR	762.32	-8.04%	7.97%
ARMATS	777.79	-43.12%	2.48%
ATNS	370.36	-44.87%	6.43%
Austro Control	775.57	-30.94%	1.47%
Avinor (Continental)	587.98	-21.12%	6.11%
BHANSA	378.08	-	-
BULATSA	415.69	-28.72%	2.01%
CAAS	830.26	-38.40%	18.08%
Croatia Control	375.74	-23.00%	-1.19%
DCAC Cyprus	270.32	-20.76%	5.93%
DFS	909.22	-35.91%	3.90%
DHMI	467.54	61.55%	47.01%
DSNA	795.42	-42.77%	6.37%
EANS	483.46	-22.55%	11.15%
ENAIRE	591.40	-26.81%	5.38%
ENAV	660.34	-34.53%	1.18%
FAA-ATO	475.95	-12.86%	3.22%
Fintraffic ANS	670.16	-26.31%	6.26%
HASP	259.96	-20.36%	0.36%
HungaroControl	379.18	-26.20%	4.36%
IAA	459.03	-34.11%	3.55%
Isavia ANS	189.22	-34.69%	4.55%
KCAA	519.07	290.13%	25.70%

CO1: Combined Cost per IFR hour (USD) (continued)

Formula: Total costs / IFR flight hours.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
LFV	574.41	-29.70%	9.12%
LGS	449.83	-4.80%	11.10%
LPS	729.07	-6.94%	4.74%
LVNL	1825.77	-29.07%	8.25%
MATS	350.98	-5.52%	7.34%
M-NAV	464.32	-3.19%	1.82%
MOLDATSA	1683.73	68.25%	22.25%
MUAC	421.32	-33.68%	14.29%
NATS (Continental)	584.05	-42.62%	2.50%
NAV CANADA	325.27	-29.71%	3.75%
NAV Portugal	359.90	-38.32%	-1.53%
NAVIAIR	692.91	-38.89%	6.77%
Oro navigacija	590.40	14.33%	10.70%
PANSA	586.64	6.31%	9.52%
ROMATSA	635.34	-23.23%	8.18%
Sakaeronavigatsia	578.55	-37.69%	5.88%
skeyes	2773.41	-20.03%	10.56%
Skyguide	1315.01	-37.05%	5.25%
Slovenia Control	654.27	-14.92%	3.04%
SMATSA	420.92	-23.98%	8.45%

CO2D: Combined Proportion of total costs made up of ATCO in OPS employment costs

Formula: ATCO in OPS employment costs / Total Costs.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
AEROTHAI	0.23	-14.52%	-4.43%
Airways NZ	0.39	0.25%	0.97%
Albcontrol	0.10	39.25%	-4.41%
ANA	0.38	-1.35%	1.75%
ANS CR	0.26	19.29%	1.17%
ARMATS	0.21	-4.03%	7.58%
ATNS	0.24	-6.11%	0.80%
Austro Control	0.31	3.41%	0.97%
Avinor (Continental)	0.42	3.62%	3.89%
BHANSA	0.25	-	-

CO2D: Combined Proportion of total costs made up of ATCO in OPS employment costs (continued)

Formula: ATCO in OPS employment costs / Total Costs.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
BULATSA	0.31	10.83%	0.65%
Croatia Control	0.33	-2.75%	-0.59%
DCAC Cyprus	0.30	1.66%	2.33%
DFS	0.39	4.81%	2.27%
DHMI	0.18	-2.16%	-2.62%
DSNA	0.23	2.63%	-3.46%
Croatia Control	0.33	-2.75%	-0.59%
DCAC Cyprus	0.30	1.66%	2.33%
DFS	0.39	4.81%	2.27%
DHMI	0.18	-2.16%	-2.62%
DSNA	0.23	2.63%	-3.46%
EANS	0.30	-0.99%	2.27%
ENAIRE	0.38	-11.61%	-5.04%
ENAV	0.34	9.14%	1.41%
FAA-ATO	0.24	4.63%	1.25%
Fintraffic ANS	0.34	6.35%	0.19%
HASP	0.39	20.78%	8.15%
HungaroControl	0.22	-11.81%	-3.13%
IAA	0.32	-4.31%	1.64%
Isavia ANS	0.27	-2.03%	1.44%
KCAA	0.07	-84.99%	-29.36%
LFV	0.47	0.61%	0.92%
LGS	0.23	-6.45%	-2.07%
LPS	0.30	4.90%	1.32%
LVNL	0.14	-10.85%	-15.33%
MATS	0.28	-7.23%	1.20%
M-NAV	0.31	-0.14%	1.92%
MOLDATSA	0.23	-14.42%	-2.21%
MUAC	0.40	3.57%	-3.08%
NATS (Continental)	0.34	-6.39%	4.83%
NAV CANADA	0.33	29.06%	3.97%
NAV Portugal	0.44	8.07%	-0.49%
NAVIAIR	0.31	5.69%	1.10%
Oro navigacija	0.25	-4.13%	-0.15%
PANSA	0.35	21.81%	1.11%

CO2D: Combined Proportion of total costs made up of ATCO in OPS employment costs (continued)

Formula: ATCO in OPS employment costs / Total Costs.

ANSP	KPI	2021-2022 AGR	2018-2022 CAGR
PANSA	0.35	21.81%	1.11%
ROMATSA	0.34	18.32%	1.51%
Sakaeronavigatsia	0.11	-3.78%	3.14%
skeyes	0.18	-2.05%	-5.11%
Skyguide	0.27	55.01%	0.59%
SMATSA	0.26	0.33%	1.04%

Annex 6: Exchange Rates

All exchange rates shown in the table below represent the 2022 National Currency Per U.S. Dollar, Period Average. For sources please see Annex 8.

ANSP	Currency	2022 Exchange Rate
AEROTHAI	THB	35.0613502144776
Airways NZ	NZD	1.57718333333333
Albcontrol	ALL	113.041666666667
ANA	EUR	0.949623753156941
ANS CR	CZK	23.357
ARMATS	AMD	435.6661796523
ATNS	ZAR	16.3558534845
Austro Control	EUR	0.949623753156941
Avinor (Continental)	NOK	9.61416666666667
BHANSA	BAM	1.85932587706093
BULATSA	BGN	1.86014166666667
CAAS	SGD	1.37866666666667
Croatia Control	EUR	0.949623753156941
DCAC Cyprus	EUR	0.949623753156941
DFS	EUR	0.949623753156941
DHMI	TRY	16.5488604173067
DSNA	EUR	0.949623753156941
EANS	EUR	0.949623753156941
ENAIRE	EUR	0.949623753156941
ENAV	EUR	0.949623753156941
FAA-ATO	USD	1
Fintraffic ANS	EUR	0.949623753156941
HASP	EUR	0.949623753156941
HungaroControl	HUF	372.595833333333
IAA	EUR	0.949623753156941
Isavia ANS	ISK	135.27990200138
KCAA	KSH	117.865989201683
LFV	SEK	10.114251277564
LGS	EUR	0.949623753156941
LPS	EUR	0.949623753156941
LVNL	EUR	0.949623753156941
MATS	EUR	0.949623753156941

ANSP	Currency	2022 Exchange Rate
M-NAV	MKD	58.5743916666667
MOLDATSA	MDL	18.8971896198157
MUAC	EUR	0.949623753156941
NATS (Continental)	GBP	0.811301715827773
NAV CANADA	CDN	1.30155477474355
NAV Portugal	EUR	0.949623753156941
NAVIAIR	DKK	7.0761518625
Oro Navigacija	EUR	0.949623753156941
PANSA	PLN	4.45775833333333
ROMATSA	RON	4.688475
Sakaeronavigatsia	GEL	2.9162
Skeyes	EUR	0.949623753156941
Skyguide	CHF	0.9548325
Slovenia Control	EUR	0.949623753156941
SMATSA	RSD	111.662183333333

Annex 7: Acronyms and Abbreviations

ACE	ATM Cost Effectiveness	IMF	International Monetary Fund
ACC	Area Control Centre	KEA	Actual Flown Trajectory
ACI	Airports Council International	KPI	Key Performance Indicator
ADS	Automatic Dependent Surveillance	LTAG	Long Term Global Aspirational Goal
ALDT	Actual Landing Time	MET	Aeronautical Meteorological
ANS	Air Navigation Services	NM	Nautical mile
ANSP	Air Navigation Service Provider	OECD	Organisation for Economic Co-operation and Development
AOBT	Actual Off-Block Time	OPS	Operations
ASBU	Aviation System Block Upgrade	PPP	Purchasing Power Parity
ASK	Available Seat Kilometres	PRU	Performance Review Unit
ASMA	Arrival Sequencing and Metering Area	RPK	Revenue Passenger Kilometres
ATC	Air Traffic Control	RWY	Runway
ATCO	Air Traffic Controller	SAF	Sustainable Aviation Fuel
ATFM	Air Traffic Flow Management	SES	Single European Sky
ATM	Air traffic management	SIWG	Safety Intelligence Workgroup
ATOT	Actual Take-Off Time	TNSU	Terminal Navigation Service Units
ATS	Air Traffic Service	TMA	Terminal Manoeuvring Area
CAGR	Compound Annual Growth Rate	TWR	Tower
CG	Comparator Group	UN	United Nations
CANSO	Civil Air Navigation Services Organisation	USD	United States Dollar
CNS	Communications, Navigation and Surveillance	VFR	Visual Flight Rules
CORSIA	ICAO Carbon Offsetting and Reduction Scheme for International Aviation	YoY	Year-on-Year
CPDLC	Controller Pilot Data Link Communications		
EU	European Union		
FTE	Full Time Equivalent		
FY	Financial Year		
GBWG	Global Benchmarking Workgroup		
IATA	International Air Transport Association		
ICAO	International Civil Aviation Organisation		
IFR	Instrument Flight Rules		
IFRS	International Financial Reporting Standards		

Annex 8: Sources

Definitions

[EUROCONTROL Specification for Economic Information Disclosure V3.0](#)

ACE benchmarking report data dashboard

Eurocontrol.int/ACE/ACE-Home.html

Industry trends

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2022 Performance Data

[ACE Benchmarking report \(2024 edition\)](#)

Exchange Rate Data

[Official exchange rate \(LCU per US\\$, period average\) | Data \(worldbank.org\)](#)

PPP Rate and Inflation Data

[Implied PPP conversion rate, National currency per current international dollar | Indicator Profile | Prosperity Data360 \(worldbank.org\)](#)

